Urban Forest Master Plan

Syracuse
New York

SYRACUSE
URBAN FOREST MASTER PLAN

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SYRACUSE'S EXISTING CANOPY PROVIDES $9.1 MILLION IN SERVICES

Urban forests play an important role in sustaining an economically, socially, and environmentally healthy community. The existing tree canopy in Syracuse covers 27% of the city and provides over $9.1 million in services to the community each year. Almost every benefit provided by trees (listed in Table 1) supports the city's overall vision and goal of an improved and high quality of life as described in the City's Comprehensive Plan 2040 (2012).

WITHOUT ACTION, FUTURE URBAN TREE CANOPY LOSSES ARE EXPECTED

Despite its proven value, Syracuse's urban forest is under threat and is declining. Current and future losses in tree canopy in Syracuse are the result of:

- **Climate change effects, in terms of increasingly severe weather events.** Significant citywide tree damage and canopy loss can come from the growing frequency and severity of high winds, snow and ice storms, hurricanes and tornadoes, drenching rains, and drought attributed to climate change. This also increases tree risk and the city's liability.

- **Climate change effects, in terms of stress on tree species to survive.** In 50 to 100 years, the Syracuse area is expected to move from Zone 5 to Zone 8 Hardiness Zone (which currently characterizes North Carolina, Tennessee and parts of Georgia). Predominant species in Syracuse, such as sugar and red maples, American elms, and northern red oaks (representing more than 10% of the species in western New York) will see a significant decline in population, and may disappear from

Table 1. Annual Benefits of Syracuse's Urban Forest			
Benefit	**Quantity**	**Unit**	**Value**
Stormwater: Reduced runoff	13,275,000	cubic feet	$884,000
Energy: Savings from reduced use	2,600	megawatts	$818,000
Air: Carbon monoxide removed	3	tons	$3,437
Air: Nitrogen dioxide removed	14	tons	$11,867
Air: Ozone removed	93	tons	$544,545
Air: Particulate matter removed	60	tons	$5,963,452
Air: Sulfur dioxide removed	7	tons	$1,707
Carbon sequestered	6,856	tons	$912,000
Total Benefits Overall			**$9,139,008**

the landscape, according to the US Forest Service's Tree Atlas model. These trees are anticipated to face high levels of stresses and are therefore highly prone to further insect and disease pressures as the climate changes over time.

- **Climate change effects, in terms of increasing insect and disease issues.** The warmer, moister climate expected will likely cause the life cycle of existing and emerging pests to be exponentially increased from the normal one-to-two pest life cycles per year up to six-to-eight, which would be catastrophic to susceptible trees.

- **Greater pressure from invasive plant species.** Citywide, 36% of Syracuse's tree species are considered invasive and out-compete the region's native trees which provide the most benefits to Syracuse's citizens and ecosystems. Climate change could further acerbate this issue, by allowing invasive species to spread beyond the controllable levels.

- **Conflicts with sidewalks.** Today, 14-20% of the annual mature public tree removals in Syracuse is due primarily to sidewalk repair projects. Conflicts with sidewalks are citied as the number one reason people reject the planting of a tree. Unless new sidewalk policies and construction techniques are adopted by the city, Syracuse is expected to lose (unnecessarily) a significant portion of its green infrastructure (the public tree population) in the near future.

- **Lack of sufficient funds for proactive management.** There is a current annual budget shortfall of nearly $600,000 to achieve a six-year proactive maintenance cycle. Without an increase in long-term funding, further tree loss is inevitable. Proactive tree care has been proven to improve tree health, decrease storm damage, reduce tree risk, and reduce maintenance budgets in the long term. A proactive maintenance program requires commitment and funding. The city has made recent positive advancements toward implementing such a program using grants, volunteer programs, partnership and county assistance, but these financial resources are not sustainable or dependable in the long-term.

- **Lack of awareness of the importance of tree canopy by the public.** Success in improving or maintaining tree canopy must require that citizens and property owners of all types and sizes understand: 1) the value of trees and tree canopy; and 2) how to plant and care for trees. Without this awareness and information, mature trees can be removed prematurely without the knowledge of the loss of benefits. In Syracuse, approximately 80% of the tree canopy is located on private lands.
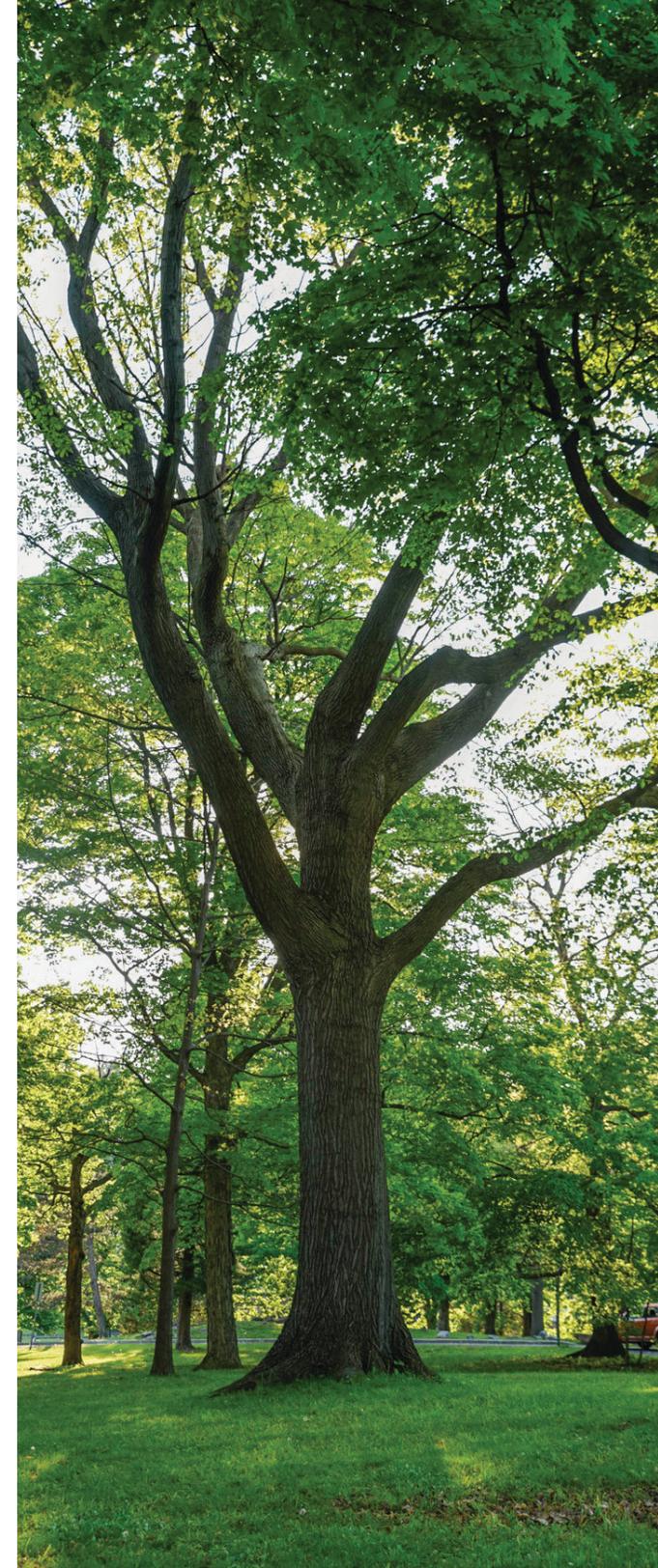
PUBLIC TREE POPULATION

- **Data Exists for Effective Management.** The foundation for effective and efficient asset management is to have accurate and accessible data on the asset itself (in this case, the trees). Syracuse has worked diligently to inventory all public trees since the first master plan in 2001, and UTC and tree benefit data are readily available. This has resulted in city staff being able to access a variety of information about public trees and perform analyses to make short and long-term management decisions.

- **Quantity of Street Trees Has Been Declining Until Recent Years.** In 1951, there were approximately 47,000 public trees in Syracuse. This number dropped to around 33,000 by 1999, due in large extent to Dutch elm disease killing off the city's heavy population of elms. Currently, there are roughly 38,500 street trees. This increase is primarily due to Onondaga County's Save the Rain program that has funded the annual planting of some 1,500 trees per year since 2013, as part of a stormwater management plan that is intended to reduce pollution to Onondaga Lake, focusing specifically on the Midland Sewershed. This program, however, is coming to an end, and it will then be the City's responsibility to continue tree planting to replace and expand the public urban forest.

- **Age Distribution of Public Trees is Good.** All ages are needed for long term resiliency. A balanced age distribution maintains the flow of the urban forest's benefits over time, so the number of newly planted trees must exceed losses from death and removal on an ongoing basis. Currently, the percentage of public trees in each age group mimics the recommended levels for optimal long-term benefits. However, more funding is needed for future tree planting to maintain this important balance.

- **Species Diversity Overall is Good.** Norway maple exceeds the recommended 10% limit (at 14%) and honeylocust is nearing it (at 8%). Otherwise, there are a wide range of diverse species in Syracuse's public tree population.

- **Public Trees are Primarily in Fair Condition.** More than 60% of publicly-managed trees in Syracuse are in Fair condition, meaning a large percentage of city trees could fail in a storm, suffer from drought, and/or succumb to insect and disease pressures. Healthy trees are resilient trees and provide maximum benefits. Proactive care could improve these trees' condition to Good; lack of care may see them become Poor.

IMPACT OF HUMAN ACTIVITIES ON THE URBAN FOREST

What people do in the urban forest and how involved they are is important to know if the City wants to have a successful urban forest management program, maintain a thriving tree population, and provide a high quality of life for the citizens. Additionally, knowing about the current management activities and resources is critical understanding if the urban forest management program is efficient and effective.

- **Trees provide a positive return on investment.** Because the City has dedicated resources for professional urban forest management activities and staff for decades, the tree population, despite its challenges, is producing a wide variety of valuable environmental, social, and economic benefits. US Forest Service models reveal that for every $1 of public funds spent on tree care, the city and citizens receive over $2 of annual benefits. The return on investment can be even greater in the future if more resources were allocated for proactive maintenance and greater tree planting.

- **A core group of stakeholders is active, but many others remain untapped.** In Syracuse, there is a core group of organizations and individuals who are very aware and engaged in work to preserve and improve the urban forest, and perform public outreach, including Onondaga County, Onondaga Earth Corps, SUNY ESF, and more. Onondaga Earth Corps especially has become a strategic long-term partner with the City of Syracuse over the last decade.

However, there are many other groups that should be involved yet, to date, have not been—largely due to the lack of a single initiative, defined collective goals, and objectives for them to join and support. These groups include large landholders (educational and institutional agencies), the regional green industry, the development community, additional neighborhood groups, funders and more. The overall community sentiment is that there is a distinct lack of awareness about the value and importance of the urban forest. Read summarized takeaways from the community outreach process of this master plan in Appendix D, or view the complete community outreach report here: *http://www.syracuse.ny.us/Parks/forestry.html.*

- **City partnerships are filling current gaps in tree planting, but a net loss is predicted for the future.** Over the last eight years, the Onondaga County's Save the Rain program has consistently funded and planted 1,100-1,300 trees per year. The local non-profit Onondaga Earth Corps (OEC) plants 65% to 70% of these trees for the city, and the remaining public trees are planted by a City contractor. However, the OEC's program is now at its end, and existing city funding only supports minimal planting (approximately 350 per year). Considering that 700 trees are removed each year, it is clear that without funding for continued planting and new tree care, the city will experience a net loss in the quantity of public trees each year. The OEC also recently initiated a young tree pruning program for all newly planted trees, which is an essential practice done three to five years after planting to ensure development of a strong structure, lessening likelihood of failure and need for expensive maintenance in the future. This important activity needs leadership and resources to continue.

- **Lacking an official urban forest maintenance/management plan, tree maintenance is largely reactive.** Current maintenance work on public trees is 60% to 70% reactive—triggered by citizen requests, severe weather damage, infrastructure repair, and as determined by staff. Work remains reactive primarily due to a lack of funding required to get the public tree population on a regular cycle. There is currently no formal management plan in place. One developed for council approval in 2003 was never adopted; therefore the work it recommended was not funded. Syracuse initiated the concept of a cyclical, preventive tree maintenance program in 2016 by performing a re-inventory on 1/7th of the public tree population to drive management decisions. Per national best practices, the ideal maintenance cycle for mature trees is 6-10 years. However, because of budget constraints, proactive maintenance is possible on only a small percentage of the population, equating to an almost 25-year cycle.

- **Funding and personnel levels are not adequate for a proactive management approach.** The current annual funding level for urban forest management activities and staff is $897,000. Based on inventory data and regional average costs for tree maintenance and planting, the estimated annual budget needed to provide 5-year cyclical maintenance as well as routine maintenance, stump grinding, young tree maintenance, and replacement planting is $2,758,000. The annual budget required for a 10-year proactive cycle and all other urban forest management tasks is approximately $1,380,000. The apparent budget shortfall is a barrier to implementing a proactive, cyclical maintenance program on any time frame under 10 years. While a proactive program can raise current budgetary needs in the short-term, this level of care will reduce municipal tree care management costs in the long-term, increase tree benefits, and likely minimize the costs related to other city infrastructure such as stormwater management, energy use, and sidewalk repair.

- **Tree risk is known, but funding restricts full action**. A city's top priority should be to minimize risk in the urban forest. Thanks to the extent and quality of the inventory data, Syracuse has information on tree condition and risk, but proactive efforts to reduce risk are not happening due to lack of resources for staff and/or contractors to correct the existing risk conditions. Syracuse also does not have a written risk management policy or plan. And, other departments and the general public do not fully acknowledge or understand how their actions can cause risk thereby increasing the liability of the city. Despite having no formal urban forest risk management plan in place, Syracuse is handling risk issues informally but appropriately given the resources available.

- **Tree protection and preservation is a challenge.** Businesses, citizens, and even some city departments are unaware of many of the ordinances' requirements, and/or do not understand the existing tree protection regulations. Additionally, many found compliance to be complicated, bureaucratic, or burdensome. Sidewalk conflicts emerged as source of up to 20% of the public tree losses each year, as current standards necessitate tree removal. Finally, even the best regulations can be ineffective if there is not consistent enforcement. Currently, forestry staff levels struggle to support routine and diligent enforcement of code violations and perform thorough plan reviews. The city cannot strengthen tree ordinance and zoning rules without sufficient and trained staff to inspect and enforce compliance.
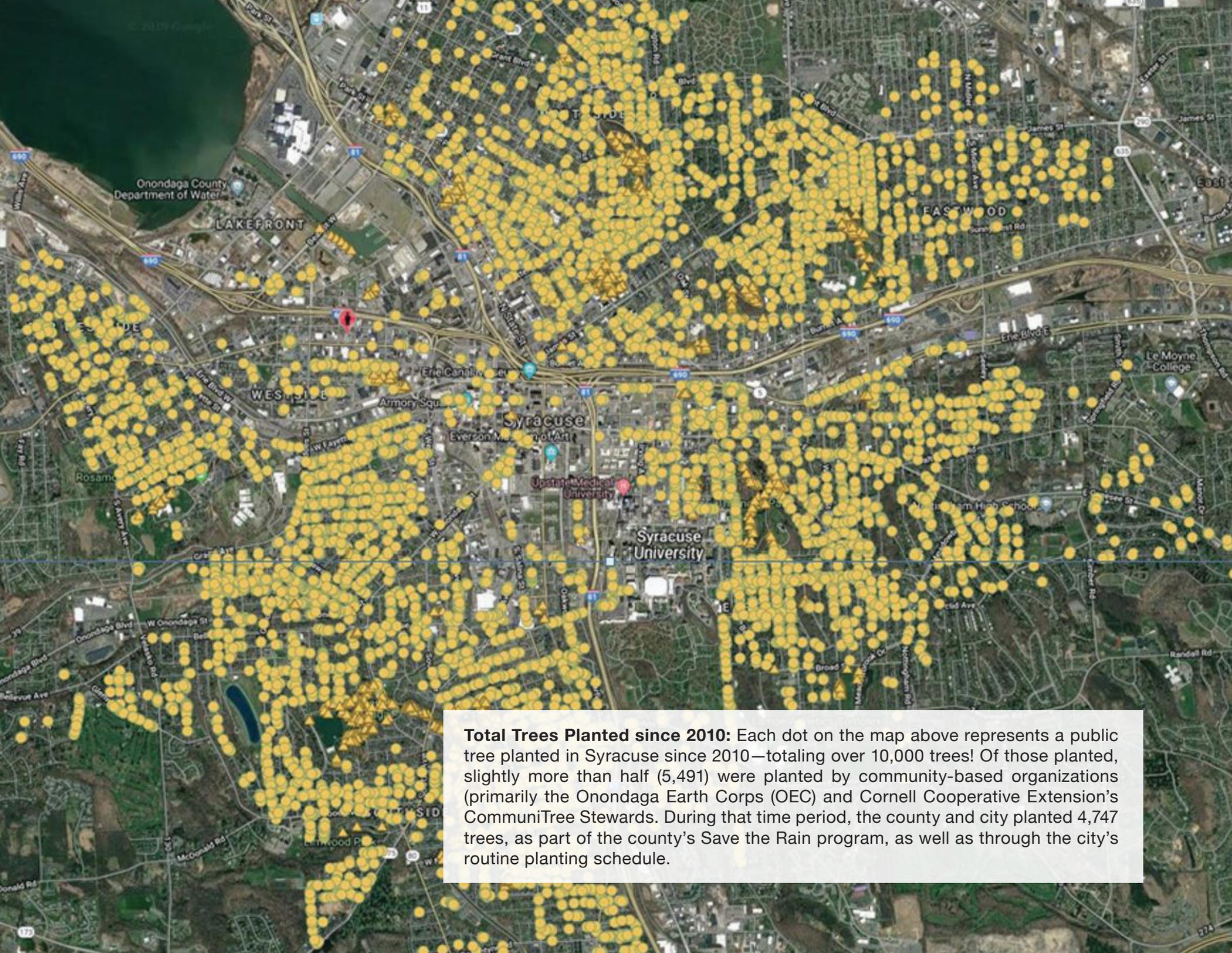
Total Trees Planted since 2010: Each dot on the map above represents a public tree planted in Syracuse since 2010—totaling over 10,000 trees! Of those planted, slightly more than half (5,491) were planted by community-based organizations (primarily the Onondaga Earth Corps (OEC) and Cornell Cooperative Extension's CommuniTree Stewards. During that time period, the county and city planted 4,747 trees, as part of the county's Save the Rain program, as well as through the city's routine planting schedule.

CURRENT CONDITIONS OF SYRACUSE'S URBAN FOREST

To effectively and efficiently make long-lasting improvements, it is important to first accurately assess the state of the existing urban forest, establish goals for the future, and use this information to map out the most effective ways to move forward. The following describes major characteristics about both the citywide tree canopy and the public tree population (park, street, and other trees on public property managed by the city).

CITYWIDE TREE CANOPY

- **Canopy cover has remained steady.** The amount of tree canopy cover in Syracuse has remained somewhat steady over last few decades, fluctuating between 26% to 28% overall.

- **Canopy quality is likely deteriorating.** The number of invasive plant and tree species is rising based on inventory data and statistics presented in the 2016 State of the Urban Forest report. Currently, it is estimated that on vacant, undeveloped land, 48% of the tree canopy is likely made up of invasives. So, while the overall tree canopy quantity appears stable, it is likely that the increasing invasive species populations are masking the loss of higher quality, native species.

- **Higher canopy is possible.** Syracuse has achieved 48% of what has been deemed total possible canopy based on the last canopy assessment performed in 2009. This means there are still areas where tree canopy can be established without hindering other land uses.

- **Canopy data is outdated, and where and why canopy changes are occurring cannot be determined.** Aside from 2009, all past Urban Tree Canopy (UTC) assessments have been done using a point sampling method, which provides an estimate of canopy across the city as a whole but does not

Image 1. Canopy Percent by Neighborhood
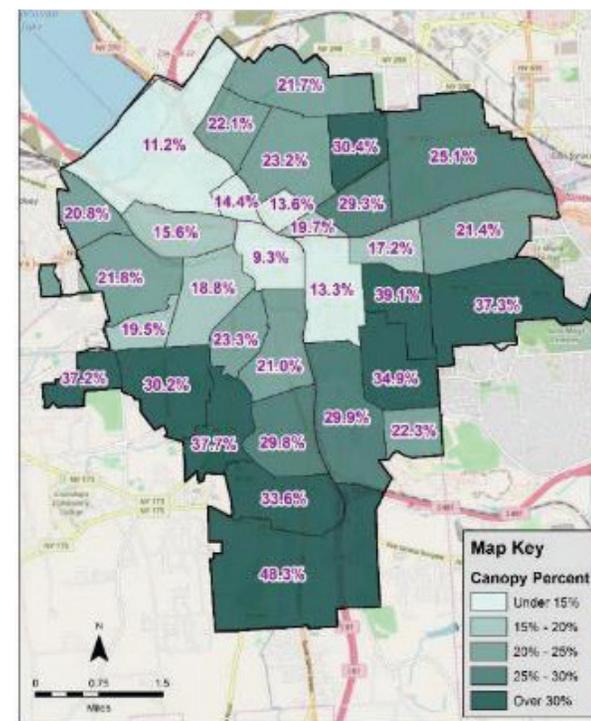
show where exactly canopy changes (gains or losses) are happening. For this reason, the causes of changes are only educated guesses at this time. A new high-resolution UTC will allow comparison of recent canopy to 2009 and can provide valuable insight on where changes are happening and allow further exploration into why they are happening.

- **No Existing Canopy Goal.** While it is not required, having a canopy goal can be an important benchmark to gauge success and failure, and be a motivator to affect change in coming years.

- **Canopy cover is not equal across the city.** Tree canopy (and its many benefits) is not equally distributed across the city; canopy percentage across the neighborhoods ranges from a low of 9% to a high of 49%. Those citizens who live in the low canopy areas do not have access to the important benefits trees provide, which affects public health, economic prosperity and more. The City recognizes the importance of equal access to trees, and tree planting has been done in recent years to begin to address this inequity.

- **Tree species are not diverse in the citywide canopy.** Sugar maples (which face serious future changes from climate shifts) make up 31% of the urban forest, while an invasive species, European buckthorn, makes up 21% of trees in Syracuse. Diverse urban forests are more resilient to pests, disease, and a changing climate, and are therefore longer lived, provide more benefits, and require less maintenance. It is recommended that no one species represent more than 10% of the entire urban forest.

VISION, MISSION, AND GOALS

A core team of partners including the City of Syracuse Division of Forestry, the City's Division of Planning, the Gifford Foundation, and Onondaga Earth Corps convened a group of steering committee members to advise and participate in a public outreach campaign. Made possible through funding provided by the Gifford Foundation, outreach was carried out through a series of three stakeholder meetings and one-on-one interviews.

Onondaga Earth Corps conducted further outreach through the summer and fall 2018 designed to engage a wide range of citizens with the goal to provide an educational, interactive, and easy way for community members to provide input about their hopes, challenges, and dreams for the city's tree cover. They hosted seven public meetings in collaboration with neighborhood partners across the city, and distributed a public survey which collected input from over 1,200 respondents.

VISION

Citizens of Syracuse will enjoy a high quality of life through an abundant, resilient and safe urban forest that is integrated into city-wide planning and our everyday lives.

MISSION

To grow and sustain an urban forest that is cherished by its citizens.

Based on the findings from the public engagement process and informed by the analysis of existing data, plans, policies, regulations, and procedures in place, the following vision, mission, and goals were formed. The vision and the three goals also serve as the guiding basis for all strategies recommended in this plan and will be the foundation for framing next steps over the next 20 to 30 years.

GOALS

We intend to advance Syracuse's urban forest master plan by working towards three goals:

Goal 1. Grow canopy equitably
This plan recommends increasing canopy from 27% to 34%. This 7% increase (an estimated 984 acres) would place Syracuse just above the national average of 32% for cities its size. It would require an additional 57,400 trees be planted over 20 years or 2,870 trees per year*. This does not include trees that need to be planted to account for losses. The City can lead the way on this effort as a significant amount of this goal can be achieved on a variety of publicly-owned lands. Since the public input process revealed a consistent desire to expand canopy, an implementation team of committed stakeholders could propose more aggressive canopy goals focusing on lands not controlled by the city.

Goal 2. Improve urban forest safety and resiliency.
Syracuse can achieve a safe urban forest through regular inventory intervals, consistent pruning cycles and systematic removal of structurally compromised and unhealthy trees. A resilient urban forest is realized through strategic planting to ensure species and age diversity and improved site condition to optimize survival, growth and benefits across all neighborhoods and business districts. Fully funded forest operations, improved design standards and construction practices, increased tree protection and better enforcement of rules on the books will protect what we have. At public meetings and through surveys, residents indicated that the city should prioritize increasing canopy where it is needed most.

Goal 3. Connect the entire community to the urban forest.
This plan strives to connect the whole community to the urban forest through equitable canopy distribution, information and resources that are easy to find and education and training that is readily available. This will improve opportunities for Syracuse residents to value, care for and preserve trees and forests in the city. Robust education and stewardship programs are a keystone to increasing tree canopy on the 80% of lands not controlled by the city.

NEXT STEPS: STRATEGIES FOR ACTION

Twelve strategies with specific action steps were developed to meet these three goals over coming years:

GOAL #1. GROW CANOPY EQUITABLY

Strategy #1: Assemble an Implementation Team. This urban forest master plan suggests many improvements for the management of public trees, but since this represents only 20% of the city's tree canopy, real progress will require the efforts and support from the community at-large. The City and Onondaga Earth Corps must harness the momentum and interest of stakeholders and the public that was generated during the planning process. This team should drive the agenda for each of the strategies below and monitor long-term success

Strategy #2: Obtain Updated Tree Canopy Data. A current urban tree canopy assessment (UTC) was last done in 2009. Updated data should be obtained every 10 years to gauge progress and identify areas and reasons for any losses that may be. This data will enable identification trends in gains or losses in canopy, and also where the largest canopy changes are actually occurring and perhaps why.

Strategy #3: Set Goals and Prioritize Areas of Need. This plan recommends increasing canopy from 27% to 34% - a 7% increase. Syracuse citizens clearly expressed that one of their top priorities is to increase the urban tree canopy where it is needed most, with the goal of a more equitable distribution of tree cover within the city. With an updated UTC, low-canopy neighborhoods can be identified and realistic, achievable goals can be set. This will require analysis of potential planting areas on public and private land to determine what percent is feasible to plant.

Strategy #4: Fully Implement Proactive Management and Risk Reduction Programs. A management plan uses tree inventory data to map out a plan of action for tree care and specifically details what resources are needed for effective management of the urban forest. Fulfilling this recommendation is one of the most important steps to effective care and lowering costs of care in the long term. This will, however, require additional resources in the short and mid-terms to realize the long-term cost benefits.

GOAL #2. IMPROVE URBAN FOREST SAFETY & RESILIENCY

Strategy #5: Update/Officially Adopt Tree Design/ Protection/ Preservation Measures. Syracuse has a long-standing tree ordinance, but it should be updated to address better tree protection and to bring other sections and administrative items in line with national standards and to reflect city goals. Revisions to the ordinance have been submitted for consideration. In addition, related resources will be required for an effective protection program, including education, staffing for enforcement, etc.

Strategy #6: Address the Sidewalk and Trees Conflict. Sidewalk conflicts with trees account for an average of 11% of the street trees lost each year. The policy guiding sidewalk repair and responsibility should be reviewed and revised so that both pavement and trees are accommodated. Additionally, alternative pavement materials should be trialed and considered for use in Syracuse; and shortening the length of multi-year contracts in place for sidewalk work will allow for using new construction and technologies as they become available.

Strategy #7: Create a Purposed-Based Planting Plan that Reflects City Goals. To achieve neighborhood based goals, planting plans must assess planting site potential and conditions both on public and private including areas that will need modified to reduce heat islands. The suite of i-Tree tools including iTree Design and iTree Canopy can be utilized to help analyze lot level or block level canopy cover and to project future benefits based on where new trees are planted. The team should investigate partnering with initiatives that are looking to create neighborhood scale change.

GOAL #3. CONNECT THE ENTIRE COMMUNITY TO THE URBAN FOREST

Strategy #8: Officially Adopt and Incorporate Community Goals. Public outreach helped define the community mission to maintain and grow existing canopy while increasing canopy quality, equal distribution, and diversity. It is vital to incorporate these goals into citywide policies to ensure its survival and momentum during inevitable transitions in leadership and staffing in the coming years. By including urban forestry goals in relevant policy and code, the city establishes tree canopy as a priority from the outset. This includes a formal plan adoption by the Common Council and references to goals and canopy cover included in comprehensive plan updates development regulations and other relevant city plans.

Strategy #9: Increase Public Awareness of Value and Importance of Trees in Syracuse. During the development of this plan, it became clear that the public was not fully aware of the value and importance of trees in cities. This is an area that if improved has the potential to make significant progress in tree canopy growth and preservation as 80% of the tree canopy is located on private land. This requires planning to establish a unified voice, better define partnership roles, create one central information hub, and establish branding and messaging that can be used across the City of Syracuse.

Strategy #10: Improve Lines of Communication. The lack of information flow between citizens and city or between different agencies of the city was cited as an area for improvement multiple times through the input received to develop this plan. All parties asked for better education, engagement, and communication. Public outreach showed multiple times that many of the roadblocks to tree planting and preservation in neighborhoods are removed once people have their concerns heard and are informed about why tree canopy is important. Strategies to improve avenues for better and more consistent communication include creating a central information hub, making improvements to the city website (both for ease of access and content provided), hosting an annual tree meeting, engaging the public in plan implementation, setting internal city urban forestry goals, and incorporating urban forest efforts into the Today's Neighborhoods Tomorrow (TNT) work plan.

Strategy #11: Create and Implement an Outreach Plan to Reach Multiple Audiences. A clearly-defined marketing strategy is needed that first identifies various existing and potential audiences, and then crafts messaging that will resonate and be understood by those unique groups. A focus should be on identifying areas or topics where personal, company and/or organization missions may coincide with the City's particular urban forest message. By tailoring the message and marketing strategy to the different groups, the City will be more successful gaining support for the urban forestry program and acceptance of city policies and regulations.

Strategy #12: Encourage Tree Planting and Preservation on Private Property. The public stated that the number one way to increase tree cover on private property (where 80% of the city's tree canopy is located) is through a public education campaign to encourage property owners to plant and maintain trees. The OEC and the Plan Implementation Team can identify key groups and develop customized ways to reach them, such as the general public (adults and children), neighborhood groups, developers, staff/city departments, universities, health care companies, large landholders, and city leadership

ABOUT PLAN IMPLEMENTATION

Implementation of this plan will require additional resources, and can be done in a logical order.

Resources. Funds will be needed for 1) the management plan's initial roll-out and implementation; 2) public relations, marketing materials, and outreach work; and 3) additional tree maintenance/planting work and staffing needs. It has been determined that approximately $1,380,000 will be required to eventually have the public trees on a 10-year cyclical proactive maintenance cycle. To implement other strategies in this plan, such as an updated UTC, additional staff for code enforcement, and consultants for marketing and technical tasks, at least another $50,000 to $100,000 annually will be needed. It is yet unknown at this time of the resources needed to support a robust planting program. However, once the UTC is updated and a planting plan is created, estimates are likely to range from $100,000 to $150,000 annually. Potential funding sources are revenue generation from tax districts, grants, and/or stormwater fees, and can be supplemented with compliance fees, permitting and plan review fees, sale of wood products, or carbon credit sales. The budget needed for the urban forestry program and other possible funding mechanisms are discussed in more detail in the full report.

Timeline for Implementation: Tasks from the action strategies listed above have been put into a suggested timeline for ease of implementation. The associated strategy number is listed in parentheses. However, the Urban Forest Master Plan should be considered a living document and reviewed regularly to assess successes and failures based on current data and information, and/or for the need to modify or change course on a particular issue. Benchmarks for progress should also be set in advance for regular progress assessment.

YEAR 1 (2019)

Officially adopt the master plan (Strategy #4), get an implementation team together (#1), start process of tree protection regulation adoption (#6), secure funding for updating the UTC (#2), define agreed upon benchmarks (many options provided in this plan) to measure future progress, and begin to plan and develop messaging, central hub and other plans to launch outreach program in 2020 (#8–10).

YEAR 2 (2020)

Implement UTC update study (Strategy #2), utilize new UTC data to identify areas of high priority, set canopy goal (#3), define a planting plan (#11), continue implementation of proactive care program (#5), finalize new tree protection regulations (#6), begin to address sidewalk/tree solutions (#7), start implementation of outreach/education program (#8–10).

YEAR 3 (2021)

Take an inventory of progress to date using annual and periodic benchmarks; then plan work and goals for the next two years to get as much done by year 5 as possible.

YEAR 4-5 (2022-23)

Continue to implement with yearly check-ins.

YEAR 5 (2023)

Revisit progress to date. Update sustainability matrices and update benchmark to gauge progress, map out steps for next 5 years based on these results.

YEAR 6-10 (2024-27)

Implement remaining action steps not yet completed, or new ones identified in Year 5 progress review.

YEAR 10 (2028)

Update the tree canopy assessment to gauge progress on the citywide and neighborhood levels. Use these results and updated benchmark statistics to revise and update the urban forest master plan.

YEAR 11-20 (2029-38)

Implement action steps defined in revised master plan.

CONCLUSION

With this Urban Forest Master Plan, Syracuse now has an important and critical tool to help form, expand, and sustain an effective, comprehensive urban forestry program and grow its urban tree canopy. The plan will allow the city staff and leaders, and the citizens, to examine a number of urban forestry issues in terms of what is technically correct, organizationally feasible, aesthetically right, as well as what is economically expedient.

It is intended that the Syracuse Urban Forest Master Plan will be a working document that can be used by the city and its stakeholders as a guide and reference to achieve not only short- and long-term urban forestry goals, but overall city goals as well. The importance of comprehensive urban forestry management in Syracuse transcends the daily, operational maintenance routines and responsibilities; it stands to demonstrate the city's leadership and commitment to improving the quality of life for its citizens.

A full version of this plan with all of these concepts discussed in detail can be found at:
http://www.syrgov.net/Parks/forestry.html

SECTION 1:

INTRODUCTION, WHY TREES? AND CHALLENGES

INTRODUCTION

The urban forest is of vital importance to cities that want to be sustainable, resilient, successful, and provide a high quality of life to their citizens. This is because the urban forest provides a wide range of services to the community that have direct and significant impacts on public health, air and water quality, economic development, and energy conservation. Urban forests are now recognized across the country as critical to an economically, socially, and environmentally healthy community.

Despite the science that quantifies the benefits urban forests provide, tree canopy is in decline nationwide across our city landscapes. Land use change, poor tree protection, pest and disease and insufficient planting and maintenance are the main culprits. Comprehensive and far-sighted planning is needed to reverse negative trends and set a course for positive management and growth.

This Urban Forest Master Plan evaluates the current conditions of the Syracuse's urban forest, its short- and long-term management approach, and the level of engagement that organizations and people have with the forest. The plan then recommends a path forward to renewing and growing Syracuse's urban forest. This plan was developed to leverage the power of trees to make Syracuse a more vibrant, healthy, successful, and sustainable community. Achieving the goals of this plan also directly supports the established city-wide goals of ensuring that Syracuse is a city with a high quality of life and opportunities for all.

Syracuse's 27% tree canopy cover provides the community an estimated $9.1 million in benefits annually.

WHY TREES?

Like many other cities, Syracuse is facing budget shortfalls, aging infrastructure, social issues, and greater competition for city resources.

So why focus attention on trees?

Because trees are a tool that can help Syracuse reach its goals. Almost every benefit described in this section supports the *city's overall vision and goal of an improved and high quality of life* as set out in the city Comprehensive Plan 2040 (2012). That plan defines quality of life as "determined by the community's collective health, happiness, security, material well-being, social engagement, and freedom. The foundation of the community's well-being is fulfillment of people's most basic needs."

Many of the Comprehensive Plan's goals reflect the vision of creating equitable access to basic needs like nourishing food, clean air, and safe places for recreation, as well as better neighborhoods and quality of life. *This Urban Forest Master Plan reflects that same vision.*

Image 2. View from Onondaga Park Round Top

Trees contribute positively and directly to the quality of life in cities and, drawing on over two decades of research, we are now able to quantify many of those benefits.

There are an estimated 1.5 million trees within Syracuse's city limits. This collective urban forest covers 27% of the city and provides approximately $9.1 million in benefits every year (Table 1).

Because of the significant value of these benefits, cities across the country now recognize trees as critical infrastructure. In fact, trees represent a multi-tasking infrastructural system, and are the only infrastructure type that increases in value over their service life.

While trees are not a singular solution to Syracuse's challenges, they should be considered and integrated into many more plans, projects, and initiatives as they are so versatile and alleviate many issues.

The direct benefits, and many co-benefits, of Syracuse's trees, whether on public and private lands, are described in more detail in this section and in Appendix A.

Table 1. Annual Benefits of Syracuse's Urban Forest (Source: State of the Urban Forest Report (2016))			
Benefit	**Quantity**	**Unit**	**Value**
Stormwater: Reduced runoff	13,275,000	cubic feet	$884,000
Energy: Savings from reduced use	2,600	megawatts	$818,000
Air: Carbon monoxide removed	3	tons	$3,437
Air: Nitrogen dioxide removed	14	tons	$11,867
Air: Ozone removed	93	tons	$544,545
Air: Particulate matter removed	60	tons	$5,963,452
Air: Sulfur dioxide removed	7	tons	$1,707
Carbon sequestered	6,856	tons	$912,000
Total Benefits Overall			**$9,139,008**

1. URBAN TREES REDUCE POLLUTION ENTERING WATERWAYS

As cities grow, the amount of land that naturally absorbs rainwater (i.e., lawns, parks, fields, woods) tends to shrink, while hard surfaces that cause rain to runoff (i.e., roads, buildings, parking lots) increase in area. As it flows over roads, parking lots, and lawns, rainwater accumulates contaminants (fertilizers, oil, chemicals, grass clippings, litter, pet waste, etc.). This contaminated stormwater then flows into overloaded man-made sewers, ultimately reaching the local lakes and streams.

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

Stormwater Pollution Reduction in Syracuse

Syracuse's existing urban tree canopy intercepts over 99 million gallons of stormwater each year (equivalent to over 150 Olympic-size swimming pools). This service is valued at $884,000 annually to the city.

This benefit provided by the urban forest directly supports achieving Syracuse's Sustainability Goal 2: "to reduce negative impacts on the Onondaga Creek watershed."

Any losses in tree canopy cover in Syracuse will directly equate to losses in stormwater intercepted and require either additional capacity from man-made water treatment systems will result in polluted water entering the Onondaga Watershed.

2. URBAN TREES REMOVE CARBON DIOXIDE FROM THE AIR

Most of the carbon dioxide (CO2) in the atmosphere comes from human activities that involve the burning of fossil fuels. High levels of CO2 result in climate instability issues, which result in more frequent and increasingly severe storms, droughts, and other natural stresses.

Trees are constantly removing and storing carbon dioxide from the atmosphere. In fact, one single large tree is able to absorb as much as 48 pounds of carbon dioxide (CO2) per year, while one acre of trees stores the same amount of CO2 released by driving an average car for 26,000 miles (Megalos 2015).
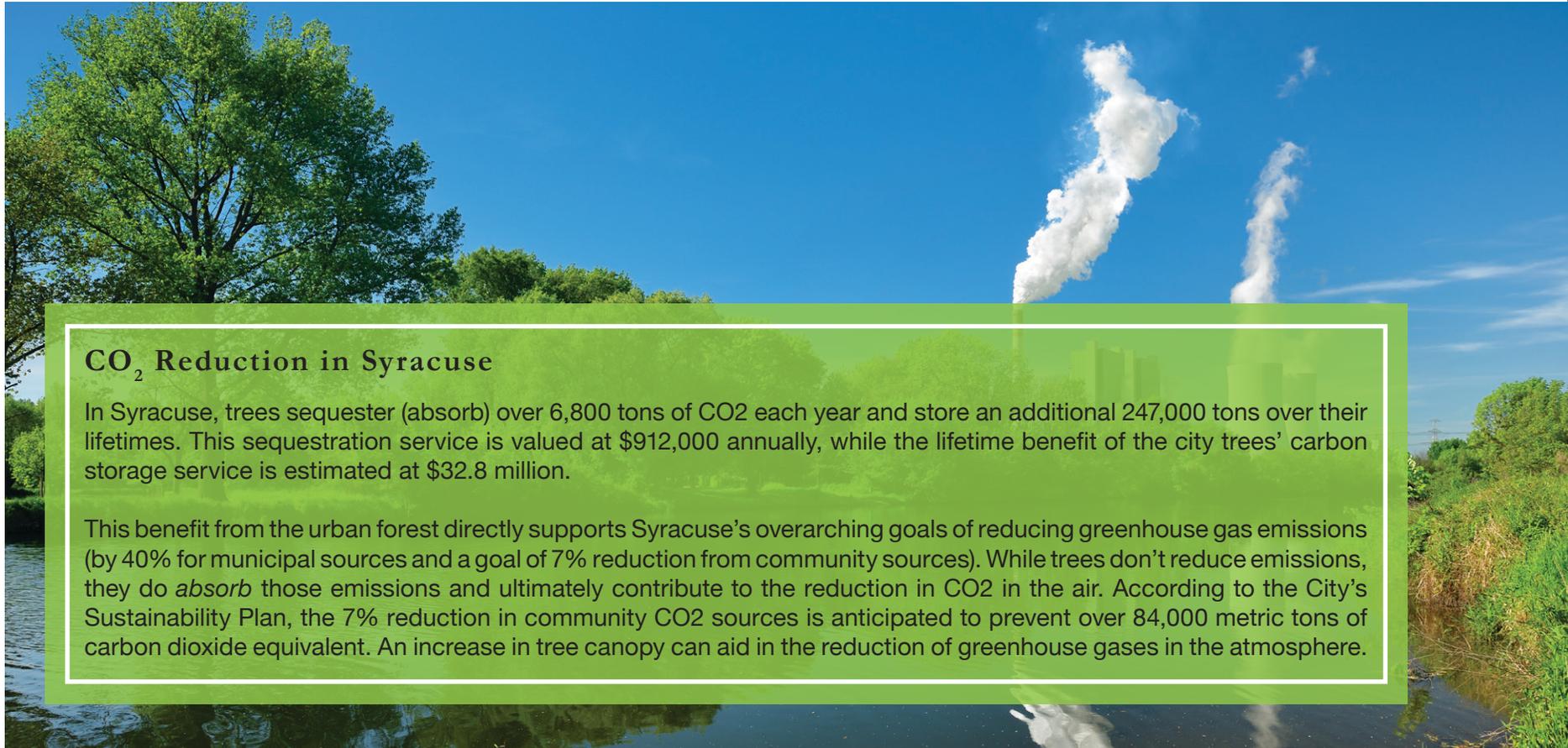
CO_2 Reduction in Syracuse

In Syracuse, trees sequester (absorb) over 6,800 tons of CO2 each year and store an additional 247,000 tons over their lifetimes. This sequestration service is valued at $912,000 annually, while the lifetime benefit of the city trees' carbon storage service is estimated at $32.8 million.

This benefit from the urban forest directly supports Syracuse's overarching goals of reducing greenhouse gas emissions (by 40% for municipal sources and a goal of 7% reduction from community sources). While trees don't reduce emissions, they do *absorb* those emissions and ultimately contribute to the reduction in CO2 in the air. According to the City's Sustainability Plan, the 7% reduction in community CO2 sources is anticipated to prevent over 84,000 metric tons of carbon dioxide equivalent. An increase in tree canopy can aid in the reduction of greenhouse gases in the atmosphere.

3. URBAN TREES REDUCE ENERGY USAGE AND COSTS

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

Trees provide energy savings by reducing cooling and heating costs, both through the shade they offer as well as the release of moisture through transpiration. In fact, the cooling effect of one healthy tree is equivalent to 10 room-sized air conditioners operating 20 hours a day (North Carolina State University 2012). The shade of properly-placed trees can save residents up to 58% on daytime air conditioning costs, while mobile homeowners can save up to 65% (Smith 1999). Beyond monetary saving, the cooling effect provided by trees is an important benefit for any resident of Syracuse, but can be a life or death issue for those prone to heat related illnesses and those in lower income areas, as described in the next benefit on heat stress.

Energy Reduction in Syracuse

Syracuse's tree canopy saves 2,600 megawatts in electricity and 22,500 MBTUs annually in natural gas, for an estimated cost savings of over $818,000 annually.

This benefit from the urban forest directly supports achieving Syracuse's Sustainability Goal 1: "reduce the volume and impact of energy consumption in the City of Syracuse."

4. URBAN TREES ALLEVIATE HEAT STRESS

Urban areas without trees often experience temperatures 15° to 25°F hotter than nearby, less developed areas—a scenario known as urban heat island effect. Heat stress has been proven to cause significant public health problems and even mortality. In fact, each year, more Americans die from extreme heat than all other natural disasters combined (i.e., hurricanes, floods, tornadoes, lightning). Those over 65 or under age 5 are especially vulnerable to heat-related health problems.

Urban trees are widely accepted as one of the most effective long-term solutions to reducing the effects of urban heat islands. Properly placed mature tree canopy can lower overall ambient temperatures by 20° to 45°F (EPA 2015).

SUMMER IN THE CITY Syracuse ▾   CLIMATE CENTRAL

SUMMER HEAT IN
Syracuse

UP TO
23.0° HOTTER IN THE CITY THAN IN NEARBY RURAL AREAS

AVERAGE
2.0° CITY SUMMERS ARE HOTTER THAN IN RURAL AREAS

6 MORE DAYS ABOVE 90° F EACH YEAR, THAN RURAL AREAS

Heat Stress in Syracuse

Those over 65 or under age 5 are especially vulnerable to heat-related health problems, and these two age groups account for nearly 20% of Syracuse residents.

This benefit from the urban forest directly supports general public health initiatives and specifically supports Syracuse's Sustainability Goal 4.5 to reduce the urban heat island effect by increasing trees in areas with high concentrations of streets pavements and buildings.

5. URBAN TREES CLEAN THE AIR AND IMPROVE HEALTH

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

This is an important service, as air pollution creates significant public health issues. Ozone and particulates can especially aggravate existing respiratory conditions (like asthma) and create long-term human health problems (American Lung Association 2015).

New York City saw a significant decrease of asthma in young children (-29%) after increasing its tree canopy through the installation of only 300 trees for each square kilometer (Lovasi et al. 2008). Studies have also shown that individuals with views or access to green space tend to be healthier; employees experience 23% less sick time and greater job satisfaction, and hospital patients recover faster with fewer drugs (Ulrich 1984). Trees have also been shown to have a calming and healing effect on ADHD adults and teens (Burden 2008).

Trees' Effect on Air Quality and Public Health in Syracuse

The current tree canopy in Syracuse removes over 175 tons of air pollutants from the air each year, valued at $6.5 million in services to the community.

This benefit from the urban forest directly works toward achieving Syracuse's city-wide goal of improving the overall quality of life for residents through a healthier community environment. This is an especially important service to Syracuse residents, as Chronic Lower Respiratory Disease (CLRD), which includes lung diseases such as emphysema, chronic bronchitis, and asthma, is the third leading cause of death in Syracuse. Additionally, rates of lung cancer in the city are more than 50% above expected (NY State Department of Health 2017). Over 10% of adults in Onondaga County have asthma, but rates of hospitalization in children under four years of age are even higher (Onondaga County Health Department 2017). Loss in canopy would have significant impact on air quality and, thus, public health in Syracuse.

6. URBAN TREES BUILD STRONGER, MORE VIBRANT COMMUNITIES

Tree-lined streets can create stronger communities and attract new residents. While more difficult to quantify, the tree benefits related to community building are no less important than other services.

One study showed that residents of apartment buildings surrounded by trees reported knowing their neighbors better, socializing with them more often, having a stronger community, and feeling safer and better adjusted than did residents of more barren, but otherwise identical areas (Kuo and Sullivan 2001).

7. URBAN TREES CAN CONTRIBUTE TO A DECREASE IN CRIME

Recent studies have shown that tree-lined streets have been linked to lower crime. A study in Baltimore found that a 10% increase in tree canopy was associated with a roughly 12% decrease in crime. Note that this pertains specifically to trees, not to low vegetation which is often associated with higher crime rates.

It has also been shown that outdoor areas populated with trees tend to suffer from less graffiti, vandalism, and littering than their treeless neighbors (PHS 2015).

8. URBAN TREES PROVIDE BUFFERS FOR NOISE AND POLLUTION

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

Improved Quality of Life in Syracuse

Better community, less crime, and buffers for noise and pollution are all benefits that trees can provide in working towards multiple city-wide goals in Syracuse (based on the Comprehensive Plan 2040):

- Improving the overall quality of life for residents,
- Protecting and enhancing the character and "sense of place" of Syracuse's neighborhoods.
- Improving public safety within city neighborhoods.

9. URBAN TREES BOOST PROPERTY VALUES

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

10. URBAN TREES CREATE MORE SUCCESSFUL BUSINESS DISTRICTS

Studies have shown that tree-covered commercial shopping districts are more successful than those without canopy. In multiple studies, consumers showed a willingness to pay 11% more for goods and shopped for a longer period of time in shaded and landscaped business districts (Wolf 1998b, 1999, and 2003). Consumers also felt that the quality of products was better in business districts surrounded by trees and were willing to pay more (Wolf 1998a).

Property Values in Syracuse

In Syracuse, street and park trees increase total property values by almost $1.5 million/year (City of Syracuse 2016).

This directly works toward Syracuse's Comprehensive Plan goals related to expanding economic opportunities for all Syracuse residents.

Boosting Business District Prosperity in Syracuse

This benefit from the urban forest directly works toward achieving Syracuse's Comprehensive Plan guiding policy of encouraging business in the city:

"As the heart of the regional economy, it is the policy of the City of Syracuse to encourage, promote, and support a business-friendly environment that provides for sustainable urban economic growth and economic opportunities for Syracuse residents."

And more specifically, this benefit connects to Goal C.3 in the Comprehensive Plan, "to facilitate revitalization of Syracuse's neighborhood business corridors."

11. URBAN TREES MAKE STREETS SAFER AND MORE WALKABLE

In an age where walkability and pedestrian-friendly areas tend to draw the most people, tree cover is a powerful tool to revitalize business districts and neighborhoods.

Urban trees have been shown to slow traffic and help ensure safe, walkable streets in communities. Traffic speeds and driver stress levels have been reported to be lower on tree-lined streets, contributing to a reduction in road rage and aggressive driving (Wolf 1998a, Kuo and Sullivan 2001). According to the Federal Highway Administration, tree canopy along a street discourages speeding (U.S. Department of Transportation 2015). The buffers between walking areas and driving lanes created by trees also make streets feel safer for pedestrians and cyclists.

12. URBAN TREES PROVIDE ESSENTIAL WILDLIFE HABITAT

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

A More Walkable Syracuse

This urban forest benefit supports Syracuse's Comprehensive Plan goal that includes developing "complete streets":

Goals J.2 and J.3. related to planning for Complete Streets, enabling all users and modes of transportation to safely and efficiently move about the city

This is especially important in urban areas targeted for revitalization, including Downtown and University Hill. "Both areas are characterized by a lively mix of business, non-profit and residential uses, with active street life both day and night. Ensure that new development and major renovations front the sidewalk and contribute to the pedestrian experience."

Wildlife Habitat In Syracuse

This benefit from the urban forest supports progress on city goals and initiatives that are included in Syracuse's Sustainability Plan:

Goal 4.1 Develop an open space network connecting Syracuse's parks and other public spaces with neighborhood greenways.

Goal 4.2 Improve the ecological and recreational value of the Onondaga Creek Corridor and tributaries. Support ecological connectivity and integrate this network with trail and bikeway plans.

The Case for Preservation

It is no surprise that larger trees provide more services to the community. With their larger canopies, they intercept more stormwater, remove more air pollution, provide more energy savings, and sequester more carbon.

It is important to understand that the increase in benefits and services is exponential; as the tree grows larger, the amount of benefits it offers doubles or triples over time. Preservation of large trees to maximize benefits should be a high priority for communities wherever possible.

Consider the air pollution benefits alone: large healthy trees (30"+ DBH) have been shown to remove 70 times more air pollution a year than small healthy trees (less than 3" DBH) (Nowak 2002).

Consider comparing the number of new trees it would take to replace the services provided by one mature tree. Eight new sugar maples (3" DBH) would be needed to compensate for the benefits lost from the removal of just one mature sugar maple (Acer saccharum, 30" DBH) (National Calculator 2019).*

As part of Syracuse's goals is to enhance the quality of the existing tree canopy and thus increase the services trees provide to residents, prioritizing maintenance for existing trees (over planting new trees) is a critical piece of this effort.

Additionally, when new tree planting does occur, it is important to ensure the longest life span possible for each tree by making sure it is the *right* tree species planted in the *right* place. Improving canopy quality means increasing life spans of desirable trees and thus maximizing the benefits these trees provide.

Exact replacement equivalent depends on the specific tree benefit to be matched.

CHALLENGES FACING SYRACUSE

While the current overall tree canopy coverage may be good, the urban forest is a living asset and is susceptible to myriad threats, including the effects of climate change, insect and disease threats, conflict with sidewalks and utilities, lack of sufficient funds for proper and proactive management, and the community's lack of knowledge of the importance of tree canopy. These threats are described in more detail below.

Effects of Climate Change. Syracuse is already experiencing the effects of abnormal variations in local and regional weather due to climate change. The changes in temperature and precipitation threaten the urban forest in three important ways:

- Severe Weather Events. The growing frequency and severity of high winds, snow and ice storms, hurricanes and tornadoes, drenching rains, and drought attributed to climate change can cause significant tree damage and canopy loss, as well as increase risk and the city's liability.

Image 3: Increases in severe weather, due to climate change, threatens the health of Syracuse's urban forest

- Stress on Tree Species. Beyond contributing to severe weather events, climate change is causing shifts in native tree species' ability to thrive in their natural range. Trees adapted to Syracuse's historic climate may become stressed and more prone to insects and disease as the climate changes over time.
    - Syracuse is currently in Zone 5 Hardiness Zone. Climate models anticipate that within 100 years upstate New York could be in Zone 8, which is how Tennessee, North Carolina, and upper parts of Georgia are now categorized.
    - The U.S. Forest Service's Tree Atlas modeling tool looks at many models of anticipated climate changes over the next 100 years under multiple scenarios. All scenarios are anticipating changes in climate suitability for many common species in Syracuse, such as sugar maple and red maple in particular, and for American elm, northern red oak, and others. For example, the model predicts that under high emissions scenarios, sugar maples could decline between 70-90% in this time frame. This is important to note, as sugar maples comprise 10% of the urban forest population, and even a partial loss of this 10% would create a significant decline in tree benefits and overall canopy in Syracuse.

- Greater Pressure from Invasive Species. 36% of Syracuse's tree species city-wide are considered invasive. Invasive plant species are often characterized by their vigor, ability to adapt, reproductive capacity, and general lack of natural enemies. These abilities enable them to displace native plants and make them a threat to natural areas. Climate change could further acerbate the issue, allowing them to spread beyond the ability to control their populations and out-compete native trees which provide the most benefits to Syracuse's citizens and ecosystems.

Insect and Disease Threats. Many non-native, invasive insects and diseases, such as winter moth, gypsy moth, Asian long-horned beetle, spotted lantern fly, emerald ash borer, and thousand canker disease, pose serious threats to Syracuse's urban forest. The combined threat from these pests is significant, as they have the potential to weaken or kill thousands of trees and directly reduce the health, safety, value, and sustainability of the urban forest.

And climate change can exacerbate the severity of the threat from insects and disease. Not only would a warmer, moister climate be a challenge for Syracuse's existing native trees, the life cycle of existing and emerging pests could also exponentially increase. In Syracuse's historic climate conditions, a pest may have only 1 to 2 life cycles in a year. In a warming, moister climate, that may change to 6 to 8 life cycles, which could be catastrophic to susceptible trees.

Sidewalk and Infrastructure Conflicts. Trees in urbanized areas must share their growing area with many types of other important infrastructure components, such as sidewalks, curbs, and utilities. Each asset is important for public health and safety and livability in the city, but the trees tend to be the expendable asset when conflicts are addressed. It is reported that almost 14-20% of the annual removals of mature public trees is due to sidewalk repairs. The impact of trees on sidewalks is one of the primary reasons people do not want a new tree planted. Unless new sidewalk policies and construction techniques are adopted by the city, then the city may unnecessarily lose a significant portion of its green infrastructure (the public tree population) in the near future.

Image 4: The Emerald Ash Borer (EAB) is a major threat to Syracuse's ash tree population
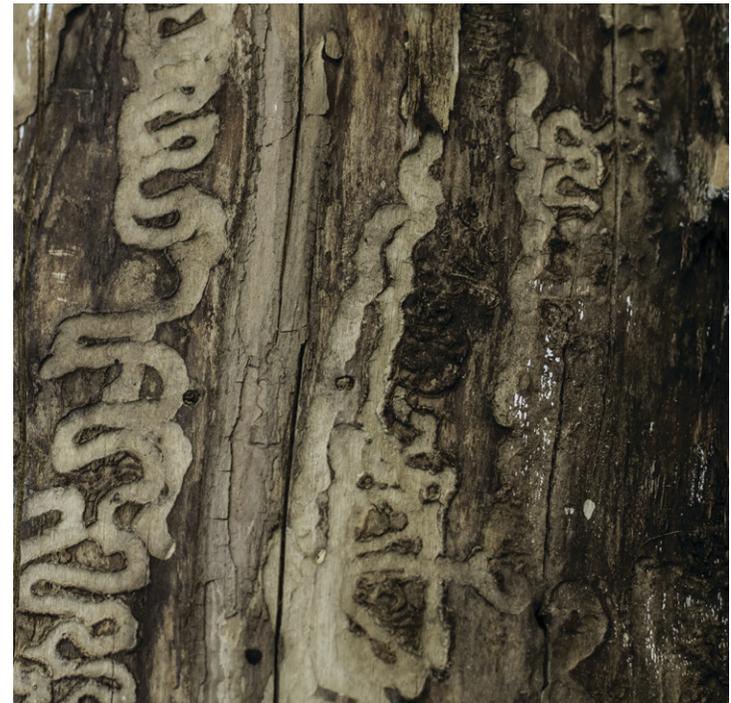
Insufficient Municipal Resources to Support a Proactive Urban Forestry Program. Many cities and towns in upstate New York are faced with shrinking infrastructure budgets, leading to repair and regular maintenance backlogs. The Forestry Division is effective at securing grants to increase planting and pruning rates of young trees but these are short term, unreliable resources that do not address total management needs. For example, the standard pruning cycle for mature street trees is every 6 years. The Forestry Division only has enough resources for an 18-year pruning cycle. The urban forest returns approximately $1.5 million annually in benefits. An expanded urban forestry program which manages a healthy, safe, and high-functioning urban forest supports economic growth and livability in the city and should be recognized as a worthy investment of public funds.

Most Trees Are Under Private Care. In Syracuse, approximately 80% of the tree canopy is located on private lands. For this reason, success in improving or maintaining tree canopy must include a citizenry that understands: 1) the value of trees/tree canopy; and 2) how to plant and care for trees. Without this awareness and information, mature trees can be removed prematurely by property owners who are unaware of the benefits they and the community at-large are losing. And replacement trees, if they are planted at all, may die, or not thrive, due to poor species choice and planting site selection.

IT'S TIME FOR ACTION IN SYRACUSE

If the urban forest canopy cover decreases from any or all of these challenges, the city could experience significant losses in the benefits that were described earlier. It is important for Syracuse to take steps now to protect the integrity of its urban forest for generations to come.

Many communities, after learning about the magnitude of services that trees provide, often want to start planting more trees right away. However, to effectively and efficiently make long-lasting improvements, it is important to first accurately assess the state of the existing urban forest, establish goals for the future, and use this information to map out the most effective ways to move forward.

SECTION 2:

SUSTAINABILITY AND CONDITION OF TODAY'S URBAN FOREST

In developing a long-range plan, it is important to first catalog and analyze the existing conditions of Syracuse's urban forest. This involves more than simply determining the types and quantity of the trees and tree canopy cover. It is also important to consider the:

quality of the urban trees,

the engagement of *key players* affecting the urban forest,

how trees are *currently being managed*, and

clarifying the challenges facing the urban forest and its level of resiliency.

All of these factors determine just how sustainable Syracuse's urban forest really is. The summary and details of this assessment follows.

SUSTAINABILITY AND CONDITION OF TODAY'S URBAN FOREST

DEFINING A SUSTAINABLE URBAN FOREST

For the purposes of this plan, the concept of sustainability is defined as the ability to maintain the urban forest into the future without compromising the ability of future generations to do the same (Clark 1997). In practice, a sustainable urban forest is a forest that is diverse, with species that are well-suited to site conditions, insect and disease resistance, and low-maintenance. A tree population meeting these criteria is sustainable, resilient, and produces maximum social, economic, and ecological benefits for the community.

There are several components that contribute to an urban forest's sustainability: ensuring that an urban forest is healthy enough or of high enough quality to remain functioning with minimum care; ensuring the financial requirements for maintaining the urban forest is realistic for years to come; and verifying that the value of the urban forest is understood by all local players that actively impact trees in Syracuse.

There are different methods for defining, evaluating, and assessing the health and sustainability of an urban forest. Because urban environments are human-made, a true assessment requires looking beyond just the tree data. Survival of a functioning urban forest relies greatly on human activity. For this reason, an urban forest assessment must include both social and economic components.

To assess Syracuse's urban forest, Davey Resource Group utilized a combination of James Clark's Model of Urban Forest Sustainability and Andy Kenney's Criteria and Indicators for Strategic Urban Forest Planning and Management (2011). This system, customized to meet Syracuse's unique needs, rated the city's performance level on 28 "indicators of a sustainable urban forest," broadly categorized into three groups: The Trees, The Players, and The Management Approach. Each indicator received a low, moderate, or good performance level rating, as shown in Table 2.
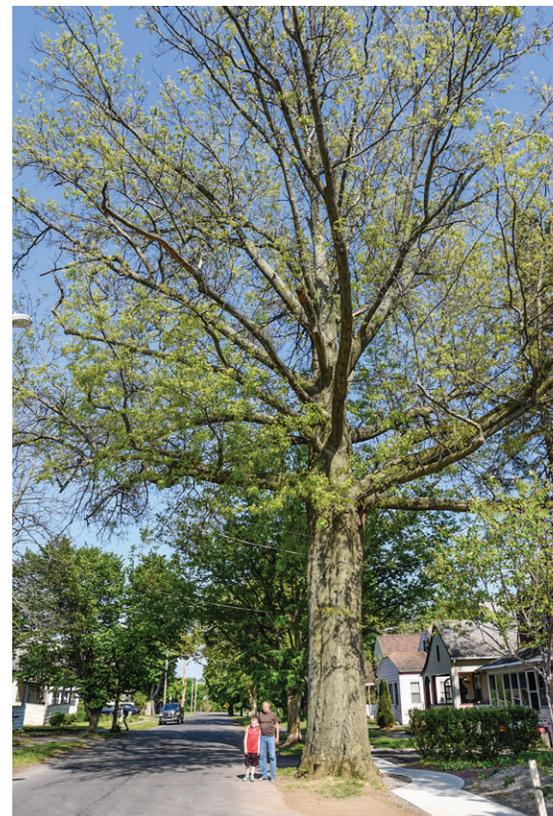
This assessment used the city's current data on inventory, tree canopy, and past studies and plans, along with feedback from interviews and meetings with organizations, the general public and city staff to assess the existing urban forest.

SUMMARY OF ASSESSMENT

Twenty-eight indicators of a sustainable urban forest were evaluated. After rigorous analysis and stakeholder input process, it was found that Syracuse rated Moderate in 46% of them (13 indicators), Low for 39% (11 indicators), and Good for 15% (4 indicators), as shown in Table 2. A summary of the ratings is on the following page, with a more detailed look at each category found in Appendix B.

Table 2: Indicators of a Sustainable Urban Forest in Syracuse		Assessed Performance Level		
		Low	Mod.	Good
The Trees	Urban Tree Canopy	■		
	Equitable Distribution		■	
	Size/Age Distribution			■
	Condition of Public Trees - Streets, Parks			■
	Condition of Public Trees - Natural Areas	■		
	Trees on Private Property			■
	Species Diversity		■	
	Suitability		■	
The Players	Neighborhood Action		■	
	Large Private & Institutional Landholder Involvement	■		
	Green Industry Involvement		■	
	City Department/Agency Cooperation	■		
	Funder Engagement		■	
	Utility Engagement		■	
	Developer Engagement	■		
	Public Awareness	■		
	Regional Collaboration	■		
The Mgmt Approach	Tree Inventory			■
	Canopy Assessment		■	
	Management Plan	■		
	Risk Management Program		■	
	Maintenance of Publicly-Owned Trees (ROWs)	■		
	Planting Program		■	
	Tree Protection Policy	■		
	City Staffing and Equipment		■	
	Funding	■		
	Disaster Preparedness & Response	■		
	Communications		■	

SUMMARY OF THE RATINGS WITHIN EACH CATEGORY

THE TREES (Moderate Rating)

Canopy cover has maintained stability, comprising around 26–28% of land cover in Syracuse over the last 20 years. This percentage has been determined to be half of the canopy that is possible in Syracuse. However, the available data is now a decade old and should be updated. The rise in the quantity of invasive species combined with this static canopy cover level suggests that there have been losses in the higher quality (and longer lasting) canopy. Additionally, tree canopy is not equally distributed throughout the neighborhoods.

Until recent years, the quantity of street trees has been steadily decreasing, from approximately 47,000 in 1951 to 33,000 in 2014. An average of 11% of street tree removals are due to sidewalk repairs. There is a high percentage of maple in the city tree population (almost 30%) which is not ideal for species diversity and longevity, especially considering climate changes. However, due in large part to the Onondaga County's Save the Rain program, trees have been added consistently in large numbers in the last 5 years, putting the current public tree population count around 38,500.

Table 2a: Indicators of a Sustainable Urban Forest in Syracuse		Assessed Performance Level		
		Low	Mod.	Good
The Trees	Urban Tree Canopy	�		
	Equitable Distribution		▓	
	Size/Age Distribution			▓
	Condition of Public Trees - Streets, Parks			▓
	Condition of Public Trees - Natural Areas	▓		
	Trees on Private Property			▓
	Species Diversity		▓	
	Suitability		▓	

Threats (pests, climate, storm losses, invasive plants) are increasing and have the potential to drastically alter the quality and quantity of Syracuse's urban forest.

THE PLAYERS (Low Rating)

There are many interested and engaged parties throughout Syracuse that are active in urban forest efforts, though much of it is uncoordinated. The general public is not fully aware of the importance of and services provided by the urban forest. Furthermore, many citizens are not aware of the rules and regulations that impact the urban forest. There are many improvements to be made in this indicator category, as improved outreach and education are key to improving engagement at all levels.

THE MANAGEMENT APPROACH (Moderate Rating)

Fortunately, there is a large amount of high-quality data on public trees, which is critical for effective management and carrying out efficient operations. However, there are few formal management plans in place, such as overall urban forest management and maintenance, disaster storm preparedness, and risk management.

Much of the work done to establish a proactive care program has included the beginnings of cyclical planting, removals, pruning, plant health care, risk management, tree protection, etc. However, any further progress depends on additional resources for staffing, equipment, and adequate operations funds.

Table 2b: Indicators of a Sustainable Urban Forest in Syracuse		Assessed Performance Level		
		Low	Mod.	Good
The Players	Neighborhood Action		■	
	Large Private & Institutional Landholder Involvement	■		
	Green Industry Involvement		■	
	City Department/Agency Cooperation	■		
	Funder Engagement		■	
	Utility Engagement		■	
	Developer Engagement	■		
	Public Awareness	■		
	Regional Collaboration	■		

Table 2c: Indicators of a Sustainable Urban Forest in Syracuse		Assessed Performance Level		
		Low	Mod.	Good
The Mgmt Approach	Tree Inventory			■
	Canopy Assessment		■	
	Management Plan	■		
	Risk Management Program		■	
	Maintenance of Publicly-Owned Trees (ROWs)	■		
	Planting Program		■	
	Tree Protection Policy	■		
	City Staffing and Equipment		■	
	Funding		■	
	Disaster Preparedness & Response	■		
	Communications		■	

MORE ON THE TREES (MODERATE RATING)

Assessing the trees in Syracuse involves examining both the overall tree canopy across the entire city (public and private trees) as well as public trees managed by the city alone.

More detailed findings and highlights of the tree resource assessments follow, separated into two categories:

A. Tree Canopy. All trees within city—both on public and private lands

B. Public Trees. Trees on public lands only (along roads, in parks and on other public property).

A. Overall Tree Canopy

The last tree canopy assessment performed was done using 2009 aerial imagery. It is a best management practice to re-evaluate tree canopy cover to track gains or losses every 5 to 10 years. For this reason, an updated urban tree canopy (UTC) assessment is strongly recommended (detailed in Strategy #3).

The following findings are based on the most recent analysis:

Canopy has remained somewhat steady. Just over 27% of the City of Syracuse is covered by tree canopy. Canopy has remained somewhat steady over last few decades (fluctuating between 26% to 28%). However, even a 1% change is significant, since it represents 163 acres in tree canopy lost or gained.

Chart 1. Syracuse Canopy Cover Over Time
(1994 - 2012)
Source: Nowak & Greenfield, 2002, Nowak, et al, 2013

Year	Canopy %
Yr 1994-98	28%
Yr 1999	27%
Yr 2003	26%
Yr 2006	27%
Yr 2009	27%
Yr 2012	28%
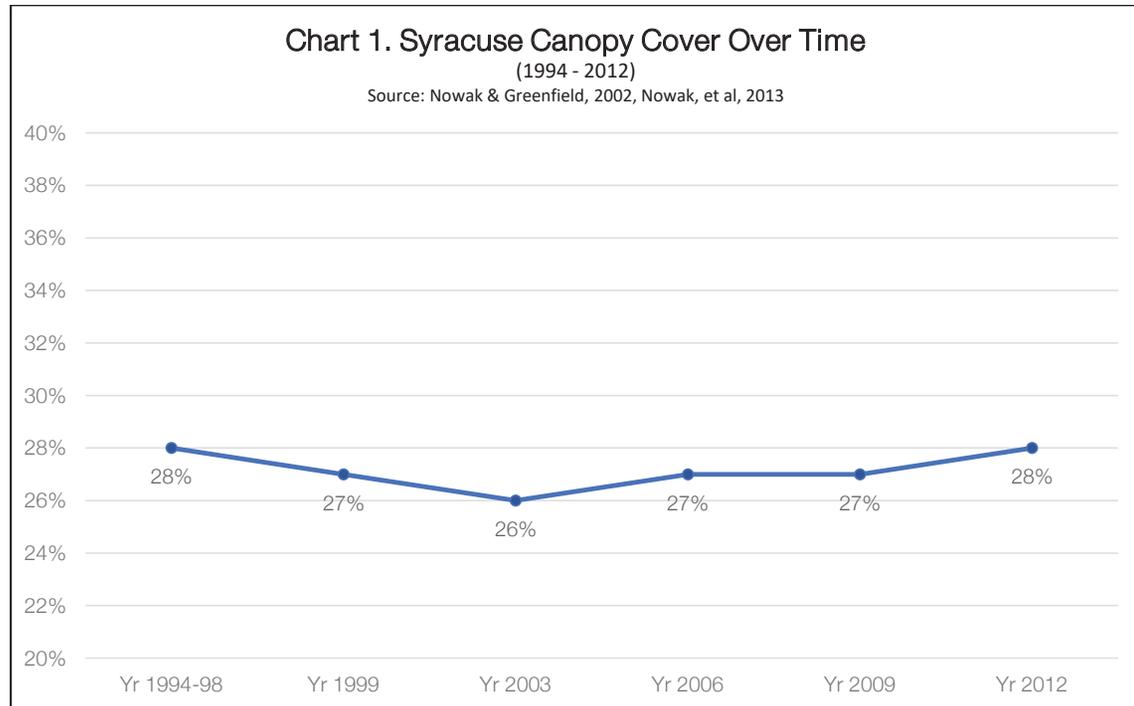
Higher canopy is possible. Syracuse has achieved 48% of what has been deemed the total possible canopy. This is termed "relative canopy" and is determined by comparing the canopy cover to the total amount of plantable space (existing pervious land cover: lawn, fields, etc.) after unrealistic areas are eliminated (athletic fields, golf courses, etc.).

Quality is likely deteriorating. While canopy levels have been shown somewhat stable in quantity, the canopy quality may be dropping as native and the most beneficial trees are lost and the number of invasive plants increases.

The *2016 State of the Urban Forest* indicated a significant increase in invasive species.

- Forested areas on all lands (and especially in the city's park system) are facing long-term decline from a combination of deer browse and proliferation of invasive plants.
- Canopy is relatively high on vacant land (Chart 2), which is also likely due to natural regeneration made up of largely invasives (i.e., Norway maple and buckthorn).
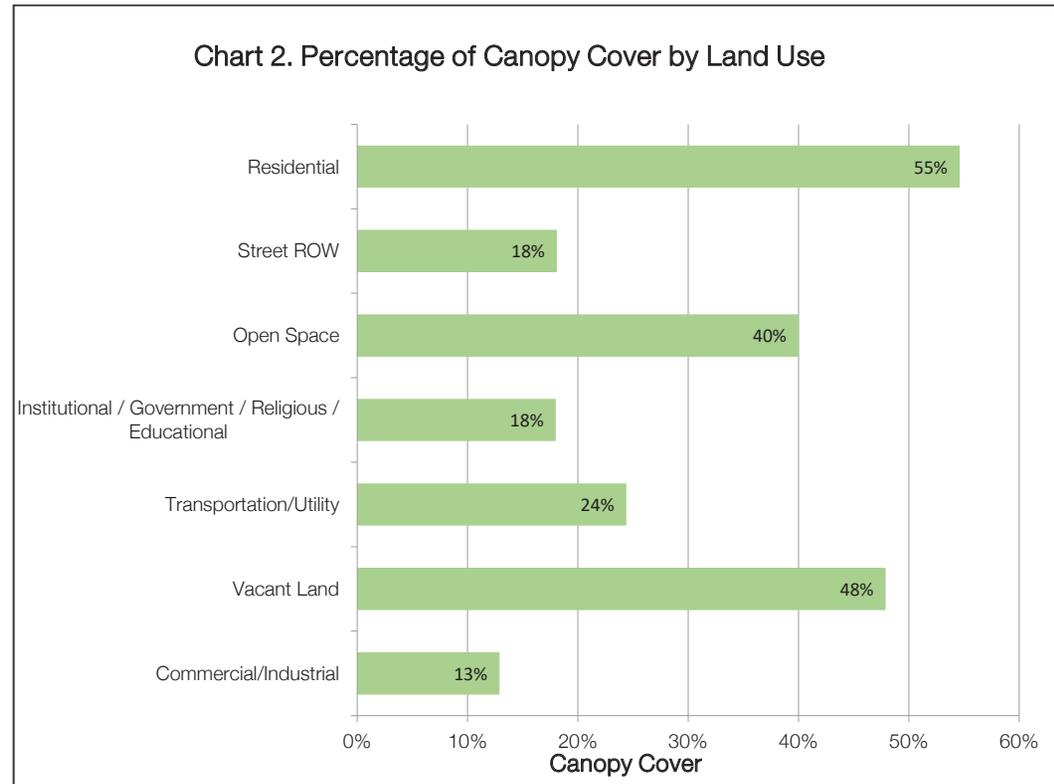
So while overall tree canopy quantity has been stable, it is likely that the increasing invasive species populations are masking the loss of higher quality, native species. Without proper management, these stresses will continue to prevent the regeneration of desired tree species.

Chart 2. Percentage of Canopy Cover by Land Use

Land Use	Canopy Cover
Residential	55%
Street ROW	18%
Open Space	40%
Institutional / Government / Religious / Educational	18%
Transportation/Utility	24%
Vacant Land	48%
Commercial/Industrial	13%

Canopy Cover

Diversity analysis shows high percentages of maples and buckthorn. There is school of thought in urban forestry that suggests no one species should represent more than 10% of the tree population to ensure diversity and limit significant losses to pests, disease or other future threats. The invasive European buckthorn on all lands (21% of trees in Syracuse) and the maple on streets (31%) both exceed this threshold. Perhaps more concerning is the projected impact that the warming climate will have on sugar maples (referenced earlier in the Challenges section and below in the next subsection). Similarly, when looking at tree genera, it is recommended that no one genus exceed 20% of the total tree population. Only the maple genus (Acer) exceeds the 20% rule. No matter which diversity guideline is followed, diversity within the urban forest should be constantly monitored.

Table 3. Prominence of Invasive Species in Syracuse

Invasive Species	Trees	% of Total Urban Forest
European buckthorn	334,261	21%
Tree-of-heaven	111,285	7%
Norway maple	82,508	5%
Black locust	38,690	2%
Belle honeysuckle	1,790	<1%
Total	**568,534**	**36%**

Chart 3. Syracuse Species Diversity (City-wide)
Goal <10%

European buckthorn, Sugar maple, Staghorn sumac, Tree of heaven, Boxelder, Norway maple, Black cherry, Arborvitae/Cedar, Norway spruce, Eastern hophornbeam, Other (91 species<3%)

Chart 4. Syracuse Genus Diversity (City-Wide)
Goal <20%

Acer (Maple), Rhamnus (Buckthorn), Prunus (Plum/Cherry), Rhus (Sumac), Ailanthus (Tree of Heaven), Carya (Hickory), Picea (Spruce), Thuja (Arborvitae), Ostrya (Hophornbeam), Other (40 genera<3%)

Information on where/why changes are occurring is not currently available. Aside from 2009, all past UTCs have been done using the point sampling method, which provides an estimate of canopy across the city as a whole but does not show where exactly canopy changes are happening. For this reason, the causes of changes can be only educated guesses at this time. A new high-resolution UTC will allow comparison of recent canopy to 2009 and can provide valuable insights on where changes are happening and allow further exploration into why they are happening.

Image 5. Canopy Percent by Neighborhood
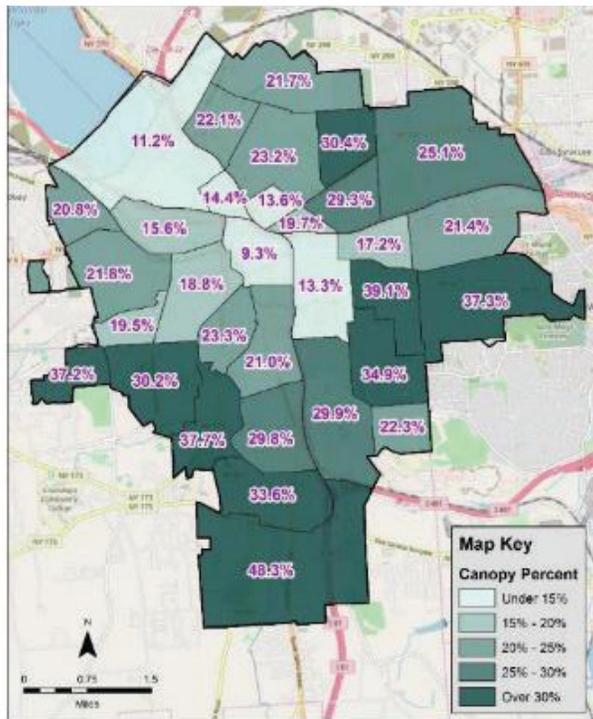
Table 4. UTC & Street Trees by Neighborhood

Neighborhood	UTC	Relative UTC	Street Trees	Street Trees/Mile
South Valley	49%	60%	1,136	67
Elmwood	38%	54%	811	81
Meadowbrook	37%	53%	2,640	106
Westcott + University Neighborhood	37%	54%	3,055	127
Brighton + North Valley	32%	52%	1,601	52
Strathmore + Winkworth	32%	48%	2,029	92
Outer Comstock	30%	44%	778	78
Sedgwick	30%	52%	1,472	113
Lincoln Hill	29%	55%	830	83
Eastwood	25%	46%	3,299	94
Northside	23%	49%	1,605	73
Court-Woodlawn	22%	38%	1,508	72
Far Westside + Tipp Hill	22%	38%	2,855	114
South Campus	22%	31%	-	-
Southwest + Southside	22%	44%	1,521	72
Washington Square	22%	48%	887	89
Salt Springs	21%	41%	831	55
Near Westside + Skunk City	19%	37%	1,765	74
Near Eastside	17%	46%	608	68
Hawley-Green + Prospect Hill	16%	50%	813	90
Park Ave.	16%	46%	827	75
Franklin Square	14%	47%	372	124
University Hill	13%	41%	957	80
Lakefront	11%	33%	374	75
Downtown	9%	56%	1,115	101
City Total	**27%**	**48%**	**33,689**	**86**

There is no existing canopy goal. There is currently no set canopy goal within the City of Syracuse. While it is not required, having a canopy goal can be an important motivator to affect change in coming years.

Canopy cover is not equal across the city. Canopy is not equally distributed across the city, though work has been done in recent years to begin correcting this inequity. Equitable distribution is important because trees provide important benefits to the community. If the majority of the canopy is located in only a few select areas of Syracuse, the tree benefits are also only available to those living and working in those areas. When looking at canopy cover by neighborhood (again, using 2009 data), canopy coverages range from 9% to 14% in the urban core areas to 37% to 49% in the more southern neighborhoods.

B. Publicly-Managed Trees Only

While canopy cover examines the tree cover across the entire city (on both public and private land), there is also data available for examination on the trees specifically managed by the city. As of 2018, there are currently 37,728 street trees under city management, and many additional trees in parks and other city properties.

The following highlights the major findings of the public tree analysis:

Quantity of street trees has been declining until recent years. Records showed that in 1950, 41,000 was the peak number of city trees; and for the next 65 year that number steadily dropped to a low of just over 33,000 trees. Since 2014, the number of public trees has risen primarily due to Onondaga County's Save the Rain program that has funded

Chart 5. Syracuse Historical Public Tree Quantities

43,000	
41,000	41,000
39,000	39,030
37,000	
35,000	34,165 33,689
33,000	38,497
31,000	
29,000	
27,000	
25,000	

Year 1950, Year 1960, Year 1970, Year 1980 ('78), Year 1990, Year 2000, Year 2014, Year 2018
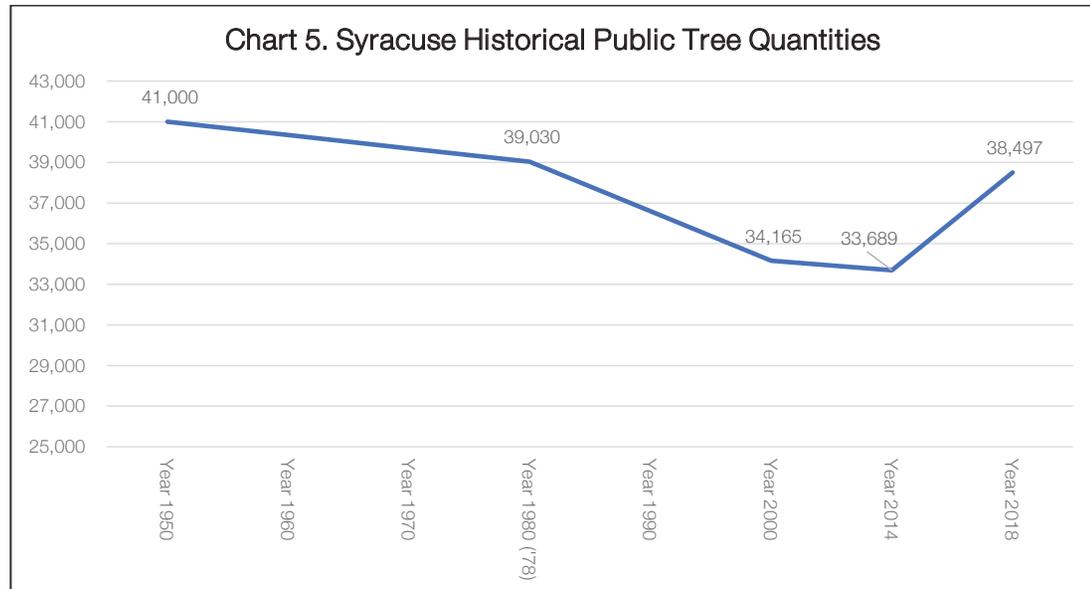
the annual planting of over 1,500 trees per year as part of a stormwater management plan intended to reduce pollution to Onondaga Lake. However, this program is scaling back to 500-600 trees per year due to funding. Meanwhile, city funds support about 350 trees per year. Considering that the number of public tree removals is about 700 per year, there will be limited canopy gains on public property in the near future.

Data exists for effective management. The foundation of an effective asset management plan is having accurate and workable data on the asset itself (in this case, the trees). Syracuse has worked diligently to inventory all public trees since the first master plan in 2001 and is in the early stages of working toward proactive care of these trees based on this data.

Condition of public trees is fair. Healthy trees are resilient trees. Not only is it an important indicator of public safety risks and for prioritizing tree work, but it can also provide a glimpse into future canopy. For example, if the majority of trees are in poor condition, it can be assumed that a large portion of these trees will die and/or need to be removed in the coming months/years, meaning significant future losses can be expected.

Table 5. Condition of Public Trees

Tree Condition	% of Public Trees
Excellent	0%
Good	27%
Fair	61%
Poor	8%
Critical	1%
Dead	1%
Unknown	2%

More than 60% of publicly-managed trees in Syracuse are in Fair condition (as Shown in Table 5), meaning a large amount of city trees could fail in a storm, suffer from drought, and/or succumb to insect and disease pressures.

Ages of trees in Syracuse follow the ideal recommendation. All ages are needed for long term resiliency. The distribution of the various age categories of trees overall is an important indicator of a forest's resiliency. It is recommended to have 40% young trees, 30% established, 20% maturing, and 10% mature in an urban forest. The concept of a balanced age distribution is to maintain the flow of the urban forest's benefits over time, so the number of newly planted trees must exceed losses from death and removal on an ongoing basis. In Syracuse, the percentage of public trees in each age group (shown in Figure 4) mimics the recommended levels for optimal long-term benefits. Note that the high number of young trees on public and private lands combined is likely due to new invasive growth on vacant lands (based on the statistics showing high canopy cover on vacant land).

Diversity of Syracuse trees needs some improvement. Diverse urban forests increase a community's resilience to pests, disease, and a warming climate (thus increasing longevity). Industry standards state that no one species should comprise more than 10% of the population, no one genus should comprise more than 20% of the population, and no one family should comprise more than 30% of the population. The breakdown of diversity of trees in Syracuse is shown in the charts below.

Within the publicly-managed tree population in Syracuse, Norway maple exceeds the 10% species guideline and *Acer* (maple) exceeds the genus guidelines.

Chart 6. Age Ranges of Syracuse's Trees
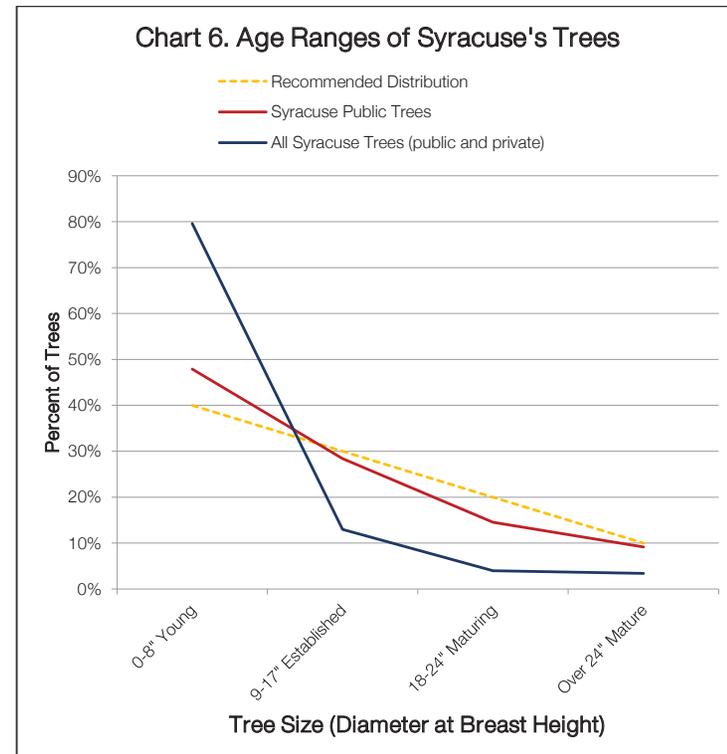
## Chart 7. Syracuse Species Diversity: Public Trees Only
Goal <10%

- Norway maple — 14%
- Honey locust — 8%
- Crabapple — 6%
- Littleleaf linden — 4%
- Sugar maple — 4%
- Silver maple — 3%
- Callery pear — 3%
- Other (222 species<3%) — 57%
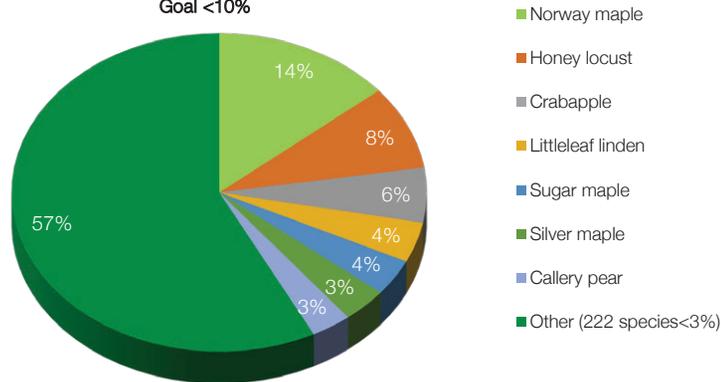
Chart 8. Syracuse Genus Diversity: Public Trees Only
Goal <20%

- Acer (Maple) — 29%
- Gleditsia (Honey locust) — 8%
- Malus (Crabapple) — 6%
- Tilia (Linden) — 6%
- Quercus (Oak) — 4%
- Pyrus (Pear) — 3%
- Picea (Spruce) — 3%
- Fraxinus (Ash) — 3%
- Other (75 genera<3%) — 38%
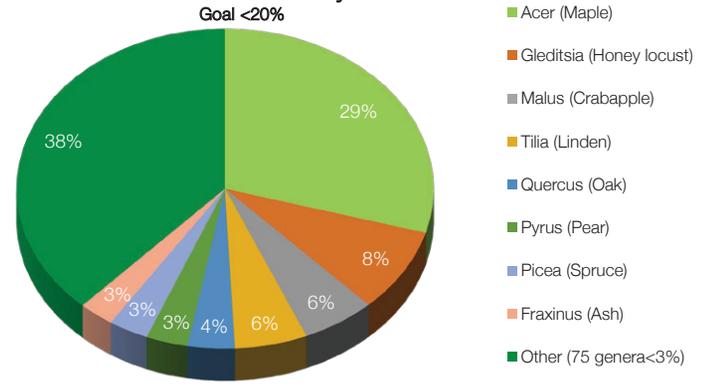
Syracuse's urban forest is facing long-term sustainability challenges. Are the existing species suitable for the long term in Syracuse? Are they able to thrive in their location with least amount of maintenance possible? The answers to these questions *must consider:* 1) limitations in the size and quality of a tree's physical growing space, as well as 2) exposure to imminent threats such as changes in climate, damage from diseases and pests, and 3) competition from invasive species.

An analysis of the public tree inventory resulted in a number of interesting findings that shed light on the City's ability to maintain and sustainable and resilient urban forest in the coming years.

1. **Grow Space Limitations: Overhead Power Lines.** Just over 20% of the public trees are large trees sited under primary power lines. While some of them are currently small enough to not interfere with the lines, all of these trees will eventually grow into the power lines if they reach maturity. Because of this interference and the potential for outages during storm events, these trees will likely be frequently and heavily pruned. This maintenance practice both stresses the trees and causes an inconvenience for utilities and customers.

2. **Grow Space Limitations: Below Ground and Soil Space.** Adequate space for root growth below ground is critical for healthy trees. In urban areas, this is an especially important issue as compaction, paved surfaces, and debris limit the amount of quality soil available for trees. In Syracuse, conflicts between tree roots and sidewalks account for up to 20% of the total losses among street trees yearly.

3. **Threatened or Undesirable Species.** Threats from pests, climate changes, and storms can transform a once suitable species into an unsuitable and unsustainable one. Additionally, invasive tree species are detrimental to the overall canopy as they crowd out other native species and deteriorate habitat.

Image 6. Density Observations of Common Buckthorn Across NY

- *Rhamnus cathartica* (European buckthorn) is an invasive small tree/large shrub species that continues to multiply in western New York. It is considered an invasive species throughout most of the northeastern and central U.S. because of the dense thickets it forms, displacing native understory plants and shading tree seedlings. Keeping buckthorn in check is crucial to preserving native habitat and species (New York Invasive Species 2019). While it may contribute only a small portion of the public trees in Syracuse, buckthorn is a very large portion of the total urban forest throughout the city (21%) and will be a challenge to eradicate.
- Likewise, *Acer platanoides* (Norway maple), once planted widely for their ability to tolerate urban conditions, are another species recently considered invasive throughout much of North America. Because of its dense canopy and shallow root system, it out-competes sugar maple and other native seedlings in the forest environment. Norway maples make up 14% of the public trees in Syracuse, and 5% of trees across public and private lands combined.

4. Pests. Syracuse's trees are threatened by both native and non-native insect pests. For example, there are 1,200 publicly-managed ash trees, (3% of public tree population) and 21,000 ash city-wide (representing 1% of all trees) in Syracuse. All have been under attack from the emerald ash borer (EAB) since it was discovered in New York state in 2009. Once infested, mortality occurs within 3 to 5 years. Trees that are not proactively treated will die. To deal with EAB, the city began a Canopy Preservation Approach following the guidance of Society of Municipal Arborists. The Parks Department's Forestry Bureau inventoried all known ash in parks and on streets (an estimated 2,100 trees), and then removed approximately 950 ash in poor condition, in bad locations or smaller than 8" diameter. The Parks Department treated all remaining ash in 2014, with a portion of those re-treated in 2016, 2017 and 2019.

Table 6. Portion of Public Trees Comprised of Invasive Species

Invasive Species	Number of Plants	% of Public Trees
European buckthorn	213	<1%
Tree-of-heaven	222	1%
Norway maple	6,132	14%
Black locust	422	1%
Belle honeysuckle	3	<1%
Total	**6,992**	**16%**

5. Climate Changes. Finally, climate change is anticipated to have a substantial impact on trees in upstate New York in the coming decades.

  ○ TreeAtlas, a modeling tool provided by the U.S. Forest Service (see Appendix C. for more information on the model), predicts that under high carbon emissions scenarios in the Erie and Ontario Lake Plain Section of the Eastern Broadleaf Forest, many native maple and elm, among other species, will struggle to survive over the next 100 years. This is especially concerning as it represents such a large proportion (over 15%) of trees in the area.

  ○ Conversely, suitable habitat for a number of species is expected to increase as well, many as they migrate north from the southern regions. Tables 7 and 8 show the top ten species expected to decline and top ten species expected to thrive due to anticipated climate change in high emissions scenarios.

Table 7. Top 10 Species Expected to Struggle in Syracuse from Anticipated Climate Change

Species	Climate Change Data		Existing QTY Species CITYWIDE		Existing QTY Species PUBLIC TREES	
	Current Importance Value	Change in Importance Value by 2100 Under High Emissions Scenario	Trees	% of Total Urban Forest	Trees	% of Public Trees
white ash (*Fraxinus americana*)	7.7	- 6.54	15,158	1%	154	0.35%
sugar maple (*Acer saccharum*)	4.75	- 4.48	150,713	10%	1,626	4%
black cherry (*Prunus serotina*)	3.96	- 3.52	68,971	4%	98	0.22%
American elm (*Ulmus americana*)	5.53	- 3.51	1,754	0.11%	215	0.48%
red maple (*Acer rubrum*)	5.41	- 2.51	3,951	0.25%	893	2%
American basswood (*Tilia americana*)	2.47	- 2.27	7,363	0.47%	576	1%
northern red oak (*Quercus rubra*)	3.03	- 2.27	2,807	0.18%	543	1%
American beech (*Fagus grandifolia*)	1.73	- 1.38	0	0%	12	0.03%
white oak (*Quercus alba*)	2.67	- 1.19	2,894	0.18%	163	0.37%
quaking aspen (*Populus tremuloides*)	1.1	- 1.07	0	0%	7	0.02%
Totals			**253,611**	**16%**	**4,287**	**10%**

Table 8. Top 10 Species Expected to Thrive in Syracuse from Anticipated Climate Change

Species	Climate Change Data		Existing QTY Species CITYWIDE		Existing QTY Species PUBLIC TREES	
	Current Importance Value	Change in Importance Value by 2100 Under High Emissions Scenario	Trees	% of Total Urban Forest	Trees	% of Public Trees
water oak (*Quercus nigra*)	0	+ 1.09	0	0%	0	0%
sugarberry (*Celtis laevigata*)	0	+ 1.15	0	0%	0	0%
silver maple (*Acer saccharinum*)	1.47	+ 1.18	6,273	0.4%	1,552	3%
hackberry (*Celtis occidentalis*)	0.45	+ 1.2	2,366	0.1%	592	1%
honeylocust	0.14	+ 1.23	9,973	1%	3,762	8%
red mulberry (*Morus rubra*)	0.05	+ 1.32	8,600	1%	51	0.11%
blackjack oak (*Quercus marilandica*)	0	+ 1.53	0	0%	0	0%
eastern red cedar (*Juniperus virginiana*)	0.18	+ 1.79	9,082	1%	251	1%
winged elm (*Ulmus alata*)	0	+ 2.34	0	0%	3	0.01%
post oak (*Quercus stellata*)	0	+ 4.92	0	0%	0	0%
Totals			**36,294**	**2%**	**6,211**	**14%**

How to Read These Tables: Negative change in Importance Value (IV) numbers mean a decrease in suitable habitats; positive values mean increase in suitable habitats, and thus no threat and in fact potential for growth. For example, if current IV = 3.4 and future model shows an anticipated change of -3.4, a total loss of suitable habitat is predicted for that species (Prasad et al 2007).

MORE ON THE PLAYERS (LOW RATING)

The second category of urban forest sustainability assessment is related to the players within the urban forest. The level of involvement and cooperation of all players is key to developing a successful urban forest management program and maintaining a thriving tree population. The assessment involves identifying who is and is not currently active in urban forest issues and actions, as well as what each group is doing (or can be doing) to advance the community's goals.

The highlights of this assessment follow:

🍃 **A core group is very engaged within Syracuse.** There is a core group of organizations and individuals who are very aware and engaged in work to preserve and improve the urban forest. These include the city's Forestry Bureau, Onondaga County, Onondaga Earth Corps, Onondaga County Extension, SUNY ESF, and more. Onondaga Earth Corps especially has become a strategic long-term partner with the City of Syracuse over the last 12 years. However, there are many others that should be involved and haven't been to date, largely due to the lack of a single initiative or defined movement for them to join and support. The sentiment from the community overall is that there is a distinct lack of awareness about the value and importance of the urban forest.

Table 2b: Indicators of a Sustainable Urban Forest in Syracuse		Assessed Performance Level		
		Low	Mod.	Good
The Players	Neighborhood Action		X	
	Large Private & Institutional Landholder Involvement	X		
	Green Industry Involvement		X	
	City Department/Agency Cooperation	X		
	Funder Engagement		X	
	Utility Engagement			
	Developer Engagement	X		
	Public Awareness	X		
	Regional Collaboration	X		

🍃 **Public awareness and engagement levels range widely across the city.** Engagement of the community in urban forestry issues and projects has shown to be an effective source of real progress, and often occurs at the neighborhood level. Across Syracuse's 25+ neighborhoods, there are a wide range of engagement levels, from the very active to non-existent. Hurdles to planting trees in neighborhoods can come from the overall lack of awareness of the importance of trees in an urban environment, but also from the differing cultural views, negative perception of current trees, and lack of engagement of these groups to date.

🍃 **No significant engagement from large landholders in urban forestry efforts to date.** Involvement of large landholders in urban forestry provides opportunities to add significant amounts of tree canopy in a faster time frame. Aside from the public lands (city/county/state), there has not been significant engagement from the local universities, hospitals, cemeteries, and private industry campuses.

🍃 **Better communication is key to city department and agency coordination.** No fewer than eight separate departments within the city and several county agencies impact trees and the urban forest in the city. Whether the impact is direct (such as Engineering and sidewalk projects) or indirect (as with decisions made by Planning), communication is key to properly managing Syracuse's trees and coordinating the actions taken by all agencies that can affect the future quality and quantity of the urban forest.

Overall, interdepartmental relations in the city are good, and there is a stated willingness from most departments to improve communication methods and frequencies with Forestry staff. Proactive meetings between certain departments occur regularly to introduce and better manage projects and identify issues and priorities (i.e., Road Recon and Pre-Development meetings). However, every department has their specific missions and goals, and other than as it relates to Parks, the urban forest is not their primary concern.

About Onondaga Earth Corps

The Onondaga Earth Corps (OEC) for local communities was formed in 2005 to engage youth 1) to understand the relationship between people and the urban ecosystem, 2) in hands-on community and environmental service learning projects, 3) via training for future jobs and careers in environmental fields, and 4) by developing their leadership abilities that help them analyze situations, solve problems, and implement strategies to improve their communities. The OEC models itself on the highly successful and effective Youth Conservation Corps model (in operation since the 1930s) to address critical environmental and human service needs.

A committed partner of the City of Syracuse, OEC crews work on multiple urban forestry projects across the city, including tree inventories, neighborhood outreach, tree planting, and tree care.

🌿 Group such as green industry professionals, developers, utilities and funders have been engaged, but at minimal levels.

Utility companies are aware of the importance of the urban forest and are in dialogue with the community. National Grid, the primary utility provider, is an important collaborator with the city on urban forestry related matters through 1) their 10,000 trees program (which provides $50 for every approved low growing tree species planted under their wires, 2) removal of poor condition trees at the City's request if they meet the goal of their line-trimming for service reliability, 3) storm planning and response, and 4) extensive personnel and tool support during Syracuse Parks' volunteer tree planting initiatives.

The City of Syracuse funds annual care for public trees, but current levels only support reactive care. The primary and most reliable source of grant funds for the last 15 years is the New York State Department of Environmental Conservation's Urban & Community Forestry Grant Program funded through the Environmental Protection Fund. However, private foundations, including the Central New York Community Foundation, the Gifford Foundation and John Ben Snow Foundation have all supported urban forestry programs mostly through the involvement of Onondaga Earth Corps.

The green industry has been engaged and offers expertise, especially from the local SUNY ESF faculty and students, as well as through the Onondaga Earth Corps green industry workforce training organization. However, additional engagement from nurseries, landscape architects, tree services, and others in the field (as well as their professional trade organizations) is currently an untapped resource.

Interaction with developers is primarily through the city's pre-development process which allows developers an audience with all relevant departments for a proposed project. The Forestry Division became part of this process in 2012. Formal design standards for new development projects are expected to be released by end of 2019. These design standards will address minimum rooting volume for trees in downtown settings, minimum tree planting requirements for new developments, tree protection requirements and mitigation for loss of healthy trees. However, developers have not been proactively educated on the benefits of incorporating good tree design in their projects.

🌿 Regional collaboration is limited to availability of partners. To date, regional collaboration has mostly come from Onondaga County and project partnerships with The Nature Conservancy. Beyond this, few outside regional organizations have taken a direct interest or role in Syracuse's urban forest to-date.

Improvements within the nine indicators of a sustainable urban forest related to The Players will result in making great strides and progress in improving Syracuse's urban forest. Much of this can be achieved through accelerated outreach, education, and engagement, which is discussed in further detail in Strategies #8–10.
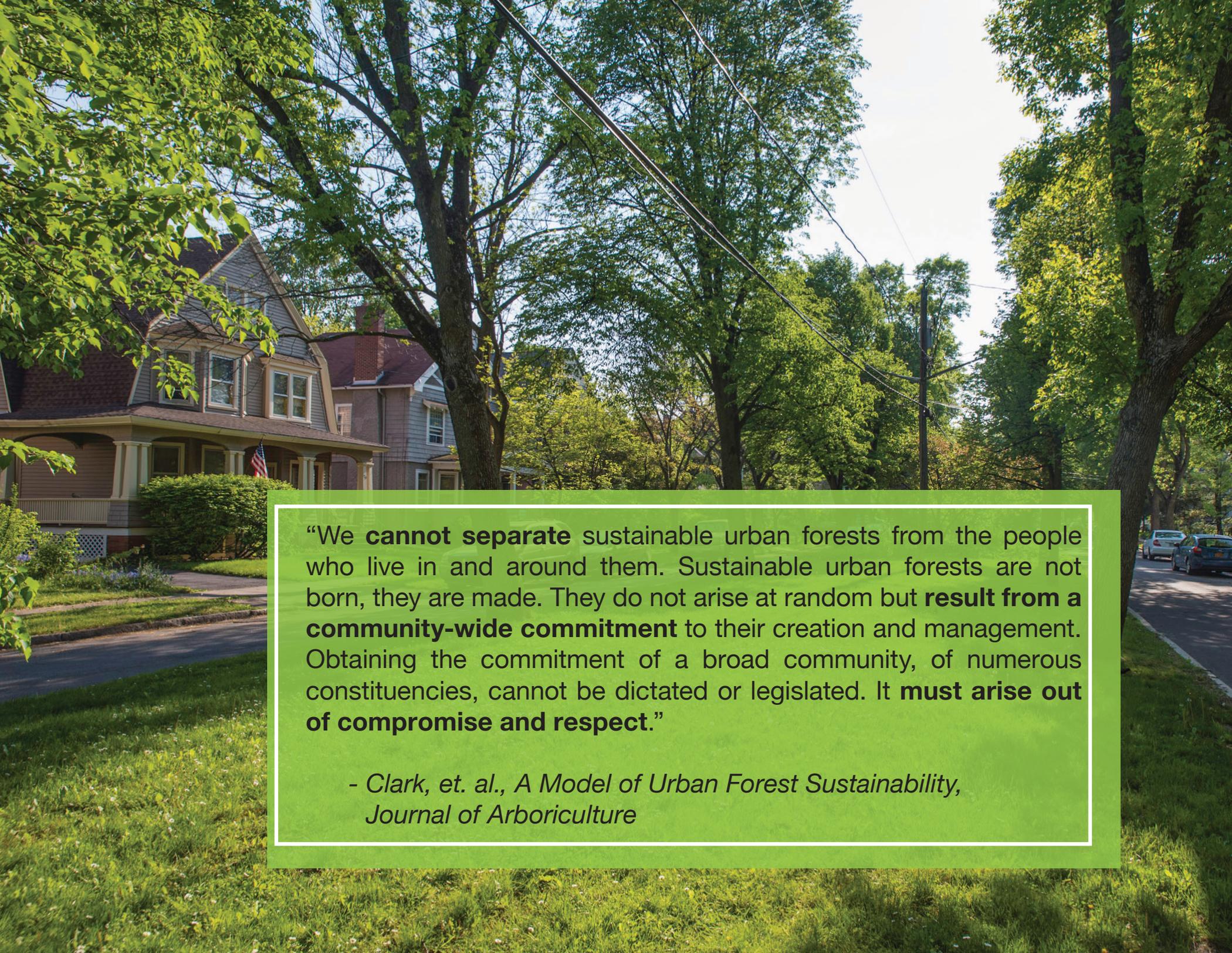
"We **cannot separate** sustainable urban forests from the people who live in and around them. Sustainable urban forests are not born, they are made. They do not arise at random but **result from a community-wide commitment** to their creation and management. Obtaining the commitment of a broad community, of numerous constituencies, cannot be dictated or legislated. It **must arise out of compromise and respect**."

- *Clark, et. al., A Model of Urban Forest Sustainability,*
  Journal of Arboriculture

MORE ON THE MANAGEMENT APPROACH (MODERATE RATING)

Indicators related to how an asset is managed is central in determining how efficient and effective an urban forest management program is. This category consists of 11 indicators and looks at policies, processes, plans, and approaches in place to manage the urban forest.

Overall Syracuse was rated as Moderate in its management approach (Table 2c). Highlights of the management analysis findings follow.

A wide variety of urban forest data and reports are available. Effective asset management and cost-efficient operations are heavily dependent on accurate and up-to-date data. The City of Syracuse is fortunate to have a wide variety of professionally produced technical reports, plans, and data sets to guide short- and long-term urban forest management activities and planning. The following have built a strong foundation for the urban forestry program:

- 2003 Draft Management Plan
- 2009 Tree Canopy Assessment
- 2013 State of the Urban Forest Report
- 2013 Street Tree Inventory
- 2014 Park Tree Inventory
- 2014 Municipal Forest Assessment (i-Tree Eco)

Table 2c: Indicators of a Sustainable Urban Forest in Syracuse		Assessed Performance Level		
		Low	Mod.	Good
The Mgmt Approach	Tree Inventory			■
	Canopy Assessment		■	
	Management Plan	■		
	Risk Management Program		■	
	Maintenance of Publicly-Owned Trees (ROWs)	■		
	Planting Program			■
	Tree Protection Policy	■		
	City Staffing and Equipment		■	
	Funding		■	
	Disaster Preparedness & Response	■		
	Communications		■	

Syracuse's tree inventory is a solid data source and the only indicator that scored in the GOOD performance level. Syracuse has made great strides in collecting data on public trees (a goal of the 2001 urban forest master plan). Since the 2000 inventory, the city has committed to keeping the data current through a full update in 2013, then initiating a new cyclical system starting in 2013 where 1/7th of all public trees are inventoried every year. Additionally, updates are made on a daily basis from fieldwork completed. The city also uses a customized version of the TreeKeeper® 8 software program to manage the tree inventory data. This software allows staff to run reports and analyses of the park and street tree data, track work histories of each tree, determine tree value and benefits produced, and enter budget data about planting and tree care. It is a powerful tool for data-driven management.

Urban canopy cover data is out of date. Canopy data, on the other hand, are significantly out-of-date (last completed in 2009) and should be updated in the short term to identify progress or losses. This information can direct where corrective actions may be required. Canopy assessments should be updated every 5 to 10 years.

There is a no formal maintenance/management plan in place, so tree maintenance is largely reactive. In a proactive maintenance program, tree work is typically performed as part of a cyclical care program where individual tree health, structure, and risk are assessed and addressed on a regular basis. Every tree in the inventoried population is regularly visited, assessed, and maintained. The inspection and maintenance are performed in defined management units on an annual rotation of between 6 and 10 years. The section *Why Prune Trees on a Cycle* in Strategy #5 shows the positive impacts of proactive care long-term tree condition.

A proactive management plan was developed for Council approval in 2003 but was never adopted, and thus a fully proactive program has not been funded.

Syracuse initiated the concept of cyclical, preventive tree maintenance again in 2016 by initiating an annual inventory of 1/7th of the public tree population to drive management decisions. However, because of budget constraints, proactive maintenance is only possible on 6% of the population, which equates to an 18-year cycle. The budget needed to prune street trees on a 6-year cycle would require an additional $500,000 annually at current contract rates. However, pruning large numbers of trees in one area can result in a 20-25% reduction in cost per tree to prune.

Syracuse Parks is consistently seeking grants and has been able to secure funds for tree planting and pruning when there is a strong volunteer/community or work force development component. However, with the exception of the re-inventory of trees and master planning, funders have not yet expressed interest in supporting projects in ongoing operations.

Details on implementation of a proactive care program can be found in Strategy #5.

Funding is not adequate for a proactive management approach. Adequate funding is needed to sustain and improve the urban forest management program. This will increase short-term and long-term public benefits, ensure that priority maintenance is performed expediently, establish proactive maintenance cycles, and fund planting.

The current annual funding level for urban forest management activities and staff is $897,000. These funds (from both general and capital funds) have increased approximately 32% over that last seven fiscal years. In that same time period, the work production levels achieved (number of removals, pruning, planting, etc.) increased 24%. The overall production rate increase does not exactly match funding increases due to rising costs for contractual services and expenditures on EAB treatments. However, these numbers do show that when given financial support, the city's urban forest management program produces results. Greater investment in tree care and planting will produce great dividends for the city and the citizens.

The city is encouraged to advance the establishment of its cyclical, preventive tree maintenance program. Estimates for additional funding are presented in Strategy #6.

Non-profit partner is taking on proactive care of young trees. Onondaga Earth Corps (OEC) recently initiated a young tree pruning program for newly planted trees and has pruned almost 2,000 trees in each of the last two years. Young tree pruning is an essential practice done 3-to-5 years after planting that will ensure development of a strong structure in future years and lessen likelihood of failure from storm damage or other stresses. Trees that are structurally pruned at a young age will also require less maintenance in future years.

Planting has accelerated in recent years thanks to County efforts; though future funding is uncertain. Over the last eight years, the Onondaga County Save the Rain program has ensured that approximately 1,100 trees per year have been funded and planted consistently. Onondaga Earth Corps plants 65% to 70% of these trees for the city, and the remaining public trees are planted by a contractor. However, the OEC's program is now coming to an end, and existing city funding only supports minimal planting (approximately 350 per year). Considering that an average of 700-800 trees are removed each year, it is clear that without additional funding for planting, the city will experience a net loss in the quantity of public trees each year.

Tree risk is known, but funding restricts corrective action. Trees provide many benefits whose values exceed the costs to plant and maintain them, but as living organisms located in areas of high human use, utilities, and valuable built structures, trees can present risks that, if unmanaged, can have catastrophic results. A community's top priority should be to minimize risk in the urban forest. Thanks to the extent and quality of the inventory data, there is information on tree condition and thus risk. However, as mentioned earlier, proactive efforts to reduce risk are not happening due to lack of funding risk reduction work.

Currently, the city does not have a written risk management policy or plan. Additionally, other departments and the general public do not fully acknowledge or understand how their actions can cause risk thereby increasing the liability of the city.

In spite of this, Syracuse is taking steps to reduce some risk given the resources available. The urban forestry division identifies and prioritizes the highest risk trees in its population using ISA and U.S. Forest Service tree risk assessment protocols and addresses them as time and resources allow.

No clear disaster management plan is in place. Disaster management plans detail staff roles, contracts, response priorities, debris management, and crisis communication plans. No formal emergency response and recovery plan is currently in place. While individual procedures related to disaster response exist within the city and public utilities, without a plan and central command structure, the overall approach for emergency management in the urban forest is considered efficient. Important next steps related to both risk and disaster management are detailed in Strategy #6.

Tree protection and preservation is a challenge. Syracuse's tree ordinances and development regulations are necessary to protect existing trees and tree canopy, thereby providing safety and a high quality of life for its citizens. Additionally, they work to ensure that all citizens benefit equally from trees and have access to urban tree canopy.

> **Challenge #1:** Existing code requires updating, simplification and outreach to community. The current versions of the City of Syracuse's Tree Ordinance, Property Conservation Code, and the Zoning Rules and Regulations were reviewed during the master plan process and discussed at stakeholder meetings.

Two Types of Risk from Trees:

Trees pose two primary types of risk: risks specifically during and after severe weather events, and risks from poor condition and/or as a result of insect or disease infestation.

Severe Weather Events and Managing Tree Risk. When catastrophic disasters such as tornadoes, ice storms, hurricanes, and severe straight-line winds strike an urban area, thousands of cubic yards of all kinds of debris are produced. Trees and vegetation can account for approximately 30% of this debris volume. Beyond the task of collecting and disposing of tree debris, the city has additional risk management considerations including increased threat to life from hanging limbs and uprooted trees, hindrance to life-saving efforts by blocked streets and driveways, power outages and power restoration efforts, and personal and public property damage. The impact of these additional tree-related considerations is not always quantifiable but can overwhelm public services and slow down the short- and long-term recovery process.

Non-Storm Related Tree Risk. Trees present risks when large dead wood and structural defects are present, root damage has occurred, and when insect and disease infestations weaken and damage trees. Additional risk management responsibilities and issues that are not related to damage caused by storms include: clearing leaves and woody debris from storm drains; pruning for sidewalk, street, and building clearance; eliminating line-of-sight conflicts for street and safety signage; removing blockages of street lamps and traffic lights; and dealing with conflicts between trees and overhead and underground utilities.

UPDATE: Overall, these regulations were found to be comprehensive and functional, but require updating to:
- adhere to current national standards and best practices,
- clarify penalties, and
- address tree protection regulatory gaps during land development that should be addressed by the ordinance.

EDUCATE: The public engagement work revealed that many businesses, citizens, and even some city departments are unaware of existing tree ordinance requirements, and/or did not understand the reasons for the regulations. Additionally, many found compliance to be complicated, bureaucratic, or burdensome. The clear message was that more outreach and easy-to-understand instructions are needed to increase awareness of and compliance with city tree regulations. The design standards manual currently being developed could become a good basis and example for information sharing and outreach related to city codes.

STAFF TO ENFORCE: Even the best regulations can be ineffective if there is not consistent enforcement. Currently, Forestry staff levels struggle to support diligent (and even routine) enforcement of code violations and permits. Additionally, a significant amount of permitting that takes place does impact trees, yet occurs beyond the purview of the Forestry Division. Strengthening the tree ordinance and zoning rules without sufficient and trained staff to inspect and enforce compliance will constrain tree protection.

Challenge #2: Current Sidewalk Policy Contributes to Canopy Loss. Tree removal due to sidewalk conflicts are another source of net loss of trees and tree canopy for the city. The repair of sidewalks accounts for up to 20% of tree losses along streets each year. Current sidewalk requirements use rigid standards that necessitate the removal of trees and do not consider alternative construction techniques and materials. Strategies to reduce tree and infrastructure conflicts and damage (preventive, remedial, or a combination), along with case studies from other cities, can be found in Appendix E. Recommendations to improve Syracuse's ordinances, better protect mature trees, and address sidewalk issues in the future are found in Strategies #6 and #7.

HOW DOES SYRACUSE MANAGEMENT COMPARE TO OTHER CITIES?

It is often valuable to compare Syracuse's urban forest management practices and performance with those of peer groups and national averages. This information is provided to give some perspective on Syracuse operations for use in broad discussions with citizens, elected officials, and other city staff.

Table 9 provides data comparing some of Syracuse's primary urban forest and urban forest management program metrics with national and regional averages in the categories of urban forest quantity, funding, program management, maintenance and planting, and tree benefit values. The national and regional benchmark data provided here should not necessarily be interpreted as a goal or best management practice (BMP) for Syracuse; the data is presented for comparison purposes only and does not imply that peer groups are following industry standards or other BMPs.

> ## A Positive ROI
>
> For every $1 of public funds spent on tree care, the city and citizens receive over $2 of annual benefits.

The benchmark information in Table 9 reveals both areas of strength and opportunities for improvement for Syracuse's urban forest and management program.

Indicators of positive trends from the benchmarking are that:
- Syracuse's urban tree canopy cover is on par with the national average and its peer group.
- The city enjoys a positive return on investment.
- However, the benchmark information reveals that Syracuse could improve its management approach…
- …by increasing its commitment to fund a progressive urban forest management program. In relation to the annual municipal budget, the amount dedicated to tree management is the lowest of all national and regional averages.
- …by increasing maintenance and using a proactive approach. Syracuse's the annual maintenance production rates are among the lowest.

Table 9: Urban Forest & Management Program Benchmarks*				
Data Point	Syracuse	National Averages	Cities with Pop. 100,000-249,999 Averages*	Northeast Region Averages*
General Statistics				
Number of public trees (estimated)	44,500	55,330	73,720	71,675
Public trees per capita	0.3	0.55	0.51	0.42
Existing urban tree canopy	27%	32%	29%	Not avail.
Urban tree canopy goal	Not determined	44%	45%	Not avail.
Funding/Budgeting				
Average municipal tree care and program budget**	$896,737	$801,595	$1,000,000	$1,122,843
Average annual budget per public tree	$20.15	$42.59	$44.85	$35.58
Average annual budget per capita	$6.76	$8.76	$9.05	Not avail.
Tree care and management program budget percent of total municipal operating budget	0.33%	0.52%	0.48%	Not avail.
Annual contractual services expenditures % of budget	58%	39%	34%	82%
Program Management				
Complete public tree inventory	Yes	67% (yes)	59% (yes)	Not Avail.
Staffing complement (full-time equivalent) ***	7.5	10	11.8	5
Agency/agencies responsible for urban forestry	Parks and Recreation	Public Works	Parks and Recreation	Not avail.
Management plan	Yes	50% (yes)	66% (yes)	Not avail.
Tree preservation ordinance	Yes	54% (yes)	53% (yes)	Not avail.

USING THIS ASSESSMENT. This assessment helps illustrate the improvements needed to achieve a more sustainable urban forest. These assessment results, when combined with a vision for Syracuse's future urban forest (discussed in the next section), help clarify the strategies for action going forward, and are the basis for the Strategies presented in this Plan. The 28 indicators of the assessment can also be used as benchmarks for measuring progress when the urban forest is reassessed in five to ten years.

CONTINUED: Table 9: Urban Forest & Management Program Benchmarks*				
Data Point	Syracuse	National Averages	Cities with Pop. 100,000-249,999 Averages*	Northeast Region Averages*
Maintenance & Planting				
Perform cyclical/preventive maintenance	No	55% (yes)	48% (yes)	Not avail.
Number of trees pruned annually	932	2,108	3,897	2,957
Number of trees removed annually	136	467	593	572
Number of trees planted annually	408	629	634	1,856
Number of trees treated for insects and disease annually	670	265	339	173
Desired cyclical maintenance cycle	6-10 years	4.8 years	5.2 years	Not avail.
Tree Benefit Values				
Value of public trees	$1,857,000	$68,665,110	$98,460,117	$118,942,106
Return on investment	01:02.1	02:25.7	02:38.5	01:10.6
* Mean statistics from Hauer R. J. and Peterson W. D. 2016. Municipal Tree Care and Management in the United States: A 2014 Urban & Community Forestry Census of Tree Activities. Special Publication 16-1, College of Natural Resources, University of Wisconsin – Stevens Point. 71 pp.				

IS IT WORTH THE EFFORT? Syracuse, like most cities, has many issues and challenges that need to be addressed. Some may think that improving the quantity and quality of the urban forest by investing public funds into the management of the program is not worth the effort. Data does show, however, that there is a return on investment. i-Tree estimates that Syracuse's street trees alone produce nearly $1.9 million in services to the community annually. Considering the average annual budget of just under $900,000, public trees provide a positive return on investment. For every $1 of public funds spent on tree care, the city receives over $2 of annual benefits. Additional funding for staff, equipment, and projects may be more easily justified with this strong supportive data.

Staffing Insufficient in Syracuse

Syracuse's urban forest management program responsibilities are extensive. The Forestry Bureau oversees all aspects of urban forest management including tree pruning and removal, storm response and contract oversight of additional tree pruning and removal, stump grinding and planting. Additionally, the department must respond to and inspect requests from citizens and other departments, address overhead and underground utility work in rights-of-way, review site plans, issue permits, appraise tree damage, coordinate work of nonprofits and program partners, attend community meetings, support special events, manage fleet and personnel, and perform other administrative duties.

To accomplish this workload, the urban forestry program has six full-time staff and two part-time or temporary positions that include Certified Arborists, an equipped field crew, administrative support, and part-time positions. For reference, the 2014 Municipal Tree Care and Management in the United States survey reports that cities similar in size to Syracuse had on average 12 full-time and 3 part-time positions dedicated to the urban forest program.

The Onondaga Earth Corps has partnered with the city to fill some gaps in capacity for this work, especially in the areas of planting and young tree care. OEC crews have planted around 900 trees annually and now are performing essential young tree pruning (as described earlier).

Additionally, there is limited ongoing staff training or budget program within the Forestry Department. Street crews attend annual safety training in compliance with OSHA standards for workers' safety, and some staff are involved in the International Society of Arborirsts (ISA), but the urban forestry program should expand to a more comprehensive, ongoing, and consistent training program. This is essential for keeping staff safe, efficient in their work, and motivated about learning new skills. This is addressed in Strategy #6.

MOVING FORWARD: VISION, MISSION, AND GOALS

An important first step to creating an efficient, effective, and fair plan of action for improving and protecting the urban forest is to clearly define the community priorities, vision, and goals.

MOVING FORWARD: VISION, MISSION, AND GOALS

THE ENGAGEMENT PROCESS

The ultimate vision for this plan was developed from an extensive process of community engagement and discussions with city and community leaders. In late 2017, a core team of partners including the City of Syracuse Division of Forestry, the City's Division of Planning, the Gifford Foundation, and Onondaga Earth Corps convened a group of steering committee members to advise and participate in a public outreach campaign.

The outreach campaign, branded ReLeaf Syracuse, was designed to engage a wide range of community stakeholders in planning for the future of the city's forest.

ReLeaf Syracuse work included:

- Three stakeholder meetings in February-April 2017. A series of meetings were held for 40 to 60 organizational representatives and followed a well-established model for urban forest assessment. These meetings were also used to design the goals and approach for the broader public outreach campaign planned later in the year.
- Seven community meetings and surveys in the summer 2017. Onondaga Earth Corps conducted further outreach through the summer and fall of 2017 that was designed to engage a wide range of citizens with the goal of providing an educational, interactive, and easy way for community members to provide input about their hopes, challenges, and dreams for the city's tree cover. The full results and summaries of these efforts can be found at: http://www.syracuse.ny.us/Parks/forestry.html
  - Seven public meetings were hosted in collaboration with neighborhood partners at locations Downtown, in Eastwood, and on the North, South, East, and West Sides of the city. Three targeted meetings to reach non-native English speakers also took place on the North Side. Each community meeting had a series of interactive stations set up to provide information about the state of the urban forest as well as to solicit input from participants.

○ A public survey was developed by the project partners (in digital and print formats) and distributed widely via partner e-mail distribution lists and through social media. OEC young adult crewmembers also set up at targeted neighborhood "street corners" to invite community members to take the survey and attend public meetings. Over 1,200 surveys were completed.

- One-on-One Interviews. City and OEC staff also participated in one-on-one interviews. The city departments or division that were interviewed included: Operations, Sidewalks, Engineering, Business and Community Development, Planning, and Parks.

THEMES THAT EMERGED FROM PUBLIC DISCUSSIONS

Eight themes emerged during the public engagement process. These themes were:

- The need for more education about trees
- The importance of reaching underserved populations
- The importance of providing equitable distribution of tree canopy cover
- The need for better tree maintenance
- The need for improved land development regulations
- The desire to explore urban agriculture further
- The need for a citywide canopy goal.

More information about each of these can be found in Appendix D and from the full public engagement report which can be found at:
http://www.syracuse.ny.us/Parks/forestry.html

RESULTING VISION, MISSION & GOALS

Based on the findings from the public engagement process and informed by the analysis of existing data, plans, policies, regulations, and procedures in place, the following vision, mission, and goals were formed. The vision and the three goals also serve as the guiding basis for all strategies recommended in this plan and will be the foundation for framing next steps over the next 20 to 30 years.

VISION

Citizens of Syracuse will enjoy a high quality of life through an abundant, resilient and safe urban forest that is integrated into city-wide planning and our everyday lives.

MISSION

To grow and sustain an urban forest that is cherished by its citizens.

GOALS

We intend to advance Syracuse's urban forest master plan by working towards three goals:

Goal 1. Grow canopy equitably
This plan recommends increasing canopy from 27% to 34%. This 7% increase (an estimated 984 acres) would place Syracuse just above the national average of 32% for cities its size. It would require an additional 57,400 trees be planted over 20 years or 2,870 trees per year*. This does not include trees that need to be planted to account for losses. The City can lead the way on this effort as a significant amount of this goal can be achieved on a variety of publicly-owned lands. Since the public input process revealed a consistent desire to expand canopy, an implementation team of committed stakeholders could propose more aggressive canopy goals focusing on lands not controlled by the city.

Goal 2. Improve urban forest safety and resiliency.
Syracuse can achieve a safe urban forest through regular inventory intervals, consistent pruning cycles and systematic removal of structurally compromised and unhealthy trees. A resilient urban forest is realized through strategic planting to ensure species and age diversity and improved site condition to optimize survival, growth and benefits across all neighborhoods and business districts. Fully funded forest operations, improved design standards and construction practices, increased tree protection and better enforcement of rules on the books will protect what we have. At public meetings and through surveys, residents indicated that the city should prioritize increasing canopy where it is needed most.

Goal 3. Connect the entire community to the urban forest.
This plan strives to connect the whole community to the urban forest through equitable canopy distribution, information and resources that are easy to find and education and training that is readily available. This will improve opportunities for Syracuse residents to value, care for and preserve trees and forests in the city. Robust education and stewardship programs are a keystone to increasing tree canopy on the 80% of lands not controlled by the city.

SECTION 4:

STRATEGIES FOR ACTION

Syracuse envisions a healthy, diverse, and resilient urban forest that contributes to the health and well-being of the community and improves the livability of the city. The issues and challenges facing Syracuse that directly affect the urban forest have been discussed in this plan, and the recommendations that follow are intended to be a set of practical next steps towards achieving the vision.
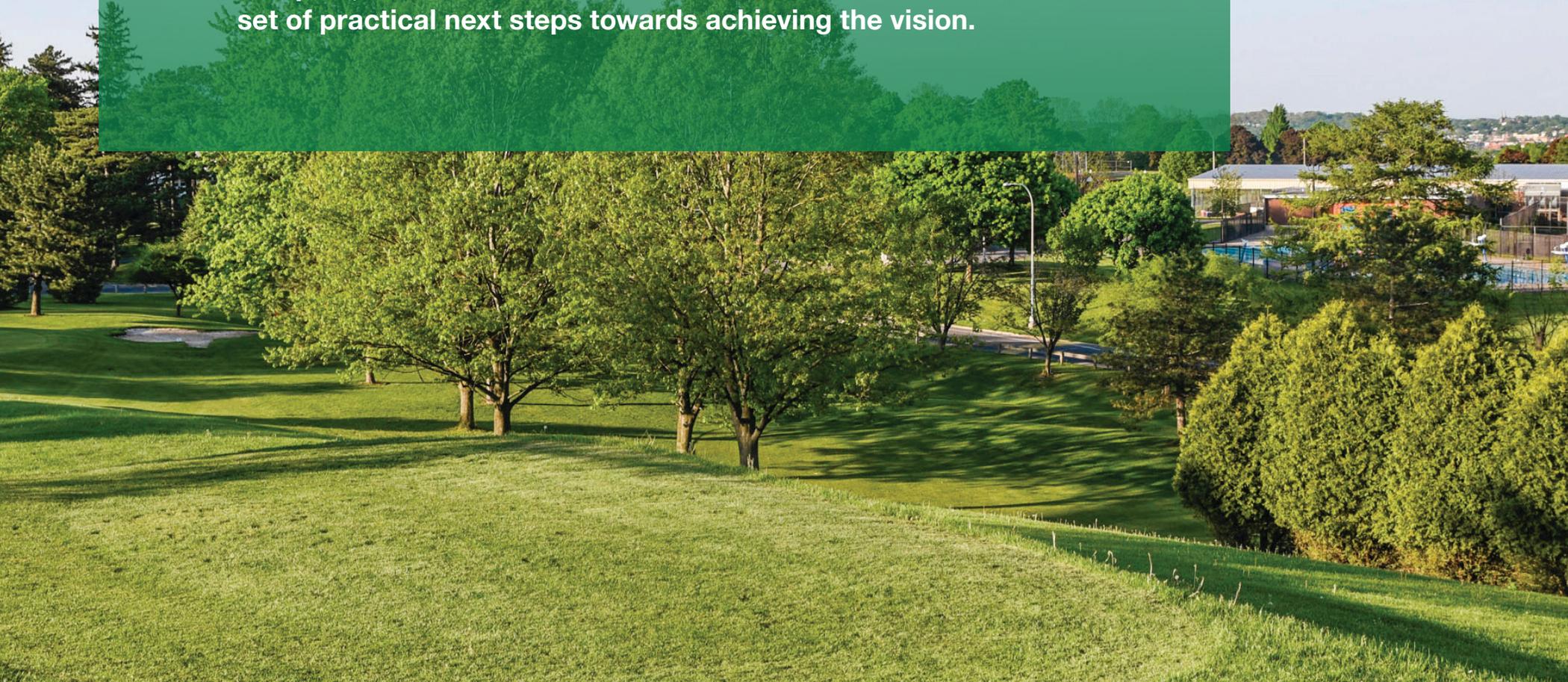
STRATEGIES FOR ACTION

Achieving the desired forest of the future requires long-term vision and a commitment to work in "tree life-cycles"—not electoral or administrative cycles. Creating a sustainable urban forest and a proactive management program requires coordination, collaboration, and expert input from multiple disciplines, including planning, engineering, urban design, landscape architecture, economics, and sustainability. Likewise, the community's sense of place and capacity for change needs to be understood and included in decision-making to ensure a responsive approach when managing Syracuse's urban forest.

The following 12 strategies are offered as a means to achieve stated goals and to be responsive to the needs of the citizens:

Table 10: Strategies to Achieve Goals
Grow Canopy Equitably
• Strategy #1: Assemble a Plan Implementation Team
• Strategy #2: Obtain Updated Tree Canopy Data
• Strategy #3: Set Goals, Prioritize Areas of Need
• Strategy #4: Officially Adopt and Incorporate Master Plan
Improve Urban Forestry Safety & Resilience
• Strategy #5: Fully Fund and Implement Proactive Management & Risk Program
• Strategy #6: Update Tree Ordinance with Improved Design and Protection/Preservation Measures
• Strategy #7: Address the Sidewalk/Trees Conflict
• Strategy #8: Create a Purpose-Based Planting Plan that Reflects City Goals
Connect the Entire Community to the Urban Forest
• Strategy #9: Increase Public Awareness of Value & Important of Trees in Syracuse
• Strategy #10: Improve Lines of Communication
• Strategy #11: Create and Implement an Outreach Plan to Reach Multiple Audiences
• Strategy #12: Encourage Tree Planting and Preservation on Private Property

GOAL #1. GROW CANOPY EQUITABLY
STRATEGY #1: ASSEMBLE A PLAN IMPLEMENTATION TEAM

This plan suggests many improvements for the management of *public* trees, but as only 20% of the city's tree canopy is on public property, real progress will require the efforts and support from the community at large. A team approach to implementation of this plan is critical to long-term success.

It is recommended that the City and OEC harness the existing momentum and interest from stakeholders and the public that was generated during the development of this plan. Many organizations represented in the stakeholder group (see full list in Appendix B) expressed genuine interest in continuing on with this effort, and many made substantial offers of support they could give and to ensure this plan is implemented. These people could form the core of a "Plan Implementation Team." This informal team/group can convene regularly and build working groups based on their strengths and interests.

An implementation team can also provide avenues for further public engagement. It can serve as a way for the public to get involved (through organized volunteer events) as well as engaging new partners through invitations to this team based on the players identified as missing from the process or lacking engagement. An implementation team can also provide the larger structure necessary to engage and direct individuals. focused on individual strategies.

STRATEGY #2: OBTAIN UPDATED TREE CANOPY DATA

Urban tree canopy assessments (UTCs) should be updated every 10 years to gauge progress and identify areas and reasons for any losses that may be occurring (see Appendix A for more information about various types of UTC methods). The last assessment was completed in 2009.

This data will enable identification of not just trends of gains or losses in canopy, but also where the largest canopy changes are actually occurring. An updated UTC will also help identify areas of concern, along with ways to rectify losses and get back on track to reach future canopy goals.

As this is extremely valuable information, is it recommended to plan and budget for this update in advance. To that end, we recommend taking these steps in the near-term:

Public Asks for Canopy Goal

The citizens and stakeholders agreed that setting a canopy goal was one of the best ways to plan for future trees and tree canopy in Syracuse.

An up-to-date UTC assessment will help inform this goal.

- **Plan for a UTC Update in 2019.** Syracuse's last complete UTC was completed using 2009 aerial data. A 2019 high resolution UTC assessment (using LiDar) will provide information on areas that are gaining or losing canopy and allow the city to plan accordingly to achieve an even distribution of benefits. A comparison of the canopy levels to the distribution of the population might reveal areas that need more attention. This information can also be used to provide a more accurate measure of the several of benefits provided for each of the citizens by the trees in Syracuse.

  Tampa is one example of many cities which requires the regular update of the UTC in their tree ordinance (Tampa Ord. No. 2006-74, § 9, 3-23-06); Syracuse may want to consider this approach or cite it as a requirement in the next update of the comprehensive plan or sustainability plan, and include it in long-range, citywide budgeting discussions.

- **Explore Partnerships and Secure Funding in Advance.** Generally, after an initial UTC is performed, it becomes easier and less expensive to follow through with updates. However, funding should still be secured in advance as this expense is above the normal scope of an annual forestry budget. UTCs can be implemented on a larger scale, like on the county or regional level, which also has the potential to save costs through partnerships. Funding from Onondaga watershed groups or New York State DEC may help also defray costs while gaining valuable land cover data to gauge progress and trends both among the trees and watersheds, allowing both groups to make more educated decisions about how to protect these important ecological resources. State and private grants are also a source of funding for all or part of a UTC project.

STRATEGY #3: SET GOALS AND PRIORITIZE AREAS OF NEED

Once canopy data is updated, a number of objectives can then be accomplished which will move Syracuse closer to achieving its urban forestry goals.

1. **Identify areas of highest need for canopy.** The new and older canopy data can be compared to identify specific areas of losses or gains. Canopy can also be overlaid with socio-economic census data and other statistics to identify areas of Syracuse where canopy is needed most. Other factors the community thinks are relevant to tree canopy equity and quality can be combined with the UTC analyses to identify areas of need for canopy improvement (whether adding trees or improving tree maintenance for existing trees). Weighing the factors selected for the UTC analysis helps set priorities.

2. **Set a canopy goal.** This can be formed by setting realistic goals for each neighborhood and, from those numbers, determining a citywide goal, or using relative canopy as an aid to set goals. The most important aspect of setting a canopy goal is determining how many trees need to be planted to create an acre of canopy and over what time scale that estimate will be based on (e.g. 200 trees for every acre of canopy assuming 100% survival after 20 years). The committee can research how cities are increasing canopy and the rationale for canopy goal and planting targets are chosen.

STRATEGY #4: OFFICIALLY ADOPT AND INCORPORATE COMMUNITY GOALS

This plan defines a city mission to maintain and grow existing canopy while increasing canopy quality, equal distribution, and diversity (see the detailed community vision in Appendix D). It is vital to incorporate these goals into city policy to ensure their survival and momentum during inevitable transitions in leadership and staffing in the coming years. By including urban forestry goals in multiple and relevant policies and code, the city establishes tree canopy as a priority from the outset and into the future.

Adoption and incorporation of the plan and the urban forest into city policy can be done in the following ways:

1. Adoption by City Leadership. It is recommended to have the city leadership commission (Common Council, other appropriate bodies) officially adopt, or otherwise recognize, the full urban forest master plan, including the canopy goals and vision.

2. Referenced in Comprehensive Plan Updates. At a minimum, the vision and goals related to tree canopy should be incorporated into the next update of Syracuse's comprehensive plan. In the most recent update, adopted in 2014, entire new sections were added to the comprehensive plan, including a sustainability plan as a component. The Urban Forest Master Plan should be incorporated as well.

3. Incorporation into Appropriate Development Regulations. City tree ordinances, regulations, and policies should include a general reference to the canopy goal and future vision/goals for the urban forest. This helps property owners and developers understand why the regulations are in place and sheds light on how tree canopy is critical to a healthy community. It also serves to reinforce Syracuse's commitment to trees as valued city infrastructure. Note that an exact canopy goal (if chosen) number should not be referenced in ordinances and regulations, as it may change over the years.

4. Inclusion in Other Relevant Documents. Inclusion and mention in other relevant planning projects used by the community (i.e., Capital Improvement Program, Long-Range Transportation Plan, etc.) should be considered as they develop and are updated. Keep in mind that this should extend beyond plans that focus primarily on greenspace, but also target those plans aimed at improving areas of the community overall, such as mobility plans, business district improvements, public health initiatives, and more.

Generally, the city should consider adopting a "trees in all policies" philosophy. Since trees provide benefits in terms of public health, safety, and welfare, and can present risks if not properly maintained, all policies should also protect trees. Ultimately, a government that acts in the *interest of its people* would also have to act in the *interest of the trees producing tangible benefits to those people*.

GOAL#2. IMPROVE URBAN FOREST SAFETY & RESILIENCY

STRATEGY #5: FULLY IMPLEMENT PROACTIVE MANAGEMENT AND RISK REDUCTION PROGRAMS

Proactive urban forest management programs that include a focused risk management objective increase resiliency and longevity, and greatly reduce risk and storm hazards through proper planting, preventive maintenance, and systematic risk reduction.

Syracuse has diligently acquired knowledge of its urban forest, and is working toward a proactive care program. However, funds and staffing are currently inadequate to fully pursue a proactive management program. It is strongly recommended that Syracuse officially adopt a proactive care and risk management program, and that the city works toward fully funding an incremental and realistic program of proactive care.

This recommendation is one of the most important steps to providing effective care and lowering costs of care in the long term. This will, however, require additional resources in the short and mid-terms to realize long-term cost benefits.

The following recommendations are part of the strategies needed to implement a proactive urban forest and risk management program.

1. Create a Management Plan for Public Trees. Unlike master plans, management plans are created to guide the regular operations of an urban forestry program. They are typically written for a five-year time frame and contain information and analyses that are important for projecting maintenance priorities and costs and developing short-term plans of action to be implemented daily, monthly, or yearly by the urban forest

City Comprehensive Plan Calls for Cost Saving Management

The Syracuse Comprehensive Plan 2040 specifically calls for improvements in efficiencies:

"Given the city's growing fiscal constraints, the following priorities emerge as critical to cost-savings and efficient provision of services: Prioritize regular maintenance that will save future costs"

It is proven that proactive care of the urban forest reduces planting and maintenance costs significantly over time and reduces the cost of municipal liabilities and litigation related to trees.

management program. Management plans also prescribe metrics and benchmarks for production and achieving goals.

A management plan uses accurate and comprehensive tree inventory data to map out a plan of action for trees on public land. An official management plan better defines and more specifically details what resources are needed for the urban forest management program to function using available resources in the given timeframe and current best management practices.

A proactive management plan will address the 61% trees in the public urban forest that are currently ranked as being in "fair" condition. If neglected, even in the short term, the majority of these fair trees could easily become "poor" or "worse" in condition, causing risk and unnecessary financial burden. With proper proactive care, fair trees can improve to good condition and continue to provide ecosystem services benefits for many years to come.

In Syracuse, the current management approach to tree care is mostly reactive given the large scope of trees and limited budget. This style of reactive care is not ideal for risk management, efficient budgeting, and overall tree health. For instance, the trees in most need of maintenance for public safety reasons may not be attended to first in a reactive approach, as shown in the data analysis case study of Largo, Florida (see "The Case for Proactive Care" inset below). Tree populations on a 6- to 10-year maintenance cycle are less prone to severe storm damage, and, in the long term, maintenance program costs are reduced once the cycle is established.

The Case for Proactive Tree Care

The City of Largo, like many cities in the U.S., primarily plans tree work in response to requests from citizens, often submitted via the eGov (311) system. Davey Resource Group analyzed two years of eGov tree-related service requests by comparing the requested service locations to locations of trees in poor condition.

While the map indicates that calls (blue dots) are coming from all over the city, most of the calls are not coming from the areas in highest need of pruning and care (shown in red) according to the city's professionally-completed tree inventory. This suggests that Largo's request-based system does not effectively reach the trees with the highest need for care and is, therefore, an ineffective method for managing the urban forest. A proactive care plan is integral to real progress and effective maintenance.
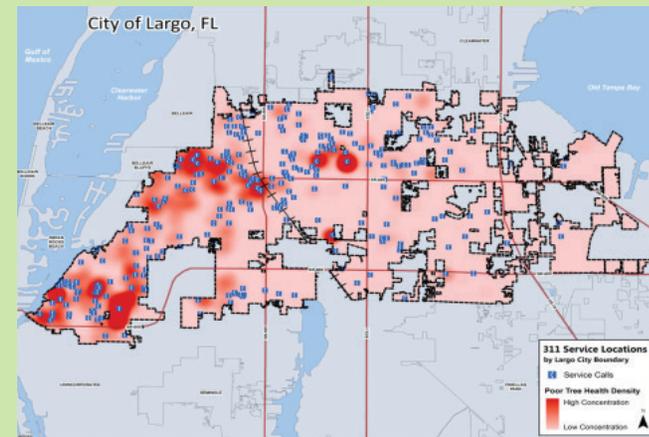
An important component of preserving and expanding tree canopy in Syracuse is to ensure that all public trees are properly and proactively cared for. Proactive tree management programs have been shown to reduce long-term care costs, increase public safety, provide more predictable workloads and budgets, reduce utility outages from storms, and improve the health and appearance of the urban environment.

DRG recommends that the city commit the resources needed to firmly establish an ongoing, cyclical management program for the city's set management sectors to methodically inspect, prune, care for, and plant new trees.

A sample basic cyclical tree care program is shown below:

- **Year One**
  - Sector 1: Inventory Update
- **Year Two**
  - Sector 1: Tree Care (Pruning, Removals, Health Care), Planting, and Public Engagement
  - Sector 2: Inventory Update
- **Year Three**
  - Sector 1: Year 1 of Young Tree Care
  - Sector 2: Tree Care, Planting, and Public Engagement
  - Sector 3: Inventory Update
- **Year Four**
  - Sector 1: Year 2 of Young Tree Care
  - Sector 2: Year 1 of Young Tree Care
  - Sector 3: Tree Care, Planting, and Public Engagement
  - Sector 4: Inventory Update
- **Year Five**
  - Sector 1: Year 3 of Young Tree Care
  - Sector 2: Year 2 of Young Tree Care
  - Sector 3: Year 1 of Young Tree Care
  - Sector 4: Tree Care, Planting, and Public Engagement
  - Sector 5: Inventory Update
- **Subsequent Years**
  - Restart cycle from beginning

2. Develop a Risk Management Policy and Plan. A defensible risk management program establishes and defines the level of care that is appropriate given a community's available resources for a specified time horizon. When properly developed, documented, and executed, a more robust tree risk management program will elevate the effectiveness and responsiveness of the city's overall community forestry program.

Trees provide many benefits whose values exceed the costs to plant and maintain them, but as living organisms located in areas of high human use, utilities, and valuable built structures, trees can present risks that, if unmanaged, can have catastrophic results.

Syracuse's top priority should be to minimize risk in the urban forest. Currently, Syracuse has identified and prioritized the highest risk trees in its population using ISA and U.S. Forest Service tree risk assessment protocols and plans to address them as resources allow.

However, the city does not have a written risk management policy or plan. Likewise, other departments and the general public do not fully acknowledge or understand how their actions can cause risk—thereby increasing the liability of the city. A defensible risk management program has a plan and/or policy that establishes and defines the level of care that is appropriate given a community's available resources for a specified time horizon.

A risk management plan or policy will help the city set goals, determine metrics, and answer questions that are essential to public safety, such as:

- Are all trees in highly trafficked areas visited annually?
- What is the city's threshold for acceptable risk?
- Is there a tree emergency management process in place?
- Is it part of a larger disaster or storm response plan?

When properly developed, documented, and executed, a more formal and robust tree risk management program will elevate the effectiveness and responsiveness of the City's forestry program.

Why Prune Trees on a Cycle?

Miller and Sylvester (1981) examined the frequency of pruning for 40,000 street and boulevard trees in Milwaukee, Wisconsin. They documented a decline in tree health as the length of the pruning cycle increased. When pruning was not completed for more than 10 years, the average tree condition was rated 10% lower than when trees had been pruned within the last several years. Ideally, municipalities should strive towards a five-year pruning cycle, though in the real world, longer cycles are often necessary due to budget constraints.
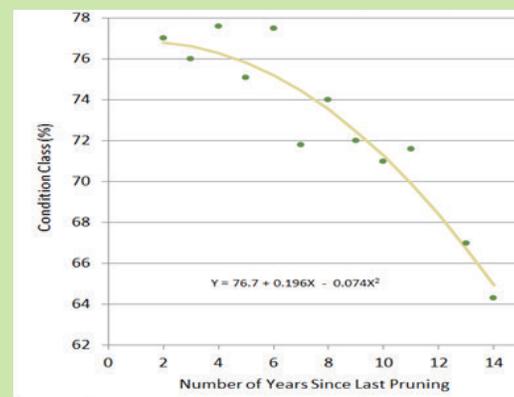
Relationship between average tree condition class and number of years since last pruning (adapted from Miller and Sylvester 1981).

3. Resources Needed for Proactive Care. Adequate funding for a proactive urban forest management program represent an upfront cost but will save the city money in the long-term when compared to continuing with a reactive approach. The funding needed to implement proactive care and risk management is detailed below, along with a strategy for gradual changes to meet those resource needs. An assessment of current staff resources has also been performed, and recommendations are made to successfully implement a proactive management program—particularly for plan review, development inspections, code enforcement, pruning and removal operations, and public education.

 a. Funding. Based on the current inventory data, and regional average costs for tree maintenance and planting, the estimated annual urban forestry budget needed to provide cyclical maintenance on a five-year rotation and perform routine maintenance, stump grinding, young tree maintenance, and replacement planting is $2,758,000. The annual budget required for a 10-year proactive cycle and all other urban forest management tasks is approximately $1,380,000.

 Considering the city currently allocates approximately $897,000 annually for urban forest management, a significant budget shortfall is apparent and is a barrier to implementing a proactive, cyclical maintenance program for any time frame under 10 years.

 While a proactive program can raise current budgetary needs in the short term, over the long term this level of care will reduce municipal tree care management costs, increase tree benefits, and likely minimize the costs related to other city infrastructure such as stormwater management, energy use, sidewalk repair, etc.

 b. Staffing. Syracuse staff perform their duties and tasks well, but need additional support to perform important functions that benefit the urban forest and other city departments as well.

 i. Specifically, two full-time positions are recommended; one dedicated to perform timely and thorough inspections of construction and land development projects, and the other dedicated to responding to service requests, damage claims, illegal removals, and performing other non-emergency tasks. One to two full-time positions to create a second fully-equipped field crew would also increase response time for service requests and allow the city to accelerate its proactive maintenance cycle. If the city personnel compliment cannot be increased immediately or at any time in the future, then contractual professionals can be retained to perform these functions in the interim.

Implementing Cyclical Care: Cincinnati Case Study

The City of Cincinnati's urban forest management program officially began in 1982. Prior to that, tree maintenance was performed only on a reactive basis. There were thousands of trees in need of maintenance and the backlog for resolving service requests was over two years. While still responding to priority tree maintenance, resolving storm damage, and planting trees, the city began to perform inventory and preventive maintenance tasks each year on a limited basis in six management units as the budget would allow. It took approximately 15 years to complete one cycle of preventive maintenance in the six units.

Currently, the city has firmly established a 6-year cycle for its public tree inventory update and preventive maintenance program. The city's urban forestry staff report that the investment of time and funding for preventive tree maintenance has decreased tree-related risks and liability, decreased the incidences and severity of storm damage, improved response time for all tree maintenance requests, improved the health of public trees, and increased the benefits trees provide the city and citizens. For instance, in the year following preventive maintenance, there is an 85% reduction in emergency and routine service requests, and even after four years there is a 40% reduction.

ii. If the goals and recommendations of the Urban Forest Master Plan are to be reached, the program needs more crews to perform tree maintenance, and needs technical and administrative support staff so that the skilled workers can perform more specialized work. Additional forestry staff with clearly defined job responsibilities will provide better and faster response to citizen and interdepartmental requests. Increased responsiveness will reduce public tree risks, increase customer service, elevate the professionalism of the program, and improve operational efficiency.

iii. Staff should also receive training so that they can acquire and maintain professional credentials that are the recommended minimum standards in the industry and are commonly required and/or supported by other municipalities. These include the ISA Certified Tree Worker, Certified Arborist, Municipal Specialist, and the ISA Tree Risk Assessment Qualification.

Training can be provided by a variety of sources such as other city and county employees, National Grid, equipment manufacturer representatives, and local and regional professional organizations. Depending on the topic, training can be offered annually, seasonally, at weekly "tailgate" sessions, or as needed.

Training does more than just educate workers. Training supports professional development and job advancement, and positively influences attitudes and morale. By providing a variety of quality training programs on a consistent basis, urban forestry staff can stay motivated about learning new concepts and performing their work responsibilities in the best, safest, and most effective possible ways.

STRATEGY #6: UPDATE TREE ORDINANCE WITH IMPROVED DESIGN AND PROTECTION/PRESERVATION MEASURES

Trees are city infrastructure, just as much as roads and utilities. Therefore, to be recognized as the valuable infrastructure components they are, public trees need to be treated as such by not only actions and policies, but in municipal codes and regulations. Tree protection goals and standards are frequently found in many city regulations, such as:

1. Tree ordinances: where public trees are protected from harm, and standards of planting and care are prescribed.

2. Zoning codes: where regulations and processes are defined that protect trees and require tree replacement during land development, particularly on private property

3. Sidewalk policies and regulations: where the treatment of trees and acceptable mitigation solutions are defined (see Strategy 8 for more information)

4. Design manuals: where specifications are made available that guide actions that will affect tree health and longevity, Syracuse has a long-standing tree ordinance, but it should be updated to address better tree protection and to bring other sections and administrative items in line with national standards and to reflect city goals. Revisions to the ordinance will be discussed here, along with potential related needs that will come from new code, such as education, staffing, etc.

Syracuse's current tree ordinance does contain the basic provisions needed to establish the city's authority, define performance standards, and enforce penalties. However, it should be updated to reflect current industry standards and to be clearer as to what is regulated, what is required of individuals and businesses to be in compliance and the costs and fines associated with non-compliance.

From the stakeholder meetings and discussion with staff during the master plan process, it became clear that having an ordinance with urban forest regulations, a permit process, and penalties was an expected and accepted responsibility of the City and was not a significant negative issue. The ordinance itself does not appear to be a barrier to doing business or owning property in the city; but what was a barrier and/or fostered frustration and negative opinions was the lack of understanding about why the ordinance was in place and how its provisions improved the safety and quality of life in the city.

A revised Street Tree Ordinance has been drafted as part of the master planning process, which has yet to undergo public review and Common Council approval. The draft as currently written has been simplified, clarifies administrative responsibility, and includes expanded Findings, Purpose, and Definitions. Other changes in the current draft include new protections for tree planting and tree removal during land development by requiring permits be obtained, replacement trees be planted on-site or off-site in publicly controlled "Tree Banks," and/or in lieu fees be paid to the city and placed in special dedicated funding accounts. Additionally, compensation for damage and penalties for violations have been revised and increased.

Therefore, the following recommendations are made:

1. **Review and officially adopt the revised tree ordinance** which now has new or revised sections or sub-sections to address and clarify ordinance administration, performance standards, tree protection and mitigation during development, and penalties.
2. **Complete the development of design standards manual** to document improved performance standards and subsequently improve compliance with tree planting and protection regulations and policies. Ensure that updates and revisions to the Zoning Code are aligned with the tree ordinance.
3. **Educate the community at-large on the updated ordinance and manual.** Educating developers, commercial businesses, utilities, tree service and landscaping companies, and the general public was identified in stakeholder meetings as a key activity needed to ensure greater cooperation and compliance. The community needs simple and frequent messaging about what is regulated and what are acceptable actions, but more importantly why certain actions are regulated and how they can do the right thing within the urban forest. Simple one-page "how to" or "I want to…" guides can be written and posted on the city's website or printed and given to permit applicants.
4. **Educate appropriate city staff** (such as members of code enforcement, public works, engineering, water, etc.) about the ordinance requirements so they can be more alert to potential violations.

STRATEGY #7: ADDRESS THE SIDEWALK AND TREES CONFLICT

Trees and sidewalks present challenges in every city. In Syracuse, sidewalk conflicts with trees account for almost 20% of the street trees removals that take place each year. Addressing the sidewalk/tree conflict issue could alleviate significant tree losses and allow more tree planting, both of which would ensure continued canopy growth and maximize the greater benefits from mature trees citywide.

Based on the outreach efforts for the master plan, it is abundantly clear that the citizens consider tree and sidewalk conflicts one of the greatest challenges to better manage the urban forest, and they want to see change in the city's current practice of requiring property owners to pay for sidewalk repair by following a narrow list of acceptable solutions. Public input also revealed that citizens assume that trees are the major contributors to the problem of sidewalk disruption and damage in Syracuse.

However, this assumption merits scrutiny and educational outreach since arboricultural research and practice indicate that other factors can be the primary reasons sidewalks fail, and tree removal may not be the only or best solution.

Trees certainly can displace sidewalks, but acknowledging this fact does not lead to the conclusion that trees are the principal reason for sidewalk failure. Science requires that we look at the problem without the bias of starting with a known problem (see "Contributing Factors in Sidewalk Failure" in Appendix E).

> **Sidewalks are the Biggest Challenge in Syracuse, According to the Public**
>
> Outreach done for this plan revealed that the public believes that roots breaking and heaving sidewalks and other pavement surfaces is one of the largest concerns and challenges with trees in Syracuse.
>
> From both the public meetings and in survey results, city residents showed significant interest in exploring sidewalk management beyond the status quo and are willing to consider different models of cost sharing which would allow the city to take on the primary responsibility of repairing sidewalks. Numerous comments were also made about the importance that any solutions not carry a disproportionate burden on low-income residents.

In Syracuse, the current regulations and standard operating procedures regarding sidewalks are in direct conflict with the desire to preserve existing trees and the goal to provide more trees and canopy benefits for the citizens. City staff recognize this and are currently considering significantly revising the city's sidewalk policies and program.

In support of a more modern and proactive sidewalk program that considers trees as an equally valuable infrastructure asset on the right-of-way, the city is encouraged to consider how other cities address this issue and then make changes or take appropriate further action to find customized solutions for Syracuse and its citizens. Case studies from other cities related to trees and sidewalk policies, various approaches to funding, and strategies to reduce tree and sidewalk conflicts are found in Appendix E.

The city's urban forestry program already takes action to reduce sidewalk conflicts and maintain safe rights-of-way by planting the appropriately sized tree (at maturity) in the space available, performing tree risk assessments before and during sidewalk repair work, and removing trees when needed and then replanting as appropriate. The urban forestry staff should be a key contributor to the city's ongoing discussion about revising sidewalk policy, standards, contracts, and construction specifications.

While this issue is currently in review, the following recommendations are made to consider when discussing changes to the city's sidewalk policies:

1. Investigate Alternative Materials and Construction Techniques. Currently, only standard concrete is allowed, though many other pavement options are available today. Alternative construction materials and methods to protect already-developed and developing root systems will allow greater flexibility for planting as well as for preserving mature trees as long as possible.

2. Sidewalk Repair Contract Changes. Changing the two-year contract term to a one-year term, and/or incorporating greater flexibility in the sidewalk construction specifications, would allow the city to use new construction and tree protection technologies and options as needed.

STRATEGY #8: CREATE A PURPOSED-BASED PLANTING PLAN THAT REFLECTS CITY GOALS

Continual tree planting is essential for the growth and sustainability of Syracuse's urban forest. Tree planting is also essential for the city to reach a number of its goals. For the urban forestry program to be more efficient and effective, responsive to the citizens, and address important issues in the city by expanding the tree canopy cover, a planting plan should be developed.

Any new tree is an asset to the city. But, when faced with restricted funding and resources for new tree planting, a plan based on overall citywide goals and crafted with clearly defined objectives will assure that efforts and funds invested in new trees will provide the most returns.

As the citizens clearly expressed, one of their top priorities for Syracuse is to increase the urban tree canopy where it is needed most, with the goal of a more equitable distribution of tree cover within the city.

During the public engagement process, citizens demonstrated that they know trees improve human health, decrease pollution, decrease urban heat, and beautify the neighborhoods they live in. For these reasons, equitable distribution of the benefits associated with trees is a priority for the public.

Tree planting is part of the solution in Syracuse to attain...		
City Goals	**Sustainability Plan Goals**	**Citizen Goals**
Achieve financial stability	Increase the urban tree canopy	Plant more trees in parks and on streets
Increase economic investment and neighborhood stability	Decrease urban heat island effects	Increase the urban tree canopy in areas that need it the most
Provide quality constituent engagement	Improve stormwater with green infrastructure	Improve public health
Higher quality of life	Reduce heat island effect	Beautiful all neighborhoods equally
Deliver city services efficiently, effectively, and equitably	Improve the quality of life for citizens	

The urban forestry program is well-prepared to respond to the citizens' need by creating a purpose-based citywide planting plan. The city has access to a vast amount of GIS mapping and other geospatial data to create a practical plan. Using tree inventory data, land cover data, underground and aerial utility locations, and right-of-way information, the city could identify all potential planting areas on public lands. Using similar information for commercial and institutional private lands, including ownership contact information, planting opportunities can be identified on private lands as well.

A master tree planting plan will make tree canopy expansion "shovel-ready" when city funds, grants, mitigation funds, fund-raising projects, and partnership agreements are available. And, all tree planting locations identified can be prioritized, based on stated goals of the city and its residents. Those goals include planting trees to support and encourage education at schools, enhance Syracuse's parks, complement economic growth, improve the quality of the tree canopy, and ensure equal access to trees and their associated greenspaces for all citizens.

> ### The Public Asked for More Trees Where They are Needed the Most
>
> Outreach for this plan revealed that the top three priorities from the public are to:
>
> 1. Plant more trees on public spaces that need them most;
> 2. Manage the trees we have better; and
> 3. Plant more trees on school and park properties.
>
> Two out of the three priorities from the public are based on adding more trees where they are needed most and support the theme of equity.

The Plan Implementation Team (Strategy #1) should lead the initiative to create a prioritized planting plan and to decide the values that will determine which areas are in most need of new tree planting. For instance, the Implementation Team will need to consider the data and get information on:

- Which neighborhoods have the lowest tree canopy percent?
- Where are the city's greatest stormwater problems?
- What areas have the highest surface temperatures in the summer?
- What locations or land uses are experiencing the greatest canopy losses?
- What should our urban tree canopy percentage goal be citywide and/or for various land use types?

It is recommended that a purposed-based master tree planting plan also contain these operational and administrative elements:

Climate Adaptation: Prepare for future climate changes by expanding the selection of species to plant in the city; consider experimenting with tree species that may be better adapted to future climates (suitable for the plant hardiness zones 5 and 6) and are not currently present in the municipal forest. Select species that are resistant to storm damage.

Species Diversity: Create a species recommendation list for municipal use that represents a variety of proven high-performing yet uncommon species (species representing less than 5% of the population). Continue to increase species diversity in Syracuse's street and park tree resources so that no single species is greater than 10% of the population. Design street and park tree plantings that complement diversity needs on a neighborhood basis.

Partnership Development: Define roles for existing partners, such as OEC, and search for new partnerships, such as public health-focused organizations, Students of Sustainability at Syracuse University, etc. to fund, develop, and implement the plan.

Citizen Involvement: Foster partnerships with neighborhood groups to be a liaison between residents and the city to educate residents about the importance of trees in their neighborhood and encourage tree planting on both private and public lands. Consider OEC establishing itself as a point of contact/guide for neighborhoods looking to start their own planting projects. Focus tree planting and maintenance education and outreach efforts and messaging to the citizens.

Funding: Based on current contractual and volunteer-based planting costs, determine the funding level(s) needed to achieve the priority planting projects identified in the plan over the next ten years. Funding sources will need to be identified to replace, and even exceed, the support provided by the Save the Rain program.

Urban Forestry Program Policies: Refine program policies to reflect goals. For instance, set a policy that states municipal trees will be replanted after removal on at least a 1:1, 2:1, or greater ratio; gather data on the success rate of tree plantings three years after installation and develop strategies for minimizing loss; and maximize tree benefits by planting large-growing species wherever space allows within street rights-of-way, parks, and other public properties.

A purpose-based planting plan, whether on citywide or neighborhood scales, will be a useful tool to advance the urban forest management program and maximize the co-benefits that trees provide the city. The value of the many ecosystem services derived from Syracuse's urban tree canopy provides compelling cost-benefit data in support of additional tree planting throughout the city and in target neighborhoods. Trees are a proven solution for achieving many of Syracuse's sustainability, public health, economic development, pollution abatement, and equity goals.

Benchmarks should be set by forestry staff, the Plan Implementation Team, and citizen input, and can include metrics such as: the removal planting ratio; how many schools were engaged in planting; the number of trees given away; the number of trees planted in each neighborhood.

GOAL #3. CONNECT THE ENTIRE COMMUNITY TO THE URBAN FOREST

STRATEGY #9: INCREASE PUBLIC AWARENESS OF VALUE AND IMPORTANCE OF TREES IN SYRACUSE

The lack of information flow between citizens and city, or between different agencies of the city, was cited as an area for improvement multiple times through the input received to develop this plan. All parties asked for better education, engagement, and communication. Public outreach showed multiple times that many of the roadblocks to tree planting and preservation in neighborhoods disappear once people have their concerns listened to and are informed about why tree canopy is important.

The following recommendations will begin to provide and improve avenues for better ongoing communication:

1. **Establish a Central Information Hub.** As mentioned in Strategy 8 in more detail, creating one primary source for "all things trees" in Syracuse—on private or public lands—is key to better communication.

2. **Improve Urban Forestry Pages on City Website.** There are two main areas for improvement related to city's web site: the process of finding the right pages, and then getting the information needed.

Finding the Page. Once on the city web site, it is extremely difficult to find the page that provides information on trees and work by the urban forestry division. There is no reference to trees or tree canopy on the home page (Figure 1), which admittedly is not always possible.

[Left] Figure 1. Syracuse home page, with no clear mention of forestry division

[Below] Figure 2. Disorienting result of clicking "search" function on home page
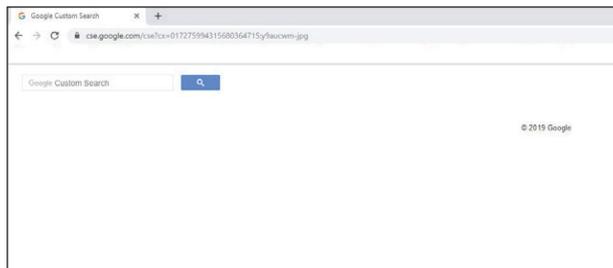
However, there is not a link to the Forestry Division in the "I want to…" drop down menu, nor is it clear where to look next. Additionally, when using the "search" function at the top right, it sends the user to a page that looks like an error page (Figure 2).

The relevant pages are actually located in the Park Department section of the site (Figure 3), but a citizen with questions about their street tree is not necessarily going to seek out this page. If a user did happen to know that urban forestry pages are located within the Parks Department section of the site, and thus used the departments links on the left-hand navigation of the site, the Parks page also does not reference trees. There is, however, a small Forestry Q&A link at the bottom left side, though it appeared as an ad and was difficult to find.

Figure 4. Information on ReLeaf Syracuse
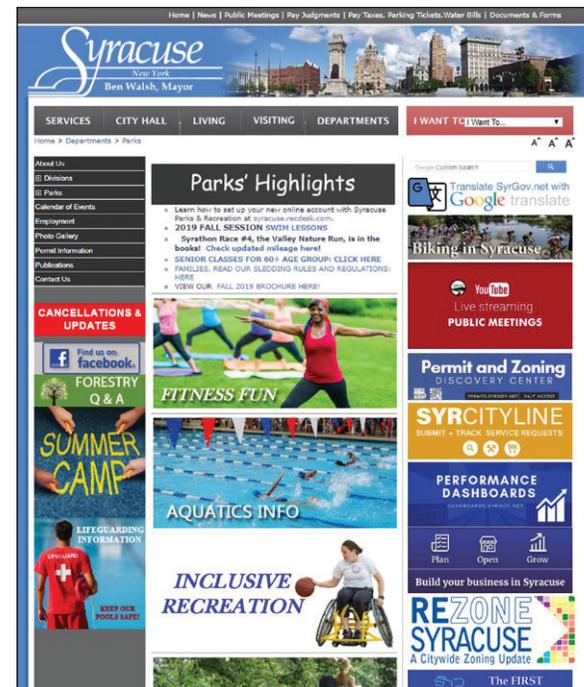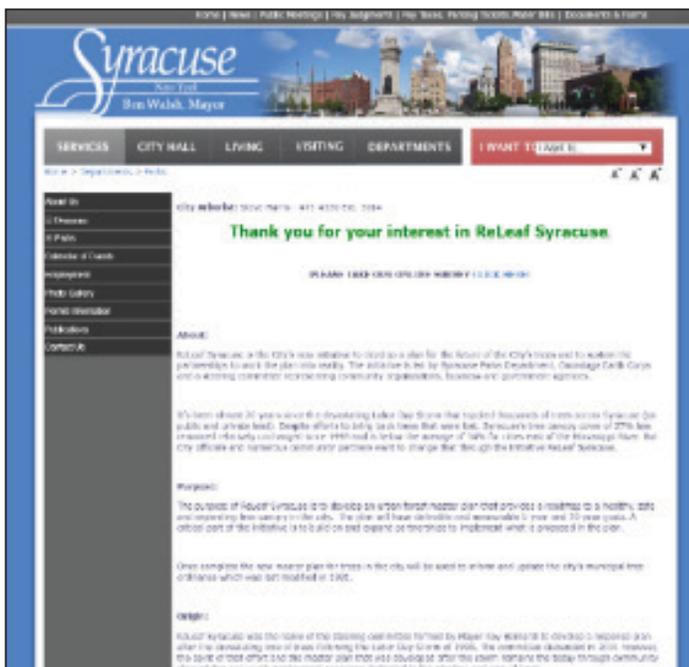
Figure 3. Syracuse Parks Department site, where the Forestry Division's site is nested

Once at the current Urban Forestry page within the city website (Figure 4: http://www.syracuse.ny.us/parks/forestry.html), there is content on the renewal of ReLeaf Syracuse and the master planning process, but no reference or place to get questions answered.

Getting the Information Needed. Once access to the relevant pages on the city web site is improved, the following recommendations are suggested for enhancing content on the urban forestry page itself:

• Address the citizens' most common questions first. Regardless of what department does the work, the hub page should address the top five to ten questions that consumers (citizens) have. Examples of common questions from users when they are looking for tree information within the city are:

  ○ I'm concerned about the condition of my street tree. Who do I contact?
  ○ I saw a tree in a park that looks dangerous. What should I do?
  ○ I'm looking for a reputable contractor for tree maintenance on my private property.
  ○ I would like to have a street tree.
  ○ Why are trees being removed on my street?
  ○ Links to city and county development pages.

Two examples of city urban forestry web pages that address users' questions will include *(see figure 5 on following page)*:

  • NYC Parks, *https://www.nycgovparks.org/services/forestry*
  • City of Cambridge, Massachusetts, *https://www.cambridgema.gov/Services/urbanforestry.*

• Consider sharing success stories. In many cases, the public only sees or notices negative actions (removals, tree hazards, etc.), but in actuality there are many positive efforts and projects going on throughout the city all the time. Highlight the processes and work currently being done by all parties, if possible, and show examples of the OEC/City partnership. Also consider featuring success stories as neighborhoods start to engage in this city-wide effort. These are important stories to share.

• List out city initiatives and priorities with explanations of each. Linking to a PDF of this master plan is an obvious content choice, but also consider featuring the Vision, Goals, and list of Strategies directly on the site. This is important to share so a user can absorb the basic ideas without having to read through a large PDF document.

• Keep a disaster response/update page updated at all times. A link to a disaster preparedness and response page specifically focused on trees is a good page to always have in place. This can include how to prepare for storms with minimal tree damage (proactive care, etc.) as well as information on what to do after a storm and who to contact if they have questions. An example from New York City can been seen at https://www.nycgovparks.org/services/forestry/storm-response

Figure 5. NYC's Tree Services site, giving visitors' clear direction to desired services
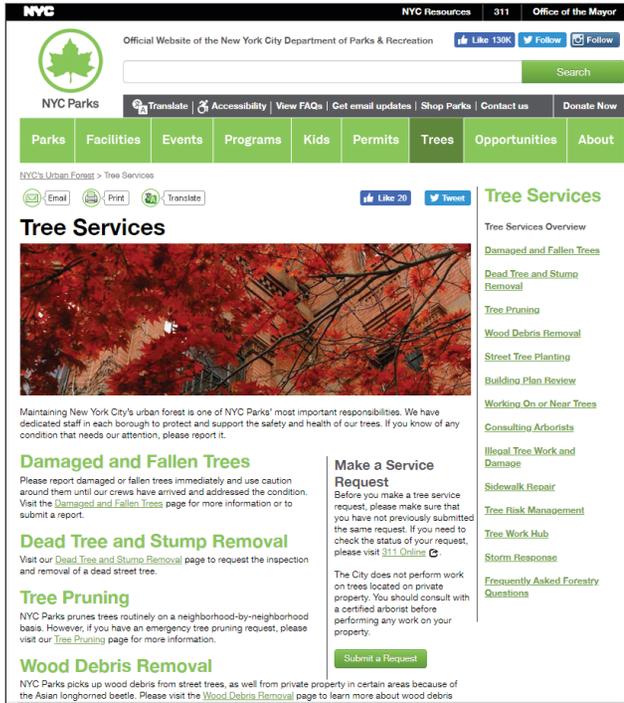
3. Consider hosting an annual public meeting. Another way to improve two-way communication with the public is to consider hosting an annual educational and entertaining forum on the "State of Syracuse's Urban Forest" each year. This gathering can be for all those active or interested in the urban forest to gather and summarize efforts in place currently, progress updates and accomplishments, and inform the public of new programs and initiatives, while providing a venue for neighborhoods and other organizations to share success stories and learnings. This can also be an established opportunity to get regular feedback and input on concerns from the citizens as well as providing an opportunity for one-on-one conversations which can make great strides in tree canopy progress.

4. Engage the public in the implementation of this plan. Whether through publishing progress reports or holding special events, engaging the public whenever possible will keep ongoing communications open as well. This is discussed in Strategy 1: Build an Implementation Team.

5. Set Internal Urban Forestry Goals. As stated earlier, no fewer than eight separate departments within the city and several county agencies impact trees and the urban forest in the city. Improvements for and solutions to better communication internally within the city depend on strong leadership and internal goal-setting. City leadership should set overarching, "top-level" urban forestry goals and priorities, so that all departments can then perform their specific work in concert and for the best interests of the citizens. Revisit progress toward city goals quarterly. Currently, urban forestry staff are housed in multiple departments. Quarterly meetings with staff of different departments would allow better communication of operation updates and give an opportunity for the city to assess if they are reaching their city goals relating to urban forestry The public input during the Urban Forest Master Plan process showed that the citizens do expect their city to maintain, protect, and plant trees regardless of where a department is positioned on an organizational chart.

6. Incorporate ReLeaf Syracuse efforts into city neighborhood planning guided by the Department of Neighborhood and Business Development office (or NBD). At the macro-scale, the Parks Department would benefit by becoming more aware of neighborhood-scale planning initiatives. Parks should continue sharing information with the public through NBD's designated neighborhood planning structure known as Tomorrow's Neighborhoods Today (TNT). TNT is comprised of eight neighborhood districts and each holds a monthly public meeting where information can be shared. Parks should not rely solely on TNT forums to share information, but this is the place to start.

STRATEGY #10: IMPROVE LINES OF COMMUNICATION

Strategies #8 and #9 defined messaging and avenues of communication. This third outreach strategy focuses on making a plan to reach all players (both existing and potential). A clearly-defined marketing strategy to identify each audience is crucial, especially one that seeks out areas or topics where company and/or organization missions may coincide.

Not all messaging touches are created equal. Will they be meaningful? Or, are they perceived as just a spammy "sales pitch"? Effective online messaging can include images, videos, or blog posts, etc. Messaging could also include in-person conversations, one-on-one calls, mailings, billboards, and more.

The following examines the eight groups of "players" examined in the assessment (see the Sustainability & Condition of Today's Urban Forest section), potential ways to reach each group, messages that may resonate for each, and potential synergies in missions. While the Plan Implementation Team will ultimately need to decide specific outreach priorities and avenues to pursue, the following examples can provide a starting point for developing a robust outreach plan.

- **Neighborhoods & General Public.** These groups are large and can have a range of focus or priorities depending on the current environment, though more often than not they are largely focused on concerns related to improving quality of life improvement. Small geographic areas, like neighborhoods, can use local knowledge from community hubs (churches, clubs, other social groups) to identify the community's primary needs and to open up lines of communication to hear their concerns as well. Individual or small group in-person outreach is most effective at this level, while larger city-wide outreach is more suited to broad marketing/message campaigns. At both levels, consider using the updated tree canopy data (see Strategy #3) to share learnings and help each community set their own goals based on their priorities.
- **Large Private and Institutional Landholders.** Large land-holders have the potential to make sweeping changes in tree canopy faster than in the public realm. These can be large companies (health care campuses, industrial areas, corporations), universities, and schools. Engaging companies dedicated to health care to improve tree canopy on their own properties may be relatively easy once approached, as the benefits of tree canopy related to health has been well documented. Industrial areas encompass large areas of land, and are likely difficult to improve related to canopy, but it may be possible to find business owners that are personally passionate about this issue and willing to take steps to add canopy, especially if converting turf to forest decreases their landscape maintenance costs. Schools are another large landholder that have low canopy cover, but have the potential for much more (tree plantings at schools also serve as an education source as well). For many of these sites, often a peer-to-peer approach of high-level leadership can result in greater support and movement to improve canopy. Again, use the new canopy data during these conversations to share the latest on what they have, what is possible, and why this is important.

- **Green Industry Groups and Businesses.** Professionals with technical expertise related to all aspects of tree care, tree planting, and green infrastructure are an important part of engagement (arborists, landscapers, landscape architects, universities, extension staff, and more). Retail operations in plant and tree sales also provide a potential avenue of information dissemination. These groups may be best engaged by asking for their expertise during public education efforts. They in turn can benefit from positive, low-cost exposure to the community for business generation.
- **City Department/Agencies.** Internal communication and buy-in among city and county agencies are critical for successfully implementing the master plan's recommendations. Ongoing education and check-ins with municipal colleagues are key. See Strategies 4 and 6 for more information.
- **Funders.** Funders include public entities like the city, county, and state, but also private charitable organizations and private corporate sponsors. Approach these funders after the plan is officially adopted individually to find any overlapping missions that may lead to funding the implementation of this plan.
- **Utilities.** Engaging utilities often happens at the city level and they can be great partners in urban forestry. The local utility companies were engaged in the development of this plan, and should be willing partners for various aspects of plan implementation. Messages related to getting the right tree in the right place, decreasing energy use, and improving safety often resonate with utility entities.
- **Developers.** Often, developers only engage in urban forestry issues as they relate to meeting building and zoning codes. However, there may be developers in the city that are more interested in promoting preservation and green infrastructure in their work. Partnerships can start through meeting with the local homebuilder/developer association for a candid discussion and exploration of how they want to get involved. One-on-one conversations may produce results as well, especially if high-level peer-to-peer strategies are used.
- **Regional Entities.** Regional groups like watersheds and planning organizations have a wide range of missions and must be examined individually. Regional planning agencies often have an air or water quality goal that may coincide with urban forestry efforts in Syracuse. Watershed groups may have problem areas they would like to improve where a partnership may make sense. Allowing these groups to use the ReLeaf Syracuse messaging or branding within their networks may be an effective way to spread the word.

Need for Education & Outreach: A Recurring Theme from the Public

(Excerpt from the OEC's Engagement report's Recurring Themes section):

Education. It was clear early on from both Steering Committee and Stakeholder meetings that the general public, even those who are very engaged in their communities, had little base knowledge about how trees—both public and private—are managed in the city. When stakeholders and residents were presented with the challenges that face the urban forest and learned about how they could be more proactive in supporting the health of a thriving urban forest, they were happy to act. Stakeholders rated this as one of three top priorities during our meetings. Survey respondents rated education as the top priority for increasing canopy on private property. Brochures created during public outreach will continue to serve as tools for this purpose and to inspire future educational tools.

ReLeaf Syracuse staff and volunteers experienced firsthand that some people's poor perceptions about trees are easily overcome when they have the opportunity to learn about how city trees are managed. There were a number of residents that came to meetings to voice their complaints about current maintenance practices. Many of them were excited to learn that the city is looking strategically at how to increase canopy.

Reaching out to the difficult to reach. In this public outreach process, great lengths were taken to engage community members that traditionally have not been at the table regarding trees and other community planning initiatives. Meetings were planned with neighborhood organizations that have deeply reached into the diverse groups and neighborhoods of Syracuse, and a broad geographic representation was received through our survey responses. Additionally, three targeted meetings were held on the North Side of Syracuse which has experienced a rapid growth in population in recent years due to refugee resettlement.

New Americans. Many "New Americans" in Syracuse are from countries that traditionally have a close and direct relationship to trees. Trees are a source of food. Trees are used for building materials. Trees are a part of daily life. For many of these residents, they are aware of the value and benefits of trees but the concept of an "urban forest" is foreign. Similar to their native Syracusan neighbors, New Americans lacked a base knowledge of how trees—both public and private—are managed in the city and have never thought about trees as infrastructure. This is compounded by language and cultural barriers and a broader lack of information about how American society functions—from infrastructure to health care, social services, education, etc.

Though also true for many Syracusans, financial self-sufficiency is of the utmost importance for New Americans. Out of necessity for daily survival and in adapting to a new culture, trees are not at the front of many residents' minds. However, when introduced to how trees are managed and the interest of city officials to increase canopy, there was support and interest.

STRATEGY #11: CREATE AND IMPLEMENT AN OUTREACH PLAN TO REACH MULTIPLE AUDIENCES

During the development of this plan, it became clear that the public was not fully aware of the value and importance of trees in cities. This is an area that, if improved, has the potential to make significant progress in tree canopy growth and preservation, as 80% of the tree canopy is located on private land.

Raising awareness requires planning to establish a unified voice, better define partnership roles, create one central information hub, and establish branding and messaging that can be used across the City of Syracuse. These are the tools that will be used in ongoing communication (see Strategy 9) and outreach to all groups (see Strategy 10).

1. A Unified Voice. Syracuse has a number of entities currently working to improve the urban forest; however, most are acting independently and with varying goals and messages. There is a long-standing concept in marketing and communications termed the "Marketing Rule of Seven." It states that a person needs to "hear" an advertiser's message at least seven times before they'll take action or truly internalize a concept. And in today's world of information overload and social media, many say that number has increased. This means that each message needs to be heard seven times. Without a clearly-defined, unified set of messages available to all to use, it is unlikely that the public will hear any one set of messages the required seven or more times.

There are already multiple groups and people active and interested in growing and preserving tree canopy currently, but with varied focus. This can serve to dilute the message. For example, the OEC crew is talking to people in communities about getting a street tree, the county is promoting trees as a way to "Save the Rain" and better manage stormwater, the City Parks Department is providing information to residents and businesses daily about services provided and rules around trees. It is essential to have all these parties active and promoting urban forestry advancement topics; however, the movement of urban forestry must be unified in nature, so that all voices can be "singing the same tune" but within their own organization/neighborhood's mission and environment. A unified voice and message are critical to get all the players working toward a single larger goal, but at their own pace and in support of their own mission.

This voice can be shaped by the Implementation Team (see Strategy #1), with a unified set of messages and branding detailed further in the next pages.

2. Create a Central Information Hub. It was clear during outreach that people have questions, frustrations, and suggestions about trees. Additionally, most citied not knowing where to go for answers, nor were they differentiating between trees on public and private lands or understanding who is an authority in each case. Depending on the topic, conversations may need to happen with the City's Urban Forestry Division, Planning, Zoning, Engineering (sidewalks), or Onondaga County, the sewer district, extension office, or other source. No matter which department or organization handles the work, the community needs one place to go with their tree issues/questions.

Public/Private Partnerships in Other Cities

Many cities are already working in partnership with local players. This is not a new concept in urban forestry and partnerships have been proven to be effective, as shown in the following three case studies:

Pittsburgh: Tree Pittsburgh and The Western Pennsylvania Conservancy are the primary partners helping to supplement the city's Forestry Division budget through tree purchase and planting programs and a volunteer stewardship program for young tree maintenance services.

Indianapolis: The non-profit Keep Indianapolis Beautiful (KIB) is partnering with the City of Indianapolis to plant 100,000 trees. KIB's agreement with the city to manage tree planting has been in place since 2011. KIB installs the trees and provides care for the first 3–5 years after installation. To date, KIB has planted 9,500 trees with an 89% success rate (11% mortality) (Kincius 2015) (Faris 2015).

Washington, D.C: Casey Trees is a Washington, D.C. non-profit started in 2002 with the goal of restoring and protecting urban tree canopy in the city. The organization supports D.C.'s municipal urban forestry department by planting trees on public and private lands not serviced by the city. Each year, the city plants over 2,500 trees with the end goal of achieving 40% canopy by 2032.

It is important to remember this basic maxim of community outreach tactics:

> ***Effective campaigns do not put the onus on the public to figure out who to talk to about tree topics.***

A central hub that can help a user figure out where to go for answers or help is critical to unifying a community campaign. This hub can be directly connected to the brand (described later in this section). This central site would also be a great place to promote efforts underway already, and potentially a place to record progress on the master plan's implementation. There are a lot of great efforts going already in Syracuse, but the public would be hard pressed to find mention of them online.

3. Review Partnership Roles. Public/private partnerships provide a reasonable and sustainable way to achieve urban forestry goals in today's current fiscal environment. To date, the Onondaga Earth Corps has become a substantial partner to the City in supporting and advocating for the urban forest through their efforts in public outreach, tree planting, and in young tree establishment (watering, mulching, pruning). As the years progress, the OEC and the City may want to consider further partnership opportunities, especially in the area of outreach and communications. OEC could be well-suited to serve as the central hub described above. Significant outreach efforts are often beyond the capacity of city staff. Having a non-profit partner spearhead outreach and education campaigns has shown to be effective and can be done with a certain degree of flexibility.

Additionally, non-profit partners can also aid in raising funds (often easier for tree plantings vs. tree maintenance), and administering tree planting and establishment programs that are appealing to the public and can be done with minor equipment needs. Tree steward training, which includes tree care for the first years during establishment, is already underway at OEC. In the last two years, OEC has planted 70% of the trees installed by the city/county and pruned almost 4,000 young trees.

4. Branding. A brand starts with "a visual and emotional connection to a product, service, or movement" and is a key piece to creating the unified voice concept.

During the public outreach work undertaken to develop this plan, OEC and the City of Syracuse were fortunate to have funding available from The Gifford Foundation to work with a branding/marketing firm to start this process of building a brand. The result: a campaign named "ReLeaf Syracuse." The brand, though updated, is a name that has been used in the past and thus is already somewhat familiar to some residents. This is an important first step.

This brand, ReLeaf Syracuse, can also serve as an effective hub web site to help answer questions and direct people to the right place— whether City, County, OEC, Extension or other source. Currently there is a ReLeaf Syracuse Facebook page, and mention of ReLeaf on the OEC, County, and City websites, but still no central place for all topics related to trees in Syracuse. Consider a site, such as "www.ReLeafSyracuse.com", that could be managed by OEC as an information hub site only.

5. Messaging. The next step is to develop the branded messaging that will be delivered to the public. It is important to create a limited number of messages that will resonate with the public.

> **Limit Quantity.** Referring back to the concept of the Marketing Rule of Seven that each message needs to be heard seven times, logic follows that the number of messages need to be limited to avoid information overload. To start, it is recommended to limit the number of key messages from three to five times.

Resonating with the Public. Another marketing adage dictates that a successful campaign "sells the problem you solve, not the product you offer." In this case, the product being pitched is trees. But, as detailed in the "Why Trees?" section, trees are really a solution to many issues facing the city and individual citizens. The most effective messages are ones that resonate with challenges or priorities of the public; they need to sell the solution—not the trees themselves.

For example, urban forestry efforts often tout that "trees are critical city infrastructure, required for a vibrant, healthy community." But this statement does describe the problems of the public that are being solved through trees. Nor does this tell a story or create an emotional connection. Consider instead the problems and subsequent message examples below:

- **Problem:** Children with high asthma rates in cities.

  Potential Message to Sell the Solution: Children have less issues with asthma in neighborhoods with trees. Trees clean the air!

- **Problem:** Brick and mortar business districts in Syracuse are struggling.

  Potential Message to Sell the Solution: People shop longer and spend 11% more in business districts with shade from trees. Boost your business – plant and preserve your trees!

Other topics that emerged during plan development included how to plant and care for trees. Consider, however, that the central information hub can help provide this type of education as the citizens requesting this information have already decided they are interested in taking the next steps.

STRATEGY #12: ENCOURAGE TREE PLANTING AND PRESERVATION ON PRIVATE PROPERTY

On average, a city's urban canopy is only 20% publicly owned, so the amount and quality of the city's UTC is extremely dependent on the existence and longevity of trees on private properties.

When the public was asked, they said the number one way to increase tree cover on private property is through a public education campaign to encourage property owners to plant and maintain trees. The OEC and the Plan Implementation Team should identify key groups and develop customized ways to reach them, such as the general public (adults and children), neighborhood groups, developers, staff/city departments, universities, health care companies, large landholders, city leadership, etc. Recommendations for educating the citizens and diverse stakeholders include:

- **General Public:** Create messages about the importance of trees and the difference they will directly have where they live (better air quality, summer cooling, reduced energy bills). Deliver these messages in a variety of media, on a regular basis, and in venues where large numbers of people are (festivals, concerts, sporting events, etc.). Additionally, a shorter, graphic-rich public version of this plan would be well-received by the general public and will also be appropriate to give to elected officials and department heads and their staff.
- **Developers:** Attend their industry events and meetings and give them information on the value of trees for business districts, property values, etc.; initially reach out to a few key developers and ask them to get involved.
- **K- 12 Schools:** Use existing messaging, curricula, and activities geared for younger students to educate them about the benefits of trees and how to plant and care for them.
- **Universities:** Get students to help spread the word and volunteer for neighborhood planting projects. Ask professors in the public health, economics, biology, and sociology fields to be campus leaders. Develop a canopy goal on university properties and provide tree preservation information to facility managers.
- **Large companies:** Heads of companies often respond better with peer-to-peer approaches. Determine which leaders are tree advocates, provide them with tree benefit information, and ask them to reach out to their peers with the 'ask.'
- **Neighborhood Groups:** Establish OEC as a guide for neighborhood groups looking to start their own planting programs.
- **Urban Agriculture Proponents:** The desire to have more fruit trees in the city was expressed several times in the public meetings. Fruit tree planting is problematic on the right-of-way and even in parks for many reasons (fruit litter, liability during harvesting, application of pesticides, etc.) but is perfectly suited for privately-owned properties. Urban agriculturalists and even food bank volunteers can spearhead initiatives to encourage fruit tree planting.
- **For All Private Landowners:** Frame tree plantings and tree preservation projects in terms of tree benefits specific to the type of landowner to influence large and small landholders. For example, hospitals might be encouraged to start their own planting programs on the basis that trees reduce the rates of childhood asthma. Landlords may be enticed to plant their trees because trees improve tenant retention and business profitability.

MAKING IT HAPPEN

Through the public engagement process, **a clear vision and goals have been defined.**

Through data analysis and stakeholder input, **strategies for action have been recommended.**

Now, it's time to make things happen.

The following begins to present a better picture of the resources needed, timeframe, and priorities for strategy implementation of this Urban Forest Master Plan.

Table 11, on the following page, summarizes the primary recommendations made in this master plan and presents them in terms of a low, medium, or high priority, a suggested relative timeframe for initiating or completing the tasks, a best estimate of the fiscal impact of the activity, and the Vision, Strategy, and/or Goal statement that the urban forest management recommendation supports.

FUNDING TO IMPLEMENT

Funds will be needed for 1) the management plan's initial roll-out and implementation; 2) public relations, marketing materials, and outreach work; and 3) additional tree maintenance/planting work and staffing needs.

This section will answer questions such as: What do we need? Are there current sources of funding that we can utilize better? What monies do we have now—is it being spent where we need it most? Opportunities for new sources will be discussed as well.

Funding Needed. It has been determined that approximately $1,380,000 will be required to eventually have the public trees on a 10-year cyclical proactive maintenance cycle. To implement other strategies in this plan, such as an updated UTC, additional staff for code enforcement, and consultants for marketing and technical tasks, at least another $50,000 to $100,000 annually will be needed. At this time, the exact level of funding needed to support a robust planting program is unknown. However, once the UTC is updated and a planting plan is created, estimates are likely to range from $100,000 to $150,000 annually.

Table 11. Prioritization and Fiscal Impacts of Syracuse Urban Forestry Master Plan's Primary Strategies

Strategy	Recommendation	Timeframe	Fiscal Impact	Priority
Create a Unified Voice	Create consistent messaging that can be shared with numerous stakeholders	Short-term	$0 (staff and stakeholder time)	High
Develop a Plan Implementation Team	Identify a core team of stakeholders and city staff that will ensure the Plan's implementation begins per community priorities.	Short-term (immediate)	$0 (staff and stakeholder time)	High
Plan for a UTC Update and Use to Set City and Neighborhood Goals	Perform in 2019/2020; set a UTC goal; secure partners and funding	Short-term	$ (consultant)	High
Incorporate Urban Forests in Community Plans, Policies, and Goals	Review/revise policies, comprehensive plan, elected officials' directives	Short- to mid-term	$0 (staff and stakeholder time)	Medium
Fully Implement a Proactive Management Program	Begin actions to establish a citywide 7-year maintenance cycle	Mid-to long-term	$1,380,000 annually	Medium
	Develop a risk management plan	Mid-term	$12,000 (staff time)	Medium
	Add 1 arborist position for inspections, and 1 to 2 crew members	Mid-term	$120,000 annually (new staff positions)	Medium
	Provide staff training	Ongoing	$3,000 (for certification fees and specialized training)	Medium
	Increase fleet for additional crews (log loader, bucket truck, chipper)	Mid-term	$TBD by Steve	Medium
Update/Adopt Tree Ordinance	Revise language; create design standards manual; add 1 arborist/inspector position for plan review, permitting, and enforcement assistance	Short-term	$0 (staff time for ordinance revision and adoption), $40,000 annually (new staff position)	High
Address Sidewalk and Tree Issue	Review and improve policies and procedures; explore alternative funding mechanisms	Short- to mid-term	$0 (staff time)	Medium
Increase Community Education and Awareness	Coordinate with stakeholders and clarify roles; host events and create information hubs	Ongoing	$0 (staff and stakeholder time), ($5,000 – $10,000 if marketing consultant is used), ($2,500 annually for printed and other marketing materials)	Medium
Create a Purposed-based Planting Plan Reflective of City Goals	Perform data analysis to map, quantify, and prioritize tree planting opportunities citywide	Mid-term	$0 (staff time), $2,000 (if consultants are used)	Medium
Encourage Tree Planting/ Preservation on Private Property	Perform outreach to targeted owners; secure funds for cost-share programs	Long-term	$0 (staff time and external grant funding)	High

Potential Budget Enhancement Sources. The urban forestry program will likely always rely heavily on general fund allocations for its operations budget. But other options exist that can provide a revenue stream more clearly dedicated to the management of the public urban forest. And, with the ecosystem benefit information at hand, the case can be made more easily that funding urban forest management is a wise and "profitable" public investment strategy for the City of Syracuse.

The following are examples of funding mechanisms used in other municipalities, and different and more creative means for enhancing the overall budget for urban forest management. Most of these funding methods/sources will require more thorough analyses; for now, they are being offered for consideration.

Financing Instruments:

- Increased allocations from the General Fund and departmental funds
- Capital improvement fund
- Taxes, special assessments, and special tax districts
- Federal and state grants, and large regional and local private foundation grants
- Percentage of stormwater management fees

Revenue Streams:

- Alternative compliance fees
- Site plan review and site inspection fees
- Tree work permit fees for non-residential applicants
- Compensatory payments for tree damage
- Sale of municipal wood products
- Voluntary donations made on utility bills
- Carbon credit sales (https://www.cityforestcredits.org)

Any or all of these funding methods should be explored by city staff to determine their legality, viability, and practicality, and how one or more of these methods would help increase budgetary resources for the urban forestry program. The city should also continue to collaborate with local partners to secure funding for tree maintenance and urban forest management activities from sources that are more inclined to provide funding to nonprofit entities as opposed to the municipality directly.

With sufficient financial resources to secure professional services, equipment, and management, Syracuse can accomplish its urban forestry goals, better respond to changes and challenges in the urban forest, and best serve the citizens.

TIMELINE TO IMPLEMENT

Tasks from the action strategies listed above have been put into a suggested timeline for implementation. The associated strategy numbers are in parentheses. However, the urban forest master plan should be considered a living document and be reviewed regularly to assess successes and failures; this exercise may then alter the timeline and priorities.

Year 1 (2019): Officially adopt the master plan (Strategy #4); get an implementation team together (#1); start the process of adopting the updated tree protection regulation adoption (#6); secure funding for updating the UTC (#2); define agreed upon benchmarks (many options provided in this plan) to measure future progress; and begin to plan and develop messaging, central hub, and other plans to launch outreach program in 2020 (#8–10).

Year 2 (2020): Implement UTC update study (Strategy #2); utilize new UTC data to identify areas of high priority, set canopy goal (#3); define a planting plan (#11); continue implementation of proactive care program (#5); finalize new tree protection regulations (#6); begin to address sidewalk/tree solutions (#7); start implementation of outreach/education program (#8–10).

Year 3 (2021): Take an inventory of progress to date using annual and periodic benchmarks; then plan work and goals for the next two years to get as much done by year 5 as possible.

Years 4–5 (2022–2023): Continue to implement the plan and the annual accomplishment reviews.

Year 5 (2023): Revisit progress to date. Update sustainability matrices and update benchmarks to gauge progress; map out steps for next five years based on these results.

Years 6–10 (2024–2027): Implement remaining action steps not yet completed, or any new ones identified in Year 5 progress review.

Year 10 (2028): Update the tree canopy assessment to gauge canopy growth progress on the citywide and neighborhood levels. Use these results and updated benchmark statistics to revise and update the urban forest master plan.

Years 11–20 (2029–2038): Implement action steps defined in revised master plan.

MEASURING PROGRESS

Benchmarks are important to establish in advance of implementation. The following benchmarks are options to consider, though it will ultimately fall to the Implementation Team to select the preferred benchmarks by which to measure.

Benchmark for all Goals: The three matrices that were used to assess the sustainability of Syracuse's urban forest (located in Appendix A) can be updated and performance levels rated again on a five-year basis. For all 28 indicators, any movement between rating levels will identify progress made or set-backs experienced. This is a more extensive exercise than just updating other benchmarking statistics, so a complete re-evaluation of the sustainability indicators should be performed in Year 5, or after enough time has passed for progress to be evident. Once re-evaluated, the information can be shared with the public as a means of continuing public engagement, to keep the urban forestry program and issues a priority in the minds of the public and other city departments, and to demonstrate accountability of a significant municipal responsibility.

Benchmarks per Goal: To gauge short- and long-term success, the following annual and periodic benchmarks should be tracked and reported:

Benchmarks for Goal 1: EDUCATION/ENGAGEMENT.
- Number of citizens engaged
- Number of organizations engaged
- Number of large landholders engaged
- Number of neighborhoods engaged
- Traffic numbers to new central hub web site

Benchmarks for Goal 2: GROW CANOPY.
- Changes in canopy cover percentages.
- Reductions in losses of trees to sidewalk issues, development, etc.
- Number of trees planted vs. lost each year
- Survival rates of trees planted

Benchmarks for Goal 3: IMPROVE CANOPY QUALITY AND LOCATION.
- Number of trees planted/changes in total UTC in targeted low-canopy areas
- Number or percentage of new/different species planted in response to climate change; species frequency distribution
- Overall improvement of the condition of public trees (as derived from inventory data and updates)
- Reduction of storm damage incidents
- Current length of proactive maintenance cycle

FINAL THOUGHTS

Historically, Syracuse has been able to boast about its fine park system, beautiful natural setting, and abundant natural resources found in the forested hillsides, fields, and waterways that characterize the city. These natural resources contribute greatly to the charm, ambiance, and character for which Syracuse is widely known.

Recently however, changing demographics, a static canopy cover, renewed interest and in attracting business and increasing economic development, and science-based on the benefits urban forests provide cities all pointed to the need for an evaluation of the current urban forest resources and management in Syracuse and a plan of action.

It is hoped that the Syracuse Urban Forest Master Plan will be a working document that can be used by the city and its stakeholders as a guide and reference to achieve not only short- and long-term urban forestry goals, but overall city goals as well.

Cities can do so many powerful things to intervene directly in urban forest processes that they sometimes do not wait for the tendency of some slower management tool to have the desired effect. Unfortunately, when direct action is taken on any single urban forestry issue, the interdependence of the whole is often ignored and produces more and different problems. Inevitably, this can lead to crisis and reactive management that characterizes so many cities' systems.

There is a greater significance to the situation of reactive management beyond the mere inefficient use of municipal resources. Governing bodies have long been looked to and held as models by other governments and citizens alike. This responsibility magnifies the need for cities to be acutely aware of their urban forest management actions and the message their actions (or inactions) send to the general public.

With this Urban Forest Master Plan, Syracuse now has a critical tool to help form, grow, and sustain an effective, comprehensive urban forestry program and grow its urban tree canopy. The Plan will allow city leaders, staff, and citizens to examine urban forestry issues in terms of what is technically correct, organizationally feasible, and aesthetically right—as well as economically expedient.

The importance of comprehensive urban forestry management in Syracuse transcends the daily, operational maintenance routines and responsibilities; it stands to demonstrate the city's leadership and commitment to improving the environmental quality of life for its citizens. It demonstrates that owning and managing land not only grants privileges but also entails obligations.

Syracuse's urban forests are municipal amenities that actually appreciate in value over time because they are alive and growing. They provide tangible and intangible benefits to the city and its citizens. Because of their significance to the environmental, social, and economic well-being of the city, the urban forest should continue to be professionally managed and protected to preserve them for all future citizens.

APPENDICES A-E

APPENDIX A: ASSESSMENT MATRICES— SUSTAINABILITY OF SYRACUSE'S URBAN FOREST

Defining a Sustainable Urban Forest: For the purposes of this plan, the concept of sustainability is defined as the ability to maintain the urban forest into the future without compromising the ability of future generations to do the same (Clark 1997). In practice, a sustainable urban forest is a forest that is diverse, with species that are well-suited to site conditions, resistant to insects and diseases, and requires low levels of maintenance. A tree population meeting these criteria is sustainable, resilient, and produces maximum social, economic, and ecological benefits for the community.

There are several components that contribute to an urban forest's sustainability:
- Ensuring that an urban forest is healthy enough or of high enough quality to remain functioning with minimum care;
- Ensuring the financial requirements for maintaining the urban forest is realistic for years to come; and
- Verifying that the value of the urban forest is understood by all local players that actively impact trees in Syracuse.

There are different methods for defining, evaluating, and assessing the health and sustainability of an urban forest. Because urban environments are human-made, a true assessment requires looking beyond just the tree data. Survival of a functioning urban forest relies greatly on human influences and activities. For this reason, an urban forest assessment must include both social and economic components.

To assess Syracuse's urban forest, Davey Resource Group utilized a combination of James Clark's Model of Urban Forest Sustainability and Andy Kenney's Criteria and Indicators for Strategic Urban Forest Planning and Management (2011). This system, customized to meet Syracuse's unique needs, rated the city's performance level in 28 "indicators of a sustainable urban forest," broadly categorized into three groups: The Trees, The Players, and The Management Approach. Each indicator received a low, moderate, or good performance level rating, as shown in the tables below by the shaded cells.

This assessment used the city's current data on inventory, tree canopy, and past studies and plans, along with feedback from interviews and meetings with organizations, the general public, and city staff.

Table 12. Sustainability of Syracuse's Urban Forest: The Trees

Indicators of a Sustainable Urban Forest in Syracuse	Overall Objective or Industry Standard	Performance Levels and Criteria			Syracuse Today
		Low	Mod.	Good	
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.	Syracuse canopy cover as of 2009 is 27%. Relative canopy is 48%. This level has been steady over the last few decades. No canopy goal has been set.
Location of Canopy (Equitable Distribution)	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 those most affected by these benefits.	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.	Canopy is currently not equitable in all neighborhoods; however, the city is aggressively planting in areas of low canopy.
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 proportionally 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.	Age ranges of public trees closely follows the recommended levels - both at city level and by most neighborhoods. Three neighborhoods (Lincoln Hill, Washington Square and South Valley) deviate from recommended levels. Public/private trees combined do not follow the recommended levels as closely.
Condition of Publicly Owned Trees (trees managed intensively)	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.	The city regularly tracks and updates the tree inventory with condition data.
Condition of Publicly-Owned Natural Areas (trees managed extensively)	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.	Minimal data are available on naturalized areas specifically.
Trees on Private Property	Possess a solid understanding of the extent, location and general condition of trees on private lands.	No data are 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.	Sample inventory of combined public/private trees (200 permanent plots) was completed and is regularly updated by USFS (every 5 years). City city intends on continuing this in 2024
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.	, On all lands only European buckthorn (21%, also considered invasive) and sugar maple (10%) meet or exceed recommended species diversity levels. The maple and buckthorn genera also exceed the 20% recommended diversity levels.
Suitability	Establish a tree population suited to the urban environment and adapted to the overall region. Suitable species are gaged 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.	The City selects appropriate species and plants new trees in suitable areas. Changing climate may alter the suitability of existing trees, and species selection in the future.

Table 13. Sustainability of Syracuse's Urban Forest: The Players

Indicators of a Sustainable Urban Forest in Syracuse	Overall Objective or Industry Standard	Performance Levels and Criteria			Syracuse Today
		Low	Mod.	Good	
Neighborhood 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.	There are a wide range of engagement levels across neighborhoods currently. Hurdles to planting trees come from lack of awareness, differing cultural views, negative perception of current trees.
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.	There is currently no outreach to large private landholders.
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.	ESF and the US Forest Service provide substantial research expertise. Limited outreach has been done to engage green industry professionals in the area.
City Department and	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.	Eight separate city departments and several county agencies impact the urban forest in Syracuse. While most departments stated a willingness to work together, each has their specific missions and goals, and other than for parks, the urban forest is not their primary concern.
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.	Funding for proactive care of city trees is inadequate. Planting funds have come from the County level in recent years. Private funders like Gifford Foundation have contributed to this overall urban forestry effort but on short-term bases.
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.	Utilities 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.	National Grid (NGRID) is aware of the value the City places on urban forests through compliance with Parks Department tree protection permits. NGRID also supports planting of low growing trees under power lines through a $50 subsidy for every approved tree. More can be done to engage NGRID in City goals to increase canopy which could help them delay peak demand surges. .

Indicators of a Sustainable Urban Forest in Syracuse	Overall Objective or Industry Standard	Performance Levels and Criteria			Syracuse Today
		Low	Mod.	Good	
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.	Low engagement currently. Only case by case efforts have been made to approach this group.
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 overall public is generally unaware of the role, value and importance of the urban forest.
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.	The county has been a solid partner in urban forestry to-date. City Arborist participates in the Regional meetings of the New York State Releaf Council which plans and organizes urban forestry workshops of interest to local municipalities. There is no regional planning to protect and increase urban forestry canopy at present.

Table 14. Sustainability of Syracuse's Urban Forest: The Management Approach

Indicators of a Sustainable Urban Forest in Syracuse	Overall Objective or Industry Standard	Performance Levels and Criteria			Syracuse Today
		Low	Mod.	Good	
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 allow 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.	Complete GIS-based inventory in place. Street trees updated in 2013, park trees in 2014. Plan is in place to re-inventory 1/7th of all trees every year.
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 assessment.	Sample-based canopy cover assessment, or dated (over 10 years old) high-resolution canopy assessment.	High-resolution tree canopy assessment using aerial photographs or satellite imagery.	Full canopy assessment was performed in 2009; no more recent data is available. Updated UTC recommended every 10 years.
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.	Management plan created in 2003, never adopted by the Common Council. Current management work is 60-70% reactive in nature, largely due to limited resources.
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 for publicly-owned trees, but risk is still managed on a request-based reactive system.	There is a complete tree inventory with risk assessment data and a risk abatement program in effect. Hazards are eliminated within a set time period depending on the level of risk.	Because of updated inventory, risk ratings are known on all trees. Only highest priorities have been addressed each year. Other risk abatement work occurs via citizen requests or chance field encounters. No official risk management policy in place related to urban forestry.
Maintenance Program of Publicly-Owned Trees (trees managed intensively)	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. Little-to-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.	Approximately 70% of pruning is reactive and 30% proactive. Most proactive work is done by Onondaga Earth Corps on young trees. OEC has pruned about 2,000 young trees per year over the last two years. funded through a combination of grants and Parks' operations dollars. Parks estimates it is on an 18-20 year pruning cycle.
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.	The Municipal Tree Ordinance, written in the 1960s does not provide for effective tree protection. The tree protection policies required through permits written by Parks Department need to be codified in tree ordinance. Staffing is not sufficient to ensure effective tree protection. Additional dedicated personnel are needed to effectively establish and enforce tree protection policies (as well as landscape and buffer requirements on private property as required by the Zoning Ordinance. Sidewalk policy has a significant impact on trees. Master plan process includes review of these policies and iTeam is focusing on reviewing sidewalk policy solutions.

Indicators of a Sustainable Urban Forest in Syracuse	Overall Objective or Industry Standard	Performance Levels and Criteria			Syracuse Today
		Low	Mod.	Good	
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.	Current staffing levels are insufficient for proactive tree care and consistent enforcement of policy. Existing staff are trained annually. Equipment is sufficient for existing staff, but not for implementing additional proactive work. The lack of an arborist dedicated to design review and permit writing and enforcement and an additional tree crew or increased contract dollars for a proactive pruning cycle are the biggest barriers to proactive sustainable urban forest management in the city.
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.	Current funding supports only reactive tree care. No management plan is in place to determine exact funding levels needed for quality proactive care.
Disaster Preparedness & 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.	No official disaster management plan is in place. Procedures exist, but are currently inefficient (no central command, debris management) for larger scale events.
Communication	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 based on 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 communication, are well-used with targeted, coordinated messages.	Communication avenues are in place within city departments via Pre-Development meetings, Road Recon meetings, and other internal processes. No established communications is in place between city and citizens related to urban forestry.

APPENDIX B: ORGANIZATIONS INVOLVED IN PLAN DEVELOPMENT

The following organizations attended the three stakeholder meetings in 2018 and were key to the development of this plan:

- The State University of New York College of Environmental Science and Forestry (SUNY-ESF) - Environmental Justice
- SUNY-ESF Center for Community Design Research
- Oakwood Cemetery
- City of Syracuse Department of Public Works
- City of Syracuse Engineering
- City of Syracuse Parks
- Centro
- City Libraries
- Save the Rain
- Heuber Breuer
- COR Development Company
- Baltimore Woods
- Syracuse City Common Council
- Central New York Services
- St. Joe
- SUNY Upstate
- Syracuse Behavioral Health Center
- Syracuse Community Health Center
- Upstate Medical University
- Christopher Community
- Housing Visions
- Jubilee Homes
- Syracuse Housing Authority
- Syracuse Model Neighborhoods
- Greater Syracuse Tenants Network

- Habitat for Humanity
- Home Headquarters
- University Neighborhood Preservation Association
- Greater Syracuse Association of Realtors
- Building Owners and Managers Association
- Onondaga County Real Estate Investors Club
- RentfromBen.com
- University Hill Realty
- Believe in Syracuse
- Northeast Hawley Development Association
- Northside Learning Center
- Southeast University Neighborhood Association
- TNT neighborhood facilitators
- Vera House
- Southwest Community Center
- Syracuse United Neighbors
- Hafners
- Rare Earth Nursery
- Catholic Charities
- Hope Print
- Interfaith Works
- McKinley Brighton Schools
- Atlantic States Legal Foundation
- Center for Civic Engagement, Upstate University
- Syracuse City School District
- Syracuse Arborist
- City of Syracuse Parks and Recreation
- Cornell Cooperative Extension

- City of Syracuse Department of Public Works
- Downtown Committee
- City of Syracuse Community Policing
- Northside Urban Partnership (UP)/Center State Economic Inclusion
- Onondaga Earth Corps
- Refugee and Immigrant Self Empowerment (RISE)
- Parks/Strathmore Advocate
- Sedgwick Farms Neighborhood Association
- Southside Family Resource Center
- Southside TNT Beautification Taskforce
- Syracuse University (SU) Community Geography
- SUNY-ESF
- SUNY-ESF Center for Landscape Preservation
- Syracuse City Planning Division

- Syracuse Housing Authority
- Syracuse Land Bank
- Syracuse Parks Conservancy and Meachem Area Park Association (MAPA)
- The Gifford Foundation
- Tomorrow's Neighborhoods Today (TNT)
- USDA Forest Service
- Yeshua Restoration Ministries
- Town of DeWitt
- Michael Grimm Tree Services
- Brady Faith Farm
- Pyramid Corporation
- City of Syracuse Transportation
- Interfaith Works of Central New York

APPENDIX C: DATA ON TREES & CLIMATE CHANGE

The susceptibility of Syracuse's existing trees to climate changes was determined by utilizing the U.S. Forest Service's Tree Atlas database (Prasad et al 2007), which projects changes in species adaptability to the predicted changes in climate over the next 100 years. Tree Atlas helps provide information on how tree species habitat may be affected by climate change in the next century by documenting the current and possible future distribution of native tree species in the Eastern United States based on multiple emissions scenarios. The model examines three factors: 1) suitable habitats for each species, 2) additional factors that affect suitable habitat, and 3) likelihood of colonization (ability to migrate with the climate changes) of that species.

The U.S. Forest Service's Tree Atlas (Prasad et al. 2007) resource helps provide information on how tree species habitat may be affected by climate change in the next century. The Atlas uses three climate models (Hadley, GCM, and GFDL), all with both high and low emissions scenarios to arrive at a range of possible future conditions by year 2100. These future conditions have an impact on each species' predicted Importance Value. Importance Value represents how dominant the species is in the natural forest area by looking at three weights—density, basal area, and count—so it is a numeric representation of the degree of habitat suitability for each tree species. High importance values represent a higher overall abundance of that species, as well as higher levels of suitable habitat for that species.

Measuring changes in Importance Value between today and the year 2100 can provide clues about the make-up of the future forest based on the impact of climate changes on habitat suitability for each tree species. Each climate scenario shows anticipated changes in suitable habitat for that particular species under that scenario. The mean change values can be negative or positive, depending on whether the species is predicted to lose or gain suitable habitat by the year 2100. Negative numbers mean a decrease in suitable habitats, positive values mean increase in suitable habitats, and thus no threat and in fact potential for growth. For instance, if the current Importance Value of a particular species is 3.4 and the future model predicts it will be -3.4, a total loss of suitable habitat is predicted for that species.

Table 15. Species Winners/Losers – Eastern Broadleaf Forest (Continental) Province (Erie and Ontario Lake Plain Section) #127

Botanical Name	Common Name	Importance Value Today (DISTRIB Modeled Current)	Importance Value (IV) Difference under Hadley Model with High Emissions Scenario (mean)	Importance Value (IV) Difference under PCM Model with Low Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with High Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with Low Emissions Scenario (mean)
Abies balsamea	balsam fir	0.03	-0.03	-0.03	-0.03	-0.03
Acer barbatum	Florida maple	0	0	0	0	0
Acer negundo	boxelder	1.21	0.47	0.12	1.29	0.09
Acer nigrum	black maple	0	0	0	0	0
Acer pensylvanicum	striped maple	0.06	-0.05	-0.02	-0.04	-0.04
Acer rubrum	red maple	5.41	-2.51	-1.2	-2.6	-1.57
Acer saccharinum	silver maple	1.47	1.18	0.61	1.54	1.69
Acer saccharum	sugar maple	4.75	-4.48	-0.04	-3.48	-1.08
Acer spicatum	mountain maple	0	0	0	0	0
Aesculus glabra	Ohio buckeye	0.15	-0.1	0.22	-0.07	0.13
Aesculus octandra	yellow buckeye	0	0	0	0	0
Amelanchier spp.	serviceberry	0.1	0.03	0.06	0.01	0.03
Asimina triloba	pawpaw	0	0.04	0.04	0.03	0.07
Betula alleghaniensis	yellow birch	0.22	-0.22	-0.14	-0.22	-0.2
Betula lenta	sweet birch	0.23	-0.18	0.01	-0.17	-0.09
Betula nigra	river birch	0	0	0	0.04	0

[Continued] Table 15. Species Winners/Losers – Eastern Broadleaf Forest (Continental) Province (Erie and Ontario Lake Plain Section) #127

Botanical Name	Common Name	Importance Value Today (DISTRIB Modeled Current)	Importance Value (IV) Difference under Hadley Model with High Emissions Scenario (mean)	Importance Value (IV) Difference under PCM Model with Low Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with High Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with Low Emissions Scenario (mean)
Betula papyrifera	paper birch	0.11	-0.11	-0.09	-0.11	-0.11
Betula populifolia	gray birch	0.15	-0.12	-0.08	-0.12	-0.09
Bumelia lanuginosa	chittamwood	0	0	0	0	0
Carpinus caroliniana	American hornbeam	0.84	-0.29	-0.21	-0.3	-0.28
Carya aquatica	water hickory	0	0	0	0	0
Carya cordiformis	bitternut hickory	0.35	0.39	0.46	0.53	0.72
Carya glabra	pignut hickory	1.39	-0.25	0.12	-0.22	0.22
Carya illinoinensis	pecan	0	0.3	0	0.3	0.08
Carya laciniosa	shellbark hickory	0	0.21	0.15	0.38	0.51
Carya ovata	shagbark hickory	1.22	-0.39	0.47	-0.27	0.84
Carya texana	black hickory	0	0.91	0	0.82	0.2
Carya tomentosa	mockernut hickory	1.24	0.38	-0.11	0.3	0.14
Castanea dentata	American chestnut	0	0	0	0	0
Catalpa speciosa	northern catalpa	0	0.06	0	0.05	0
Celtis laevigata	sugarberry	0	1.15	0	1.12	0.03
Celtis occidentalis	hackberry	0.45	1.2	1.77	1.74	2.45
Cercis canadensis	eastern redbud	0.02	0.48	1.43	1.21	1.77

Botanical Name	Common Name	Importance Value Today (DISTRIB Modeled Current)	Importance Value (IV) Difference under Hadley Model with High Emissions Scenario (mean)	Importance Value (IV) Difference under PCM Model with Low Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with High Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with Low Emissions Scenario (mean)
Chamaecyparis thyoides	Atlantic white-cedar	0	0	0	0	0
Cornus florida	flowering dogwood	0.29	0.79	0.72	0.82	0.76
Diospyros virginiana	common persimmon	0	0.82	0.07	0.85	0.39
Fagus grandifolia	American beech	1.73	-1.38	-0.25	-1.18	-0.55
Fraxinus americana	white ash	7.7	-6.54	-1.39	-6.35	-3.64
Fraxinus nigra	black ash	1	-0.88	-0.9	-0.88	-0.93
Fraxinus pennsylvanica	green ash	1.95	0.35	-0.04	0.34	0.5
Fraxinus quadrangulata	blue ash	0	0	0.03	0	0.03
Gleditsia aquatica	waterlocust	0	0	0	0	0
Gleditsia triacanthos	honeylocust	0.14	1.23	1.46	1.39	1.51
Gordonia lasianthus	loblolly-bay	0	0	0	0	0
Gymnocladus dioicus	Kentucky coffeetree	0	0	0	0	0
Halesia spp.	silverbell	0	0	0	0	0
Ilex opaca	American holly	0	0	0	0	0
Juglans cinerea	butternut	0	0	0	0	0
Juglans nigra	black walnut	0.96	-0.78	1.17	-0.04	1.25

[Continued] Table 15. Species Winners/Losers – Eastern Broadleaf Forest (Continental) Province (Erie and Ontario Lake Plain Section) #127

Botanical Name	Common Name	Importance Value Today (DISTRIB Modeled Current)	Importance Value (IV) Difference under Hadley Model with High Emissions Scenario (mean)	Importance Value (IV) Difference under PCM Model with Low Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with High Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with Low Emissions Scenario (mean)
Juniperus virginiana	eastern redcedar	0.18	1.79	1.53	2.1	2.08
Larix laricina	tamarack (native)	0.02	0.02	-0.02	0.02	0.01
Liquidambar styraciflua	sweetgum	0	0.53	0.05	0.42	0.09
Liriodendron tulipifera	yellow-poplar	0.07	0.12	0.42	0.2	0.33
Maclura pomifera	osage-orange	0.01	0.66	0.55	0.7	0.66
Magnolia acuminata	cucumbertree	0	0	0.03	0	0.01
Magnolia grandiflora	southern magnolia	0	0	0	0	0
Magnolia macrophylla	bigleaf magnolia	0	0	0	0	0
Magnolia virginiana	sweetbay	0	0	0	0	0
Morus rubra	red mulberry	0.05	1.32	0.62	1.47	1.24
Nyssa aquatica	water tupelo	0	0	0	0	0
Nyssa ogeche	Ogechee tupelo	0	0	0	0	0
Nyssa sylvatica	blackgum	0.03	0.28	0.29	0.26	0.21
Nyssa sylvatica var. biflora	swamp tupelo	0	0	0	0	0
Ostrya virginiana	eastern hophornbeam	1.45	-0.59	-0.13	-0.69	-0.56

Botanical Name	Common Name	Importance Value Today (DISTRIB Modeled Current)	Importance Value (IV) Difference under Hadley Model with High Emissions Scenario (mean)	Importance Value (IV) Difference under PCM Model with Low Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with High Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with Low Emissions Scenario (mean)
Oxydendrum arboreum	sourwood	0	0	0	0	0
Persea borbonia	redbay	0	0	0	0	0
Picea glauca	white spruce	0.07	-0.07	-0.01	-0.07	-0.07
Picea mariana	black spruce	0	0	0	0	0
Picea rubens	red spruce	0.01	-0.01	-0.01	-0.01	-0.01
Pinus banksiana	jack pine	0.03	-0.03	-0.03	-0.03	-0.03
Pinus clausa	sand pine	0	0	0	0	0
Pinus echinata	shortleaf pine	0	0.74	0	0.48	0
Pinus elliottii	slash pine	0	0	0	0	0
Pinus glabra	spruce pine	0	0	0	0	0
Pinus palustris	longleaf pine	0	0	0	0	0
Pinus pungens	Table Mountain pine	0	0	0	0	0
Pinus resinosa	red pine	0.46	-0.4	-0.38	-0.4	-0.42
Pinus rigida	pitch pine	0	0	0	0	0
Pinus serotina	pond pine	0	0	0	0	0
Pinus strobus	eastern white pine	1.08	-1.01	-0.45	-0.97	-0.58
Pinus taeda	loblolly pine	0	0.66	0	0.24	0

Botanical Name	Common Name	Importance Value Today (DISTRIB Modeled Current)	Importance Value (IV) Difference under Hadley Model with High Emissions Scenario (mean)	Importance Value (IV) Difference under PCM Model with Low Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with High Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with Low Emissions Scenario (mean)
Pinus virginiana	Virginia pine	0	0.04	0	0.03	0.01
Planera aquatica	water-elm	0	0	0	0	0
Platanus occidentalis	sycamore	0.18	0.65	0.95	0.76	0.92
Populus balsamifera	balsam poplar	0.04	-0.01	-0.04	-0.04	-0.04
Populus deltoides	eastern cottonwood	1.32	0.32	0.35	0.43	0.7
Populus grandidentata	bigtooth aspen	0.7	-0.7	-0.53	-0.7	-0.62
Populus tremuloides	quaking aspen	1.1	-1.07	-1.02	-1.07	-1.08
Prunus americana	wild plum	0	0	0	0.09	0
Prunus pensylvanica	pin cherry	0.07	-0.07	-0.07	-0.07	-0.07
Prunus serotina	black cherry	3.96	-3.52	-0.22	-3.42	-1.56
Prunus virginiana	chokecherry	0.38	-0.38	-0.38	-0.38	-0.38
Quercus alba	white oak	2.67	-1.19	0.62	-0.87	0.53
Quercus bicolor	swamp white oak	0.6	-0.57	-0.09	-0.56	-0.08
Quercus coccinea	scarlet oak	0.28	0.03	0.18	0.02	0.22
Quercus durandii	Durand oak	0	0	0	0	0

Botanical Name	Common Name	Importance Value Today (DISTRIB Modeled Current)	Importance Value (IV) Difference under Hadley Model with High Emissions Scenario (mean)	Importance Value (IV) Difference under PCM Model with Low Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with High Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with Low Emissions Scenario (mean)
Quercus ellipsoidalis	northern pin oak	0	0	0.01	0	0.01
Quercus falcata var. falcata	southern red oak	0	0.46	0	0.32	0
Quercus falcata var. pagodifolia	cherrybark oak	0	0.04	0	0.03	0
Quercus ilicifolia	bear oak: scrub oak	0	0	0	0	0
Quercus imbricaria	shingle oak	0	0.37	0.42	0.43	0.9
Quercus incana	bluejack oak	0	0	0	0	0
Quercus laevis	turkey oak	0	0	0	0	0
Quercus laurifolia	laurel oak	0	0	0	0	0
Quercus lyrata	overcup oak	0	0	0	0	0
Quercus macrocarpa	bur oak	0.58	0.8	-0.02	1.23	0.36
Quercus marilandica	blackjack oak	0	1.53	0.03	1.46	0.53
Quercus michauxii	swamp chestnut oak	0	0	0	0	0
Quercus muehlenbergii	chinkapin oak	0	0.28	0.63	0.54	0.79
Quercus nigra	water oak	0	1.09	0	0.02	0

Botanical Name	Common Name	Importance Value Today (DISTRIB Modeled Current)	Importance Value (IV) Difference under Hadley Model with High Emissions Scenario (mean)	Importance Value (IV) Difference under PCM Model with Low Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with High Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with Low Emissions Scenario (mean)
Quercus nuttallii	Nuttall oak	0	0	0	0	0
Quercus palustris	pin oak	0.67	0.29	0.28	0.34	0.71
Quercus phellos	willow oak	0	0.06	0	0.05	0
Quercus prinus	chestnut oak	0.17	-0.05	0.26	-0.03	0.2
Quercus rubra	northern red oak	3.03	-2.27	-0.35	-1.65	-0.44
Quercus shumardii	Shumard oak	0	0.17	0	0	0
Quercus stellata	post oak	0	4.92	0.72	4.55	2.24
Quercus velutina	black oak	1.1	0.48	0.41	0.78	0.53
Quercus virginiana	live oak	0	0	0	0	0
Robinia pseudoacacia	black locust	0.47	0.28	0.73	0.83	0.68
Salix amygdaloides	peachleaf willow	0	0	0	0	0
Salix nigra	black willow	1.02	-0.31	-0.12	-0.04	0
Sassafras albidum	sassafras	0.42	0.31	0.57	0.66	0.54
Sorbus americana	American mountain-ash	0	0	0	0	0
Taxodium distichum	baldcypress	0	0	0	0	0
Taxodium distichum var. nutans	pondcypress	0	0	0	0	0
Thuja occidentalis	northern white-cedar	0.13	-0.1	-0.13	-0.12	-0.13

Botanical Name	Common Name	Importance Value Today (DISTRIB Modeled Current)	Importance Value (IV) Difference under Hadley Model with High Emissions Scenario (mean)	Importance Value (IV) Difference under PCM Model with Low Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with High Emissions Scenario (mean)	Importance Value (IV) Difference under Average of 3 GCM Models with Low Emissions Scenario (mean)
Tilia americana	American basswood	2.47	-2.27	-1.51	-2.1	-1.67
Tsuga canadensis	eastern hemlock	0.78	-0.68	-0.5	-0.67	-0.59
Ulmus alata	winged elm	0	2.34	0	1.88	0.04
Ulmus americana	American elm	5.53	-3.51	0.09	-3.08	0.26
Ulmus crassifolia	cedar elm	0	0.57	0	0.43	0
Ulmus rubra	slippery elm	1.19	-0.82	0.63	-0.36	0.71
Ulmus thomasii	rock elm	0.02	-0.02	0.01	0.02	0.01

APPENDIX D: PUBLIC OUTREACH SUMMARY – EMERGING THEMES

The following is an excerpt from the full report, detailing findings from the extensive public outreach effort throughout 2018. These are the overarching themes that emerged. View the complete report at: http://www.syracuse.ny.us/Parks/forestry.html

Education. It was clear early on from both Steering Committee and Stakeholder meetings that the general public, even those who are very engaged in their communities, had little base knowledge about how trees—both public and private—are managed in the city. When stakeholders and residents were presented with the challenges that face the urban forest, and learned about how they could be more proactive in supporting the health of a thriving urban forest, they were happy to act. Stakeholders rated this as one of three top priorities during the meetings. Survey respondents rated education as the top priority for increasing canopy on private property. Brochures created during public outreach will continue to serve as tools for this purpose and to inspire future educational tools.

ReLeaf Syracuse staff and volunteers experienced firsthand that some people's negative perceptions about trees are easily overcome when they have the opportunity to learn about how city trees are managed. There were a number of residents that came to meetings to voice their complaints about current maintenance practices. Many of them left with a more positive opinion and were excited that the city is looking strategically at how to increase canopy.

Reaching Out to the Difficult to Reach. In this public outreach process, great lengths were taken to engage community members that traditionally have not been at the table regarding trees and other community planning initiatives. Meetings were planned with neighborhood organizations that have deep reach into the diverse groups and neighborhoods of Syracuse, and broad geographic representation was received through the survey responses. Additionally, three targeted meetings were held on the North Side of Syracuse which has experienced a rapid growth in population in recent years due to refugee resettlement.

TREE BENEFITS

Important Tree Benefits

Benefit	Survey Responses
Provide shade, reduce energy bills	376
Create more desirable neighborhoods	331
Reduce pollution (air, water & noise)	206
Provide wildlife habitat for birds, etc.	164
Improve my mood	89
Improve health	59
Other	23

Important benefits of trees, as reported by survey-taking community members
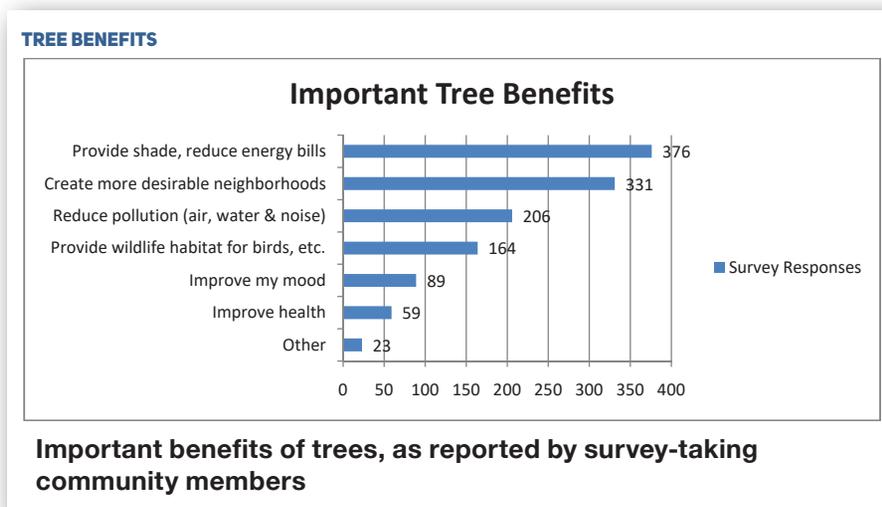
New Americans. Many "New Americans" in Syracuse are from countries that traditionally have a close and direct relationship to trees. Trees are a source of food, are used for building materials, and are a part of daily life. For many of these residents, they are aware of the value and benefits of trees but the concept of an "urban forest" is unfamiliar. Similar to their native Syracusan neighbors, New Americans lacked a base knowledge of how trees—both public and private—are managed in the city and have never thought about trees as infrastructure. This is compounded by language and cultural barriers and a broader lack of information about how American society functions—from infrastructure to health care, social services, education, etc.

Biggest Challenges with Trees

Challenge	Survey Responses
Roots cracking sidewalks and pavement	432
There aren't enough trees in my…	287
Limbs blocking sidewalks, signs, street lights	132
Roots getting into sewer pipes	113
Safety problems from trees or limbs falling	107
Leaves and fruit dropping	86
Other	34
Attracting bugs or pests	31
Creating hiding places for criminal activity	26

Most-reported challenges to Syracuse's trees

Though also true for many Syracusans, financial self-sufficiency is of the utmost importance for New Americans. Out of necessity for daily survival and in adapting to a new culture, trees are not at the front of many residents' minds. However, when introduced to how trees are managed and the interest of city officials to increase canopy, there was support and interest.

Equity. Data from the State of the Urban Forest Report shows that all canopy cover and its distribution is not created equal. The areas with the least canopy tend to be:

- Downtown, where there is little pervious surface
- Commercial and industrial areas
- Low-income neighborhoods where advocating for trees may not always be a top priority, and in neighborhoods where street layout and competition for space with other utilities precludes trees from being sited.

Taking all of these complexities into account, whether at public meetings or through surveys, residents provided feedback indicating that the city should prioritize increasing canopy where it is needed most.

Maintenance. Overall, both meeting attendees and survey respondents were supportive of city trees and increasing canopy cover; however, keeping the existing trees well-maintained seemed to be just as important. The biggest challenge for trees cited at the public meetings was maintenance, while "Manage the trees we have better" was the second ranked priority for the future of the city's trees. The message seems to be: "We support the growth of canopy but only if it will be well cared for." Absent a strong maintenance plan, new trees seem to create an impression of neglect which leaves a bad impression with community members.

New Development Standards. At public meetings, a point was made to introduce several of the planning tools that the city might consider to strengthen the protection of existing trees and encourage the replanting of trees lost to age, disease, storms, development, etc. Information was provided about six different planning ideas: "Incentivize tree planting (rebates, stormwater credit, cost share)", "Development standards" (parking lot design, existing tree protections, replacement fees), "Municipal Sidewalks," "City-wide Canopy Goal," "Fines and Enforcement," and "Updated Tree Ordinance." For many, these ideas were new and took some time to grasp. Of the ideas, working on new development standards to improve the health of the city's trees ranked the highest at public meetings and was a recurring theme in many survey comments.

Top Tree Priorities

Priority	Survey Responses
Plant more trees on public spaces in neighborhoods that need them most	593
Manage the trees we have better	234
Plant more trees on school and park properties	221
Help people who want to plant more trees on their own property	122
Encourage preservation of trees on private property	60
Other	18

The community's biggest priorities for Syracuse's urban forest

Canopy Goal. Setting a canopy goal for the city ranked second amongst ideas for improving planning for trees in the city. When questioned about canopy goal setting, most participants favored an aggressive canopy goal (25), while some preferred a middle-of-the-road approach (10), and zero (0) tallies were cast for status quo of merely replacing what canopy is lost each year.

Current Policies and Procedures are Not Working for Sidewalk Maintenance. Through both the public meetings and in survey results, it appears that city residents are interested in sidewalk management beyond the status quo and are willing to consider different models of cost sharing for the city to take on the responsibility of maintaining sidewalks. Numerous comments were also made about the importance that any solutions not carry a disproportionate burden on low-income residents.

Fruit Trees. Though not a topic specifically brought up in any presentation materials, community members made multiple requests for the city to consider the value of adding fruit trees to the landscape as evidenced by many in-person discussions plus over 13 direct comments.

Increasing Tree Cover on Private Property

Approach	Survey Responses
Start a public education campaign to encourage property owners to plant trees	474
Raise money for a tree give-away program	288
Use public dollars to plant trees on private property if planting is close to the road	261
I don't think the City should increase tree cover on private land	135
Other	91

The community is largely in support of efforts to increase tree cover on private proerty through a variety of approaches

APPENDIX E: TREES AND SIDEWALKS.

CONTRIBUTING FACTORS TO SIDEWALK FAILURE, POTENTIAL SOLUTIONS TO REDUCE CONFLICTS, AND SELECT CASE STUDIES

The following delves into the trees and sidewalk issues more closely, looking at sidewalk failures, potential solutions, and relevant case studies.

CONTRIBUTING FACTORS TO SIDEWALK FAILURE

Some significant contributing factors influencing sidewalk failure include:

- **Time:** When evaluating sidewalk failure, time must be used as a reference. It is not logical for a sidewalk to be expected to last for hundreds of years. With standard sidewalk construction methods using concrete over base material, the average and reasonable service life of a sidewalk is 20 to 25 years. So, it is not reasonable to blame the failure of a 30-year-old sidewalk entirely on the presence of a tree.
- **Construction methods:** Sidewalk design and construction methods and materials are additional factors that are commonly not considered when a tree is associated with a sidewalk failure. There are many options available to modify the design and construction of new sidewalks while still complying with regulations governed by the Americans with Disabilities Act (sidewalk placement in the right-of-way, types of base and sidewalk materials and depth, use of ramps and piers, installation of root barriers, etc.).
- **Soil characteristics:** Soils affect not only tree growth and root development, they also have limitations that affect infrastructure such as sidewalks and roads. Syracuse is built on many types of soil, but all soils are wholly or in large part of glacial origin, as described in the Onondaga County Soil Survey Soil Survey Report. The survey lists physical properties, such as slope, strength, water permeability, particle content, and susceptibility to frost action, flooding, and engineering factors for each soil type, and it further describes limitations of use in the county. The vast majority of soil types in Syracuse are described as having severe or moderate limitations for road construction due to frost action and drainage. So, the soil type upon which sidewalks in Syracuse are built are a major limiting factor in the longevity of sidewalks in the city, but trees often get the blame.

POTENTIAL SOLUTIONS TO REDUCE TREE AND SIDEWALK ISSUES

Strategies to reduce tree and infrastructure conflicts and damage can be preventive, remedial, or a combination of both. The following strategies are presented in three categories: tree and root zone-based, infrastructure design-based, infrastructure materials-based. While not all strategies, solutions, or methods may be appropriate for Syracuse, they are offered for future consideration and testing. It should also be noted that strategies in the three categories can be combined and integrated for a higher rate of success.

- A. Tree and Root Zone-Based Strategies
  - Species Selection
    - Trunk flare and root buttress characteristics
    - Rooting characteristics (known to form surface roots, or are deep-rooted)
    - Rootstocks: cultivars can be propagated on different species rootstock, which can vary in root characteristics
    - Nursery stock type: with bare-root stock, roots can be removed that are situated laterally to encourage more vertical root orientation
  - Root Pruning
    - Consider timing, frequency, species tolerance, age, and condition before performing root pruning
    - It is no longer recommended to combine crown thinning with root pruning, except maybe to do it a year prior to reduce wind load.
  - Root Guidance Systems
    - Root barriers
      - Barrier types: include deflectors, inhibitors and traps. Deflectors are a physical barrier, often plastic. Inhibitors include either herbicide or copper in some kind of fabric or screen to inhibit root development. Traps allow tip of root to get in, but then radial growth is limited and the root girdled. Includes advice for selecting plastic barrier.
      - Barrier configurations: linear (along sidewalk) or circular (around tree root zone, most commonly used in sidewalk cutouts)
      - Continuous trenches: provides more soil volume and common area for tree root growth for multiple trees
      - Root paths: still experimental, incorporating little trenches, hoping that root will choose path of least resistance

- - Root channels: similar to root path, but leads roots directly to larger, more preferred area
    - Encourage deeper rooting under sidewalk: by installing CU Structural Soil as a subbase to a 30-36" depth under the side walk. Load bearing requirements of the sidewalk are met while also allowing pore space for the roots to grow into when they reach the sidewalk sub-base.
  - Steel plates
  - Foam underlay

- B. Infrastructure: Design-Based Strategies
  - Increasing Tree Growing Space
    - Planting space: making sure the cut-out space is the appropriate size for the tree
      - Contact stress: this occurs when the cut-out is too small and tree grows over the top of the sidewalk. Eliminating the sidewalk to provide a larger space for the tree can cause tree failure by eliminating part of growth support structure for tree
    - Curving sidewalks around trees
    - Pop-outs into street (which can reduce the number and location of parking spaces)
    - Non-standard sized slabs, or non-standard shapes
    - Monolithic sidewalks (sidewalks with no tree lawn between that and street, sidewalk and street are directly next to each other)
    - Increase right-of-way width by getting easements from property owners (may also be a necessary part of curving sidewalks)
    - Eliminate sidewalks entirely if possible, or have one on only one side of the street
    - Tree islands for larger groups of trees
    - Narrower streets have lower levels of accidents and provide more space for trees

  - Creating a separation between tree roots and infrastructure
    - Bridges and ramps
    - Lower sites: similar to bridges or ramps, initially planting the tree in a site lower than the infrastructure could reduce chance of conflict
    - Gravel layer: including modifications to try to discourage root growth through this layer
  - Soil Replacement, Modification, and Management
    - Soil replacement: structural soil under hardscapes (see Root Guidance Systems above)
    - Soil modification: increasing soil volume: how much needed, assessing soil volume, increasing soil volume
    - Water management: managing water to direct the root growth

- C. Infrastructure: Materials-Based Strategies
  - Modifications to Concrete
    - Concrete reinforcement with rebar, mesh, or fiber.
    - Expansion joints as a preventative measure
    - Pervious concrete is thought to encourage deep rooting by distributing the water through the soil profile, but has not been tested in field trials
    - Flexible joints to make "flexible sidewalks"
    - Thicker slabs (> 6 inches), greater resistance to root pressure
  - Alternatives to Concrete
    - Asphalt: flexible, less expensive, good for temporary fixes. Asphalt can also be colored to blend better with concrete; this is achieved during the manufacturing process with color additives, or can be done after installation with specialty acrylic paint.
    - Decomposed granite and compacted gravel
    - Pavers, made of concrete, brick, stone, rubber, etc.
    - Recycled rubber
    - Flexi-pave (particularly as a substitute for tree grates in commercial areas)

- D. Best Practices for New Sidewalk Construction vs. Repair Projects

Best management practices differ depending on whether the situation is creating new sidewalks and spaces for trees, or when dealing with existing trees and sidewalks in conflict.

  - Common best practices when creating new spaces for trees and sidewalks include:
    - Maximize soil volume
    - Install root barriers where appropriate
    - Increase distance between tree and hardscape (create a larger tree lawn or pit)
    - Place sidewalk adjacent to curb and plant on other side of sidewalk (on excess right-of-way or private property)
    - Use an alternate sub-base material that discourages surface rooting
    - Use an alternate sub-base that encourages deeper rooting under the sidewalk (i.e. structural soils or soil cells).
    - Use a combination of root barrier and alternative sub-base
    - Install structural soil or planting cells under sidewalk as a bridge from tree lawn to front lawns
    - Channel roots by pipes filled with soil, etc.
    - Elevate the sidewalk to suspend it over soil

- o Common best practices when dealing with existing trees and sidewalks:
    - Remove heaved slabs of concrete and pour new slabs in place with minimal excavation or impact of roots. Possibly use steel to reinforce slabs if news slabs are less than 5" thickness.
    - Ramp or bridge sidewalk blocks, or place new blocks on piers
    - Grind or shave the blocks if displacement is less than 1 inch
    - Perform appropriate root pruning following industry standards for tree health and stability
    - Install root barriers (after proper root pruning)
    - Reroute the sidewalk around the trees
    - Use an alternate sub-base, such as gravel, crushed granite, rubber chips, styrofoam to provide a few more years of service from the sidewalk without removing the tree
    - Reinforce the new sidewalk slabs using steel reinforcing bars
    - Perform "slab jacking" (drilling holes in panels that are not raised, and injecting caulk to raise it to meet the other)
    - Remove tree only if no alternative is feasible, and other actions would create a public safety issue.

CASE STUDIES RELATED TO TREES AND SIDEWALKS.

The following case studies have been provided to demonstrate how other cities have investigated and addressed sidewalk and trees conflicts, and to encourage Syracuse to consider delving deeper into the issue considering the unique soil and climate conditions and engineering policies for safe sidewalks in the city.

Cincinnati: Analyzing the Issue—Cincinnati's Tree and Sidewalk Study
Cincinnati conducted a technical study to gain insights into why sidewalk failures occurred in the city, and to determine if trees were a primary factor. The results and findings included: sidewalk failures were similar in type and extent with and without trees present; tree-related failures did not occur during the first 15 to 20 years after sidewalk construction; and sidewalk blocks that failed within the first 20 years may have actually encouraged root growth beneath the cracked blocks. The study also revealed that sidewalks 50 years or older were thicker and constructed on a compacted gravel or cinder base, but when the city changed its sidewalk construction specifications for thickness and base materials, more damage occurred with the presence of trees.

Syracuse could conduct a study of its own comparing sidewalk damage to various soil types, construction methods, sidewalk age, and the presence of trees. This data could then be used to support policy and specification changes that would result in safe sidewalks and protected trees.

Seattle: Addressing the Issue: Policies and Procedures—Seattle's Trees and Sidewalks Operations Plan
Syracuse has begun departmental discussions about updating and revising its sidewalk maintenance and repair policies and procedures. Generally, the most effective approach that cities take is based on three key components: 1) The responsibility for trees and infrastructure in the right-of-way are centralized in one department (i.e., engineering and urban forestry divisions are grouped together in a larger department) which facilitates administration and communication about trees and sidewalk issues; 2) they work together on a regular basis to find solutions to each tree/sidewalk conflict using a mutually agreed upon "toolkit" of actions; and 3) their written policies reflect the community's desire to both preserve trees and protect public safety.

The City of Seattle's Tree and Sidewalk Operations Plan is an exemplary document that details policies and procedures and provides solutions and schematics for a wide variety of acceptable alternative sidewalk construction/repair techniques and materials and tree protection measures.

View the plan here: *https://www.seattle.gov/Documents/Departments/SDOT/Trees/TreeSidewalksOperationsPlan_final215.pdf*

Funding the Issue—Funding Models from Multiple Cities
Sidewalk funding models generally are in three categories:

- Individual Property Owner Funded: Property owners are responsible for funding the repair or reconstruction of sidewalks adjacent to the properties they own. This is the most common sidewalk repair funding model.
- Community-Funded Repairs: The municipality takes responsibility for repairing all sidewalks, typically using general funds and/or transportation funds.
- Hybrid Approaches: A combination of the first two models. Hybrid approaches may include special districts and cost-sharing programs.

Hybrid Funding Approaches
If Syracuse wants to explore hybrid funding approaches, the following examples are provided for consideration and further exploration:

Ithaca, NY: The city implemented a new sidewalk policy that funds sidewalk repair and construction work through annual sidewalk assessment fees. The policy divides the city into five "Sidewalk Improvement Districts," and every property owner in the city contributes an annual fee to the district they are in. The new policy moves away from burdening adjacent property owners with the entire cost of sidewalk installation and maintenance and spreads the cost of sidewalk repairs across all property owners in each district. Properties are assessed an annual amount that is based on their classification type. One- and two-family homes are classified as "low foot traffic lots" and pay an annual maintenance fee of $70. All other lots pay a base annual maintenance fee of $140 plus additional fees based on a frontage fee and the square footage of all buildings on the lot. The building footprint fee is

$0.015 per square foot of building footprint, plus a frontage fee of $30 for every 50 feet of linear lot frontage on the street. Rochester, NY. The city's sidewalk repair program is proactive, based on a multi-year rotation (currently every six years). It is fee-based on linear footage of sidewalk adjacent to each property with the funds dedicated to only hazardous sidewalk replacement. Under this program, it is the property owner's responsibility to report hazardous sidewalk and the city's responsibility to fix it. Property owners are responsible for replacing sidewalks if they are not a hazard, but are a temporary nuisance (holding water), if they elect to replace them for aesthetic reasons, or if the property owner causes damage to the sidewalks. Property owners are also responsible if they want to install sidewalks in an area where none existed before.

Chicago, IL: The Shared Cost Sidewalk Program is an extremely popular low-cost, voluntary program in which property owners share the cost of sidewalk repair with the city. The Shared Cost Sidewalk Program cost per square foot charged to property owners is well below what a private contractor would charge. Senior citizens and persons with disabilities may qualify for a further discounted rate. Applications are taken on a first-come, first-served basis. The number of participants is based on availability of funds.

Fort Wayne, IN: The City of Fort Wayne has a cost-sharing program for sidewalk repair. Under this program, the city and the petitioning resident (or residents) will each pay 50% of the cost of the repairs. Payments can be made in full, or homeowners can take advantage of low-interest loans (3%). Payments can be made over the course of 10 years on an annual or monthly basis.

Pittsburgh, PA: Pittsburgh has a policy and supporting regulation that the city will pay for repair (up to a set price per square foot) only if a city planted tree causes the damage and the property owner files a claim:

 § 417.02.A - CITY TREE ROOT SIDEWALK DAMAGE CLAIMS AND COMPENSATION. (a) In the event that a tree that has been installed by the city and/or the installation has been otherwise been sanctioned by the city and should cause damage to the sidewalk and/or curb, the abutting property owner may file a claim for damages with the city's Department of Law in accordance with Department of Law procedures.

APPENDIX F: ESTIMATED COSTS FOR FIVE-YEAR TREE MANAGEMENT PROGRAM

Estimated Costs for Each Activity			Year One		Year Two	
Activity	Diameter	Cost/Tree	# of Trees	Total Cost	# of Trees	Total Cost
Severe and High Risk Removals	1-3"	$28	0	$0	0	$0
	4-6"	$58	0	$0	0	$0
	7-12"	$138	0	$0	0	$0
	13-18"	$314	0	$0	0	$0
	19-24"	$605	0	$0	0	$0
	25-30"	$825	0	$0	0	$0
	31-36"	$1,045	0	$0	0	$0
	37-42"	$1,485	0	$0	0	$0
	43"+	$2,035	0	$0	0	$0
Activity Total(s)			**0**	**$0**	**0**	**$0**
Moderate and Low Risk Removals	1-3"	$28	6	$151	6	$151
	4-6"	$58	12	$661	12	$661
	7-12"	$138	28	$3,781	28	$3,781
	13-18"	$314	63	$19,656	63	$19,656
	19-24"	$605	121	$73,205	121	$73,205
	25-30"	$825	165	$136,125	165	$136,125
	31-36"	$1,045	209	$218,405	209	$218,405
	37-42"	$1,485	297	$441,045	297	$441,045
	43"+	$2,035	407	$828,245	407	$828,245
Activity Total(s)			**1306**	**$1,721,275**	**1306**	**$1,721,275**

Year Three		Year Four		Year Five		Five-Year Costs
# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	**$0**	**0**	**$0**	**0**	**$0**	**$0**
6	$151	6	$151	6	$151	$756
12	$661	12	$661	12	$661	$3,306
28	$3,781	28	$3,781	28	$3,781	$18,906
63	$19,656	63	$19,656	63	$19,656	$98,282
121	$73,205	121	$73,205	121	$73,205	$366,025
165	$136,125	165	$136,125	165	$136,125	$680,625
209	$218,405	209	$218,405	209	$218,405	$1,092,025
297	$441,045	297	$441,045	297	$441,045	$2,205,225
407	$828,245	407	$828,245	407	$828,245	$4,141,225
1306	**$1,721,275**	**1306**	**$1,721,275**	**1306**	**$1,721,275**	**$8,606,376**

Estimated Costs for Each Activity			Year One		Year Two	
Activity	Diameter	Cost/Tree	# of Trees	Total Cost	# of Trees	Total Cost
Stump Removals	1-3"	$18	10	$166	10	$166
	4-6"	$28	16	$426	16	$426
	7-12"	$44	32	$1,386	32	$1,386
	13-18"	$72	67	$4,769	67	$4,769
	19-24"	$94	125	$11,688	125	$11,688
	25-30"	$110	169	$18,590	169	$18,590
	31-36"	$138	213	$29,288	213	$29,288
	37-42"	$160	301	$48,010	301	$48,010
	43"+	$182	411	$74,597	411	$74,597
Activity Total(s)			1342	$188,919	1,342	$188,919
High Risk Pruning	1-3"	$20	0	$0	0	$0
	4-6"	$30	0	$0	0	$0
	7-12"	$75	0	$0	0	$0
	13-18"	$120	0	$0	0	$0
	19-24"	$170	0	$0	0	$0
	25-30"	$225	0	$0	0	$0
	31-36"	$305	0	$0	0	$0
	37-42"	$380	0	$0	0	$0
	43"+	$590	0	$0	0	$0
Activity Total(s)			0	$0	0	$0

Year Three		Year Four		Year Five		Five-Year Costs
# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	
10	$166	10	$166	10	$166	$831
16	$426	16	$426	16	$426	$2,131
32	$1,386	32	$1,386	32	$1,386	$6,930
67	$4,769	67	$4,769	67	$4,769	$23,845
125	$11,688	125	$11,688	125	$11,688	$58,438
169	$18,590	169	$18,590	169	$18,590	$92,950
213	$29,288	213	$29,288	213	$29,288	$146,438
301	$48,010	301	$48,010	301	$48,010	$240,048
411	$74,597	411	$74,597	411	$74,597	$372,983
1,342	**$188,919**	**1,342**	**$188,919**	**1,342**	**$188,919**	**$944,593**
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	**$0**	**0**	**$0**	**0**	**$0**	**$0**

Estimated Costs for Each Activity			Year One		Year Two	
Activity	Diameter	Cost/Tree	# of Trees	Total Cost	# of Trees	Total Cost
Routine Pruning (5-year cycle)	1-3"	$20	1956	$39,112	1956	$39,112
	4-6"	$30	965	$28,962	965	$28,962
	7-12"	$75	1581	$118,545	1581	$118,545
	13-18"	$120	1416	$169,920	1416	$169,920
	19-24"	$170	973	$165,376	973	$165,376
	25-30"	$225	481	$108,315	481	$108,315
	31-36"	$305	184	$56,059	184	$56,059
	37-42"	$380	69	$26,296	69	$26,296
	43"+	$590	37	$21,830	37	$21,830
Activity Total(s)			38,309	$734,415	7,662	$734,415
Young Tree Training Pruning (3-year cyle)	1-3"	$20	3259	$65,187	3259	$65,187
	4-8"	$30	1609	$48,270	1609	$48,270
Activity Total(s)			4868	$113,457	4868	$113,457
Replacement Tree Planting	Purchasing	$170	0	$0	0	$0
	Planting	$110	0	$0	0	$0
Activity Total(s)			0	$0	0	$0
Replacement Young Tree Maintenance	Mulching	$100	0	$0	0	$0
	Watering	$100	0	$0	0	$0
Activity Total(s)			0	$0	0	$0
Activity Grand Total			45,826		15,179	
				$2,758,065		$2,758,065

Year Three		Year Four		Year Five		Five-Year Costs
# of Trees	Total Cost	# of Trees	Total Cost	# of Trees	Total Cost	
1956	$39,112	1956	$39,112	1956	$39,112	$195,560
965	$28,962	965	$28,962	965	$28,962	$144,810
1581	$118,545	1581	$118,545	1581	$118,545	$592,725
1416	$169,920	1416	$169,920	1416	$169,920	$849,600
973	$165,376	973	$165,376	973	$165,376	$826,880
481	$108,315	481	$108,315	481	$108,315	$541,575
184	$56,059	184	$56,059	184	$56,059	$280,295
69	$26,296	69	$26,296	69	$26,296	$131,480
37	$21,830	37	$21,830	37	$21,830	$109,150
7,662	$734,415	7,662	$734,415	7,662	$734,415	$3,672,075
3259	$65,187	3259	$65,187	3259	$65,187	$325,933
1609	$48,270	1609	$48,270	1609	$48,270	$241,350
4868	$113,457	4868	$113,457	4868	$113,457	$567,283
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
0	$0	0	$0	0	$0	$0
15,179		15,179		15,179		
	$2,758,065		$2,758,065		$2,758,065	$13,790,327

APPENDIX G: STAKEHOLDER MEETING MASTER PLAN DRAFT REVIEW, MARCH 5TH 2020

SUSTAINING MOMENTUM:

Group 1:
- Tree give away
    - Dec seedlings to schools (teach kids where to plant!) Change a kid now to not have to change an adult later
- Can greenhouse be utilized
- Fund planning and planting of vacant lots
    - Community outreach to display alternatives & vote on preferred maintenance!
    - Production forestry look is clean
- News. We must continue to communicate

Group 2:
- Bring a friend: Social media – thru planting projects
- Continue open meetings, Connect & stay connected with TNTs
    - Starting w/ most enthusiastic TNTs (Southside)
- Succession planting in parks, mower damage
- Mindful of salt and snow storage
- .5mill shortfall – have to sell to residents
- State of the urban forest address
- Involve politicians, DPW hierarchy – get their buy in thru praise from tree recipients
(Side note – who is going to do this? Volunteers? Contractors? Grants to pay for? Private funding? Utilities? Find who locally is interested in purchasing carbon shares)

Group 3:
- Annual festival to rotate around to different neighborhoods
    - Or maybe broken up across the neighborhoods
- Even focus on "forest" parks
- Educational/interpretive signage "your taxpayers' dollars @ work"
- Make sure it gets set up so that it can be repeated in future
- 4 generations appeal

- Include urban foresting updates in state of the city
  - Using financials &/or cost benefits
- Deep involvement w/ SCSD
- High profile events
  - In parks, can do some post history (pictures) w/ landscaping to where we're headed
- High profile events generally throughout year; significant urban forestry projects

CANOPY GOALS & EQUITY

Group 1:
- Design competition – Each neighborhood must create plan that aligns w/ rubric
  - Rubric content
    - Consider ventilation & air pollution
    - Shade – food production/natives
    - Urban heat island
    - All 3 optimize services trees provide
  - Education to ensure planting makes sense
    - Series of trainings before compt – at accessible times
  - Must partner w/ HHQ on Block blitz or general housing dev
  - Ability to create employment
    - Urban jobs task force
    - Counter green gentrification, raise value of neighborhood
    - Train more arborists
  - Get more youth involved
    - Volunteer programs, high school/middle school tree nursing
    - Teach maintenance
  - Rank # of private properties that are providing data on trees
- Those involved:
  - Neighborhood orgs
  - Nonprofit orgs – ex: boys and girls club
  - City depts – Parks & NBD
    - Help provide data & help teams/neighborhoods prepare their competition pitch
  - Residents
    - To provide local knowledge – ex: breezes blow this way more
    - Event help create community leaders
    - Provide stipend

- Could model after:
  - Tree City USA comp but on neighborhood level
  - "Keep Syracuse Green"

Group 2:
- Neighborhood competitions
  - $500,000 to neighborhood
  - Vs individual benefits
- How do you get people to care?
  - "Plant the seed"
    - Start at schools, youth organizations
  - Interest/knowledge of nature, love of outdoors
  - Greater ownership over trees
  - Target different populations
- Rezone & zoning ordinance – amenity zoning provision
  - Incentive bonus for tree planting
  - Social norming – set expectations of neighborhood goals
- Planting on private property vs public ROW property
  - Programs to educate/outreach, provide tree
  - Expectations that city norm is municipality controls public space
  - Tie in w/zoning & ordinances
- Tax credits

PLANTING ON PRIVATE PROPERTY

Group 1:
- Atl. States has had mixed results: look to imp.
  - Communication w/ maint. Staff: should be more
  - GLRI funding
  - Cath. Charities / Christopher Communities/Oakwood
  - 6,700 trees planted – survival %?
- Tax rebate
  - Is it a gift? Private vs public
    - Public benefit – so not direct gift
  - Education for "gift" argument
    - Prepare legal arugement
- Plant on private prop is needed
  - Reduce red tape for OEC to help indiv. Owners
  - Better canopy/less utility interference
  - Write grants to get $
- Rezone syr – laws to require for new lots – shift laws to integrate trees into city permit process
- Education most important!
  - Teach better quality of life issues
  - Teach $ benefits to landlords
  - Teach env. Benefits to owners/tenants
  - Buy 1 get 1 free for private

Group 2: Scan is not legible, need to see the original

EDUCATION PROGRAMS

Group 1:
- K-12 formal education
  - Have kids "sponsor" (Health fairs through partners that sponsor) street tree in their neighborhood, at their school, ideally as they move along through each grade
- Non-formal
  - Tapping into refugee groups
- Through volunteer stewardship
  - TNT groups generally could provide greater leadership on tree plantings and their importance

- Public information to homeowners/landowners
  - (group didn't come up with anything)
- Developers
  - What's required predevelopment – make this meeting required
- Truck delivery drivers
  - To make them aware of possible truck damage to street trees
- How to engage people who rent properties or places? And respect tree plantings
  - include information about importance of trees on rental property as part of new renter informational packet
  - send information to parents through kids at school

Group 2:
- K-12
  - Arbor day model is excellent model to use throughout school
    - Teach the teacher training
    - Poster content through art teacher
  - 5-7th gr – more informative about natural resource (curriculums)
    - Tracks in high school
    - CTS model – convert to k-8 curriculum
- Afterschool programs
  - Food forests
  - Natural areas
  - Invasive species education – tree id program
  - Pass arboretum
  - YMCA, Catholic Charities, Parks A.S program
    - Contact with them because they run the afterschool program for SCSD
- Volunteer stewardship
  - Annual community tree plantings – please continue!!!!
    - We get 100-150, people come out w/families
    - More media coverage w/ arbor day / community plantings!
  - Community tree stewards in combined w/schools
- Pubic information to homeowner/landowners
  - Incentive for homeowners?
    - Mailings or incorporate into existing mailings
    - Backpack poster incentives – "Swag"
  - Smaller community tree plantings in and with churches / catholic schools
    - Incorporating w/ Sunday schools

FUNDRAISING & MARKETING

Group 1:
- Get understanding of community interest
  - Who? List serve
- Get understanding of community donors & corporate donors
  - Who? List serve
- Fund raisers at schools
- Increased marketing personnel and efforts
  - Funds & awareness
- Arbor day run fundraiser
- Marketer and grant person
- TNT coordination for arborist program
- Bring save the rain back as a partner
- Require utilities to pay into program/fund if the utility isn't under the pavement (grid gas)
- Identify groups who would purchase carbon credits
- Make TNT program funds must do tree plantings every x years or every year
- Demonstrate downward trend of tree canopy & use it as a go fund me type effort
- Require all municipal and utility development to plant trees and create a tree ? system
- Incentive for private properties (tax break?) to plant trees

Missing back of page

MAINTENANCE

Group 1:
- Churches – engage interested members of congregation to protect and care for trees
- Schools – engage PTOs, principals, teachers, faculty meetings
- Youth employment serves many goals
  - For kids & trees
  - Sustained involvement
  - < 20/yr now, but if $$ available, many more kids interested
- Stewardship
  - Good for occ planting, but difficult to use for pruning, watering, protecting trees from lawn mower blight
- Student engagement
  - Ok, but often lack time. Transportation, and then move on after 1-2 yrs

Attendees / Volunteers	Planting	Design & Delivery Ed Programs	Data analysis & GIS	Fund raise for private giveaway	Track & monitor trees	Community Engagement
Karen Schroeder	X	X		X		X
Richard Shoff Jr	x				x	
Jen Lawrence	x					
Jennifer Schultz						x
Michael Laflair					x	x
Elizabeth Domachowske	x	x				x
Heather Schroeder		x				x
Autumn Beaudoin	x	x				x
Hannah Garty	x	x			x	x
Tom Cross	x	x				x
Donald Leopold		x				
Anna Nguyen	x		x			
Cimone Jordan	x		x			
Madison Quinn	x					x

Other1	Other2	Other3	UFMP Draft Feedback
Blockblitz / Rehabs / New construction	We can include in our home ownership classes	Happy to amplify any message	Great job! Need to find a way to incorporate care/removal of existing homeowner for trees for low-income families!
			Thank you so much for all the work you did. Interfaith works has an interfaith initiative program that works with all the churchs etc. Not sure if connecting with them would be helpful, if so I can facilitate the connection
How to disseminate and activate neighbors			
			Very interesting idea w/carbon credits. Lots of momentum & energy to move the plan forward. Need to keep it and follow through
Developers and truck delivery drivers			
			I know someone who would be extremely valuable in implementing this. She currently freelances and I'm sure would love to consult in any capacity. Aidan Hudson-Lapore aidanhudsonlapore.com
			Plan seems very well thought-out & prepared. Looking forward to engaging further as a city dept in how we can be collaborative in making this successful.
			Great for residents of syracuse and the environment
			Very exciting plan
			It was interesting to hear about the local organizations assisting to plant trees then there should be a taskforce to focus on it
			We could coordinate w/ local businesses & organizations to plan volunteer days similar to block blitz w/HHQ but city wide
			Great discussion on education!

Attendees / Volunteers	Planting	Design & Delivery Ed Programs	Data analysis & GIS	Fund raise for private giveaway	Track & monitor trees	Community Engagement
Theodore Endreny	x	x	x		x	x
Jim Blum						
Kevan Busa		x				
Paul Harris	x	x	x	x	x	x
Lauren Houtenbrink	x	x			x	
Jessica Grant	x		Possible		Possible	x
N/A						x
Amy Samuels		x				x
Dick Scheutzow	x	x		x	x	x
N/A						
Paula Uche		x				
N/A						

Other1	Other2	Other3	UFMP Draft Feedback
Running itree tools for project			Great job getting community engagement from a diverse community group & for advocating equility w/ canopy cover. Need to get coordinated w/ I81 project to ensure no net loss of tree cover & replacement of high-funcationing tree cover.
			Great job to the team
Assisting w/tapping into carbon trading	Strategizing for canopy restoration	Grant writing	Very valuable
			How might species selection evolve w/ the warming climate? Are we planning for this?
			Consider "equity planting" where wealthier can opt to sponsor $/ labor for care of trees in low-income neighborhoods. Tree species will migrate north with climate change. Shifting towards N.C species! Work w/ landbank & DOT projects
			I think we need to chagne the ROW to include front lawn. People don't want their utilities messed up but they don't mind it close to the home.
			Great job!
Coordinate religious group outeach (planting & fundraising)			Focused outeach - potential(Grass); land use - Acres (potential); Religious - low hanging fruit
			I feel like we should not just look more @ single family homes but 2 family homes too. Doing outreach I learned that a lot of renters want city trees. It's more on the landlords that need to be on our side
			As a former teacher, evnironmental educator, & administrator, I will be happy to encourage environmental ed for trees to PTO/PTAs, principals, & teachers
			Excellent Job!

Attendees / Volunteers	Planting	Design & Delivery Ed Programs	Data analysis & GIS	Fund raise for private giveaway	Track & monitor trees	Community Engagement
Marnie Annese	x					
Neil Burke					x	
David Ryan					x	
Paul Triolo			x			
Sheena Soloman	x			x		
Emanuel Carter		x				
Taveon Stenson						x
Kat Korba	x	x	x	x	x	x
Peter King	x	x	x			x
Eric Greenfield	x	x	x	x	x	x
Christine Body						x

Other1	Other2	Other3	UFMP Draft Feedback
			Great information - I was looking for more about health benefits and overall costs associated with the work
			Haven't made it all the way through it. Focus on outreach & easy/simple to digest materials (What,Why,Species list, etc)
			Excellent presentation! Interesting corralation with canopy & income. Much to think about
			I think the largest issue is equity. Making sure underserved or under represented have equal access to trees. Think of and plan for the multifunctionality of urban trees and focus on additional greenery such as shrubs or green roofs and how they relate to urban trees. Religious institutions are a huge untapped market for new trees
Willing to fund some ideas			I thought the draft & presentation was great. It's great information to share with the community.
High profile revitalization projects in city parks			the city should demonstrate its commitment by negotating to: 1) include SCSD properties 2) re-forested park sites, and 3) a call to each private property to contribute trees and gardens to the Syr urban forsest. The city needs an "Urban forest and Ecosystem Management" team! Tree requirements need to be in our zoning regulations! City needs to participate in the I81 planning process!
			I look forward to seeing how it all rolls out
			love the carbon credit idea!
I will foreward a bio about NYC clean soil bank			Kudos for focus on social barriers re communication, maybe that's the most impactful change method, seek and use local knowledge, find prospect methods which positively impact other issues, eg lead in soils. Ventalation might be crictical. Airquality, cold air return, maybe leave some open spots
Implementation committee			Paper was too hard to read; but did have lots of comments
			Thank you

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