

GREENFIELD TREE COMMITTEE

2020 GREENFIELD TREE INVENTORY

REPORT AND ACTION PLAN



Many thanks to Greenfield Tree Committee members for their participation in the tree inventory project as well as for tree planting, maintenance, and advocacy on behalf of trees in Greenfield:

Helaina Balcanoff
Jaimye Bartak
John Bottomley
Richard Brown
Mary Chicoine
Bekka Eöwind
David Gott
Nancy Hazard
Margo Jones
Susan Miller-King
Kurt Schellenburg

Thanks also to Greenfield Department of Public Works and their Forestry Division crew, and all they do to plant and maintain trees throughout the City. Special thanks to Mike Duclos, DPW Assistant Field Superintendent, Paul Newell, DPW Deputy Director and Tree Warden, and Paul Raskevitz, former DPW Deputy Director and Tree Warden.

Thanks to U.S. Forest Service for providing funding via the Landscape Scale Restoration Grant Program FY 2018 to plant 800 trees in the City of Greenfield and to increase tree planting and maintenance capacity. Thanks to Franklin Land Trust's Director of Community Outreach and Education, Melissa Patterson-Serrill, for her grant management and positive leadership. And thanks to Massachusetts Department of Conservation and Recreation's Urban and Community Forestry Division and their Community Action Forester, Mollie Freilicher, for her guidance and participation in the tree planting project.

Many thanks to all the volunteers who have made our neighborhood tree planting events such a success. Without you, Greenfield would be much less green.

Photo credits: Cover (bottom left): Susan Farber
Cover (bottom center): Pat Leuchtman, Commonweeder
Cover (bottom right): City of Greenfield DPW
Page 4: Tim Umphreys (@timumphreys)
Page 5 (bottom left): Wikimedia Commons
Page 10: Melissa Patterson-Serrill
Page 17: Wikimedia Commons
Page 20: Amelia, Age 10
Back cover: Susan Farber

All other photographs are the property of Greenfield Tree Committee.

Report authored by Mary Chicoine, Greenfield Tree Committee member
www.greenfieldtreecommittee.org

Released March 2021

INTRODUCTION	4
<i>The Need for a Tree Inventory</i>	4
<i>Our Mission and Goals</i>	4
<i>Inventory Methodology</i>	5
 INVENTORY FINDINGS	 6
<i>Tree Species</i>	6-7
<i>Shade Trees and Small Trees</i>	8
<i>Tree Trunk Diameter</i>	9
<i>Tree Height</i>	10
<i>Tree Canopy</i>	11
<i>Native and Non-native trees</i>	12-13
<i>Tree Removals</i>	14-15
<i>Trees Planted Since 2014</i>	16-17
<i>Condition</i>	18
<i>Maintenance</i>	19
<i>Main Street Only Analysis</i>	20-21
<i>Tree Canopy Assessment</i>	22-23
 NEXT STEPS	 24
<i>Where to Plant More Trees</i>	24
<i>Tree Planting Challenges</i>	25
 FIVE YEAR ACTION PLAN	 26-32



Volunteer tree planting events help increase public support for trees and pride in participants' neighborhoods.

INTRODUCTION

The Need for a Tree Inventory

In 2020, members of the Greenfield Tree Committee (GTC) undertook the task of inventorying public trees primarily along streets in the most densely populated neighborhoods in Greenfield. The purpose of this inventory was to assess street tree removals and plantings since earlier inventories, to assess tree species and age diversity, to help plan for future tree plantings, and to position the City to be more competitive in receiving grants for planting and managing more public trees.

The 2020 inventory was an update to two earlier inventories conducted by the Franklin Regional Council of Governments. The first inventory took place in 2014, in which 752 trees were mapped, measured and assessed for maintenance needs. A simpler windshield assessment followed in 2016, confirming only whether trees inventoried in 2014 were still living.

A substantial reduction in street trees was predicted in the 2014 inventory, based on the poor condition of many trees inventoried. In fact, of the trees inventoried in 2014 (not including on Main Street), 16% - or 108 - of trees growing on tree belts in the project area had been removed by 2016. Only 34 trees were planted on tree belts during the same period of time, making the loss of mature trees even more dramatic.

The 2020 inventory shows an even sharper decline since the 2014 inventory, with one third of the 752 trees inventoried in 2014 now removed. These findings confirm that public street trees in Greenfield have been in serious decline .

**-- Of the 752 trees inventoried in 2014,
30% of the trees
had been removed by 2020. --**

In order to reverse the decline of public street trees, this report discusses challenges to planting more trees and potential solutions and planting strategies, and includes an action plan, which will be employed to help rebuild a healthy, diverse street tree population.

Our Mission and Goals

Our Mission: Greenfield Tree Committee is a non-profit, volunteer group of citizens, operating under the non-profit umbrella organization, the Connecticut River Conservancy. Our purpose is to promote a strong and resilient urban forest in Greenfield by facilitating the planting of trees along public ways and by educating the public on the value of trees and the need for their care and maintenance. As a citizen committee, we raise funds and work closely with the Greenfield Department of Public Works in an advisory and supportive capacity.

GTC continues to refine its goals, as new needs and opportunities present themselves. In the last few years, GTC has focused on several specific goals:

- Planting 1,000 trees in Greenfield in a decade (2016-2025)
- Increasing tree canopy cover, especially in low-income neighborhoods
- Updating and expanding the tree inventory
- Educating the public on the importance and value of trees, and empowering them to lead volunteer neighborhood tree planting events
- Starting a tree nursery to provide more diverse public tree species
- Creating and/or revising ordinances and policies for a healthier, more attractive, and environmentally beneficial landscape for our residents



Learn more: www.greenfieldtreecommittee.org. We are always welcoming new members - please consider joining Greenfield Tree Committee by contacting us at greenfieldtreecommittee@yahoo.com.

Inventory Methodology

GTC members used the ArcGIS Collector app to update tree data points inventoried in 2014, to note trees removed since 2014, and to add new data points for trees planted since 2014.

In addition to identifying tree species, measurements were taken of the tree trunk diameters, the overall height of the trees and the height and width of the tree canopy. Where possible, changes in the trees from 2014 were analyzed.

Trees were measured using simple tools. The DBH - or diameter at breast height - was determined using a tape measure that converts circumference to diameter. The height was measured using a 5' rod placed next to the tree and a hand-held scale used by the person measuring.

Tree conditions were estimated using a simple visual assessment, and maintenance needs were determined. See pages 17 and 18 for more information on this methodology.

Trees were also photographed as part of the 2020 inventory.



The inventory area is outlined in red on the map, with a few of the trees inventoried falling just outside the boundary. Most parks and municipal properties were not inventoried in 2020, but will be included in future inventories.



A tape measure converts the circumference of a tree trunk to the diameter.



A five-foot rod next to a tree provides a scale with which to measure the height from a distance.

INVENTORY FINDINGS

Tree Species

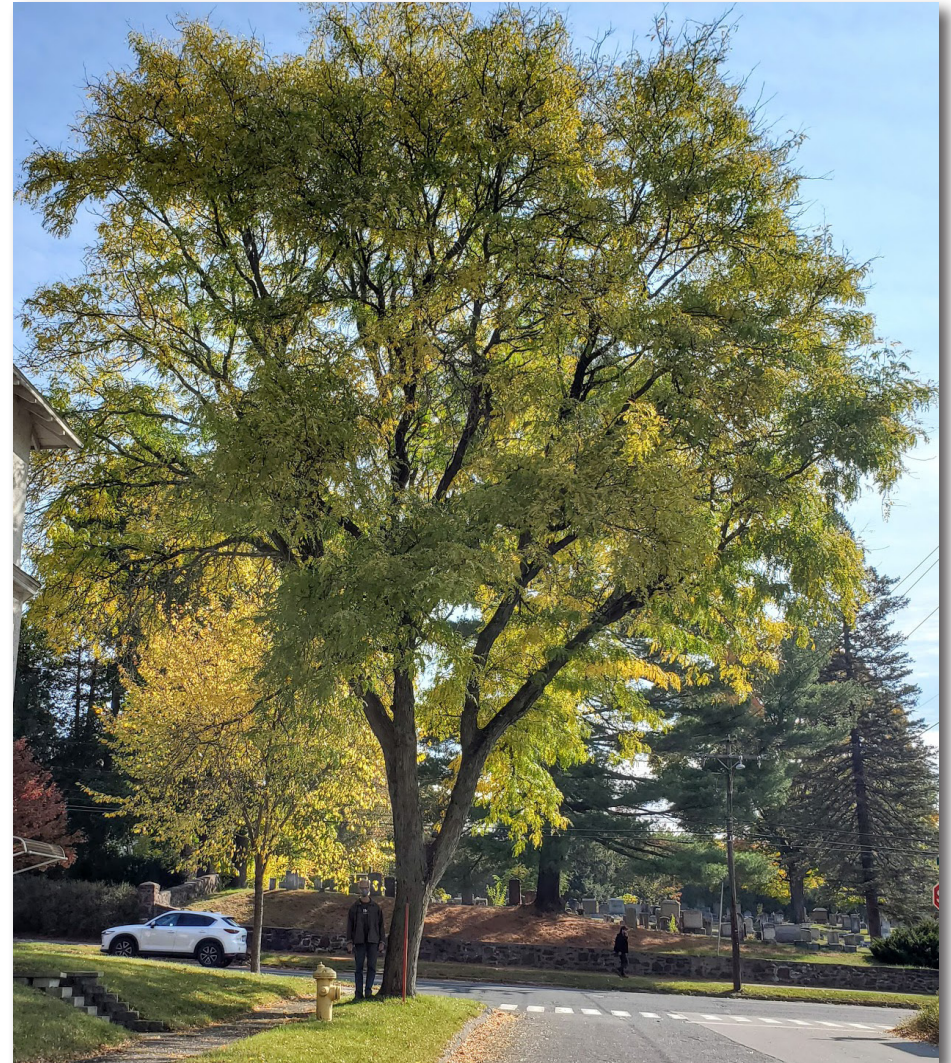
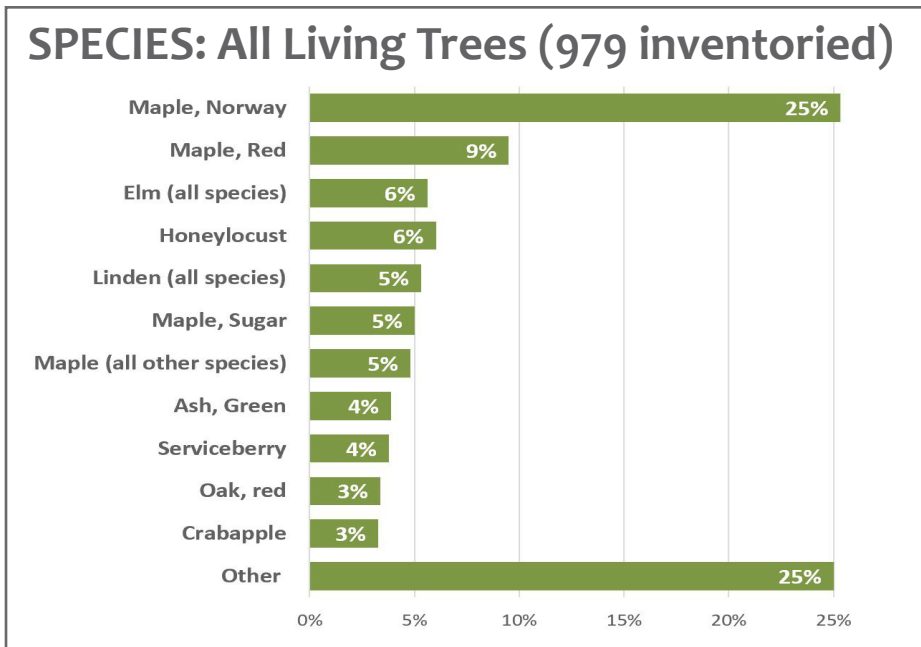
Nearly 1,200 trees were inventoried in 2020. GTC members determined 220 trees shown in the 2014 inventory had been removed. The total living trees analyzed was 979, as mapped on the following page.

Total trees inventoried in 2020	1199*
Total trees removed since 2014	220
Total trees analyzed	979

*Some of the trees inventoried were planted with public funds on private property (front yards), and were not included in all analysis.

The most prevalent tree species inventoried was Norway maple (*Acer platanoides*), which comprised 25% of all trees. In fact, all species of maples made up 44% of trees inventoried.

Having a tree population that is dominated by one genus is concerning, given maples' susceptibility to Asian long-horned beetles (*Anoplophora glabripennis*), as well as to other invasive insects and environmental factors. Species diversity in future tree planting is critical to guarding against the widespread loss of trees due to insects, disease or environmental issues.



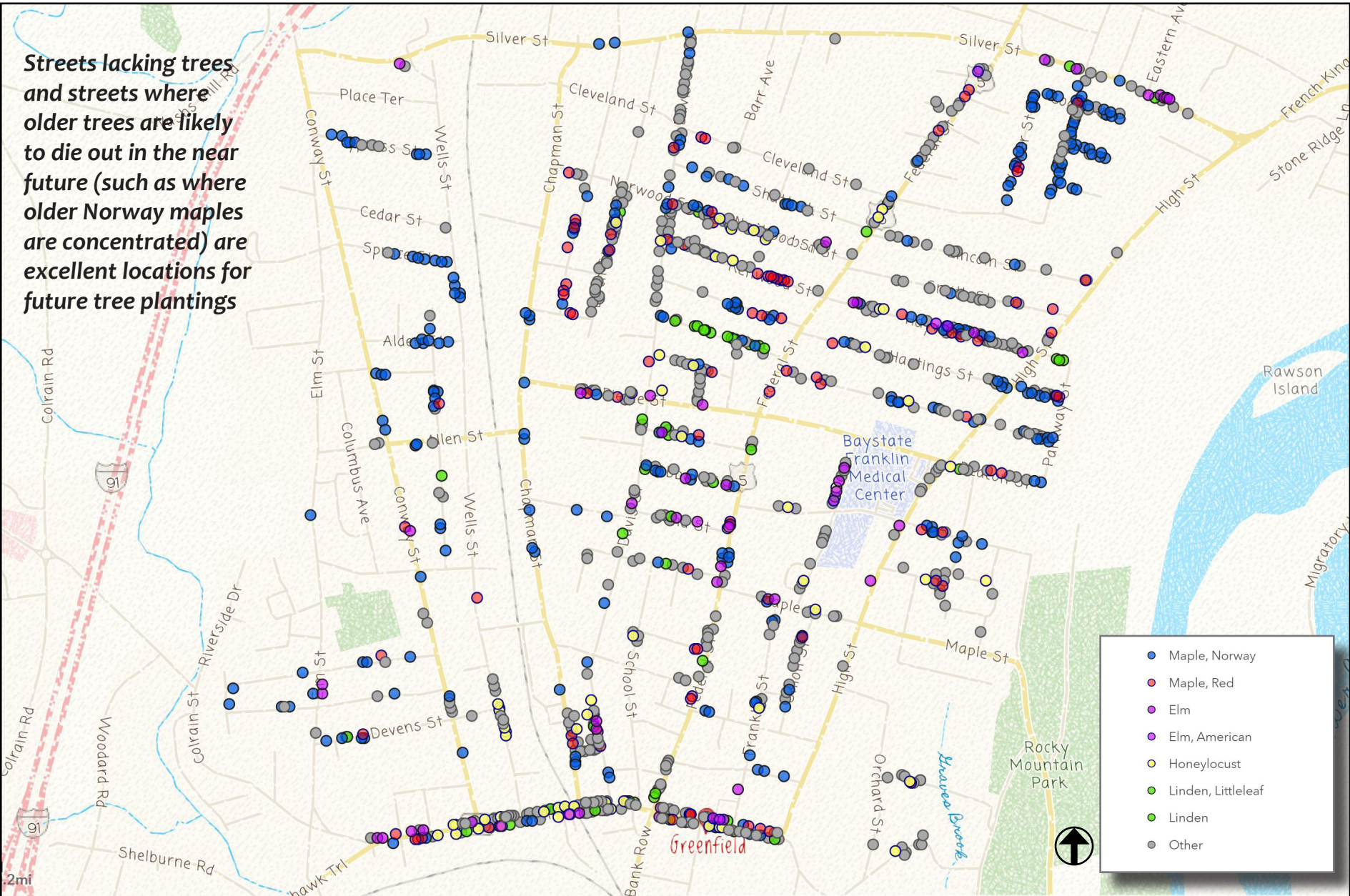
Honeylocusts made up six percent of all trees inventoried in 2020 - or 59 trees.

After Norway maple and red maple (*Acer rubrum*), elms (*Ulmus* spp.) and honeylocusts (*Gleditsia triacanthos*) each made up 6% of the inventoried trees, while lindens (*Tilia* spp.) made up 5%.

The most prevalent of small stature trees (those trees that typically grow to 30' in height or less) was serviceberry (*Amelanchier* spp.), making up 4% of all trees inventoried, while crabapples (*Malus* spp.) made up 3%.

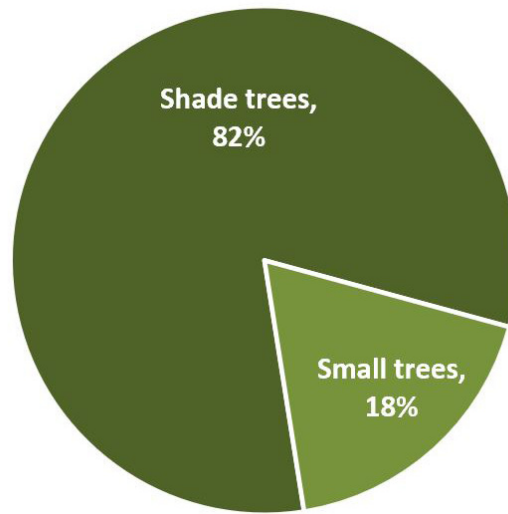
TREE SPECIES ANALYZED (979)

Streets lacking trees and streets where older trees are likely to die out in the near future (such as where older Norway maples are concentrated) are excellent locations for future tree plantings



Shade Trees and Small Trees

For the purpose of this inventory, shade trees are those taller than 30 feet at maturity; most shade trees are at least 50 feet tall at maturity. Small trees are those that typically grow to 30 feet in height or less at maturity.



Analysis on this and following pages is of the 950 public trees only; private trees are not included.

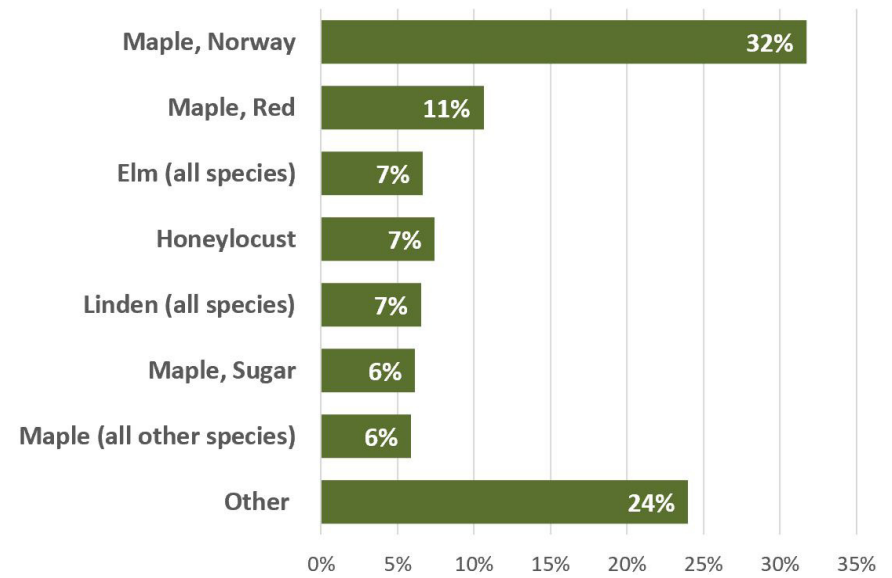
Shade trees made up 82% of the 950 public trees inventoried in 2020, while small trees make up 18%. This 4 to 1 ratio of shade to small trees is desirable because shade trees provide more benefits to our community - greater shade and cooling, greater stormwater absorption, and many other values.

For future tree planting, this ratio of four shade trees for every one small tree should be maintained or even improved. To this end, GTC and Greenfield DPW will try to avoid planting small, ornamental trees except where a shade tree would not fit, such as under utility lines.

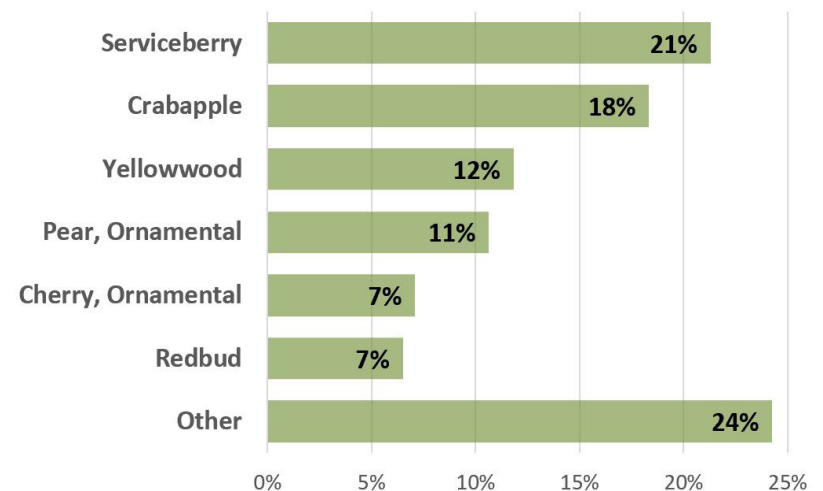
Of the 781 shade trees inventoried, maples of various species made up 55% of the total. Of the 169 small trees inventoried, the most prevalent were serviceberry, crabapples and yellowwood (*Cladrastis kentukea*), of which almost all were planted since 2014. Ornamental pears, which were the next most common small tree, have not been planted in recent years due to their invasive tendencies.

Since serviceberry, crabapples and yellowwood were planted in substantial numbers in recent years, it makes sense to plant some other small, native trees in the next couple of years while assessing the performance of the serviceberry, crabapples and yellowwood as street trees under utility lines.

SPECIES DIVERSITY: Shade Trees (781)



SPECIES DIVERSITY: Small Trees (169)



Tree Trunk Diameter

One measure of tree size is the diameter of the trunk, taken at 4 1/2' up from the base of the trunk.

About half of the 950 public trees inventoried have relatively small trunks - 1 to 10 inches in diameter. Of these 478 trees, about one third were small stature trees - trees that will never reach much larger diameters.

The other two thirds - or 316 trees - of the 1 to 10 inch diameter category were made up of shade trees. The assumption can be made that these were relatively young shade trees that have the potential to reach much larger diameters.

About one fifth of trees measured were medium-sized trees - those with diameters between 11 and 20 inches. All but five of these 191 trees were

SIZE: 1 - 10" Trunks

Shade	316	66%
Small	162	34%
Total	478	100%

shade trees, so again the assumption can be made that they have the potential to reach much larger diameters.

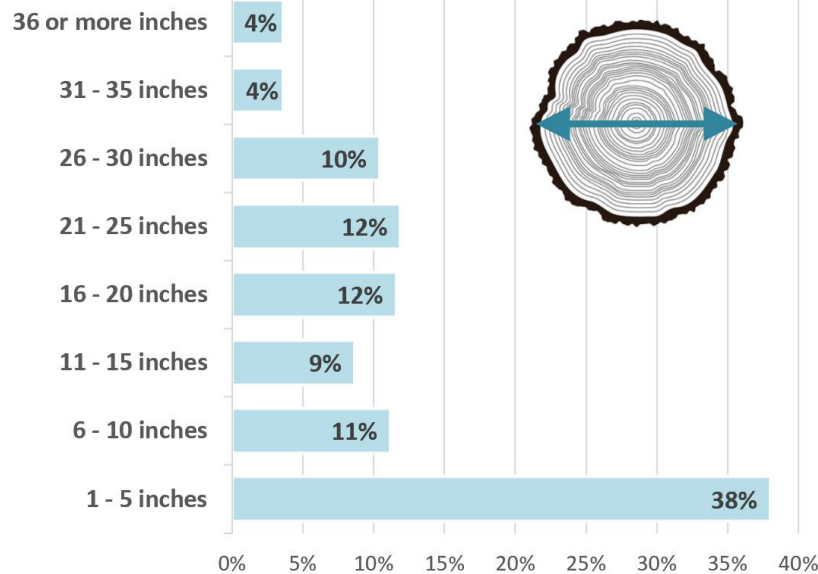
Larger trees - trees with diameters of 21" or wider made up only about one third of all trees inventoried. It is these large trees that provide - and will continue to provide as they grow older - the most shade, carbon storage and other benefits.

Tree Trunk Size Increase

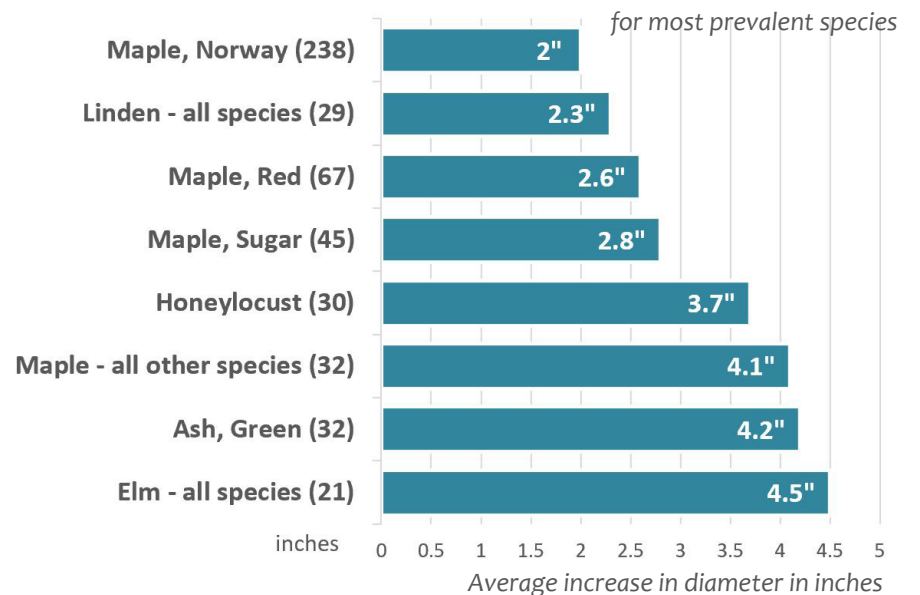
The average increase in trunk diameter from 2014 to 2020 is between 2.3" and 4.5". Norway maples grew the most slowly. The relatively slow growth of Norway maples can be attributed to their relatively poor condition and older age, compared to other tree species.

Elm species have experienced the fastest growth since 2014. Unfortunately, this fast growth may be contributing to a relatively high number of losses of young elms - 9 of 61 elms were removed since 2014.

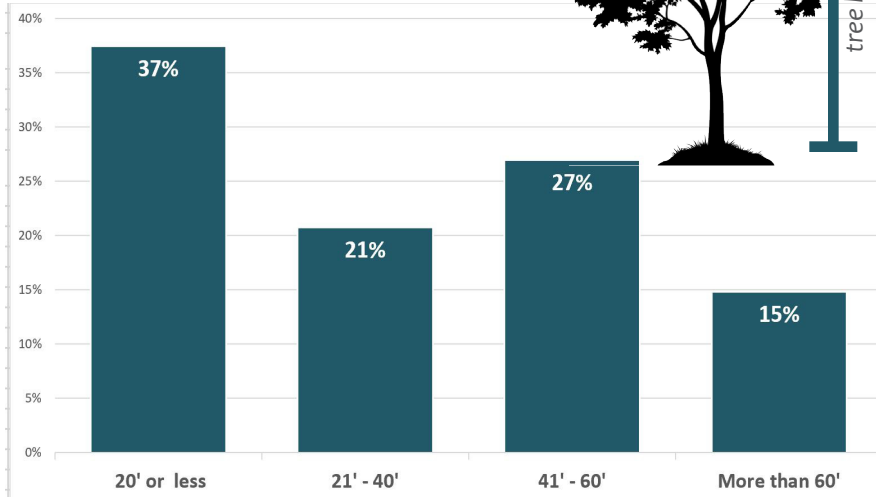
SIZE: TRUNK DIAMETER IN INCHES



SIZE: AVERAGE TRUNK DIAMETER INCREASE



SIZE: TREE HEIGHT



Tree Height

Thirty seven percent of the 950 public trees inventoried were 20 feet tall or less. And 14% were 10 feet tall or less.

Of the 478 trees that were 20 feet tall or less, just over two thirds - or 316 trees - were shade trees. These trees have the potential to grow significantly taller in future years. The others were small stature trees, most of which will only grow another 10 to 15 feet higher.

HEIGHT: 20' or Less

Shade	316	66%
Small	162	34%
Total	478	100%

On the other end of the spectrum, only about 15% of the 950 trees measured were over 60 feet. These larger trees have the capacity to store more carbon than smaller stature trees, and they continue to grow even as they get older. Studies show that trees actually accelerate growth as they get older and bigger.¹

¹ <https://www.theguardian.com/environment/2014/jan/15/trees-grow-more-older-carbon>



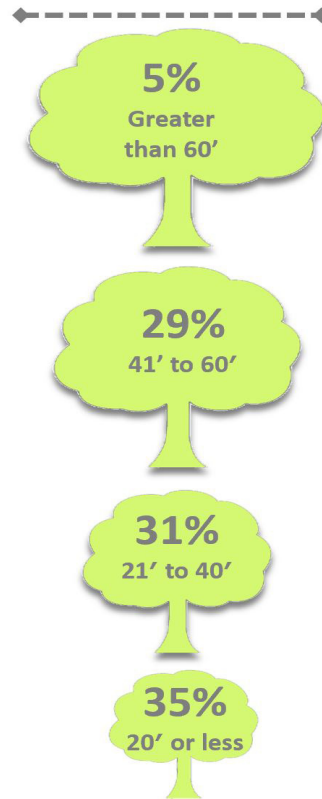
This approximately 80' tall red oak is a powerhouse of benefits. Along with shading the asphalt from the south/southwest sun, the tree also slows stormwater runoff, provides homes for birds and butterflies, and beauty for its human neighbors.

Tree Canopy - *Shade Trees Only*

Thirty five percent of the shade trees analyzed have a canopy width of 20 feet or less. Shade trees between 20 and 60 feet wide comprise 61% of shade trees. Just five percent of shade trees have a canopy width greater than 60 feet.

Measurements of tree canopy height - the distance from the bottom to the top of the tree canopy - were similar to those of width. Tree canopy height of shade trees 20 feet or less make up 35% inventoried, while those between 20 and 60 feet wide comprise 64%. Only 2% of shade trees have a tree canopy taller than 60 feet.

CANOPY WIDTH



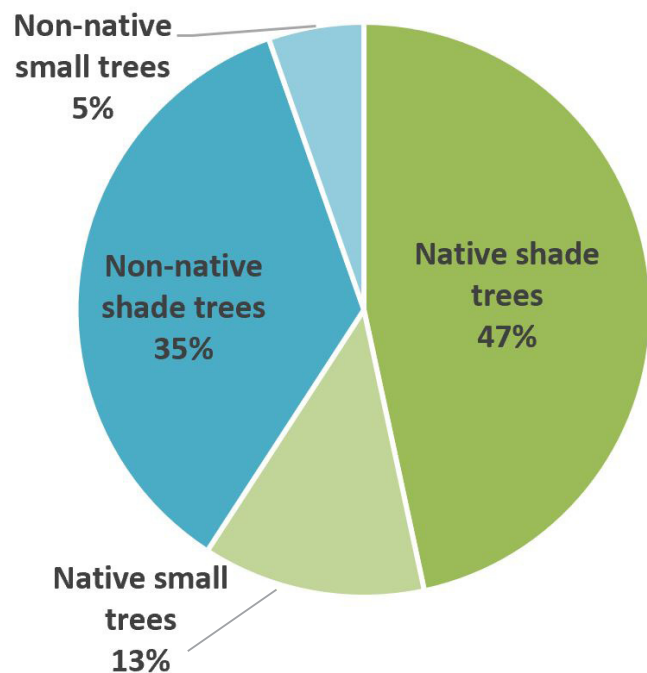
The mass of a tree's canopy, found by measuring the height and width and adjusting depending upon tree species can be used to calculate carbon storage and sequestration. It is hoped that analysis for carbon storage and sequestration will be conducted on a tree-by-tree basis in the coming years.

For this report, some analysis was done using aerial photography and random sampling to find percent canopy coverage. See the results on page 21.



The canopy of this red maple on Davis Street measures about 55' high by 50' wide.

NATIVE and NON-NATIVE TREES



Native and Non-native trees

The pie chart above and the map on the following page show trees classified by native and non-native status. About sixty percent of trees inventoried were native tree species or cultivars. Among our native street trees are red maple, sycamore, tulip poplar (*Lireodendron tulipifera*), hackberry (*Celtis occidentalis*), serviceberry, musclewood (*Carpinus caroliniana*) and others.

Non-native trees made up the remaining tree inventory - about 40%. In addition to Norway maples, discussed previously, non-natives include Zelkova (*Zelkova serrata*), ornamental pear (*Pyrus spp.*), little-leaf linden (*Tilia cordata*) and others.

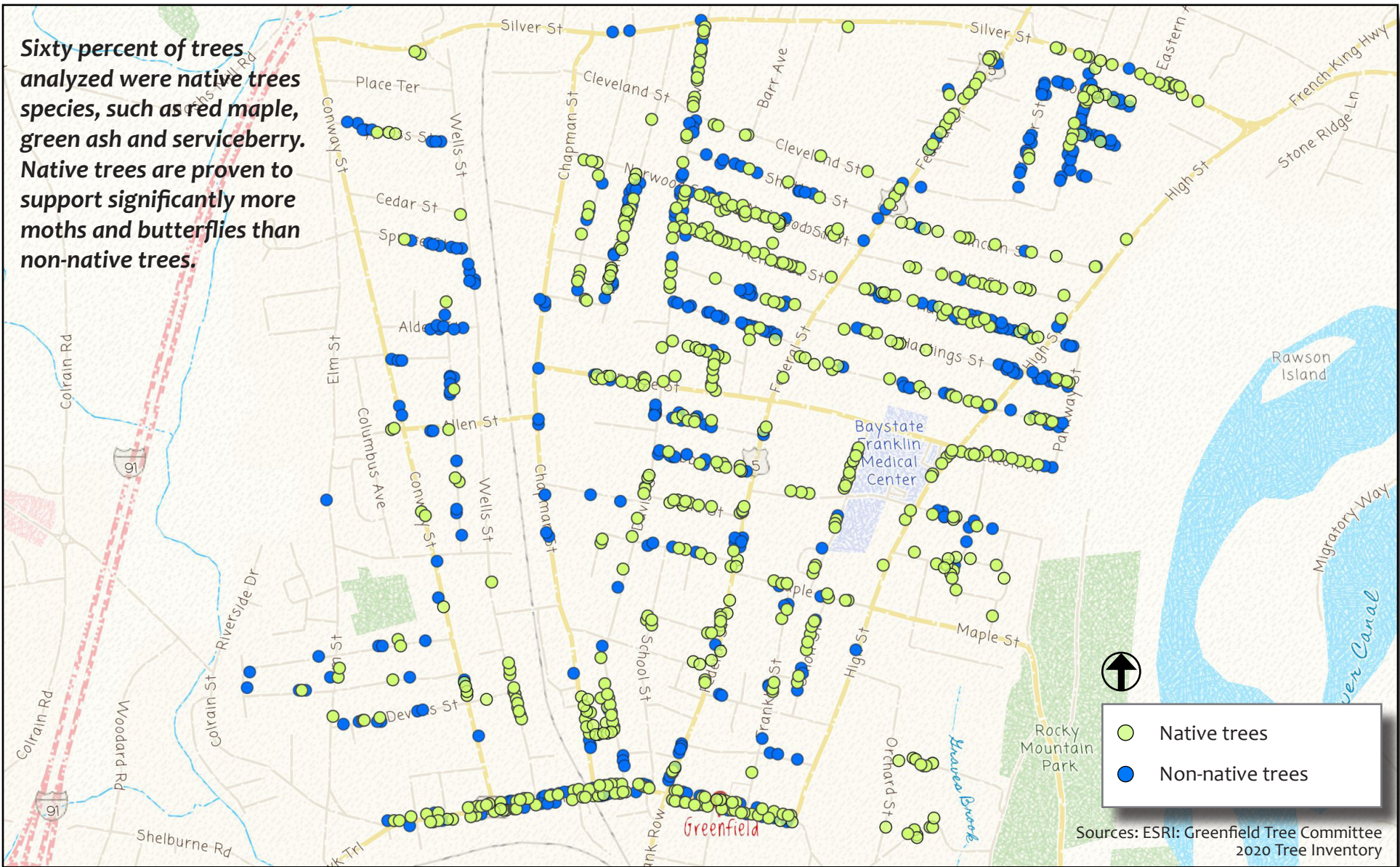
Greenfield Tree Committee - and Greenfield's DPW - have been planting more native tree species in recent years. GTC has developed a tree selection tool for residents, which focuses primarily on native trees: greenfieldtreecommittee.org/tree-selection.

Native tree species and native insects, birds and mammals have evolved together. Native trees provide food for pollinators, insects, birds and mammals. Native maples, for example, sustain up to 300 species of moths and butterflies. Non-native Norway maples sustain only 7 species. And chickadees need over 70% of trees near their nests to be native in order to find enough insects to feed and raise their young.



A native tree, this nearly 4-feet-in-diameter American sycamore, supports over two dozen species of moths and butterflies, and provides habitat for birds and small mammals.

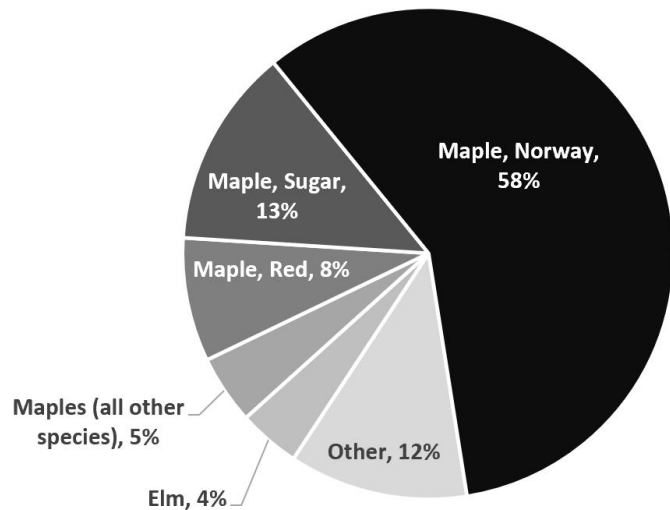
NATIVE and NON-NATIVE TREES



Tree Removals

Trees removed since the 2014 inventory are charted below and are mapped on the following page. Norway maples made up 51% of trees inventoried in 2014; they made up 25% in 2020. This decline of Norway maples as the most dominant street tree species in the inventory is primarily due to the removal of old, deteriorating Norway maples and the planting of 387 trees of other species since 2010.

SPECIES: Trees Removed Since 2014 (221)



-- Of the 752 trees inventoried in 2014, 30% have since been removed --

A reduction in the number of Norway maples is ultimately a good thing, since they are an invasive species.¹ However, a downside to the declining Norway Maple population is a significant reduction in canopy cover across the city, since Norway maples currently represent some of our largest street trees. Also, the reduction of Norway maples is just a drop in the bucket of Norway maples that have self-seeded and naturalized throughout the city, choking out native trees in the woods and causing a change in the species make-up of the area's plant communities.

¹ <https://www.massaudubon.org/learn/nature-wildlife/invasive-plants>

While maple species made up 84% of all trees removed, there were some tree species that had notably few removals since 2014:

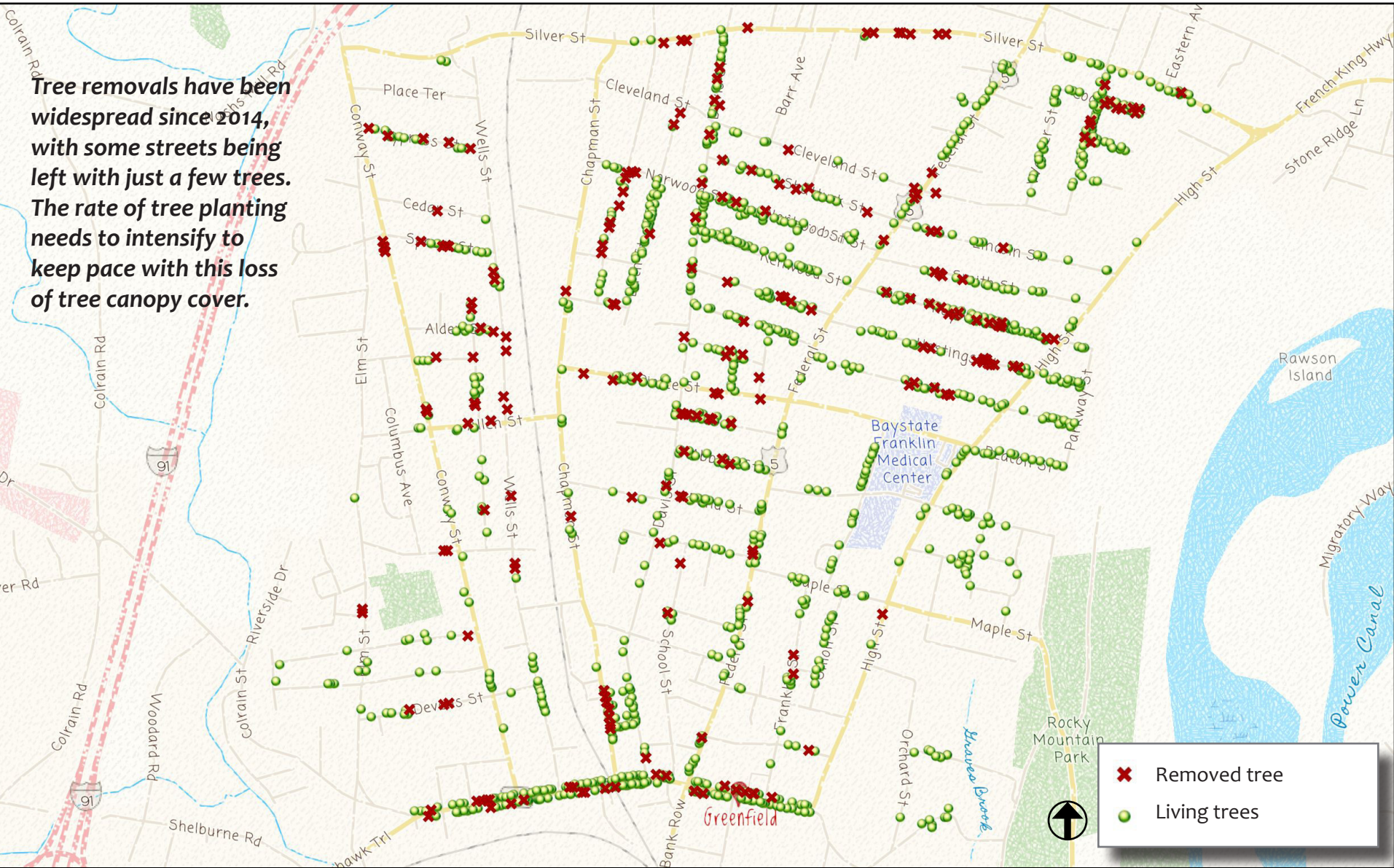
- Only 3 of 60 honeylocusts
- Only 1 of 18 oaks (*Quercus* spp.)
- Zero of 17 sycamore (*Platanus occidentalis*)
- Only 1 of 39 green ashes (*Fraxinus pennsylvanica*)

On the face of it, honeylocust, oaks, sycamore and ash appear to be quite resilient, based on their low removal rates. While this is true for the first three species, unfortunately ash trees across the State and region are being devastated by emerald ash borer (*Agrilus planipennis*), a destructive beetle first detected in the state in 2012. No new ash trees are being planted in Greenfield due to this beetle invasion. It is hoped the City's existing graceful ash trees will avoid the devastation of the ruinous beetle.



Norway maples were one of the most popular trees to be planted along streets in the wake of the widespread loss of elm trees in the 1930s through 1950s, due to Dutch elm disease. Many Norway maples are reaching the end of their lives in Greenfield and are being removed due to their deterioration. The removal of Norway maples is leaving many empty tree belts and public spaces that can be planted with new, diverse tree species.

TREE REMOVALS SINCE 2014



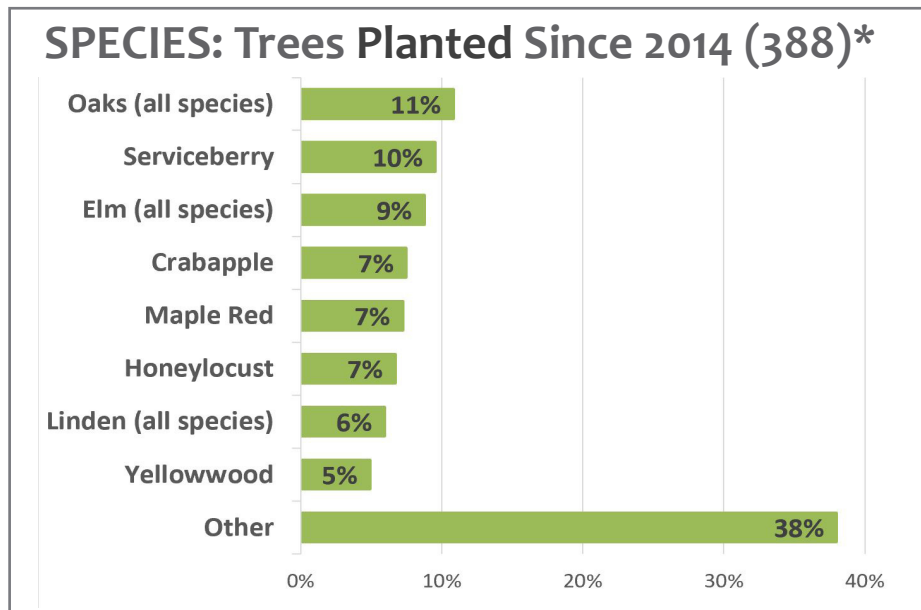
Trees Planted Since 2014

With the removal of about one third of the trees inventoried in 2014, the City was facing the reality that their public street trees were in serious decline. Planting of trees began to pick up in 2014 and has further intensified since the receipt of a U. S. Forest Service Landscape Scale Restoration Program grant in 2019. One of the goals of the grant is to plant 800 trees in Greenfield in a few years, concentrating on shade trees in public spaces and along streets.

As stated previously, 220 trees were removed between 2014 and 2020. During this same period, 388 trees were planted. This positive trend must continue moving forward, given that the City is poised to lose even more deteriorating Norway maples and other species in the next decade.

Tree species planted since 2014 were primarily native, with oaks being the most prevalent shade tree, including red oak (*Quercus rubra*) and swamp white oak (*Quercus bicolor*).

The map on the following page shows the locations of trees planted since 2014. Planting was concentrated on the eastern half of the inventory area. The stars indicate the locations of GTC-lead neighborhood tree plantings.

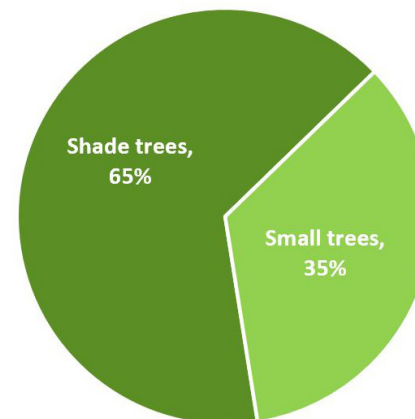


*Trees planted since 2014 inside the inventory area total 388, however trees planted city-wide since 2014 total 614.



GTC had a highly successful, COVID-safe community tree planting event in fall of 2020, planting 27 mostly native trees on the perimeter of a neighborhood park. Staff from DCR's Community Forestry program and Franklin Land Trust assisted with the event.

Tree Grant Trees (285)



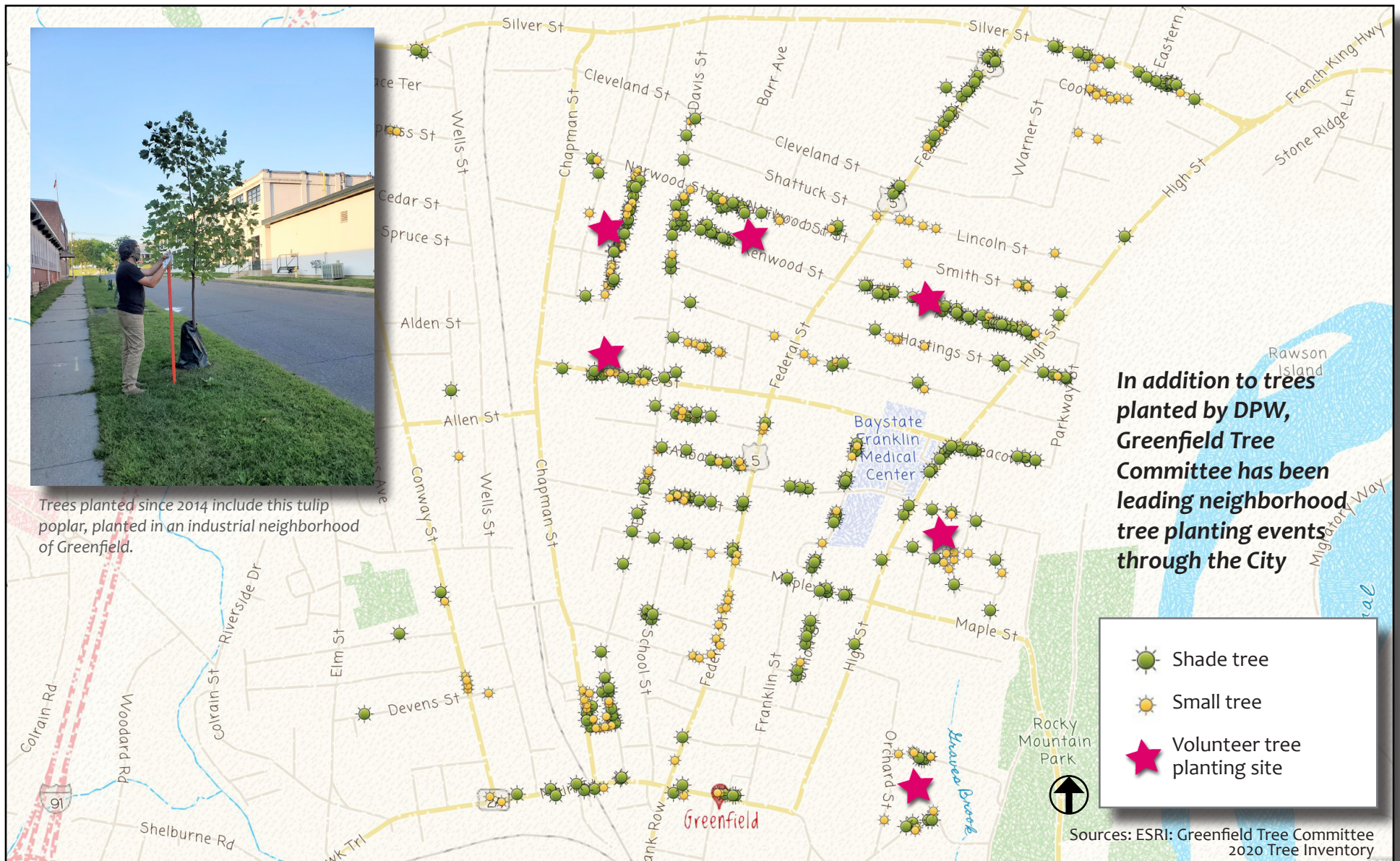
DPW Forestry Division crew planted the majority of the 285 trees under the first two years of the U. S. Forest Service grant, concentrating on the eastern half of the inventory area.

About two thirds of trees planted as part of the grant were shade trees. As stated earlier, GTC would like to see a larger percentage of shade trees planted in future years to increase the benefits provided, including increasing shade and cooling and decreasing stormwater runoff.

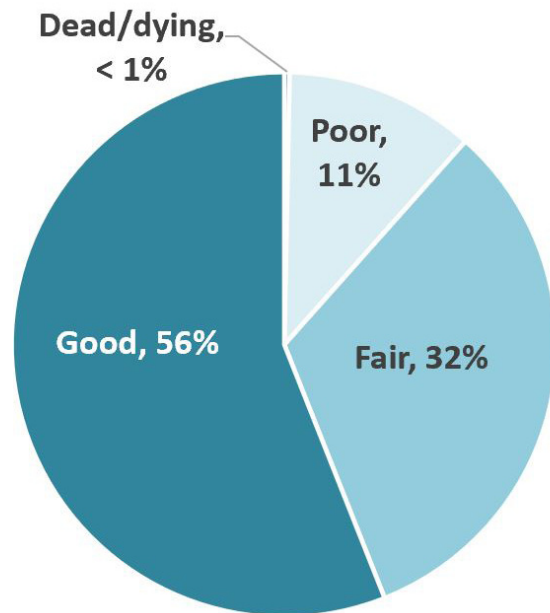
TREES PLANTED SINCE 2014



Trees planted since 2014 include this tulip poplar, planted in an industrial neighborhood of Greenfield.



CONDITION: All Living Trees (950)



During a visual assessment, GTC members noted defects with trees such as decay, dead or missing limbs, mushrooms and other issues, and used the condition chart on this page to determine the condition.

Condition

Tree condition was determined using a simple visual assessment and assigning one of six values shown in the chart below. If a tree was planted by the DPW or GTC on private property, it was noted as being private and no further assessment was conducted of it. Likewise, if a tree was present during the 2014 inventory but was subsequently removed, it was noted as removed but not otherwise included in the condition analysis shown on this page.

Of the living, non-private trees, more than half were deemed to be in good condition, while just less than one third were in fair condition. Eleven percent were poor and only three trees were assigned the dead/dying category.

-- Of the 107 trees assessed to be in poor condition, 82 of them - or 77% - were Norway maples. --

CONDITION DEFINITIONS	
Condition	Description
Good	If all are true: 1) Trunk is sound and solid; 2) all limbs appear sound; 3) crown is full and balanced; 4) no pests or disease are present
Fair	If some are true: 1) Minor sections of are bark missing; 2) one major or several minor limbs are dead or missing; 3) crown is full but unbalanced; 4) one pest or disease is present (insect colony, mushroom, etc.)
Poor	If some are true: 1) Trunk has extensive decay or hollow; 2) two or more major limbs are dead or missing; 3) tree has only a partial crown; 4) two or more pests or diseases are present (insect colonies, mushrooms, etc.)
Dead/ Dying	If either or both are true: 1) Trunk is broken/split; 2) most major limbs are dead or missing
Removed	Tree has been removed since previous inventory
Private	Planted with public funds on private property - not assessed

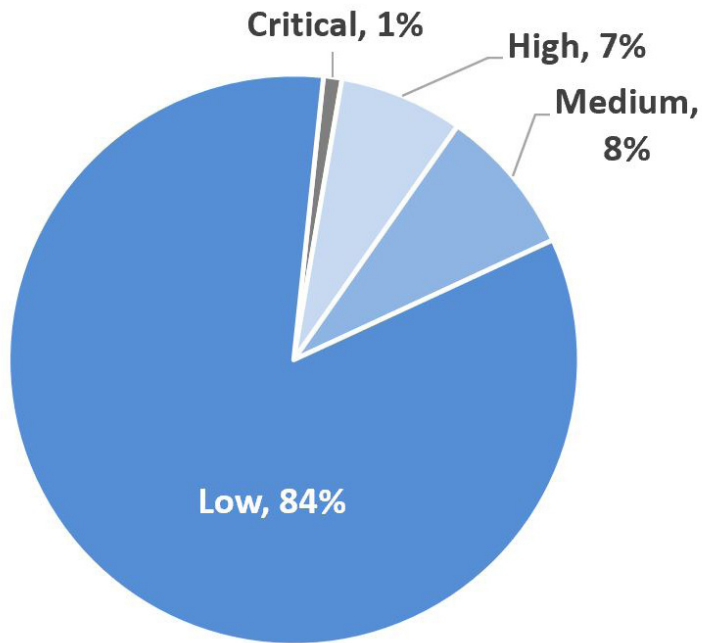
Maintenance

Once the condition of each tree was assessed, a maintenance priority was assigned. The highest priority for maintenance involved trees that posed an imminent threat to public safety. A list of 77 trees rated as 'critical' or 'high' maintenance priorities was provided to the Greenfield Tree Warden and Greenfield DPW.

GTC also tracked the smaller trees that needed pruning and/or mulching, and has been using that list to prioritize 2021 wintertime and spring pruning.

The single most important action DPW and GTC can take to maintain trees and reduce maintenance costs is to address pruning while the trees are young. Young trees can undergo pruning that can address structural issues; this pruning can help the City avoid expensive maintenance needs later in the trees' lives.

MAINTENANCE: All Living Trees (950)



MAINTENANCE DEFINITIONS	
Priority	Description
Critical	Imminent threat to public safety; large dangling branch(es) over sidewalk/road ; broken trunk
High	Large dead branches near sidewalk/road
Medium	Minor dead branches; low-hanging branches
Low	No maintenance needed
GTC pruning	Pruning to be conducted by GTC
GTC mulching	Mulching to be conducted by GTC



GTC members provide important pruning of younger public trees, helping the City avoid larger maintenance costs later in the trees' lives.

Main Street Only Analysis

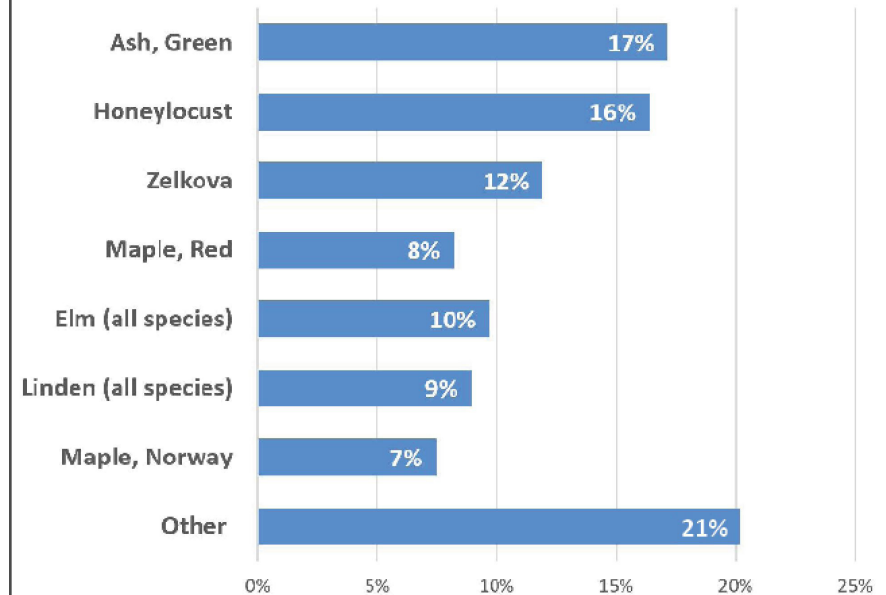
Trees growing along Main Street were included in the previous analysis, but in this section they were isolated and analyzed on their own. It is important to assess Main Street trees separately since they have particular challenges that other public trees are not as exposed to including constrained root zones, road and sidewalk salt, and human-caused harms.

On Main Street, shade trees make up 89% of the 134 trees inventoried, as opposed to 82% for trees in the whole inventory area. Even though tree wells - the approximately 4'x4' openings in sidewalks for planting trees - provide much more constrained space for trees to grow on Main Street, larger stature trees have typically been planted along Main Street. This may be so that the canopies of the trees are able to reach high enough so that they do not obscure the view of store and restaurant signs.

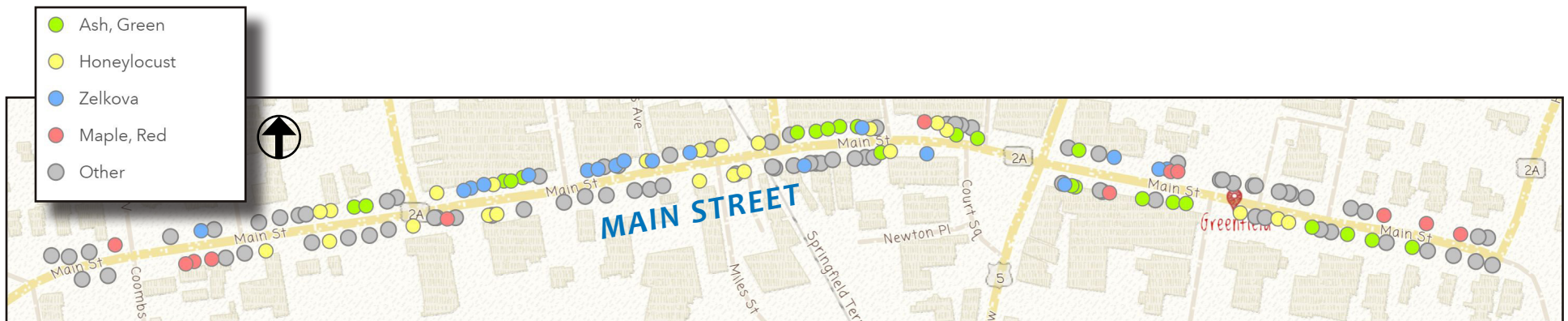
In spite of the fact that most trees on Main Street are shade trees, their canopies are not always able to grow tall enough because their growth is stunted by all the environmental issues they endure on Main Street. For future tree planting, shade trees which have less dense growth habits or can be pruned to have open forms, not dense forms, should be chosen, including honeylocust, ginkgo, some elms and other trees.

The most prevalent tree species on Main Street was green ash, followed by honeylocust and zelkova. This contrasts with the overall inventory in which Norway and red maples and elms were the most prevalent trees.

MAIN STREET: All species (134)



The make-up of trees on Main Street will change in the future, especially if emerald ash borer decimates the ash trees. Also, zelkovas should be avoided on Main Street since they have a particularly dense form and are difficult to prune so that business signs can be visible.



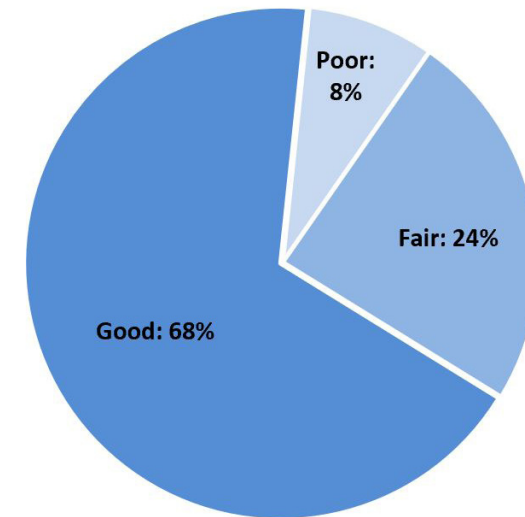
Main Street Only Analysis (cont.): Trees on Main Street were smaller than trees in the larger inventory, based on trunk diameter. There were no trees with trunk diameters over 36", whereas there were 36 such trees in the overall inventory.

Twenty one percent of tree trunks on Main Street were 16" or wider, whereas 42% of the trees in the overall inventory were 16" or wider. Fifty nine percent of tree trunks on Main Street fell within 6" and 15" wide. Interestingly, due to the tree planting initiative funded by a U.S. Forest Service grant in 2019 and 2020 which has been focusing on neighborhoods north of Main Street, there were many more small diameter trees in the general inventory than on Main Street. The Main Street tree population was 19% trees from 1" to 5", while the general inventory had 39% or twice as many of the same size trees.

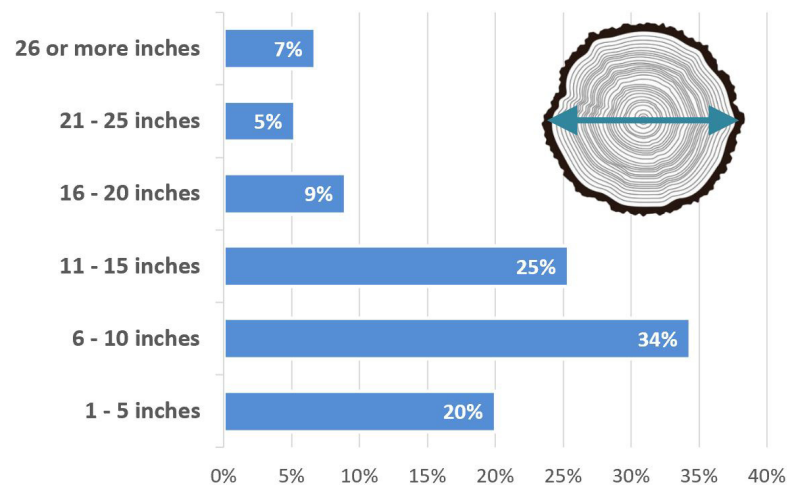
Main Street trees were mostly in good condition. Just over two thirds (68%) of Main Street trees were deemed to be in good condition. Fair condition trees made up 24% and poor condition make up 8%.

Typical maintenance concerns for trees on Main Street include keeping tree branches pruned up to prevent interference with pedestrians and vehicles, and to prevent obscuring business signs.

MAIN STREET: CONDITION



MAIN STREET: DBH





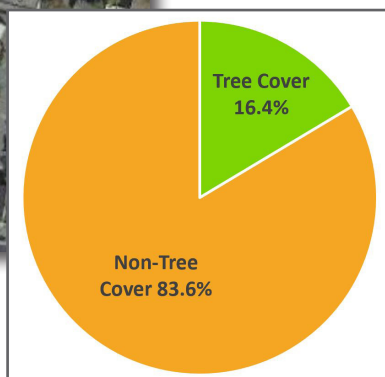
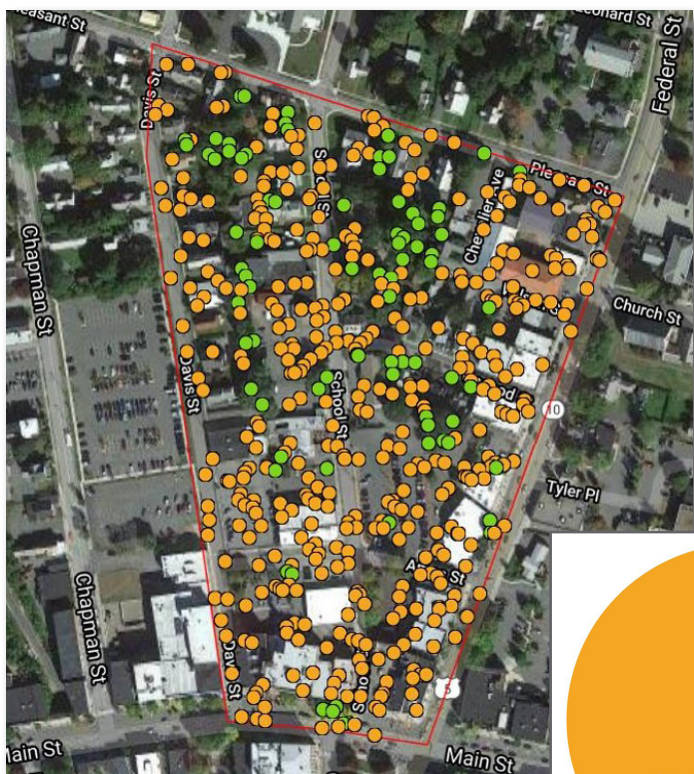
Tree Canopy Assessment

In addition to the tree-by-tree physical inventory described on previous pages, a tree canopy assessment was begun in 2020 by GTC, using U. S. Forest Service's iTree Canopy. The tool was used to estimate tree cover in some neighborhoods within the project inventory area. iTree Canopy employs aerial photography and a random sampling process to classify ground cover types - in this case as tree or non-tree.

The average percent tree canopy cover of the neighborhoods assessed is about 20%. Following are the neighborhoods that were analyzed to date, with percent tree canopy cover in green and non-tree cover in orange.

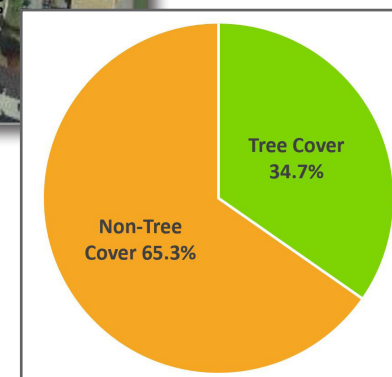
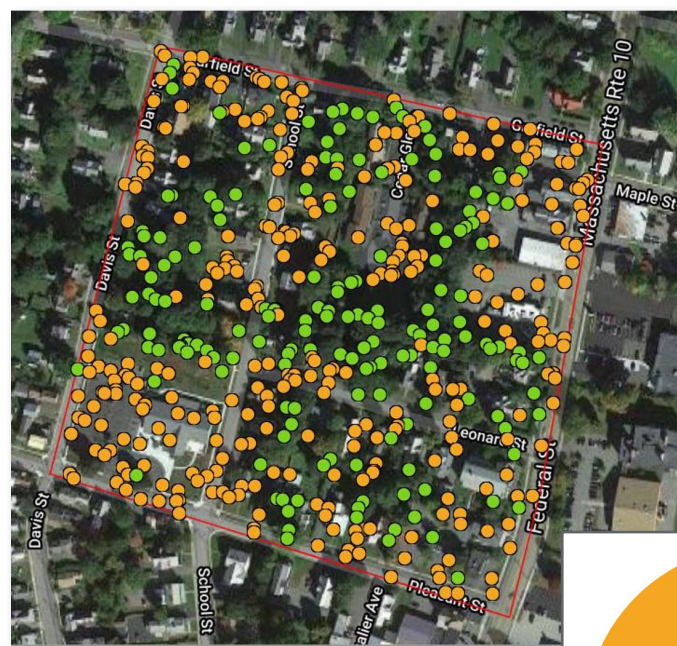
MAIN STREET TO PLEASANT STREET:

This 19-acre neighborhood bordering Main Street is covered with a considerable amount of impervious surfaces, such as streets, parking lots and structures – with only 16% tree cover.



PLEASANT STREET TO GARFIELD STREET:

This 21-acre neighborhood has over twice the percent tree cover as the previous area. Swaths of wooded areas make up most of the tree cover in this neighborhood.

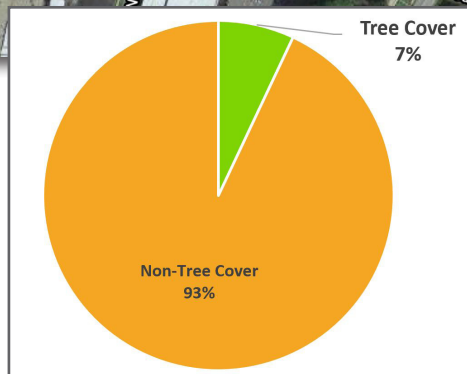
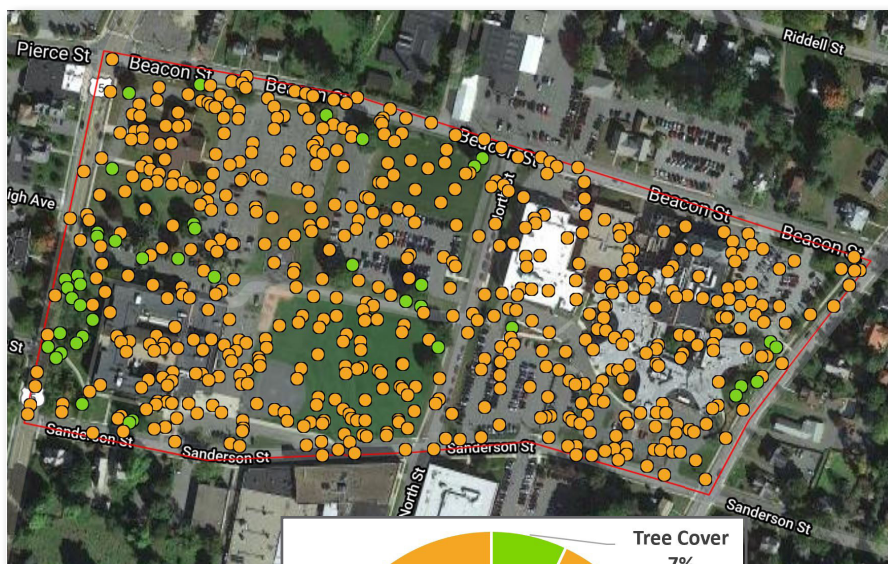




Tree Canopy Assessment (cont.)

SANDERSON STREET TO BEACON STREET:

This 26-acre neighborhood has only seven percent tree cover, making it the least tree-covered neighborhood assessed so far. Although much of the space is comprised of parking, structures and a ball field, there are ample opportunities for increasing tree cover substantially. Tree planting in this neighborhood will require the help of property owners with parcels of land, such as the hospital.



Many communities are setting goals for increasing canopy cover across the globe. Reasons for doing so include reducing stormwater runoff, reducing the heat island effect and improving conditions for walking and biking. Forty percent canopy cover is often cited as optimal coverage for an urban area. According to a national analysis, a 40-60 percent urban tree canopy is attainable under ideal conditions in forested areas, such as in Western Massachusetts.¹

In 2014, the Sustainable Greenfield Master Plan set the goal of 40% tree canopy cover in the populated core of Greenfield. Our City should continue to assess what canopy cover would be optimal for the community, considering variables such as:

- existing canopy cover
- capacity for tree maintenance
- increasing needs for stormwater runoff management

In conjunction with iTree Canopy, a useful resource for helping to set tree canopy coverage is Davey Institute's *A Sustainable Urban Forest*.²

¹ <https://www.americanforests.org/blog/no-longer-recommend-40-percent-urban-tree-canopy-goal/#:~:text=According%20to%20a%20national%20analysis,ideal%20conditions%20in%20forested%20states.>

² https://www.itreetools.org/documents/175/Sustainable_Urban_Forest_Guide_14Nov2016.pdf

NEXT STEPS

Where to Plant More Trees

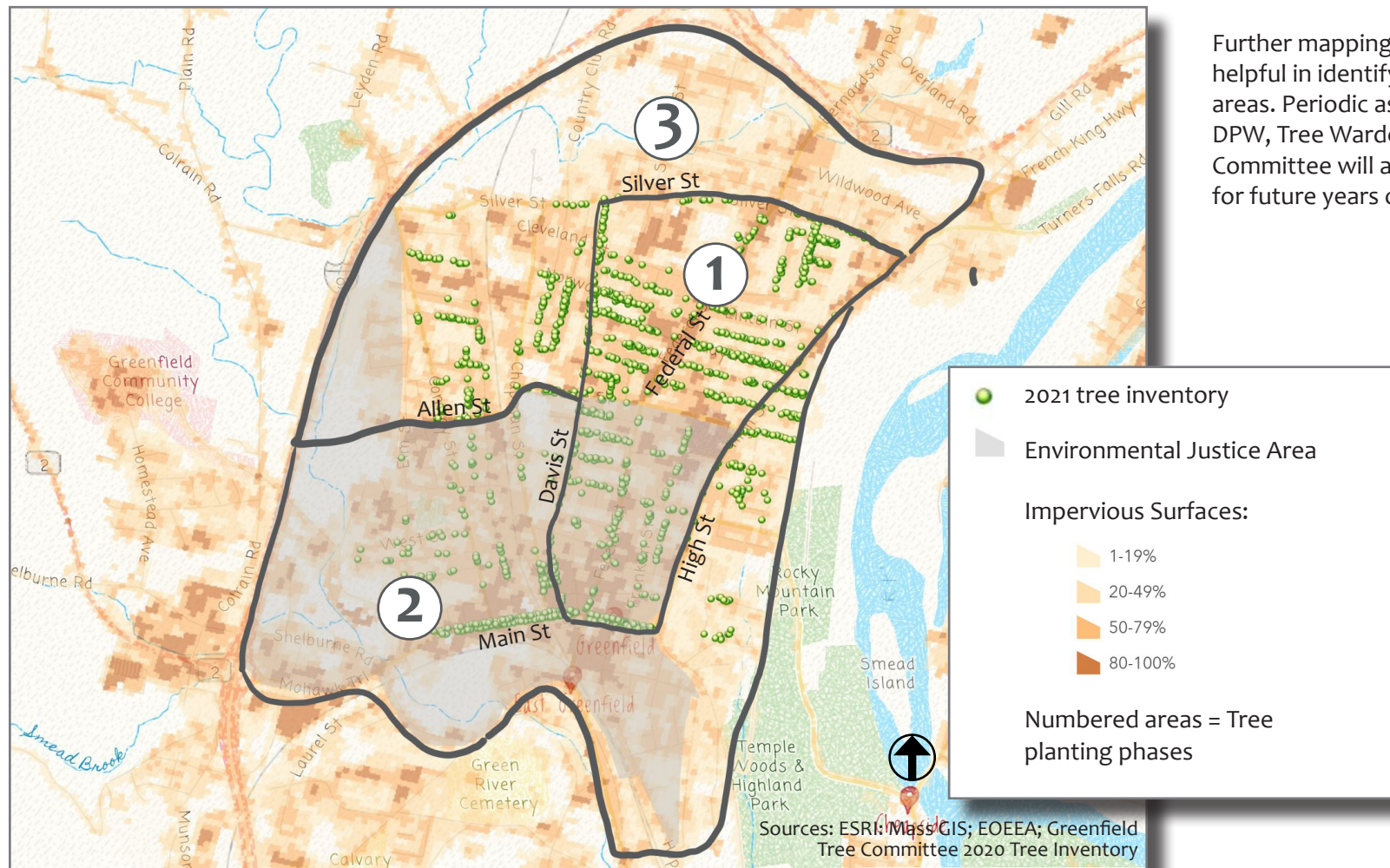
As part of the planning process for the U. S. Forest Service tree grant, a number of criteria were considered before priority areas for planting trees were identified in 2018. As shown on the map below, criteria such as locations of Environmental Justice areas (high minority, non-English speaking, and/or low-income populations) were mapped, along with areas with high density of impervious surfaces and areas with low density of trees planted along streets. Also considered were requests by residents gathered at a public open house.

From these findings, three priority areas were identified, as numbered on the map below. These areas will receive most trees provided by the grant.

Other priority areas could include:

- places where stormwater runoff is particularly heavy
- along sidewalks that are primary walking routes to schools and businesses
- around large expanses of asphalt, such as parking lots
- along streets where canopy cover is low

Further mapping and assessment will be helpful in identifying additional priority areas. Periodic assessments by the DPW, Tree Warden and Greenfield Tree Committee will also be useful in planning for future years of tree planting.



Tree Planting Challenges

WATER: One of the single-most challenging aspects of planting young trees is keeping them watered in the first couple years of their lives, while their roots are establishing in the ground. The use of water bags can help during those first years. There is, however, the challenge of having enough staff to fill the water bags. DPW has summertime staff to help tend to the water bags, but the reality is that DPW's hard-working crews are often stretched thin with many projects and tasks to be done.

Greenfield Tree Committee, with the help of other volunteers, has endeavored to help support the tree watering, but without a truck or water tank, watering trees by hand is very time consuming and difficult. GTC has been looking for ways in which to address this issue but, to date, has not found a resolution.

TREE AVAILABILITY: Although much progress has been made in Greenfield to plant more diverse, mostly native trees, there are still constraints to being able to find good quality, diverse trees. Mass DCR procures trees on behalf of the City as part of the U. S. Forest Service grant, but there are only two tree nurseries in the state who are approved vendors. Although the quality of trees received through the grant has been generally good, sometimes some of the trees requested are not available. And even when the City wasn't participating in the grant, there were still challenges in finding good quality, diverse tree species from area nurseries.

To try to address this ongoing challenge, GTC has decided to start its own tree nursery, which will be located on City-owned land, leased to GTC by Just Roots, the Community Farm. The U. S. Forest Service grant is paying for much of the start-up costs of the nursery, and the first bareroot trees will arrive for planting in early spring of 2021.

GTC plans to concentrate on growing primarily native shade tree species and cultivars. Since some smaller trees are also needed, mostly for planting under utility lines, GTC will also grow some less common native tree species such as American hornbeam (*Ostrya virginiana*) and musclewood (*Carpinus caroliniana*).

When the nursery is in full production, about 40 trees a year will be ready for planting. What is not planted by GTC will be available to the City for planting by DPW.

CAPACITY: GTC has increased its membership and expertise, and therefore its capacity in recent years. Despite this, there is always a need for more volunteers to join the group or to help out periodically.

Need for volunteers is a common theme throughout the community. There are many trees, parks, gardens and other public spaces that need maintenance beyond what the DPW has staffing for. While there are some informal volunteer groups throughout the City, more are needed.

GTC will continue to explore potential partnerships, particularly with youth groups such as Scouts and school groups, to help build its capacity.



Youth participation is essential in growing more public tree planting and maintenance capacity in Greenfield.

POLICIES AND REGULATIONS: In recent years, properties redeveloped in our City have not included adequate - or sometimes any tree planting - as part of the site plan and landscape. Greenfield has the potential for improving site plan requirements for commercial/ industrial areas to include specifications for tree canopy coverage for new and redeveloped properties. Such regulations will decrease the heat island effect and will reduce cooling costs for businesses.

FIVE YEAR ACTION PLAN






In 2016, GTC set the goal of planting 1,000 trees in the next decade, including those planted by the DPW. Since 2016, the City has planted 567 trees, including those planted by GTC. As we continue to work toward the 1,000 tree goal by 2025, there are a number of related goals and strategies that will help us build our capacity, garner more public enthusiasm for trees, and help protect our environment while beautifying our community.




Greenfield Tree Committee will use this Action Plan to help direct our future work and to measure our progress. We will need to dedicate time toward

prioritizing items in the action plan - focusing on low cost/high benefit items. Where known, potential partners and funding sources are identified along with the action items.




Note: Action Items marked with a tree symbol are adapted from the 2014 Greenfield Sustainable Master Plan.


GOAL	ACTION ITEM	POTENTIAL PARTNERS	FUNDING
1. Plant, maintain and protect trees along urban streets, and around commercial, industrial and municipal properties.			
	1.A. Continue to update and improve the public tree inventory.		
	1.A.1. Establish a process for regularly updating the inventory with trees planted and removed by DPW.	DPW; GTC	Volunteers
	1.A.2. Build on the 2020 inventory by inventorying municipal properties such as parks and schools, as well as neighborhoods east of High Street and north of Silver Street, and other such densely populated areas.	GTC; Rec Dept	Volunteers
	1.A.3. Utilize the 2020 Greenfield Tree Inventory Report to prioritize and guide tree-related decisions.	GTC; DPW	Volunteers
	1.A.4. Use iTree Canopy to measure the percent tree canopy cover in more populated areas of the City to help prioritize tree planting. Conduct a canopy re-assessment every five years. 	GTC; DPW	Volunteers
	1.A.5. Use iTree Canopy and other tools to set percent tree canopy cover goals for the more populated areas of the city, using the Sustainable Greenfield Master Plan goal of 40% in the interim. 		
	1.B. Continue to pursue a substantial tree-planting initiative.		
	1.B.1. Continue the systematic planting of primarily native trees in priority planting zones in the urban core as agreed upon under the U.S. Forest Service tree grant. 	DPW; GTC; FLT; DCR	U.S. Forest Service
	1.B.2. Plant primarily native trees throughout the City, following the List of Approved Trees for Town Street Planting. 	DPW; GTC	U.S. Forest Service
	1.B.3. Strengthen downtown as a welcoming, attractive, and vibrant mixed-use urban space by, in part, planting and maintaining shade trees throughout downtown. 		

GOAL	ACTION ITEM	POTENTIAL PARTNERS	FUNDING
	1.B.4. Increase the shade trees planted along primary walking and biking routes to schools and to downtown to improve walking and biking conditions. 	DPW; GTC; Planning Department; FRCOG	U.S. Forest Service
	1.B.5. To decrease the heat island effect, increase planting along and inside of parking lots and other areas with high concentrations of impervious surfaces. 		
	1.B.6. Make schools more welcoming and beautiful, and increase shade where children gather and play, by planting more primarily native trees on school grounds. 		
	1.B.7. Increase publicity for trees planted in Greenfield using the Kostanski Funeral Home's Memorial Tree Fund monies.		
	1.C. Increase the maintenance of trees planted along streets.		
	1.C.1. Increase municipal funding for DPW to conduct more tree planting and maintenance.	Mayor; City Council	Municipal budget
	1.C.2. Increase the staffing and capacity of DPW's Forestry Division to provide season-long watering of new trees and preventative tree maintenance to avoid more costly tree maintenance or removal in the future.	Mayor; City Council	Municipal budget
	1.C.3. Continue to conduct other tree maintenance work days for weeding, mulching and other activities.	GTC; Volunteers	Volunteers
	1.C.4. Continue to seek education on best pruning practices through DCR Urban Forestry and other resources.	GTC; DCR; UMass	GTC funds
	1.C.5. Provide consistent watering for young trees for first two growing seasons.	DPW; GTC; Volunteers	
	1.C.6. Investigate options for providing volunteers with training and equipment needed to carry out watering of young trees in the urban core.	GTC	DCR Urban Forestry Challenge Grant; Equipment donations
	1.D. Improve policies and practices related to planting trees along streets and in commercial, industrial and municipal areas.		
	1.D.1. Update zoning bylaws to increase tree canopy coverage requirements in commercial, industrial and municipal spaces, focusing on shading parking lots and buildings.	Planning Board; Tree Warden; City Council; GTC	
	1.D.2. Minimize the planting of small-stature trees in sites where a shade tree can be accommodated - including in front yard set-back plantings, to increase tree benefits.	DPW; GTC	
	1.D.3. Update standard practices and procedures for sidewalk and street construction and/or replacement to include street trees as a standard and necessary component.	DPW; City Engineer; Tree Warden	
	1.D.4. Include funding for tree planting for sidewalk and street projects in grant applications to ensure trees are included in all such projects.	DPW; Tree Warden	

GOAL	ACTION ITEM	POTENTIAL PARTNERS	FUNDING
	1.D.5. When opportunities arise, such as during major road construction, seek funding to bury utilities to improve their resilience to climate change and to potentially allow for the planting of more shade trees.	DPW; PLANNING DEPT	MassDOT Transportation Enhancement Grants
	1.D.6. Use techniques such as structural soil, root guards and tree break-out zones to improve the viability of trees and to reduce the potential for damage to sidewalks from tree roots.	DPW; City Engineer; Tree Warden	DCR Urban Forestry Challenge Grant
	1.E. Continue to expand the growing capacity of the Greenfield Tree Committee's community tree nursery to provide low cost, native tree options that are resilient to climate change.		
	1.E.1. Assess the performance of different tree growing techniques, such as using grow bags and growing from seed.	GTC	Volunteers
	1.E.2. Purchase low-cost trees from the nursery to help sustain it and to save the municipality money.	City of Greenfield; GTC	Municipal budget
	1.E.3. Grow trees with species diversity in mind to avoid mass losses of trees due to insects or pathogens.	GTC	Volunteers
	1.E.4. Collaborate on public events that invite the public to learn about the tree nursery and related activities.	GTC; Just Roots; FLT	
2. Plant, maintain and protect trees around recreation facilities, urban green spaces, and open spaces.			
	2.A. Conduct a tree inventory in all City parks and green spaces, and determine tree planting needs, focusing on native trees.	GTC	Volunteers
	2.B. Carry out tree planting projects at recreational areas.		
	2.B.1. Greenfield Swimming Area: Plant native trees to increase tree canopy and shade.	GTC; Rec Dept	U.S. Forest Service
	2.B.2. Hillside Park: Plant shade trees along the park perimeter including evergreens for summer shade and screening for neighboring residents.	GTC; Rec Dept	U.S. Forest Service
	2.B.3. Beacon Field: Plant shade trees interspersed with existing mature trees along perimeter and south and west of the playground to provide summer shade. Plant a row of wind-breaking trees to the north and paralleling the tennis courts.	GTC; Rec Dept	U.S. Forest Service
	2.B.4. Highland Park and Temple Woods: Install new markers for the new "Trees of Highland" hike.	GTC; Tree Warden	GTC funds
	2.B.5. Shattuck Park:		
	Conduct an inventory of the urban woods.	GTC	Volunteers
	Conduct tree pruning on aging trees in the woods.	DPW	
	Interplant young native trees to increase tree diversity in the woods.	GTC	U.S. Forest Service

GOAL	ACTION ITEM	POTENTIAL PARTNERS	FUNDING
	Design and install interpretive signs that describe the function of the woods and primary tree species.	GTC	
	2.B.6. JZ Community Center: Address the need for more shade trees at the JZ Community Center.		
	Remove the dead and dying flowering dogwood from the parking lot islands and plant upright shade trees that are salt tolerant.	DPW	U.S. Forest Service
	Plant shade trees in large grassy areas on the east and south of the property.	DPW or GTC	U.S. Forest Service
	Create cut-outs in the west edge of the parking lot into the undersized tree belt to accommodate three to four shade trees among the small hedgerow. Doing so may require designating the spaces on along the west side of the parking lot for compact cars.	DPW; Engineering	U.S. Forest Service
	Develop a consistent watering plan for the first two years to ensure success.	DPW; Senior Center staff; GTC	
	2.C. Work with community garden users to determine interest in growing fruit trees, and help them plant appropriate species. 	Rec Dept; GTC	DCR Urban Forestry Challenge Grant
	2.D. Maintain Greenfield's Tree City USA status (yearly).	DPW; GTC	
	2.E. Work to remove invasive trees and plant species in recreational areas and open spaces.		
	2.E.1. Develop a tracking and prioritization of areas with invasive tree and plant species. Focus on areas where exotic plants have overrun the landscape, including along the Green River.	GTC; Con Com	
	2.E.2. Conduct an inventory and create a management plan for exotic tree and plant removal for areas such as Temple Woods and Highland Park, where Norway maple trees and other exotic plant and shrub species are displacing native species.	GTC; Greenfield Tree Warden; Conservation Commission	MassWildlife Habitat Management Grant
	2.F. Increase volunteers working in Greenfield's recreational areas and urban green spaces.		
	2.F.1. Hire a volunteer coordinator - such as Terra Corps - to recruit and manage volunteers to help maintain Greenfield's public street trees, gardens, parks, and conservation areas, as well as to participate in annual clean-up, planting events and invasive plant species removal.	GTC; Rec Dept; GGEC, Greenfield Garden Club	Private foundation funding
	2.F.2. Maintain an online site to connect volunteer opportunities with existing resources and organizations.		Private foundation funding

GOAL	ACTION ITEM	POTENTIAL PARTNERS	FUNDING
	2.G. Protect trees from weed whip damage and improper mulch application, especially at sites such as schools where the grounds are maintained by outside contractors.	GTC; School grounds staff	
	2.H. Increase green space by acquiring one or two vacant lots along Federal Street to convert into green spaces and to provide places for pedestrians to rest and beauty in a commercial area.	Planning Department; Rec Dept; GTC	PARC Grant
	2.I. Provide education via public spaces to increase support for public trees.		
	2.I.1. Create murals and other public art that increases enthusiasm for and interest in trees.	GTC; Local Cultural Council	Mass Cultural Council
	2.I.2. Work with schools to provide identification of trees growing on school property for the purposes of educating children.	GTC; School officials/ teachers	DCR Urban Forestry Challenge Grant
	2.I.3. Design creative signs or other methods of teaching the public about trees along Main Street.	GTC	DCR Urban Forestry Challenge Grant
	2.I.4. Create a virtual platform where residents can tell stories about their favorite trees in Greenfield.	GTC	Volunteers
	2.I.5. Complete the creation of the Highland Park Tree tour, including signage, and encourage in-person and virtual use through social media and other venues.	GTC	GTC funds
	2.I.6. Host tree and nature walk and talks to increase the public's understanding and enthusiasm for trees and nature; partner with other groups with shared interests and connections to nature and the earth.	GGECC; GTC; Greenfield Garden Club; Nolumbeka Project	GTC funds
	2.I.7. Promote Greening Greenfield's 70% pollinator plant challenge.	Rec Dept; GTC	Volunteers
	2.J. Develop a celebration tree program to plant trees in celebration or memory of residents' loved ones, planting trees primarily in parks with Tree Warden approval.	Rec Dept; Tree Warden; GTC	GTC funds
3. Help plant, maintain and protect trees on private property.			
	3.A. Increase awareness of the Greenfield Tree Committee and its resilient trees for residential planting selection tool using social media and local newspapers.	GTC	Volunteers
	3.B. Provide educational opportunities related to trees for private land owners. Include topics such as environmental and health benefits.	GTC; DCR Urban Forester	Volunteers
	3.B.1. Offer workshops on tree care and planting skills.	GTC; DCR Urban Forester	Volunteers
	3.B.2. Offer workshops about native trees and their benefits including ecosystem services, wildlife and pollinator habitat and other benefits.	GTC; GGECC	Volunteers
	3.C. Develop an "Ask the Expert" program to provide information to the public about trees and tree planting. The program could be held at events, fairs and farmers markets.	GTC	Volunteers

GOAL	ACTION ITEM	POTENTIAL PARTNERS	FUNDING
	3.D. Design and produce tags that could be provided to local nurseries and other businesses selling tree, to include info and links to best practices for tree planting.	GTC	GTC funds
	3.E. Add a best practices page to GTC's website for tree planting and maintenance.	GTC	Volunteers
	3.F. Provide incentives to private property owners to plant and maintain trees.	GTC	Foundation funding
	3.G. Increase tree planting around residential rental properties by providing outreach and support to renters and to landlords, as well as to the Landlords' Business Association	GTC; FRCOG	
4. Prioritize climate change in all GTC actions and activities.			
	4.A. Combat climate change by increasing the long-term carbon storage of City-owned conservation areas and urban forests by maintaining or increasing forest cover		
	4.A.1. Advocate for City of Greenfield owned lands to be managed to maximize CO ₂ removal from the atmosphere and maximize long term carbon storage. Ensure that all forest management is clearly shown to have a climate positive impact through full accounting of carbon storage and removal.	GTC; Planning Department; Conservation Commission; Mayor	
	4.A.2. Collaborate with other towns and/or Land Trusts, such as Mount Grace Conservation Land Trust, that are exploring the opportunity to manage public and conserved land so that they are able to sell valuable carbon-offsets and provide a revenue stream to municipalities to keep forests intact. For an alternate source of revenue, consider enrolling conservation lands into a carbon trust, similar to the Tri-City carbon project. http://www.cooleffect.org/content/project/tri-city-forest-project	Planning Department; Conservation Commission; Mayor	
	4.A.3. Increase public education about the value of intact forests as important resources for carbon storage, and provide information on carbon trusts to private land owners.	GTC; Non-profit conservation groups	Volunteers
	4.B. Prepare for increasingly heavy rain events, causing more stormwater to enter streams and rivers.		
	4.B.1. Conduct an analysis of impervious surfaces, slopes, and stormwater drains to determine where the heaviest flows of stormwater enter storm drains, streams and rivers. Determine areas where plantings of trees could capture and infiltrate rainfall.	Planning Department; Tree Warden; DPW; GTC	
	4.B.2. Conduct mass plantings of trees to slow/curb stormwater runoff as part of a larger Green Infrastructure initiative. 	DPW; GTC	U.S. Forest Service
	4.C. Anticipate the continuing impacts of climate change on the urban forest.		
	4.C.1. Seek climate change related education on the changing ranges of tree species and adjust tree species planted by the city and volunteer groups.	GTC	
	4.C.2. Seek climate change related education on invasive plant and insect species that are increasing due to climate change and are negatively impacting native trees.	GTC	

GOAL	ACTION ITEM	POTENTIAL PARTNERS	FUNDING
	4.D. Conduct trial plantings of trees typically growing south of our region to determine their suitability for street tree planting in Greenfield	GTC	
5. Build the capacity and membership of GTC.			
	5.A. Develop a citizen tree steward program to increase the capacity to maintain and care for trees, including pruning, watering and mulching.	GTC	Volunteers
	5.B. Continue to conduct Greenfield Tree Committee-led community-based tree plantings with neighborhood liaisons.	GTC; DCR	Volunteers
	5.C. Maintain active social media and website for public information and education.	GTC	Volunteers
	5.D. Seek out groups looking for community service opportunities and train them to perform tree related volunteer tasks.	GTC; Scouts; Public Schools	Volunteers



Good tree planting practices include making sure the trees are not root-bound from growing in pots before planting them in the ground.



Our community tree planting events include providing educational materials that participants can take with them, information on becoming a GTC member and a sign-up for our mailing list.



Site preparation was underway in 2020 for GTC's new tree nursery, located on the property of Just Roots.



"Until you dig a hole, you plant a tree, you water it and make it survive, you haven't done a thing. You are just talking."

— Wangari Maathai