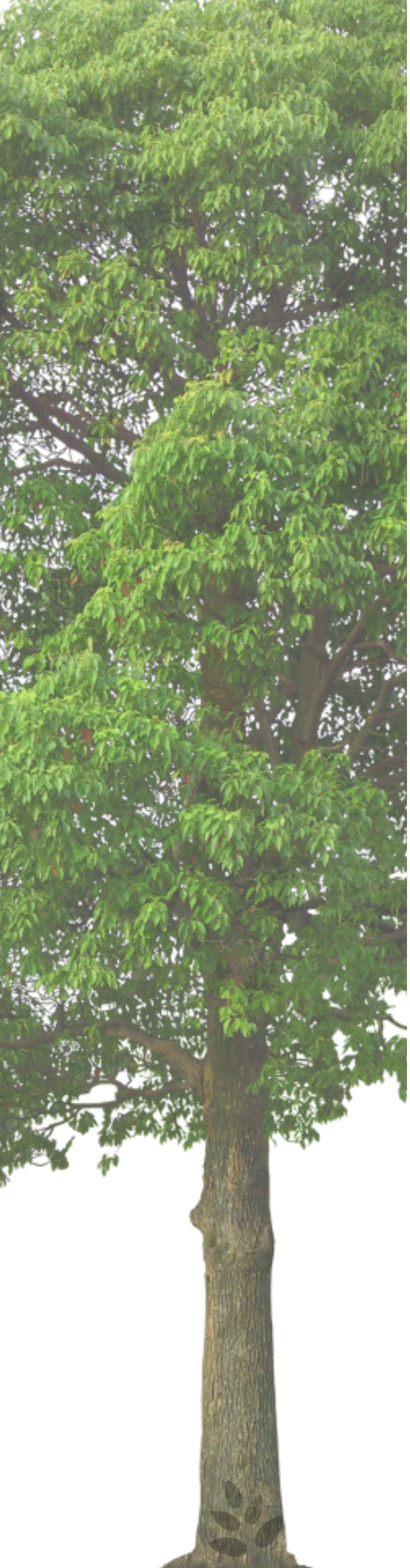


Cuyahoga County Urban Tree Canopy Assessment Update **2019**

December 12, 2019

County Planning
CUYAHOGA COUNTY
PLANNING COMMISSION

TABLE OF CONTENTS

PREPARED BY

Daniel Meaney, GISP – *Information & Research Manager*
Shawn Leininger, AICP – *Executive Director*
Susan Infeld – *Special Initiatives Manager*
Kevin Leeson – *Planner*
Robin Watkins – *GIS Specialist*
Ryland West – *Planning Intern*

CUYAHOGA COUNTY PLANNING COMMISSION

2079 East 9th Street
Suite 5-300
Cleveland, OH 44115

216.443.3700
www.CountyPlanning.us
www.facebook.com/CountyPlanning
www.twitter.com/CountyPlanning

Why Tree Canopy is Important

Tree canopy is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above. Tree canopy provides many benefits to society including moderating climate, reducing building energy use and atmospheric carbon dioxide (CO2), improving air and water quality, mitigating rainfall runoff and flooding, enhancing human health and social well-being and lowering noise impacts (Nowak and Dwyer, 2007). It provides wildlife habitat, enhances property values, and has aesthetic impacts to an environment.

Establishing a tree canopy goal is crucial for communities seeking to improve their natural environment and green infrastructure. A tree canopy assessment is the first step in this goal setting process, showing the amount of tree canopy currently present as well as the amount that could theoretically be established.

Project Background

The 2019 Cuyahoga County Urban Tree Canopy Assessment is an update to a countywide assessment published by the Cuyahoga County Planning Commission in 2013. Both studies used a countywide assessment of tree canopy for data measurement. The 2013 report used data measured in 2011 while the 2019 report used data measured in 2017. Together, the original and updated studies provide a current snapshot in time, as well as an indication of change over the six-year period from 2011 to 2017.

As with the previous study, the goal of the updated study was to apply the USDA Forest Service's Urban Tree Canopy Assessment protocols to Cuyahoga County. The updated analysis was conducted primarily from 2017 infrared imagery from the National Agricultural Inventory Program (NAIP), and from surface elevation data provided by LIDAR data collections from the Northeast Ohio Regional Sewer District and Cleveland Metroparks. Additional local data sources (building footprints, impervious surfaces, etc.) provided enhancements to the final data results.

This project was made possible entirely through $28,000 in contributions from local organizations:

- *Cleveland Neighborhood Progress*
- *Cleveland Office of Sustainability*
- *Cuyahoga County Department of Sustainability*
- *Holden Forests & Gardens*
- *Western Reserve Land Conservancy*

Substantial in-kind contributions, valued at over $110,000 were provided by the Northeast Ohio Regional Sewer District, Cleveland Metroparks, and the Cuyahoga County Planning Commission.

Land cover analysis was conducted by the Spatial Analysis Laboratory (SAL) at the University of Vermont's Rubenstein School of the Environment and Natural Resources. Tree canopy metrics and reporting were prepared by the Cuyahoga County Planning Commission.

Key Terms

- **Tree Canopy:** is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above.
- **Land Cover:** Physical features on the earth mapped from aerial or satellite imagery, such as trees, grass, water, and impervious surfaces.
- **Existing Tree Canopy:** The amount of urban tree canopy present when viewed from above using aerial or satellite imagery.
- **Possible Tree Canopy:** Total area theoretically available for establishment of additional tree canopy.
- **Impervious Possible Tree Canopy:** Asphalt or concrete surfaces, excluding roads and buildings, that are theoretically available for the establishment of tree canopy.
- **Vegetated Possible Tree Canopy:** Grass or shrub area that is theoretically available for the establishment of tree canopy.

Land Cover Methodology

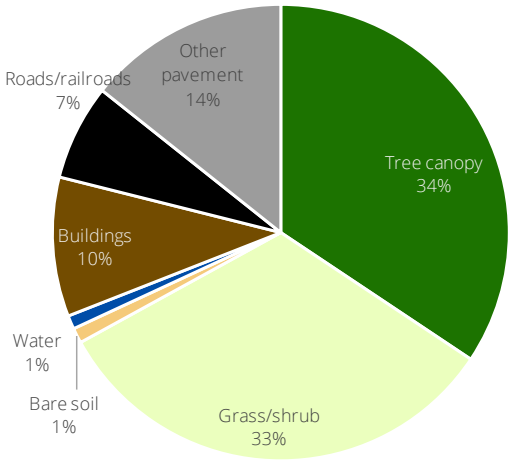
The basis for the urban tree canopy assessment is a high-resolution land cover analysis, provided by consultants at the University of Vermont Spatial Analysis Laboratory. The analysis, which is documented in a separate report, involves the integration of several input data sources:

- National Agricultural Imagery Program (NAIP) leaf-on imagery (2017)
- Cuyahoga County orthophotography leaf-off imagery (2017)
- LIDAR-derived surface models (Northeast Ohio Regional Sewer District, 2017; Cleveland Metroparks, 2018)
- Other local data, including building footprints and parcels.

Source: County Planning

The resulting base land cover data includes the following ten classes:

1) *Building*
2) *Road*
3) *Other Pavement*
4) *Bare Soil*
5) *Water*
6) *Vegetative Cover*
7) *Tree Canopy Over Vegetation*
8) *Tree Canopy Over Building*
9) *Tree Canopy Over Road*
10) *Tree Canopy Over Pavement*



These ten classes were further condensed to a set of seven classes, where all Tree Canopy classes (TC) are combined to a single "Tree Canopy" category. Using elevations above-ground, derived from a LIDAR generated Digital Surface Model (DSM), trees are distinguished from smaller "shrubs" by using a minimum height measurement of eight feet. Although efforts are made to manually identify smaller trees. LIDAR does generally require a minimum area of 30 square feet to be captured. This could result in some smaller diameter trees not being captured in the data set.

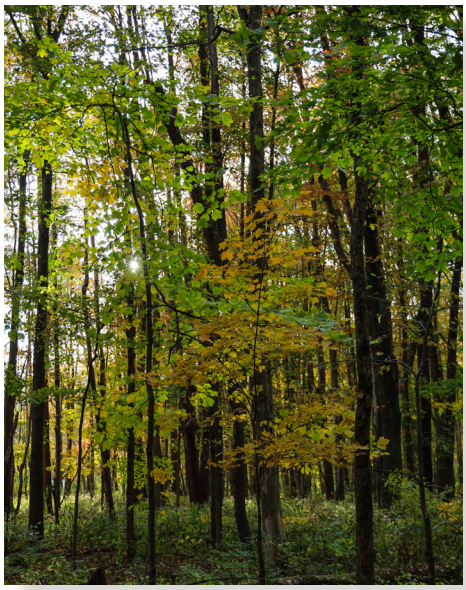
"Possible Canopy" (P) is a land cover combination consisting of areas where trees have not yet been planted but could be, including grass/shrub areas, bare soil, and even parking lots.

Another land cover class, which can be looked at from ground level, can be a combination of various land covers (building, road, pavement) and classified as Imperviousness (I). Impervious cover is a key contributor to increased stormwater runoff and urban heat island effect.

Tree Canopy Metrics Methodology

Using the land cover data, various summary metrics were tabulated for the County as a whole, its 59 individual communities, City of Cleveland neighborhoods, census tracts, census blocks, parcels, and watersheds. Those results form the bulk of this report. Additional details are available in spreadsheet and GIS formats through the study website:

countyplanning.us/utc-update

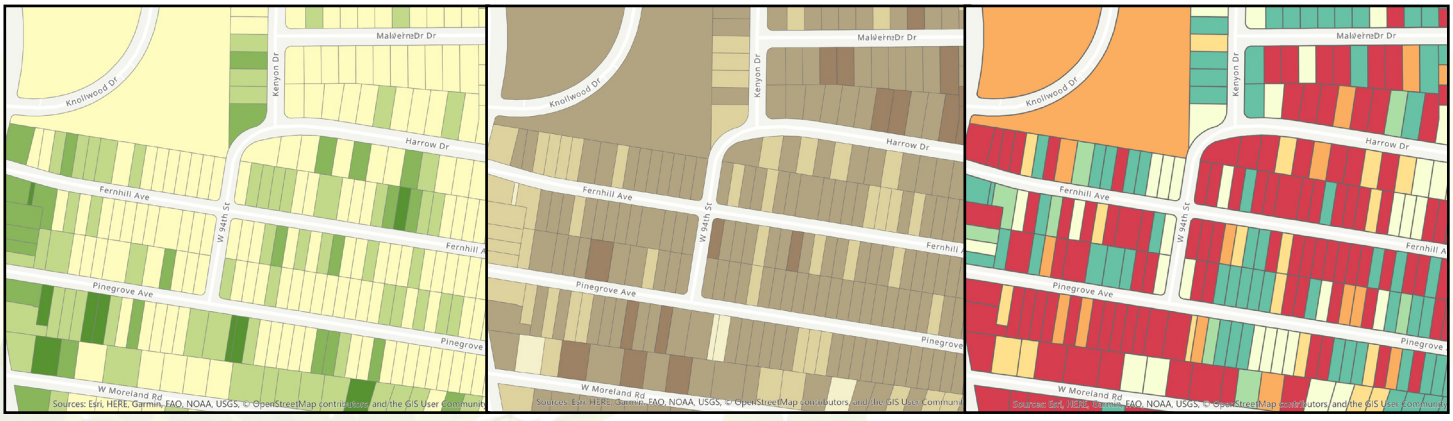


Source: County Planning

Users will note that some of the data from 2011 has been revised slightly due to advances in algorithm development, better data, and data from multiple time periods. Please refer to the Land Cover report from the University of Vermont for further details.

Another item important to note is that all of the land cover estimates are subject to a degree of error. As of publication of this report, the margin of error for the 2017 measurements has not yet been calculated, although a countywide margin of error of +/- 1.5% for the tree canopy class was calculated for the 2013 study data. Due to improved measurement methods and higher quality input data, the accuracy of the 2017 data is expected to improve. However, for data analysis purposes a 1.5% margin of error for 2017 data will be assumed.

AERIAL *LAND COVER* *CANOPY CHANGE 2011-2017*



PERCENT EXISTING TREE CANOPY BY PARCEL *PERCENT POSSIBLE TREE CANOPY BY PARCEL* *PERCENT TREE CANOPY CHANGE BY PARCEL (2011-2017)*

Countywide Findings

Countywide Findings

Cuyahoga County is the most densely populated county in the State of Ohio. Its land area continues to be challenged by sprawl, large impervious areas, and fragmented habitat, and preservation of its remaining tree cover will continue to be difficult without concerted effort.

Cuyahoga County in recent years has launched a number of initiatives aimed at raising awareness and conserving its natural resources:

- Urban Tree Canopy Assessment (2013)
- Cuyahoga County Greenprint (2015)
- Cuyahoga Greenways Plan (2019)
- County Climate Change Action Plan (2018)
- Healthy Urban Tree Canopy Grant Program (2019)

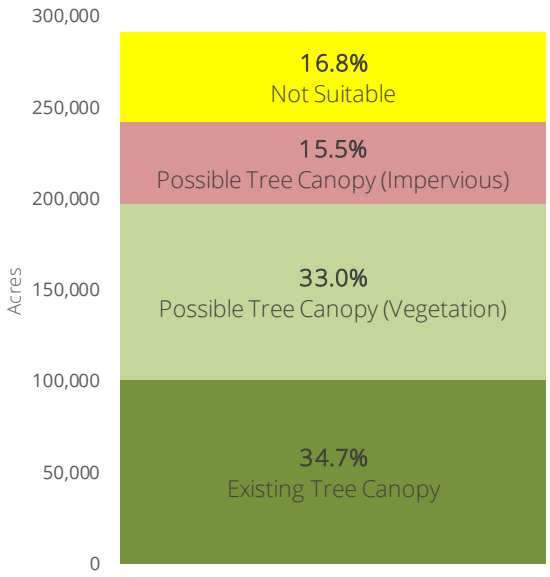
The City of Cleveland also published The Cleveland Tree Plan for its neighborhoods in 2015.

The 2019 updated Urban Tree Canopy Assessment complements these program efforts with support and guidance based upon in high quality data.

Source: County Planning

Countywide: Existing & Possible Tree Canopy

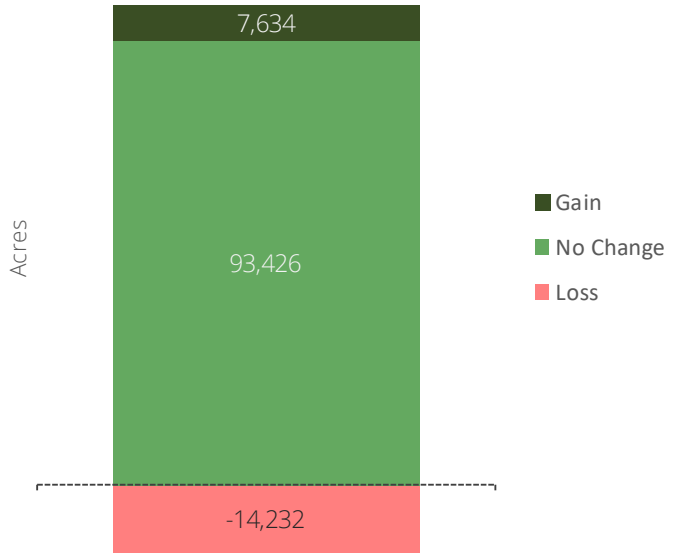
The updated 2017 results for Cuyahoga County, show that just over 100,000 acres of the county were covered by tree canopy, representing 34.7% of all land in the county. An additional 45.5% (371,000 acres) of the county can be considered "Possible Tree Canopy". Within the Possible category, 15.5% (45,200 acres) of the County was classified as "Impervious Possible" and another 33.0% was Vegetated Possible (96,000 acres). "Vegetated Possible", or grass and shrubs, is more conducive to establishing new tree canopy, but establishing tree canopy on areas classified as "Impervious Possible" would have a greater impact on water quality and summer temperatures.



Countywide: Change 2011-2017

The results for 2017 indicate that the Cuyahoga County has posted a net tree canopy loss of about 6,600 acres - a decline of 6.1% of its tree canopy since 2011. The County's tree canopy now stands at 34.7% of its total land area (down from 37.0% in 2011). This net loss comes despite concerted efforts in recent years to increase tree cover, and reflects losses due to development, invasive pests, and other causes such as wind damage and neglect. As an example; the Emerald Ash Borer and Superstorm Sandy occurred since the time of the last study in 2011. Slight gains that were observed between the assessment periods were due primarily to the slow growth of existing trees over time, as well as some growth from recent plantings.

COMPONENTS OF CHANGE IN TREE CANOPY



The effect of natural losses are observable within the protected Cleveland Metroparks Reservations, which showed a tree canopy decline of nearly 6% from 2011-2017. Nearly every reservation showed a net loss in canopy, attributed largely to emerald ash borer infestations.

Another factor in tree canopy decline was clear-cutting for development, particularly in outer suburbs. See the supplemental article on "Clear-cutting for Development" at the end of this report for more information.

Source: County Planning

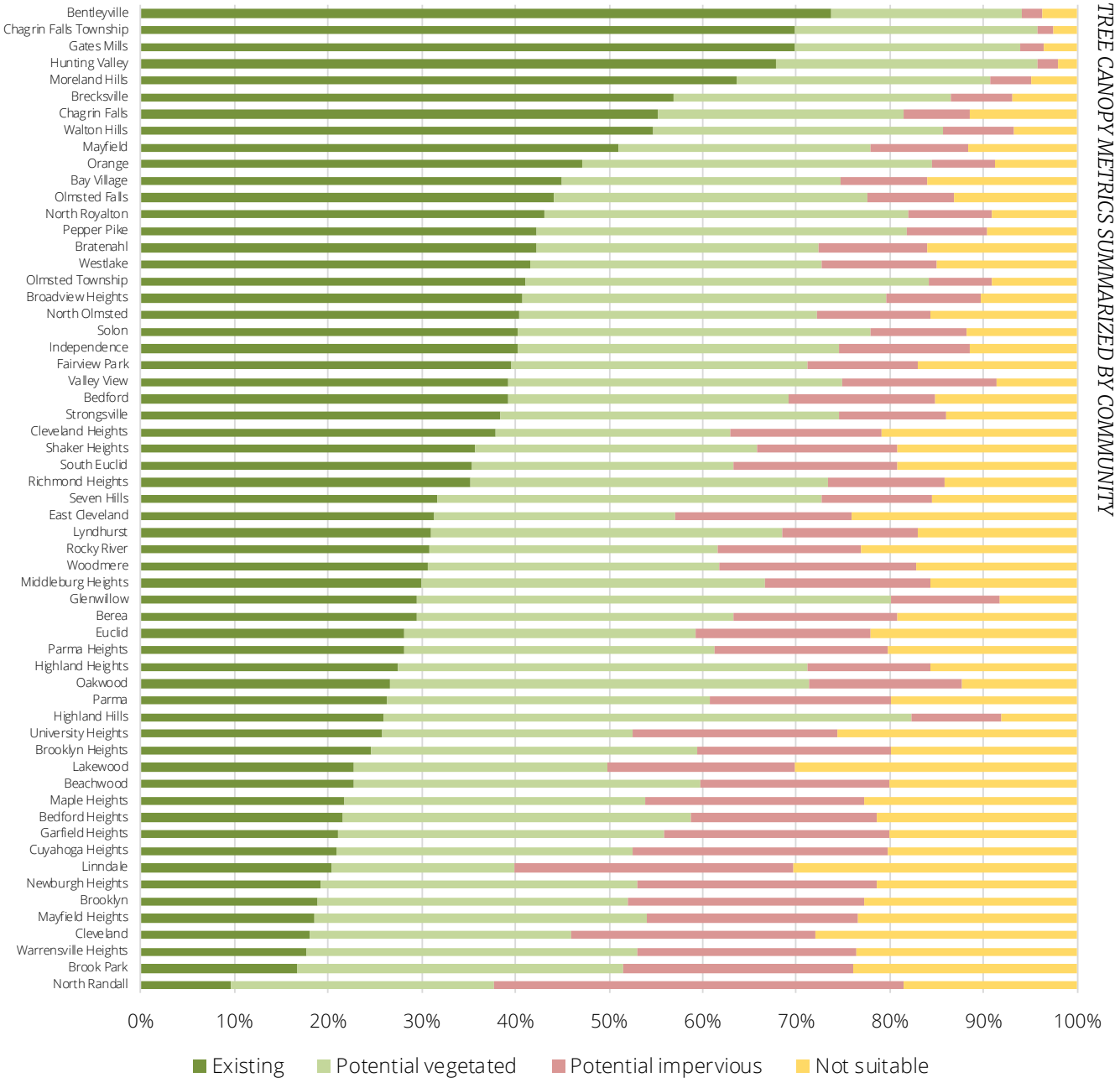
Area Summary : **Local Communities**

Local Communities: Current Status

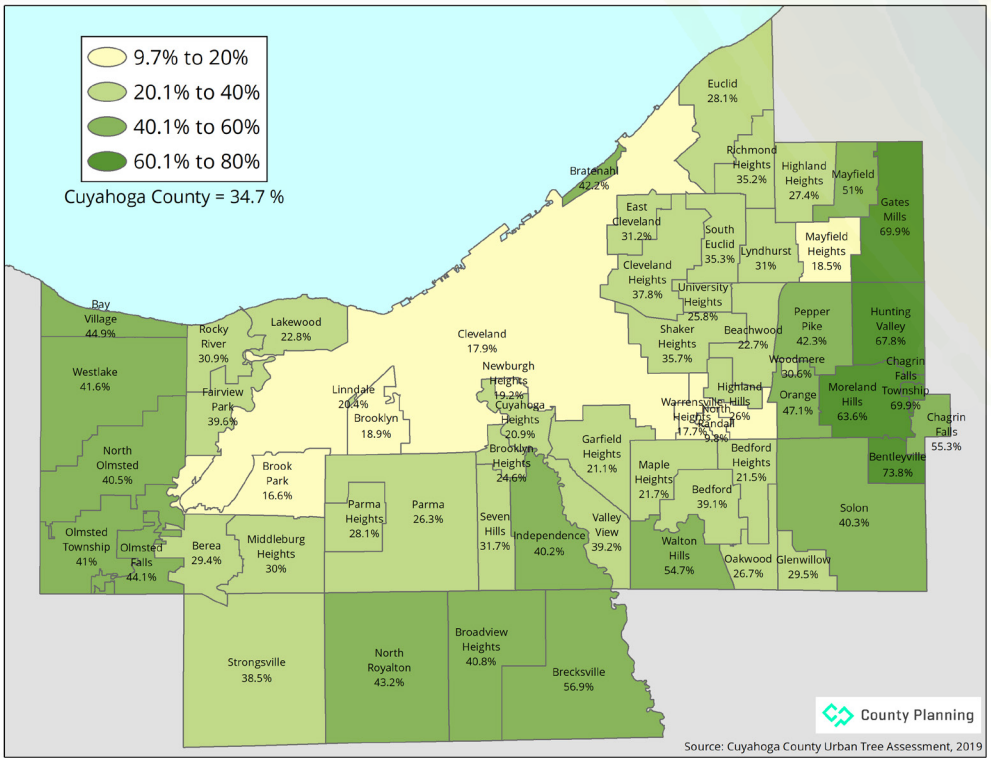
There are 59 municipalities, villages, and townships in Cuyahoga County. The City of Cleveland comprises about 17% of the County's total land area and is surrounded by approximately two dozen highly urbanized inner-ring communities. Outer-ring communities in Cuyahoga County feature less dense development patterns. The Cleveland Metroparks system is extensive (18,649 acres in Cuyahoga County) and touches many communities throughout Cuyahoga County. Other significant park acreage is held by the Cuyahoga Valley National Park (2,800 acres), numerous local parks, and other conservation land.

The Ohio Constitution gives tremendous local control to its communities through "home rule", a provision which authorizes Ohio communities to govern themselves through local laws. Thus, communities in Ohio can establish policies for land use and development and protect the natural environment through local statutes. This provision in the Ohio Constitution recognizes that a community best knows how to serve its needs.

Community-level metrics for tree canopy are important because they serve as a realistic basis for a community to develop goals, policies, and possibly legislation for the management of trees.

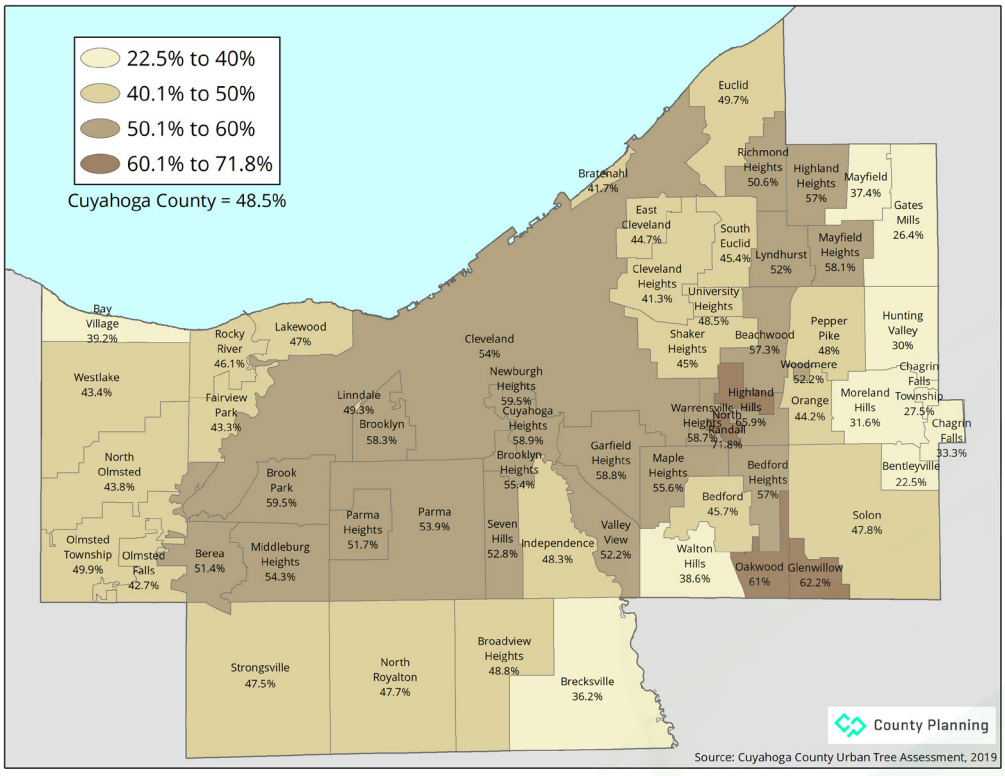


Local Communities: Existing & Possible Tree Canopy



EXISTING TREE CANOPY SUMMARIZED BY COMMUNITY

Geography, development, and community standards can all impact tree canopy in individual communities. As a result, the existing tree canopy in Cuyahoga County is not evenly distributed. Viewing the bar chart on previous page and the map to the left, one can see that half (30) of the communities in Cuyahoga County have less than the County average of 34.7% for Existing Tree Canopy. The tree canopy in Cleveland, measured at 17.9%, is well below the County average. Several inner-ring suburban communities exceed the county average for tree canopy including Bedford, Cleveland Heights, Fairview Park, Shaker Heights and South Euclid. Except for Bratenahl, nearly all the leading Tree Canopy communities are located in outlying suburbs. The cities of Brook Park, North Randall and Warrensville Heights have an average tree canopy below that of Cleveland.



POSSIBLE TREE CANOPY SUMMARIZED BY COMMUNITY

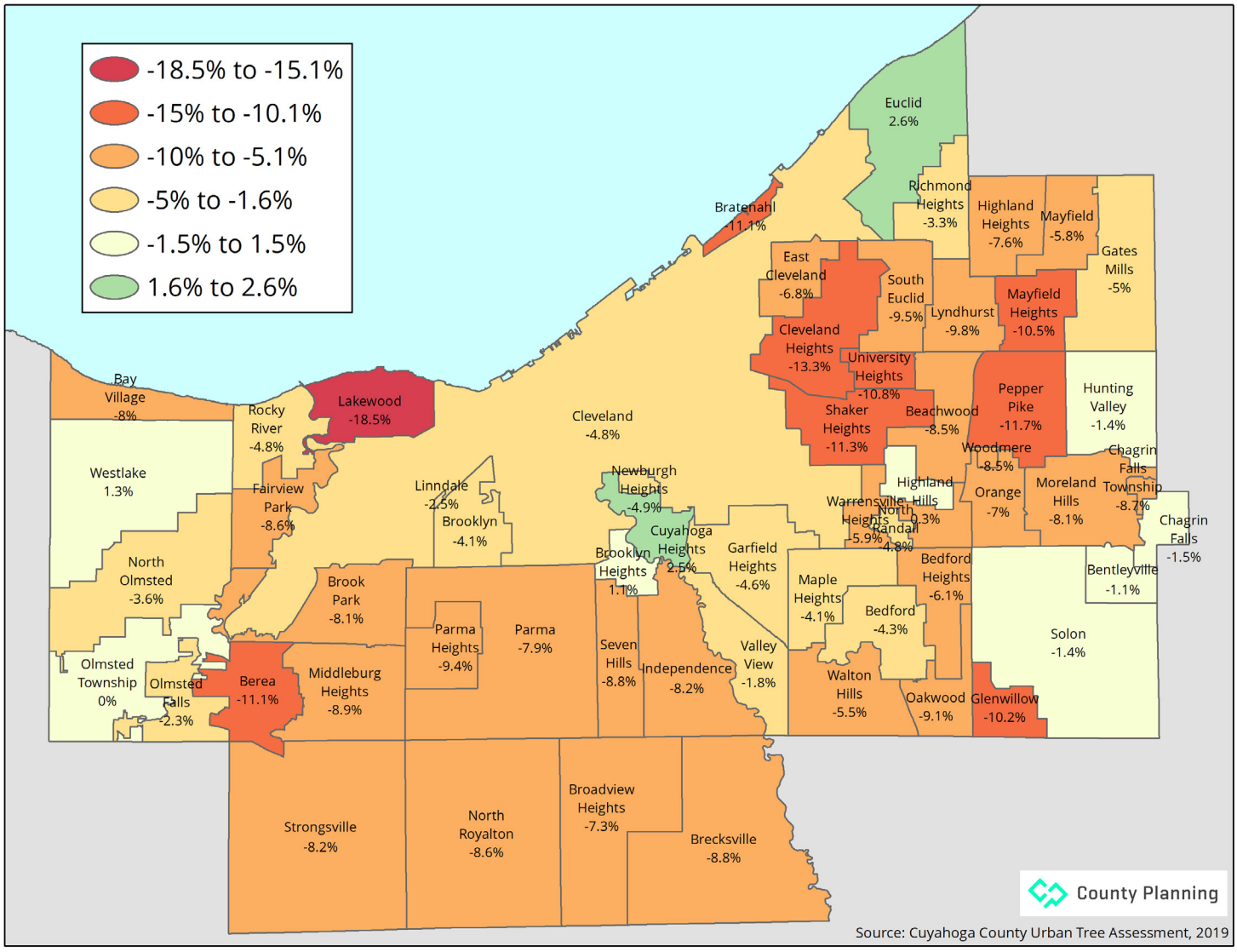
A community's "Possible Tree Canopy" measurement provides an indication of available land for tree planting. Again, viewing the bar chart on page 10, one can see the extent of suitable non-tree canopy land, including "Possible-Vegetated" (light green) and "Possible-Impervious" (light red). The map to the left shows the Percent of 'Possible' land for each community where trees do not currently exist.

Local Communities: Change 2011-2017

No Cuyahoga County communities showed a substantial gain in tree canopy. Only two communities (Euclid and Cuyahoga Heights) showed minor gains of about 2.5%. Additional study would be needed to determine what specific factors contributed to these changes.

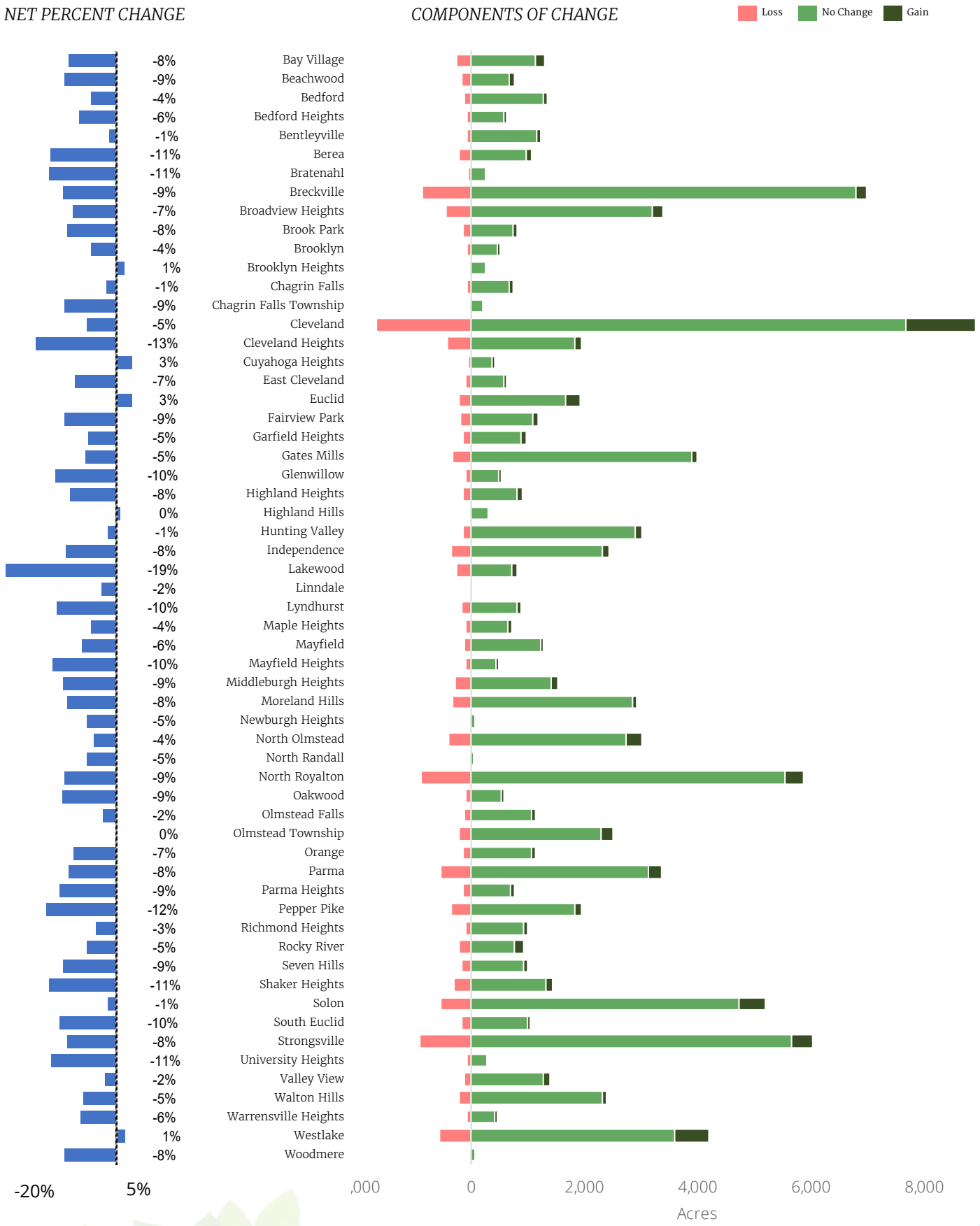
Many communities showed a decline in Tree Canopy from 2011 to 2017, with nine losing more than 10% of their canopy. Six of those were the inner ring suburbs of Berea, Bratenahl, Cleveland Heights, Lakewood, Shaker Heights and University Heights.

The City of Cleveland lost nearly 5% of its 2011 tree canopy area, from 18.8% to 17.9% canopy. Despite gaining over 1,200 acres of new canopy, Cleveland also lost over 1,600 acres of canopy from 2011 to 2017.



TREE CANOPY CHANGE SUMMARIZED BY COMMUNITY (2011-2017)

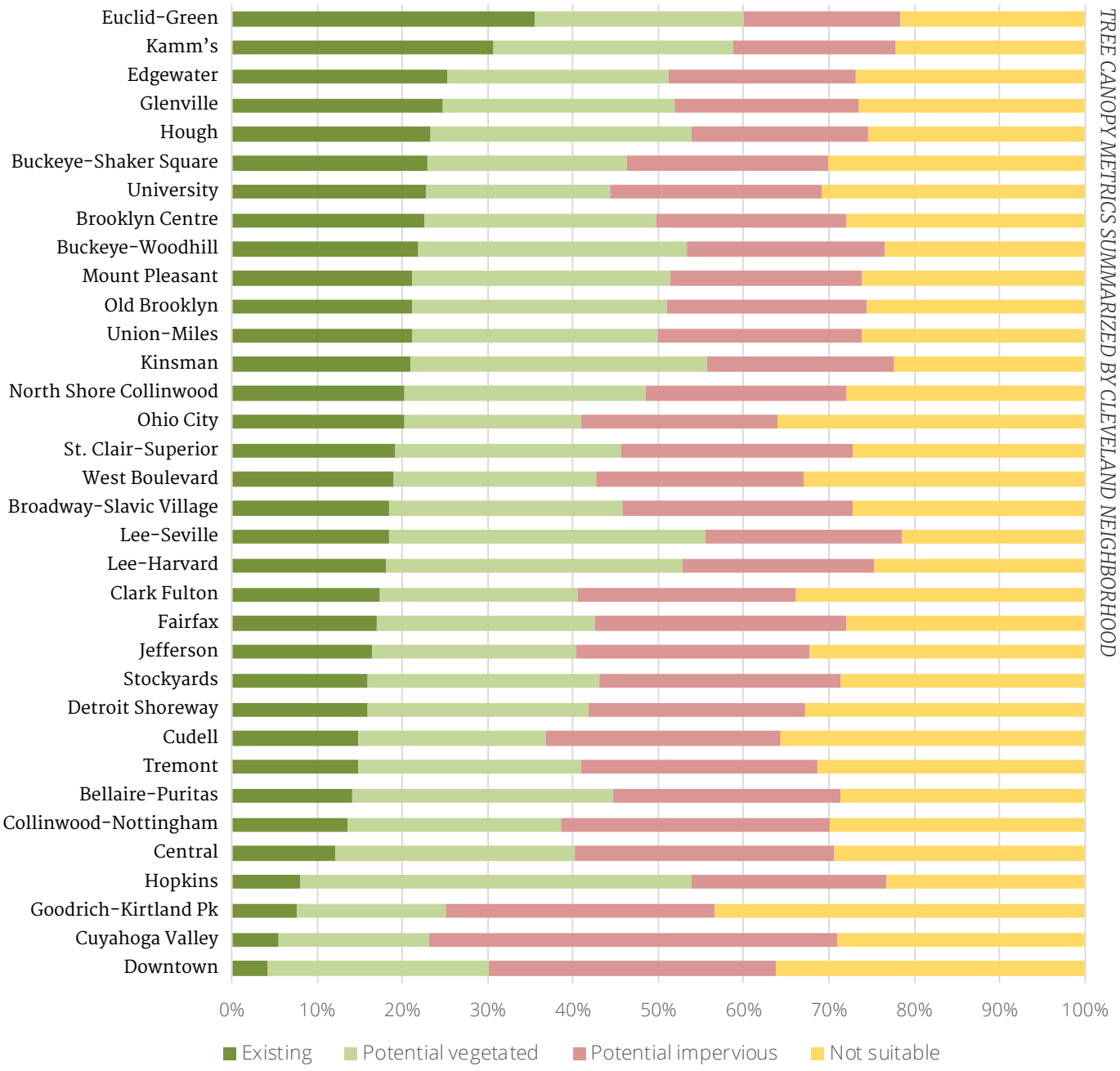
Local Communities: Change 2011-2017



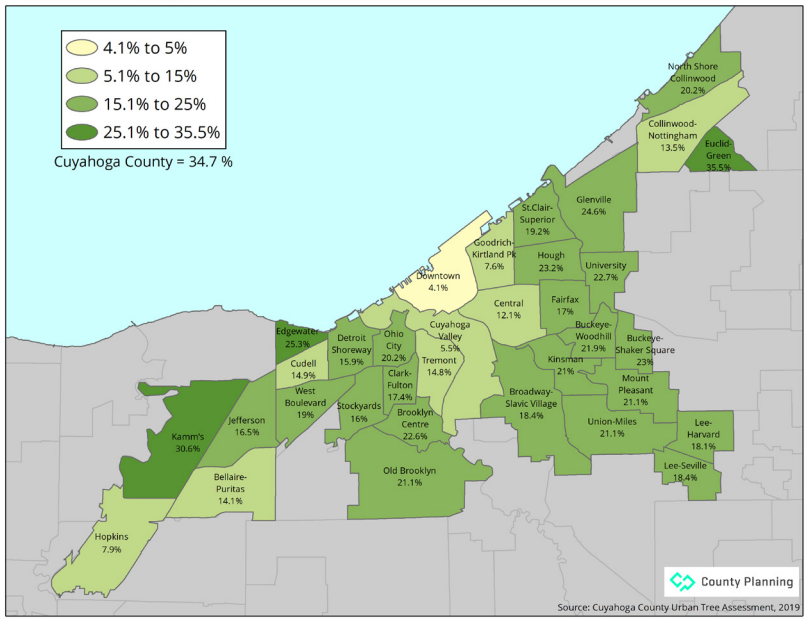
Area Summary : **Cleveland Neighborhoods**

Cleveland Neighborhoods: Current Status

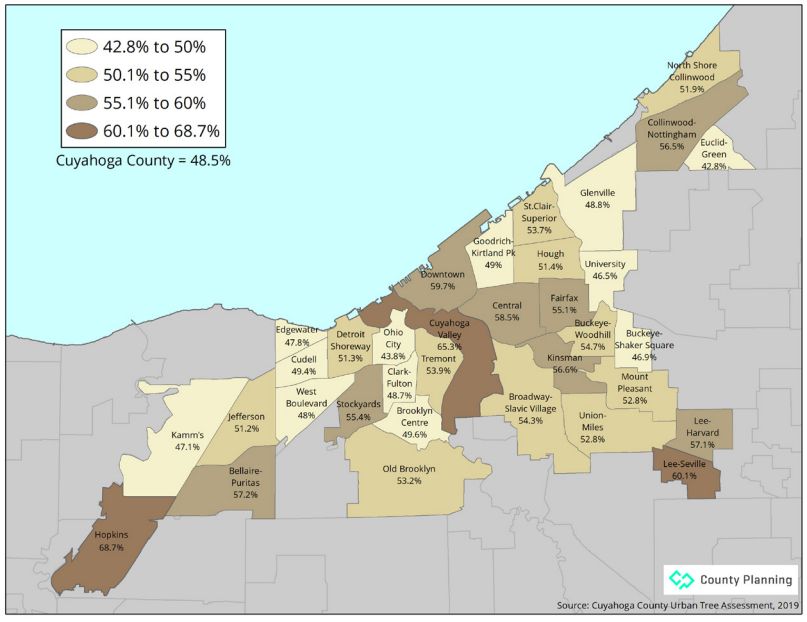
For planning purposes, the City of Cleveland is divided into 34 traditional neighborhoods, technically known as Statistical Planning Areas (SPAs). As the name implies, SPAs provide a framework for summarizing socio-economic and other statistics within the City. SPA boundaries were last revised in 2012.



Cleveland Neighborhoods: Existing, Possible & Change



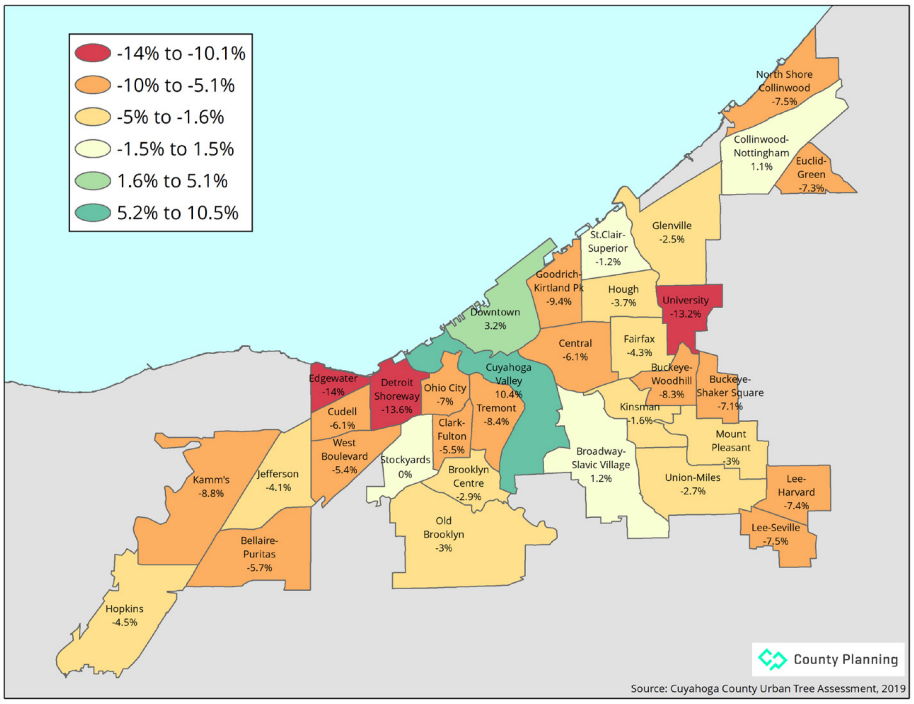
EXISTING TREE CANOPY SUMMARIZED BY CLEVELAND NEIGHBORHOOD



POSSIBLE TREE CANOPY SUMMARIZED BY CLEVELAND NEIGHBORHOOD

The City of Cleveland's Tree Canopy, as noted above, was at 17.9% of its land area in 2017. The canopy in fourteen of its SPAs were below the City average. Four of those low-canopy neighborhoods are dominated by non-residential uses characterized by impervious areas. (including two airports): Downtown, Cuyahoga Valley, Goodrich-Kirtland Park, and Hopkins. All four had extremely low canopy (below 8%) and high concentrations of impervious cover. These four areas together encompass almost 16% of the City's land area.

Twenty neighborhoods exceeded the City average for tree canopy, including four with canopy near or above 25%.

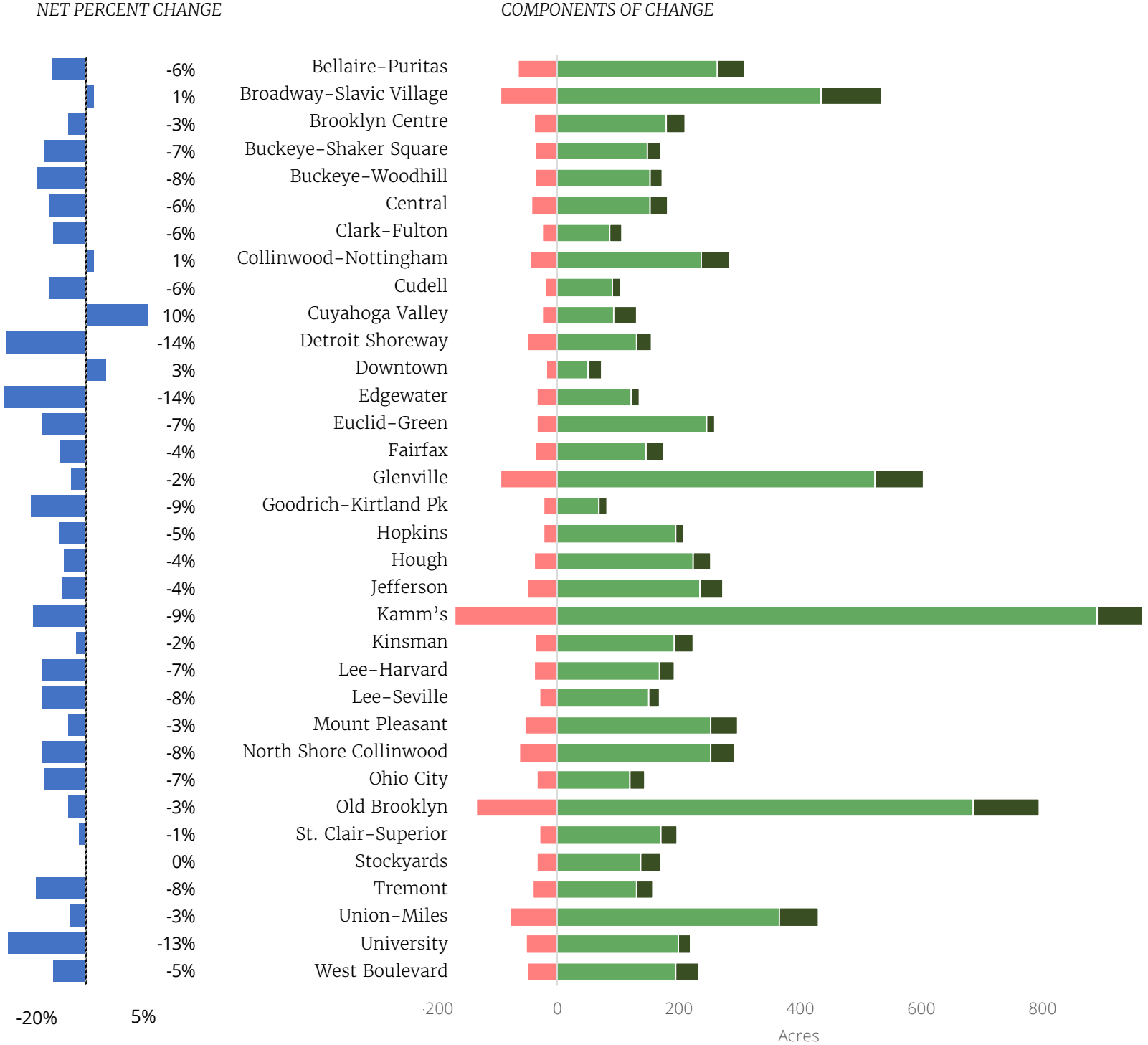


TREE CANOPY CHANGE SUMMARIZED BY CLEVELAND NEIGHBORHOODS (2011-2017)

As observed among the County's 59 communities, nearly all Cleveland neighborhoods lost tree canopy from 2011-2017. Losses exceeding 10% occurred in Detroit-Shoreway, Edgewater, and University Circle.

Only the heavily urbanized Downtown and Cuyahoga Valley neighborhoods showed increases above the countywide margin of error of +/- 1.5%. Cuyahoga Valley showed an increase of over 10%, though it is among the lowest in existing tree canopy overall.

Cleveland Neighborhoods: Change 2011-2017



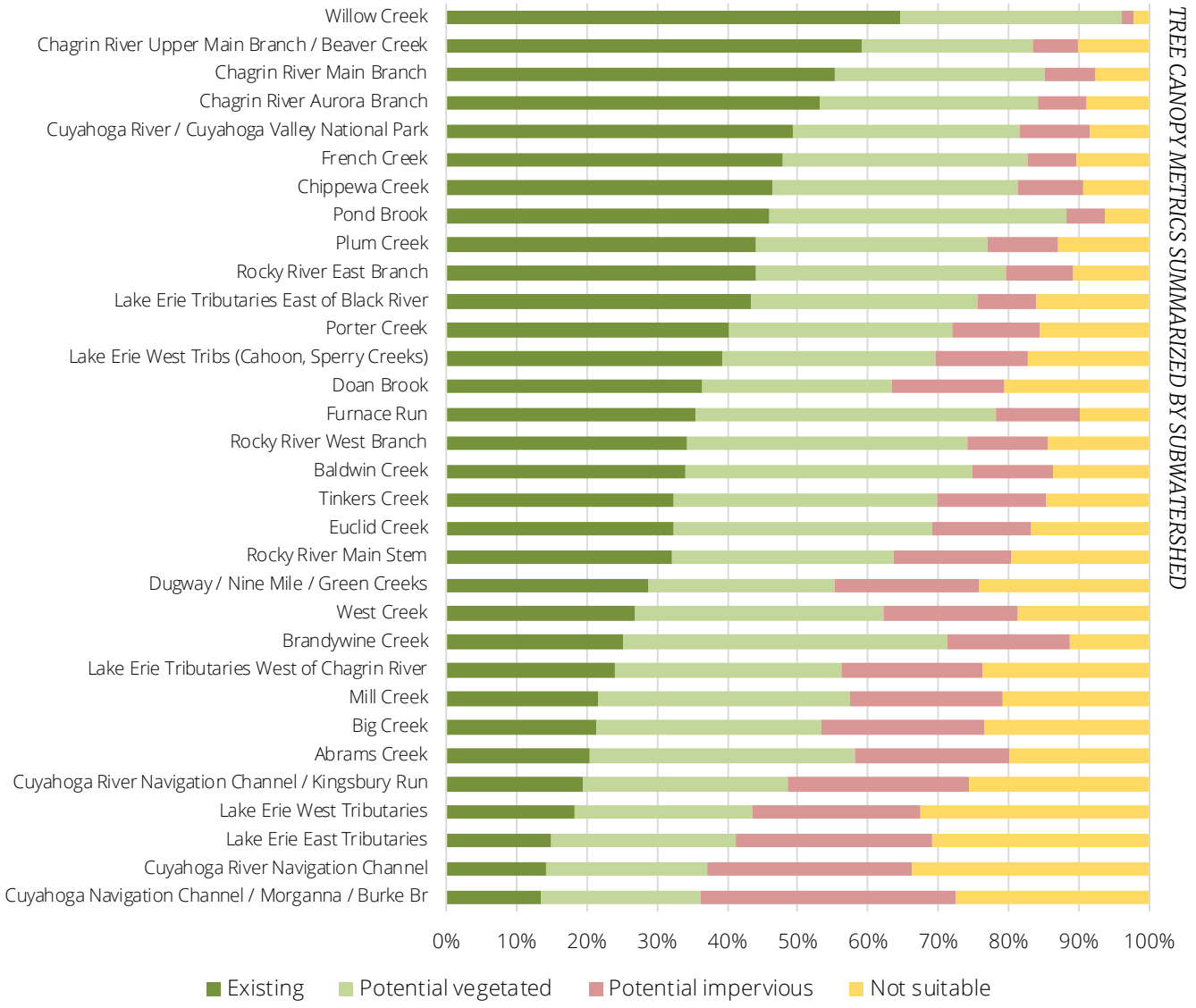
Area Summary : **Subwatersheds**

Subwatersheds: Current Status

Large watersheds are areas that separate waters flowing to different rivers, basins, or oceans. Cuyahoga County is intersected by three major river watersheds: the Rocky River, Cuyahoga River, and Chagrin River watersheds. In addition, much of Cuyahoga County drains directly to the shores of Lake Erie. Within those major watersheds are 32 smaller subwatersheds, ranging in size from 200 acres to more than 20,000 acres. Although they follow the natural contours of their respective drainage areas (as opposed to local community boundaries), these subwatersheds are characterized by varying degrees of urbanization and degradation. In a few subwatersheds, there is no significant above-ground drainage, while others benefit from extensive protection in the form of parks and conservation easements.

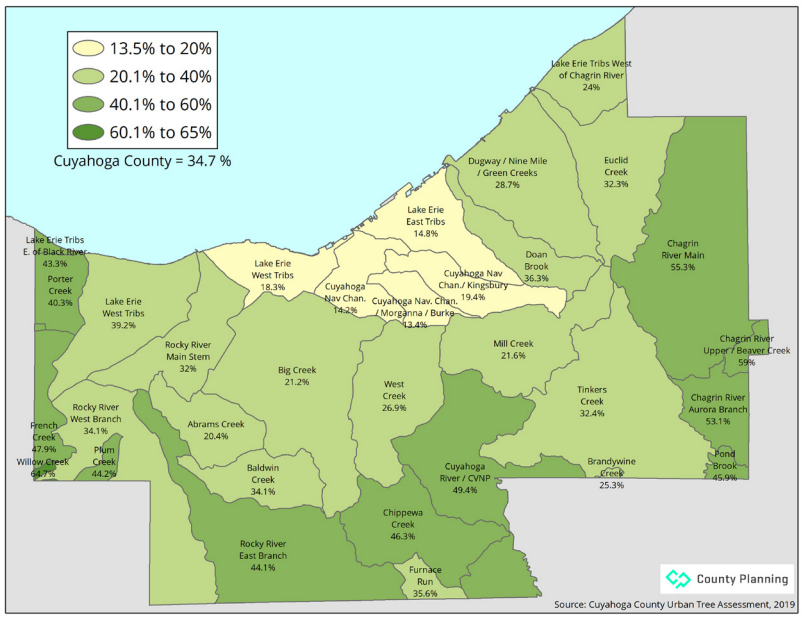
Source: County Planning

These subwatersheds are typically monitored and managed by local watershed stewardship groups, such as Big Creek Connects or Friends of Euclid Creek. Their Watershed Action Plans are key to a cleaner Lake Erie.

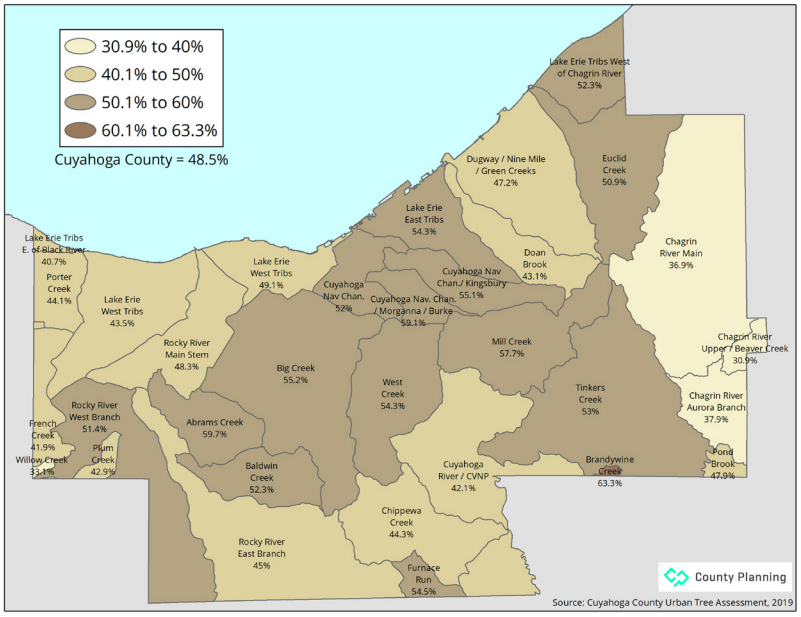


Subwatersheds: Existing, Possible & Change

EXISTING TREE CANOPY SUMMARIZED BY SUBWATERSHED



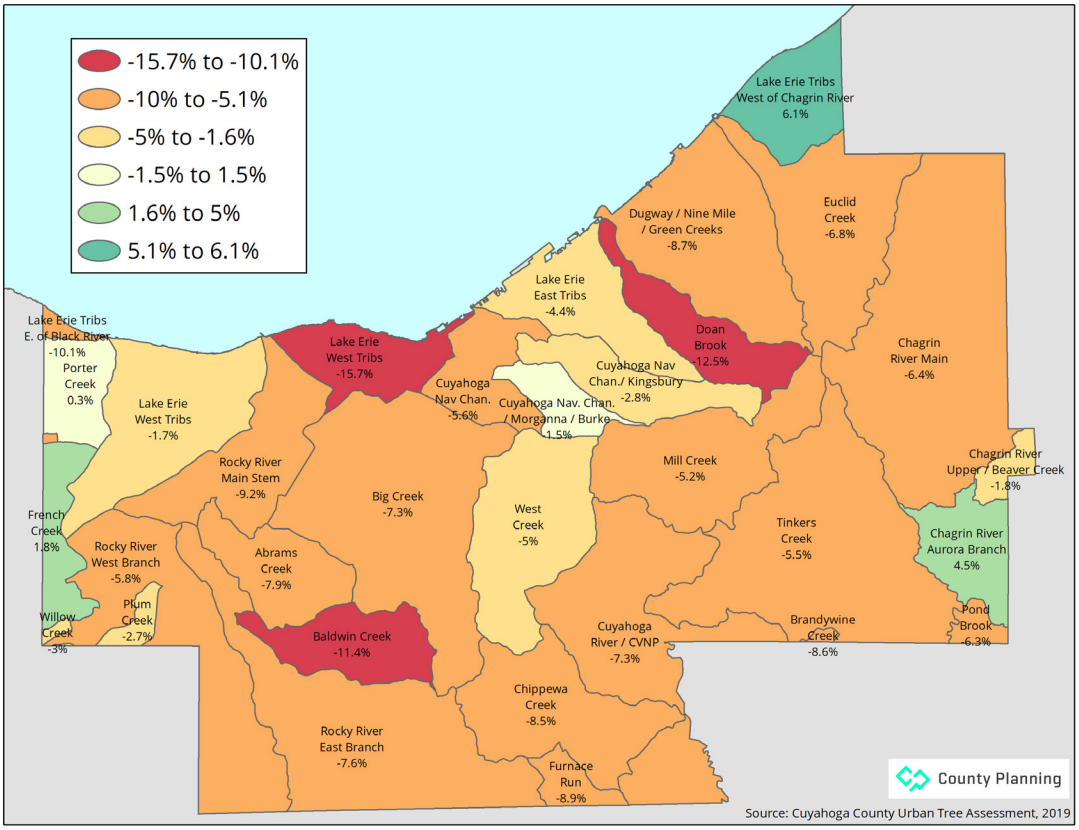
POSSIBLE TREE CANOPY SUMMARIZED BY SUBWATERSHED



Among the 32 subwatersheds, 15 exceeded the County average of 34.7% tree canopy. Those with the lowest canopy are within the most urbanized areas within and adjacent to downtown Cleveland, including several Lake Erie and Cuyahoga River drainage areas. Those that are below the County tree canopy average are typified by areas with high degrees of imperviousness and areas "not suitable for planting".

Many subwatersheds with low to moderate canopy levels can be encouraged to realize higher canopy coverage by their availability of "Vegetated Area", including Rocky River West Branch, Abrams Creek, Tinkers Creek, Euclid Creek, and Mill Creek.

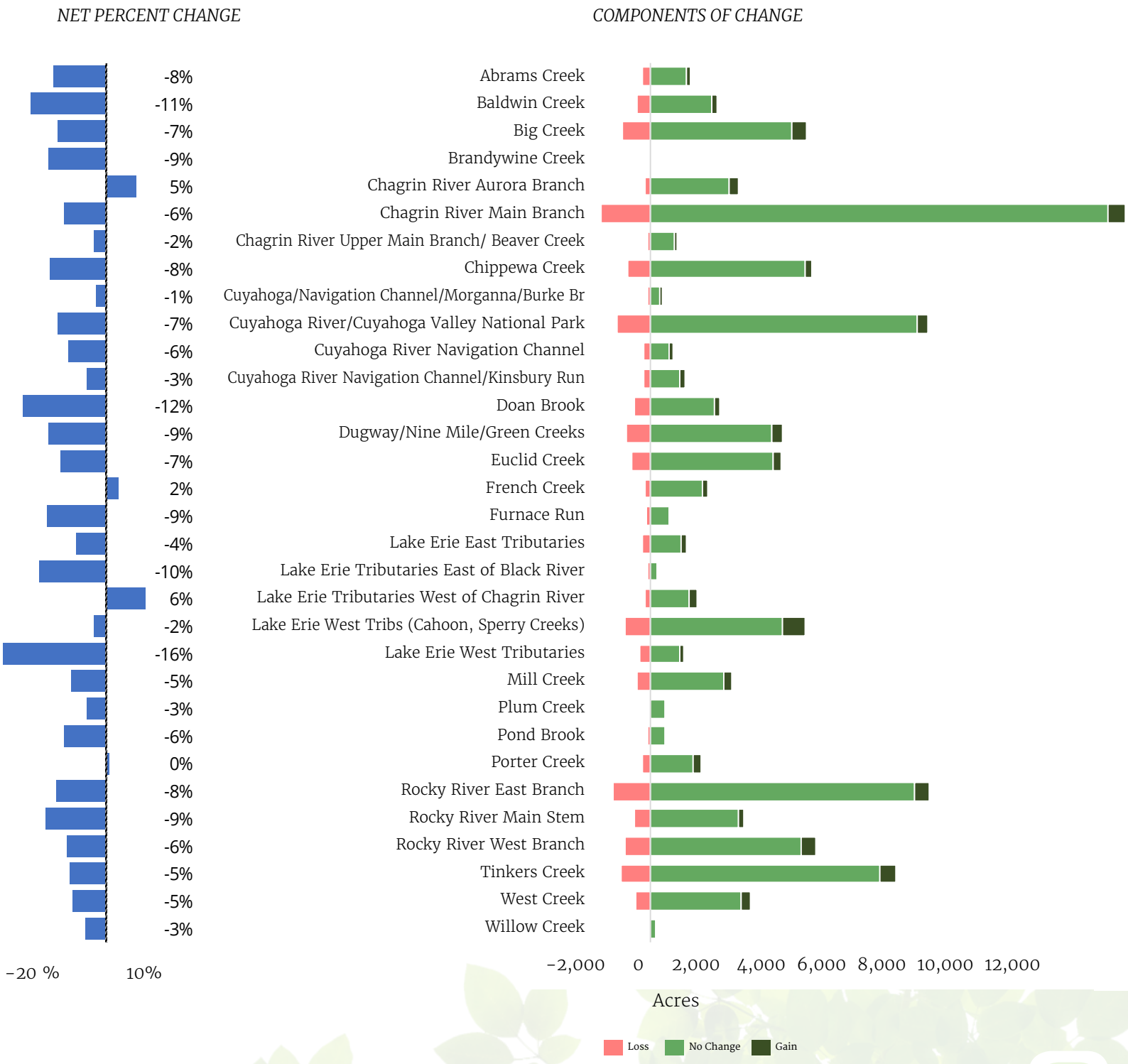
TREE CANOPY CHANGE SUMMARIZED BY SUBWATERSHED (2011 – 2017)



Subwatersheds: Change 2011–2017

Consistent with findings for other geographies, very few subwatersheds showed any substantial gain in tree canopy from 2011 to 2017. Only the Chagrin River Aurora Branch and the Lake Erie Tributaries West of Chagrin River had gains above 4%.

Losses exceeding 10% of the 2011 canopy occurred in largely western subwatersheds: Lake Erie West Tributaries, Doan Brook, Baldwin Creek, and the Lake Erie Tributaries East of Black River.

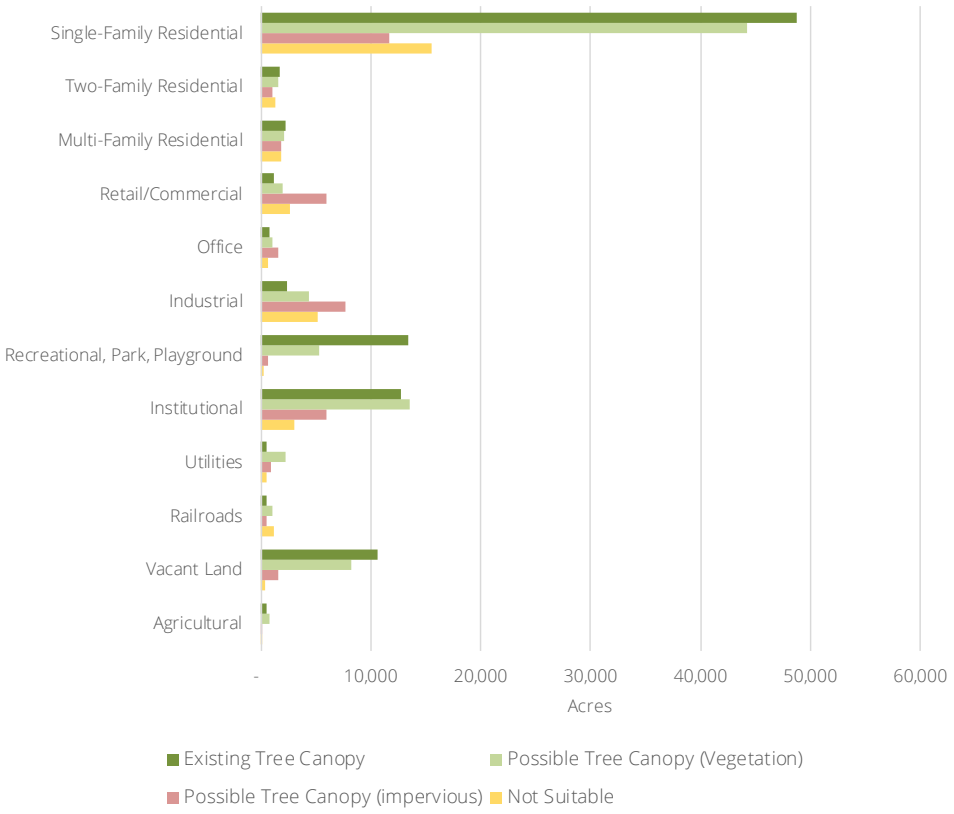


Area Summary : **Land Use**

Land Use: Current Status

There are nearly 500,000 individual, non- right-of-wayparcels of land in Cuyahoga County, representing 87% of the County's land area. Tree canopy maintenance is the responsibility of land owners across the spectrum of land uses: residential, commercial, industrial, institutional, etc.

TREE CANOPY METRICS SUMMARIZED BY LAND USE



For each of 12 parcel land use classes, Tree Canopy metrics were calculated: as a percentage of land area in the specified land use category; and as a percentage of all land in the county as a whole.

Parks and recreational land, as might be expected, is the use most dominated by tree canopy at 68.5% of its land – far more than any other land use. However, as a share of the County, parks account for only about 14% of all tree canopy.

Occupied residential land is the largest land use type within the county, at 47.5% of all land, and contributes 51.2% of the county's total tree canopy.

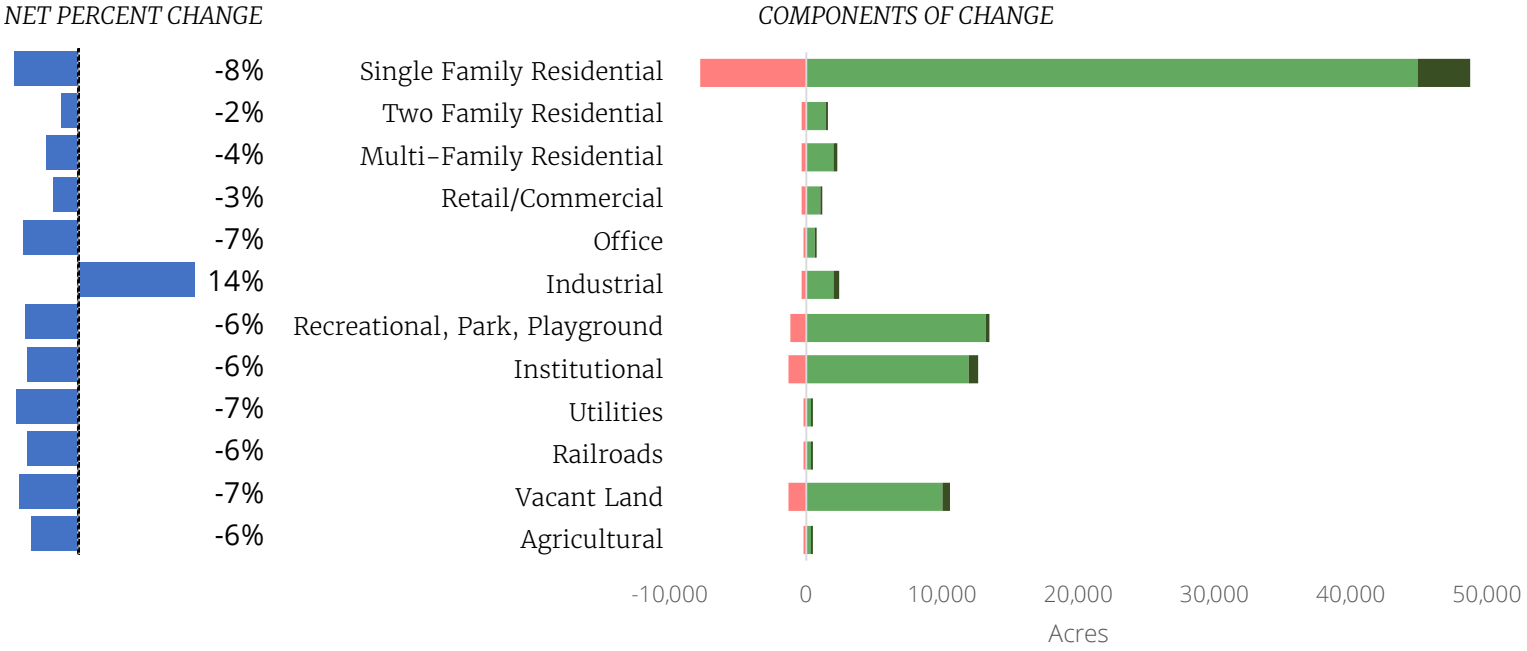
Possible Tree Planting Area is dominated by residential land use, accounting for 44.6% of all possible Tree Planting Area in the County.

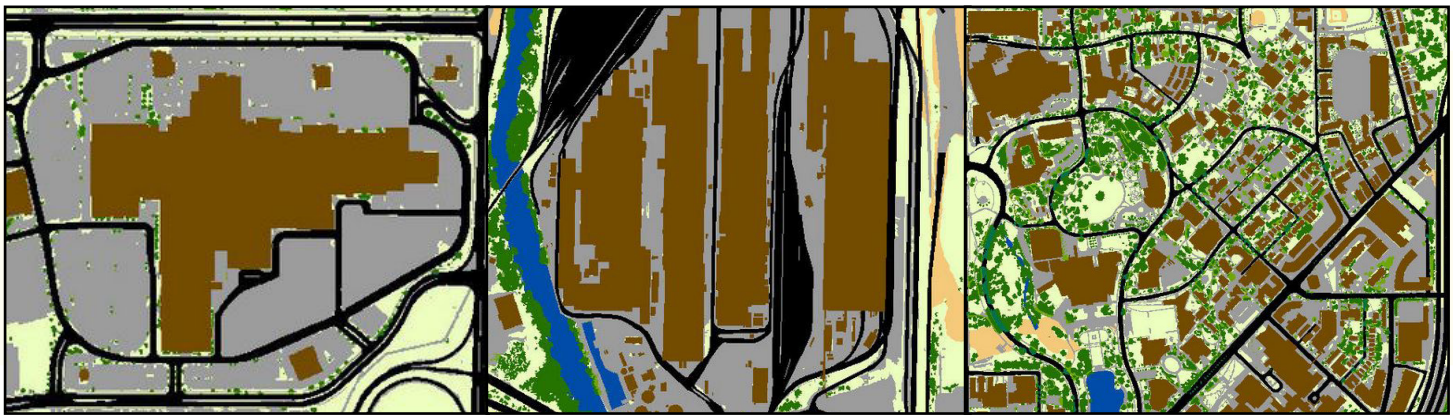
Commercial and industrial land uses provide significant possible planting area, particularly in large lawns and impervious areas. While not impacting overall tree canopy goals to a large degree, parking lots and areas immediately adjacent provide significant opportunity for the establishment of tree canopy. Additional canopy can help reduce stormwater runoff and urban heat effects.

As noted earlier in this report, patterns of tree canopy and other land cover vary widely across the county. The online report for this study provides land use detail for each of the county's 59 communities.

Land Use: Change 2011-2017

Consistent with findings for all land in the County, non- right-of-way parcels lost 6.2% of their canopy collectively from 2011-2017. The only land use to show a gain was in the relatively small category of Railroad uses, gaining 14.0%. Residential properties, the largest segment in terms of land use area, had losses exceeding the County average, at -7.4%.





COMMERCIAL *INDUSTRIAL* *INSTITUTIONAL*

MULTI-FAMILY *SINGLE FAMILY* *PARK/OPEN SPACE*

Area Summary : **Rights-of-Way**

Rights-of-Way: Current Status

Public right-of-way covers about 13% of the County's land area. Those rights-of-way can be further subdivided into "local" vs. "highway".

Local rights of way are maintained by City arborists or their contractors, as well as by electric utility companies which periodically trim canopy around their power lines.

Highway land is largely maintained by the Ohio Department of Transportation.

For the rights-of-way analysis, sections of local rights-of-way were divided up by street names within municipalities. These individual street sections are best evaluated on the study's interactive map which can be viewed at: **http://arcg.is/1qqOCH**

EXISTING CANOPY SUMMARIZED BY RIGHTS-OF-WAY

Countywide, about 15.3% of rights-of-way are covered by existing tree canopy, with local roads at 16.4% and highways at only 10.2%. As shown in the chart below, highways have a vastly outsized proportion of their land cover taken up by vegetated areas: 43.0% vs. 21.7% for local roads.

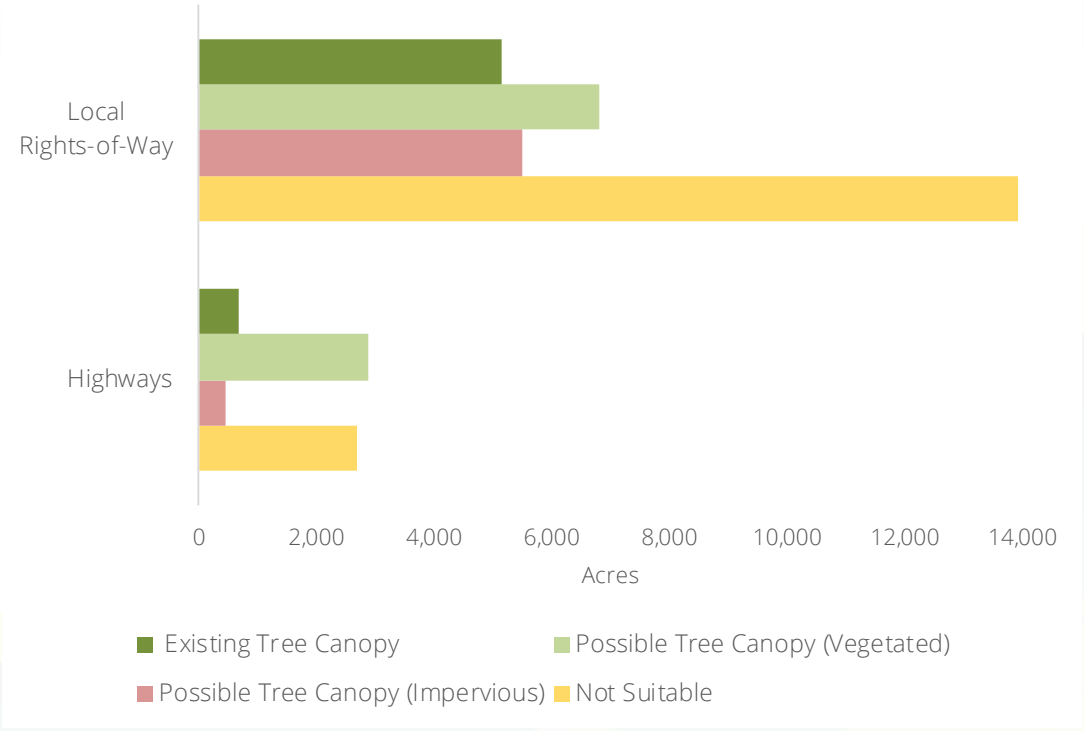
The degree of tree canopy within any given right of way is determined by a number of factors:

- Rights-of-way width varies considerably, especially outside of the roadway pavement. Some width may be consumed by wide pavement, while other boulevard-style rights-of-way may have relatively large tree lawns and/or medians.
- Narrower rights-of-way may have tree canopy covering the entire width, as large tree lawn trees extend over the roadway.
- Wider avenues would not likely support such a full canopy.

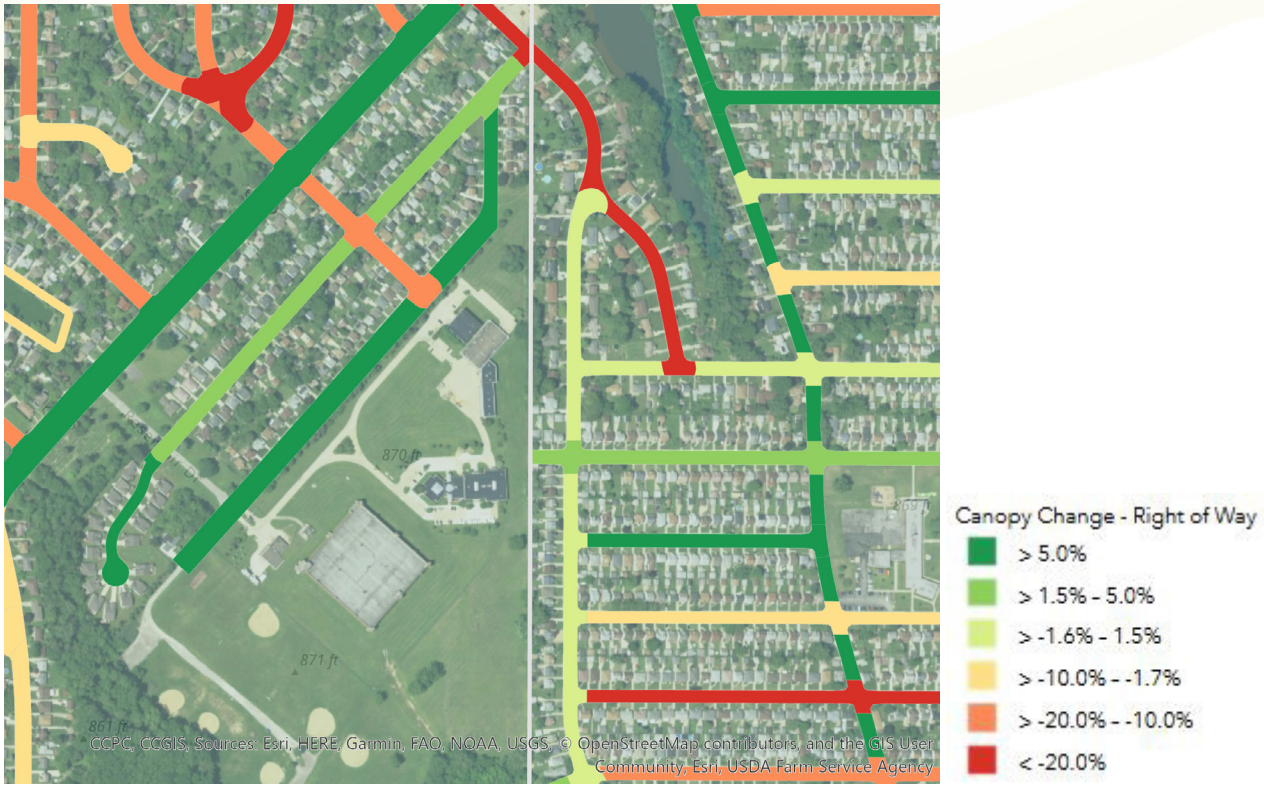
As a result of these and other factors, possible planting area will vary widely between rights-of-way. Countywide, 23.5% of city rights-of-way are covered by vegetated areas such as tree lawns and medians that could accommodate additional tree canopy. The possible tree canopy is likely to be underestimated, as large new canopy could extend well over the street pavement.

Rights-of-Way: Change 2011-2017

COMPONENTS OF TREE CANOPY BY RIGHTS-OF-WAY



TREE CANOPY CHANGE SUMMARIZED BY RIGHTS-OF-WAY (2011-2017)



Conclusions

This Urban Tree Canopy Assessment Update report and associated website can be valuable resources for a variety of groups in understanding their current tree canopy and developing plans for the future.

The study has shown a slight decrease in canopy throughout the County since the 2013 Assessment, but communities can be encouraged by several caveats:

- Trees take time to grow. Many of the plantings that have occurred over the past decade may still be too small to register – minimum height of eight feet and six feet canopy diameter. As an example, Cleveland Metroparks has planted more than 30,000 trees over the past five years, that have not grown sufficiently to officially register as part of the canopy. As a consequence, the impacts of the Cuyahoga County Healthy Tree Canopy Grant Program (2019) may take several years beyond the planting period to register in future updates.

- Losses could have been worse. The protected natural areas of the Cleveland Metroparks showed about the same rate of loss (nearly 6%) as the County as a whole (6.1%). Considering that the privately-held lands outside of the park system are subject to continued development pressures, it is encouraging to see that losses were not greater.

- Diversity in tree species can help to avert large losses in the future. Arborists, landscapers, and landowners have become increasingly attuned to the need for diversification of species for new tree planting.

At the same time, large losses due to clear-cutting highlight the need for continued vigilance by communities and land use regulators to support healthy forest canopy through proper management and enforcement of existing ordinances and regulations. Communities that lack such protections should seek guidance from experts identified in the resources section of this study.

Moving forward, the Assessment Update can serve as a foundation for more targeted work by communities, watershed groups, neighborhood organizations, and property owners. While each of those stakeholders may have different priorities, the findings in this report and accompanying website can help support those priorities, including the aforementioned Cuyahoga County Healthy Tree Canopy Grant Program.

For example, the City of Cleveland Tree Plan (2015) has emphasized equity in guiding its tree-planting efforts. Socioeconomic data on concentrations of poverty and race, when combined with indicators of low tree canopy can help develop those place-based priorities. Other prioritization studies have focused on large land owners, vacant land, and parks.

For more information on these prioritization approaches, see the available publications on the US Forest Service website which "describe various aspects of the Urban Tree Canopy suite of tools, including Assessment, Prioritization, Marketing, and Change:"

Additional Information

More information on Cuyahoga County's Urban Tree Canopy Assessment is available on the Cuyahoga County Planning Commission's website, including an interactive mapping application, downloadable spreadsheet and GIS data, and links to a variety of related resources:

countyplanning.us/utc-update

More information on local reforestation efforts and best practices is available from the Cuyahoga River Restoration's education resources page:

http://cuyahogariver.org/educationresources.html

More information on Urban Tree Canopy Assessments can be found at the US Forest Service Urban Tree Canopy site, including links to other studies and further research topics:

http://nrs.fs.fed.us/urban/utc/

The Division of Forestry of the Ohio Department of Natural Resources provides a wealth of information for local communities in its Urban Forestry Toolbox, including Community Program Management, Tree Care, and Other Resources:

http://forestry.ohiodnr.gov/urbanforestrytoolbox

For insights into the interaction between trees and stormwater, see this fabulous resource developed by the Ohio Kentucky Indiana Regional Council of Governments (OKI). The site includes guidance for communities throughout the country, including a vast "Resource Library", and a unique "Document Builder" to build your own case for implementing trees in your stormwater management plan". See TreesandStormwater.org

Special thanks to Jarlath O'Neil-Dunn of the University of Vermont Spatial Analysis Lab for their excellent land cover analysis, and for providing templates for the metric graphics and for portions of this report's narrative content; to Stephen Mather, Constance Hausman of Cleveland Metroparks & Alan Siewart of The Ohio Division of Natural Resources.

Photo provided by: Soil & Water Conservation

Source: County Planning

Photo provided by: Soil & Water Conservation

Did You Know Supplemental Information

The following are a series of brief articles with various detailed information that will help in the understanding of the results of the report. These articles include:

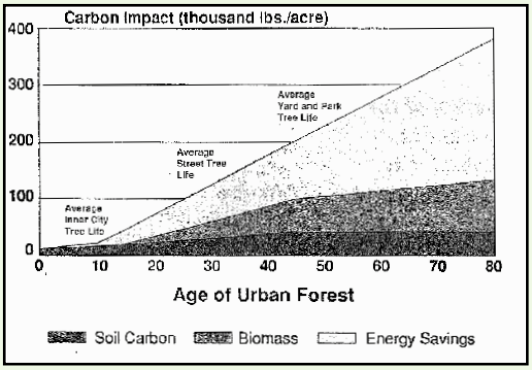
- The Importance of Maintenance
- Tree Canopy & Land Use Regulation
- Clear-Cutting for Development
- Pests & Pathogens
- New Trees Take Time to Grow

Source: NEORSD

A tree lined riparian buffer can create habitat, help with erosion, and stabilize streambanks. For instance, by planting these young trees at Highland Park Golf Course, NEORSD is working to create a healthier watershed.

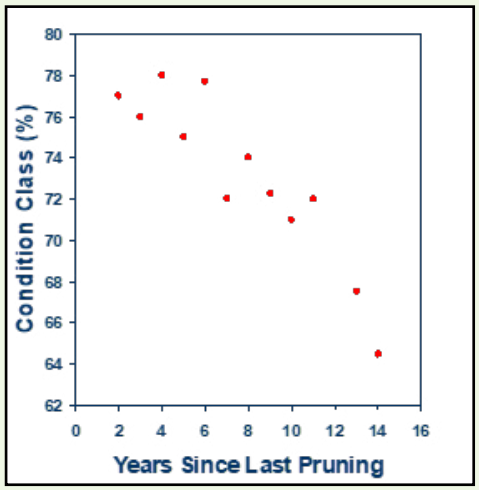
The Importance of Maintenance

When it comes to canopy cover, energy savings, carbon sequestration, and other ecosystem services derived from canopy cover, size matters. A healthy 50-year-old sugar maple will sequester 120 times the annual amount of carbon of a 10-year-old tree. Tree crowns start to have an impact on cooling as they begin to fill out, between 15 and 20 years of age. Therefore, planting trees will not change canopy cover benefits for two to three decades. Consequently, a tree planted in 2020, will have little or no impact on the canopy until 2040 or 2050.



1) THE IMPORTANCE OF LARGE TREE MAINTENANCE IN MITIGATING GLOBAL CLIMATE CHANGE

The trees that we plant along our streets and in backyards are not designed to grow in a light plentiful environment. This is because the skills they developed competing for sunlight in a natural forest do not serve them in our yards and on our streets. Without proper pruning and maintenance, in an urban environment, trees are prone to splitting apart and failing long before they reach 30 years old. Without proper maintenance, the trees planted this year will never have an impact on the canopy.



2) AN ECONOMIC EVALUATION OF THE PRUNING CYCLE

The single most important objective to increase the canopy in urban forests is to extend the functioning life of the trees. Routine pruning (training) of young trees for the first ten years of life has shown to be the most cost-effective and beneficial activity that can be performed in the urban forest to extend the life of a tree. Research has shown that routine pruning of mature trees once every five years will significantly improve their value and longevity. Good pruning can also reduce damage and cleanup costs after storms. Trees should be pruned by trained professionals two years after planting and again in years 4, 6, 8,10,15, 20, 25…

If you want canopy, you need maintenance.

Prepared by: Alan Siewert, Urban Forester ODNR Division of Forestry

An excellent resource on the value of large urban trees is provided by the US Forest Service:

https://www.fs.fed.us/psw/topics/urban_forestry/products/cufr476_large_tree_argument.pdf

Graph Sources: 1) National Arborist Association, 1991
2)Journal of Arboriculture 7, April 1981

Tree Canopy & Land Use Regulation

The potential for growing a community's tree canopy is largely determined by land use, land ownership, and government policies. Policies that promote trees and ordinances that address tree placement, maintenance, and removal are key to promoting a healthy tree canopy. The establishment of a Tree Commission demonstrates a community value to protect and enhance trees.

Communities can encourage a healthy tree environment through land use and development policies. For example, Low Impact Development is a stormwater management strategy that aims to mitigate the impacts of stormwater runoff as close to the source as possible. Simulating natural processes that infiltrate stormwater to protect water quality; strategies can include bio-retention facilities, rain gardens, planted rooftops, permeable pavements, and other types of green infrastructure.

While trees can help reduce the amount of stormwater runoff through absorption, water management efforts are important to consider for tree health. Younger trees and seedlings can be washed away during heavy water events, and the root systems of mature trees can be compromised. Policies that promote vegetation along stream banks and in floodplains can result in a reduction of the velocity of floodwaters and lessen the erosive force of a flood event. Riparian areas and wetlands are especially valuable downstream of urbanized areas of development. Their natural functions can counteract the effects of concentrated stormwater runoff from pavement and buildings to protect water quality.

Source: County Planning

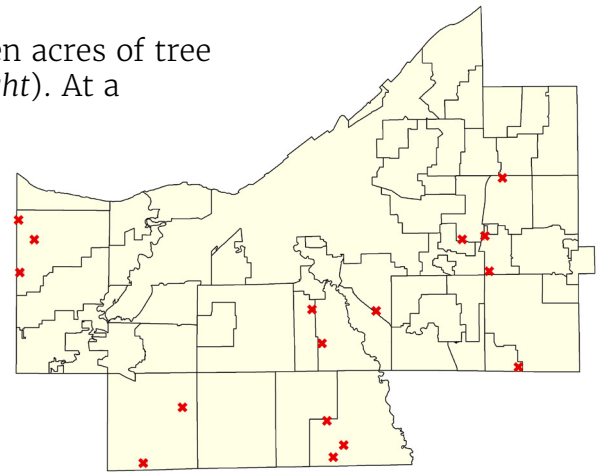
Source: County Planning

Clear-Cutting for Development

Clear-cutting of trees for development continues to be a factor in loss of tree canopy in Cuyahoga County, particularly in outlying suburbs. The loss of large areas of mature trees is difficult to replace.

LOCAL EXAMPLE OF CLEAR-CUTTING FOR DEVELOPMENT WITHIN CUYAHOGA COUNTY

Between 2011 and 2017, sixteen sites exceeded ten acres of tree canopy loss, totaling 284 acres (*see map to the right*). At a conservative estimate of 66 mature trees per acre, these large sites accounted for a loss of over 18,000 trees. Reforestation plantings, where densities of 500-600 trees per acre are standard, would require over 142,000 seedlings to replace what was lost in these sixteen sites. [Cleveland Tree Plan, 2015].



Tree preservation ordinances and community master plans can also be effective tools in guiding development. The Ohio Department of Natural Resources provides a number of resources in its Urban Forestry Toolbox. See TCA Forms & Downloads (Tree Commission Academy materials):

http://forestry.ohiodnr.gov/urbanforestrytoolbox

A solid riparian/wetland protection ordinance can go a long way toward preserving trees on both commercial and residential subdivision developments, and many communities have not adopted such ordinances. Locally, the Chagrin River Watershed Partners have a good model ordinance which has been used by many communities:

https://crwp.org/index.php/member-services/model-regulations/riparian-setbacks

If extensive clearing must be done, a variety of techniques are available to builders to preserve existing vegetation on their development sites. The University of Massachusetts Amherst has provided helpful guidance on Preserving Trees During Construction:

https://bct.eco.umass.edu/publications/articles/preserving-trees-during-construction/

Pests & Pathogens Affecting Tree Health

Various pests and pathogens affect tree health. Some cause superficial damage that can make a tree look "sick", through discolored leaves or a thinning canopy, but without affecting the overall health of a tree. Others can cause significant internal stress to a tree that may lead to mortality in just a few years. In Cuyahoga County, the decline of ash trees (Fraxinus spp.) due to the exotic emerald ash borer (EAB) (Agrilus planipennis) has greatly impacted canopy cover.

EAB, a wood-boring beetle, completes its lifecycle on ash trees. Adult beetles lay their eggs on the bark of ash trees and once larvae hatch, they burrow into the cambium (area between the bark and wood) of the tree, boring "S"-shaped patterns or galleries into the tree as they feed. This feeding process damages trees by destroying the tissues that transport water and nutrients, effectively girdling or "choking" the tree. As adult beetles emerge, they bore distinctive "D"-shaped holes in the trunk. Once an ash tree is infested, EAB causes mortality within 5-6 years.

Native to Asia, this beetle was first identified as the killer of ash trees in the Detroit Michigan area in 2002. The beetle likely arrived in the United States 10 or more years prior as a result of an accidental introduction of infested wood shipping containers originating from Asia. Since then, EAB has spread to 35 U.S. states and 5 Canadian provinces, killing hundreds of millions of ash trees.

The first record of EAB in Cuyahoga County was in 2006. Since then, EAB has contributed to tree loss in communities where ash was a significant component of street trees and the urban landscape. Ash trees generally make up between 6-10% of native forests and occur with greater prevalence in habitats found in the western portion of the county compared to the east. The outbreak of EAB has caused mortality levels that reduced overall Urban Tree Canopy Cover within the county.

The impact of EAB and ash loss reflects the importance of understanding tree health and the condition of our urban forests. Proper survey, inventory, and management prescriptions will help maintain the current canopy cover. Tree health assessments should identify other possible pests and pathogens based on their potential host tree. Early detection and rapid response may provide the best outcome for managing new afflictions that would compromise trees and forests in the future. A few of the other known pests and pathogens on the watch-list include: Hemlock Wooly Adelgid, Asian Longhorned Beetle, Spotted Lanternfly, Beech Leaf Disease and Thousand Cankers Disease. Each of these can cause mortality in their host trees and should be reported when suspected.

For reporting and more information on tree health visit http://forestry.ohiodnr.gov/treehealth

Source: County Planning

Prepared by:

Constance E. Hausman, Ph.D.
Plant and Restoration Ecologist
Cleveland Metroparks

New Trees Take Time to Grow

One generation plants the trees, another gets the shade.
–Chinese proverb

Despite efforts from a variety of groups to reforest our area, most planting sites from recent years are not yet qualifying as "tree canopy" in the 2019 assessment data. This is partly due to the measurement tool: In order to distinguish trees from shrubs and other foliage, a minimum tree height of eight feet is necessary. Newly planted trees grow at a rate of 1-3 feet per year and will not be measured as tree canopy for 5-8 years depending on growth.

For example, the Cleveland Metroparks reforested the two-acre Little Cedar Point Picnic Area site in the Rocky River Metropark in 2012/2013. However, the rate of tree growth on this site has not yet registered as tree canopy as seen in the aerial photo below.

LITTLE CEDAR POINT PLANTING SITE, 2019

Source: Pictometry.com; EagleView Technologies, Inc.

Similarly, over 5,000 trees and shrubs planted in the Cleveland Metroparks' Acacia Reservation in 2015 have not had sufficient growth to register as tree canopy for this study.