Urban Forest Master Plans
&
Urban Tree Canopy Analysis

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CENTER FOR SPATIAL PLANNING

ANALYTICS AND VISUALIZATION

Georgia Planning Association
September 7, 2018

What is an Urban Forest Master Plan?

An Urban Forest Master Plan is a road map, providing detailed information, recommendations and resources needed to effectively and proactively manage and grow a city's tree canopy.

Management Plan VS. Master Plan

	Management Plan	Master Plan
Tree Population (Data)	Public (Streets & Parks)	Public & Private
People	City Staff	All Stakeholders
Goals	Proactive Maintenance	Shared Vision
Creation Timeframe	4 – 6 weeks	9 – 12 months
Implementation Timeframe	5 – 10 years	10 – 20 years
Costs	$3,000 - $10,000	$25,000 - $150,000

DAVEY
RESOURCE GROUP
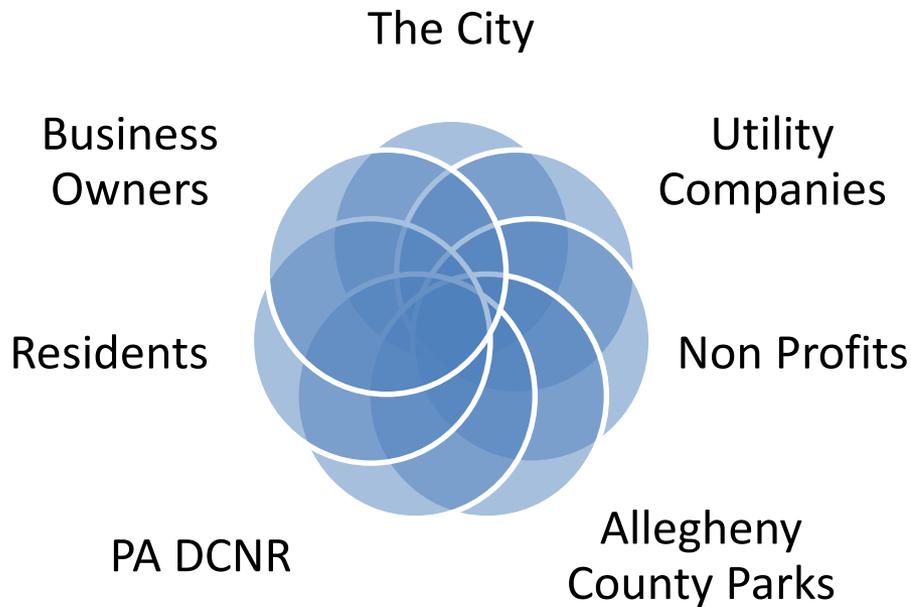*A Division of The Davey Tree Expert Company*

So Why Do You Need One?

- To proactively address growing environmental challenges

- To practice and model cooperation and efficiency

- To create clear goals and baseline metrics for the entire urban forest

- To foster long-term advocates and increase civic participation in the preservation of our urban forest

- To create a coordinated vision

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Why Pittsburgh needed a plan

The City

Business Owners

Utility Companies

Residents

Non Profits

PA DCNR

Allegheny County Parks

| City	Planting Budget	Total Annual Street Tree Expenditure
Pittsburgh	$0	$816,400
New York City	$8,160,000	$21,774,576
Minneapolis	$223,855	$9,209,041
Charlotte	$180,000	$1,819,460
Charleston	$109,125	$531,200

The planning process

- Steering Committee

- Existing reports and data

- Public outreach and surveys

- State of the Urban Forest report

- The audience and layout of the plan

- Reviewing other cities urban forest master plans

Create a Steering Committee

- **Steering Committee Member Organizations**

  Tree Pittsburgh
  Pittsburgh Shade Tree Commission
  City Forester, City of Pittsburgh
  Pittsburgh Shade Tree Commission
  Western Pennsylvania Conservancy, TreeVitalize Pittsburgh
  Pittsburgh Parks Conservancy
  Department of City Planning, City of Pittsburgh
  Duquesne Light
  The Pennsylvania State University
  Urban Redevelopment Authority of Pittsburgh
  Western Pennsylvania Conservancy
  Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry
  Davey Resource Group
  Allegheny County Sanitary Authority (ALCOSAN)
  Pennsylvania Environmental Council
  Remaking Cities Institute, Carnegie Mellon University
  Pittsburgh Community Reinvestment Group
  USDA Forest Service
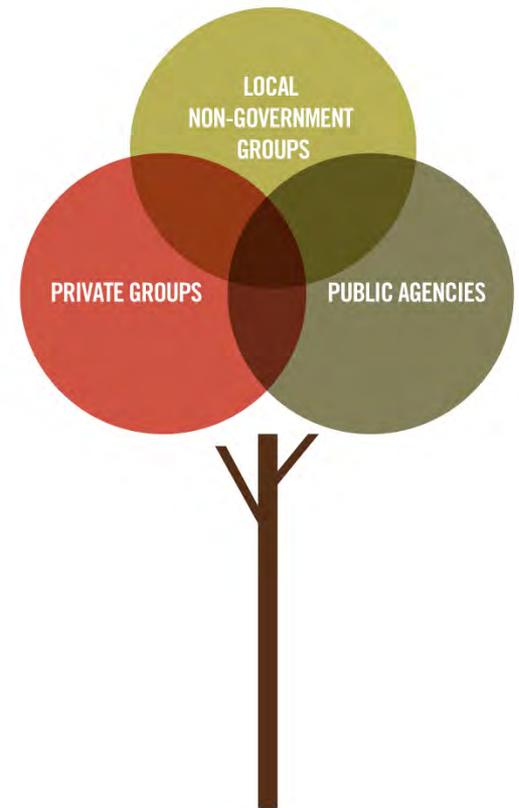
Adaptive Management

- *Urban Forestry: Planning and Managing Urban Greenspaces*
  - Miller, R. W. 1988. New Jersey: Prentice Hall.

- *ufmptoolkit.net*
  - Inland Urban Forest Council

What Do We Have?

What Do We Want?

How Do We Get There?

How Are We Doing?

Criteria & Indicators

- *Criteria and Indicators for Sustainable Urban Forest Planning and Management*
  - Kenney, W. A., et al. 2011. Arboriculture & Urban Forestry 37(3): 108 – 117.

- *The Sustainable Urban Forest, a Step-by-Step Approach*
  - USDA Forest Service and The Davey Tree Expert Company, 2016

Kenney, W. A., et al. 2011. "Criteria and Indicators for Sustainable Urban Forest Planning and Management." Arboriculture & Urban Forestry 37(3): 108 – 117.

A Division of The Davey Tree Expert Company

Vibrant cities cultivate thriving urban forests that boost public health, safety, sustainability, and economic growth.

MAKE THE CASE

Evidence keeps growing — see research data and real examples of trees' impact.

MAKE IT HAPPEN

Get started in your own community with the Urban Forestry Toolkit.

Urban Forestry Toolkit

The U.S. Forest Service Step-by-Step Guide to Implementing Urban Forestry in Your Community

Assess | Prioritize | Organize | Plan | Build | Sustain

1	**Begin With Urban Tree Canopy**
2	**Street Tree Inventory**
3	**Benefits Of Your Trees**

PITTSBURGH URBAN FOREST MASTER PLAN
A Road Map for the Effective Management of our Urban Forest

The Cleveland Tree Plan

Collaborating to Rebuild The Forest City

August 2015

Prepared for:
The Cleveland Forest Coalition
City of Cleveland
Cleveland Neighborhood Progress
Holden Arboretum
LAND Studio
Western Reserve Land Conservancy/Thriving Communities Institute

Prepared by:
Davey Resource Group
A Division of The Davey Tree Expert Company
1500 North Mantua Street
Kent, Ohio 44240
800-828-8312

CITY OF CLEVELAND
Mayor Frank G. Jackson

Cleveland
Neighborhood
Progress

L | A | N | D

The HOLDEN Arboretum

DAVEY
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Western Reserve Land Conservancy
Thriving Communities Institute
FROM VACANCY TO VITALITY

LARGO
URBAN FOREST
MASTER PLAN

City of Largo
Recreation, Parks & Arts

Largo, Florida

2016

Prepared for:
City of Largo
Recreation, Parks & Arts
201 Highland Ave
Largo, FL 33770
727- 587-6720

Prepared by:
Davey Resource Group
A Division of The Davey Tree Expert Company
1500 North Mantua Street
Kent, Ohio 44240
800-828-8312

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A Division of The Davey Tree Expert Company

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WHAT DO WE HAVE?
State of the Urban Forest
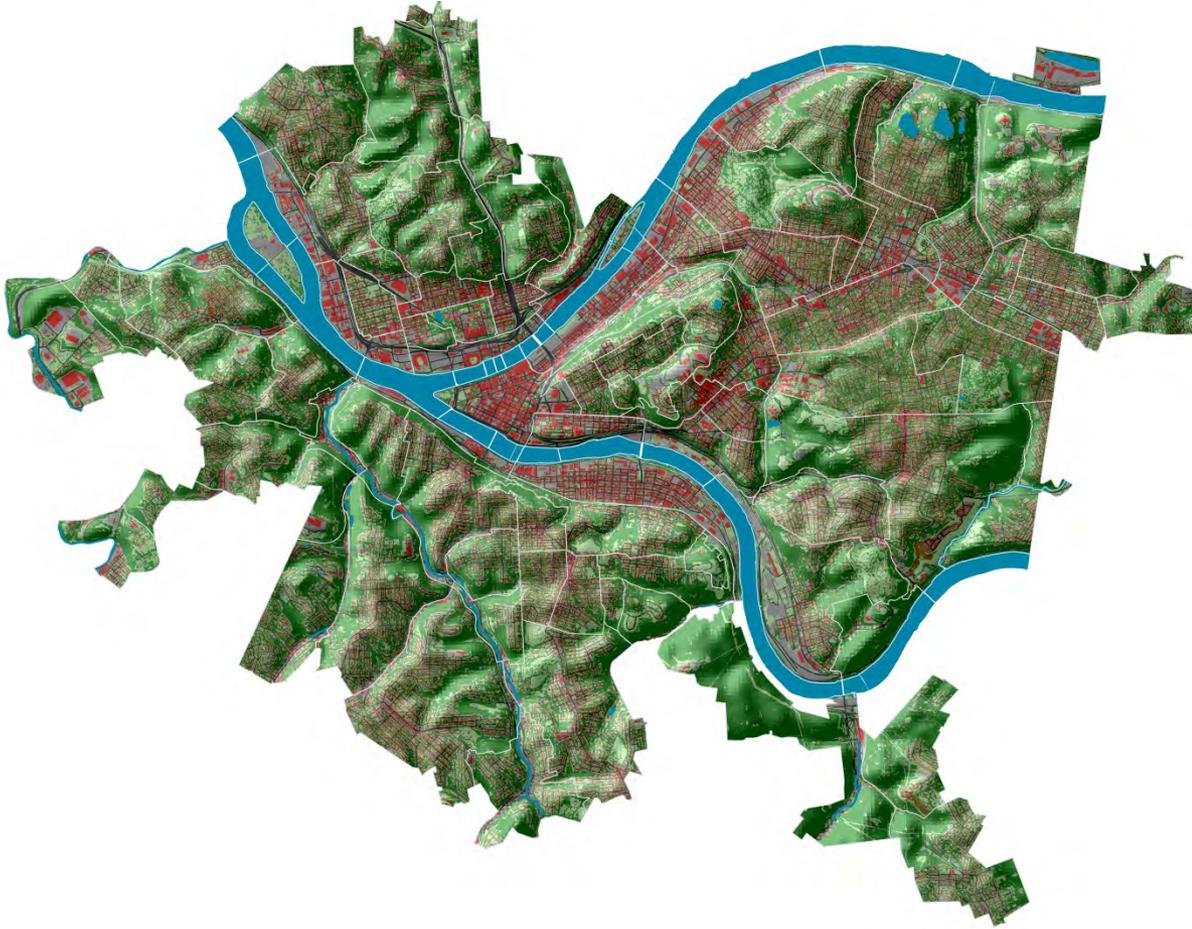
- Existing reports + data

- Benchmarks

- Structure, Function, and Value

- Public outreach

Cleveland was assessed on 25 *indicators of a sustainable urban forest*, categorized into three groups: the trees, the players, and the management approach. Each indicator was given a Low, Moderate, or Good performance rating. Cleveland was found to rate in the Low performance level in more than 18 (70%) of the indicators, shown in Table 2.

The Trees: Low Performance Level. There is a lack of accurate data on the public trees in Cleveland, which creates difficulties in management, budgeting, and most importantly, ensuring public safety. The City Urban Forestry Division inspects 8,000–9,000 trees annually, but the lack of comprehensive information makes data-driven decision making very difficult. There is, however, an accurate assessment of overall canopy cover rates from a 2013 Cuyahoga County urban tree canopy assessment.

The Players: Low-Moderate Performance Level. A number of non-profit organizations and volunteers are eager for involvement, and some tree planting, stewardship, and other short-term funding and programs are in place. However, most have been working independently and without a unified vision, thus inefficiently in terms of making significant progress city-wide. The city has multiple departments working within the urban forest, but coordination efforts are minimal and goals for each department differ. City budgets are stretched thin and trees are not a priority. The public often views trees as a nuisance because of the perception that they cause significant damage. While players are in place, the unified vision and common goals are lacking.

The Management Approach: Low-Moderate Performance Level. The lack of a comprehensive and fully updated tree inventory affects almost every indicator in this category, causing low performance ratings. Although efforts have been made in recent years to revise and improve preservation and installation practices, revisions have not been incorporated into the relevant city code and development specifications. Tree protection policies and installation guidelines are outdated and without enforcement penalties. The city has a significant backlog in tree maintenance, lacks adequate funding to catch up, and is operating in a reactive manner only. Planting is relatively ad hoc and is not planned around equitable distribution of trees across the city.

Table 2. Cleveland Performance Ratings in the 25 Indicators of a Sustainable Urban Forest

	Indicators of a Sustainable Urban Forest	Assessed Performance Level (green)		
		Low	Mod.	Good
The Trees	Tree Canopy	■		
	Size/Age Distribution		■	
	Condition of Public Trees - Streets, Parks	■		
	Condition of Public Trees - Natural Areas	■		
	Species Diversity		■	
	Species Suitability	■		
The Players	Neighborhood Action		■	
	Large Private Landholder Involvement	■		
	Green Industry Involvement	■		
	City Department/Agency Cooperation	■		
	Funder Engagement		■	
	Utility Engagement	■		
	Public Awareness	■		
	Regional Collaboration	■		
The Management Approach	Tree Inventory	■		
	Canopy Assessment			■
	Equitable Distribution	■		
	Management Plan	■		
	Risk Management Program	■		
	Maintenance Program - Streets, Parks	■		
	Maintenance Program - Natural Areas	■		
	Planting Program	■		
	Tree Protection Policy		■	
	City Staffing & Equipment	■		
	Funding	■		

TREEKEEPER

Welcome, Guest

Columbia

address search

Tree Benefits

5,033 total trees

0 Selected Sites

Total Yearly Eco Benefits
$298,001.01

Greenhouse Gas Benefits
$9,141.04
558,380.14 lbs CO_2 avoided
698,603.14 lbs CO_2 sequestered

Water Benefits
$74,578.01
2,751,956.21 gallons saved

Energy Benefits
$89,957.12
427,610.90 kWh saved
58,674.95 Therms saved

Air Quality Benefits
$11,575.22
3,805.11 lbs pollutants saved
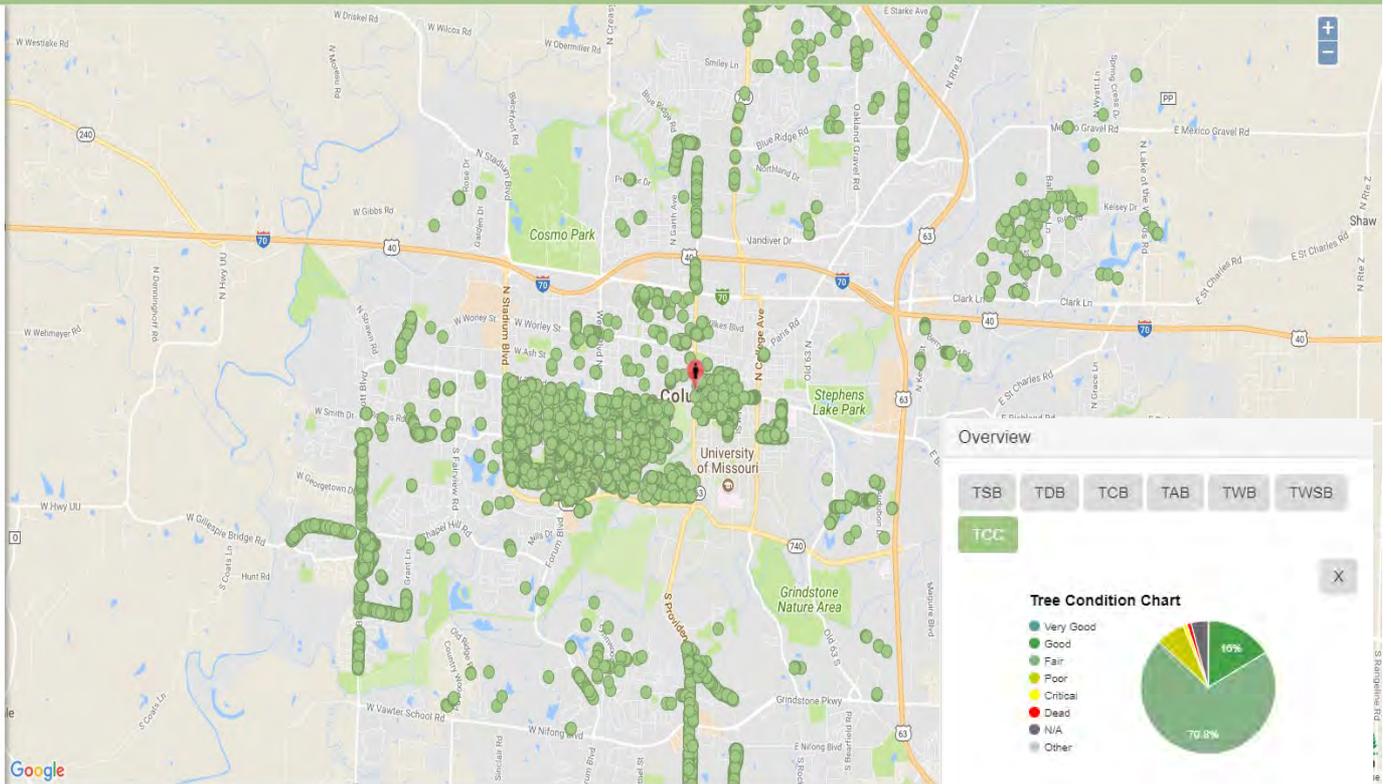
Property Benefits
$112,749.62
466,067.80 leaf surface area

https://columbiamo.treekeepersoftware.com
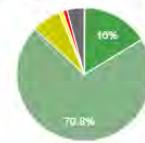
Overview

TSB   TDB   TCB   TAB   TWB   TWSB

TCC

X

Tree Condition Chart

- Very Good
- Good
- Fair
- Poor
- Critical
- Dead
- N/A
- Other

10%

70.8%

Google

Columbia, MO
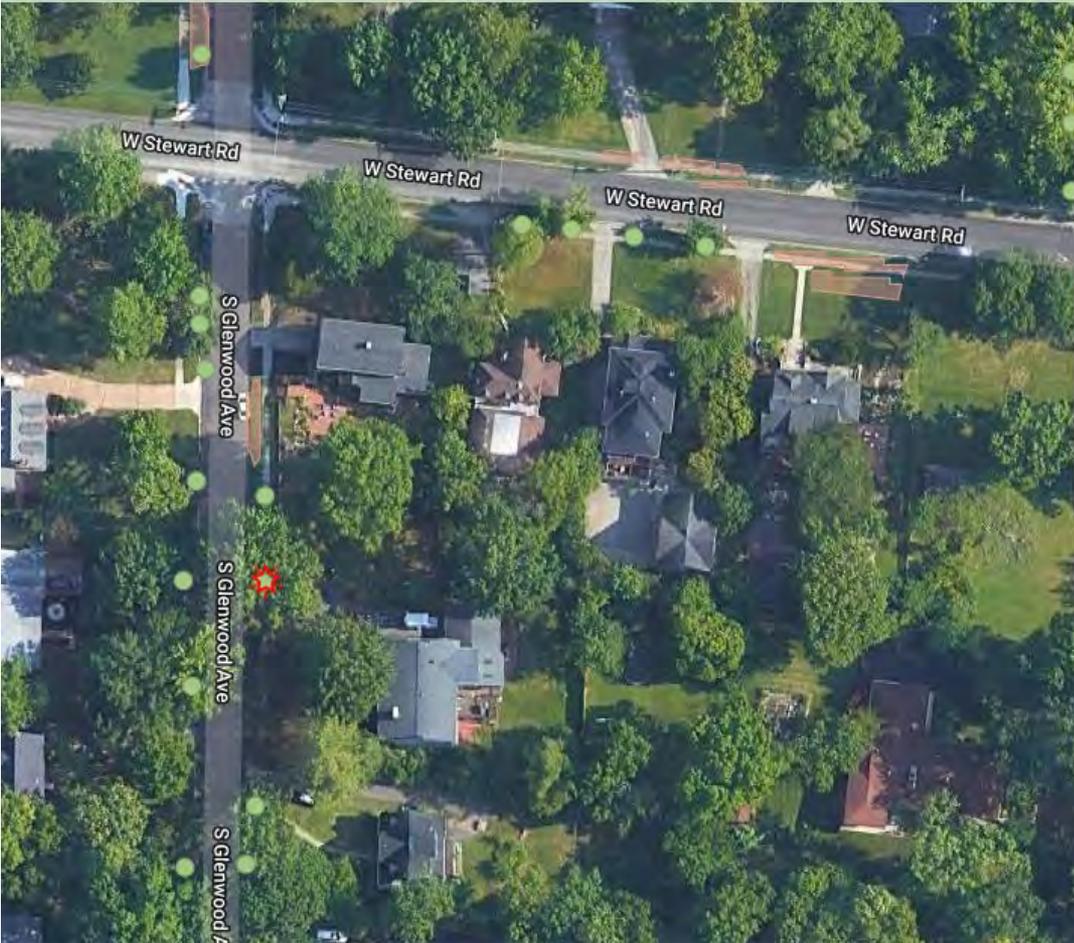
Site Information

Quercus palustris

408 S Glenwood Ave,
Front

Site ID	11429
Condition	Good
Diameter	33
Primary Maintenance Need	Large Tree Clean
Risk Rating	6
Ward	Fourth

Move Site

Oak, Pin at 408 S Glenwood Ave

Upload Photo

Accepted file types are:
.png, .jpeg, .jpg, .bmp, .tiff, .gif

Tree

Edit

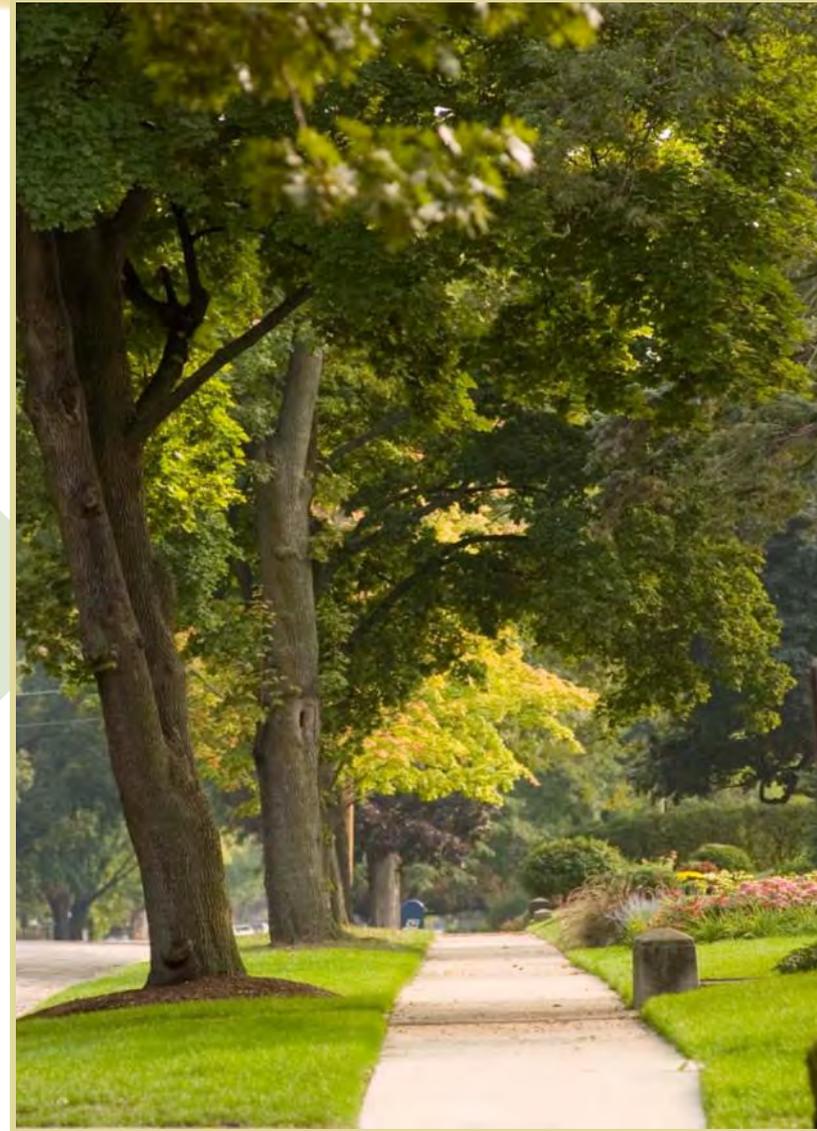|	
Address **408**	Suffix
Street **S Glenwood Ave**	Side **Front**
Site **1**	On Street **S Glenwood Ave**
From Street **Dead End**	To Street **W Stewart Rd**
X **1683869.1**	Y **1133782.57**
Remote ID **ZR 20120229093759**	Site ID **11429**
Inventory Date **02/29/2012**	Ward **Fourth**
Target Neighborhood **N/A**	ROW **0**
Growing Space Type **Tree Lawn/Parkway**	Growing Space Size **6**
Aboveground Utilities **No**	Hardscape Damage **Sidewalk**
Clearance Requirements **None needed**	Comments **HANGERS**
Last Changed Date **09/08/2017**	Last Changed Time **09:37:59**
Last Changed By **Deb Sheeler (DRG)**	

Functional Tree Benefits

$262,000
Carbon Sequestration

$3.75 million
Pollution Removal

$3.22 million
Energy & Carbon

Total
$7,232,000

Tree Canopy

Land Cover

- Tree Canopy - 39.67%
- Grass/Shrub - 22.41%
- Bare Earth - 0.19%
- Water - 4.85%
- Buildings - 11.58%
- Roads/Railroads - 12.13%
- Other Paved Surfaces - 9.16%
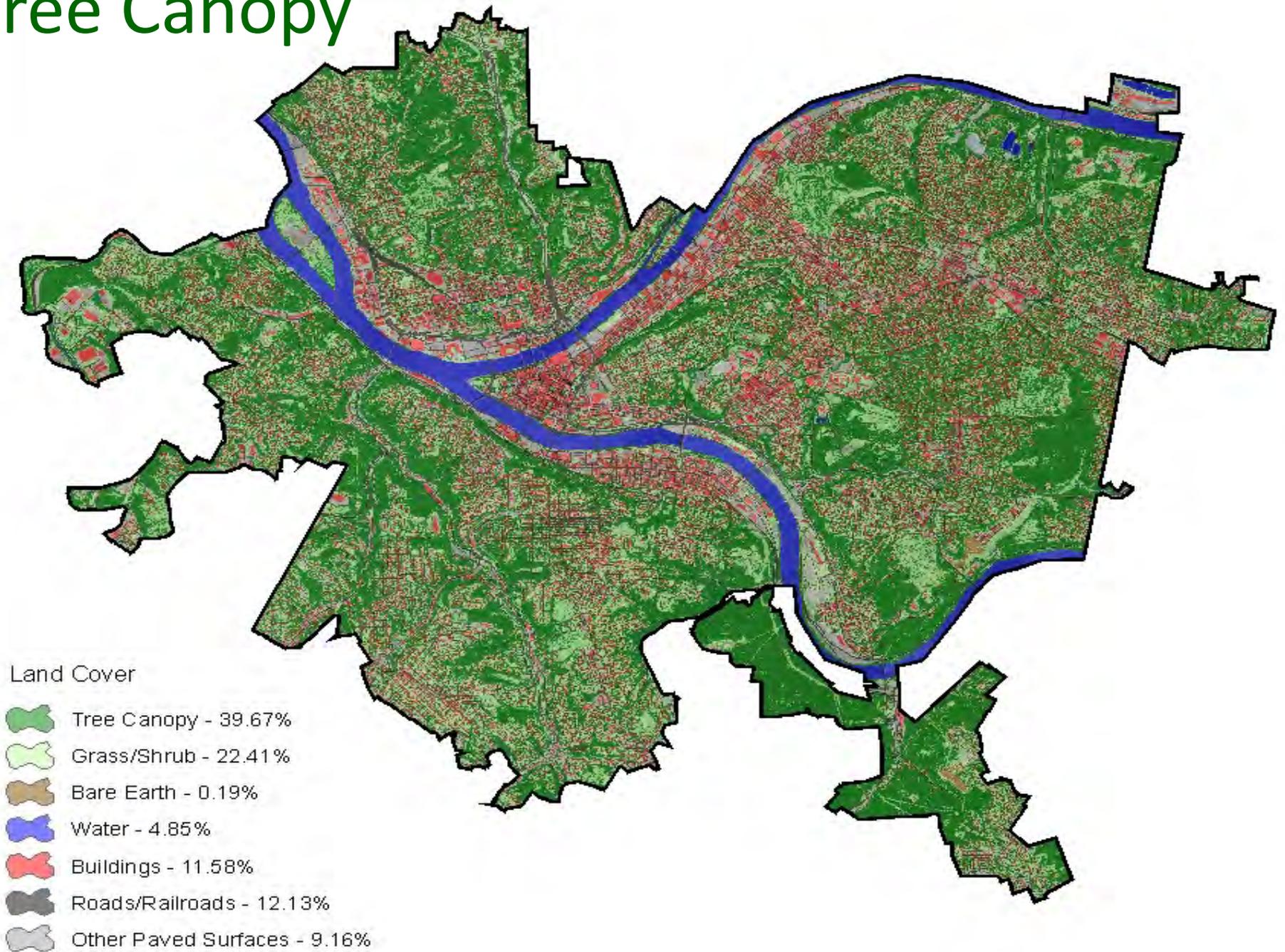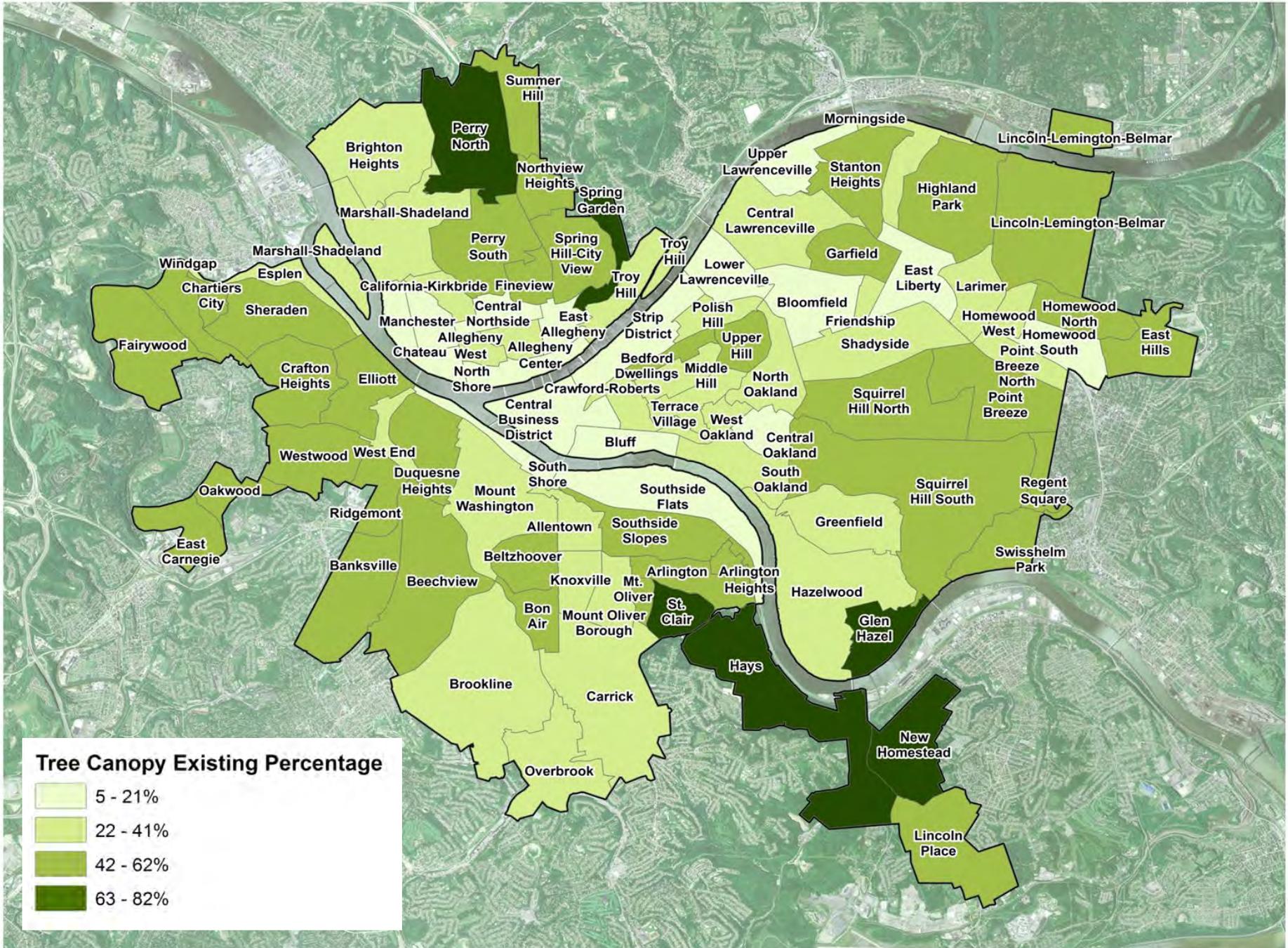
Tree Canopy Existing Percentage

- 5 - 21%
- 22 - 41%
- 42 - 62%
- 63 - 82%

Top 10 Neighborhoods

Highest Percentage Canopy Cover

Neighborhood	%
Hays	82%
Glen Hazel	81%
St. Clair	69%
New Homestead	67%
Perry North	64%
Spring Garden	63%
Regent Square	61%
Ridgemont	61%
Arlington Heights	60%
Oakwood	59%

Bottom 10 Neighborhoods

Lowest Percentage Canopy Cover

Neighborhood	%
Chateau	5%
North Shore	7%
Central Business District	8%
Bluff	12%
Southside Flats	12%
Strip District	12%
East Allegheny	14%
Lower Lawrenceville	15%
Manchester	17%
Bloomfield	18%

Neighborhood	% Possible Tree Canopy
Allegheny Center	20%
Allegheny West	28%
Allentown	31%
Arlington	33%
Arlington Heights	28%
Banksville	21%
Bedford Dwellings	26%
Beechview	28%
Beltzhoover	29%
Bloomfield	38%
Bluff	36%
Bon Air	42%
Brighton Heights	32%
Brookline	19%
California-Kirkbride	26%
Carrick	29%
Central Business District	30%
Central Lawrenceville	23%
Central Northside	30%
Central Oakland	40%
Chartiers City	38%
Chateau	28%
Crafton Heights	47%
Crawford-Roberts	34%
Duquesne Heights	33%
East Allegheny	44%
East Carnegie	31%
East Hills	24%
East Liberty	35%
Elliott	37%
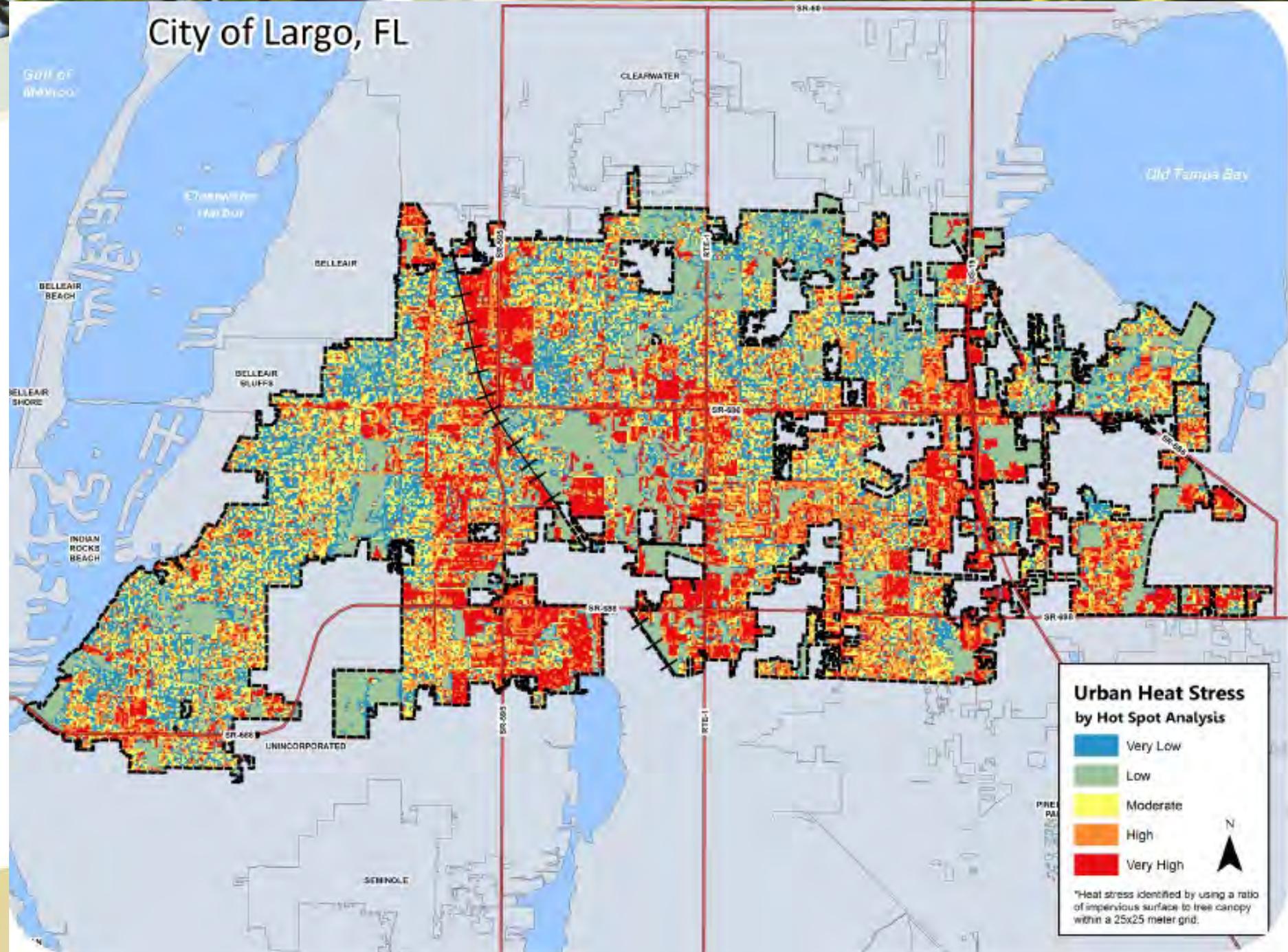
City of Largo, FL
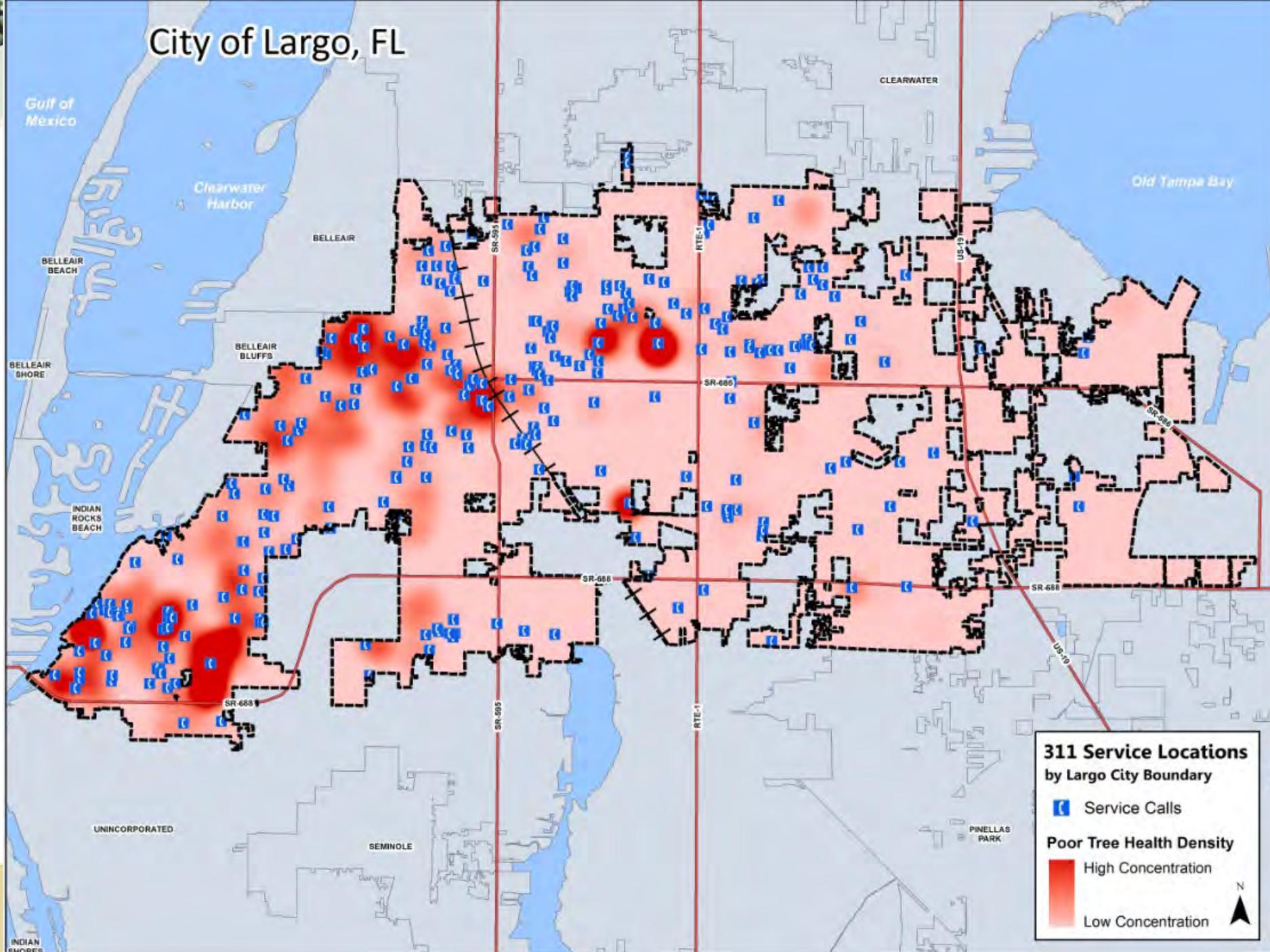
Urban Heat Stress
by Hot Spot Analysis

Very Low
Low
Moderate
High
Very High

N

*Heat stress identified by using a ratio of impervious surface to tree canopy within a 25x25 meter grid.

City of Largo, FL

311 Service Locations
by Largo City Boundary

🔵 Service Calls
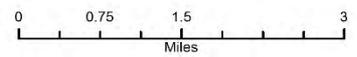
Poor Tree Health Density

High Concentration

Low Concentration

Leaf Litter Hotspot Map

High	(green)
Medium	(yellow)
Low	(red)

N

0   0.75   1.5   3
Miles
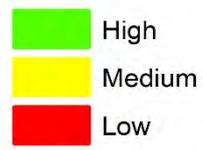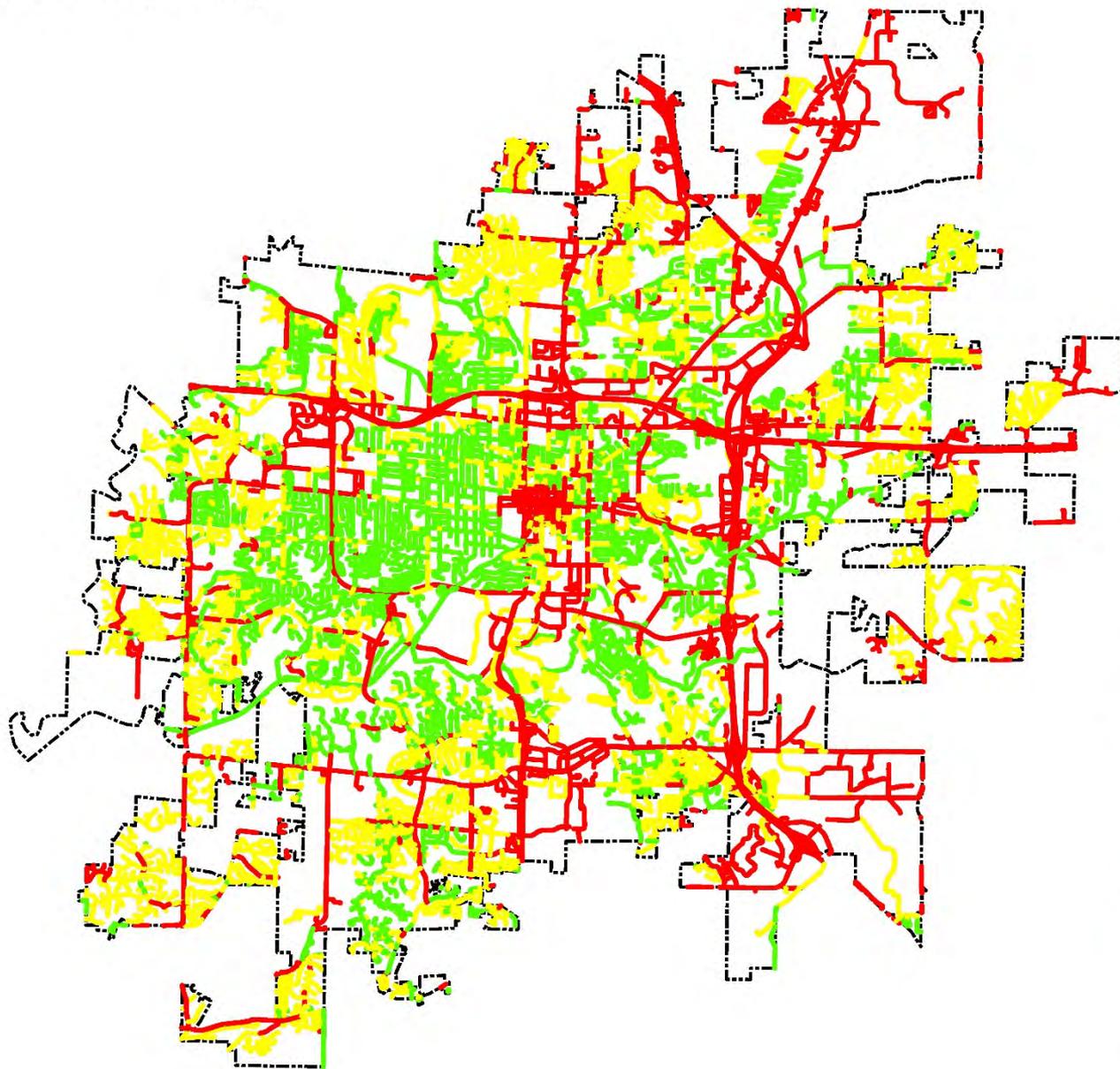
WHAT DO WE WANT?
Outreach Campaign

- **Steering Committee**

- **Departments**

- **Public Meetings**

- **Survey**

- **Review/Comment**

Outreach Campaign

- **Public Meetings**

- **Survey**

- **Review/Comment**

11x17 Poster and Bus Shelter Poster

WIW

Public Opinion

Public Survey Questions

Trees provide many benefits to our community. What are the most important to you?

What problems do you encounter with public trees?
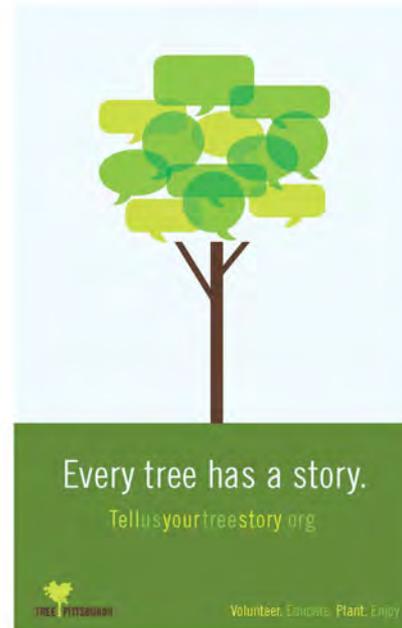
What does Pittsburgh's urban forest need the most?

What would you be willing to do to ensure Pittsburgh's trees are maintained and protected for future generations to come?

- 1,699 surveys completed
- 52% improve quality of life
- 10% lower energy bills
- 52% hardscape damage
- 2% trees cost too much
- More trees
- Better maintenance
- 64% more planting & protection
- 37% support 1% fee

DAVEY RESOURCE GROUP
A Division of The Davey Tree Expert Company

HOW DO WE GET THERE?
Vision, Goals + Objectives

OUR VISION & GOALS

CONNECT
- Connect urban forestry partners through a single vision
- Utilize urban forestry research with on-the-ground operations
- Increase access to trees so that all can enjoy

ENGAGE
- Focus on neighborhood-based initiatives and solutions to urban forestry issues
- Implement a coordinated and comprehensive outreach and educational campaign
- Encourage public and private participation in urban forest management through volunteerism

MANAGE
- Match funding to desired level of service for urban forestry management
- Develop a proactive management regime for public trees
- Implement a technically sound risk management program
- Expand tree benefits for future generations through a sustainable planting program

PLAN
- Establish a comprehensive tree emergency response and recovery plan
- Incorporate urban forestry practices into the City's stormwater management plan
- Achieve 60% urban tree canopy cover in 20 years

PROJECT
- Monitor the resource for exotic and invasive pests and diseases
- Protect trees and preserve their role in defining the City's character

CHARLOTTE
URBAN FOREST MASTER PLAN
2017

PRESERVING AND ENHANCING CHARLOTTE'S URBAN FOREST

Charlotte Urban Forest Master Plan 2017

Help preserve and care for Charlotte's tree canopy.

Charlotte, North Carolina is proud to be known and valued for its vibrant urban tree canopy. When viewed from above, tree canopy covers 47% of the city, which makes Charlotte one of the highest canopy cities in the U.S. On top of the aesthetic benefits Charlotte's trees provide, the city receives over $335 million in real benefits and services from these trees every year.

Download the Charlotte Urban Forest Master Plan summary document (PDF format).

CHARLOTTE
URBAN FOREST MASTER PLAN
— 2017 —

HOME   ACTION STEPS   PARTNERS   GET INVOLVED   FULL REPORT   ABOUT

How YOU can get involved.

We need YOU. If you are interested in joining the team to help preserve the tree canopy in Charlotte, we want to hear from you. There are a number of ways to get involved (list below), and we will be working to add more options soon.

Help Plant Trees. TreesCharlotte hosts tree planting events from October to April, with a short break in January to avoid bad weather. Find out when the next planting is scheduled and join us.

Get Involved in Your Neighborhood. Are there tree activities currently going on in your neighborhood? Find out by getting in touch with us through the form below. If not, nominate your neighborhood for a community tree planting or stewardship event here. Cankerworm banding assistance is also provided to neighborhood groups through the city's Neighborhood Services division. More neighborhood engagement options are anticipated as the implementation of this plan progresses.

Donate or sponsor a TreesCharlotte program (a 501(c)3 organization)
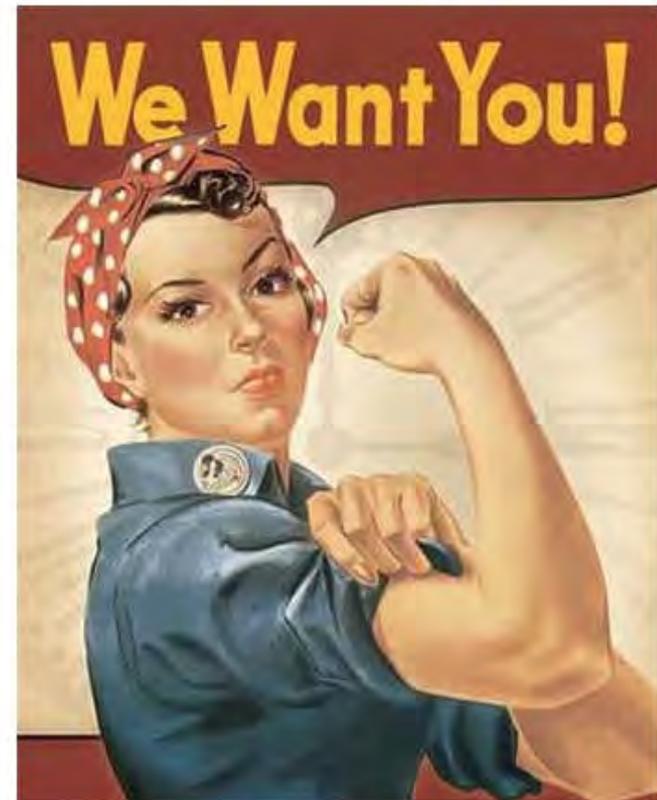
SO WHAT NOW?

In order to make any progress or reach any goal, the first step is defining what success looks like. How do we measure progress and success? Ultimately, every city must create its own definition and benchmarks for progress. However, based on study results and input from stakeholders, progress in Largo can be gauged by achieving higher canopy levels, gaining partnerships and public engagement to collaborate and share the workload, and making improvements in public tree management.

These three "missions" can be achieved through implementing 14 strategies:

MISSION 1: INCREASE TREE CANOPY COVER AND ASSOCIATED BENEFITS

STRATEGY 1: SET A CANOPY GOAL

Setting a tree canopy target creates a goal around which a community can rally. It should be set as a community and incorporated into both outreach efforts and city policy.

STRATEGY 2: WORK TO ACHIEVE CANOPY GOAL THROUGH PRESERVATION

Tree preservation is just as important to reaching a canopy goal as tree planting. Preservation efforts include improving the management of public trees, ensuring an effective tree protection policy is in place, and educating the community on tree care best practices.

STRATEGY 3: WORK TO ACHIEVE CANOPY GOAL THROUGH PLANTING

Tree planting can be implemented in a number of ways, including ramping up city plantings, incorporating trees into stormwater management efforts, exploring a complete streets policy, and encouraging and assisting neighborhoods interested in implementing their own tree campaigns.

STRATEGY 4: WORK TO ACHIEVE CANOPY GOAL THROUGH SUPPORT

Support structures are also important in achieving a canopy goal. These include a strong tree protection policy, public access to urban forest data and study results, and ensuring that a wide range of tree species are available for tree plantings.

STRATEGY 5: REGULARLY MEASURE AND ASSESS CANOPY PROGRESS

The amount of tree canopy should be measured every five years to track progress and identify any problem areas or new opportunities. Costs for this UTC update can potentially be shared through joint updates with other cities or counties.

STRATEGY 11: DEVELOP A 3-5 YEAR MANAGEMENT PLAN

Current management of public trees is largely reactive in nature. The city can move towards a more proactive program by prioritizing immediate needs and reallocating budget and resources to a cyclical proactive tree care program.

STRATEGY 12: IMPROVE AND STREAMLINE THE TREE SELECTION PROCESS

A new smart tree selection tool was developed for the Parks Division as part of this study. Use of this tool will streamline tree selection on large plantings and improve tree diversity, which is critical for the long-term health of the urban forest.

STRATEGY 13: INSTITUTE POLICY IMPROVEMENTS

Tree preservation is critical to maintaining a constant canopy level. More stringent penalty and enforcement mechanisms in city tree protection policies will ensure Largo can sustain a healthy urban forest well into the future.

STRATEGY 14: DEVELOP A DISASTER MANAGEMENT PLAN

Urban forest disaster management plans extend beyond just emergency response. They can play a critical role in tree preservation well after storms pass. Forward-thinking disaster plans include a public communication and messaging component to avoid unnecessary tree removals during the weeks or months after a storm event.

Each of these strategies are spelled out in more detail and in a chronological four-year format in the full version of the plan, which can be found at www.Largo.com.

Implementation of these 14 strategies will allow Largo to improve the sustainability of its urban forest resource and achieve a more vibrant and healthy community for all.

HOW CAN I GET INVOLVED?

If you are interested in getting more involved in the implementation of this urban forest plan, *we want to hear from you!* Visit the Recreation, Parks & Arts page at *Largo.com* and click on the link to volunteer, or call the Parks Division (727) 586-7415 and let them know you're interested in getting involved. Your urban forest needs you!

Other ways to make a difference:

- Plant and care for trees in your yard.

- Participate in neighborhood plantings when they happen in your area.

- Attend Arbor Day or other environmental education events in Largo

- Utilize the expertise of the Pinellas County Extension and Largo Parks Division staff.

- Consult a certified arborist for tree care on your property.

Stay tuned for future urban forest community projects!

	CURRENT PROGRAM			10% BUDGET REALIGNMENT* (30% Removal, 60% Routine Pruning and 10% Structural Pruning)					
	Current Budget			No Budget Change			10% Maintenance Budget Increase Allocated to Planned Removal and Pruning		
	Tasks Performed***	Cost****	Percent of Operating Budget	Tasks Performed***	Cost****	Percent of Operating Budget	Tasks Performed***	Cost****	Percent of Operating Budget
PROACTIVE: Removals ($2,000 per)		$0	0%	4	$8,468	3%	11	$22,581	7%
PROACTIVE: Pruning ($100 per)	200	$20,000	7%	369	$36,936	13%	$10	$51,049	16%
PROACTIVE : Program Cost/ Structural Pruning ($30 per)	250	$7,500	3%	344	$10,323	4%	344	$10,323	3%
REACTIVE: Inspection	n/a	$47,840	17%	n/a	$47,840	17%	n/a	$47,840	15%
REACITVE: Gen. Maintenance Contract Removals ($2,000 per)	25	$50,000	18%	20	$40,591	14%	20	$40,591	13%
REACTIVE: Gen. Mainetenance Contract Pruning ($100 per)	280	$27,960	10%	186	$18,551	7%	189	$18,551	6%
REACTIVE: City Maintenance Pruning and Removal	n/a	$128,960	46%	n/a	$119,552	42%	n/a	$119,553	39%
Total Proactive Tree Maintenance		$27,500	10%	-	$55,726	20%	-	$83,952	27%
Total Reactive Tree Maintenance		$254,760	90%	-	$226,534	80%	-	$226,534	73%
Maintenance Program Total		$282,260	69%	-	$282,260	69%	-	$310,486	71%
Administration		$46,592	11%	-	$46,592	11%	-	$46,592	11%
Tree Planting*****		$78,155	19%	-	$78,155	19%	-	$78,155	18%
TOTAL PROGRAM BUDGET	755	$407,007	100%	923	$407,007	100%	1,072	$435,233	100%

Cleveland Tree Plan
Action Sheet

A roadmap for progress.

Action #1:
Establish a Unified Voice, Formalize Partnerships

LEAD AGENCY / OWNER: Mayor's Office of Sustainability

There are many active players in Cleveland and most are working independently on short-term projects. Formation of a coalition of urban forest stakeholders will serve to create a unified voice and direction for all urban forestry efforts.

The city has a substantial backlog in tree maintenance, which can have serious impact on public safety. A formal partnership between the city and the coalition has the potential to reduce some of the city's workload, freeing up time and resources for the city to address the maintenance backlog.   Prerequisite: None

Steps		Resources Required	Suggested Participants	Target Completion Date	Progress Tracking
☐	1. Build an advisory team for the formation of the coalition, starting with Tree Plan team plus a few additional key stakeholders.	Time	City (Sustainability, Urban Forestry, Planning, Capital Projects), Western Reserve Land Conservancy, Holden Arboretum, Cleveland Neighborhood Progress, LAND Studio, NEORSD, First Energy, Dominion, NOACA, NEORSD, Metroparks	End of 2015	
☐	2. Define how the coalition is to be set up, funded, and staffed. The coalition could take many forms, from a collection of organized stakeholders to a brand new non-profit to a municipal tree commission. However it is set up, there needs to be lead agencies from both the public and private sectors that are committed to urban forestry as part of their mission and willing to fundraise.	Time	Same as above	End of 2015	
☐	3. Map out coalition's program of work, using the goals and recommendations in this plan as the foundation. Gauge interest of other potential participants.	Time	Same as above	Q1 2016	
☐	4. Determine interest of city in formal agreement, start discussions between coalition, city leadership, and/or lead agencies.	Time	Office of Sustainability to start discussion with City leadership. City Legal Department, Public Works/ Urban Forestry, Coalition Members.	Q1 2016	
☐	5. Define clear responsibilities for each partner, work out particulars of agreement. Determine what groups are authorized to work on public property on behalf of this plan, and in what ways the city supports them.	Time	Coalition members, as will be defined in Steps 1, 2 & 3.	Q1 2016	
☐	6. Formalize agreement with city.	Time, Legal Services	Legal, Coalition members as will be defined in Steps 1, 2 & 3.	Q2 2016	

2014 Urban Tree Canopy Assessment

Tony Giarrusso

Associate Director

CENTER FOR SPATIAL PLANNING

ANALYTICS AND VISUALIZATION

Sponsored by the

City of Atlanta

Agenda

- Project Backgroud
- 2008 Baseline Canopy Assessment
- 2014 Canopy update
- Methods and findings
- Canopy change 2008-2014
- Interpreting change
- Implications
- Recommendations

Summary of findings

- Overall change numbers not as important as specifics
- Quality vs. quantity
- Loss is site by site
- Loss is accelerating

What is Urban Tree Canopy?

- Definition: The layer of leaves, branches, and stems of trees that cover the ground when viewed from above

- Affected by local geography
  - Phoenix and Atlanta never had the same tree canopy
  - Miami and Chicago never had the same tree canopy

- Affected by land use and development
  - Residential neighborhoods have more trees and open space than downtown
  - Multi-family residential areas typically have more trees and open space than industrial and commercial areas

Why Study Tree Canopy?

- Reveals patterns

  - Tree distribution

  - Changes over time

  - Points to reasons for loss/gain

- Measures quantity, not quality

  - Species matters

  - Tree health matters

  - Bio-diversity matters

- Great tool for policy-makers and planners

Project History

- First City of Atlanta Baseline Urban Tree Canopy (UTC) Assessment (2008)

- Derived UTC (and other land cover) from high-resolution satellite imagery

- Goal was to establish a UTC baseline and monitor UTC change over time

- Calculated UTC statistics for the city as a whole and small areas

- Results intended to inform sustainability efforts and policy decisions related to climate, water and air quality, and watershed protection
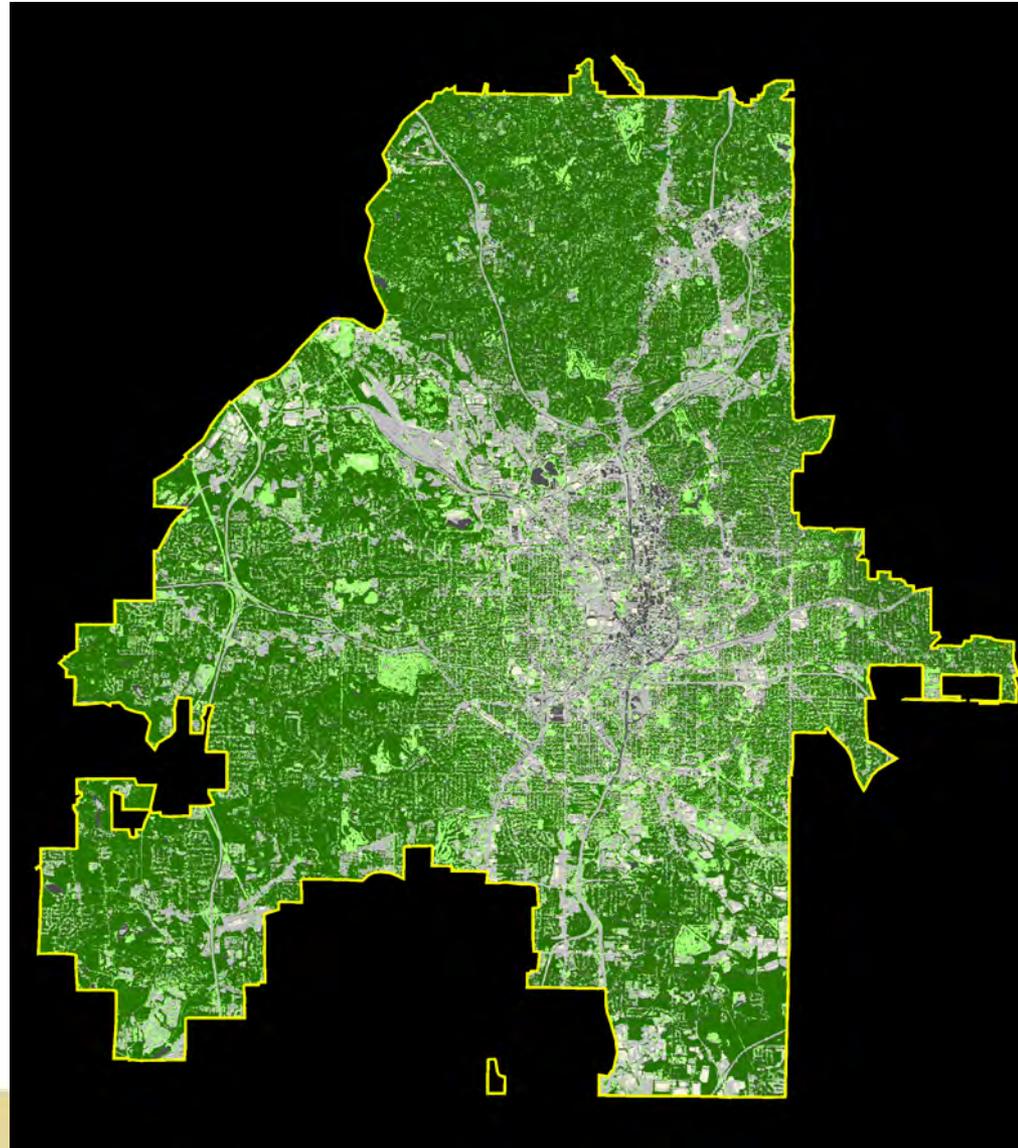
FINDINGS: 2008 Baseline UTC Assessment

- Tree cover distribution driven by land use

- 77% of Atlanta's UTC was on single-family residential land

- The highest amount of canopy was in neighborhoods along Nancy and Utoy Creeks (>70%)

- Very limited tree cover in the downtown vicinity and along transportation corridors (<10%)

- Atlanta has higher tree canopy than most other major U.S. cities
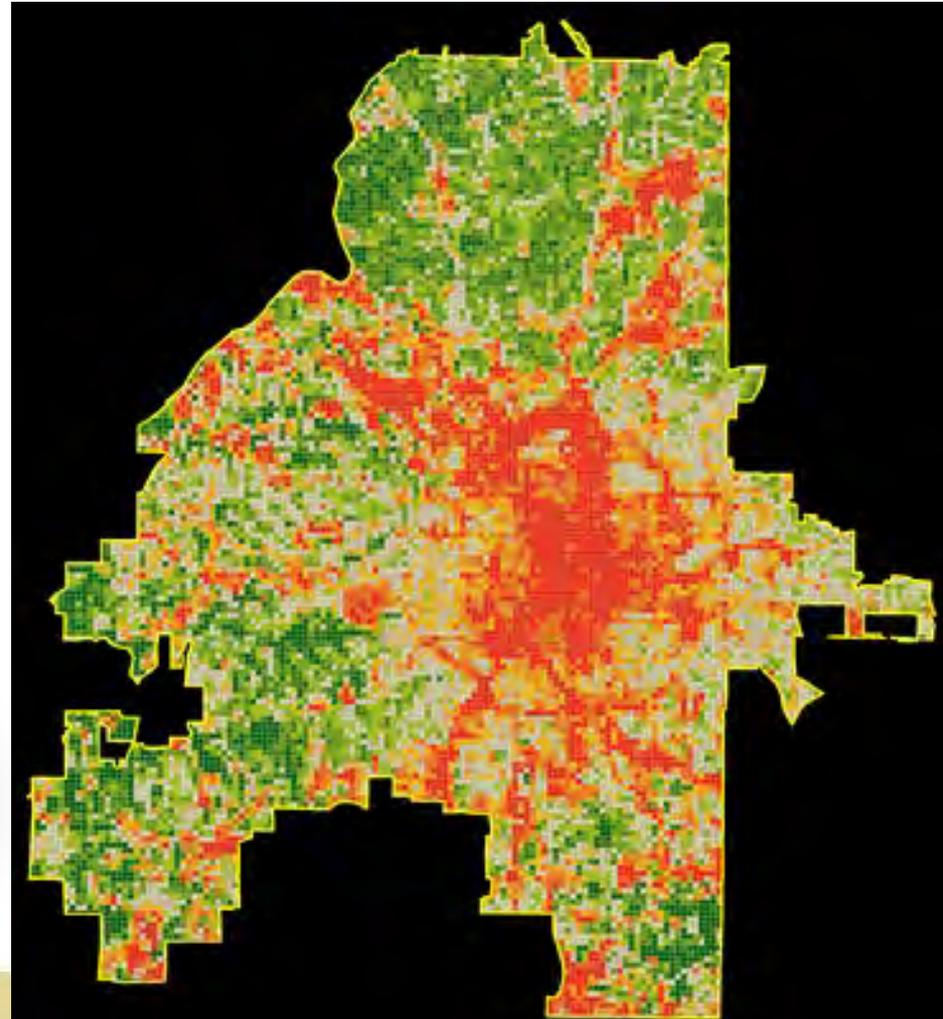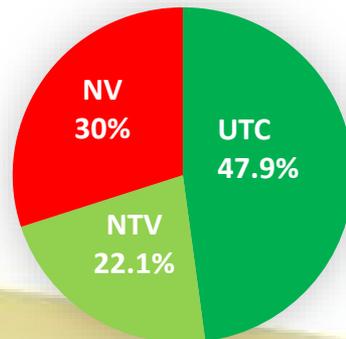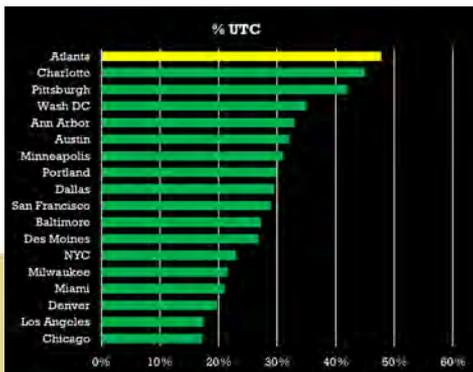
Canopy Update:
2014 UTC Assessment

- Obtained WorldView-2 satellite imagery taken in late summer 2014
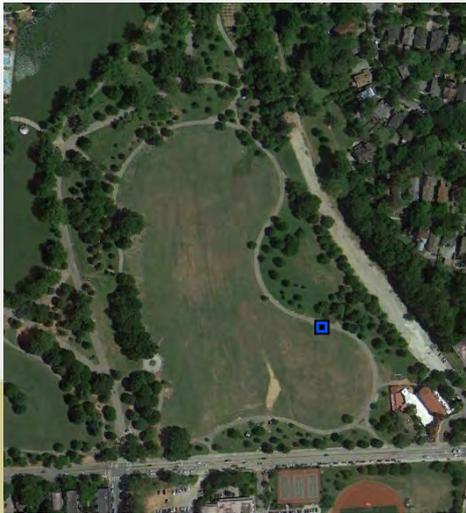

The 8 spectral bands of WorldView-2
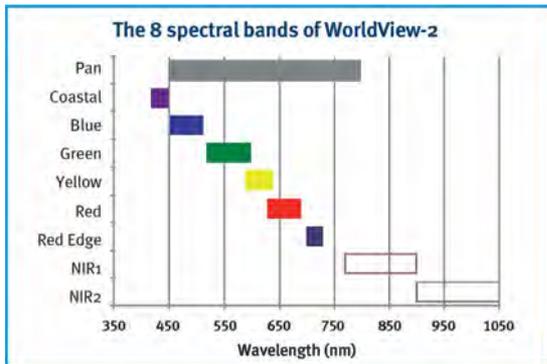
- Determined land cover through imagery classification

- Three classes of land cover
  - Trees
  - Non-Tree Vegetation
  - Non Vegetation

- Manual classification performed to improve accuracy
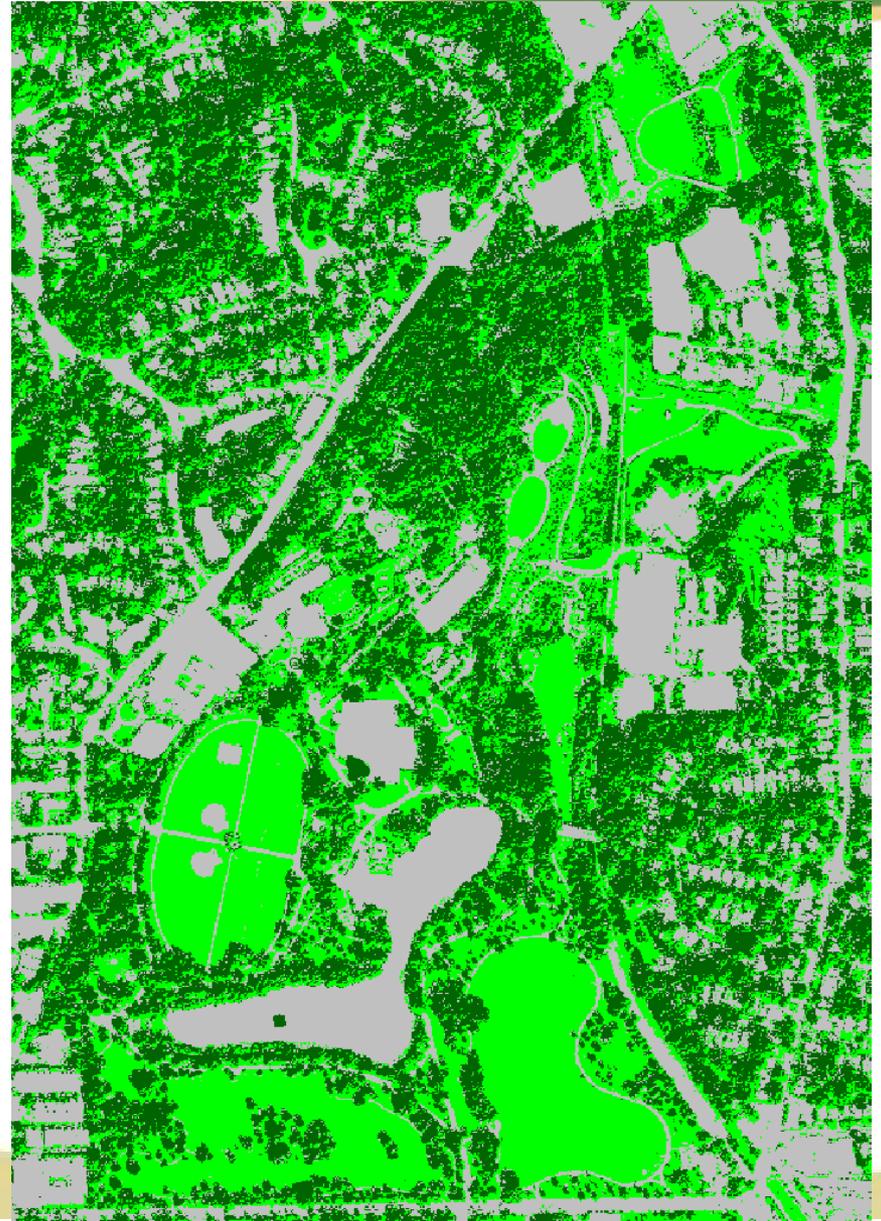
Accuracy: 2014 UTC Assessment

- Accuracy Assessment (250 Randomly Stratified Points)

- Compared 2014 results to Google Earth Historic Imagery
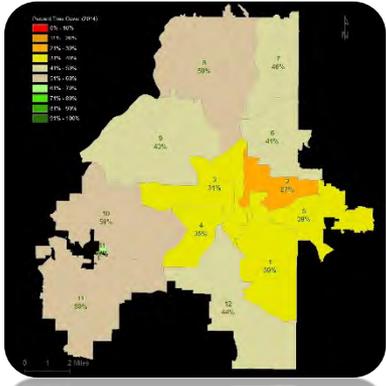
- 91.8% Overall Accuracy
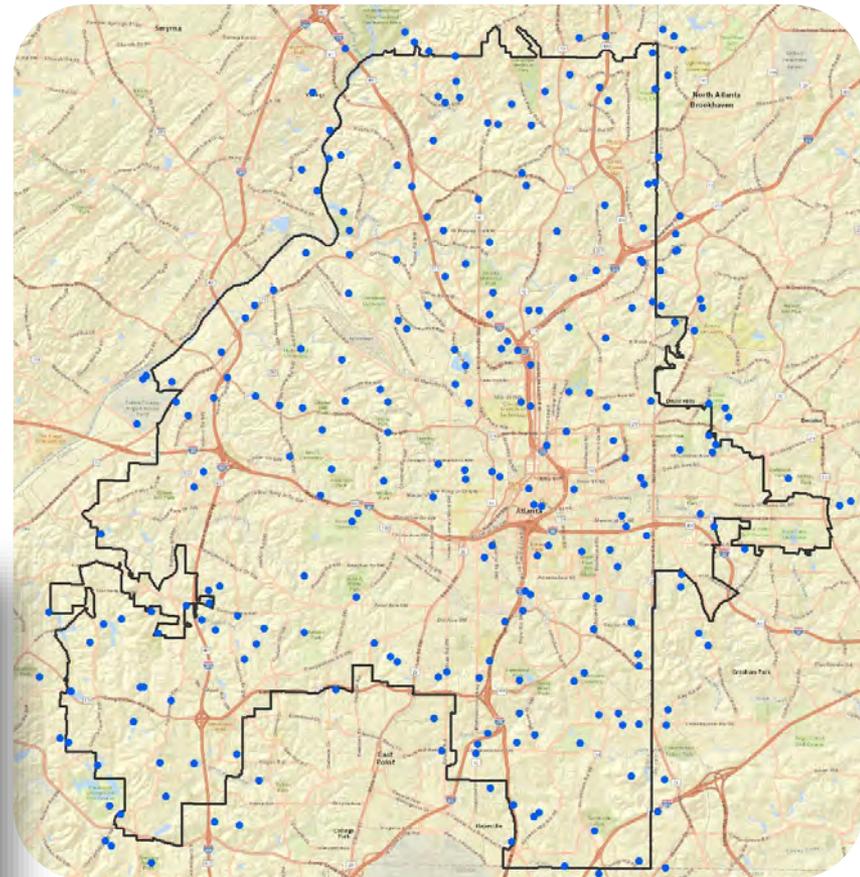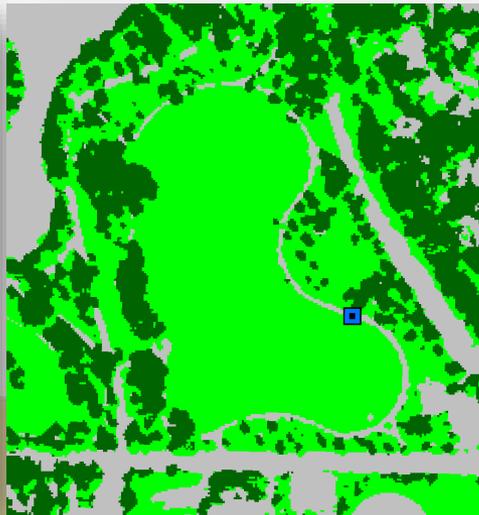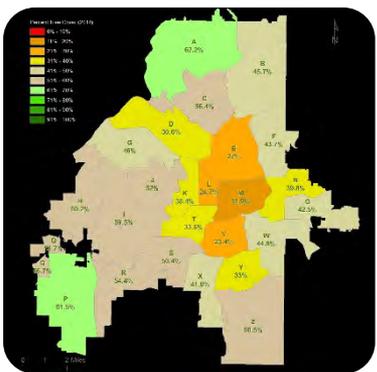
Findings: 2014 Urban Tree Canopy Assessment

Tree Cover
Non-Tree Vegetation
Non-Vegetation

25,921
30.0%

40,740
47.1%

19,758
22.9%

Tree Cover Non-Tree Vegetation Non-Vegetation
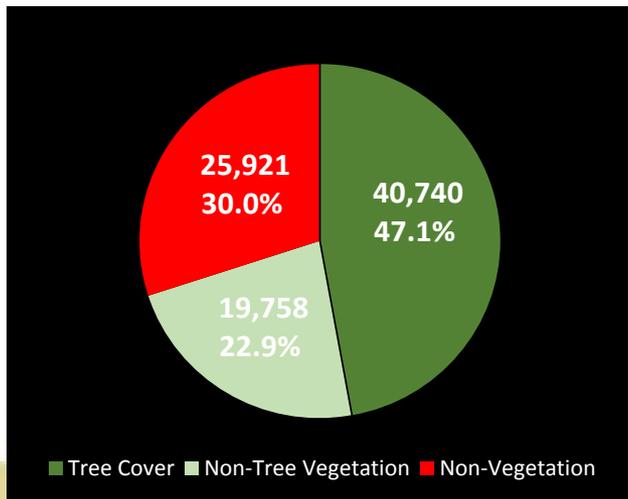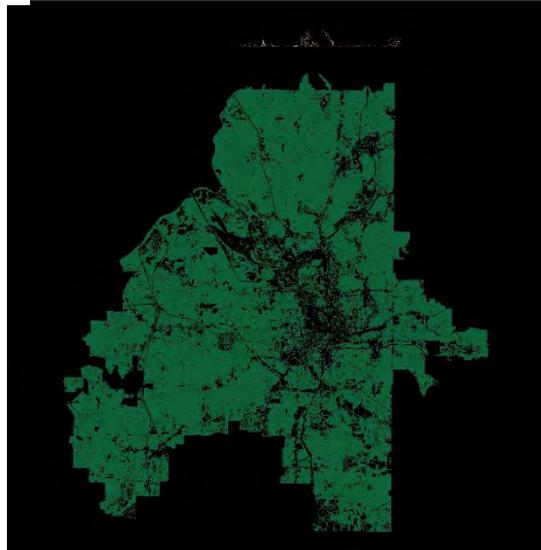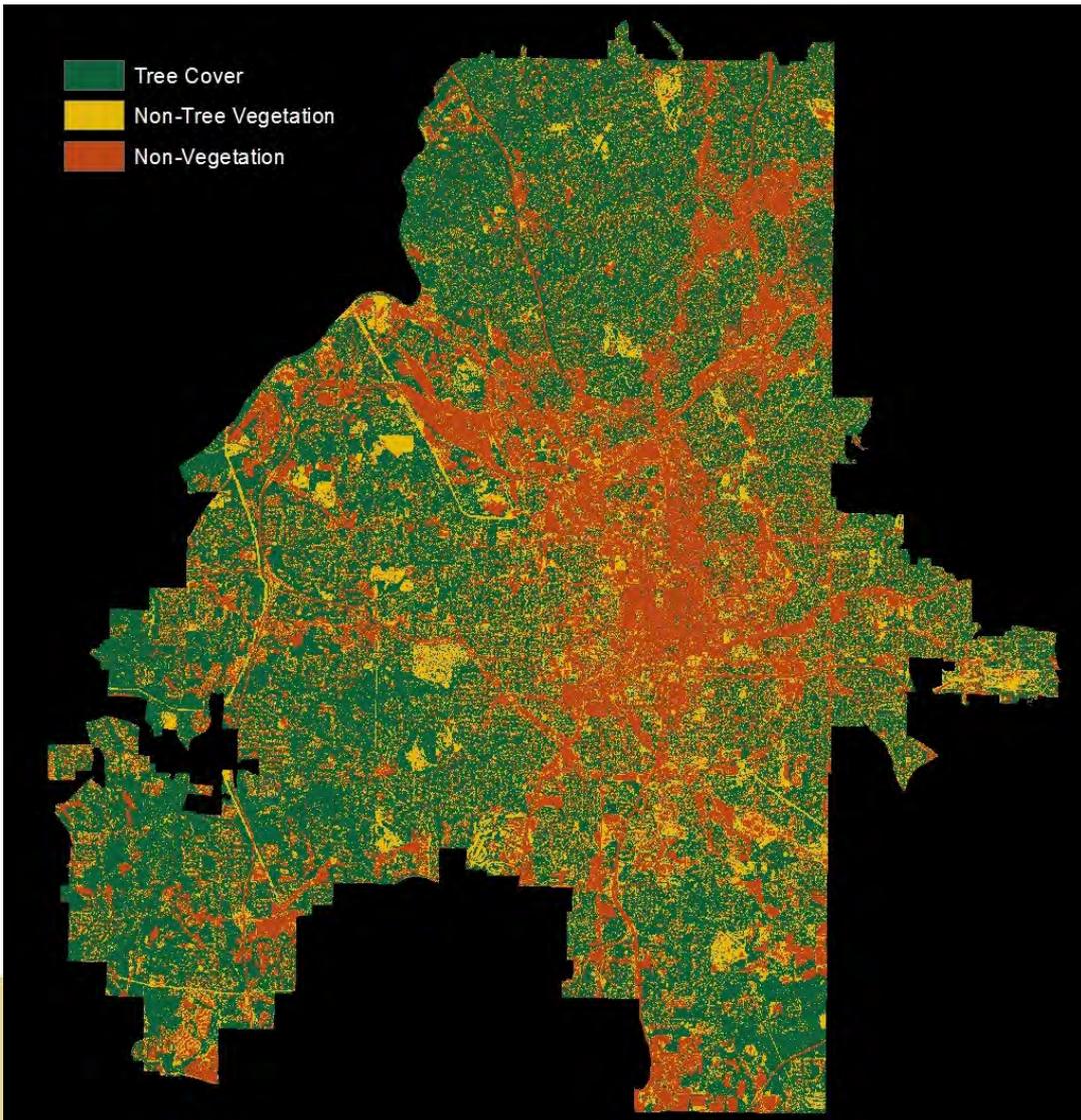
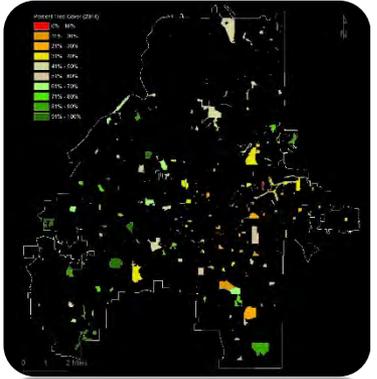# Summaries: 2014 Urban Tree Canopy Assessment
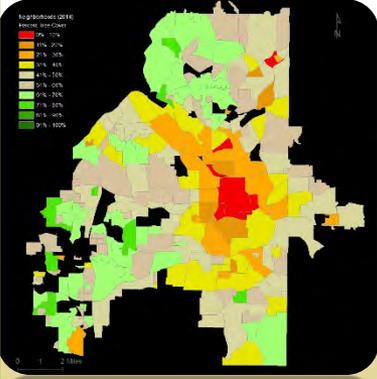

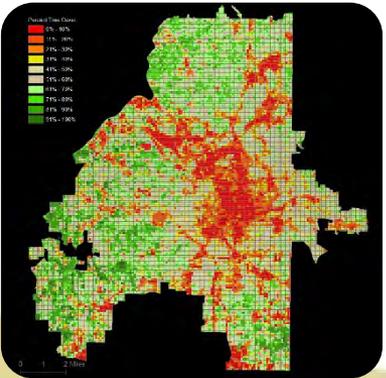Council Districts

NPU
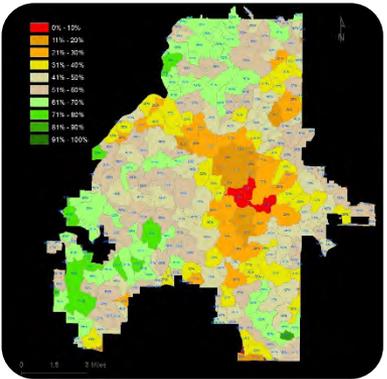
Jurisdiction

Small Watersheds
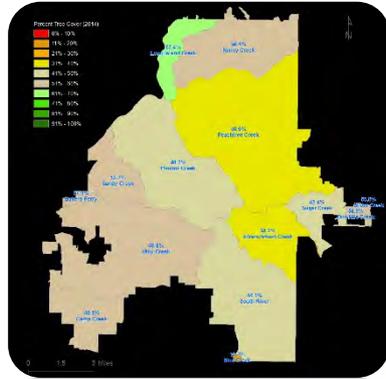

Parks

Neighborhoods
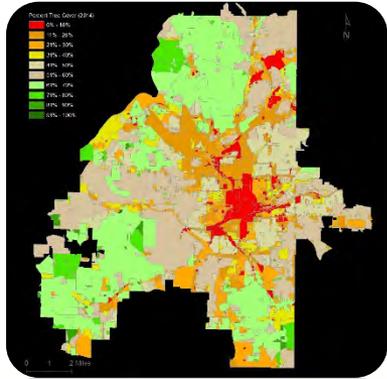

City Grid (6 Acres)

Location

Watersheds

Environmental

Zoning

Land Use - Policy

Summaries: 2014 Urban Tree Canopy Assessment

Small Watersheds

Neighborhoods

Zoning

Legend: ■ Non-Vegetation   ■ Non-Tree Vegetation   ■ Tree Cover

Council Districts

% Landcover by Council District (2014)

Watersheds

% Landcover by Watershed (2014)

Watershed	Acres UTC 14	Acres NTV 14	Acres NV 14
Long Island Creek	1,510	91	471
Utoy Creek	9,104	3,480	2,937
Bakers Ferry	250		86
Nancy Creek	4,532		1,909
Camp Creek	2,169		937
Doolittle Creek	254		89
Sandy Creek	1,930	775	889
Shoal Creek	37		20
South River	5,233		3,677
Sugar Creek	1,096		798
Proctor Creek	4,873		4,148
Peachtree Creek	7,568		7,856
Intrenchment Creek	1,665	1,203	1,395
Mud Creek	12		50

City-wide trends: 2014 UTC Assessment

- Tree cover distribution driven by land use

- Sixty-two neighborhoods have >= 60% canopy, with majority located in SW and NW Atlanta

- Thirty neighborhoods have <= 25% canopy, almost all < 2 miles from downtown

- Canopy varies greatly by small watersheds, ranging from 5 % for a section of Peachtree Creek to 82% for a section of the South River

Bottom 5 Neighborhoods

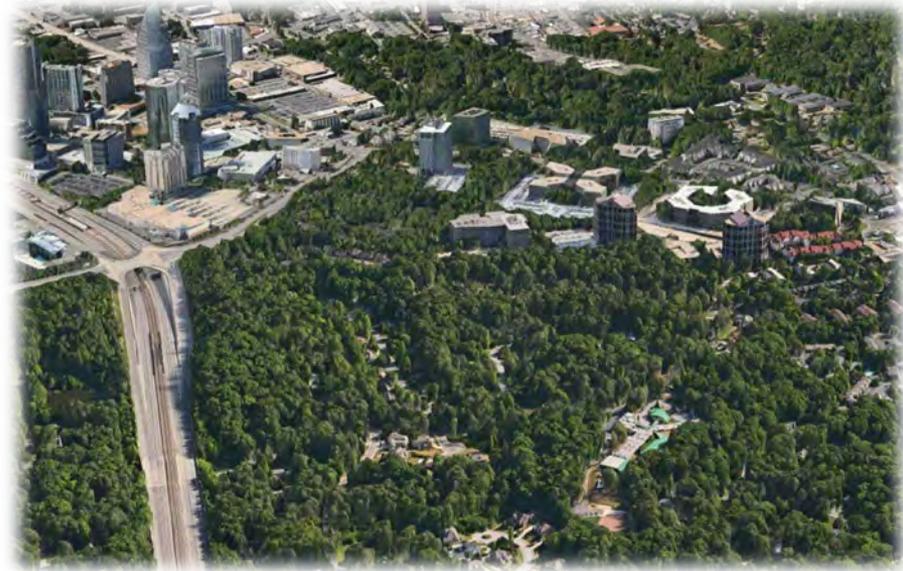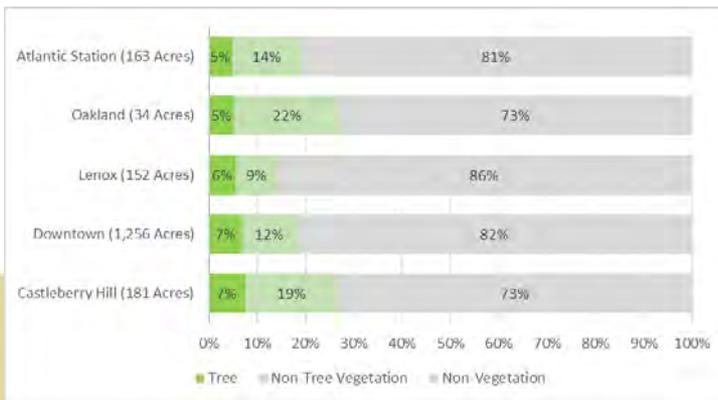| Neighborhood	Tree	Non-Tree Vegetation	Non-Vegetation
Atlantic Station (163 Acres)	5%	14%	81%
Oakland (34 Acres)	5%	22%	73%
Lenox (152 Acres)	6%	9%	86%
Downtown (1,256 Acres)	7%	12%	82%
Castleberry Hill (181 Acres)	7%	19%	73%

■ Tree ■ Non Tree Vegetation ■ Non-Vegetation

Top 5 Neighborhoods

Neighborhood	Tree	Non-Tree Vegetation	Non-Vegetation
Boulder Park (386 Acres)	78%	16%	6%
Butner/Tell (144 Acres)	77%	17%	6%
Audobon Forest (497 Acres)	74%	17%	9%
Oakcliff (67 Acres)	73%	17%	10%
Bakers Ferry (161 Acres)	72%	19%	8%

■ Tree ■ Non-Tree Vegetation ■ Non-Vegetation

City-wide trends: 2014 UTC assessment

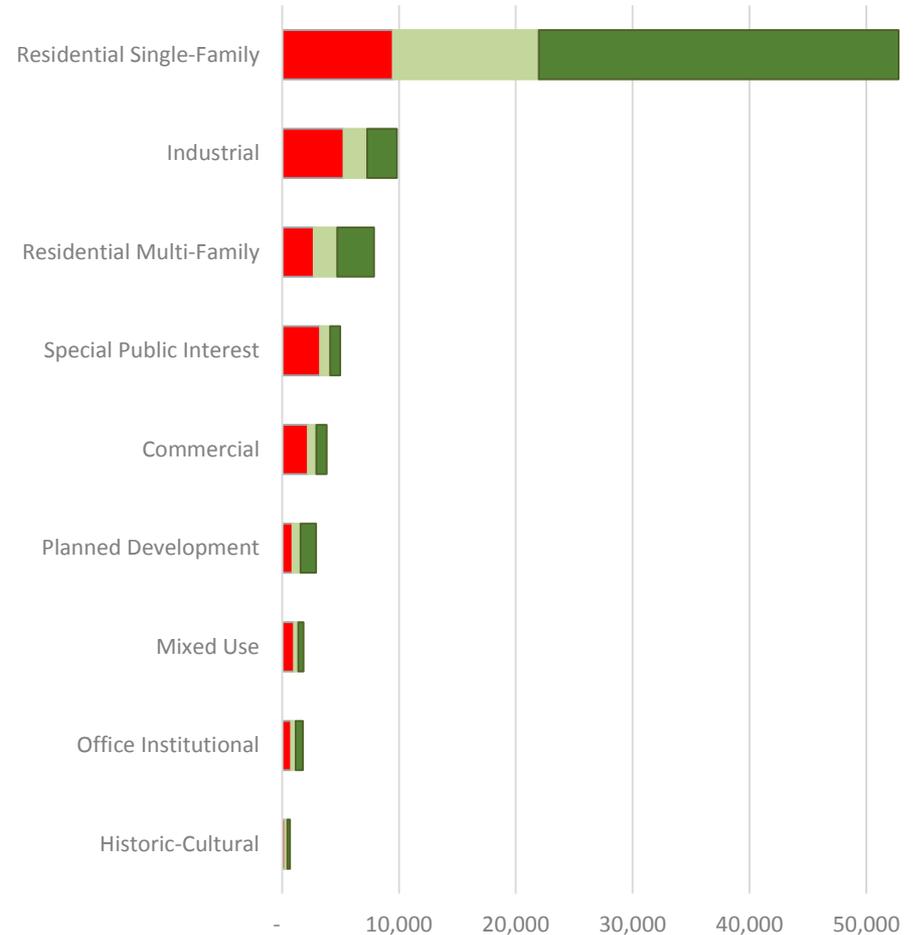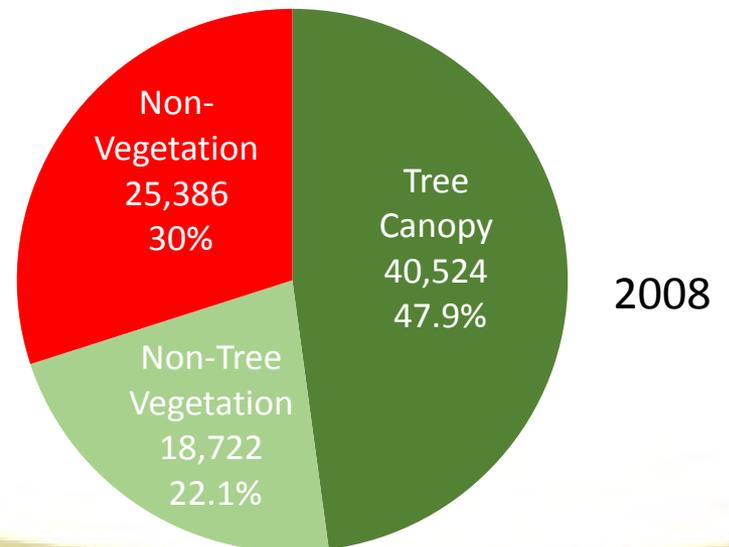- 76% (30,788 acres) of the city's UTC is located on single-family residential land

- 58% of single-family land is tree-covered

- 7.7% (3,128 acres) of the city's UTC is located on multi-family residential land

- 40% of multi-family land is tree-covered

- 6.2 % (2,515) of the city's UTC is located on industrial land.

- 26% of industrial land is tree-covered

Residential Single-Family	
Industrial	
Residential Multi-Family	
Special Public Interest	
Commercial	
Planned Development	
Mixed Use	
Office Institutional	
Historic-Cultural	

- 10,000 20,000 30,000 40,000 50,000

■ Non-Vegetation ■ Non-Tree Vegetation ■ Tree Cover

UTC Change: 2008 - 2014

- Compared 2014 to 2008
- Calculated change for city and smaller geographies
- City annexed over 2,000 acres and changed boundaries between 2008 and 2014
- Statistically insignificant change across most geographies (+-5%)
- Greatest canopy loss in NW and NE
- Greatest canopy gains in W, SW and S of the city core

Pie chart (2014): Non-Vegetation 25,921 30.0%; Non-Tree Vegetation 19,758 22.9%; Tree Canopy 40,740 47.1%

Pie chart (2008): Non-Vegetation 25,386 30%; Non-Tree Vegetation 18,722 22.1%; Tree Canopy 40,524 47.9%
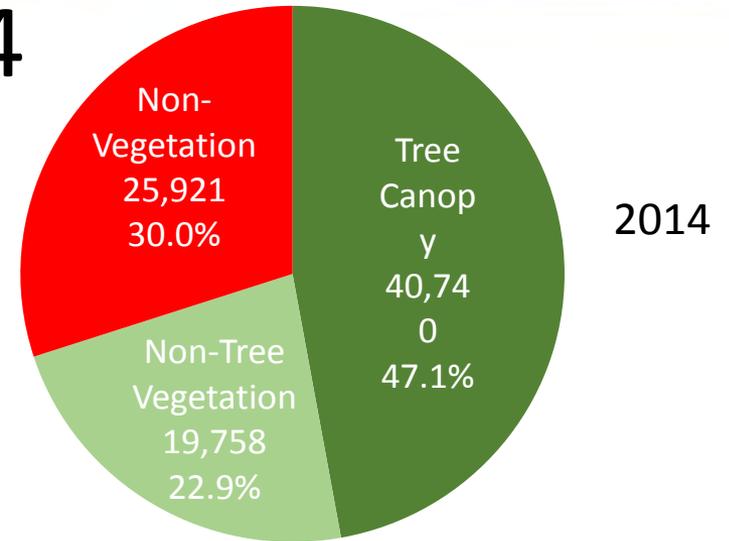
UTC Change Summaries: 2008 - 2014
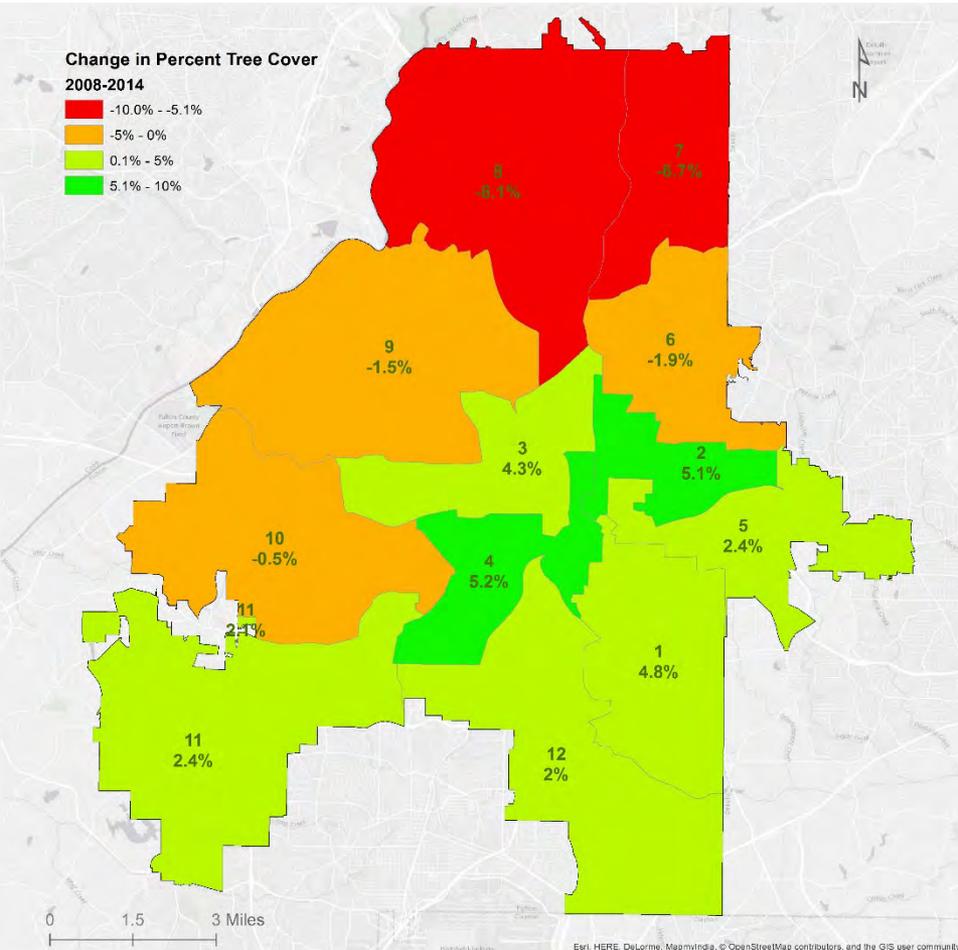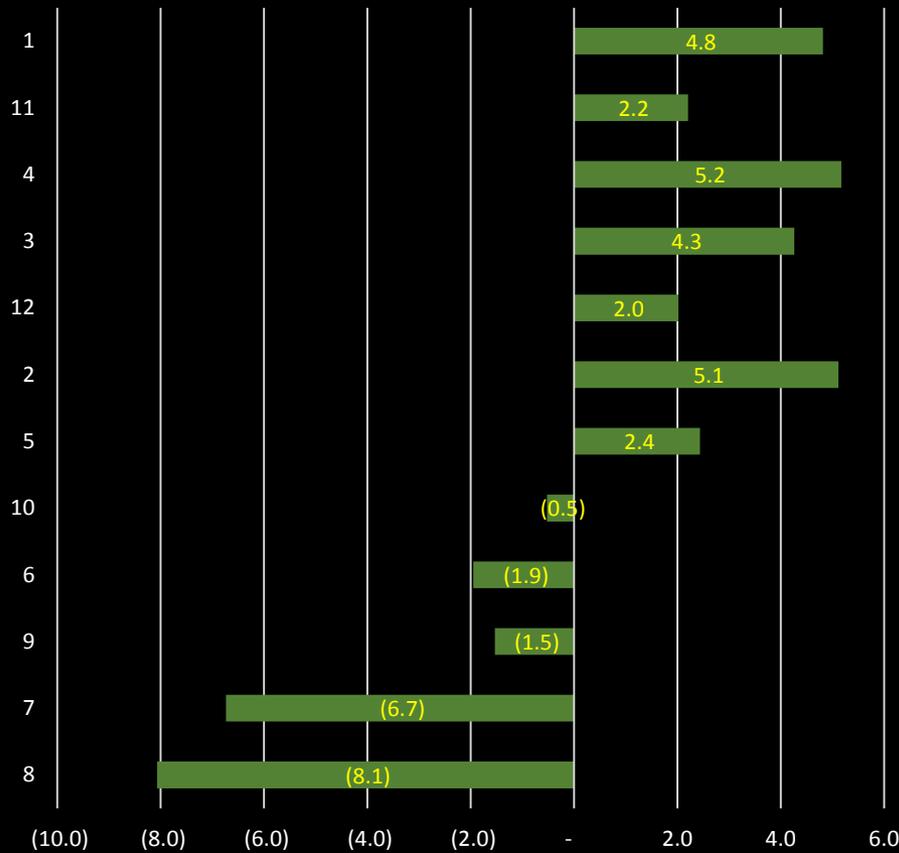
- Calculated change for NPUs, neighborhoods, council districts, large and small watersheds, zoning categories, parks and the city grid

- There were changes in all geographies between 2008-2014 except for the city grid (new NPU, council districts redrawn, updated neighborhoods, new parks, revised watershed layers, etc..)

- To account for the boundary changes, 2008 UTC data was aggregated to the 2014 geographic units

- NPU Q did not exist in 2008

- No 2008 satellite imagery for land annexed after 2008

% Tree Cover Change by NPU (2008-2014)

NPU	Value
W	178
V	122
T	112
N	105
Y	98
X	98
K	97
S	94
M	94
L	54
J	38
H	37
Z	31
P	29
O	27
E	14
R	(50)
G	(60)
F	(70)
I	(83)
D	(114)
C	(321)
B	(448)
A	(586)
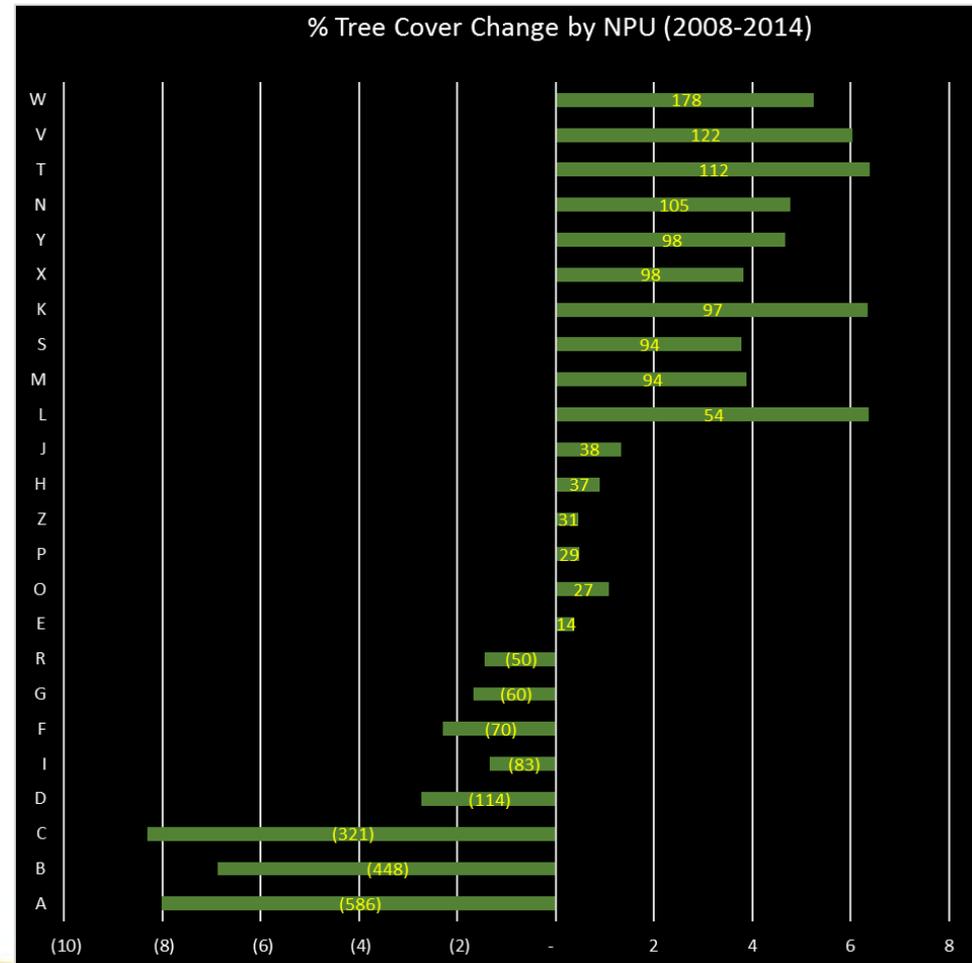
UTC Change Summaries: 2008 - 2014

% Tree Cover Change by Council District (2008-2014)

District	Value
1	4.8
11	2.2
4	5.2
3	4.3
12	2.0
2	5.1
5	2.4
10	(0.5)
6	(1.9)
9	(1.5)
7	(6.7)
8	(8.1)

Change in Percent Tree Cover 2008-2014
- -10.0% - -5.1%
- -5% - 0%
- 0.1% - 5%
- 5.1% - 10%

Verifying Change: 2014 UTC Assessment

- Manually inspected 720 grid cells on the computer to evaluate findings

- Conducted field visits for over 100 sites to validate findings and qualify change
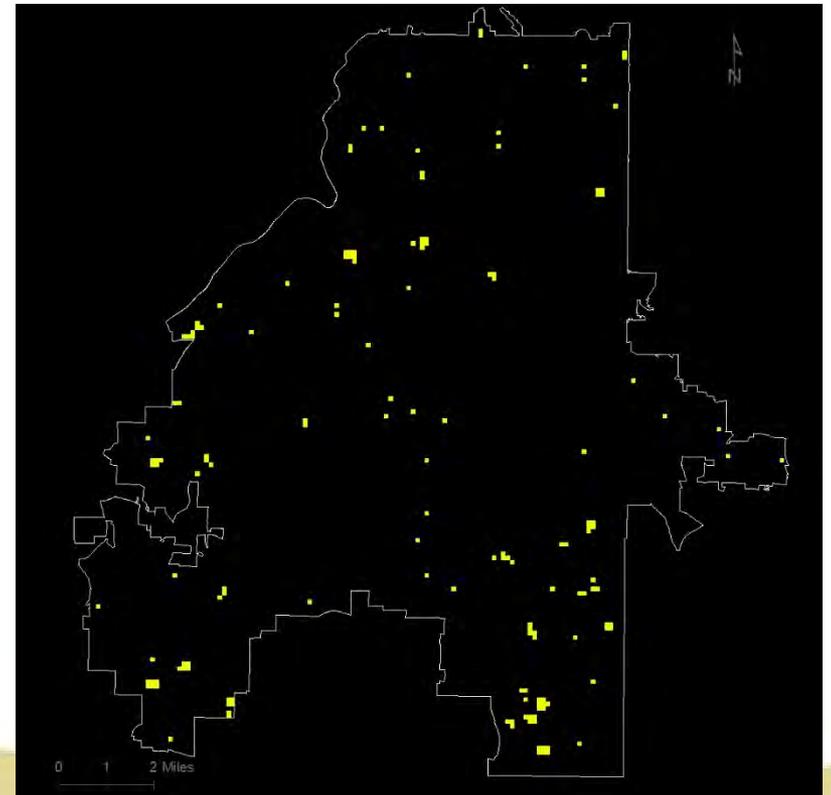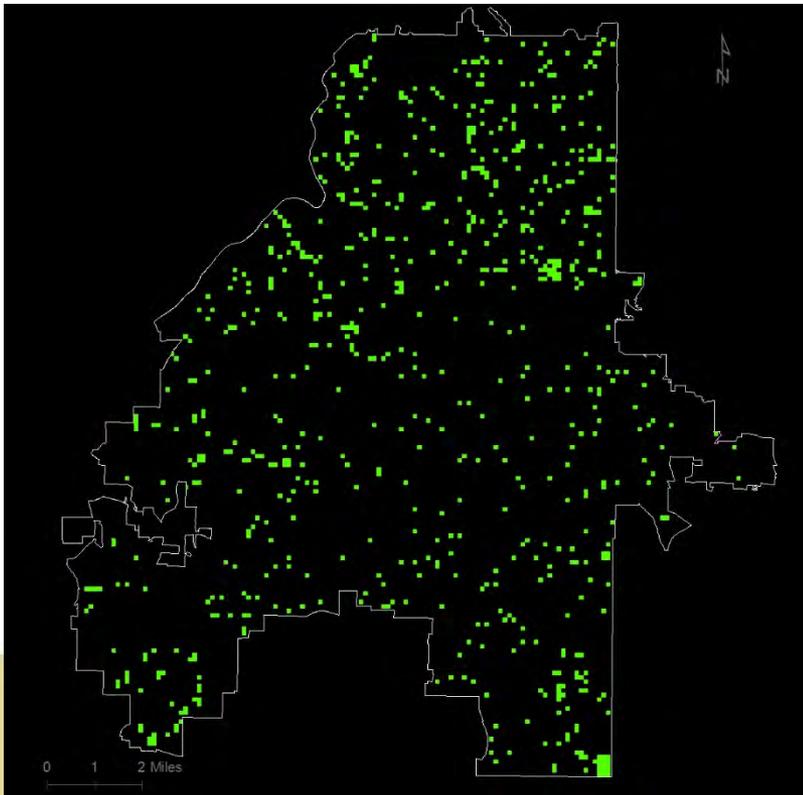
UTC Change CITY GRID: 2008 - 2014

- Change at city grid scale (6 acres) is more revealing

- 277 grid cells showed UTC loss >= 1 acre, over 100 of which were a result of a single-family redevelopment

- 50 of the 102 sites showing UTC gain >= 1 acre were "false growth" (secondary growth on cleared land)

- 32 "pipe farms" identified, all of which show UTC growth

- Largest pipe farm is 80 acres, cleared between 2003-2007
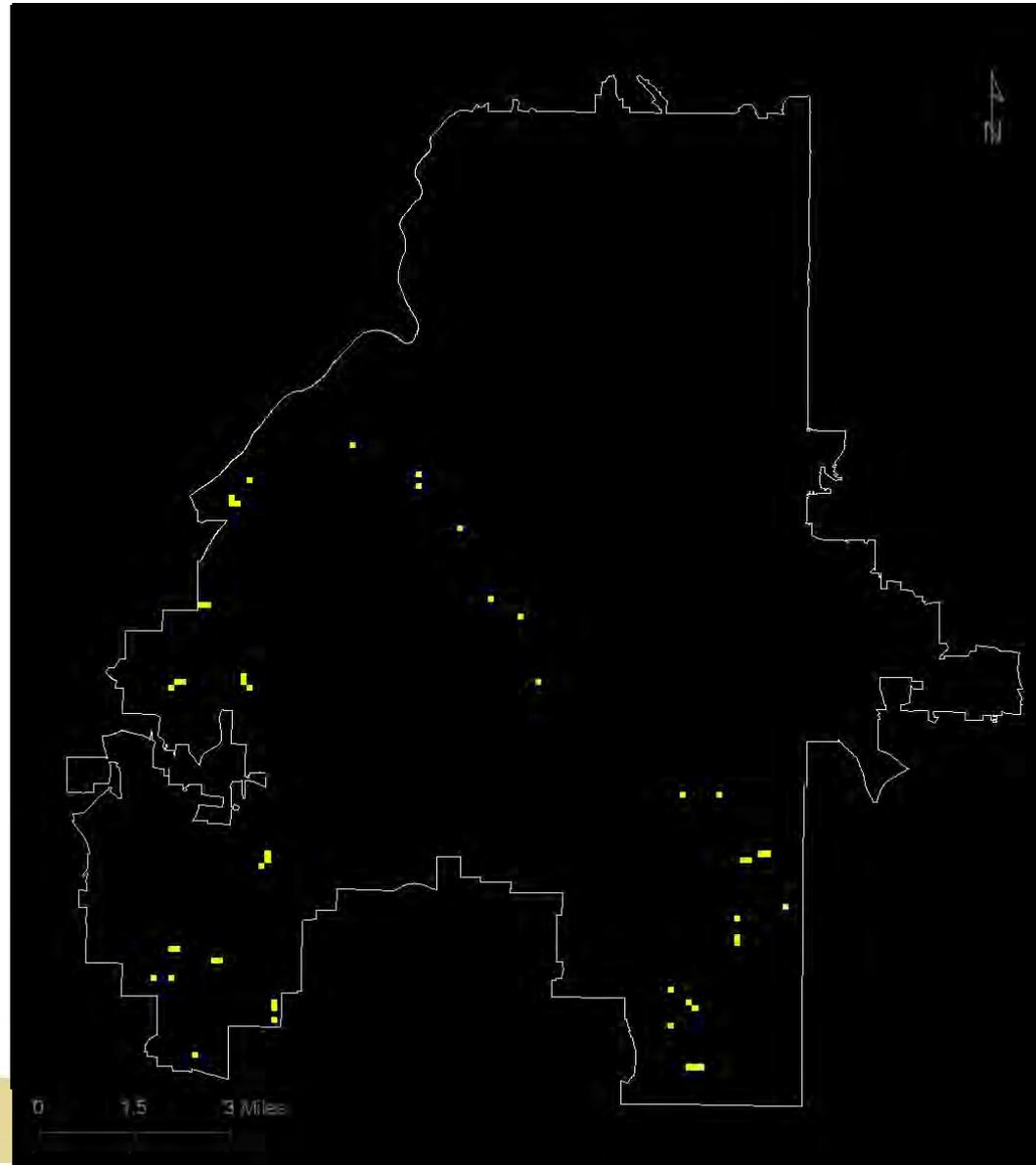
UTC **Gain**: 2008-2014

- Normal canopy growth
- Street tree growth in subdivisions built circa 2008
- Planted trees (parks, individual lots)
- *False* gain found in unfinished developments (Estimated 900 acres or 2.3% of the City's canopy)
- Sites showing largest contiguous gain – pipe farms
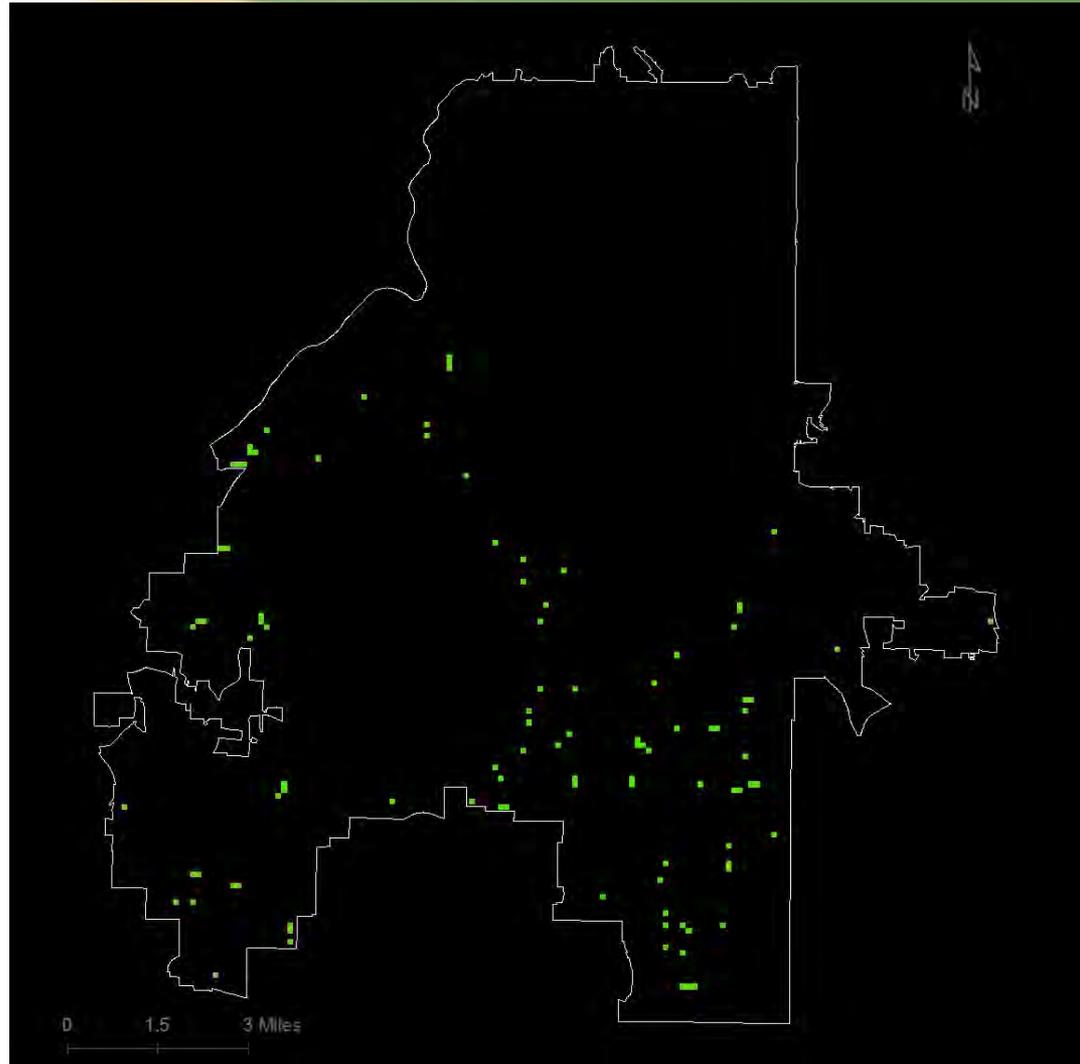
Gain >=1 acre

UTC **Gain**:2008-2014 ----Tree Plantings

- SE Neighborhood Center -- McDonough Blvd

2017

UTC **Gain**:2008-2014 ----Street Trees

- Dupont Commons –NW Atlanta Near Railyard

2017

UTC **Gain**:2008-2014 ---------Growth

- Freedom Park

2017

UTC **Gain**:2008-2014 ---------False gain

- Unfinished Development

2017

UTC **Gain**:2008-2014 -----False gain
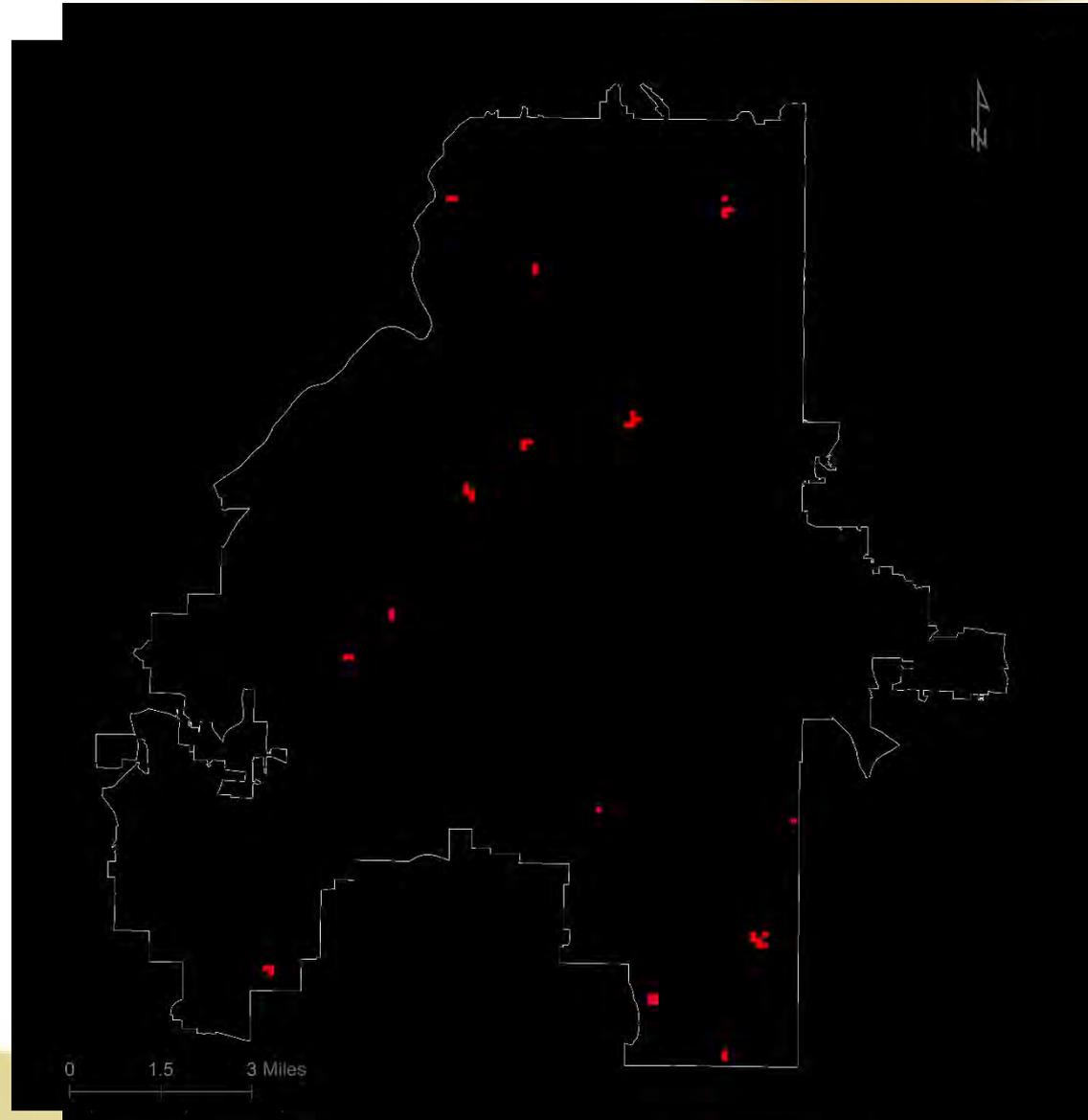
- Pipe Farm

2017

UTC **Gain**:2008-2014 -------False gain

- City's Largest and Oldest Pipe Farm

2017

UTC **Loss**: 2008-2014

- 277 grid cells with >= 1 acre canopy lost

- Redevelopments (single-family lots and neighborhoods)

- New Developments (multi-family, industrial, government, churches, and infrastructure improvements)

- 15 sites > 10 acres in size showed >=50% canopy loss

UTC **Loss**:2008-2014 ----New development

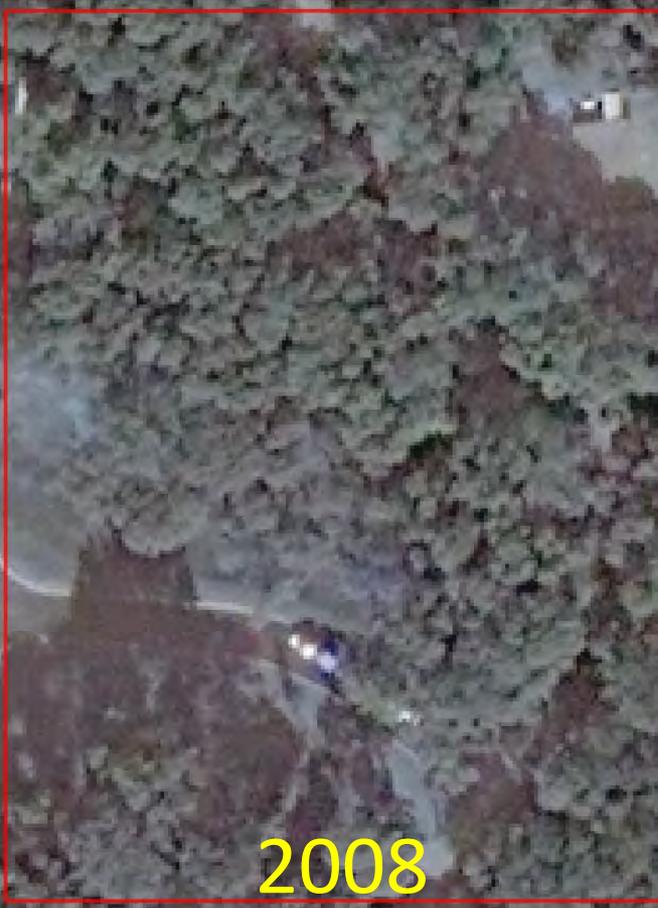- Condos and Apartments (Buckhead)

2008

2017

UTC **Loss**:2008-2014 ----New development

- Single-Family Subdivision (West Atlanta)

2017

UTC **Loss**:2008-2014 ----New development

- Single-Family (NW Atlanta)

2008

2017

UTC **Loss**:2008-2014 ----New development
- Industrial (SE Atlanta)

2017

UTC **Loss**:2008-2014 -----New development

- Multi-Family (NW Atlanta)

2008

2017

UTC **Loss**:2008-2014 ----New development

- Commercial (NW Atlanta)

2008

2017

UTC **Loss**:2008-2014 ----New development
- Townhomes (NE Atlanta)

2017

UTC **Loss**:2008-2014 ------ Redevelopment

- Mixed Residential (NW Atlanta)

2017

# UTC **Loss**:2008-2014 ----Redevelopment
- Single-Family (NW Atlanta)

2017

UTC **Loss**:2008-2014 ---- Redevelopment
- Single-Family (NW Atlanta)

2017

Implications: The Future of the City's Trees

- Most of the city's trees are on private property

- Development has steadily increased since 2012

- Some zoning categories permit complete or almost complete removal of trees (industrial)

- Street trees do not provide the same benefits as a forest

- The gap between high-quality canopy gain and overall loss is widening
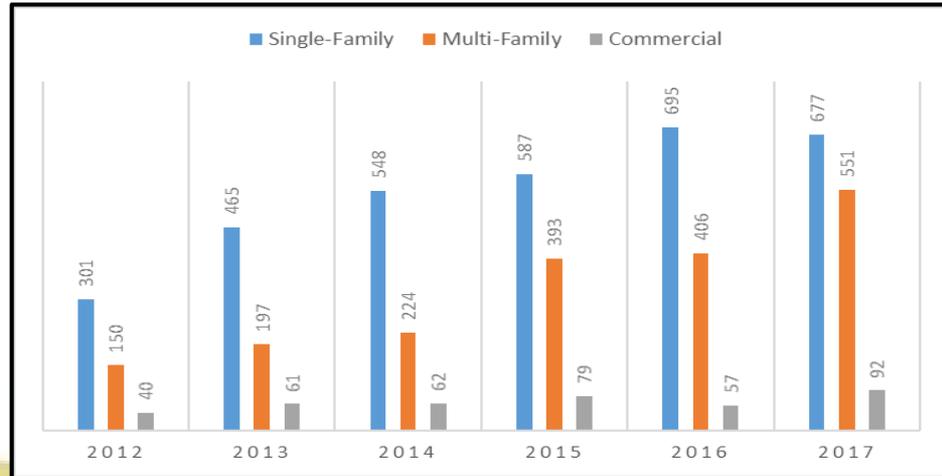
New Building Permits 2012 - 2017

City Goals: Conserve and Maintain UTC at 50%

- **Official City Goal:**

  Maintain 50% canopy coverage with no net loss

- **Solution*:***

  Increase canopy coverage
  Mitigate canopy loss

City Goals:
How do we get to 50% Canopy Coverage

- Existing UTC = 47.1 %

- 50% UTC = increase of 2,500 acres of UTC

- **Plant trees on public land**
  - **Possibilities**

    ~ 1,500 acres of non-tree vegetation (NTV) on existing park land

    ~ 300 acres of NTV on APS land

    ~ 800 acres of NTV on "other" public lands (GDOT, MARTA, FULCO)

    ~ 3,000 acres in Right-of-Way

- **Plant on private land**
  - Possibilities
    - ~14,600 acres on NTV on private land
    - Incentivize citizens and businesses to protect existing trees and plant new ones
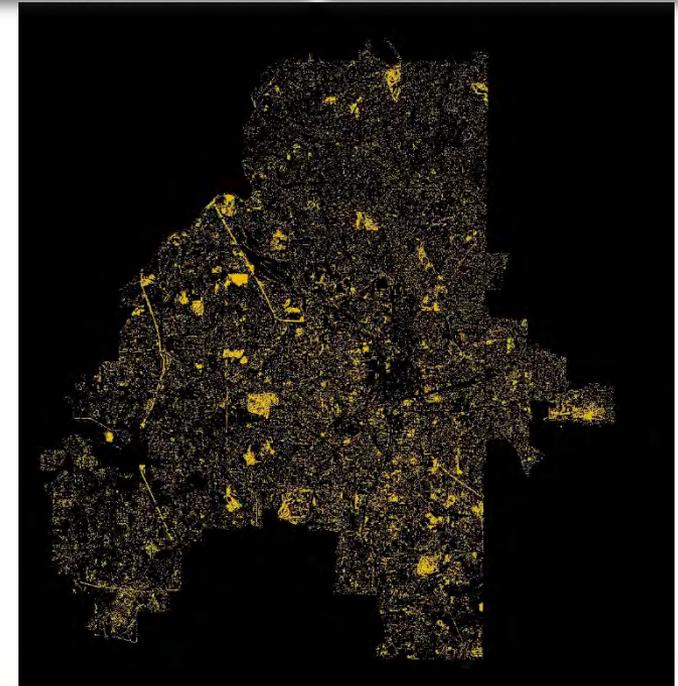
Non-Tree Vegetation 2014

City Goals: No Net Loss of Canopy

- Loss mitigation
  - Increase canopy on public lands
  - Permanently protect existing forests
  - Zoning code modifications to limit max lot coverage or tree removal
  - Permanently protect trees of certain caliper (size, age, health)
 - Public education campaign

% Single-Family Lots Built Out to Max Lot Coverage	100%	50%	25%	10%
Estimated Acres Lost	14,887	7,443	3,722	1,489
Estimated % UTC Lost	37%	18%	9%	4%

Summary of Zoning Regulations in R Districts

|		R-1	R-2	R-2A	R-2B	R-3	R-3A	R-4	R-4A	R-4B	R-5
MINIMUM SETBACKS	FRONT	60 ft.	60 ft.	60 ft.	50 ft.	50 ft.	50 ft.	35 ft.	30 ft.	20 ft.	30 ft.
	SIDE[a]	25 ft.	15 ft.	15 ft.	10 ft.	10 ft.	10 ft.	7 ft.	7 ft.	5 ft.	7 ft.[c]
	REAR	35 ft.	30 ft.	30 ft.	20 ft.	20 ft.	15 ft.	15 ft.	15 ft.	5 ft.	7 ft.[c]
LOT REQUIREMENTS	MINIMUM LOT AREA	2 acres	1 acre	30,000 sq.ft.	28,000 sq.ft.	18,000 sq.ft.	13,500 sq.ft.	9,000 sq.ft.	7,500 sq.ft.	2,800 sq.ft.	7,500 sq.ft.
	MINIMUM STREET FRONTAGE[b]	200 ft.	150 ft.	100 ft.	100 ft.	100 ft.	85 ft.	70 ft.	50 ft.	40 ft.	50 ft.[c]
	MAXIMUM LOT COVERAGE	25%	35%	35%	40%	40%	45%	50%	55%	85%	55%
	MAXIMUM FLOOR AREA RATIO	0.25	0.30	0.35	0.40	0.40	0.45	0.50	0.50[d]	0.75[e]	see section 16-07.010
	MINIMUM REQUIRED CAR PARKING SPACES	2	2	2	2	2	2	1	1	1	see section 16-07.010

Recommendations (Immediate Action)

- Refine policies and set canopy goals to ensure that each area of the City receives the benefits of a healthy canopy;

- Inform sustainability efforts and policy decisions related to climate, water and air quality; and

- Educate the public about the importance of tree canopy in Atlanta.
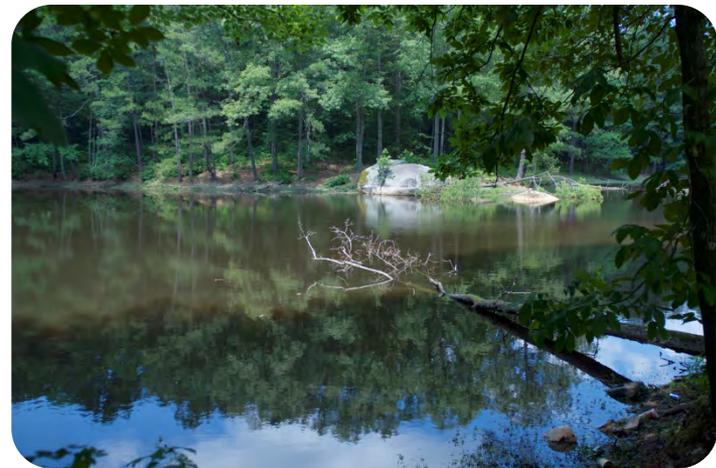
Specific Recommendations For Consideration

- Protect the few largest tracts of high quality forests (approx. 5,700 acres of vacant forested land remain – 14% of existing canopy).

- Evaluate policy decisions related to land development, especially "pipe farms"

- Identify tools to prevent clearing of large sites that will not be completed (e.g. development bonds)

- Evaluate effect of maximum allowable lot coverage on tree canopy, especially on residential land.

Vacant, Forested Properties
- 10- 25 Acres
- 25 - 50 Acres
- 50 - 80 Acres
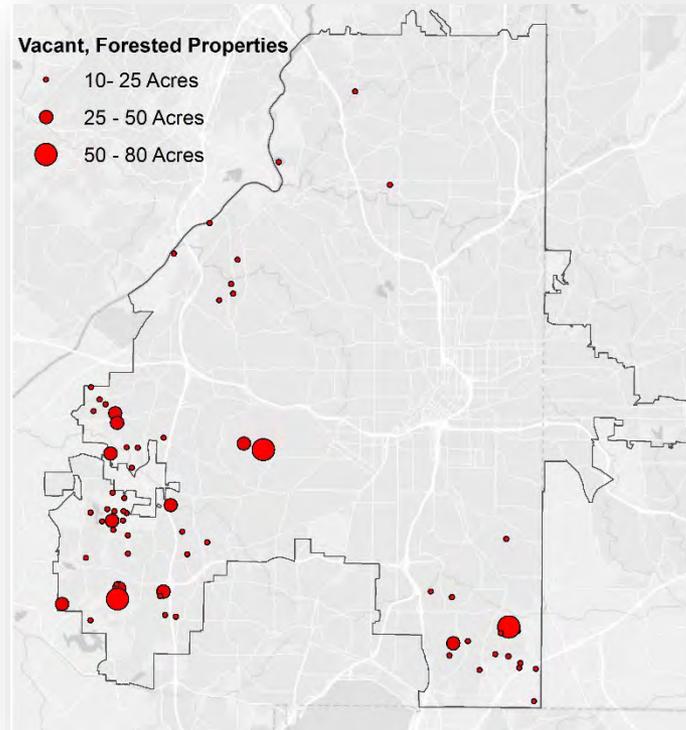
Specific Recommendations For Consideration

- Identify methods for reducing tree loss during redevelopment of single-family properties

- Implement conservation measures for new subdivisions.

- Evaluate open space requirements for multi-family and other developments.

- Require replanting of native and high quality trees to ensure equal or higher quality than trees that are removed

Next Steps: UTC Assessments in the City of Atlanta

UTC

Update

2018

Thank you!

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