URBAN TREE CANOPY ASSESSMENTS AND CHANGE ANALYSIS 2009 – 2019 CITY OF DECATUR MARCH 1, 2021
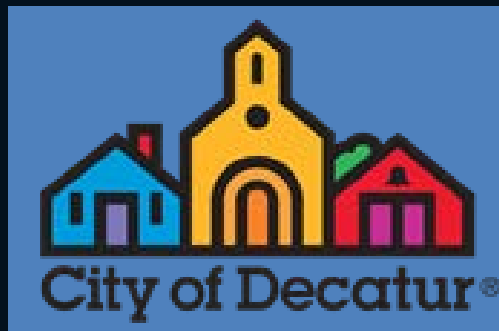
TONY GIARRUSSO - GEORGIA TECH

MIKE EDELSON - INTERDEV
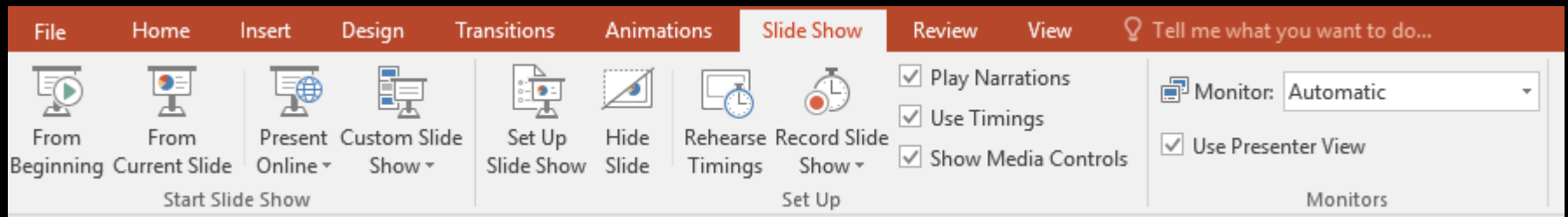
City of Decatur®

INTERDEV
IT | Security | GIS

Georgia Institute of Technology

CREATING THE NEXT

SLIDESHOW INSTRUCTIONS

Be sure to view the slideshow in "Slideshow" mode.

At the top of Power Point, go to the Slide Show Menu and click "From Beginning".
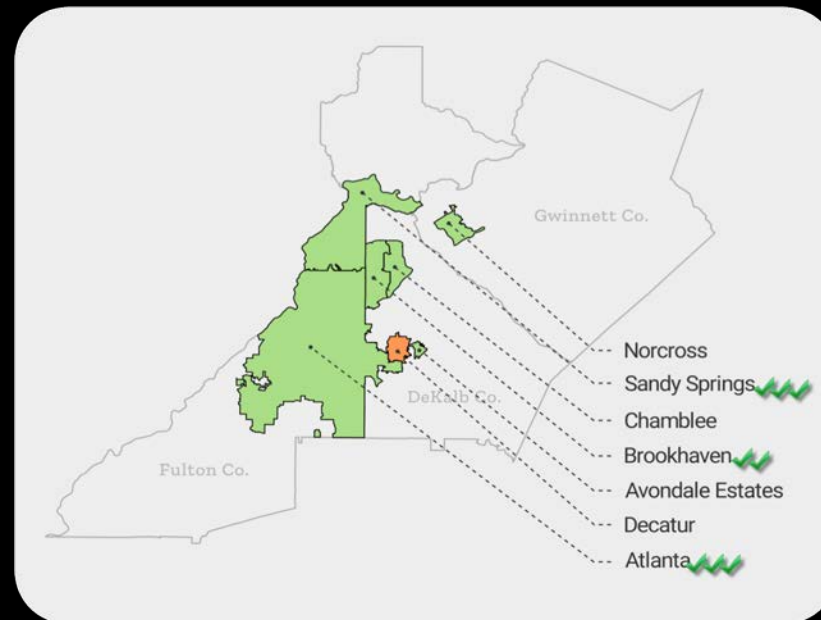

This will insure that you see all slide animations.

PROJECT TEAM

Tony Giarrusso
Senior Research Scientist

Associate Director
Center for Spatial Planning Analytics and
Visualization at Georgia Institute of
Technology

Mike Edelson
Project Manager

Director of Operations &
Director of GIS
InterDev

PROJECT OVERVIEW

- Identify trends in the City's Urban Tree Canopy between 2009 and 2019

- Timeline of Events (Oct 2020 – March 2021)

  - October – *Kick-off meeting* with the ESB

  - November & December - *received imagery* and *ran the analysis*

  - January performed *site visits* and compiled collected information – ground-truthing

  - February - performed the *accuracy assessment* and *presented Findings* to the ESB

  - March *Final Results*

AGENDA

- What is a Canopy Study?

- How to Use the Results

- Findings

- Canopy Assessment Methods

- Site Visits

- Interpreting Change

- 2019 Results

- Canopy Change 2009 to 2019

- Recommendations

WHAT IS A CANOPY STUDY?

- *Canopy:* tree leaves, branches, and stems that cover the ground when viewed from above

- Powerful "bird's eye view"

- Growth and loss to be expected

- Reveals *patterns* of change

- Measures quantity, not quality

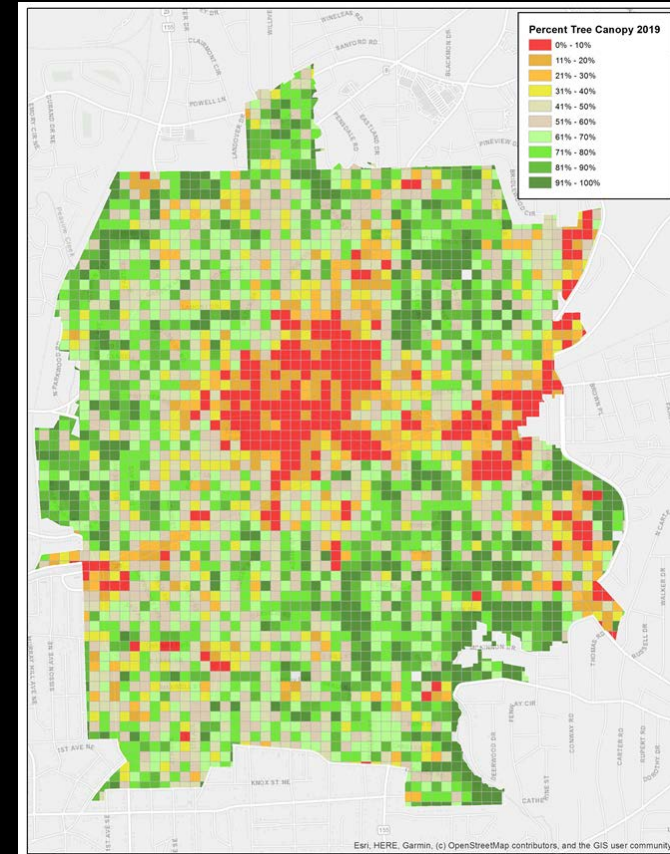- Ground-truthing and other data help interpret patterns of change

HOW TO USE THE RESULTS

- *Goal:* inform decision-making, policy & sustainability efforts related to climate, water and air quality, tree preservation and watershed protection.

- Refine policies and set canopy goals to ensure that each area of the City receives the benefits of a healthy canopy and that the overall tree canopy is maintained; no net loss

- Educate the public about tree canopy in Decatur.

FINDINGS

- Total canopy area remains consistent @ 57% ±

- Achieved and maintained 50% goal

- Land use drives canopy distribution

  - Low density residential > 70% canopy coverage

  - Downtown and CSX rail corridor has the least canopy

- Eastern residential = most neighborhood canopy
SW residential = least neighborhoods canopy

- Areas of gain

  - Fast growth of new plantings and street trees

  - Continued growth of established trees

- Areas of loss

  - Single-family redevelopment

  - New townhomes and commercial developments

  - Expansion of existing institutional developments (schools, city facilities, utility corridors

  - Discretionary tree removal or loss due to storms

Percent Tree Canopy 2019
- 0% - 10%
- 11% - 20%
- 21% - 30%
- 31% - 40%
- 41% - 50%
- 51% - 60%
- 61% - 70%
- 71% - 80%
- 81% - 90%
- 91% - 100%

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
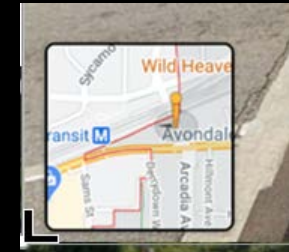
CREATING THE NEXT

CANOPY ASSESSMENT METHODS

- Obtained satellite imagery (leaf-on)

- Determined land cover by imagery classification

- Three classes of land cover

  - Trees
  - Non-Tree Vegetation
  - Non-Vegetation

- Performed manual classification to improve accuracy

- Field verification to validate and qualify findings
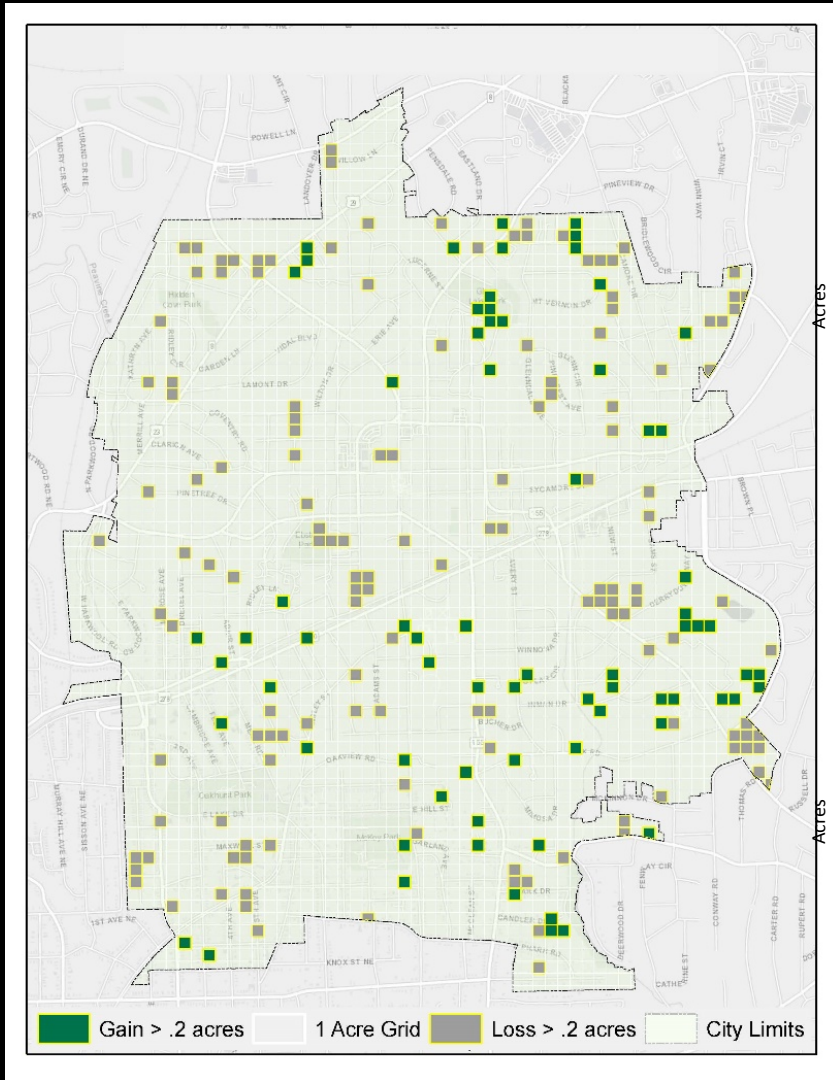
- Conducted accuracy assessments
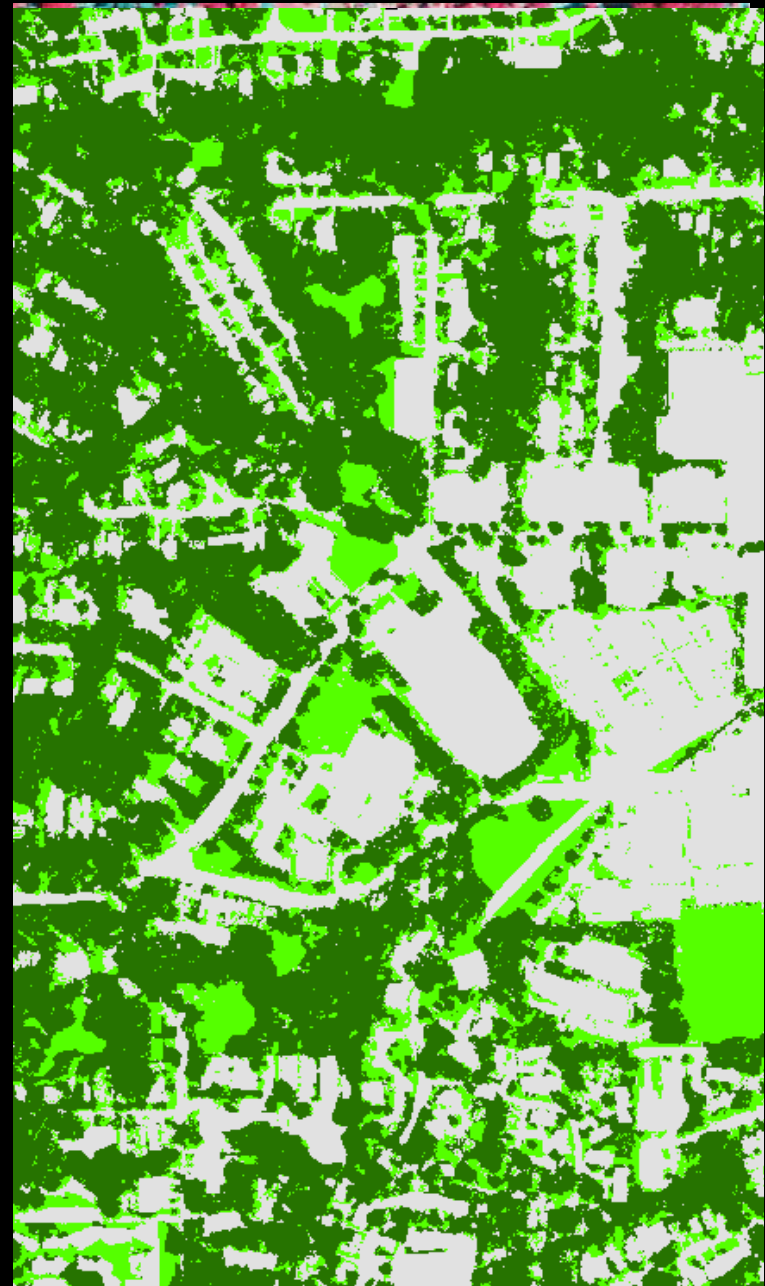
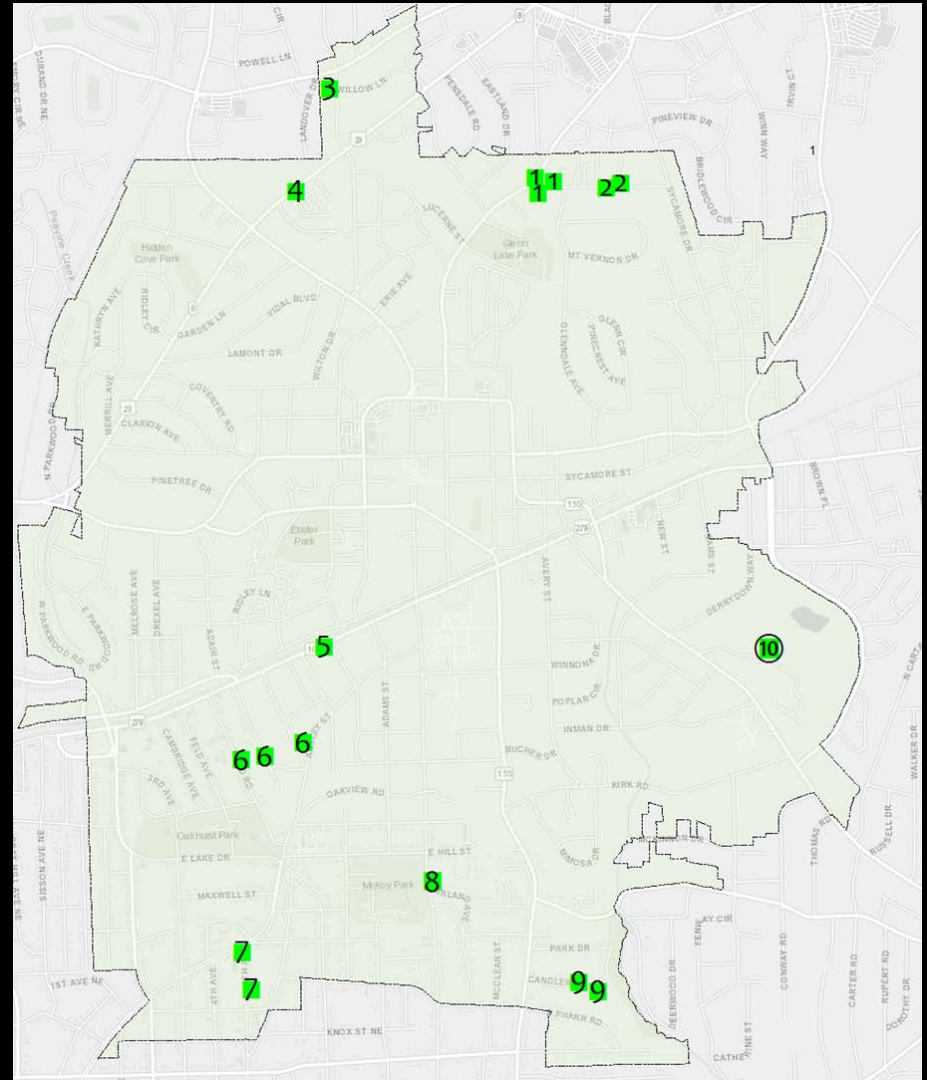# Confusing Areas – Computer Identified as Trees – Required Editing

Site Visits – Areas Showing Loss or Gain >.2 acres

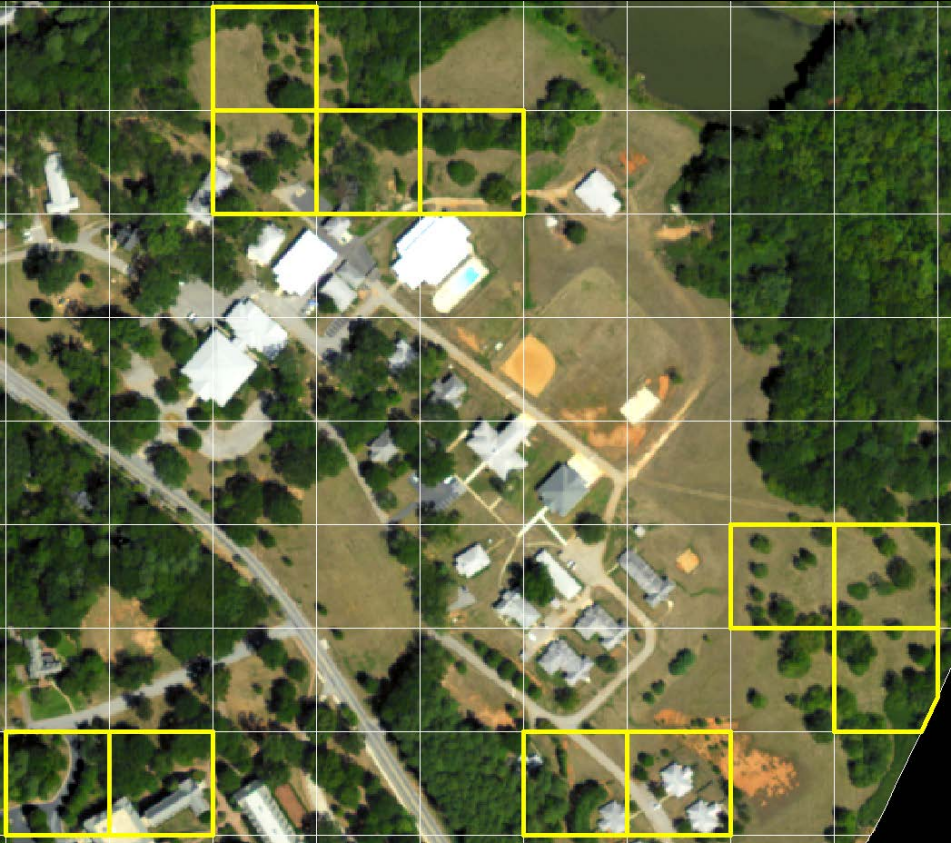

Project Team

Group

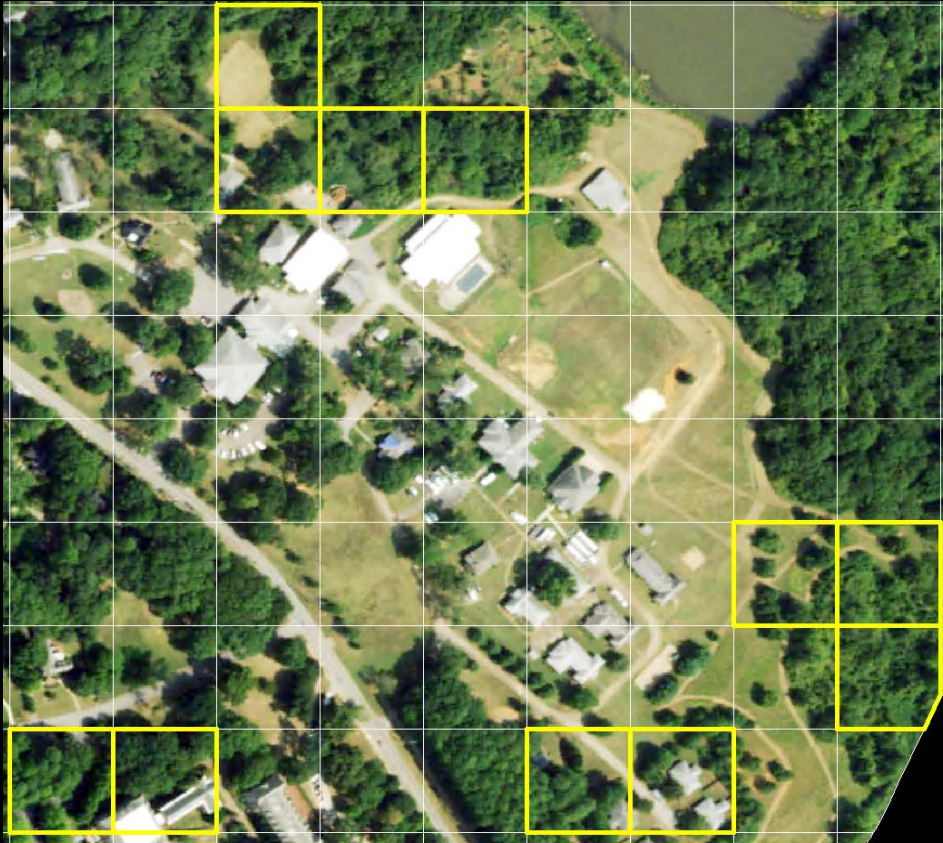| Gain > .2 acres | 1 Acre Grid | Loss > .2 acres | City Limits |

CREATING THE NEXT

SUSPECT GAIN SITES AT LEGACY

2009

2019

SUSPECT GAIN SITES AT LEGACY

SUSPECT GAIN SITES AT LEGACY

2019

2009

GAIN AND LOSS SITES (MEDLOCK/CHURCH, KNOB HILLS, MODA)

2009

2009

2019

0.25

-0.21

-0.64

-0.78

0.21

2019

Medlock and Church St
Canopy Gain: front yard and right of way trees

Knob Hills Circle
Canopy Gain: interior trees

MODA Townhomes/Condos
107 Forkner
Canopy Loss: Single-Family

CREATING THE NEXT

GAIN – MEDLOCK AND CHURCH

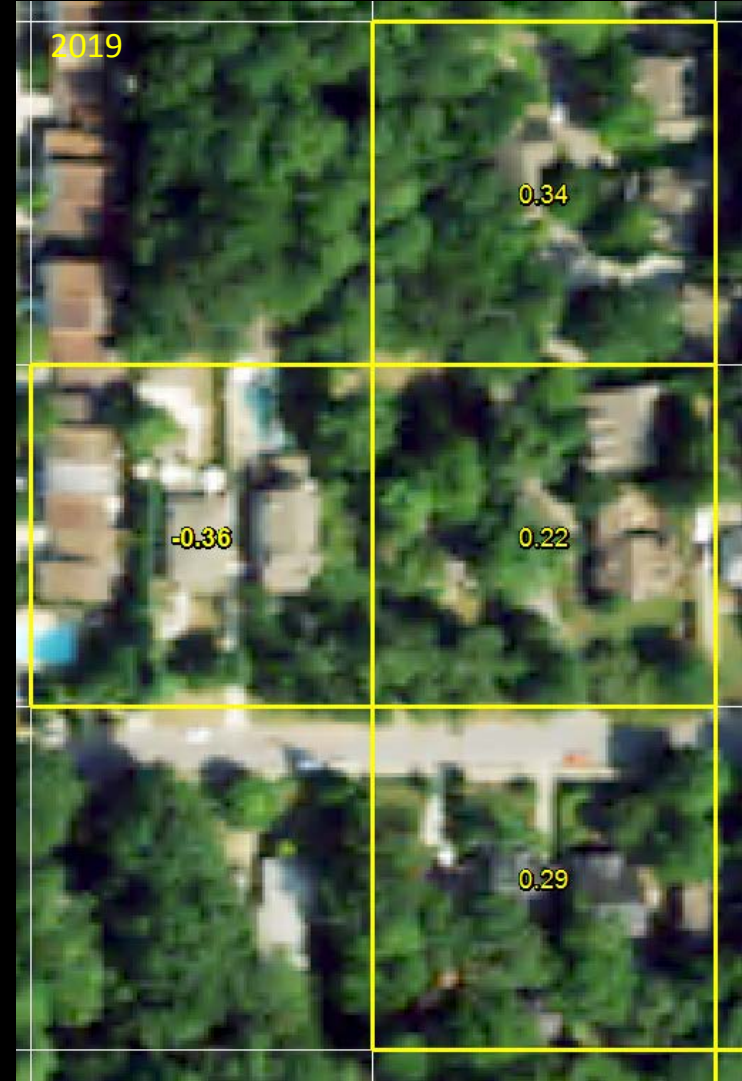# GAIN AND LOSS SITES (GLENN COURT AND FORKNER)

Glenn Court Decatur
Canopy Gain: Street trees

236 and 234 Forkner Drive
Canopy Loss: Single-Family
Development

2009

2019

2009

2019

0.34

-0.36

0.22

0.29

CREATING THE NEXT

GAIN – MEDIAN TREES EAST COLLEGE

2009

2009

Train tracks near kings hwy and east college
Canopy gain – median trees

2019

0.24
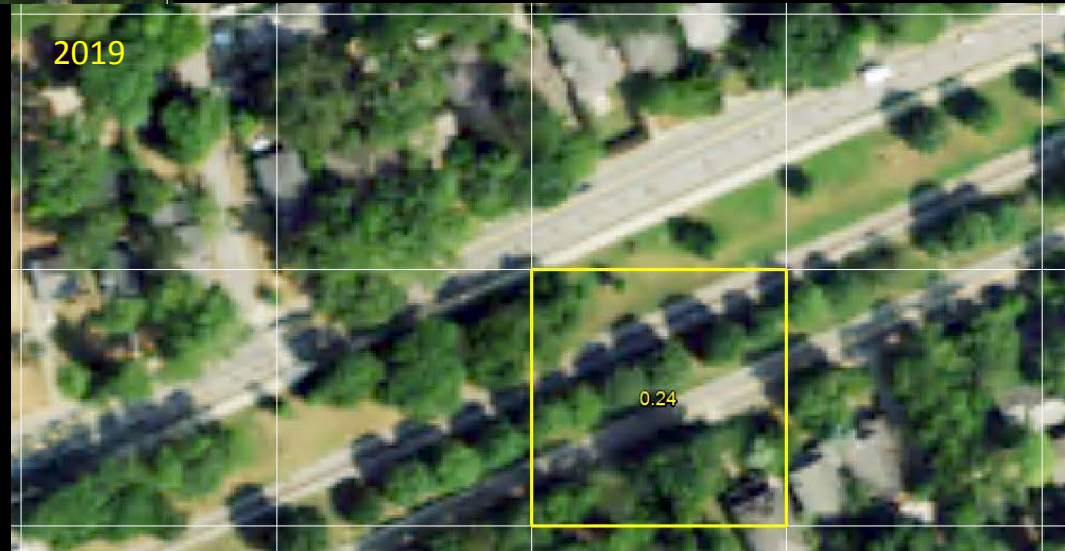
2019

GAIN – MEDIAN TREES EAST COLLEGE

LOSS SITES (MEAD, OLYMPIC, AND ANSLEY) – SF REDEVELOPMENT
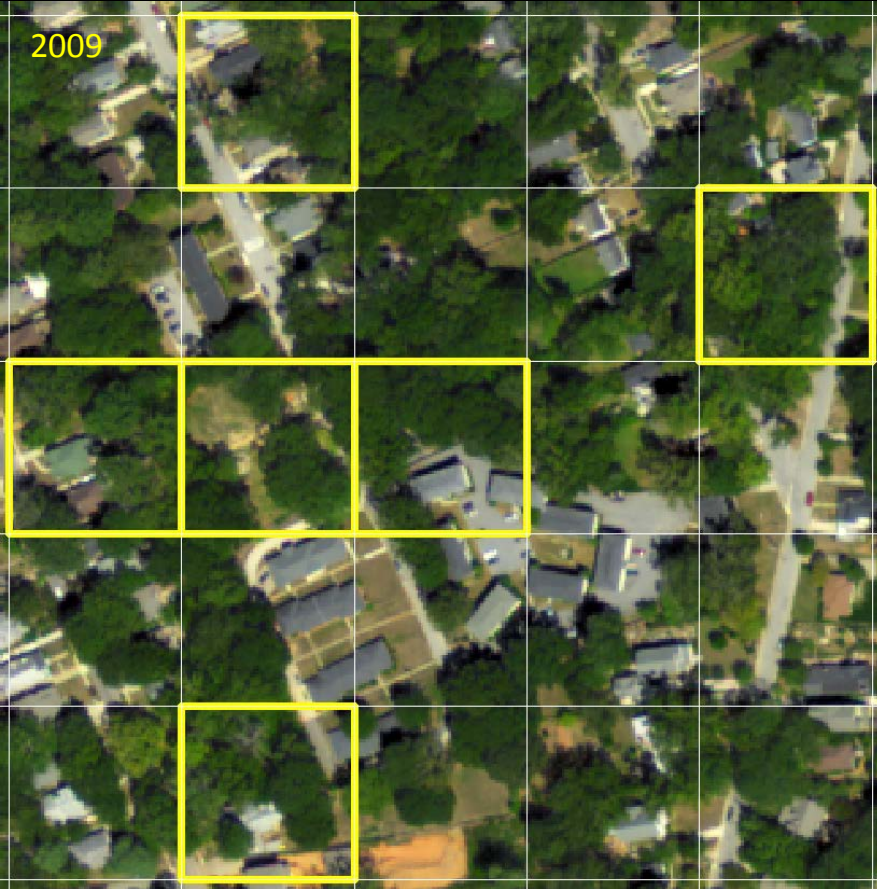
2009

2019

LOSS SITES (OLYMPIC) – SF REDEVELOPMENT

LOSS (OVERLOOK BLUFF) – NEW SF

2009
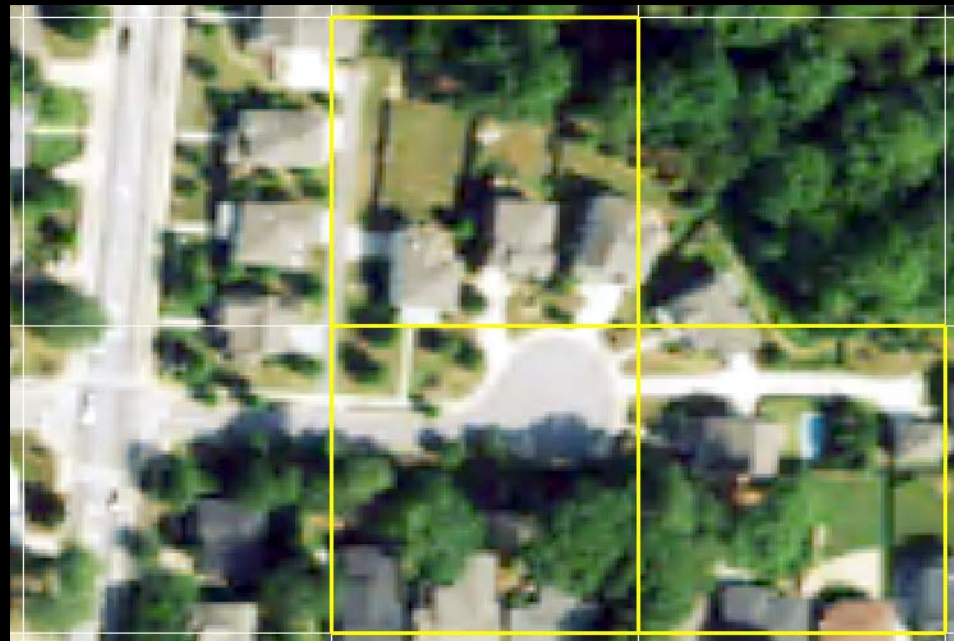
2019

LOSS (OVERLOOK BLUFF) – NEW SF

GAIN (GLENLAKE PARK AND CEMETERY)

2009

2019

GAIN (CEMETERY) – EAST SIDE SCRUBBY

GAIN (HILLCREST) – STREET TREES AND OLDER TREES

2009

2019

GAIN (HILLCREST) – STREET TREES AND OLDER TREES

GAIN (OAKHURST COMMONS) – STREET TREES

2009

2019

GAIN (OAKHURST COMMONS) – STREET TREES

ACCURACY: ASSESSING THE CANOPY ASSESSMENT

- Accuracy assessment
  (250 randomly stratified points)

- Compared results to Google Earth Historic Imagery

- 89% - 93% overall accuracy
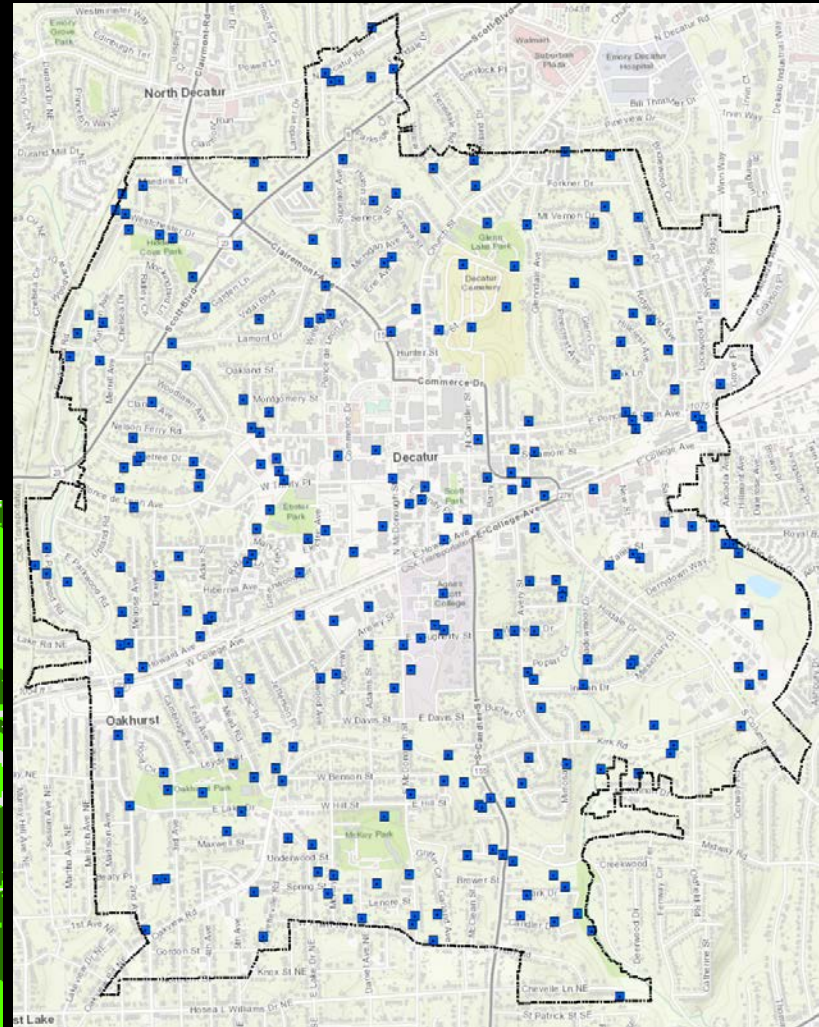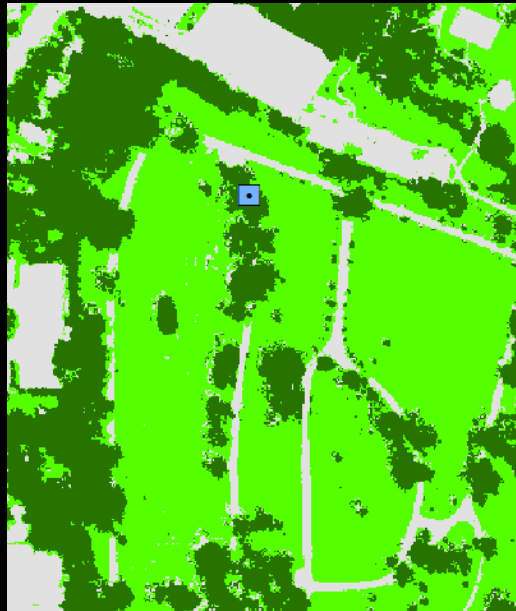
RESULTS

LAND COVER 2009, 2013, 2017, 2019
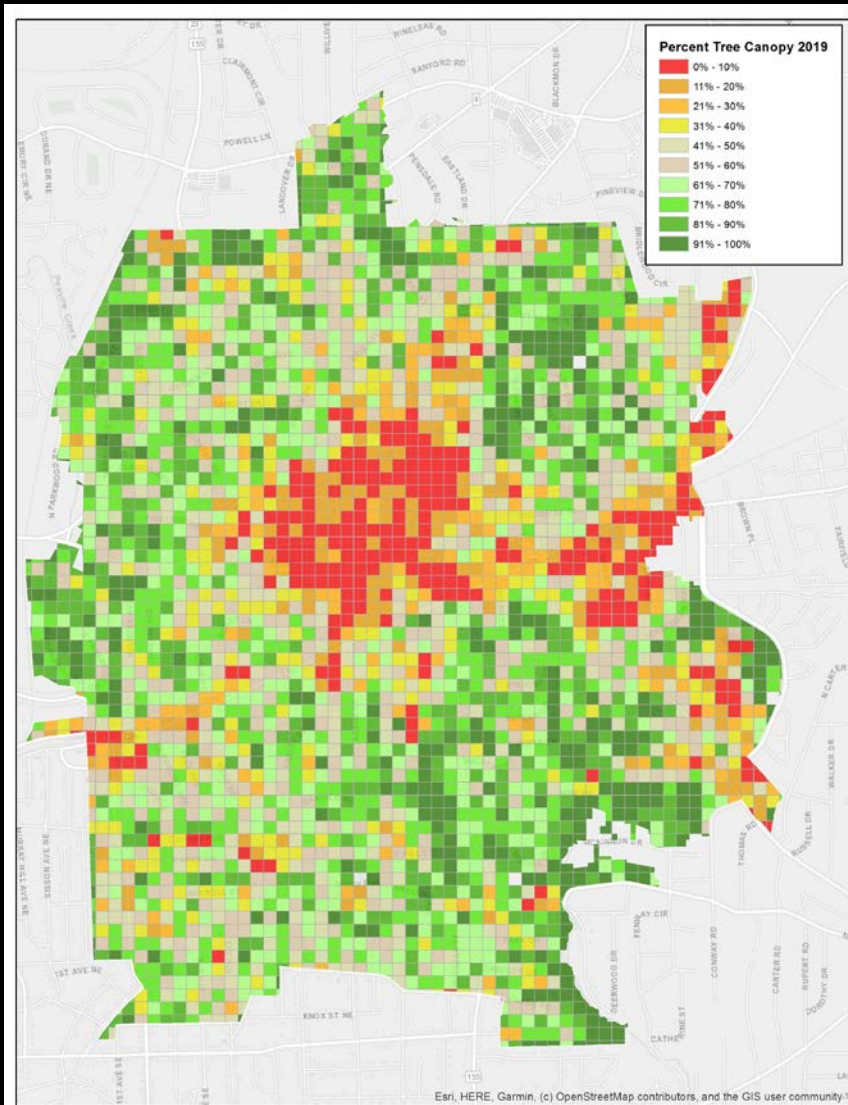
TREE CANOPY CHANGE 2009 - 2019

Tree Canopy Change 2009 - 2019 (Loss/Gain Greater than .2 acres)
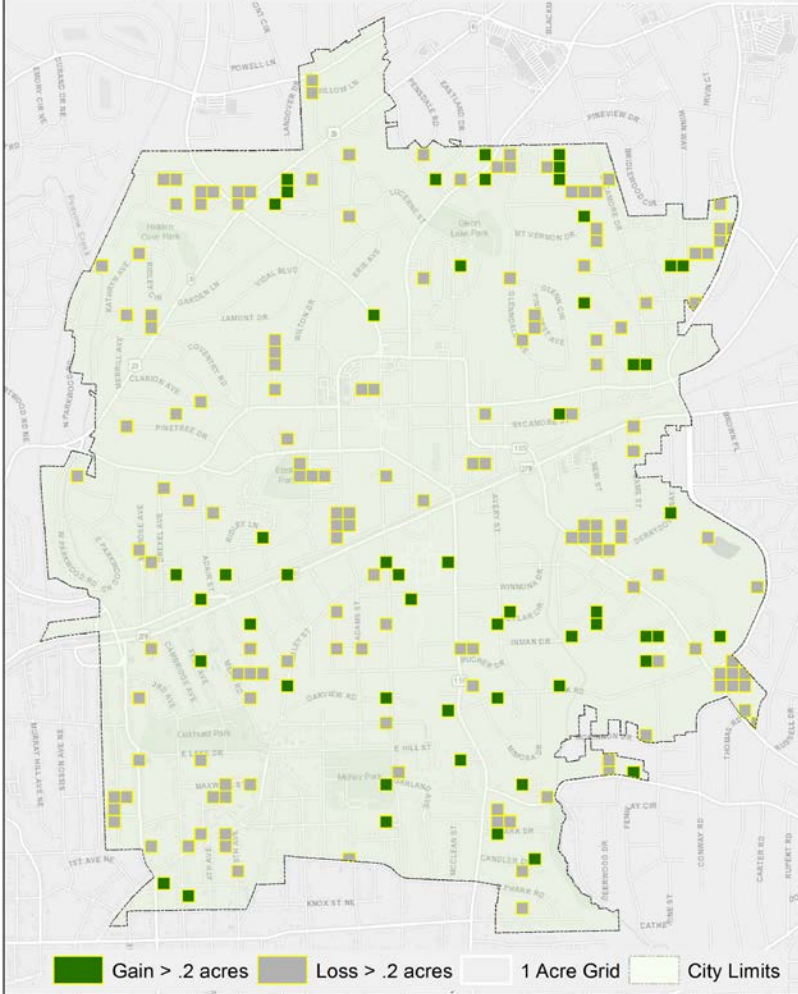
Legend: Gain > .2 acres | Loss > .2 acres | 1 Acre Grid | City Limits

AMOUNT OF CANOPY LOSS (131 ACRES) BY NUMBER OF GRID CELLS
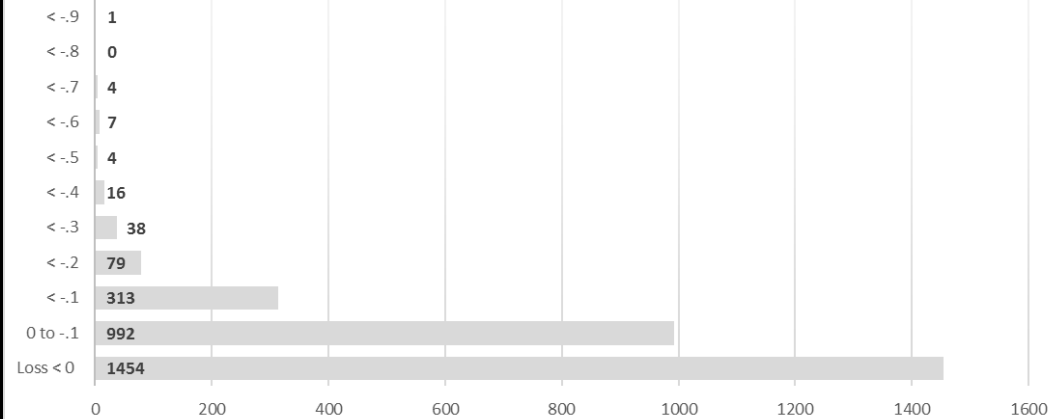
Category	Value
< -.9	1
< -.8	0
< -.7	4
< -.6	7
< -.5	4
< -.4	16
< -.3	38
< -.2	79
< -.1	313
0 to -.1	992
Loss < 0	1454

AMOUNT OF CANOPY GAIN (120 ACRES) BY NUMBER OF GRID CELLS
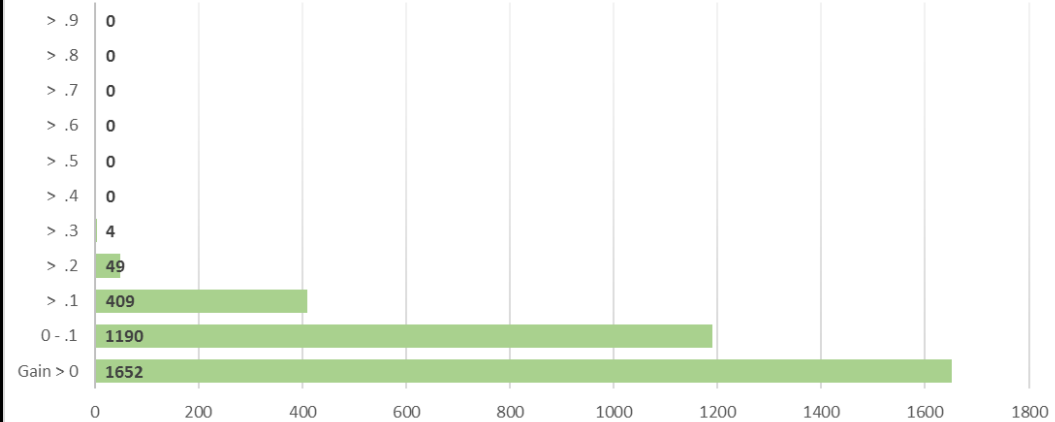
Category	Value
> .9	0
> .8	0
> .7	0
> .6	0
> .5	0
> .4	0
> .3	4
> .2	49
> .1	409
0 - .1	1190
Gain > 0	1652

CREATING THE NEXT

QUALIFIED CANOPY CHANGE

Qualified Canopy Gain 2009 -2019 (Inspected Sites)

- Young Tree Growth: 35
- Typical Growth: 18

Qualified Canopy Loss 2009 -2019 (inspected sites)

- Single-Family: 60
- Maintenance: 29
- Multi-Family: 18
- Institutional: 18
- Expansion: 14
- Mixed Use: 12
- Single-Family Subdivision: 7
- Commericial: 3
- Natural: 2
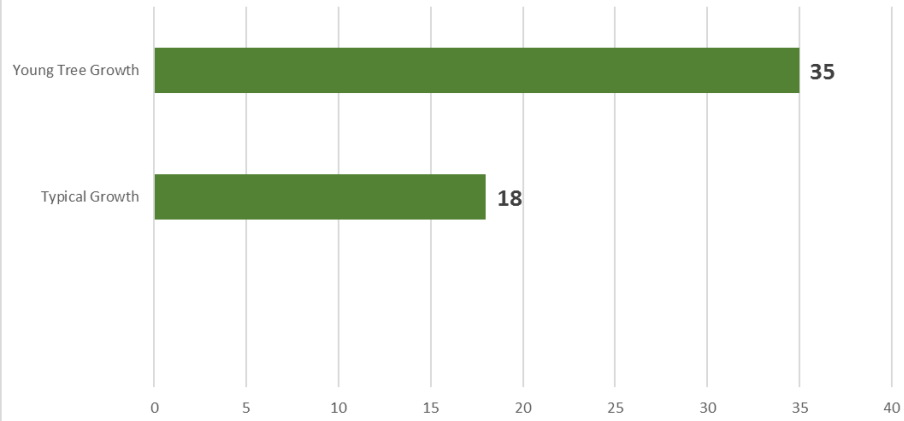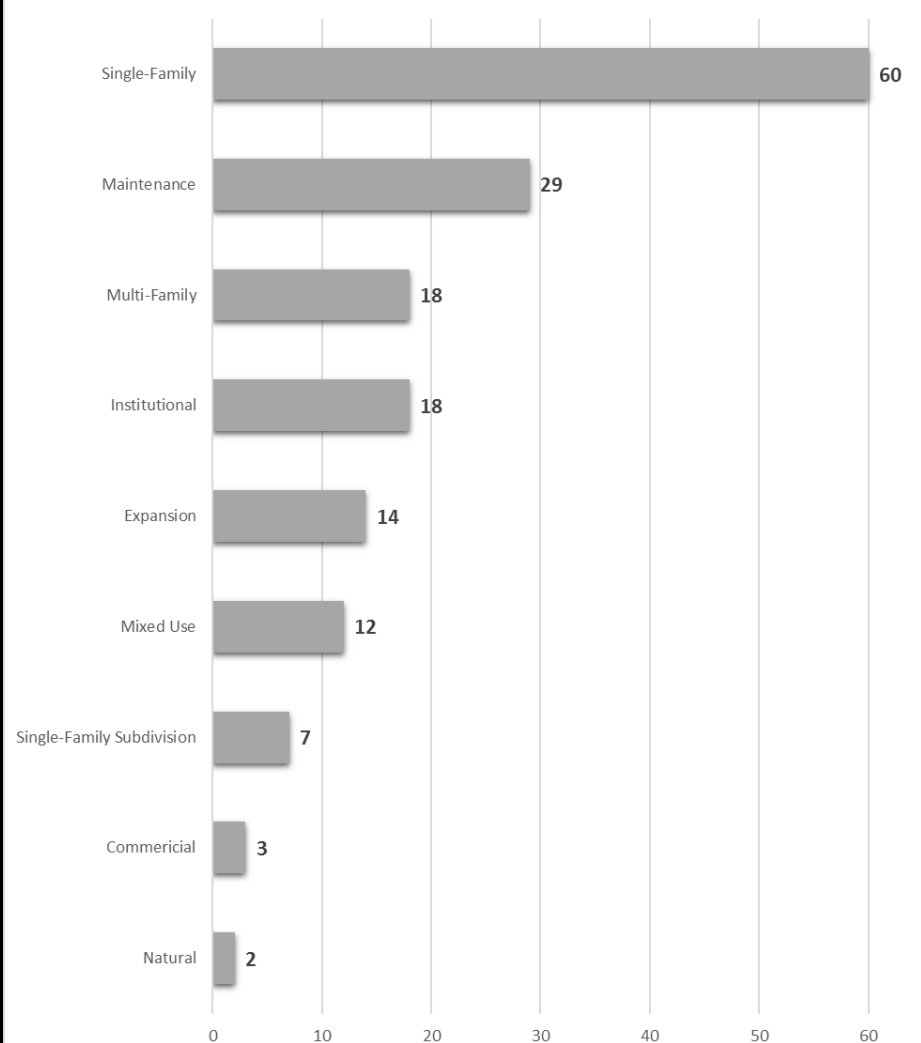
LAND USE AND CANOPY

2009 LAND COVER BY FUTURE LAND USE

Land Use	Tree Canopy	Non-Tree Vegetation	Non-Vegetation
LDR	73%, 1,101	15%, 222	12%, 187
Park	57%, 70	34%, 42	9%, 11
MDR	46%, 87	20%, 37	34%, 65
I	46%, 172	26%, 99	28%, 106
ROW	40%, 182	21%, 97	39%, 179
C - HDR	23%, 62	16%, 44	61%, 167

■ Tree Canopy   ■ Non-Tree Vegetation   ■ Non-Vegetation

2019 LAND COVER BY FUTURE LAND USE

Land Use	Tree Canopy	Non-Tree Vegetation	Non-Vegetation
LDR	72%, 1,091	12%, 187	15%, 232
Park	57%, 70	33%, 41	10%, 12
MDR	48%, 91	13%, 24	39%, 75
I	45%, 169	22%, 84	33%, 124
ROW	42%, 193	15%, 67	43%, 199
C - HDR	19%, 52	11%, 29	70%, 191

■ Tree Canopy   ■ Non-Tree Vegetation   ■ Non-Vegetation

CREATING THE NEXT

ZONING AND CANOPY

2009 LAND COVER BY 2019 ZONING

Zoning	Tree Canopy
R-60	71%, 1,059
ROW	40%, 182
I	44%, 164
R-85	81%, 123
RS-17	45%, 67
C-2	16%, 20
MU	28%, 25
C-1	26%, 9
RM-18	48%, 14
RM-43	39%, 5
RM-60	26%, 2
RM-22	87%, 3
PO	49%, 1
C-3	23%, 0
NMU	78%, 0

Tree Canopy ▪ Non-Tree Vegetation ▪ Non-Vegetation
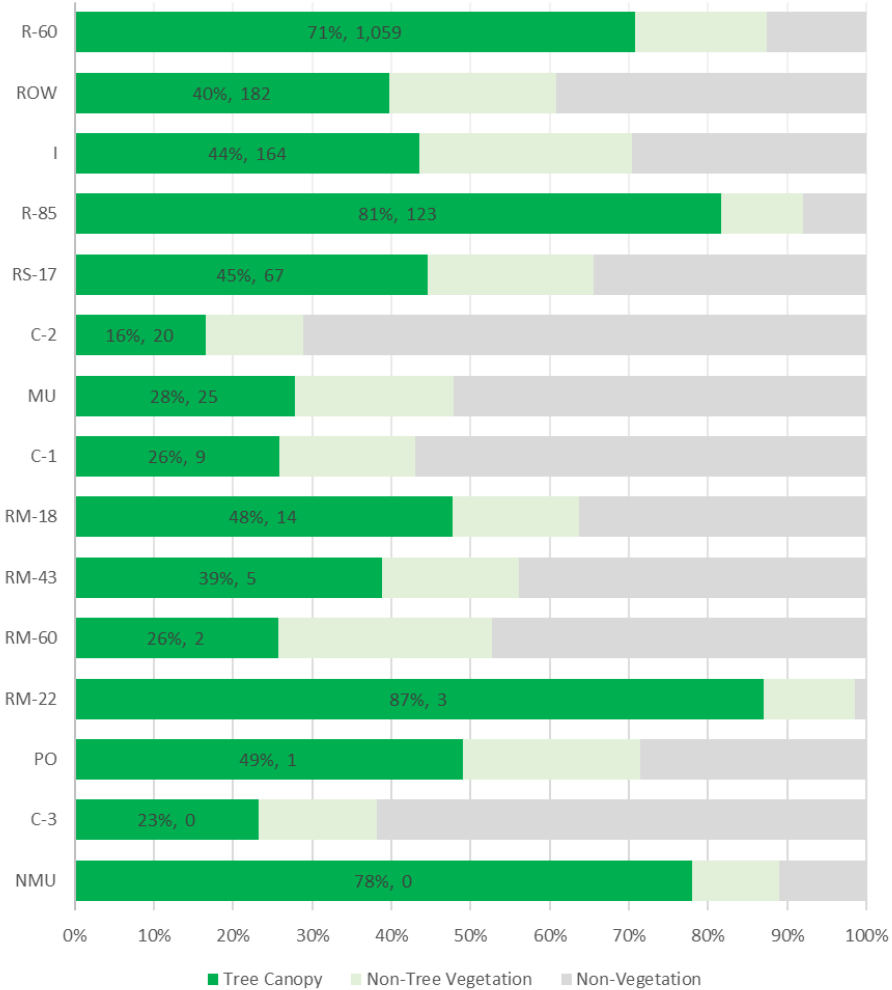
2019 LAND COVER BY ZONING

Zoning	Tree Canopy
R-60	70%, 1,049.2
ROW	42%, 192.5
I	43%, 161.0
R-85	81%, 122.6
RS-17	49%, 73.0
C-2	12%, 14.6
MU	24%, 21.8
C-1	25%, 8.9
RM-18	52%, 15.2
RM-43	45%, 5.8
RM-60	8%, 0.5
RM-22	1%, 0.1
PO	45%, 0.9
C-3	11%, 0.1
NMU	79%, 0.1

Tree Canopy ▪ Non-Tree Vegetation ▪ Non-Vegetation

CREATING THE NEXT

WATERSHEDS AND CANOPY

South Fork Peachtree Creek
2009 Canopy = 58%
2019 Canopy = 59%

Peavine Creek
2009 Canopy = 52%
2019 Canopy = 50%

Shoal Creek
2009 Canopy = 61%
2019 Canopy = 61%

Sugar Creek
2009 Canopy = 60%
2019 Canopy = 58%

Dolittle Creek
2009 Canopy = 54%
2019 Canopy = 53%

Legend: Creeks, Watersheds

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

2019 LAND COVER BY WATERSHED

Watershed	Tree Canopy19	Non-Tree Vegetation	Non-Vegetation
Shoal Creek	61%, 644	16%, 172	16%, 236
South Fork Peachtree Creek	59%, 407	14%, 99	14%, 183
Sugar Creek	58%, 150	16%, 42	16%, 68
Dolittle Creek	53%, 4	17%, 1	17%, 2
Peavine Creek	50%, 462	13%, 117	13%, 343

■ Tree Canopy19 ■ Non-Tree Vegetation ■ Non-Vegetation

CREATING THE NEXT

IMPERVIOUS SURFACES AND 2019 TREE CANOPY

Impervious Surface in Decatur

Impervious: 1,223 — 42%
Non-Impervious: 1,708 — 58%

Impervious Surface and Tree Canopy

Not Covered: 799 — 65%
Canopy Covered: 424 — 35%
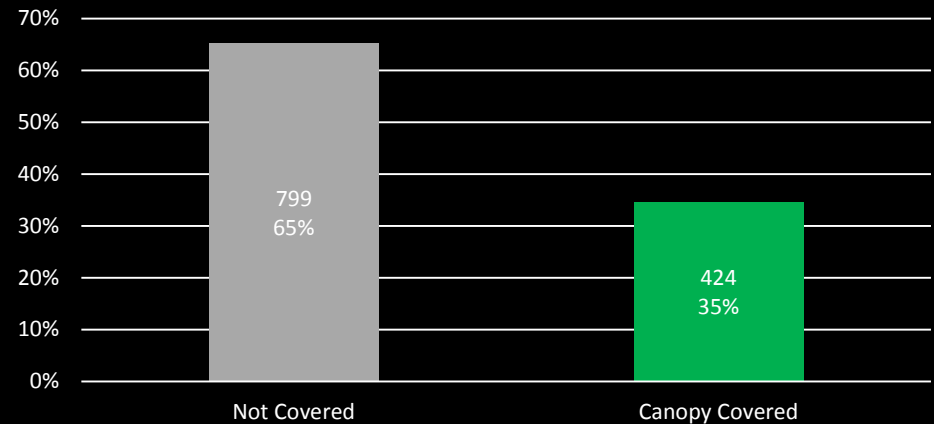
I-TREE CANOPY ECOSYSTEM BENEFITS – 2019 CANOPY

Benefit	Benefit Description	Value (USD)	Amount (Tons)
CO	Carbon Monoxide removed annually	$ 1,388	0.87
NO2	Nitrogen Dioxide removed annually	$ 1,915	5.01
O3	Ozone removed annually	$ 64,077	44.05
PM2.5	Particulate Matter less than 2.5 microns removed annually	$ 155,701	2.66
SO2	Sulfur Dioxide removed annually	$ 294	2.58
PM 10	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$ 65,590	10.46
CO2 seq	CO2 sequestered annually in trees	$ 388,344	8,349.69
CO2 stored	CO2 stored in trees (not an annual rate)	$ 9,799,982	210,706.99

i-Tree Canopy Annual Tree Benefit Estimates based on these values in lbs/acre/yr and USD/T/yr: CO 1.246 @ 1,333.50 USD | NO2 5.952 @ 382.41 USD | O3 51.980 @ 1,454.50 USD | PM2.5 3.177 @ 58,466.48 USD | SO2 3.085 @ 114.36 USD | PM10* 12.538 @ 6,268.44 USD | CO2seq 10,010.267 @ 46.51 USD | CO2 stored is a total biomass amount of 251,395.359 @ 46.51 USD

IMPLICATIONS: THE FUTURE OF THE CITY'S TREES

- Overall canopy values are stable

- Most of the city's trees are on private property – low density residential

- Development has steadily increased over the last decade

- Single-Family redevelopment is the biggest cause of loss

- Many trees in the Right of Way – 40% canopy

- Canopy gain in newer developments, especially younger trees, street trees

- Abundance of older trees. Consider strategies for renewal and replanting
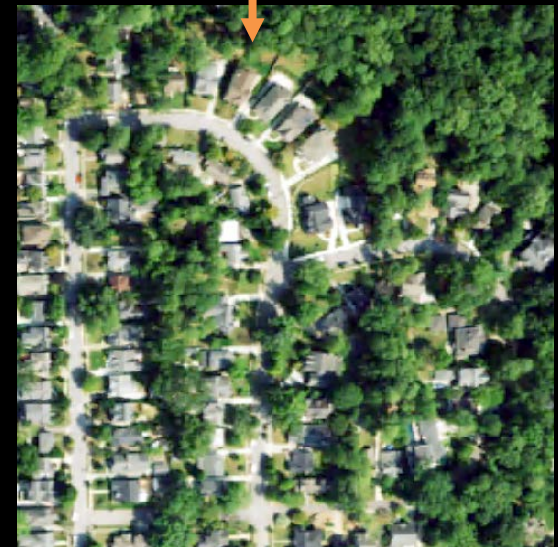
SPECIFIC RECOMMENDATIONS (FOR CONSIDERATION)

- Protect remaining large tracts of undisturbed forest and woodland areas. Consider measures to reduce impacts of invasive plants.

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

- Implement conservation measures for new subdivisions and townhouse developments.

- Ensure continued planting of trees that have similar canopies to trees that were removed and encourage the use of native and naturalized non-invasive trees to create a diverse sustainable urban canopy.