

COASTAL GEORGIA 2010-2019
TREE CANOPY ASSESSMENT, CHANGE
DETECTION, OUTREACH AND TRAINING

Coastal Incentive Grant



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CENTER FOR SPATIAL PLANNING ANALYTICS
AND VISUALIZATION

CREATING THE NEXT



AGENDA

- What is a Canopy Study?
- Project Overview
- Canopy Assessment Methods
- 2019 Results
- Canopy Change 2010 to 2019
- Site Visits
- Interpreting Change
- Results
- Resources



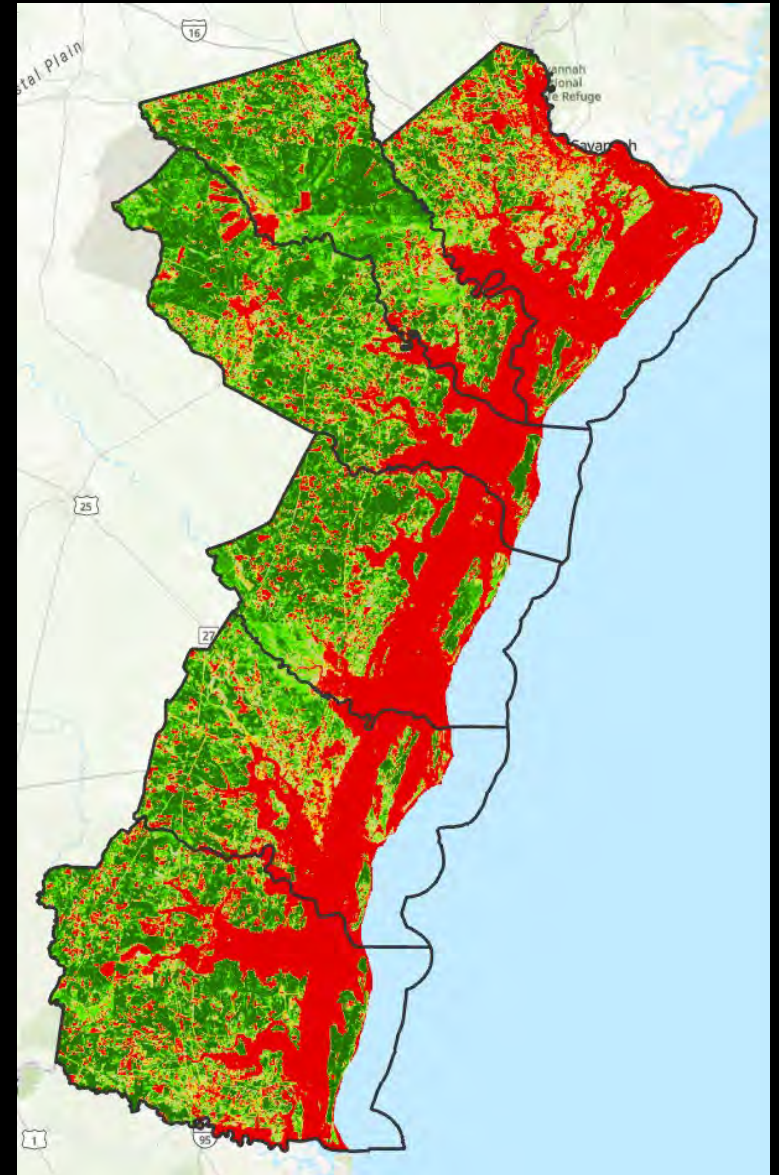
WHAT IS A CANOPY STUDY?

- *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
- Measures quantity, not quality
- Ground-truthing and other data help interpret patterns of change
- *Goal*: inform decision-making, policy & sustainability efforts
- Change analysis reveals *patterns* of change



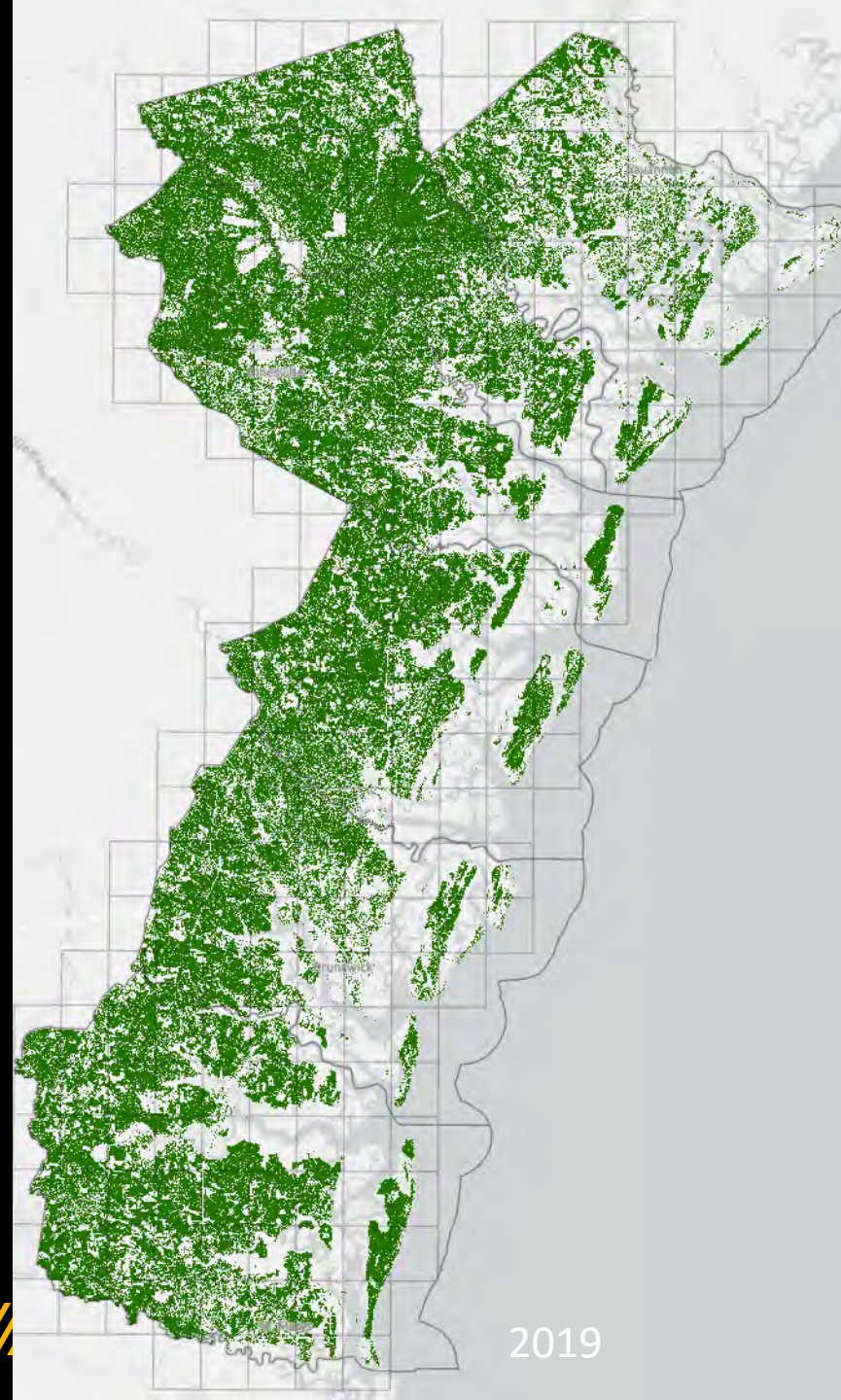
PROJECT OVERVIEW

- Coastal Georgia 2010-2019 Tree Canopy Assessment, Change Detection, Outreach and Training
- Georgia Department of Natural Resources Coastal Resources Division Coastal Incentive Grant
- Canopy Assessments for 2010 and 2019
- Change Analysis
- Interpreting Change
- Tools, Outreach and Training



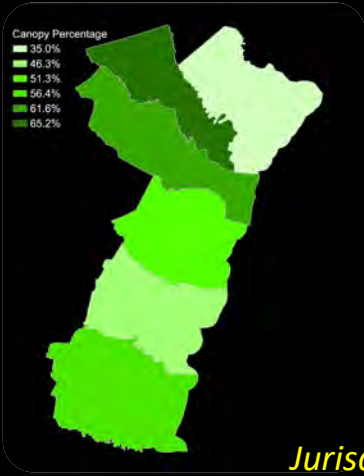
CANOPY ASSESSMENT METHODS

- USDA NAIP imagery for 2010 and 2019
- 251 Images for each time period
- Determined tree canopy through imagery classification (machine learning – training samples supervised classification)
- Start with three land cover classes
 - Trees
 - Non-Tree Vegetation
 - Non Vegetation
- Manual reclassification-cleaning
- Extract canopy and create mosaic
- Conduct accuracy assessments
- Field verification to qualify findings

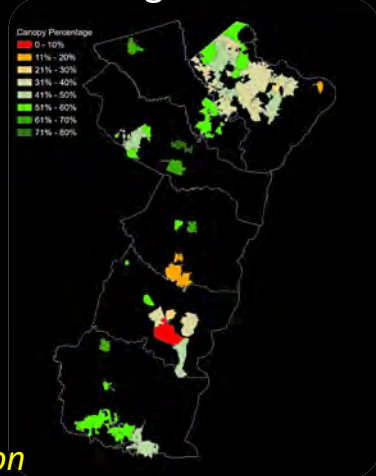


GEOGRAPHIC SUMMARIES: QUANTIFYING CANOPY

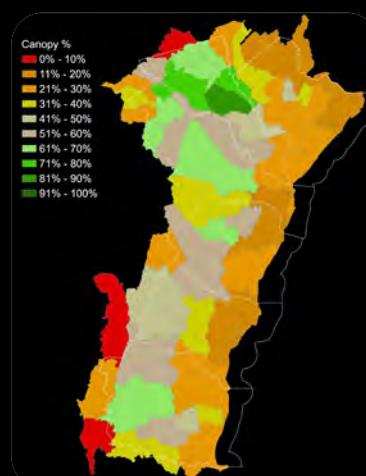
Counties



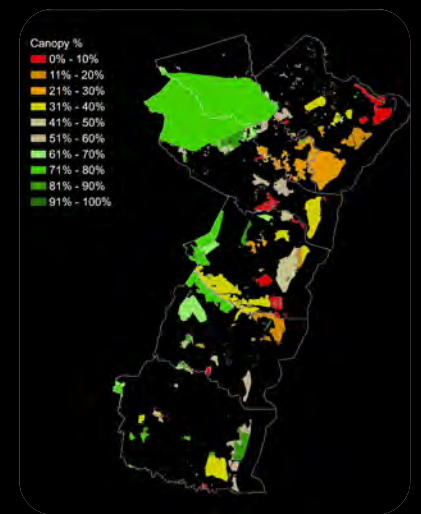
Census Designated Places



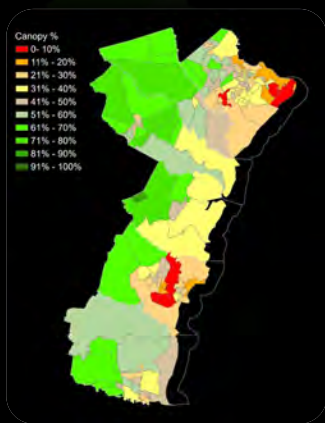
HUC 12 Watersheds



Protected Areas (PADUS)



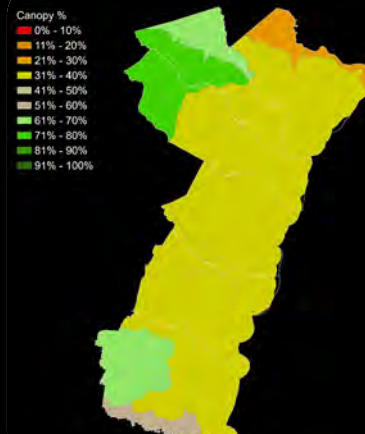
Census Tracts



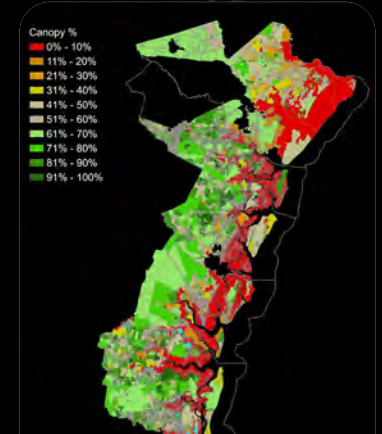
Coastal Grid (6 Acres)



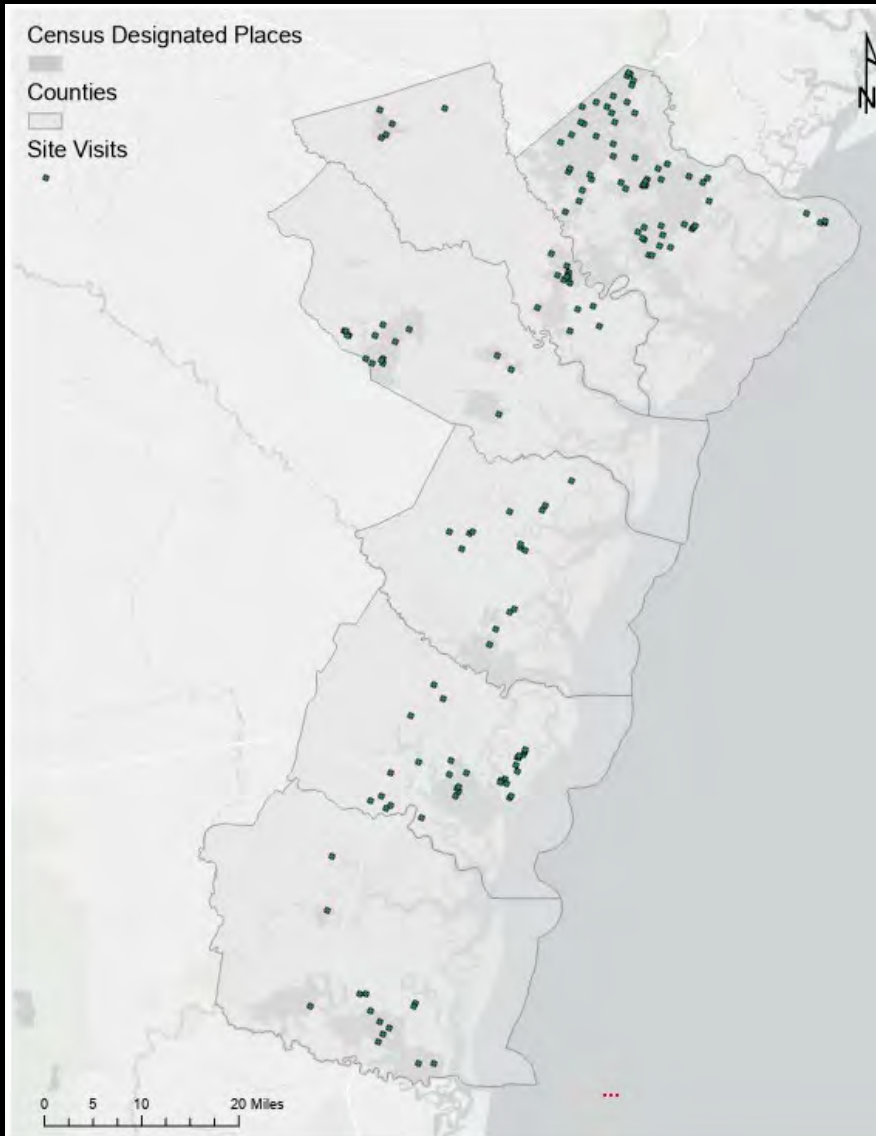
HUC 8 Watersheds



Zoning



QUALIFYING CANOPY CHANGE (2008-2018): SITE VISITS AND INSPECTIONS



Confirm study findings and further characterize canopy change

Rural (25 acres) and Urban Grids (6 acres)

Identified and Inspected sites with + or – 70% canopy gain or loss

Urban Grid:

- 1844 sites losing canopy (65%)
- 986 sites gaining canopy (35%)

Rural Grid:

- 1125 sites losing canopy (67%)
- 556 sites gaining canopy (33%)

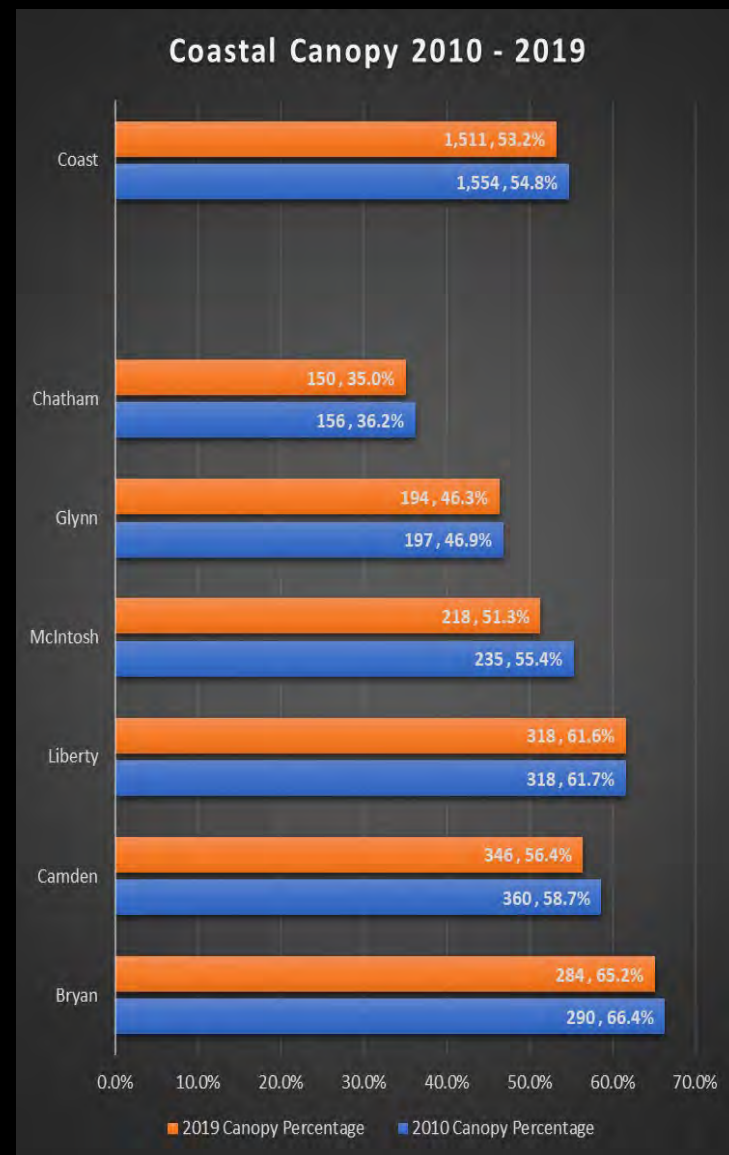
Identified sites (157) for field visits to validate causes of gain or loss

RESULTS

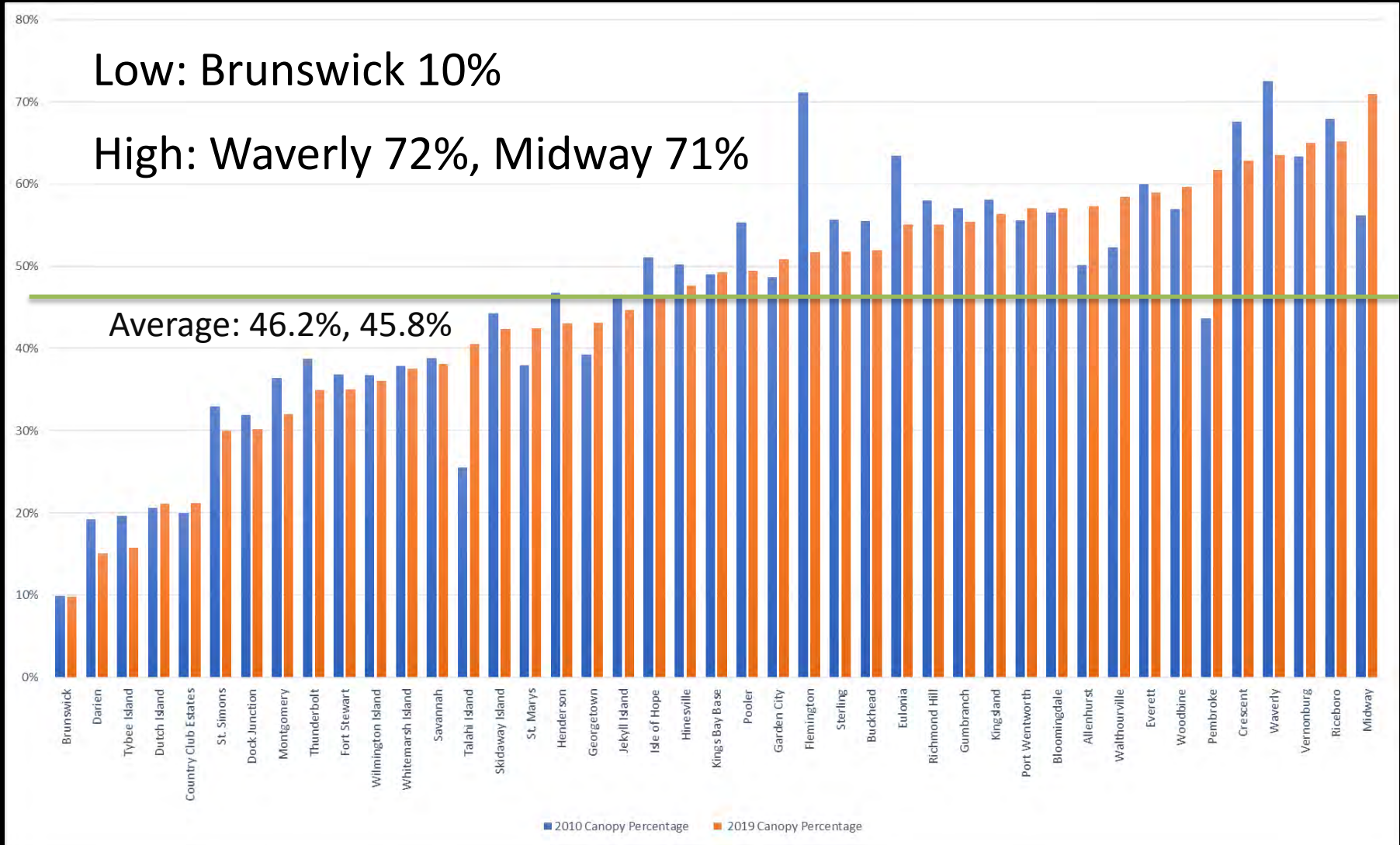


FINDINGS: 2010 AND 2019 ASSESSMENTS (COAST/COUNTIES)

- Canopy calculated for land area only (2,840 sq. miles land and 790 sq. miles water)
- 54.8% in 2010, 53.2% in 2019
- Range from a low of 35% in Chatham in 2019 to a high of 66.4% in Bryan in 2010
- Much of coastal Georgia's trees are commercial timber lands (cycle of gain/loss)
- Non-timber canopy loss driven by development (industrial, residential, commercial) in urban areas (north coast)
- Non-timber gain is primarily regrowth
- Distribution of tree canopy driven by land use (high on AG, low on commercial)
- 540 square miles on protected lands (36% of all coastal canopy)



FINDINGS: 2010 AND 2019 ASSESSMENTS – CENSUS PLACES

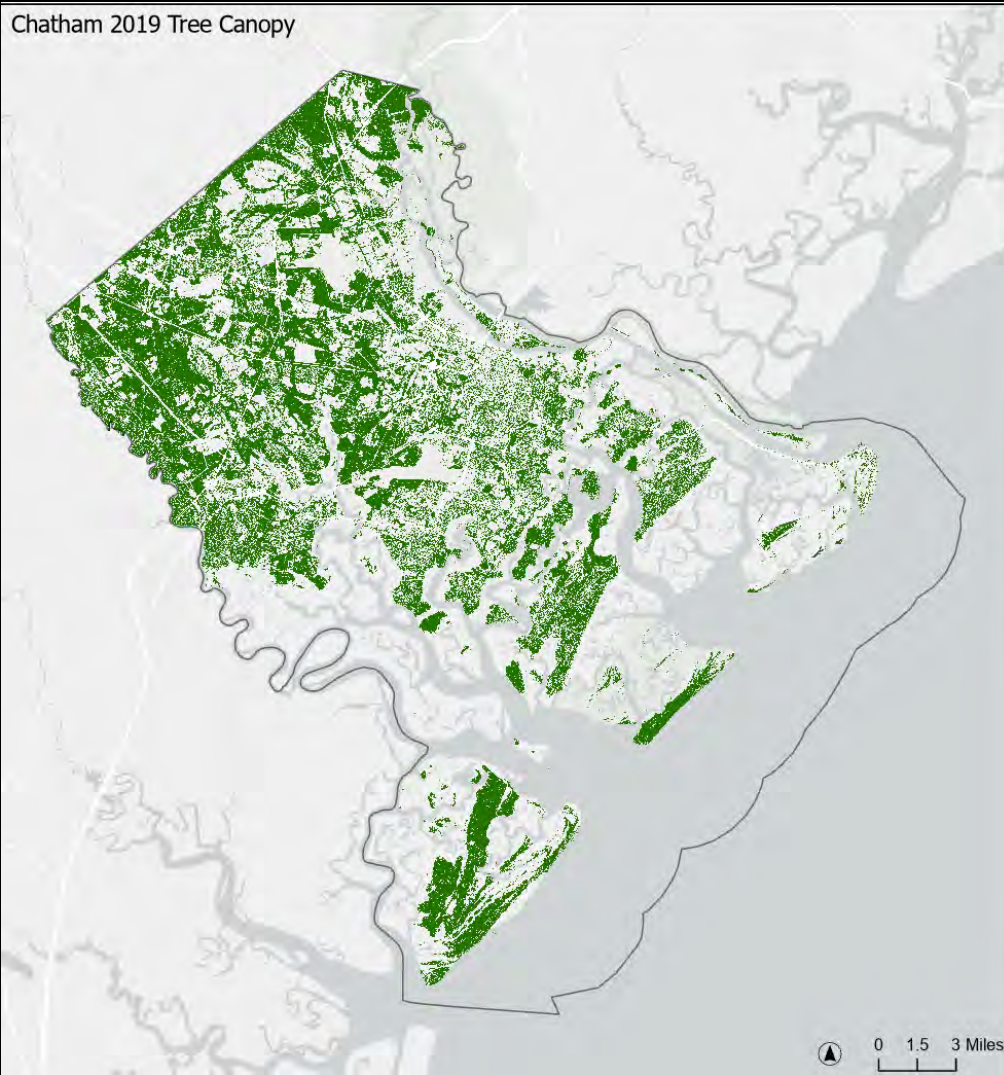


CHATHAM

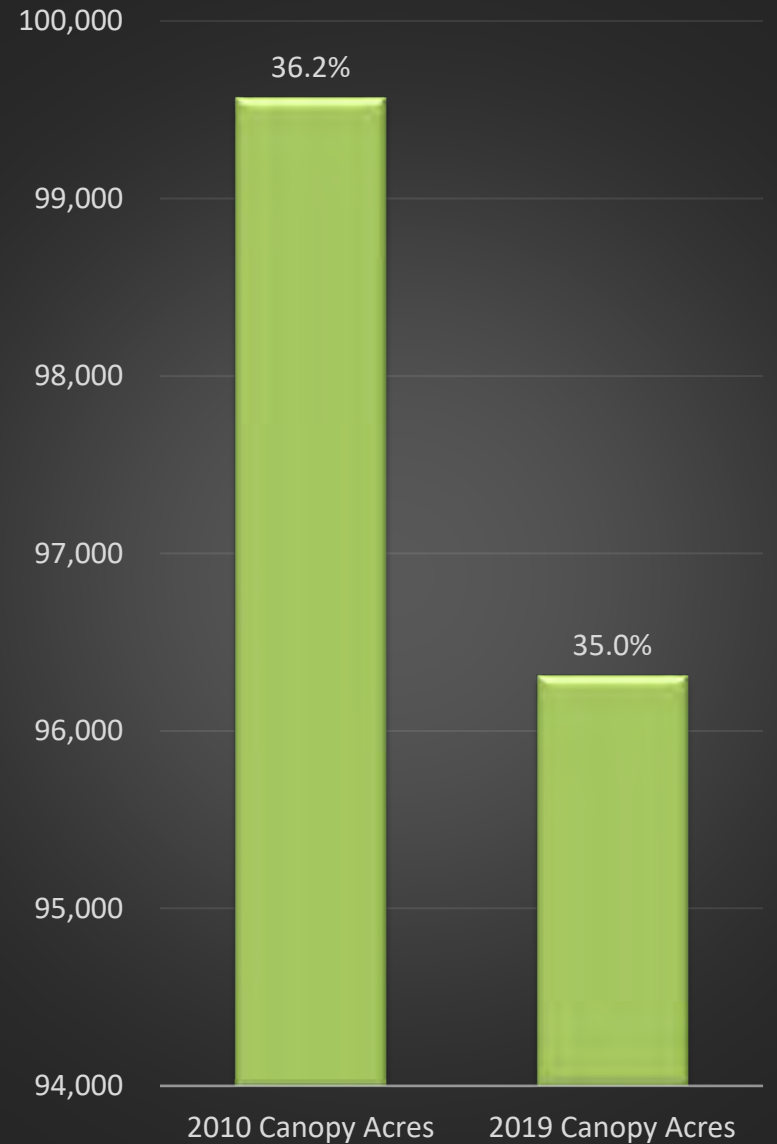
Results and Findings

FINDINGS: CHATHAM COUNTY

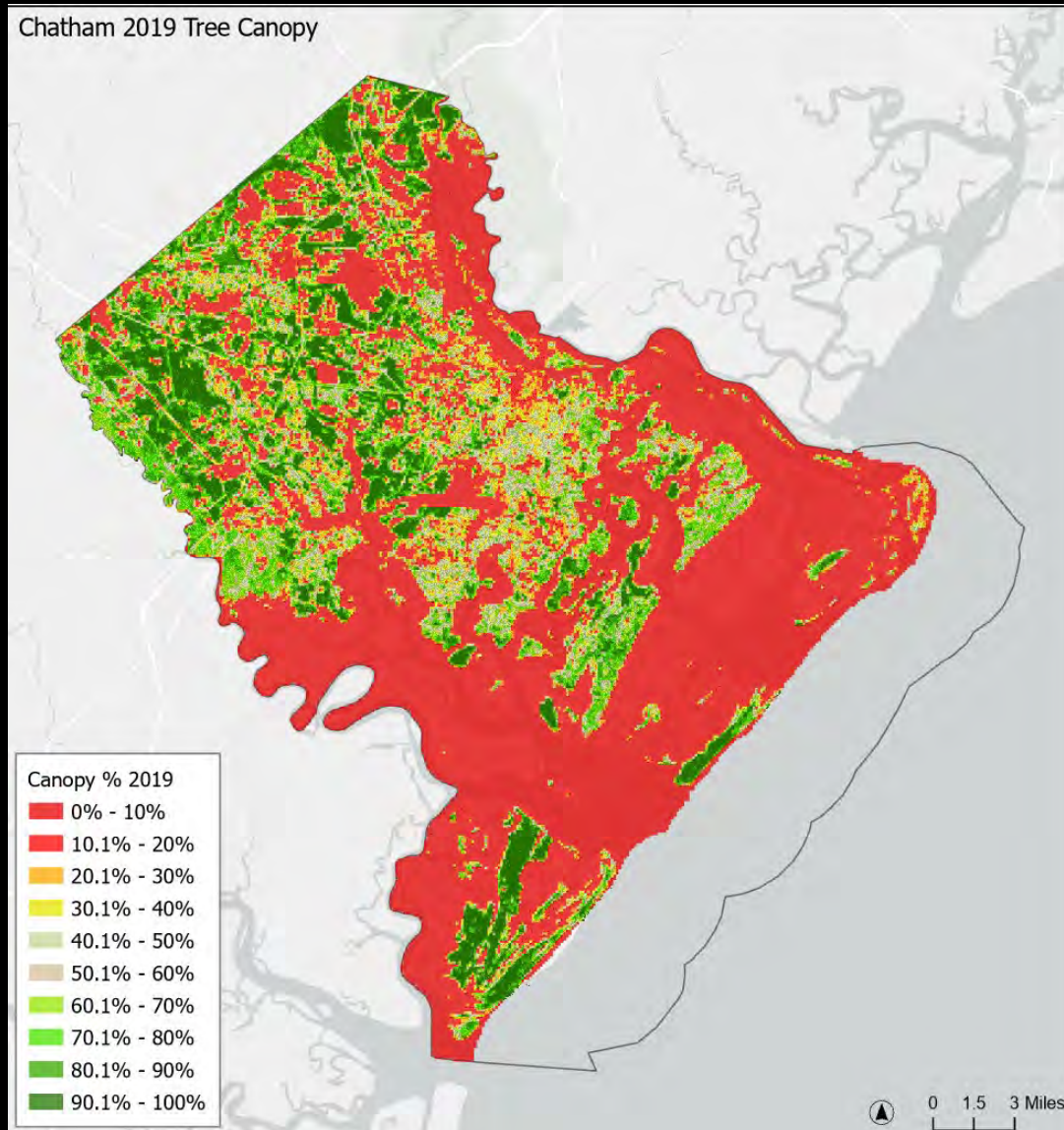
Chatham 2019 Tree Canopy



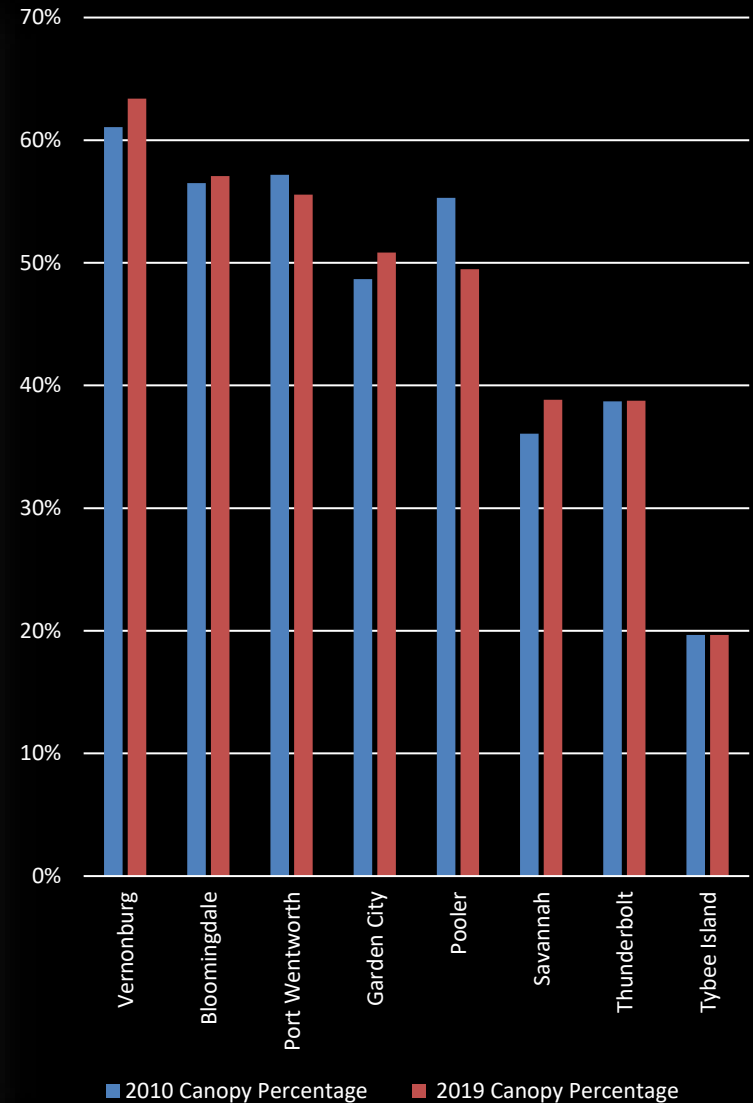
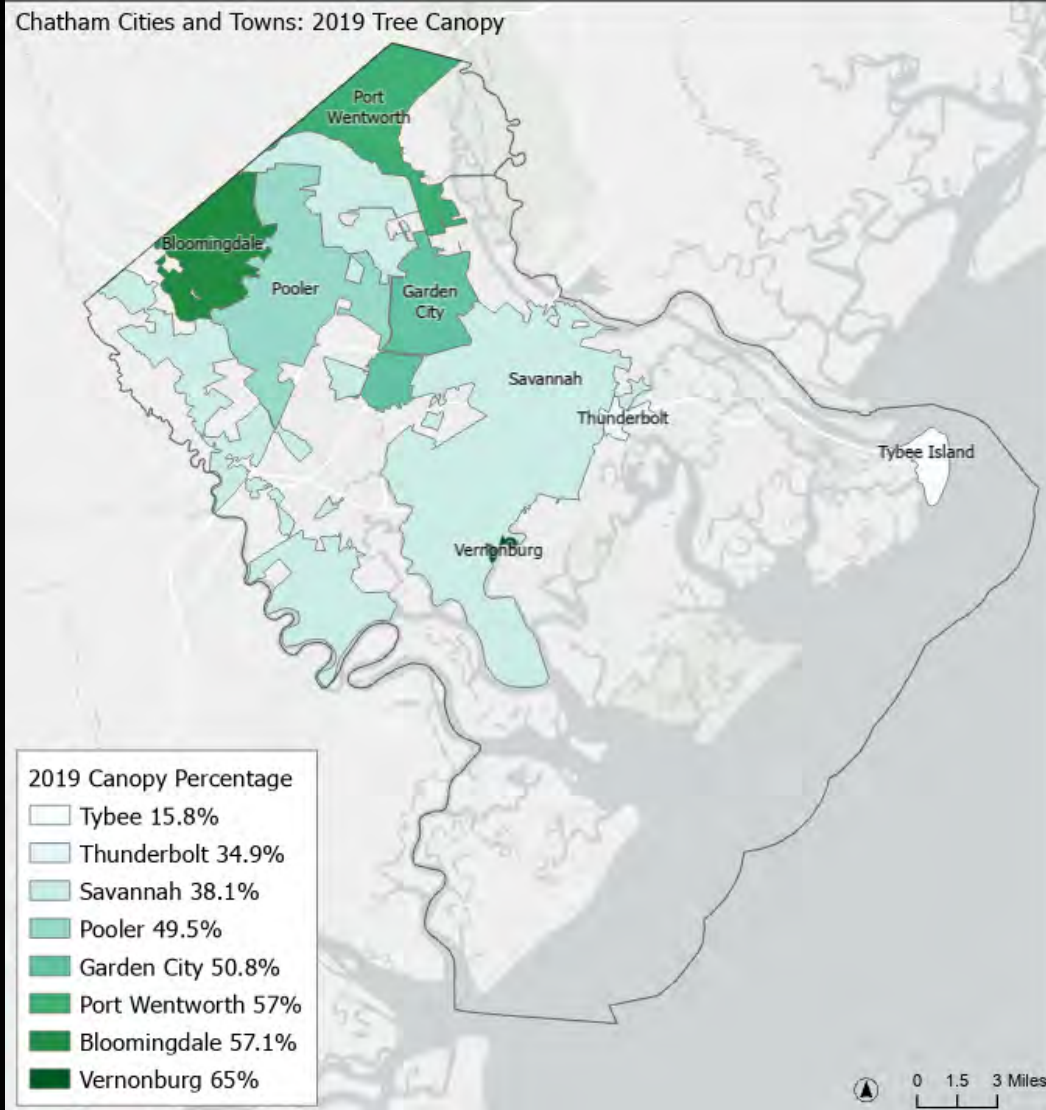
Land Area (SQMI)	Water Area (SQMI)	Total Area (SQMI)
129,763.4	404,325.8	429.5



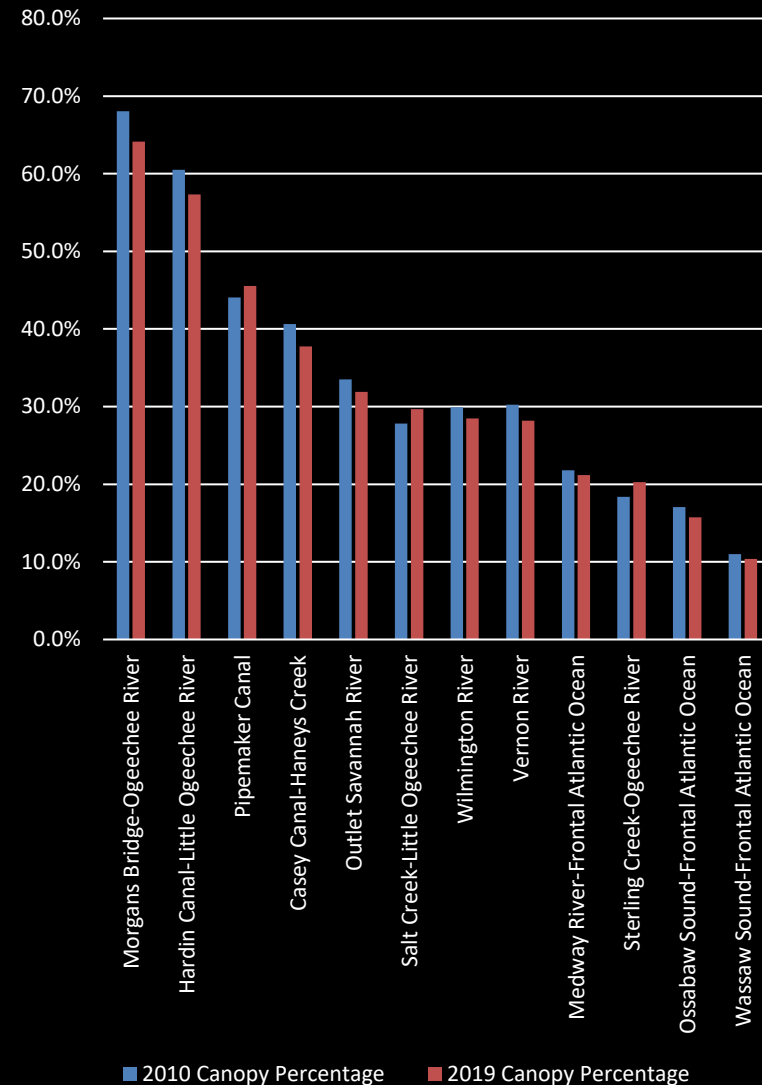
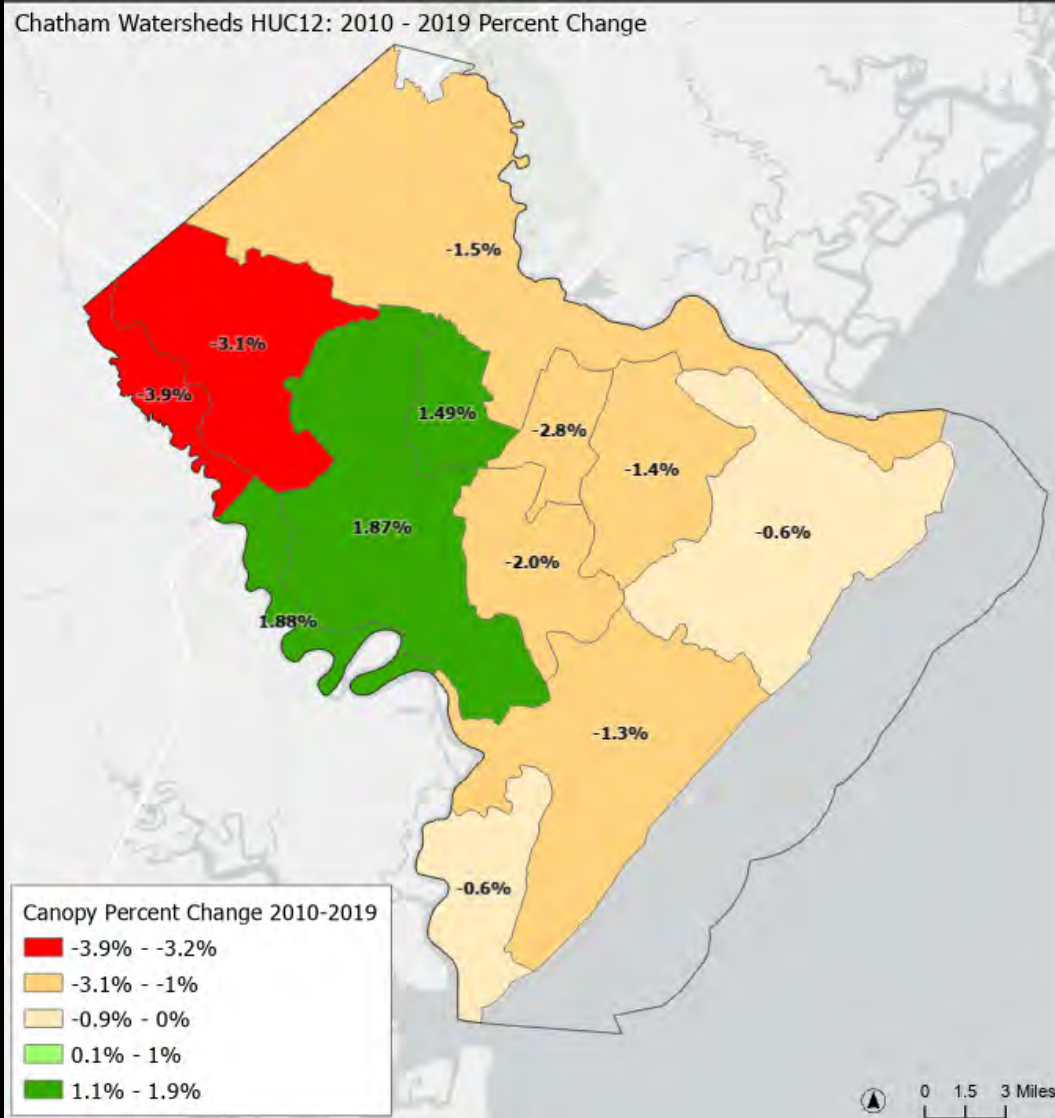
FINDINGS: CHATHAM COUNTY



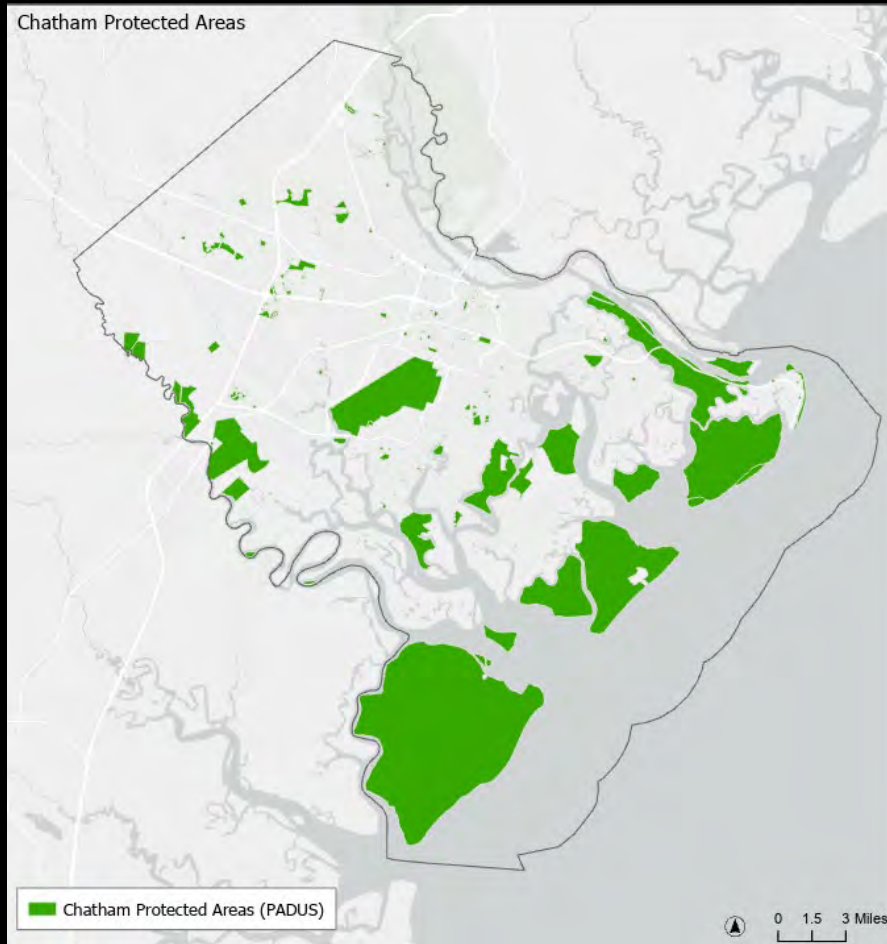
FINDINGS: CHATHAM COUNTY CITIES AND TOWNS



FINDINGS: CHATHAM COUNTY HUC12 WATERSHEDS



FINDINGS: CHATHAM COUNTY PROTECTED AREAS

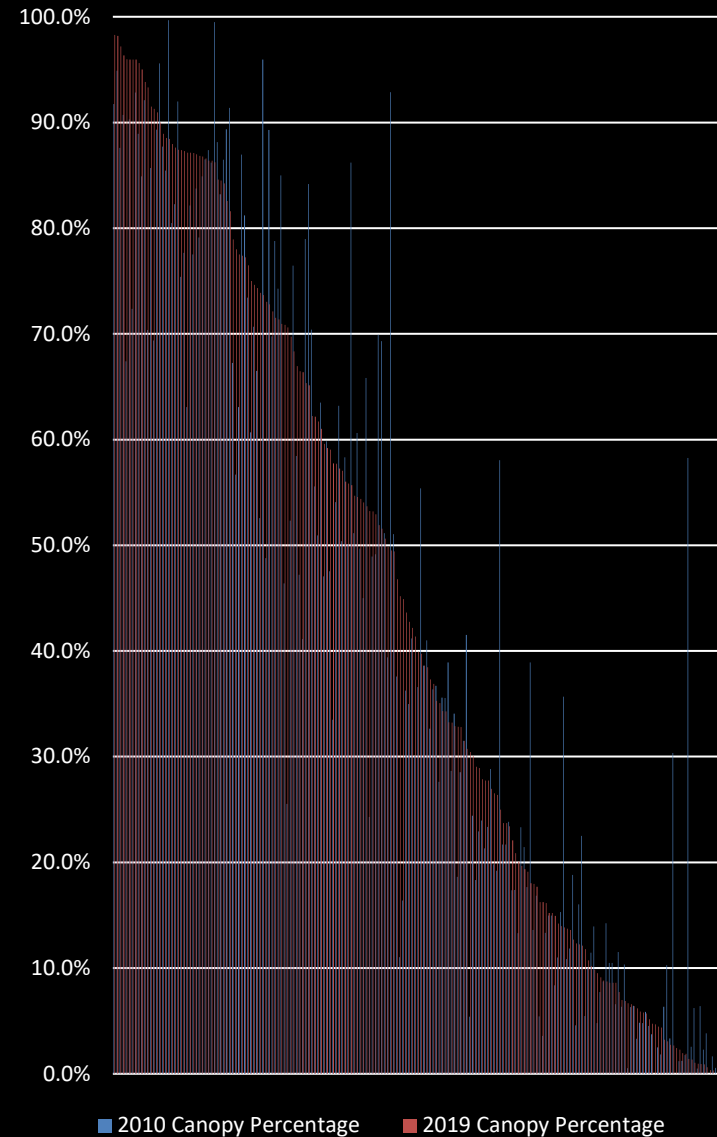


201 Protected Areas: 81,702 acres, 35% of county

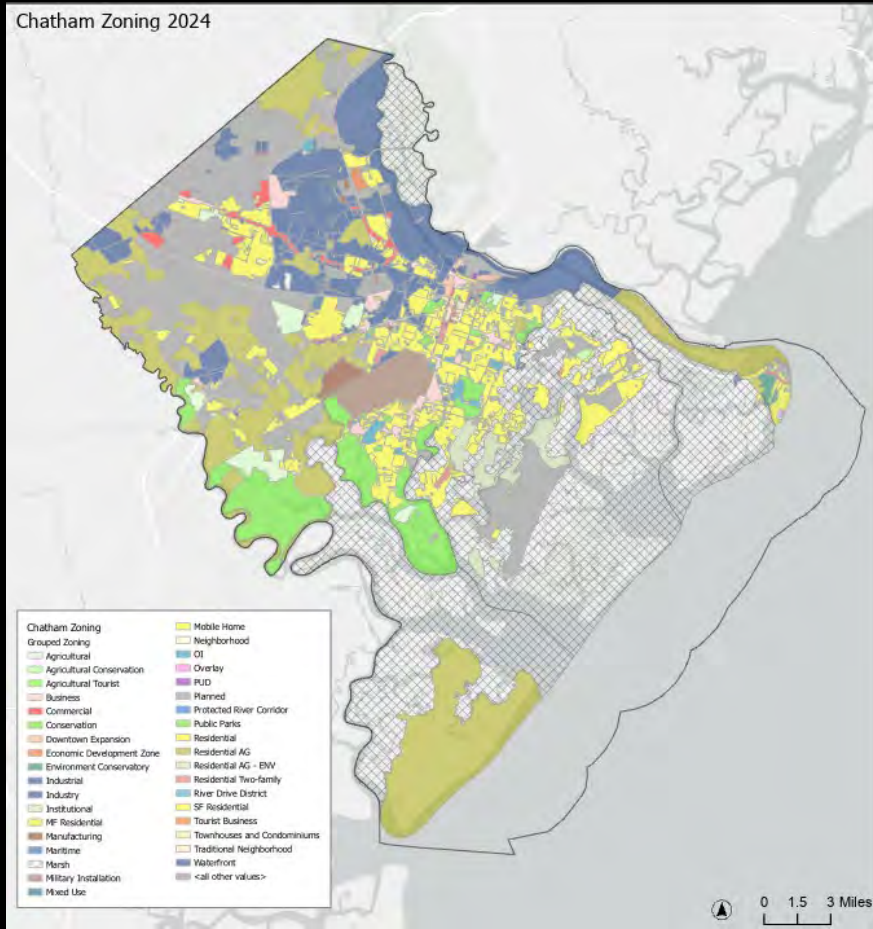
22.8 % of Protected areas is canopy

2019 Canopy: 94 acres avg, 44% avg, 18,637 acres total

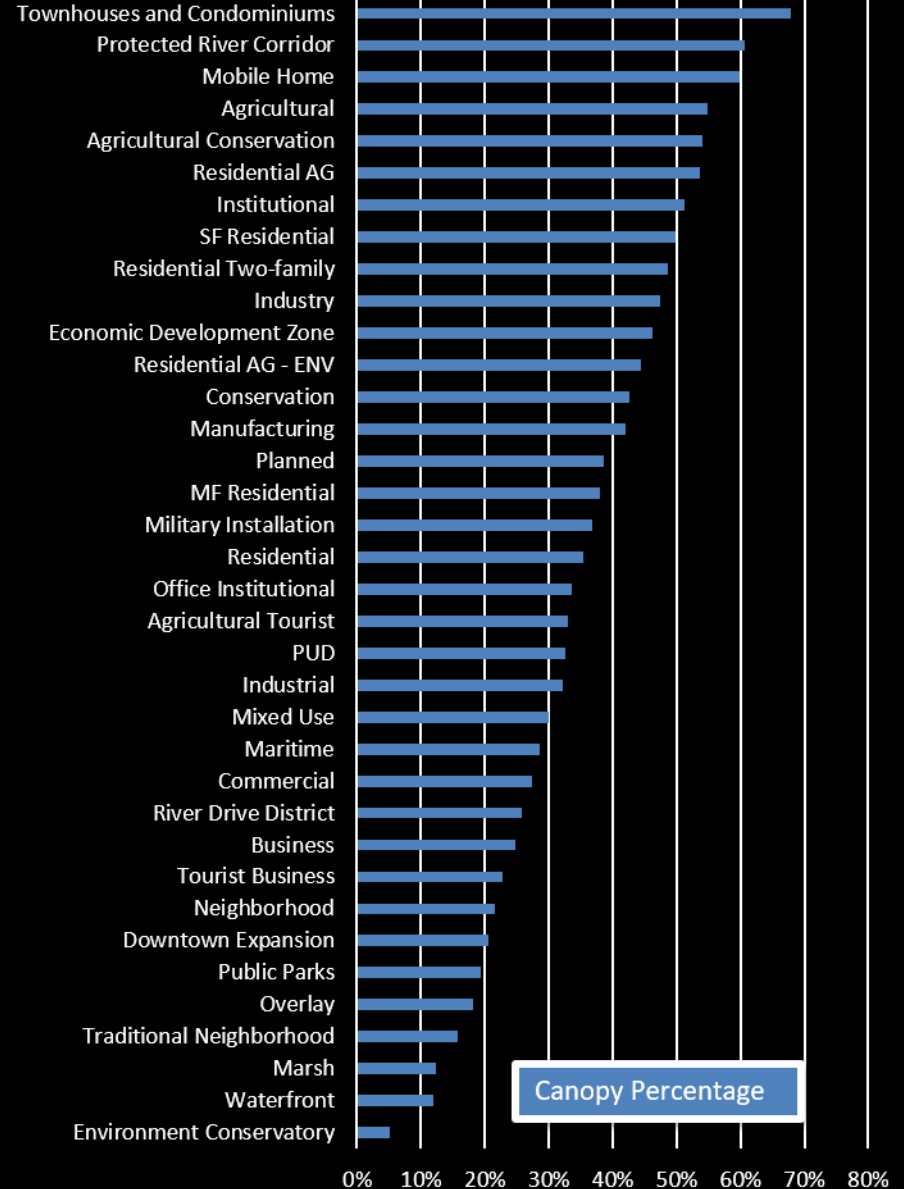
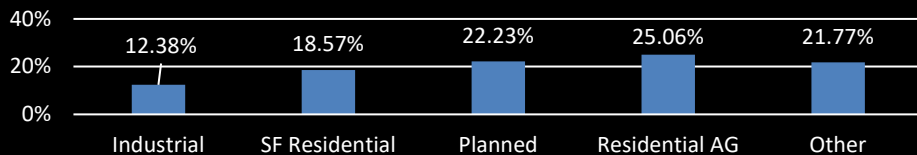
8% of Chatham's 2019 canopy (35%) is protected



FINDINGS: CHATHAM COUNTY ZONING

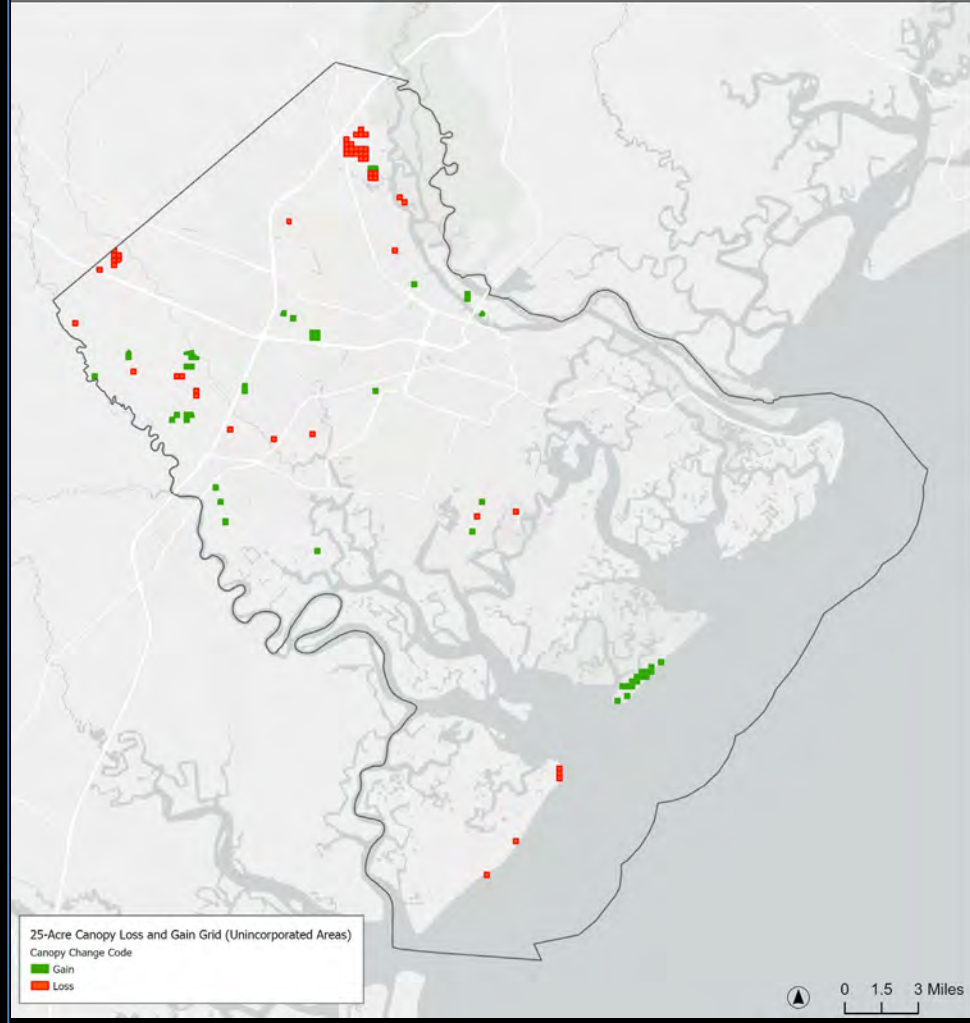
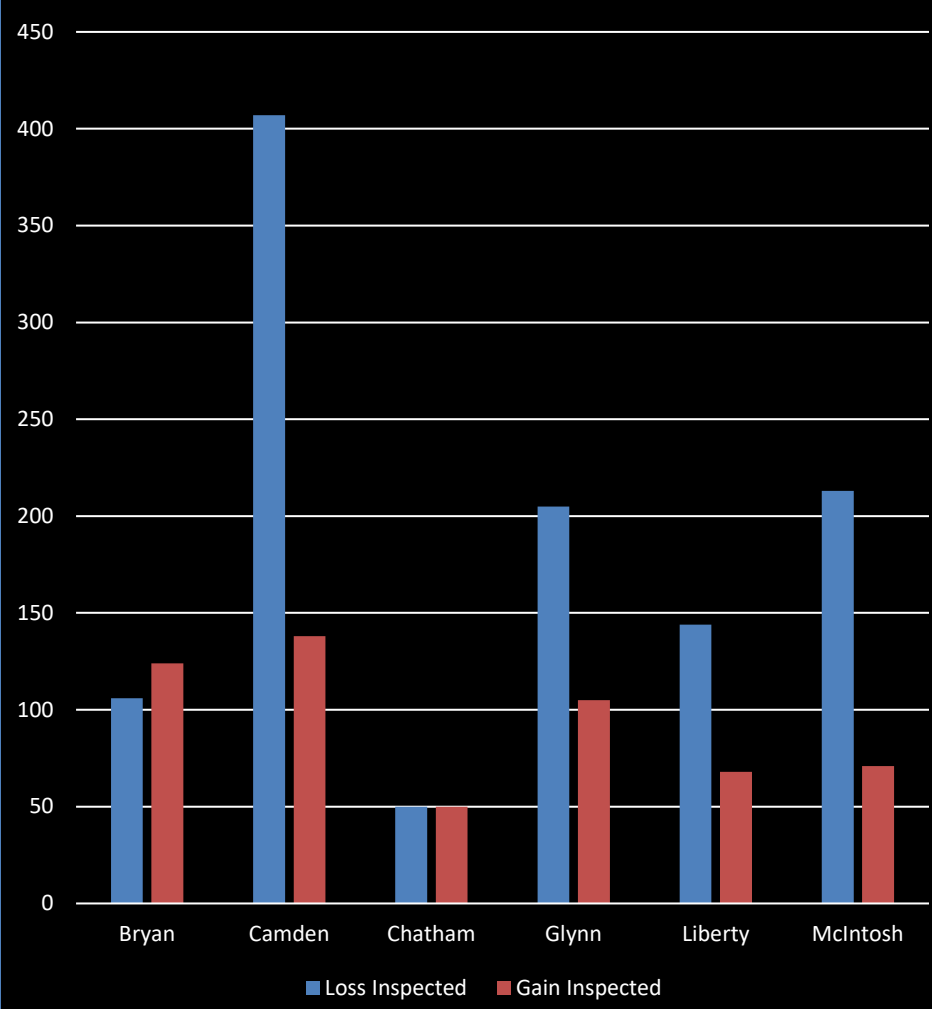


2019 Canopy Percentage



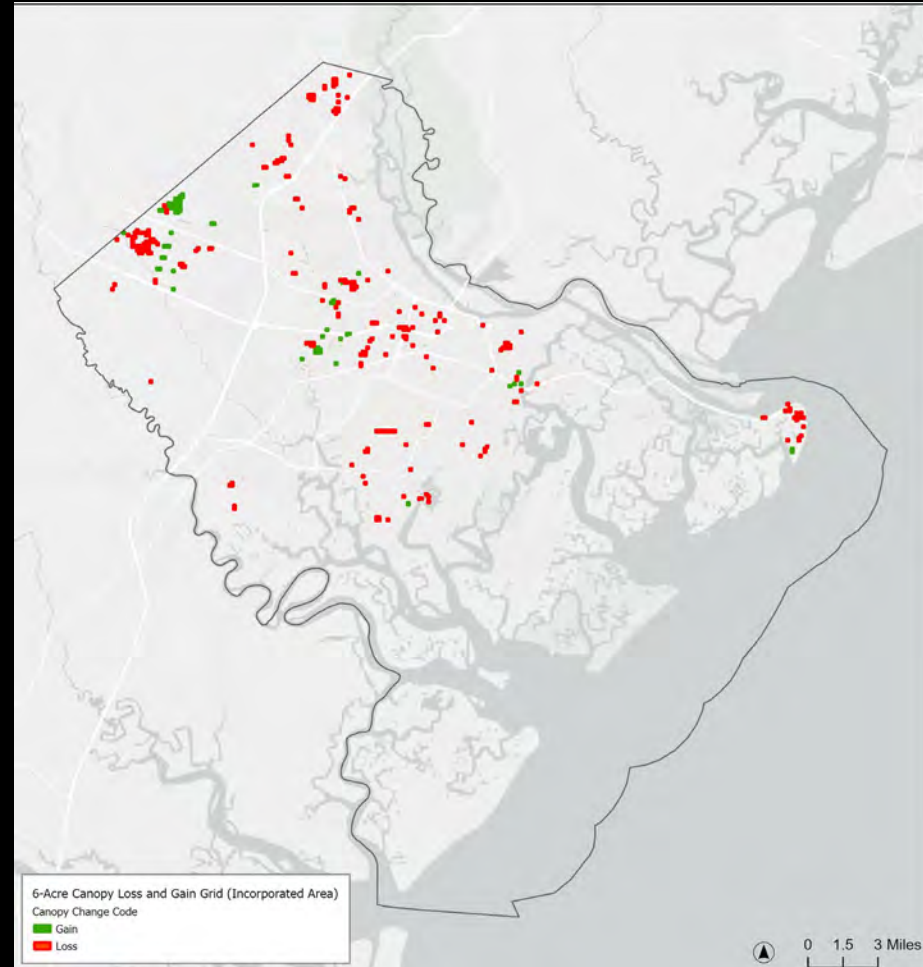
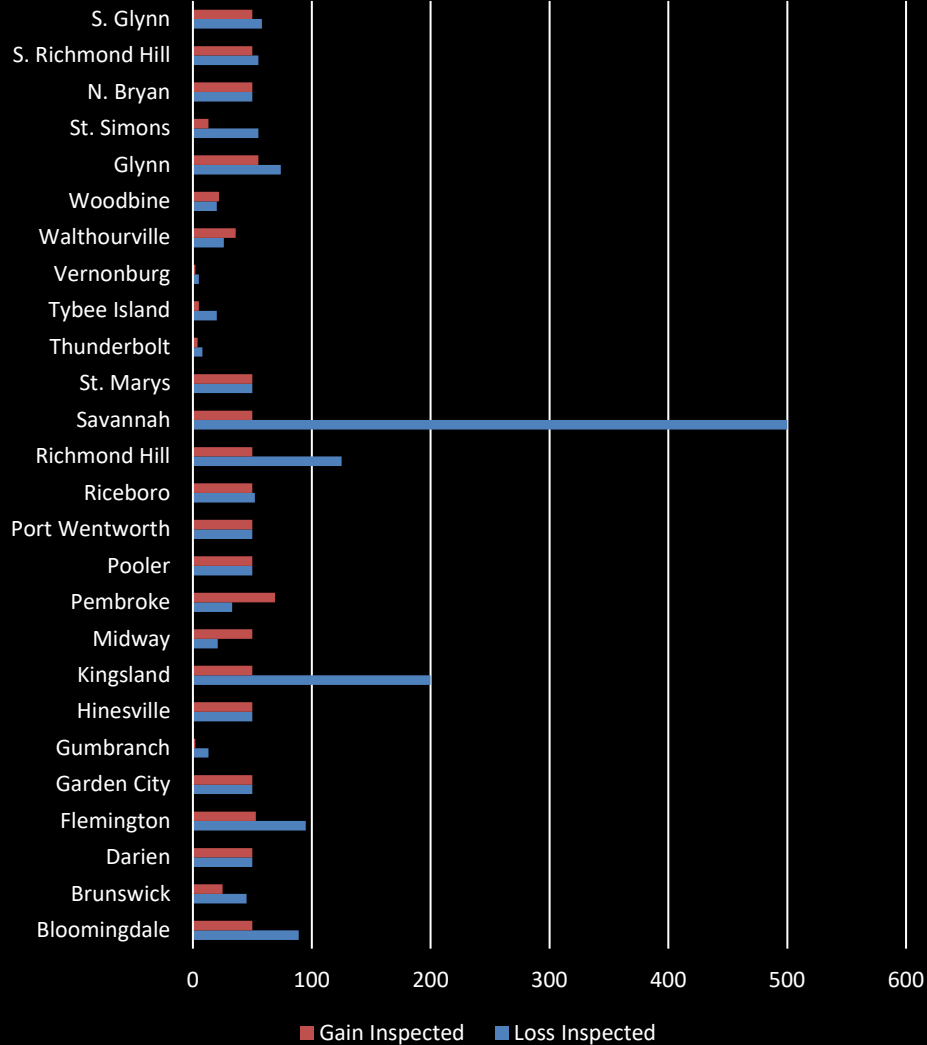
QUALIFYING CANOPY CHANGE: INSPECTED SITES

Rural Grid Sites Inspected



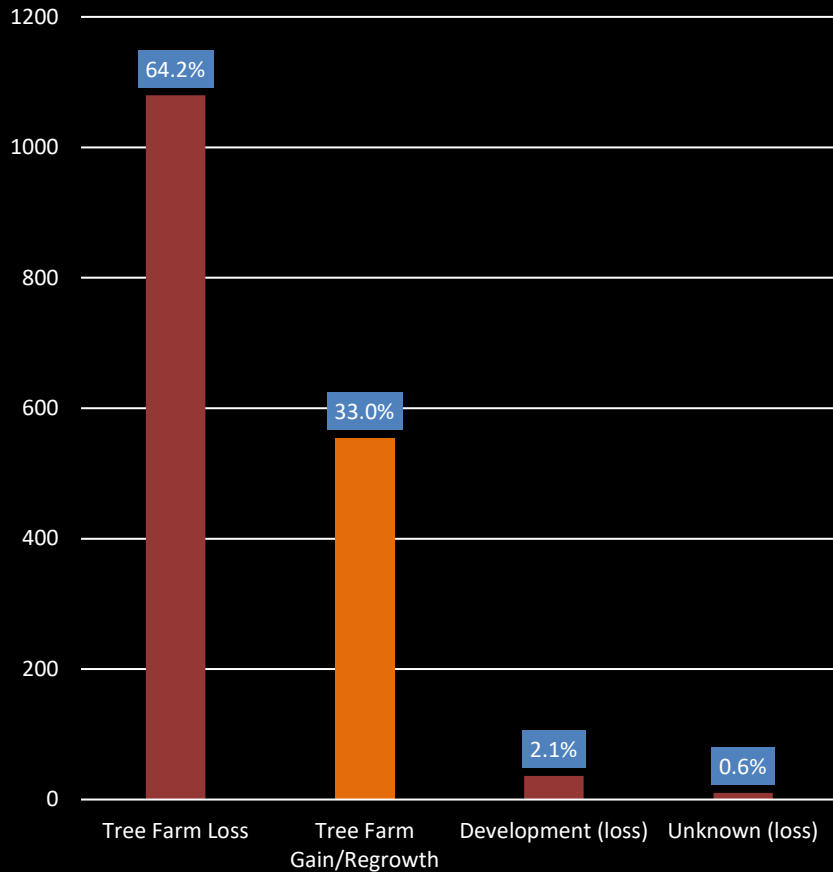
QUALIFYING CANOPY CHANGE: INSPECTED SITES

Urban Grid Sites Inspected

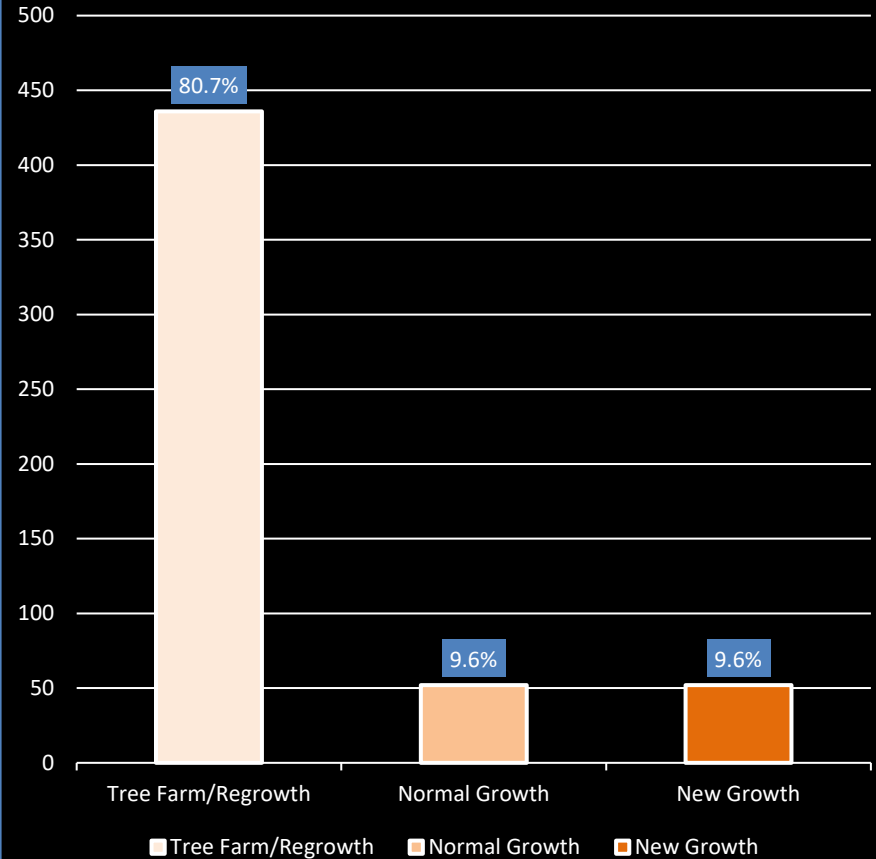


LOSS/GAIN FOR INSPECTED SITES

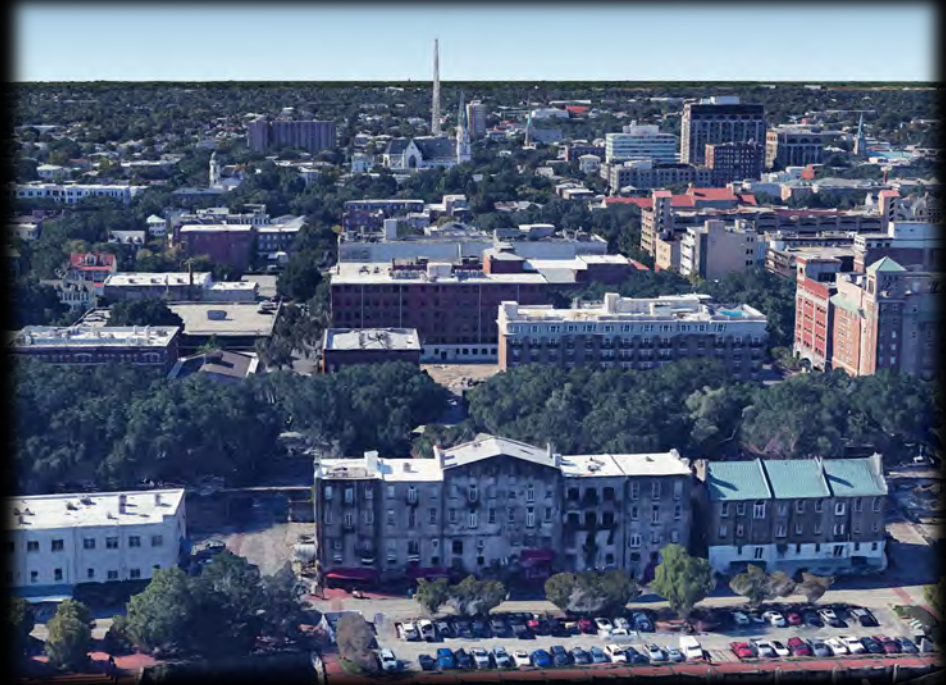
Loss/Gain Type for Rural Inspected Sites



Urban Inspected Sites by Gain Type

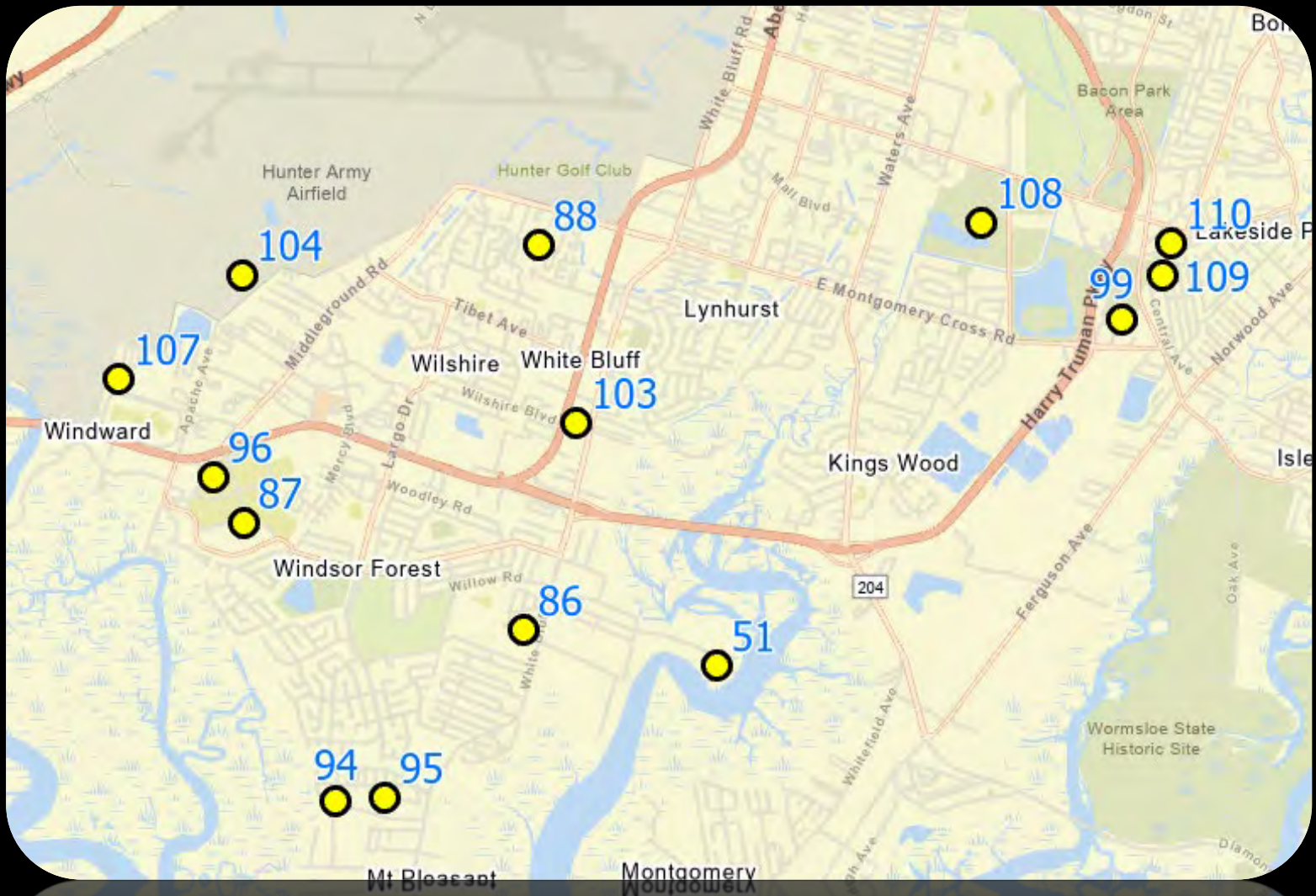


CHATHAM SITE VISITS



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SOUTH CHATHAM



CANOPY LOSS - EXPANSION



CANOPY LOSS – CAMPUS EXPANSION

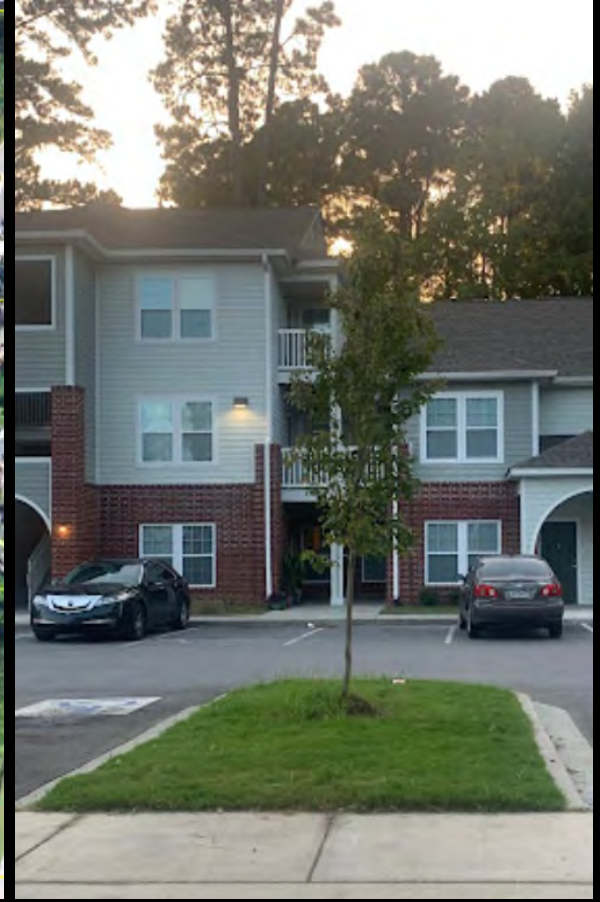


CANOPY LOSS - NEW MF

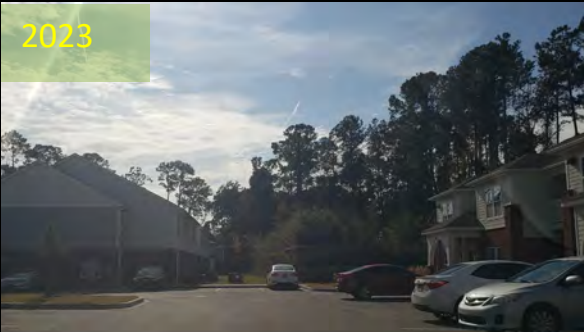
2010



2019



2023



CREATING THE NEXT

CANOPY LOSS – SF TO COMMERCIAL



CANOPY LOSS – SPORTS COMPLEX EXPANSION

2010



2019



2023



CREATING THE NEXT

CANOPY LOSS – NEW DEVELOPMENT (SCHOOL/STORAGE)



CANOPY LOSS – REDEV TO MEDICAL CENTER

2010



2019

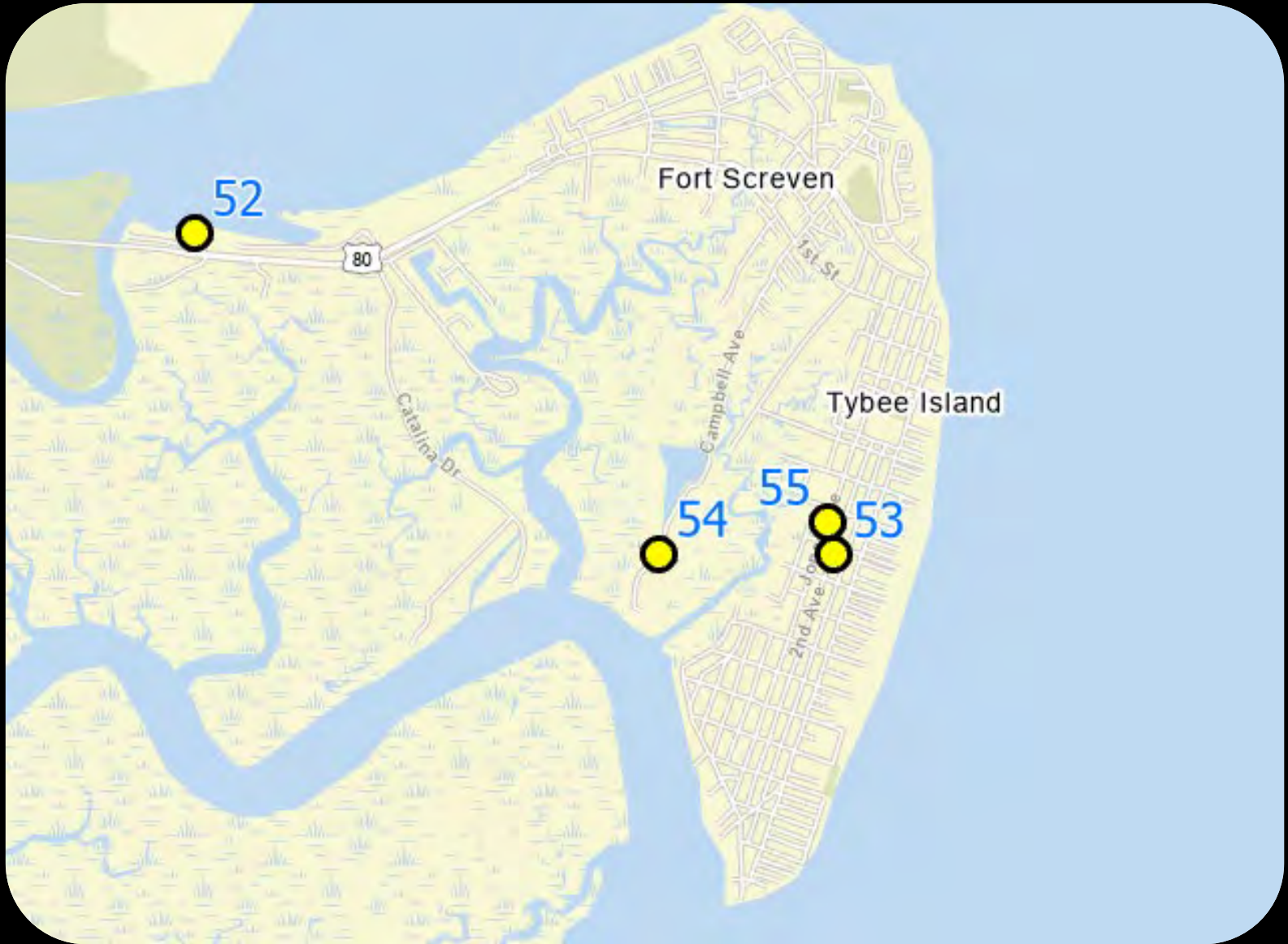


2023



CREATING THE NEXT

TYBEE



CANOPY LOSS – STALLED DEVELOPMENT

2010



2019



2023



CREATING THE NEXT

CANOPY LOSS – REDEVELOPMENT

2010



2019



2023



CREATING THE NEXT

CANOPY LOSS – REDEV, MAINT. OR STORM

2010



2019

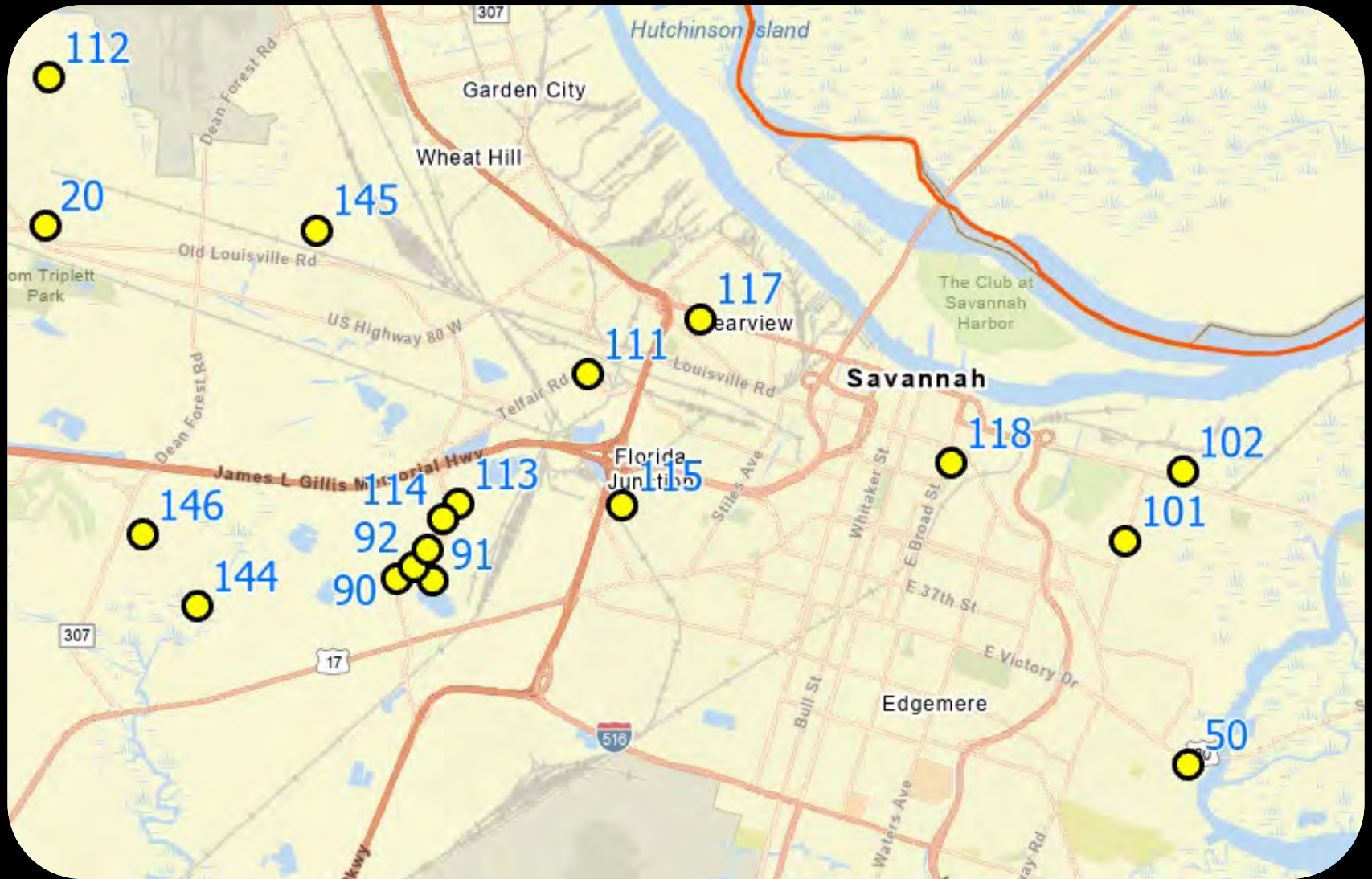


2023



CREATING THE NEXT

DOWNTOWN SAVANNAH



CANOPY LOSS – NEW DEVELOPMENT

2010



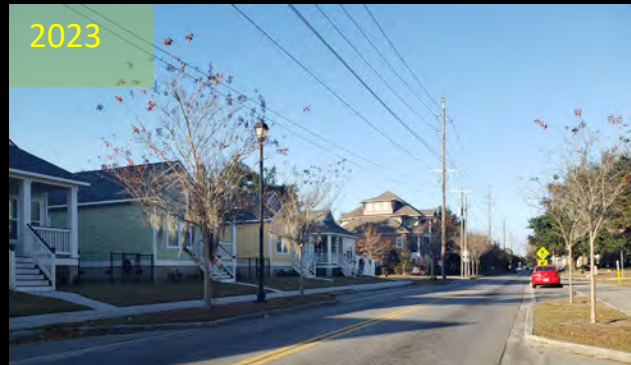
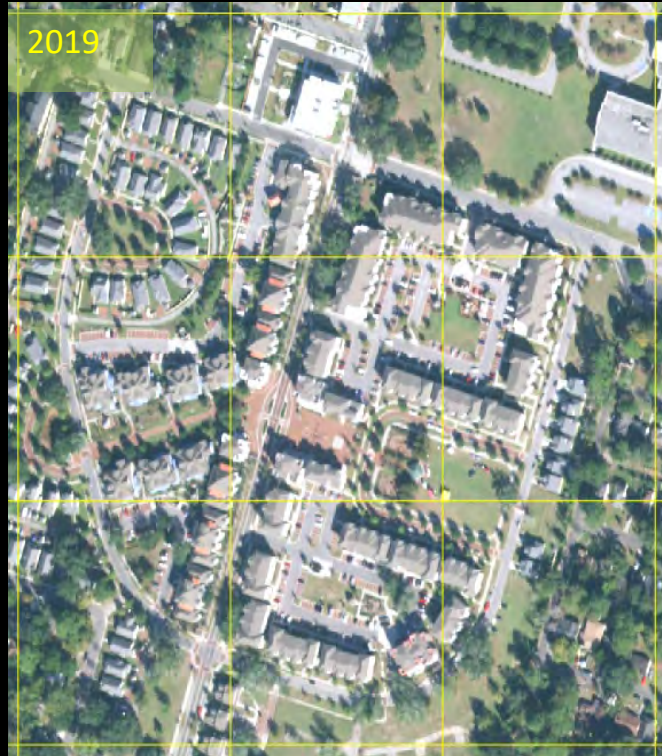
2019

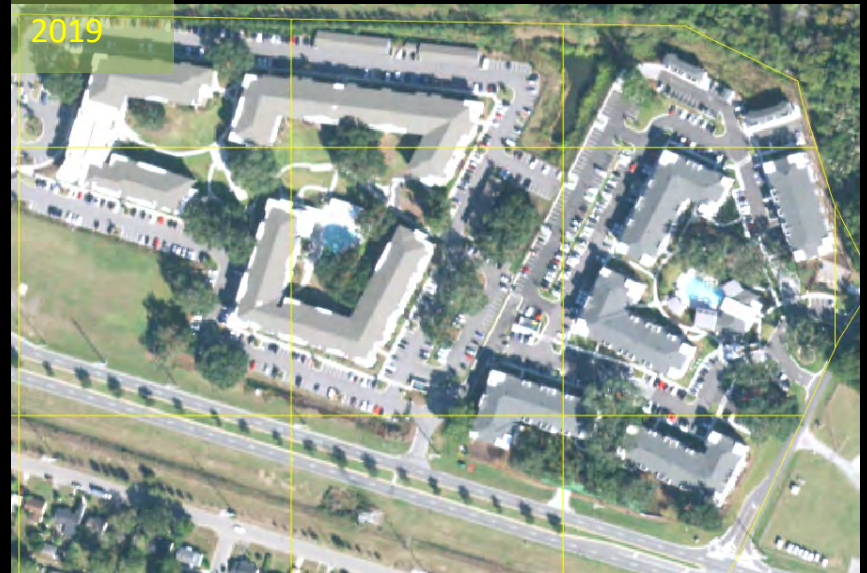


2023



CANOPY LOSS/GAIN – MF REDEVELOPMENT/GROWTH





CANOPY LOSS - INDUSTRIAL



CANOPY LOSS/GAIN – NEW DEV AND STREET TREE GROWTH



CANOPY LOSS – NEW DEVELOPMENT



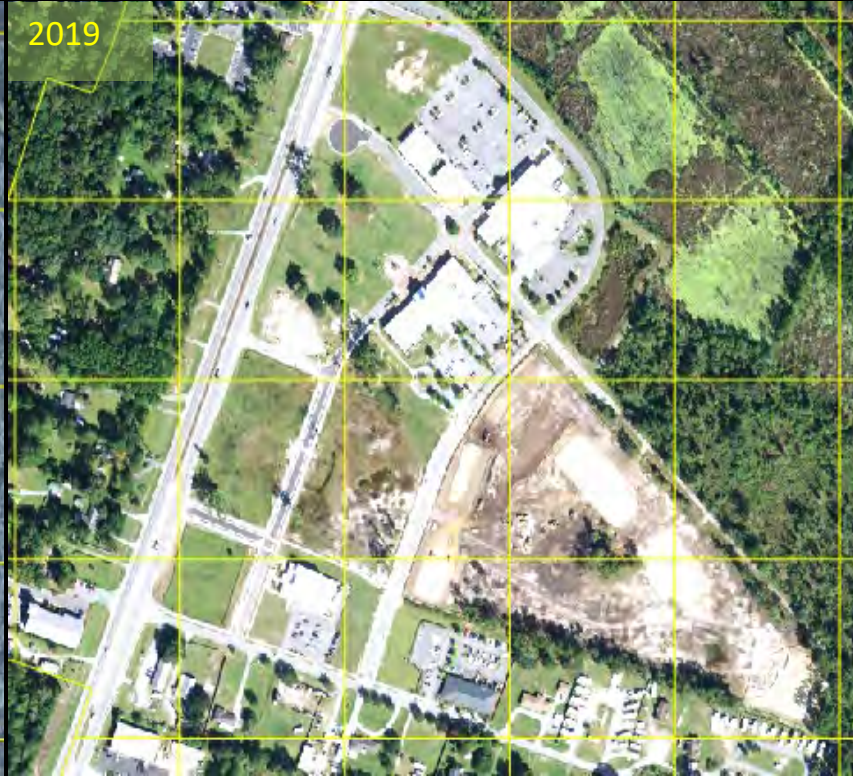


GARDEN CITY

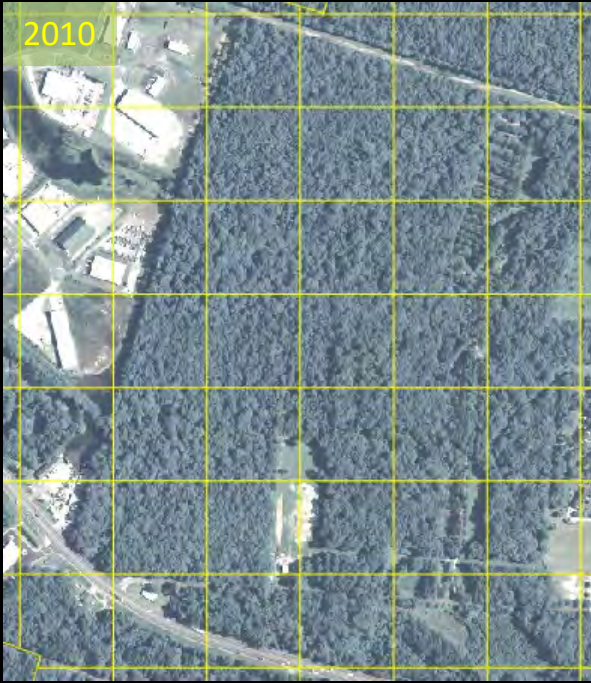
Site Visits

CANOPY LOSS - DEVELOPMENT

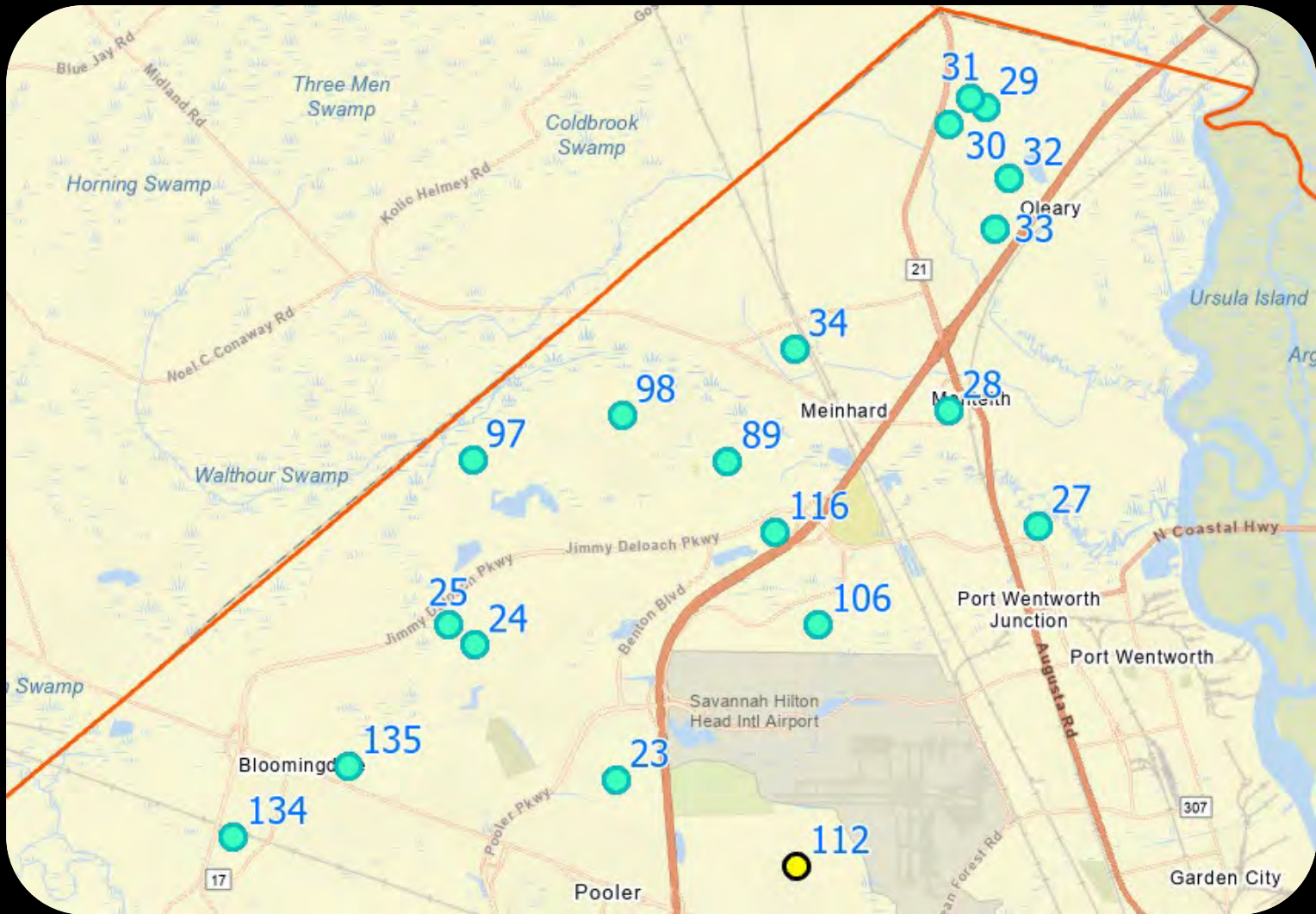




CANOPY LOSS – NEW DEVELOPMENT



NORTH CHATHAM



BLOOMINGDALE

Site Visits

CANOPY LOSS - RESIDENTIAL

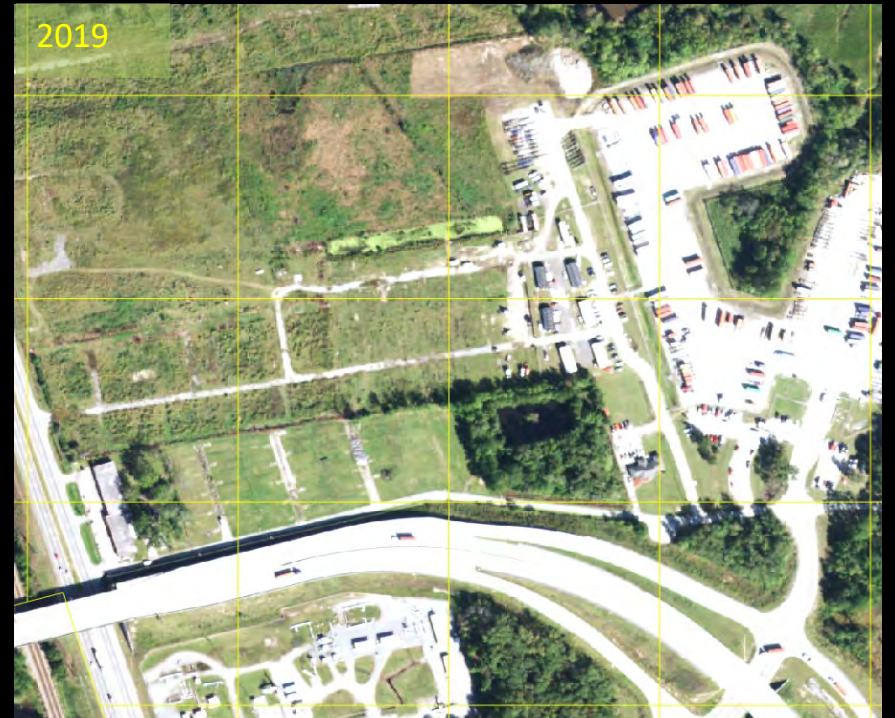
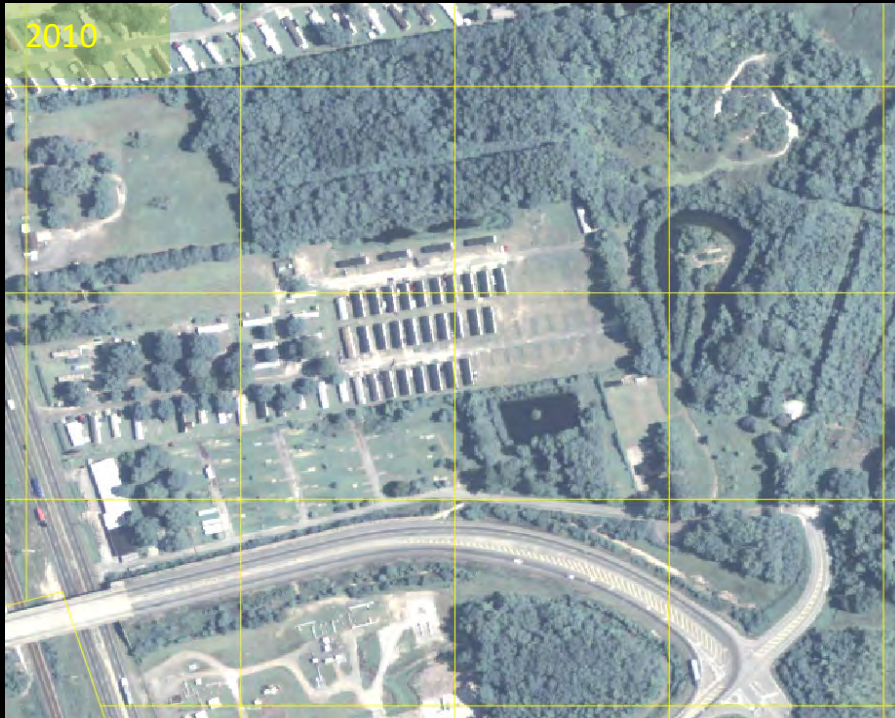




PORT WENTWORTH

Site Visits

CANOPY LOSS – NEW DEVELOPMENT



CREATING THE NEXT

CANOPY GAIN - REGROWTH



LOSS AND GAIN – NEW MF DEV, CLEARING, REGROWTH

2010



2019



2023



CREATING THE NEXT

CANOPY LOSS- RES, CLEARING



CANOPY GAIN – REGROWTH AND LOSS



CANOPY LOSS – NEW DEVELOPMENT



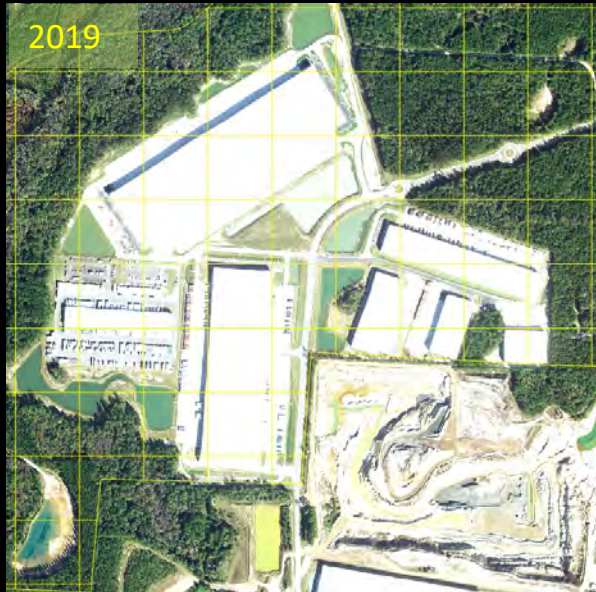
CANOPY LOSS AND GAIN – RESIDENTIAL AND REGROWTH



SAVANNAH

Site Visits

CANOPY LOSS - WAREHOUSES



CANOPY LOSS – SF RESIDENTIAL

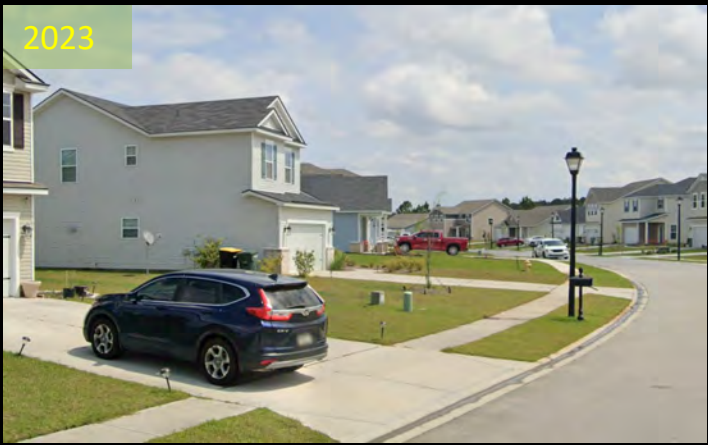
2010



2019



2023

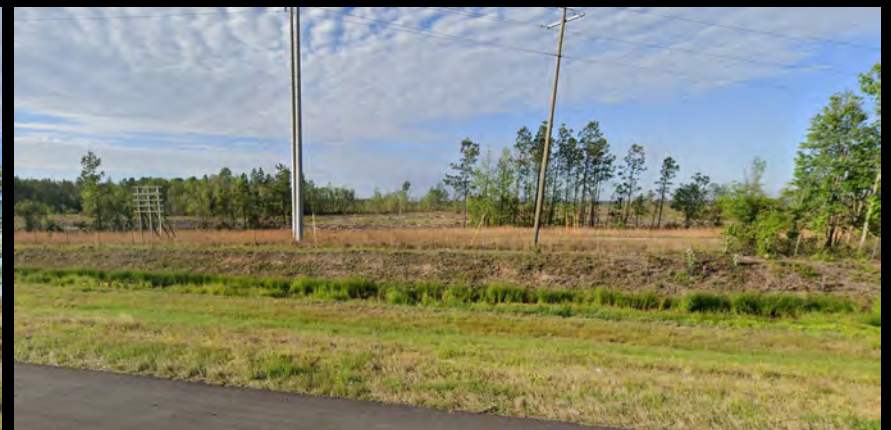


CANOPY LOSS – NEW DEVELOPMENT

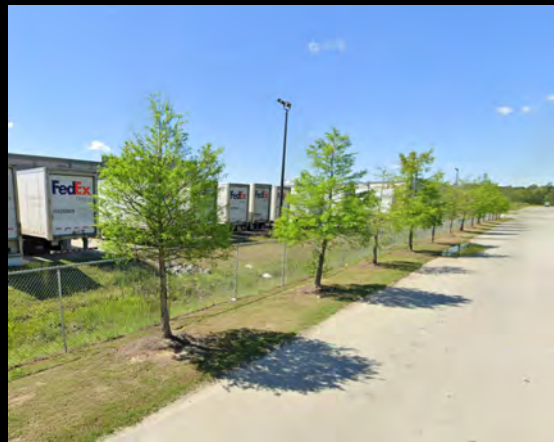
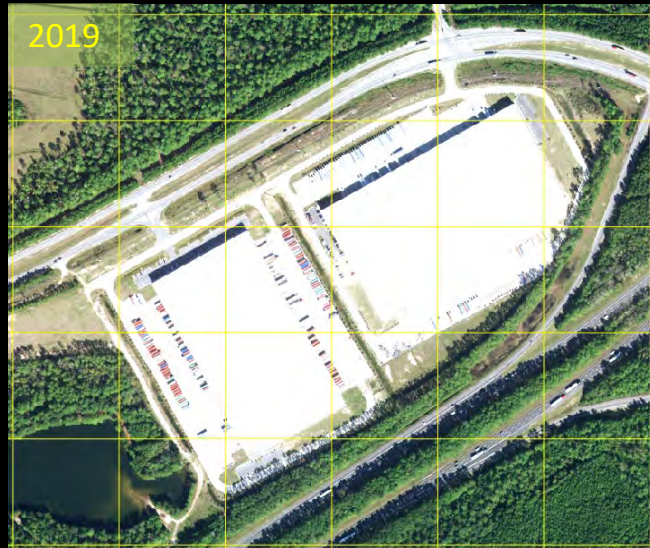


CANOPY LOSS - DEVELOPMENT





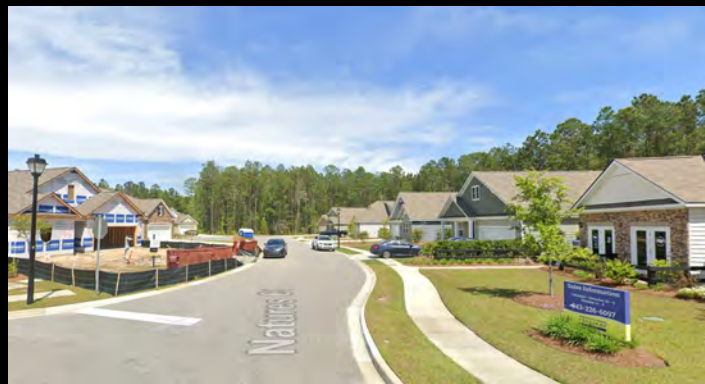
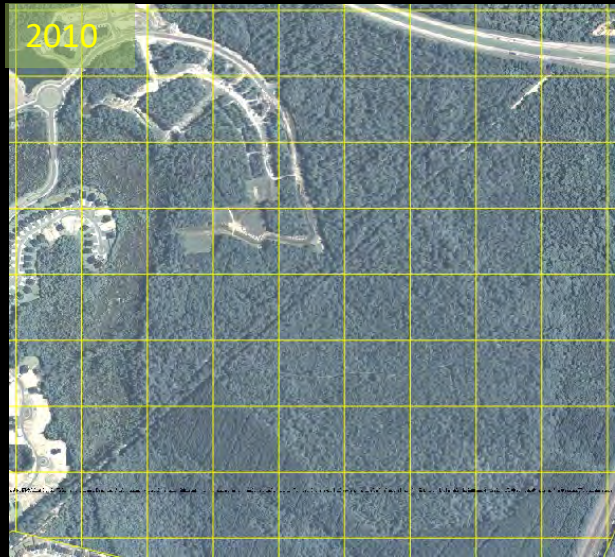
CANOPY LOSS – WAREHOUSE



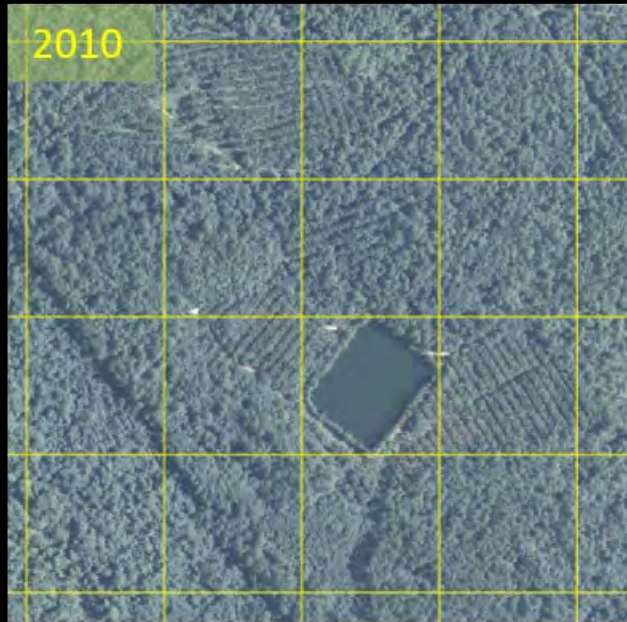
POOLER



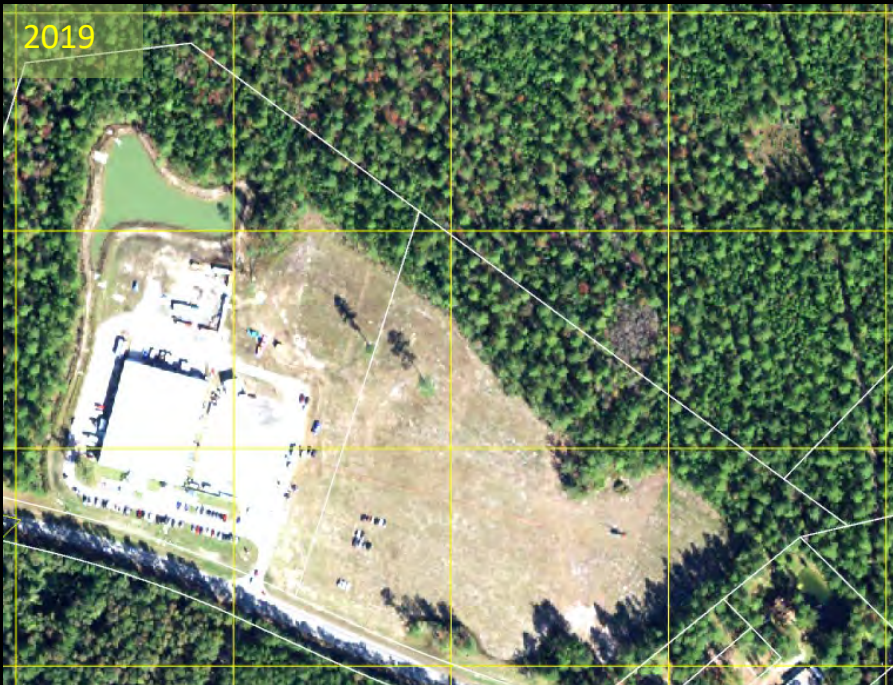
CANOPY LOSS - RESIDENTIAL



CANOPY LOSS – NEW DEVELOPMENT



CANOPY LOSS – NEW DEVELOPMENT (COMMERCIAL)



SUMMARY OF FINDINGS

Areas of gain

- Agricultural lands: commercial tree farms
- Regrowth on recently cleared land (pines and early succession)
- Growth of new plantings
- Growth of established trees



Areas of loss

- Agricultural lands: commercial tree farms
- New development of previously undeveloped land
- Residential
- *Quality* of canopy changing in urban areas



IMPLICATIONS: THE FUTURE OF THE COASTAL CANOPY

- Majority of trees on AG land - monoculture
- Industrial and residential development significant in north
- 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 quality canopy gain and overall loss is widening
- Loss outpacing gain – urban areas
- Commercial timber cycles greatly influence canopy over time



PROJECT RESOURCES

Coastal Georgia Tree Canopy 2010 - 2019

Georgia's Coastal Tree Canopy

Tracking Canopy Change 2010 - 2019

Search, Visualize, Download, Create

Search...

Welcome to the Coastal Georgia Tree Canopy Hub created by the Center for Spatial Planning Analytics and Visualization at Georgia Tech as part of a Coastal Incentive from the Coastal Resources Division of Georgia Department of Natural Resources and NOAA. Here you will find 2010 and 2019 tree canopy data and resources for Georgia's six oceanfront counties: Bryan, Camden, Chatham, Glynn, Liberty, and McIntosh. Use the search bar above or scroll down to find and download data, view StoryMaps and Data Dashboards, and interact with various maps and tools.

Explore the data

Download or stream 2010 and 2019 tree canopy datasets for coastal Georgia

- [Bryan Canopy](#)
- [Camden Canopy](#)
- [Chatham Canopy](#)
- [Glynn Canopy](#)

Tracking Georgia's Coastal Tree Canopy

Examining Tree Canopy Change in Georgia's Six Oceanfront Counties (2010 - 2019)

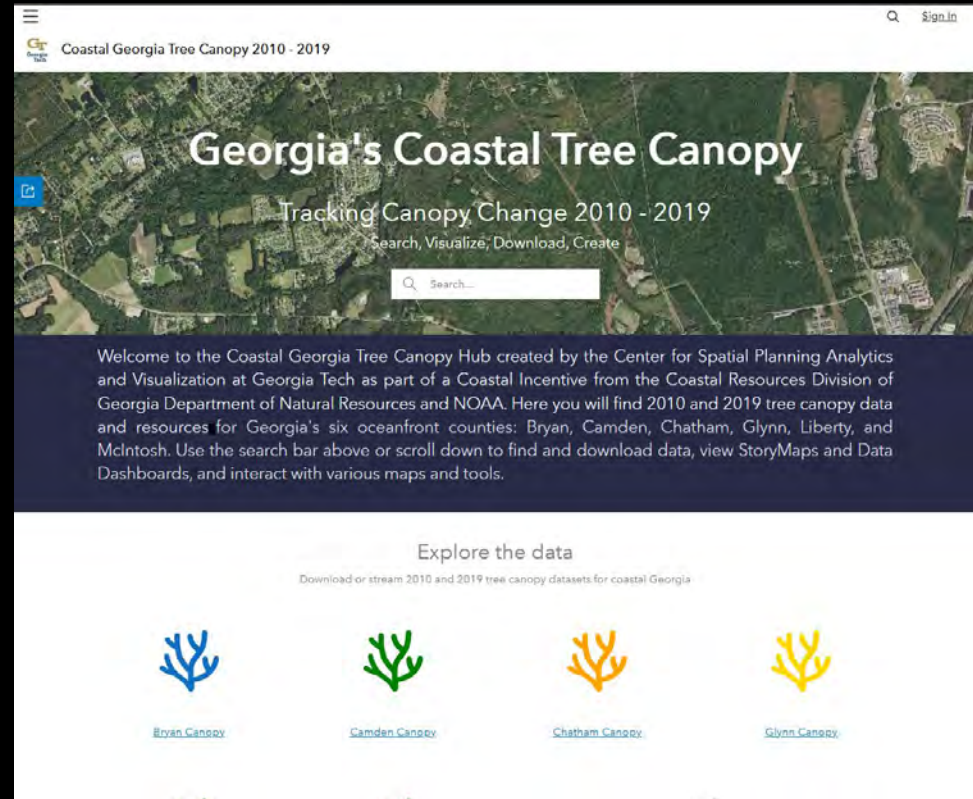
The Center for Spatial Planning Analytics and Visualization | The Georgia Institute of Technology

COASTAL GEORGIA TREE CANOPY HUB

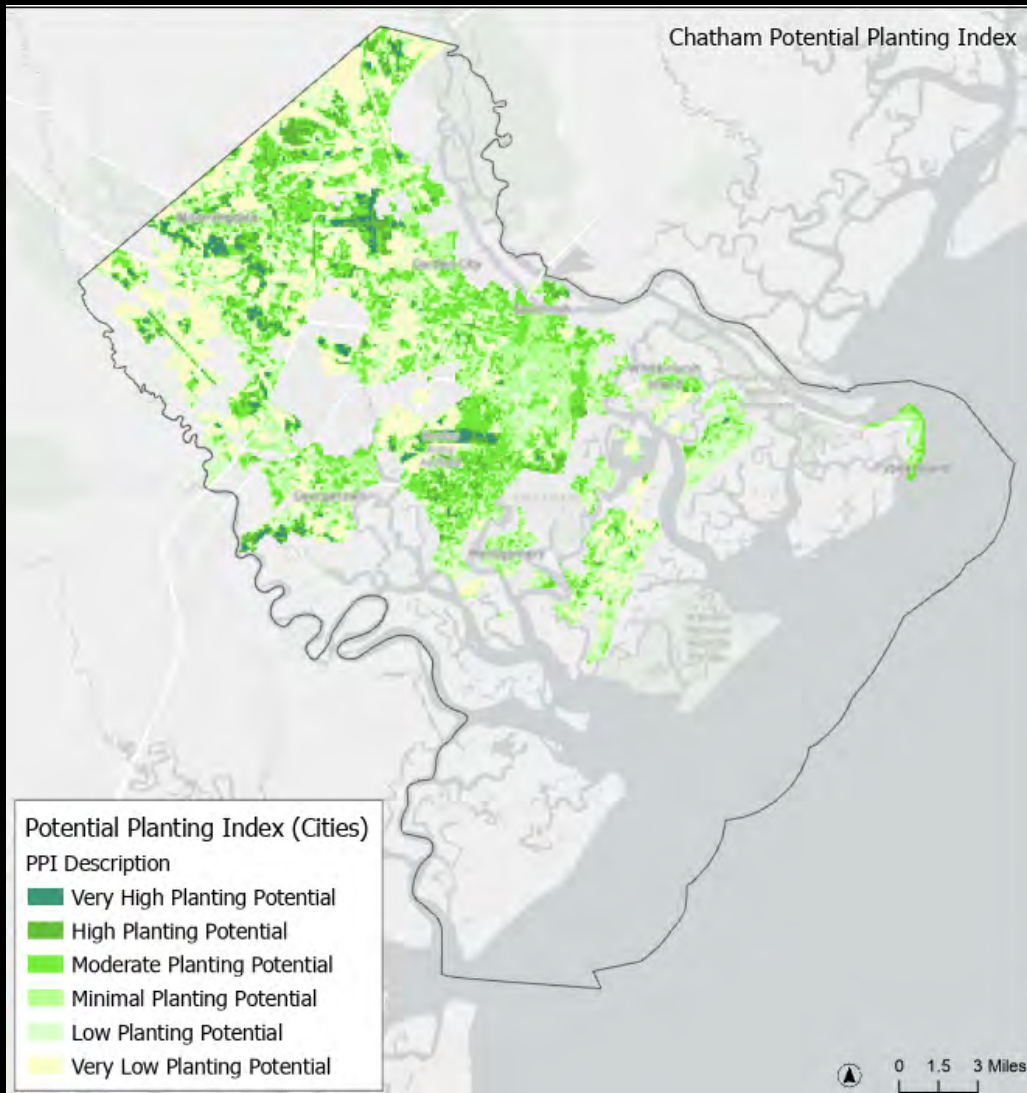
ArcGIS Hub Site

<https://georgia-coastal-tree-canopy-2010-2019-gtmaps.hub.arcgis.com/>

- Data (coastal and by county)
- Interactive Maps
- Ecosystem Service Benefits Dashboards
- StoryMaps



CHATHAM COUNTY POTENTIAL PLANTING INDEX



$$\text{Potential Planting Index (PPI)} = \text{\% Non-Tree Vegetation} - \text{\% Canopy Cover}$$

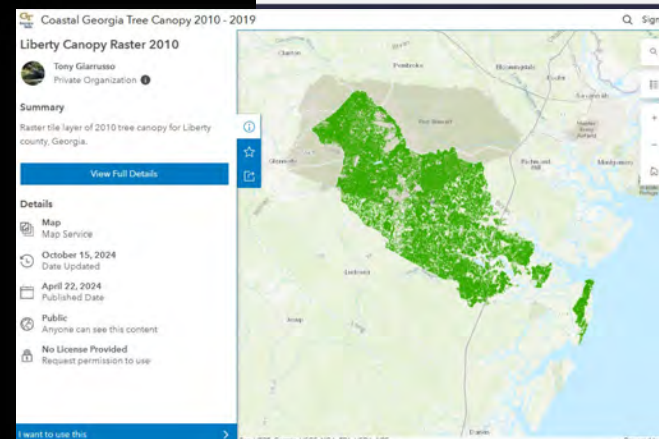
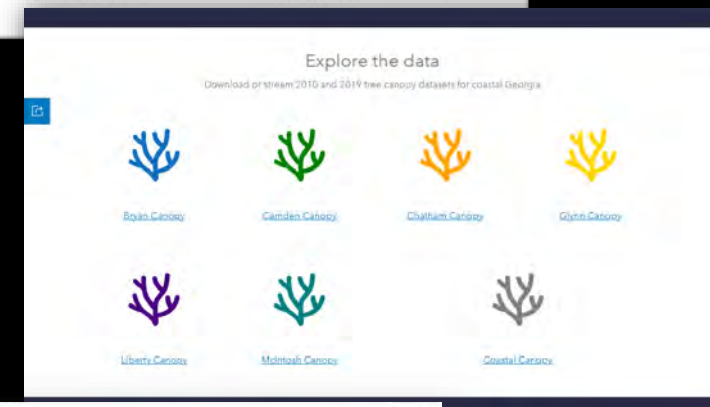
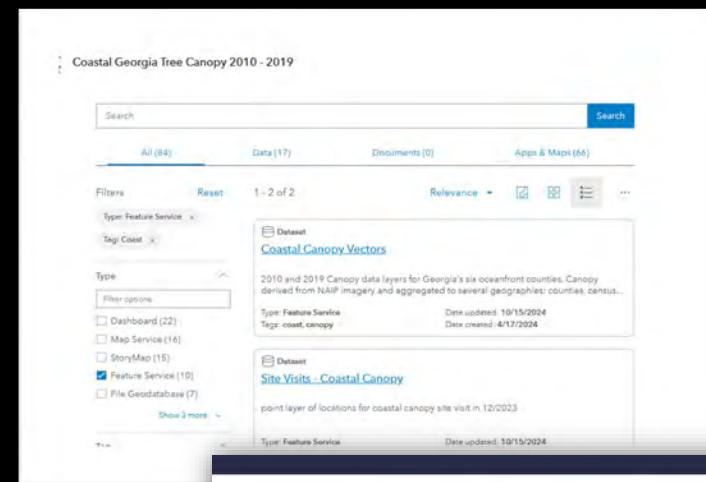
6-Acre grid for developed areas

PPI grid cell values range from -1 (very low potential, existing forest) to + 1 (high potential, no forest).

Assumes no restriction for planting
Should remove non-plantable areas (i.e. Airports, marsh, military bases)

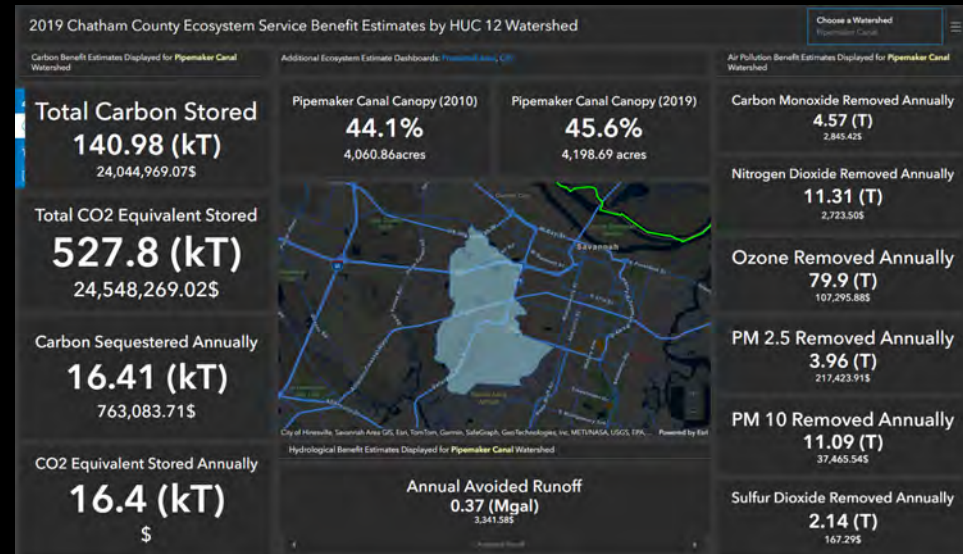
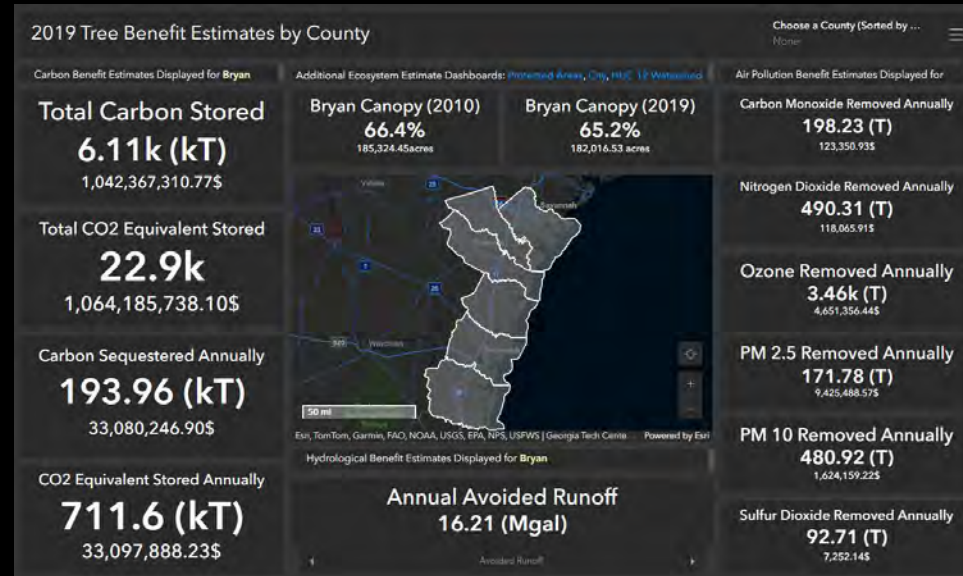
DATA EXPLORATION

- [Search for and download canopy data and applications](#)
- Coastal and by county
- Datasets: counties, census designated places, watersheds, census tracts, 6-acre and 25-acre canopy loss and gain grid, protected areas
- Web services: 2010 and 2019 canopy rasters, 2010 and 2019 NAIP imagery by county
- Applications: StoryMaps, dashboards, interactive maps



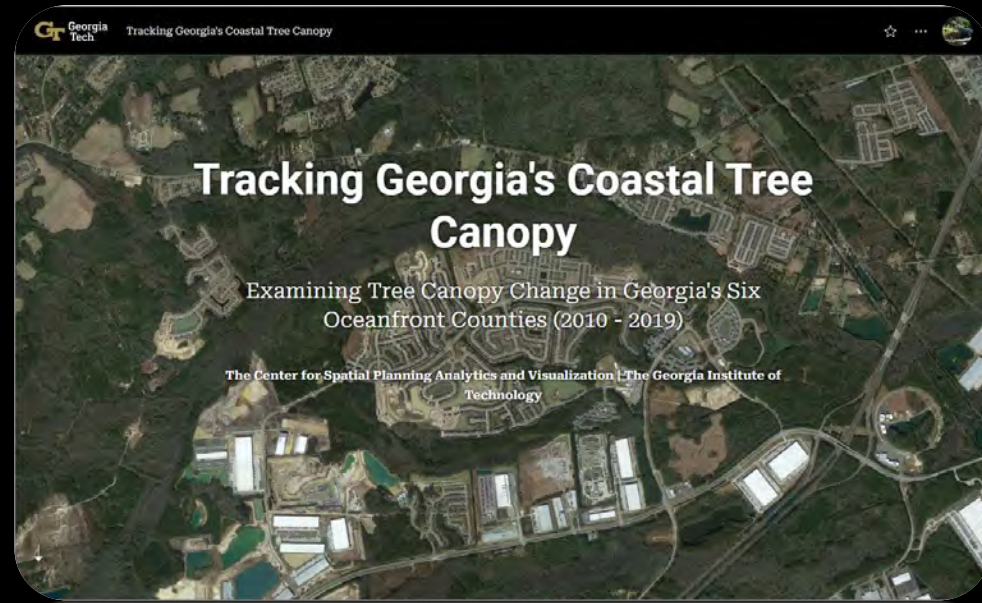
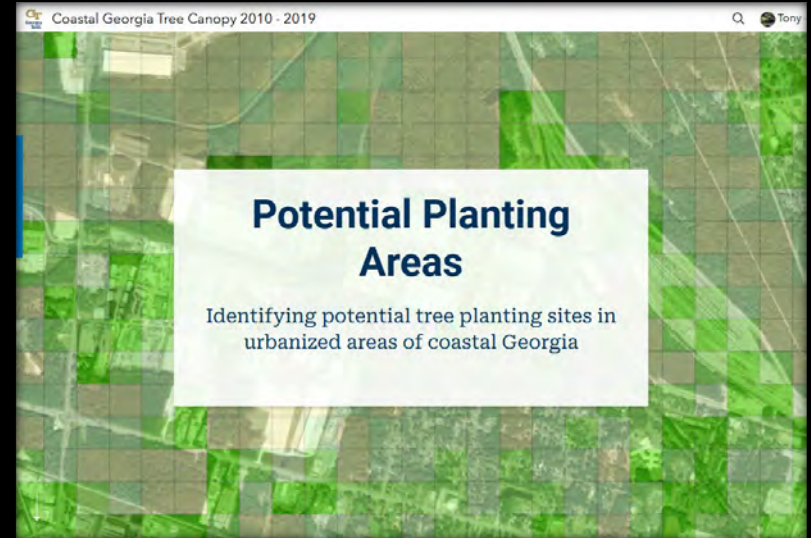
DASHBOARDS

- [Ecosystem Service Benefit Estimates](#)
- Derived from USFS and I-Tree Canopy
- Carbon, Air Pollution, Hydrologic
- Available by county, census designated place, watershed, and protected areas



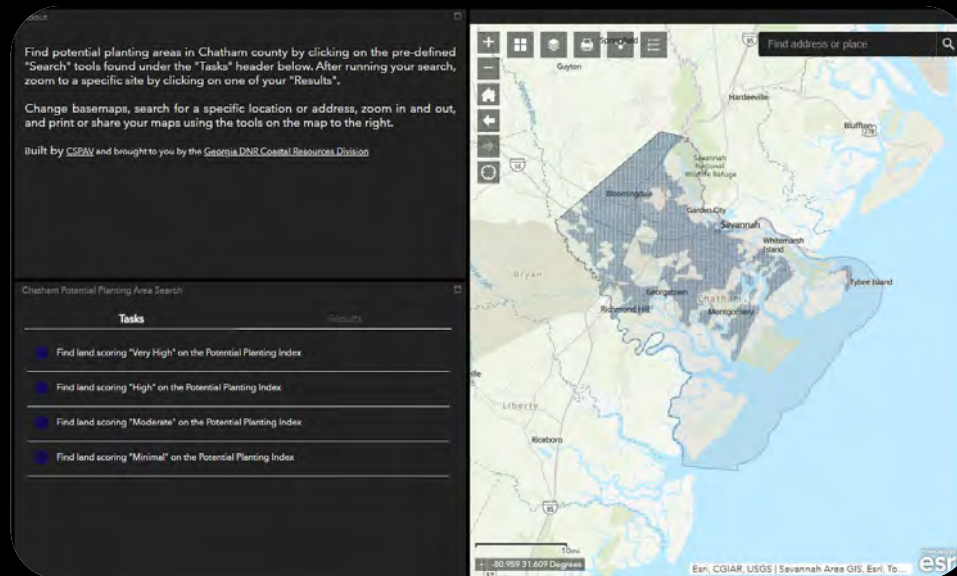
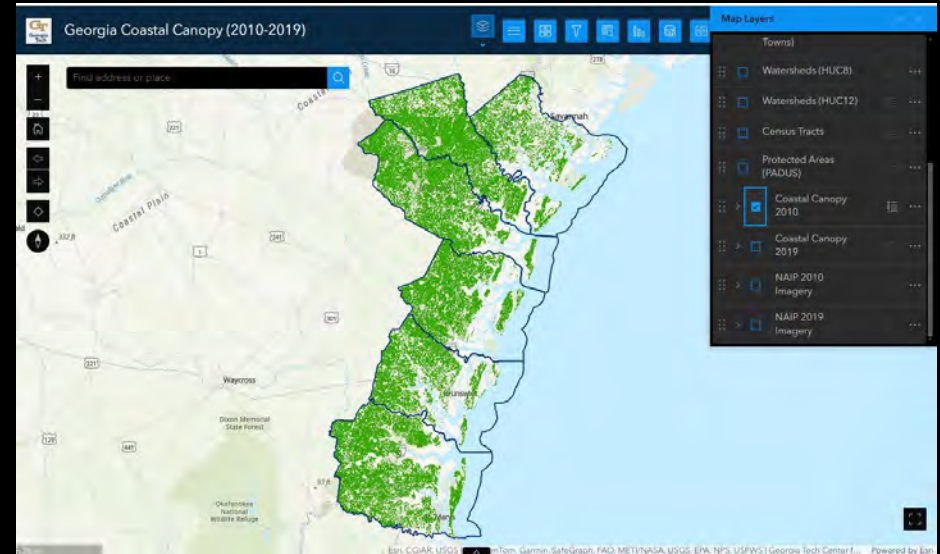
STORYMAPS

- [Project Overview](#)
- [Site Visits](#)
- [Potential Planting Areas](#)
- Tutorials
- Coastal and by county



INTERACTIVE MAPS

- Customized [interactive maps](#) by county and coast-wide
- Filters, charts, queries, print, elevation profile, swipe tools
- Customized [PPI Search tools](#)
 - Filter by PPI Scores



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