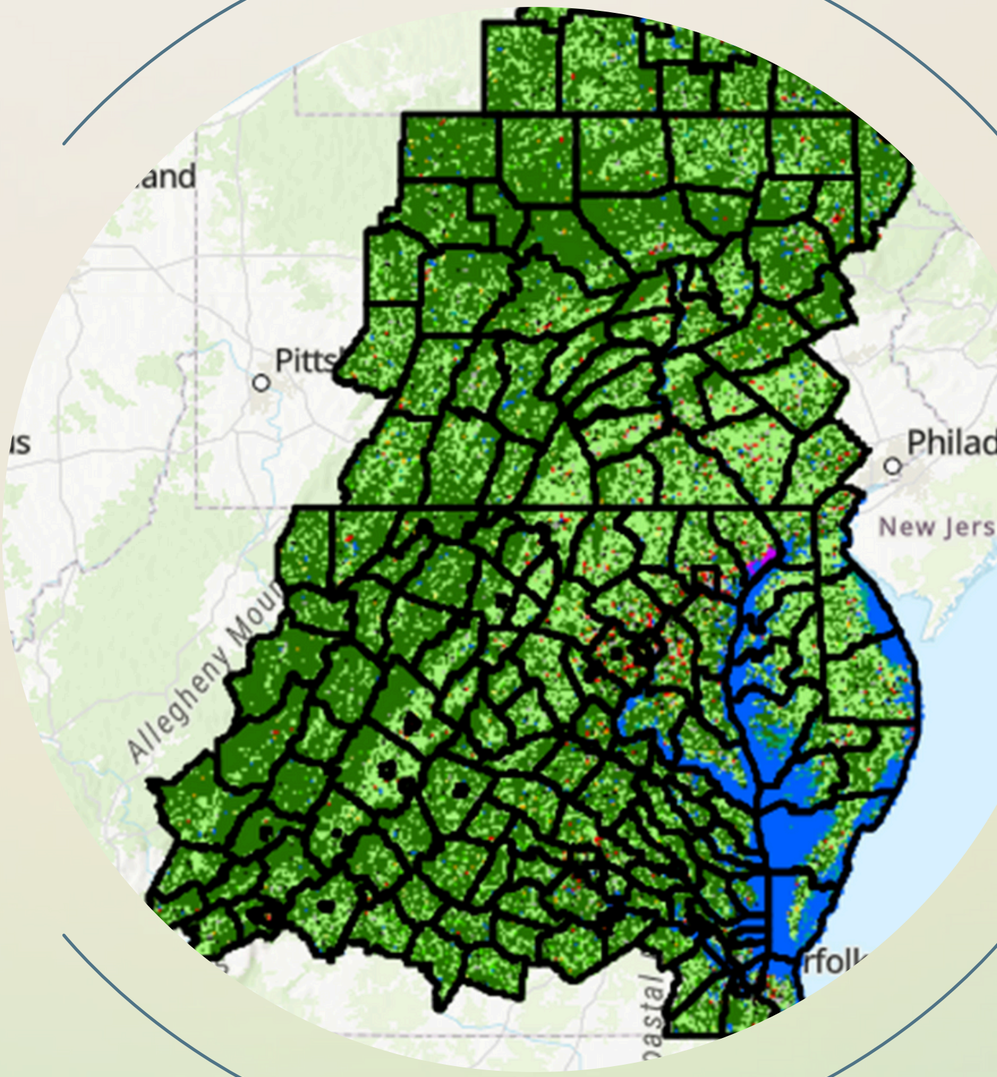
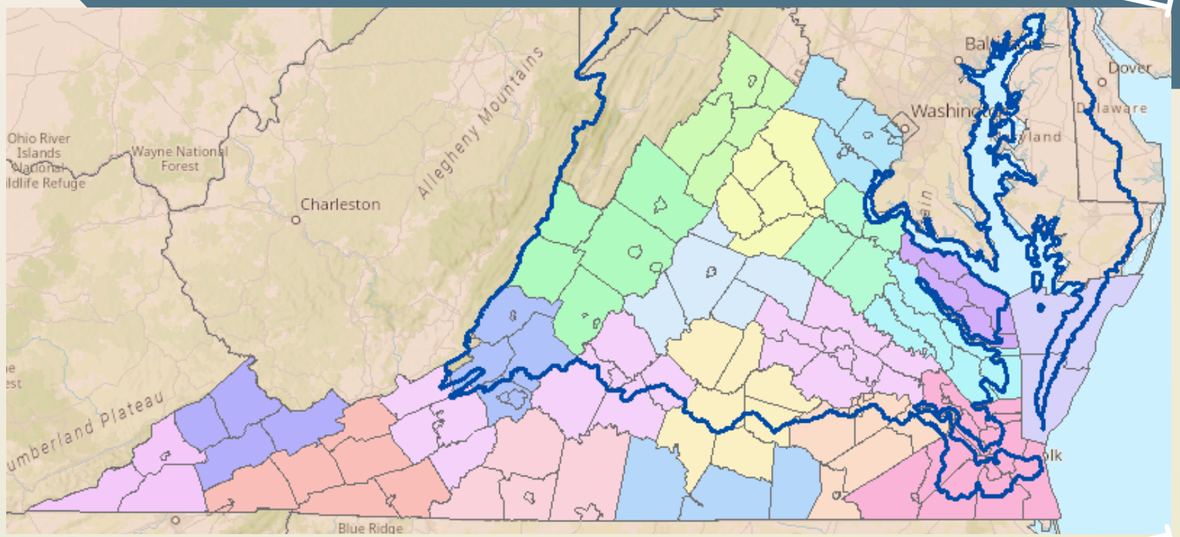
USE CASES FOR LAND USE DATA IN HAMPTON ROADS



KC Filippino, Senior Water Resources Planner,
Hampton Roads Planning District Commission
August 19, 2025

HAMPTON ROADS PDC

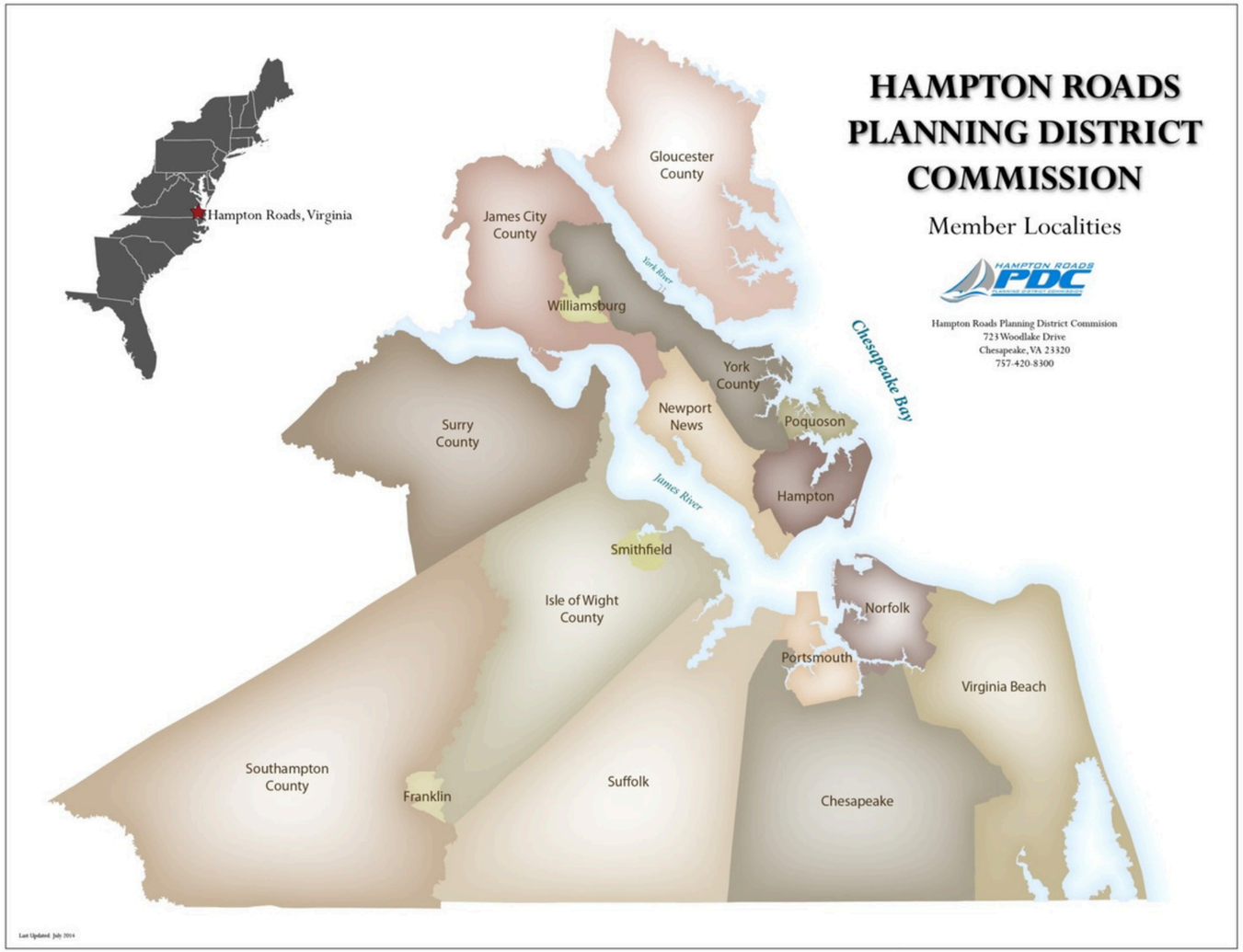
Who are we?



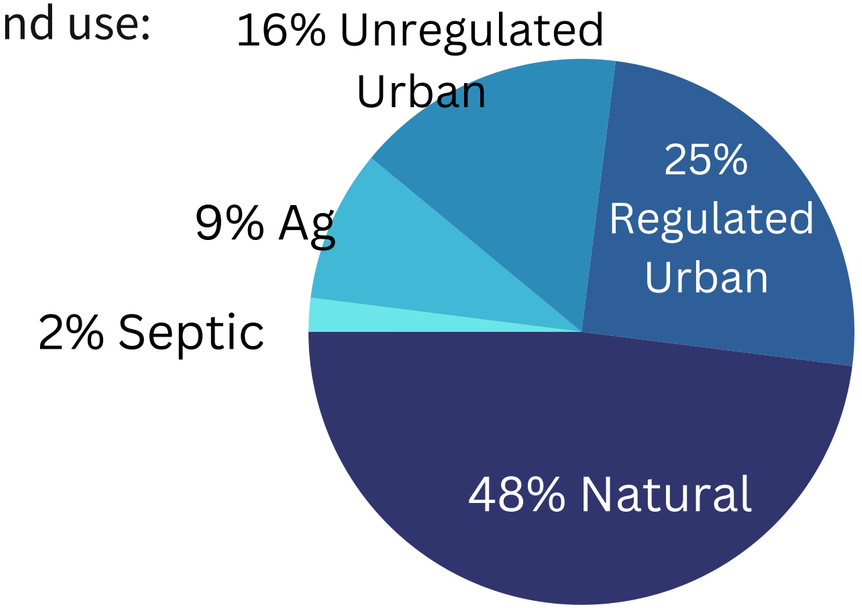
Hampton Roads Planning District Commision (HRPDC)

22 Planning District or Regional Commissions
State enabled; locally created

Who are we?



- 1 of 15 regional planning districts in the Virginia Chesapeake Bay watershed
- 15 of 17 localities in our region are totally or partially in the Bay watershed
- Land use:



WHAT HAVE WE USED THIS DATA FOR?

- Parking Lot Analysis
- Resilient Design Standards
- Green House Gas Emissions Estimates
- Land Use Change Patterns

Hampton Roads Parking Lot Analysis Goals and Objectives

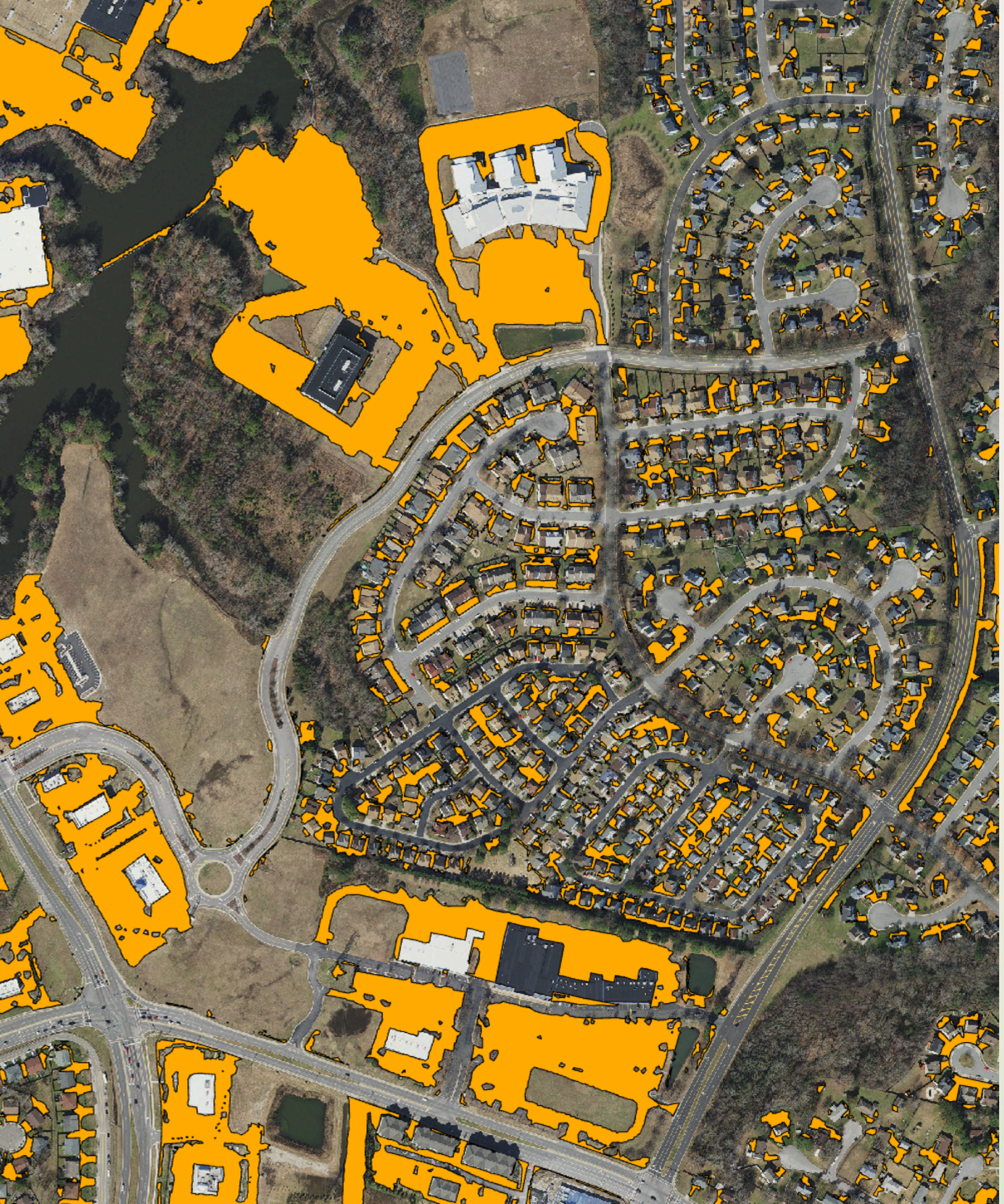
In 2011 HRPDC identified policies and practices local governments could undertake to protect land and water quality, including assessing how localities were regulating parking

Assess current parking patterns in Hampton Roads

- Research locality parking regulations and current best practices
- Analyze location, size, and land use of large parking lots using GIS
- Analyze water quality impacts of large impervious surfaces

Develop recommendations & strategies for reducing negative impacts of parking

- Policy changes
- Opportunities for retrofits or other improvements



Data Gathering

The Hampton Roads Parking Analysis required gathering and considering several different data layers and information sources to accurately characterize parking in different communities.

1. CBP Land Use/Land Cover
2. Regional Land Use/Land Cover
3. Regional Parcels
4. Locality Zoning
5. Locality Land Ordinances
6. Locality Parking Specifications
7. Google Earth Imagery

Case Study: Military Circle Mall, Norfolk, VA

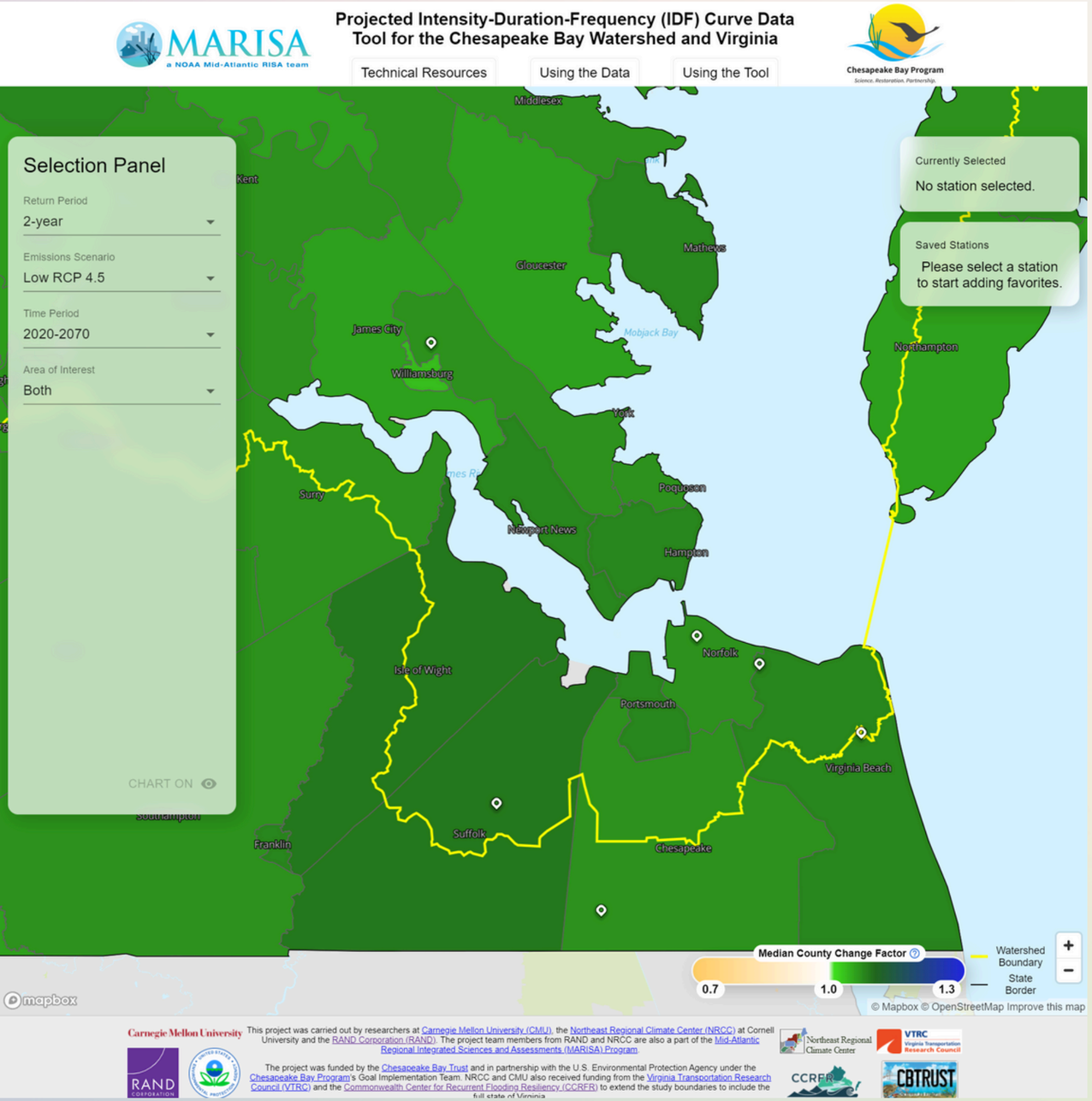
- **Square Footage:** 696,543 sq ft plus 84,087 sq ft Movie Theater
- **Local Zoning Classification:** CR Commercial Industrial / Military Circle LASO / Suburban Character District
- **Minimum Parking Standard(s):** 1 per 250 sq ft (Cinema: 1 space per 5 seats)
- **Minimum Parking Space Dimensions:** 8'x18'
- **Minimum Calculated # of Parking Spaces:** 3,012
- **Manual Count of Parking Spaces:** 4,052
- **Excess Spaces:** 1,040
- **Excess Parking Area:** 149,760 sq ft

Parking is necessary, the parking we have is not

1. Parking is driven by both regulatory requirements and private development decisions.

2. Changes to local regulations, like reducing or eliminating minimums or implementing maximums, can reduce the amount of space devoted to parking.

3. Land cover data is an important tool for helping communities understand the impacts of development.

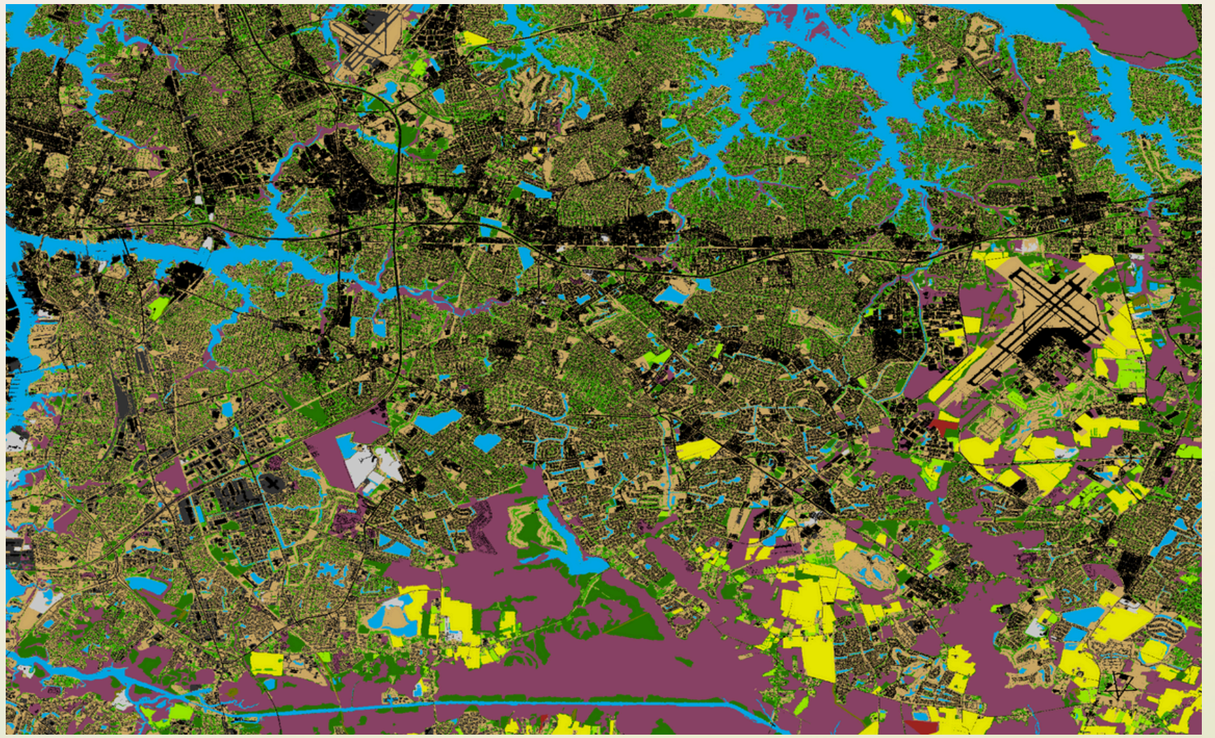


Hampton Roads Resilient Design Standards

- Current design standards are based on the past, not sea level rise or increased precipitation
- For development and stormwater management, standards should be future-proofed and incorporate sea level rise, tailwater elevations, precipitation, and joint probability events
- Goal is to **provide guidance to help localities amend ordinances and policies to include design standards reflecting future conditions** under climate change

Approach to Resilient Design Standards

- Future precipitation projections developed using MARISA Itensity, Duration, & Frequency (IDF) tool
- **Impervious cover was used as a proxy** for watershed capacity to absorb rainfall
  - More impervious cover means potentially higher consequences if rainfall is greater than predicted
- Multipliers recommended for each locality based on climate projections and impervious cover
- Regional Resilient Design Guidelines for Hampton Roads adopted by HRPDC



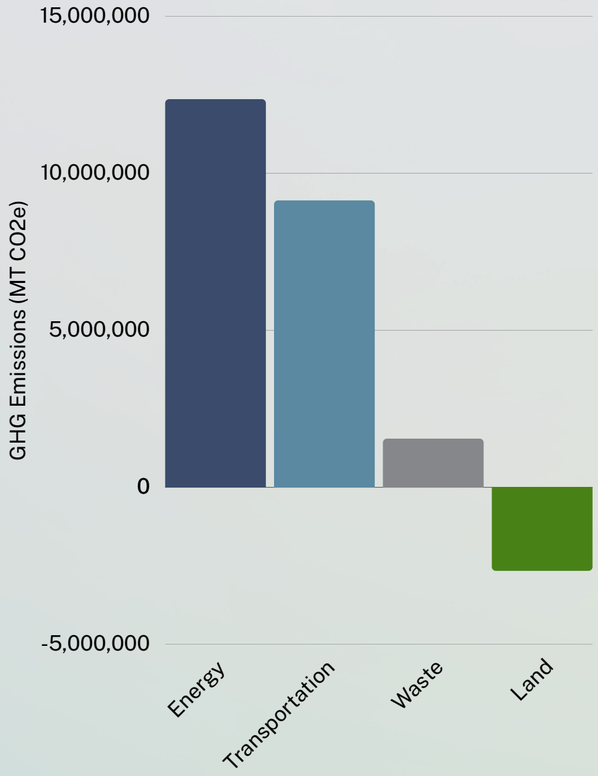
Data Source: Chesapeake Bay High-Resolution Landcover

Refining Regional Greenhouse Gas Inventory

HRPDC is developing the region's first Climate Action Plan, first step is to develop a greenhouse gas (GHG) inventory.

Default Methods from EPA and IPCC:

- Scale down state-wide emissions from the State Inventory Tool
- Use national datasets such as the National Landcover Database (NLCD) & USDA National Agricultural Statistics Service (NASS)



Simplified GHG Inventory from the Hampton Roads MSA Priority Climate Action Plan (2024)

HRPDC used the high-res Land Use Land Cover Data and CAST for the Ag & Natural Lands sector of the GHG Inventory

Data Comparison & Approach

CBP
1m resolution
56 categories

NLCD
30m resolution
20 categories

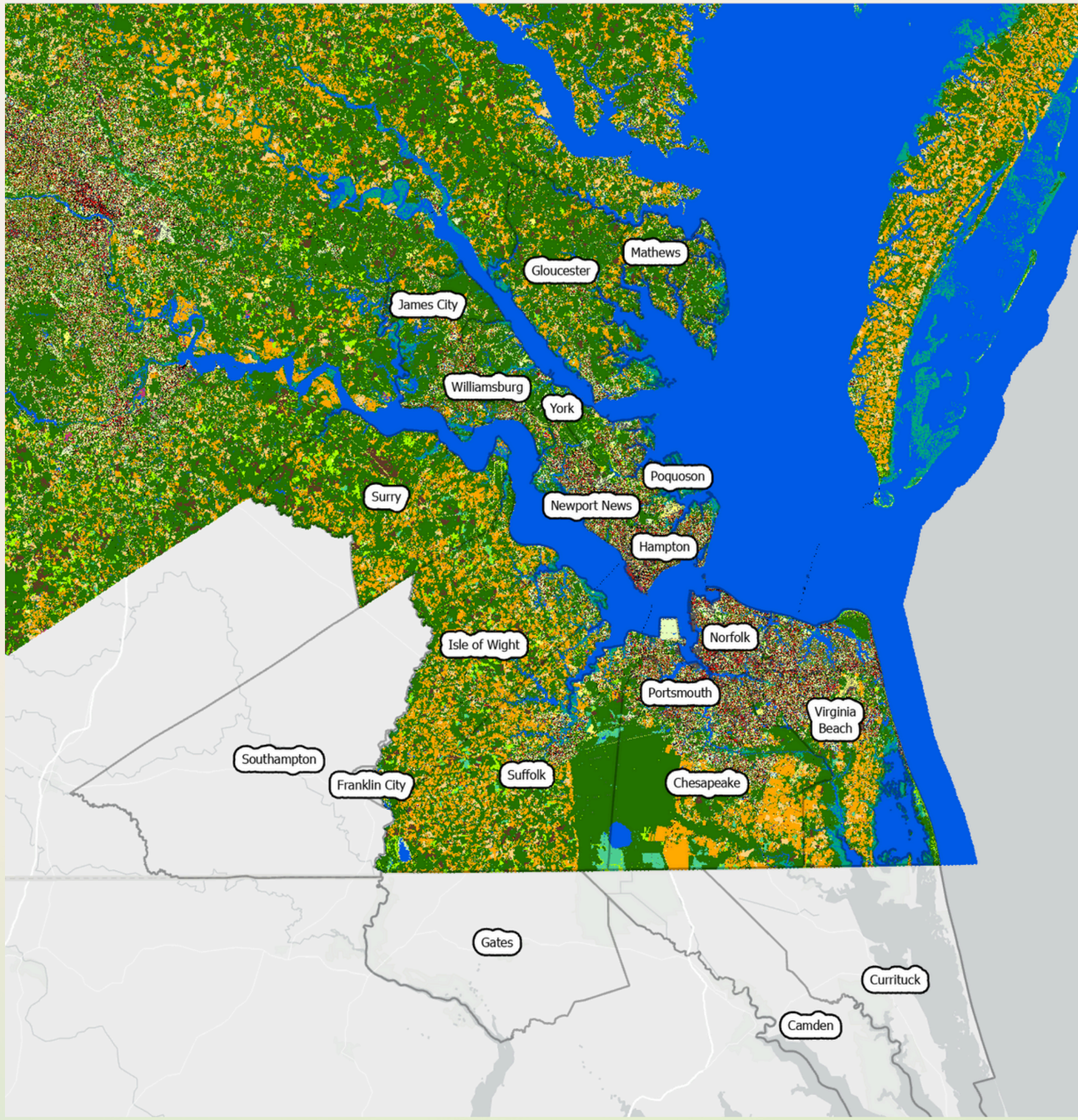
- Used land use data and loads from CAST to improve estimates in agriculture, natural & working lands, and tree canopy
- The land use categories from each dataset had to be categorized into common IPCC categories

Land Use Category Crosswalk

Cropland	Cropland/Grassland
Natural Succession	
Pasture/Hay	
Extractive	Developed Land
Impervious Roads	
Impervious Structures	
Impervious, Other	
Pervious Developed, Other	
Turf Grass	
Forest	Forested Land
Harvested Forest	
Tree Canopy over Impervious	Urban Trees
Tree Canopy Over Turf Grass	
Tree Canopy, Other	
Wetlands, Riverine Non-Forested	Wetlands
Wetlands, Terrene Non-Forested	
Wetlands, Tidal Non-Forested	

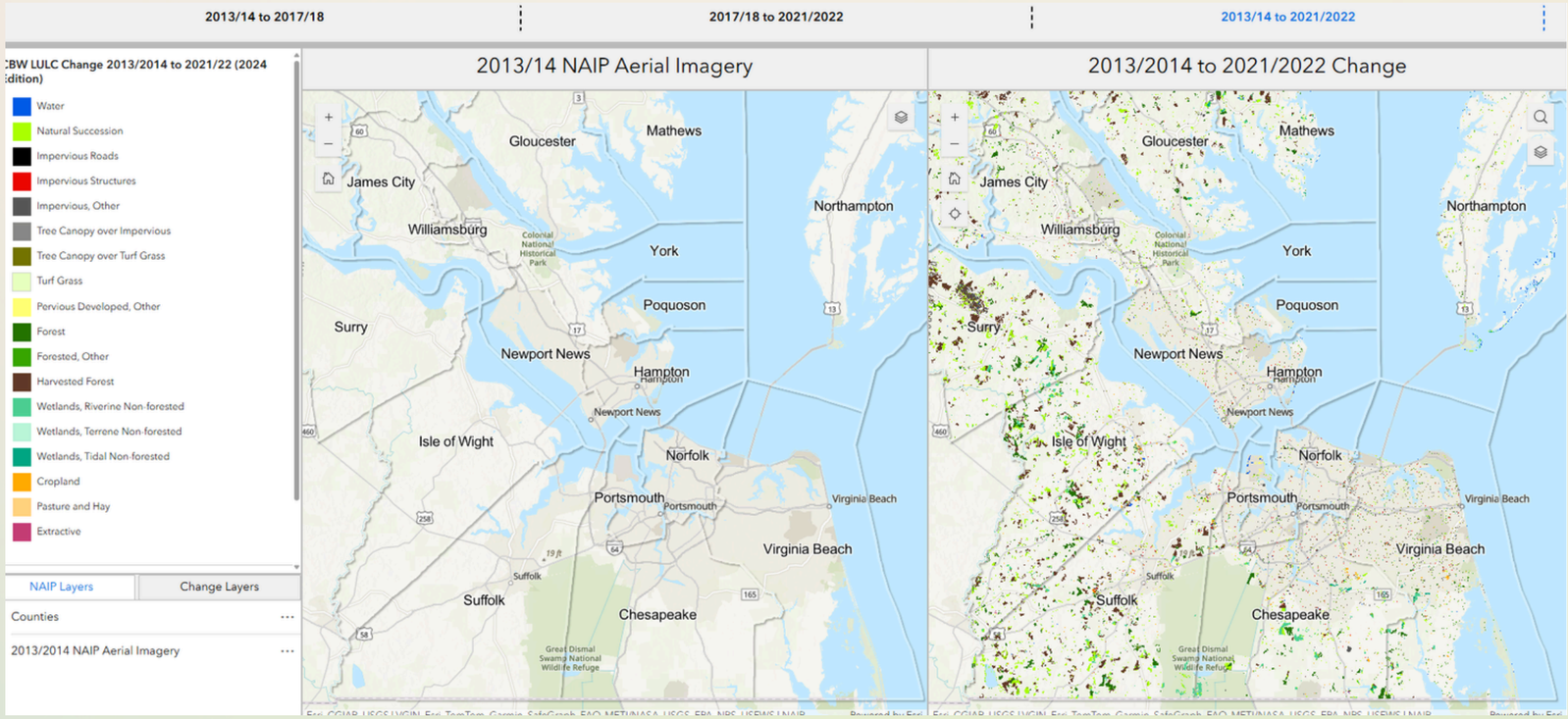
Findings

- 650 MT of organic fertilizer application was not captured by the default method
- Annual carbon sequestration from urban trees was 157k MT CO2e less using the CBP data
- Wetlands **would not have been analyzed** for the GHG inventory without access to the high-res LULC data
- Using the Chesapeake Bay Program LULC data allowed for a higher resolution GHG inventory than downscaling other data sets



Land Cover & Land Use Change

- Change data now available for three time periods
  - 2013/14-2017/18
  - 2017/18-2021/22
  - 2013/14-2021/22
- What's this data telling us?



Hampton Roads
2013 - 2021

42,787

Forest Acres Lost

1,907

Agriculture Acres Lost

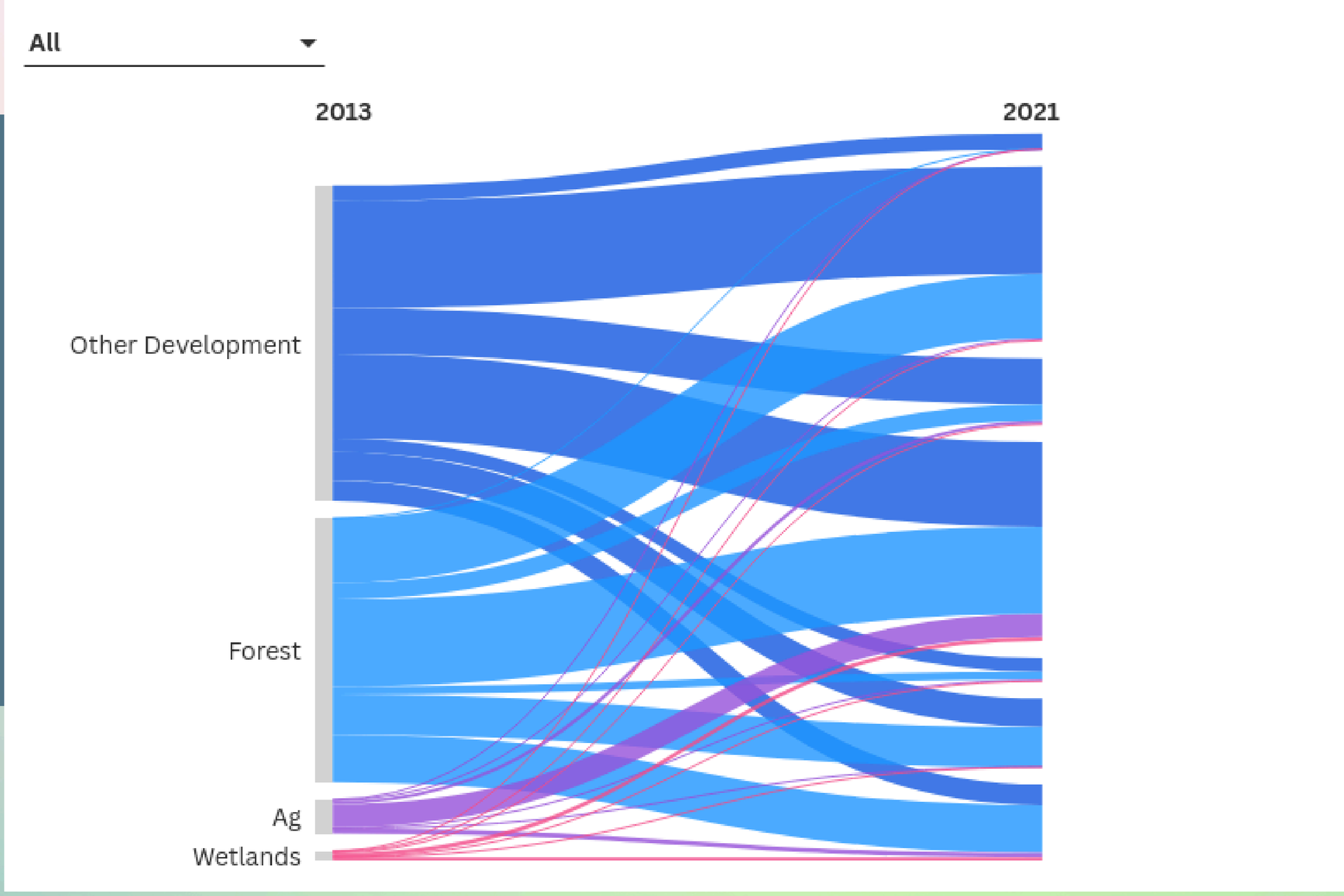
9,455

Impervious and Turf Grass Acres Gained

25,275

Harvested Forest Acres Gained

Hampton Roads Development Patterns



What can we learn from this data?

Development patterns

Infill and redevelopment vs new

Conservation needs

Have we lost crucial conserved land?

Integration

Resilience, hazard mitigation, water quality

Smart Growth

Planning ahead to maximize development w/ conservation

Urban Trees & Forestry

Losing or gaining?

Coastal Protections

Identify buffer and wetland needs

THANK YOU!

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