



Whose woods are these?

Forest patch distribution, ownership, and land use history throughout the Mid-Atlantic

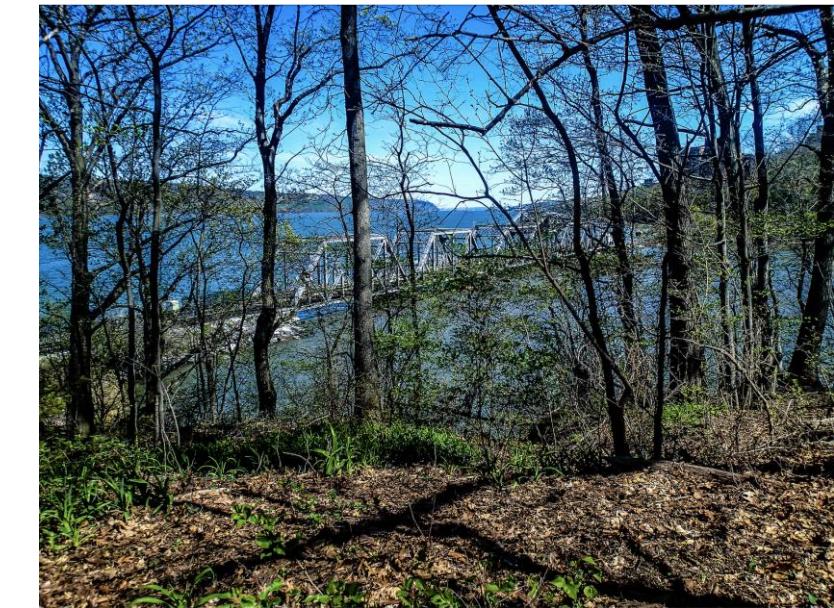
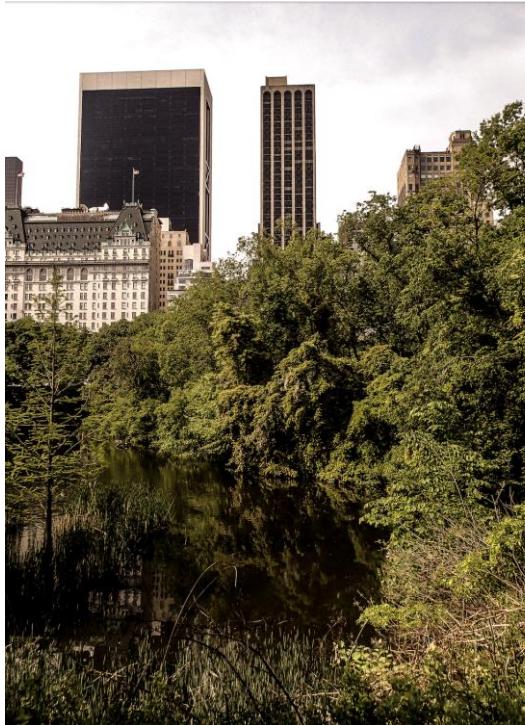
Nancy F. Sonti and Miranda H. Mockrin, USDA Forest Service, Northern Research Station
Matt Baker, UMBC

January 7, 2026
Chesapeake Bay Program
Forestry Workgroup



Presentation Goals

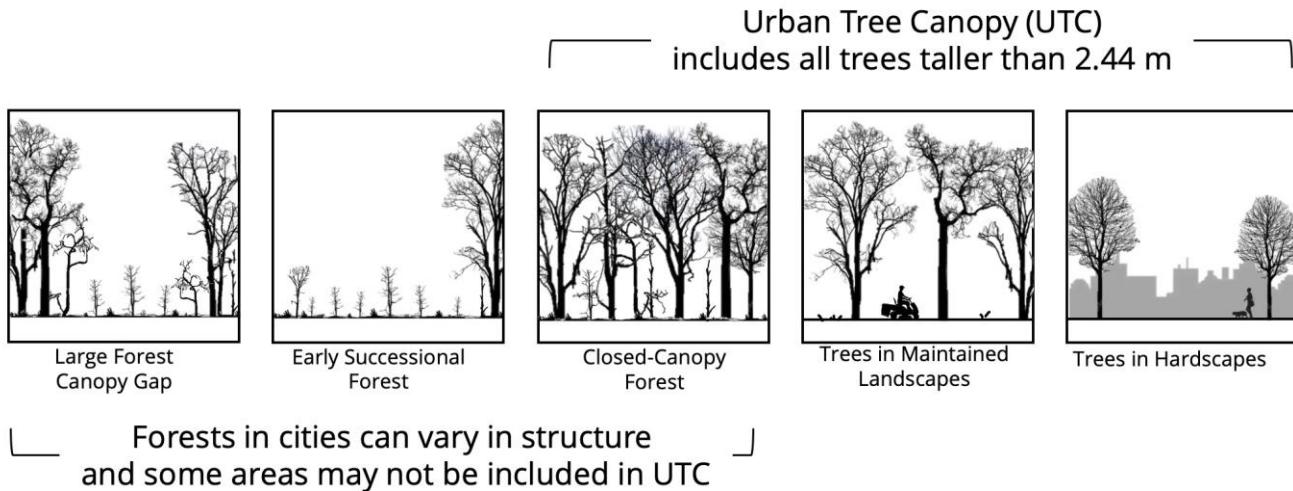
- Overview **methods for forest patch mapping**
- **Results on patch size and ownership**
 - Urban to rural setting, Baltimore County and City, MD
 - New York, NY; Philadelphia, PA; and Baltimore, MD
- Introduce **online tool – forest patch viewer**



Research Goals

Map those areas with forest ecosystem processes and recruitment

Image credit: Max R. Piana

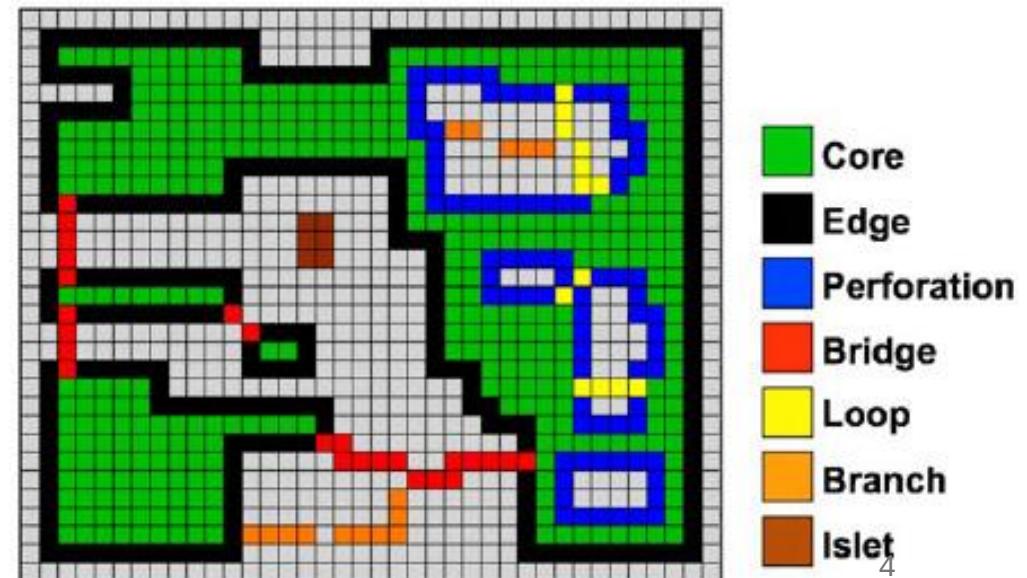
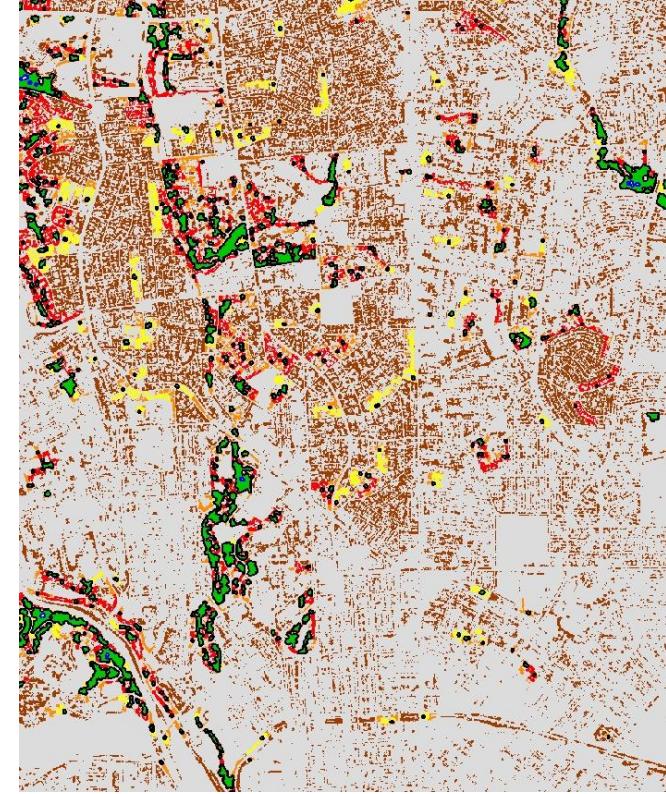


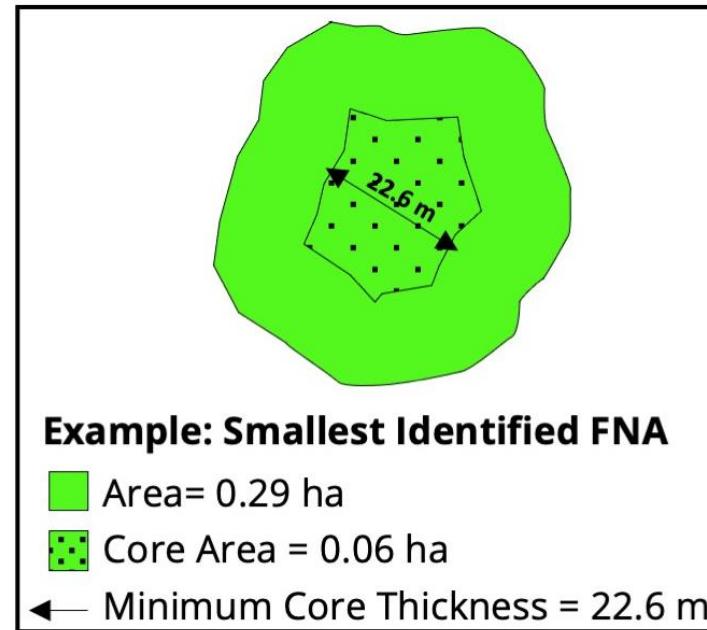
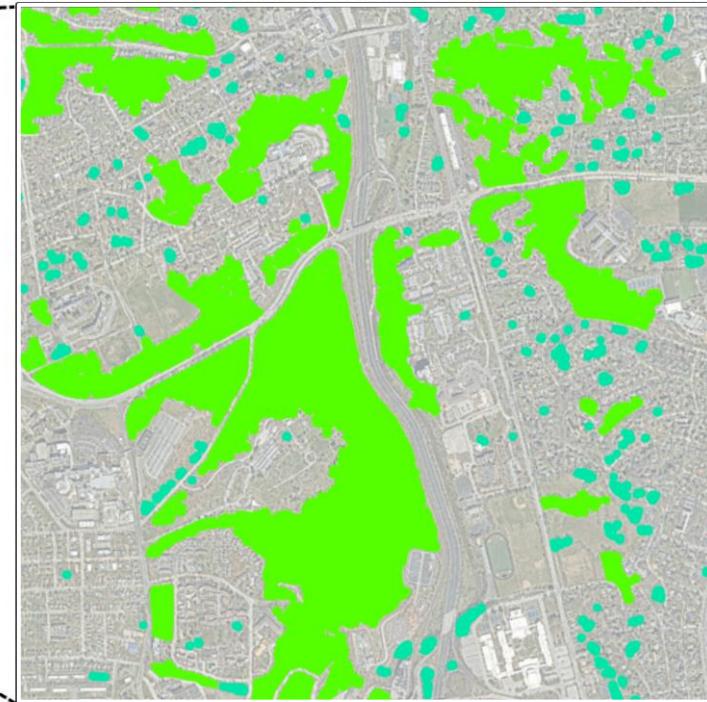
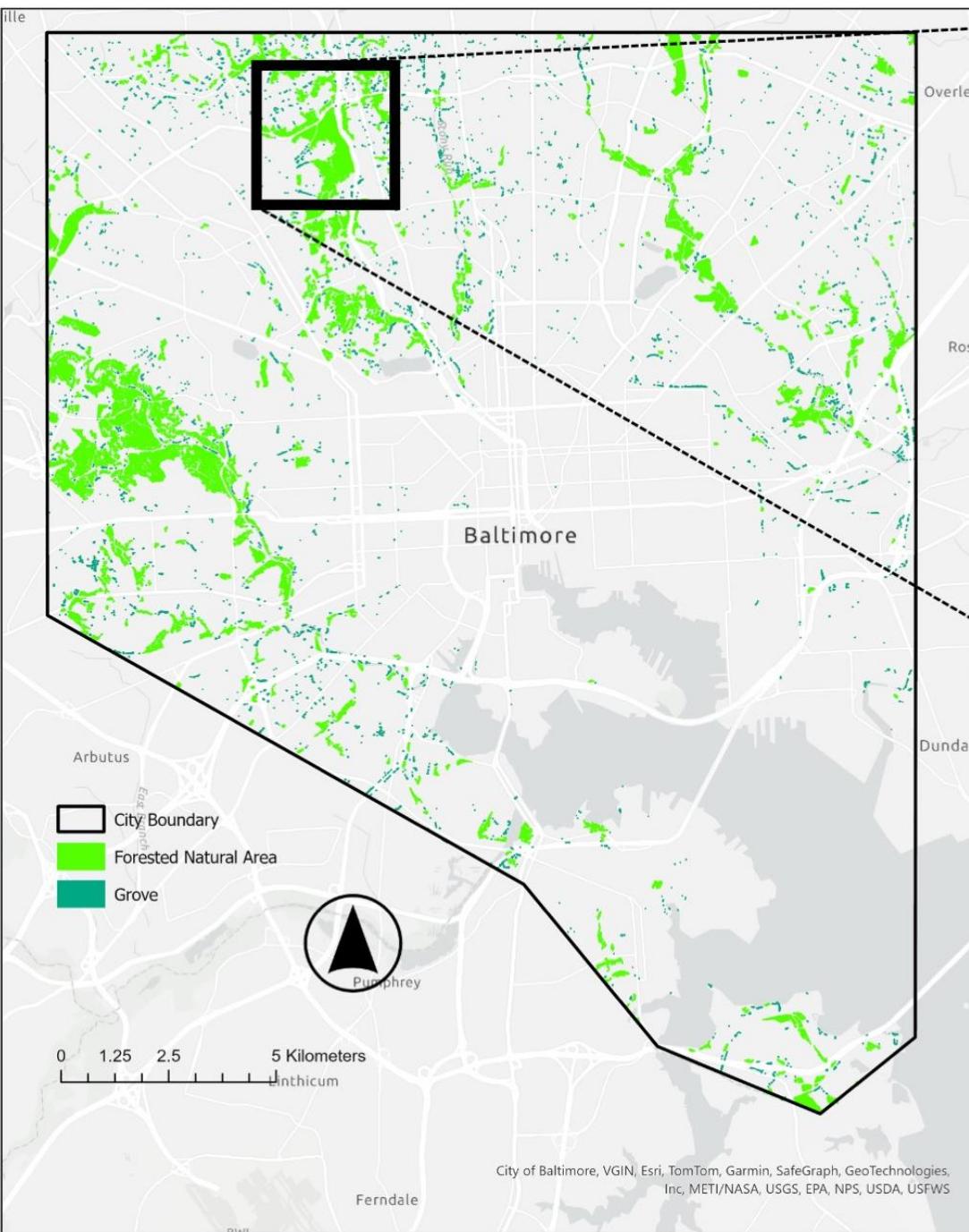
Methods - morphological spatial pattern analysis (MSPA)

Create data on forest patches

- high resolution land cover data (2013), streets and buildings removed, with MSPA tool Guidos Toolbox
- edge width set to 15 meters

Baker, M., Yesilonis, I., Templeton, L., Shobe, B., Bos, J., Sonti, N. F., & Lautar, K. (2025). Distributed urban forest patch sampling detects edge effects and woodland condition for monitoring and management. *Ecosphere*, 16(3), e70236. <https://doi.org/10.1002/ecs2.70236>





Forest patches from rural to urban areas

Number and area of forest patches

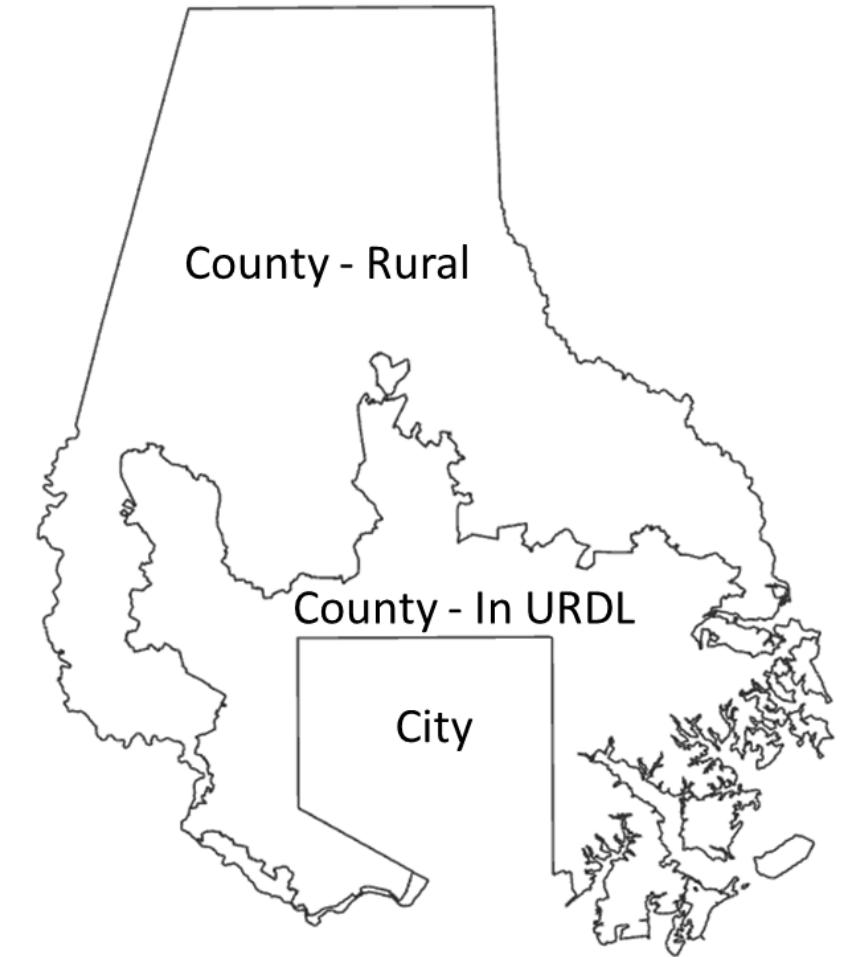
Ownership and land use, parcel data

Ownership:

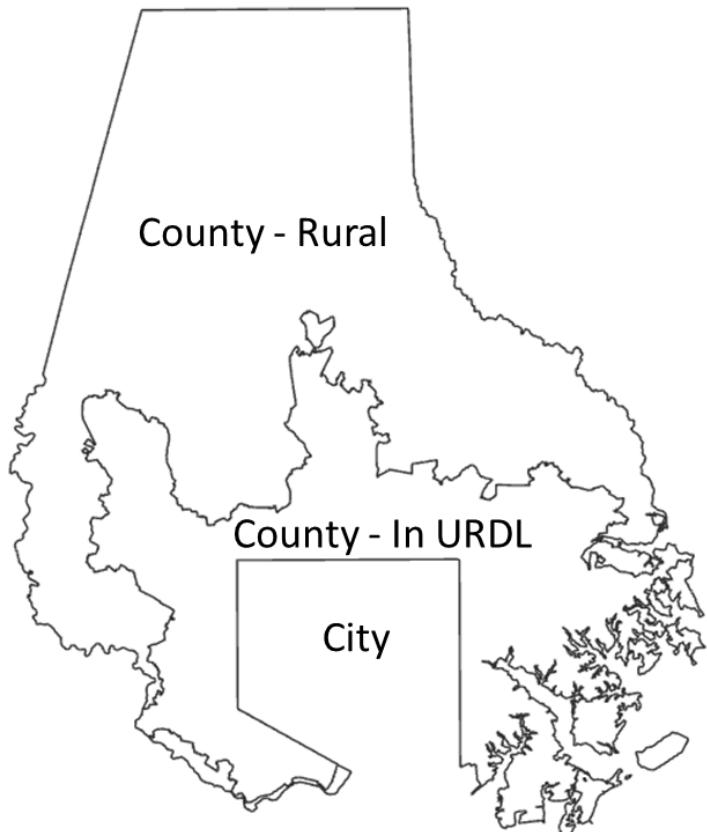
- Public – Federal, State, Municipal
- Private – Commercial, Institutions, Residential

Land Use:

- School, other institution, transportation
- Park & recreation
- Residential
- Agriculture



Over 20,000 forest patches mapped across Baltimore City and County, totaling 581.9 km²(32.6% of total area area).



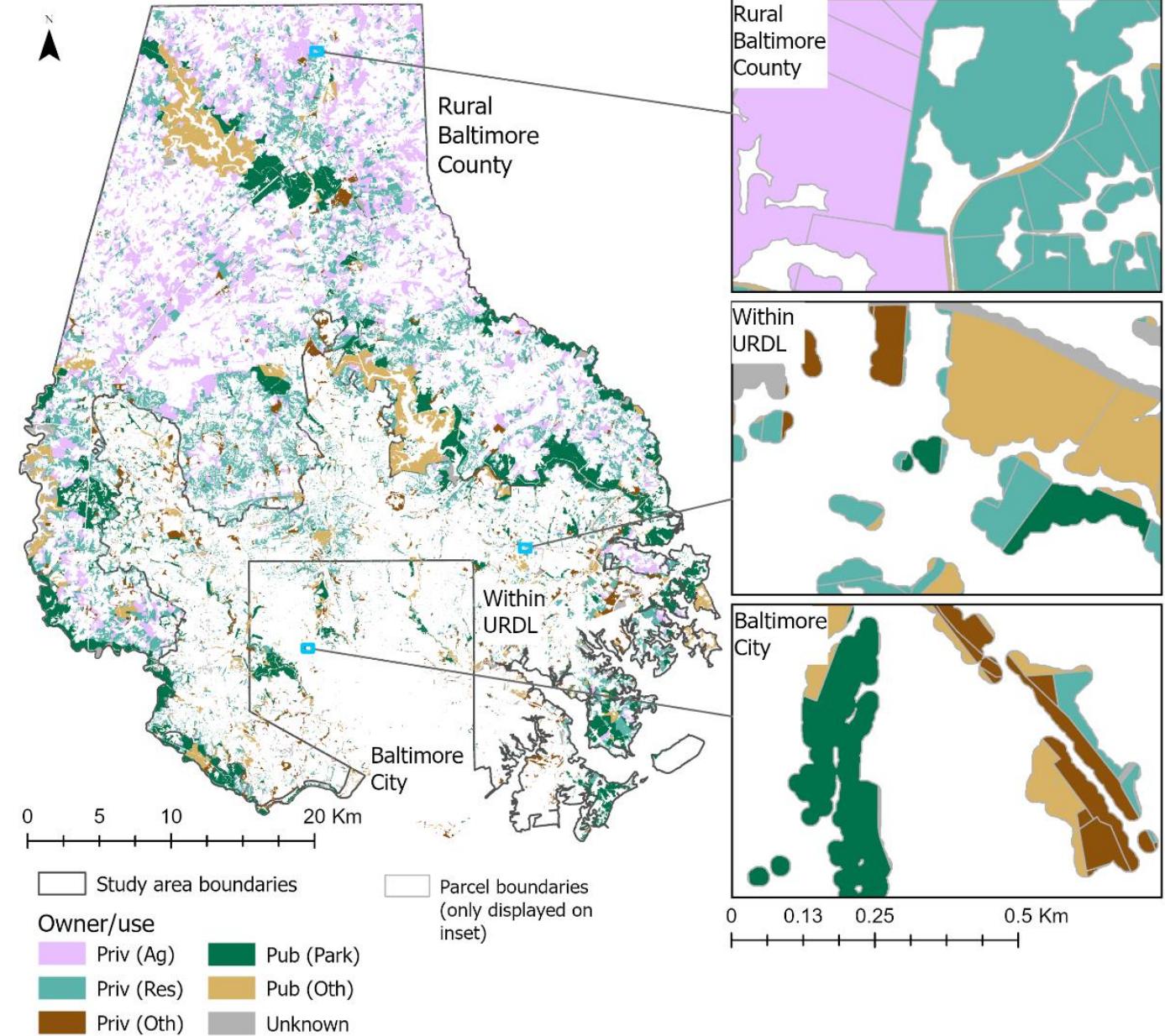
- **Baltimore City: 9.7% forest cover;** median patch size ~2,100 m².
- **Suburban (inside URDL): 17.9% forest cover;** median patch size ~2,300 m².
- **Rural (outside URDL): 44.7% forest cover;** median patch size ~2,600 m²

Forest Patch Ownership and Land use

Urban - Forest mostly publicly owned (55%), concentrated in parks (e.g., Gwynns Falls/Leakin Park).

Suburban: Forest primarily private residential (39%), with some public parkland.

Rural: Forest dominated by private agricultural lands (34%) and private residential (31%), plus public lands near reservoirs.



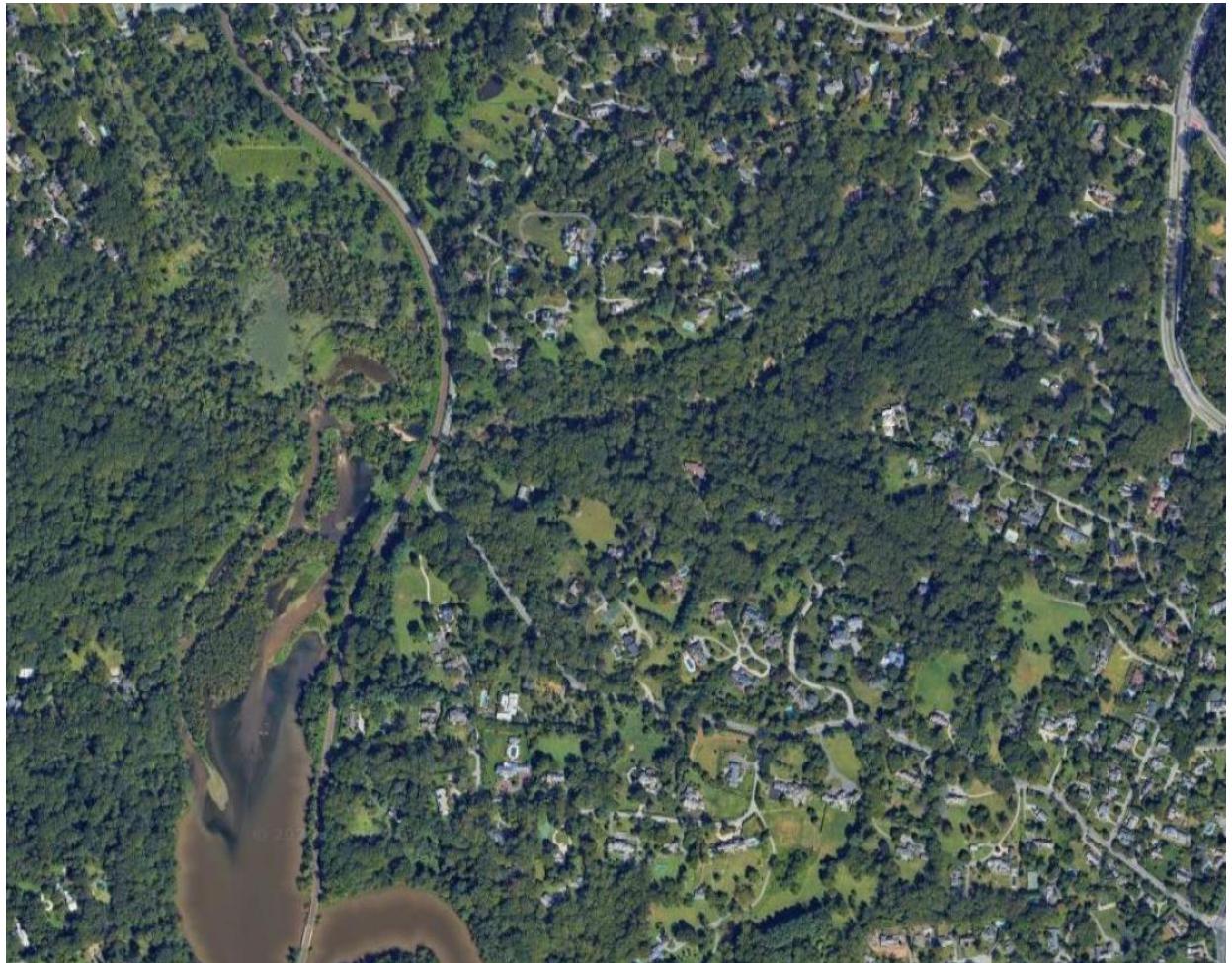
Amount and ownership in suburban areas is notable

Area within URDL makes up one-third of Baltimore County's total area & 90% of the county's population, ~ $\frac{3}{4}$ million people.

- **17.9% of land area is in forest**
- **Highest patch density (14.6 patches/km²), despite intense development.**
- **Mostly private residential ownership and use**

Mockrin, M. H., Baker, M. E., Katoski, M., Sonti, N. F., & Holland, M. B. (2025). Legacies of urbanization and suburbanization on forest patch distribution, ownership, and use: Insights from Baltimore, Maryland. *Urban Forestry & Urban Greening*, 107, 128778.

<https://doi.org/10.1016/j.ufug.2025.128778>



Urban Forest Patch Viewer: Conserving Forests in Cities



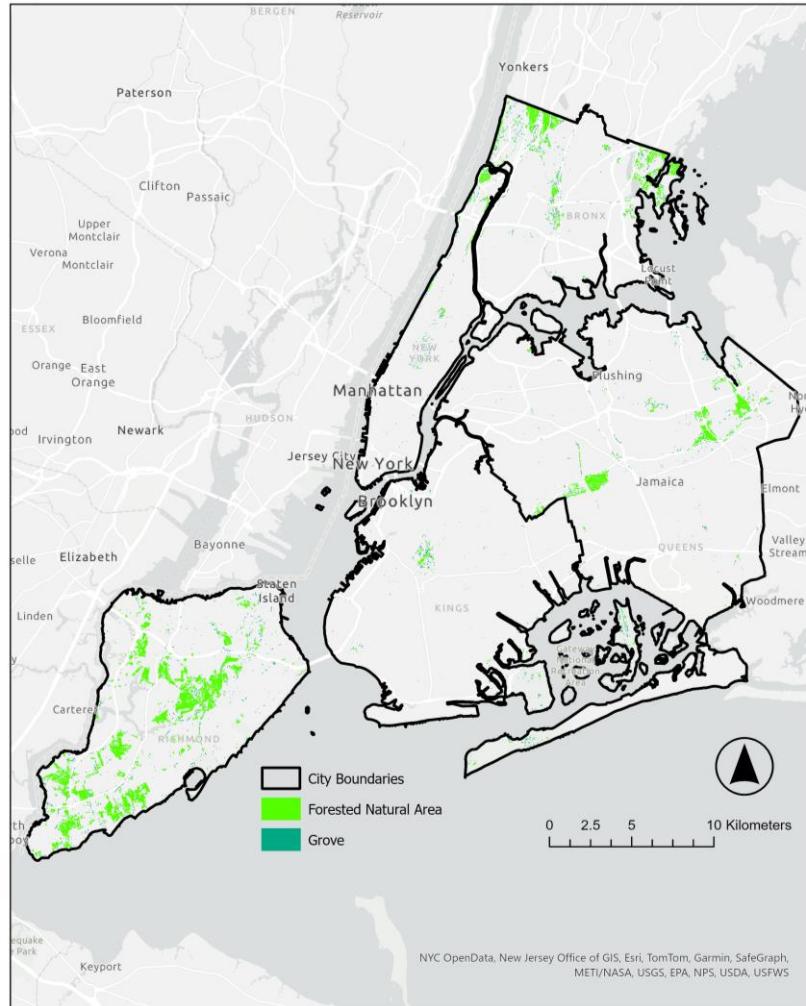
UMBC



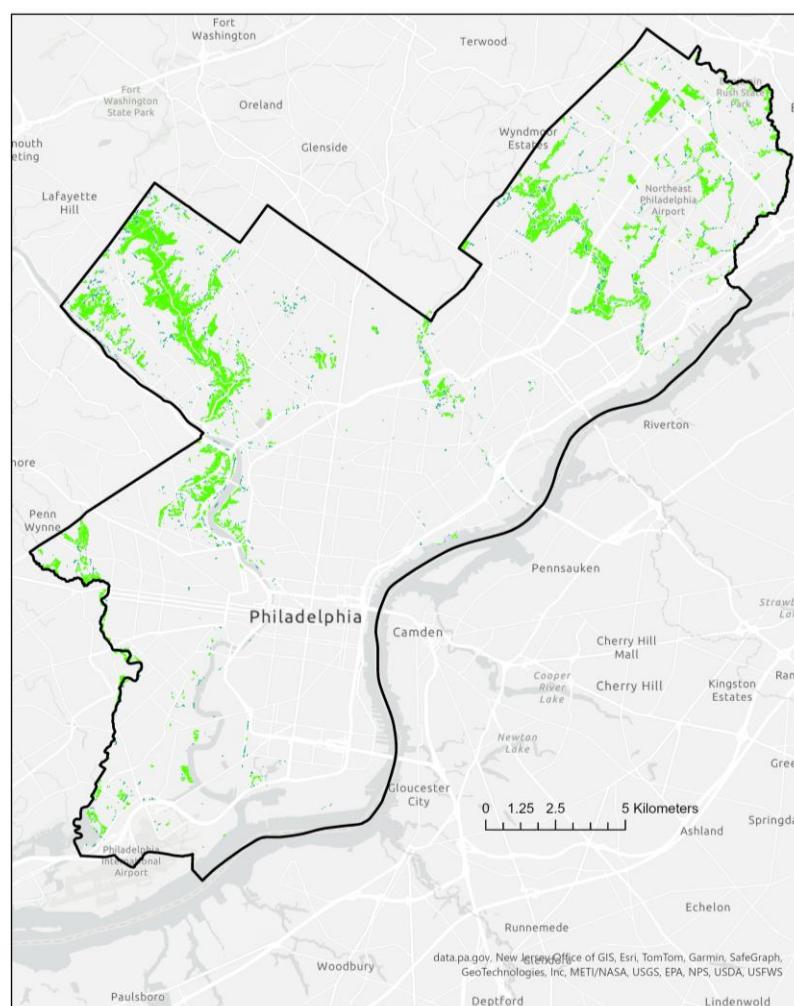
**baltimore
greenspace**



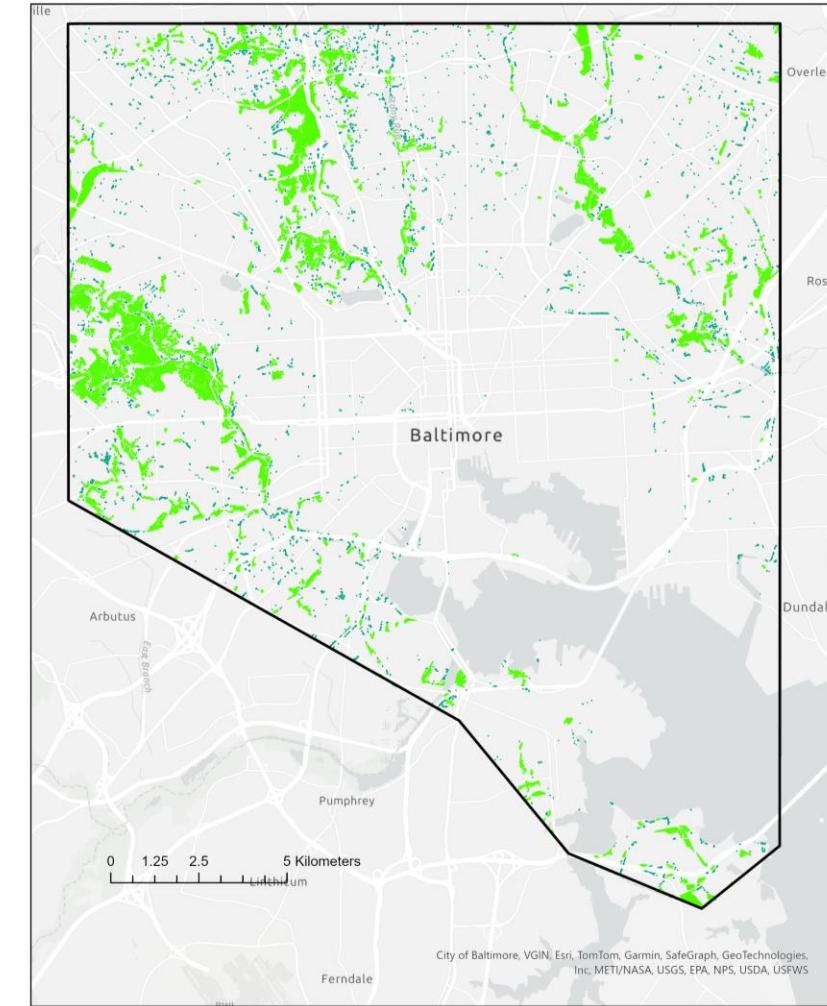
New York City:
22% UTC
3.9% Forest Patch Cover



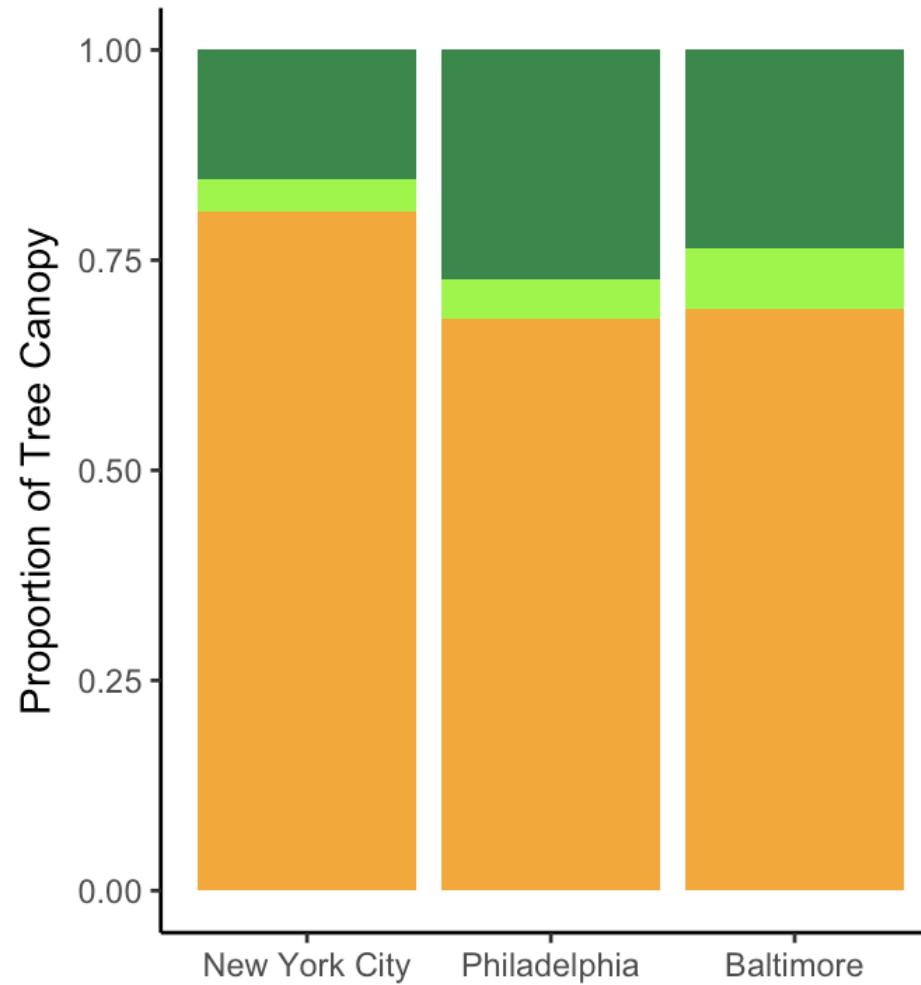
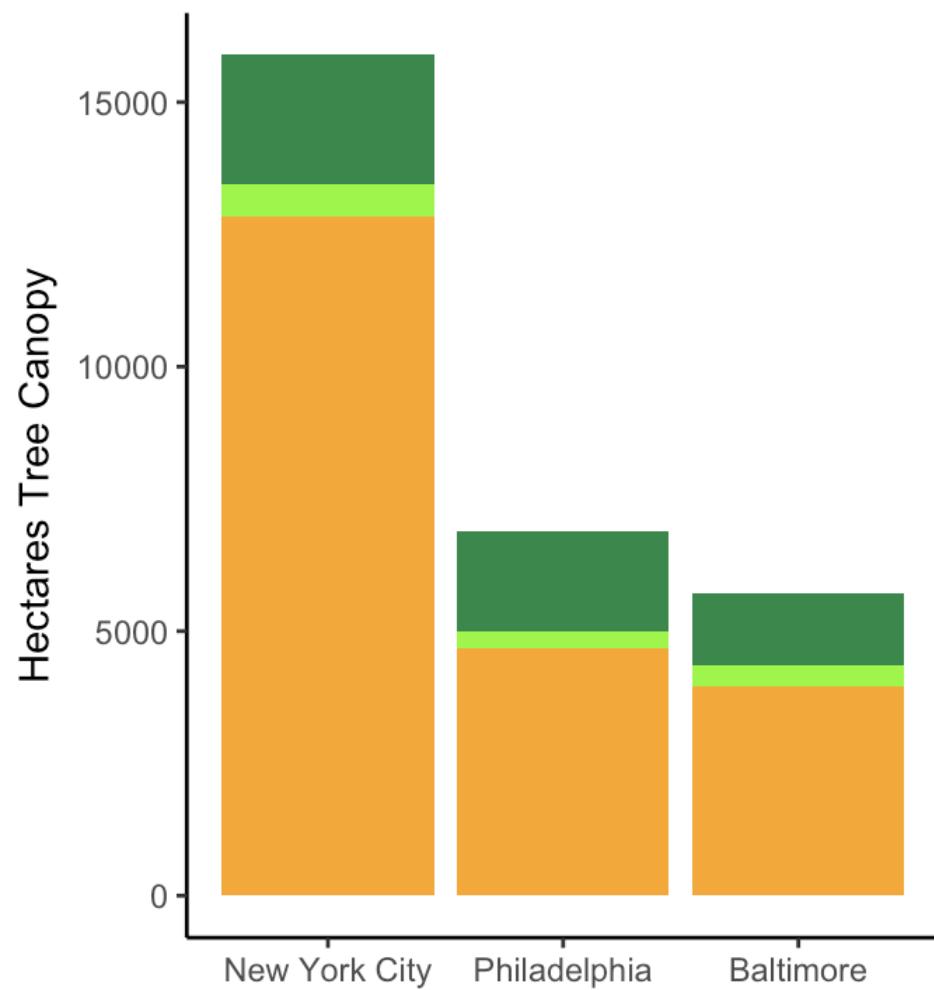
Philadelphia:
20% UTC
6.3% Forest Patch Cover



Baltimore:
28% UTC
8.4% Forest Patch Cover



Mapping Forest Patch Canopy



CanopyType

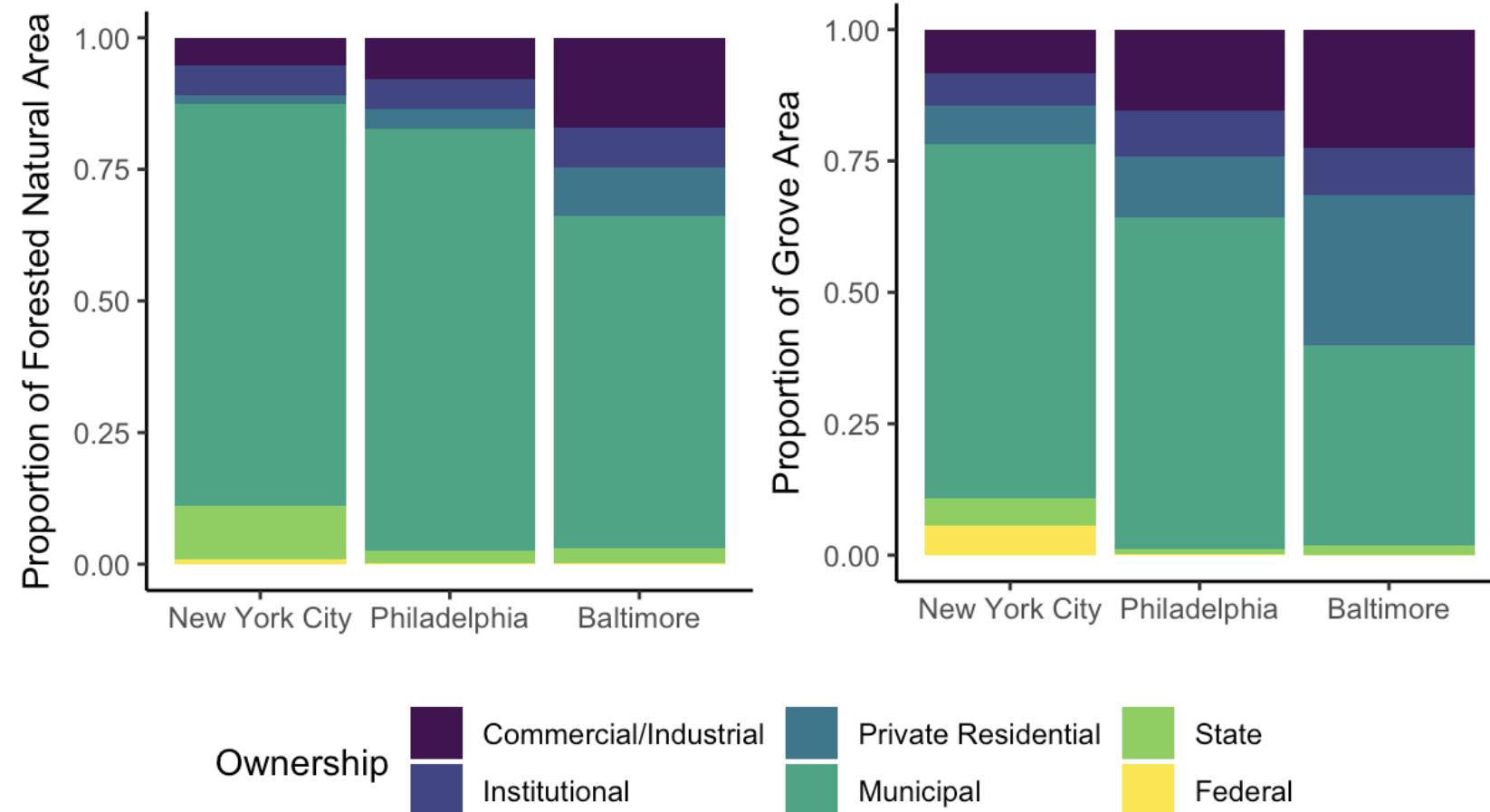
Forested Natural Area

Grove

Other Tree Canopy

Mapping Forest Patch Ownership

- Policy implications
 - Conservation priorities
 - Legal preservation challenges across parcels
- Management implications
 - Forest connectivity across parcels and ownerships
 - Landowner outreach / extension activities



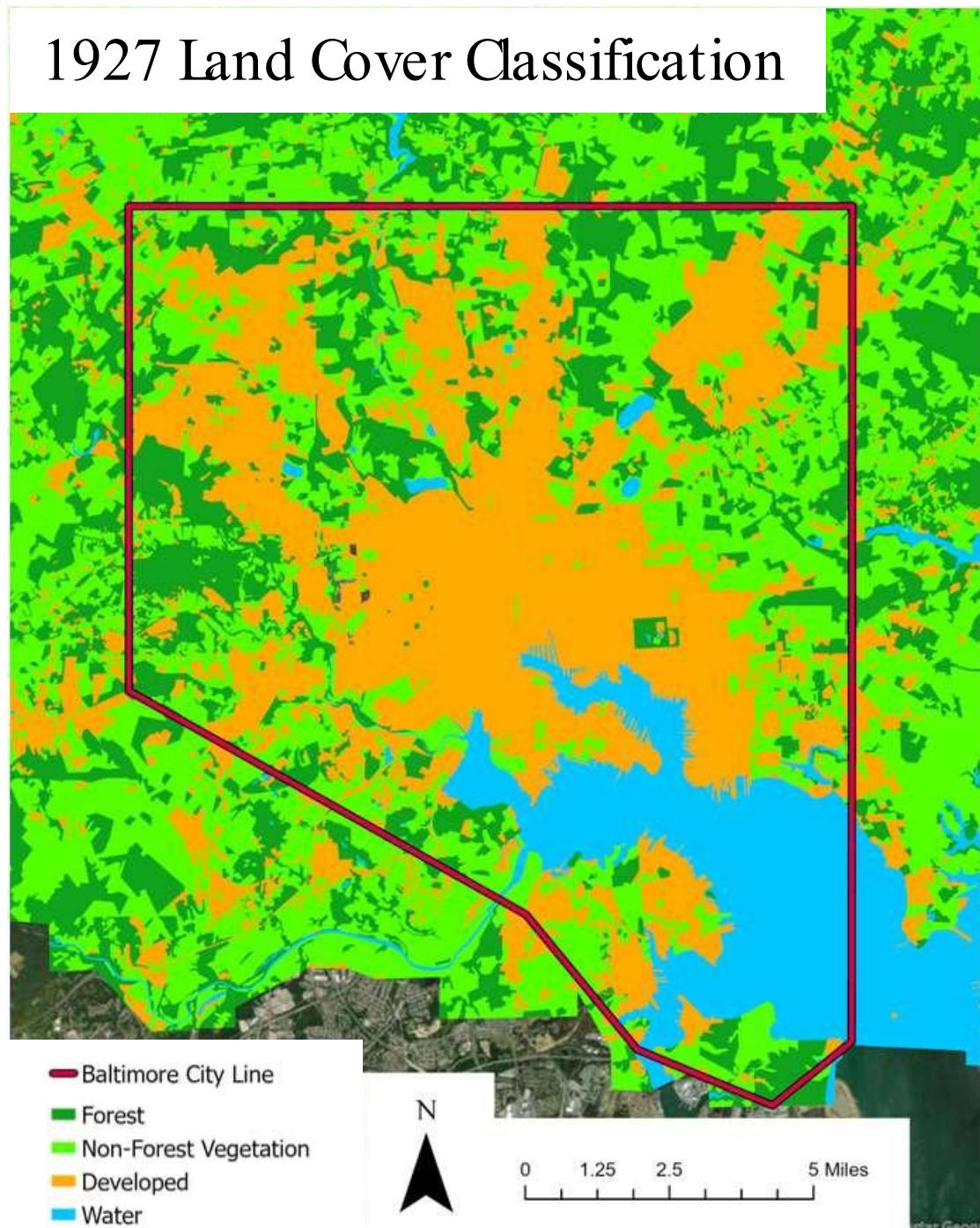
1927 Aerial Imagery



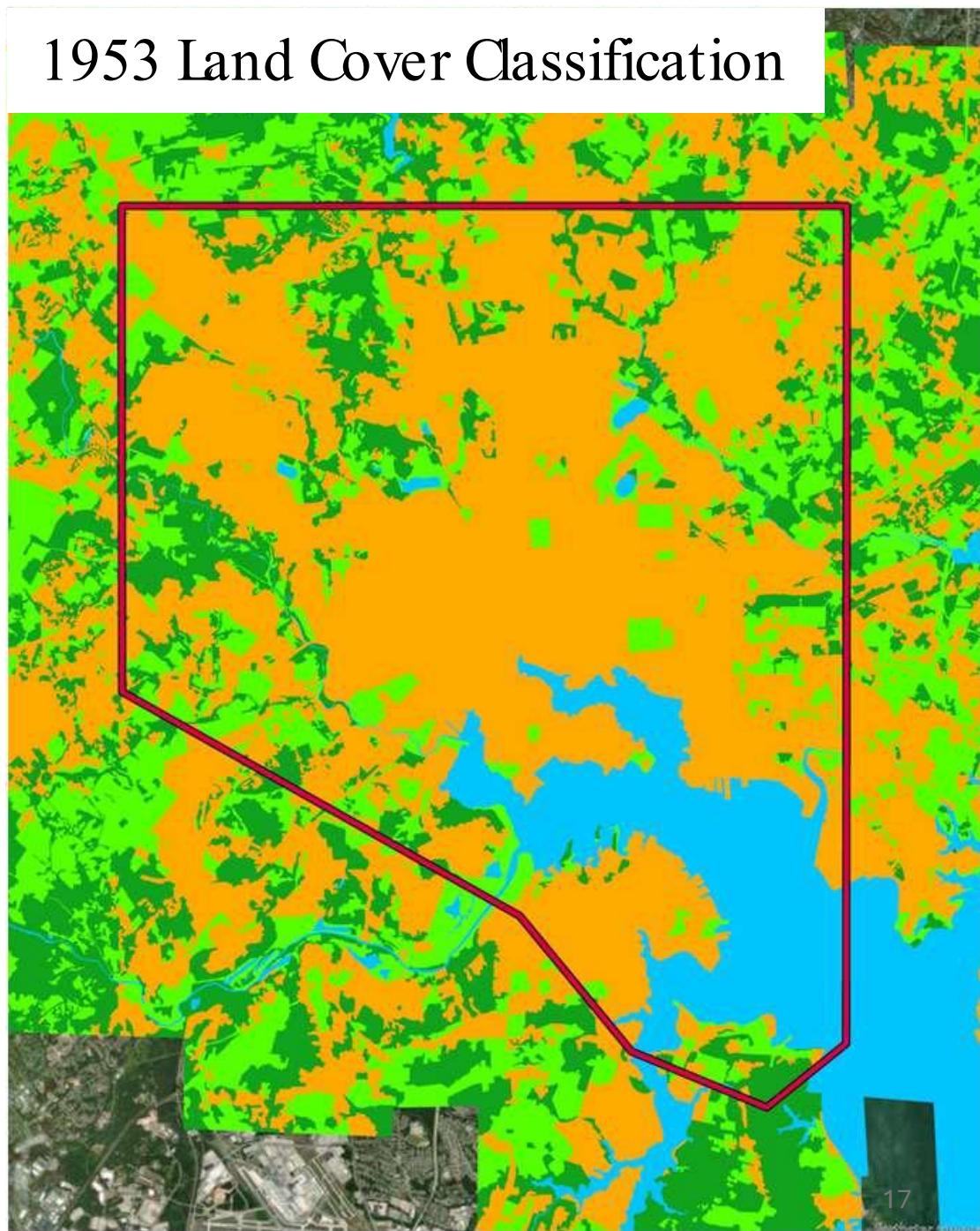
1953 Aerial Imagery

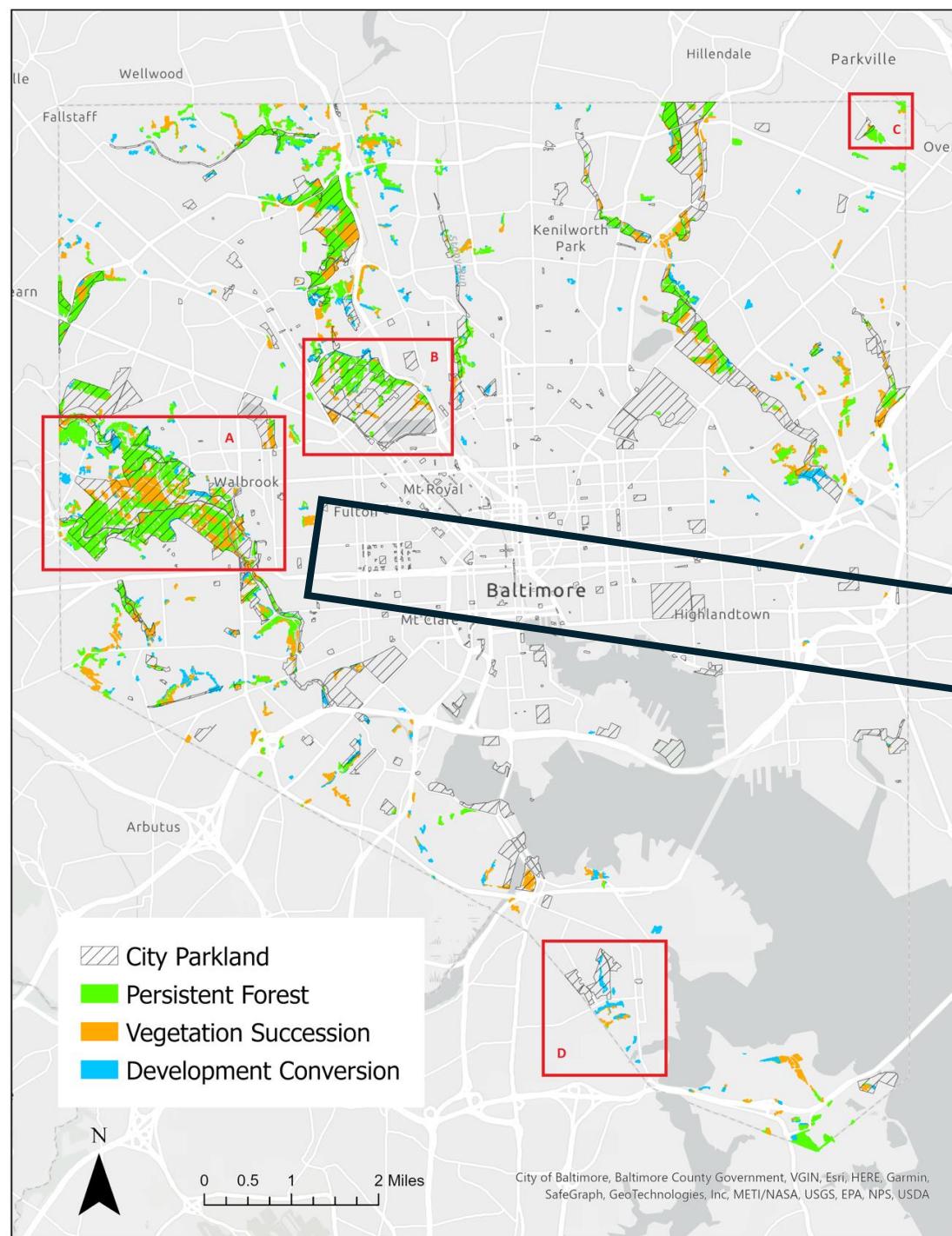


1927 Land Cover Classification

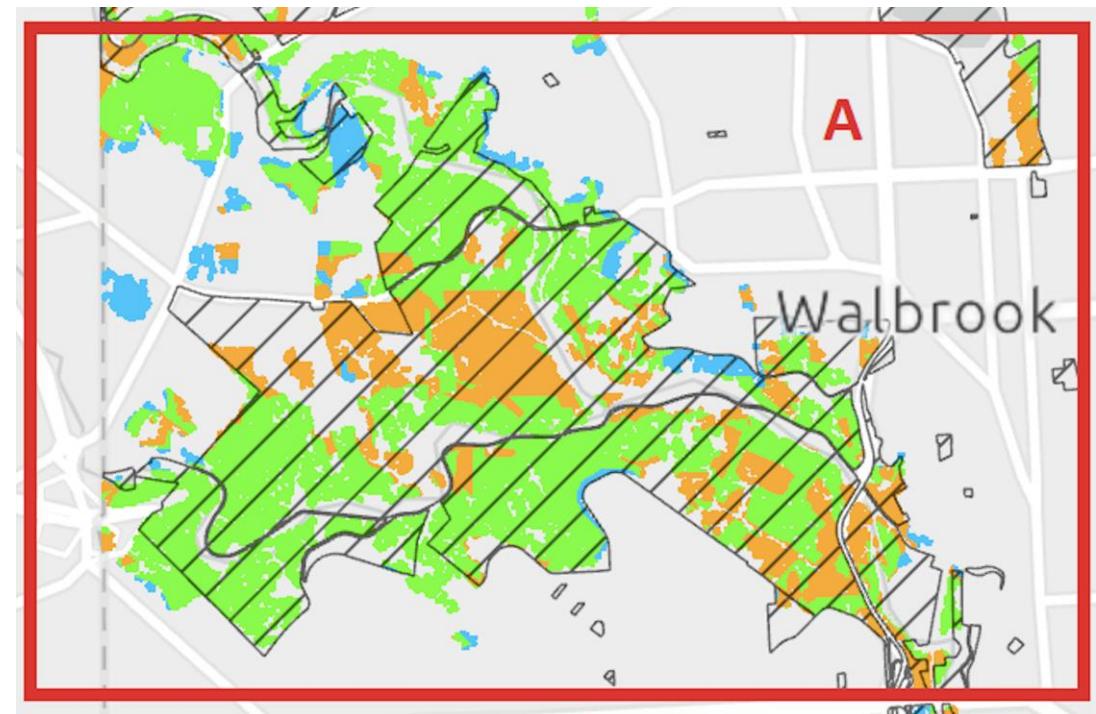


1953 Land Cover Classification





Gwynns Falls – Leakin Park





The Urban Forest Patch Viewer

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Sources: Esri, USGS, data.pa.gov, Delaware FirstMap, New Jersey Office of GIS, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS | USDA Forest Service Northern Research Station | USDA Forest Service, Northern Research Station

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Welcome to the Urban Forest Patch Viewer!

Using This Web Application

Click on a city name at the top of the screen to view map layers, and summary data tables for that city. You can turn layers on and off within each city and can change the transparency of each layer. You may also view a swipe screen within each city. Be sure that all layers are on before selecting which layer to view with the swipe tool. Click on "Details" buttons within each layer for metadata about how each layer was created.

Layer Descriptions

The Urban Forest Patch Viewer displays three map layers providing slightly different information on urban forest patches. The forest patch ownership layer is visible by default. The forest patches layer provides an indication of size, with groves being the smallest type of patch. The forest patches and the core and edge forest layers can be viewed by checking the box next to the layer in the **Map Layers** tool. View the item details in the map layer tool for [more information on these layers](#).

Web Application Information

Citation:

Sonti, N.; Baker, M. 2023. Urban forest patch viewer app. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station.
<https://experience.arcgis.com/experience/e9801ba79ba0487c8a027390da49fbea> (15 September 2023).

Project Contact:

[Nancy Sonti](#), Research Ecologist at nancy.f.sonti@usda.gov.

Last Update: 26 February 2024

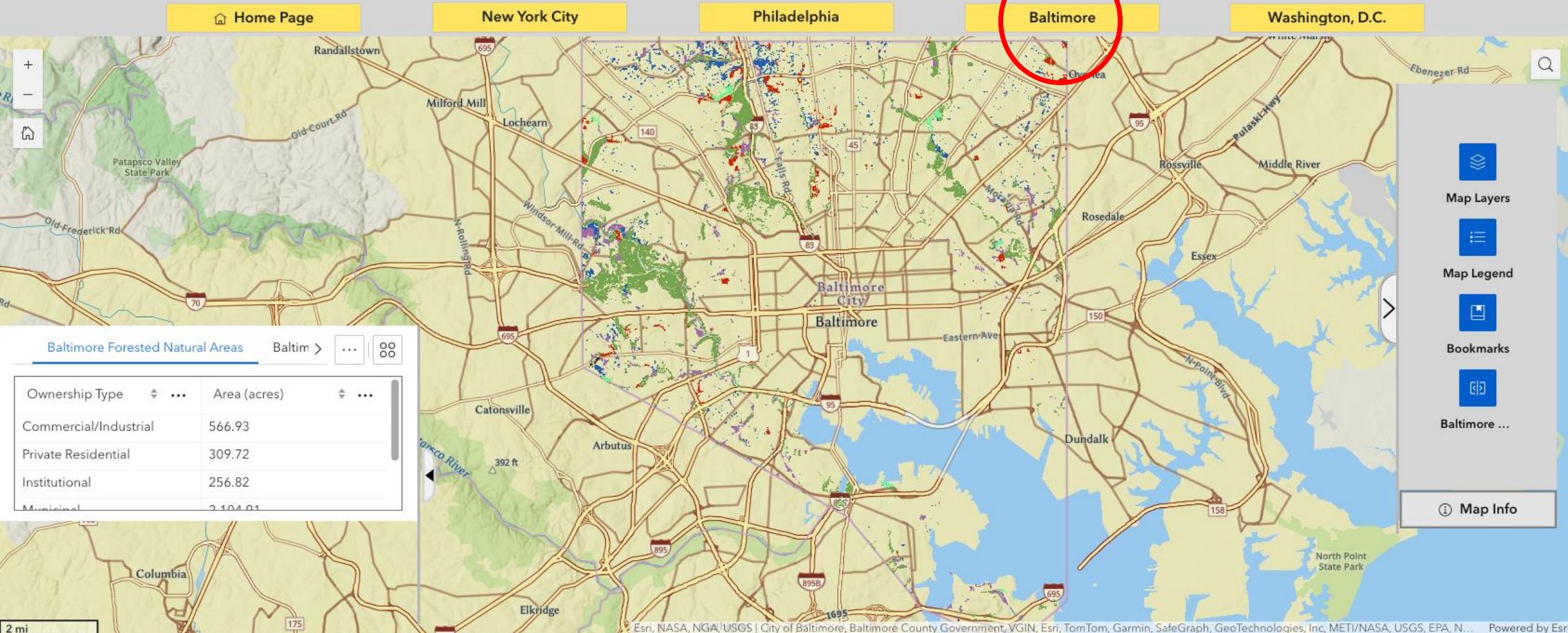
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<u>Ownership</u>	<u>Core and Edge Forest</u>
 Commercial/Industrial	 Core
 Federal	 Edge
 Institutional	 Grove
 Municipal	 Forested Natural Area
 Residential	
 State	



The Urban Forest Patch Viewer





The Urban Forest Patch Viewer

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+ - House Search

Baltimore Forested Natural Areas Baltimore > ... 00 00

Ownership Type	Area (acres)
Commercial/Industrial	566.93
Private Residential	309.72
Institutional	256.82
Municipal	2104.01

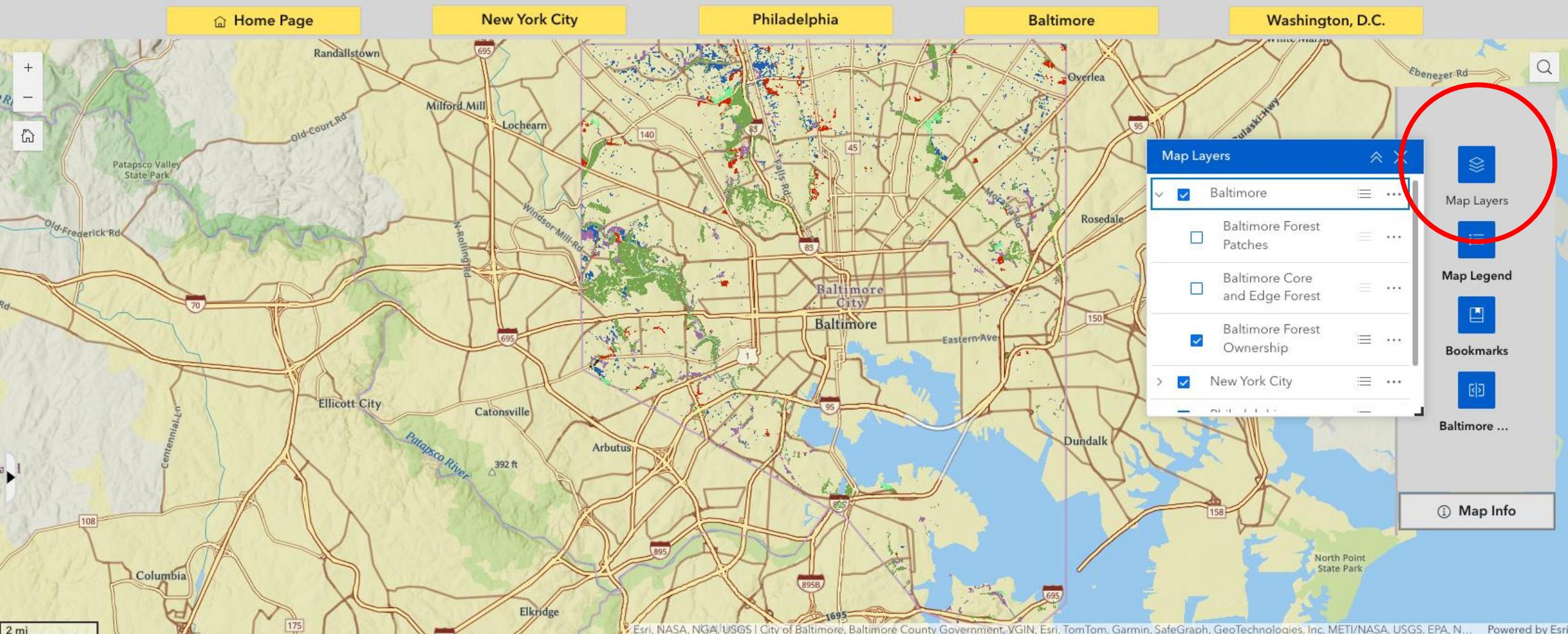
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Esri, NASA, NGA, USGS | City of Baltimore, Baltimore County Government, VGIN, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, N...

Map Layers Map Legend Bookmarks Baltimore ... Map Info

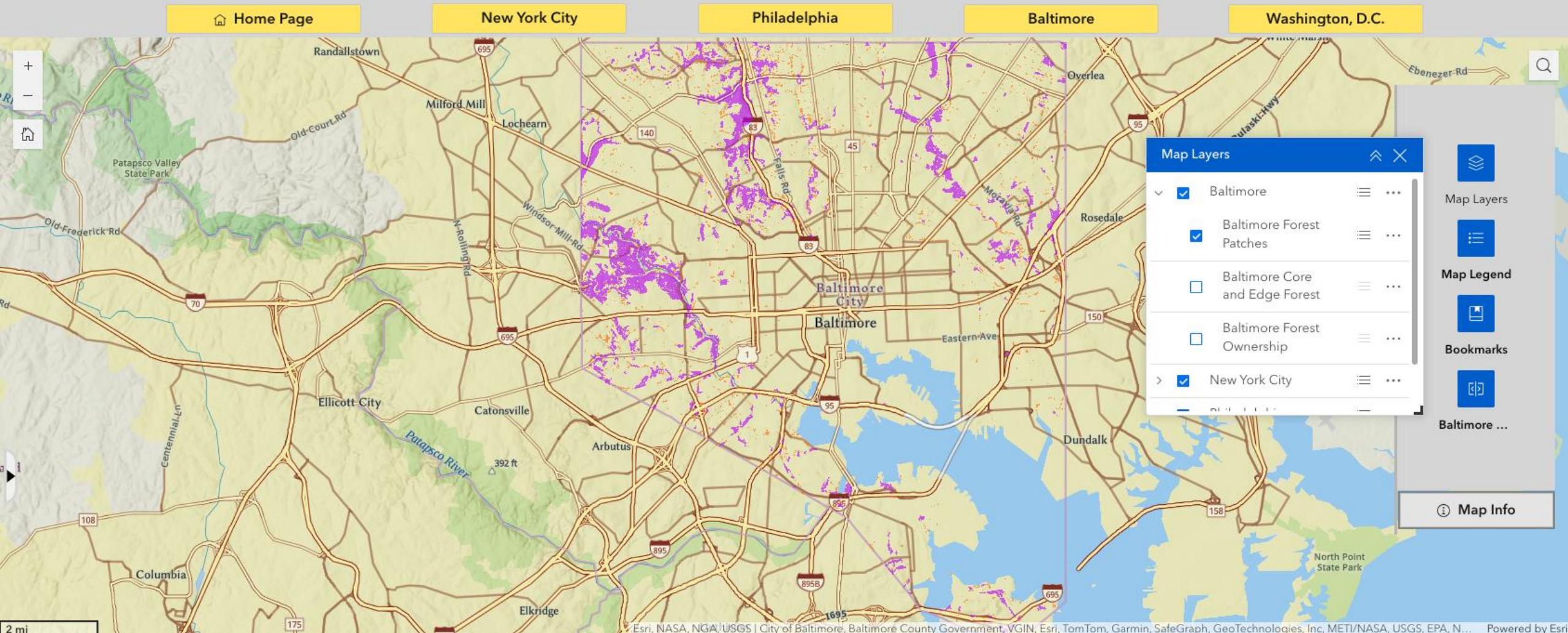


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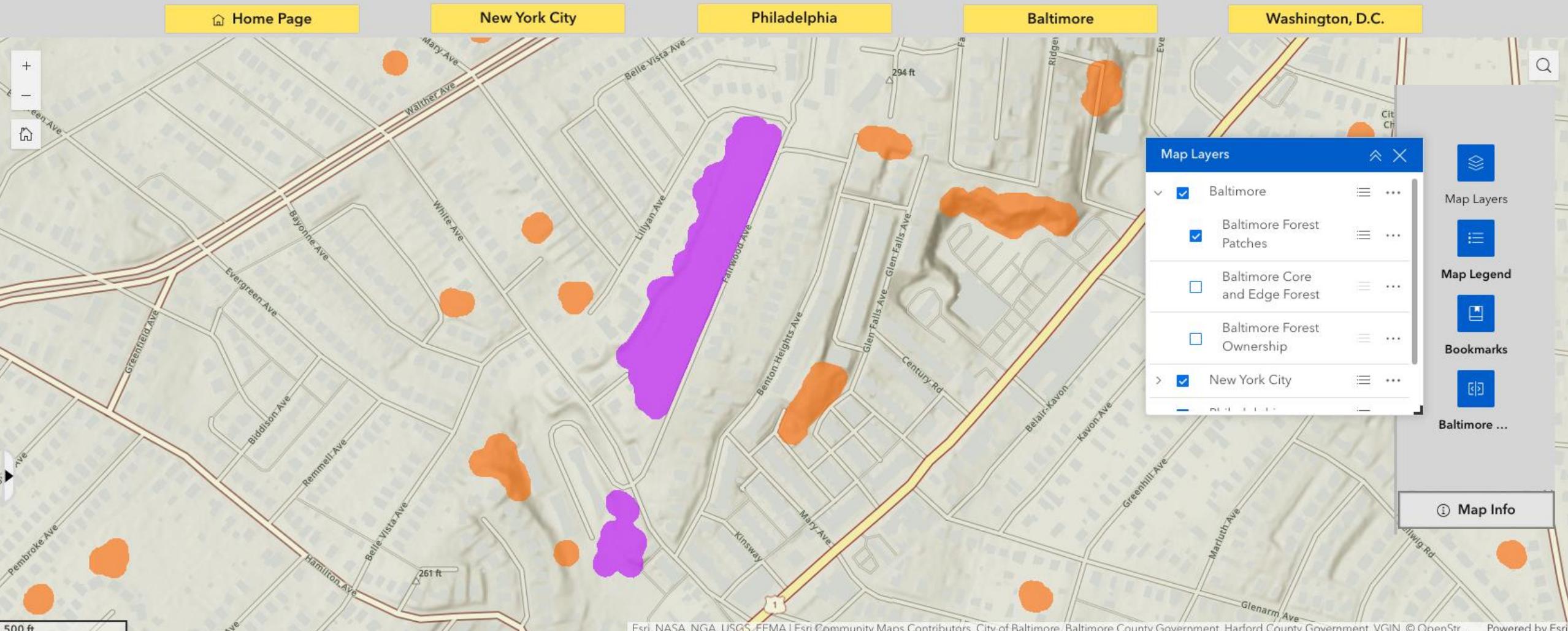


The Urban Forest Patch Viewer





The Urban Forest Patch Viewer





The Urban Forest Patch Viewer

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Map Layers Map Legend Bookmarks Baltimore ...

Baltimore Forest Patches

Grove Forested Natural Area

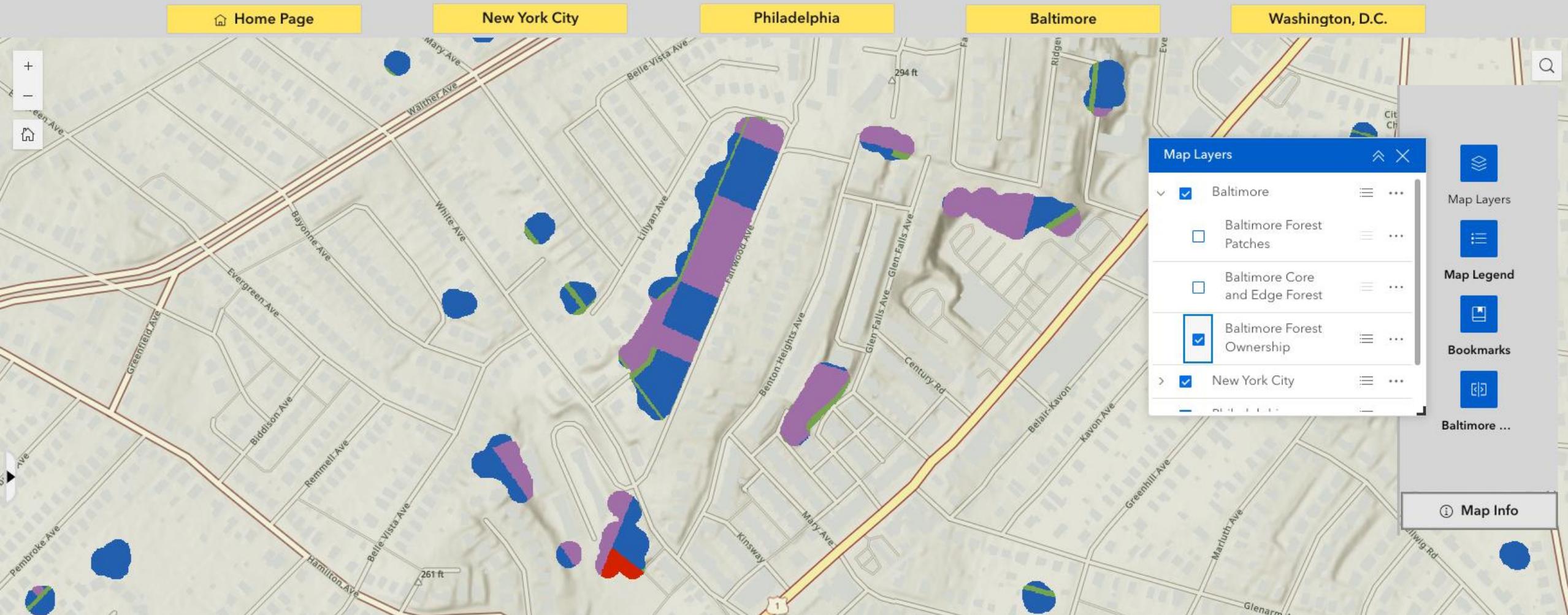
Map Info

500 ft

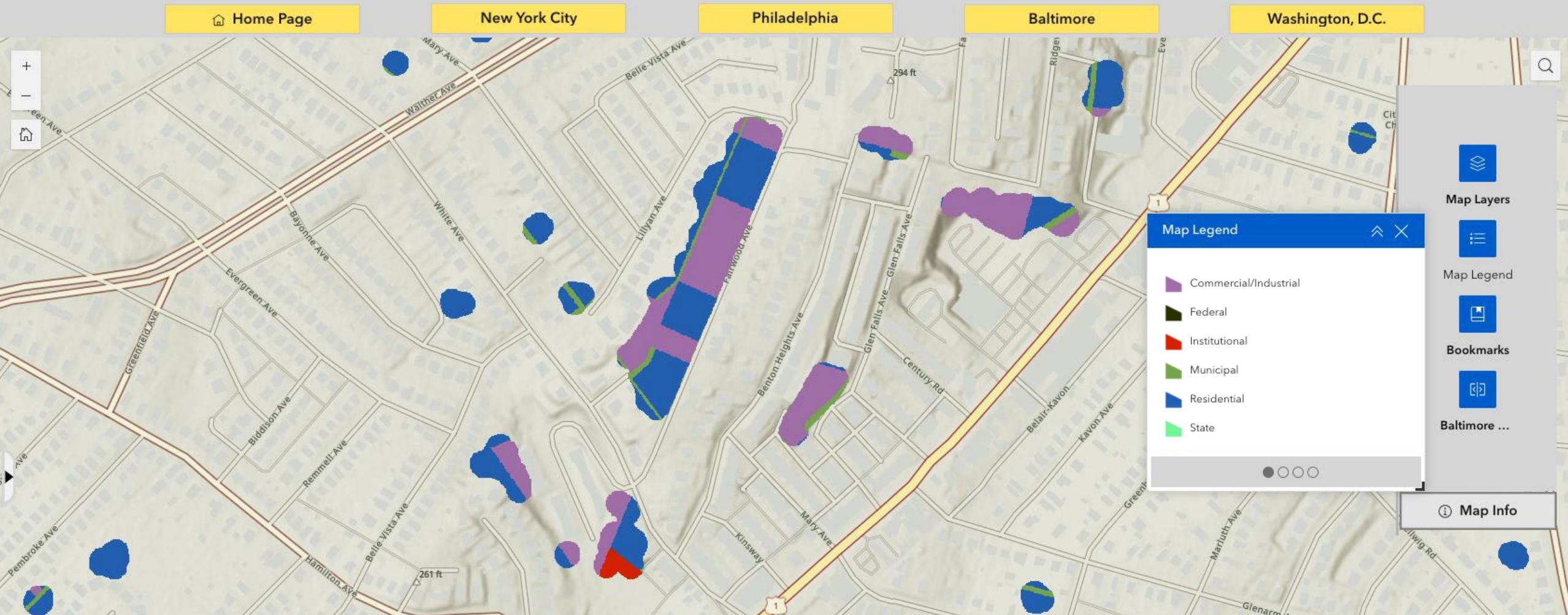
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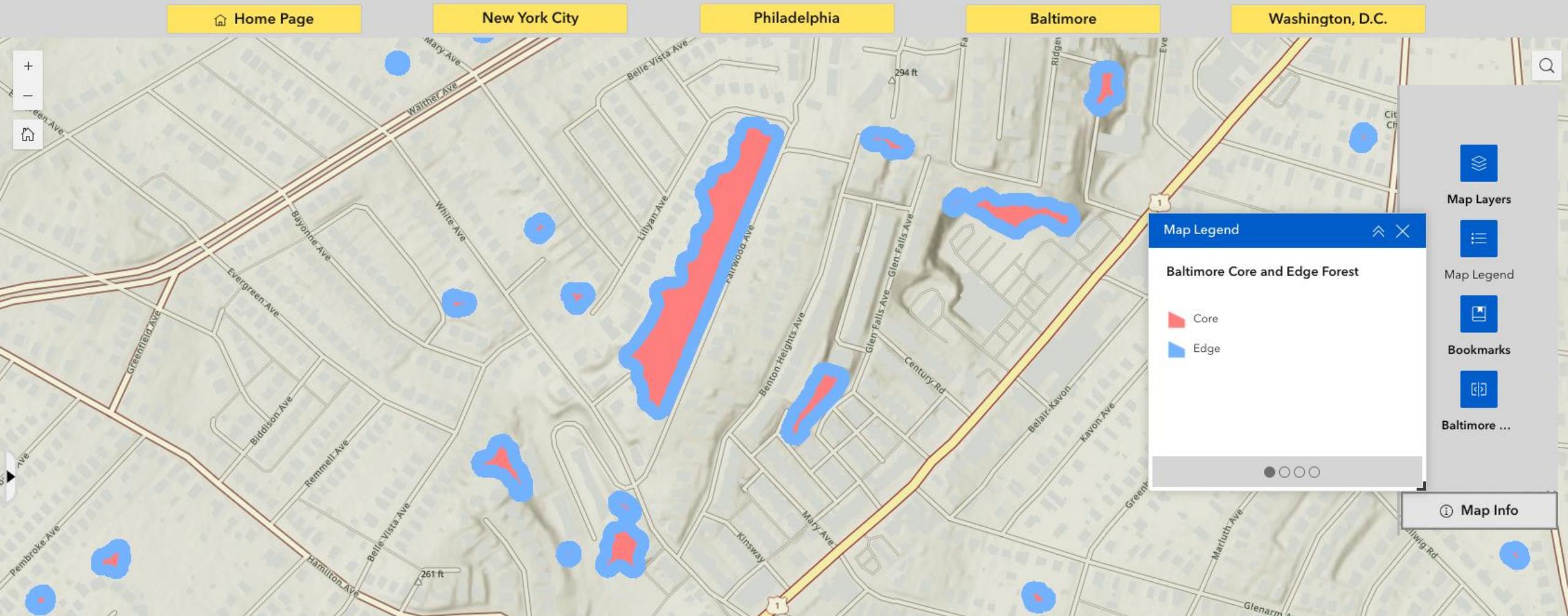


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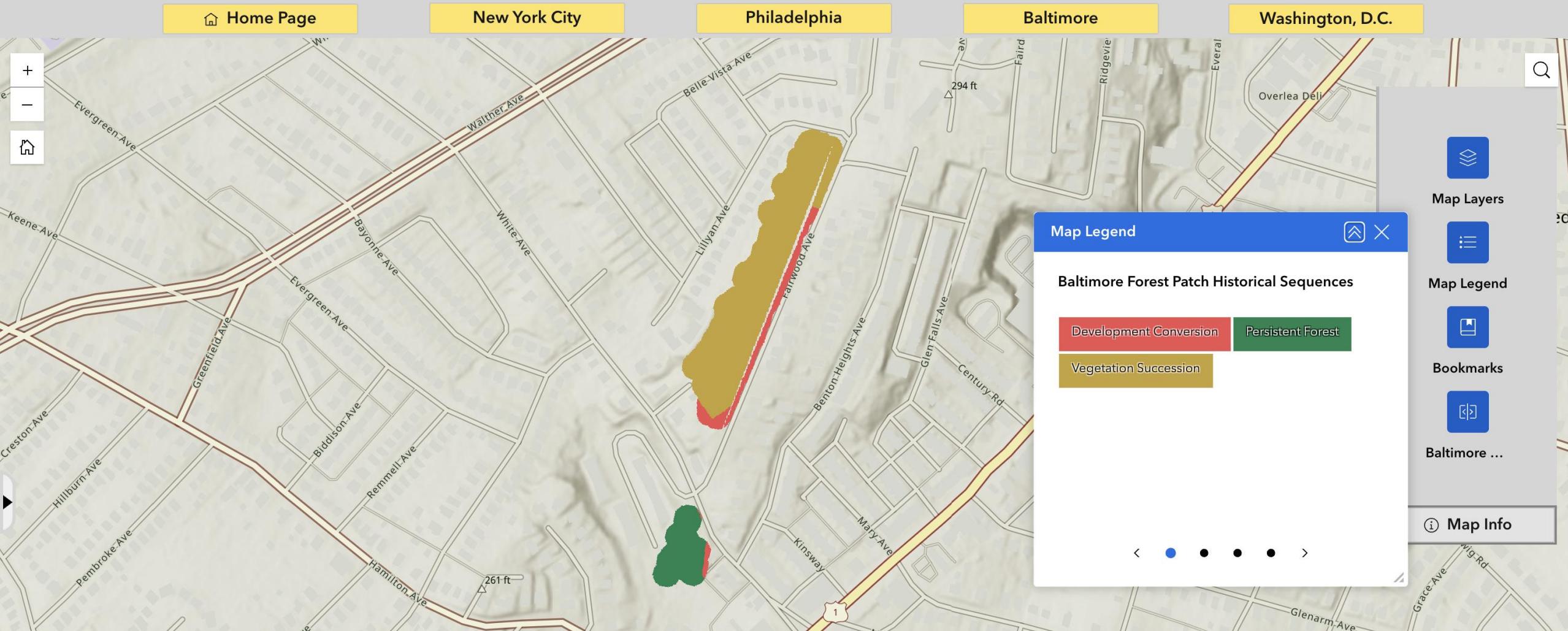




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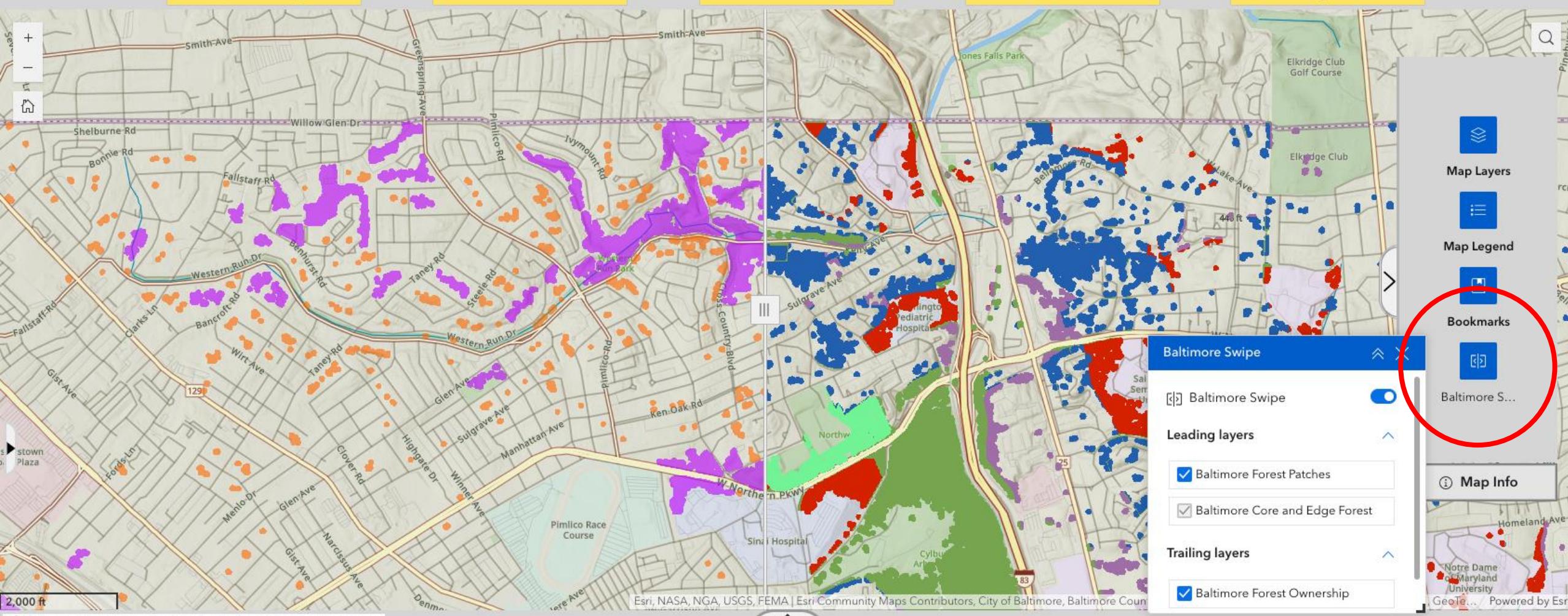


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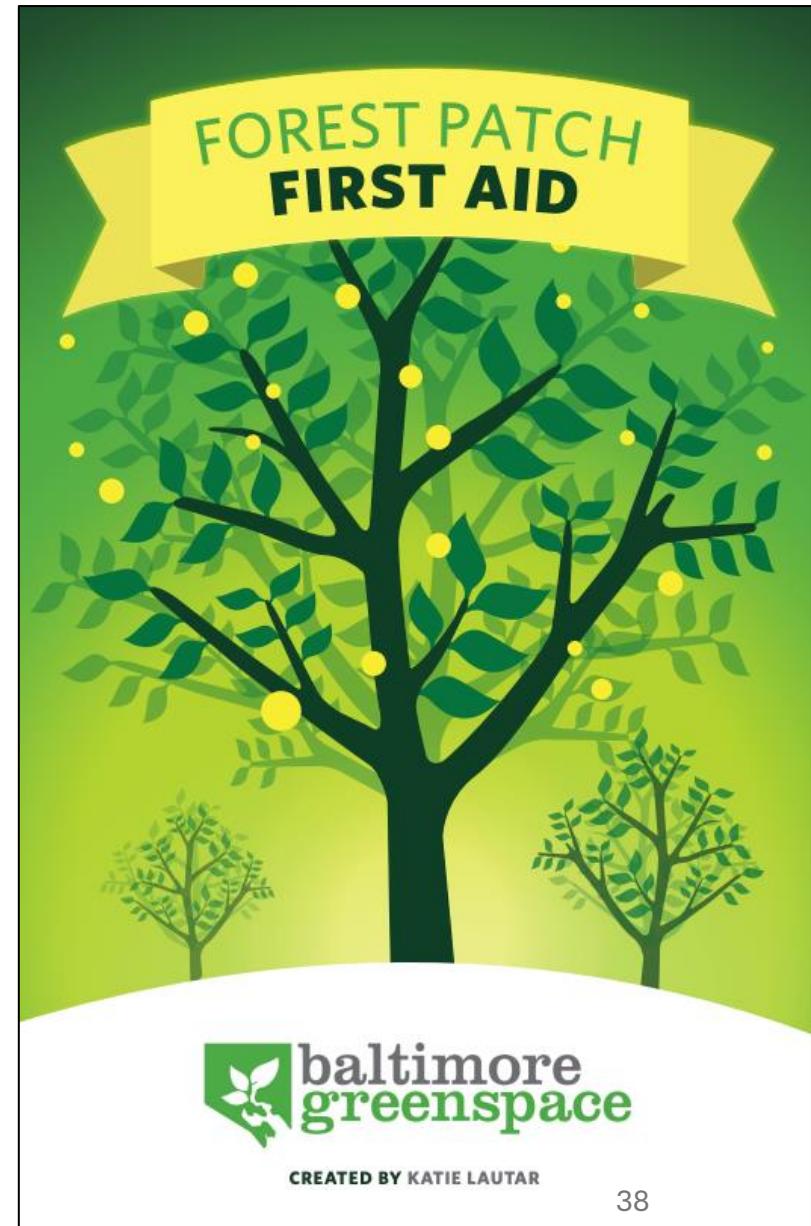


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Baltimore's Forest Patches

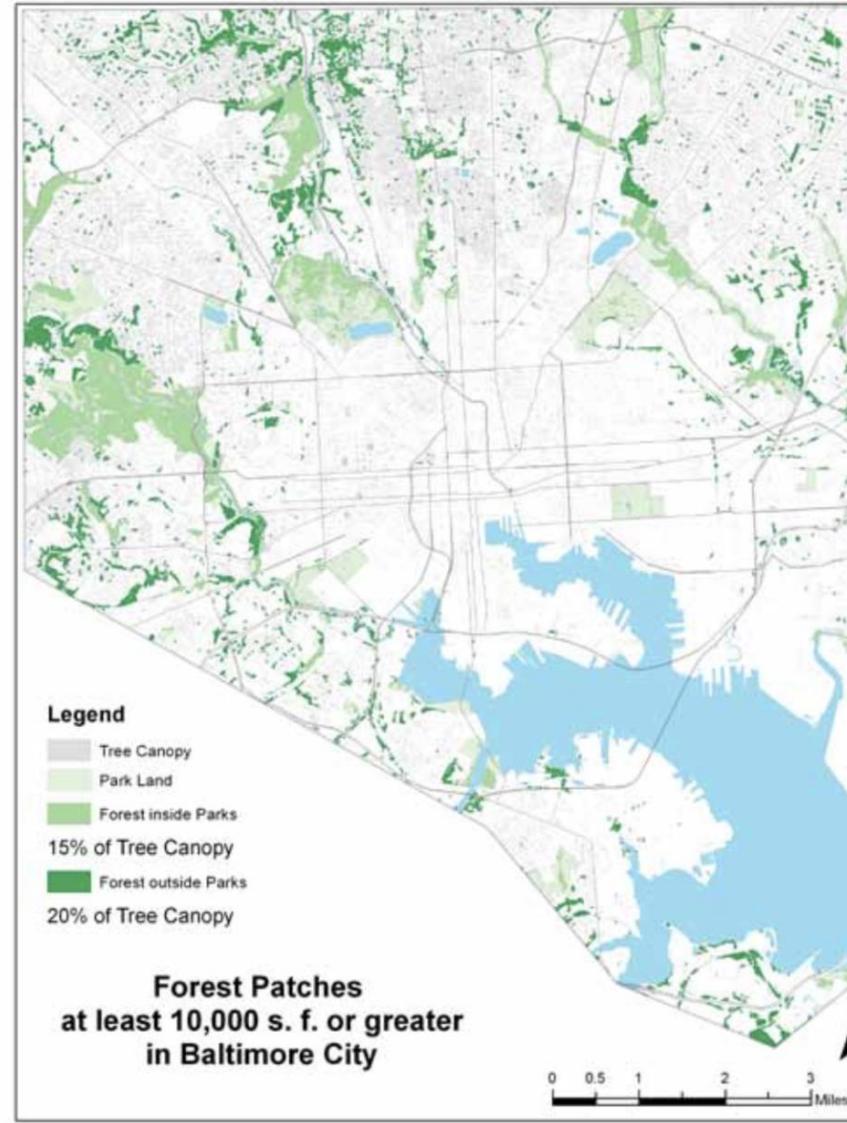


Mapping Baltimore's Forest Patches



**BALTIMORE'S FOREST PATCHES:
EMERALD ASSETS FOR ECOSYSTEM
SERVICES**

Miriam Avins
Baltimore Green Space
June 2013



THANK YOU

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