# Forest Study Analysis Tasks

**Forest and Tree Canopy Extent (Task 1)**
- What is the extent of Maryland's forest and tree canopy?
- What opportunities are there for forest restoration and tree planting?

**Forest Health (Task 2)**
- How healthy are Maryland's forests? How are they impacted by fragmentation and invasive species?

**Chesapeake Restoration (Task 3)**
- What progress has been made through the Chesapeake Bay Program on urban tree planting and riparian forest buffers?

**Forest & Tree Canopy Change (Task 4)**
- What changes have been observed in Maryland's forests and tree canopy?
- What further changes are projected?

**Progress (Task 5)**
- What progress has been made in tree planting programs, forest protection?

**Mitigation Banking (Task 6)**
- How has forest mitigation banking progressed?

**Forest and Tree Planting Programs (Task 7)**
- What programs are available for tree planting at federal, state and local levels? What funding is available?

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# Datasets



## USDA Forest Service Forest Inventory and Analysis (FIA)

Field inventory for 90 years

*Photo: USDA Forest Service*

## USGS National Land Cover Dataset (NLCD)

30m Landsat satellite data 2000-2019
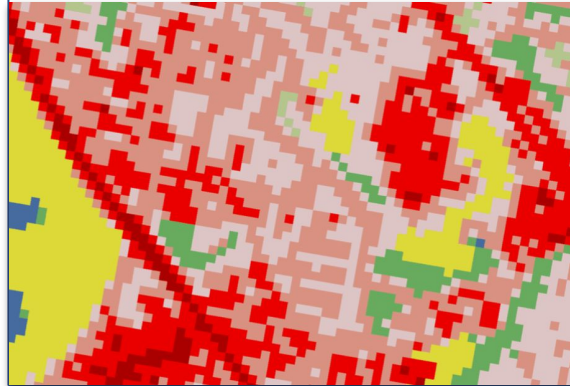
2019 edition

## Chesapeake Bay Program (CBPO) Land Use/Land Cover

1m USDA NAIP imagery +LiDAR 2013/14 to 2017-18

2022 edition

# Forest Definitions

## USDA Forest Service Forest Inventory and Analysis (FIA)

Land that is at least 10% stocked by trees of any size or formerly having been stocked and not currently developed for non-forest use.

The area with trees must be at least 1 acre in size and 120 feet wide, with a continuous length of at least 363 feet.

## USGS National Land Cover Dataset (NLCD)

Areas dominated by trees generally greater than 5 meters tall and greater than 20% of total vegetation cover.

## Chesapeake Bay Program (CBPO) Land Use/Land Cover

All contiguous patches of tree canopy that are greater than 1 acre in extent, with a patch width greater than 240-ft. somewhere in the patch.

*Forest classes from the land use that were specifically used for this study include:*
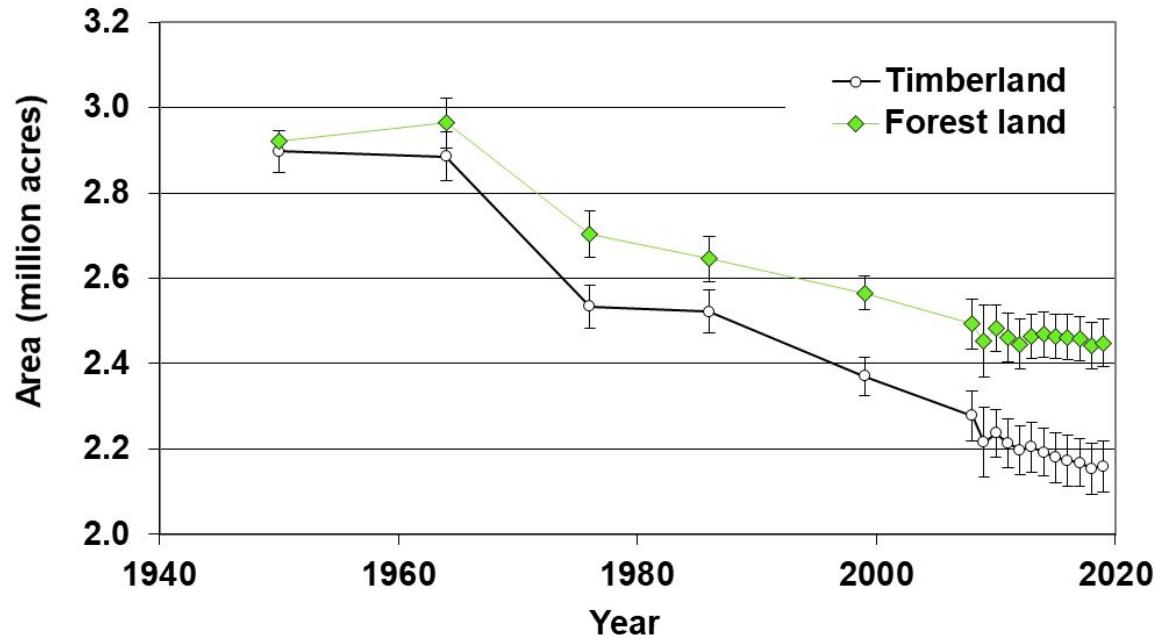*-forest*
*-harvested forest barren*
*-harvested forest herbaceous*
*-tidal wetlands forest*
*-riverine wetlands forest*
*-terrine wetlands forest*

# Forest and Tree Canopy Extent (Task 1a)

## Historical Context

## USDA Forest Service FIA Data

- Rapid forest loss after 1960
- Reduction in rate of loss 2000 to 2020

# Forest and Tree Canopy Extent (Task 1a)

## Maryland Regions

**Western**
Allegany, Garrett, Washington

**North Central**
Baltimore, Baltimore City,
Carroll, Harford

**Central**
Anne Arundel, Frederick,
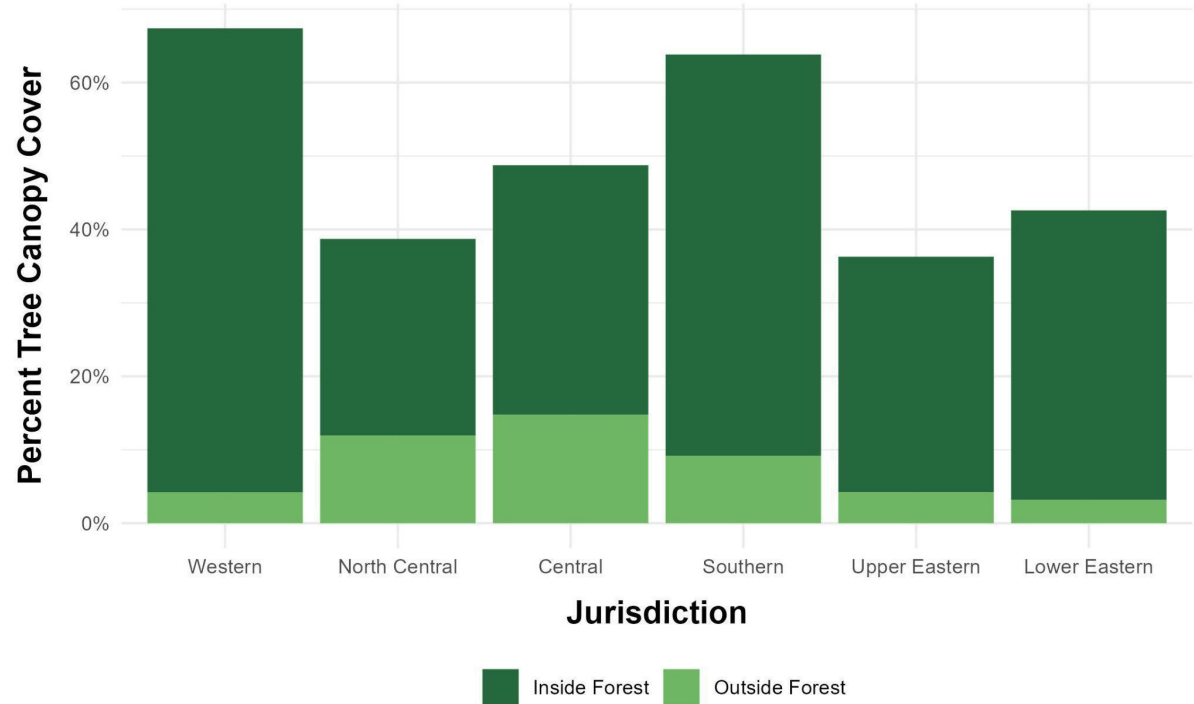Howard, Montgomery, Prince
George's

**Southern**
Calvert, Charles, St. Mary's

**Upper Eastern**
Cecil, Caroline, Dorchester, Kent,
Queen Anne's, Talbot

**Lower Eastern**
Somerset, Wicomico, Worcester

# Forest and Tree Canopy Extent (Task 1a)

Table ES-1. Forest and tree canopy extent estimates from key data sources.

| Source | Initial Year | Extent (thousand acres) | End Year | Extent (thousand acres) | Total % Change (Annual % Change) |
|---|---|---|---|---|---|
| **Forest[1]** | | | | | |
| FIA[2] | 1999 | 2,566 (+/- 770) | 2019 | 2,448 (+/- 108) | -4.6% (-0.23%) |
| CBPO | 2013 | 2,584 | 2018 | 2,566 | -0.70% (- 0.14%) |
| **Tree Canopy** | | | | | |
| Total Tree Canopy (NLCD) | 2001 | 2,802 | 2019 | 2,791 | -0.39% (-0.022%) |
| Within Forest (CBPO) | 2013 | 2,584 | 2018 | 2,566 | -0.70% (- 0.14%) |
| Outside Forest (CBPO | 2013 | 523 | 2018 | 529 | +1.15% (+0.23%) |
| Total Tree Canopy (CBPO)[3] | 2013 | 3,107 | 2018 | 3,095 | -0.39% (-0.077%) |

# Afforestation & Reforestation Opportunities (Task 1b)

## Results

Plantable areas - turf, low vegetation, barren

Agricultural areas excluded
*(riparian forest buffers addressed separately)*

374,000 acres statewide
> Most: Baltimore, Montgomery and Prince George's counties

> Least: Kent and Somerset



Area =< 100sqm and width =<10m
Area >100 sqm and wider than 10m

# Forest Health (Task 2)

## Results

Fragmentation analysis with CLEAR tool

- Increasing fragmentation of already patchy forest
- Forest → tree canopy outside forest, isolated forest patches
- Central Maryland - increase in isolated patches, decline in core forest

Invasive species

FIA data showed 12% forest land with large-scale disturbance; suppression of trees by invasive species leading cause
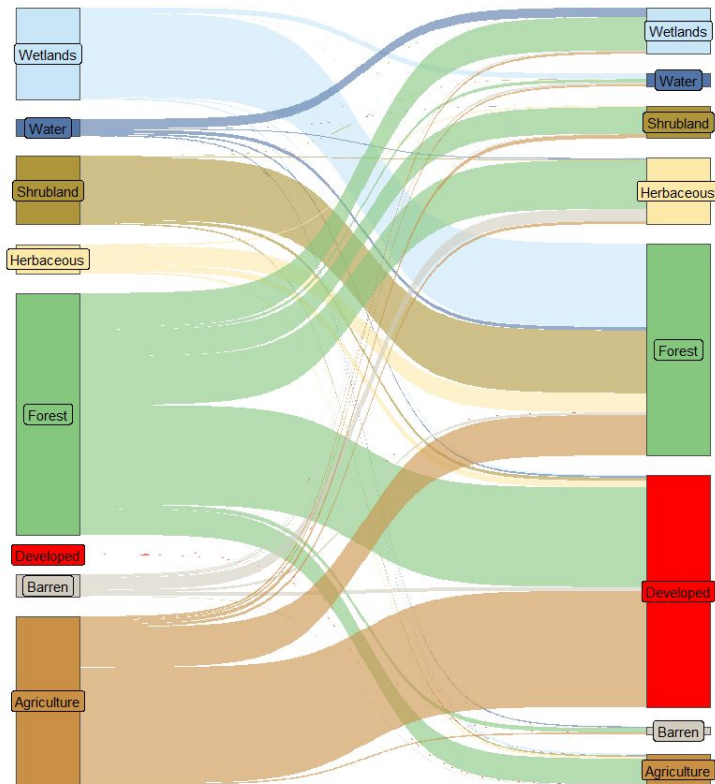


CLEAR Fragmentation
- Isolated Patch
- Edge
- Small Core (<250 acres)
- Medium Core (250-500 acres)
- Large Core (>500 acres)

# Forest and Tree Canopy Change (Tasks 4 & 5)

## Land Cover (NLCD) Transitions

Forest - 38% of all areas that changed in 2001

Developed - largest resulting class in 2019 (36%)



NLCD Change between 2001-2019

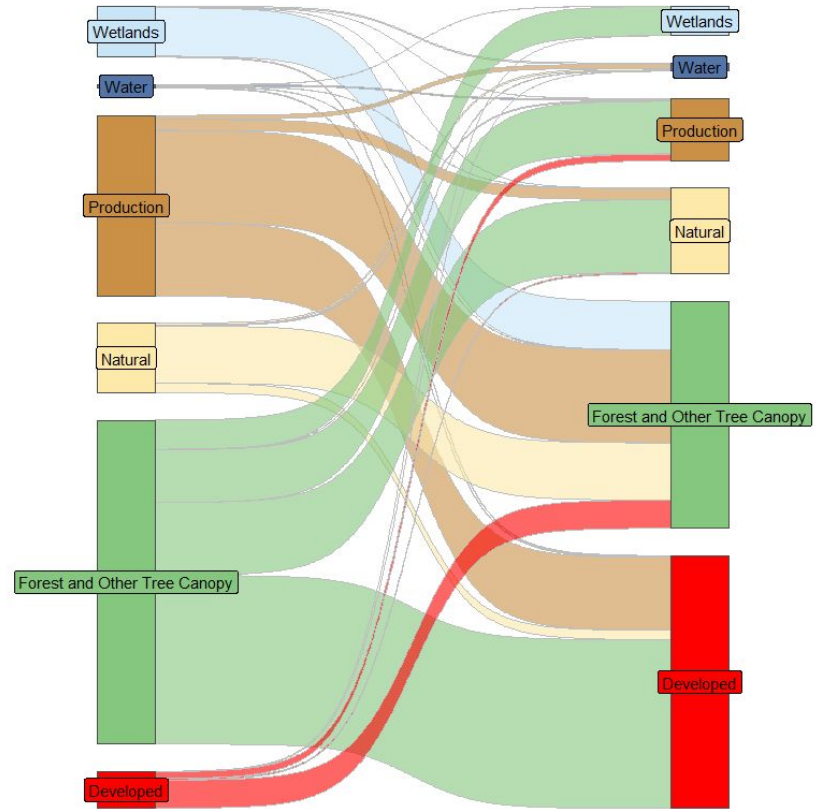# Forest and Tree Canopy Change (Tasks 4 & 5)

## CBPO Land Use Transitions

High resolution (1m) over 5 year time period

Forest - 49% of all areas that changed in 2013

Developed - largest resulting class in 2018 (38%)



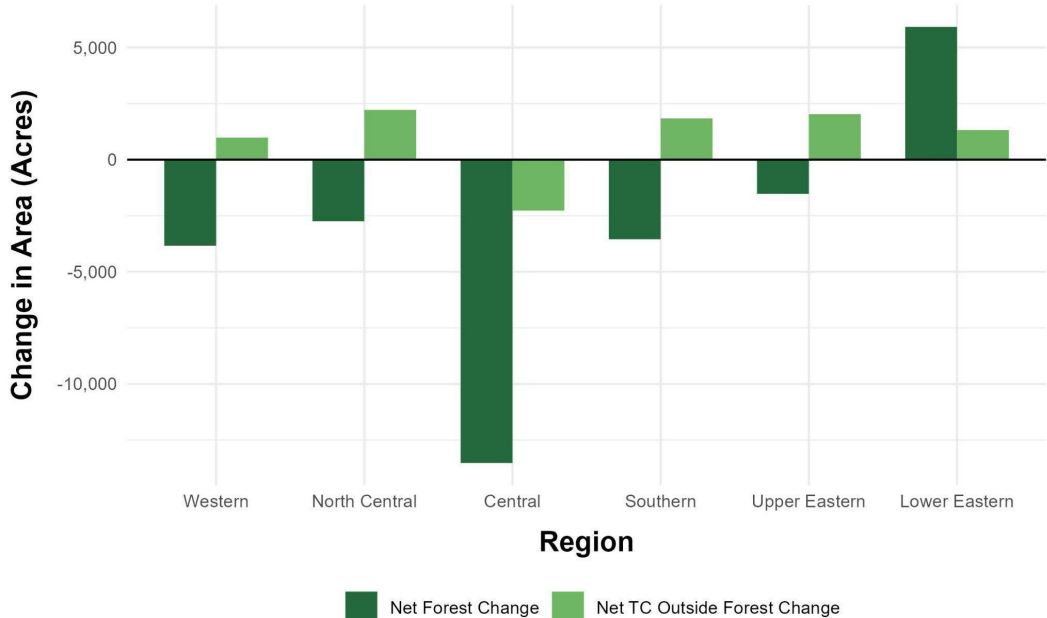High-resolution Land Use Change between 2013-2018

# Forest and Tree Canopy Change (Tasks 4 & 5)

## Net Change in Forest and Tree Canopy

Greatest forest loss in Central Maryland; also only region with net loss of tree canopy outside forest
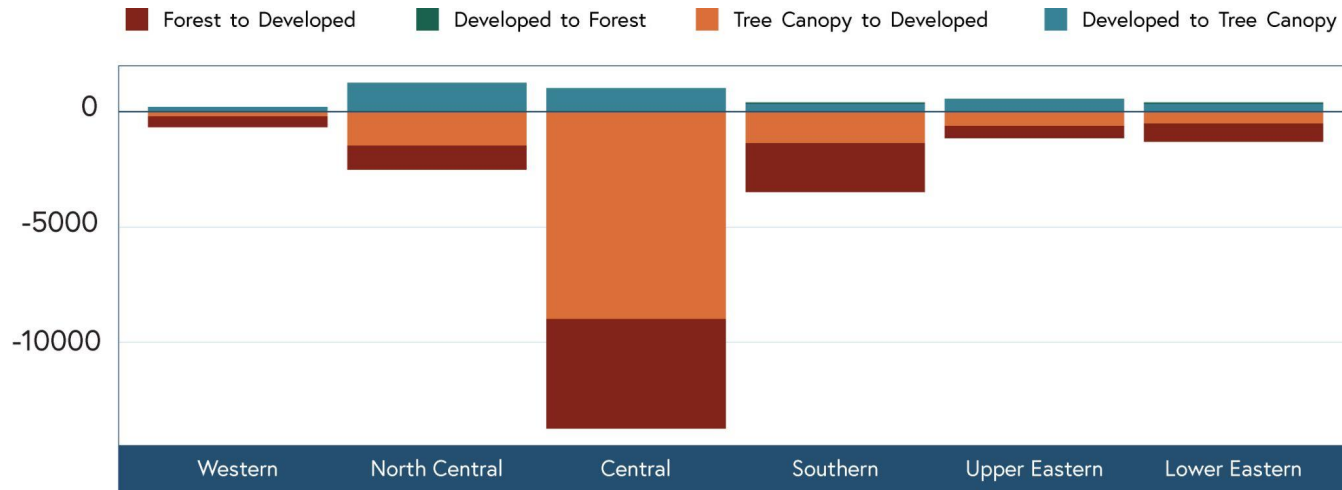
Significant portion of gain in TC outside forest results from forest fragmentation

Lower Eastern region forest gain - likely harvested forest regrowth

# Forest and Tree Canopy Change (Tasks 4 & 5)

## Forest Change Due to Development



Legend:
- **Forest to Developed** (dark red)
- **Developed to Forest** (dark green)
- **Tree Canopy to Developed** (orange)
- **Developed to Tree Canopy** (teal)

Regions: Western, North Central, Central, Southern, Upper Eastern, Lower Eastern

Y-axis values: 0, -5000, -10000

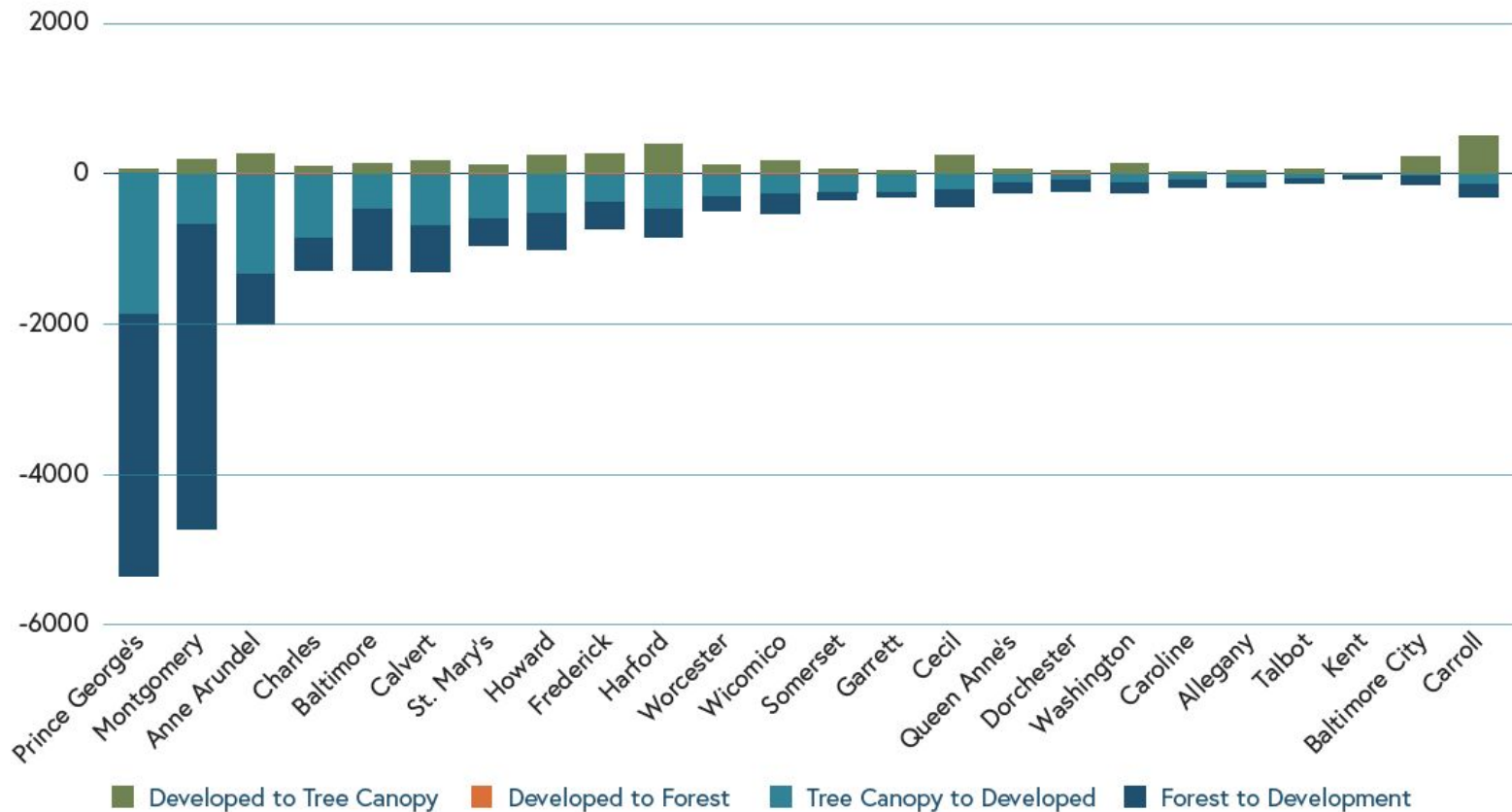# Forest and Tree Canopy Change Associated with Development



Figure 22. Forest cover change due to development, by jurisdiction.

# Conclusions

- The rate of forest loss in Maryland has moved from rates of significant decline toward stabilization since the Forest Conservation Act of 1991.

- However, forest loss for development and forest fragmentation continue to be significant trends, especially in Central Maryland, though with regional variation.

- The state has a significant opportunity to transition from forest and tree canopy loss to gain
  - Investment in tree planting and progress towards CBWA goals
  - Forest protection: avoiding loss and as a source of tree canopy gain

Thank you!

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Full Report

StoryMap Link