

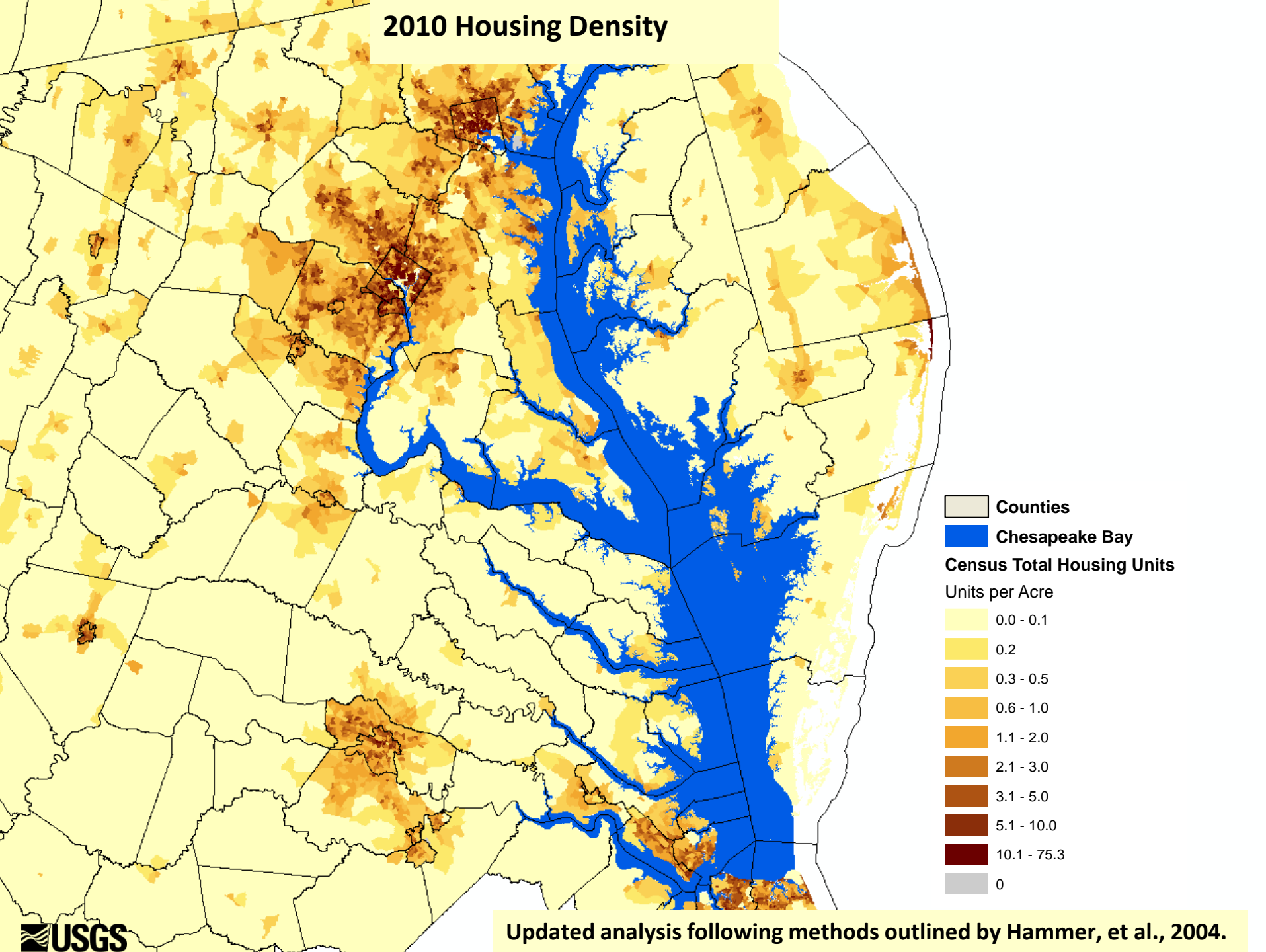


Future Urbanization in the Chesapeake Bay Watershed

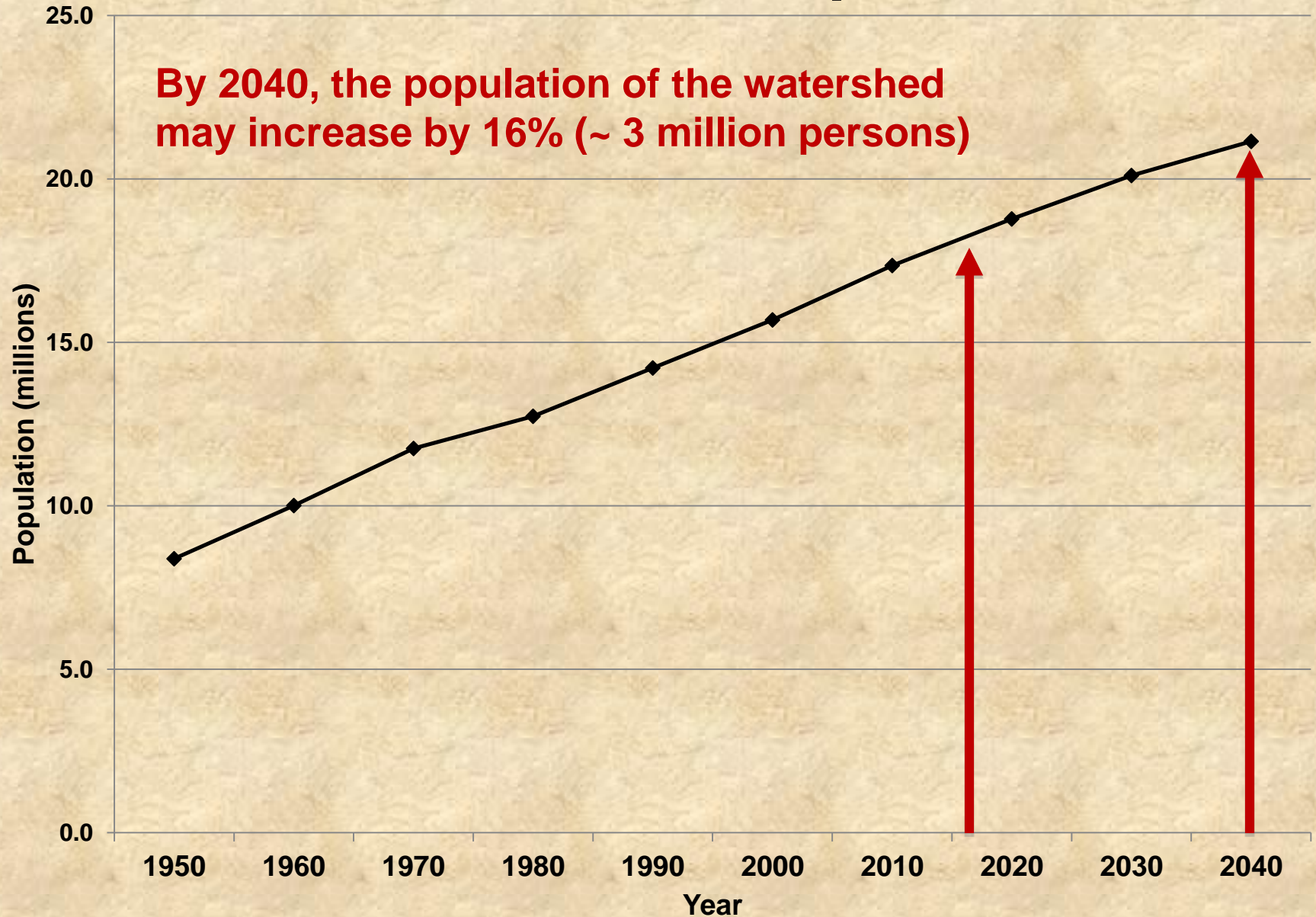
Peter Claggett, Labeeb Ahmed, Jacob Czawlytko, David Donato,
Fred Irani, Quentin Stubbs, and Renee Thompson

Chesapeake Bay Program's Local Government Forum
June 7, 2017

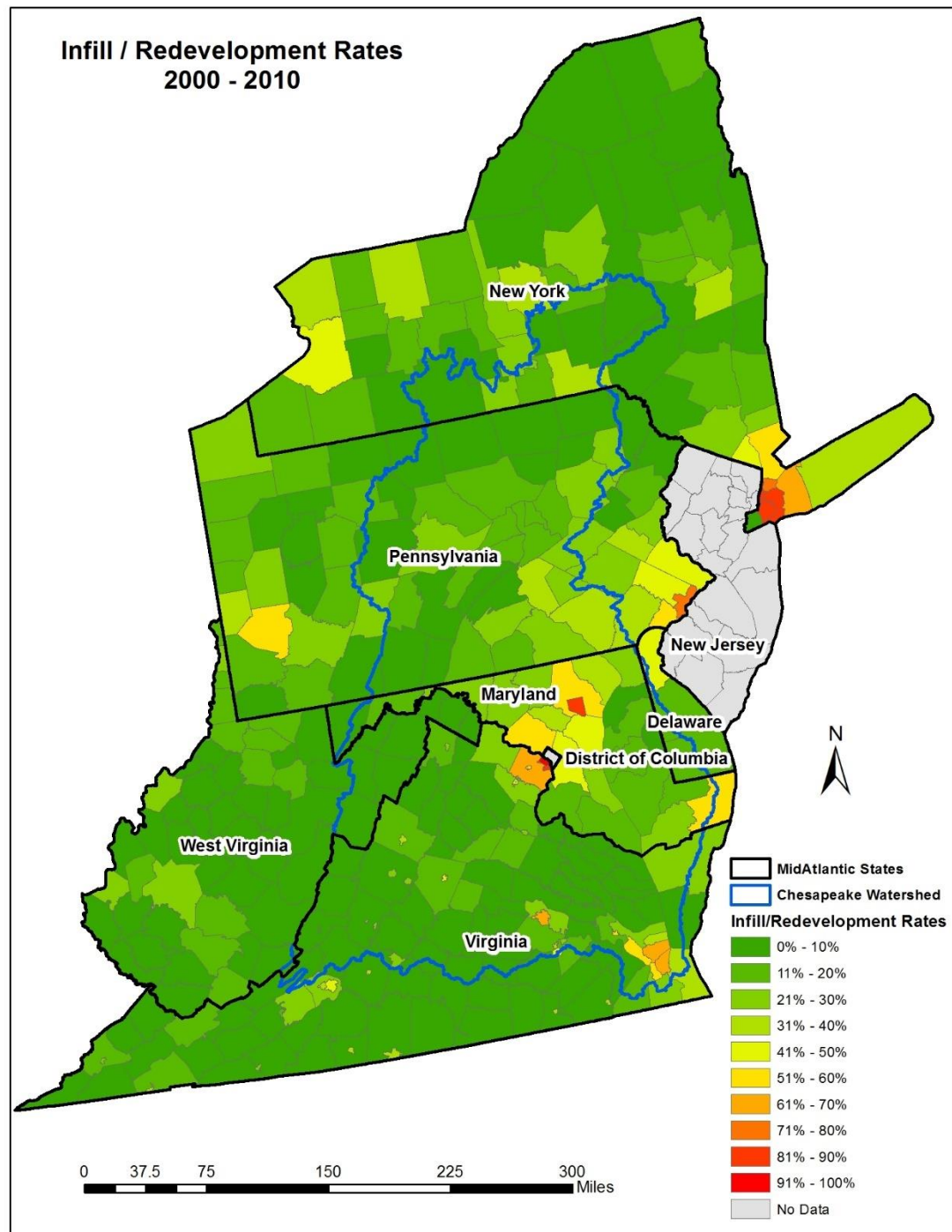
2010 Housing Density



Future Watershed Population



Estimated proportion of housing change (2000 – 2010) that did not result in an expected amount of land use change.



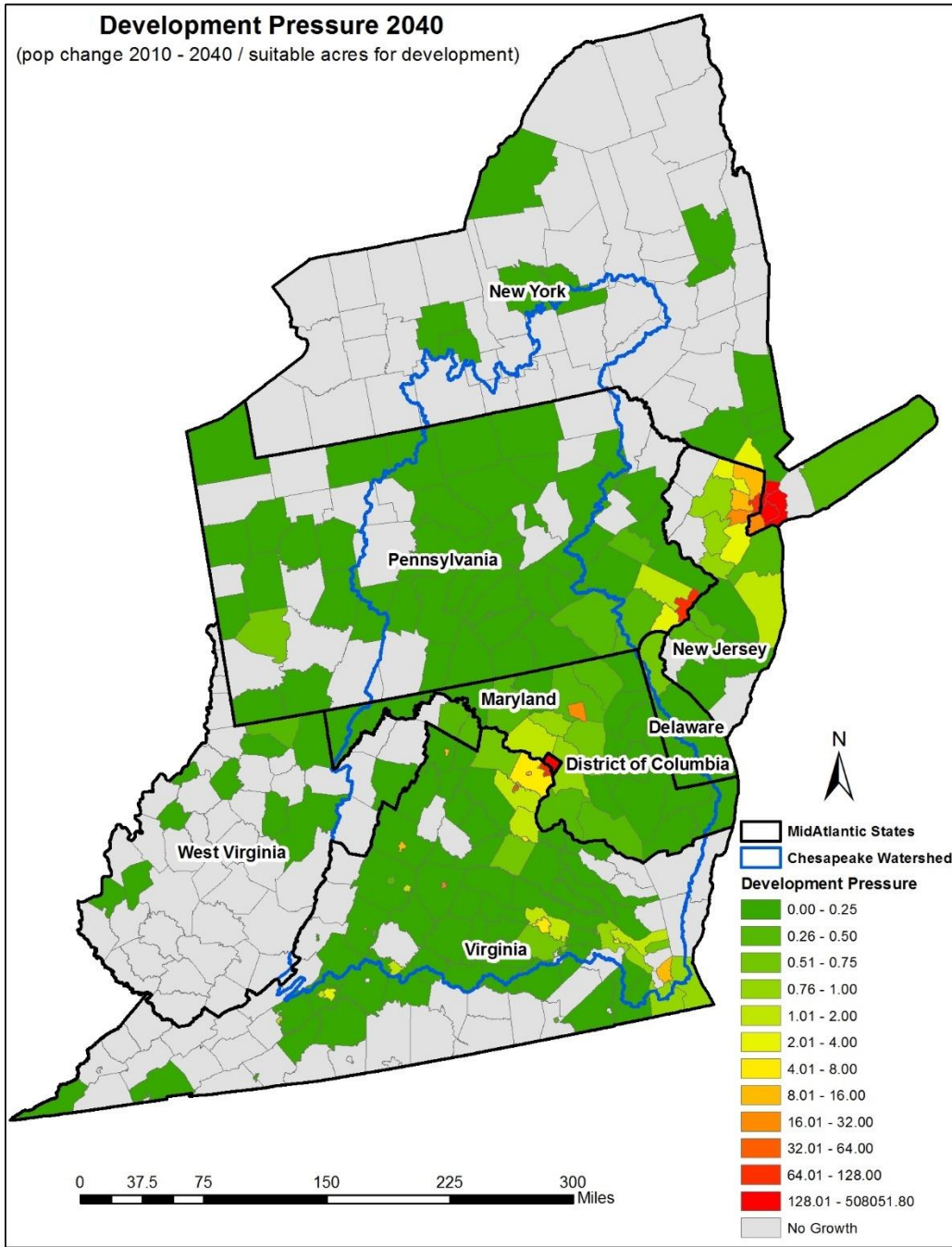
Example:

Montgomery County, MD

Population Change (2010-2040): 225,354

Suitable Land for Growth: 138,000

Development Pressure: 1.63



Example #1: Growing slower than expected

Loudoun County, VA

2040 Projected Population: 492,517

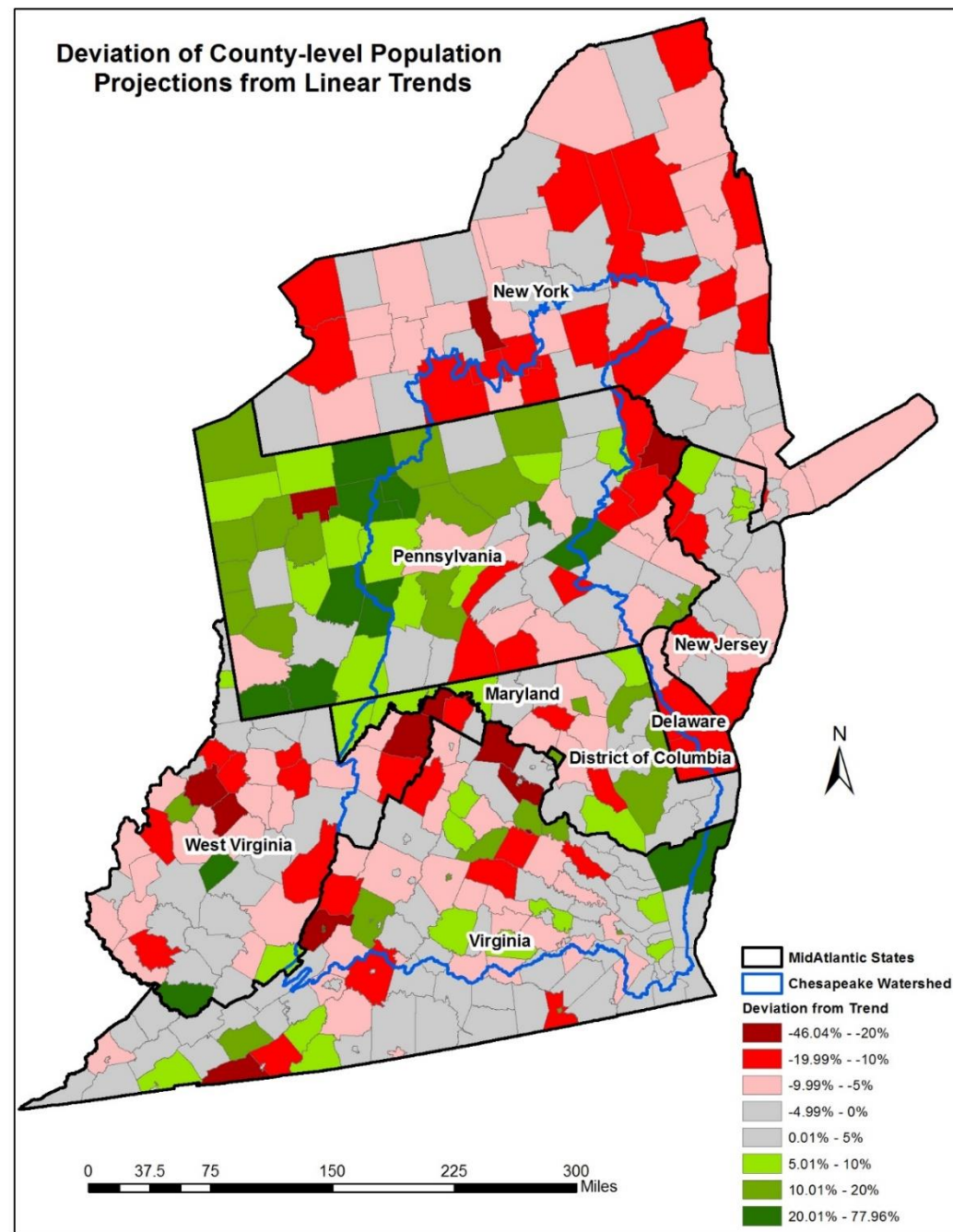
2040 Trends (2000 – 2015): 715,459

Example #2: Growing faster than expected

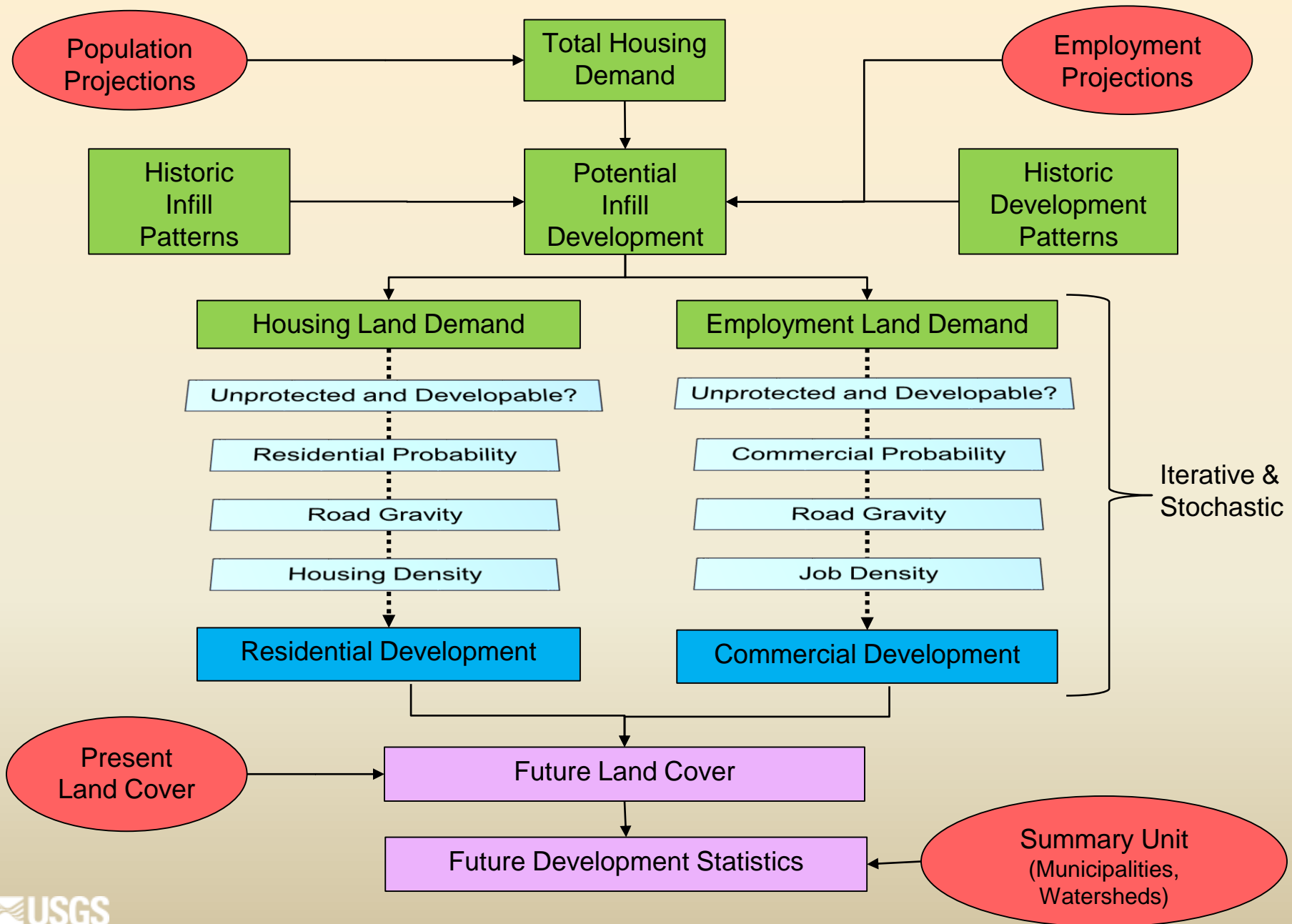
District of Columbia

2040 Projected Population: 940,687

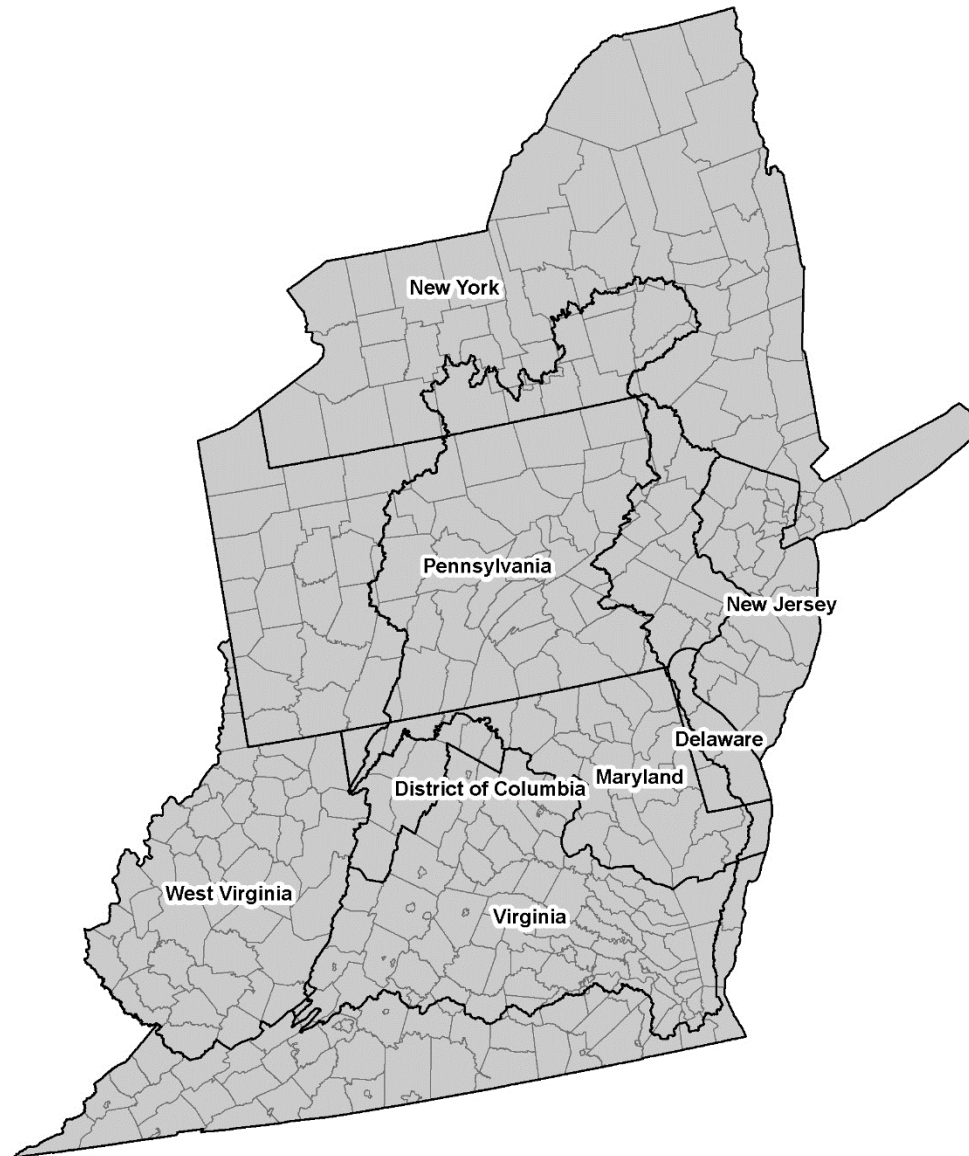
2040 Trends (2000 – 2015): 811,060



Chesapeake Bay Land Change Model v3a



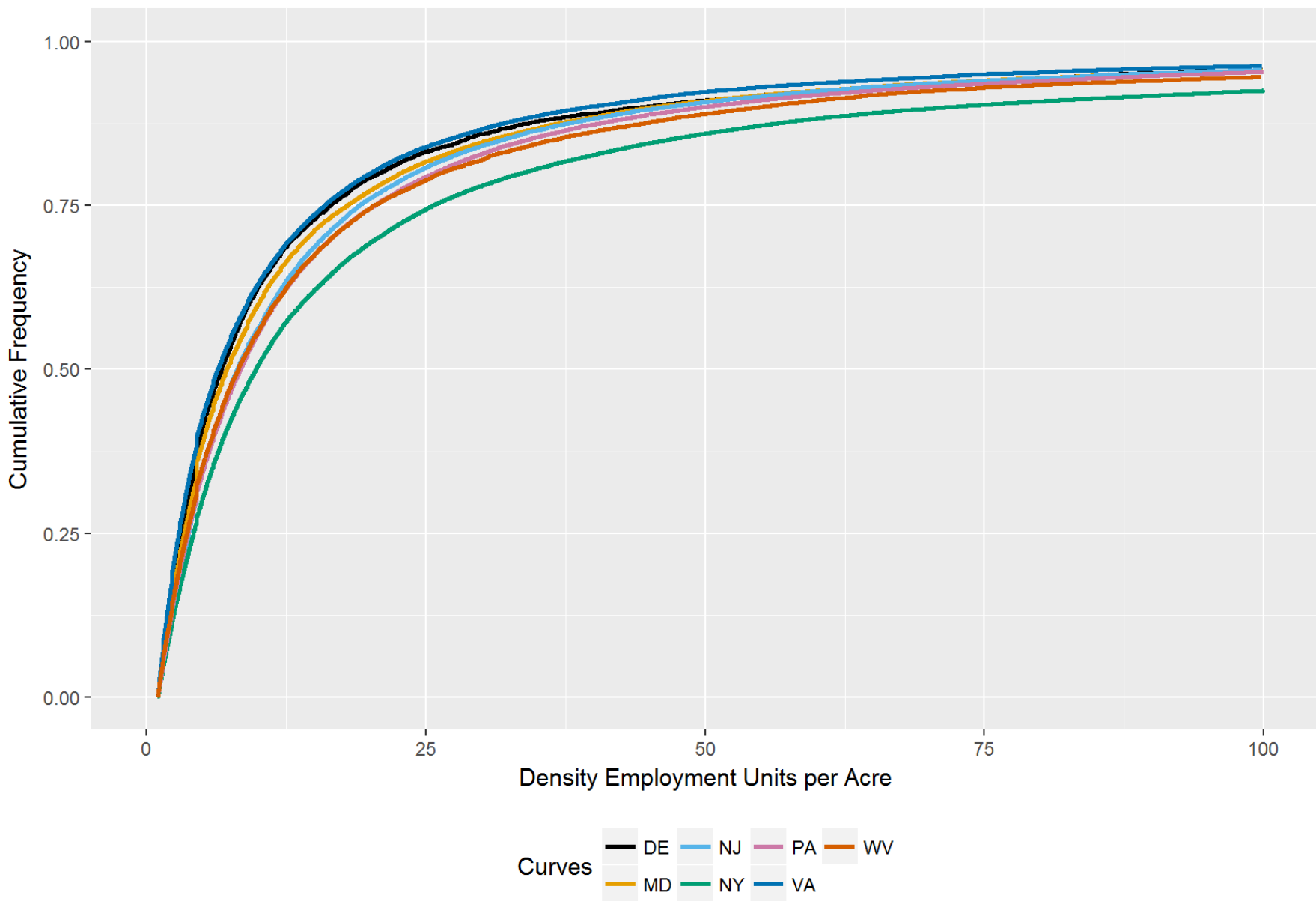
Chesapeake Bay Future Land Use Scenario Domain



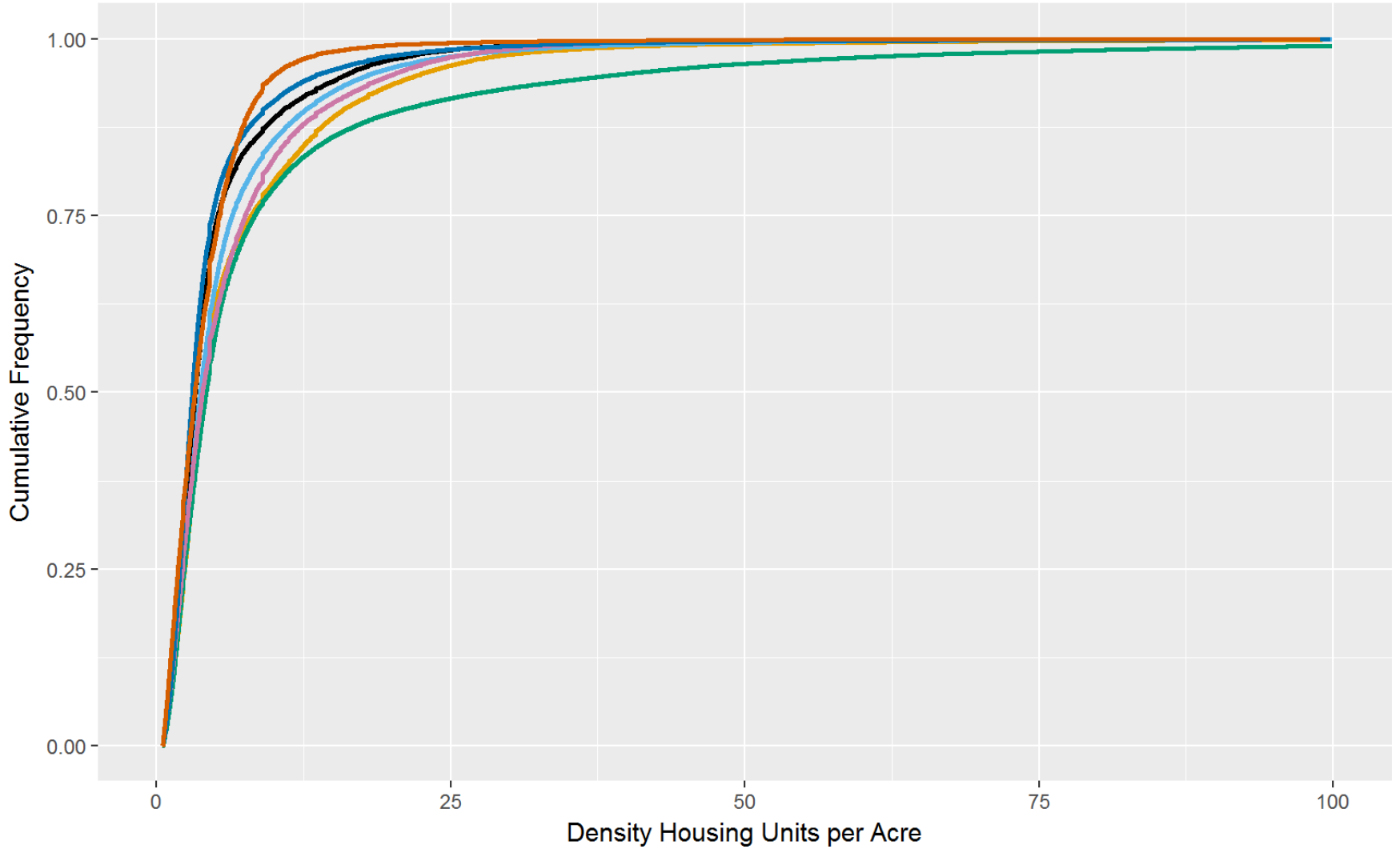
R² Values for Logistic Regressions

State	Residential	Commercial
Delaware	0.766	0.555
District of Columbia	n/a	n/a
Maryland	0.778	0.718
New York	0.871	0.867
Pennsylvania	0.835	0.821
Virginia	0.901	0.869
West Virginia	0.908	0.921

Urban Employment Density per Acre



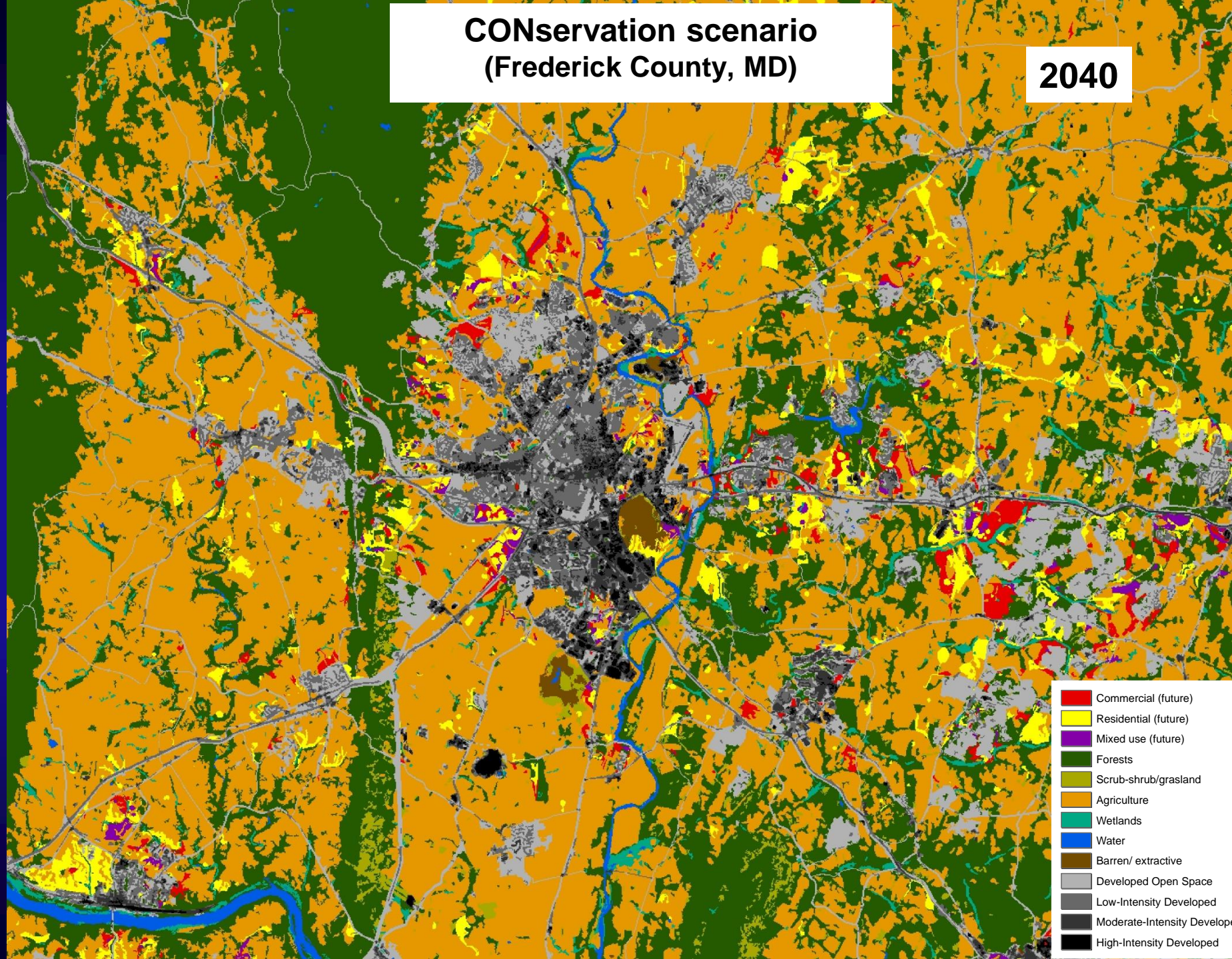
Urban Housing Density per Acre



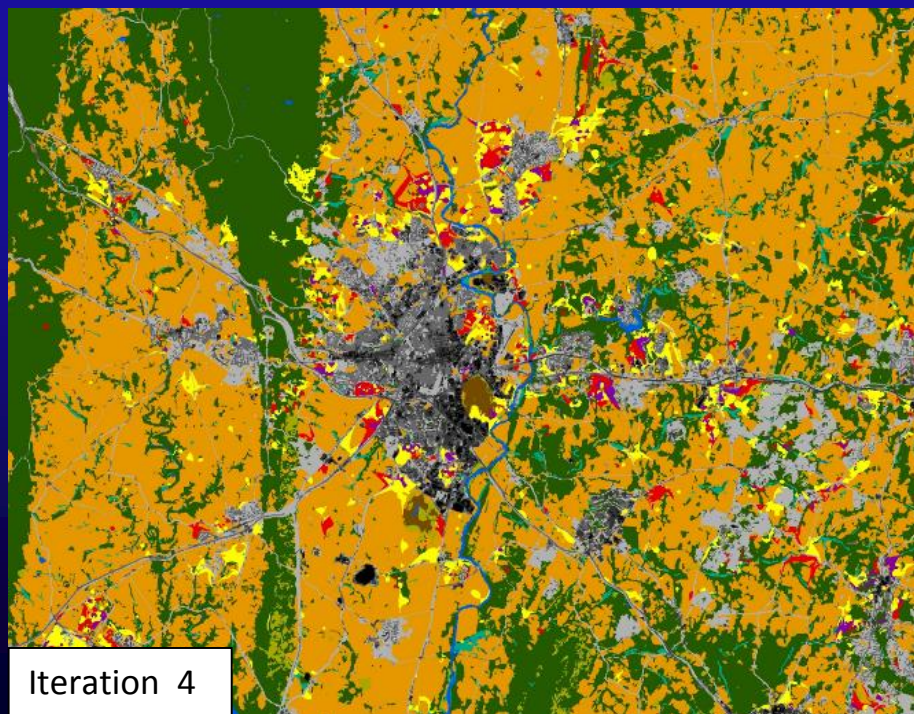
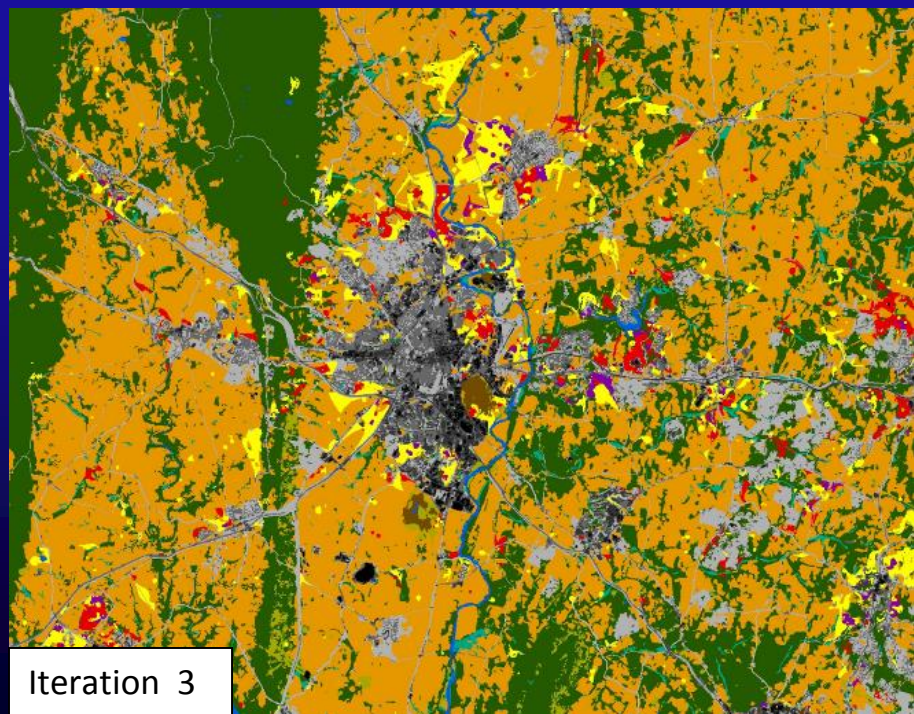
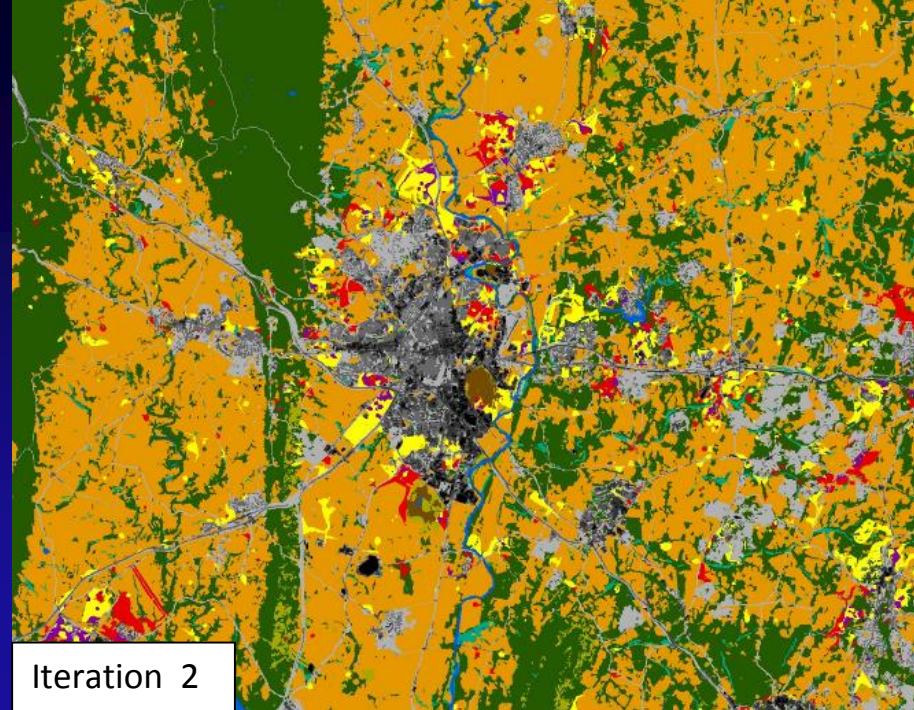
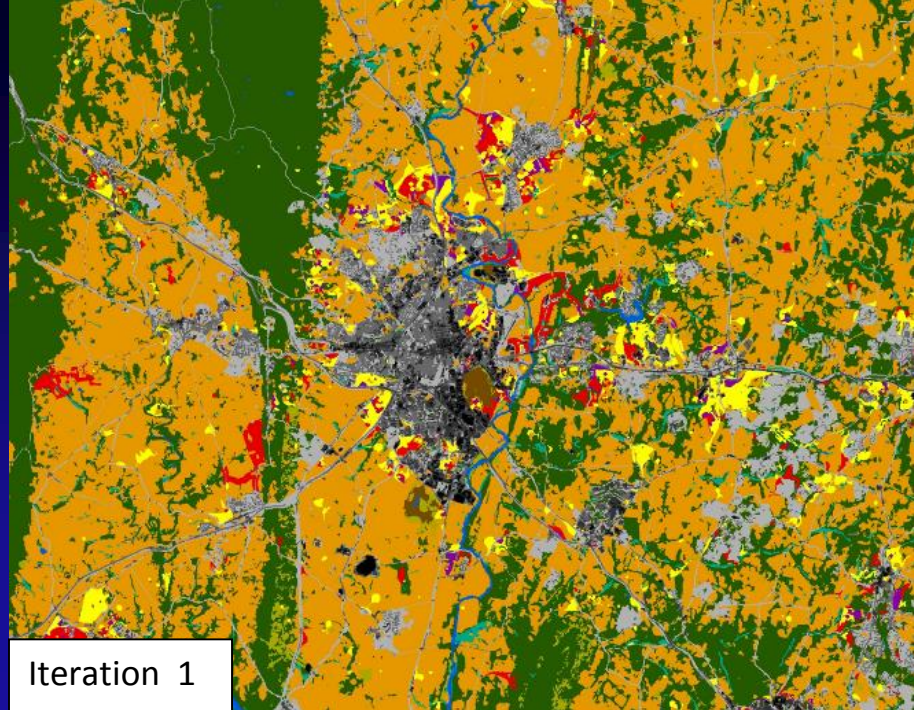
Curves DE NJ PA WV
MD NY VA

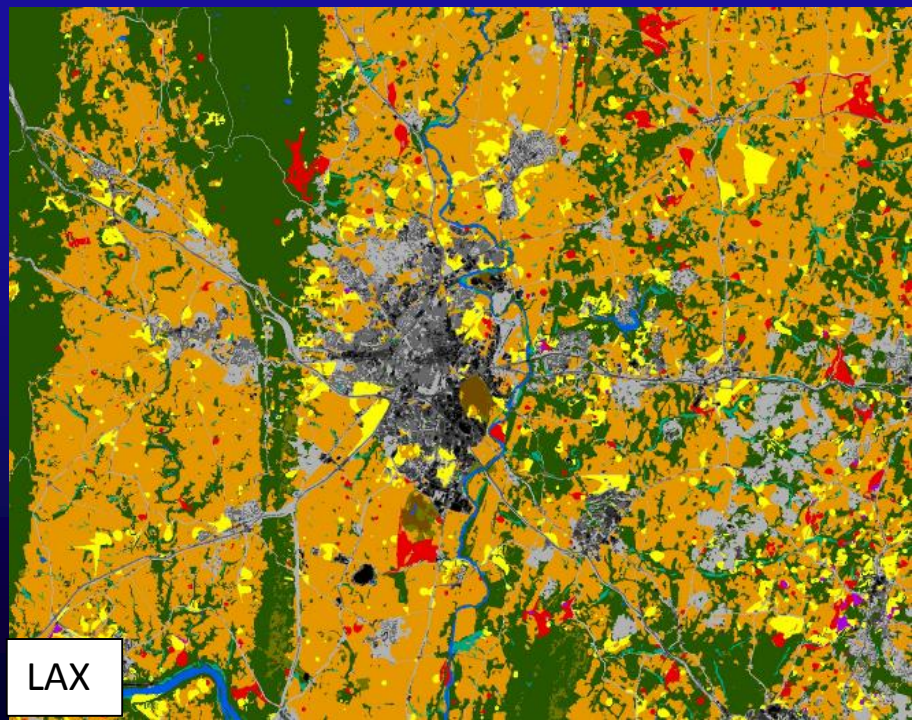
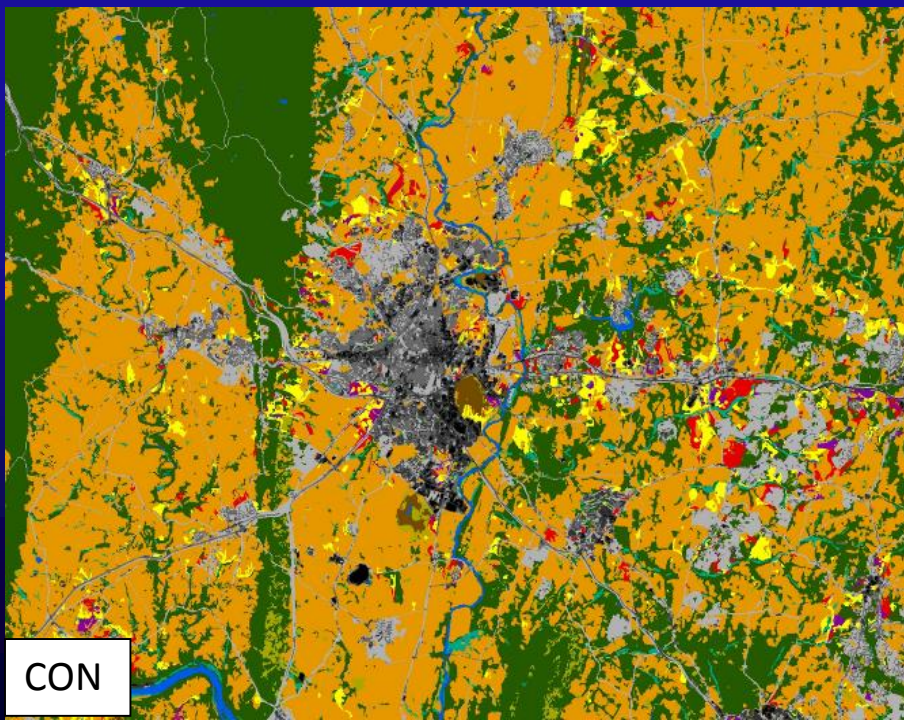
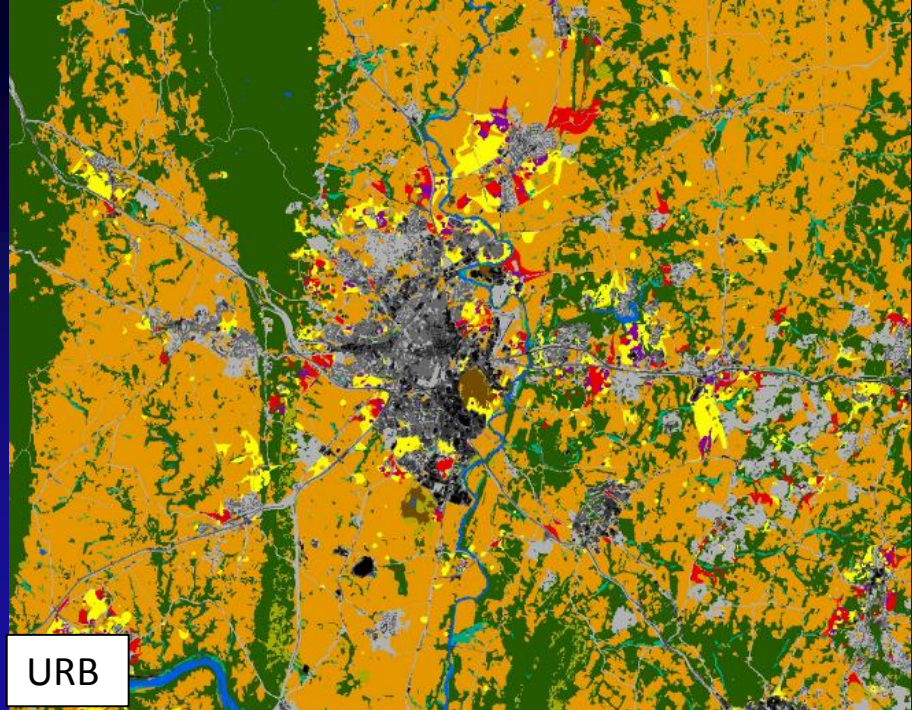
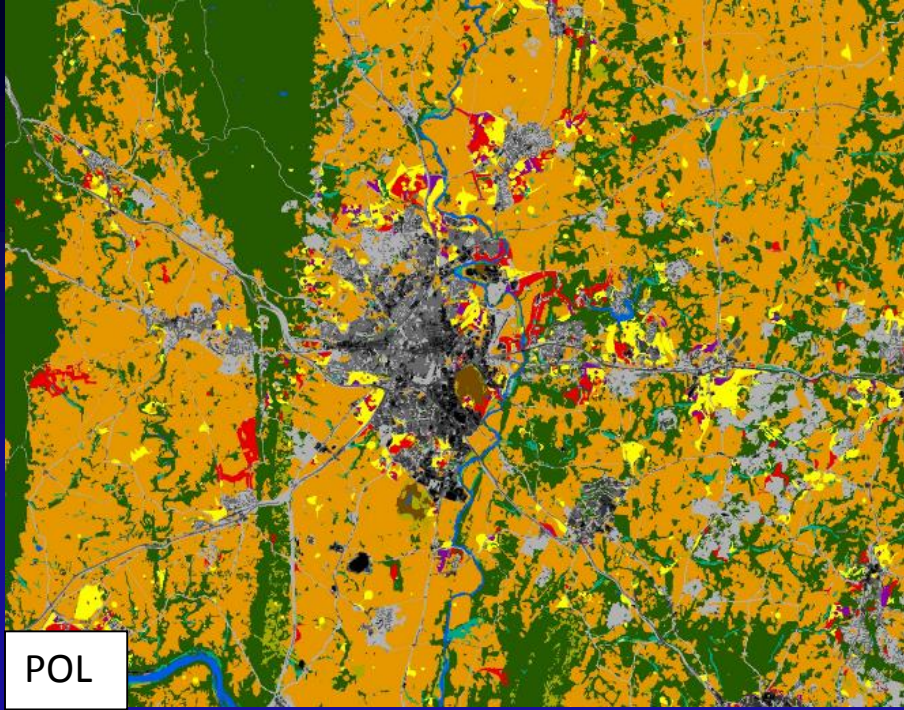
CONservation scenario (Frederick County, MD)

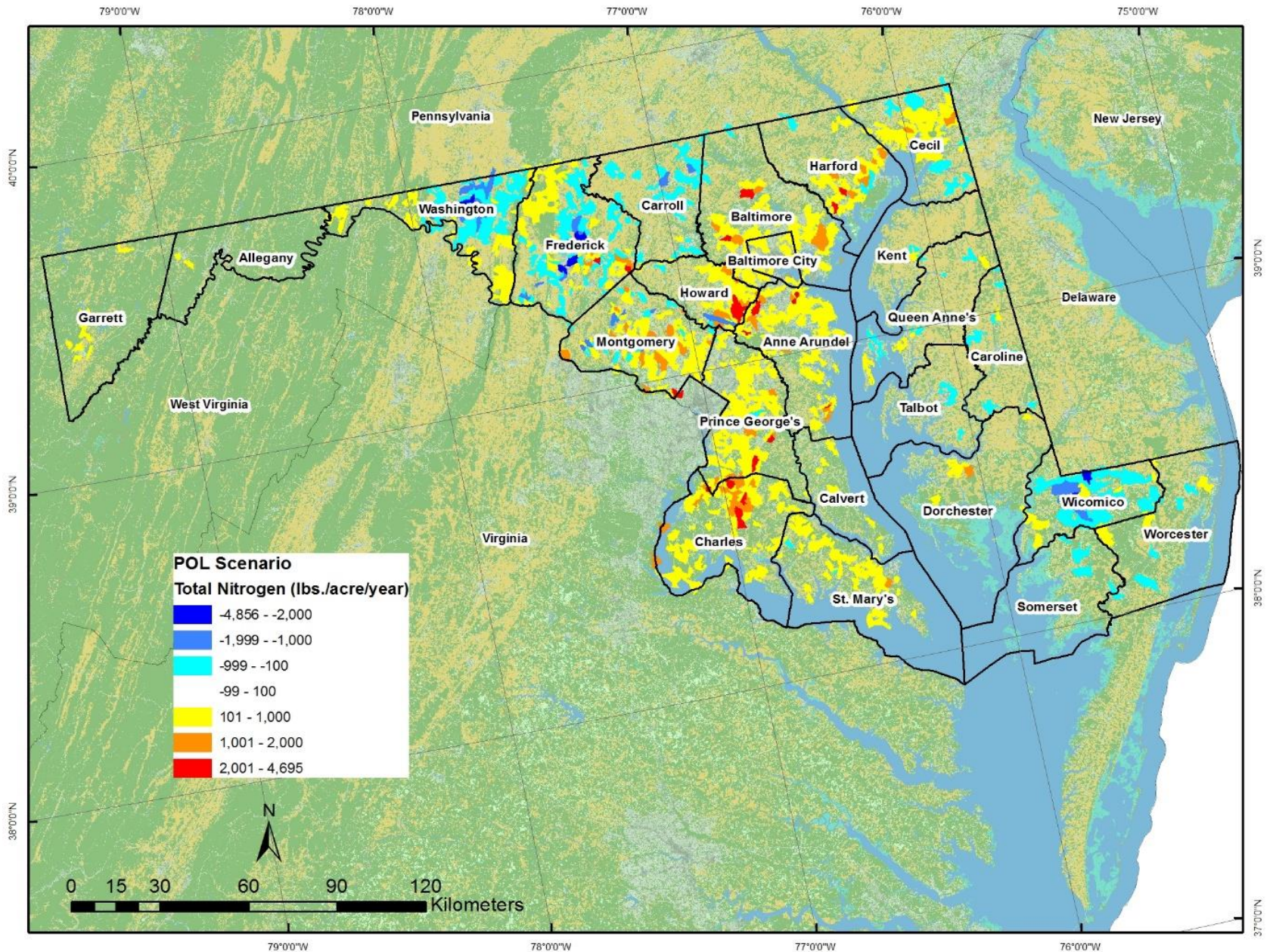
2040



- Commercial (future)
- Residential (future)
- Mixed use (future)
- Forests
- Scrub-shrub/grasland
- Agriculture
- Wetlands
- Water
- Barren/ extractive
- Developed Open Space
- Low-Intensity Developed
- Moderate-Intensity Developed
- High-Intensity Developed







What can be changed in the model?

1. Demand for greenfield development
 - population and employment projections, infill/ redevelopment rates
2. Land available for development
 - zoning, easements, comprehensive plans, environmental constraints
3. Development capacity and density
 - zoning, subdivision ordinances, Transfer of Development Rights, Impact fees, urban service areas
4. Factors influencing the likelihood of development
 - proximity to recent development and/or employment centers, current land use (farms or forests), accessibility, amenities and dis-amenities, slope and other environmental constraints
5. Other
 - urban/rural boundaries; summary units (e.g., municipalities, watersheds), demand units (e.g., counties, metro areas, commuter sheds), densification rates; attractiveness of new development to roads and to areas of recent growth

Scenario Results For Review

Scales: P6 Land-River Segments & Counties

1. New development acres
2. Future population on sewer and septic
3. Residential land consumption rate (acres / household)
4. Commercial land consumption rate (acres/ job)
4. Forest acres converted to development
5. Farmland acres converted to development
6. Δ Total Nitrogen (# / acre / yr.)
7. Δ Total Phosphorus (# / acre / yr.)
8. Δ Total Sediment (tons / acre / yr.)

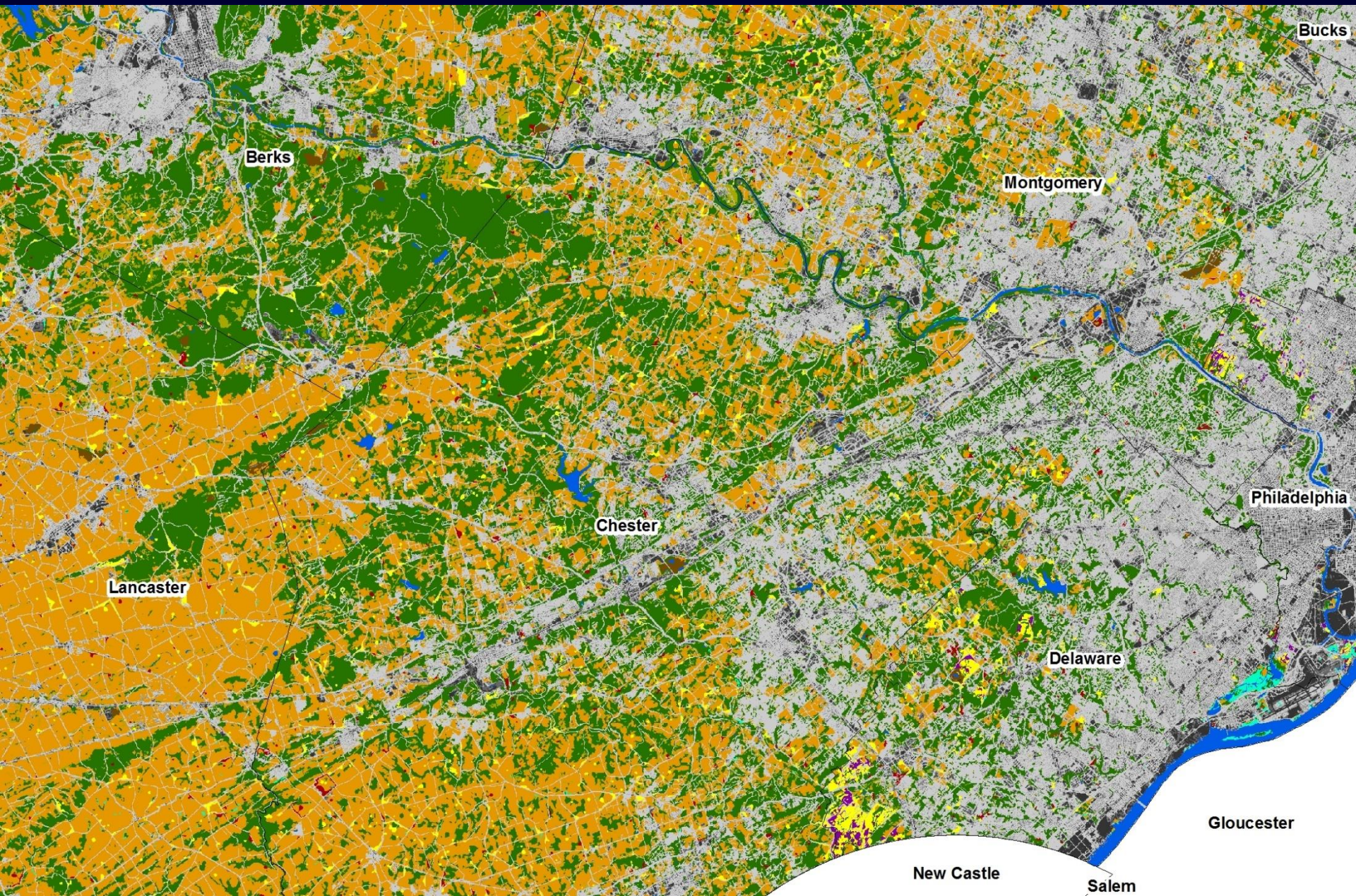
Optional Evaluation Metrics

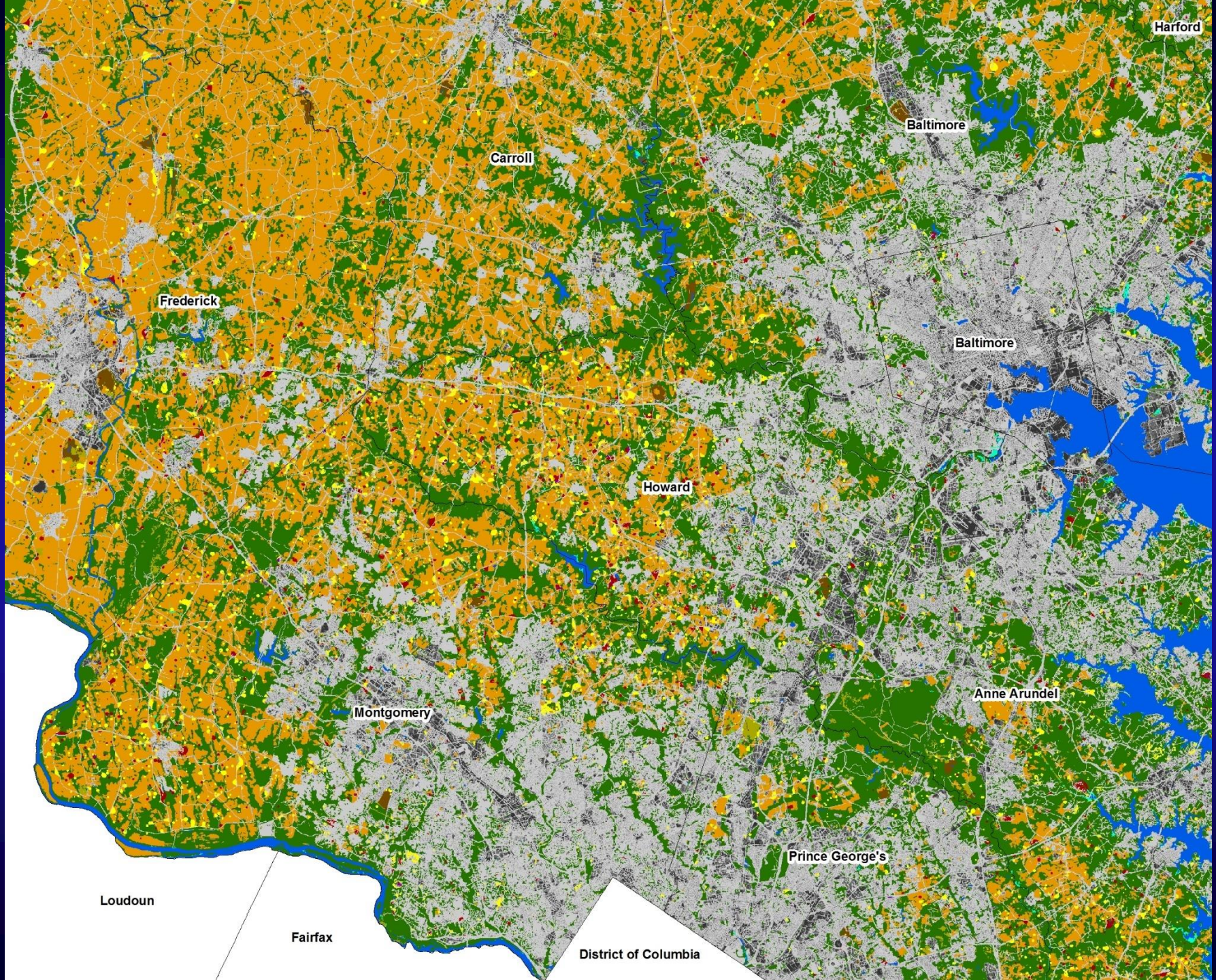
Scale: P6 Land-River Segments & Counties

1. New impervious per capita
2. Large forest patches converted / total forest converted
3. Prime soils converted / total farmland converted
4. Forest and farmland fragmentation
5. Concentration or excess of manure
6. Loss of BMPs (due to the conversion of farmland)

Chesapeake Bay Future Land Use Scenario Domain







Harford

Baltimore

Carroll

Frederick

Baltimore

Howard

Montgomery

Anne Arundel

Prince George's

Loudoun

Fairfax

District of Columbia

Tompkins Cortland

Tompkins

Chenango

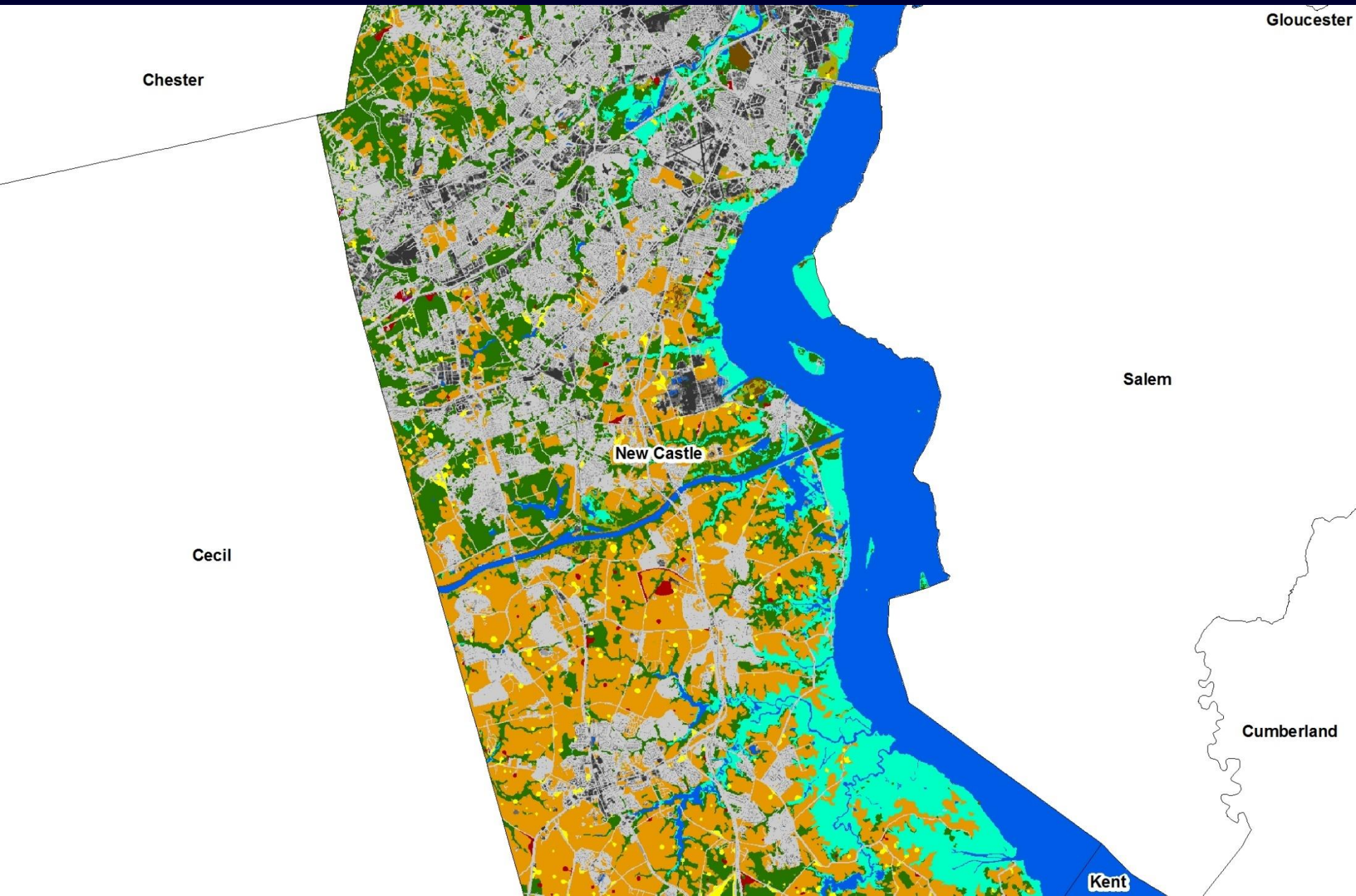
Broome

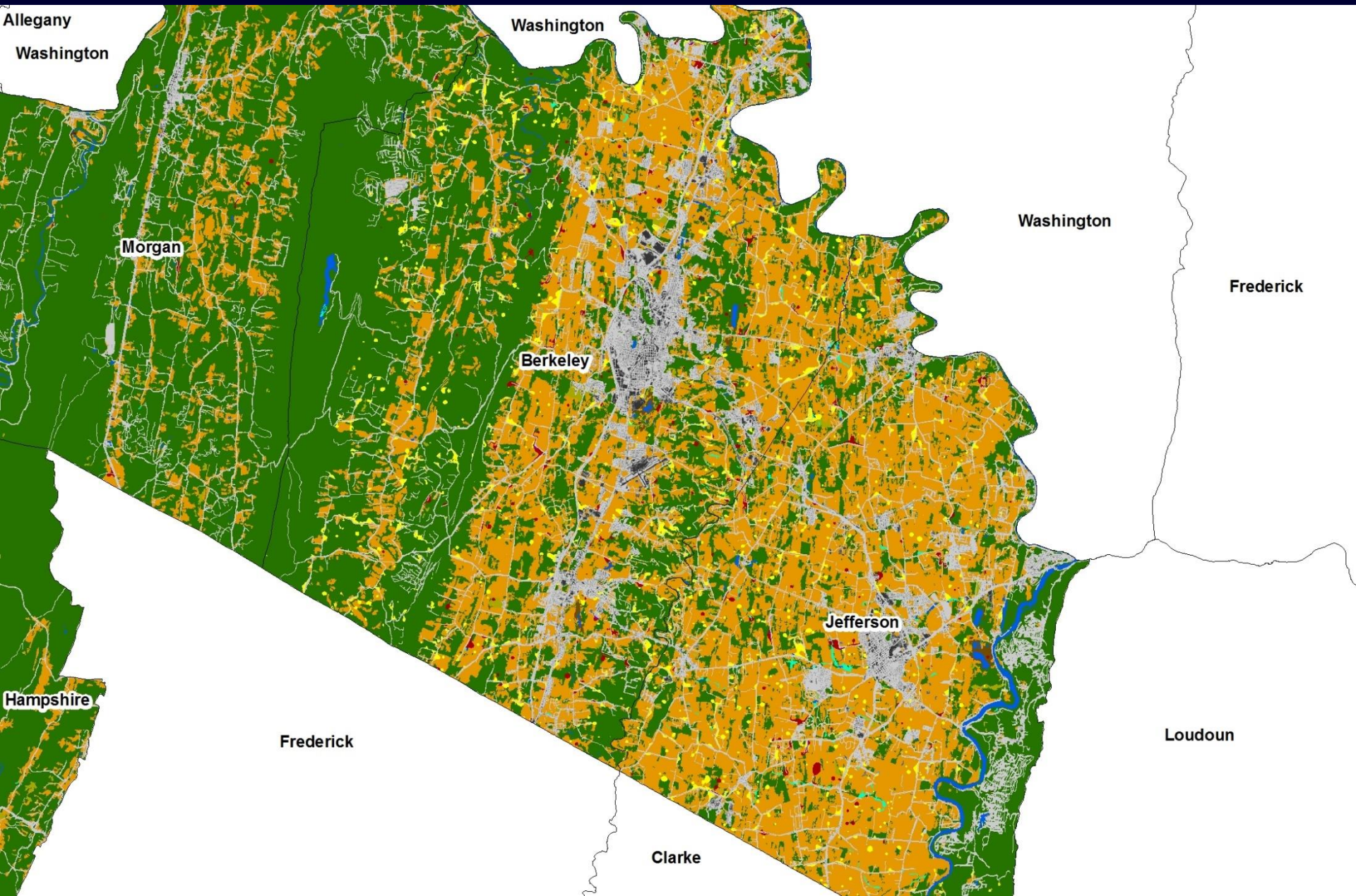
Tioga

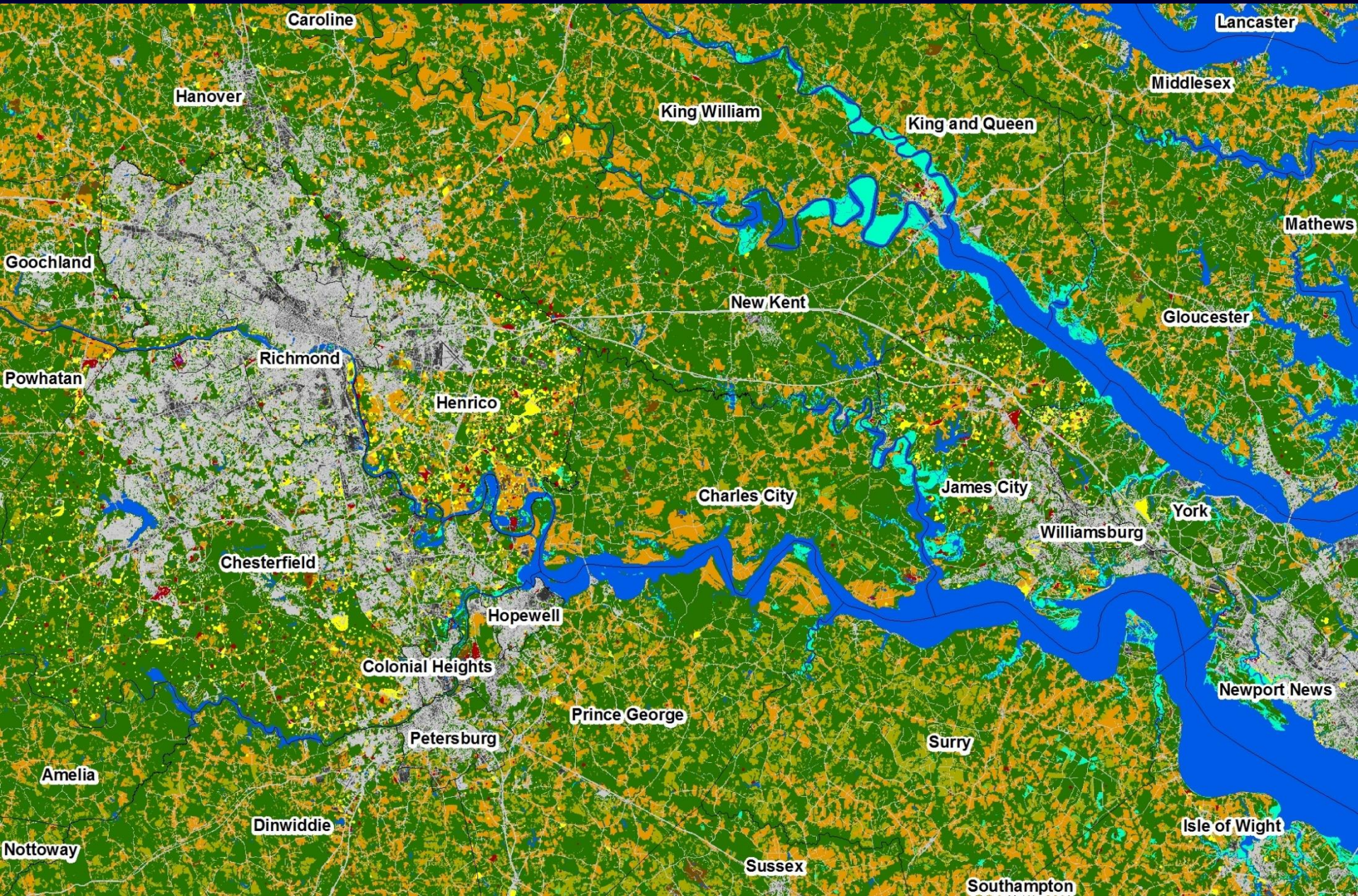
Susquehanna

Bradford



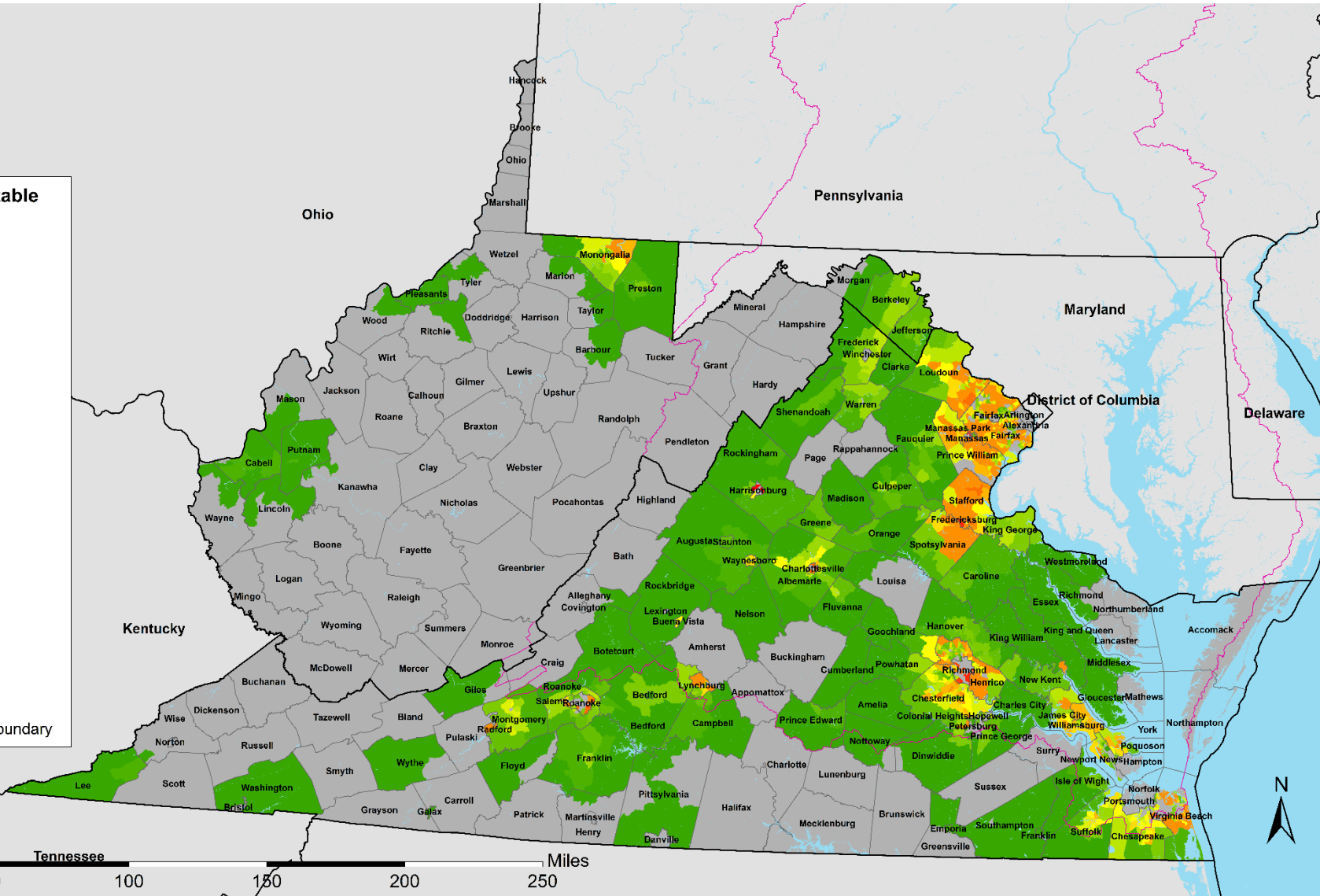
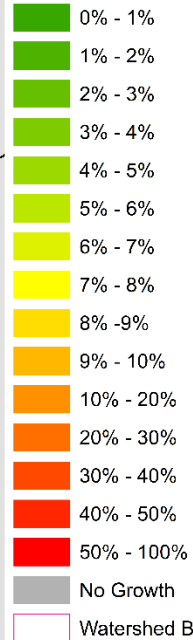




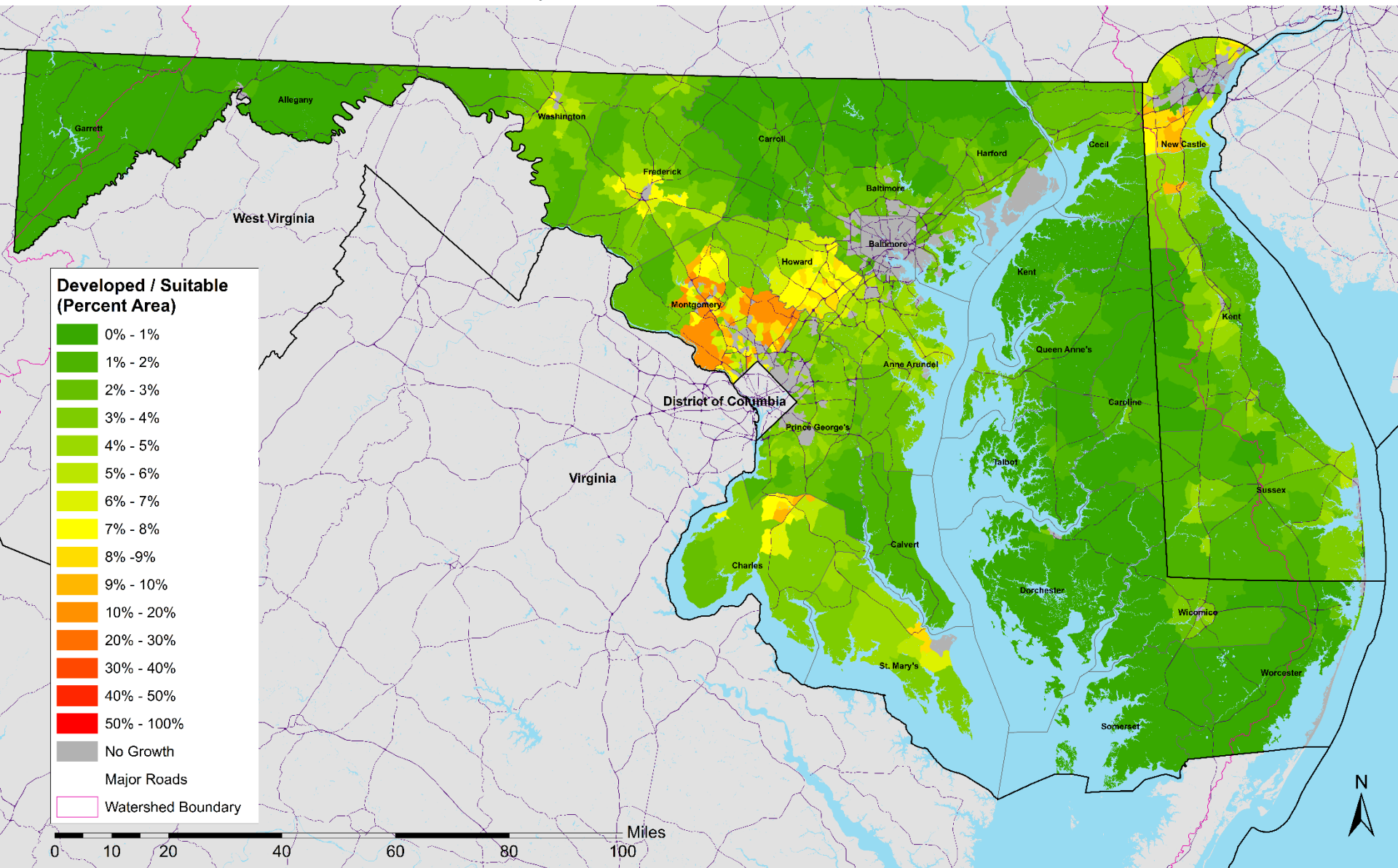


New Development in Virginia and West Virginia (2030) as a Percentage of Land Suitable for Development

Developed / Suitable (Percent Area)

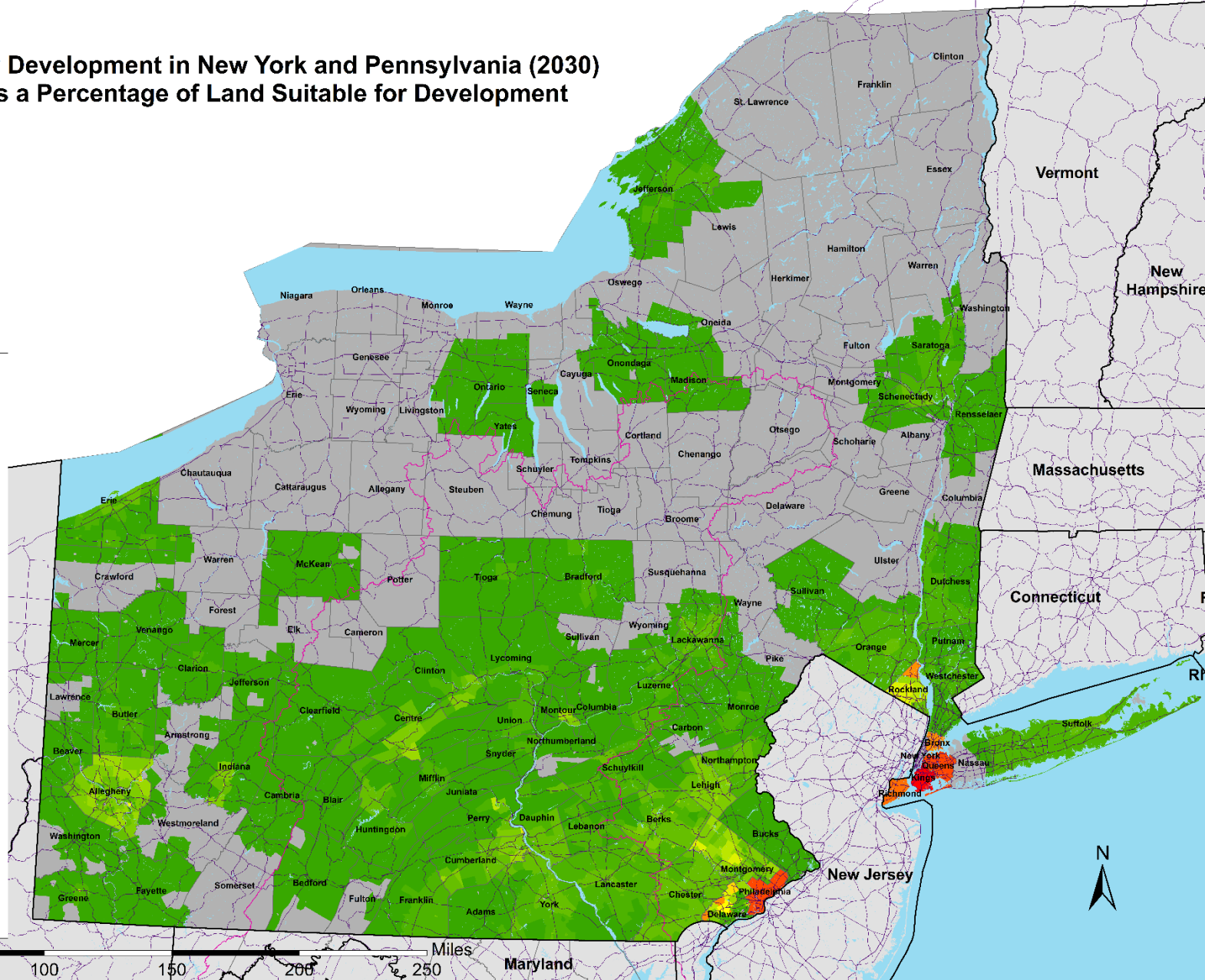
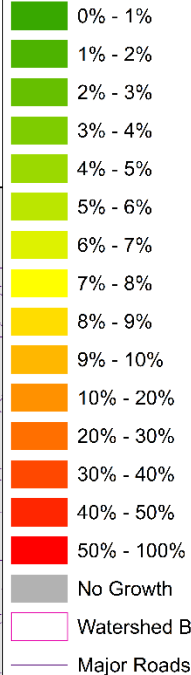


New Development in Maryland (2030) and Delaware (2040) as a Percentage of Land Suitable for Development



New Development in New York and Pennsylvania (2030) as a Percentage of Land Suitable for Development

Developed / Suitable (Percent Area)



Future Land Use Scenarios:

Logically-coherent storylines and assumptions of factors influencing land use change that represent a full range of plausible futures.

Why?

To help jurisdictions account for potential future growth in pollutant loads as required by the Chesapeake Bay TMDL.

To inform long-range development, restoration, and conservation plans.

Potential Alternative Future Scenarios

“Historical Trends”: patterns over previous decade(s) prevail.

“Current Policy”: growth focused in areas with infrastructure and capacity.

“Land Conservation”: more aggressive conservation of forests and farms.

“Rural Character”: up-zone urban areas and down-zone rural areas.

“Infill and Redevelopment”: direct more growth into urban areas.

“Transportation Corridors”: growth focused along major transportation corridors.

“Deregulated and Less Managed”: patterns driven by private sector and free market.

“Amenity based”: growth focused along coasts and adjacent to public lands.