Assessing the Vulnerability of Forested Watersheds to Urbanization

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Vulnerability = *ƒ* (exposure, sensitivity, and resilience)

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Vulnerability of Forested Watersheds to Urban Development

Exposure =

- land demand

Sensitivity =

- level of protection
- suitability for development
- accessibility

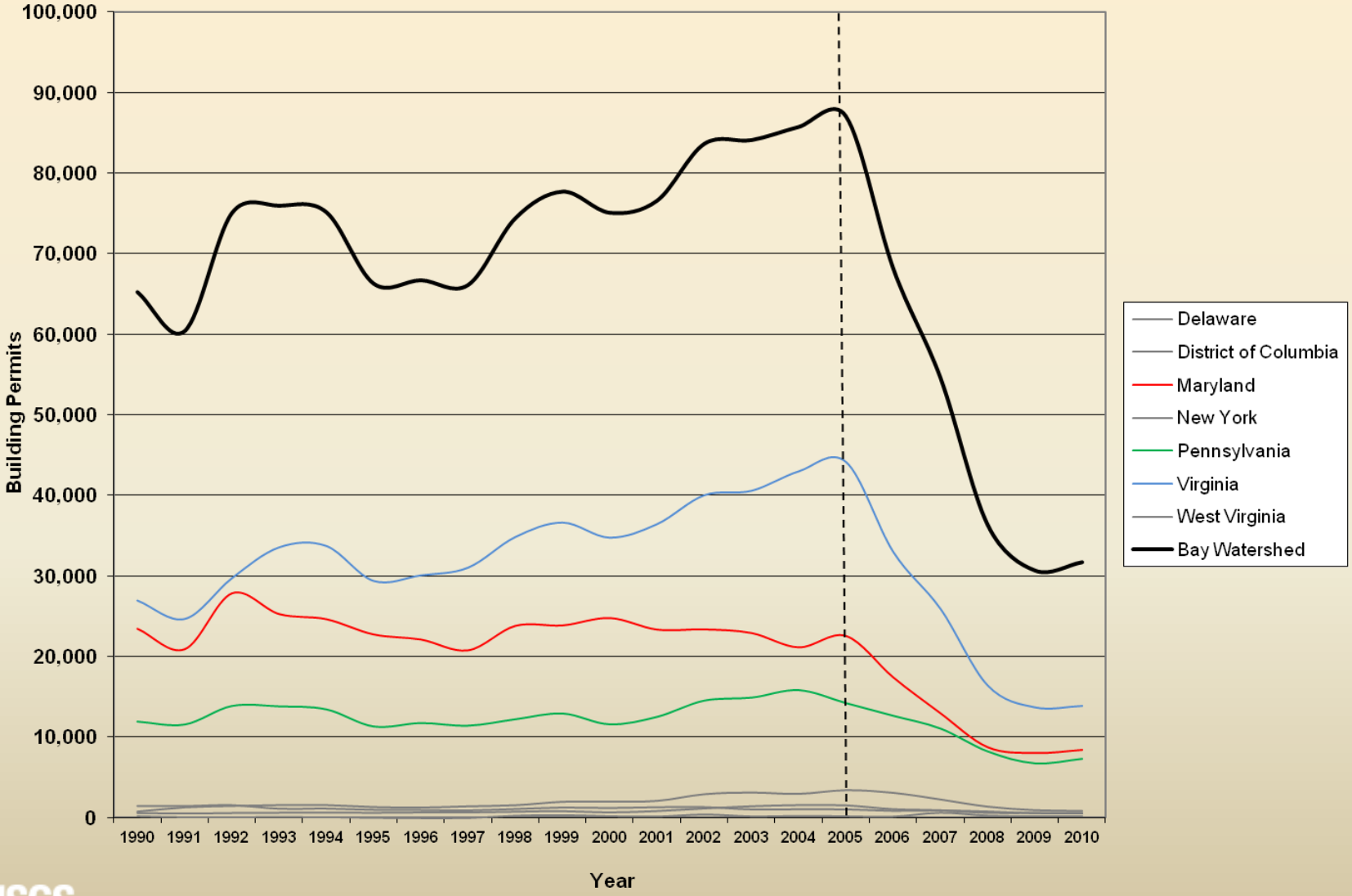
Resilience =
(i.e., adaptive capacity)

- land supply relative to demand
- hydrograph proportion of runoff to baseflow
- slope
- % forest cover
- % riparian forest cover
- other condition metrics

USGS

Exposure Varies Temporally

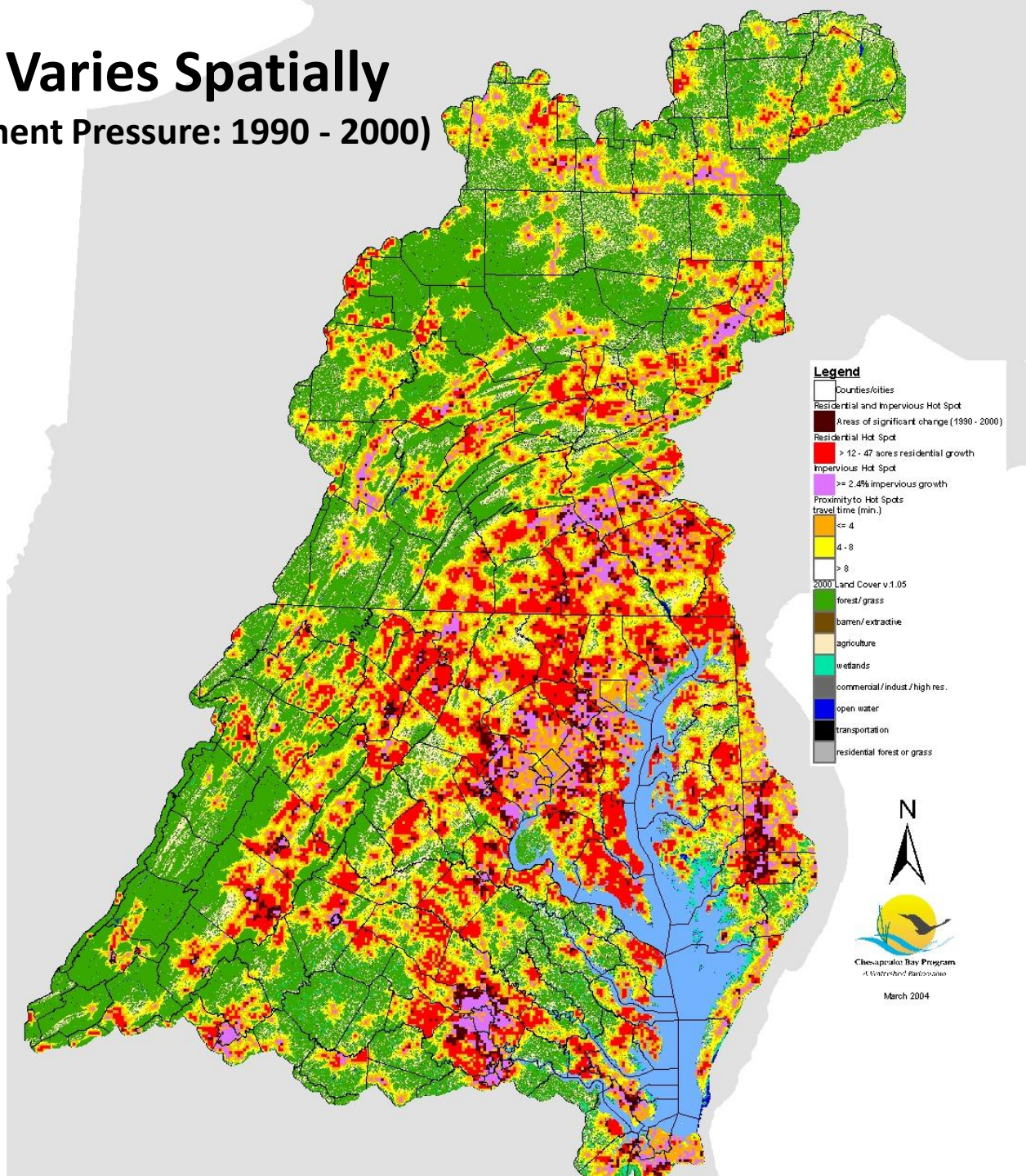
(Residential Building Permits: 1990 – 2010)



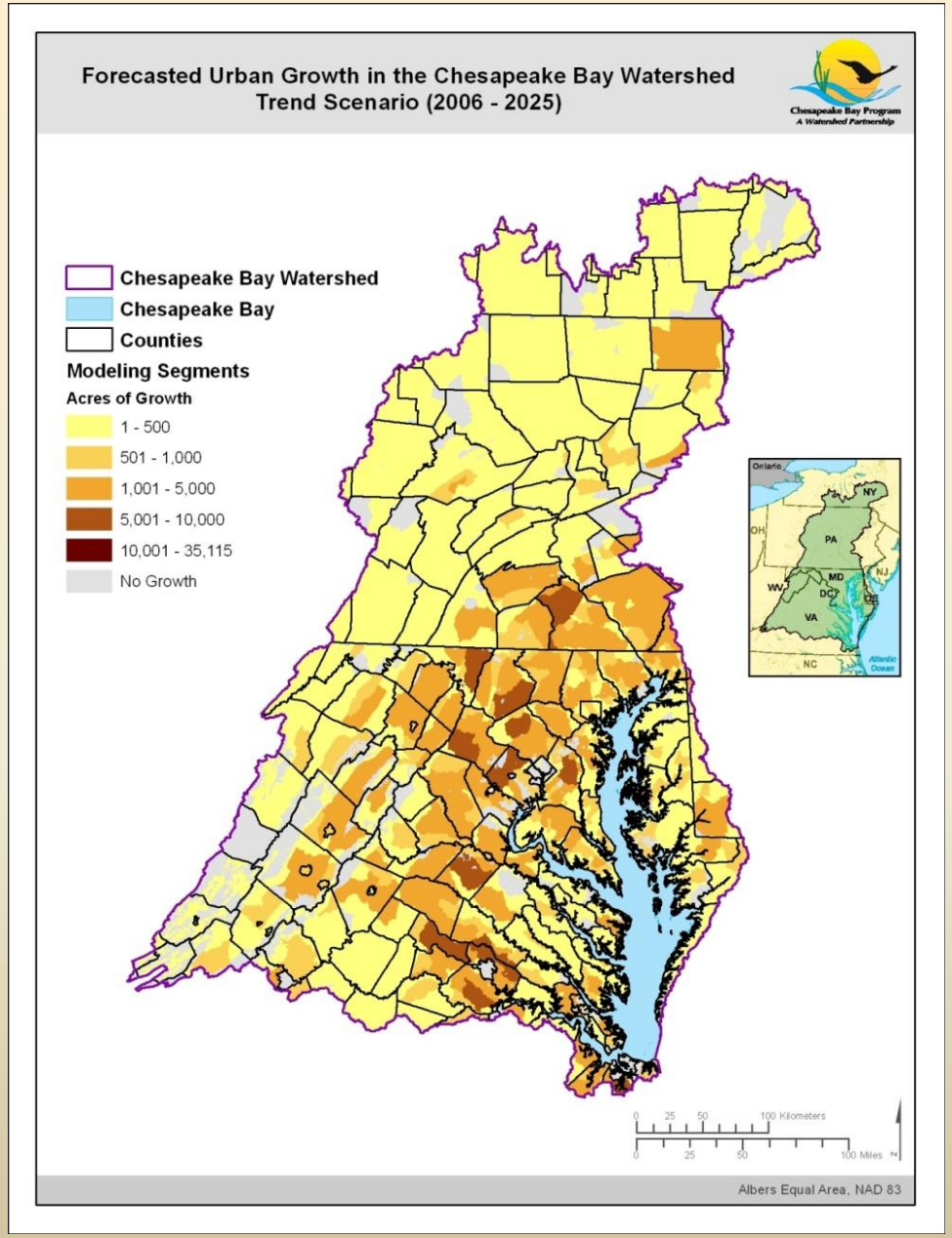
USGS

Exposure Varies Spatially

(RLA Development Pressure: 1990 - 2000)



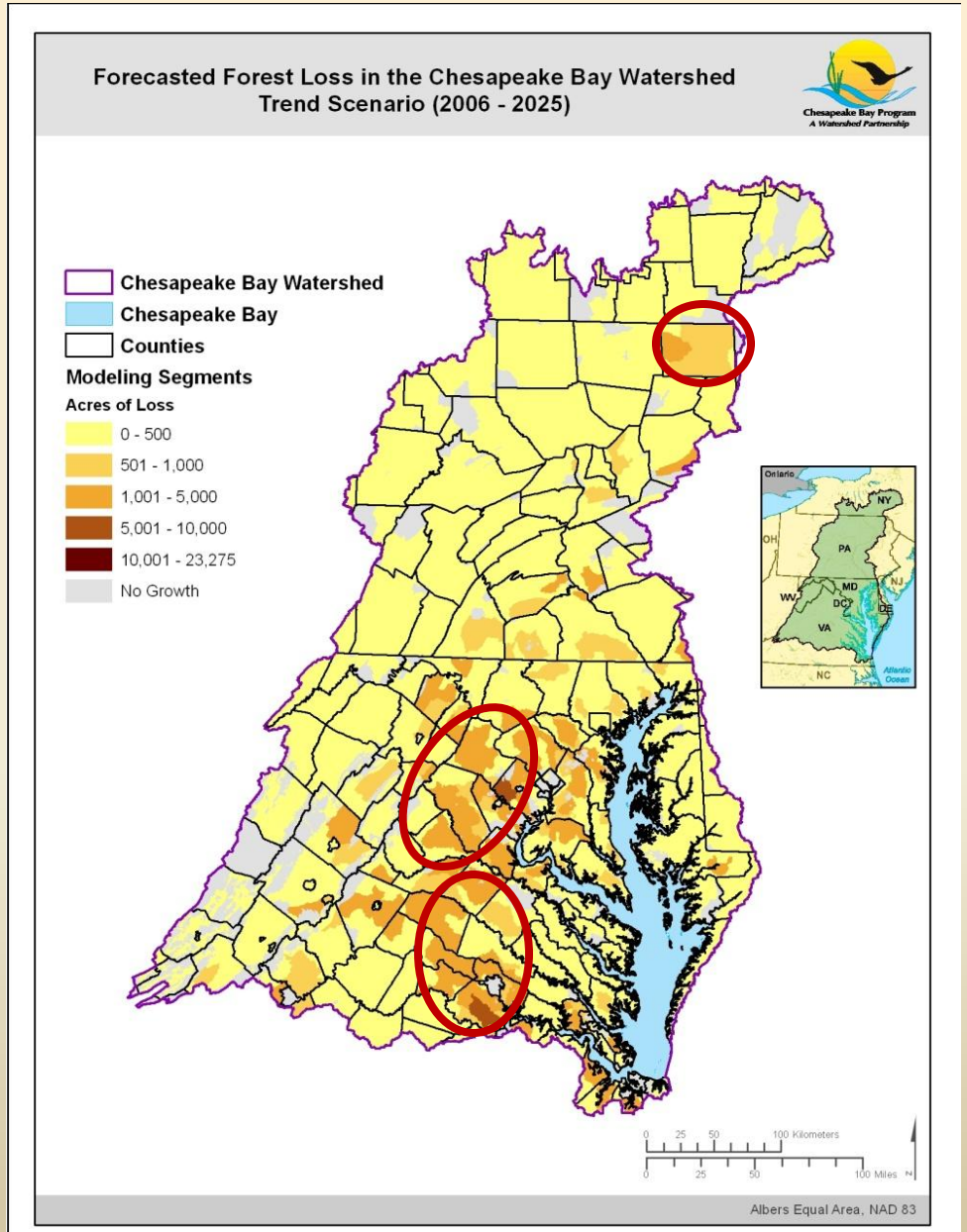
Forecasted Urban Growth in the Chesapeake Bay Watershed



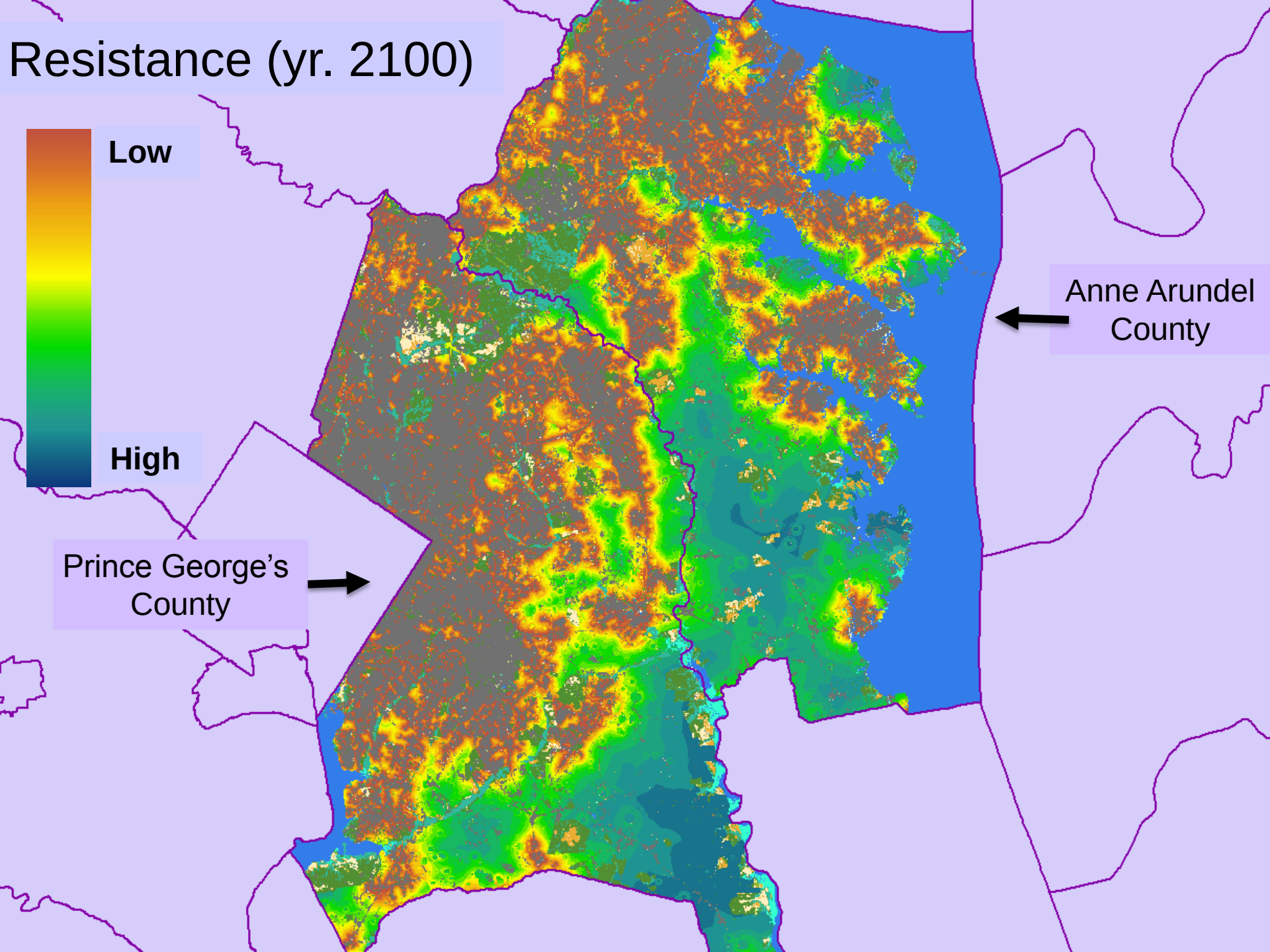
2006 - 2025

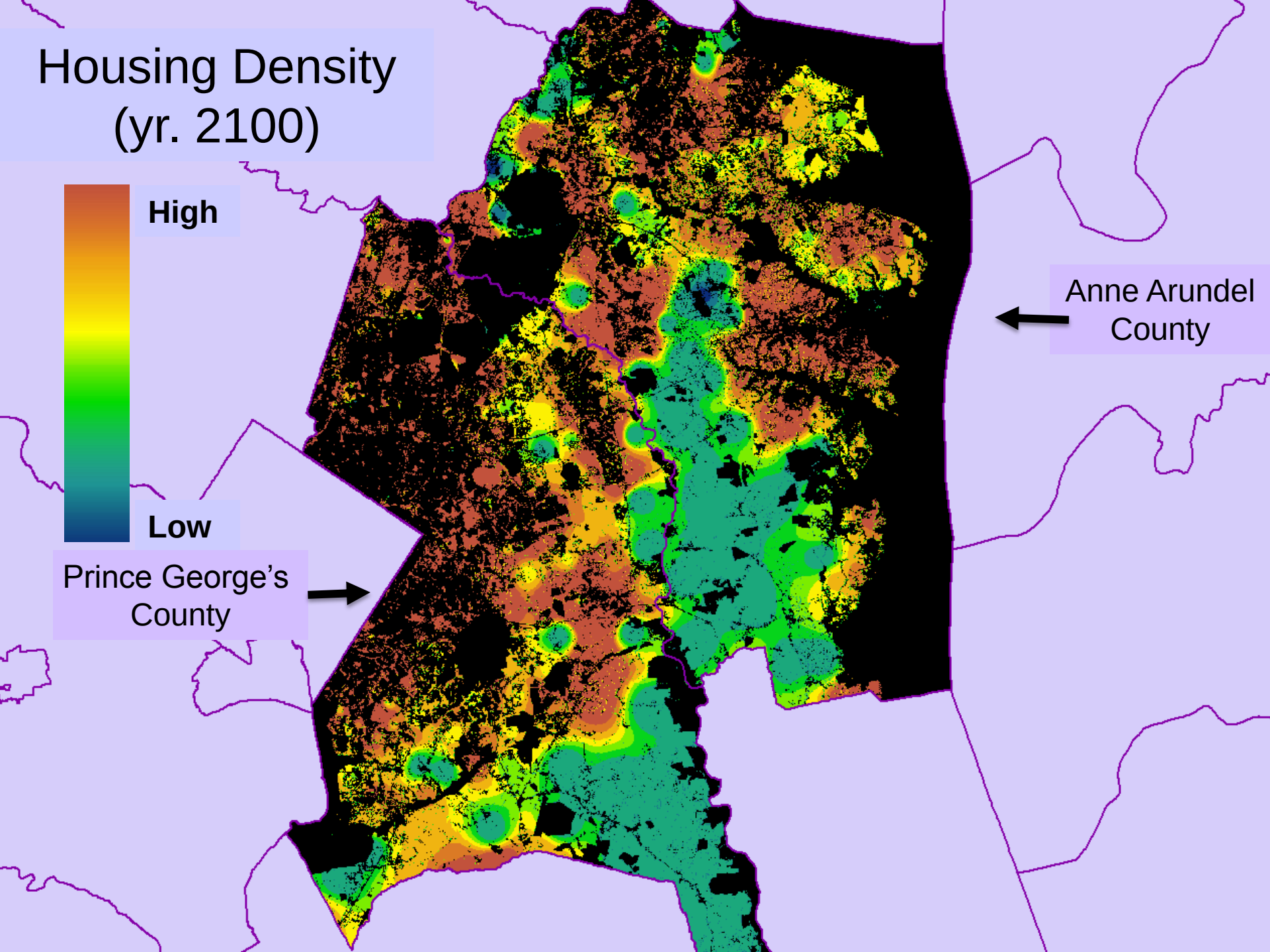
USGS

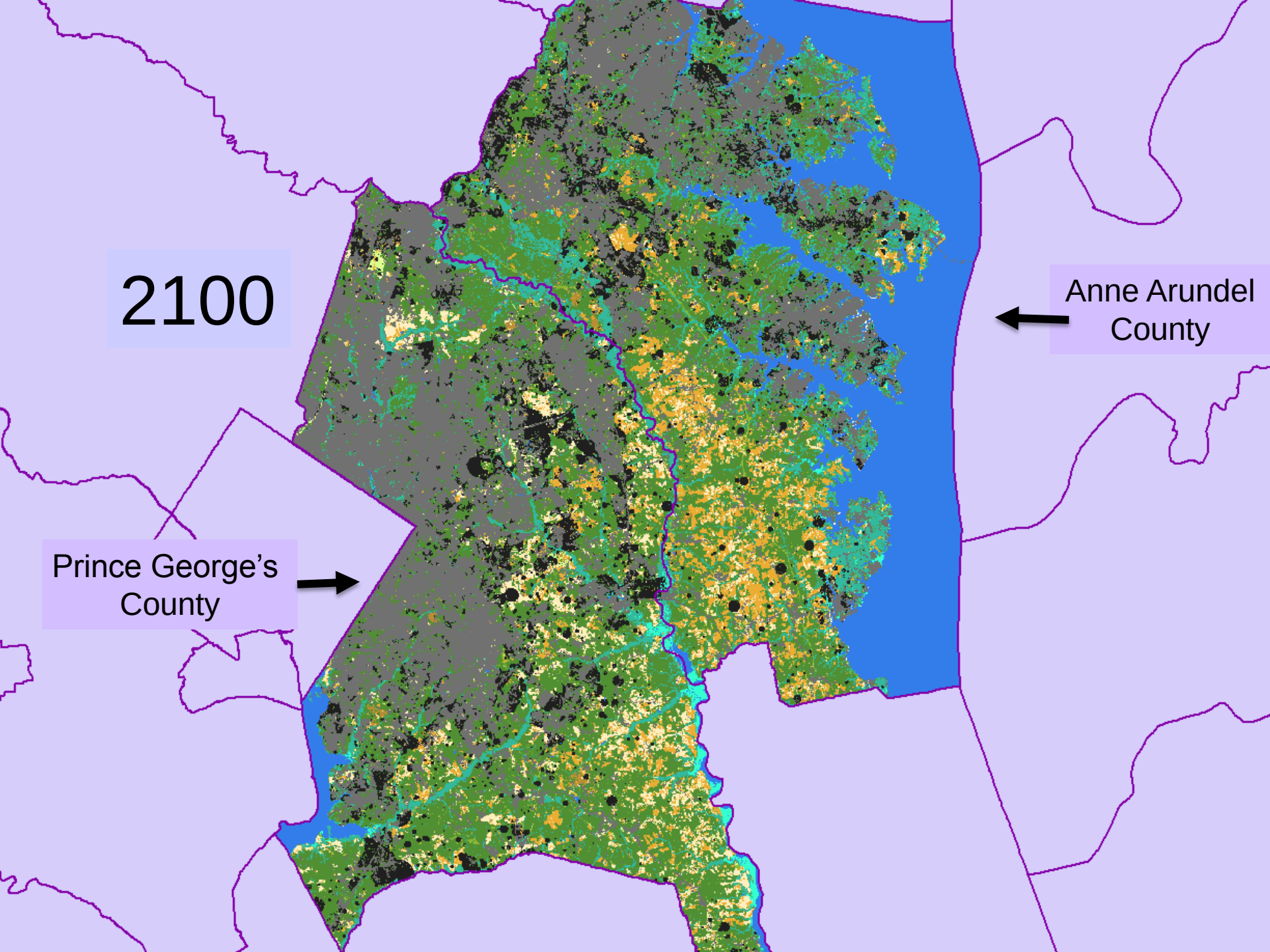
Forest Loss (2006 – 2025)

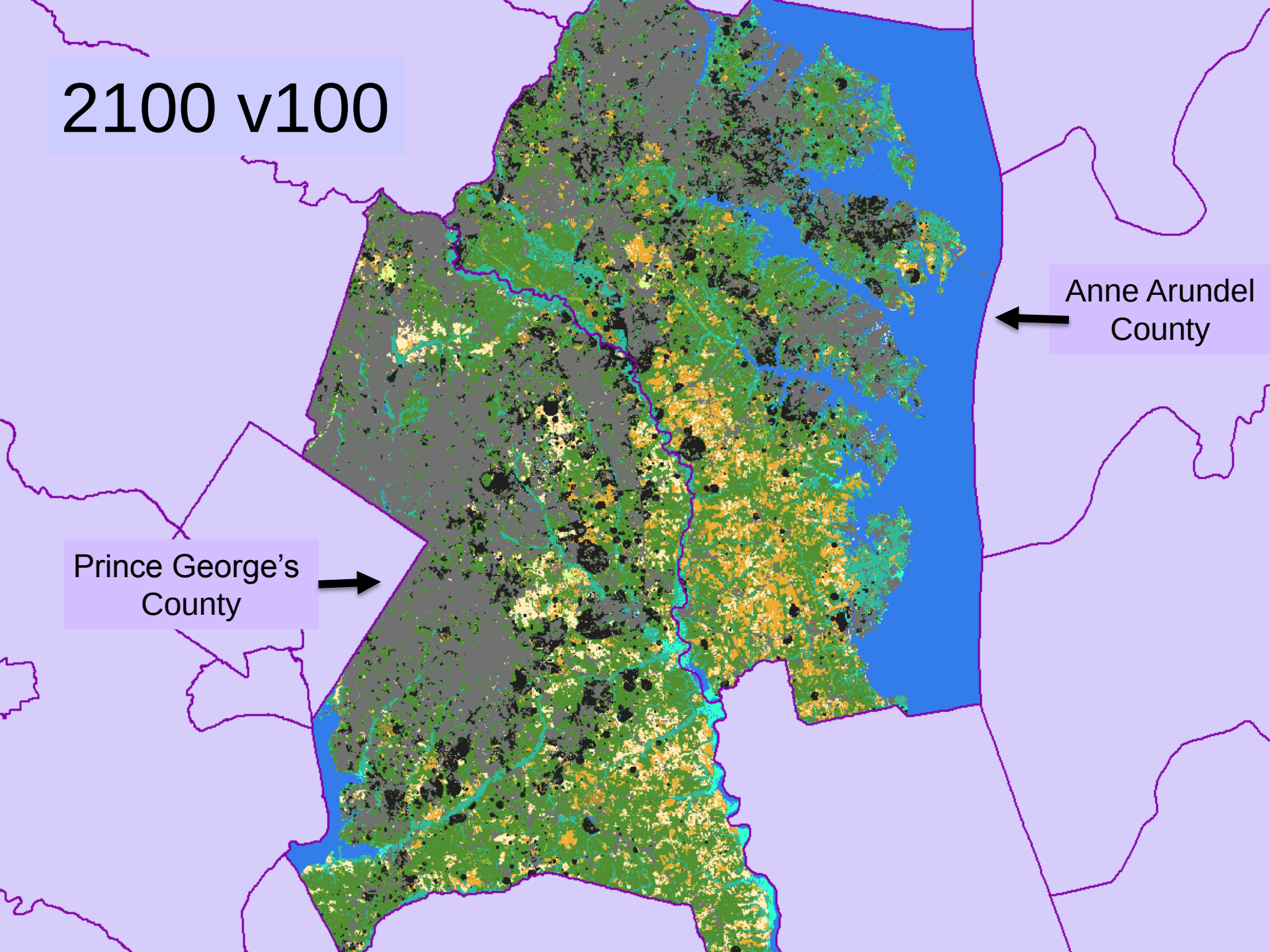


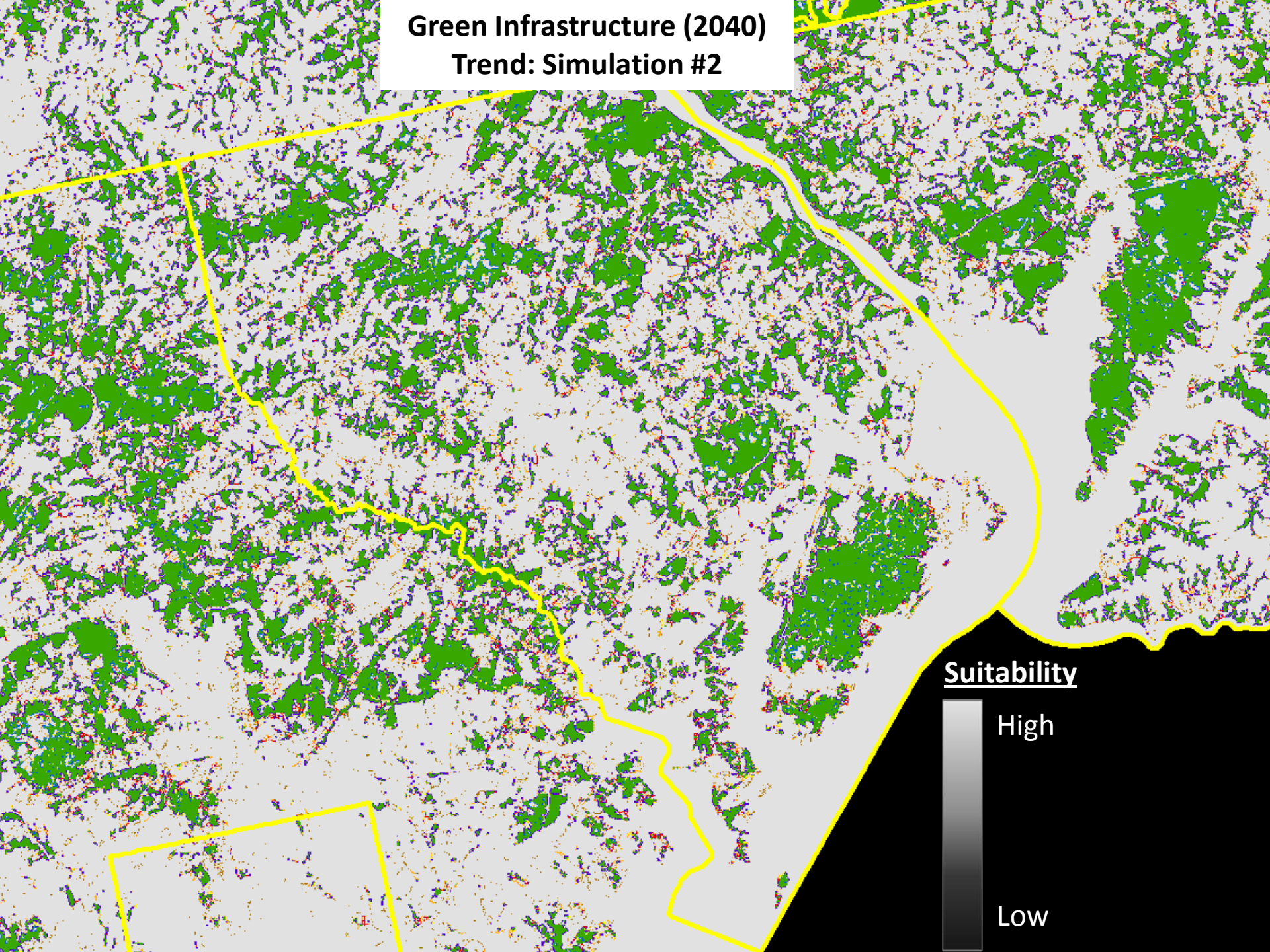
USGS


Resistance (yr. 2100)
Low
High
Anne Arundel County
Prince George's County

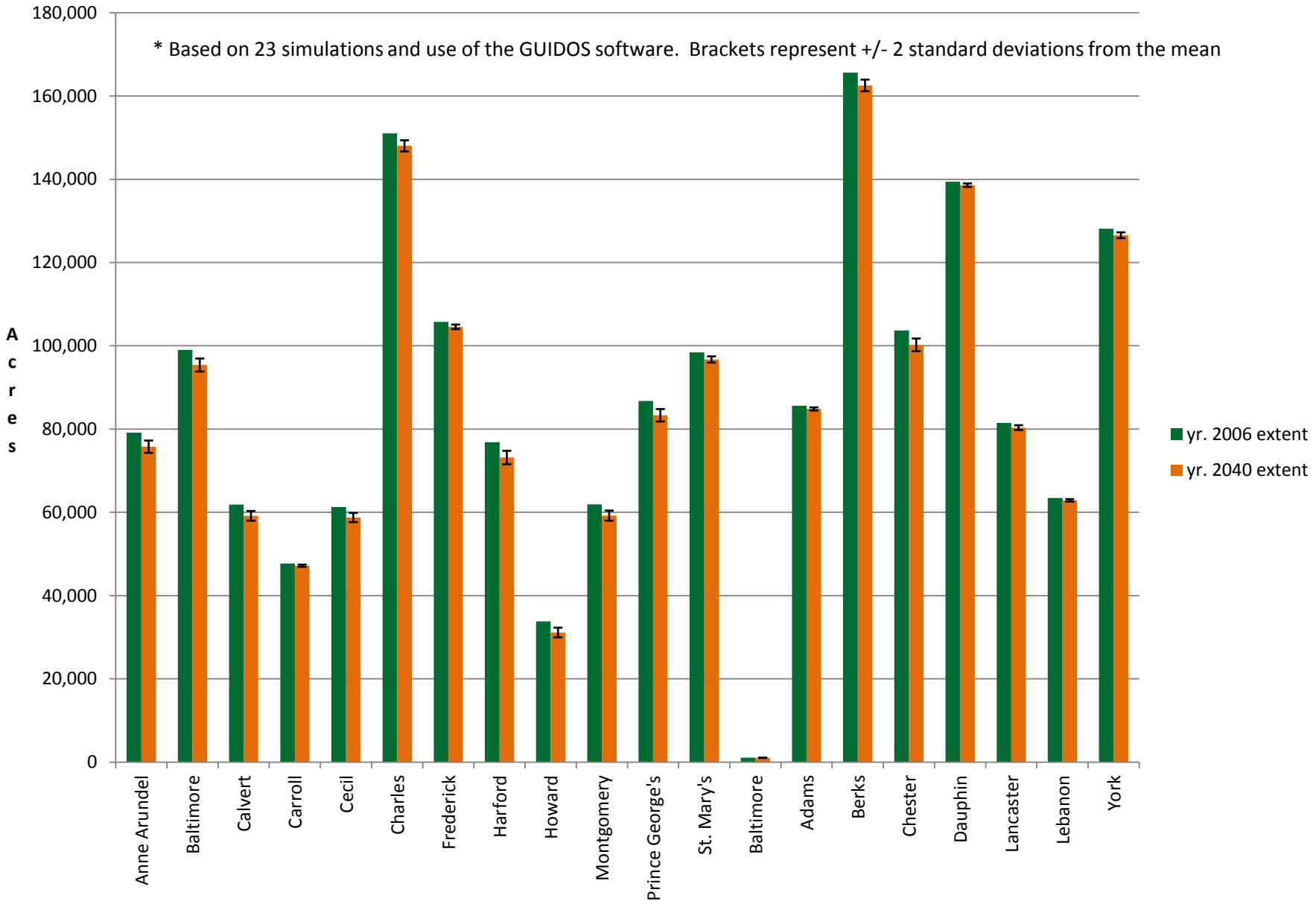

Housing Density
(yr. 2100)
High
Low
Prince George's
County
Anne Arundel
County


2100
Anne Arundel County
Prince George's County


2100 v100
Anne Arundel County
Prince George's County


Green Infrastructure (2040)
Trend: Simulation #2
Suitability
High
Low

Change in Core Forest Extent 2006 - 2040



What about other threats?

- **Roads**
- **Energy transmission lines**
- **Shale gas pads**
- **Sea-level rise**
- **Temperature/precipitation change**