Chesapeake Bay Program
A Watershed Partnership

Mapping & Forecasting Agriculture: 2021 Milestones Land Use

October 15, 2020
AGWG Call

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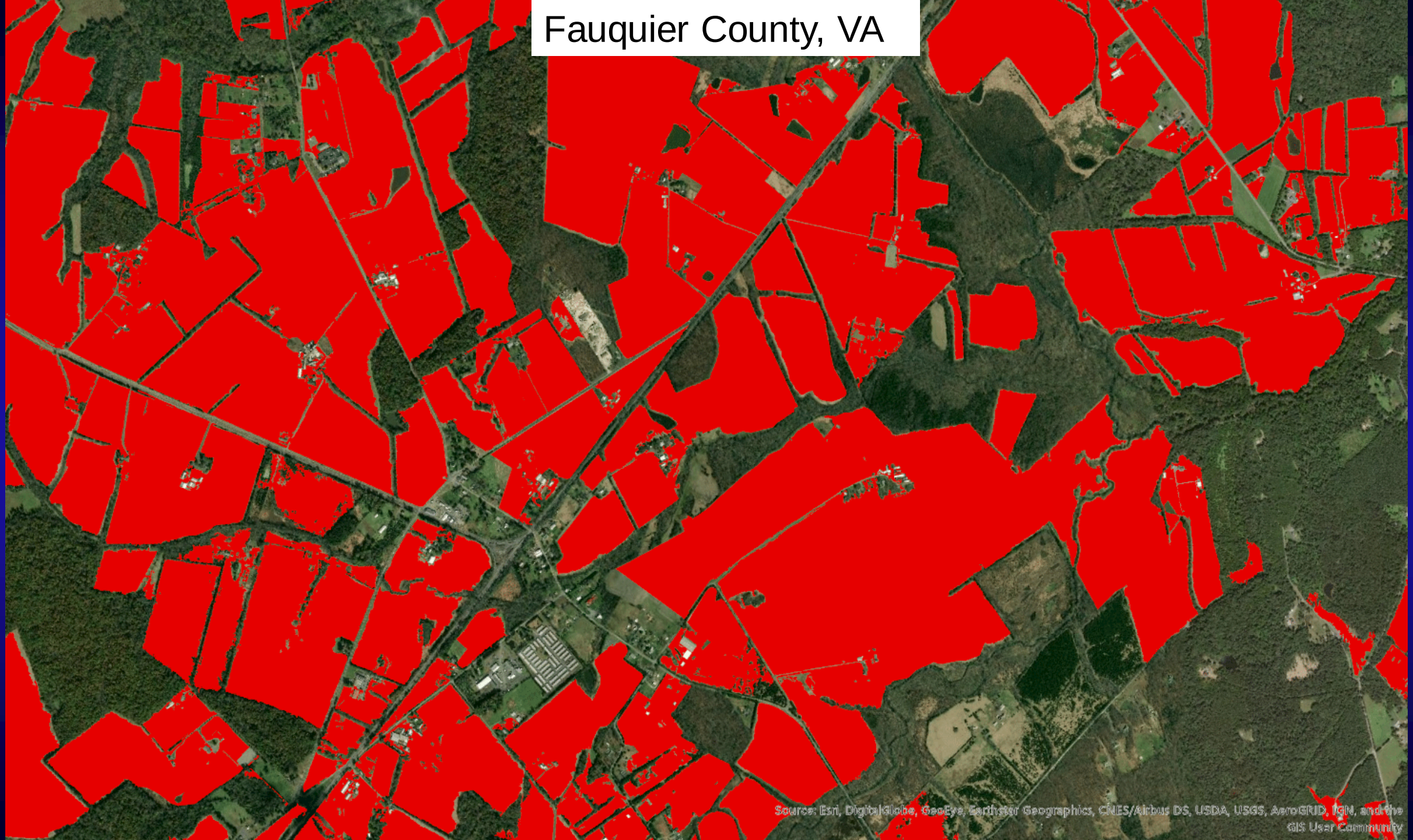
Fauquier County, VA
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Lancaster County, PA:	Total Farmland
2012 Census of Agriculture:	377,807
2013 High-res Land Use:	272,655
Trial with 2017 Parcel and Patch Data:	303,132

Clearfield County, PA:	Total Farmland
2012 Census of Agriculture:	41,436
2013 High-res Land Use:	115,343
Trial with 2017 Parcel and Patch Data:	67,052

Fauquier County, VA:	Total Farmland
2012 Census of Agriculture:	166,587
2013 High-res Land Use:	119,175
Trial with 2017 Parcel and Patch Data:	135,954

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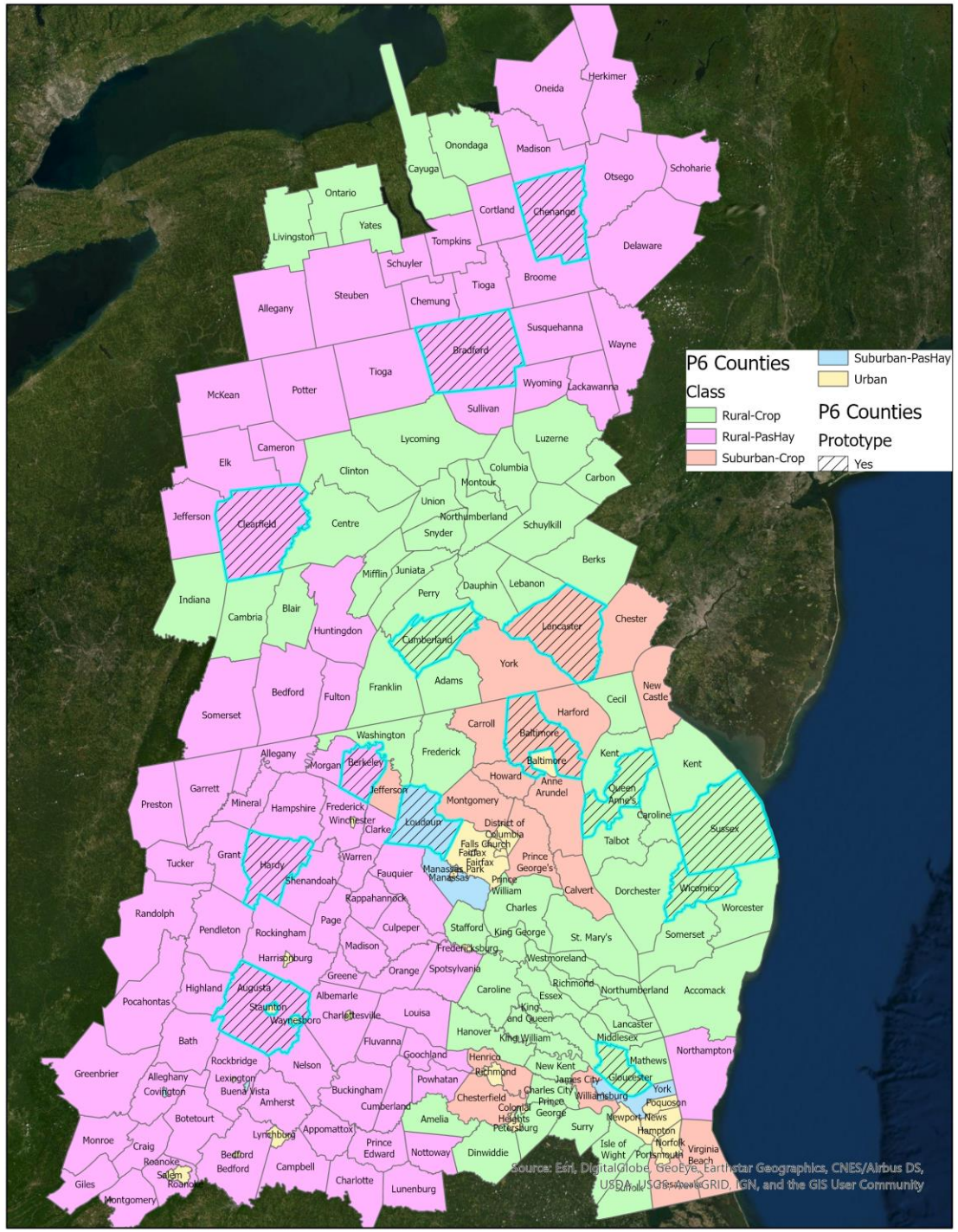
Fourteen Counties Selected to Prototype Development of the 2017 High-res Land Use Data

FIPS	CNTY_NAME	P_Crop	P_Dev	Class
10005	SUSSEX	97.4%	18.8%	Rural-Crop
24005	BALTIMORE	66.7%	38.6%	Suburban-Crop
24035	QUEEN ANNES	96.3%	14.2%	Rural-Crop
24045	WICOMICO	94.5%	20.6%	Rural-Crop
36017	CHENANGO	28.3%	5.8%	Rural-PasHay
42015	BRADFORD	39.2%	5.7%	Rural-PasHay
42033	CLEARFIELD	42.0%	8.1%	Rural-PasHay
42041	CUMBERLAND	65.8%	24.6%	Rural-Crop
42071	LANCASTER	68.2%	29.2%	Suburban-Crop
51015	AUGUSTA	27.1%	9.3%	Rural-PasHay
51073	GLOUCESTER	85.1%	12.6%	Rural-Crop
51107	LOUDOUN	33.1%	27.7%	Suburban-PasHay
54003	BERKELEY	33.1%	23.8%	Rural-PasHay
54031	HARDY	22.2%	6.4%	Rural-PasHay



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Schedule of Tasks and Coordination for CAST 21

2017 Land Use Production Schedule		2020			2021							
Order	Task	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
1	Local review of 2017 Land Cover Data			LUWG			LUWG	LUWG				
2	Draft Hyper-resolution Hydrography			LUWG	ID LiDAR gaps		LUWG	LUWG				
3	Cropland, Pasture, Orchards, and Turf Grass	AGWG										
4	Suspended Succession, Bare Shore, and Solar Fields	LUWG										
5	Tidal & NonTidal Wetlands	WWG										
6	Bare Construction		LUWG									
7	Forests, Tree Canopy, Timber Harvests, and Natural Succession			FWG								
8	Federal Facility Land Uses			FedFac								
9	Data clean up											
10	Prototype Land Use in 14 counties											
11	Approve 2017 Land Use Methods and Updates to 2013 Land Use					LUWG, AGWG, WWG, FWG, FedFac						
12	Complete 2017 Land Use Dataset									LUWG		
13	Revise 2013 Land Use (to match 2017)						LUWG			LUWG		
14	Update MS4s, Sewer, Septic, Zoning, and Population Estimates and Projections											
15	Revise Agricultural Forecast Methodology	AGWG					AGWG					
16	Update Land Use Forecasts									LUWG		
17	Update 2013, 2017, and 2025 CAST Inputs										LUWG	WQGIT

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Recommendations:

- Use mapped agriculture in 2013 and 2017 to represent the total agricultural acres within each county;
- Adjust the Census of Agriculture to conform to the mapped acreages;
- Trash the “true-up” method.

Agriculture Forecasting Method (2017 – 2025)

Spatially and stochastically allocate demand for farmland retirement and expansion while simultaneously simulating urban growth (using CBLCM v5).

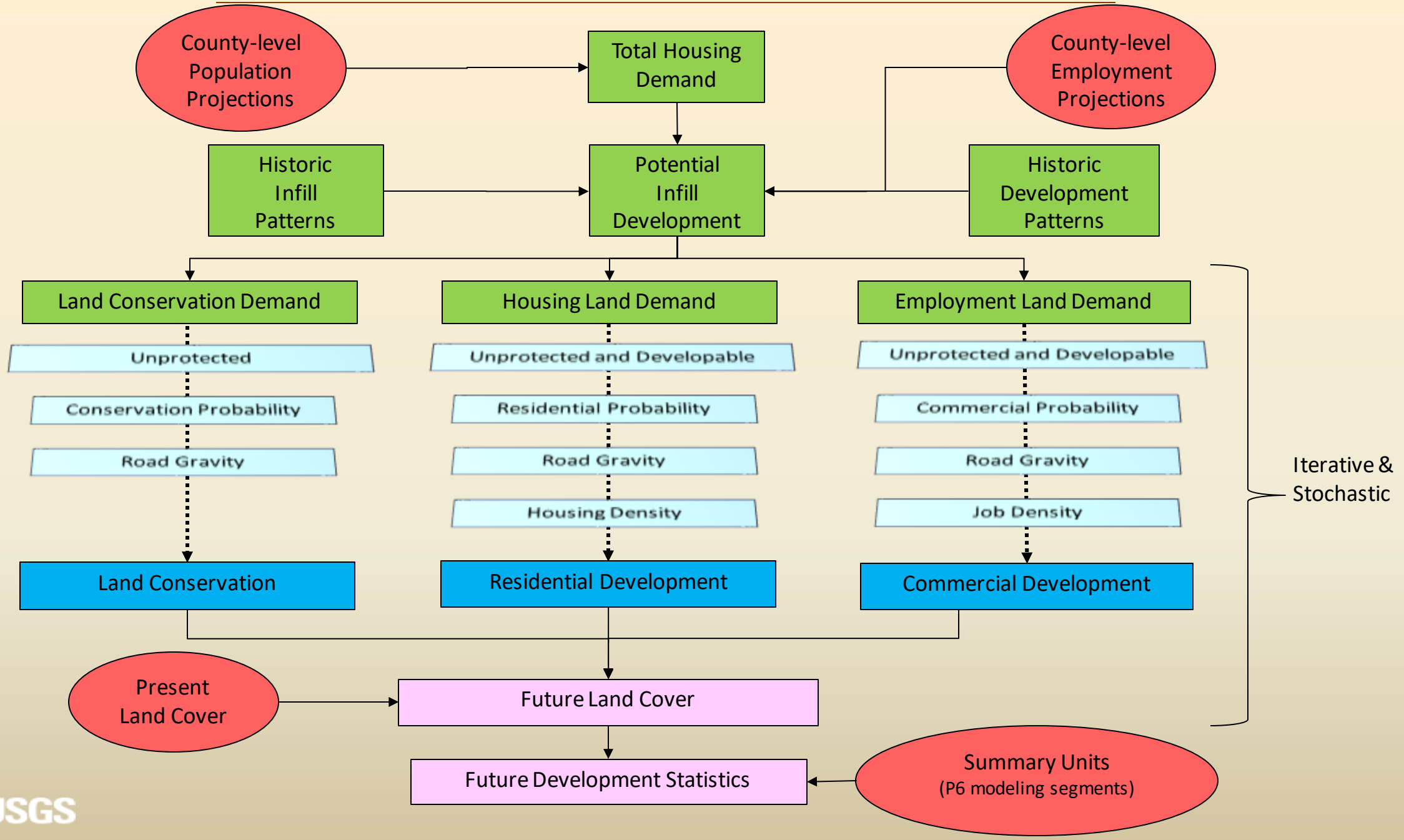
Farmland Retirement = estimated future proportional loss of farmland from the Census of Agriculture applied to the 2013 footprint of agriculture that exceeds estimated loss associated with urbanization.

- Retirement may be presumed to occur on marginal farmlands

Farmland Expansion = estimated future proportional growth in farmland from the Census of Agriculture applied to the future footprint of agriculture that remains following urbanization.

- Expansion may be presumed to occur on lands undergoing natural succession or those that are currently idle/fallow.

Chesapeake Bay Land Change Model v5 (Python & R)



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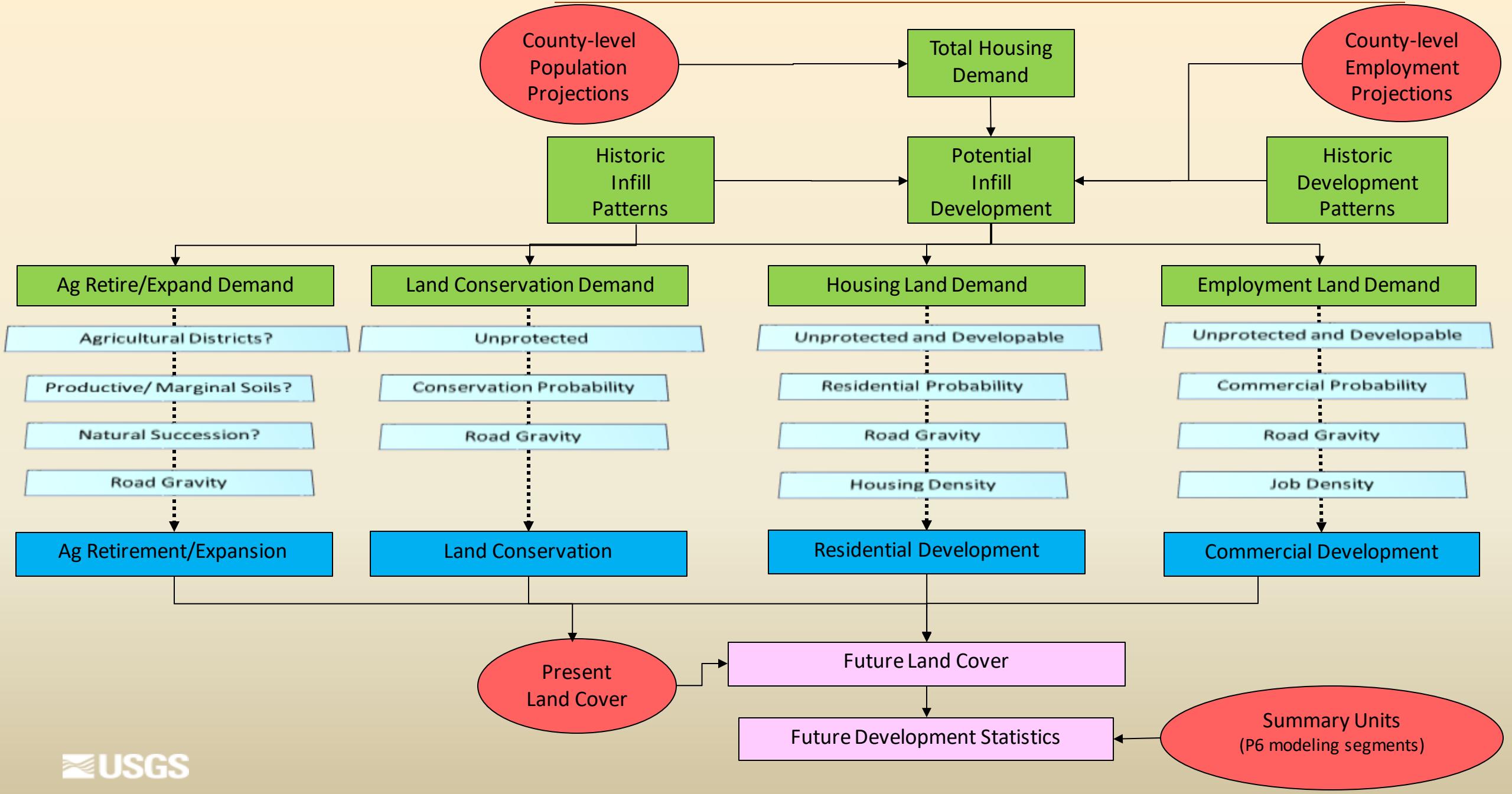
Chesapeake Bay Land Change Model v5.1 (Python & R)



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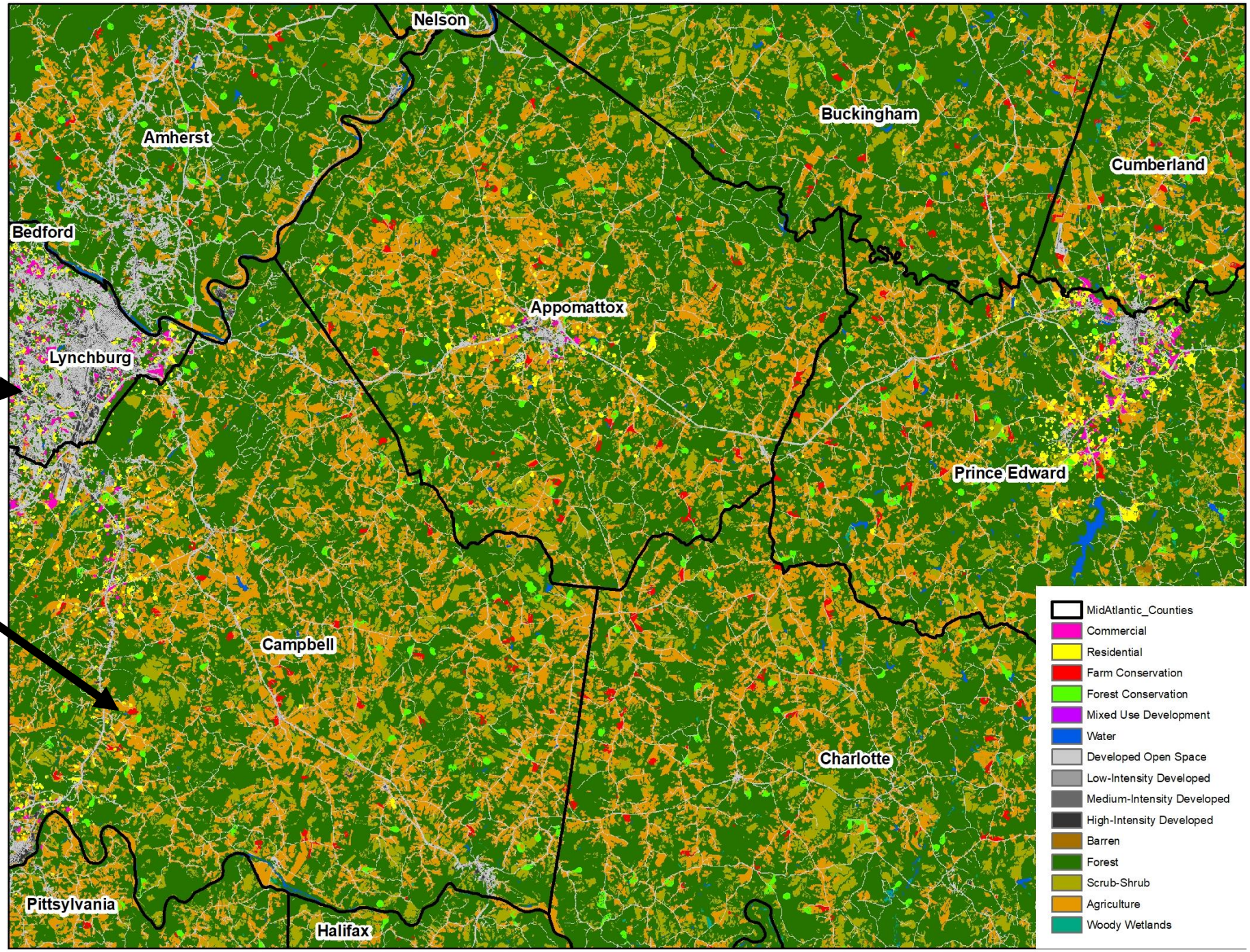
Land Change Model Outputs

Commercial and Residential Growth

Farmland and Forest Conservation

Farmland Retirement and Expansion



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Agriculture Backcasting Method (1985 - 2013) aka the "Mullet Method"

Deconstruct Urban Growth and Restore Agriculture Back to 1985

1. Deconstruct urban growth from 2013 to 1985 at the parcel scale
   - Infer pre-development conditions- forest or farm- at the parcel scale using annual satellite data
2. Create proportional demands for farmland retirement and expansion from the Census of Agriculture
3. Apply proportional demands to the 2013 high-res baseline and compare to restored historical footprint of agriculture following urban deconstruction to generate "demand" for retirement and expansion
4. Spatially and stochastically allocate demand for farmland retirement* and expansion** to suitable parcels using the CBLCM.
   - Compare historic rates of land use change at the state scale with NRCS' National Resources Inventory in Delaware and Maryland

*Farmland Retirement = Historical Census footprint < Restored footprint
**Farmland Expansion = Historical Census footprint > Restored footprint

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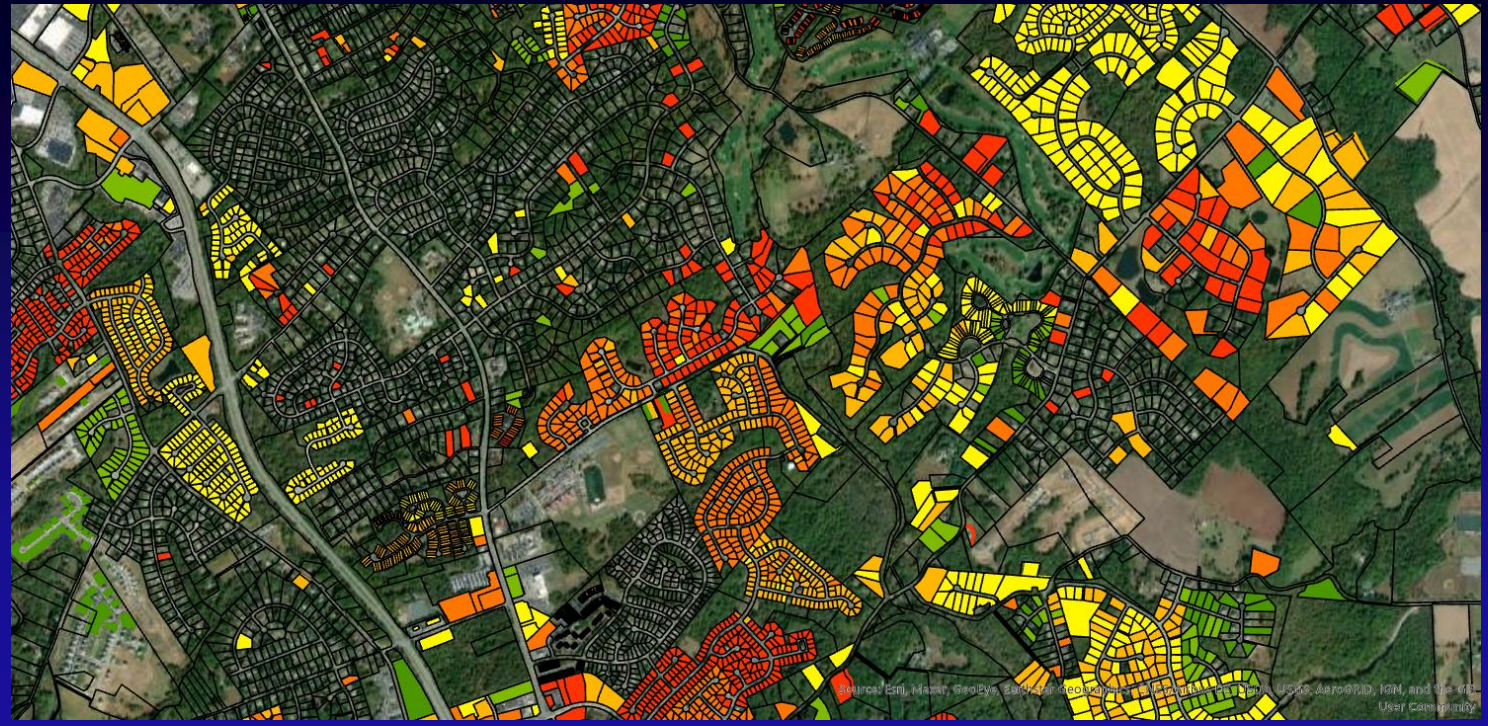
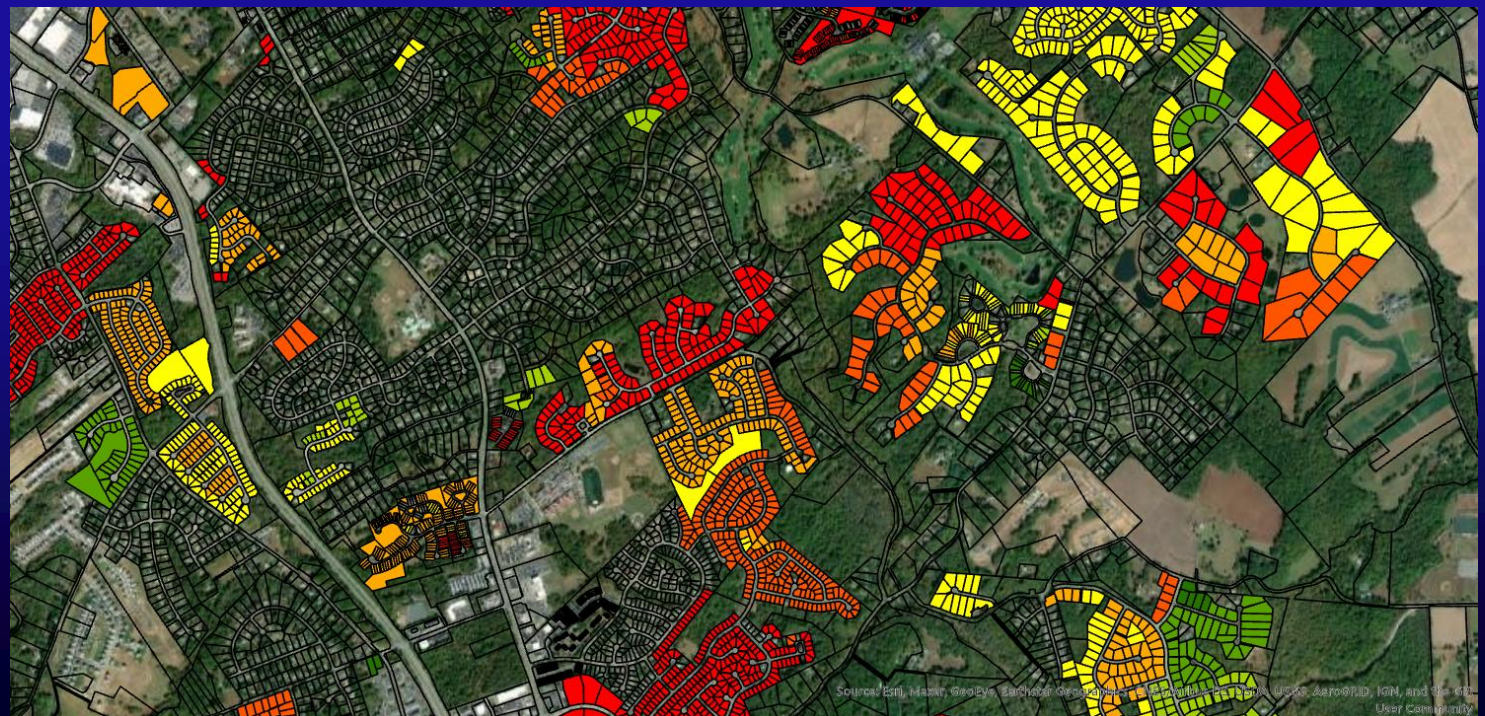
Parcel-Level Deconstruction of Urban Development

Year-Built Attributes from Tax Records





Year-Built Attributes from USGS' LCMAP