A land cover mapping, modeling, and monitoring system for the Delaware River Basin

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Center for Land Use and Sustainability

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Workshop agenda

- Introductions
- Project Background
- Watershed Identity
- Lunch
- Scenario Development

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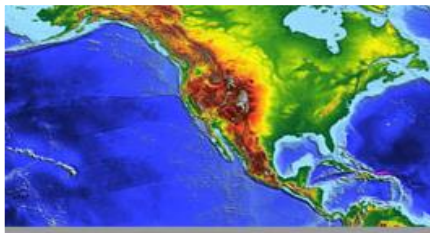
USGS
science for a changing world

Chesapeake Bay Program
A Watershed Partnership

The University of Vermont



UVM Spatial Analysis Lab

Objectives

Help decision-makers to think about the DRB by:

- Listening to you and reading a lot
- Producing high resolution land cover data
- Developing basin-wide modeling tools
- Conduct a feasibility study to gage interest in long-term land cover change monitoring

http://drbproject.org

DELAWARE RIVER BASIN
Land Use Dynamics
SHIPPENSBURG UNIVERSITY

WILLIAM PENN FOUNDATION

Goals for Today

Discuss current characteristics of the basin

Modified SWOT analysis

- Strengths and Weaknesses- Current
- Opportunities and Threats- Future

We need your input!

Questions?

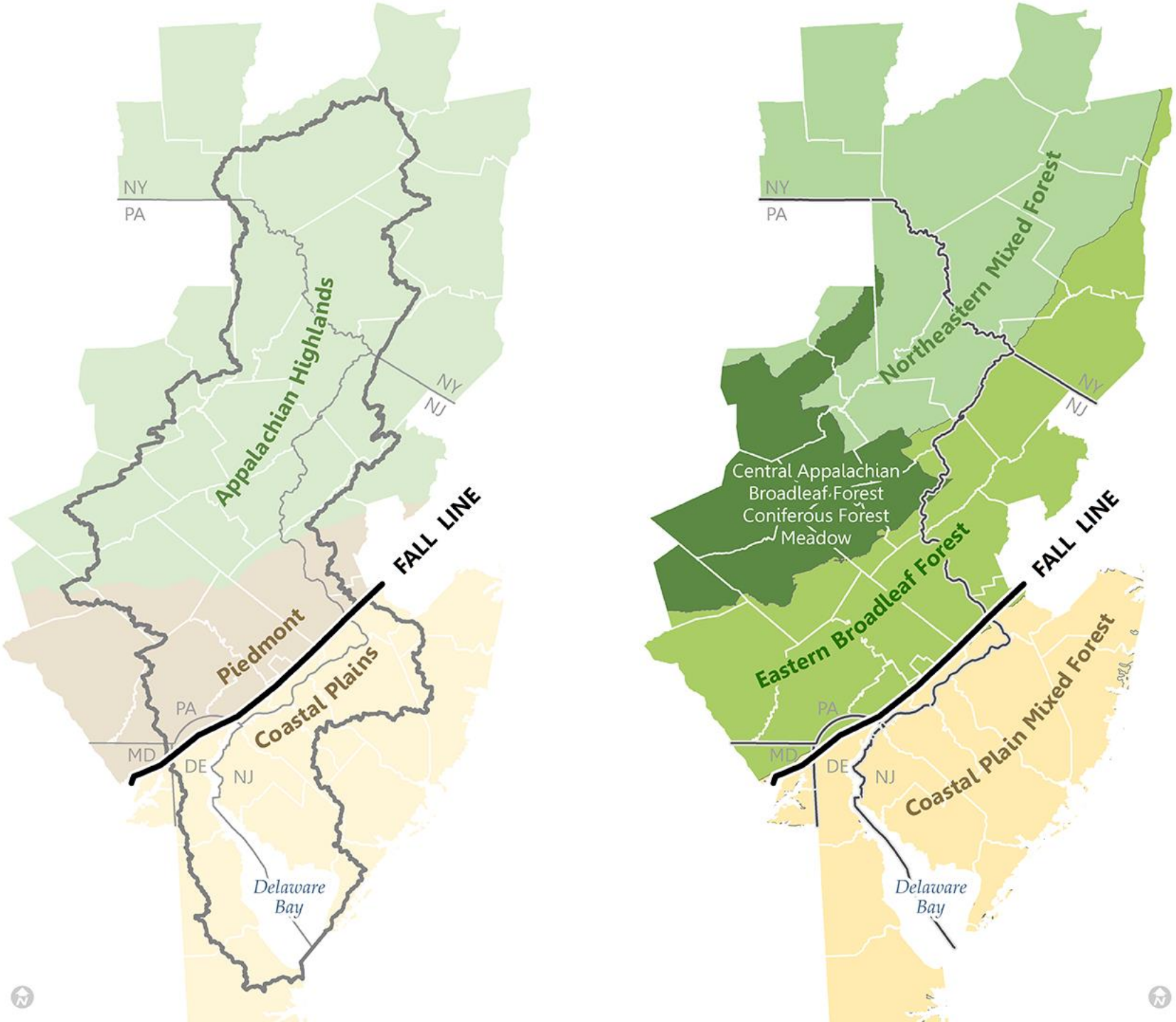
The DRB - what does the data tell us?

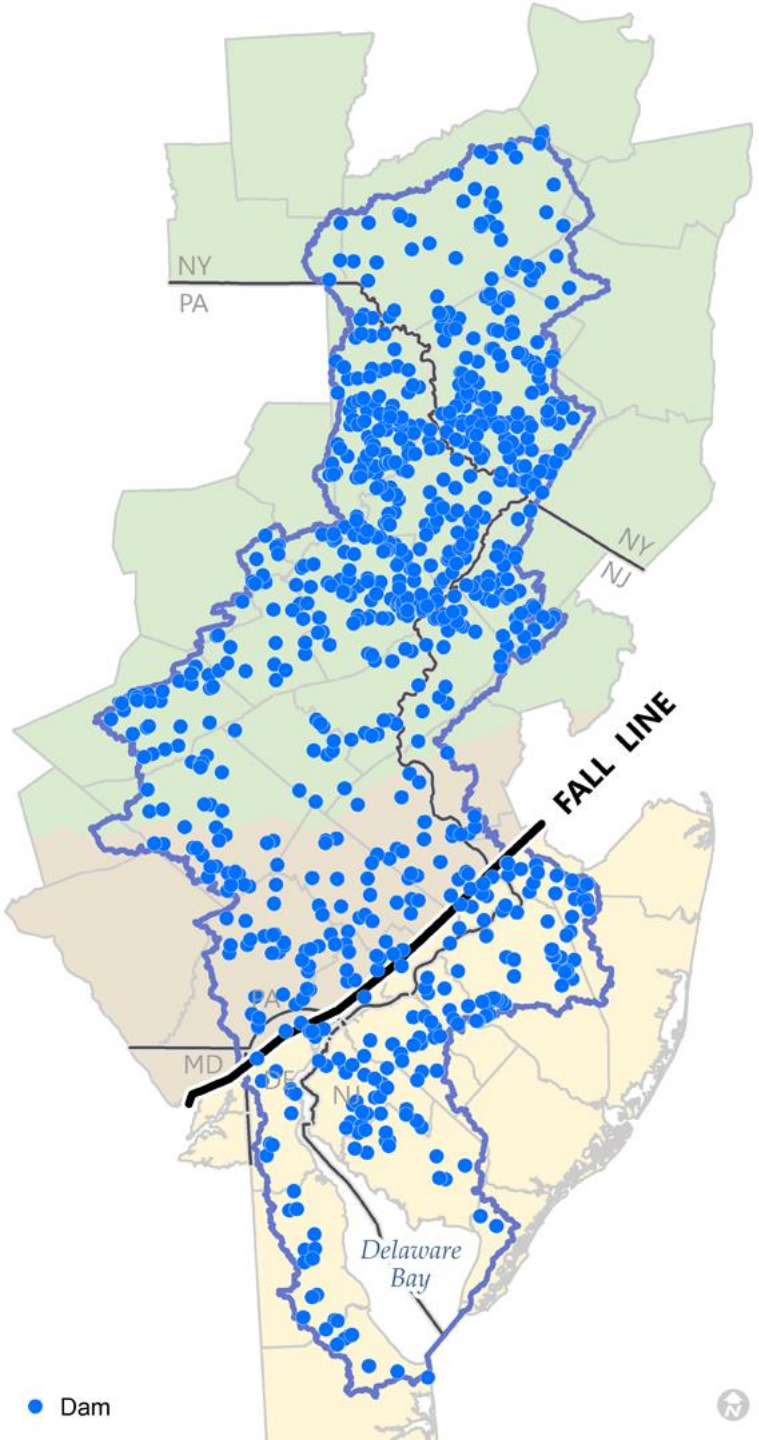
Introduction: physical setting

People & housing

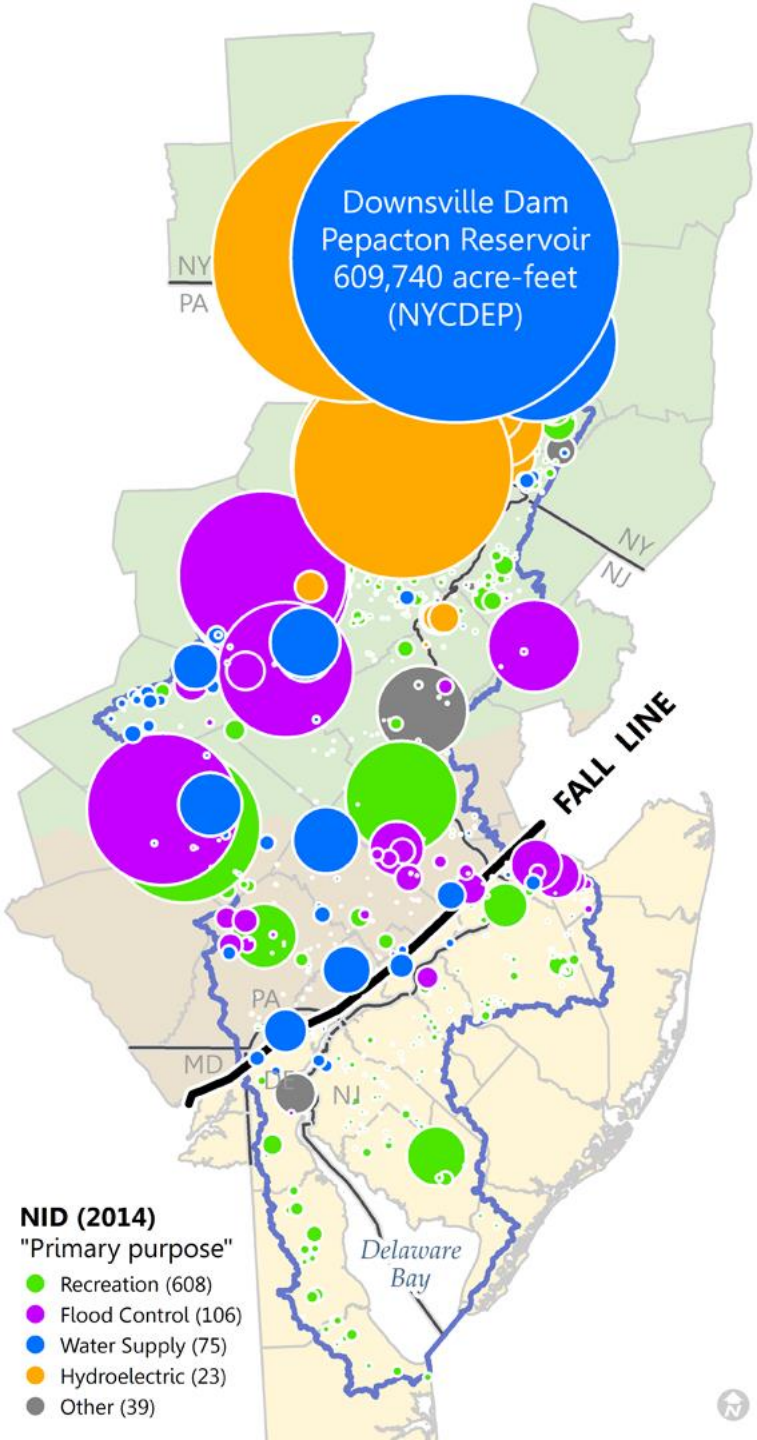
Economics & commuting patterns

Recent land use change trends

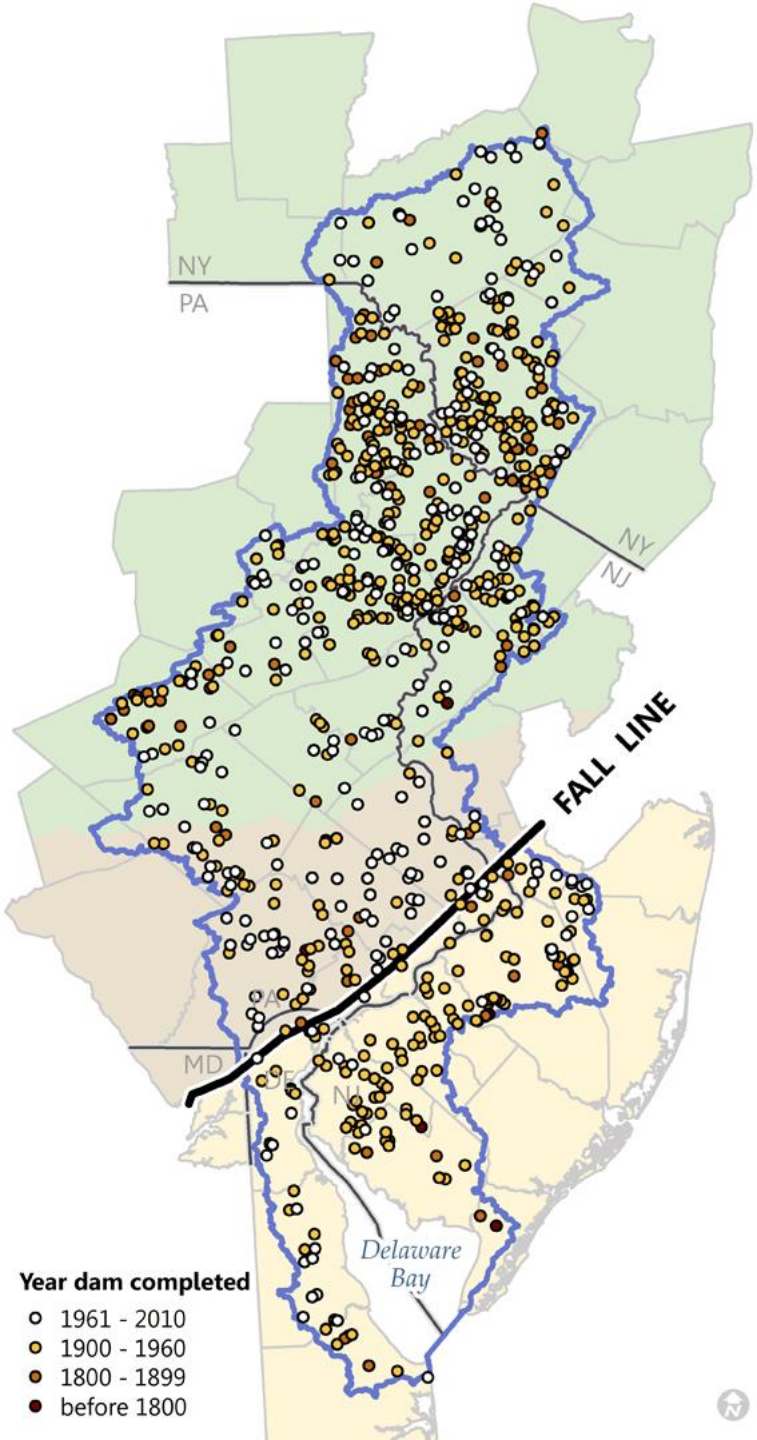

NY
PA
Appalachian Highlands
NY
NJ
FALL LINE
Piedmont
Coastal Plains
PA
MD
DE
NJ
Delaware Bay
NY
PA
Northeastern Mixed Forest
NY
NJ
Central Appalachian
Broadleaf Forest
Coniferous Forest
Meadow
Eastern Broadleaf Forest
FALL LINE
PA
MD
DE
NJ
Coastal Plain Mixed Forest
Delaware Bay

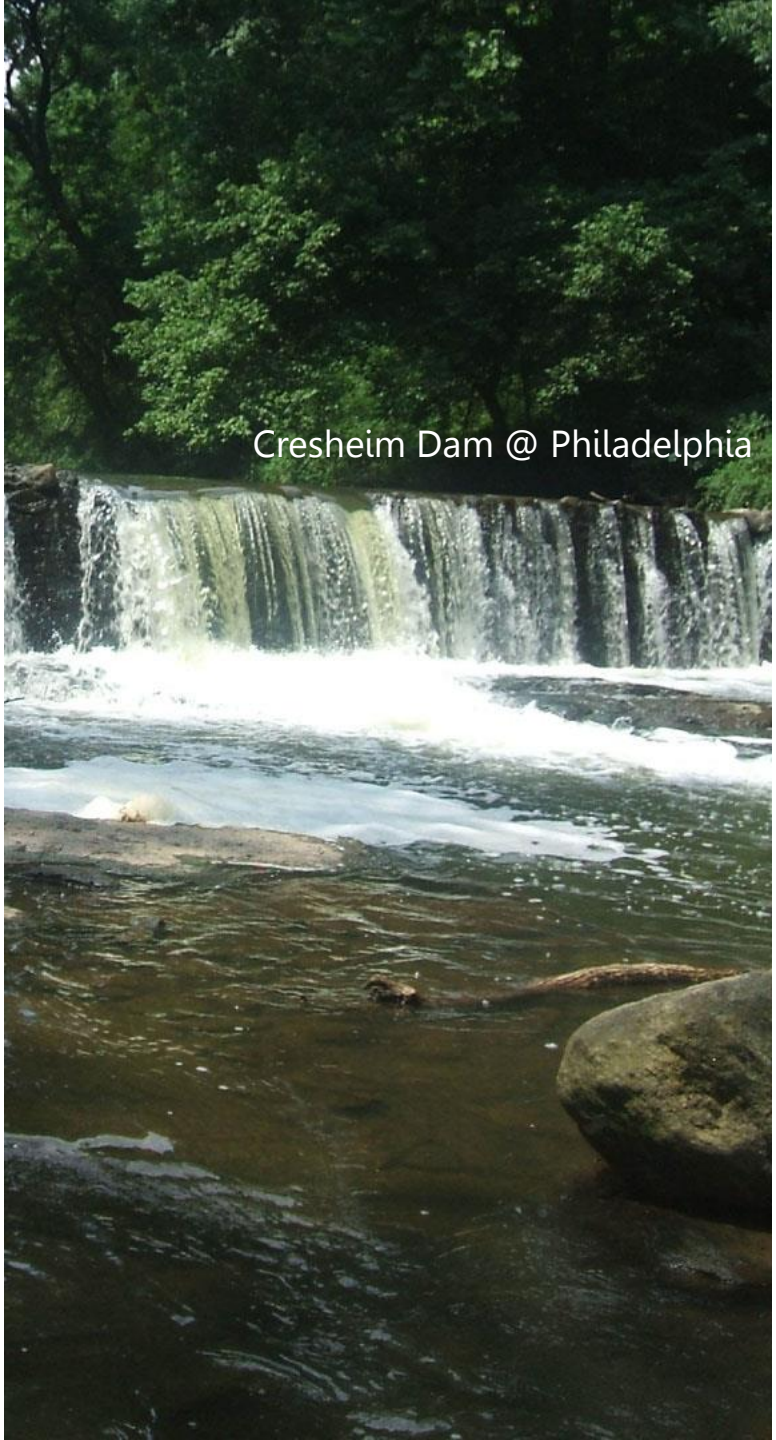

NY
PA
NY
NJ
FALL LINE
PA
MD
DE
NJ
Delaware
Bay
Dam

Nockamixon State Park
DANGER
DO NOT GO
BEYOND
FENCE


Downsville Dam
Pepacton Reservoir
609,740 acre-feet
(NYCDEP)
NY
PA
NY
NJ
FALL LINE
PA
MD
DE
NJ
Delaware Bay
NID (2014)
"Primary purpose"
Recreation (608)
Flood Control (106)
Water Supply (75)
Hydroelectric (23)
Other (39)

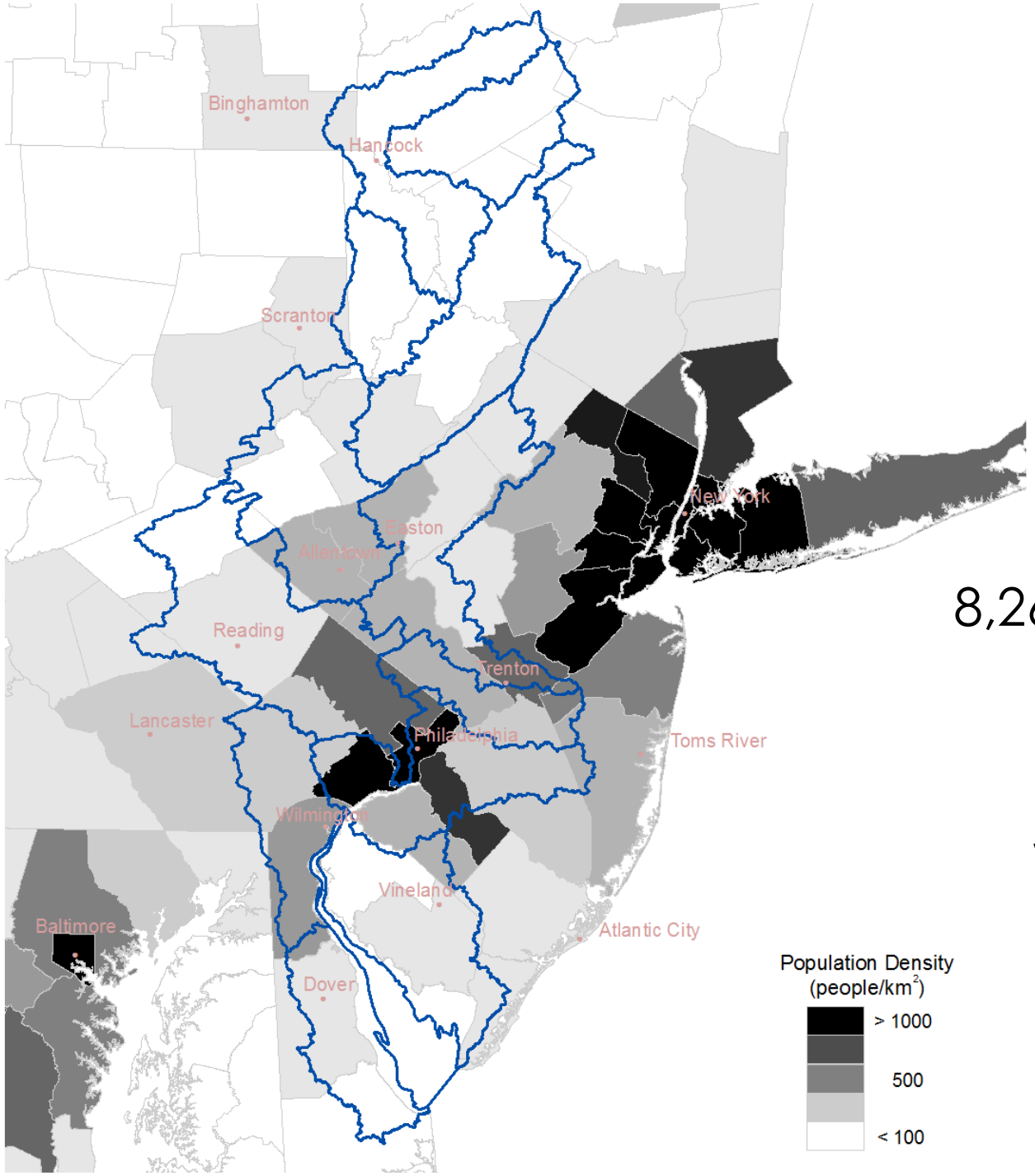
Pepacton Reservoir @ Downsville, NY


NY
PA
NY
NJ
FALL LINE
MD
DE
NJ
Delaware Bay
Year dam completed
1961 - 2010
1900 - 1960
1800 - 1899
before 1800


Cresheim Dam @ Philadelphia

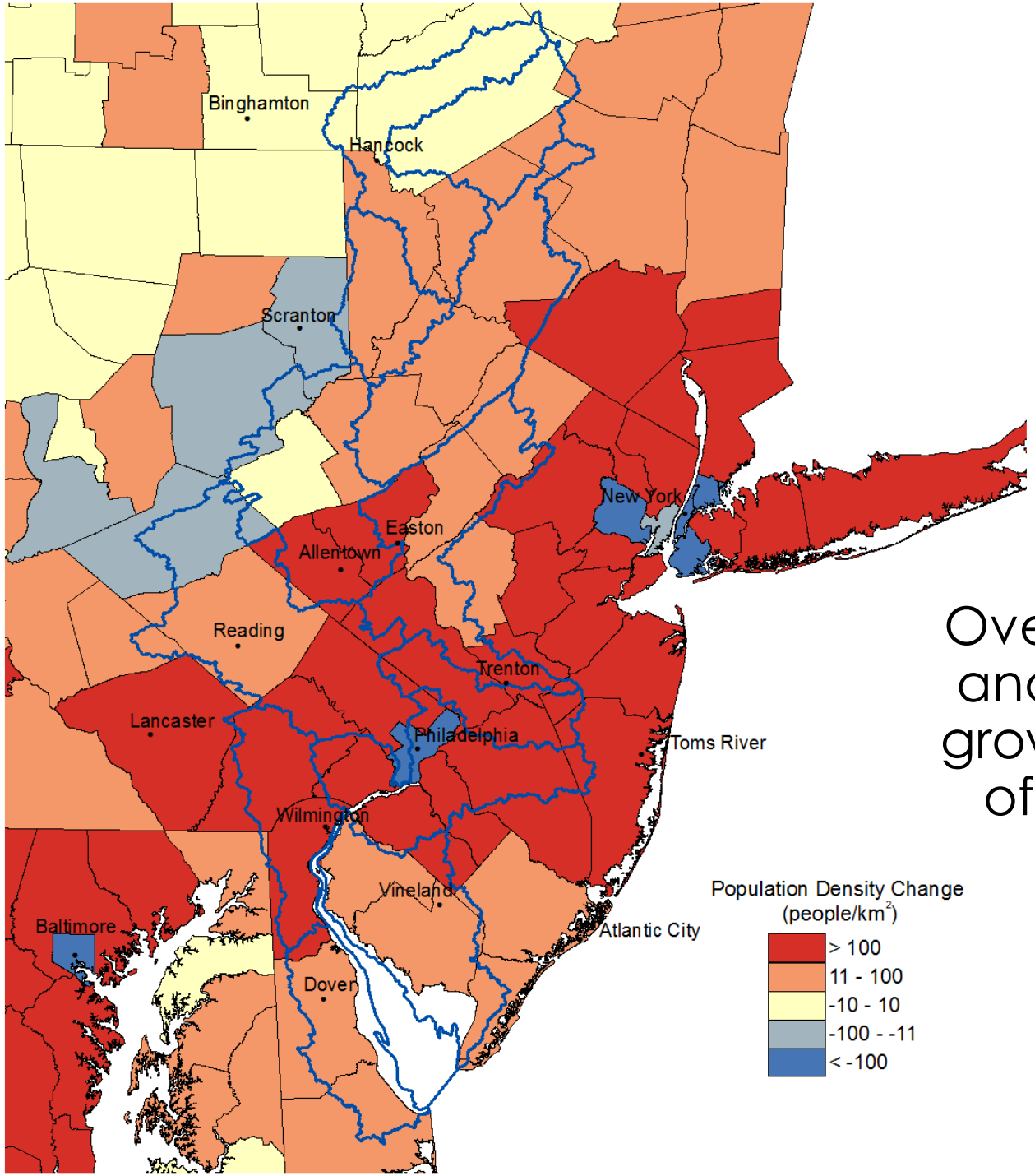
Huntington Pike Dam Removal, 2007
@ Pennypack Creek

Primary purpose of dam	Count	Avg. age (yrs)	Storage (acre-ft)
Recreation	608	82	585930
Flood control	103	41	847630
Water supply	75	95	926350
Hydroelectric	23	68	1128900
Other	17	62	59170
Fire protection, stock, fish pond	13	50	960
Fish & wildlife pond	4	95	5770
Irrigation	3	56	340
Tailings	2	35	1330
Source: USACE NID (2014) and our calculations	851	76	3,556,400



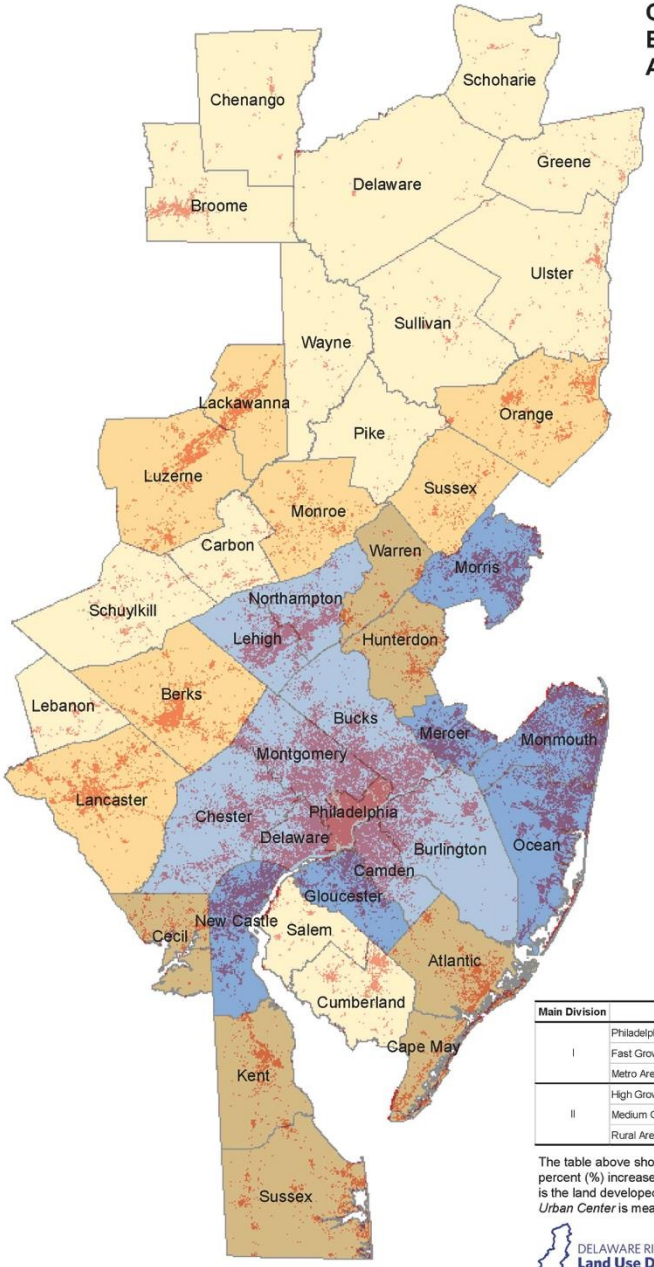
8,268,500 people call somewhere in the DRB 'home'.

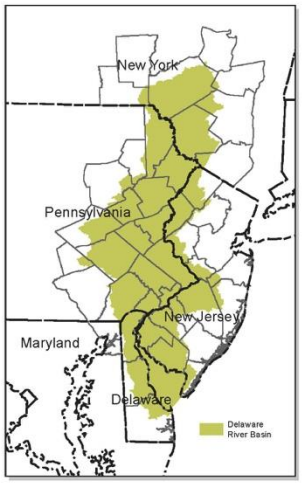
3,625,600 workers* work somewhere in the DRB.



Over the last 50 years and despite regional growth, a lesser share of people live in the DRB's largest city.

DELAWARE RIVER BASIN COUNTY CLASSIFICATION BASED ON URBAN GROWTH AND URBANIZATION DEGREE





Counties Stratification

- Philadelphia
- Fast Growth Metro Areas
- Metro Areas
- High Growth Sub-Urban
- Medium Growth Sub-Urban
- Rural Areas
- Urbanized

Scale 1:2,000,000

Main Division	Groups	Total Growth	Urban Area	Largest Urban Center
I	Philadelphia	12.05	83.07	304.81
	Fast Growth Metro Areas	2.55	30.78	196.35
	Metro Areas	1.15	32.95	221.99
II	High Growth Sub-Urban	0.55	9.95	32.29
	Medium Growth Sub-Urban	0.31	9.45	67.93
	Rural Areas	0.09	3.17	14.41

The table above shows the mean value within each group. *Total Growth* is the percent (%) increase of urban area during the period (1996-2010). *Urban Area* is the land developed out of the available land in each county (%). *Largest Urban Center* is measured in square kilometers (km^2).

DELAWARE RIVER BASIN
Land Use Dynamics
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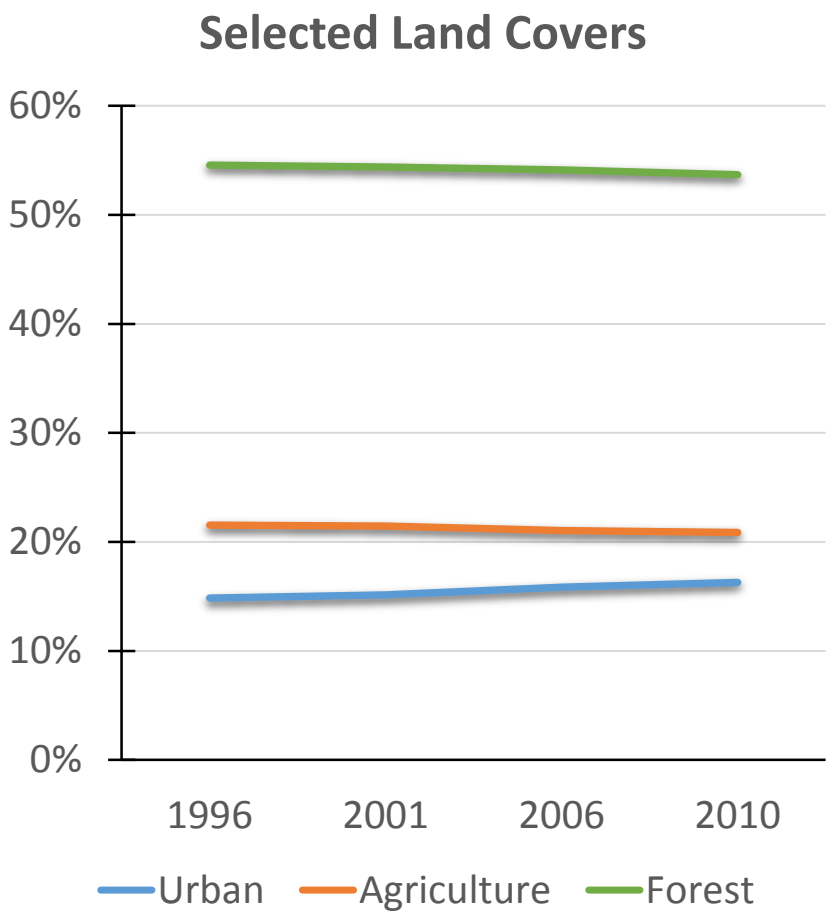
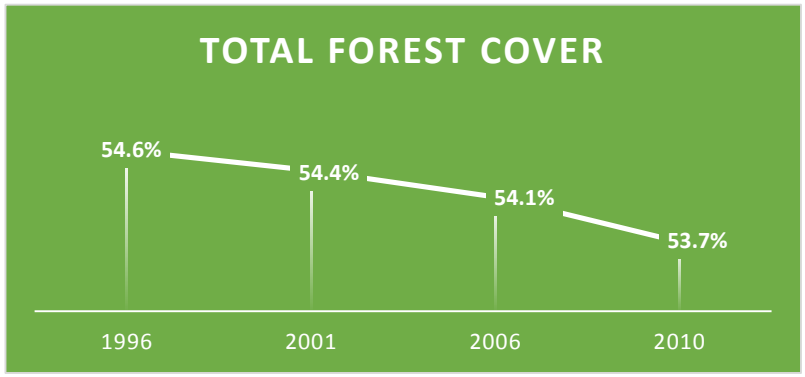
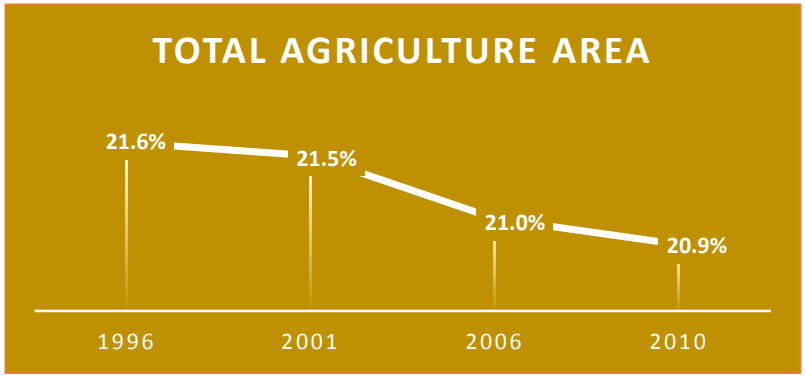
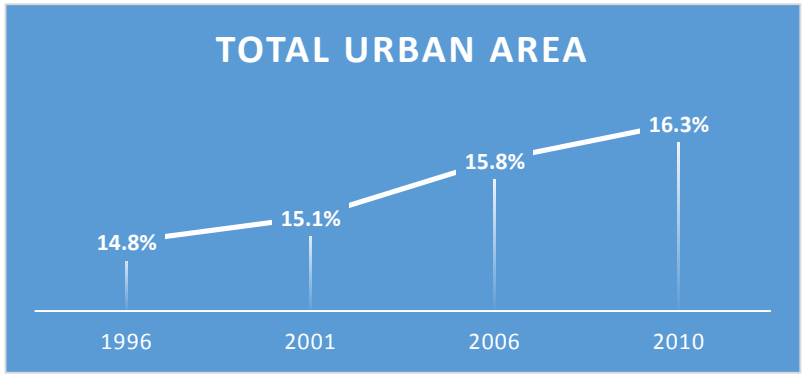
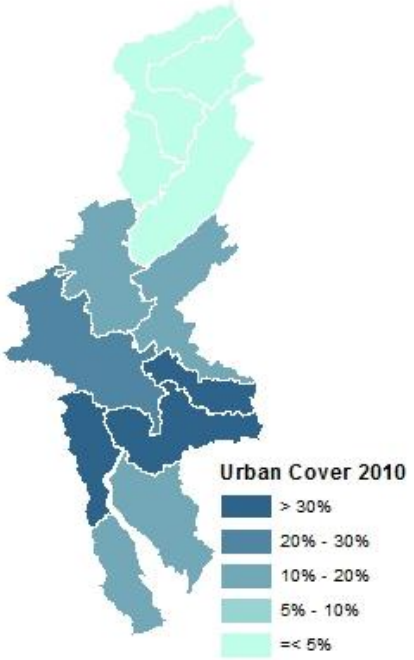
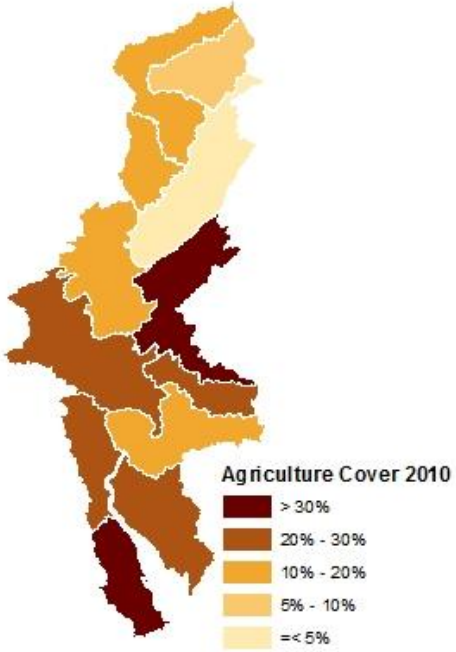

Selected Land Covers
60%
50%
40%
30%
20%
10%
0%
1996
2001
2006
2010
Urban
Agriculture
Forest

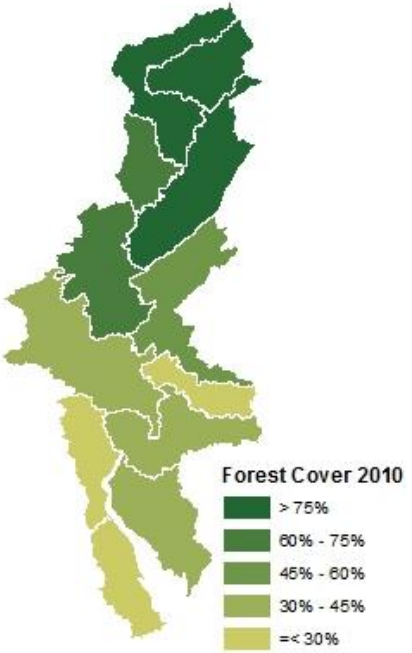

TOTAL FOREST COVER
54.6%
54.4%
54.1%
53.7%
1996
2001
2006
2010

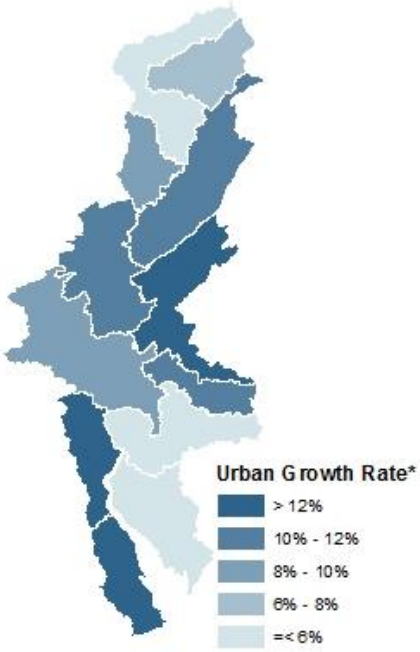

TOTAL AGRICULTURE AREA
21.6%
21.5%
21.0%
20.9%
1996
2001
2006
2010

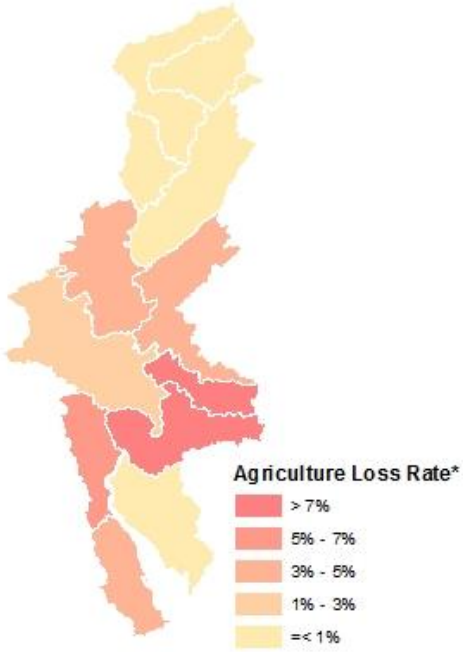

TOTAL URBAN AREA
14.8%
15.1%
15.8%
16.3%
1996
2001
2006
2010

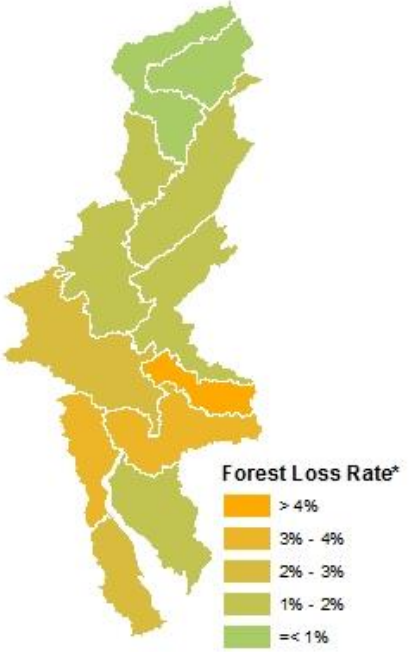




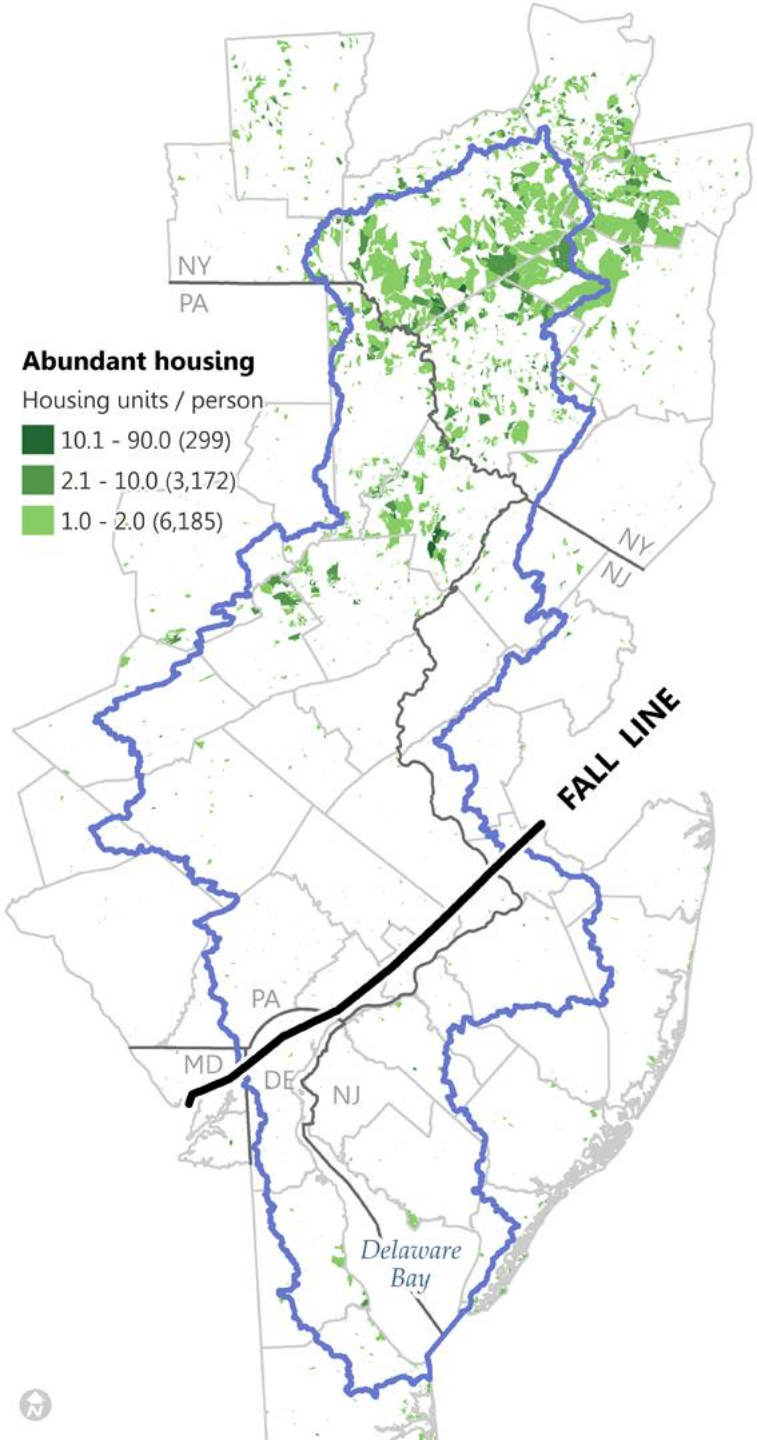




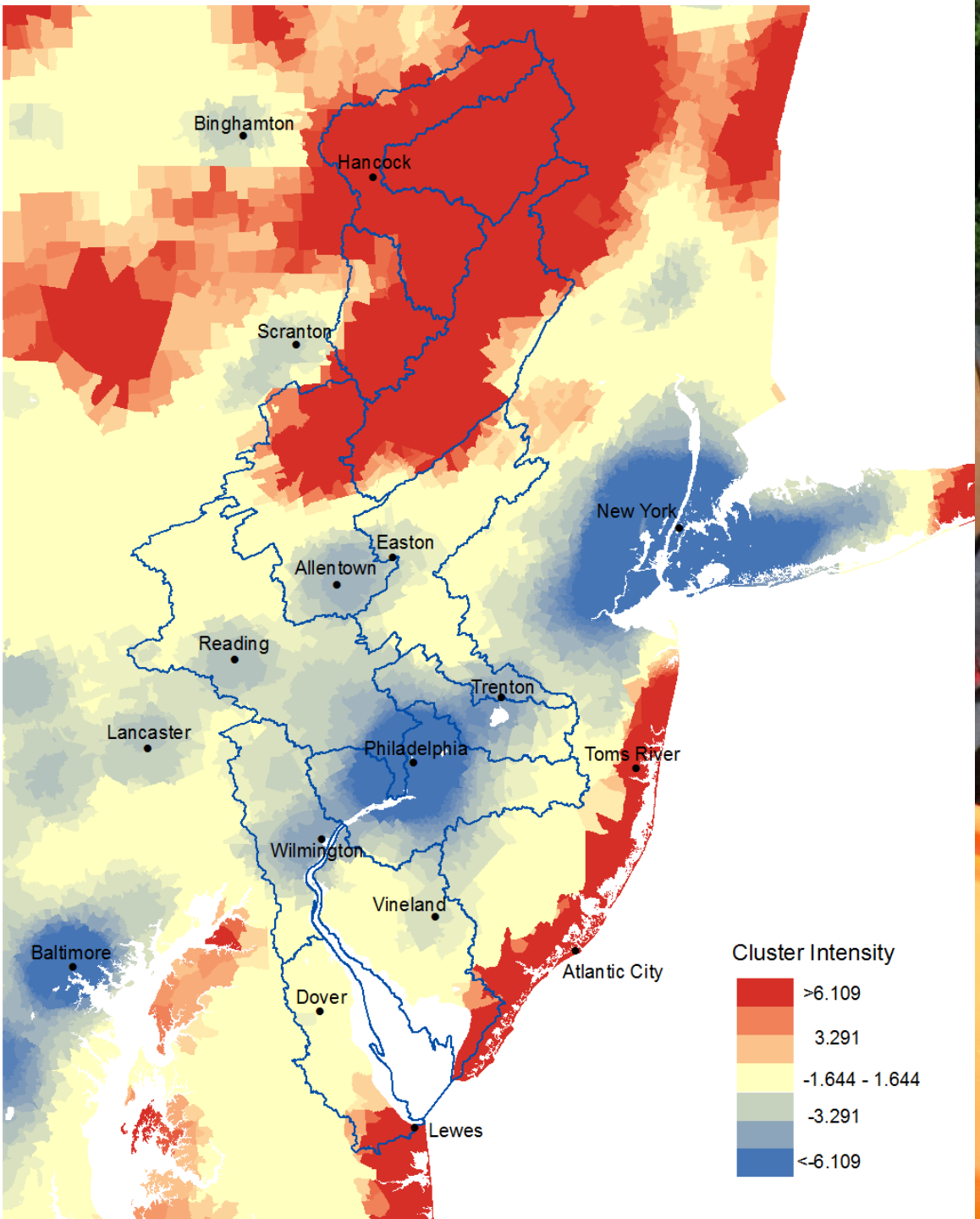




*period of analysis from1996 to 2010

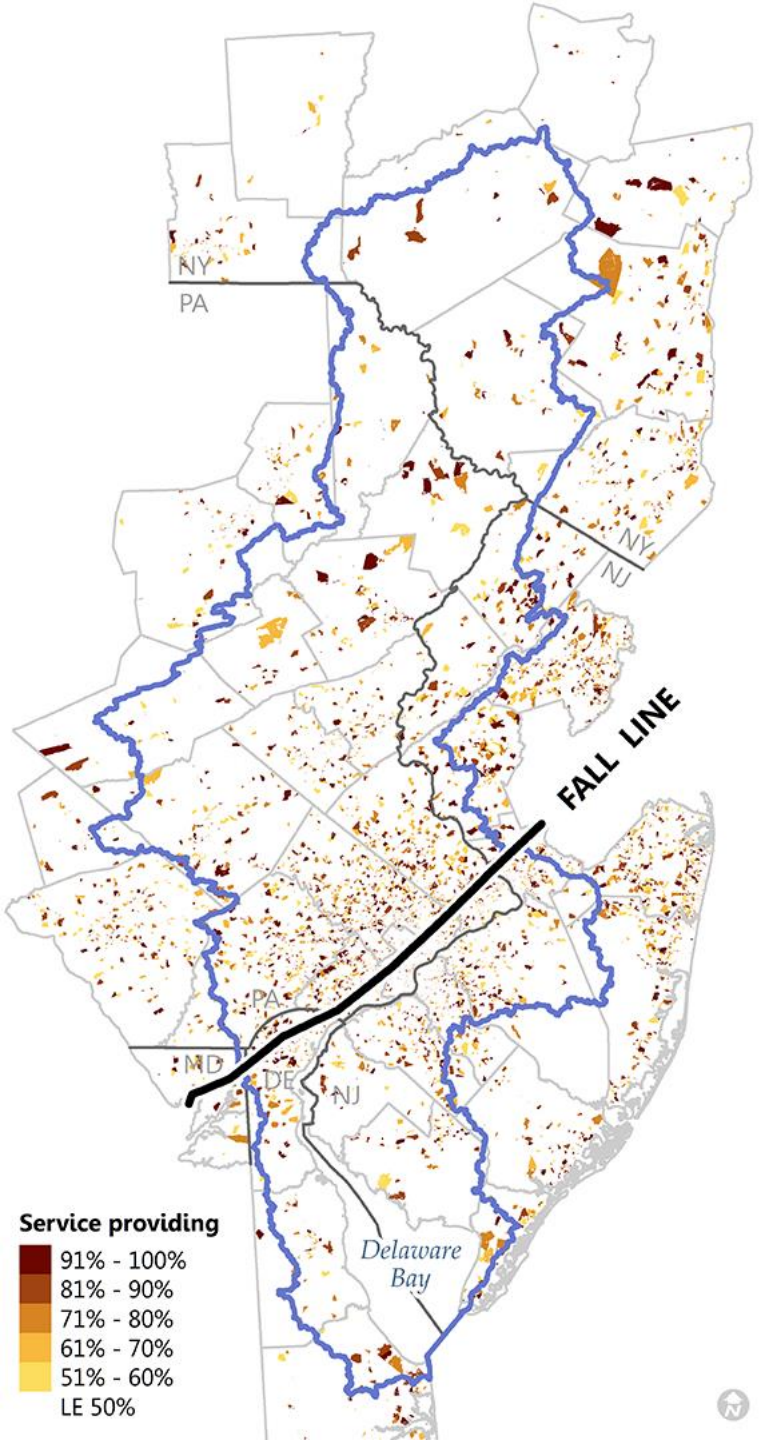


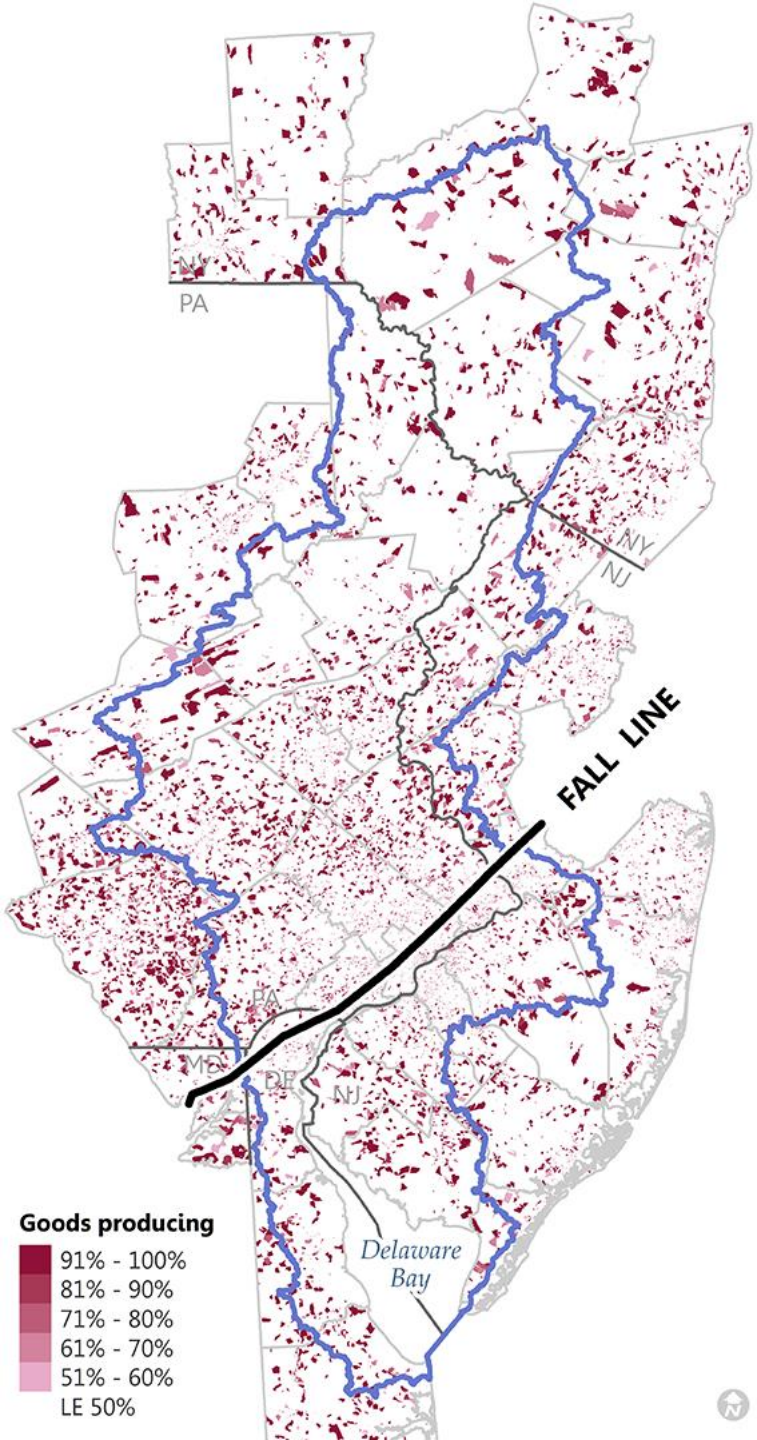
Red cabin @ Smallwood, NY


Binghamton
Hancock
Scranton
New York
Easton
Allentown
Reading
Trenton
Lancaster
Philadelphia
Toms River
Wilmington
Vineland
Baltimore
Atlantic City
Dover
Lewes
Cluster Intensity
>6.109
3.291
-1.644 - 1.644
-3.291
<-6.109

Bancroft Mills @ Wilmington, DE

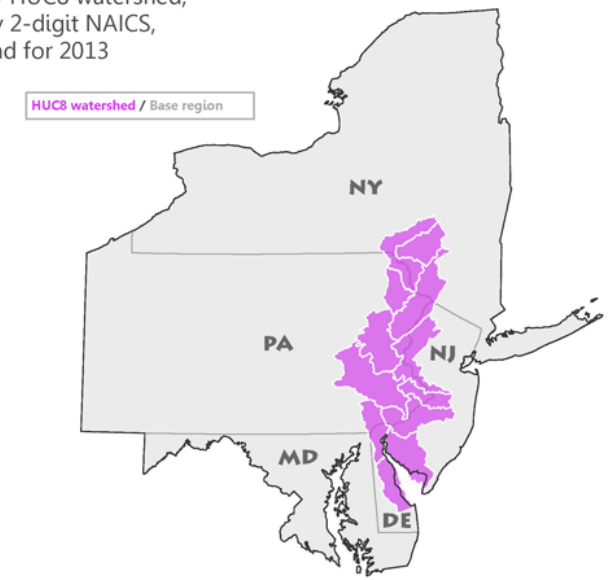
Huntington Yarn Mill @ Philadelphia


NY
PA
NY
NJ
FALL LINE
PA
MD
DE
NJ
Delaware Bay
Service providing
91% - 100%
81% - 90%
71% - 80%
61% - 70%
51% - 60%
LE 50%


NY
PA
NY
NJ
FALL LINE
PA
MD
DE
NJ
Delaware Bay
Goods producing
91% - 100%
81% - 90%
71% - 80%
61% - 70%
51% - 60%
LE 50%

Employment concentration

by HUC8 watershed,
by 2-digit NAICS,
and for 2013



What do the green colors mean?

Employment LQ

- 2.001 - 20.00 *Concentrated*
- 1.101 - 2.000
- 0.901 - 1.100 *on par*
- 0.501 - 0.900
- 0.060 - 0.500 *Sparse*

How were the LQs calculated?

$$LQ_{iwB} = \frac{SE_{iw} / TE_{w}}{SE_{iB} / TE_{B}}$$

Where:
LQ = the Location Quotient for industry sector ***i*** in watershed ***w*** and relative to the base region ***B*** (see map at right);
SE = Employment in sector ***i***; and
TE = Total employment.

Summay

The maps at left were built using the US Census Bureau's 2013 Longitudinal Employer-Household Dynamics data, which track payrolled employment by census block and by 2-digit NAICS. We aggregated the census blocks that comprise each HUC8 watershed for analysis. Note: self-employed persons are not represented by these data.

A Location Quotient (LQ) is a valuable way to quantify how employment is concentrated in a particular industry in a particular watershed relative to how much it is concentrated in the hosting base region (the map above shows the five-state base region we used). A LQ can reveal what makes a particular region unique; in this case, unique in terms of jobs.

Light grey tones indicate a watershed that hosts a smaller share of workers than the base region (e.g., the paucity of those working in the Upper Delaware and in the Finance and Insurance sector). Dark green hues indicate a watershed that hosts a share of employment that is larger than the base region share (e.g., those working in the Manufacturing sector and in watersheds containing cities like Allentown, Bethlehem and Trenton). We're interested in the dark green areas because the predominance of jobs in just one or a few sectors can influence the uniqueness - identify - of the area.

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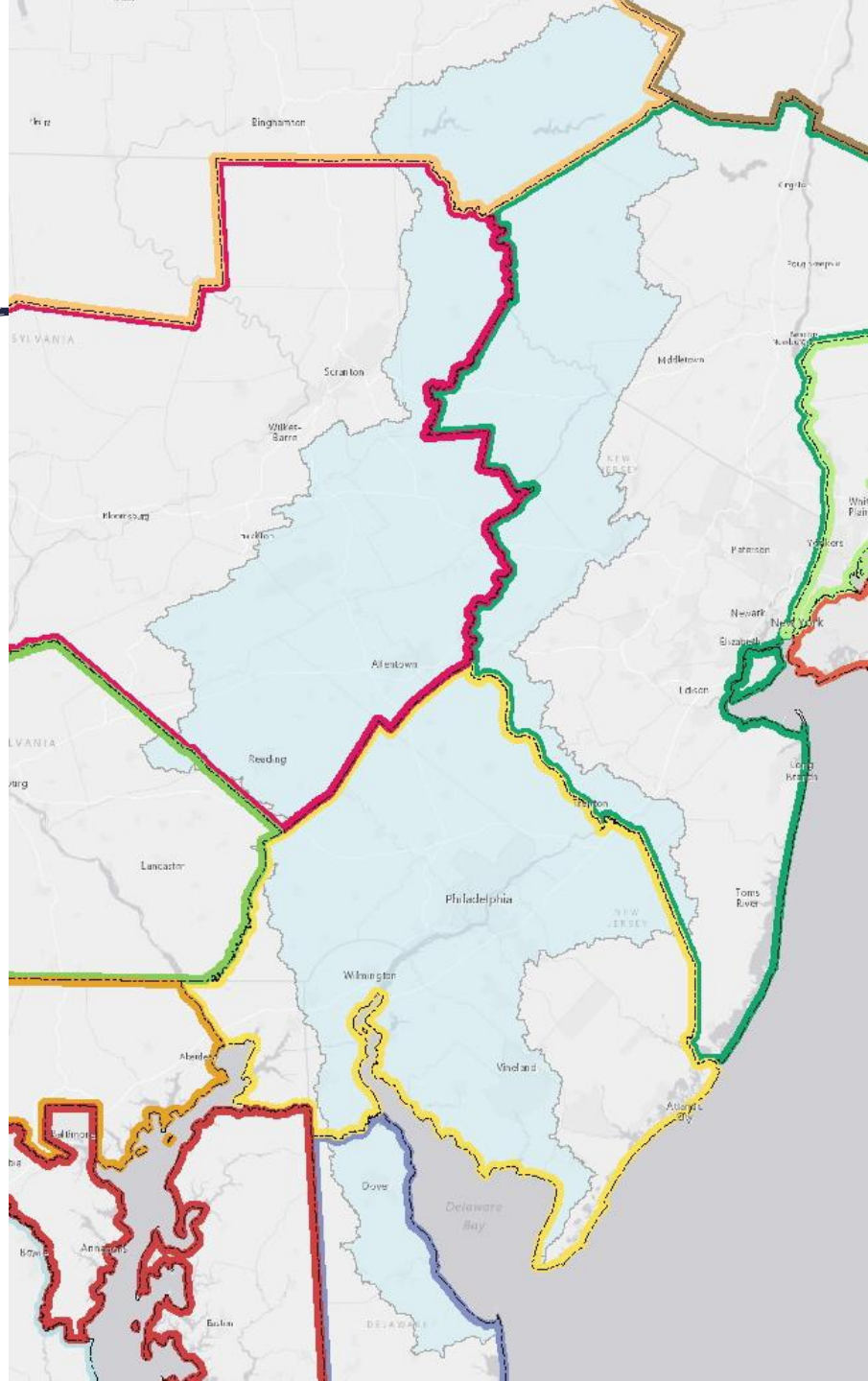
Watershed identity

Does the Delaware River Basin have a cohesive regional identity or many fragmented identities?

How important is it to plan for the future by thinking about the whole watershed?

Open Discussion

Lunch!



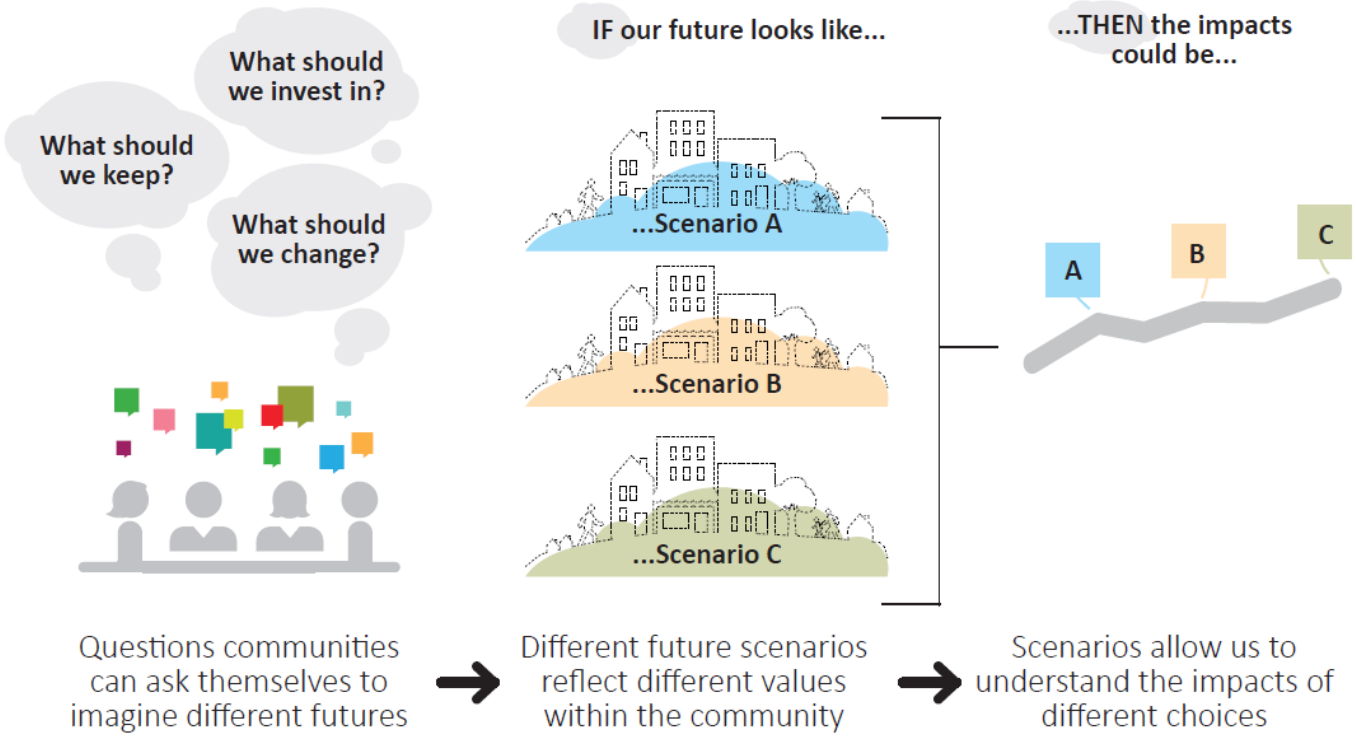
The Watershed in 2070

Our approach to forecasting land use change

- Community driven
  - What do you value?
  - Iterative
- Data driven
  - Reflect current trends
  - Best available forecast data
- Use scenarios

The Watershed in 2070

Scenarios are plausible stories about the possible futures and range of changes that could occur



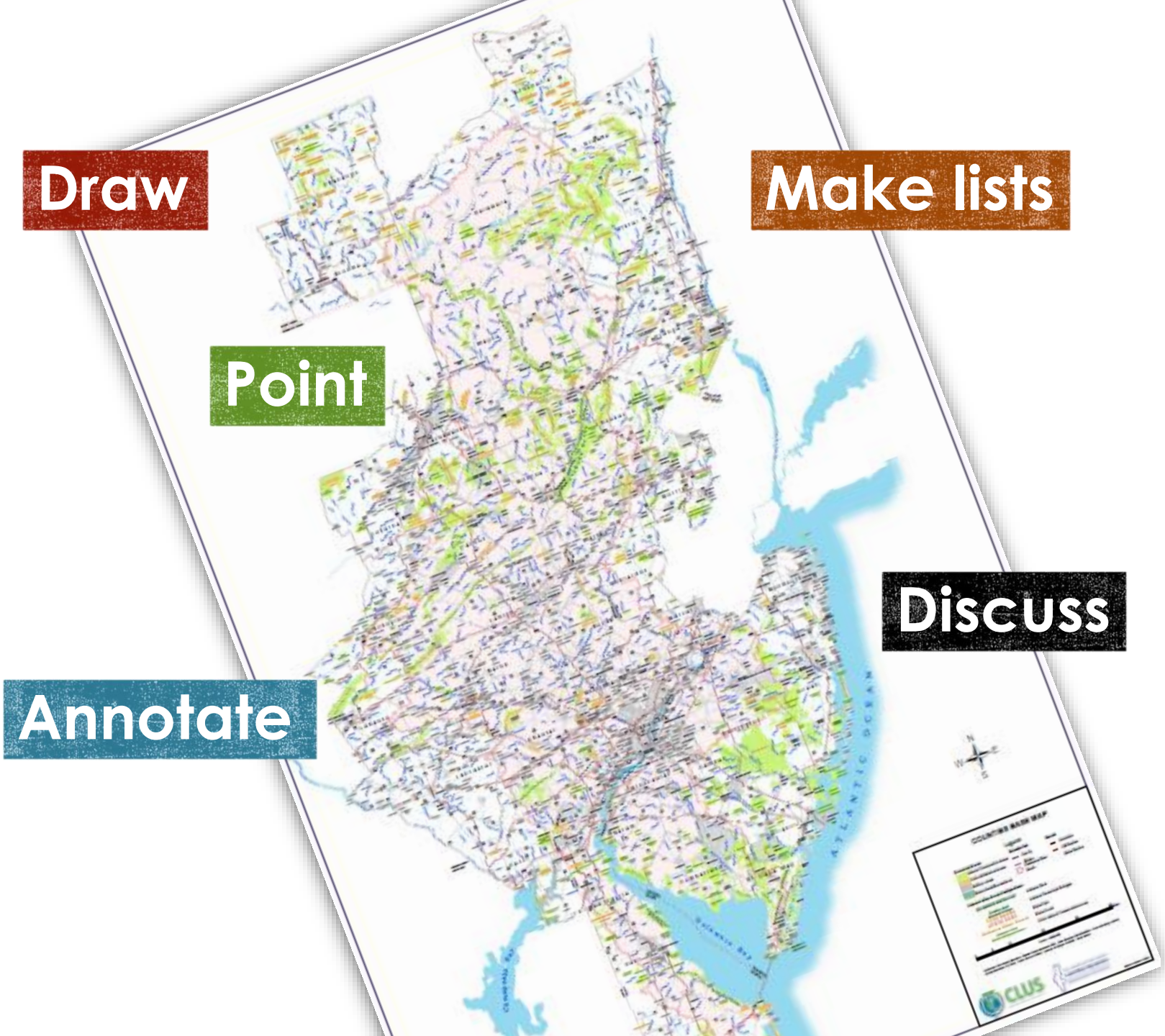
Let's get to work

Session 1

- What do you value? What would you like to preserve? What are the current challenges & opportunities?
- Report back

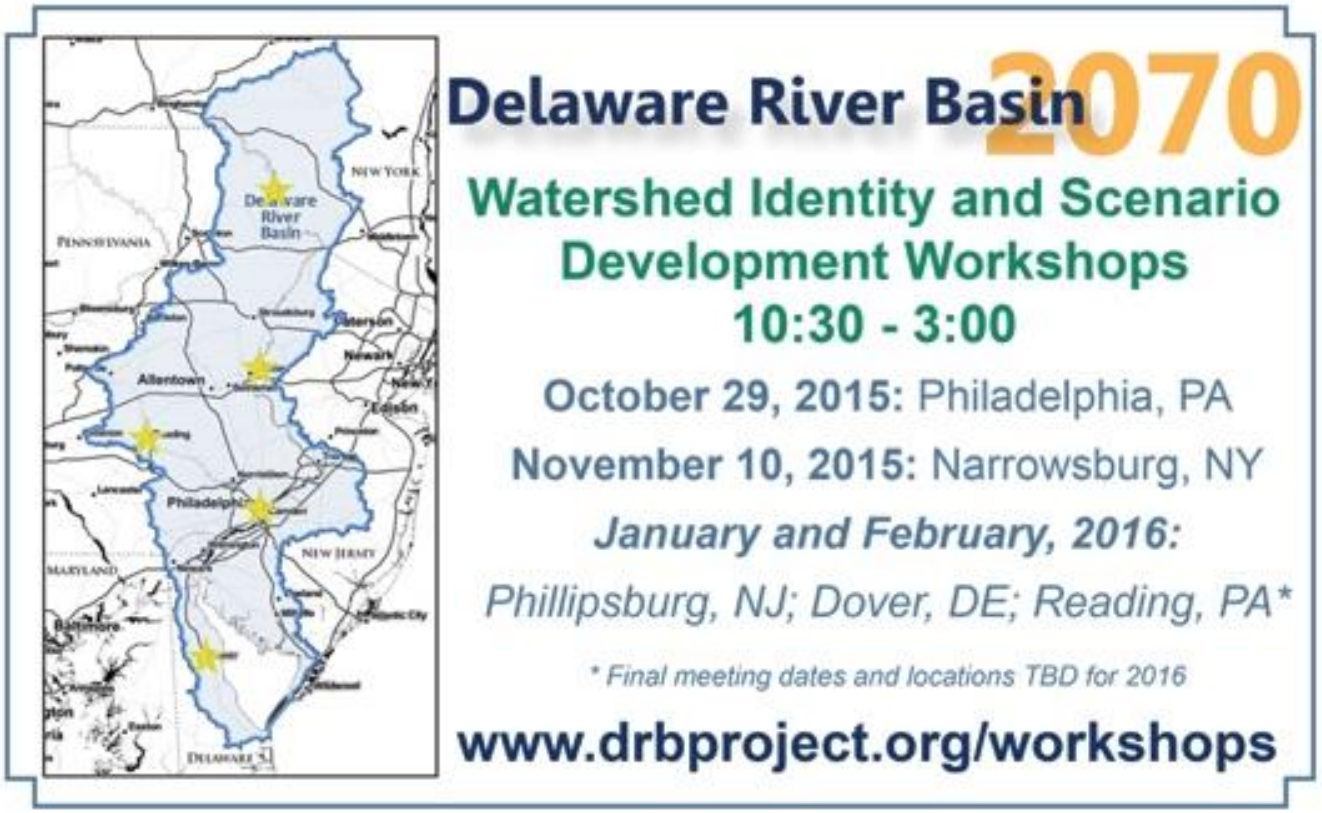
Session 2

- What would you like to change? What are future challenges & opportunities?
- Report back


Draw
Make lists
Point
Discuss
Annotate

What's next

More workshops coming up



What's next

On-line survey (coming in winter 2016)

- A chance for you to contribute individually
- A chance for others to contribute

Draft scenario storylines (coming in spring 2016)

- Incorporate best data and findings from workshops and survey
- We'll be asking for your feedback

Final scenario storylines (summer 2016)

Scenario forecasts (fall/winter 2016)

Thank you!

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Alfonso Yáñez Morillo – Research analyst; ayanezmorillo@ship.edu

Antonia Price– Project coordinator; afprice@ship.edu

Project website: http://www.drbproject.org

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