



Land Use Regulations and Land Cover Change in the Upper Delaware Scenic and Recreational River Region

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Overview

Project goal

Background

Objectives

Methods

Expected results

Timeline

Project Goal

Map land cover change and land use regulations in the Upper Delaware.



National Park Service



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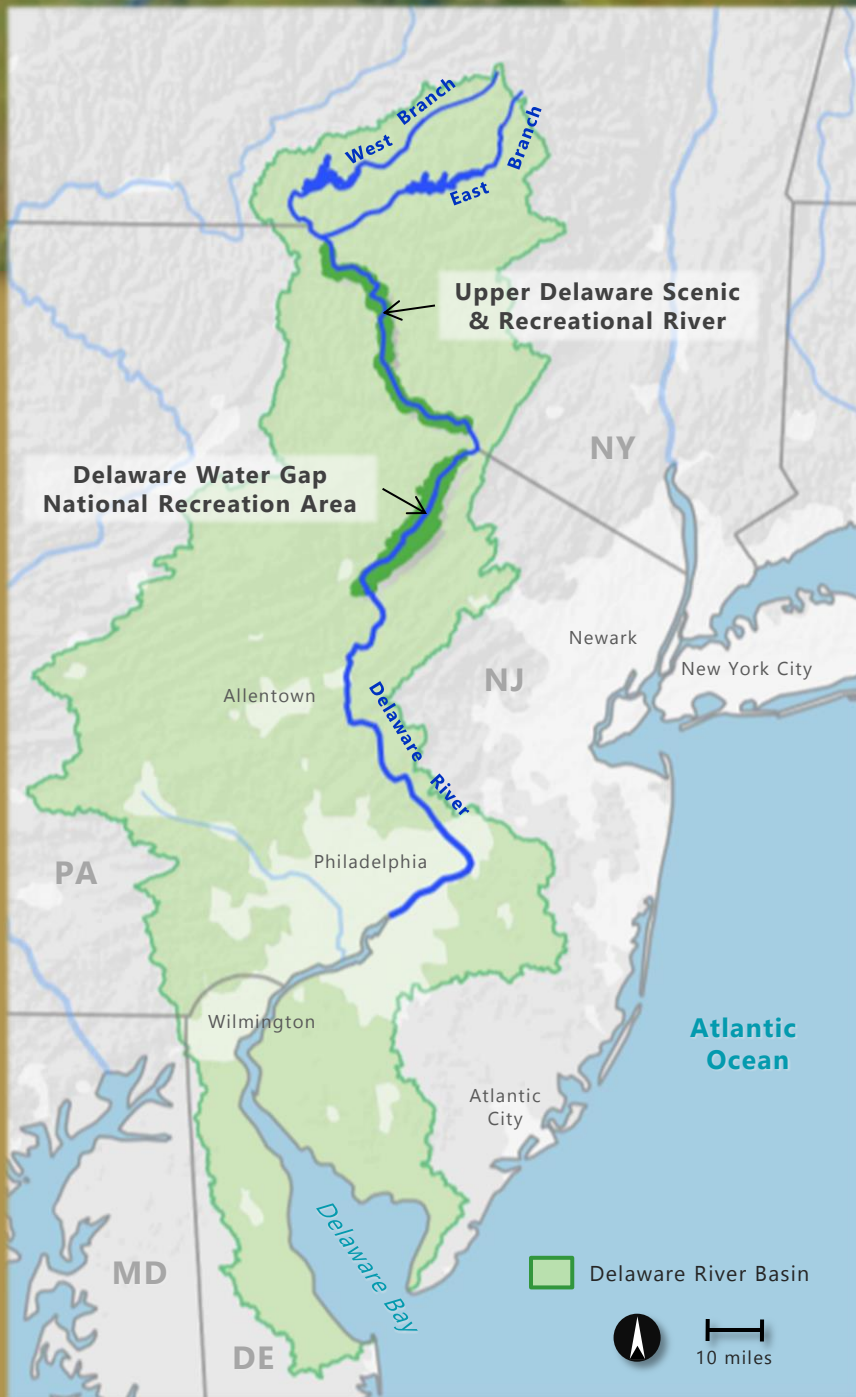
[About Us](#)

Upper Delaware

Scenic & Recreational River
NY, PA



Delaware River



"The longest and one of the cleanest rivers in the Eastern United States that remains undammed the length of its mainstem."

~National Park Service

Upper Delaware

1978 – National Scenic and Recreation River

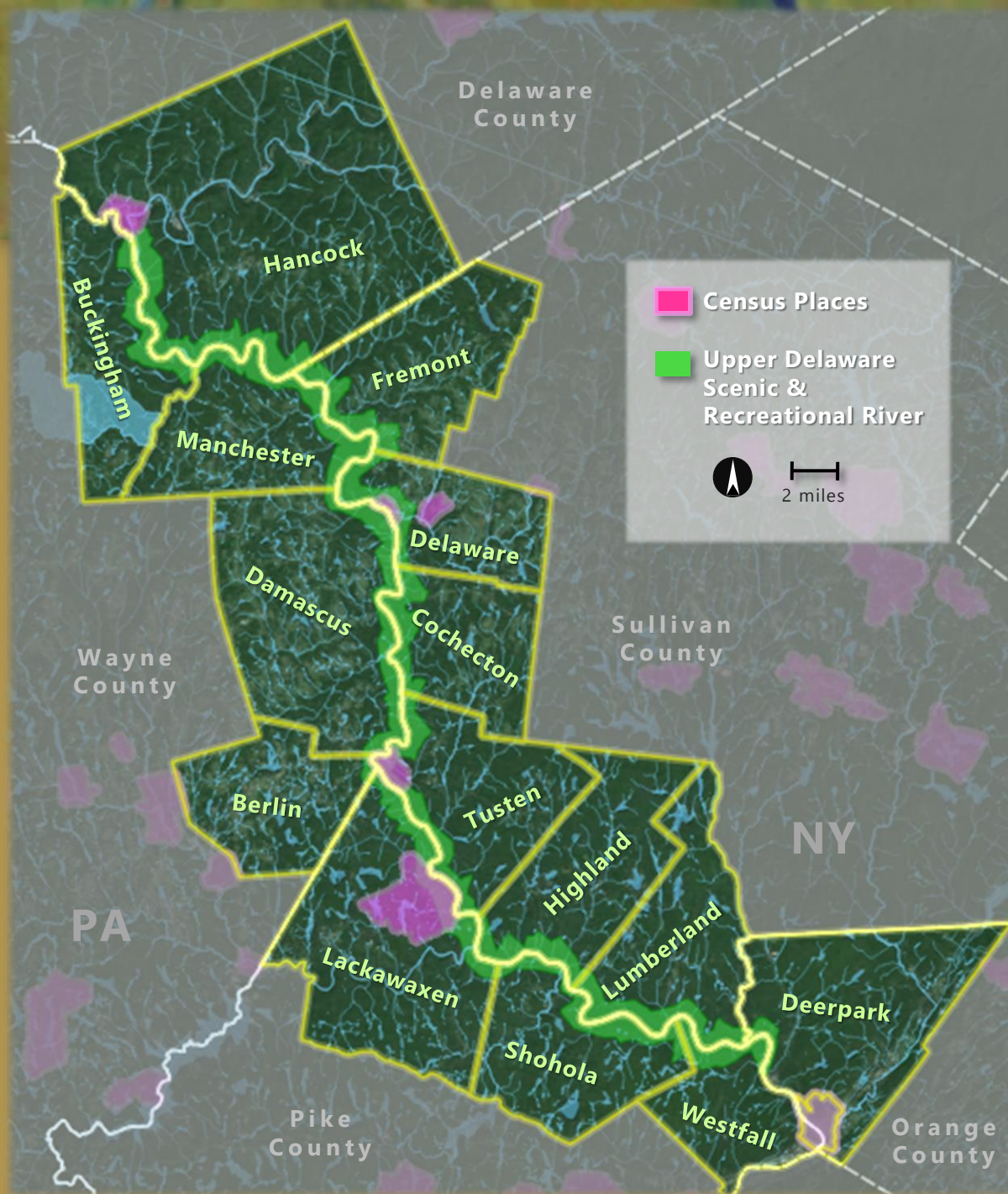
73.4 miles of river

55,575 acres (>99% privately owned)



Photo credit: Scott Rando

Upper Delaware



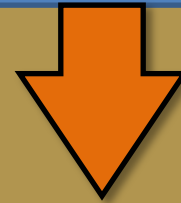
15 townships
~ 40,500 people
~870 mile²
~ 47 people/mile²

Collaborative Management

- 1986 – River Management Plan
- Land and Water Use guidelines
- Management partners:
 - National Park Service
 - Upper Delaware Council
 - Local government
 - [Private landowners]

National Park Service Duties:

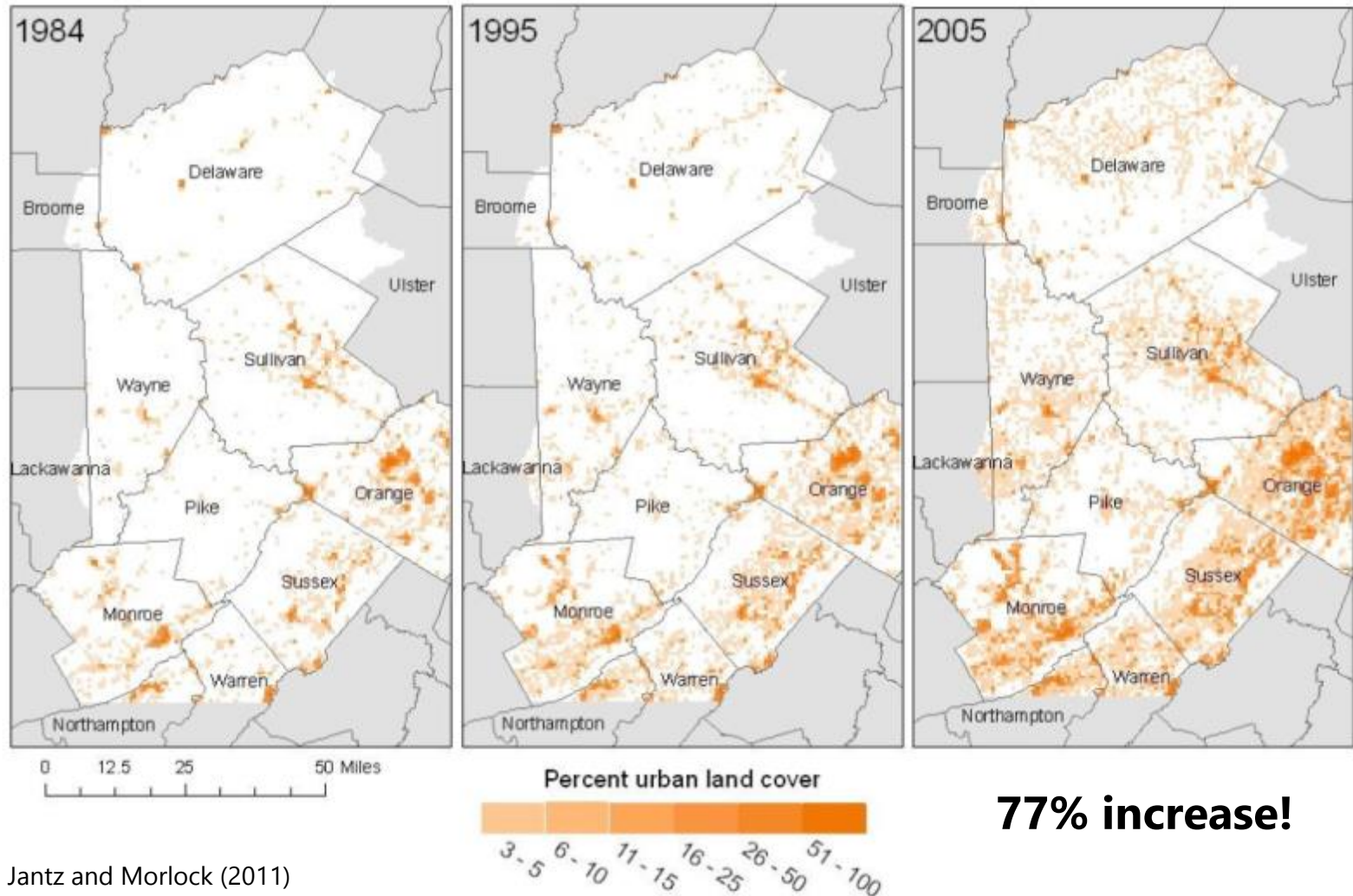
- Review proposed projects (land use & zoning)
- Provide technical assistance to townships



GIS



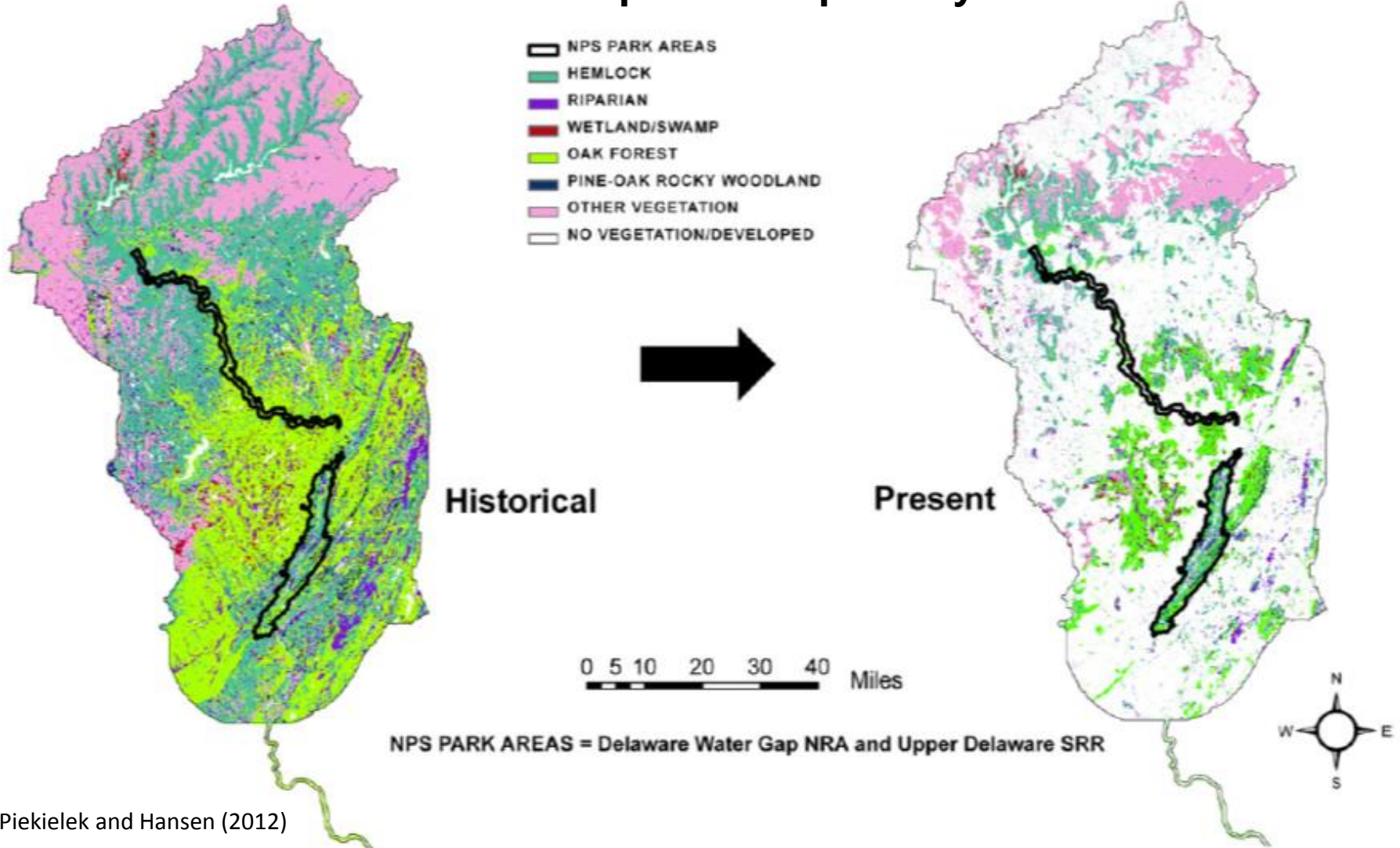
Past Studies – urban development



Jantz and Morlock (2011)

Past Studies – historical changes

< 20% historical habitat persists on privately owned lands



Objectives



Create unified representation of zoning in the UPDE.



Analyze land cover change in the region (1978-2014).



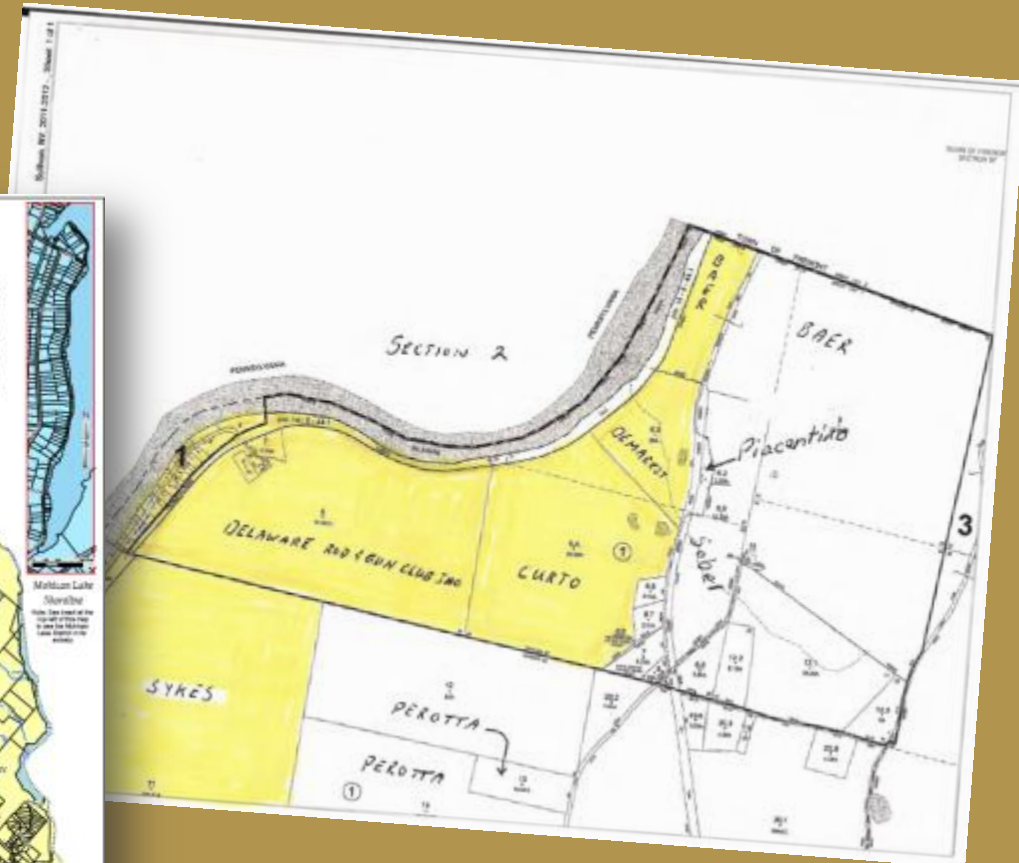
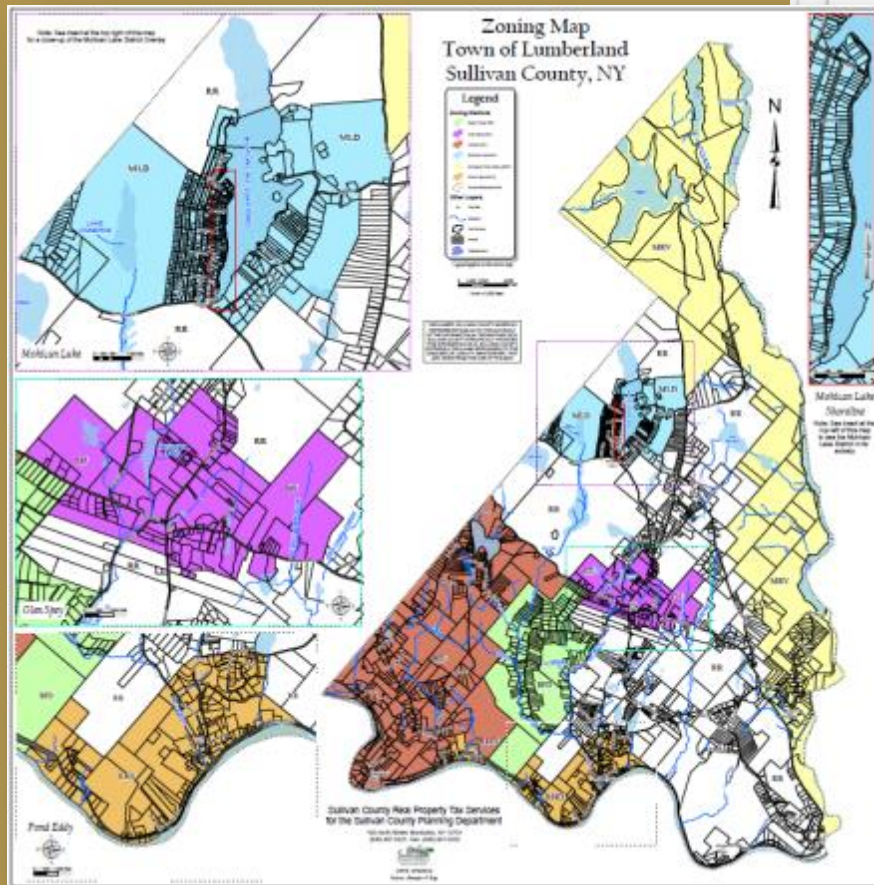
Evaluate landscape-level changes in forest & watershed conditions.



Develop GIS for the NPS and UDC to aid stewardship activities.

Unified representation of zoning

15 towns & townships



5 counties

Land cover classification



Landsat data



**Classification
algorithm**



**Discrete land
cover raster**

**ISODATA
or
Maximum
likelihood**

Timeline

1978

1986

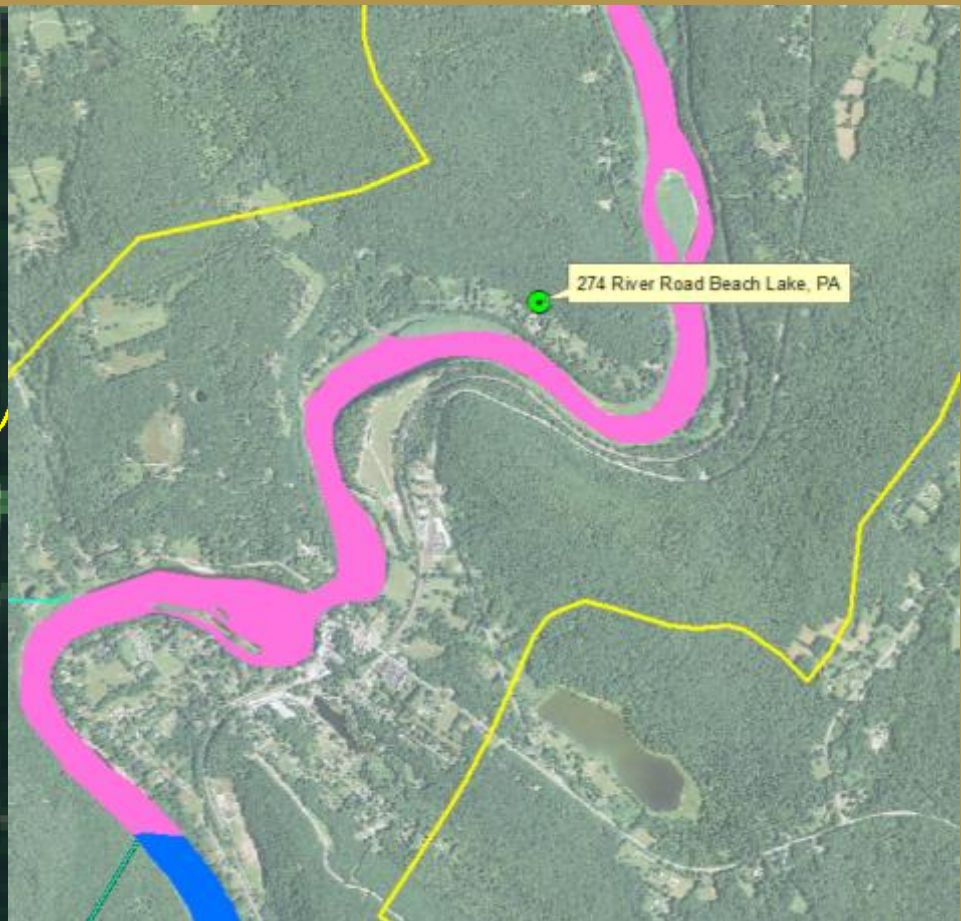
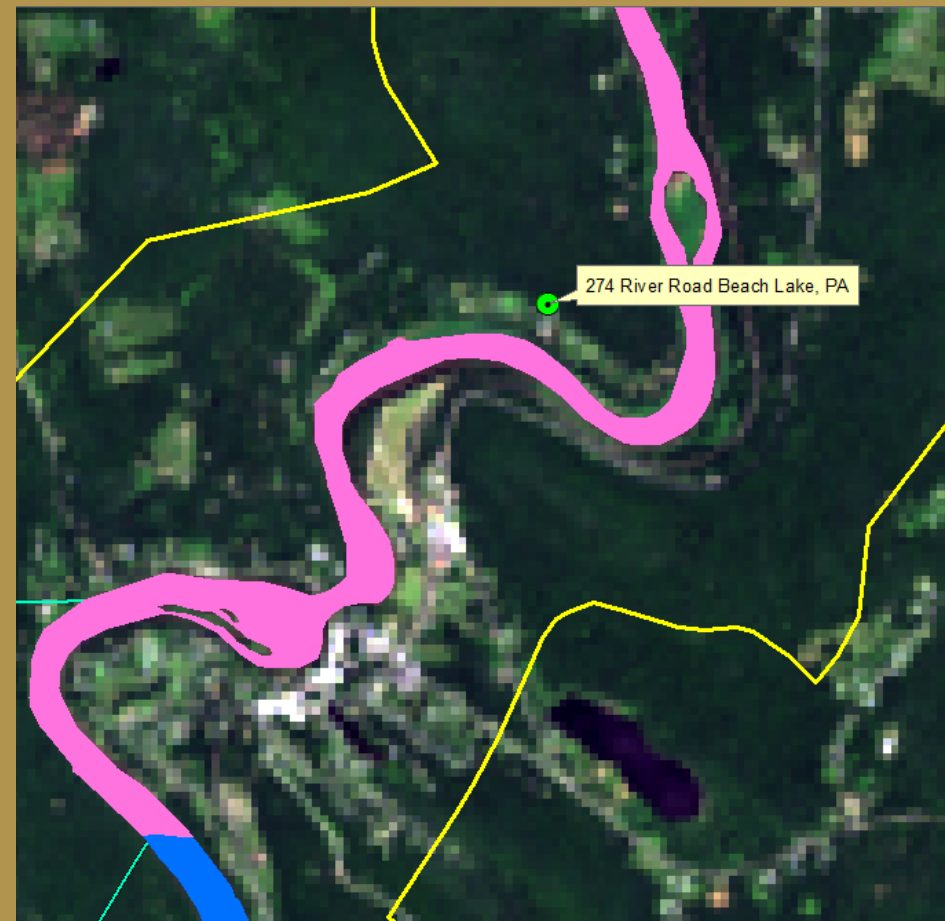
2000

2014

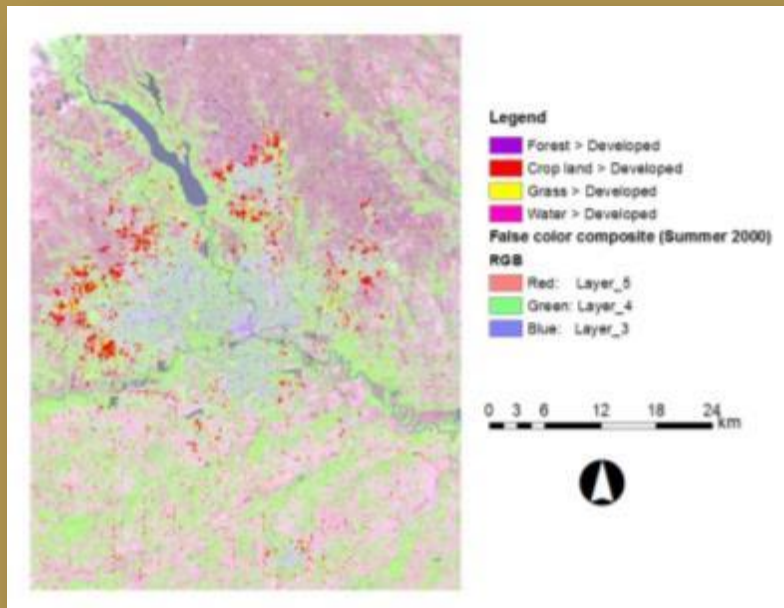
Accuracy assessment

Landsat composite

Aerial photo



Land cover change

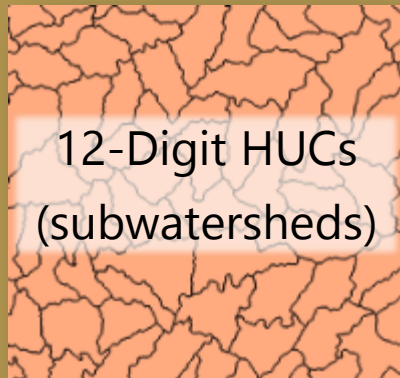


Example from Des Moines, Iowa

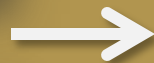
		2010 land cover (km ²)					
		Developed	Seasonally flooded	Forest	Crop land	Grass	Water
2000 land cover (km ²)	Developed	346	0	2	2	2	0
	Seasonally flooded	0	0	0	0	0	0
	Forest	10	7	277	14	26	18
	Crop land	65	39	29	1,083	171	10
	Grass	47	16	102	214	188	11
	Water	1	3	2	0	0	54

Indicators and zoning

How have watershed conditions changed over time and space?



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Landscape Metrics:

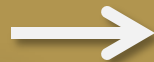
- 1) Percent impervious surface vs. natural veg
- 2) Percent core vs. edge forest
- 3) Average vegetation condition (NDVI)

Indicators and zoning

How do land cover and environmental conditions vary across zoning categories within the watersheds?



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Extract land cover area, change, diversity ...

Physical manifestations of zoning?

Zones with incongruous land cover?

Stewardship considerations?

Geographic Information System

Address

Lon/Lat

Administrative setting:

- In UPDE boundary?
- Wild/scenic classification?
- County & township?
- Zoning designation?
- Relevant ordinances?

Landscape conditions:

- Land cover?
- Landscape metrics?
- Land use (parcel)?
- Elevation and slope?
- Soil class?
- Flood risk?

Physical context:

- Roads
- Public lands
- Wetlands
- Hydrology
- Trails
- Bridges
- Cons. easements
- Others ...

Expected results

Effective and efficient decision support tool.



GIS

Conditions at
project location.

DATA

INFORMATION

Proposed timeline

Objective – Task	Oct 2014	Nov 2014	Dec 2014	Jan 2015	Feb 2015	Mar 2015
1 – Unified zoning	X	X				
2 – Land cover classification		X	X	X		
3 – Landscape conditions				X	X	
4 – GIS development					X	X
5 – Report and presentation						X



Society for
Conservation GIS

| July 26-29, 2015, Monterey California

Acknowledgements

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National Park Service