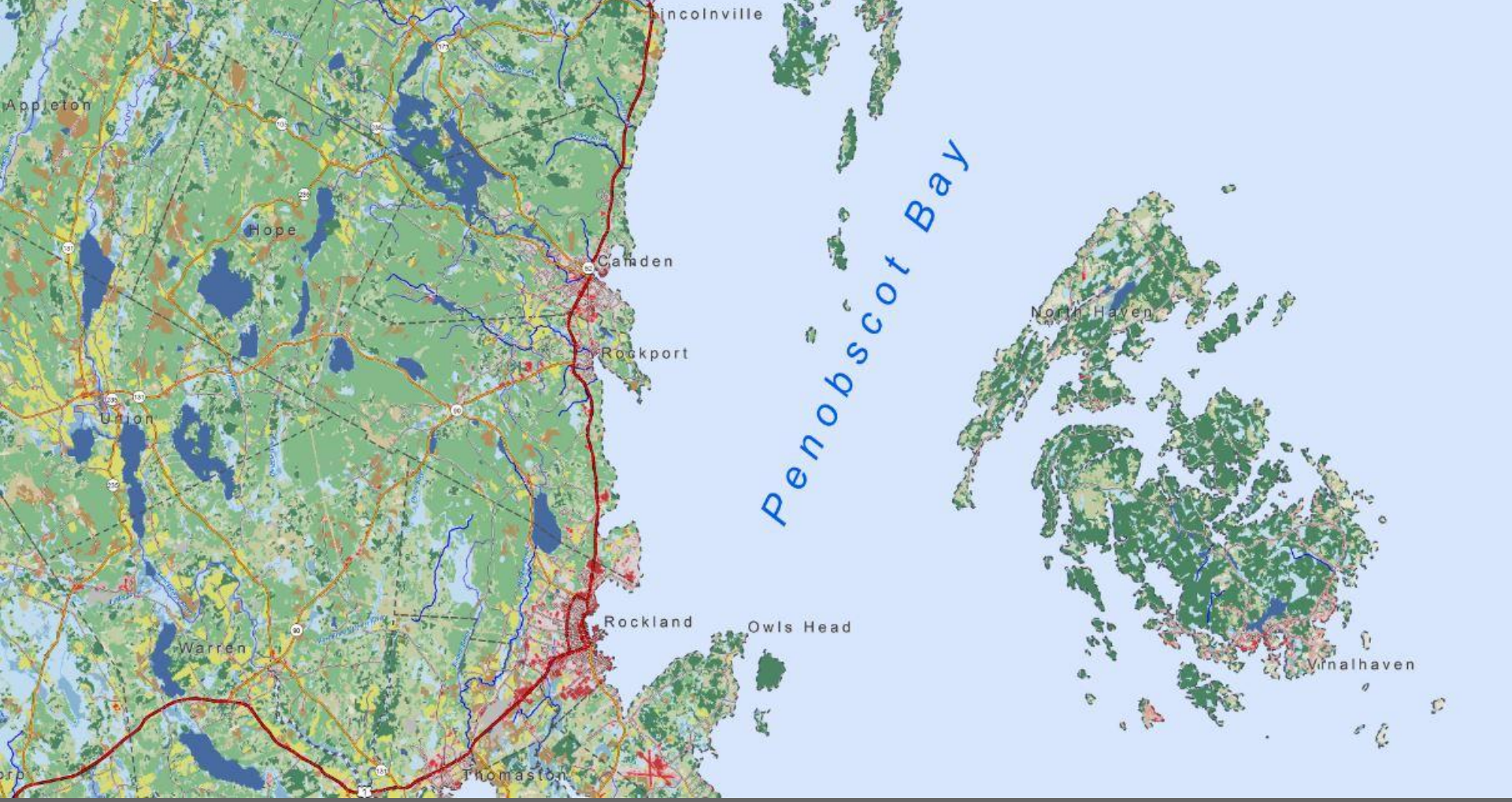


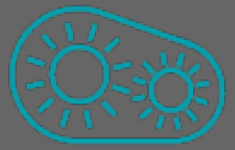
Friends of Penobscot Bay:

Tools for Assessing and Managing Human Impact on Maine's Harbors

Today's Outline

1. Project Goals
2. Methods
3. Findings and Results
4. Conclusions
5. Recommendations for further research

Civic Software, Data Analytics & Research



B Corporation

- Civic / Social Apps
- Pro Bono Program
- Donate share of profits

Research-Driven

- 10% Academic Research Program
- Academic Collaborators
- Open Source
- Open Data

Data Analytics

- Identifying hidden patterns
- Prioritize and plan operations
- Streamline your decision making process
- Visually communicate these plans to other

Kevin Frech

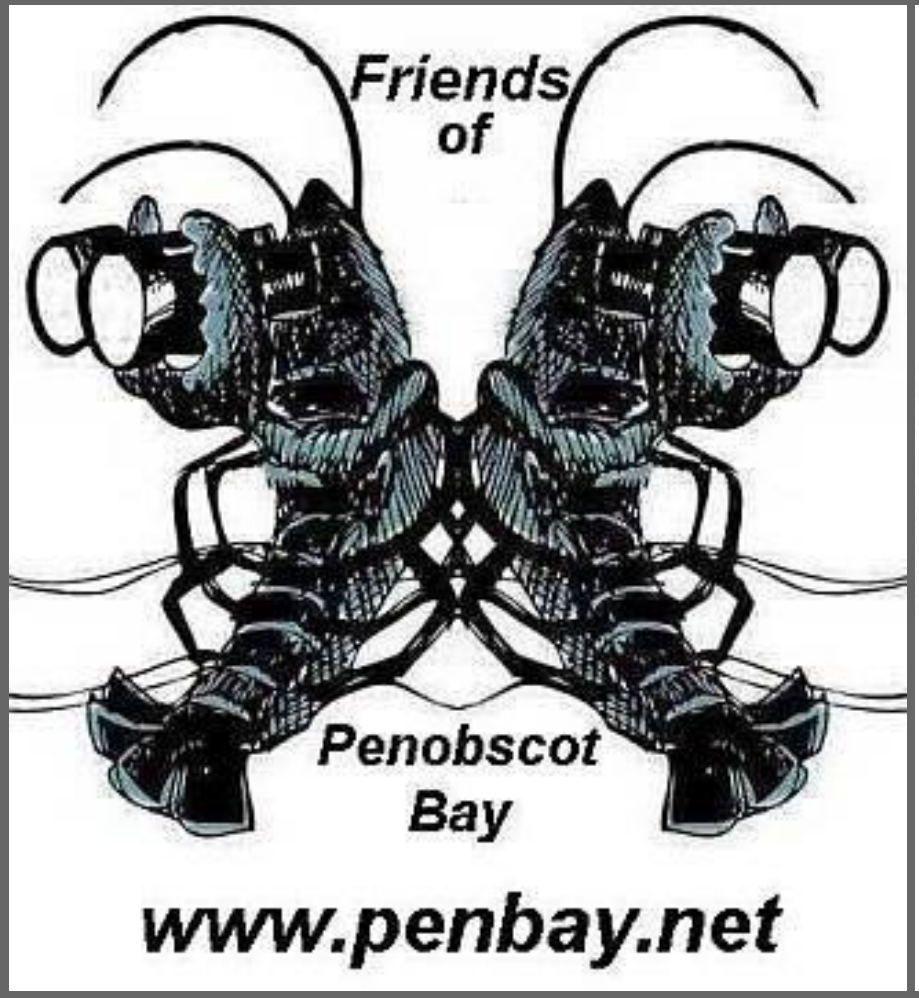
- College Graduate
- Avid Cartographer
- Certified Tree-Hugger

AZAVEA

SUMMER of MAPS

- $5,000 Fellowship for Student GIS Analysts
- Work on pro-bono projects for nonprofits
- Mentored by Azavea Staff

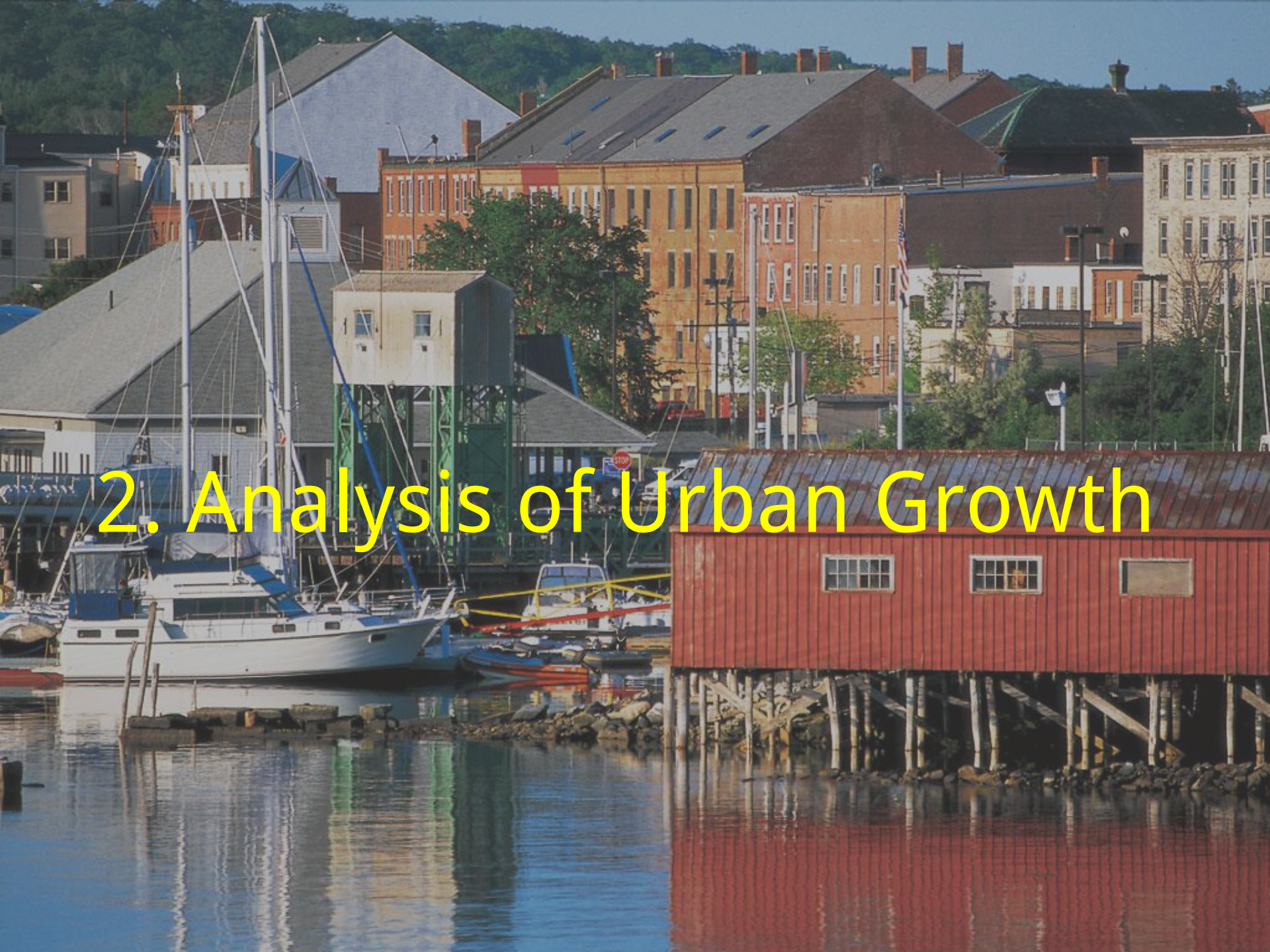
More at Summerofmaps.com


Friends
of
Penobscot
Bay
www.penbay.net

publiclab.org

Project Goals

1. Analysis of Forest Cover



2. Analysis of Urban Growth

3. Impact on Bay Wildlife

Methods

Methods

- Software: ArcGIS

- Study Area: West Bay from Stockton Harbor to South Thomaston

Data Sources: Maine Office of GIS, NLCD, Friends of Penobscot Bay

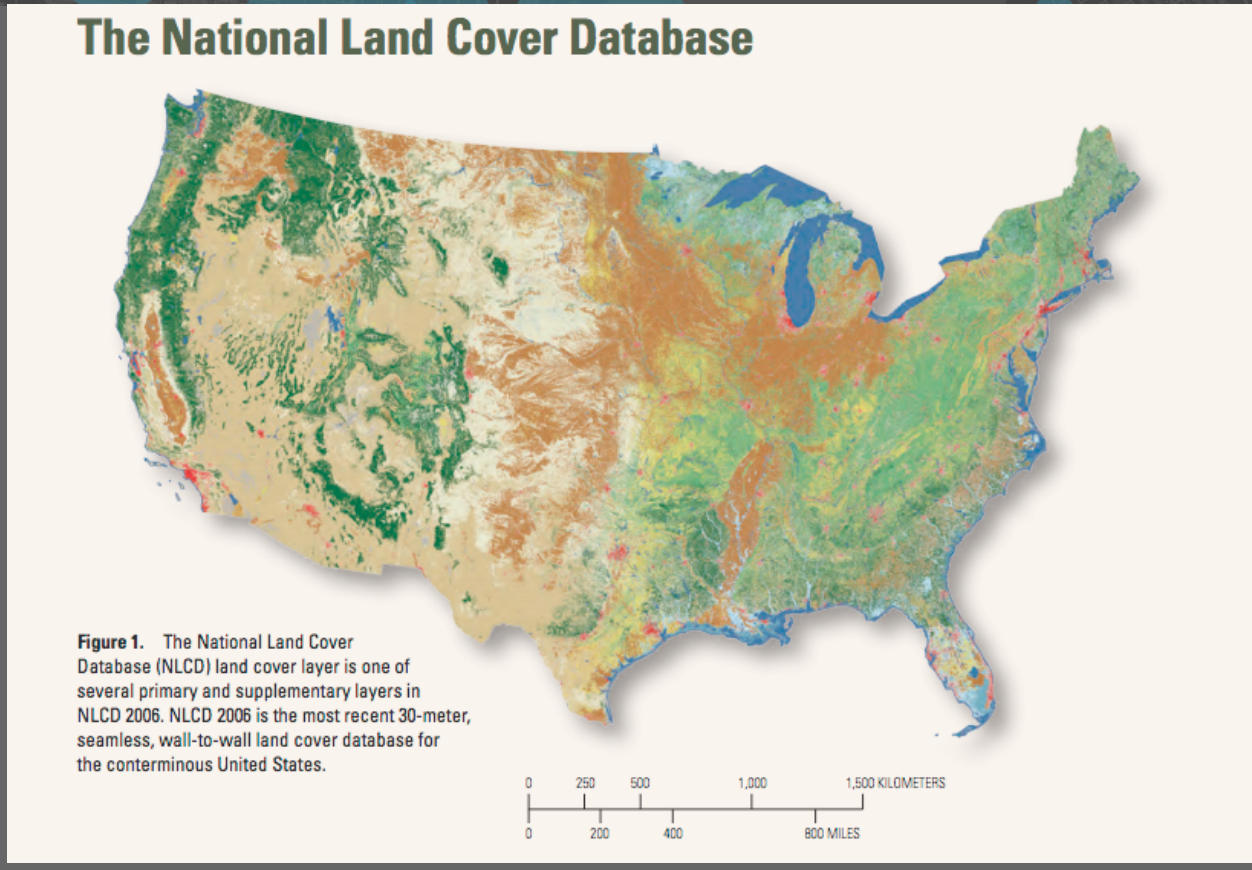
National Land Cover Database (NLCD)

A comprehensive land cover dataset for the entire United States using satellite remote sensing technology

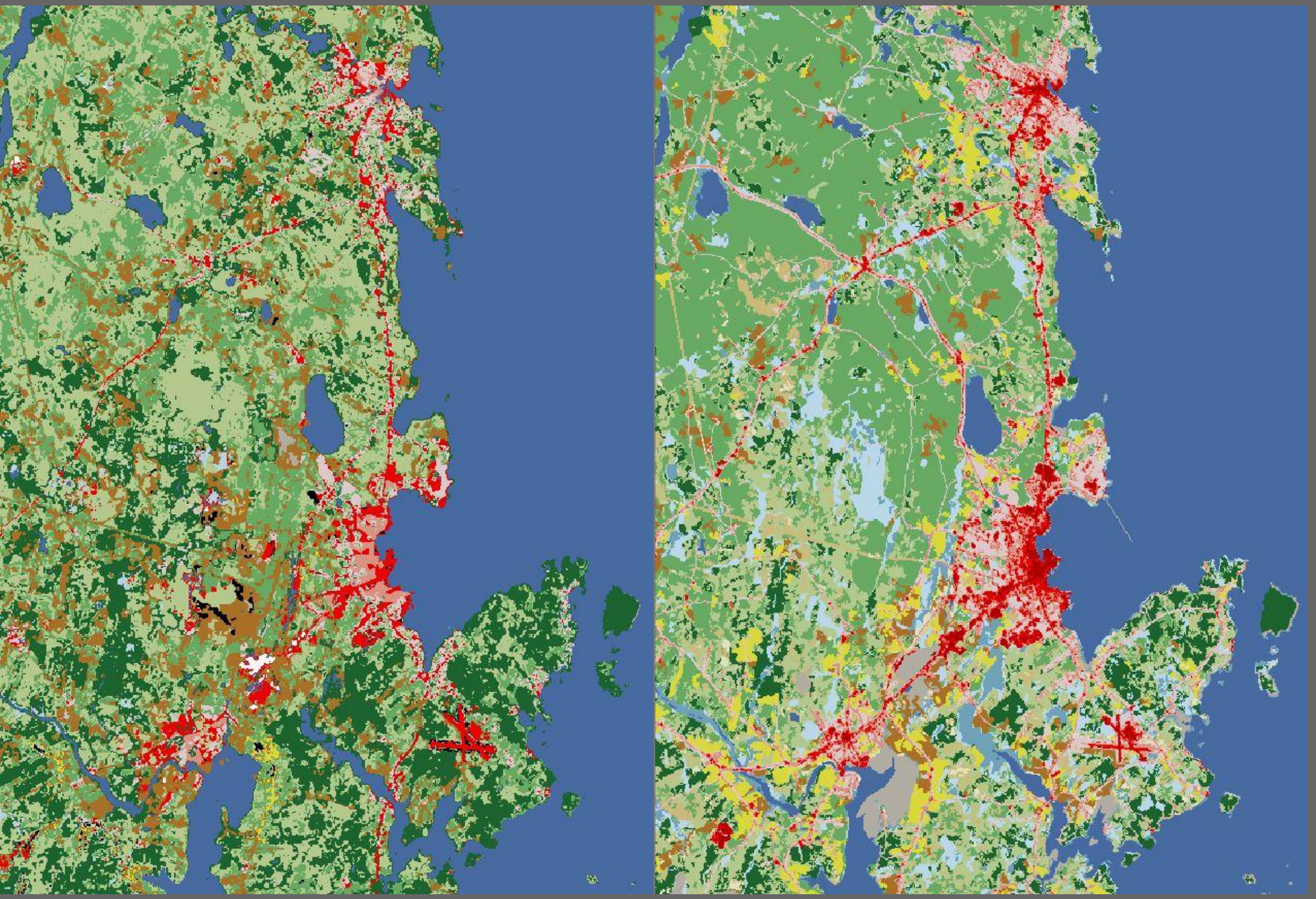
- Advantages
  - Free
  - Pre-classified
  - Available for any geography

Land Cover Classifications

- Water
- Developed
- Barren
- Forest
- Grassland
- Agriculture
- Wetlands



Penobscot Bay Reference Map



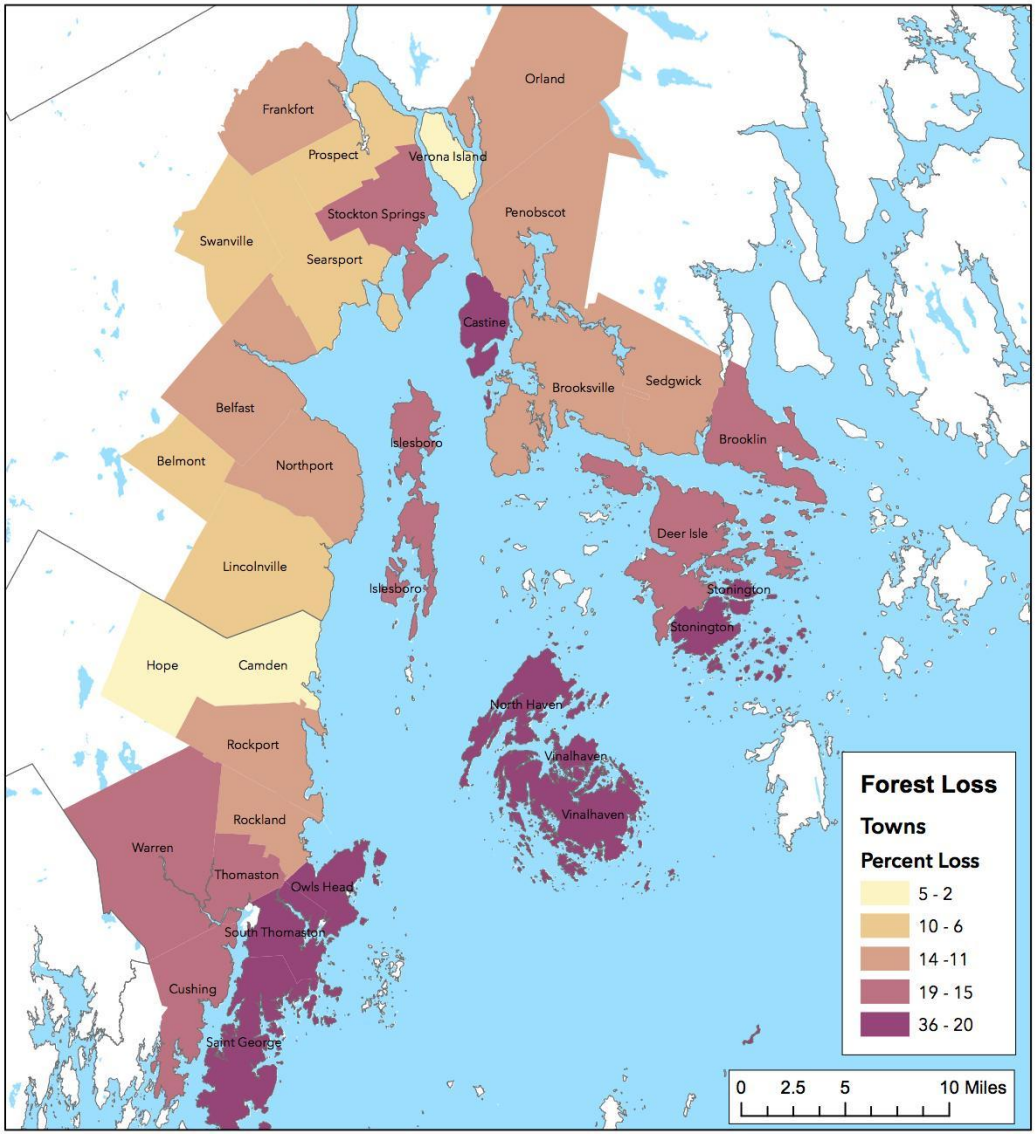
How was it used?

1. Calculating percent change
2. Cartographic Comparisons
3. Raster Differencing
4. Land Cover Transitions

Percent Change

Penobscot Bay

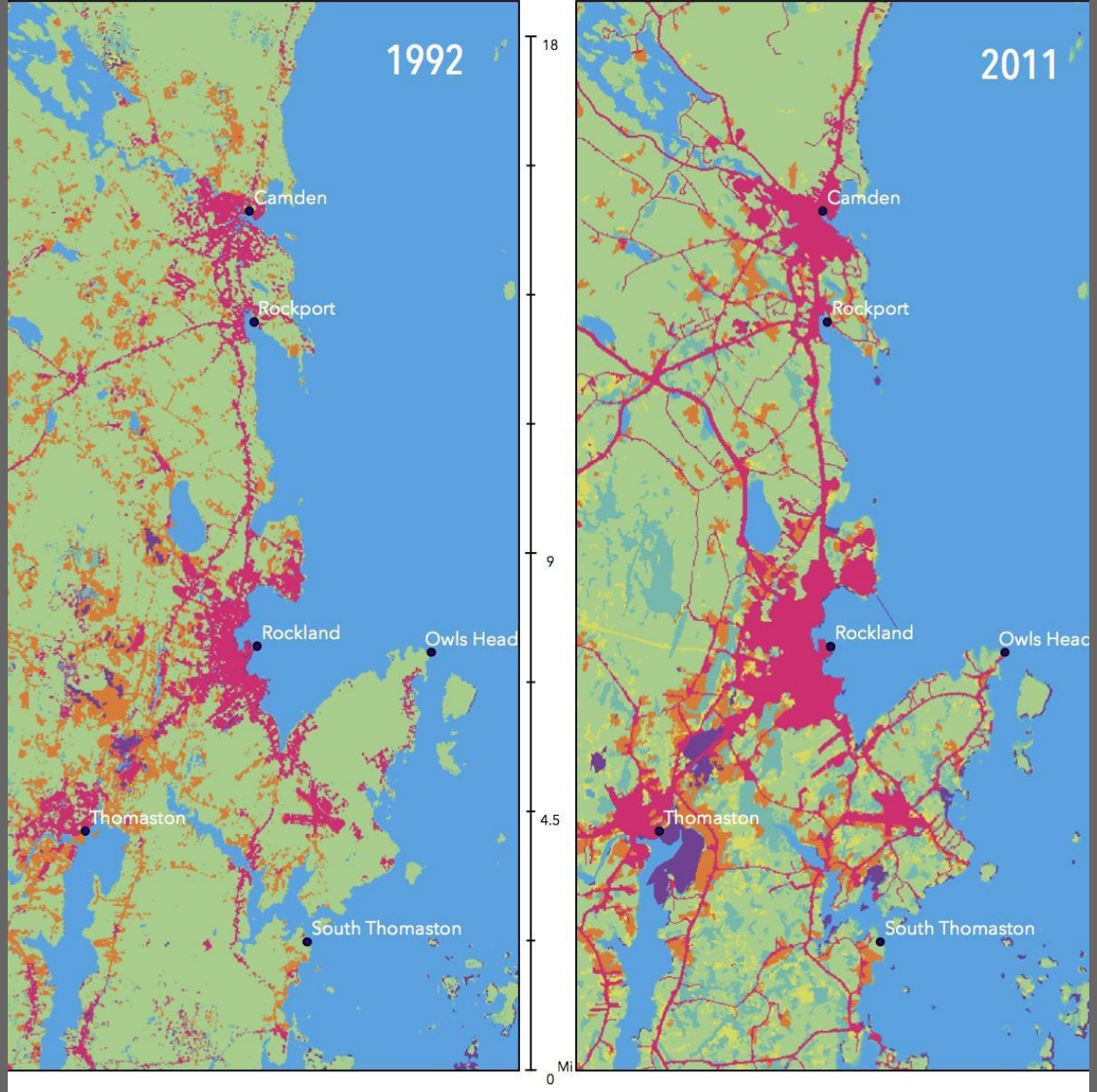
Forest Loss by Town

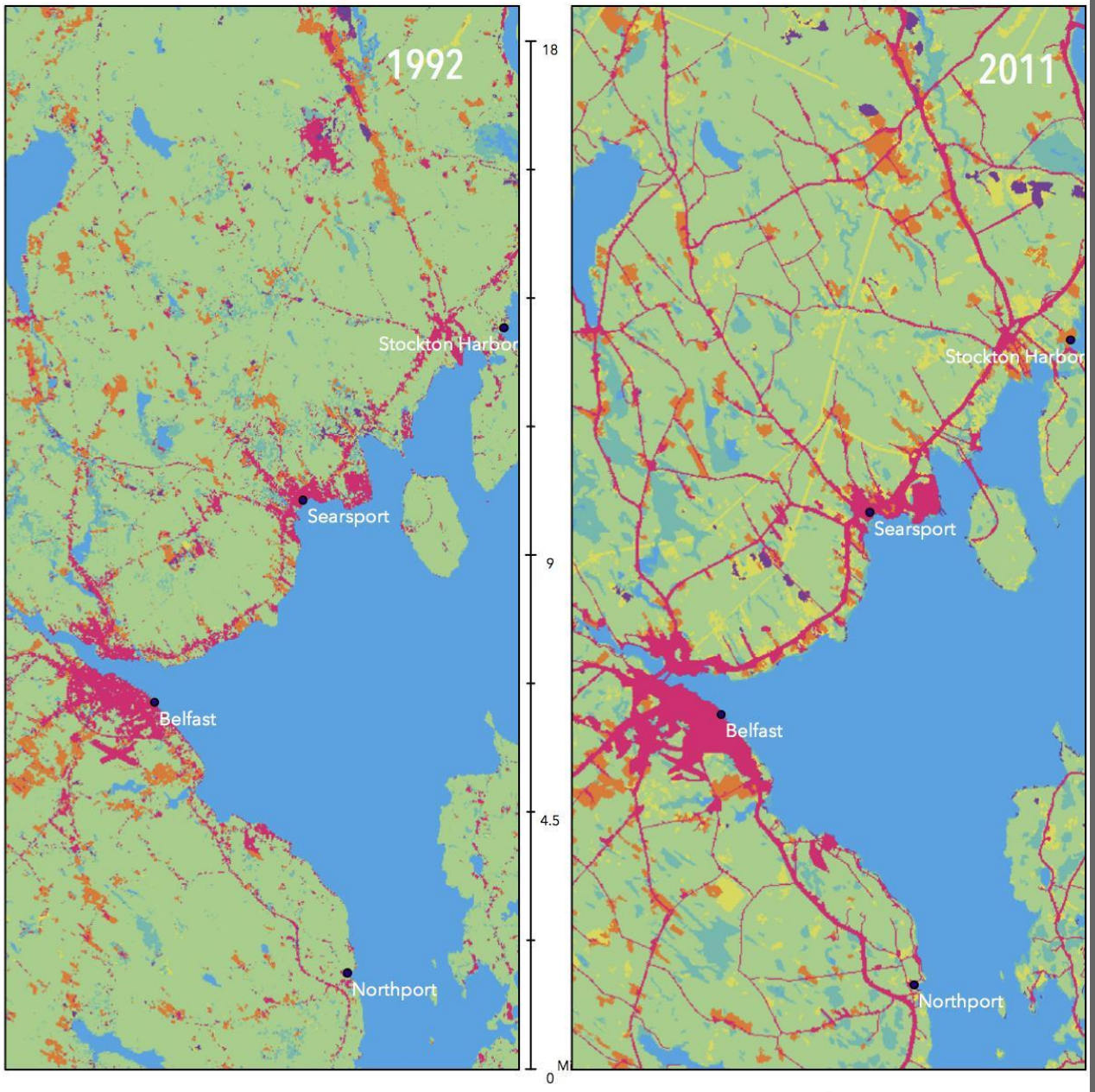


AZAVEA
SUMMER of MAPS

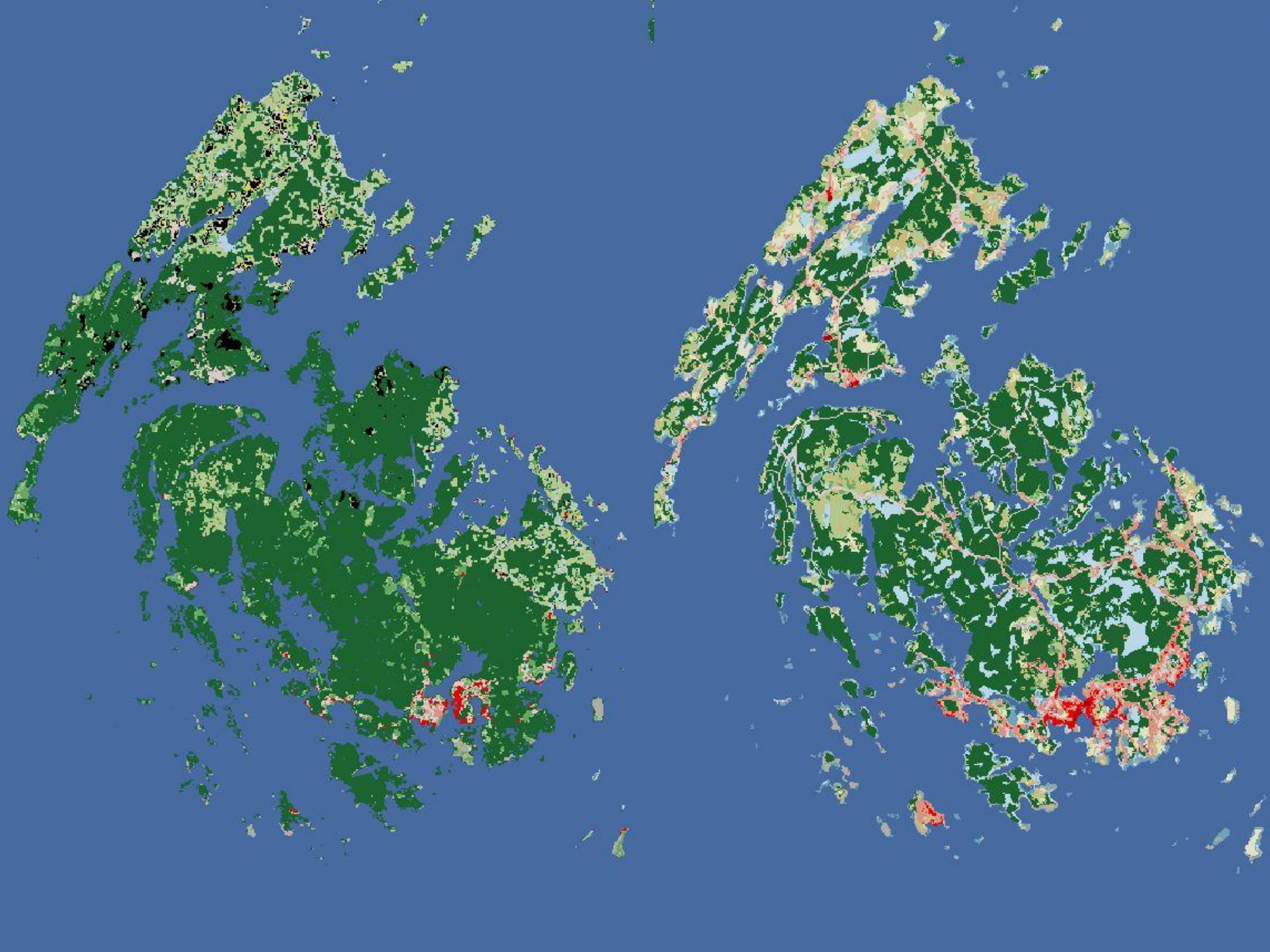
Cartographer: Kevin Frech
Source: NLCD 1992, 2011

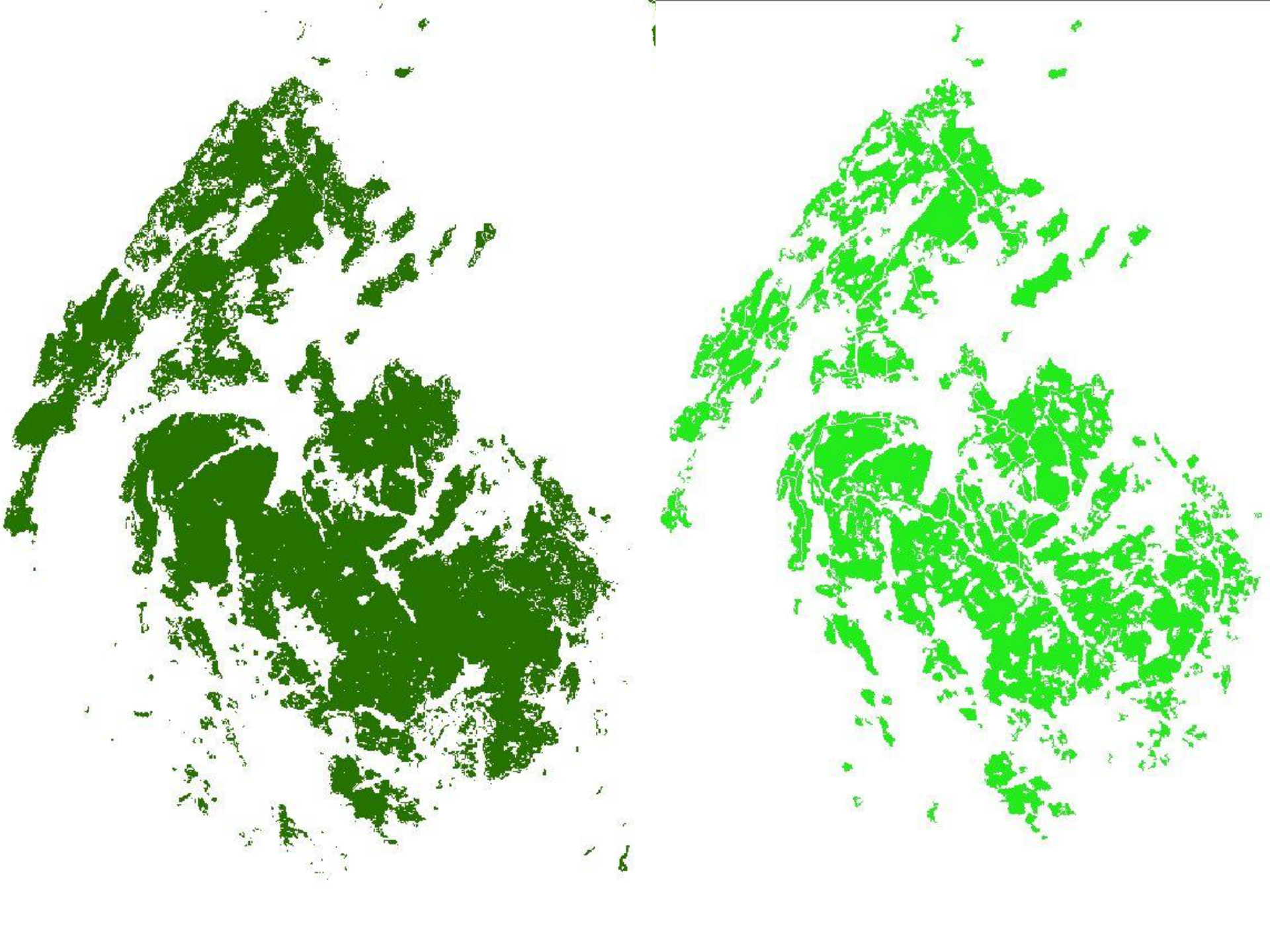
Cartographic Comparison

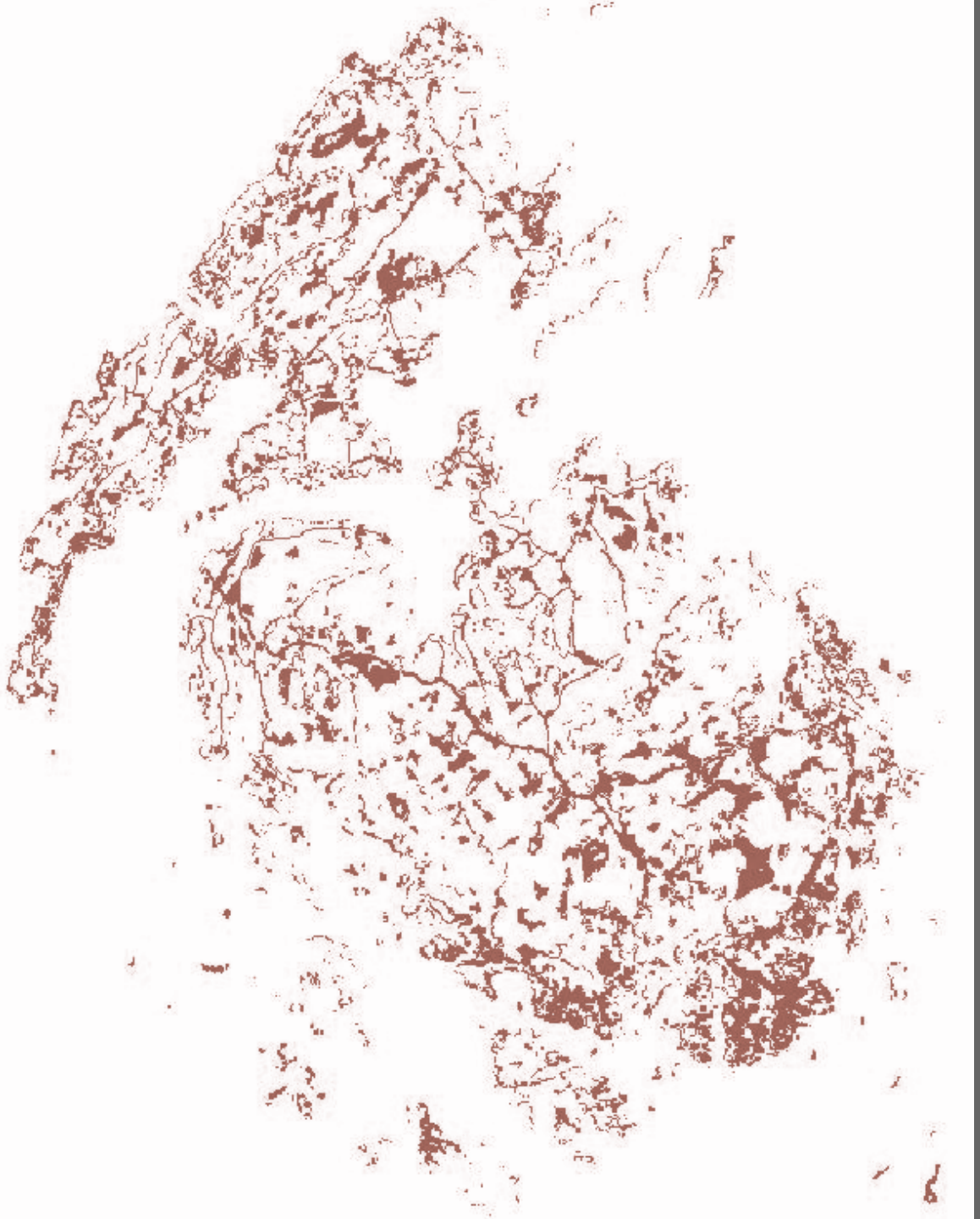

1992
2011
Camden
Rockport
Rockland
Owls Head
Thomaston
South Thomaston
18
9
4.5
0
Mi
Water
Developed
Barren
Forest
Grassland
Agriculture
Wetland


1992
2011
Stockton Harbor
Searsport
Belfast
Northport
18
9
4.5
0
MI
Water
Developed
Barren
Forest
Grassland
Agriculture
Wetland

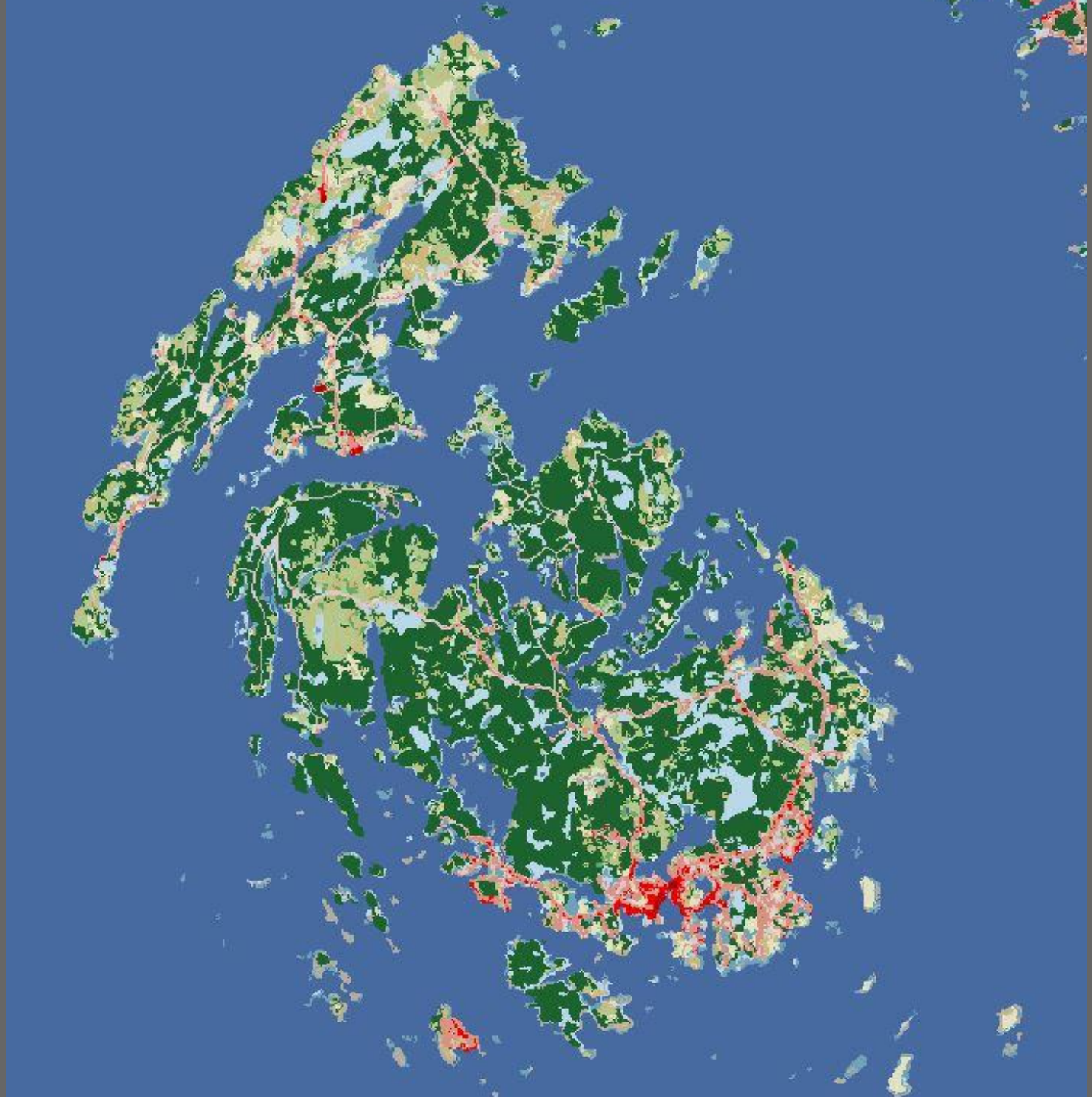
Raster Differencing

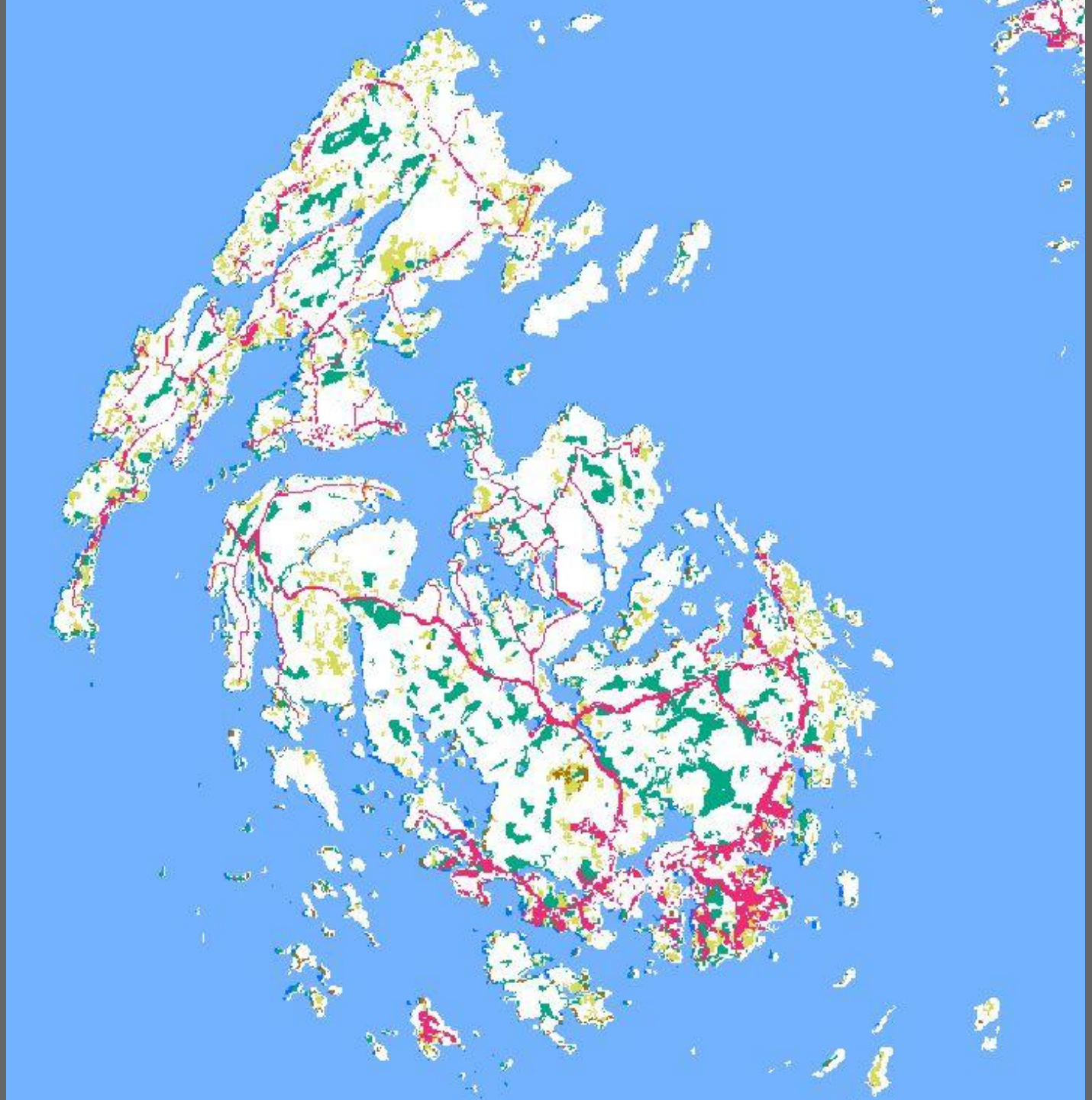






Land Cover Transition

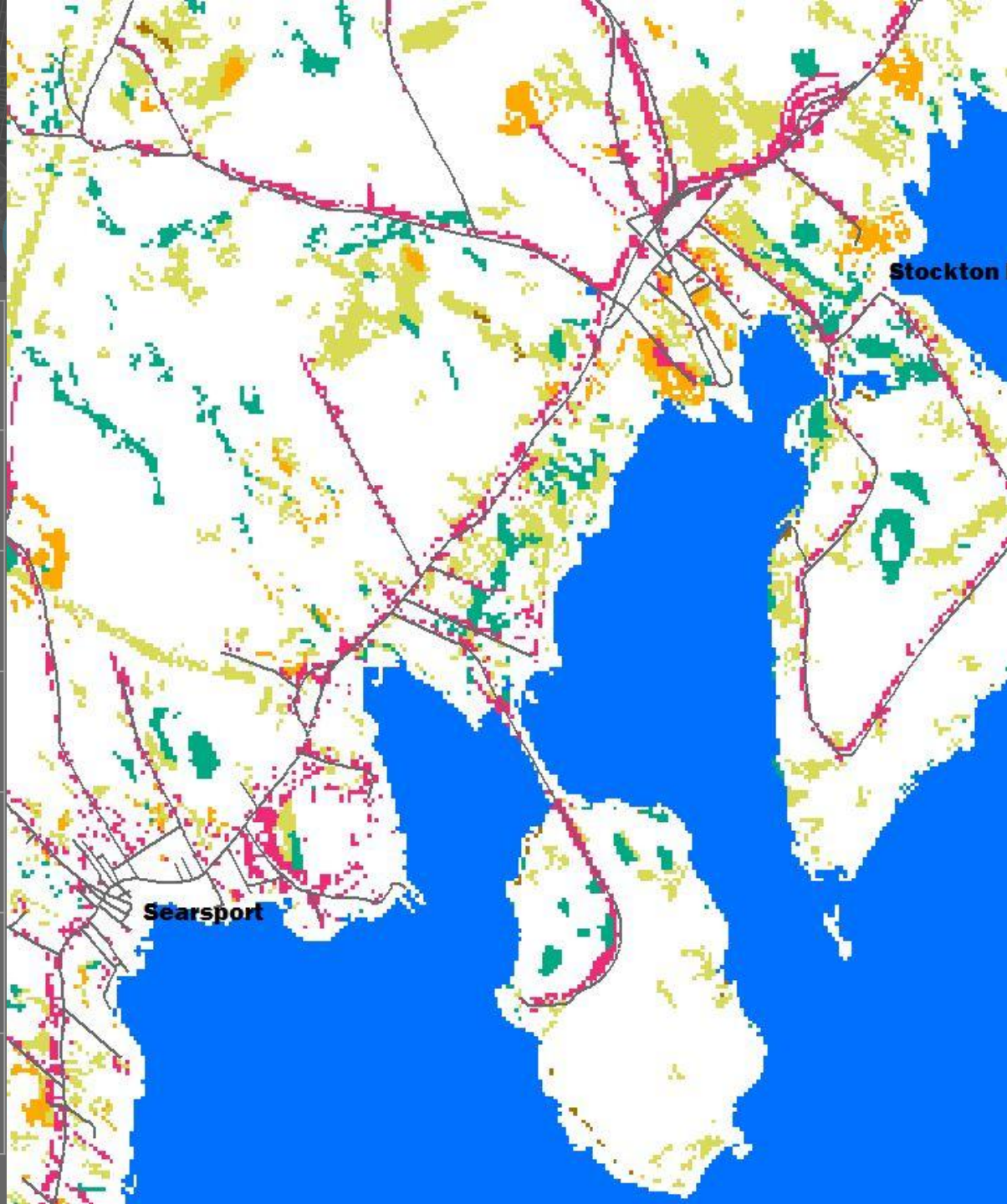




Results

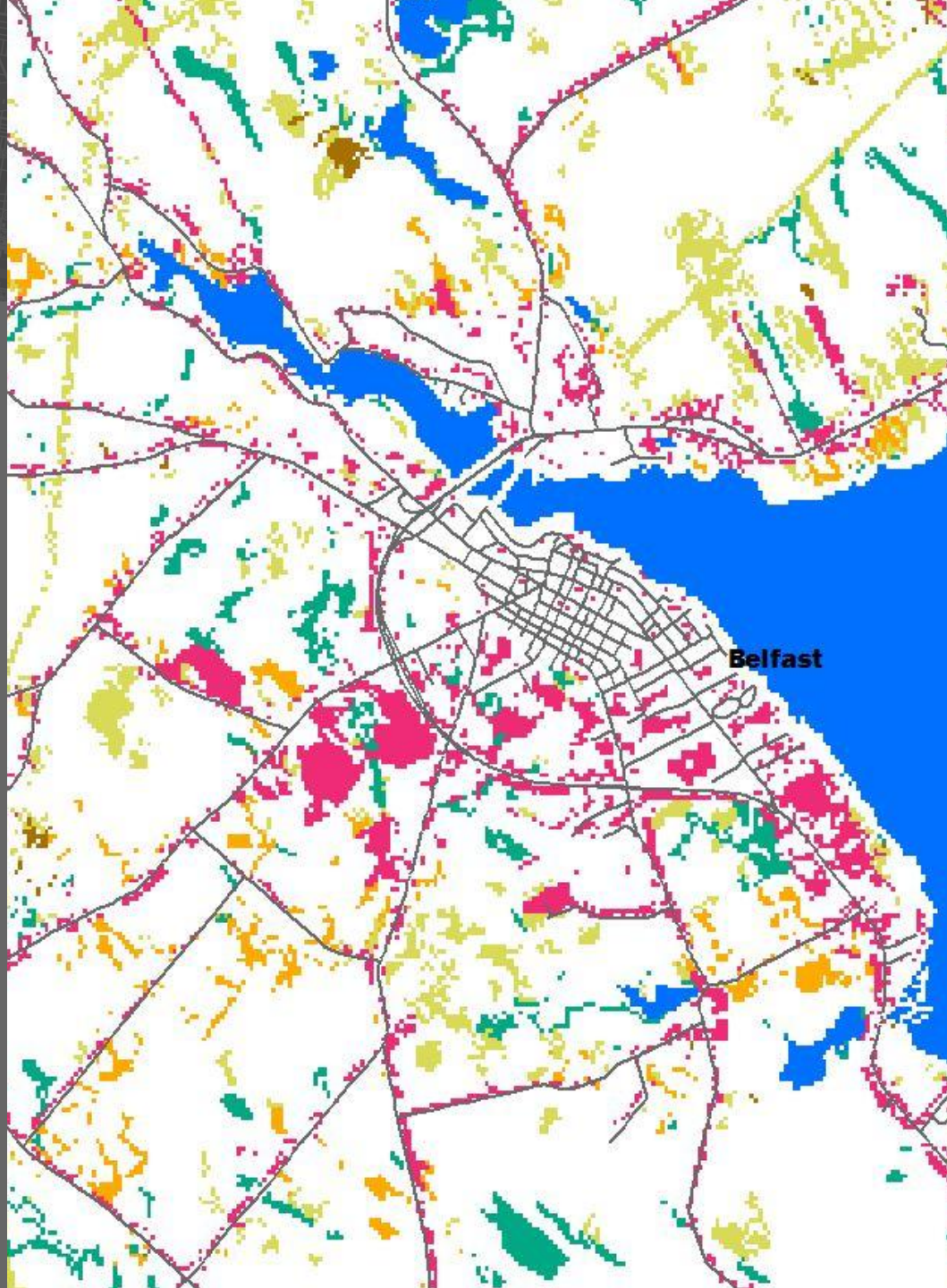
Searsport and Stockton Harbor

Land Cover	Change (Sq Mi)	Change (%)
Forest	- 5.6	-14%
Grassland	+ 3.7	+1500%
Developed	+ 0.8	+24%
Wetlands	+ 0.5	+17%
Agriculture	+ 0.3	+17%
Population	+84	+2%



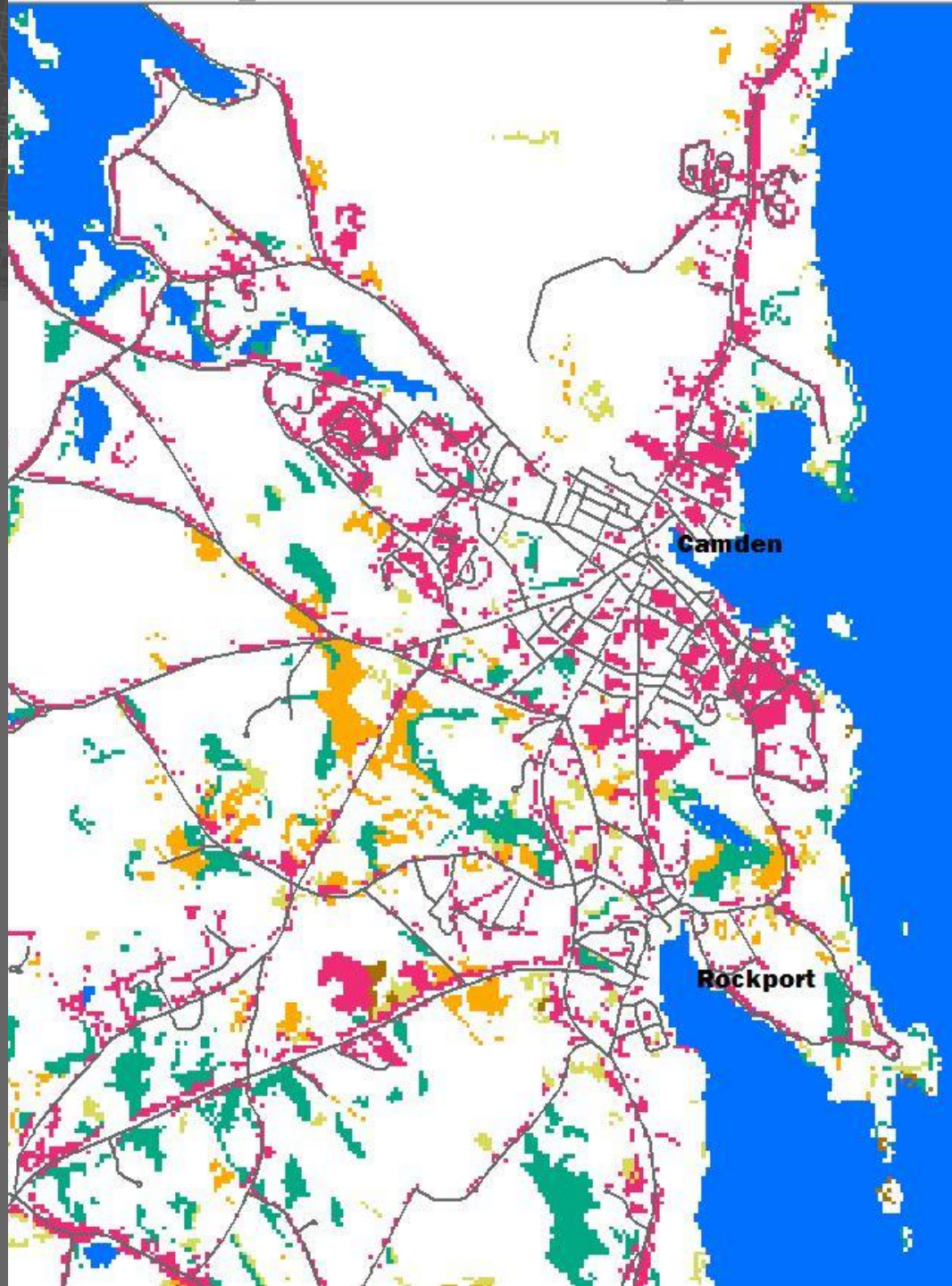
Belfast

Type	Change (Sq Mi)	Change (%)
Forest	- 3.7	-15%
Agriculture	- 0.2	-5%
Grassland	+ 1.9	+800%
Developed	+ 1.7	+44%
Wetlands	+ 0.9	+50%
Population	+287	+4.3%



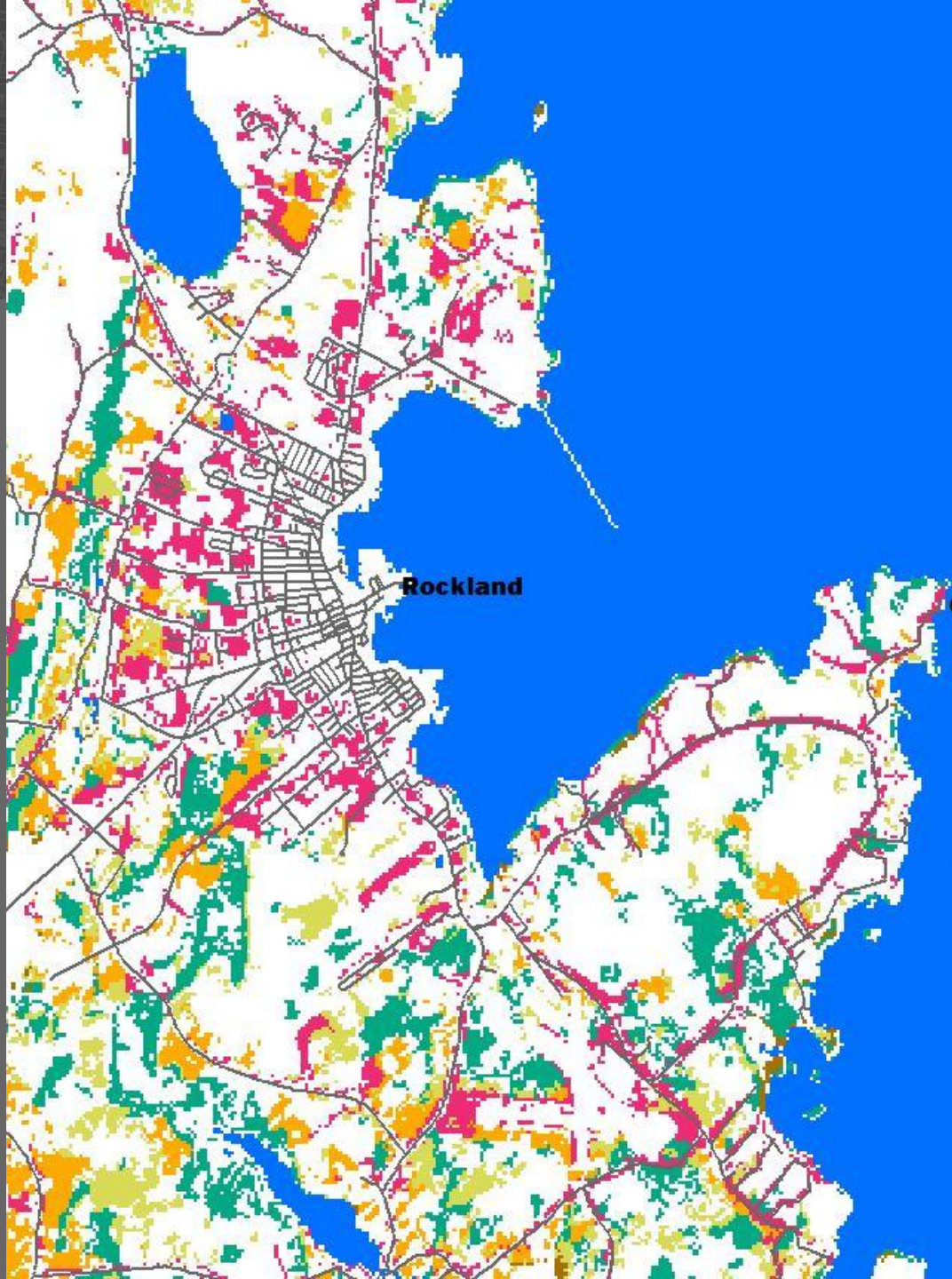
Camden and Rockport

Type	Change (Sq Mi)	Change (%)
Forest	- 2.8	-8%
Agriculture	- 2.8	-60%
Developed	+ 3.2	+100%
Wetlands	+ 1.6	+500%
Grassland	+ 1.1	+5000%
Population	+72	+0.1%



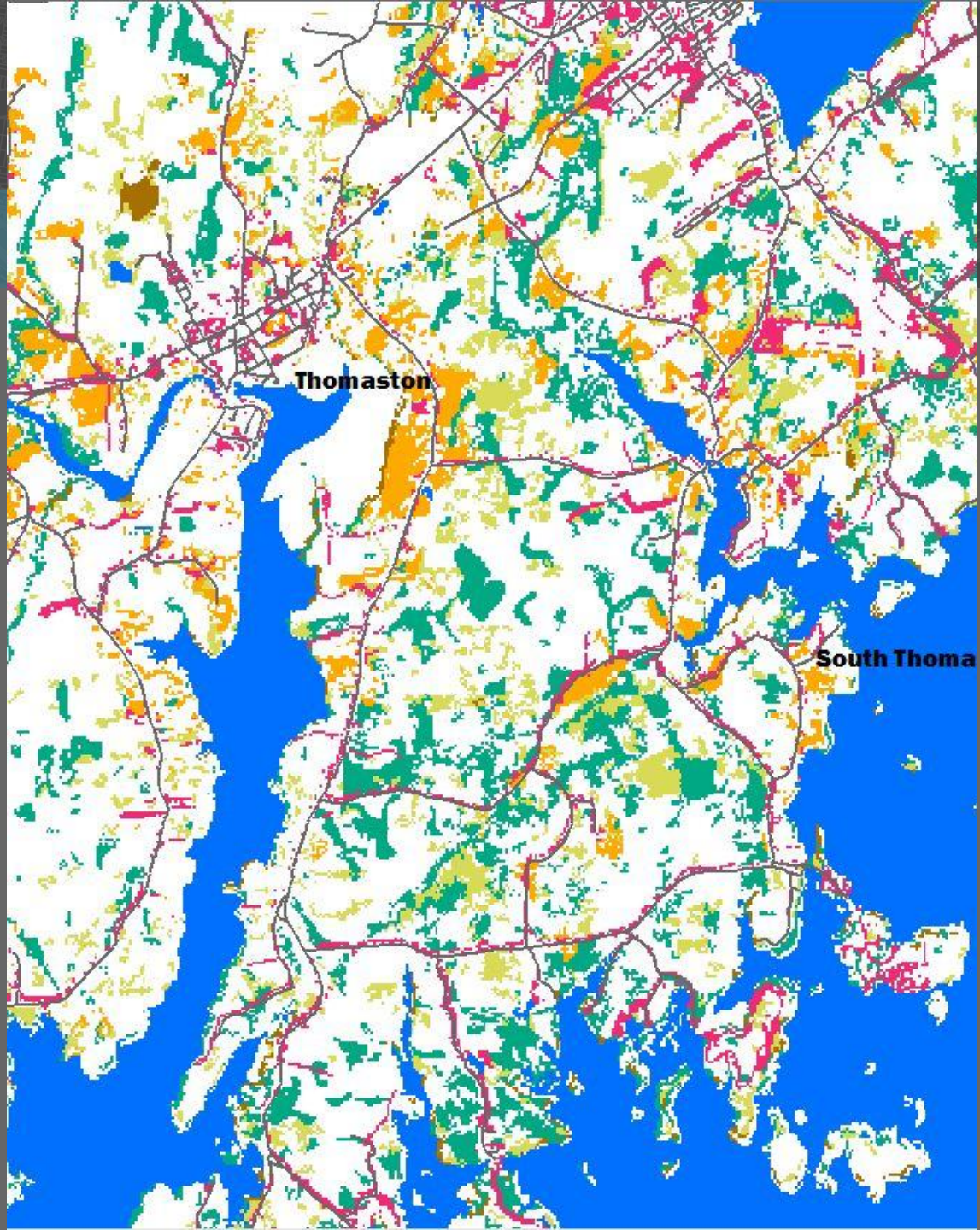
Rockland

Type	Change (Sq Mi)	Change (%)
Forest	- 4.4	-23%
Agriculture	- 2.8	-63%
Developed	+ 3.2	+45%
Wetlands	+ 1.6	+1000%
Grassland	+ 1.1	NA
Population	-675	-8%



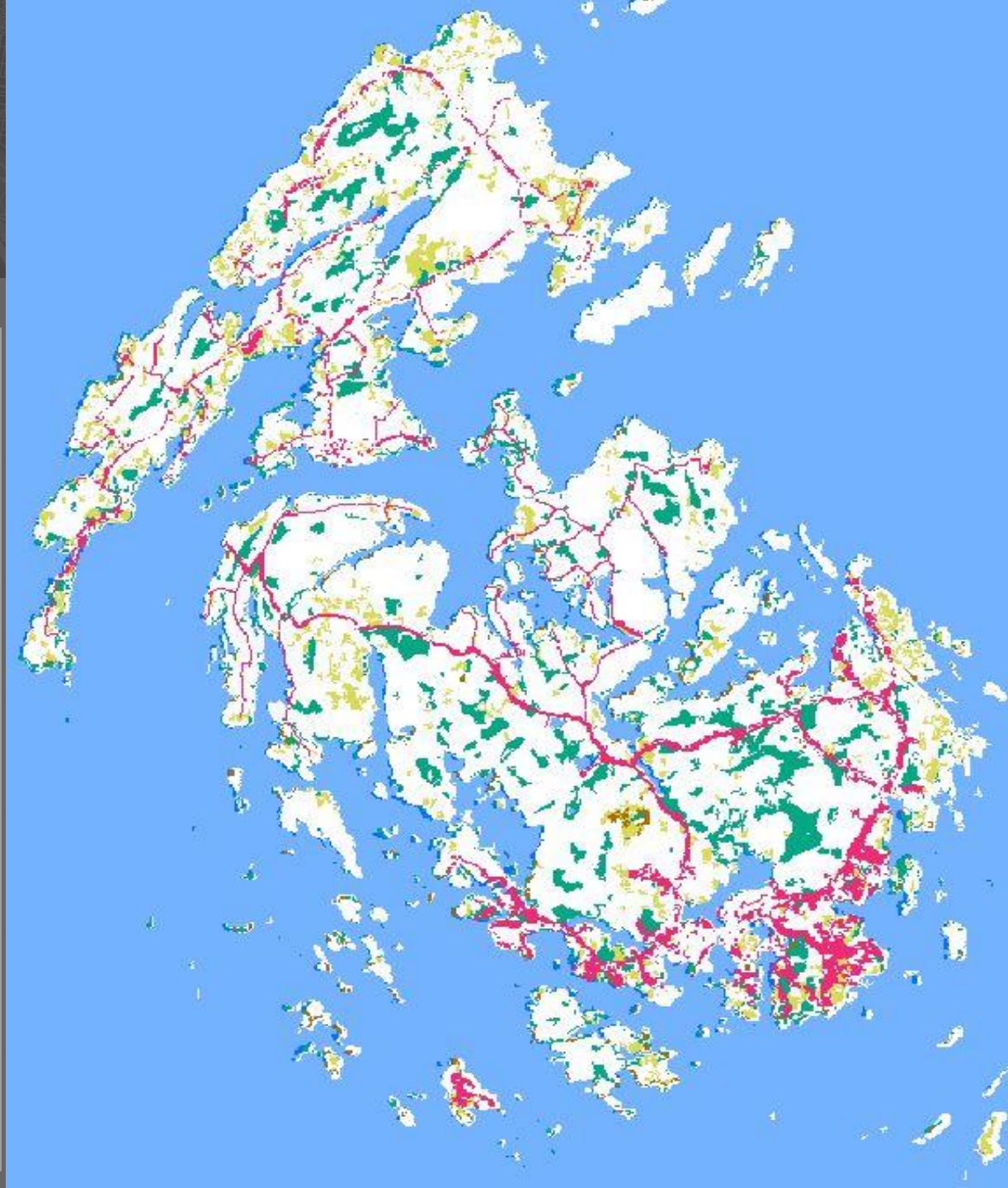
Thomaston

Type	Change (Sq Mi)	Change (%)
Forest	- 5.9	-37%
Agriculture	- 0.4	-10%
Wetlands	+ 2.9	+1000%
Grassland	+ 2.0	+1000%
Developed	+ 1.4	83%
Population	- 525	-16%



Vinalhaven

Type	Change (Sq Mi)	Change (%)
Forest	- 5.9	-22%
Developed	+ 0.8	+250%
Grassland	+ 1.7	+1000%
Agriculture	+ 0.0	~
Wetlands	+ 2.5	+700%
Population	+87	+8%



Conclusions

Forest Cover

Forest Cover

- Substantial Deforestation in all Towns
- Over 30 Square Miles
- Average of 23% Loss
- Emergence of Grasslands and Wetlands
- +12 Square Miles of Grasslands
- +13 Square Miles of Wetlands

Urban Growth

Urban Growth

- Growth of developed land much higher than population growth
- Average increase of 85%
- Over 12 Square Miles
- Average population decrease of 2%
- Development largely for Tourism, Commercial, Industrial purposes

Impact on Bay Wildlife

Wildlife Reference Map

Recommendations for Further Research

Nexts Steps

- EPA pollutants
  - Effect on wildlife
- Demographic Research
  - censusreporter.org
- Economic Impact
  - Is GDP increasing in line with development?
- Creation of online web map as tool for data exploration

Why a Webmap?

Next Steps

QUESTIONS!

Thanks for listening!
KevinCFrech@gmail.com
@azavea
analytics.azavea.com
bit.ly/DGDGIS