Assessing Coastal Resilience
IN THE UNITED STATES

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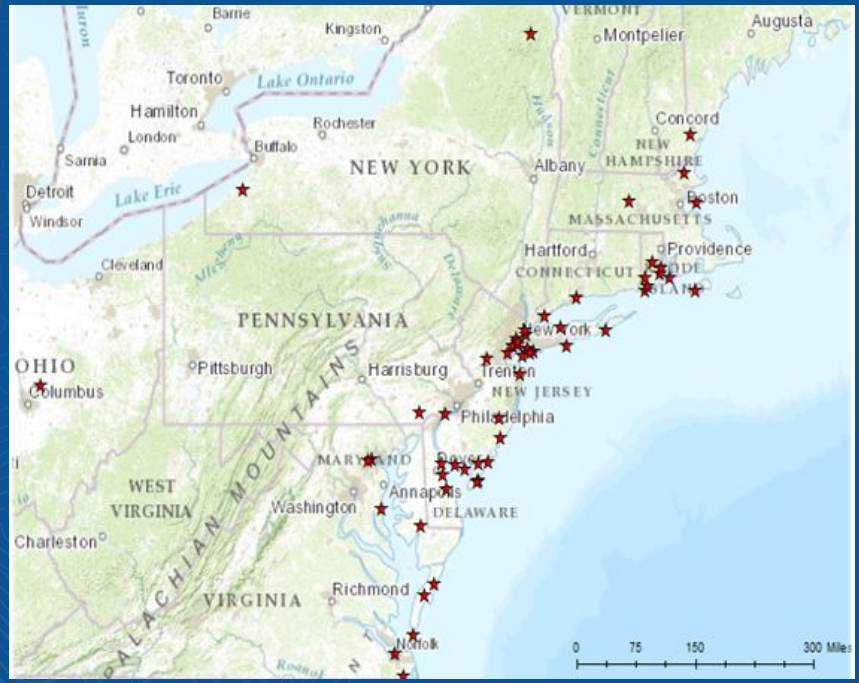
National Environmental Modeling & Analysis Center
NFWF

Background Information

- August 2013: DOI selected NFWF to administer its Hurricane Sandy Coastal Resilience Program
- Projects that reduce communities' vulnerability to coastal storms and related threats by strengthening natural lands that also benefit fish and wildlife
- With funding from DOI and NFWF, over $100 million was awarded to 54 projects



Project Objectives

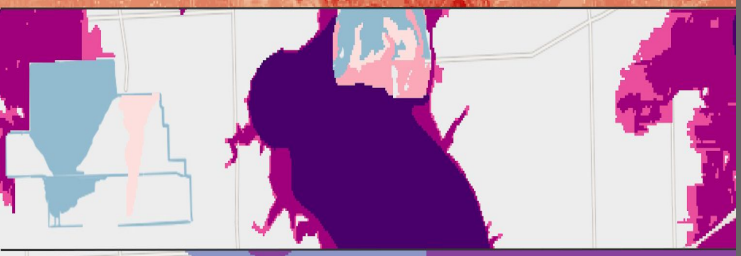
- Identify areas on the landscape where implementation of conservation actions will have maximum benefit for *human community resilience* AND *fish and wildlife habitat*
- Account for coastal and inland storm events
- Regional assessments create a contiguous and standardized dataset for US coastlines
- Targeted watershed assessments identify projects that build community and ecological resilience at local levels

Project Regions

Community Exposure Index

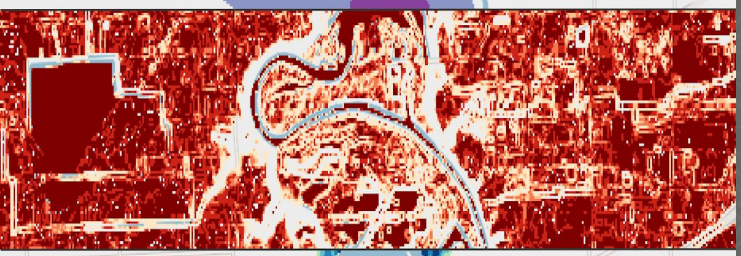
Threat Index
What are the flood-related hazards on the landscape?
X
Community Asset Index
What assets are exposed to harm?
=
Community Exposure Index

Combined Threat Index

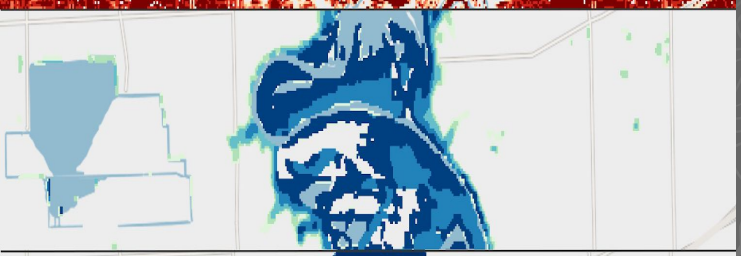


Flood-prone Areas

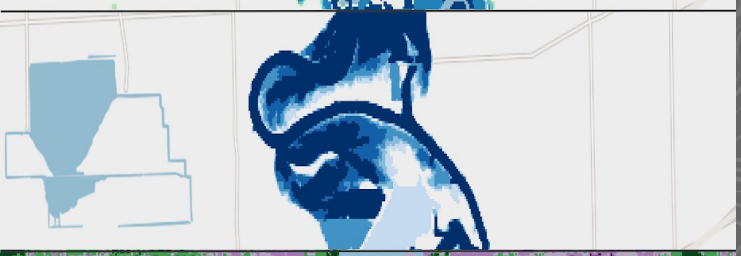
Geological Stressors



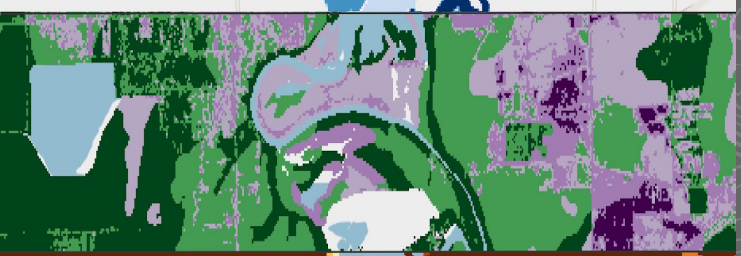
Areas of Low Slope



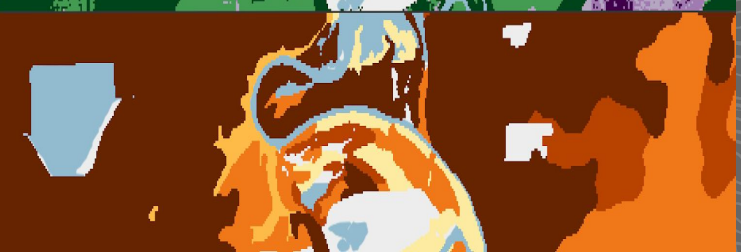
Storm Surge



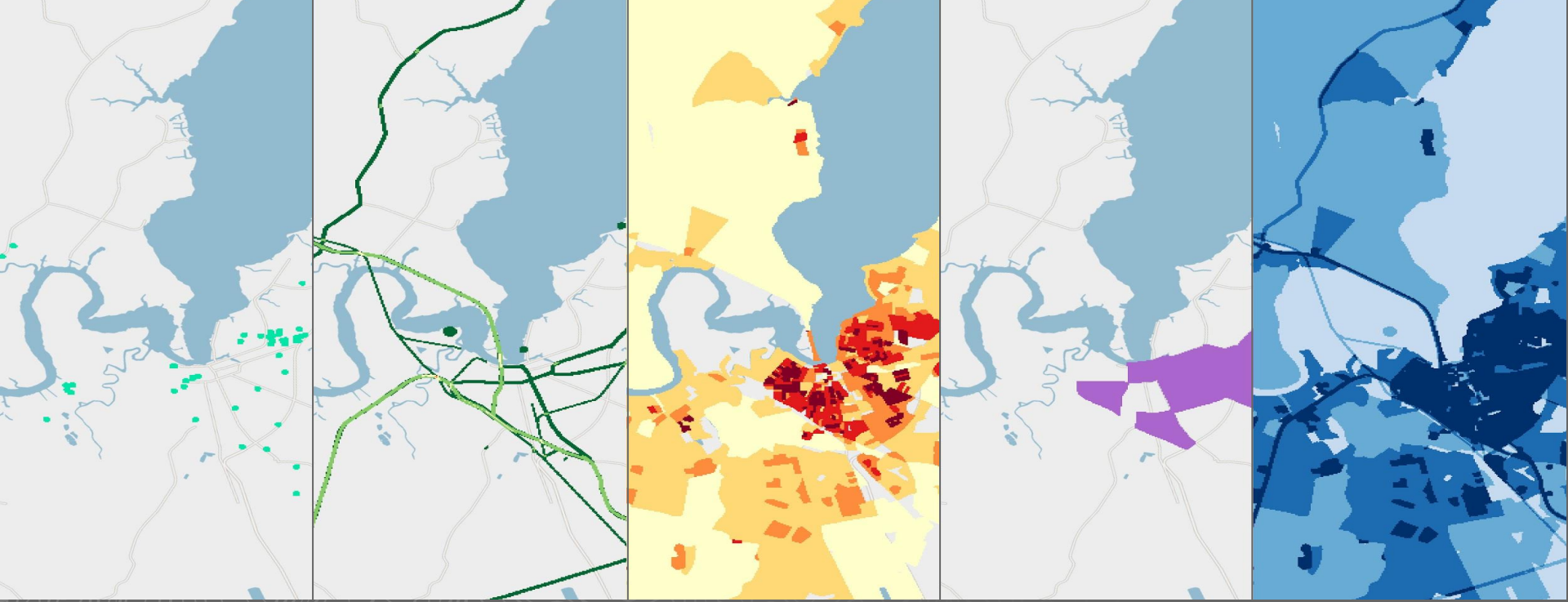
Sea Level Rise

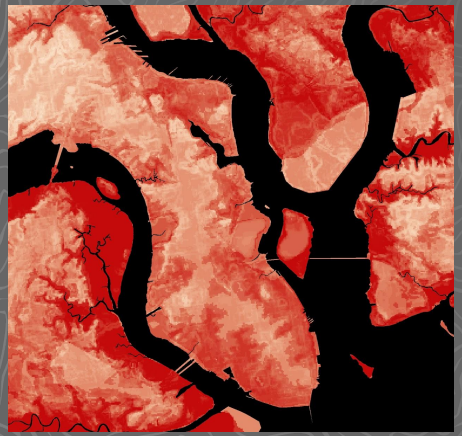


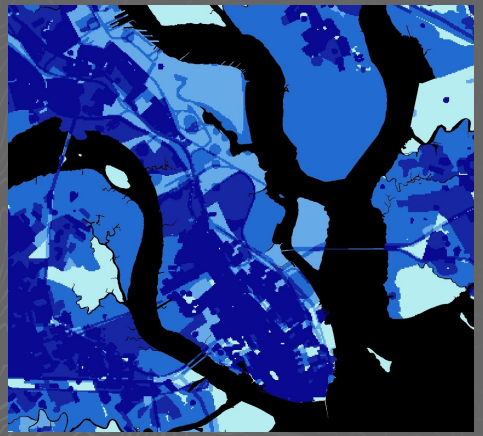
Impermeable Soils

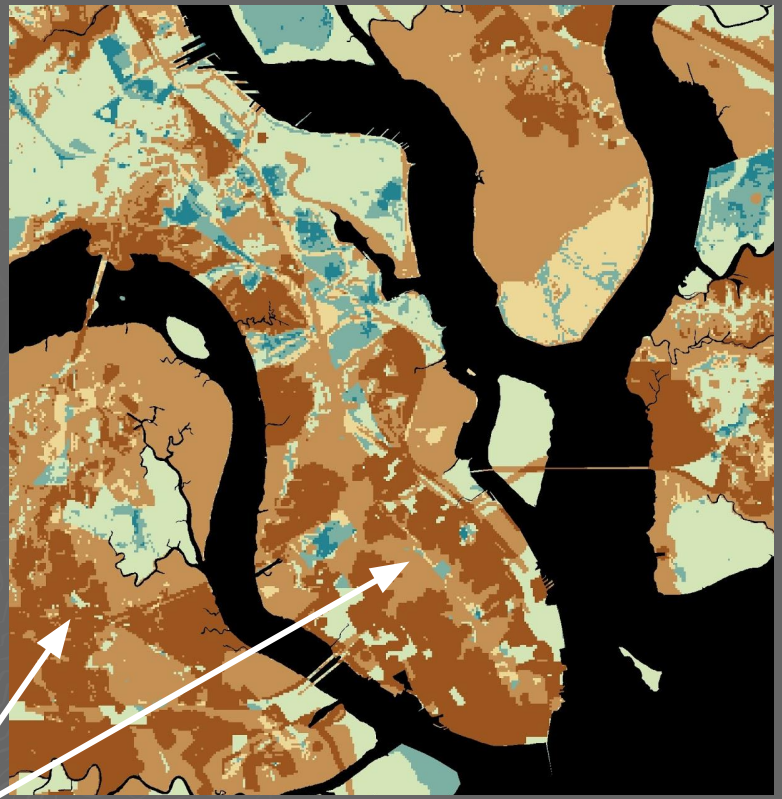


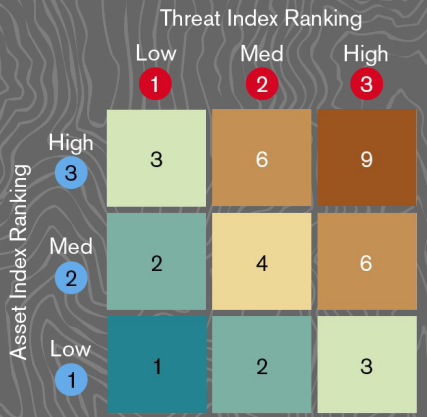
Soil Erodibility


Critical Facilities
Critical Infrastructure
Population Density
Social Vulnerability
Combined Community Asset Index

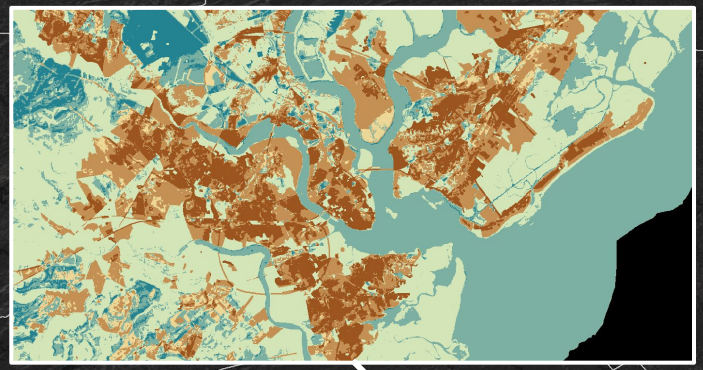








Helps communicate where the most people and assets are exposed


Suffolk
Roanoke Rapids
Elizabeth City
Greensboro
Chapel Hill
Tarboro
Asheboro
Greenville
Sanford
Goldsboro
Kinston
New Bern
Fayetteville
Jacksonville
Wilmington
Florence
Sumter
Conway
Myrtle Beach
Charleston
Beaufort
Hilton Head
Savannah

Regional Fish and Wildlife Index

Terrestrial Index:

- NatureServe (HUC-10) priority species
- Audubon Important Bird Areas

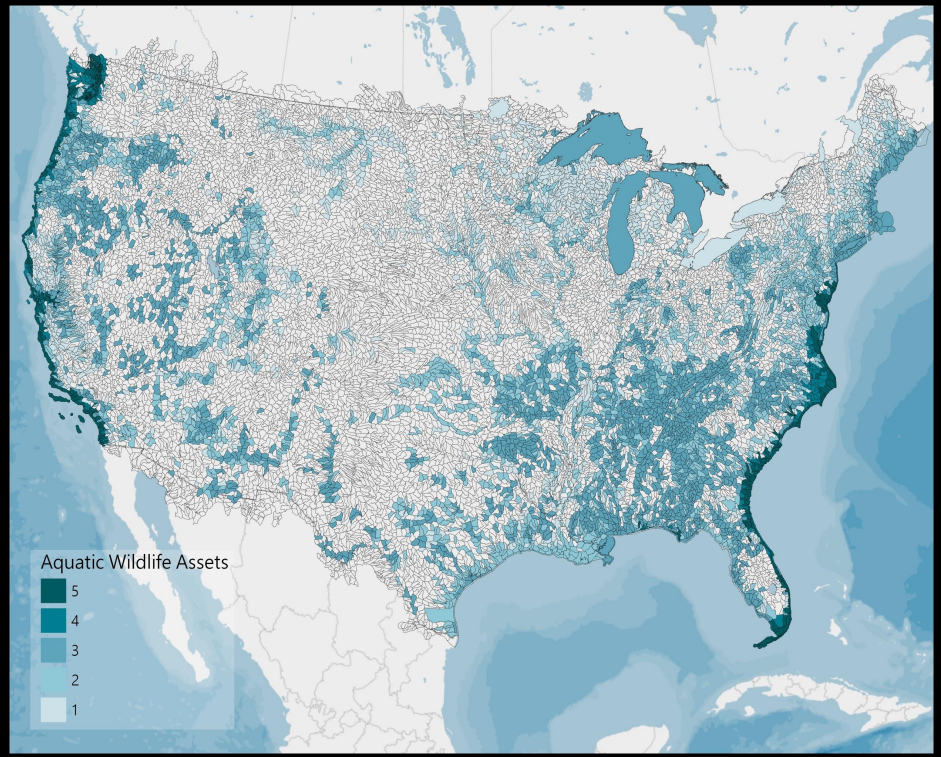
Aquatic Index:

- NatureServe (HUC-10) priority species
- NOAA Critical Habitat
- NOAA Essential Fish Areas
- NOAA Habitat Areas of Particular Concern

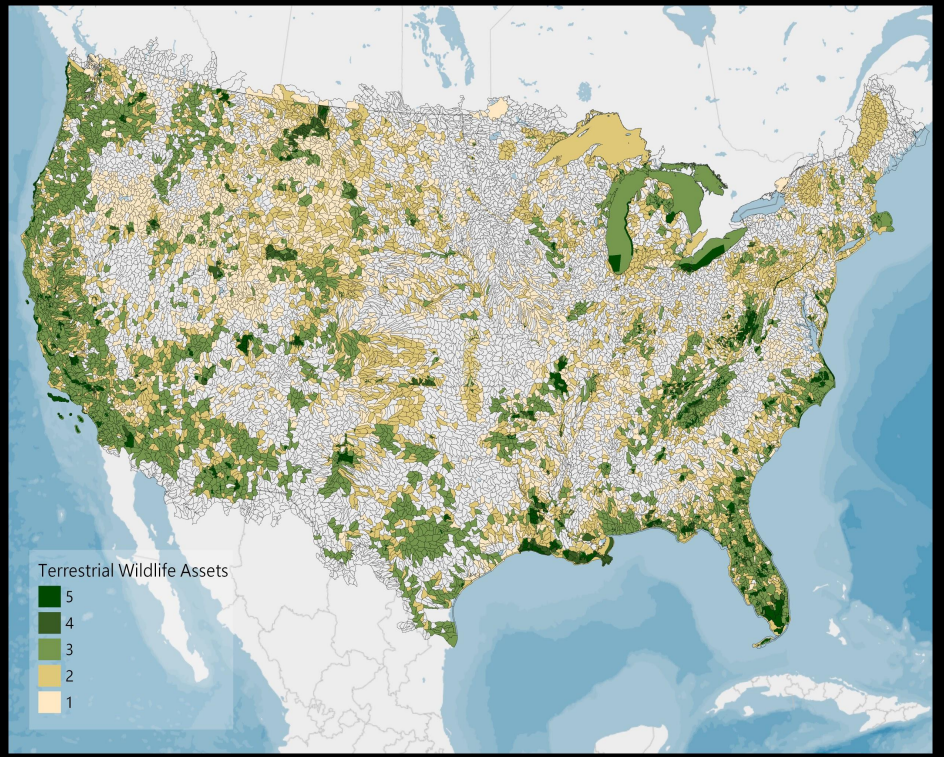
Combined Fish and Wildlife Index:

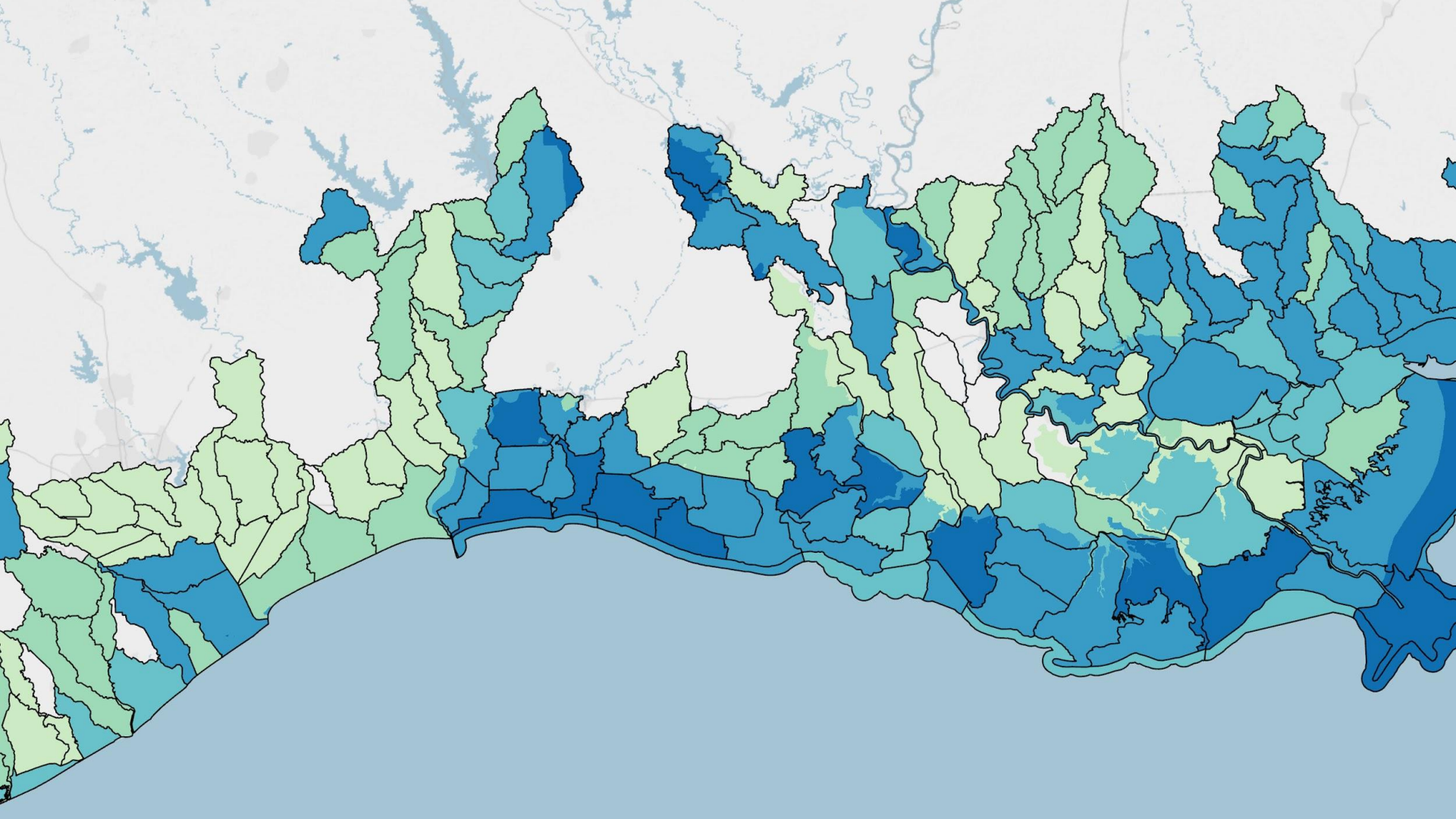
Identifies areas on the landscape where there is a high concentration of both priority Terrestrial and Aquatic species and their habitats.

Aquatic Index



Terrestrial Index

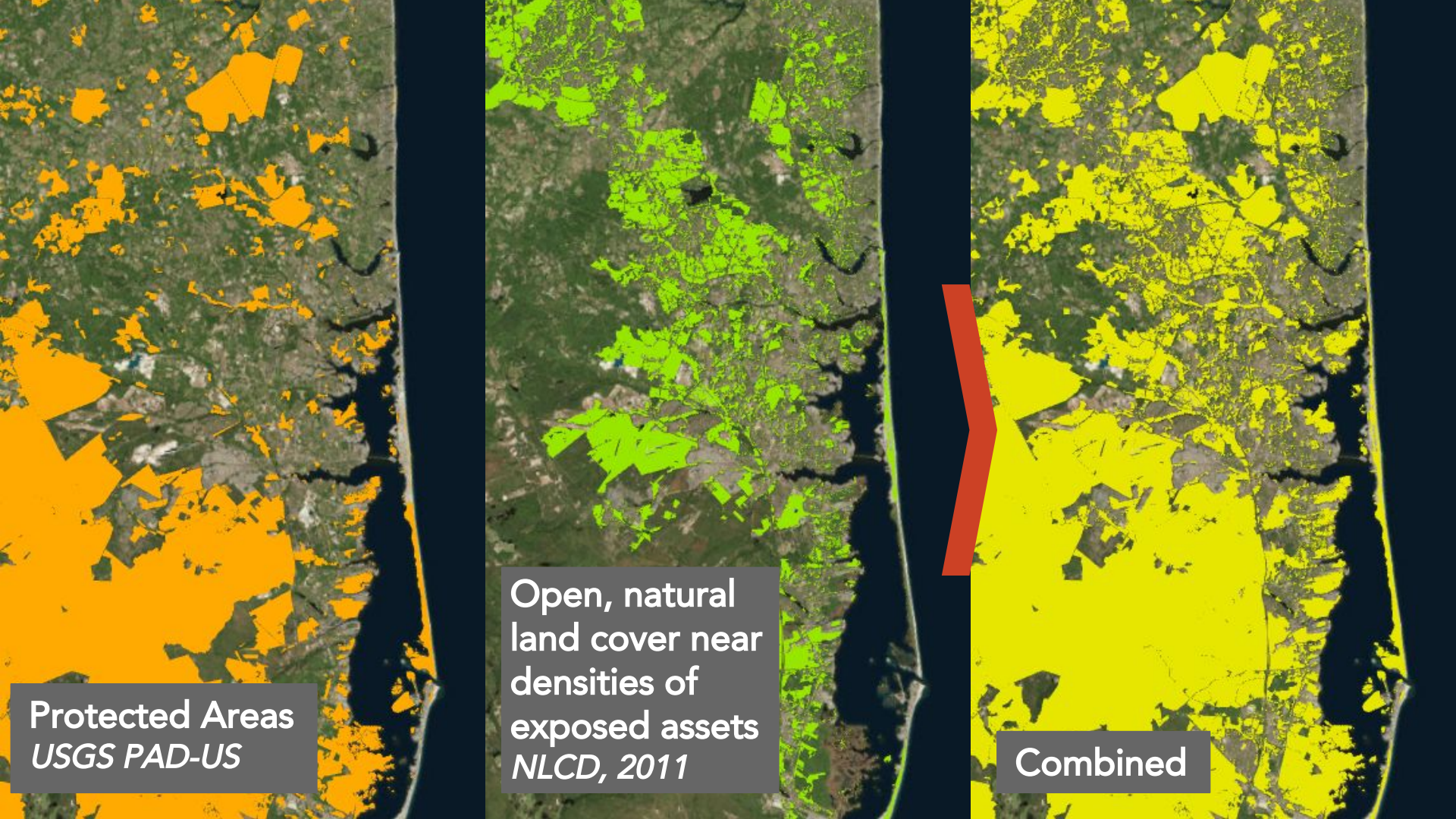




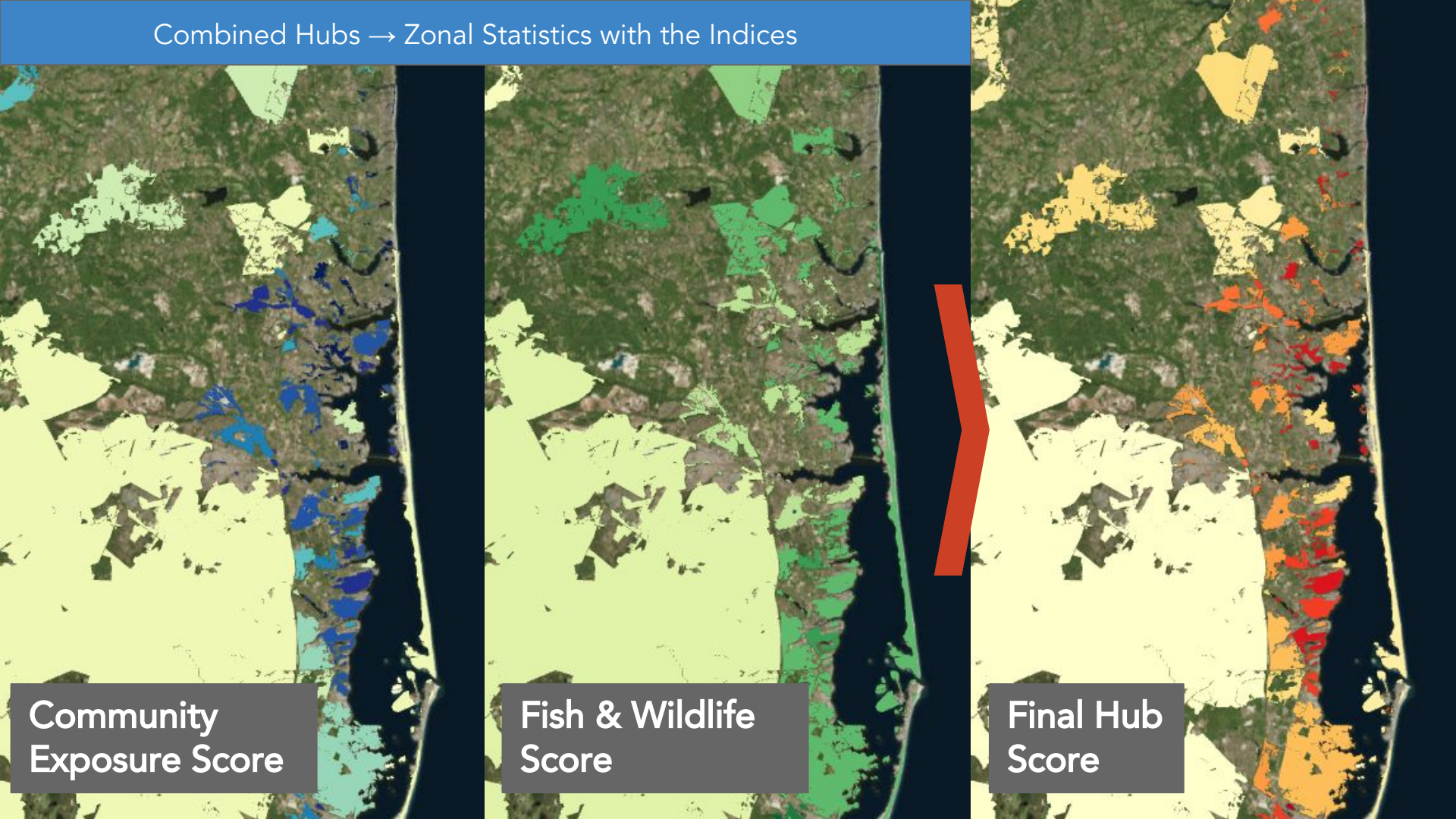
Hubs

How to identify and prioritize landscapes that can build resilience for both community assets and fish & wildlife?

- Large, contiguous tracts of open land
- Provide communities protection and buffering from storms
- Ideal for restoration, enhancement, and expansion projects
- Look at these places through the lens of community exposure and critical fish & wildlife habitat


Protected Areas
USGS PAD-US
Open, natural land cover near densities of exposed assets
NLCD, 2011
Combined

Combined Hubs → Zonal Statistics with the Indices



Threat Index

Asset Index

Community Exposure Index

Fish & Wildlife Index

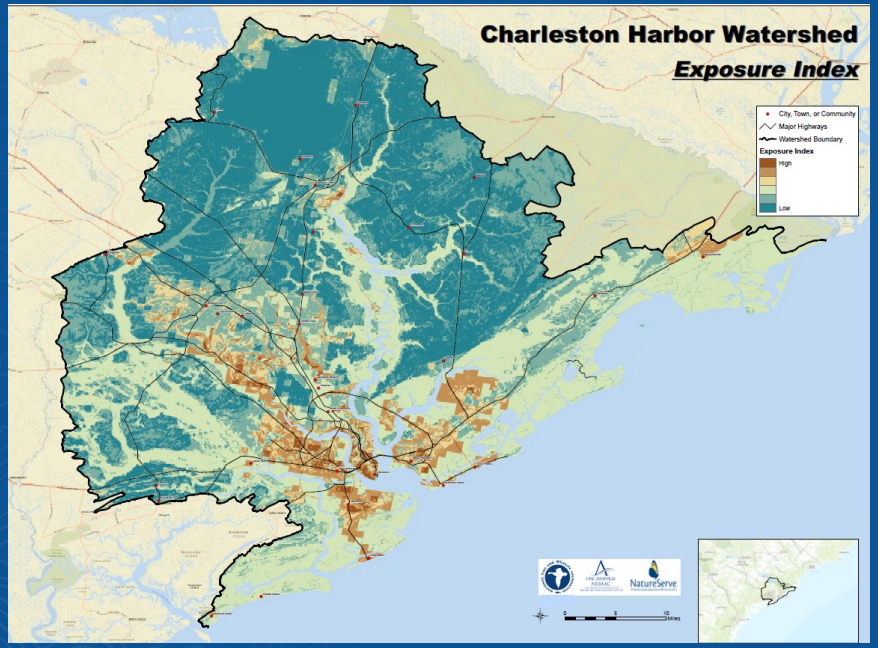
Hubs!
Landscapes that can be used to help communities respond to and recover from flood-related events
AND
Provide benefit to natural habitat

Targeted Watersheds

Targeted Watersheds

Targeted Watershed Assessments

- Deeper dive into select watersheds
- Engage with local stakeholders to:
  - Identify alternative or better, more local-scale data
  - Provide awareness of the Assessment
  - Discuss potential project opportunities and project sites
- The process:
  - Introductory webinar
  - 1-day workshop
  - Follow-up webinars with draft results
  - ½-day workshop with final results

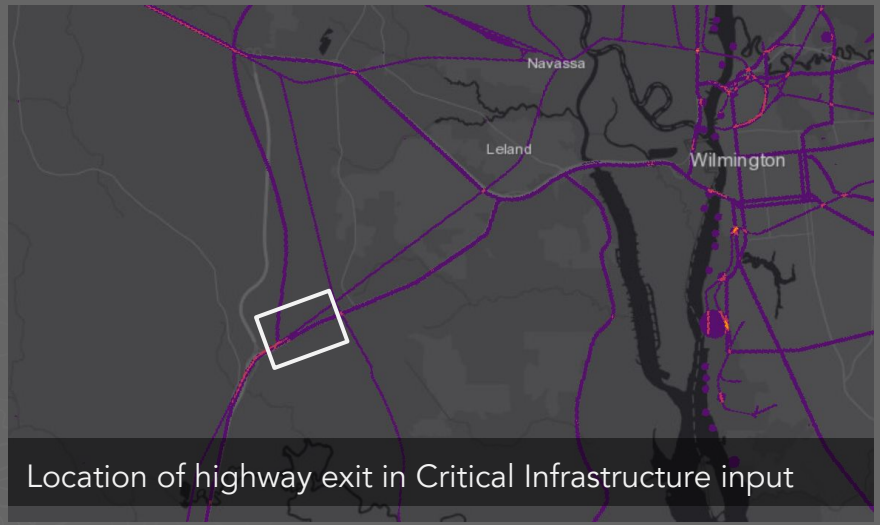


CASE STUDY:

Hurricane Florence

Wilmington, NC

Highway 17 south of Leland, NC. *Image: Ken Blevins, Star News.*



Location of highway exit in Critical Infrastructure input

Location of highway exit in Exposure Index

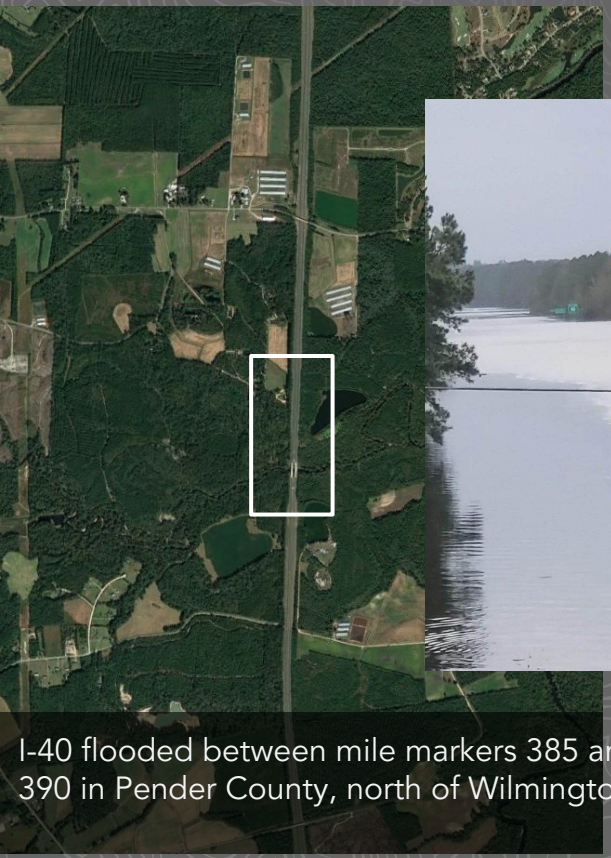
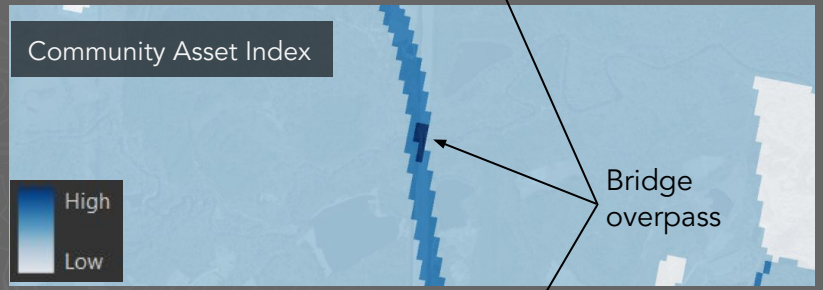


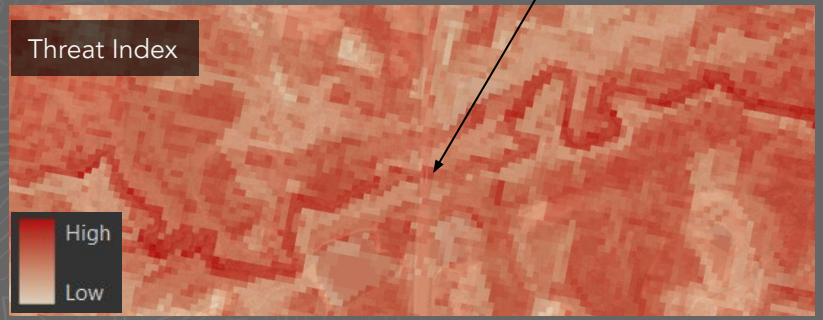
Image: NCDOT

I-40 flooded between mile markers 385 and 390 in Pender County, north of Wilmington.

Exposure
High
Low



Bridge overpass



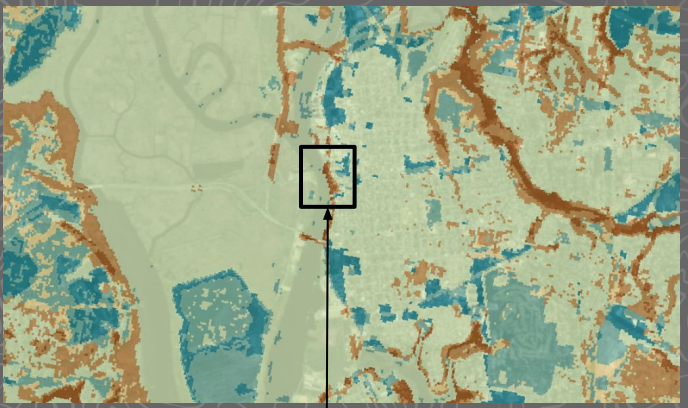
Lake Sutton, north of Wilmington, overflowed and flooded U.S. 421 (*image: Google Earth*)

Part of U.S. 421 washed away just south of the Pender-New Hanover County line near Wilmington, Sept. 21. (*image: Matt Born, Star News*)

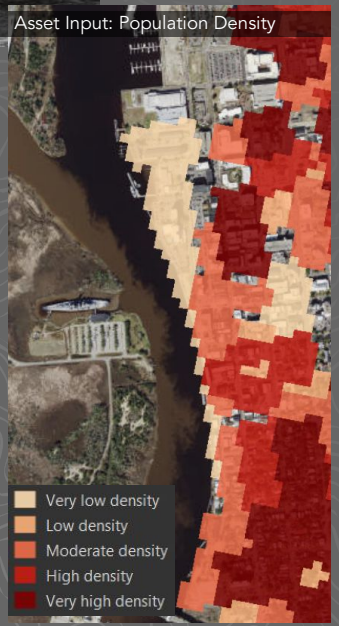
Threat Input: Flood-prone Areas

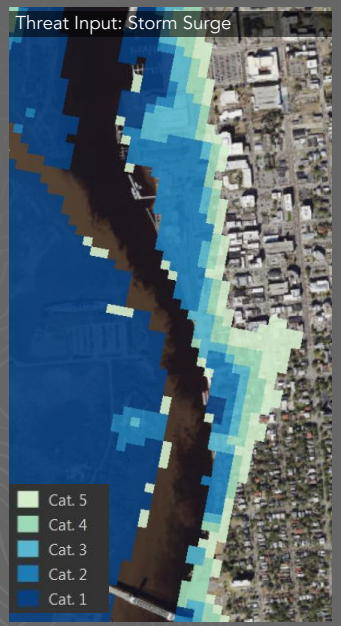
Threat Input: Storm Surge

Floodwaters begin to recede on Water Street in Wilmington. *(image: Ricky Carioti, Washington Post)*



Water St. is a part of Wilmington that is highly exposed

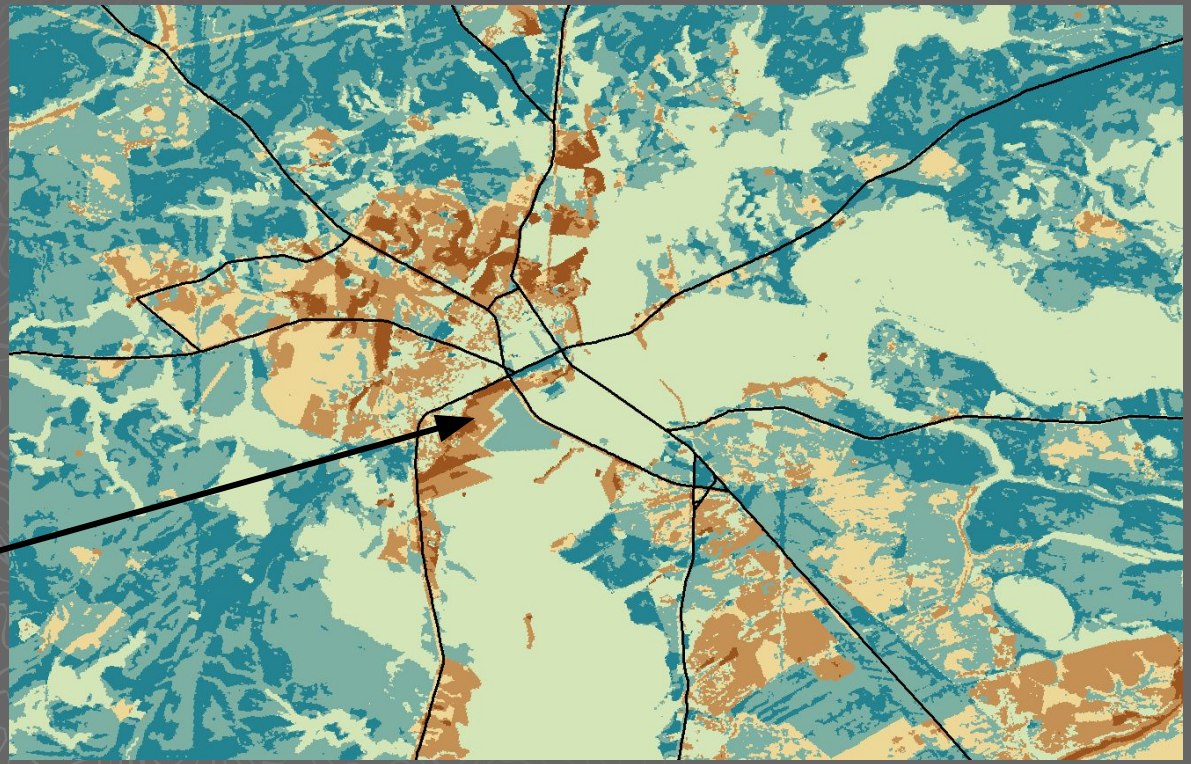




CASE STUDY:

Hurricane Florence

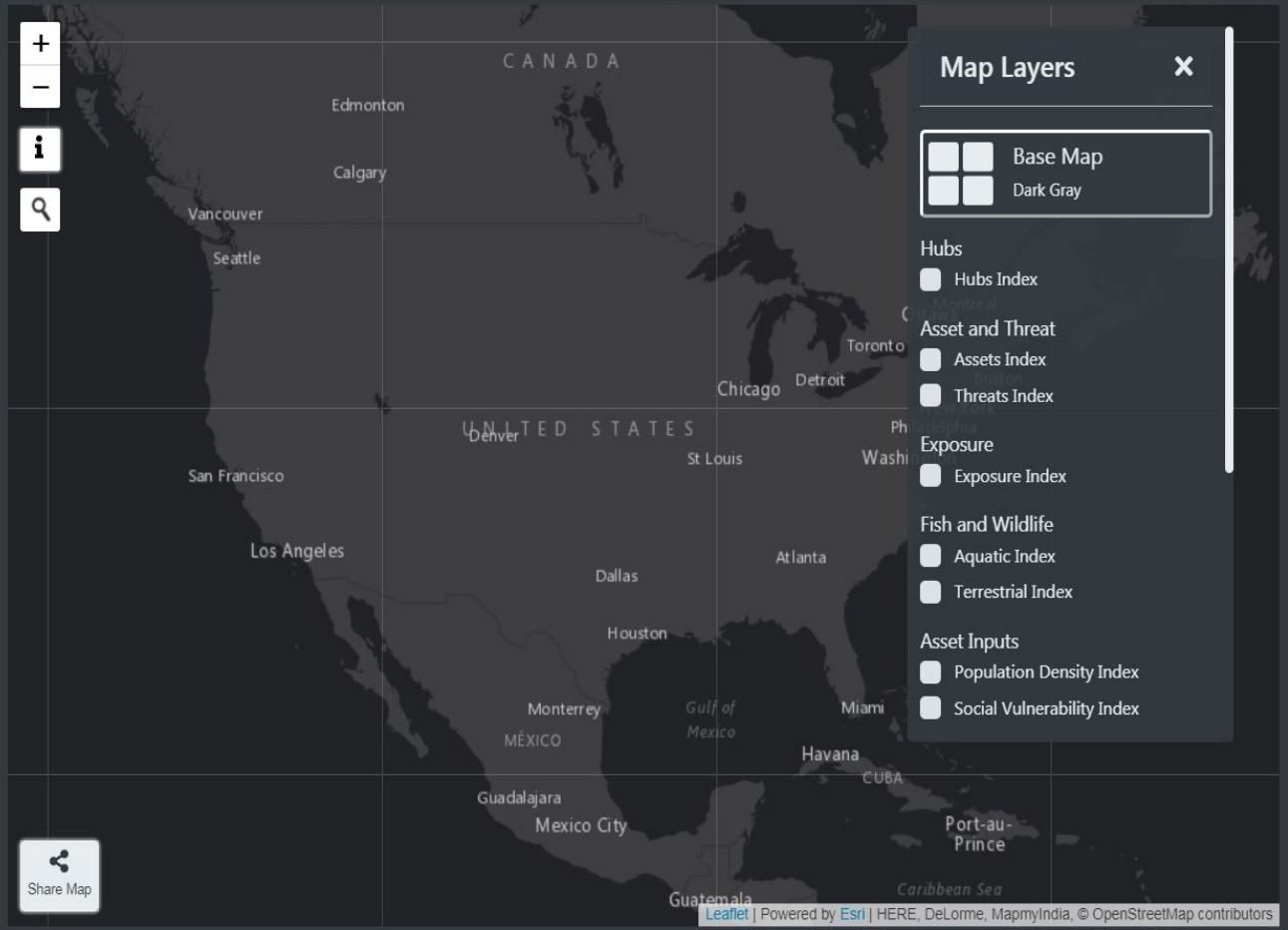
Conway, SC



Web Tool

NFWF Coastal Resilence Assessment

Home | Download Data | About



Map Layers

Base Map
Dark Gray

Hubs
- Hubs Index

Asset and Threat
- Assets Index
- Threats Index

Exposure
- Exposure Index

Fish and Wildlife
- Aquatic Index
- Terrestrial Index

Asset Inputs
- Population Density Index
- Social Vulnerability Index

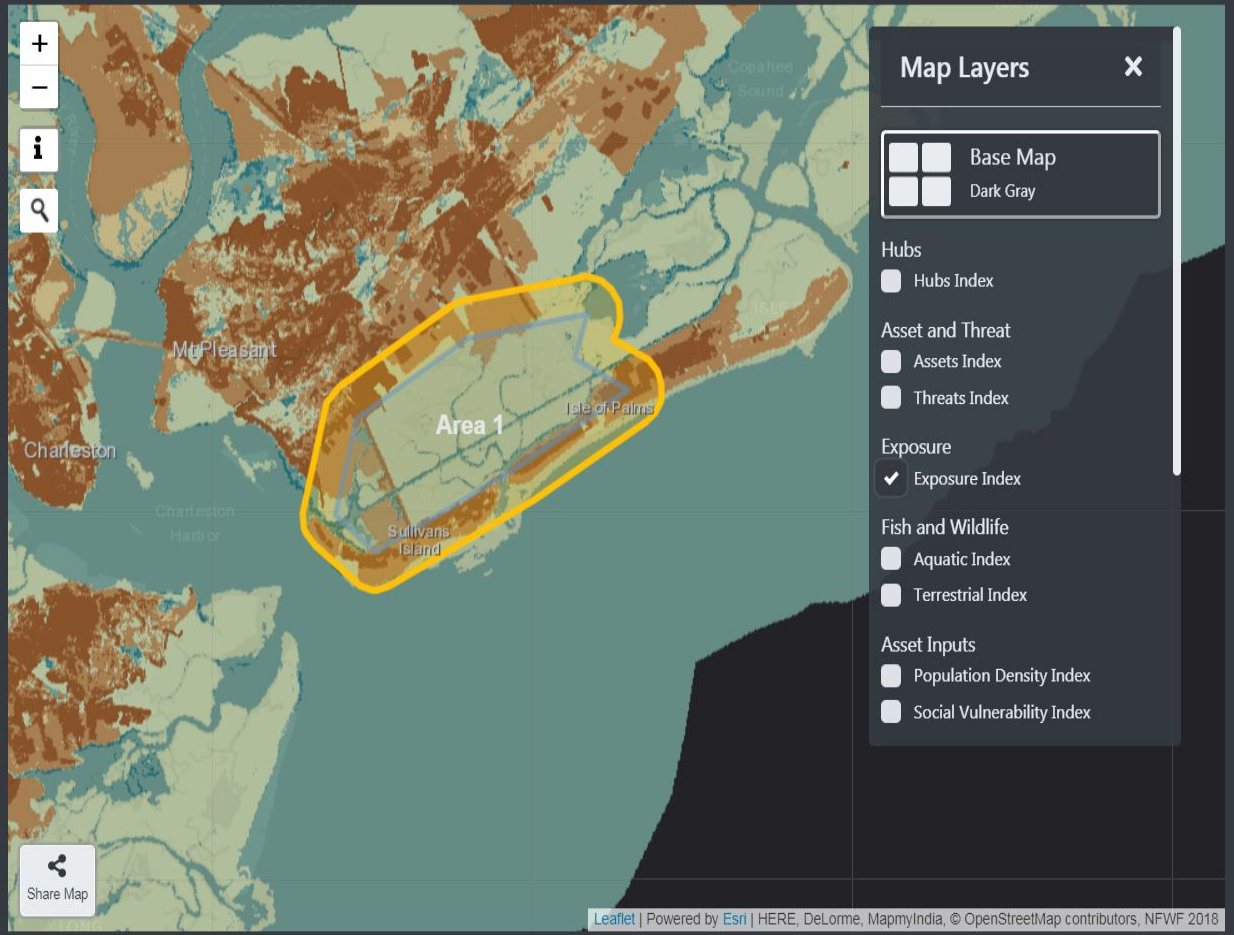
Start Exploring

Clear Areas on map | Draw Area on map | Upload Shapefile | Update Statistics

Click on the map to bring up information. Select multiple points to draw an area and get information on the area.

NFWF Coastal Resilence Assessment

Home | Download Data | About



Start Exploring

Clear Areas on map | Draw Area on map | Upload Shapefile | Update Statistics

Low — High

None | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

Asset and Threat Indexes

Asset Ranking

Low — High

N/A | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13

Threat Ranking

Low — High

Next Steps

- Phase 2 - expanding the Assessment to include Puerto Rico and the U.S. Virgin Islands, Hawaii, Alaska
- Scoring and ranking proposed projects
- Develop process/tool for evaluating metrics of success of projects

Questions?

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