Collaborating with NOAA's Office for Coastal Management

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Office for Coastal Management

April 22, 2015

Maximizing Coastal Management Efforts "Since 2014"

The office catalyzes and influences a broad base of leaders, community residents, and coastal practitioners to ensure these aims:

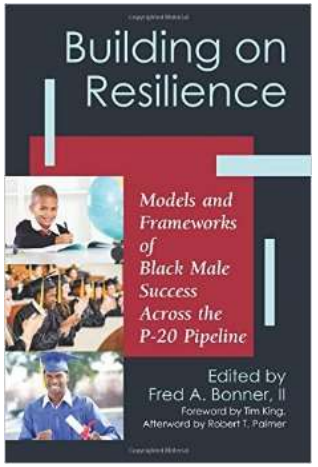
- Healthy coastal ecosystems
- Resilient coastal communities
- Vibrant and sustainable coastal economies

Expertise Is Aligned with Constituent Needs

- Natural and social sciences
- Geospatial data, modeling, and tool development
- Coastal and ocean resource planning
- Policy, education, training, and technical assistance
- Convening, networking, facilitating, and communicating

Resilience

GLOBAL RESILIENCE PARTNERSHIP



13 October
INTERNATIONAL DAY FOR DISASTER RISK REDUCTION 2014
Resilience is for life.

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What Is at Stake?

Insured Property Values in Coastal States, 2012

Source: Data from Clark and Co.

Resilient Communities

- Coastal Lifelines at Risk
- Economic Disruption
- Vulnerable Ecosystems
- The State of Coastal Adaptation

Sandy: A Turning Point?

Call to Action

Achieve A More Resilient Nation

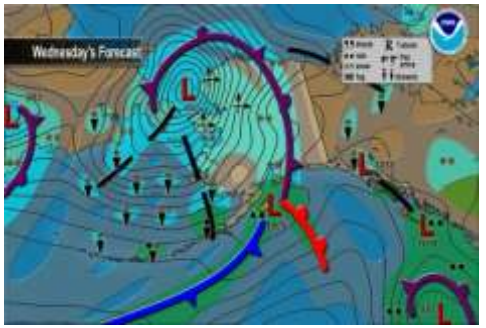
- National Academy of Sciences 2012 Report, *Disaster Resilience: A National Imperative*
- Presidential Policy Directive 8 on National Preparedness
- President's Climate Action Plan

Managing Risk: A Systematic Approach

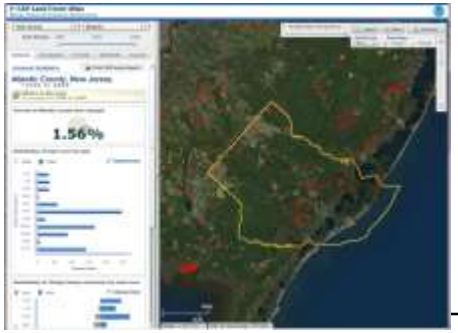
Planning for Long-Term Resilience

Promoting Resilience to Coastal Hazards and Climate

Building a Weather-Ready Nation



Supporting Community Livability



Ensuring Safe, Efficient, and Environmentally Sound Navigation

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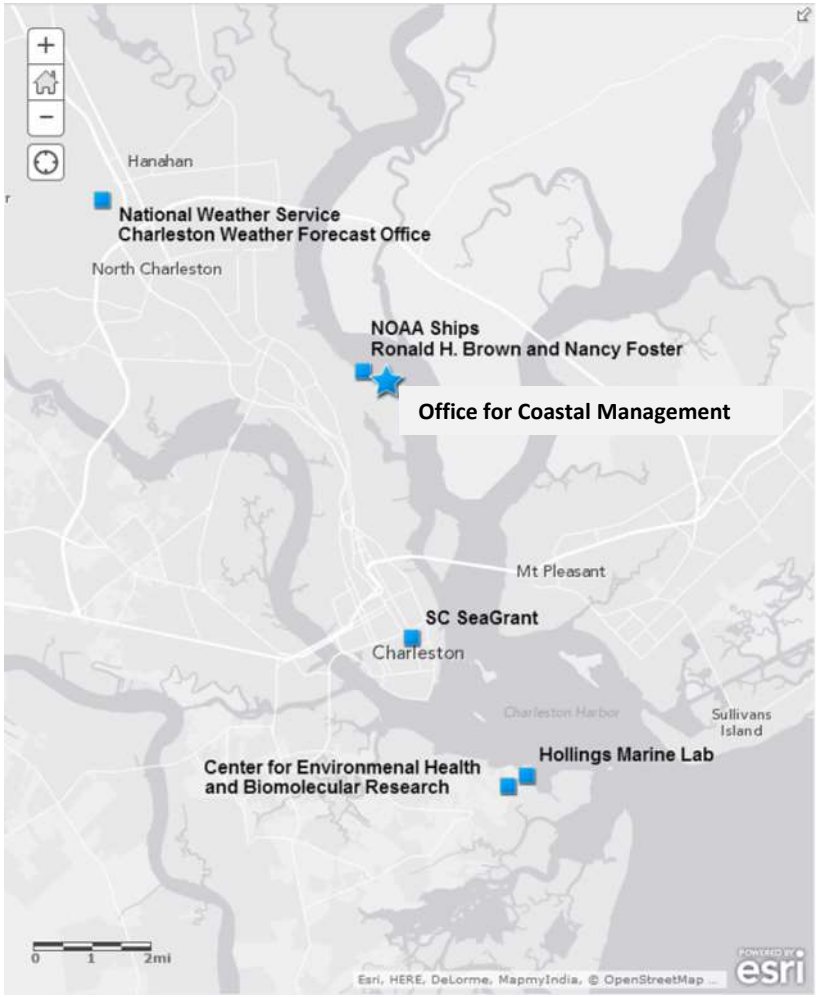
NOAA in the Charleston Area

- NWS Charleston Weather Forecast Office
- NOAA Ships Ronald H. Brown and Nancy Foster
- NOAA Office for Coastal Management
- South Carolina Sea Grant
- Center for Environmental Health and Biomolecular Research
- Hollings Marine Lab
- NESDIS National Environmental Information Service
- NMFS Office of Habitat Conservation



NOAA Contributions to the NAS Resilient America Roundtable effort

- Office for Coastal Management
- Climate Program Office
- National Centers for Coastal Ocean Science
- Integrated Ocean Observing System
- Office of Program Planning and Integration
- Office of Habitat Conservation
- Sea Grant
- National Weather Service

Motivation and Choices

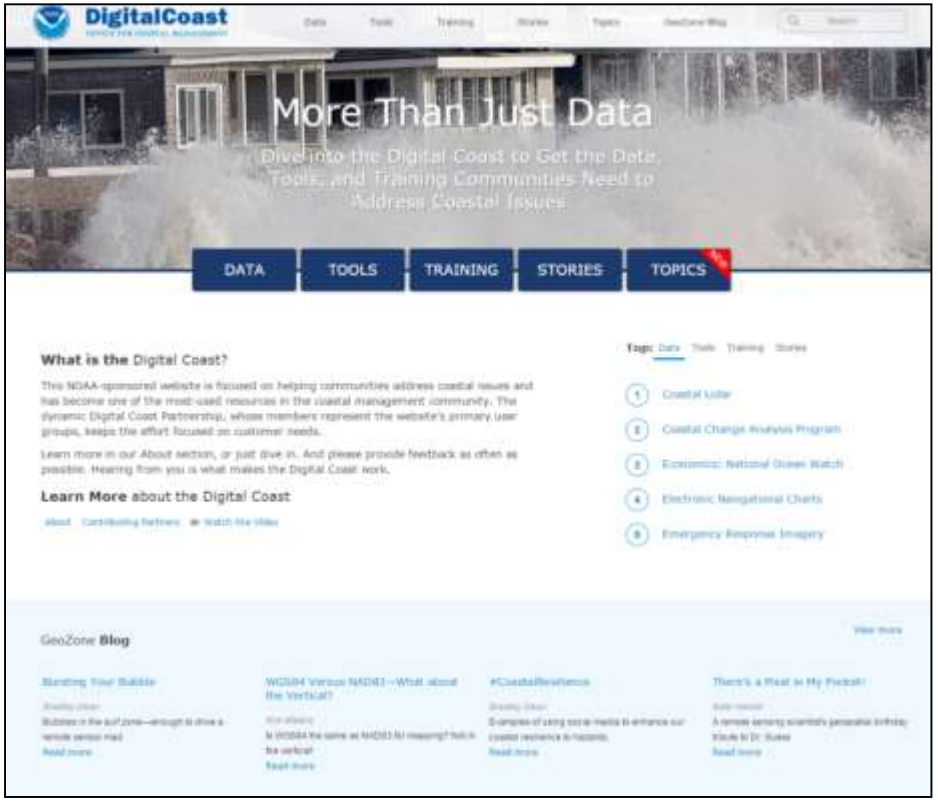
- Is it sufficient to be incremental…OR…must we be ***transformative***?
- What does a ***culture of resilience*** look like?
- How does the role and sufficiency of ***science and technology*** drive decision making?

Demo

Russell Jackson
Coastal Hazards Specialist
National Oceanic and Atmospheric Administration (NOAA)
Office for Coastal Management

Digital Coast

- **Approach:** Bring the geospatial and coastal management communities together
- **Outcome:** A constituent-driven, integrated, enabling platform supporting coastal resource management that is used



http://coast.noaa.gov/digitalcoast/

A Comprehensive Platform Facilitating Use and Application

DISCOVER

Information on coastal inundation impacts through the Coastal Inundation Toolkit

DOWNLOAD

High-resolution digital elevation models via the Data Access Viewer

MAP

Create coastal flood exposure maps to share with stakeholders via the CFEM

ANALYZE

Potential sea level rise impacts with the SLR Viewer

LEARN

How to map inundation through in-person training

SHARE

Outcomes with others though Stories from the Field

DATA → **INFORMATION** → **ACTION**

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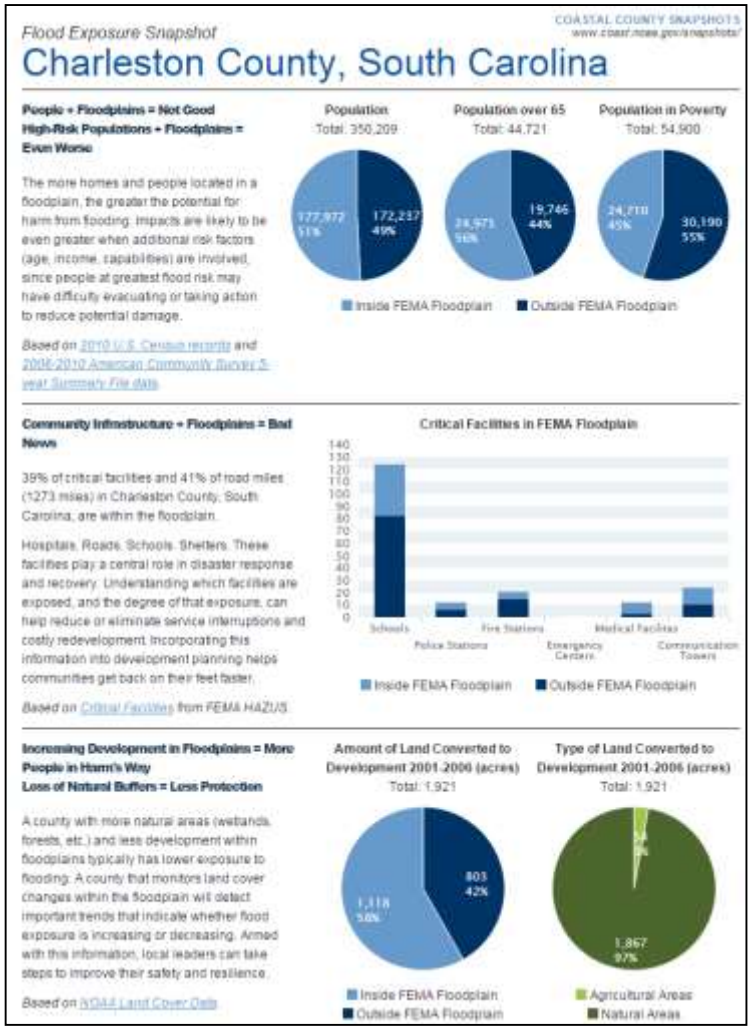
Decision Support Tools: Coastal County Snapshots



Uses:

- Finding demographic information
- Understanding exposure and resilience to flooding for populations both in out of the floodplain
- Identifying economic reliance on coastal resources
- Making comparisons across counties
- Getting downloads that can serve as handouts and education aids

http://coast.noaa.gov/digitalcoast/tools/snapshots

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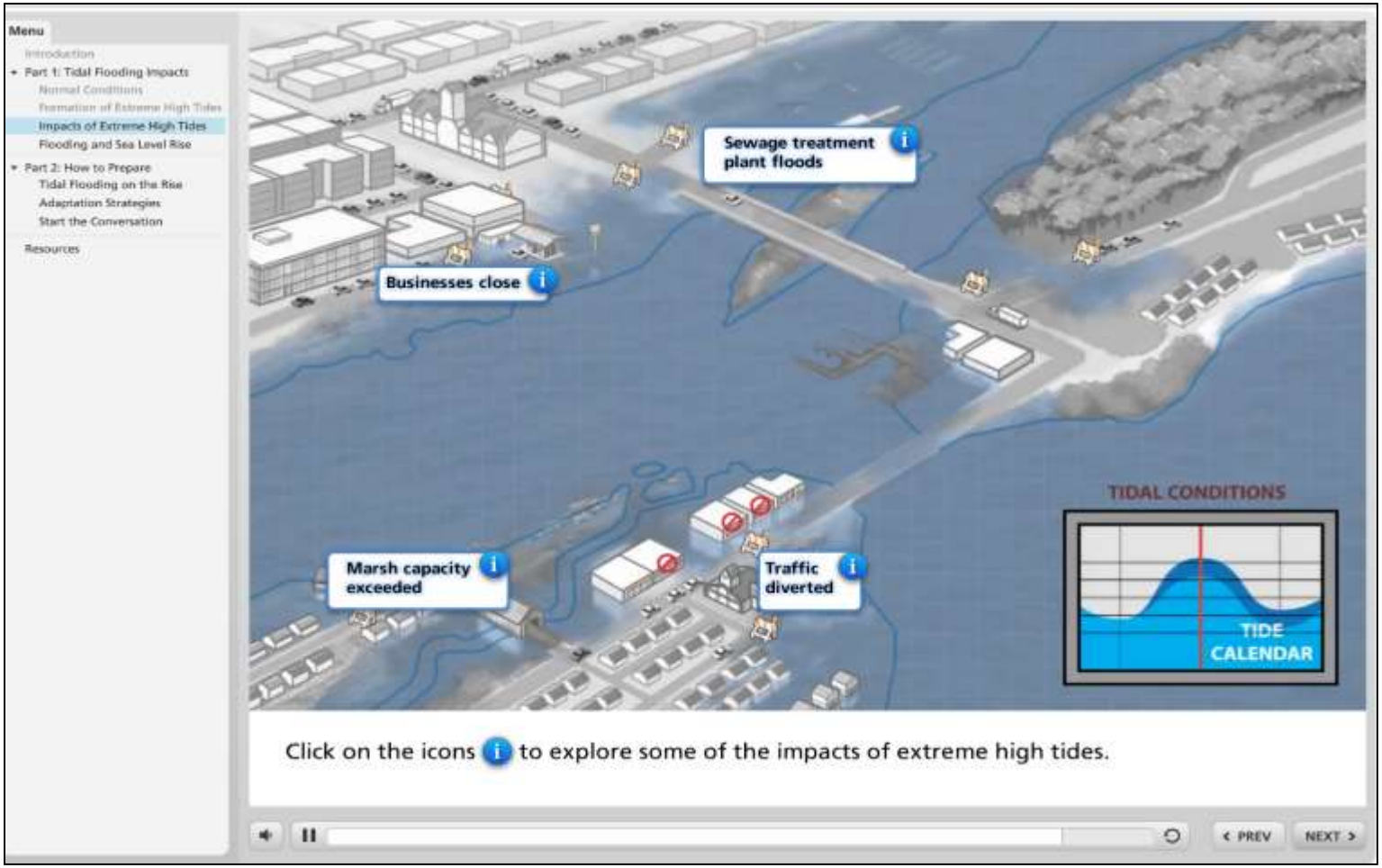
Visualizations

Tidal Flood Impacts



Visualizations

Storm Surge Fast Draw

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Data | Tools | Training | Stories | Topics | GeoZone Blog | Search

Historical Hurricane Tracks

Contributing Partners: NOAA Office for Coastal Management

Overview | In Action

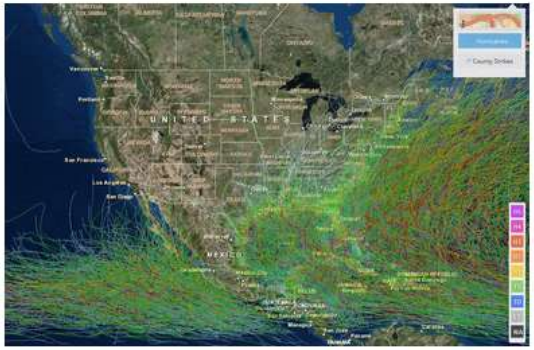
Launch Now

Use this interactive tool to see historical hurricane tracking information.

Features

- **Search and display** hurricane data by storm name, latitude and longitude coordinates, or geographic region
- **View** coastal population data and hurricane strike data for coastal counties from Maine to Texas
- **Access** National Hurricane Center storm reports for the Atlantic and East-Central Pacific Basins
- **Share** specific storm tracks with a unique link

Access previous version



Hurricane Planning and Response

Data, tools, and additional resources you need to get ready for the next big storm

www.coast.noaa.gov/digitalcoast/historical-hurricane-tracks

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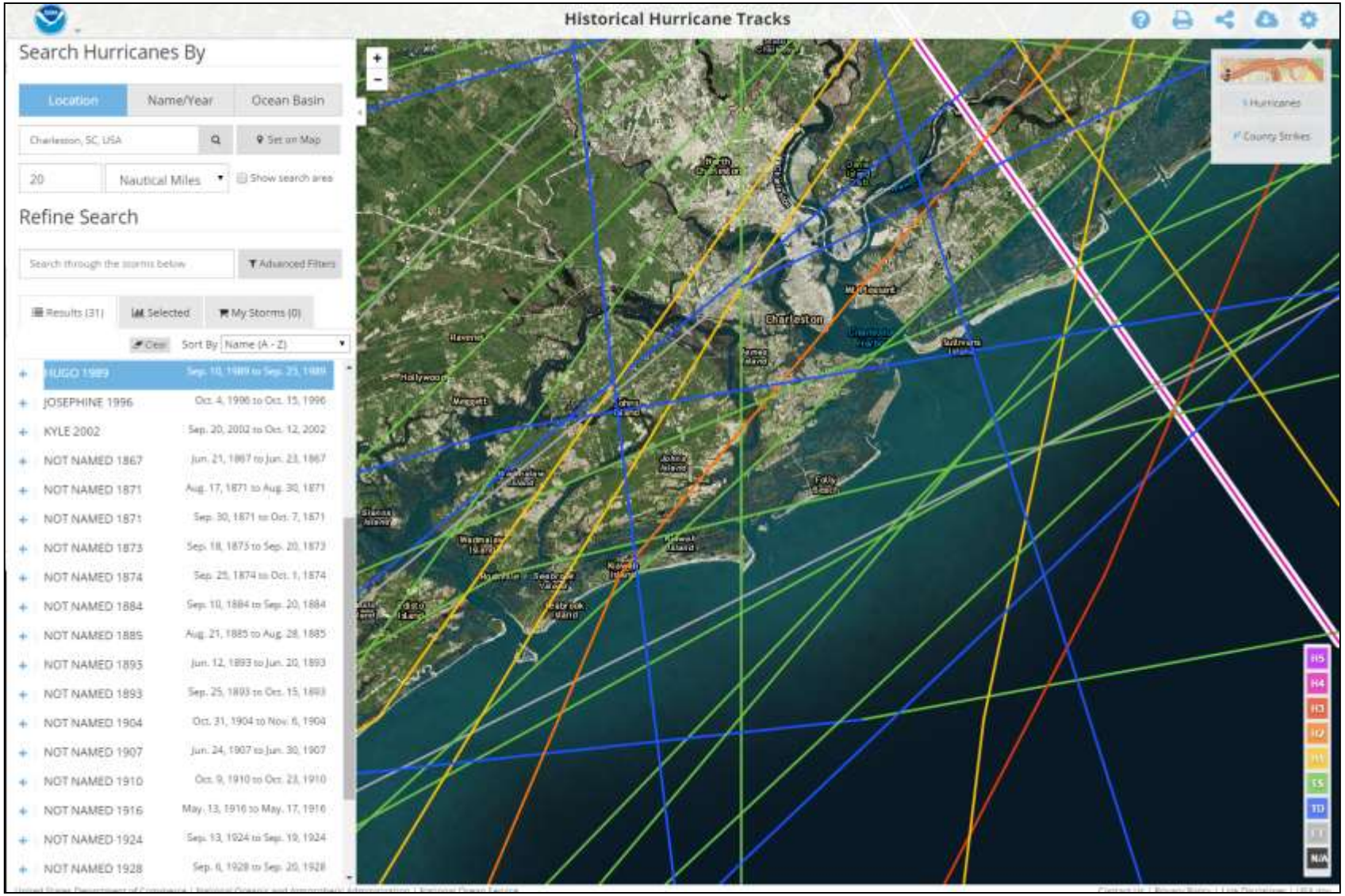

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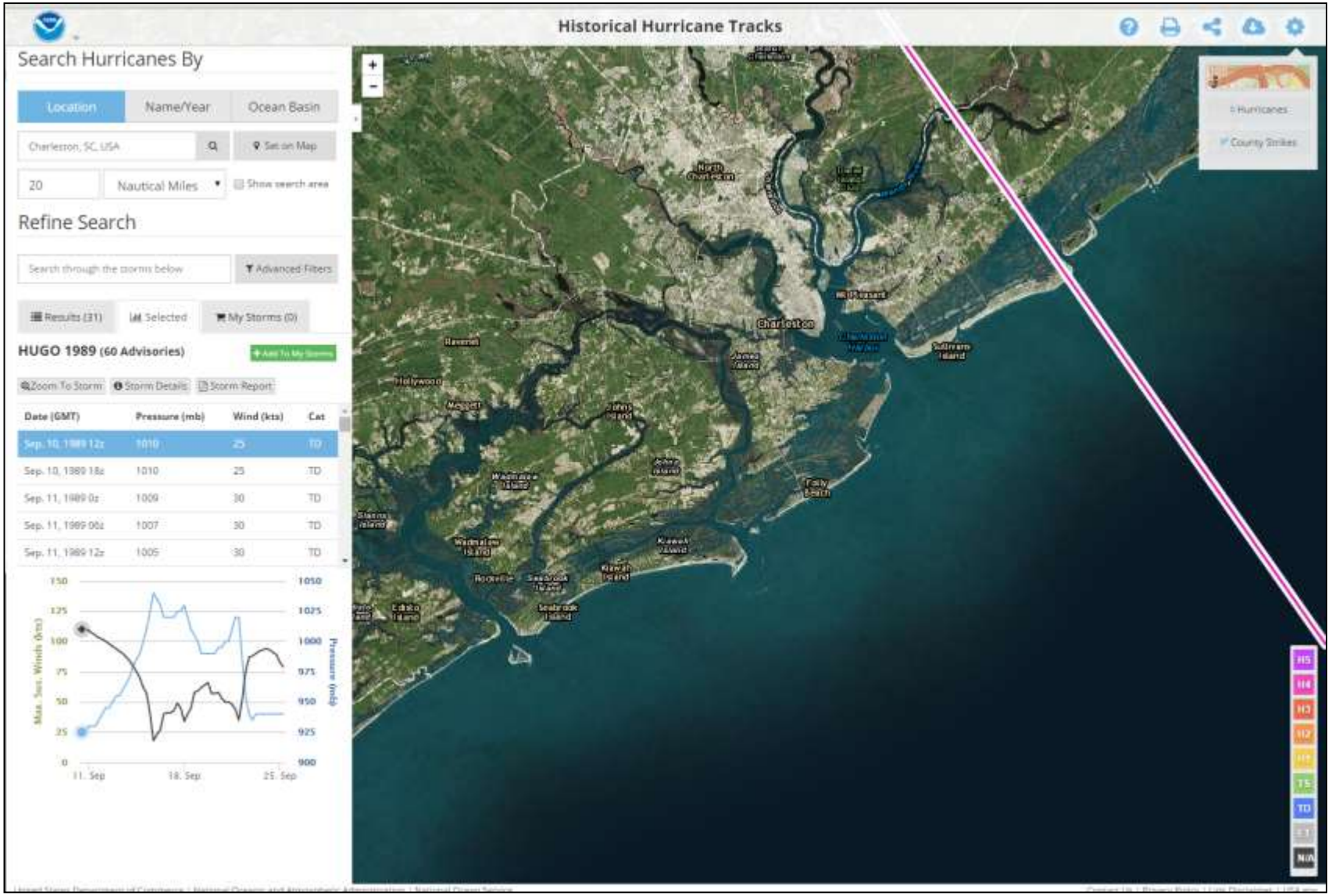

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Coastal Flood Exposure Mapper

Contributing Partners: NOAA Office for Coastal Management

Overview | Support

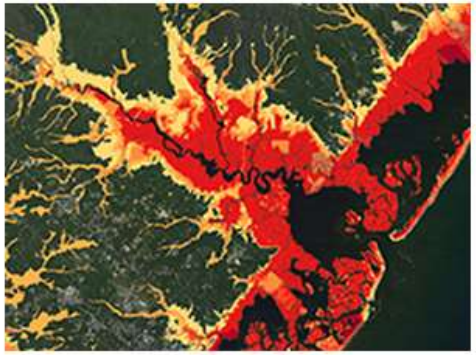
Get It Now

This tool supports users undertaking a community-based approach to assessing coastal hazard risks and vulnerabilities by providing maps that show people, places, and natural resources exposed to coastal flooding. This product is based on knowledge and experiences the Office for Coastal Management has in community-based risk and vulnerability assessments.

The current geography includes the East Coast and Gulf of Mexico.

Features

- **Allows** users to select a location and explore maps that show people, places, and natural resources exposed to coastal flood hazards
- **Creates** a collection of maps to download or share online to communicate flood exposure
- **Provides** guidance for using the maps to engage community members and stakeholders in conversations about potential coastal flood impacts
- **Offers** access to map services and tips on using them in an online mapping platform



Related Data

- Coastal Change Analysis Program Regional Land Cover
- Spatial Trends in Coastal Socioeconomics

Related Training

- Climate Adaptation for Coastal Communities
- Coastal Inundation Mapping
- Introducing Green Infrastructure for Coastal Resilience
- Roadmap for Adapting to Coastal Risk

Related Tools

- C-CAP Land Cover Atlas
- Sea Level Rise Viewer

www.coast.noaa.gov/digitalcoast/tools/flood-exposure

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Help start your community discussions about hazard impacts with maps of your area that show people, places, and natural resources exposed to coastal flooding.

www.coast.noaa.gov/digitalcoast/tools/flood-exposure

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Coastal Flood **Exposure Mapper**

Select the Flood Hazards Map or One of the Community Exposure Maps

Select a section below to view maps showing flood hazards or different aspects of community exposure to those flood hazards.

First-time user? Starting with Flood Hazards is a good idea.

Flood Hazards

Flooding events are among the more frequent, costly, and deadly hazards that can impact coastal communities. There are two types:

- Short-term (episodic) – Temporary flooding caused by extreme conditions, including storm surge, tsunamis, inland flooding, and shallow coastal flooding.
- Long-term (chronic) – Flooding caused by a rise in relative sea level or some other change in conditions.

Societal Exposure

Understanding the populations that live in or near coastal flood-prone areas is an important information need, since residents who are elderly, who live in high-density areas, or who are impoverished may merit special considerations.

Infrastructure Exposure

Community infrastructure, including roads, bridges, and water and sewer systems, can be damaged by coastal flooding. Communities should first assess infrastructure vulnerabilities and associated environmental and economic issues to determine what steps are needed to protect these assets.

Ecosystem Exposure

Natural areas provide important benefits to coastal communities, including hazard protection, flood storage, water quality maintenance, fisheries support, and recreational opportunities. Communities can increase resilience by protecting natural areas along the coast that are exposed to flooding and adjacent inland areas.

www.coast.noaa.gov/digitalcoast/tools/flood-exposure

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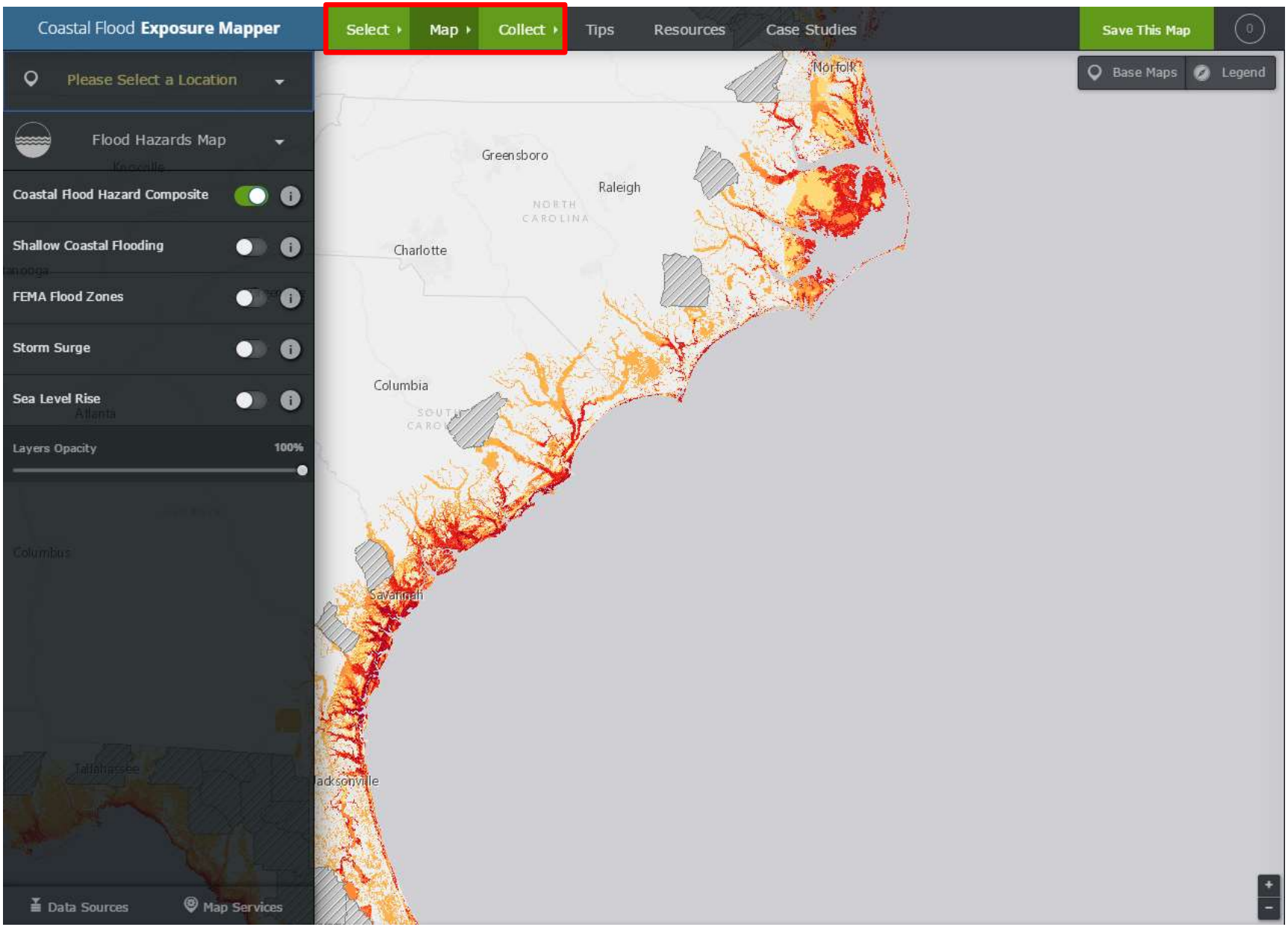

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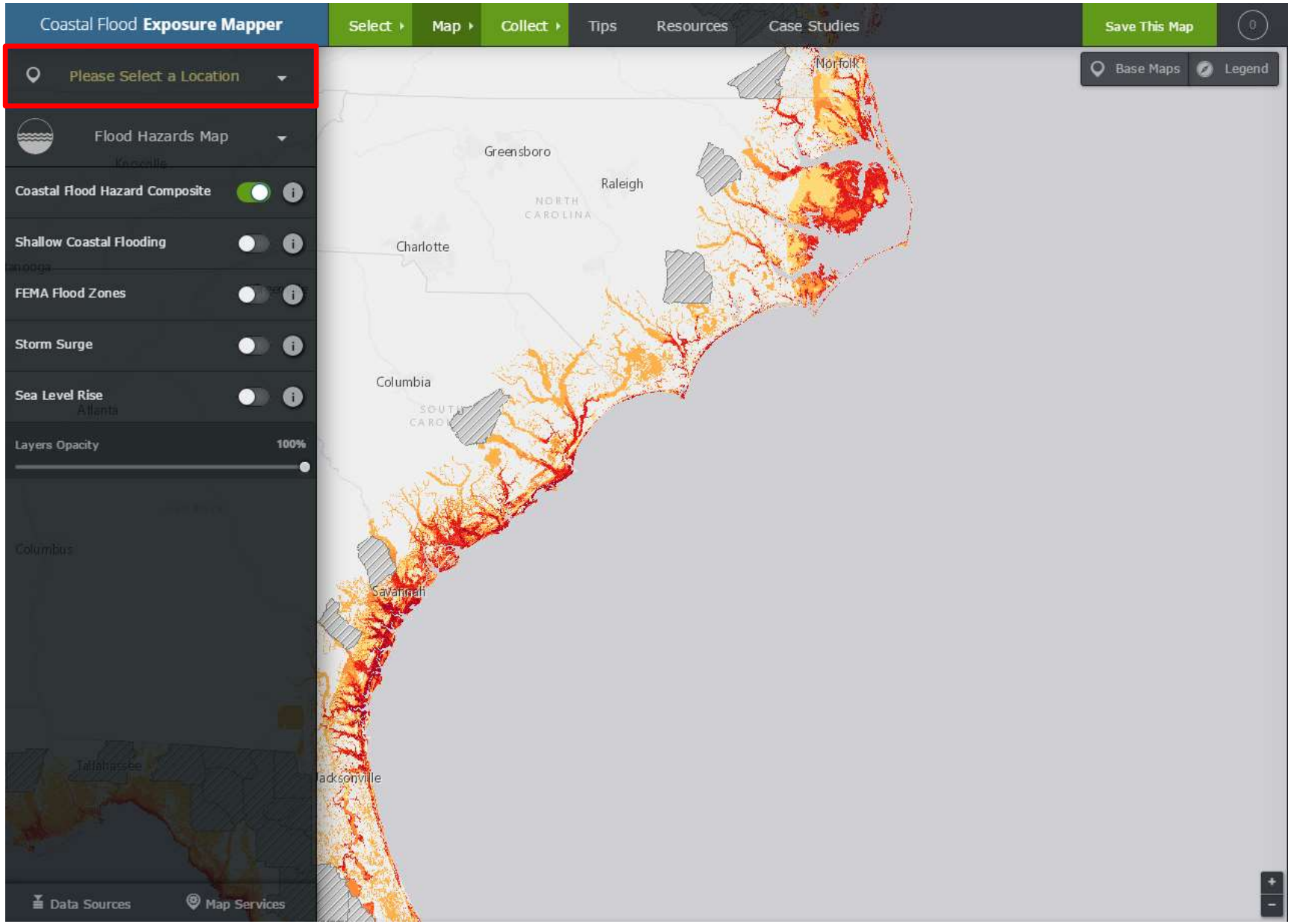

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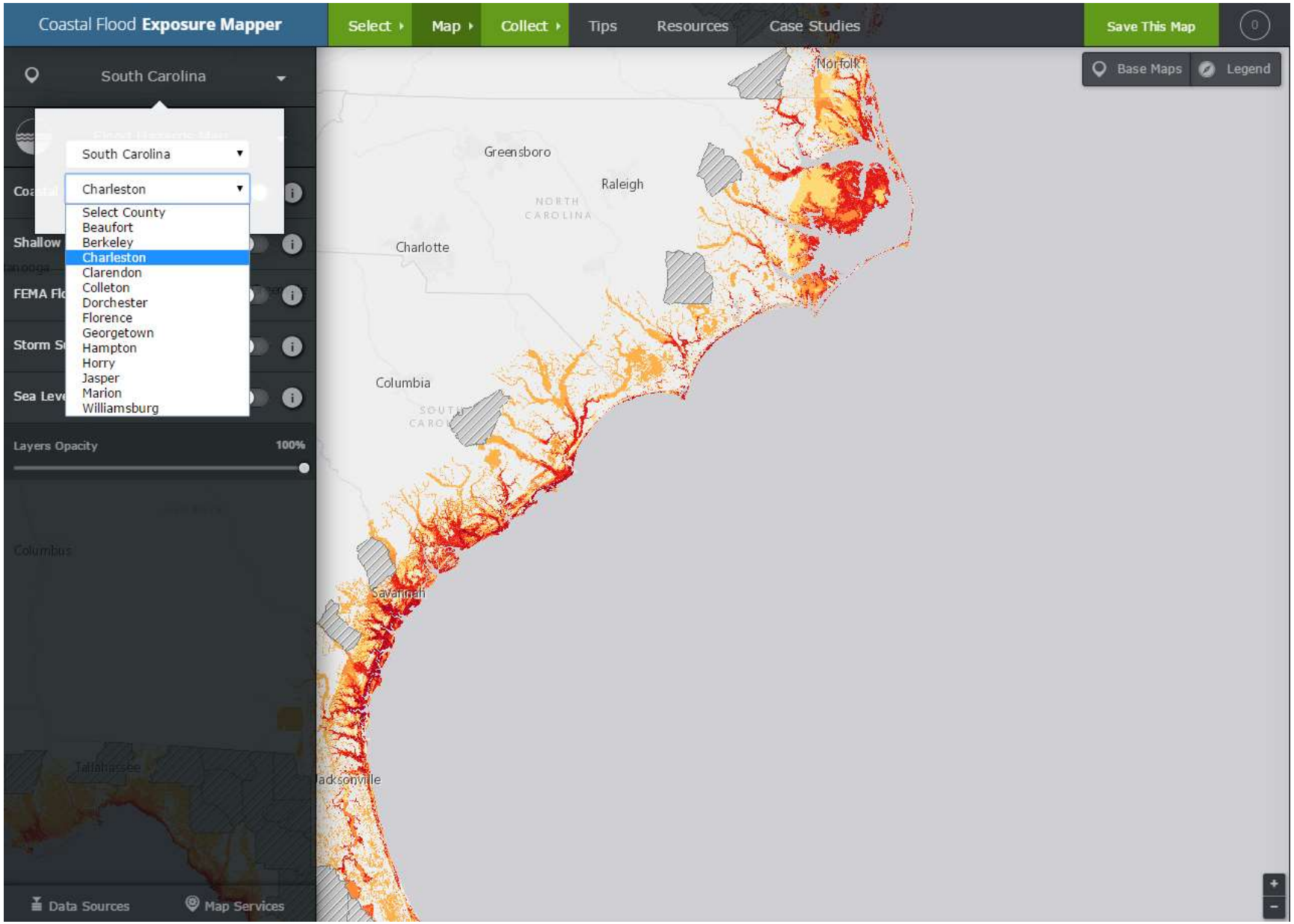

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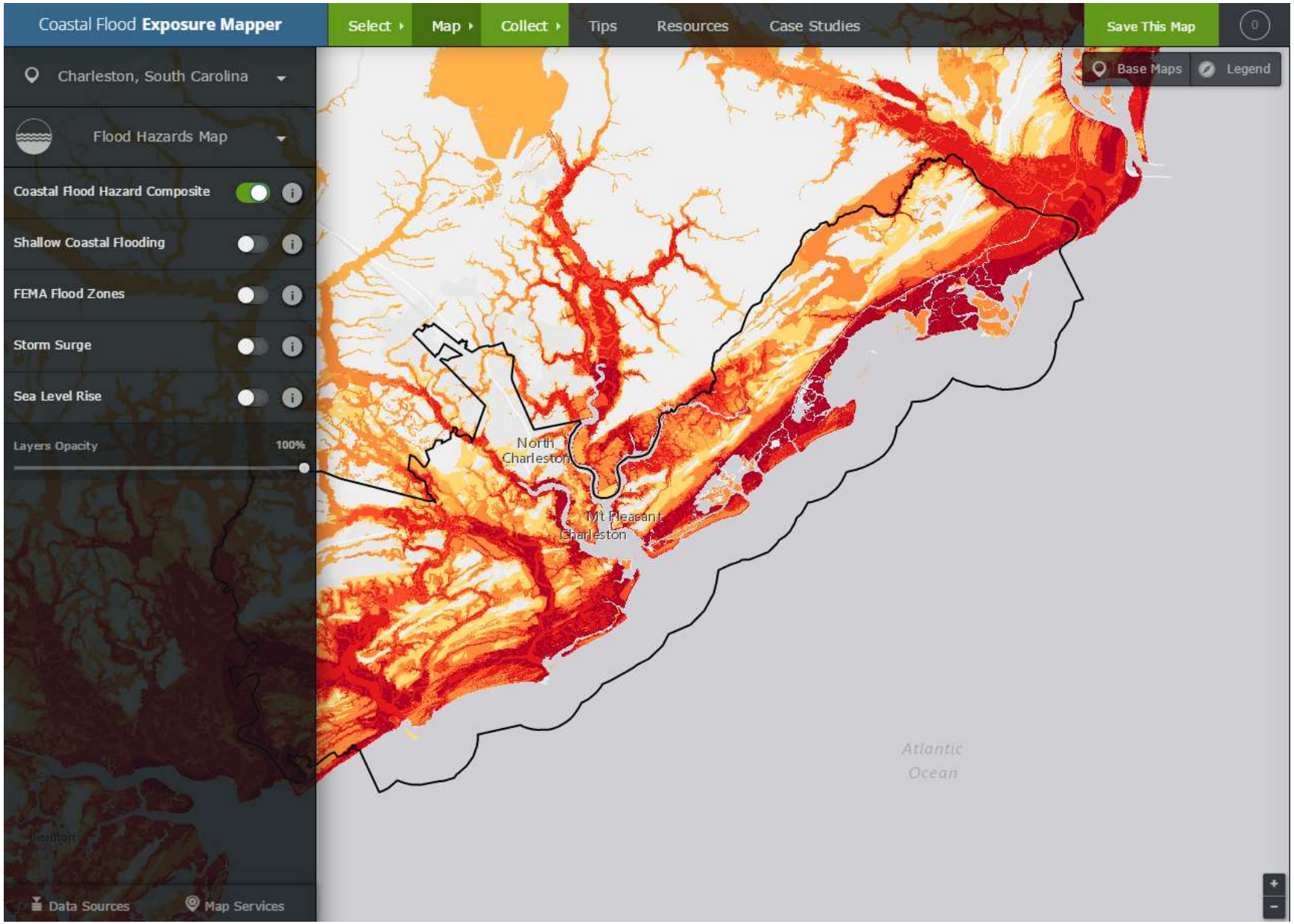

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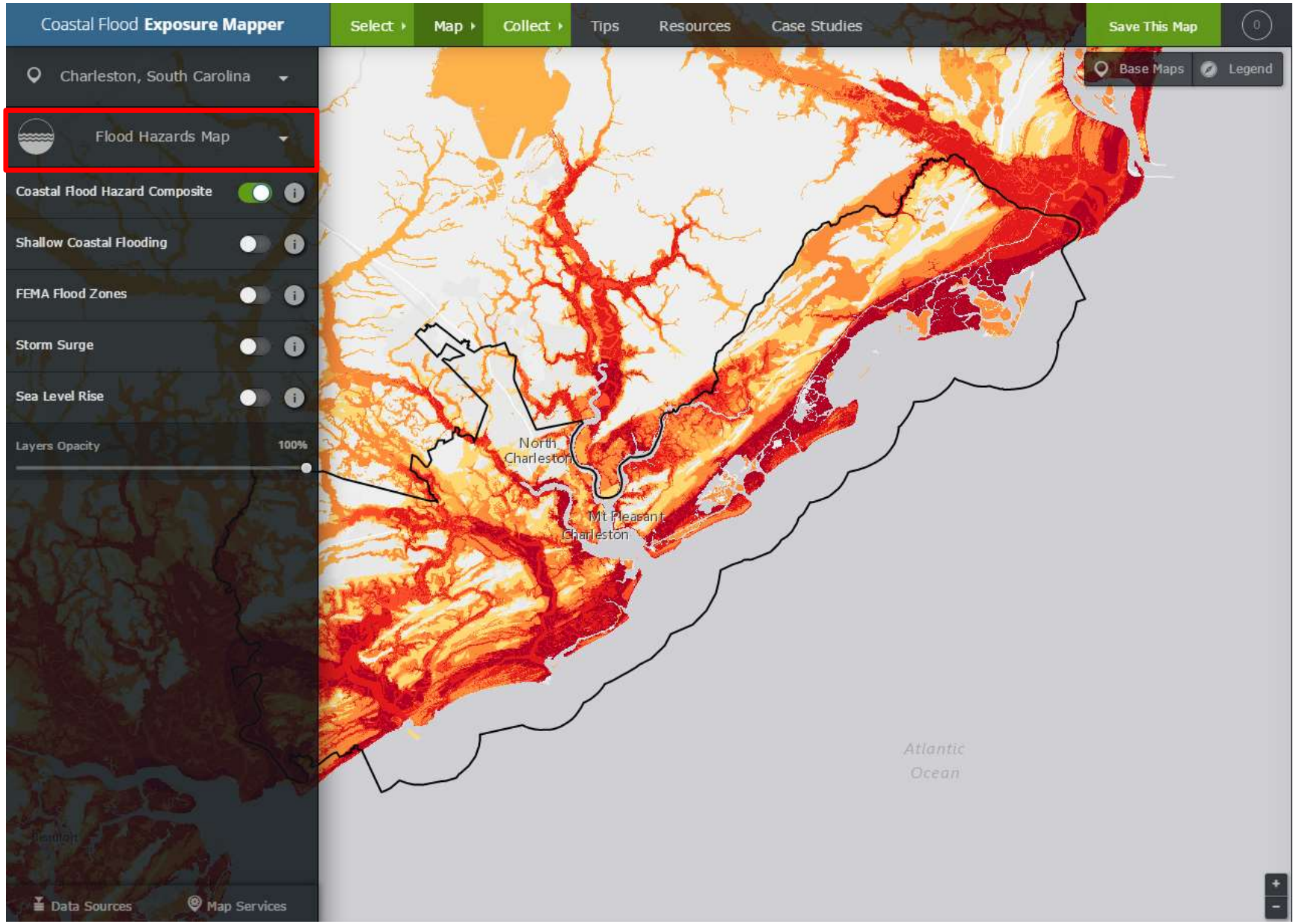

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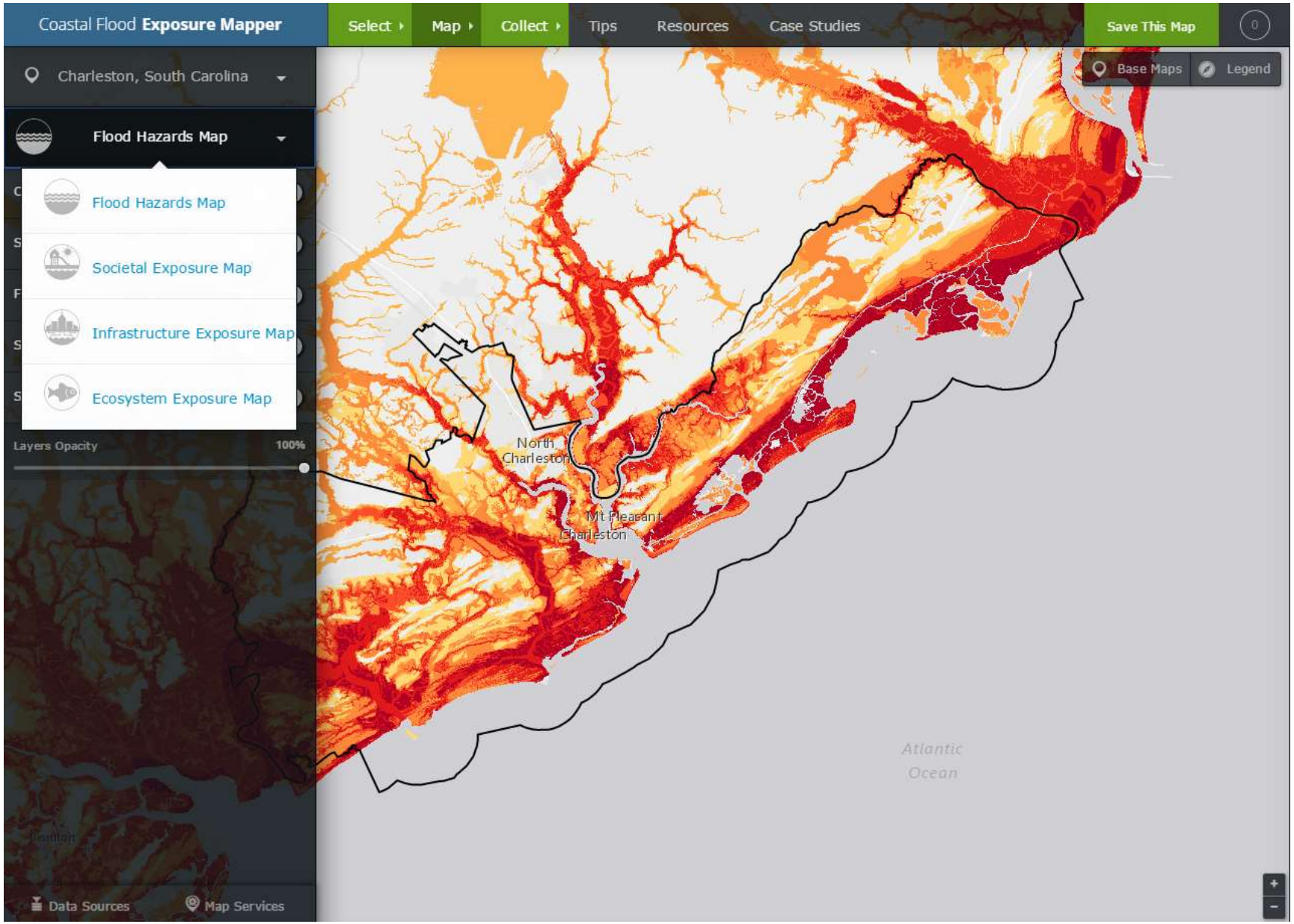

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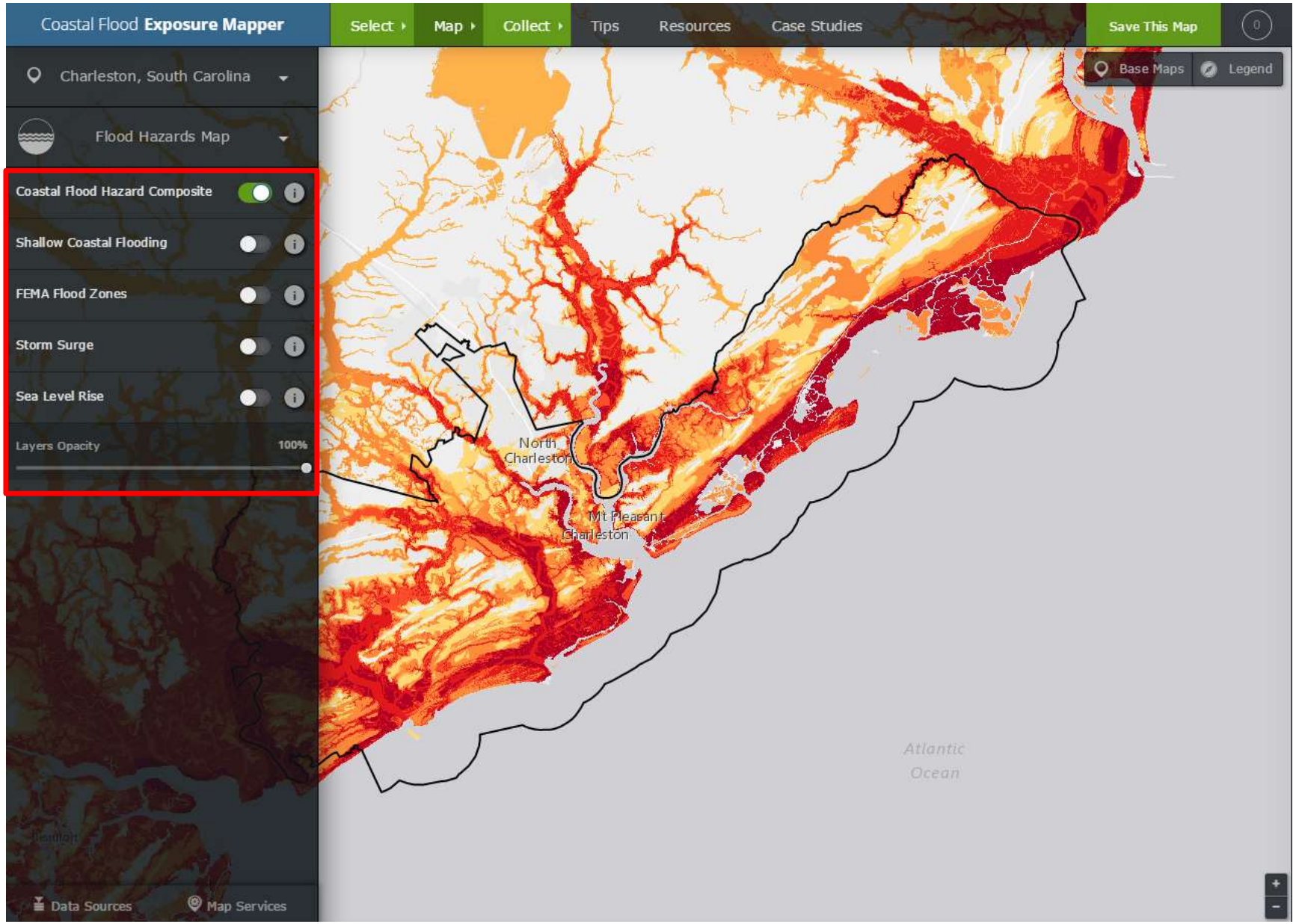

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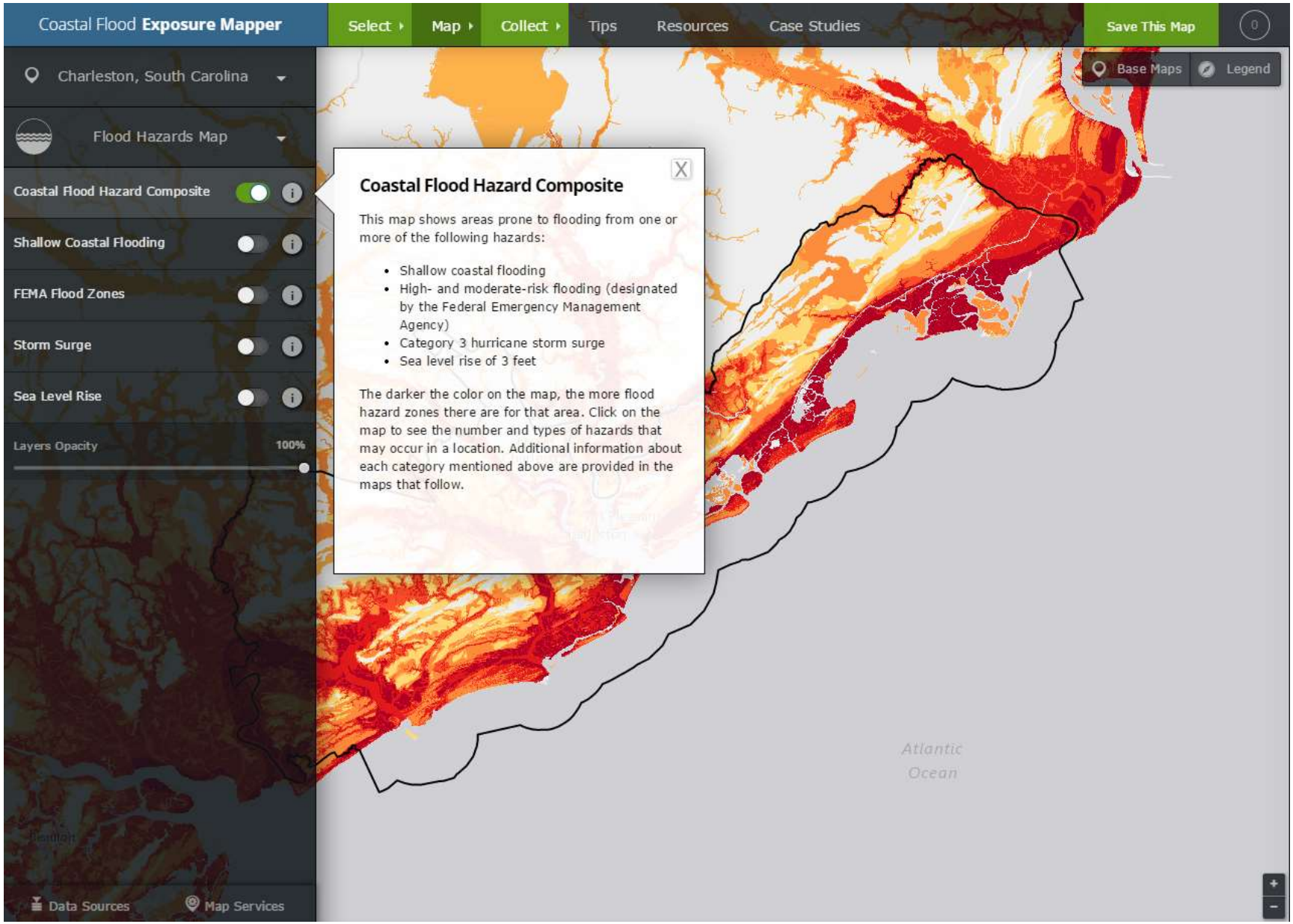

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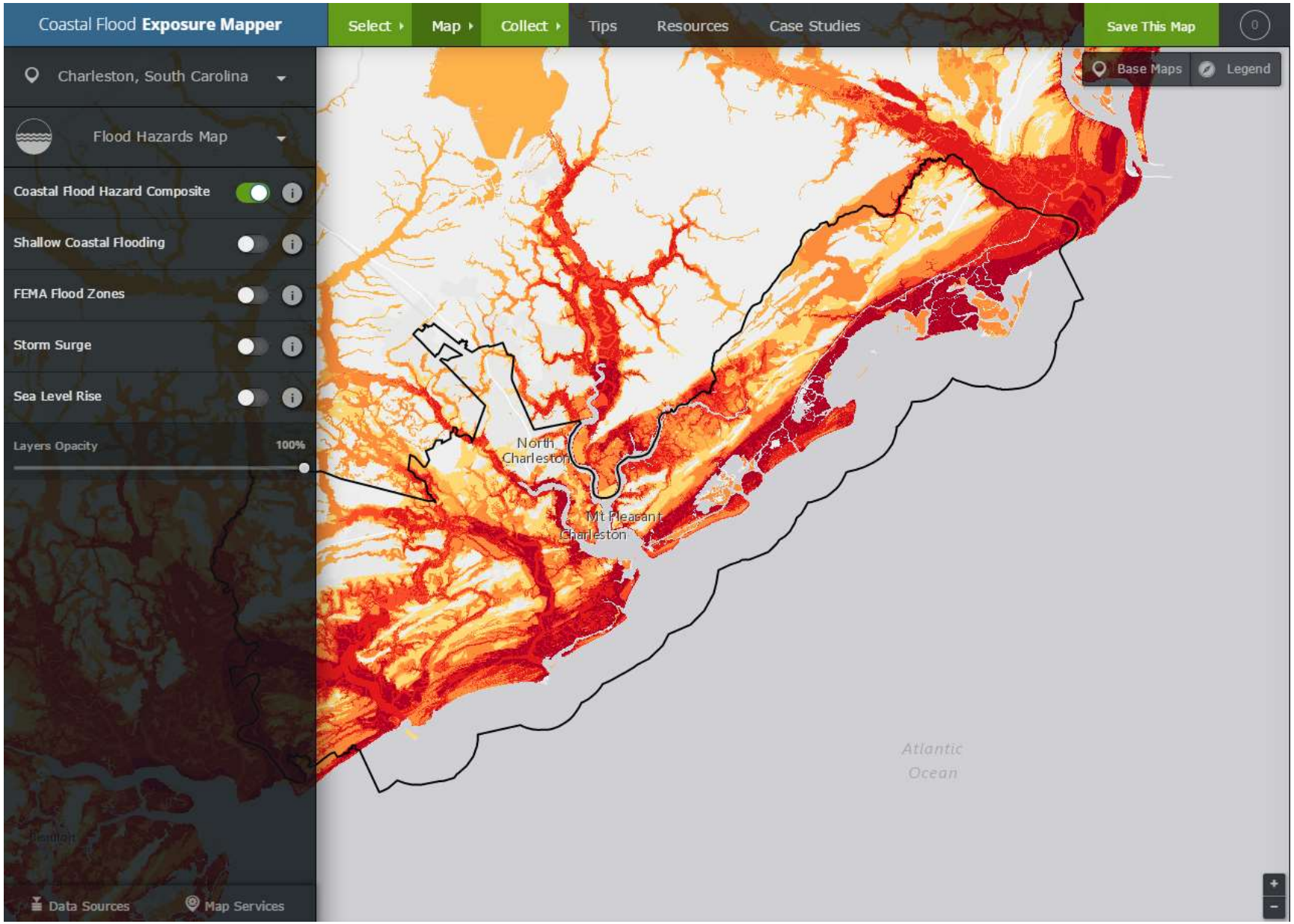

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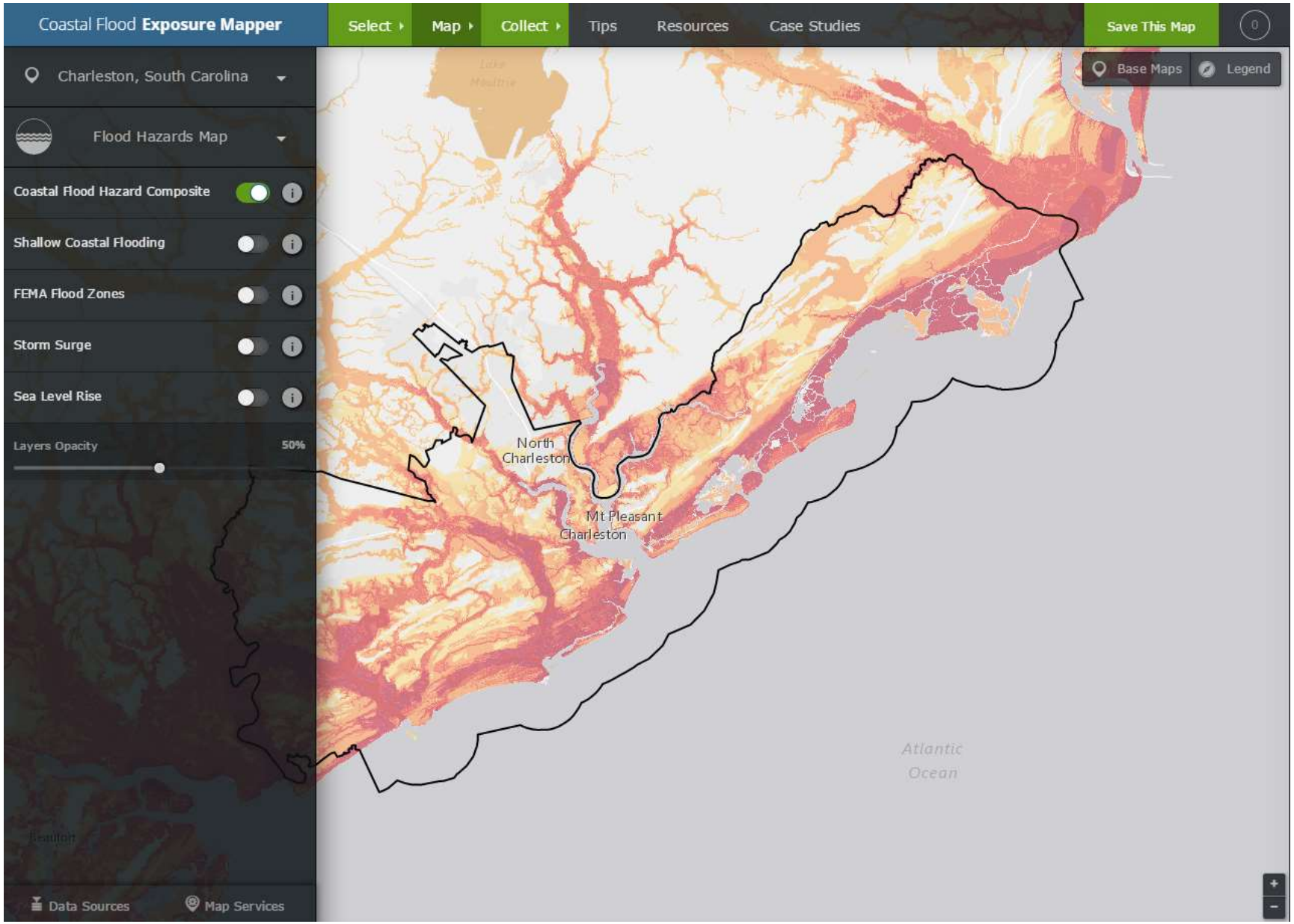

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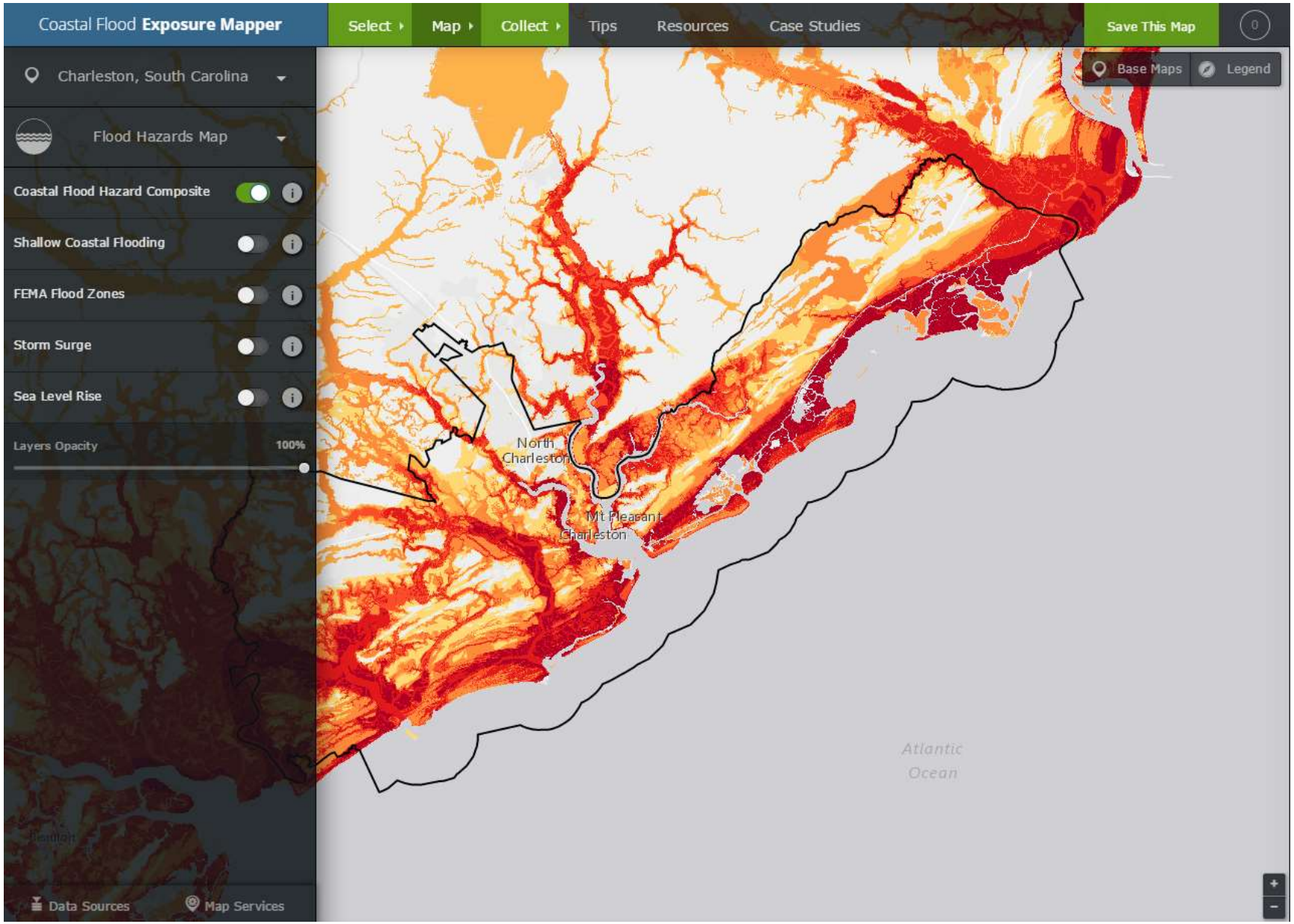

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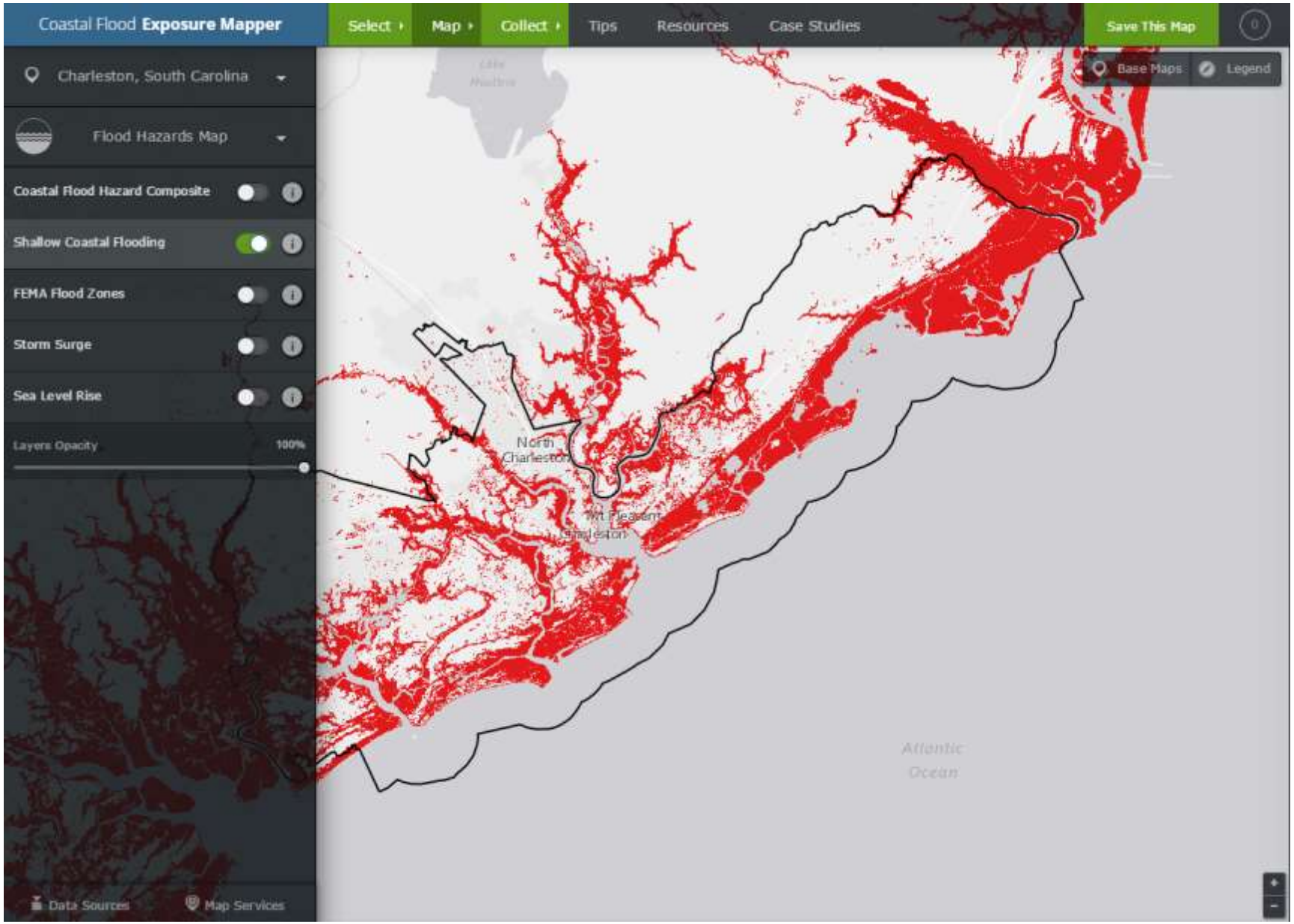

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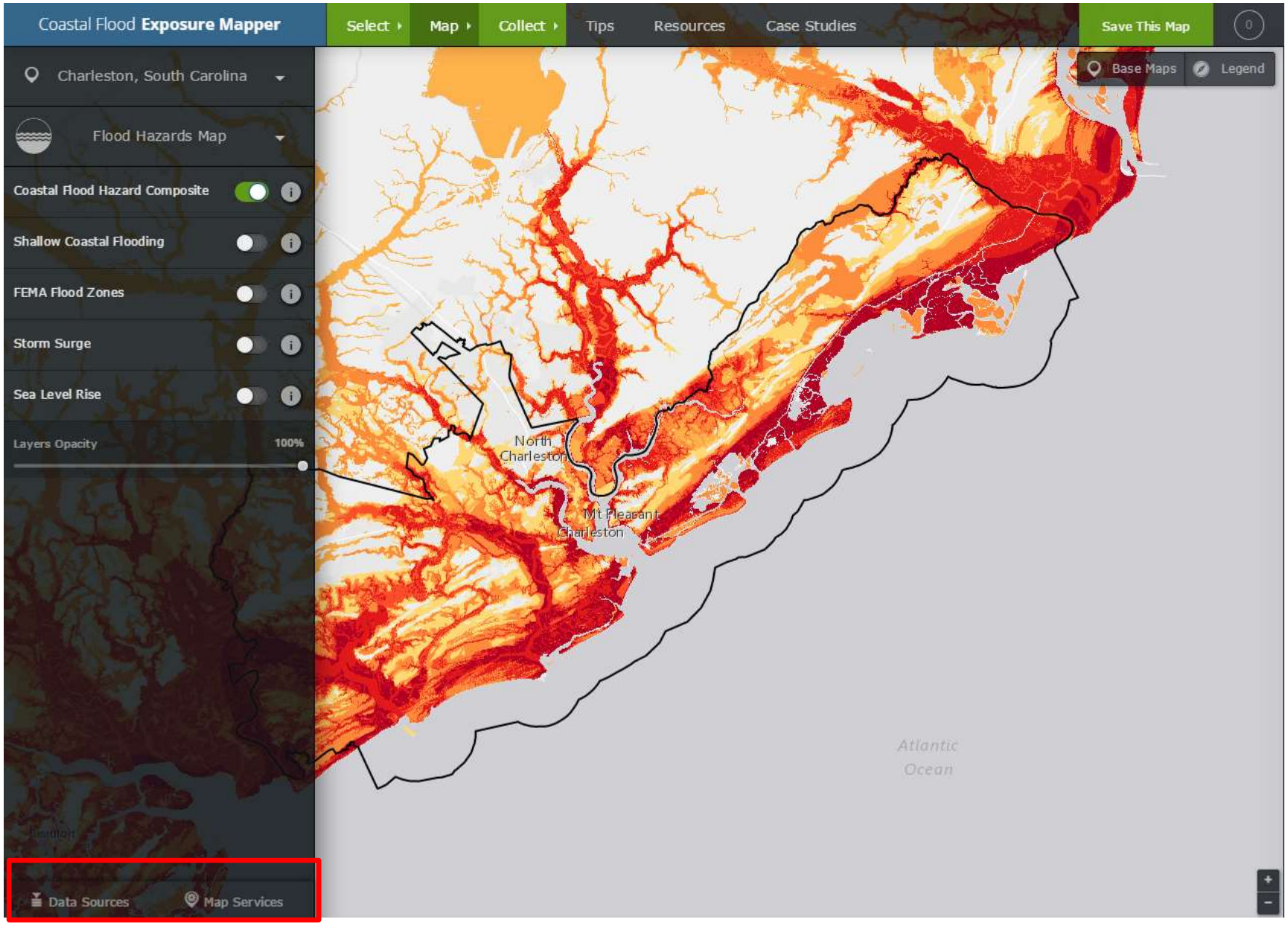

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Coastal Flood **Exposure Mapper**

Exposure Data and Information

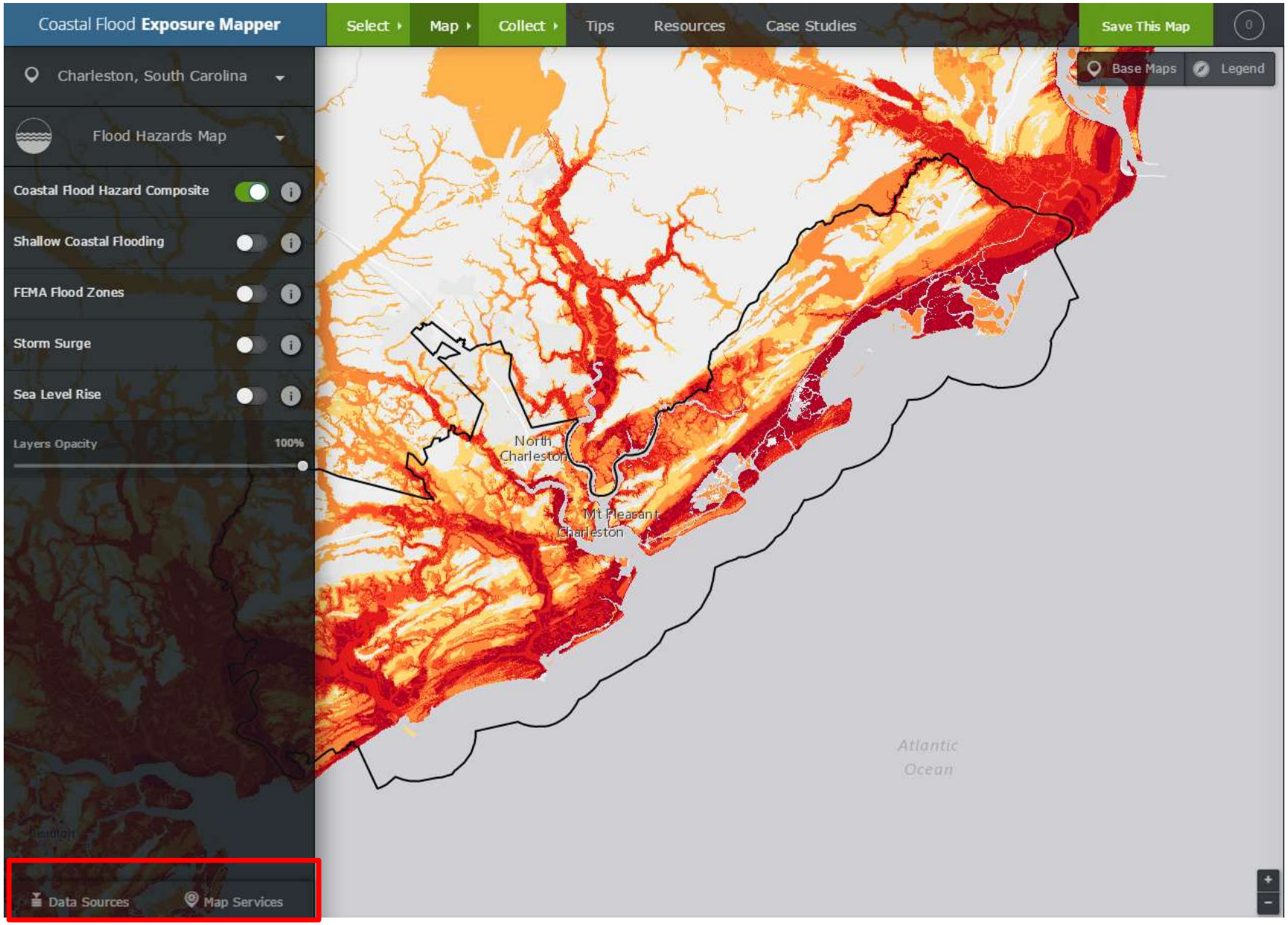
This page provides information on the data used in the Coastal Flood Exposure Mapper, map services available for use in ArcGIS Online or other online mapping platforms, and instructions on using map services within ArcGIS Online. Click here to directly access all map services.

Flood Hazards

Name	Description	Where to Get It		Significance
		Map Service	Authoritative Source	
Coastal Flood Hazard Composite	Spatial extents of multiple flood hazard data sets combined. Flood hazard data sets include shallow coastal flooding, Federal Emergency Management Agency (FEMA) flood data (V zones, A zones, and 500-year zones treated as individual layers), storm surge for Category 3 hurricane, and sea level rise of three feet above mean high tide.	Coastal Flood Hazard Composite Map Service	Coastal Flood Exposure Mapper	Provides a quick visual assessment of areas most prone to flood hazard events.
Shallow Coastal Flooding	Areas that flood when coastal flood warning thresholds are exceeded. Derived from the flood frequency layer within the Sea Level Rise and Coastal Flooding Impacts Viewer.	Shallow Coastal Flooding Map Service	Sea Level Rise and Coastal Flooding Impacts Viewer	Areas subject to shallow coastal flooding.
FEMA Flood Zones	Digital FEMA flood data. The data represent the digital riverine and coastal flood zones available as of June 2014 and are a combination of Digital Flood Insurance Rate Maps and Q3 flood data.	FEMA Flood Zones Map Service	FEMA's Map Service Center	Areas at risk from flooding.
Storm Surge	Areas of near-worst-case storm surge flooding scenarios for coastal areas along the Gulf of Mexico and Continental U.S. Atlantic coasts. Data were derived from storm surge inundation maps created by the National Hurricane Center (NHC) Storm Surge Unit with the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model.	Storm Surge Map Service	National Hurricane Program Center Storm Surge Unit	Areas at risk from storm surge.
Sea Level Rise	Sea level rise inundation scenarios ranging from zero to six feet above mean higher high water (MHHW). Derived from data created for the Sea Level Rise and Coastal Flooding Impacts Viewer.	Sea Level Rise Map Service	Sea Level Rise and Coastal Flooding Impacts Viewer	Areas likely to be inundated by sea level rise.

Step-by-Step Instructions for Using Registered Services in ArcGIS.com

1. Setup
   - Go to ArcGIS.com
   - Click Sign In
   - If needed, register for new account
2. Build a Map
   - Click the MAP button in the top banner
   - Click the Basemap button
   - Select a basemap from the available options
3. Add a Layer From ArcGIS Online
   - Click the Add drop-down list
   - Select Search for Layers
   - In Find: type a keyword to search (example: Hurricane Evacuation Routes)
   - Click Add to get layers to appear in the map
   - Click Done Adding Layers when finished
4. Add a Layer that is not published to ArcGIS Online
   - Go to the ArcGIS Service Directory where you can find services (example: Coastal Service Center, www.coast.noaa.gov/ArcGISPUB/rest/services)
   - Browse to the REST page for the service you want (example: Social Vulnerability Block Groups, www.coast.noaa.gov/ArcGISPUB/rest/services/sovi/sovi_blockgroups/Ma...)
   - Copy the URL for the map service (example: same URL as previous step)
   - In your arcgis.com map, click Add
   - Click Add Layer from Web
   - In URL: paste path to the map service from earlier step
   - Click Add Layer



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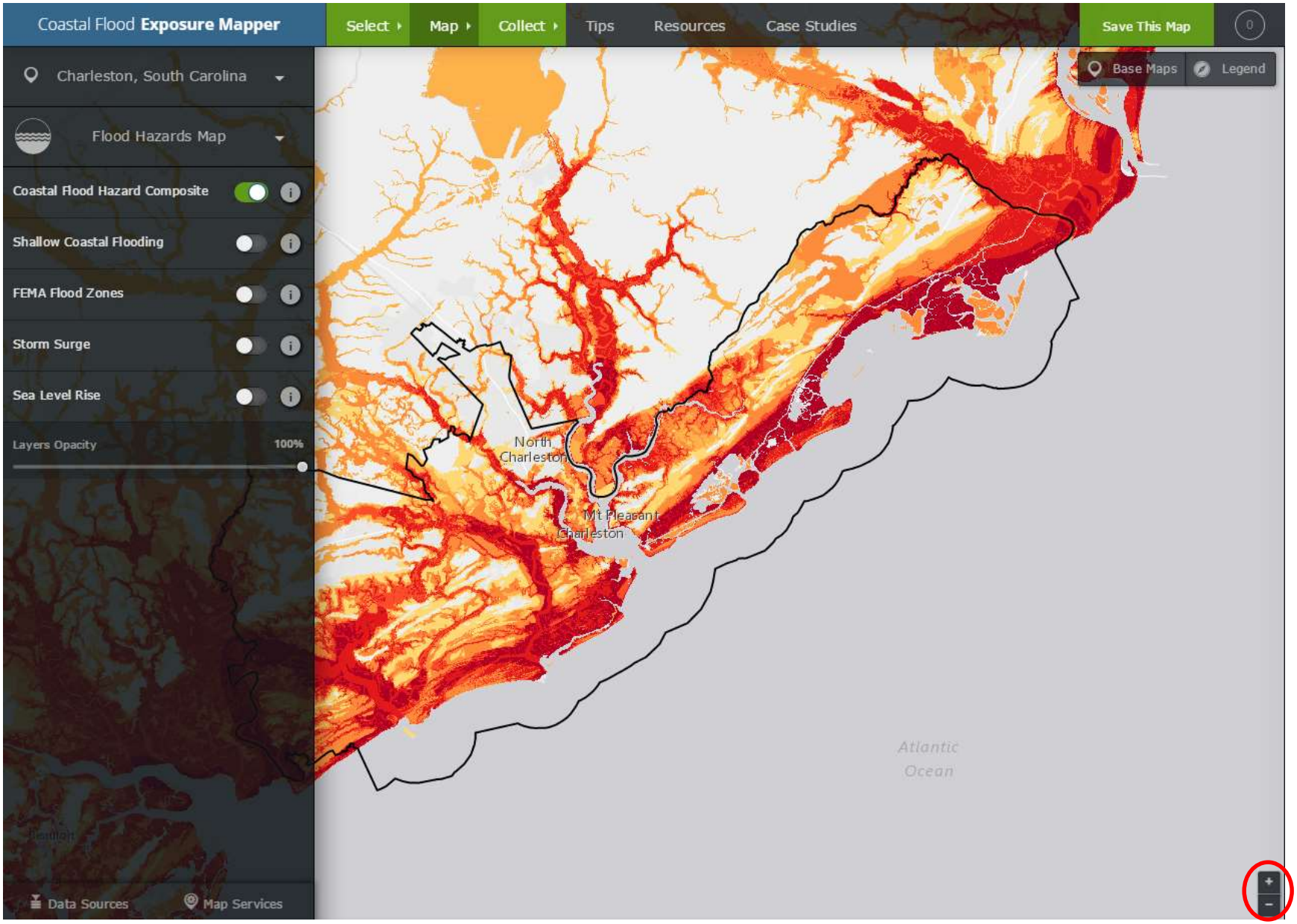

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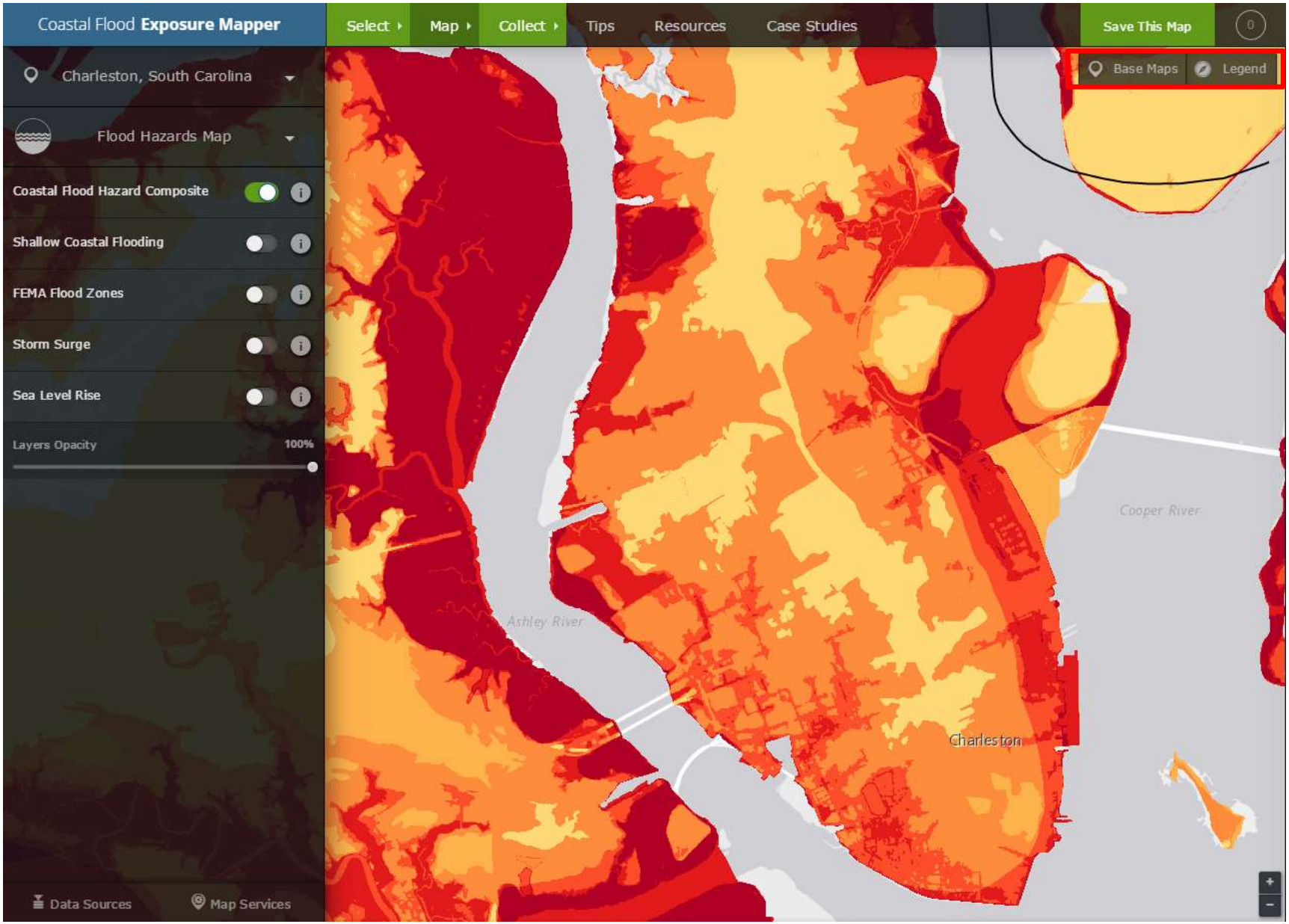

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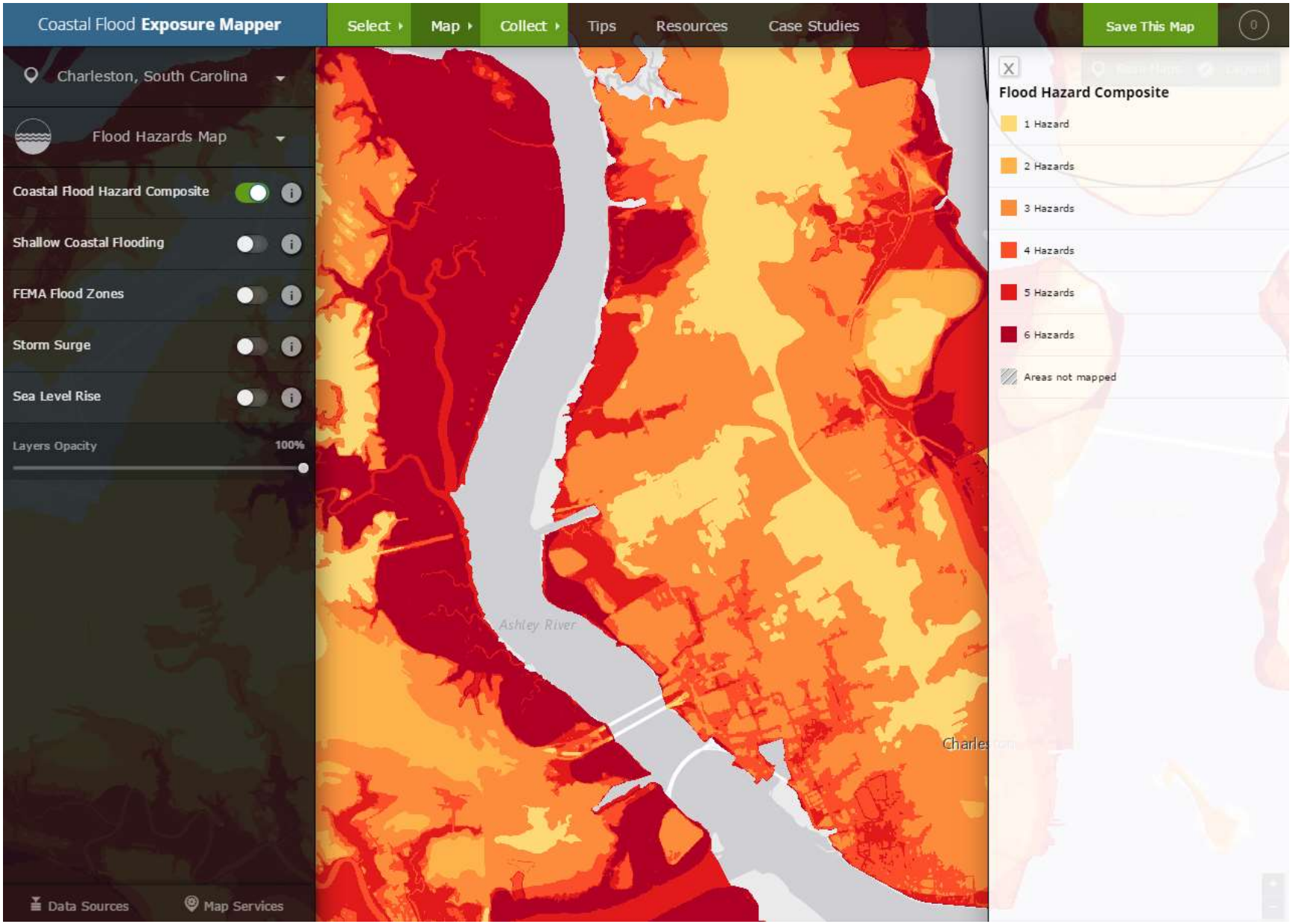

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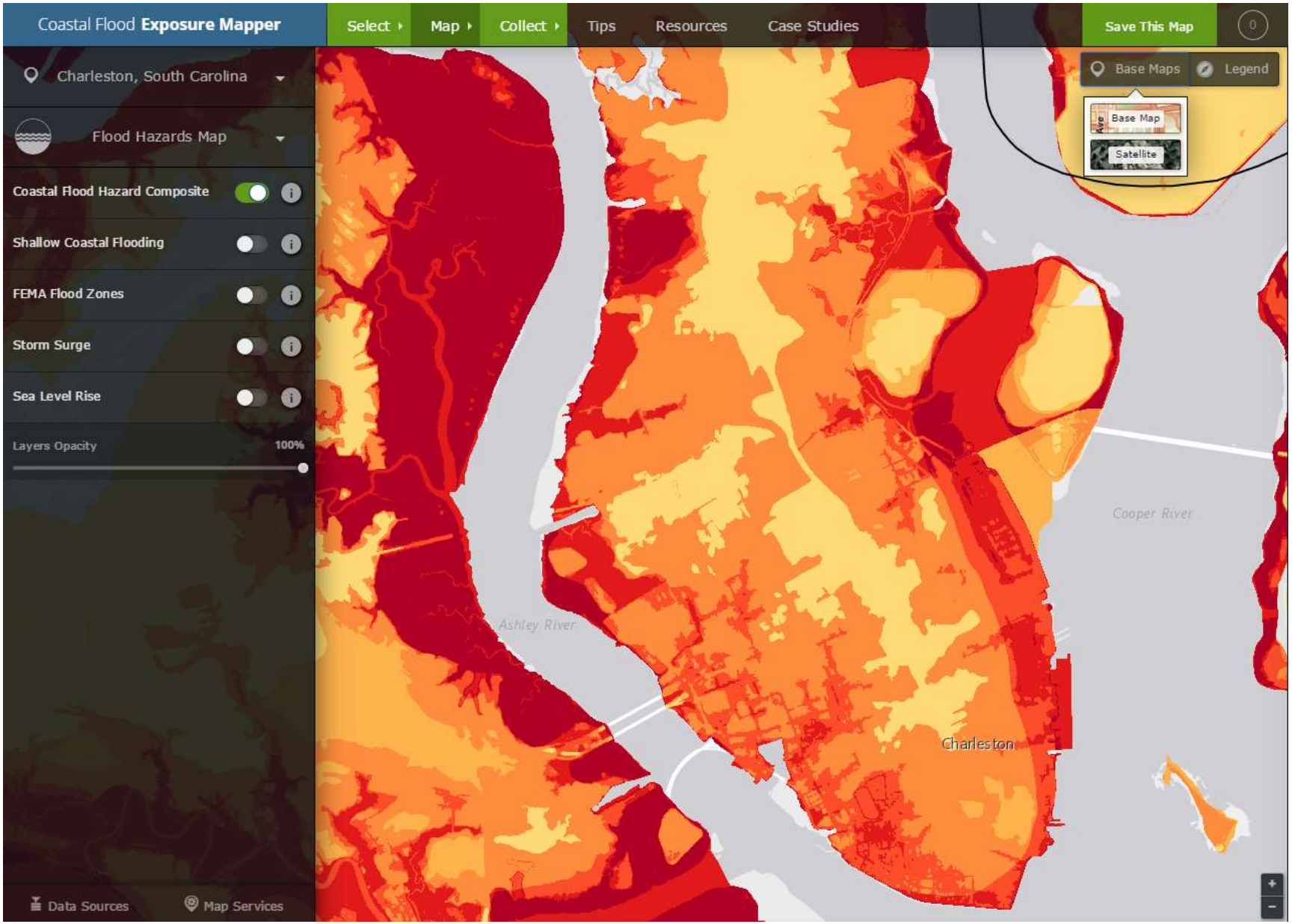

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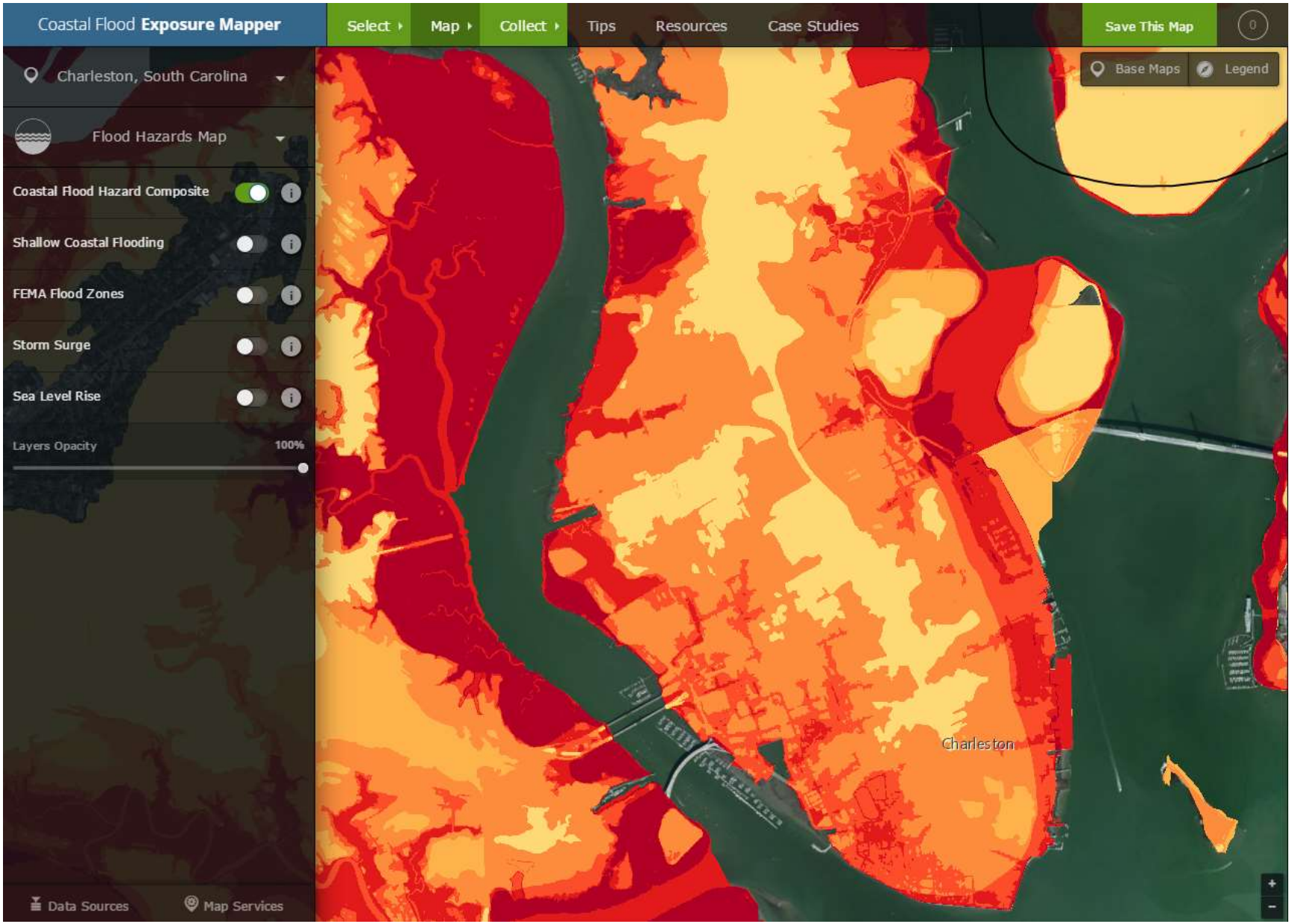

www.coast.noaa.gov/digitalcoast/tools/flood-exposure

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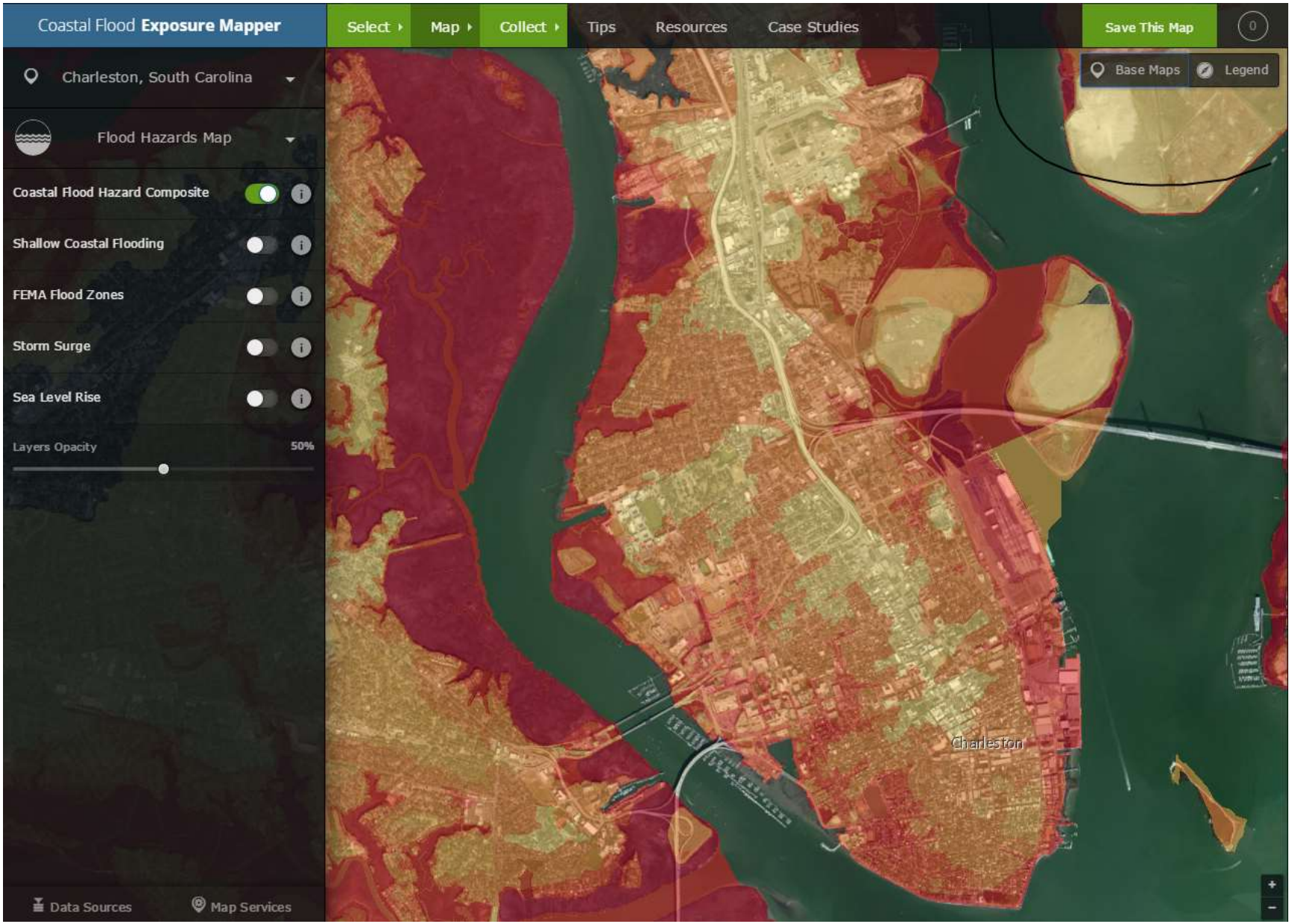

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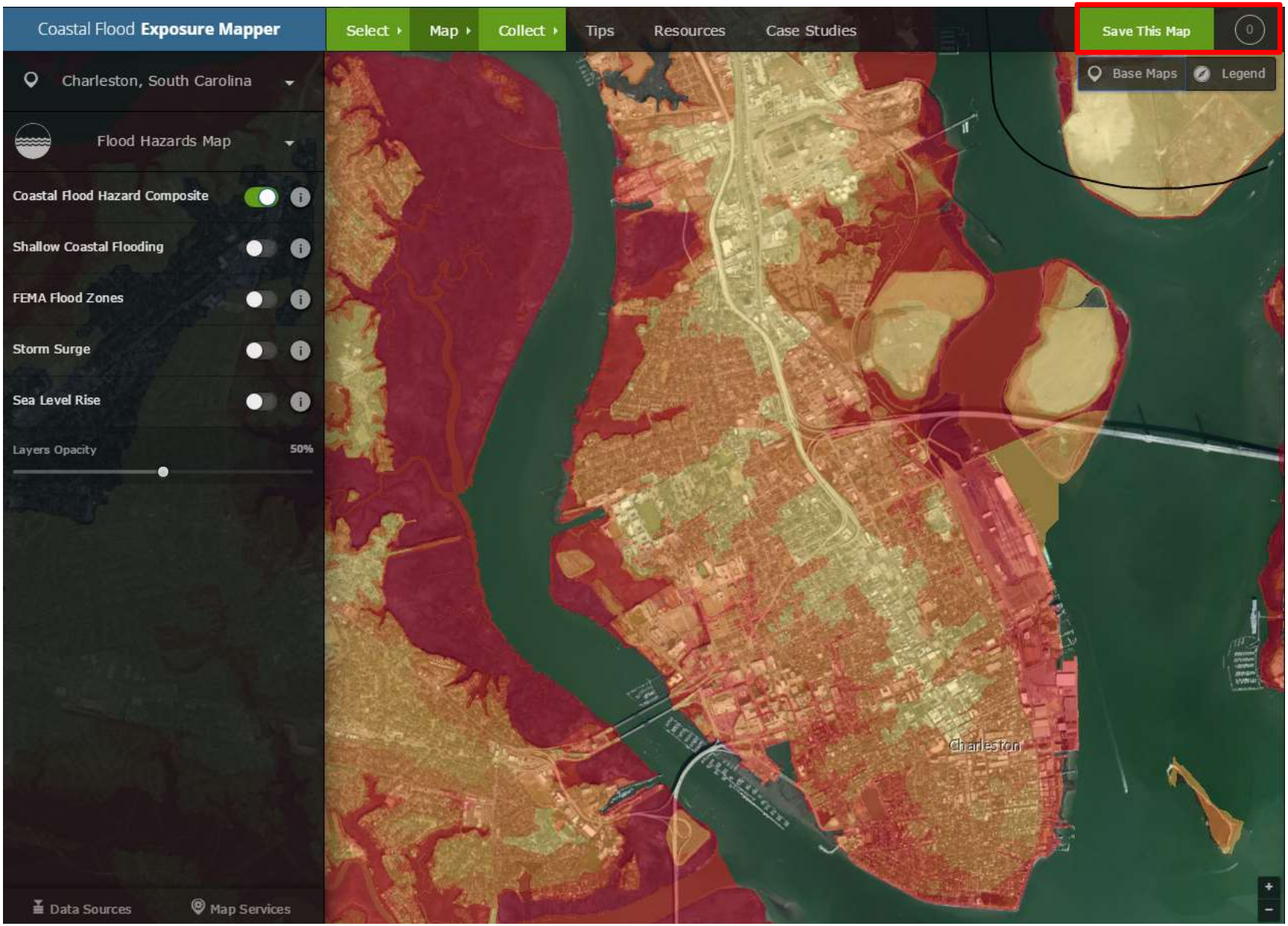

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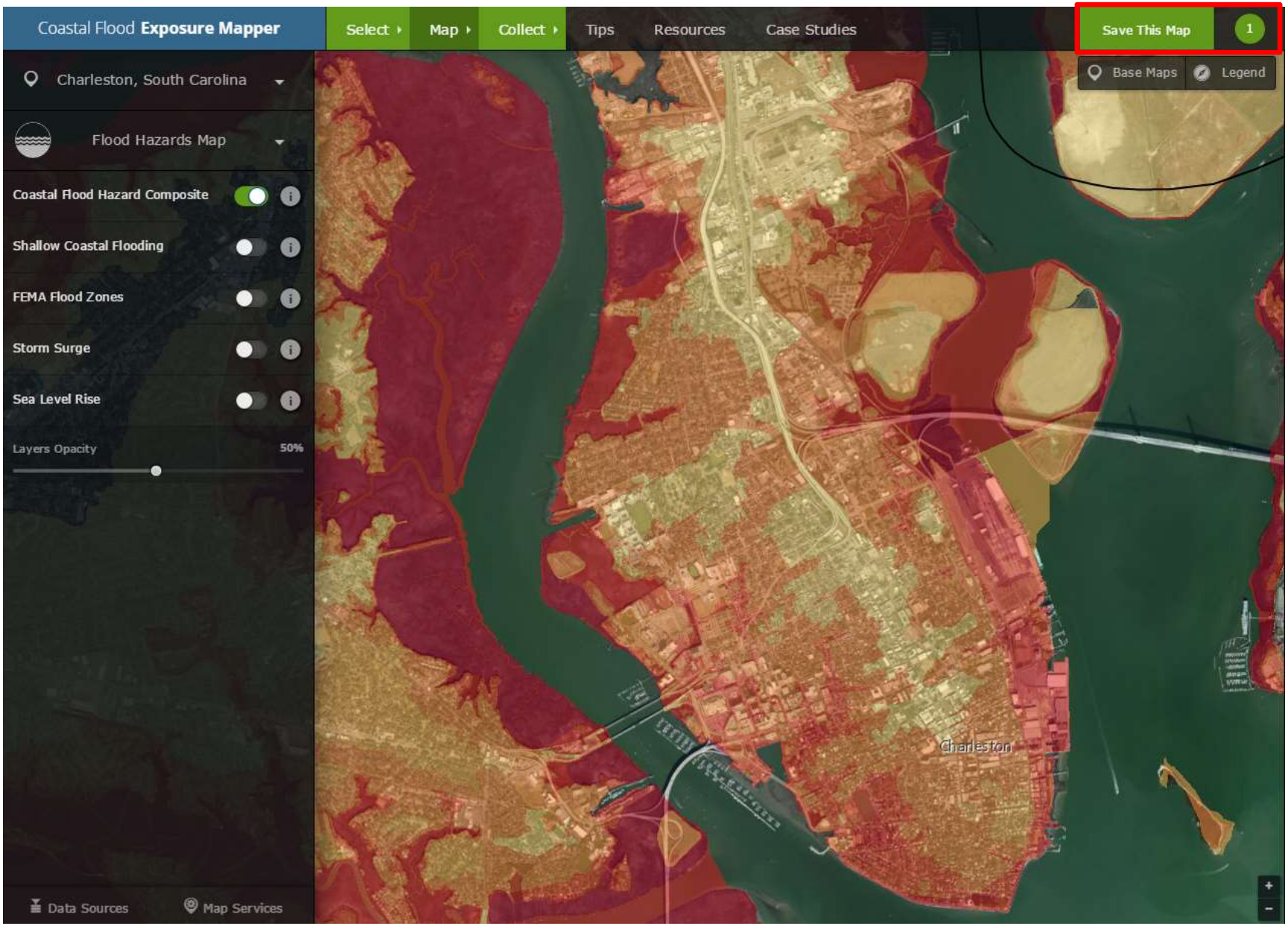

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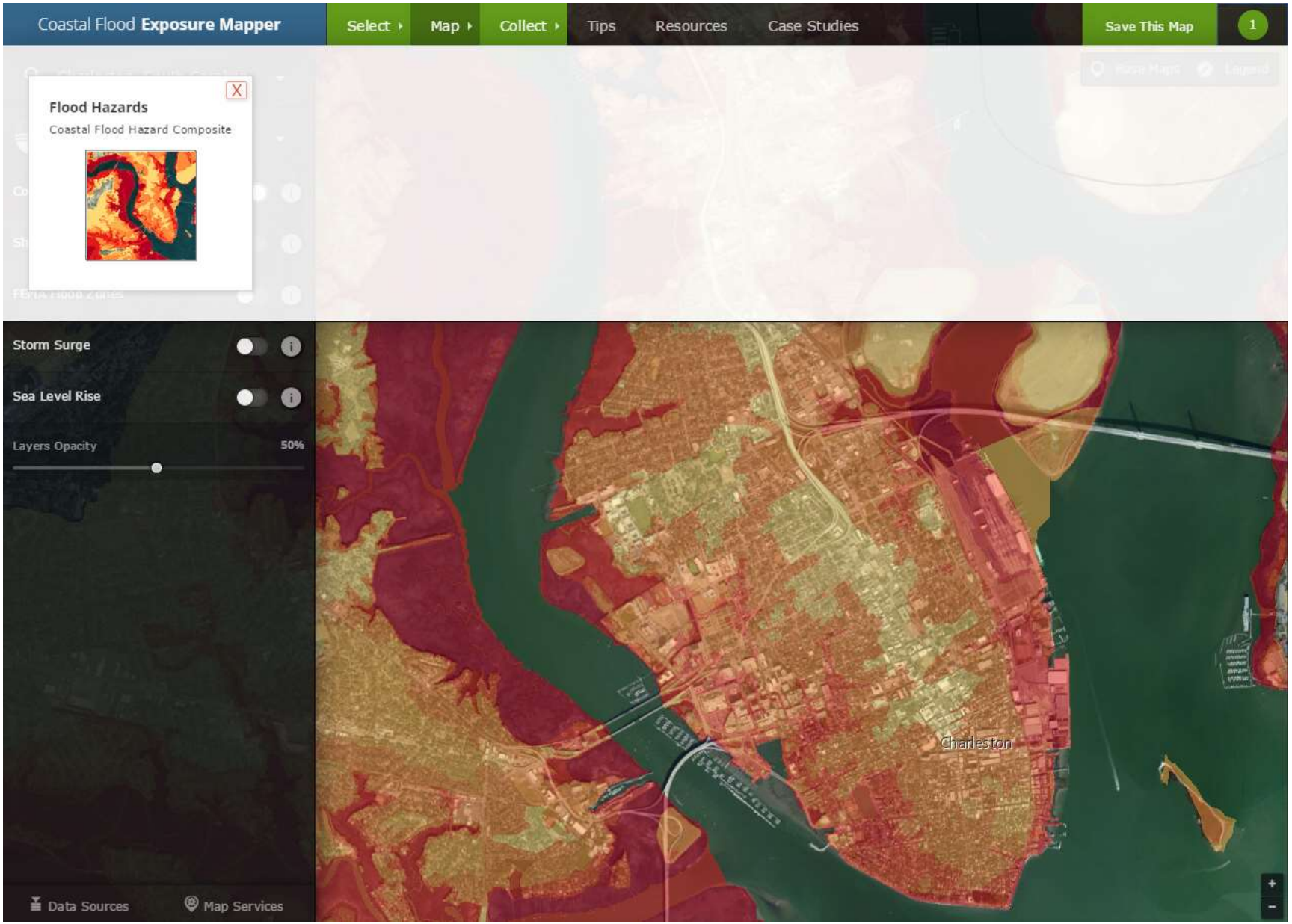

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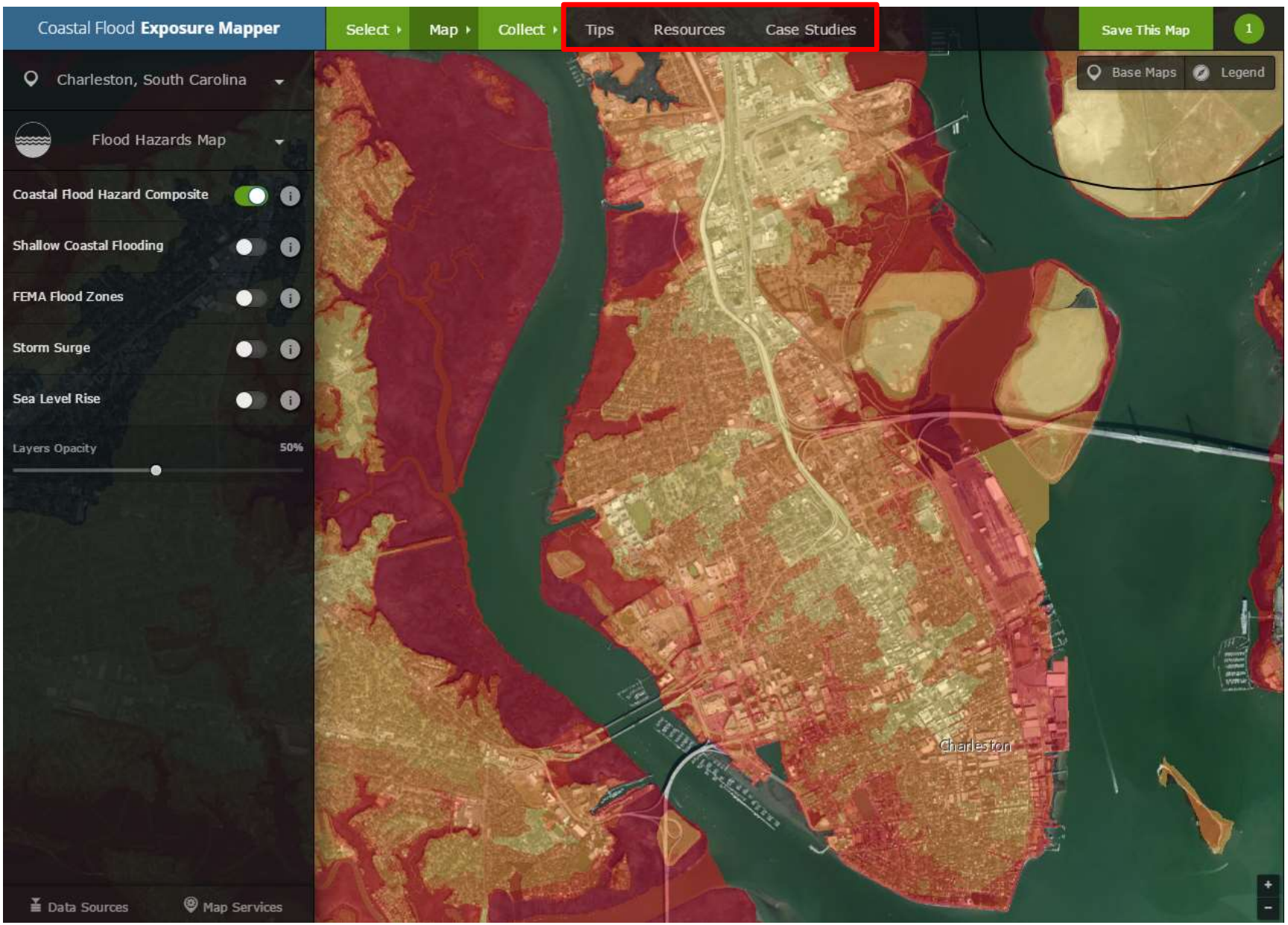

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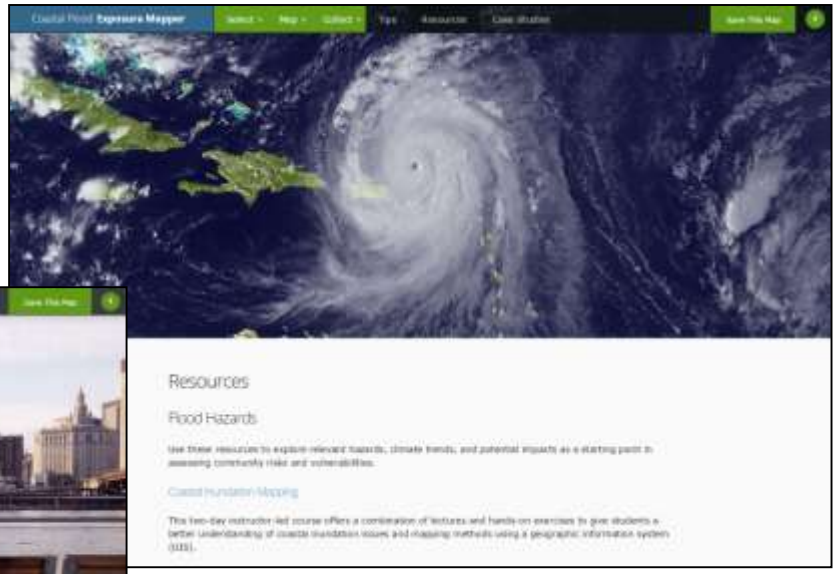
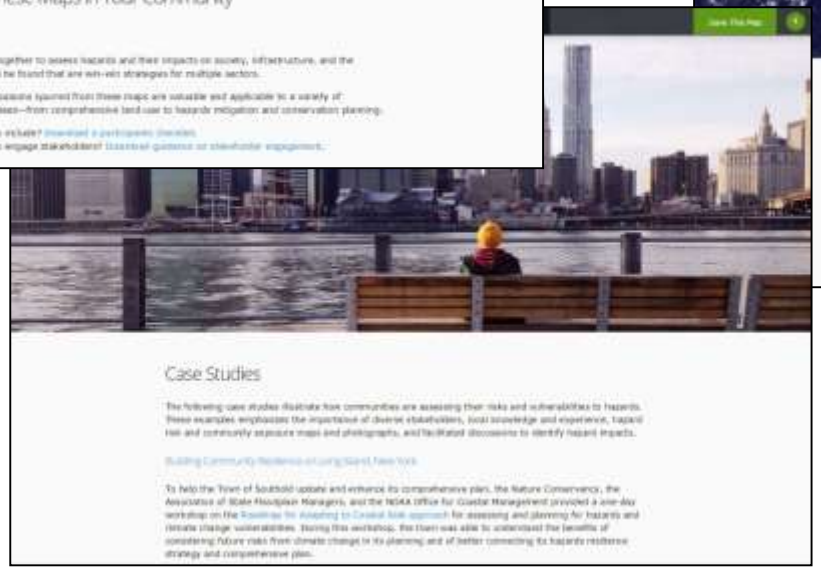
Tips, Resources, and Case Studies





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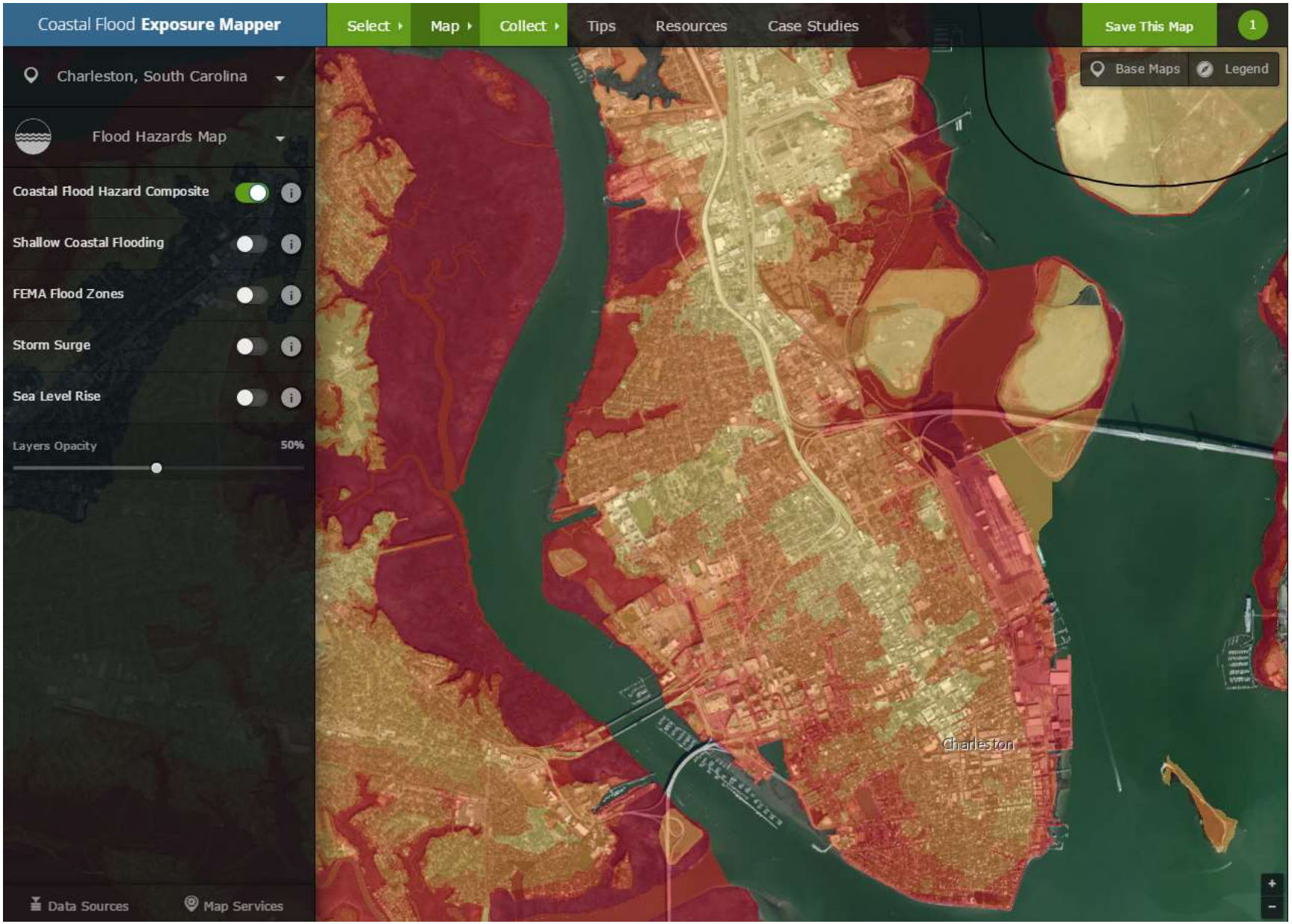

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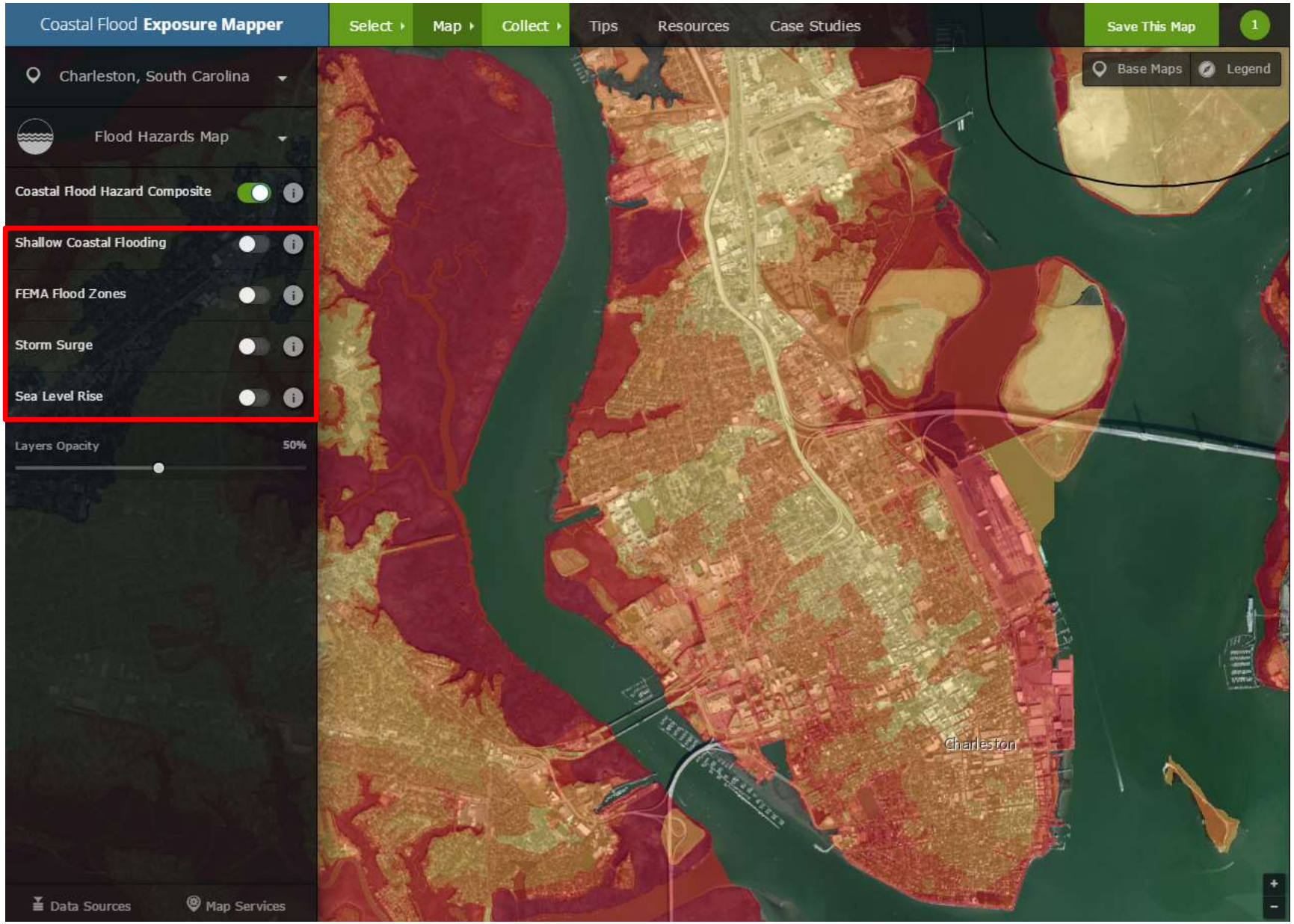

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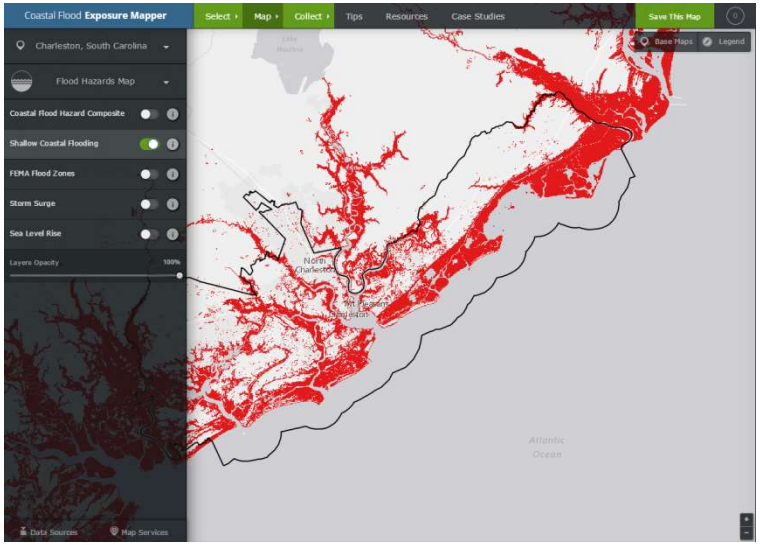
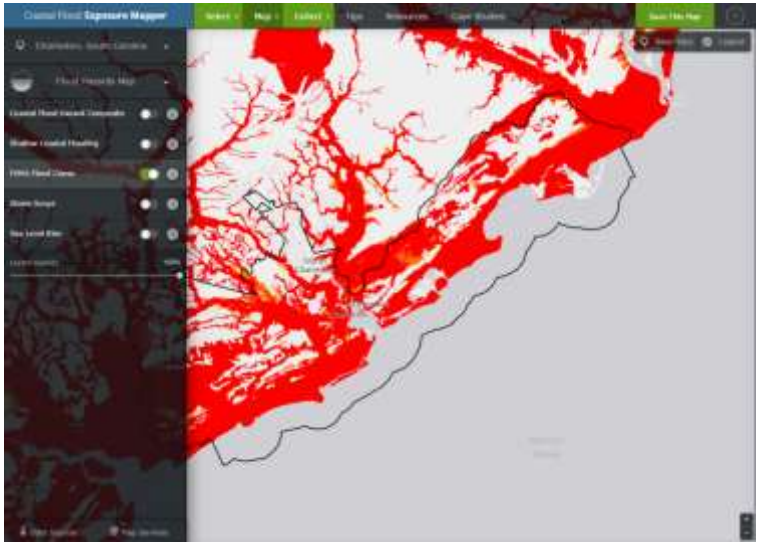
Shallow Coastal Flooding



FEMA Flood Zones



Hurricane Storm Surge

Sea Level Rise

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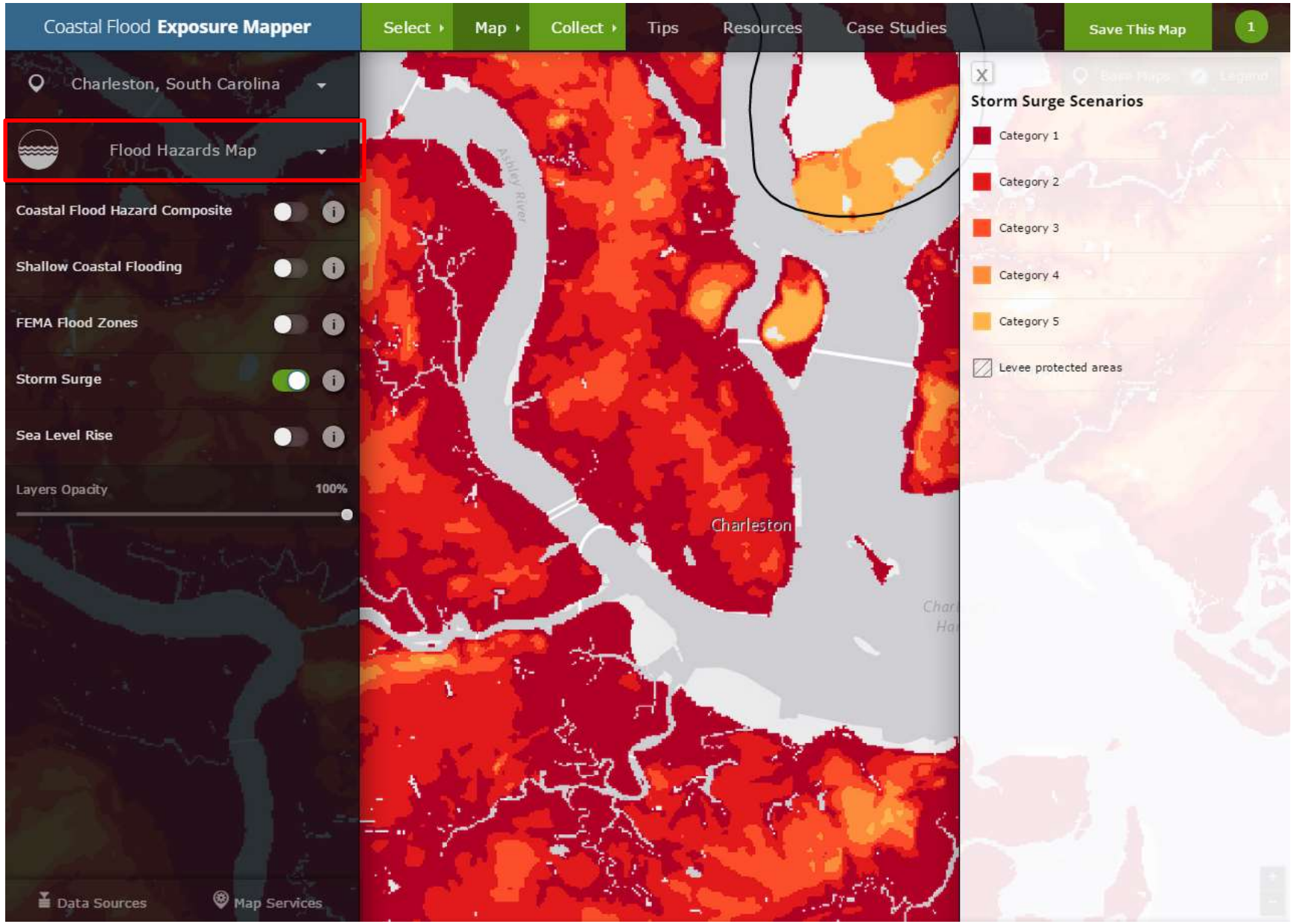

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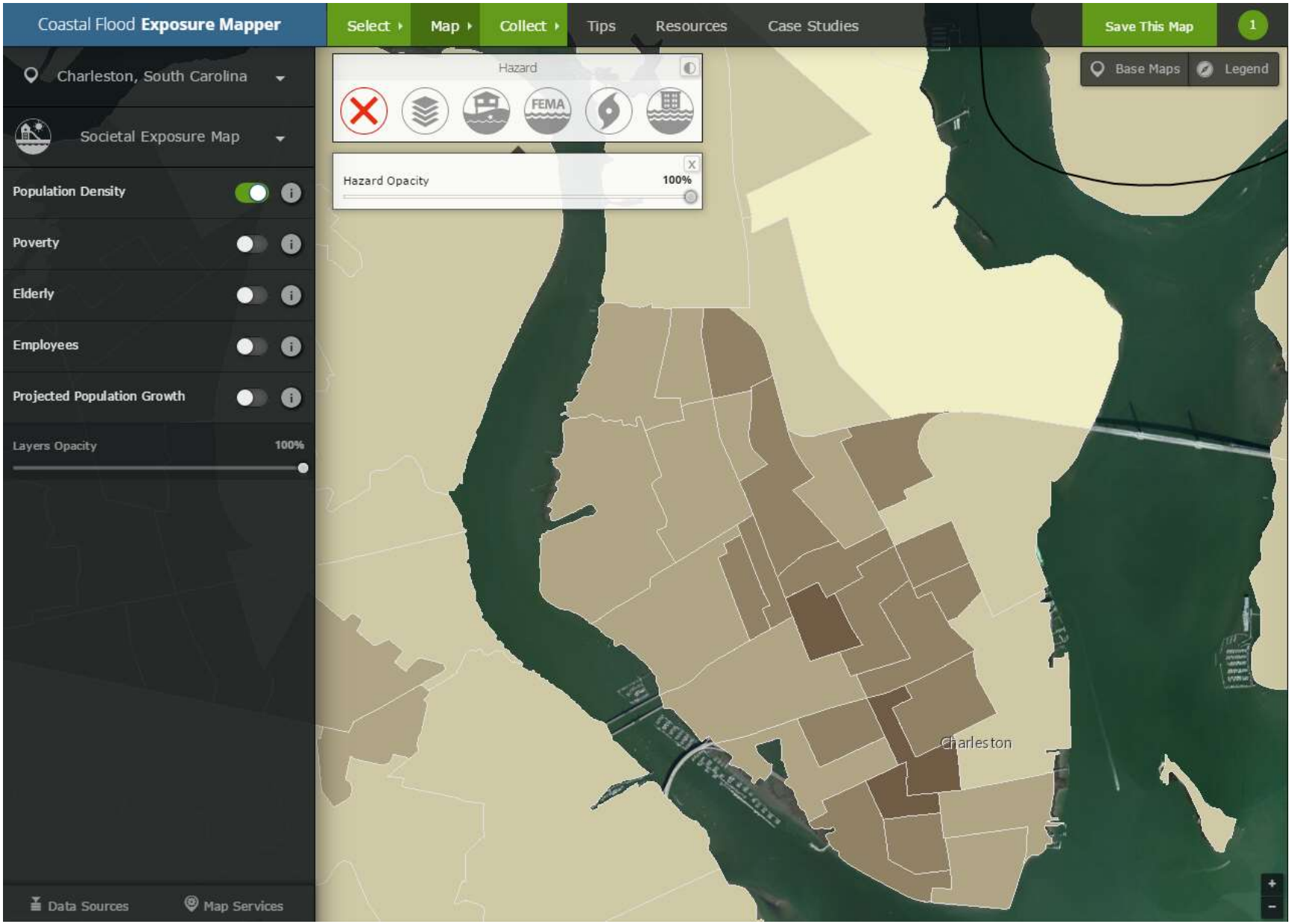
Societal Exposure Maps



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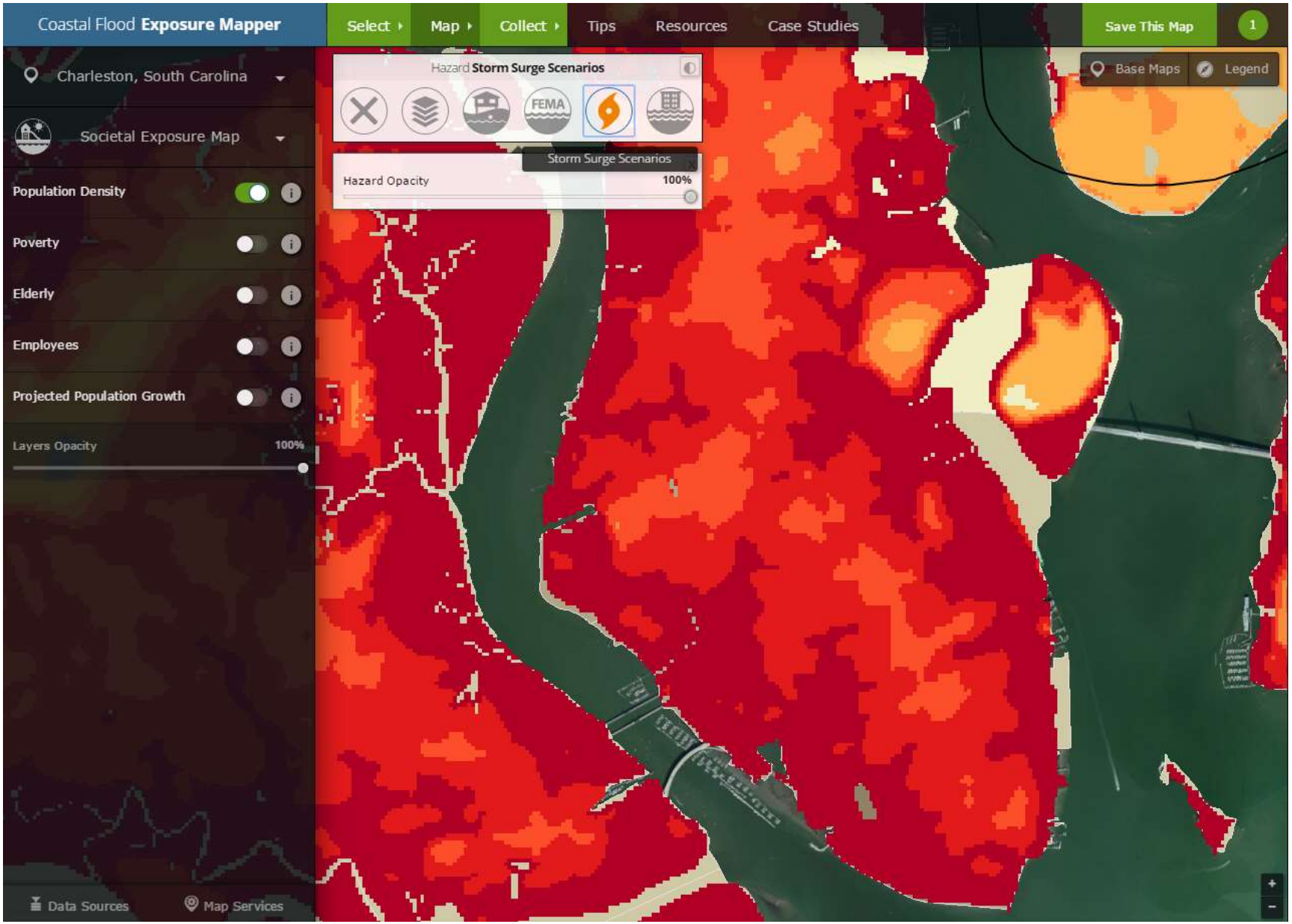

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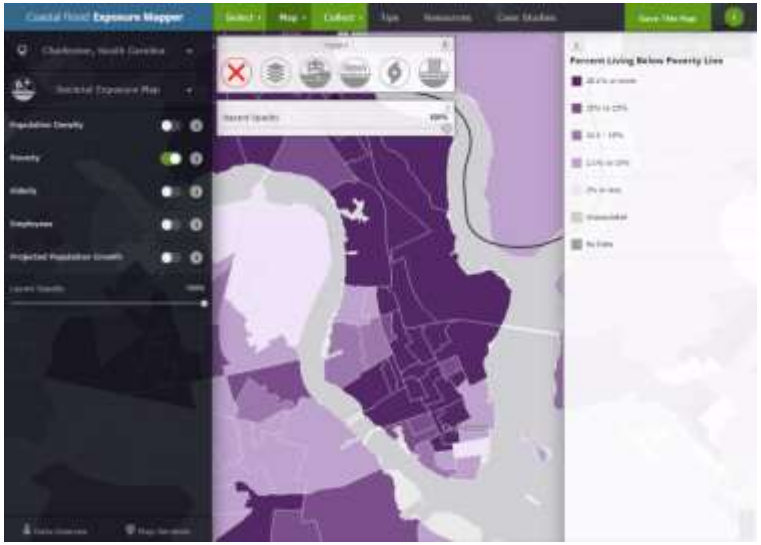
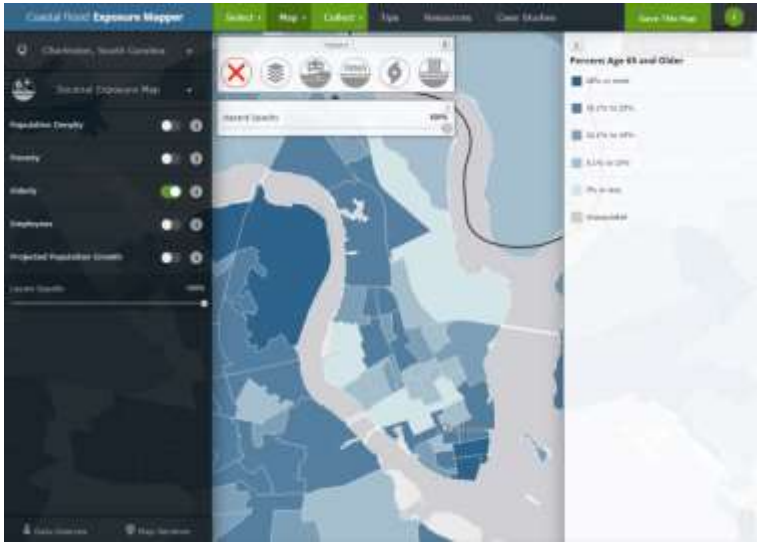
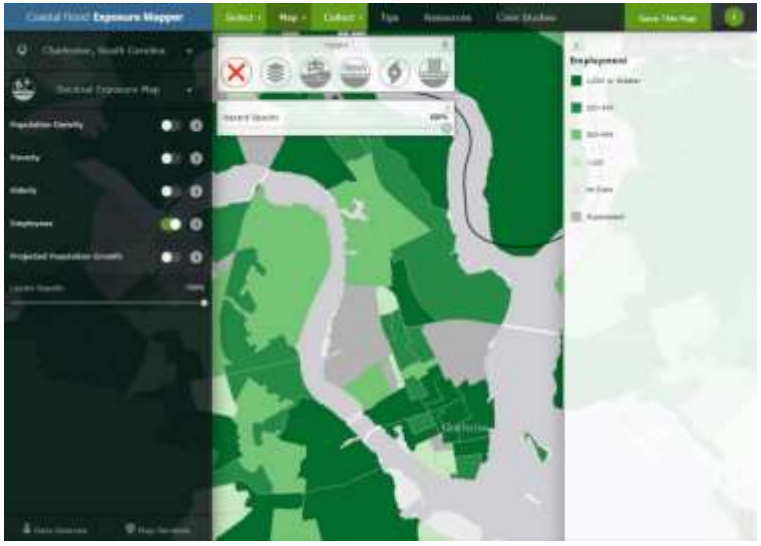
Poverty



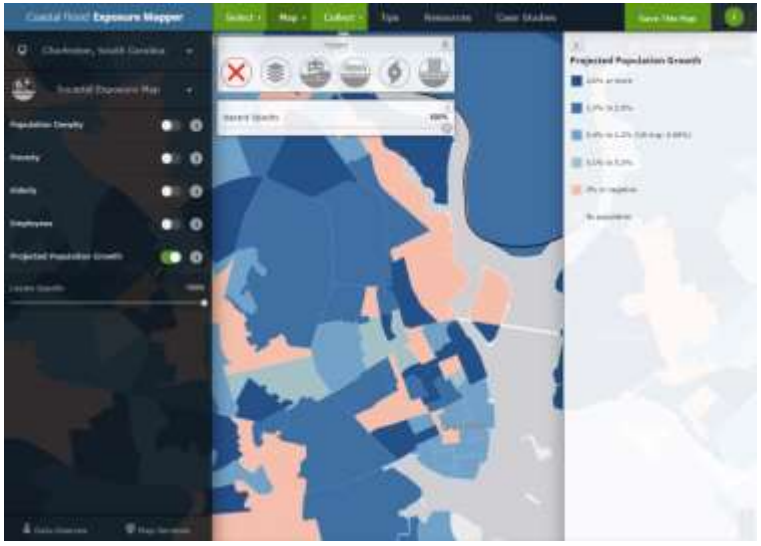
Elderly



Employment



Projected Population Growth



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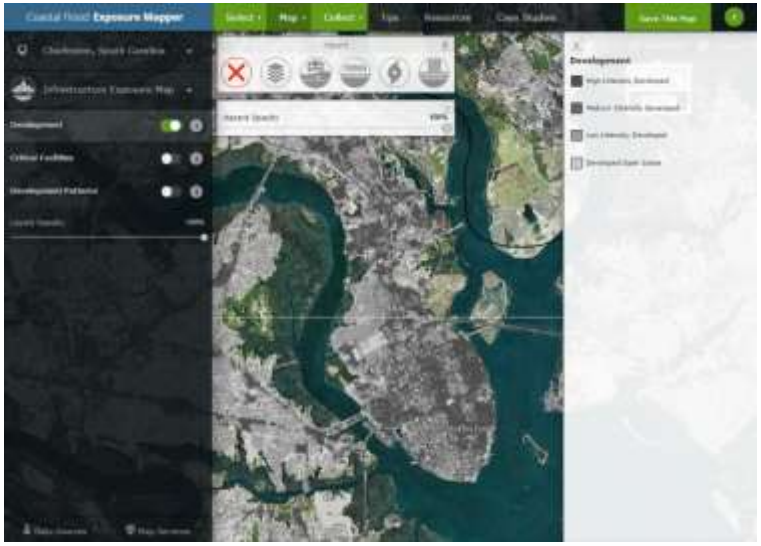
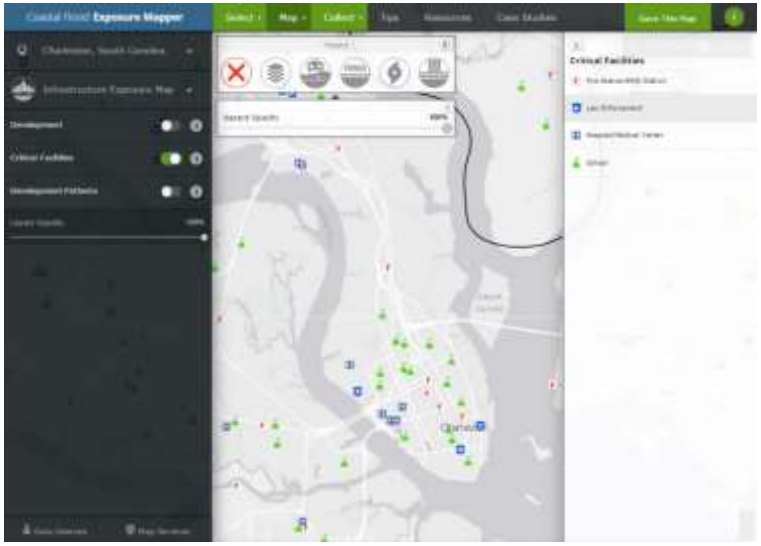
Infrastructure Exposure Maps

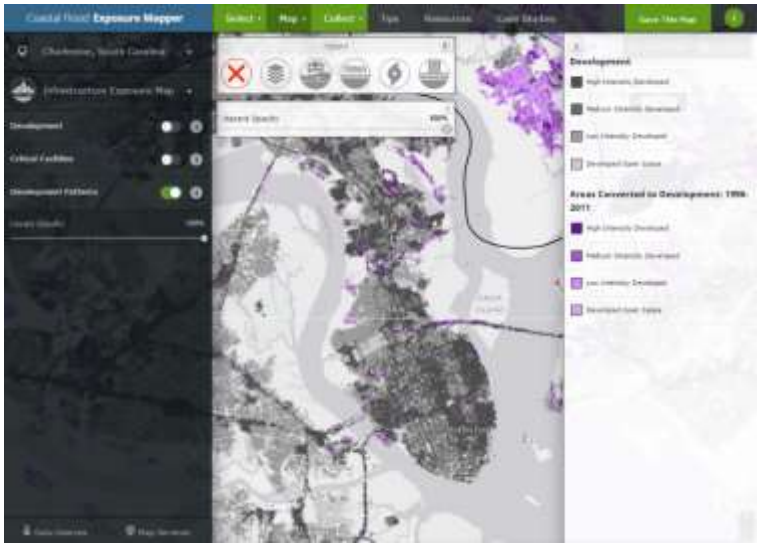
Development



Critical Facilities



Development Patterns



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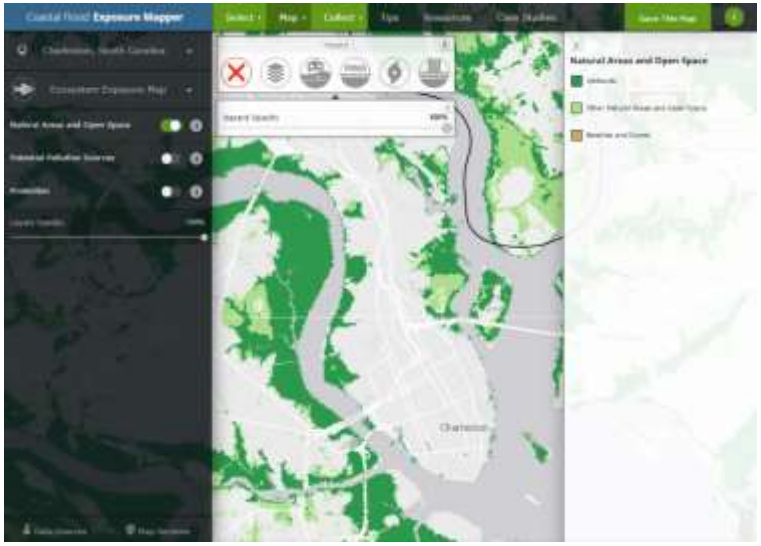
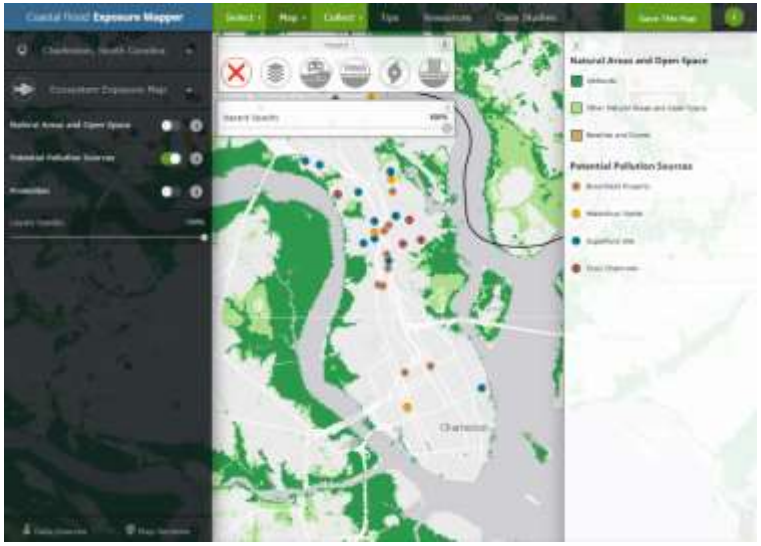
Ecosystem Exposure Maps

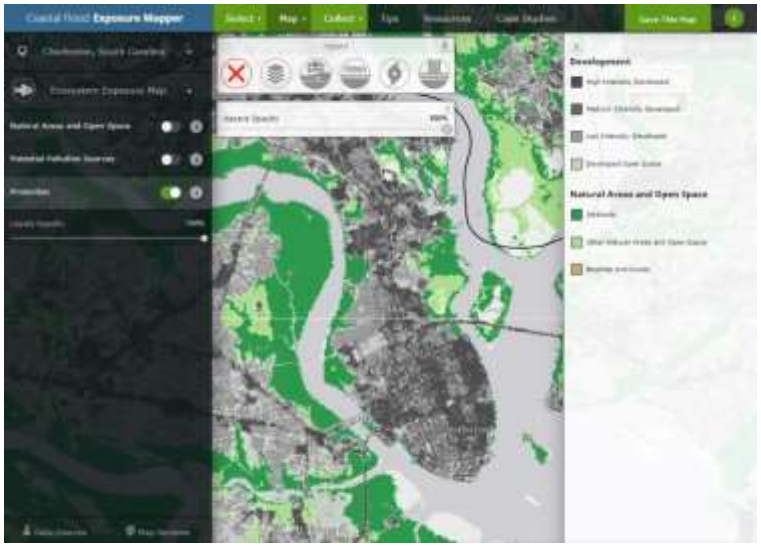
Natural Areas and Open Space



Potential Pollution Sources



Natural Protection



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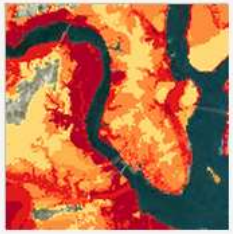
Collect and Share Your Maps

Download and print these maps or copy the link to share online with colleagues or in a community workshop.

Important: These maps will not be saved once you leave this site. To ensure your work is safe, either create and download a PDF or save and share the map URLs.

Tips for using these maps

Coastal Flood Hazard Composite



View Map

Map URL

http://go.usa.gov/3aXxd

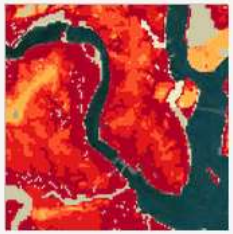
Population Density

View Map

Map URL

http://go.usa.gov/3aXCw

Population Density



View Map

Map URL

http://go.usa.gov/3aXCe

Print Maps

www.coast.noaa.gov/digitalcoast/tools/flood-exposure

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Available via NOAA Digital Coast

coast.noaa.gov/digitalcoast/tools/slr

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Sea Level Rise Viewer

Contributing Partners: NOAA Office for Coastal Management

Overview | In Action | Support | Get It Now

Launch Viewer

Select a geography and use the slider bar to simulate various sea level rise scenarios (from one to six feet above the average highest tides) and the corresponding areas that would be impacted by flooding. Click the camera icons for pictures that depict how local landmarks could be affected. Additional tabs provide information about marsh impacts, nuisance flood frequency, and social and economic data.

Maps are not currently available for Alaska and Louisiana due to the accuracy of existing elevation data, the hydraulic complexity of the coast, and gaps in vertical datum transformation.

Data Updates

Features

- **Models** potential marsh migration due to sea level rise
- **Examines** how tidal flooding will become more frequent with sea level rise
- **Enables** access through mobile devices
- **Produces** shortened URLs for easy map sharing through email and social media
- **Provides** access to Web map services and underlying geospatial data
- **Offers** supporting documents and information on sea level rise mapping

Acknowledgments

The NOAA Office for Coastal Management acknowledges the many organizations that helped guide the development of this tool.

Videos

Tool Overview

First Time Tips

Digital Coast Webinar Series

Mapping and Visualizing Sea level Rise and Coastal Flooding Impacts

View recorded webinar

Related Data

- Coastal Lidar
- Social Vulnerability Index (SOVI)

Related Training

- Climate Adaptation for Coastal Communities
- Coastal Inundation Mapping

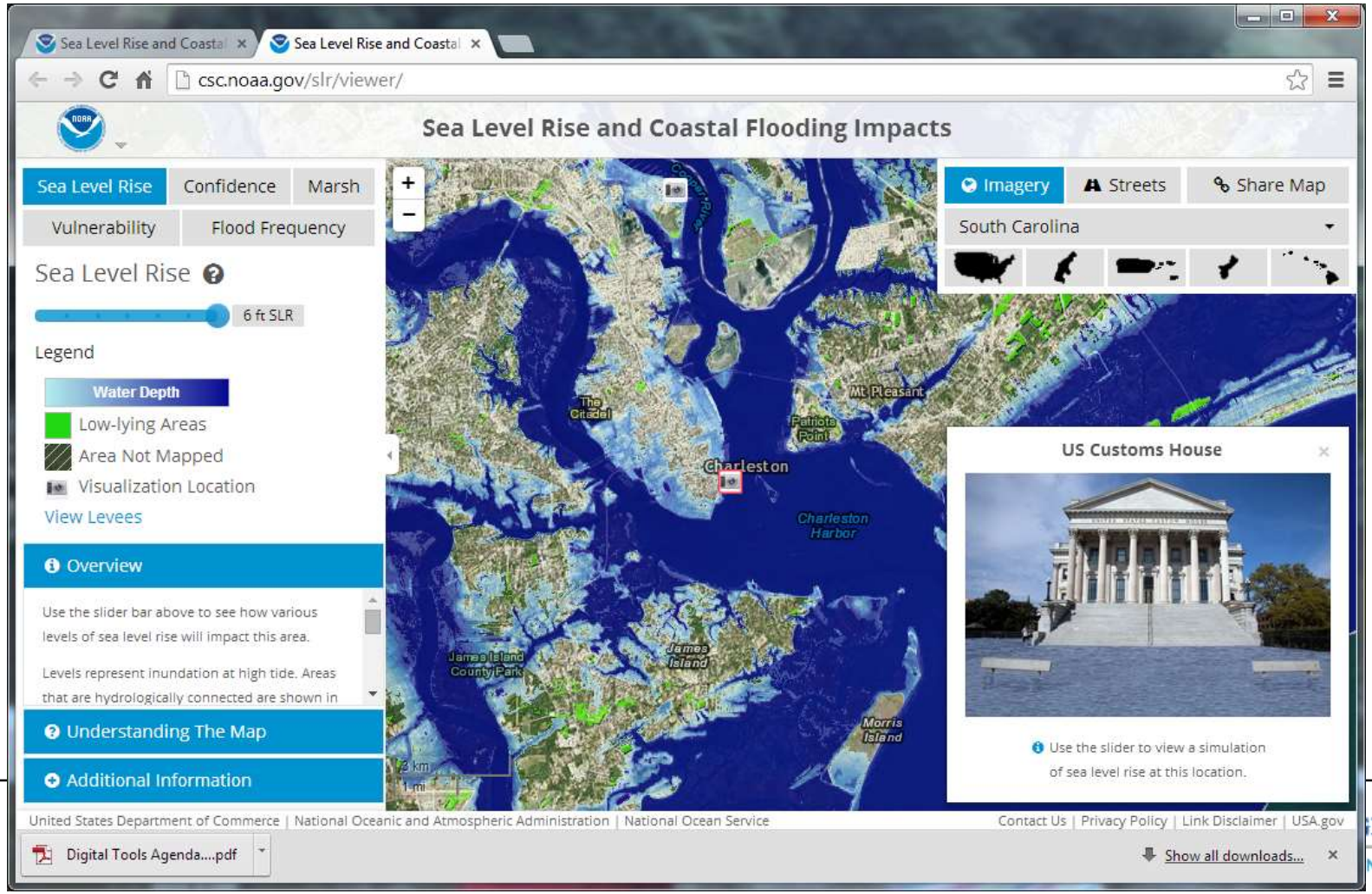
Sea Level Rise and Coastal Flooding Impacts Viewer

coast.noaa.gov/digitalcoast/tools/slr

- **Displays** potential future sea levels
- **Provides** simulations of sea level rise at local landmarks
- **Communicates** the spatial uncertainty of mapped sea levels
- **Models** potential marsh migration due to sea level rise
- **Overlays** social and economic data onto potential sea level rise
- **Examines** how tidal flooding will become more frequent with sea level rise

Impacts of Sea Level Rise

Visualize impacts for mean higher high water (MHHW) 6-foot SLR scenarios overlaid on aerial imagery, street map, and terrain map. Photos of SLR on individual structures will illustrate site-specific impacts.



Sea Level Rise and Coastal

csc.noaa.gov/slr/viewer/

Sea Level Rise and Coastal Flooding Impacts

Sea Level Rise | Confidence | Marsh | Vulnerability | Flood Frequency

Sea Level Rise

Current MHHW

Legend

- Water Depth
- Low-lying Areas
- Area Not Mapped
- Visualization Location

View Levees

Overview

Use the slider bar above to see how various levels of sea level rise will impact this area.

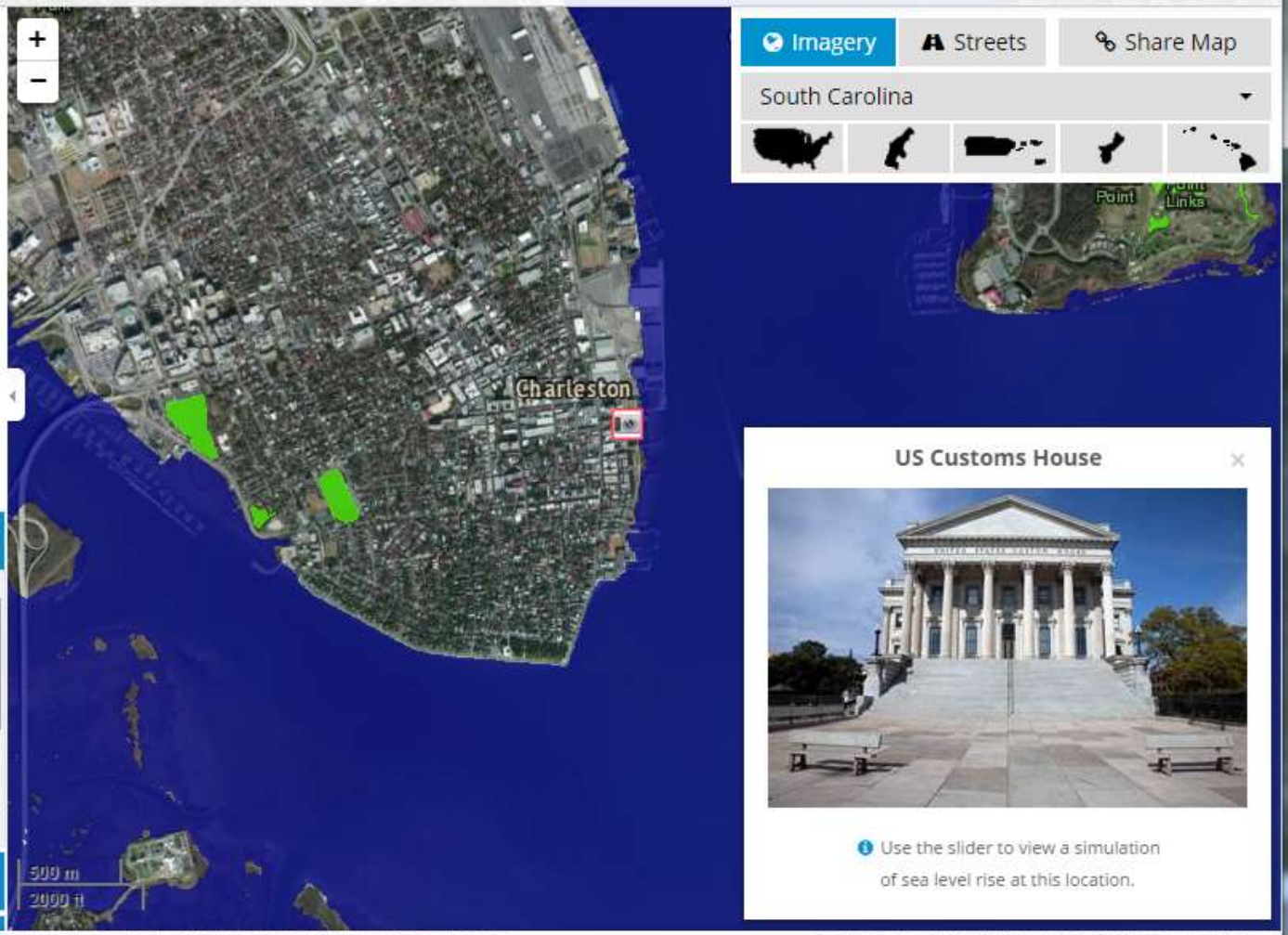
Levels represent inundation at high tide. Areas that are hydrologically connected are shown in shades of blue (darker blue = greater depth).

Low-lying areas, displayed in green, are hydrologically "unconnected" areas that may

Understanding The Map

Imagery | Streets | Share Map

South Carolina



US Customs House

Use the slider to view a simulation of sea level rise at this location.

United States Department of Commerce | National Oceanic and Atmospheric Administration | National Ocean Service

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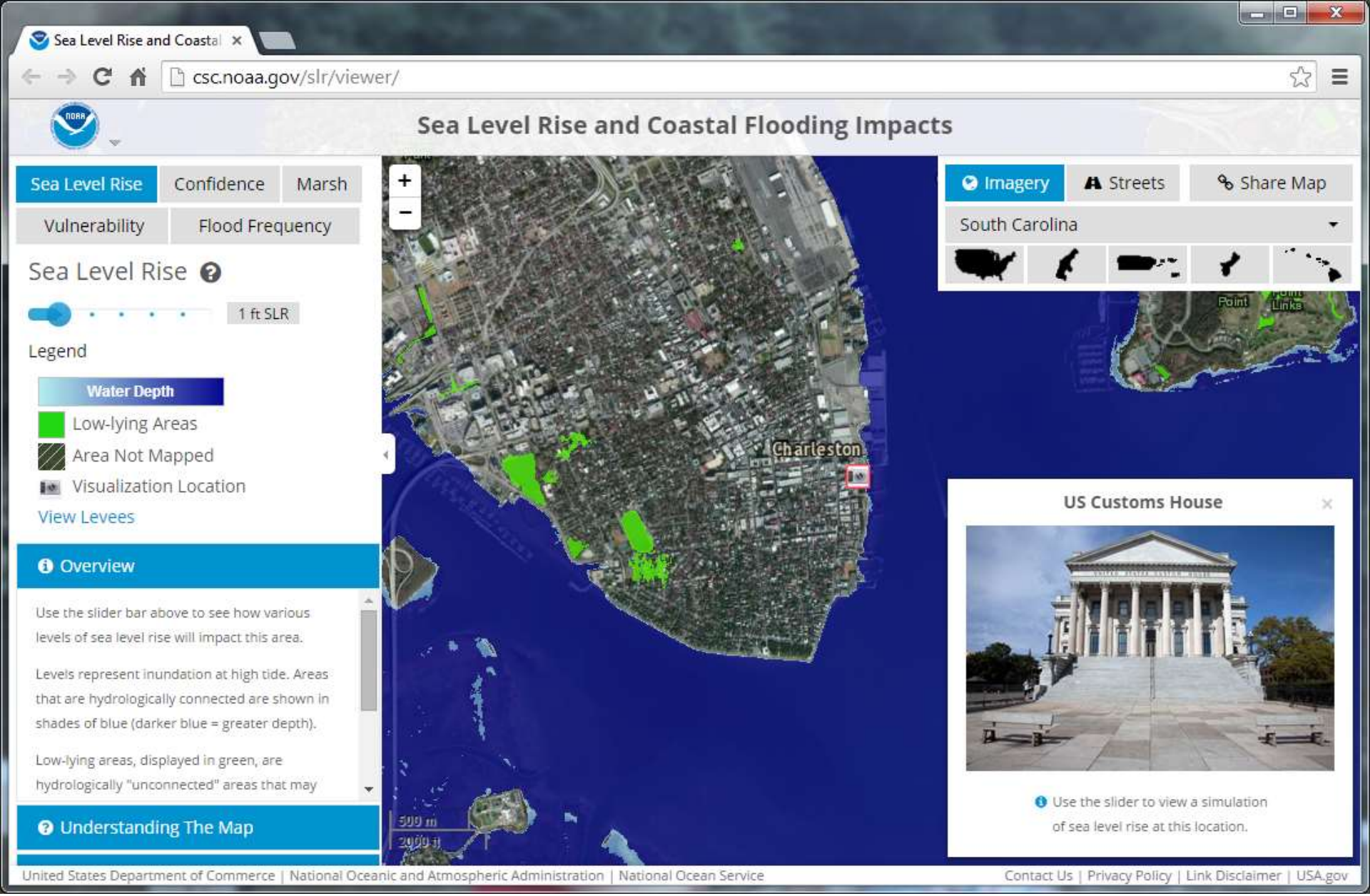

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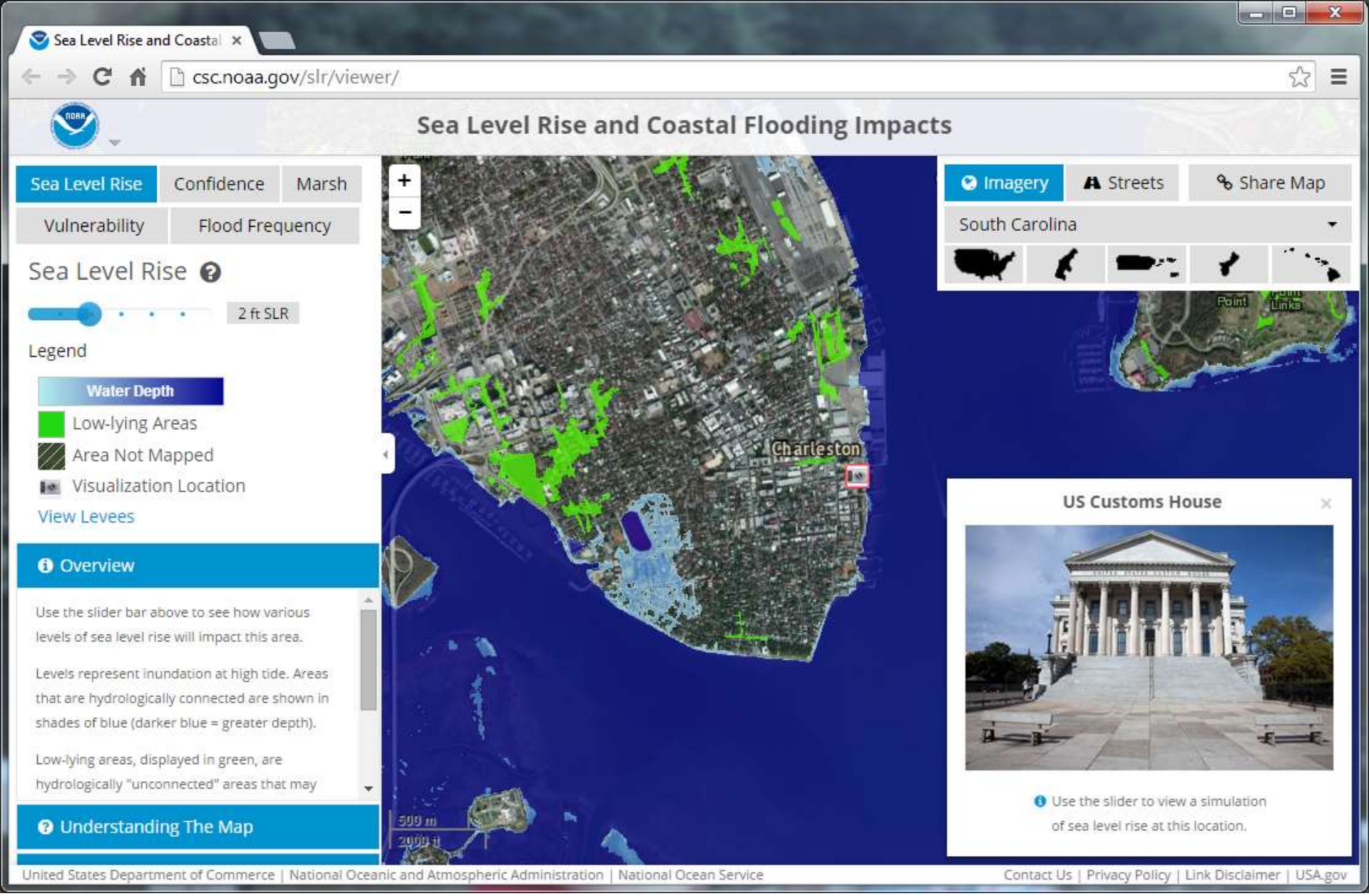

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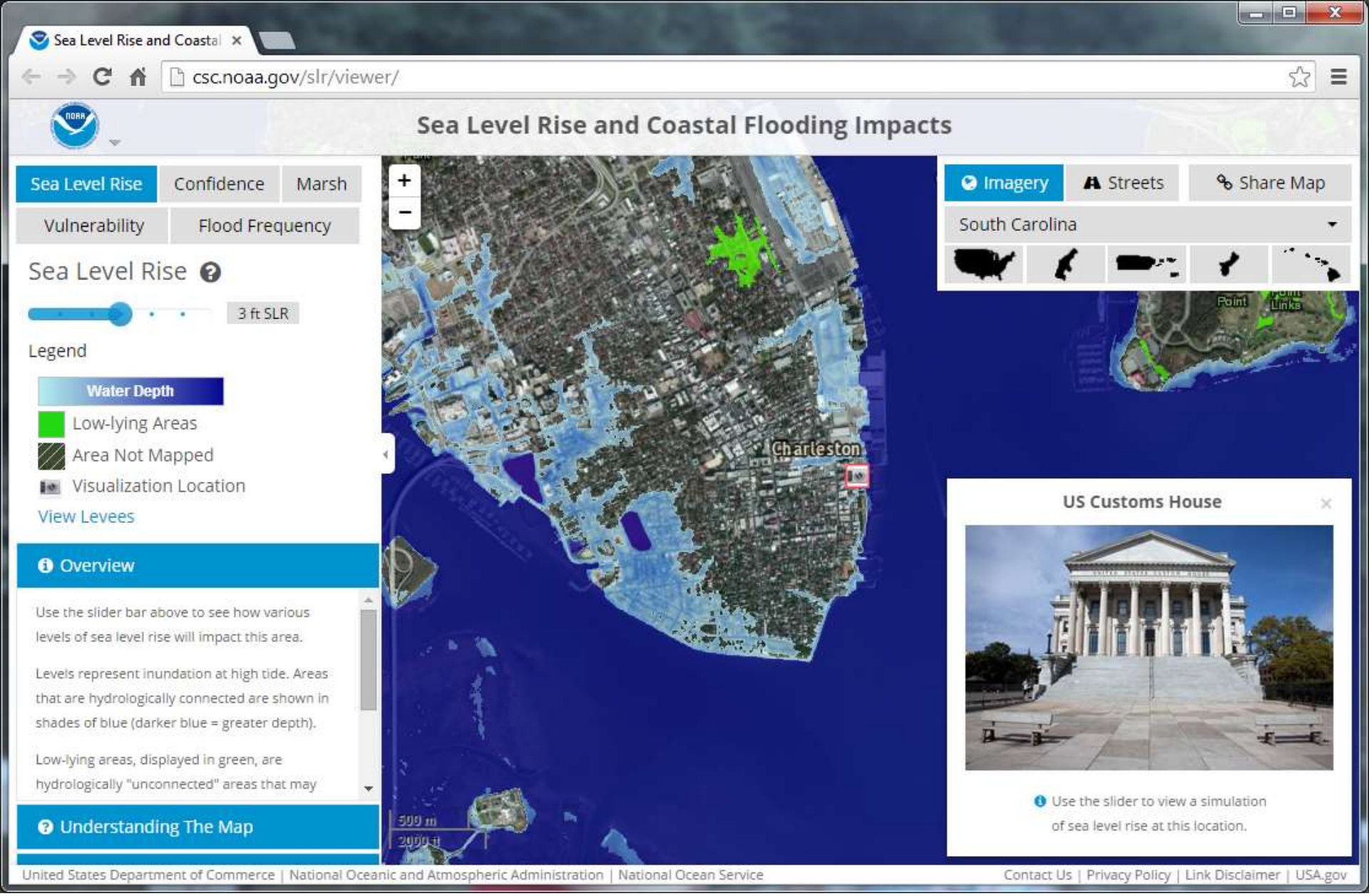

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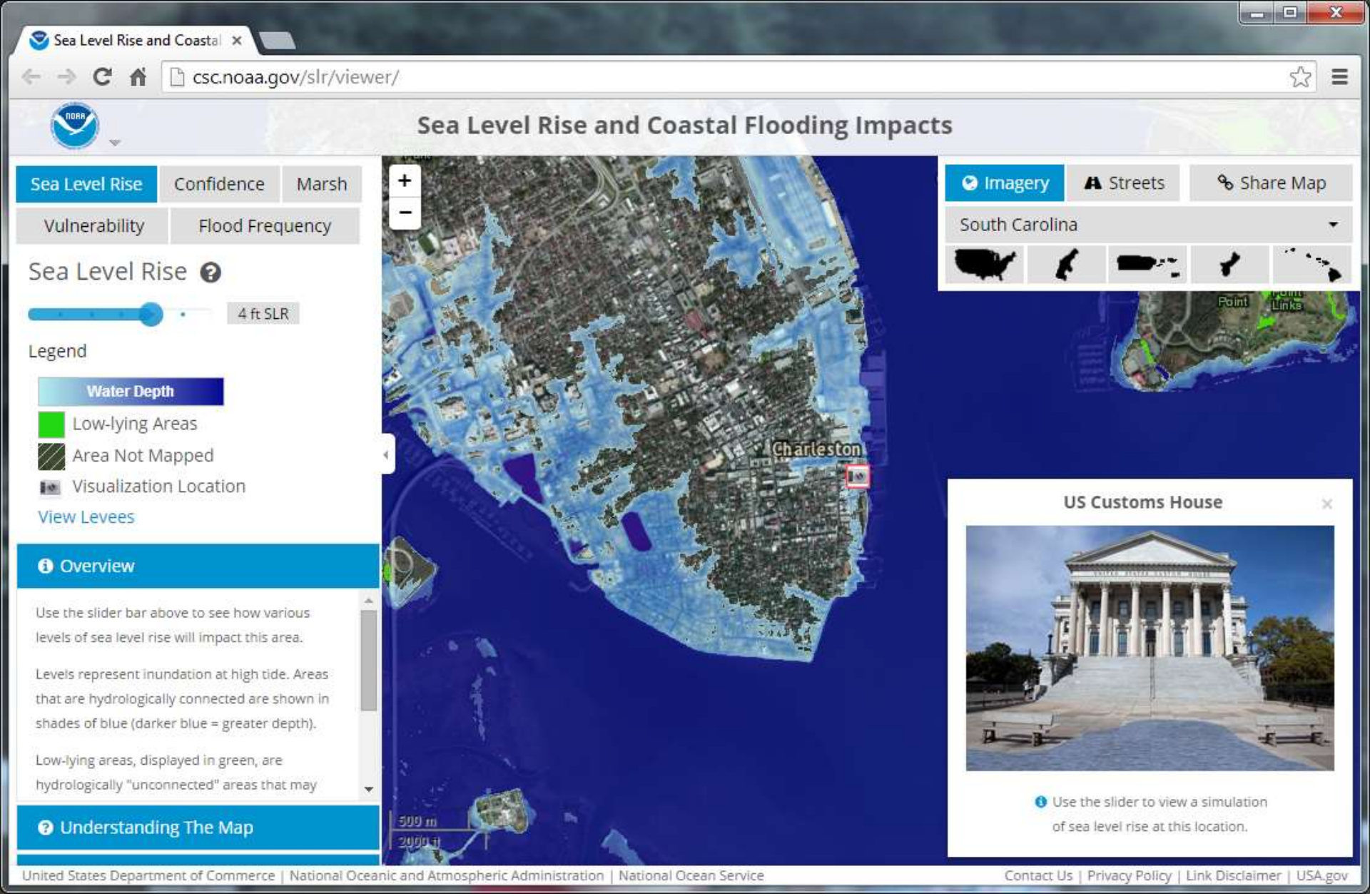

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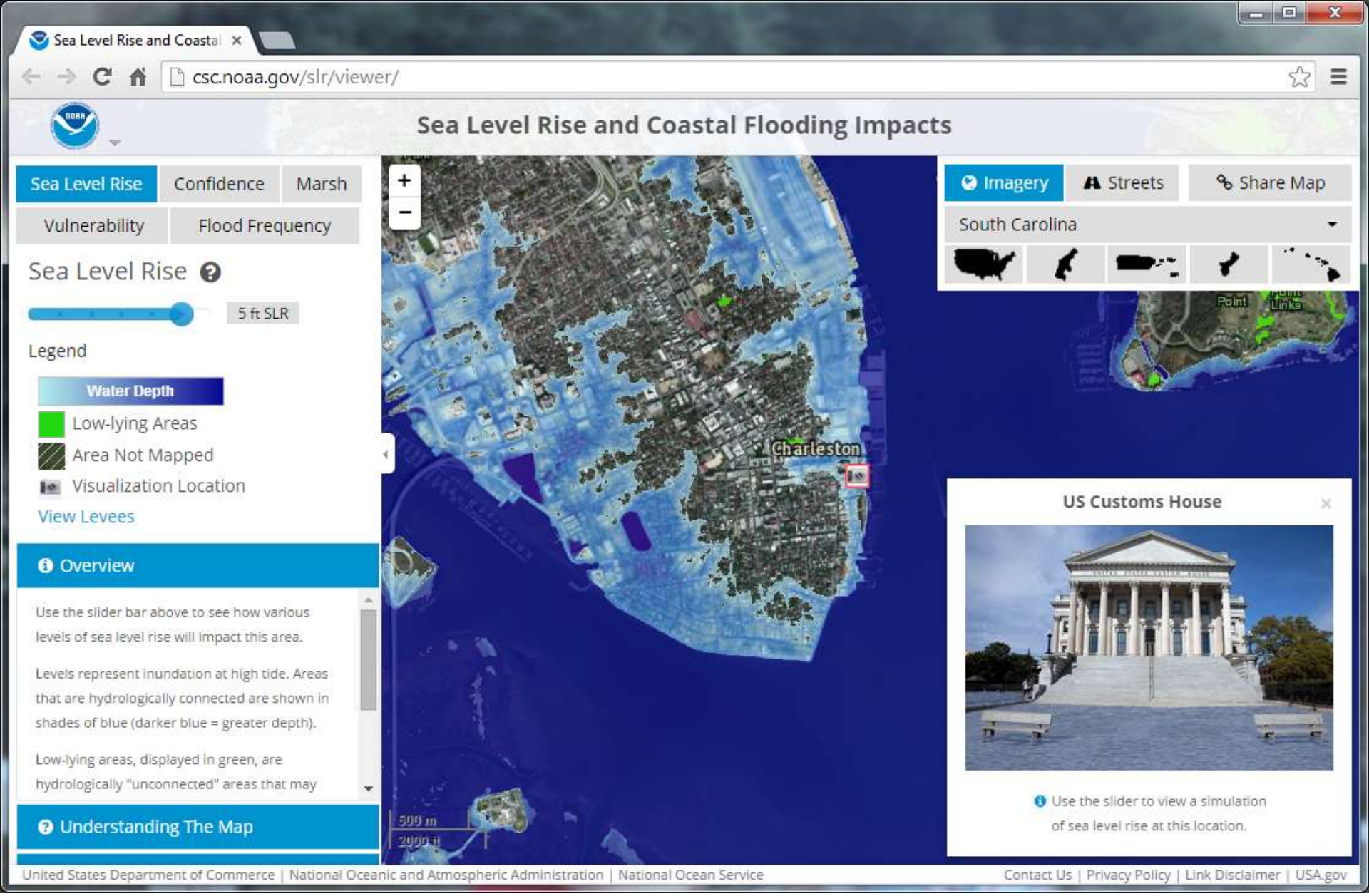

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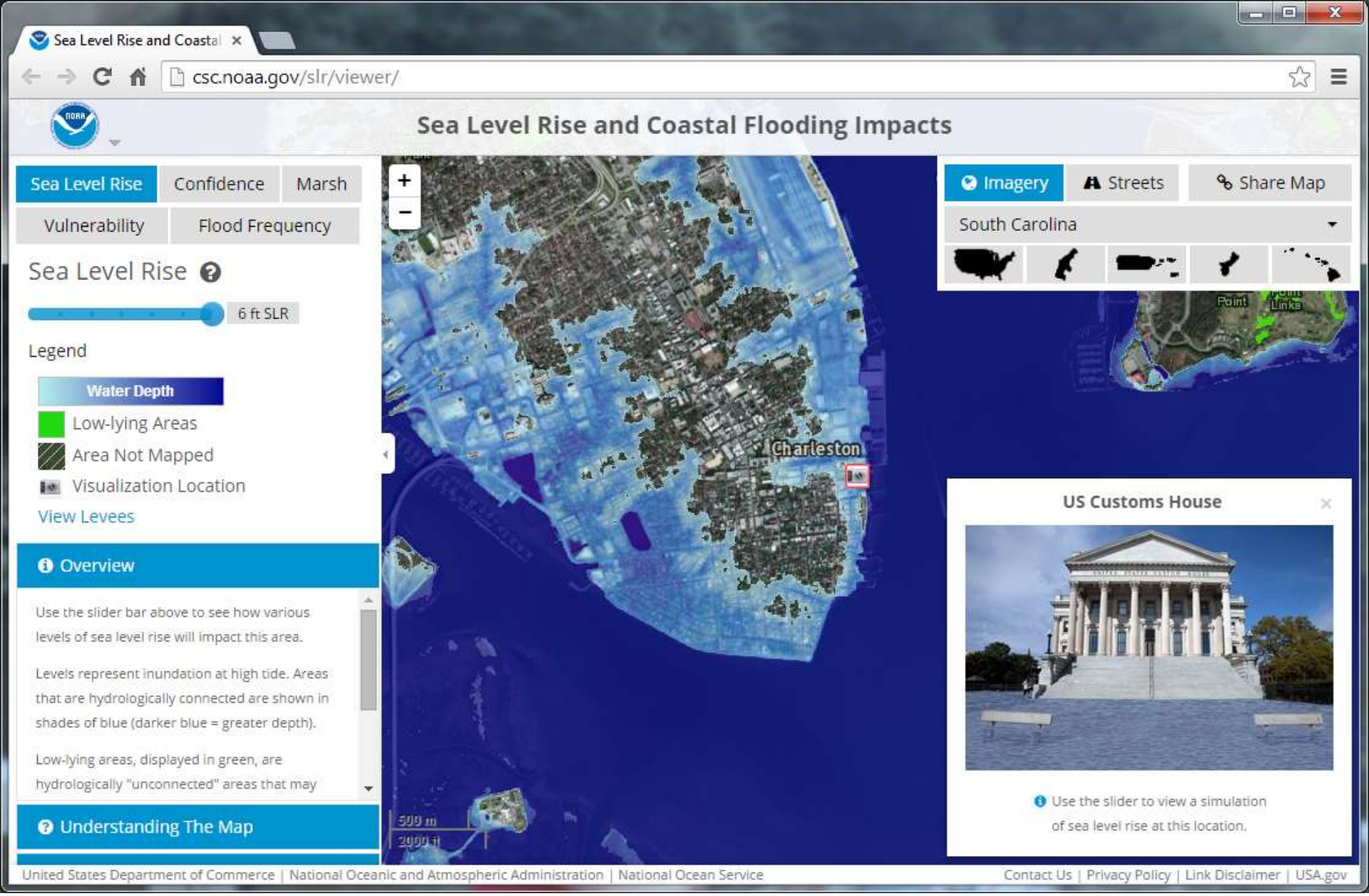

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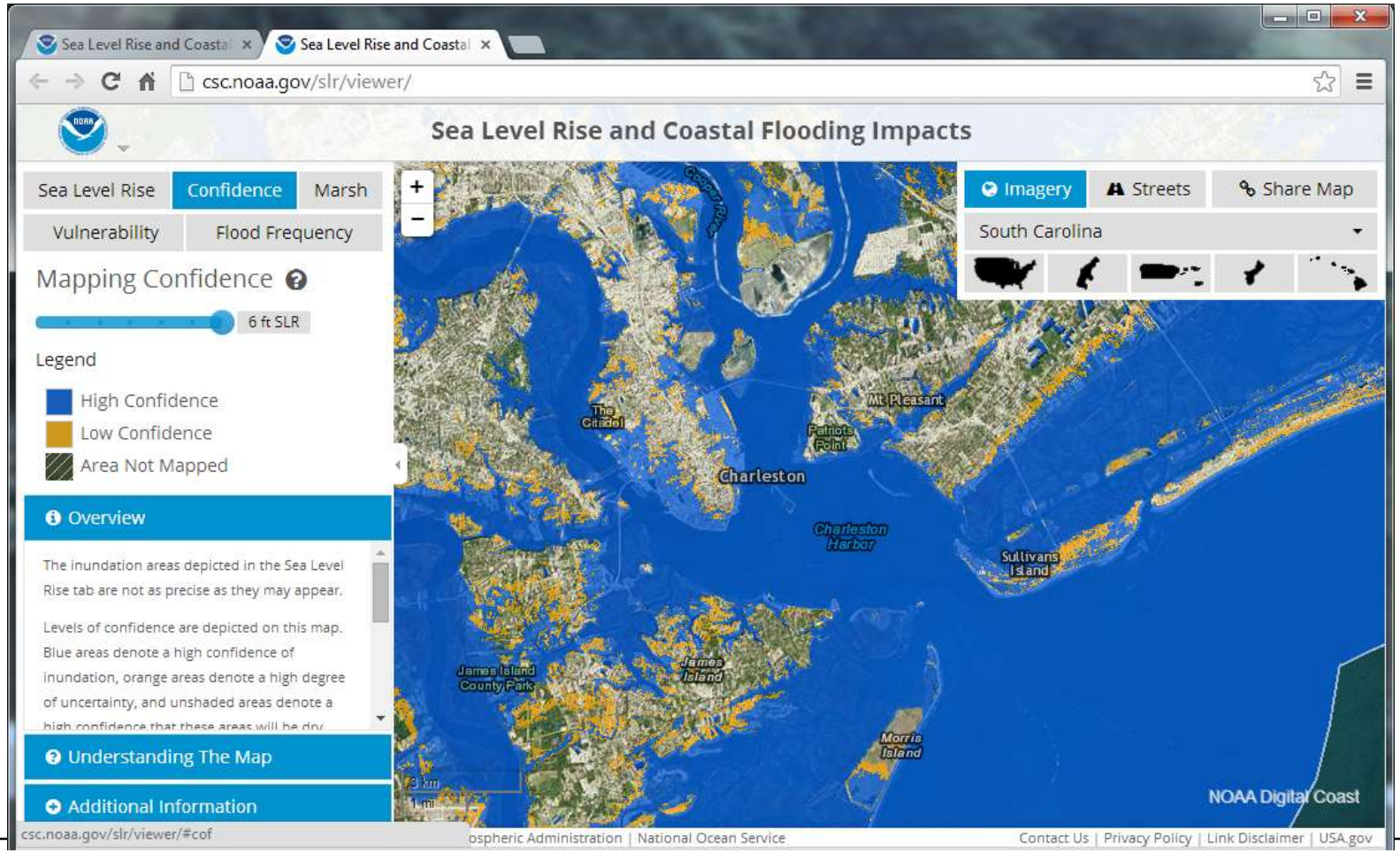
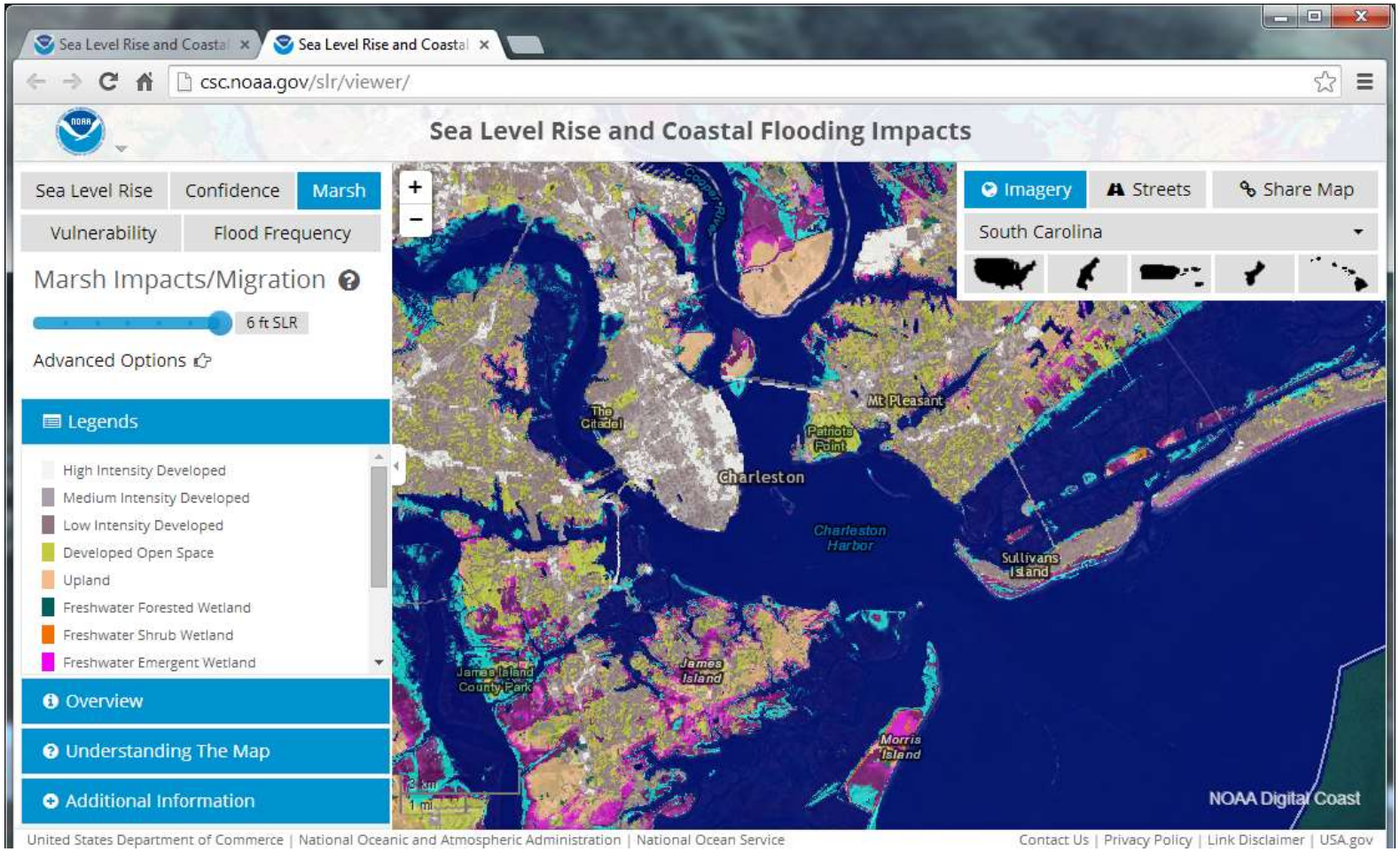
Communicate Mapping Confidence

Visualize the mapping confidence of inundation area based on uncertainty of elevation data and MHHW tidal surface.



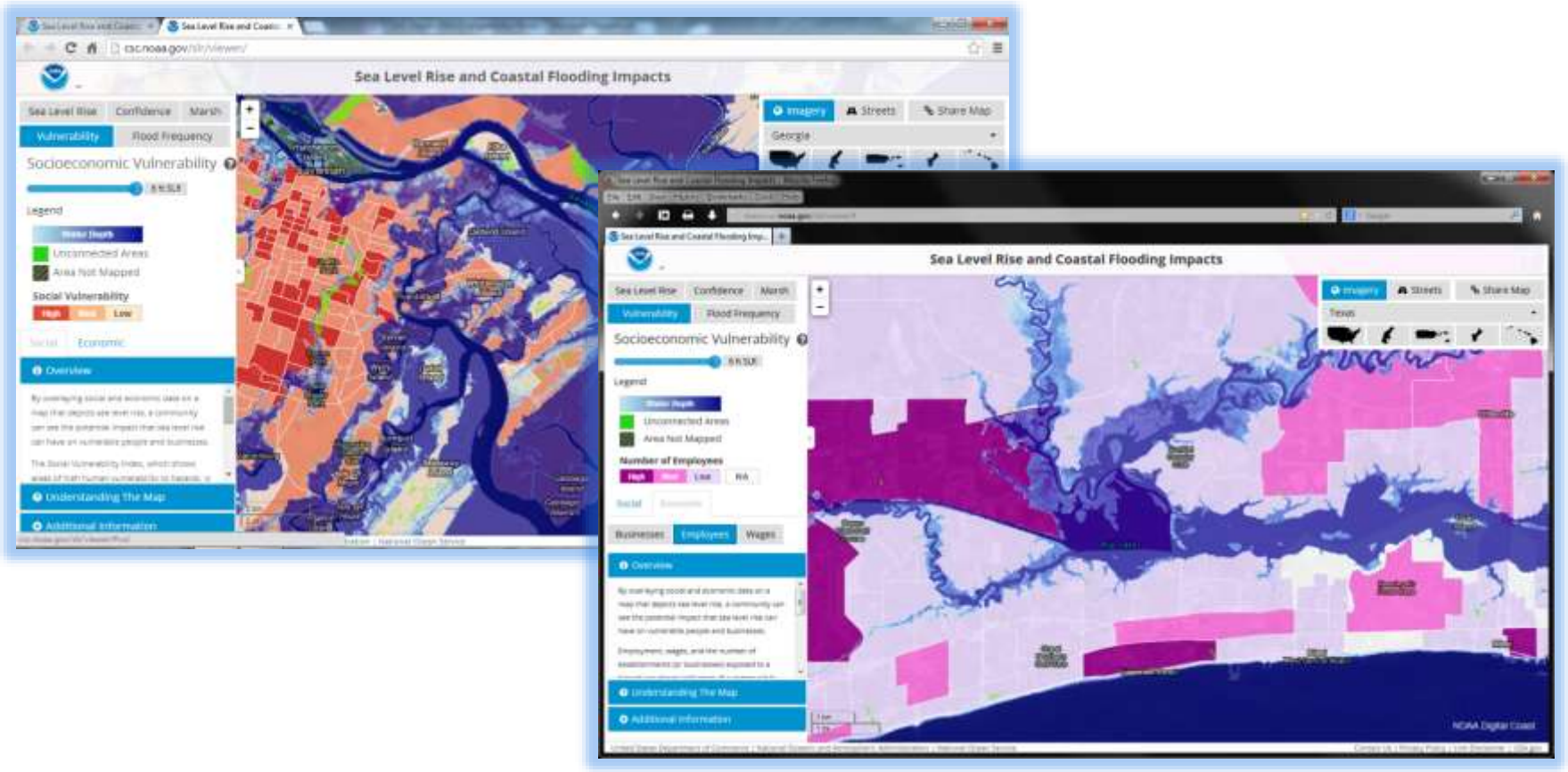
Visualize Marsh Impacts

Visualize the impacts of SLR scenarios on marshes using Coastal Change Analysis Program (C-CAP) data.



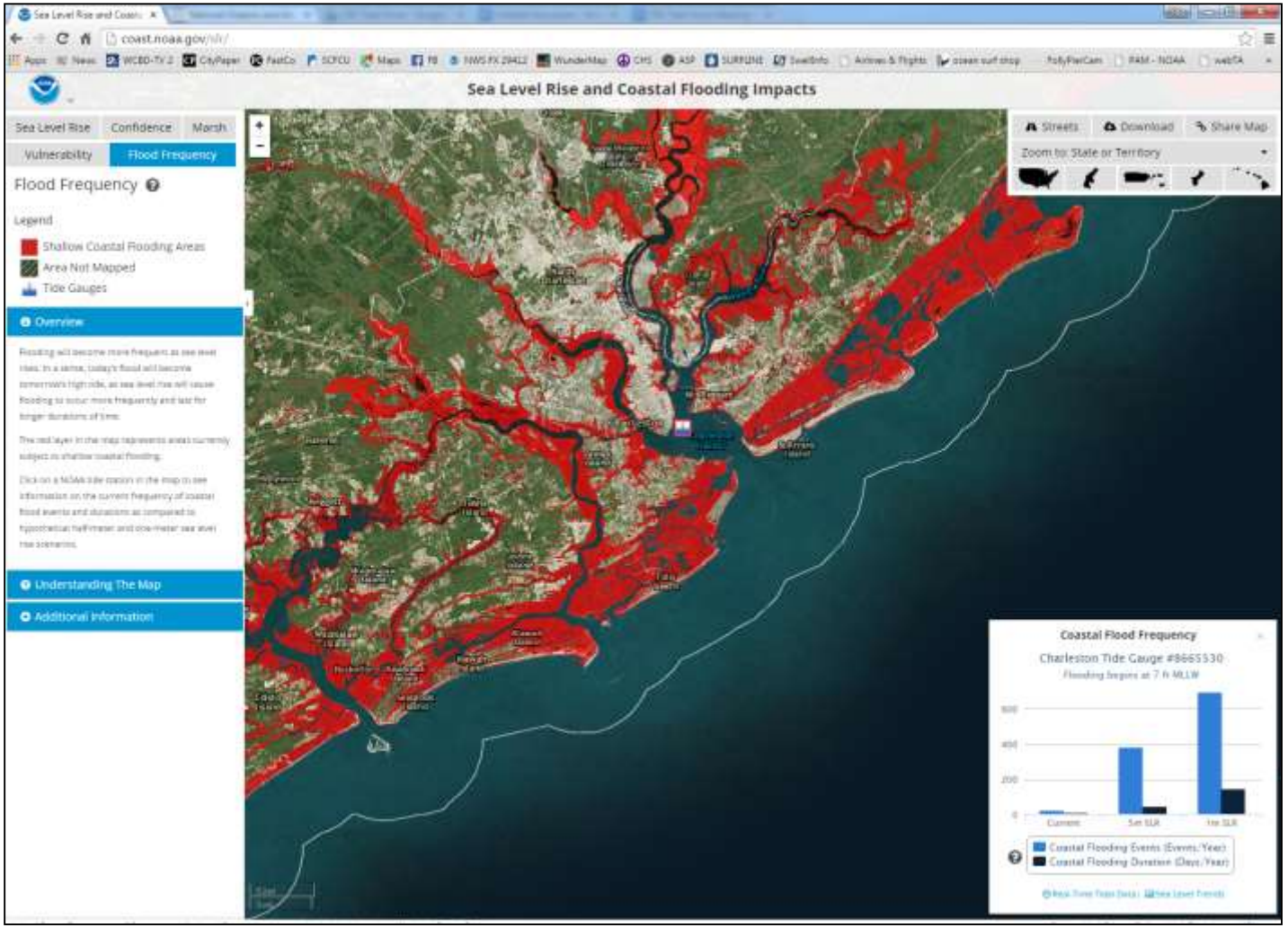
Social and Economic Vulnerability

Include Social Vulnerability Index (SOVI) from University of South Carolina and data from the Bureau of Labor Statistics (BLS) showing impacts on society and economy.



Coastal Flood Frequency

Communicate that today's flood is tomorrow's high tide. Use three years of observed water level data at National Ocean Service National Water Level Observation Network (NWLON) stations to show increased frequency of everyday flooding.



Current MHHW = 23/2 0.5m SLR = 382/46 1m SLR = 695/149

Not Waiting for a Disaster to Achieve Better Resilience Today