

NOAA Digital Coast Resources in Support of National Flood Risk Characterization



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Office of Ocean and Coastal Resource Management | Coastal Services Center

Inundation and Coastal Communities

Impacts - Inundation is among the most frequent, costly, and deadly coastal hazards to impact coastal communities in the U.S.

Need - Coastal communities require support through community planning and capacity building to enhance resilience.



“When I visit with citizens that have experience a land falling hurricane, I am frequently told ‘I didn’t know storm surge could happen to me.’”

**Bill Read, Former Director
NOAA National Hurricane Center**



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Selected Products and Collaborations

- Coastal County Snapshots
- NOAA SLR and Flooding Impacts Viewer
- NY Post-Sandy Risk Assessment Site (for NY Dept. of State)
- NJ Flood Mapper (with Rutgers Univ. and Jacques Cousteau National Estuarine Research Reserve)
- NOAA Roadmap to Adapting to Coastal Risk (beta site)





More Than Just Data

Dive into the Digital Coast to Get the Data, Tools, and Training Communities Need to Address Coastal Issues.

DATA

TOOLS

TRAINING

STORIES

What is the Digital Coast?

Coastal issues aren't easy. Sea level rise, storms, economics, natural resources, natural disasters, long-range planning...There's a lot going on.

The Digital Coast provides the coastal intelligence needed to conserve natural resources and make coastal communities more resilient.

See the "About" section to learn more about the dynamic Digital Coast Partnership that makes this resource possible.

Learn More about the Digital Coast

[About the Website](#) [Partnership](#) [Contributing Partners](#) [Watch the Video](#)

Top: [Data](#) [Tools](#) [Training](#) [Stories](#)

- 1 [Coastal Lidar](#)
- 2 [Coastal Change Analysis Program](#)
- 3 [Economics: National Ocean Watch](#)
- 4 [Electronic Navigational Charts](#)
- 5 [Emergency Response Imagery](#)

County Flood Hazard Snapshots

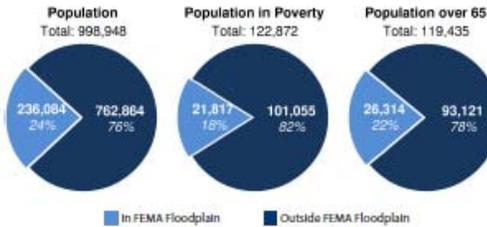
Hazard Exposure Information for

Hillsborough County, Florida

DATA SNAPSHOTS – COUNTY LEVEL
www.csc.noaa.gov/snapshots/

People + Floodplains – Not Good High-Risk Populations + Floodplains – Even Worse

The more homes and people located in a floodplain, the greater the potential for harm from flooding. Impacts are likely to be even greater when additional risk factors (age, income, capabilities) are involved, since people at greatest flood risk may have difficulty evacuating or taking action to reduce potential damage.

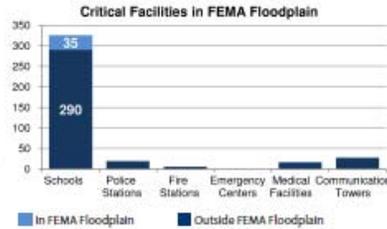


Based on 2000 U.S. Census records.

Community Infrastructure + Floodplains – Bad News

10% of critical facilities and 17% of road miles (1282 miles) in Hillsborough County are within the floodplain.

Hospitals, Roads, Schools, Shelters. These facilities play a central role in disaster response and recovery. Understanding which facilities are exposed, and the degree of that exposure, can help reduce or eliminate service interruptions and costly development. Incorporating this information into development planning helps communities get back on their feet faster.

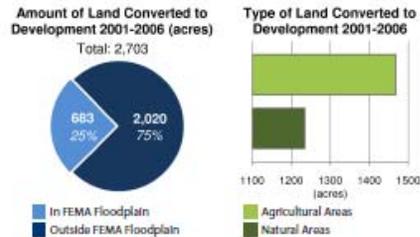


Based on Critical Facilities from FEMA HAZUS database.

Increasing Development in Floodplains – More People in Harm's Way

Loss of Natural Buffers – Less Protection

A county with more natural areas (wetlands, forests, etc.) and less development within floodplains typically has lower exposure to flooding. A county that monitors land cover changes within the floodplain will detect important trends that indicate whether flood exposure is increasing or decreasing. Armed with this information, local leaders can take steps to improve their safety and resilience.



Based on NOAA land cover data.



Next Steps

Through adaptation planning, all communities can be better prepared to face coastal hazards. While each community is different, there are some basic steps that all communities can follow to become more resilient.

Training that will lead your organization through this task can be brought to your office. Visit the Roadmap for Adapting to Coastal Risk Training (www.csc.noaa.gov/training/roadmap.html) to learn more. Many of the components of this course (which are outlined below) can be found within the Digital Coast's Coastal Inundation Toolkit (www.csc.noaa.gov/inundation).

- 1. Know your risks** – If your county has a hazard mitigation plan, get a copy of it from your county emergency management office or the Federal Emergency Management Agency (FEMA) (www.fema.gov/plan/mitplanning/status.shtml#1). Having county information about potential hazards, vulnerabilities, and priority hazard mitigation projects is important.
- 2. Develop a team** – To see the issues and opportunities from as many perspectives as possible, engaging a diverse group of stakeholders is always a good idea. The County Snapshots (www.csc.noaa.gov/snapshots) are used to help people visualize the issues.
- 3. Know what resources are available** – Federal and state agencies have funds available for risk reduction activities. See the funding opportunities listed below to learn more. There are also data and tools available to help people visualize the issues and solutions. For information on creating inundation maps for your community, visit the map section of the Coastal Inundation Toolkit (www.csc.noaa.gov/inundation/map).
- 4. Discover what others are doing** – See how other communities are addressing these issues. Visit the discover section of the Coastal Inundation Toolkit (www.csc.noaa.gov/inundation/discover). You may also contribute a story about your community efforts.

Data Sources

- **Flood Zones** – Based on FEMA 1% annual chance flood zones - <http://msc.fema.gov>
- **Critical Facilities** – FEMA HAZUS-MH data - www.fema.gov/plan/prevent/hasus/
- **Roads** – Based on ESRI 2005 streets data
- **Demographic Data** – NOAA - <http://csc.noaa.gov>
- **Land Cover Data** – NOAA - www.csc.noaa.gov/digitalcoast/data/landcover.html

Funding Opportunities

- FEMA – www.fema.gov/government/grant/fmapp/
- NOAA Coastal Management Program – <http://coastalmanagement.noaa.gov/mystate/>



County Flood Hazard Snapshots

Hazard Exposure Information for

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Hillsborough County

People + Floodplains =
Not Good

Population

Population in Poverty

Population over 65

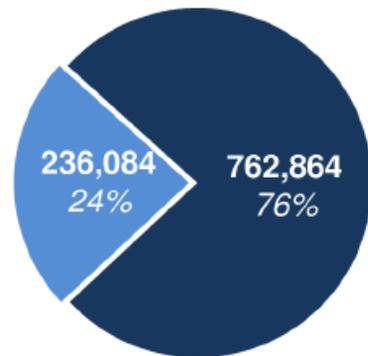
People + Floodplains =

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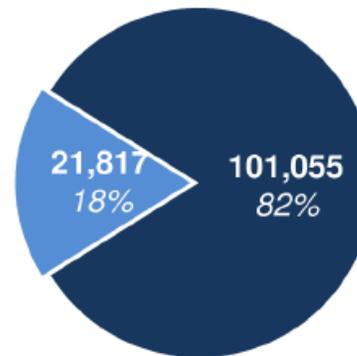
High-Risk Populations + Floodplains =
Even Worse

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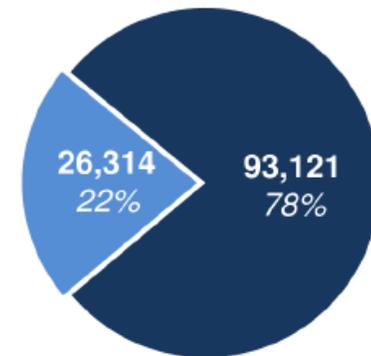
Population
Total: 998,948



Population in Poverty
Total: 122,872



Population over 65
Total: 119,435



In FEMA Floodplain

Outside FEMA Floodplain

Based on 2000 U.S. Census records.

By understanding, assessing and reducing your vulnerability, your community can take steps to improve their safety and resilience.

Based on NOAA land cover data.

In FEMA Floodplain
Outside FEMA Floodplain

1100 1200 1300 1400 1500
(acres)
Agricultural Areas
Natural Areas

- **NOAA** – based on earth justice streets data
- **Demographic Data** – NOAA - <http://h1/cs.noaa.gov>
- **Land Cover Data** – NOAA - www.csc.noaa.gov/digitalcoast/data/landcover.html

Funding Opportunities

- FEMA – www.fema.gov/government/grant/fimgp/
- NOAA Coastal Management Program – <http://coastalmanagement.noaa.gov/mystate/>



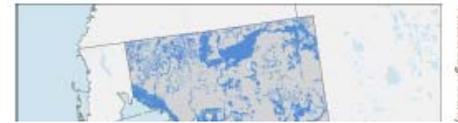
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County Flood Hazard Snapshots

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People + Floodplains =

Population

Population in Floodplains

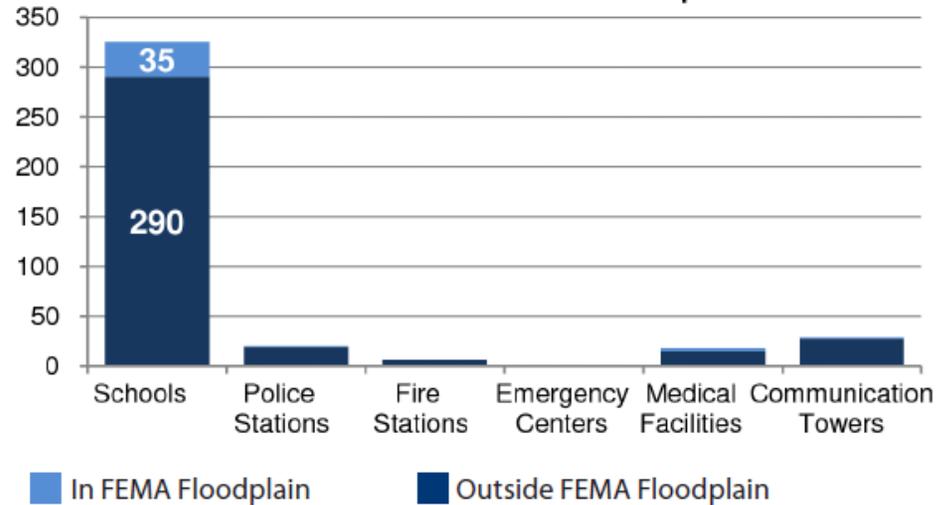
Population Outside

Community Infrastructure + Floodplains = Bad News

10% of critical facilities and 17% of road miles (1282 miles) in Hillsborough County are within the floodplain.

Hospitals. Roads. Schools. Shelters. These facilities play a central role in disaster response and recovery. Understanding which facilities are exposed, and the degree of that exposure, can help reduce or eliminate service interruptions and costly redevelopment. Incorporating this information into development planning helps communities get back on their feet faster.

Critical Facilities in FEMA Floodplain



Based on Critical Facilities from FEMA HAZUS database.

By understanding, assessing risks and taking necessary, smart actions, communities can take steps to improve their safety and resilience.

Based on NOAA land cover data.

In FEMA Floodplain
Outside FEMA Floodplain

1100 1200 1300 1400 1500 (acres)
Agricultural Areas
Natural Areas

- **NOAA** – based on Esri JUNE STREETS data
- **Demographic Data** – NOAA - <http://hcs.noaa.gov>
- **Land Cover Data** – NOAA - www.csc.noaa.gov/digitalcoast/data/landcover.html

Funding Opportunities

- FEMA – www.fema.gov/government/grant/fmgp/
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County Flood Hazard Snapshots

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Hillsborough County

People + Floodplains =

Population

Population in Floodplains

Population Outside

**Increasing Development in Floodplains =
More People in Harm's Way**

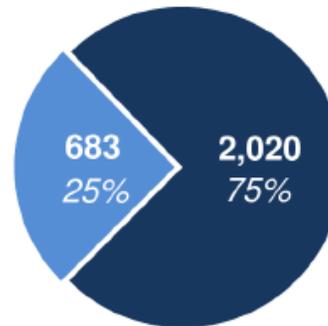
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Less Protection**

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Based on NOAA land cover data.

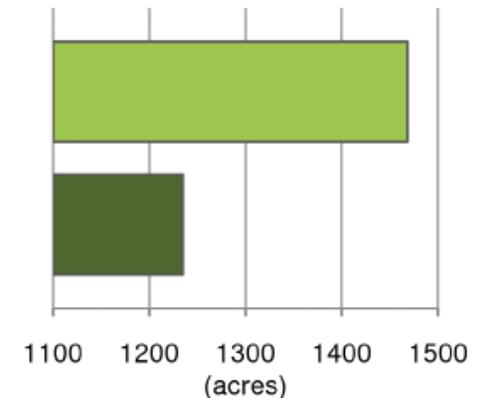
**Amount of Land Converted to
Development 2001-2006 (acres)**

Total: 2,703



- In FEMA Floodplain
- Outside FEMA Floodplain

**Type of Land Converted to
Development 2001-2006**



- Agricultural Areas
- Natural Areas



NOAA Coastal Management Program – <http://coastalmanagement.noaa.gov/mystate/>



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Economics: National Ocean Watch (ENOW)

Contributing Partners: Bureau of Economic Analysis Bureau of Labor Statistics NOAA Coastal Services Center

Overview Details In Action Support

Get It Now

- Data Wizard – Choose a year and geographic area for a subset of the data
- Tabular Data – Download the full data set

ENOW provides time-series data on the ocean and Great Lakes economy, which includes six economic sectors dependent on the oceans and Great Lakes. ENOW is available for counties, states, regions, and the nation in a wide variety of formats.

See the Data

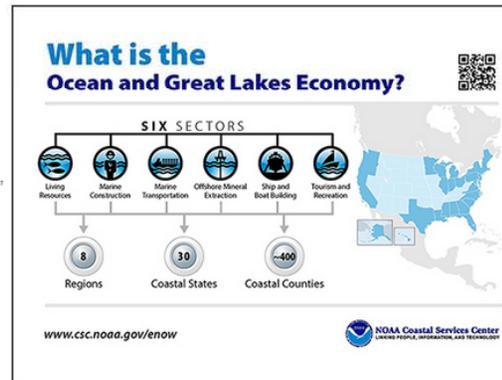
- **County Snapshots** – easy-to-understand stories about your county, complete with charts and graphs; the “Ocean Jobs” and “Wetland Benefits” snapshots use ENOW data
- **Summaries** – the national report and a variety of infographics (visual representations of the data) at the national, regional, and state levels

Interact with the Data

- **ENOW Explorer** – a tool using maps, charts, and graphs to show changes in the ENOW data from place to place and over time

Data Specifications

- **Area of Coverage:** Approximately 400 coastal counties, 30 coastal states, 8 regions, and the nation
- **Dates Available:** 2005 to 2011
- **Format:** Comma-separated value (CSV)
- **Scale:** National, state, and county



Related Data

- Economics: National Ocean Watch (ENOW) for Self-Employed Workers
- Gross Domestic Product
- Quarterly Census of Employment and Wages
- Spatial Trends in Coastal Socioeconomics

Related Tools

- Coastal County Snapshots
- ENOW Explorer

Ocean Jobs Snapshots

Ocean Jobs Snapshot Los Angeles County, California

COASTAL COUNTY SNAPSHOTS
www.csc.noaa.gov/snapshots/

Ocean Jobs = A Healthy Economy

In 2011, Ocean-related businesses provided 2.6% of the total jobs in Los Angeles County. This represents a 6% increase in Ocean jobs since 2005. Nationwide, Ocean jobs represent double the number of jobs supported by agriculture.

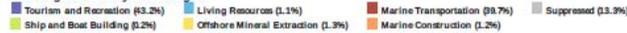


Ocean Jobs by Sector

Comparing Los Angeles County's Ocean sectors to the state and nation shows how local concerns may or may not coincide with state and national priorities.



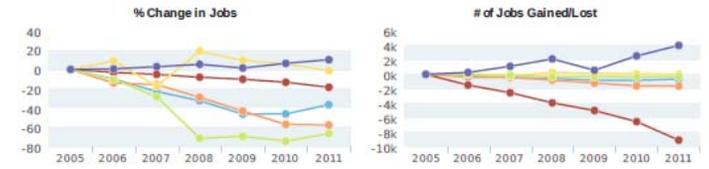
Los Angeles County Percentages



Job Trends

When making coastal management decisions, it is important to understand how the six sectors have changed over time.

Los Angeles County Percent Changes



County and National Wages

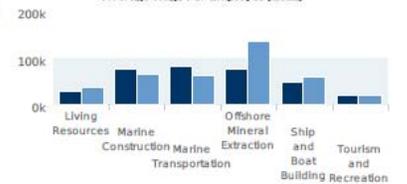
Higher local wages can be attractive to employees but a deterrent to new or expanding businesses. Managers should consider cost of living rates when making this comparison.

Impact of Part-time Workers

Average tourism wages can be smaller due to the high percentage of part-time workers, but total tourism wages are often among the highest because of the large number of people employed.



Average Wage Per Employee (2011)



Snapshot data source – Economics: National Ocean Watch
Date Printed: February, 2014

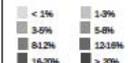


Understanding Neighbors Makes a Region Stronger



Knowing how neighboring communities depend on Ocean resources can be important when it comes to developing regional governance policies that benefit all. See the Coastal County Snapshots for nearby counties to better understand regional similarities and differences.

Ocean Jobs as % of Total Jobs (2011)



Digging Deeper

This snapshot provides a good starting point, but there are aspects of the Ocean economy that are not captured in this analysis. Information to help fill these gaps is listed below.

Frequently Asked Questions (<http://www.csc.noaa.gov/snapshots/faq/ocean-jobs.pdf>)

Key Economic Sectors

Economic statistics that focus on employment, like those used in this snapshot, miss the contributions of the self-employed. However, the self-employed are an important part of some sectors, like commercial fishing. NOAA compiles a wide range of data on commercial fishing (<http://www.st.nmfs.noaa.gov/commercial-fisheries/index>) that more fully illustrates this sector's economic importance.

Values outside the Market

Because many of the natural features that make the coast attractive can be enjoyed at no cost, their value is not evident in the 'market' data (jobs, wages, etc.). However, independent studies have estimated these 'nonmarket' values (aesthetics, health, safety, etc.).

- State of the Coast (http://stateofthecoast.noaa.gov/coastal_economy/nonmarket.html)
- National Ocean Economics Program (<http://www.oceaneconomics.org/nonmarket/>)

Combining Data to Make Decisions

Combining information on market and nonmarket values to inform coastal management can be complicated. Below are a few resources that will assist in this task.

- General overview in laymen's terms (<http://www.ecosystemvaluation.org>)
- Developing and using information on nonmarket values (<http://nepis.epa.gov/AdobePDF/P10ERJY.pdf>)
- Assessing tradeoffs (<http://csc.noaa.gov/digitalcoast/tools/invest>)

Additional Coastal Economic Resources

- Marine Ecosystem Services Partnership (<http://www.marineecosystemservices.org/>)
- Introduction to Economics for Coastal Managers (<http://www.csc.noaa.gov/economics/>)

Data Source for This Snapshot

Economics: National Ocean Watch (ENOW) (<http://www.csc.noaa.gov/enow/>). This 2011 data set provides ocean- and Great Lakes-related establishments, employment, and wages computed using the Bureau of Labor Statistics' Quarterly Census of Employment and Wages, and gross domestic product (GDP) data derived from state GDP statistics from the Bureau of Economic Analysis.



Ocean Jobs Snapshots

Ocean Jobs Snapshot
Los Angeles County, California

COASTAL COUNTY SNAPSHOTS
www.csc.noaa.gov/snapshots/

Understanding Neighbors Makes a Region Stronger



Knowing how neighboring communities depend on Ocean resources can be important when it comes to developing

Ocean Jobs = A Healthy Economy

In 2011, Ocean-related businesses provided 2.6% of the total jobs in Los Angeles County. This represents a 6% increase in Ocean jobs since 2005. Nationwide, Ocean jobs represent double the number of jobs supported by agriculture.

Los Angeles County Ocean jobs account for

101,159

employees

\$6b

in wages

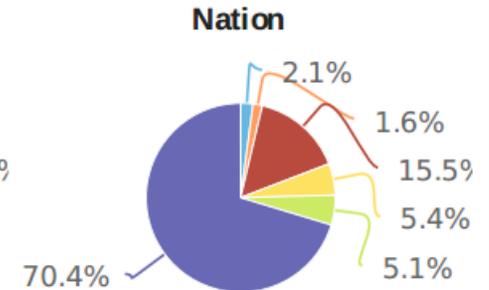
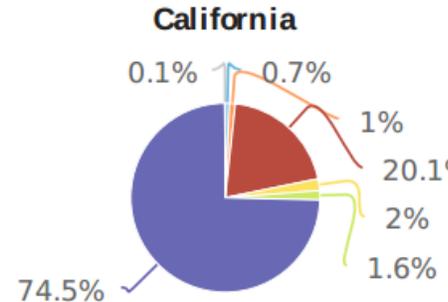
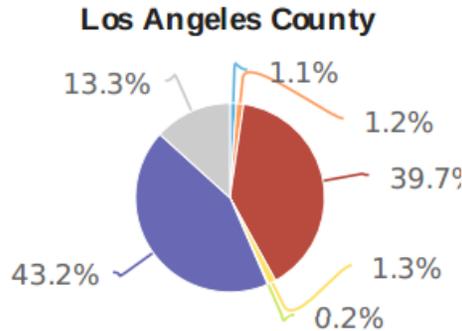
\$13b

in goods & services

in 2011

Ocean Jobs by Sector

Comparing Los Angeles County's Ocean sectors to the state and nation shows how local concerns may or may not coincide with state and national priorities.



Los Angeles County Percentages

- Tourism and Recreation (43.2%)
- Living Resources (1.1%)
- Ship and Boat Building (0.2%)
- Offshore Mineral Extraction (1.3%)
- Marine Transportation (39.7%)
- Suppressed (13.3%)
- Marine Construction (1.2%)

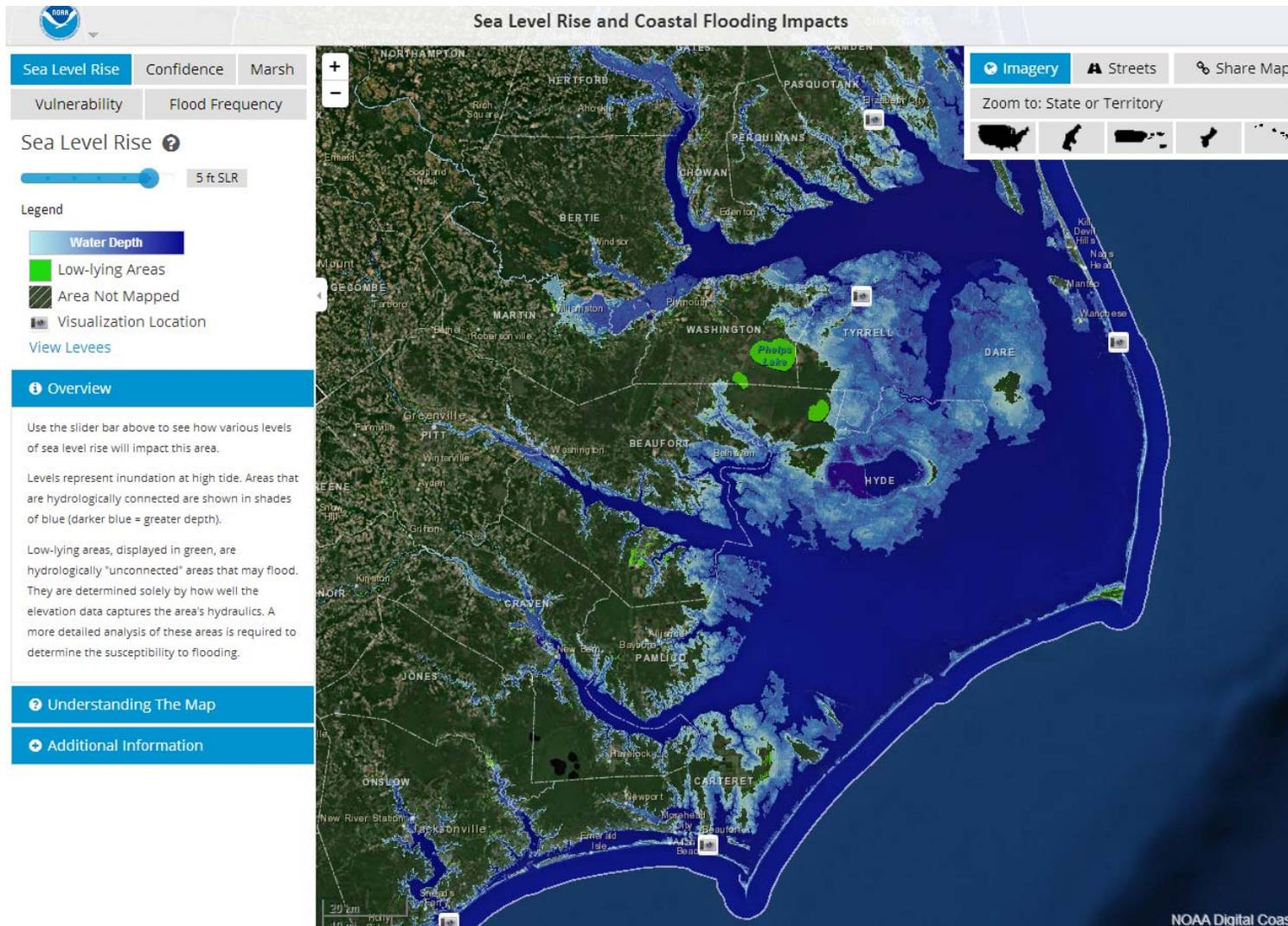
Snapshot data source – Economics: National Ocean Watch
Date Printed: February, 2014



Employment and Wages, and gross domestic product (GDP) data derived from state GDP statistics from the Bureau of Economic Analysis.



NOAA SLR and Coastal Flooding Impacts Viewer

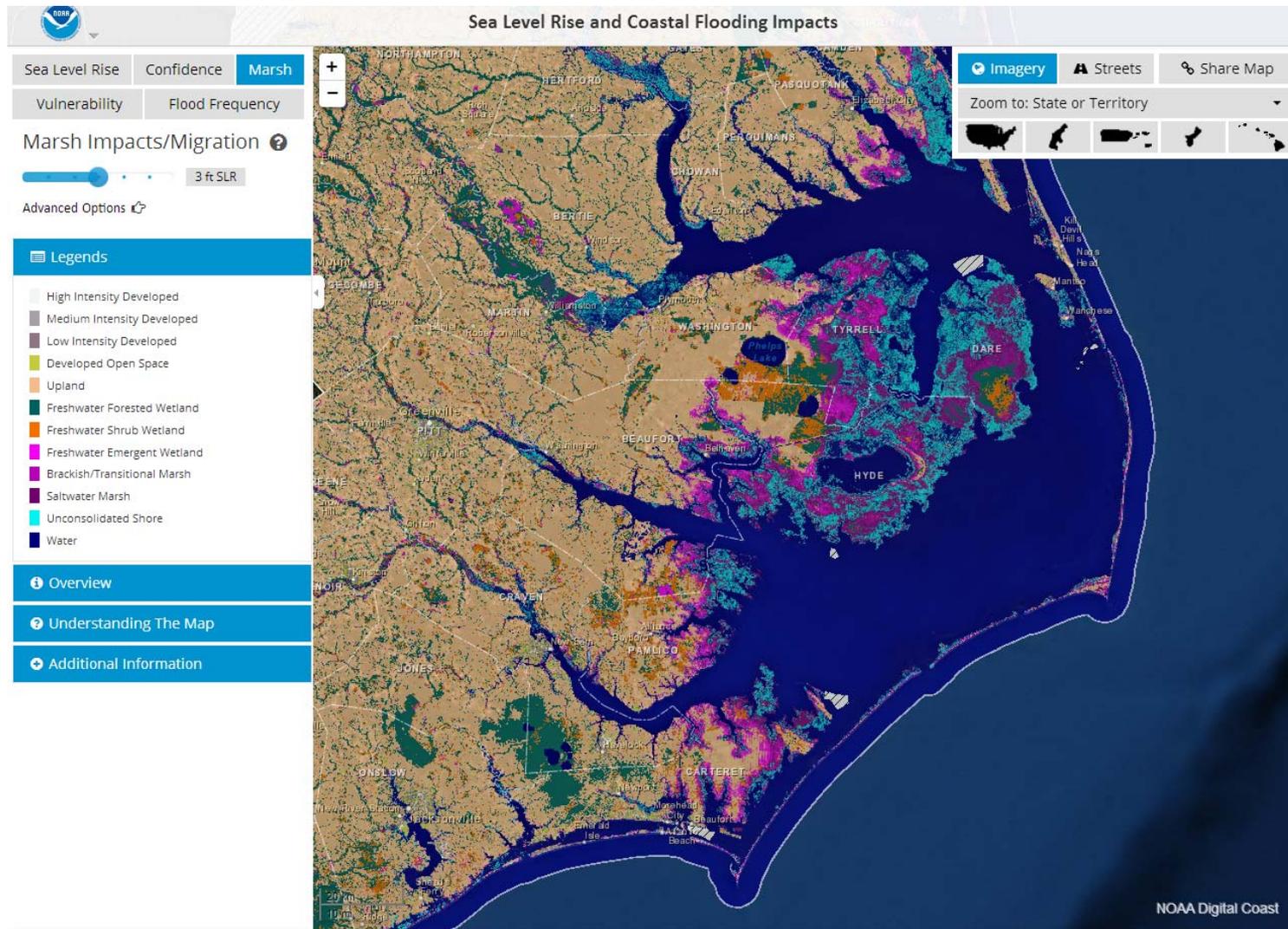


<http://csc.noaa.gov/slr/viewer>



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NOAA SLR and Coastal Flooding Impacts Viewer

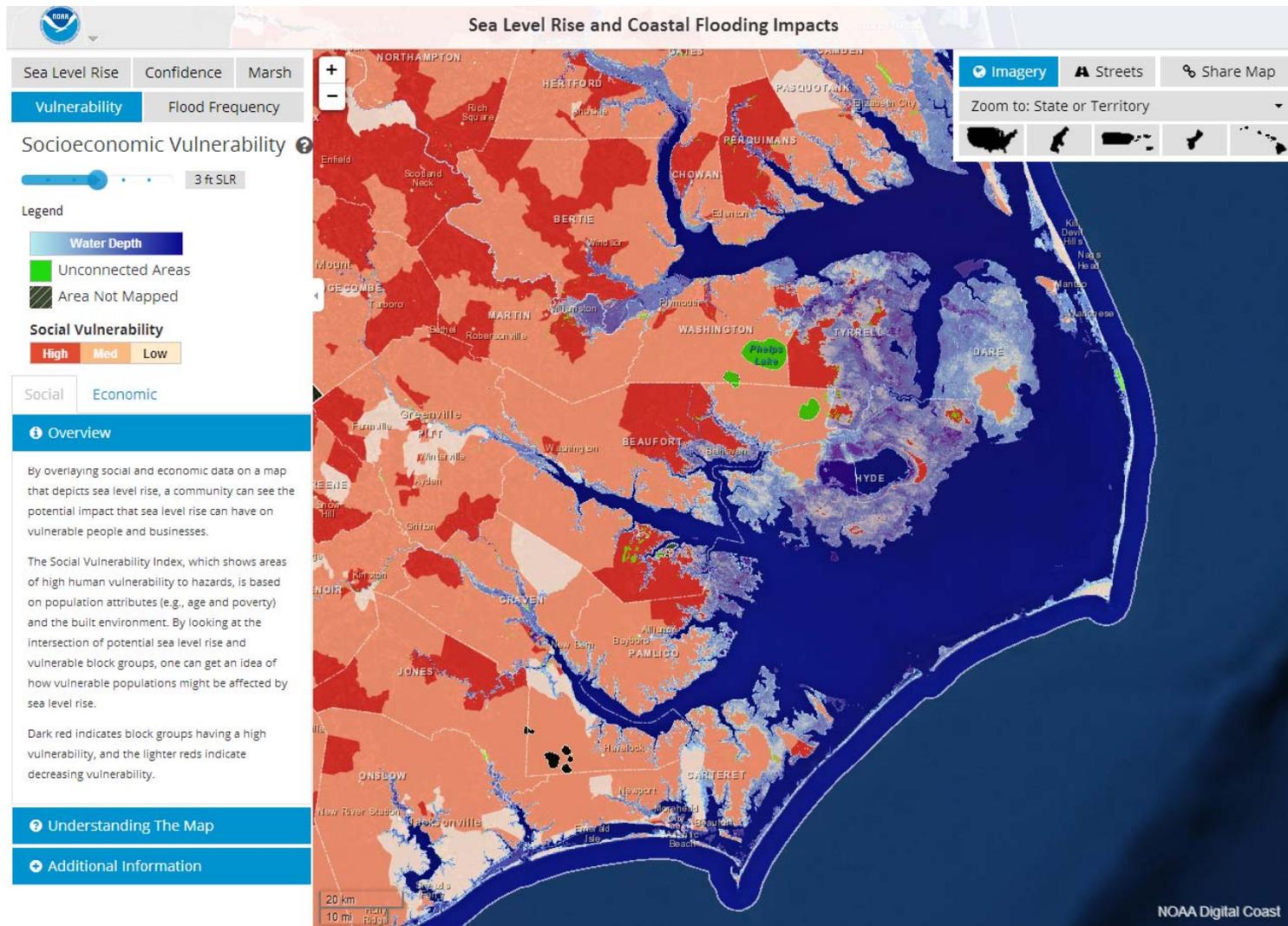


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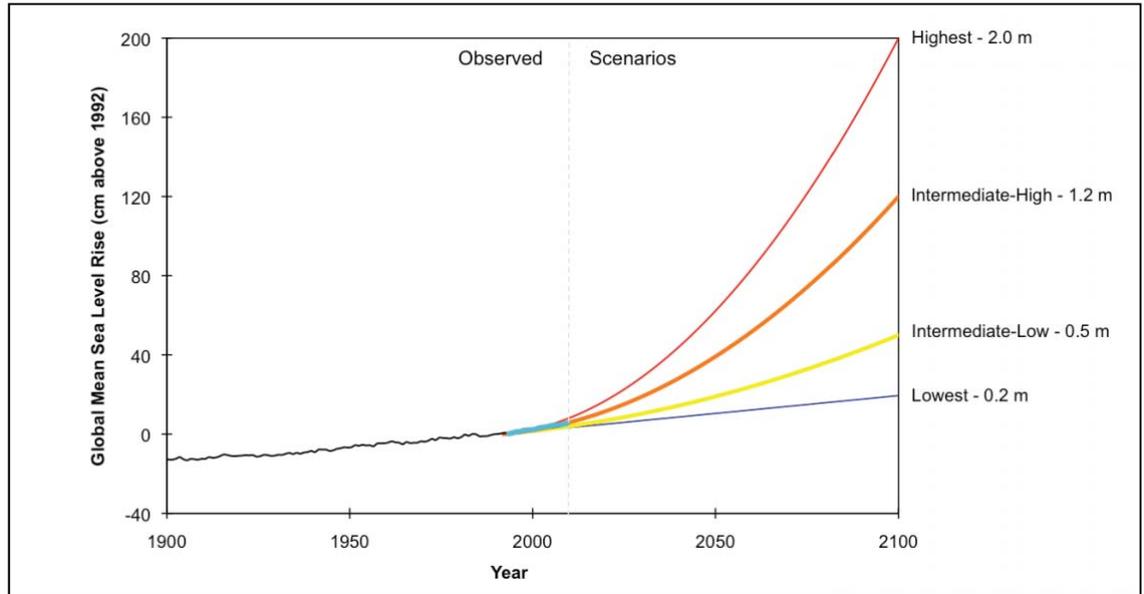
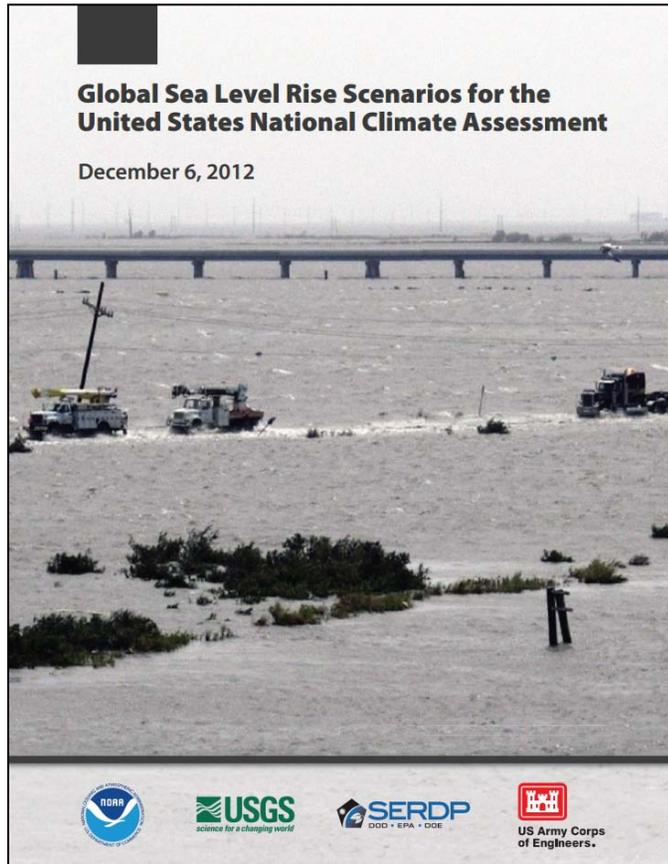


<http://csc.noaa.gov/slr/viewer>



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Global SLR Scenarios – National Climate Assessment

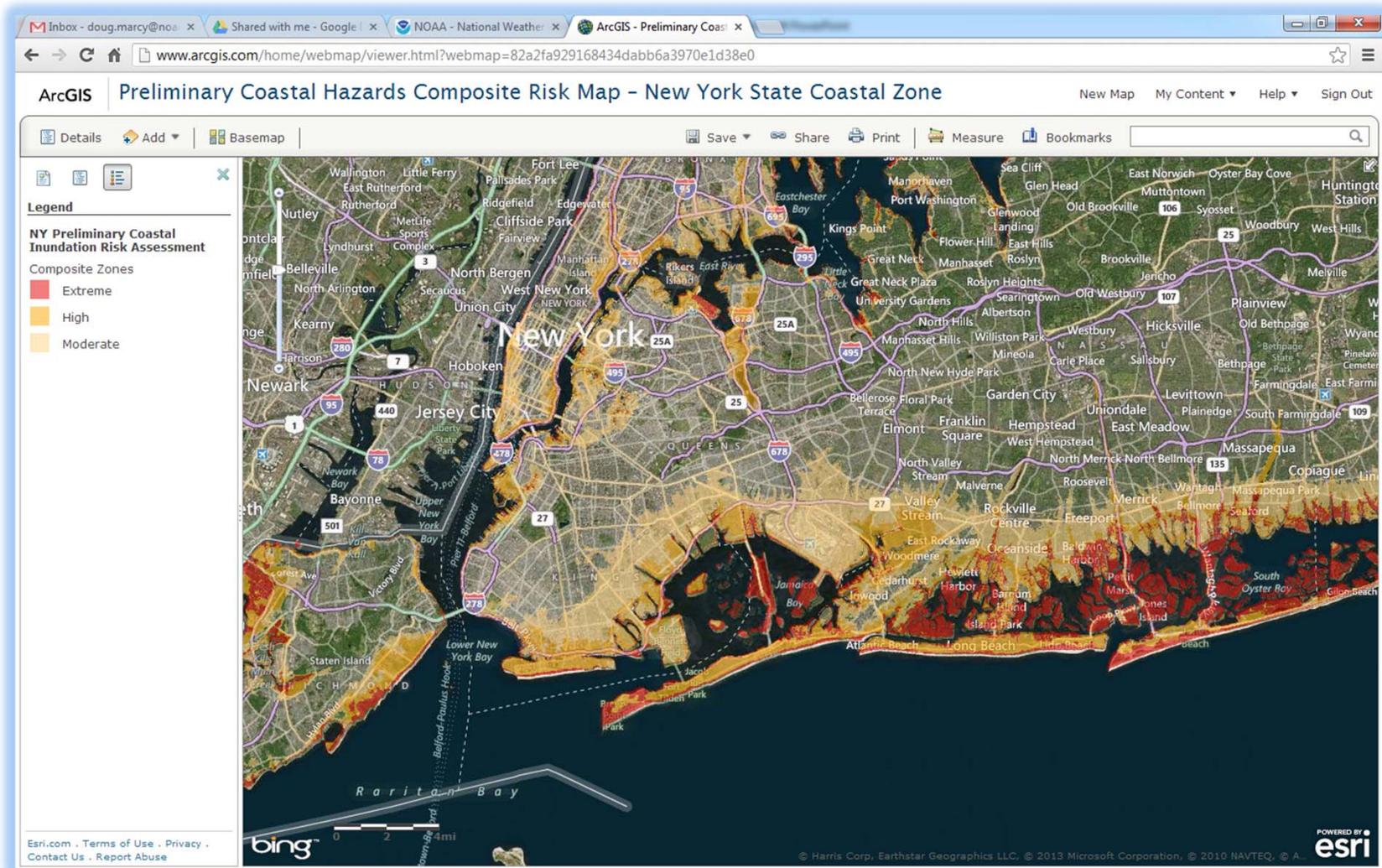


http://cpo.noaa.gov/sites/cpo/Reports/2012/NOAA_SLR_r3.pdf

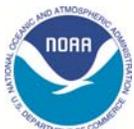


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NY Guidance for Community Reconstruction Zone Plans



<http://nysandyhelp.ny.gov/community-reconstruction-zones>



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NY Risk Assessment Area Mapping

http://nysandyhelp.ny.gov/sites/default/files/documents/Risk_Assessment_Area_Mapping.pdf

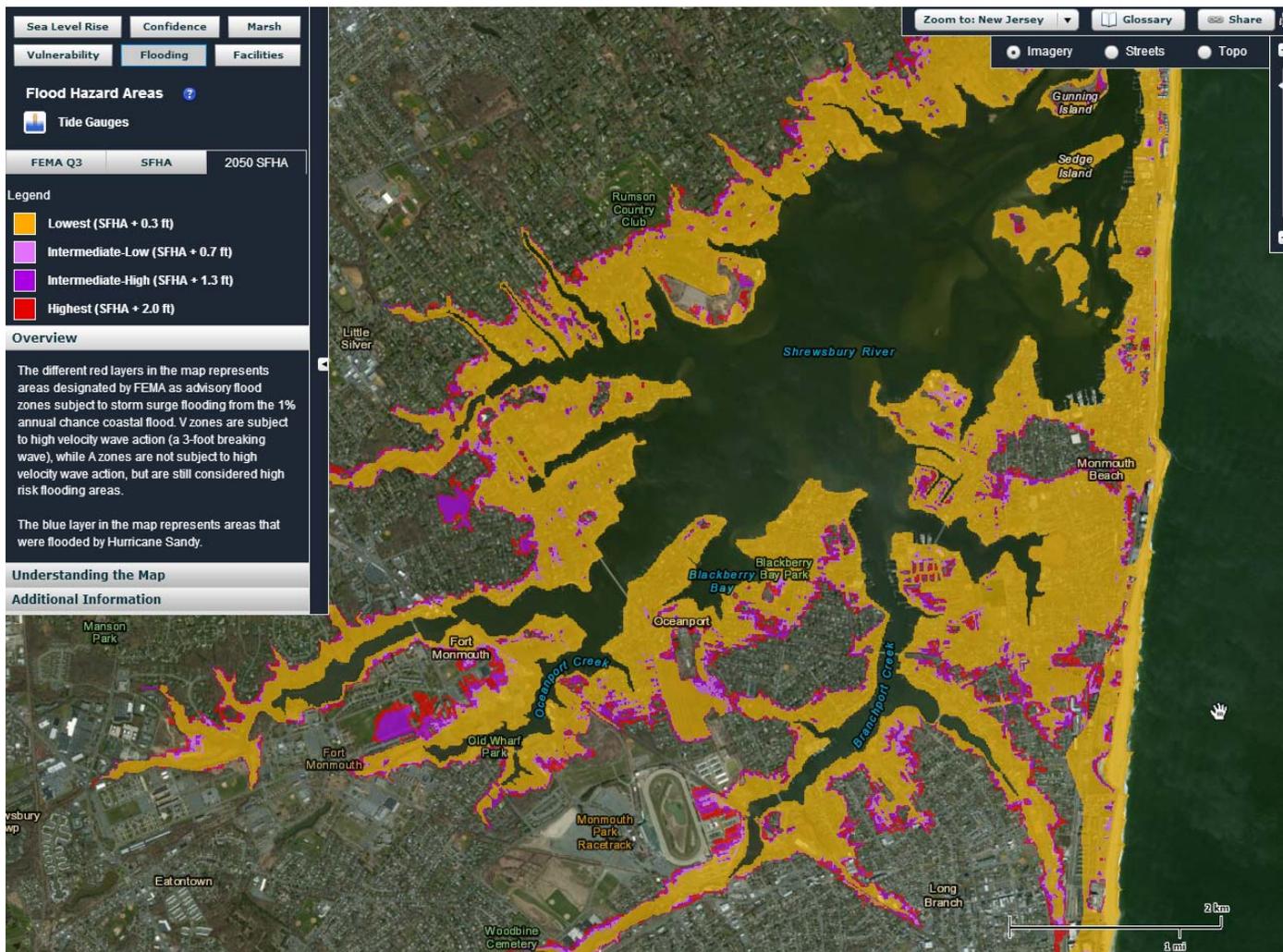
Layers
Combined Zones
Extreme:
V Zones
NWS Coastal Flood Advisory
Susceptible Natural Shoreline Feature
MHHW + 3ft SLR
High:
High - full area, without extreme erased
1% Flood Zone (V and A)
Susceptible Natural Shoreline Feature
NWS Coastal Flood Advisory + 3ft
Moderate:
Moderate - full area, without ext and high erased
0.2% Flood Zone
1% Flood Zone + 3ft SLR
Category 3 Surge Zone
Base:
Water
Map Service Layers:
Composite
Extreme
High
Moderate

Source Data
Advisory Flood Zones
Revised Advisory Flood Zones for NYC
1% Annual Chance Flood Zones + 3ft Sea Level Rise
Nassau County Storm Surge Zones
NYC Storm Surge Zones
Suffolk County Storm Surge Zones
Westchester County Storm Surge Zones
3ft Sea Level Rise
National Weather Service Coastal Flood Advisory
National Weather Service Coastal Flood Advisory + 3ft SLR
Nassau County Flood Zones
Suffolk County Flood Zones
Susceptible Natural Shoreline
Water
Water Feature to Remove Water from Hazards Data



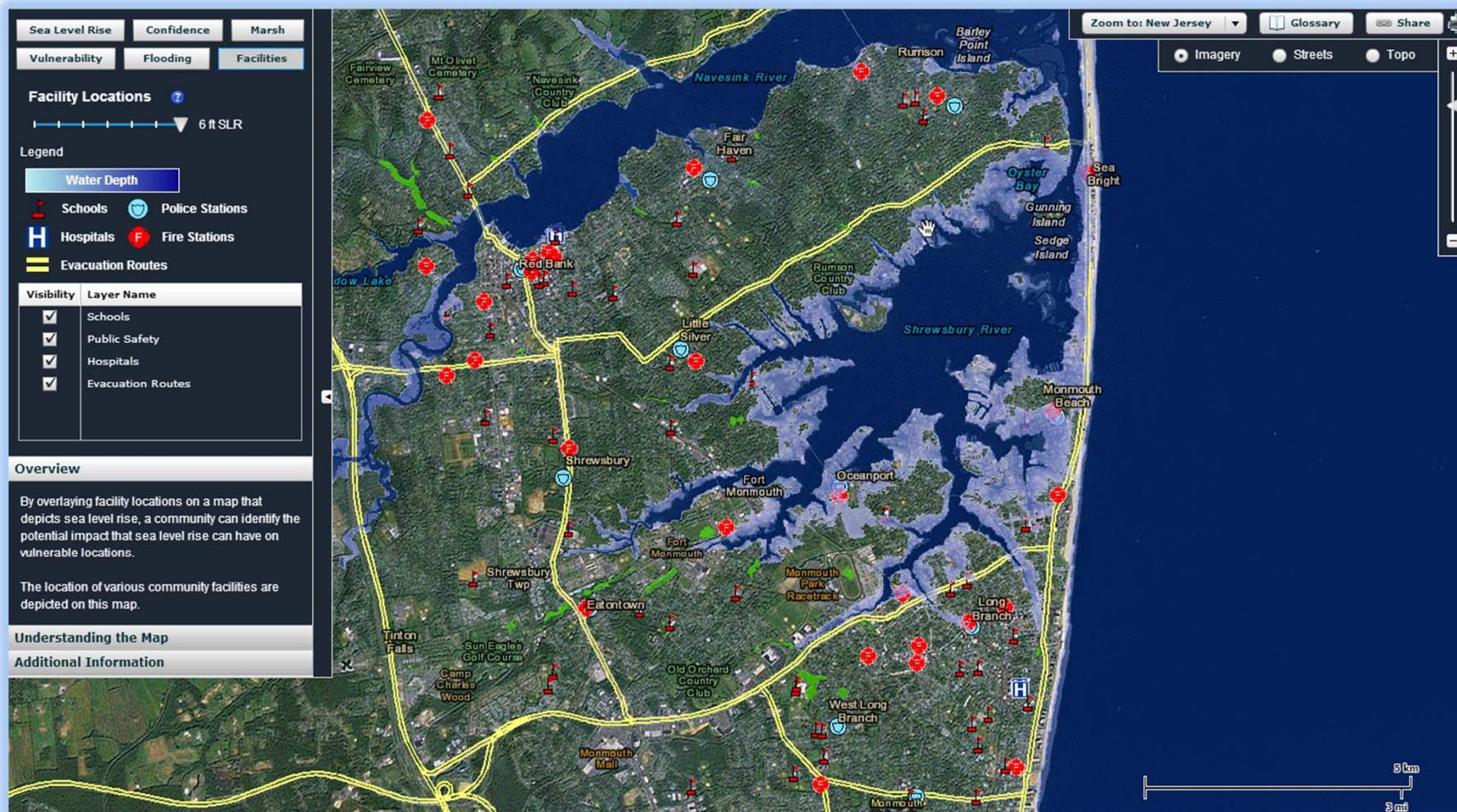
New Jersey Flood Mapper

<http://www.njfloodmapper.org/>



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Coastal Flood Exposure Mapper

*DRAFT WEBSITE
AND DATA
DO NOT CITE*

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

Get Started

The information in this product is based on the Roadmap for [Adapting to Coastal Risk](#) approach to assessing coastal hazard risks and vulnerabilities.

When completed, site will be available through:

<http://www.csc.noaa.gov/digitalcoast/training/roadmap/>

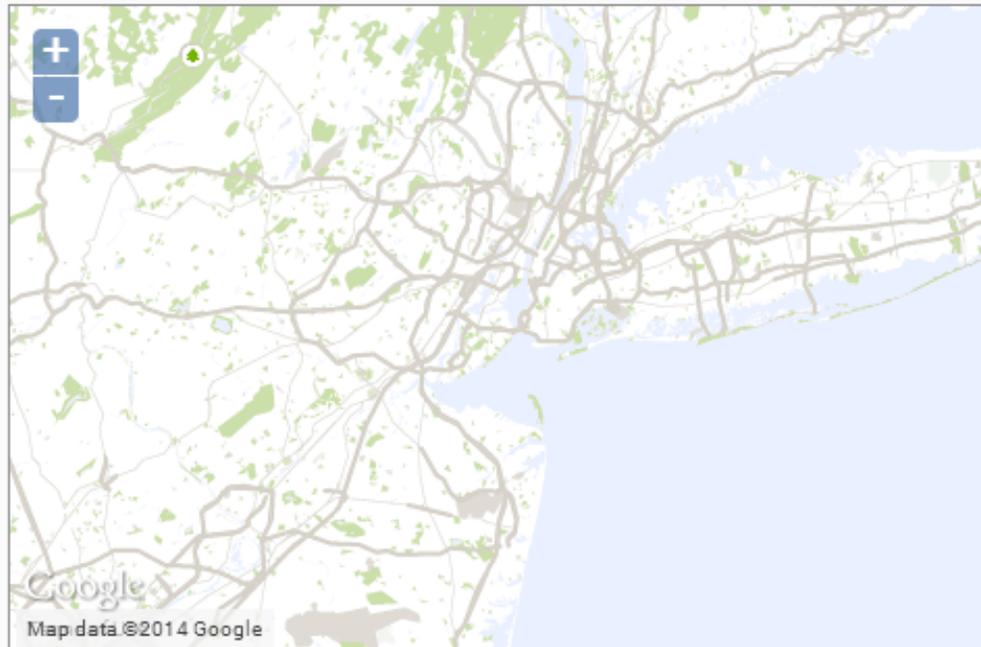


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1 Select Flood Hazards or Community Exposures

Each section contains a collection of maps showing different aspects of community exposure to flood hazards. Collect maps to share with community members to get the conversation started!

- Delaware +
- New Jersey +
- New York +
- Pennsylvania +



Flood Hazards



Ecosystem Exposure



Societal Exposure



Infrastructure Exposure

*DRAFT WEBSITE
AND DATA
DO NOT CITE*

2 Create Maps to share

You are at , , Coastal Flood Hazard Composite

Flood Hazards

Coastal Flood Hazard Composite

- Shallow coastal flooding
- High- and moderate-risk flooding (designated by the Federal Emergency Management Agency)
- Category 3 hurricane storm surge
- Sea level rise of 3 feet

The darker the color on the map, the more flood hazard zones there are for that area. Click on the map to see the number and types of hazards that may occur in a location. Additional information about each category mentioned above are provided in the maps that follow.

Shallow Coastal Flooding

FEMA Flood Zones

Storm Surge

Sea Level Rise

+ Add to Map Pack



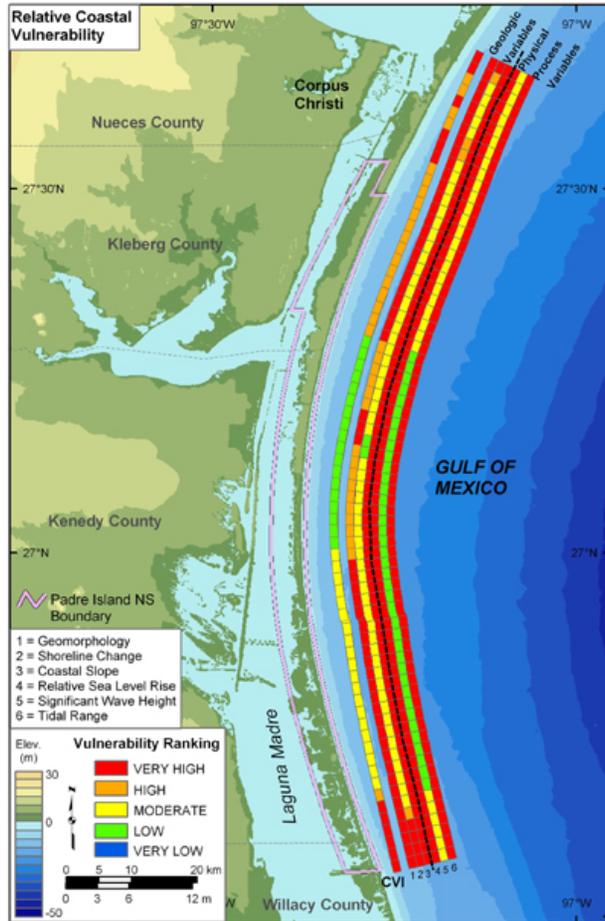
You are viewing the Coastal Flood Hazard Composite Hazards Profile.

Layer Selected Opacity 100%

- View layer descriptions and data sources
- Directory of Our Map Services

**DRAFT WEBSITE
AND DATA
DO NOT CITE**

Also of Note – USGS Coastal Resources



- **Coastal Vulnerability Index (updated for NCA)**
POC: Rob Thieler (rthieler@usgs.gov)
- **Coastal Change Hazards Portal**
In development
 - Extreme storms
 - Historical shorelines and ratesPOC: Hilary Stockdon (hstockdon@usgs.gov)

