Surging Seas Risk Finder: A New Tool and Analysis

TechSurge 2014

Technical Support for Coastal Resiliency
ODU Ted Constant Center
June 4, 2014

Dan Rizza
Manager and Research Associate
Program on Sea Level Rise
Climate Central
609-945-7821
drizza@climatecentral.org
sealevel.climatecentral.org

CLIMATE CENTRAL

SUPPORT OUR WORK

CLIMATE CENTRAL

Researching and reporting the science and impacts of climate change

WHO WE ARE

An independent organization of leading scientists and journalists researching and reporting the facts about our changing climate and its impact on the American public.

WHAT WE DO

Climate Central surveys and conducts scientific research on climate change and informs the public of key findings. Our scientists publish and our journalists report on climate science, energy, sea level rise . . . . Read More

ABOUT OUR EXPERTISE

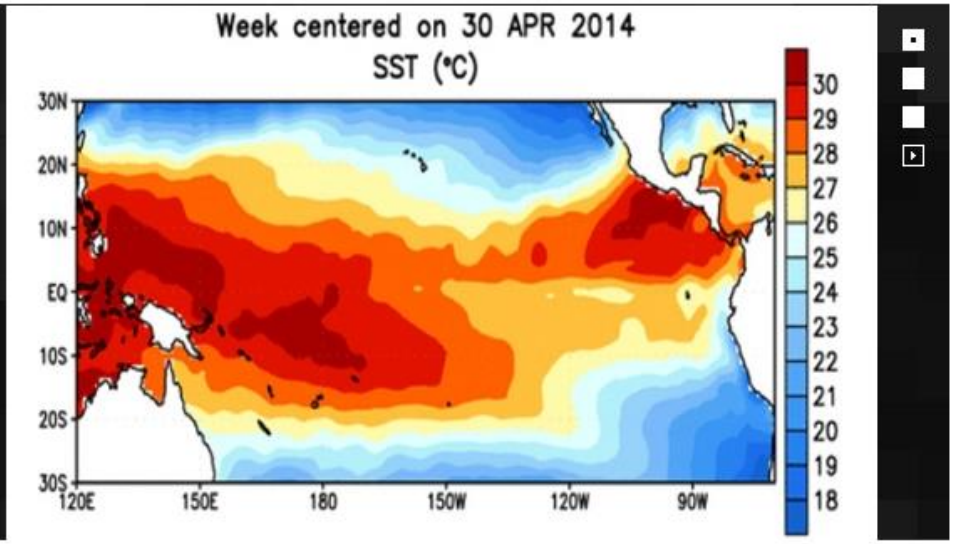
Members of the Climate Central staff and board are among the most respected leaders in climate science. Staff members are authorities in communicating climate and weather links, sea level rise, climate . . . . Read More

HOW WILL WE KNOW IF EL NINO IS FINALLY HERE?

SIMPLE QUESTION, TRICKIER ANSWERS

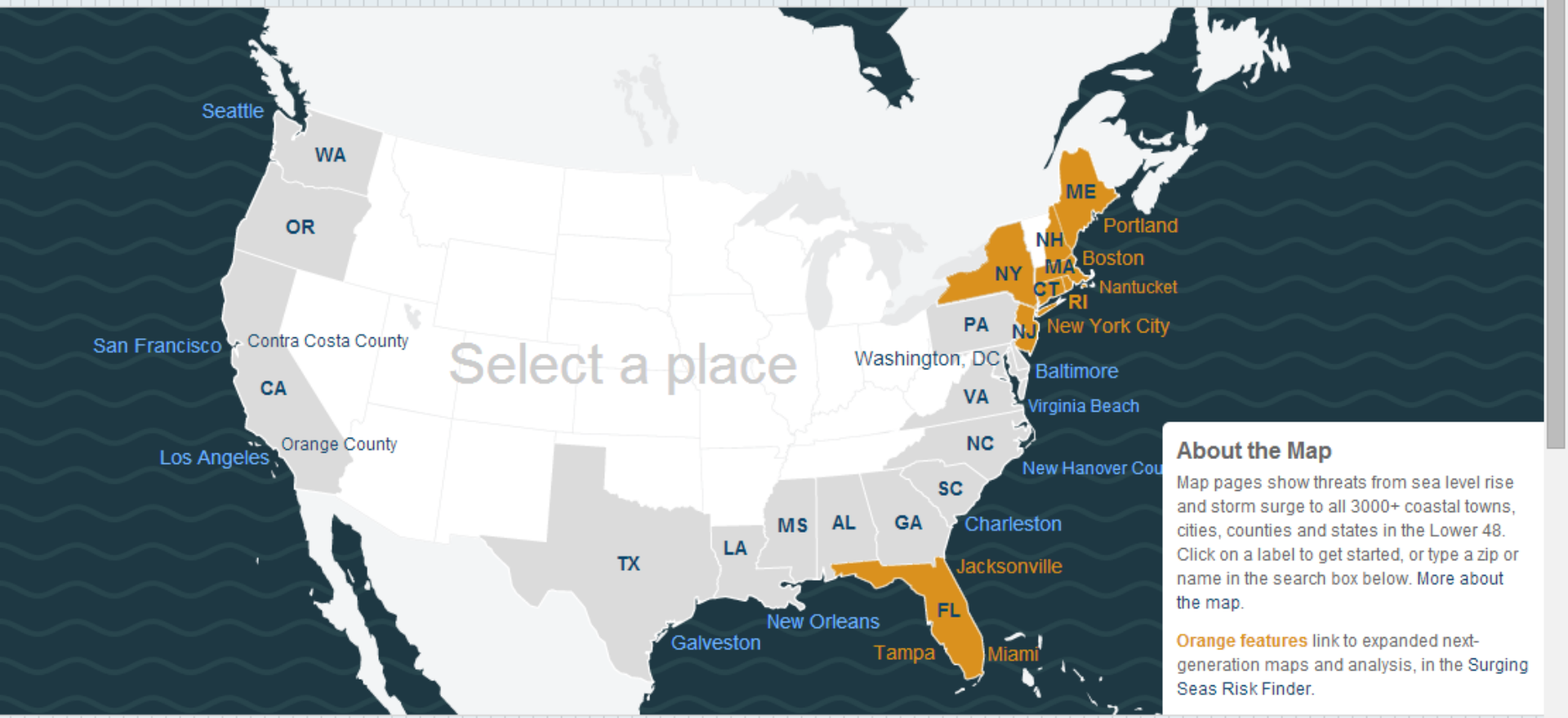
El Nino has been the climate phenomena on everyone's lips, but how will we know when it's finally arrived? ...

TAKE A LOOK ▶



Surging Seas

Sea level rise analysis by CLIMATE CENTRAL



About the Map

Map pages show threats from sea level rise and storm surge to all 3000+ coastal towns, cities, counties and states in the Lower 48. Click on a label to get started, or type a zip or name in the search box below. More about the map.

Orange features link to expanded next-generation maps and analysis, in the Surging Seas Risk Finder.

Click any location from the map above, or search by zip

Search by City, State or Zip

Commitment to Release Surging Seas for All Coastal States

Learn More ›

LATEST NEWS & UPDATES

Commitment to Release

THE FACTS ABOUT SEA LEVEL RISE

Global warming has raised global sea level about 8 inches since 1880,

Peer-Reviewed Scientific Papers

Tidally adjusted estimates of topographic vulnerability to sea level rise and flooding for the contiguous United States

Authors: Strauss, BH, Ziemlinski, R, Weiss, JL, and Overpeck, JT
Journal: Environmental Research Letters
Publication Date: 2012

More info »

Modeling sea level rise impacts on storm surges along U.S. coasts

Authors: Tebaldi, C, Strauss, BH and Zervas, CE
Journal: Environmental Research Letters
Publication Date: 2012

More info »

IN THIS SECTION

Reports
Peer-Reviewed Papers
Data Downloads
Methods

Explore the Map

http://sealevel.climatecentral.org/research/papers/

Science Behind the Tool

The fundamental science behind Surging Seas Risk Finder is the same as the peer-reviewed science behind the original Surging Seas.

Updated Mapping and Exposure Analysis

- **Improved elevation data**: Our 2012 analysis used the best available national coverage elevation dataset at the time. This analysis uses far more accurate laser-based (LiDAR) elevation data.
- **Over 100 additional variables**: Our 2012 research assessed land, population and housing vulnerable to sea level rise and coastal flooding. This research assesses over 100 additional variables, including socially vulnerable population, populations by racial and ethnic group, property value, roads, rail, airports, power plants, sewage plants, hazardous waste sites, schools, churches, and hospitals.
- **Additional administrative areas**: Our 2012 analysis tabulated exposure at state, county, and city levels. This analysis adds zip codes and congressional districts, with further areas, such as planning districts and state legislative districts, to be added online over time.

Updated Sea Level Rise Projections

For sea level rise projections, this analysis uses updated scenarios for future emissions of carbon pollution, as developed by the global climate research community. We use updated models of the global warming expected from these emissions, and a selection of global sea level rise models, instead of just one. We then factor in *local* effects, such as sinking land, to develop *local* sea level rise projections, employing the same methods as in our original peer-reviewed research.

Updated Storm Surge Risk Methods / Capability

We also carry forward the same methods we previously used to characterize storm surge risk, and integrate it with projected sea levels, to develop projections of overall local flood risk by decade. However, we have updated analysis inputs to include the full available record of hourly water levels at each water level station through the end of 2012. This means 48-102 years of data (depending on the station) instead of 30 years (as in the original analysis), and that Sandy's surge is factored in when developing risk statistics.

For details on the methods used in Surging Seas Risk Finder see the Methods Appendix of the state reports for New Jersey and New York.

Risk Finder: Florida

See More States | U.S. (v1)

CHOOSE A TOOL: **Map** | Forecast | Analysis | Comparison

Searchable interactive map of sea level rise & flood risk areas

CLICK TO EXPLORE: Miami, Fort Lauderdale, St. Petersburg, Jacksonville, Broward County, Pembroke Pines, Tampa, 33141, and more.

REPORT
Florida and the Surging Sea

- Science Behind the Tool
- FL Resiliency Resources
- Quick Tutorials / Help
- About
- Feedback

RECEIVE EMAIL UPDATES

Email Address | Sign Up

Get involved

Suggestion Box

Get Widgets

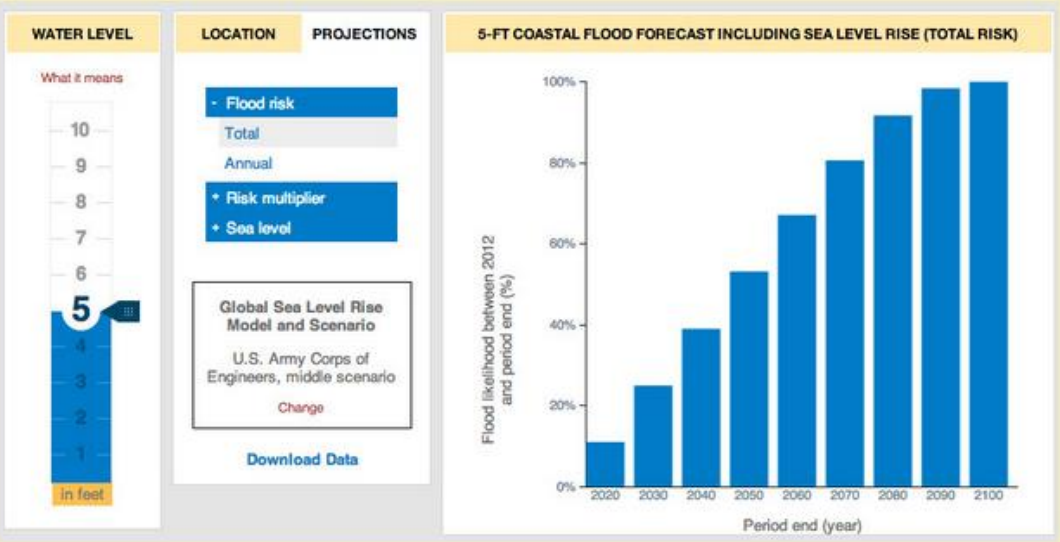
Risk Finder: Florida

See More States | U.S. (v1)

CHOOSE A TOOL: **Map** | **Forecast** | **Analysis** | **Comparison**

Sea level rise & flood risk projections

CLICK TO FORECAST: Miami, Fort Lauderdale, St. Petersburg, Jacksonville, Broward County, Pembroke Pines, Tampa, 33141 and more.



REPORT
Florida and the Surging Sea

- Science Behind the Tool
- FL Resiliency Resources
- Quick Tutorials / Help
- About
- Feedback

RECEIVE EMAIL UPDATES

Email Address | Sign Up

Get involved

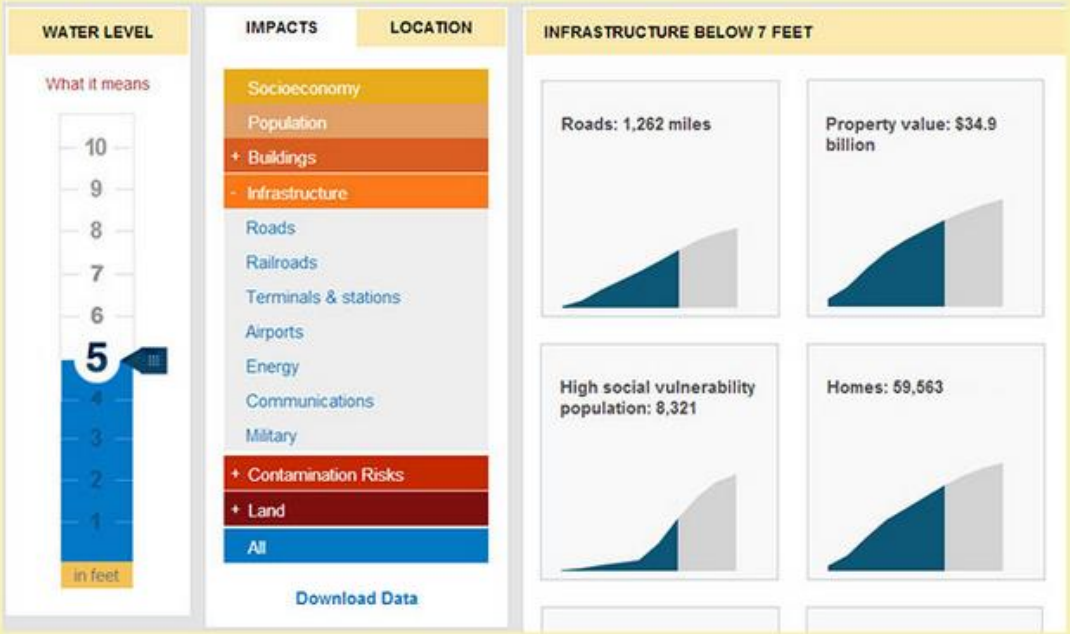
Risk Finder: Florida

See More States | U.S. (v1)

CHOOSE A TOOL: Map | Forecast | Analysis | Comparison

Comprehensive analysis of sea level rise & flood exposure, by place

CLICK TO REVIEW: Florida, Miami, Fort Lauderdale, St. Petersburg, Jacksonville, Broward County, Pembroke Pines, Tampa, 33141, and more.



REPORT
Florida and the Surging Sea

- Science Behind the Tool
- FL Resiliency Resources
- Quick Tutorials / Help
- About
- Feedback

RECEIVE EMAIL UPDATES

Email Address | Sign Up

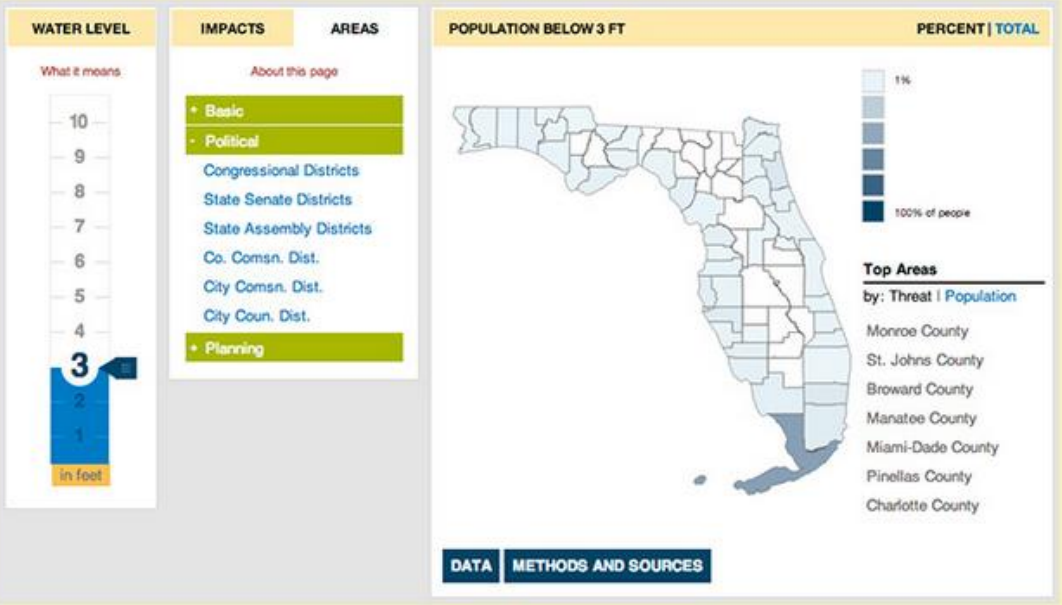
Risk Finder: Florida

See More States | U.S. (v1)

CHOOSE A TOOL: **Map** | **Forecast** | **Analysis** | **Comparison**

Heat maps of sea level rise & flood exposure, by topic

CLICK TO COMPARE: Population, Property, Roads, EPA sites, Schools, Hospitals, Railroads, Power Plants, High Social Vulnerability Population, and more.



REPORT
Florida and the Surging Sea

Science Behind the Tool
FL Resiliency Resources
Quick Tutorials / Help
About
Feedback

RECEIVE EMAIL UPDATES

Email Address | Sign Up

Get

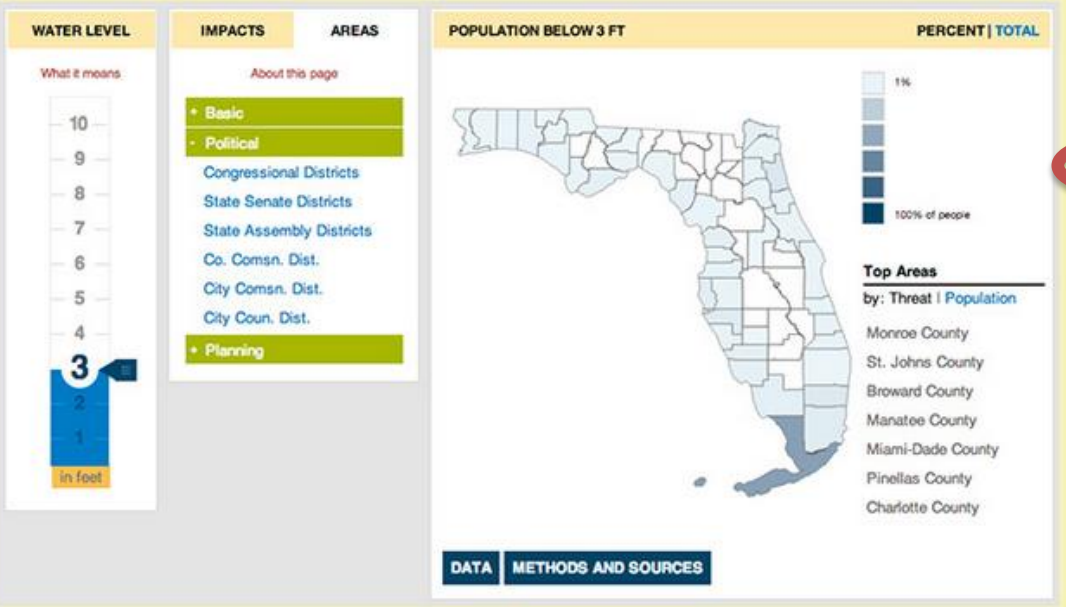
Risk Finder: Florida

See More States | U.S. (v1)

CHOOSE A TOOL: **Map** | **Forecast** | **Analysis** | **Comparison**

Heat maps of sea level rise & flood exposure, by topic

CLICK TO COMPARE: Population, Property, Roads, EPA sites, Schools, Hospitals, Railroads, Power Plants, High Social Vulnerability Population, and more.



REPORT
Florida and the Surging Sea

- Science Behind the Tool
- FL Resiliency Resources
- Quick Tutorials / Help
- About
- Feedback

RECEIVE EMAIL UPDATES

Email Address | Sign Up

Get

- White House's Climate Data Initiative
- Thanks to NOAA

CLIMATE CENTRAL

Risk Finder: New Jersey

See More States | U.S. (v1)

CHOOSE A TOOL: **Map** | Forecast | Analysis | Comparison

Searchable interactive map of sea level rise & flood risk areas

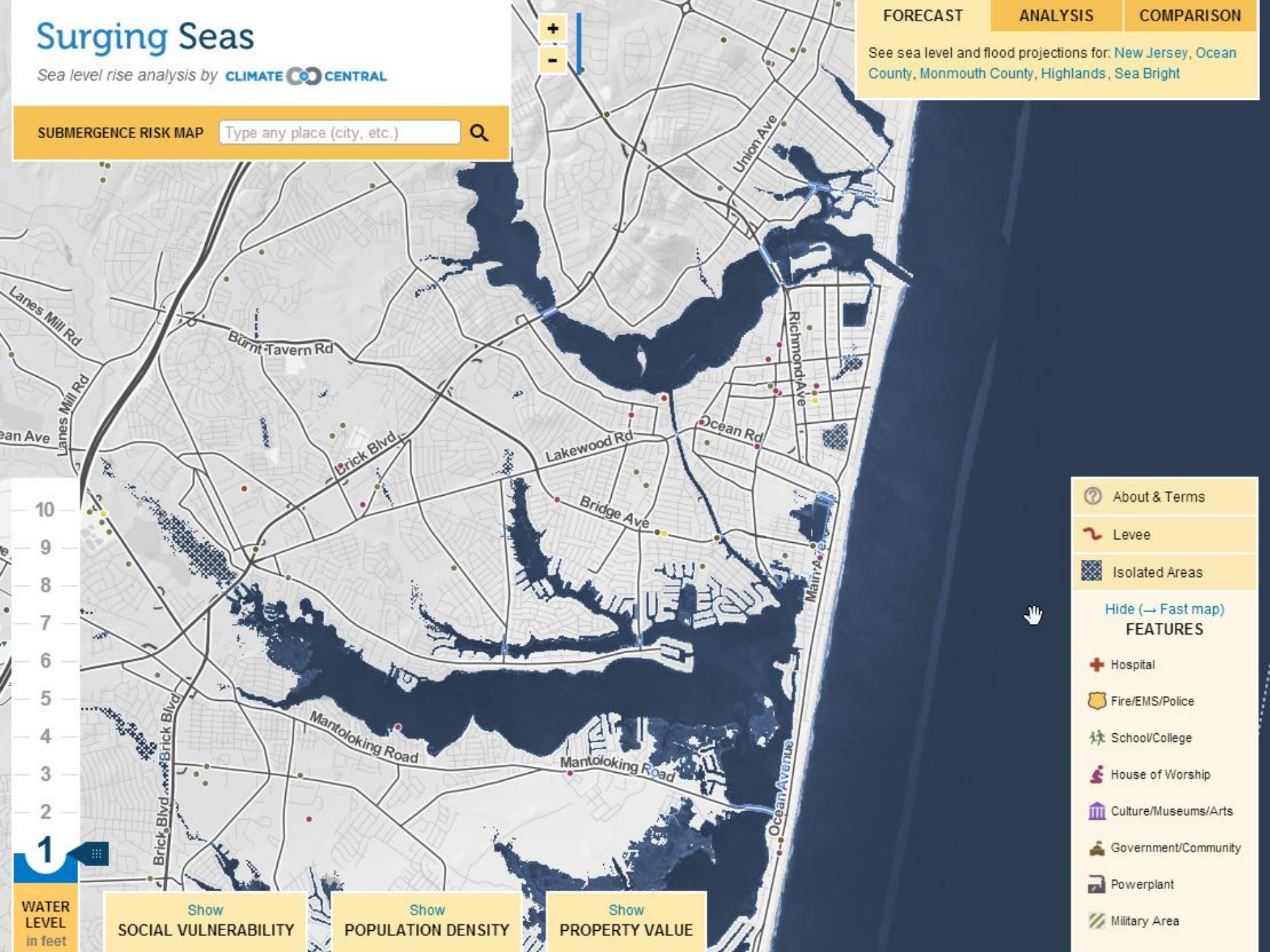
CLICK TO EXPLORE: Newark, Jersey City, Camden, Toms River, Elizabeth, Hoboken, Ocean County, 08724 and more.

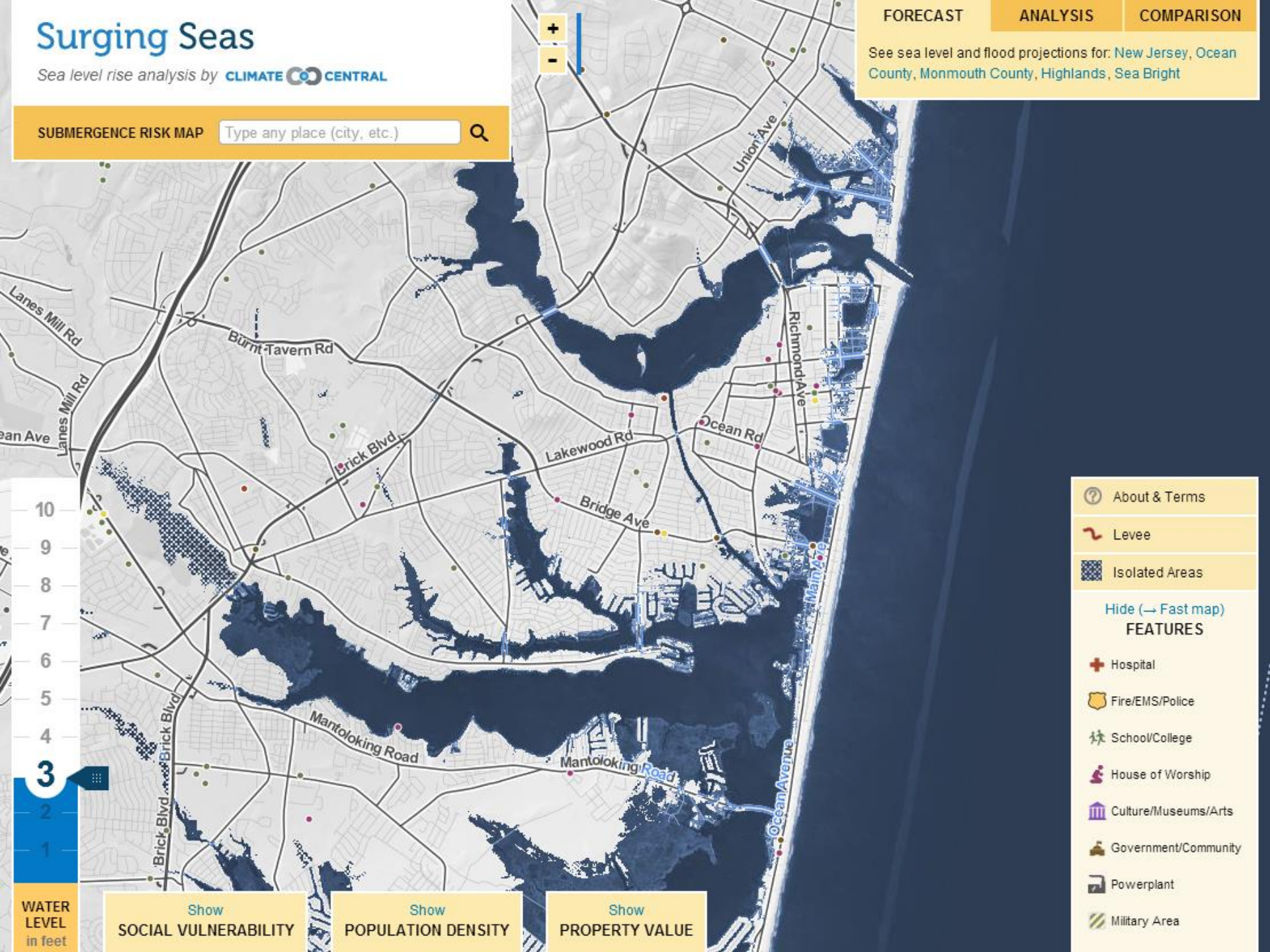
REPORT
New Jersey and the Surging Sea

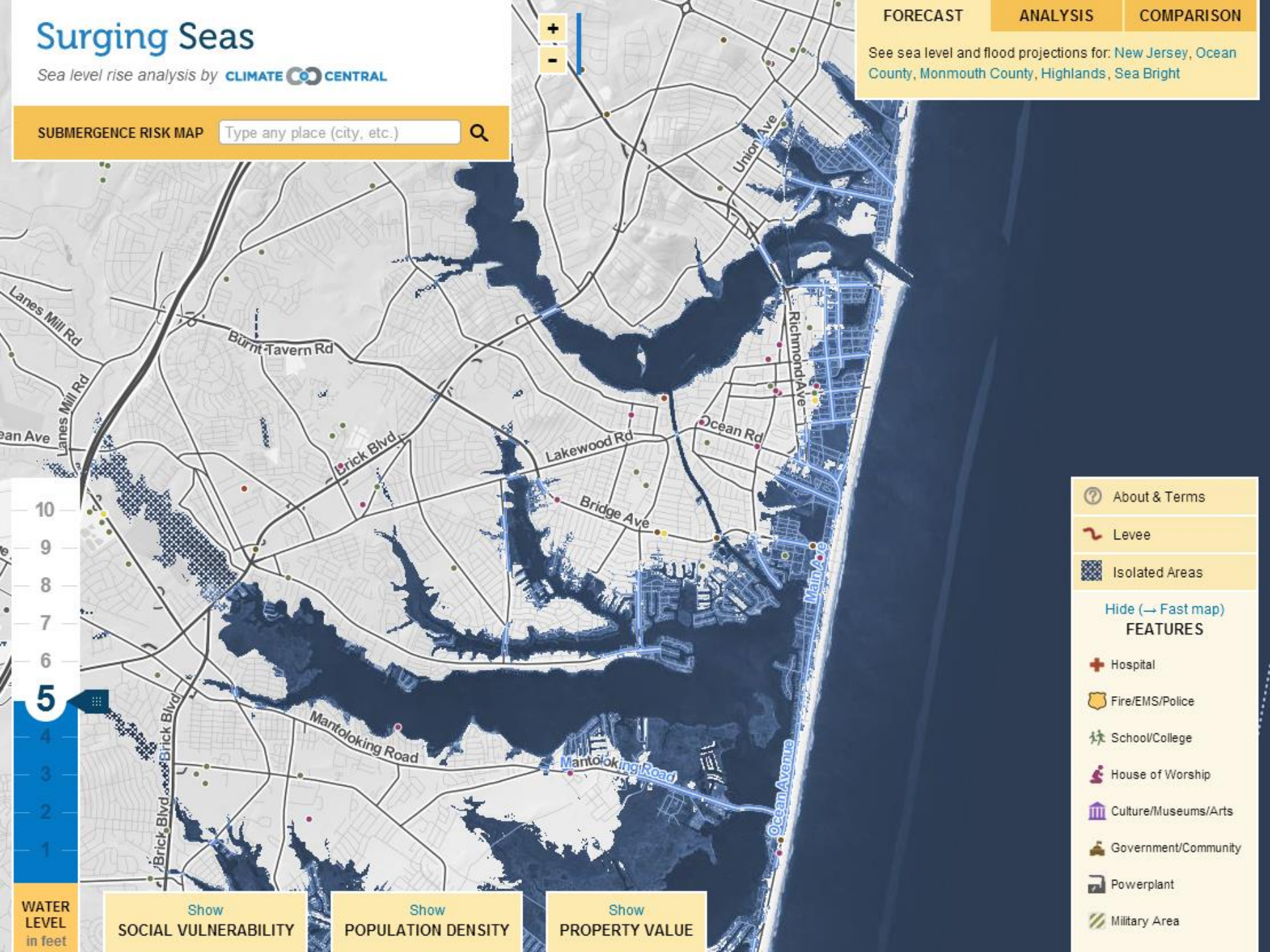
- Science Behind the Tool
- NJ Resiliency Resources
- Quick Tutorials / Help
- About
- Feedback

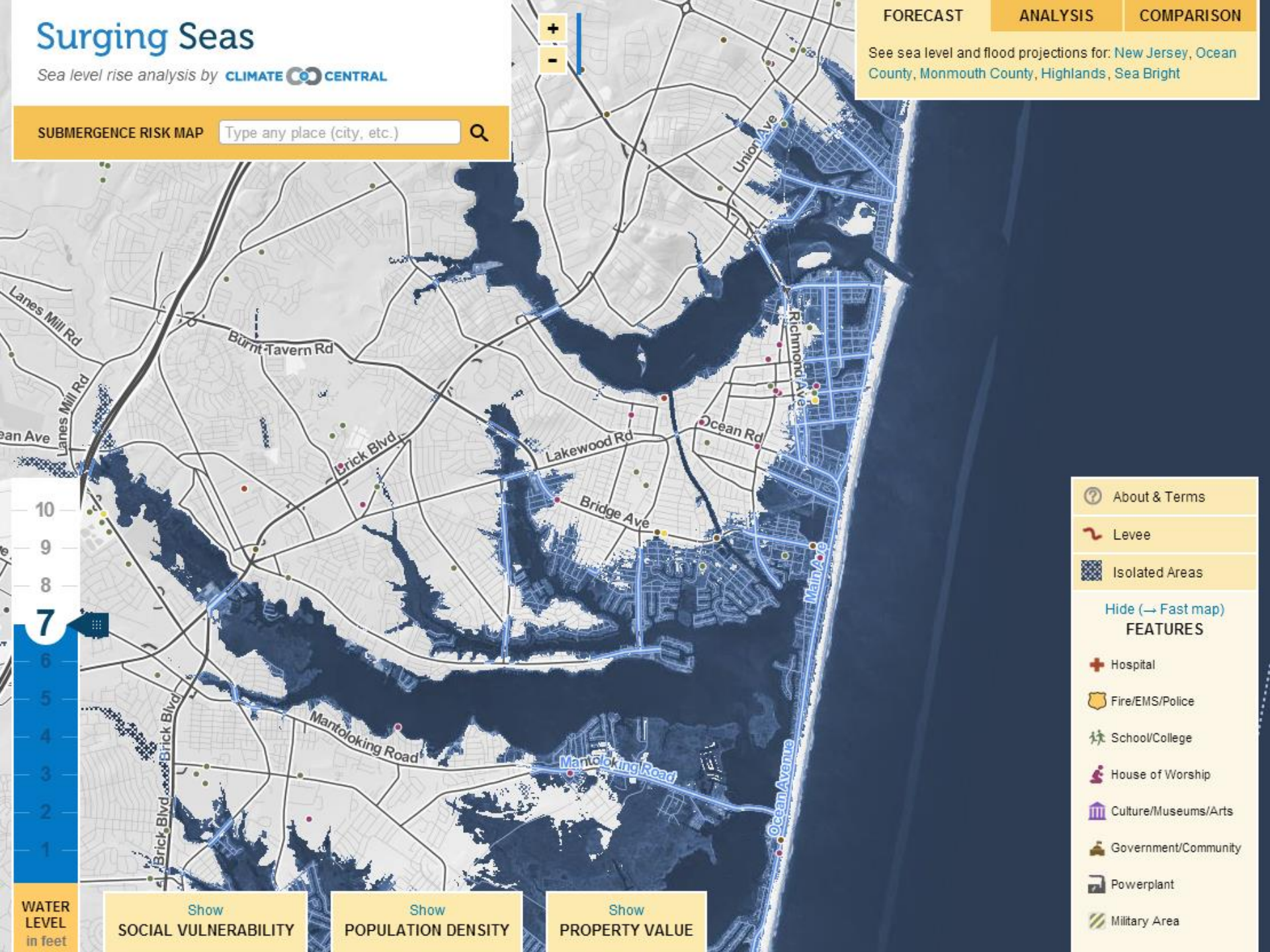
RECEIVE EMAIL UPDATES

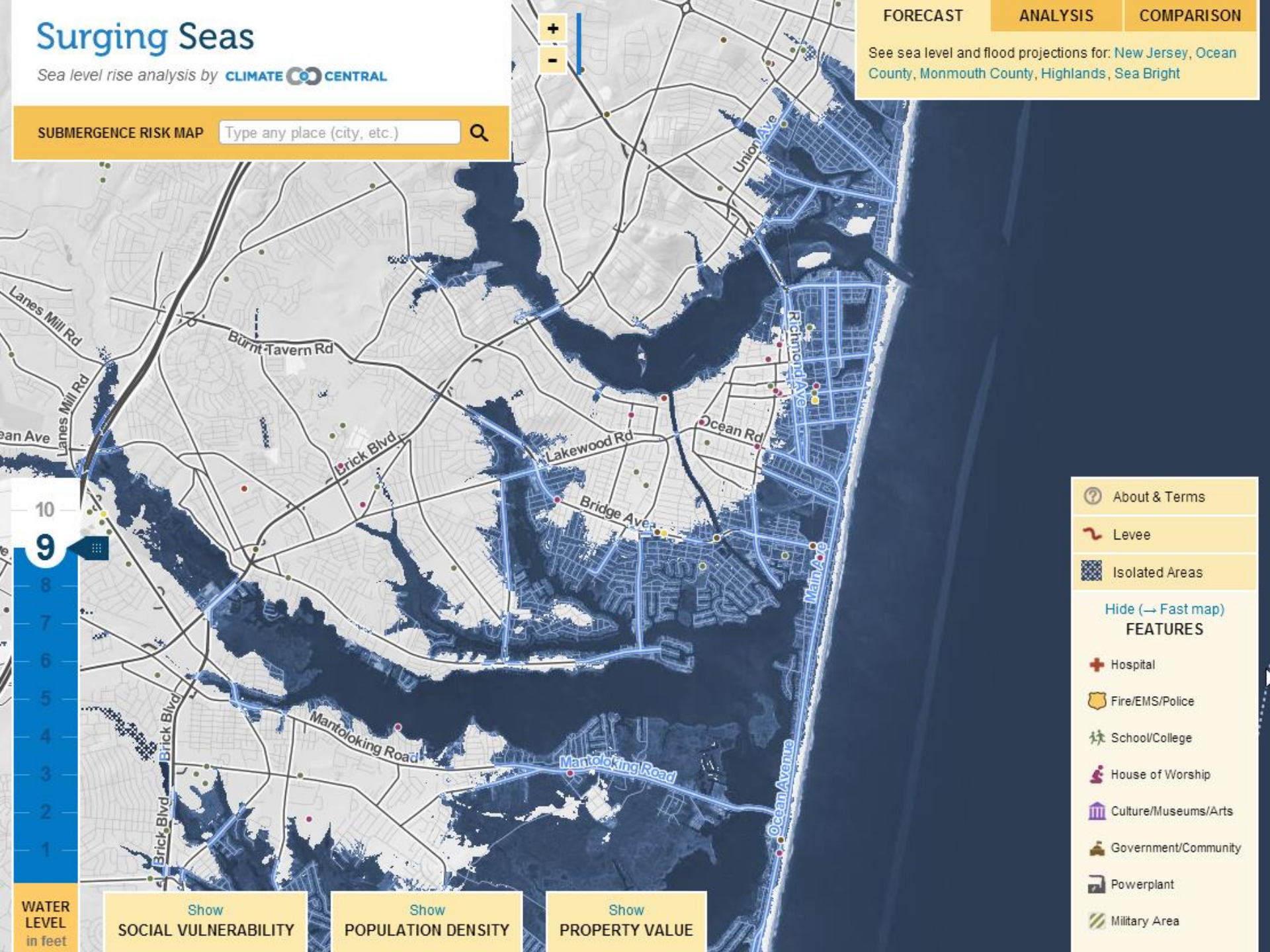
Email Address | Sign Up

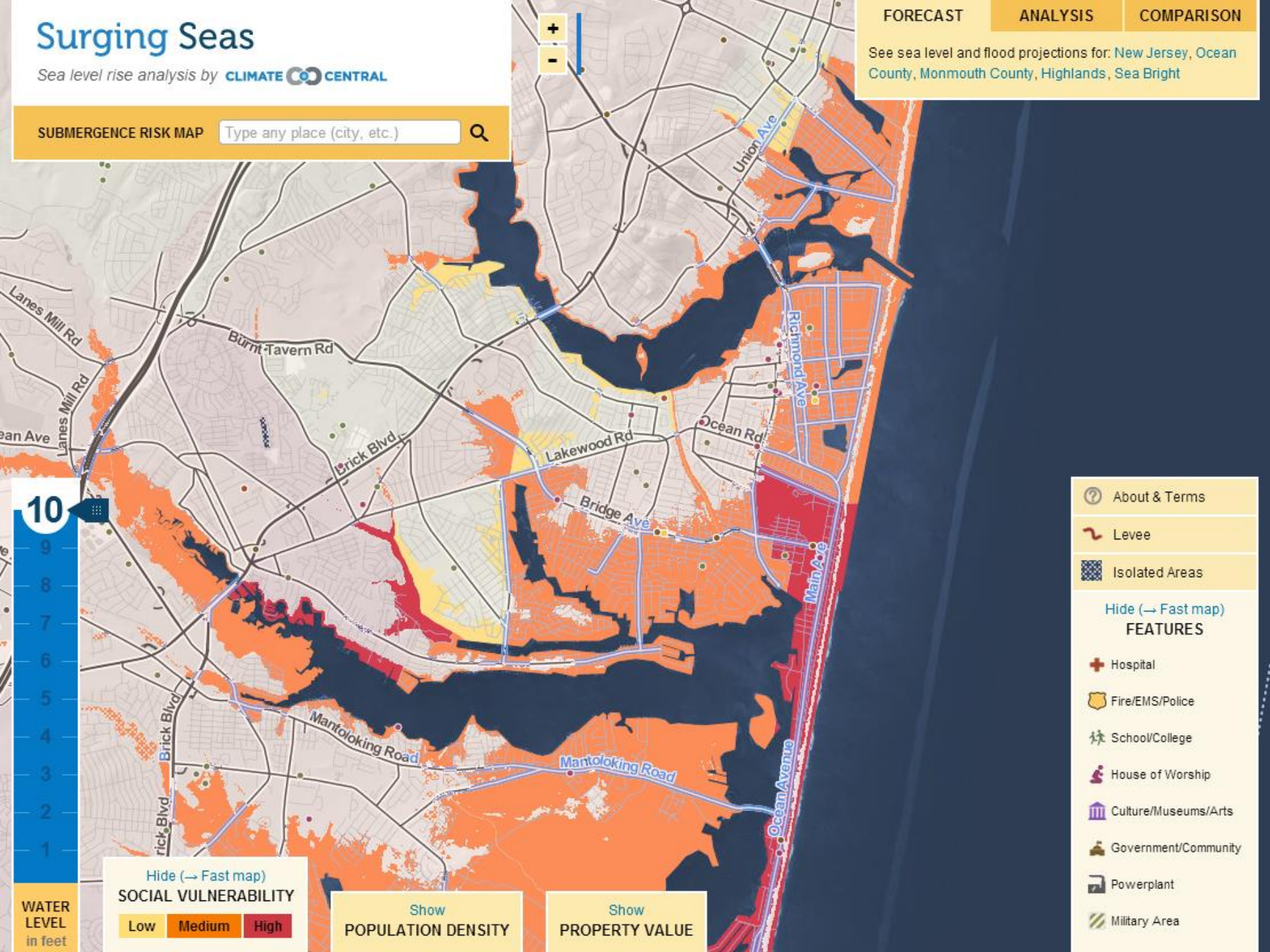

Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Type any place (city, etc.)
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New Jersey, Ocean County, Monmouth County, Highlands, Sea Bright
Union Ave
Lanes Mill Rd
Burnt Tavern Rd
Richmond Ave
Ocean Rd
Lakewood Rd
Brick Blvd
Bridge Ave
Main Ave
Mantoloking Road
Ocean Avenue
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Show PROPERTY VALUE
About & Terms
Levee
Isolated Areas
Hide (→ Fast map)
FEATURES
Hospital
Fire/EMS/Police
School/College
House of Worship
Culture/Museums/Arts
Government/Community
Powerplant
Military Area

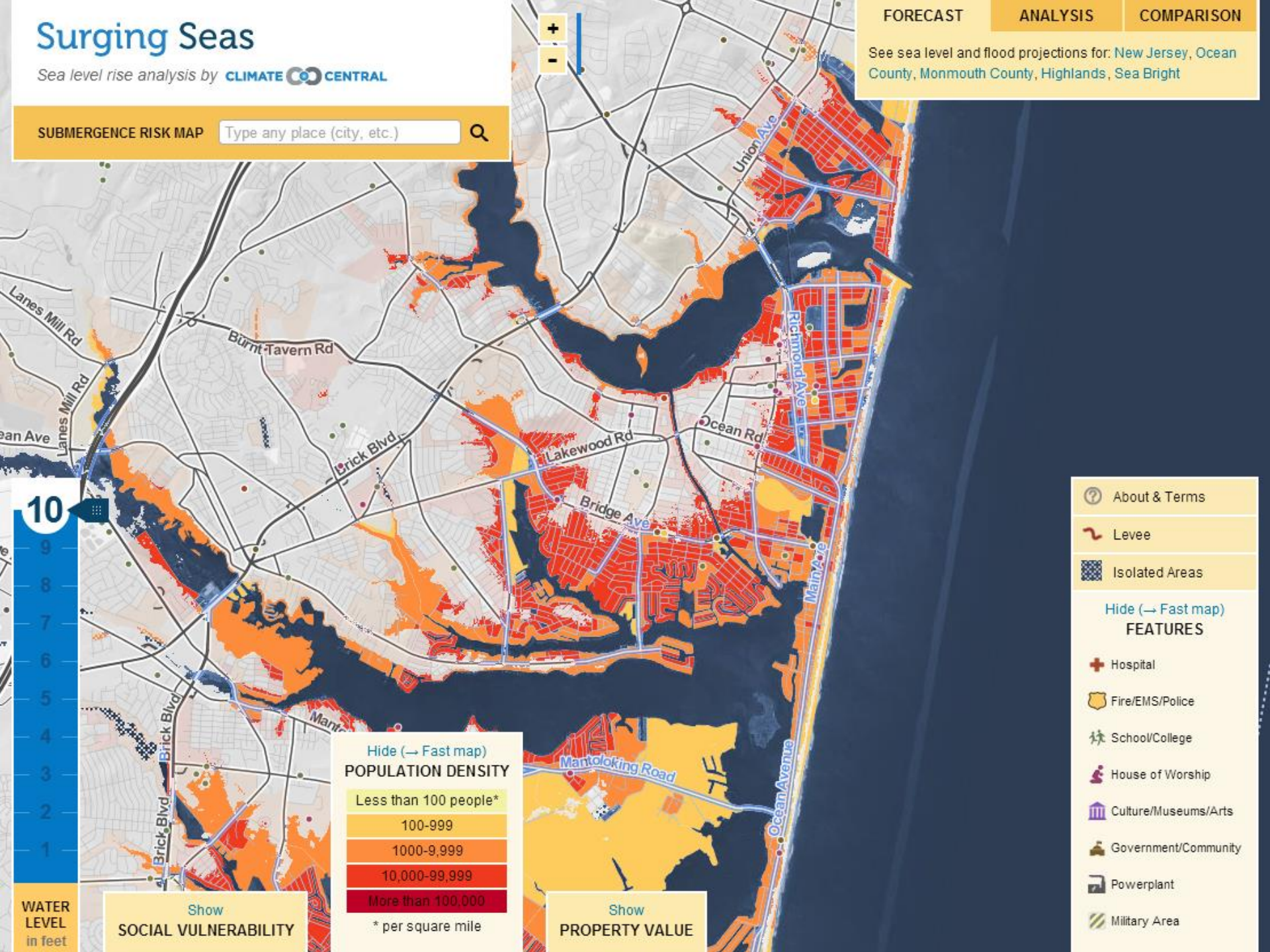

Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Type any place (city, etc.)
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New Jersey, Ocean County, Monmouth County, Highlands, Sea Bright
+
-
Union Ave
Lanes Mill Rd
Burnt Tavern Rd
Richmond Ave
Ocean Rd
Lakewood Rd
Brick Blvd
Bridge Ave
Main Ave
Mantoloking Road
Ocean Avenue
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
About & Terms
Levee
Isolated Areas
Hide (→ Fast map)
FEATURES
Hospital
Fire/EMS/Police
School/College
House of Worship
Culture/Museums/Arts
Government/Community
Powerplant
Military Area
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Show PROPERTY VALUE

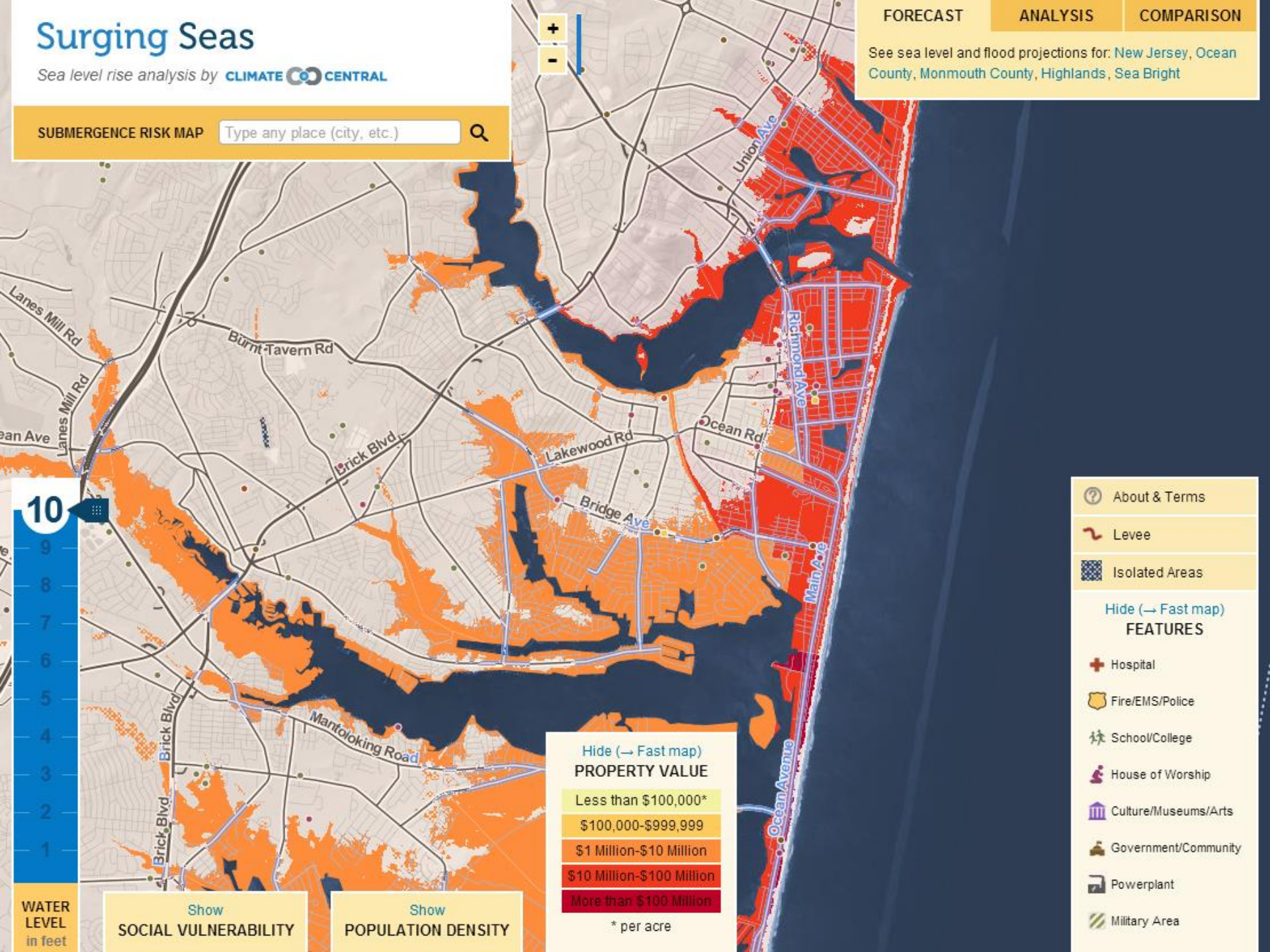

Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Type any place (city, etc.)
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New Jersey, Ocean County, Monmouth County, Highlands, Sea Bright
Union Ave
Lanes Mill Rd
Burnt Tavern Rd
Richmond Ave
Ocean Rd
Lakewood Rd
Brick Blvd
Bridge Ave
Main Ave
Mantoloking Road
Ocean Avenue
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Show PROPERTY VALUE
About & Terms
Levee
Isolated Areas
Hide (→ Fast map)
FEATURES
Hospital
Fire/EMS/Police
School/College
House of Worship
Culture/Museums/Arts
Government/Community
Powerplant
Military Area

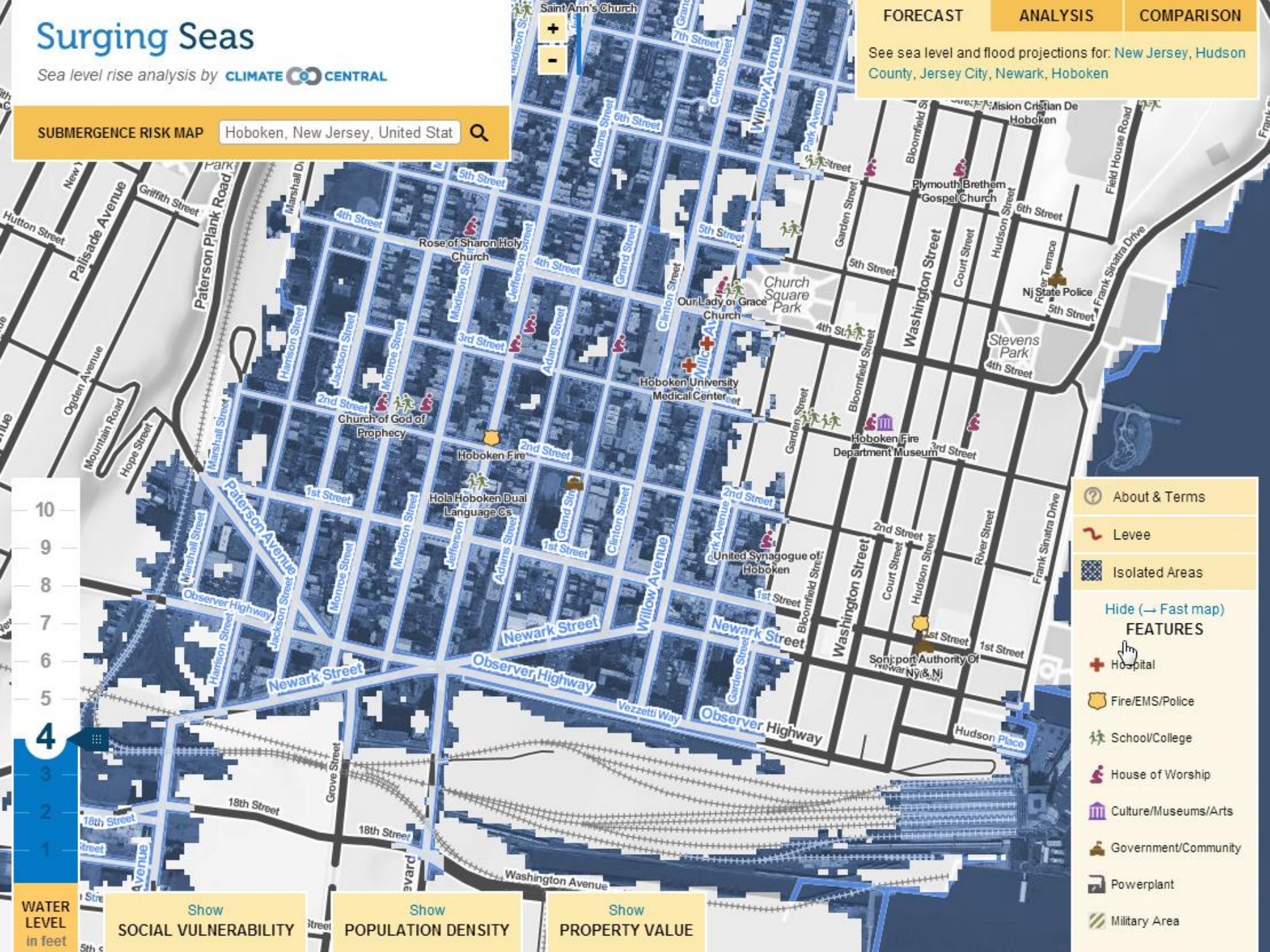

Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Type any place (city, etc.)
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New Jersey, Ocean County, Monmouth County, Highlands, Sea Bright
Union Ave
Lanes Mill Rd
Burnt Tavern Rd
Richmond Ave
Ocean Rd
Lakewood Rd
Brick Blvd
Bridge Ave
Main Ave
Mantoloking Road
Ocean Avenue
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Show PROPERTY VALUE
About & Terms
Levee
Isolated Areas
Hide (→ Fast map)
FEATURES
Hospital
Fire/EMS/Police
School/College
House of Worship
Culture/Museums/Arts
Government/Community
Powerplant
Military Area

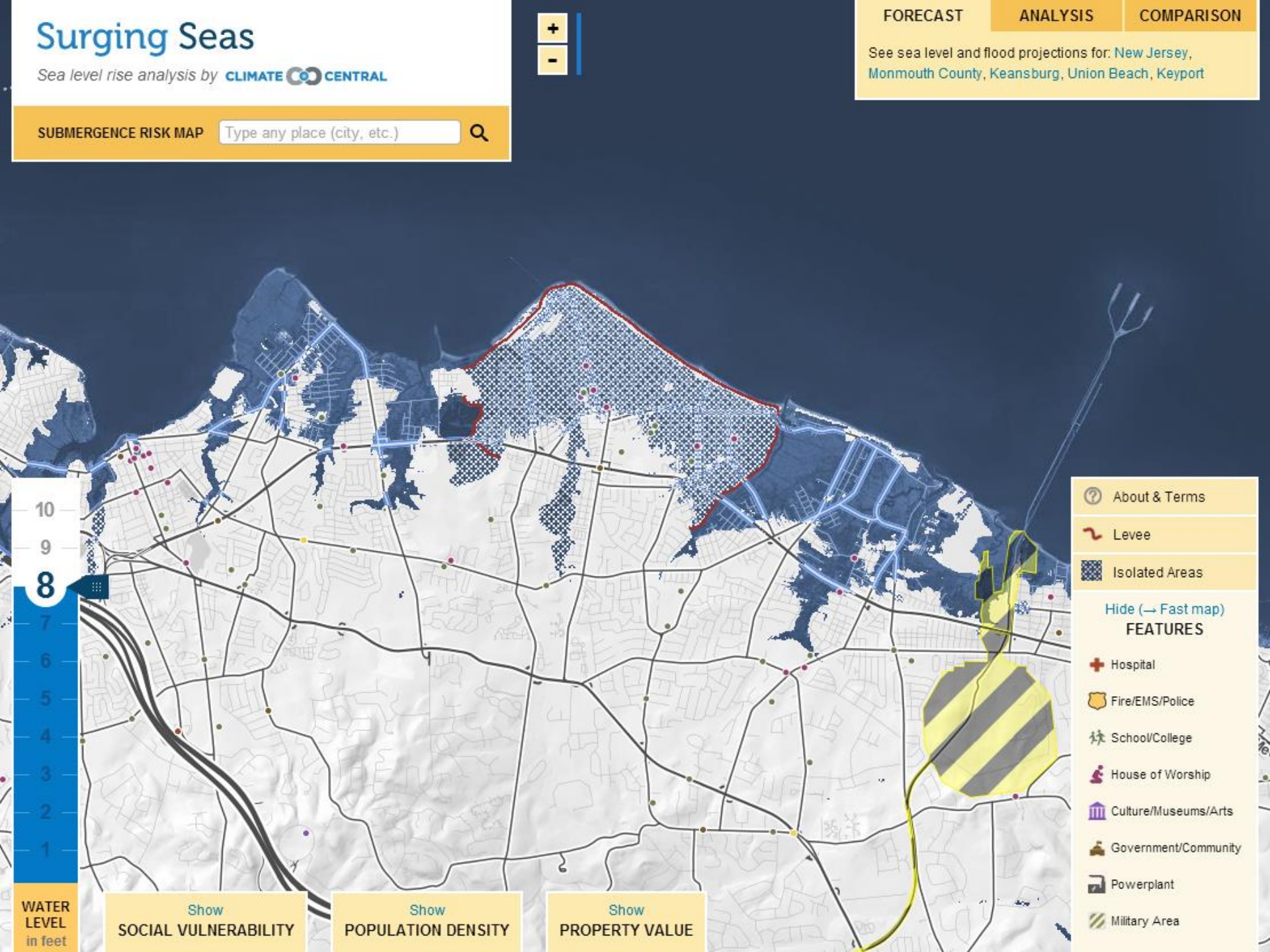

Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Type any place (city, etc.)
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New Jersey, Ocean County, Monmouth County, Highlands, Sea Bright
Lanes Mill Rd
Burnt Tavern Rd
Brick Blvd
Lakewood Rd
Ocean Rd
Bridge Ave
Union Ave
Richmond Ave
Main Ave
Ocean Avenue
Mantoloking Road
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Show PROPERTY VALUE
About & Terms
Levee
Isolated Areas
Hide (→ Fast map)
FEATURES
Hospital
Fire/EMS/Police
School/College
House of Worship
Culture/Museums/Arts
Government/Community
Powerplant
Military Area

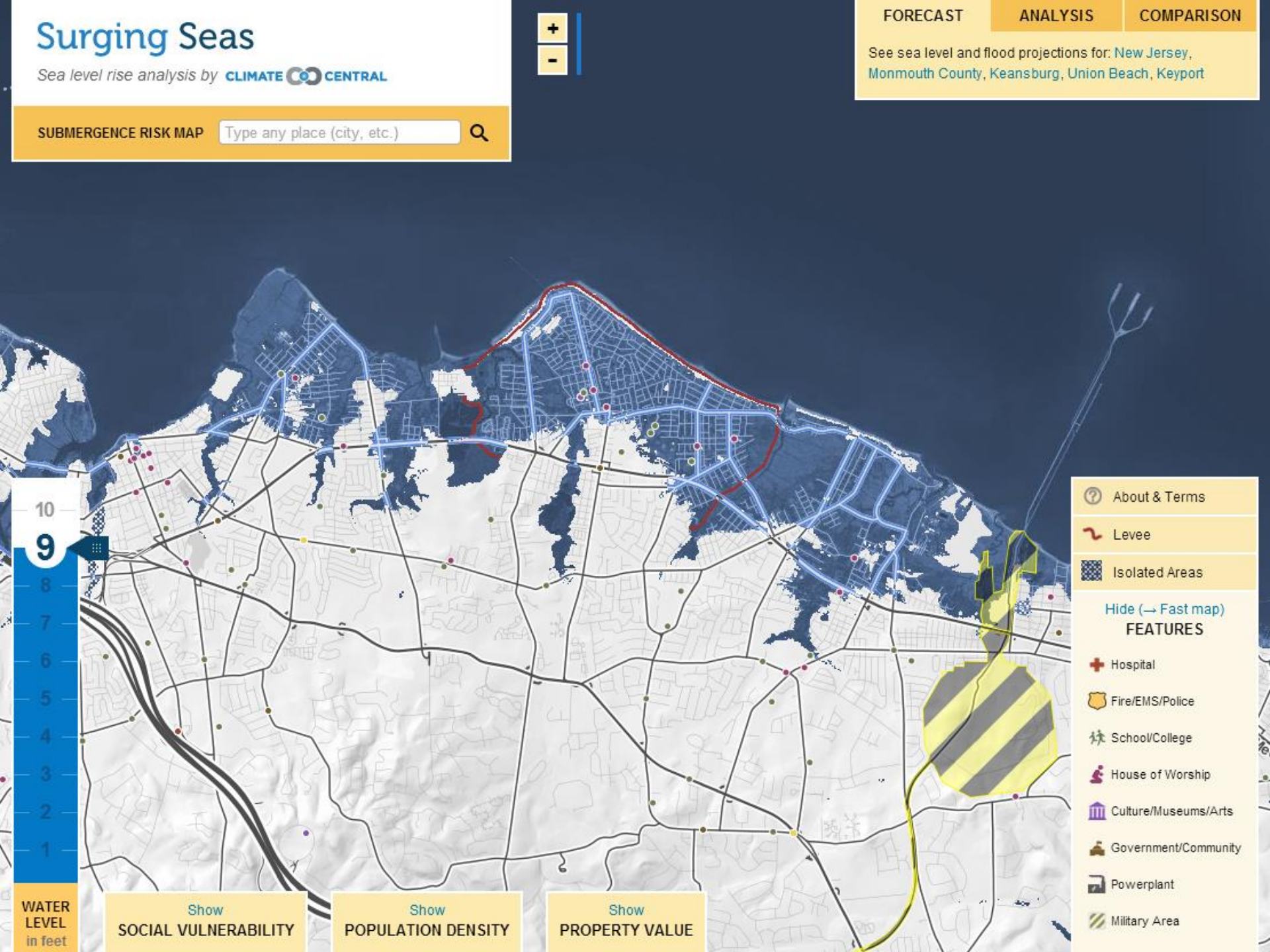

Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Type any place (city, etc.)
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New Jersey, Ocean County, Monmouth County, Highlands, Sea Bright
Union Ave
Lanes Mill Rd
Burnt Tavern Rd
Richmond Ave
Ocean Rd
Lakewood Rd
Brick Blvd
Bridge Ave
Main Ave
Mantoloking Road
Ocean Avenue
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
Hide (→ Fast map)
SOCIAL VULNERABILITY
Low
Medium
High
Show
POPULATION DENSITY
Show
PROPERTY VALUE
About & Terms
Levee
Isolated Areas
Hide (→ Fast map)
FEATURES
Hospital
Fire/EMS/Police
School/College
House of Worship
Culture/Museums/Arts
Government/Community
Powerplant
Military Area

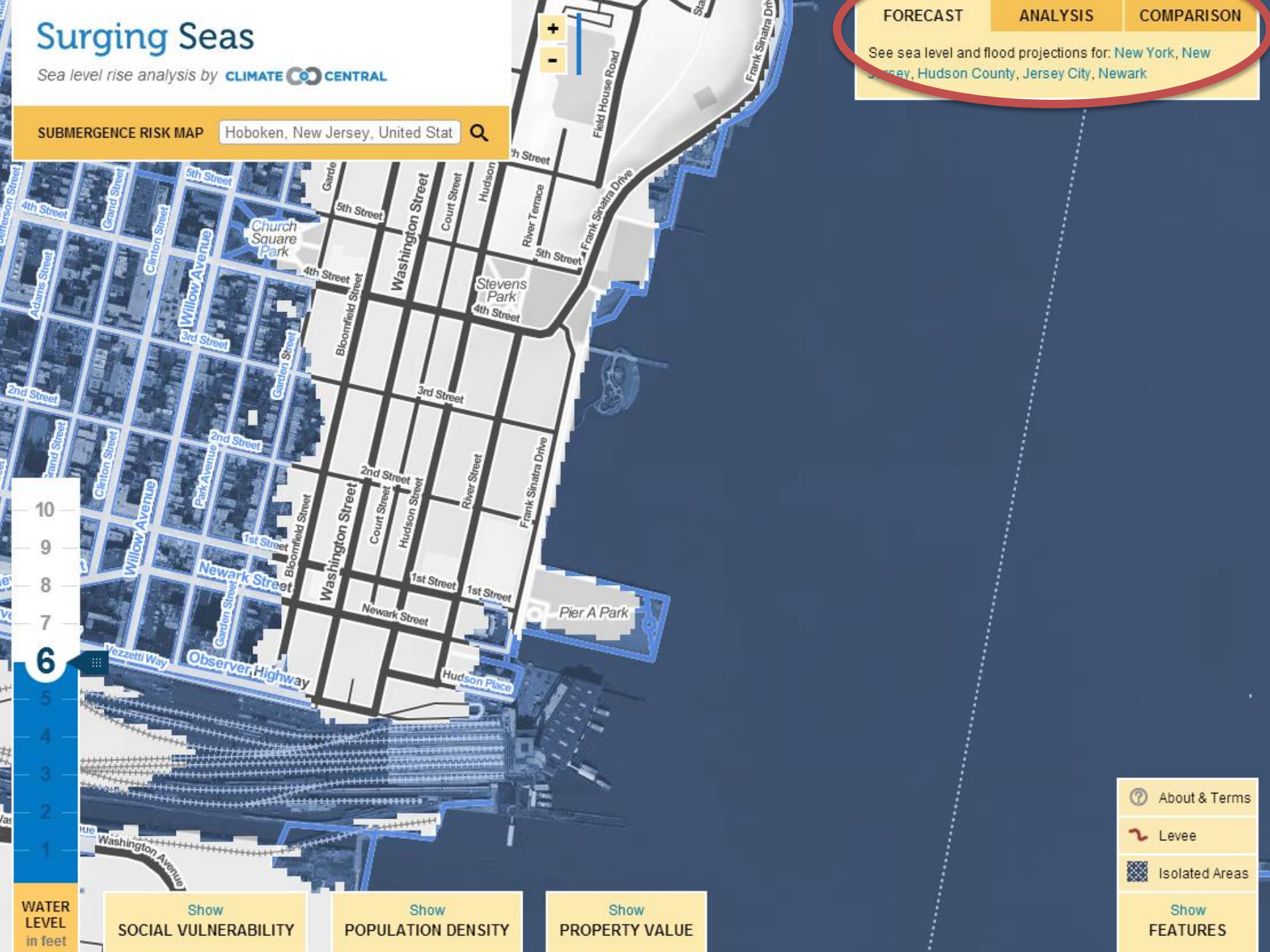

Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Type any place (city, etc.)
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New Jersey, Ocean County, Monmouth County, Highlands, Sea Bright
Lanes Mill Rd
Burnt Tavern Rd
Brick Blvd
Lakewood Rd
Ocean Rd
Bridge Ave
Union Ave
Richmond Ave
Main Ave
Ocean Avenue
Mantoloking Road
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
Show SOCIAL VULNERABILITY
Hide (→ Fast map)
POPULATION DENSITY
Less than 100 people*
100-999
1000-9,999
10,000-99,999
More than 100,000
* per square mile
Show PROPERTY VALUE
About & Terms
Levee
Isolated Areas
Hide (→ Fast map)
FEATURES
Hospital
Fire/EMS/Police
School/College
House of Worship
Culture/Museums/Arts
Government/Community
Powerplant
Military Area


Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Type any place (city, etc.)
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New Jersey, Ocean County, Monmouth County, Highlands, Sea Bright
Union Ave
Lanes Mill Rd
Burnt Tavern Rd
Richmond Ave
Ocean Rd
Brick Blvd
Lakewood Rd
Bridge Ave
Main Ave
Mantoloking Road
Ocean Avenue
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Hide (→ Fast map)
PROPERTY VALUE
Less than $100,000*
$100,000-$999,999
$1 Million-$10 Million
$10 Million-$100 Million
More than $100 Million
* per acre
About & Terms
Levee
Isolated Areas
Hide (→ Fast map)
FEATURES
Hospital
Fire/EMS/Police
School/College
House of Worship
Culture/Museums/Arts
Government/Community
Powerplant
Military Area


Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Hoboken, New Jersey, United Stat
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New Jersey, Hudson County, Jersey City, Newark, Hoboken
Saint Ann's Church
Mision Cristian De Hoboken
Plymouth Brethem Gospel Church
Rose of Sharon Holy Church
Our Lady of Grace Church
Church Square Park
Nj State Police
Stevens Park
Hoboken University Medical Center
Church of God of Prophecy
Hoboken Fire
Hola Hoboken Dual Language Cs
Hoboken Fire Department Museum
United Synagogue of Hoboken
Sonj:port Authority Of Newark Ny & Nj
Paterson Avenue
Observer Highway
Newark Street
Vezzetti Way
Willow Avenue
Washington Street
Hudson Place
Washington Avenue
18th Street
Grove Street
Palisade Avenue
Paterson Plank Road
Ogden Avenue
Mountain Road
Hope Street
Hutton Street
Griffith Street
Marshall Street
Harrison Street
Jackson Street
Monroe Street
Madison Street
Jefferson Street
Adams Street
Grand Street
Clinton Street
Garden Street
Bloomfield Street
Court Street
Hudson Street
River Street
Frank Sinatra Drive
Field House Road
1st Street
2nd Street
3rd Street
4th Street
5th Street
6th Street
7th Street
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Show PROPERTY VALUE
About & Terms
Levee
Isolated Areas
Hide (→ Fast map)
FEATURES
Hospital
Fire/EMS/Police
School/College
House of Worship
Culture/Museums/Arts
Government/Community
Powerplant
Military Area


Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Type any place (city, etc.)
+
-
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New Jersey, Monmouth County, Keansburg, Union Beach, Keyport
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
About & Terms
Levee
Isolated Areas
Hide (→ Fast map)
FEATURES
Hospital
Fire/EMS/Police
School/College
House of Worship
Culture/Museums/Arts
Government/Community
Powerplant
Military Area
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Show PROPERTY VALUE


Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Type any place (city, etc.)
+
-
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New Jersey, Monmouth County, Keansburg, Union Beach, Keyport
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
About & Terms
Levee
Isolated Areas
Hide (→ Fast map)
FEATURES
Hospital
Fire/EMS/Police
School/College
House of Worship
Culture/Museums/Arts
Government/Community
Powerplant
Military Area
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Show PROPERTY VALUE


Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Hoboken, New Jersey, United Stat
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: New York, New Jersey, Hudson County, Jersey City, Newark
Church Square Park
Stevens Park
Pier A Park
Washington Street
Willow Avenue
Bloomfield Street
Court Street
Hudson Street
River Street
River Terrace
Frank Sinatra Drive
Field House Road
Garden Street
Clinton Street
Adams Street
Grand Street
Park Avenue
Newark Street
Observer Highway
Hudson Place
Vezzetti Way
Washington Avenue
1st Street
2nd Street
3rd Street
4th Street
5th Street
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Show PROPERTY VALUE
About & Terms
Levee
Isolated Areas
Show FEATURES

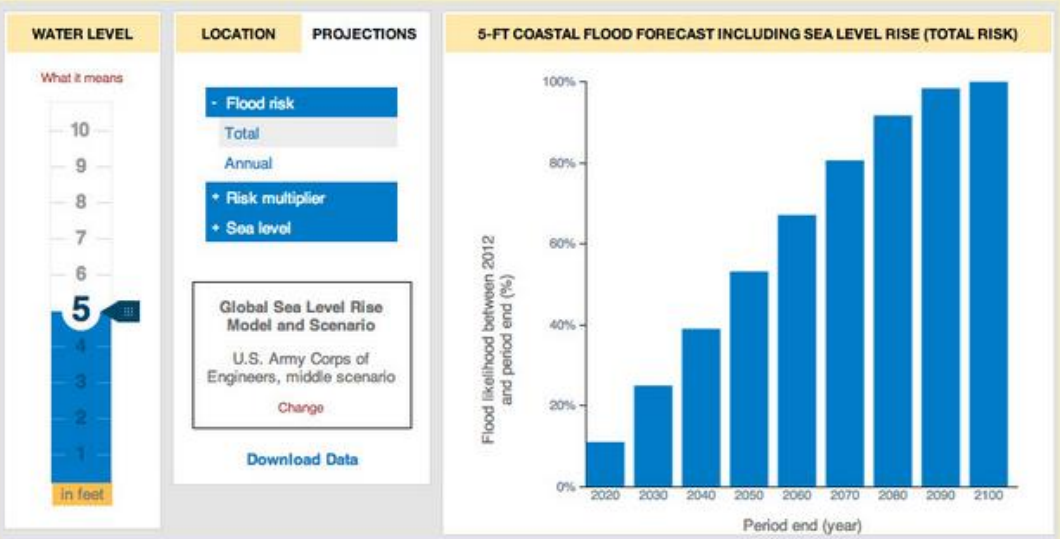
Risk Finder: Massachusetts

See More States | U.S. (v1)

CHOOSE A TOOL: **Map** | **Forecast** | **Analysis** | **Comparison**

Sea level rise & flood risk projections

CLICK TO FORECAST: Boston, Revere, Hull, Quincy, Salisbury, Nantucket, Westport, 02532 and more.



REPORT
New England and the Surging Sea

Science Behind the Tool
MA Resiliency Resources
Quick Tutorials / Help
About
Feedback

RECEIVE EMAIL UPDATES

Email Address | Sign Up

Get

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

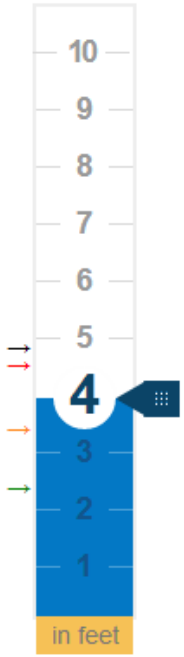
SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

Boston, MA (near Boston)

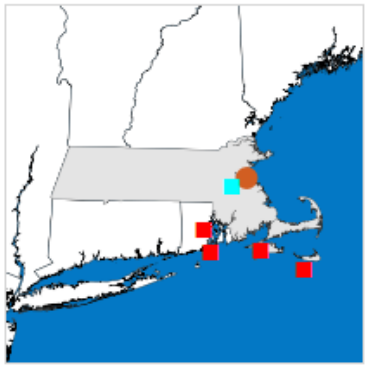
MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL | LOCATION | PROJECTIONS

What it means

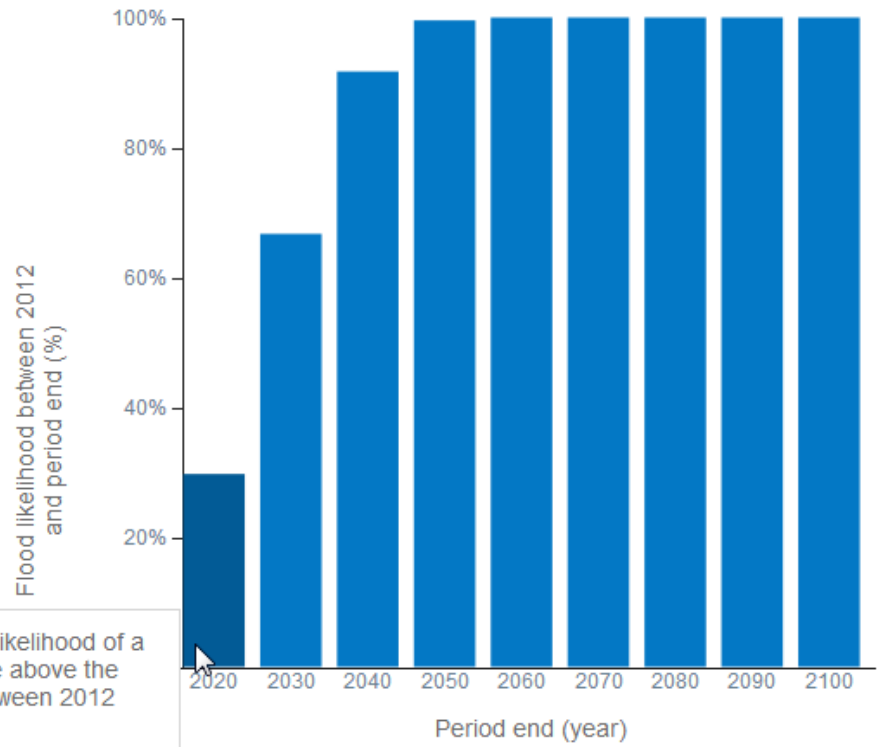


Important notes



- Boston
- Boston, MA
  Distance: 2 miles
- Other water level stations
  Click to select

4-FT COASTAL FLOOD FORECAST INCLUDING SEA LEVEL RISE (TOTAL RISK)*



30% cumulative likelihood of a flood 4 ft or more above the high tide line between 2012 and 2020.

***Figure based on selected sea level rise scenario. See Projections tab to left for more.**

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

Boston, MA (near Boston)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL | LOCATION | PROJECTIONS

What it means

Important notes

- Flood risk
  - Total
  - Annual
- + Risk multiplier
- + Sea level

Global Sea Level Rise Model and Scenario

NOAA 2012 technical report for the U.S. National Climate Assessment, intermediate high sea level rise scenario

Change | About

Download Data

4-FT COASTAL FLOOD FORECAST INCLUDING SEA LEVEL RISE (TOTAL RISK)*

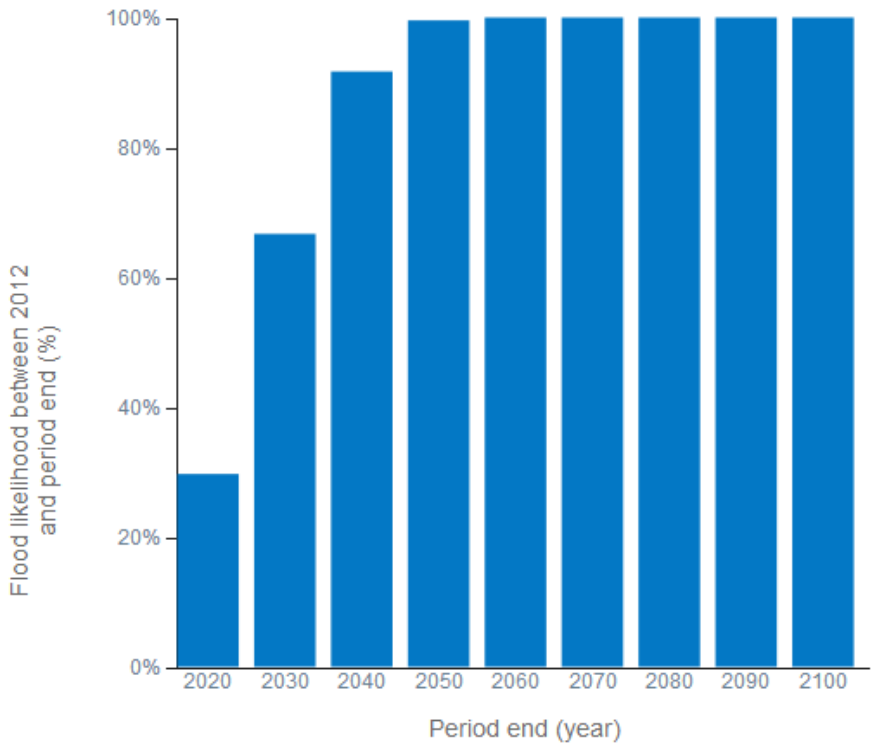


*Figure based on selected sea level rise scenario.
See Projections tab to left for more.

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

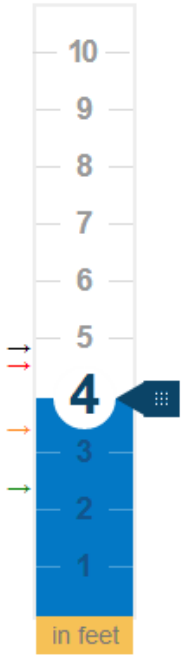
SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

Boston, MA (near Boston)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means



SETTINGS

Quickpick | Advanced

- (•) Slow sea level rise
- ( ) Medium sea level rise
- ( ) Fast sea level rise
- ( ) No global sea level rise

Based on global sea level projections of about 0.5 ft of rise by 2050, and 1.5 ft by 2100, from a 2012 baseline.

4-FT COASTAL FLOOD FORECAST INCLUDING SEA LEVEL RISE (TOTAL RISK)*

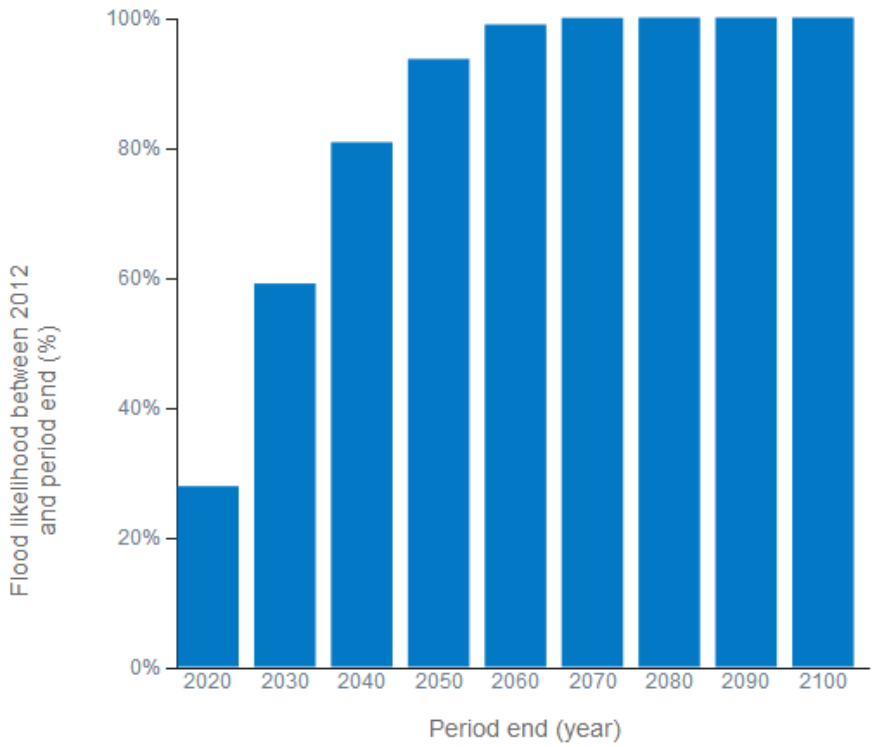


***Figure based on selected sea level rise scenario.**
See Projections tab to left for more.

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

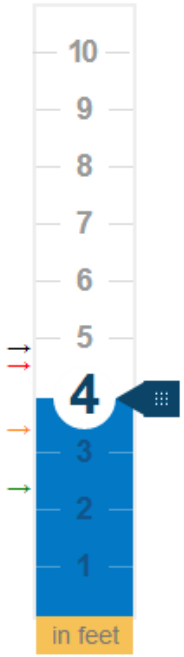
SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

Boston, MA (near Boston)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means



SETTINGS

Quickpick | **Advanced**

- ○ Slow sea level rise
- ○ Medium sea level rise
- ○ Fast sea level rise
- ◉ No global sea level rise

Sea level rise projections based only on local factors such as sinking land. Assumes no global warming and no global sea level rise.

4-FT COASTAL FLOOD FORECAST INCLUDING SEA LEVEL RISE (TOTAL RISK)*

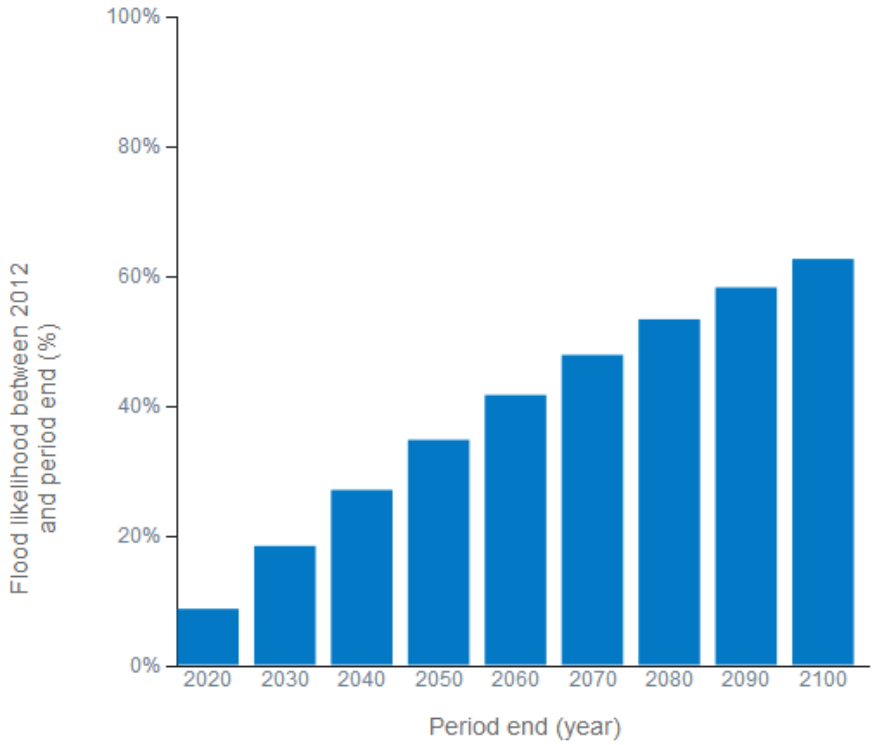


***Figure based on selected sea level rise scenario. See Projections tab to left for more.**

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

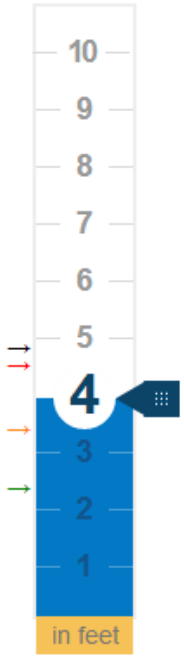
SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

Boston, MA (near Boston)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means



SETTINGS

Quickpick | **Advanced**

- NOAA 2012
- (•) Army Corps of Engineers
- IPCC 2014
- Semi-empirical
- No global warming

Global sea level rise projections from U.S. Army Corps of Engineers guidelines, and also used as the basis for the unified projections of the four-county Southeast Florida Regional Climate Change Compact. Based on an earlier National Research Council study. Combined with local factors, to make local projections, by Climate Central.

Projection

- Lower
- (•) Middle
- Upper

Scenario leading to midrange sea level rise projections (NRC curve II)

4-FT COASTAL FLOOD FORECAST INCLUDING SEA LEVEL RISE (TOTAL RISK)*

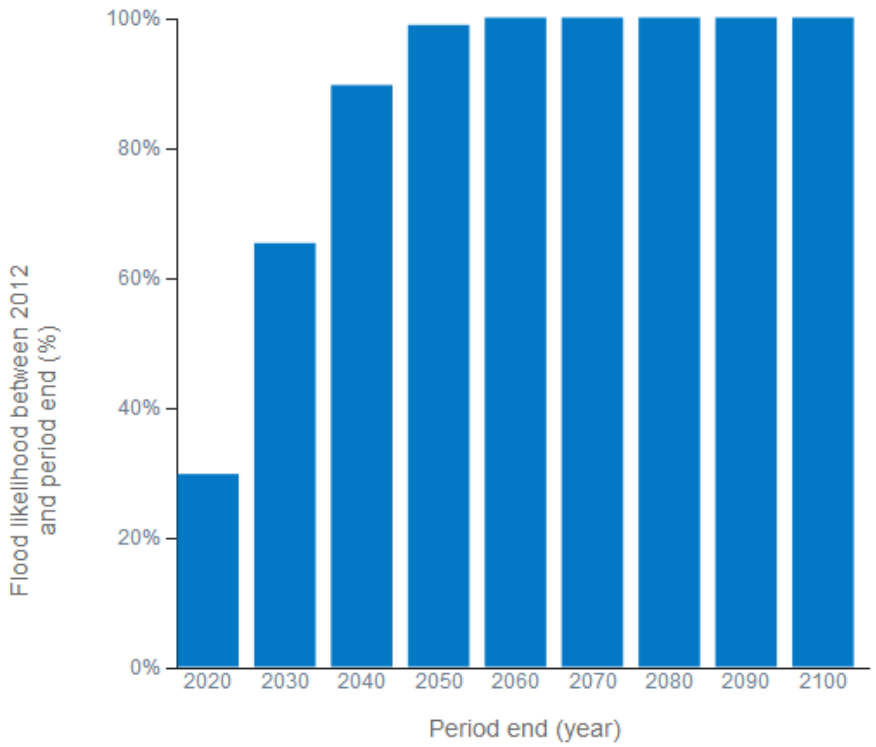


***Figure based on selected sea level rise scenario. See Projections tab to left for more.**

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

Boston, MA (near Boston)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

SETTINGS

Quickpick | **Advanced**

- ○ NOAA 2012
- ◉ Army Corps of Engineers
- ○ IPCC 2014
- ○ Semi-empirical
- ○ No global warming

Global sea level rise projections from U.S. Army Corps of Engineers guidelines, and also used as the basis for the unified projections of the four-county Southeast Florida Regional Climate Change Compact. Based on an earlier National Research Council study. Combined with local factors, to make local projections, by Climate Central.

Projection

- ○ Lower
- ◉ Middle
- ○ Upper

Scenario leading to midrange sea level rise projections (NRC curve II)

5-FT COASTAL FLOOD FORECAST INCLUDING SEA LEVEL RISE (TOTAL RISK)*

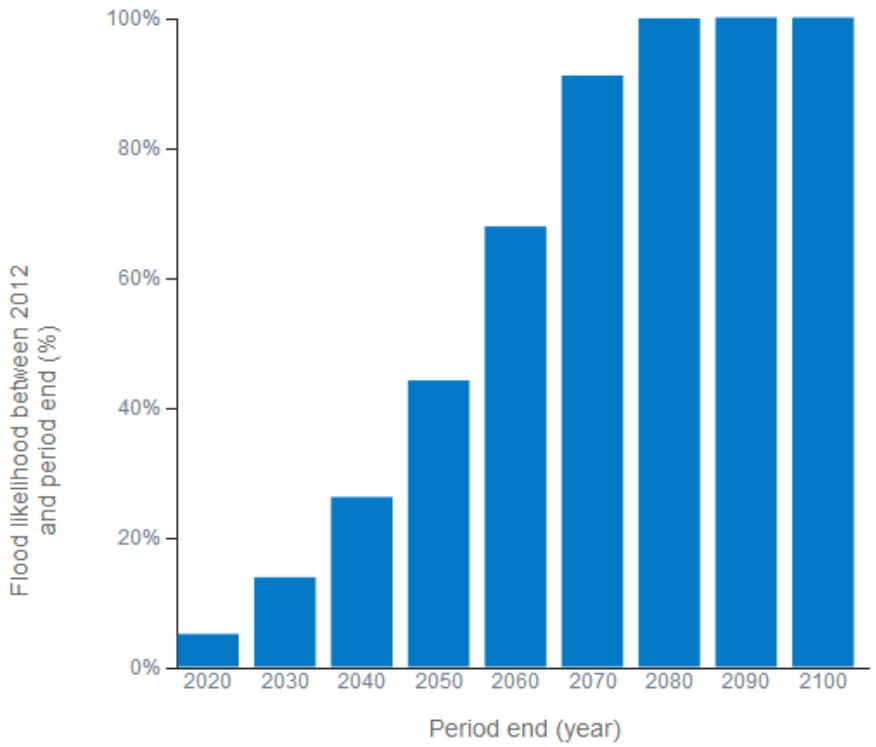


***Figure based on selected sea level rise scenario. See Projections tab to left for more.**

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

Boston, MA (near Boston)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

SETTINGS

Quickpick | **Advanced**

- NOAA 2012
- (•) Army Corps of Engineers
- IPCC 2014
- Semi-empirical
- No global warming

Global sea level rise projections from U.S. Army Corps of Engineers guidelines, and also used as the basis for the unified projections of the four-county Southeast Florida Regional Climate Change Compact. Based on an earlier National Research Council study. Combined with local factors, to make local projections, by Climate Central.

Projection

- Lower
- (•) Middle
- Upper

Scenario leading to midrange sea level rise projections (NRC curve II)

5-FT COASTAL FLOOD FORECAST INCLUDING SEA LEVEL RISE (TOTAL RISK)*

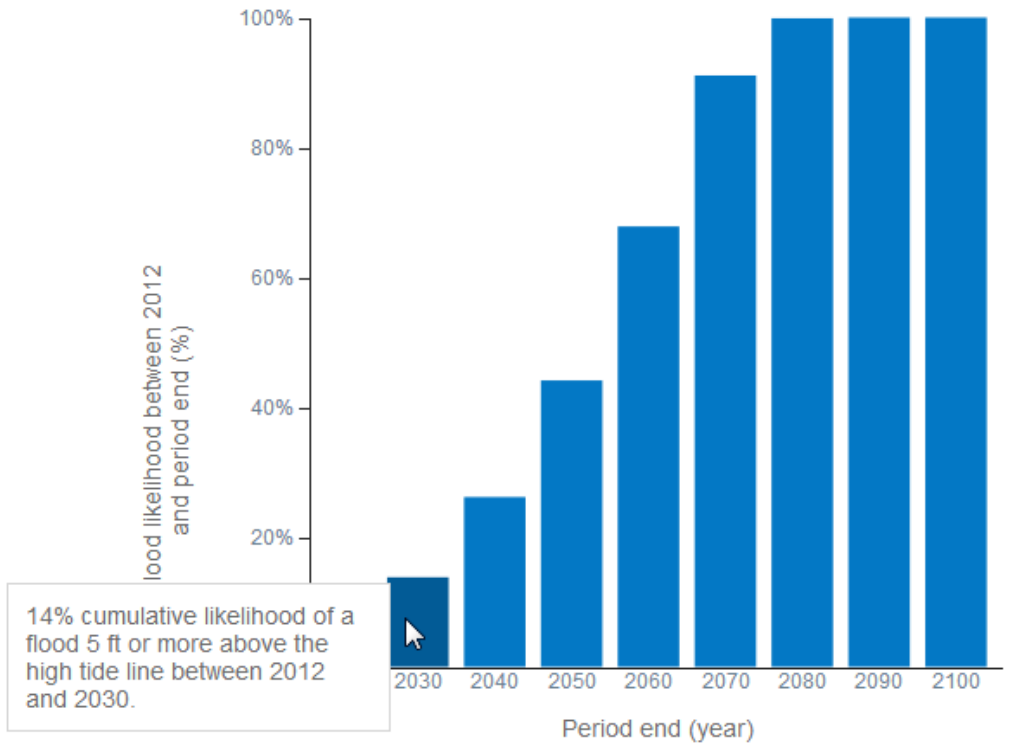


***Figure based on selected sea level rise scenario.**
See Projections tab to left for more.

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

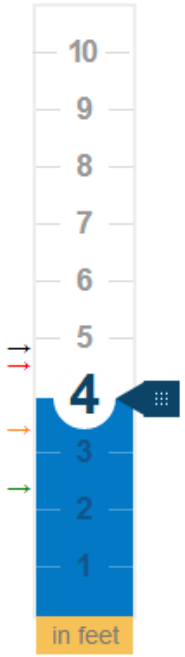
SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

Boston, MA (near Boston)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means



DOWNLOAD DATA

Name:

Organization:

Email:

Intended Use:

Download Projection Data

4-FT COASTAL FLOOD FORECAST INCLUDING SEA LEVEL RISE (TOTAL RISK)*

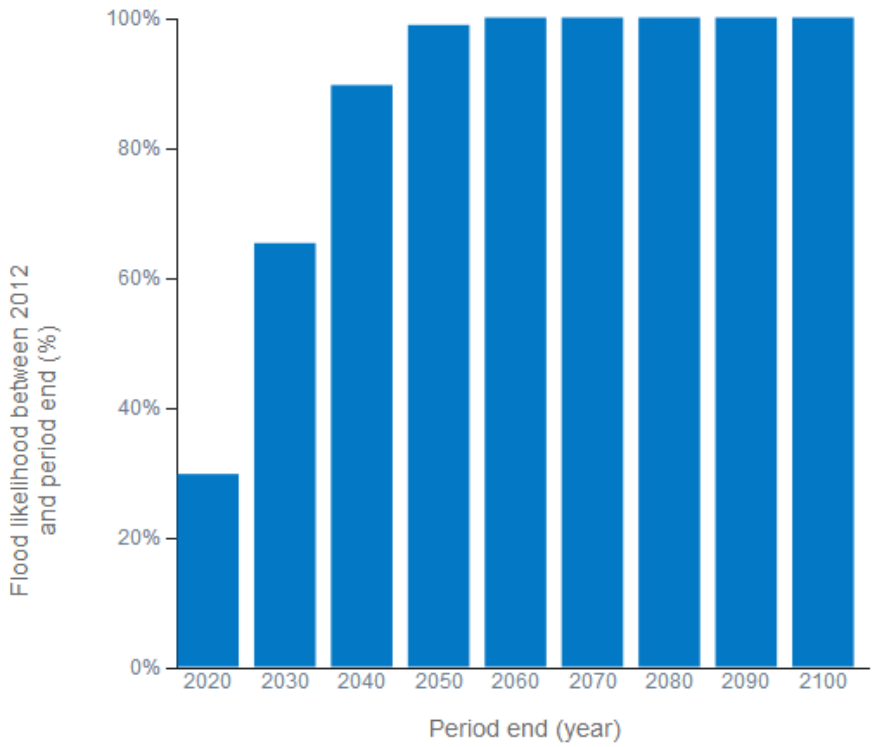


*Figure based on selected sea level rise scenario.
See Projections tab to left for more.

ssrf.climatecentral.org.s3-

ssrf.climatecentral.org.s3-website-us-east-1.amazonaws.com/Buffer2/projections/downloads/8723970/8723970.ACE.txt

TITLE: LOCAL SEA LEVEL RISE AND COASTAL FLOOD RISK PROJECTIONS AT VACA KEY, FL
FORMAT: Tab-delimited text (open/import from within spreadsheet software)

NOAA water level station ID: 8723970
Global sea level rise model used: U.S. Army Corps of Engineers (2011)
Adjustments to localize sea level rise projections: Following Tebaldi et al 2012

CONTENTS
 - Header material: Sources; Critical Notes; Details; Citation; Disclaimer; Table Key
 - Current and Historic Flood Risk
 - Table 0: Local Sea Level Rise Projections
 - Tables 1-10: Local Flood Risk Projections at 1-10 ft. (a) Cumulative Risk; and (b) Annual Risk.

SOURCES
 - Findings from Surging Seas (SurgingSeas.org), a project of Climate Central (climatecentral.org)
 - Global sea level rise model:
     U.S. Army Corps of Engineers (2011). Sea-level change considerations for civil works programs. Engineering Circular 1165-2-212.
 - Methods to localize sea level rise projections:
     Tebaldi C, Strauss BH & Zervas CE (2012). Modelling sea level rise impacts on storm surges along US coasts. Environmental Research Letters, 7(1), 014032.
 - Methods for local flood risk projections (1):
     Tebaldi C, Strauss BH & Zervas CE (2012). Modelling sea level rise impacts on storm surges along US coasts. Environmental Research Letters, 7(1), 014032.
 - Methods for local flood risk projections (2):
     http://sealevel.climatecentral.org/research/methods/estimating-chances-and-timing-of-flood-levels1/
 - Water level station data:
     NOAA (tidesandcurrents.noaa.gov). Hourly data from 1979 to 2013.
 - More details at SurgingSeas.org, including linked reports and scientific papers.

CRITICAL NOTES
 - Water level station projections are indicators of area flood risk, but flood patterns vary from place to place.
 - Flood risk estimates based on sea level rise projections combined with historic patterns of storm surge and tide.
 - Potential changes in future storm patterns are not accounted for, but would further affect risk.
 - Natural variability will cause annual and longer term sea level fluctuations, contributing to departures from projections.
 - Listed total or cumulative flood risk estimates cover 2013 through the year listed in the table.
 - Listed flood heights are measured relative to station high tide line (Mean Higher High Water (MHHW)).
 - MHHW is defined for the station's current tidal epoch (it is a fixed reference even as sea levels rise).

DETAILS
 - File creation date: 02-Apr-2014
 - File name: 8723970.ACE.txt
 - File URL: http://ssrf.climatecentral.org/projections/downloads/8723970/8723970.ACE.txt

CITATION
Climate Central (2014). Local sea level rise and coastal flood risk projections at Vaca Key, FL.
Retrieved from Surging Seas Risk Finder: http://ssrf.climatecentral.org/projections/downloads/8723970/8723970.ACE.txt

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

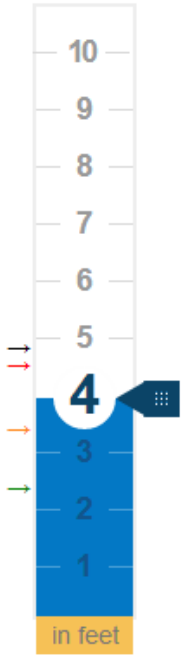
Boston, MA (near Boston)

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL | LOCATION | PROJECTIONS

What it means



Important notes

- Flood risk
  - Total
  - Annual
- + Risk multiplier
- + Sea level

Global Sea Level Rise Model and Scenario

U.S. Army Corps of Engineers, middle scenario

Change | About

Download Data

4-FT COASTAL FLOOD FORECAST INCLUDING SEA LEVEL RISE (ANNUAL RISK)*

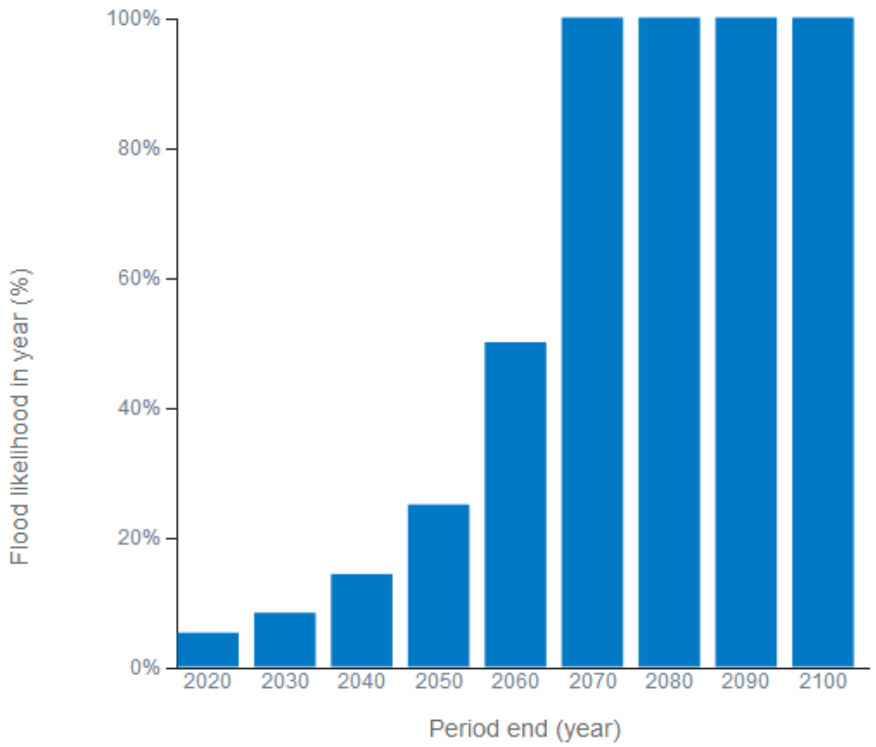


***Figure based on selected sea level rise scenario. See Projections tab to left for more.**

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

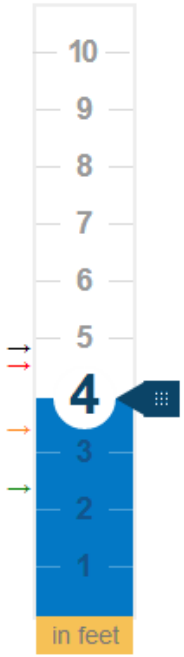
SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

Boston, MA (near Boston)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL | LOCATION | PROJECTIONS

What it means



Important notes

+ Flood risk
+ Risk multiplier
- Sea level
  - Basic
  - With mild flood
  - With moderate flood
  - With extreme flood

Global Sea Level Rise Model and Scenario

NOAA 2012 technical report for the U.S. National Climate Assessment, intermediate high sea level rise scenario

Change | About

Download Data

FORECAST SEA LEVEL RISE*

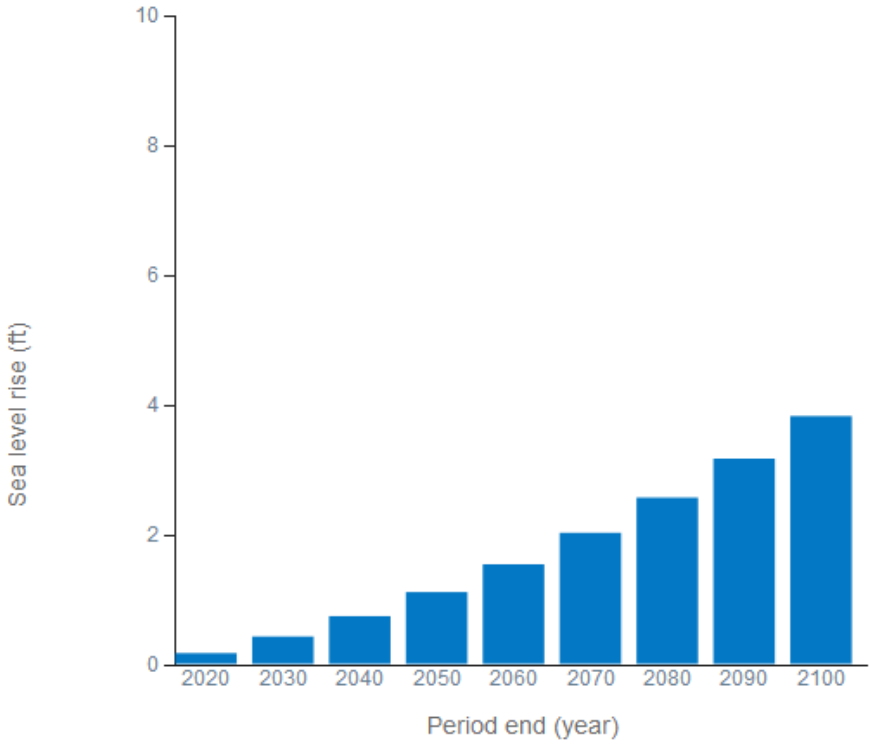


*Figure based on selected sea level rise scenario. See Projections tab to left for more.

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

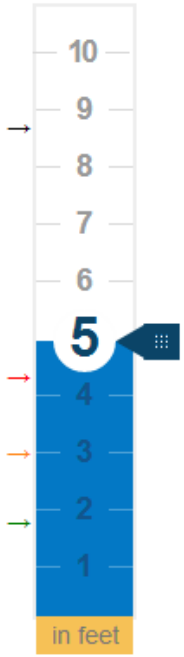
SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

Woods Hole - Buzzards Bay, MA (near Boston)

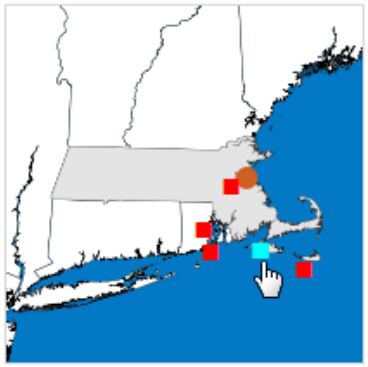
MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL | LOCATION | PROJECTIONS

What it means



Important notes



- **Boston**
- **Woods Hole, MA**
  Distance: 59 miles
- **Other water level stations**
  Click to select

5-FT COASTAL FLOOD FORECAST INCLUDING SEA LEVEL RISE (TOTAL RISK)*

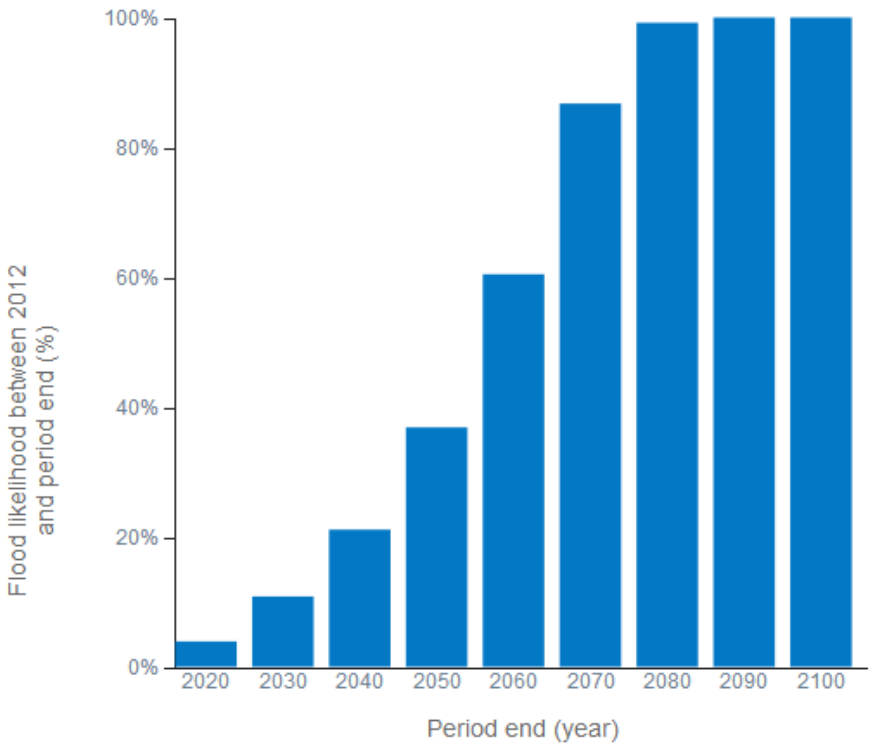


*Figure based on selected sea level rise scenario.
See Projections tab to left for more.

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

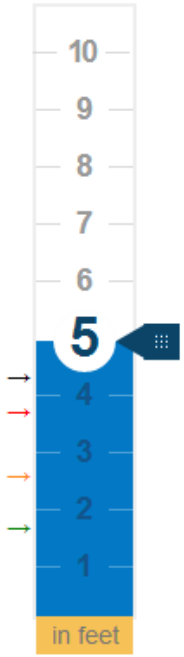
SEA LEVEL & FLOOD PROJECTIONS AT WATER LEVEL STATION:

Nantucket Island - Nantucket Sound, MA (near Boston)

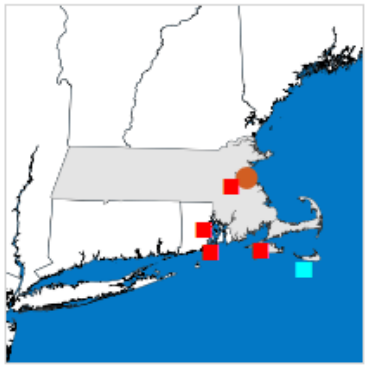
MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL | LOCATION | PROJECTIONS

What it means



Important notes



- Boston
- Nantucket Island, MA
  Distance: 86 miles
- Other water level stations
  Click to select

5-FT COASTAL FLOOD FORECAST INCLUDING SEA LEVEL RISE (TOTAL RISK)*

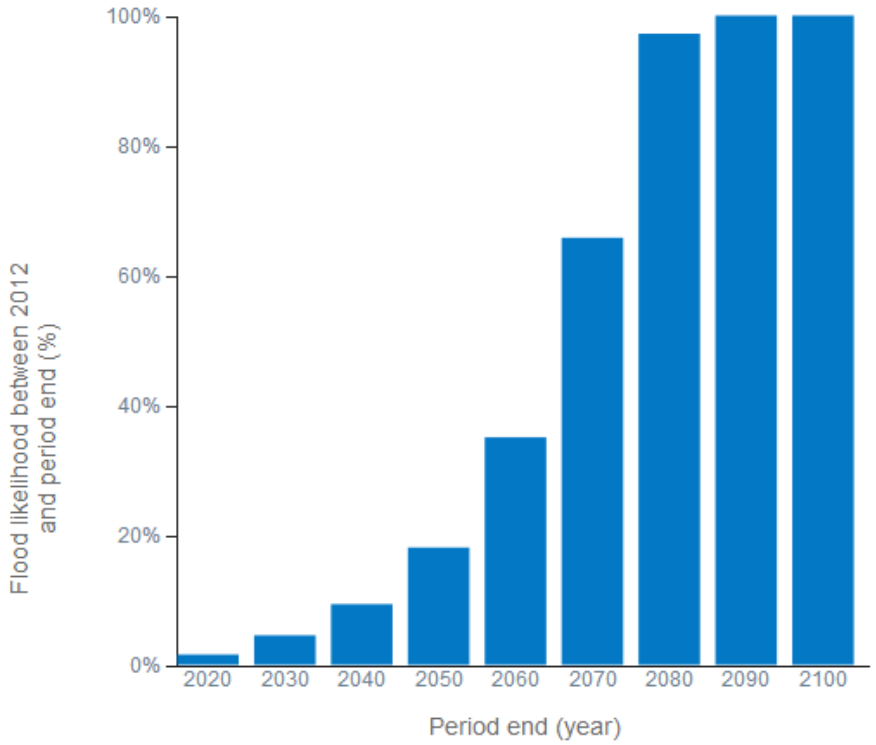


*Figure based on selected sea level rise scenario.
See Projections tab to left for more.

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

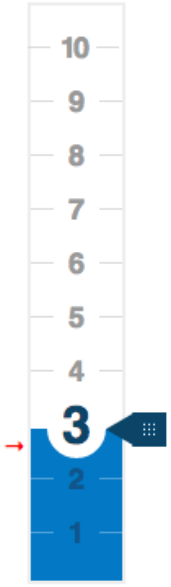
Sea level and coastal flood risk projections at Vaca Key, FL

RISK FINDER: FLORIDA Type Any Place (City etc)

CHOOSE WATER LEVEL AND PROJECTION TYPE AND SETTINGS

WATER LEVEL

From combined sea level rise, storm surge, and tide (any year)



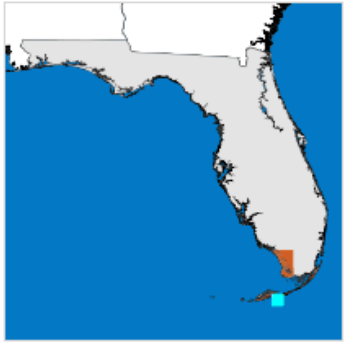
Feet above local high tide

LOCATION

NOAA water station at

Vaca Key, FL

Station nearest to center of **Monroe** - 54 miles

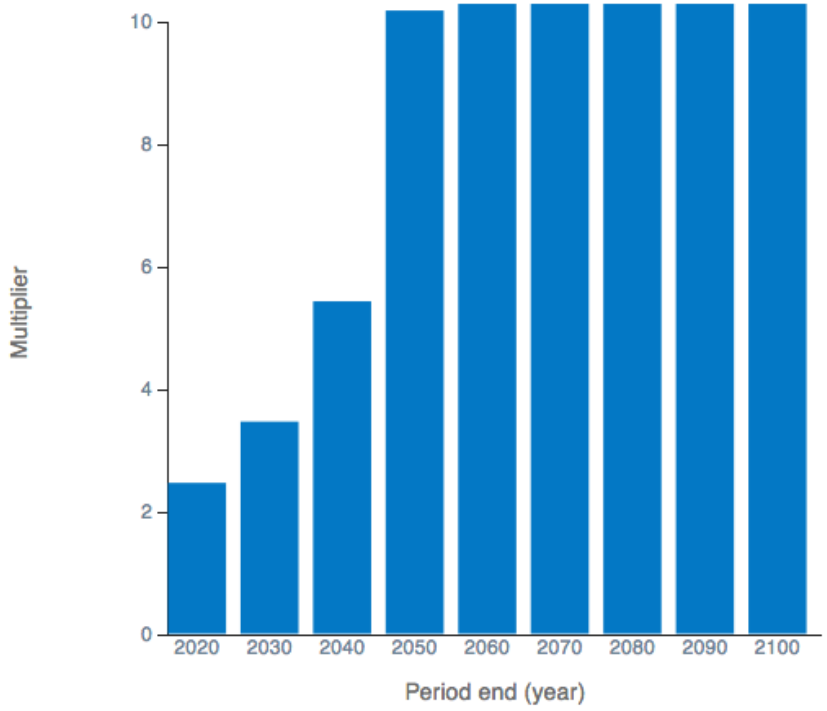


PROJECTION TYPE

+ Flood risk
- Risk multiplier
  - For total flood risk
  - For annual flood risk
+ Sea level

WHEN THREATS ARISE

Estimated global sea level rise multipler on annual coastal flood risk above 3 ft



Army Corps of Engineers, middle scenario

MORE

Home »

When »

Where »

What »

Compare »

Links:

Report: Florida and the Surging Sea

Comments & Suggestions

Science

About

Help

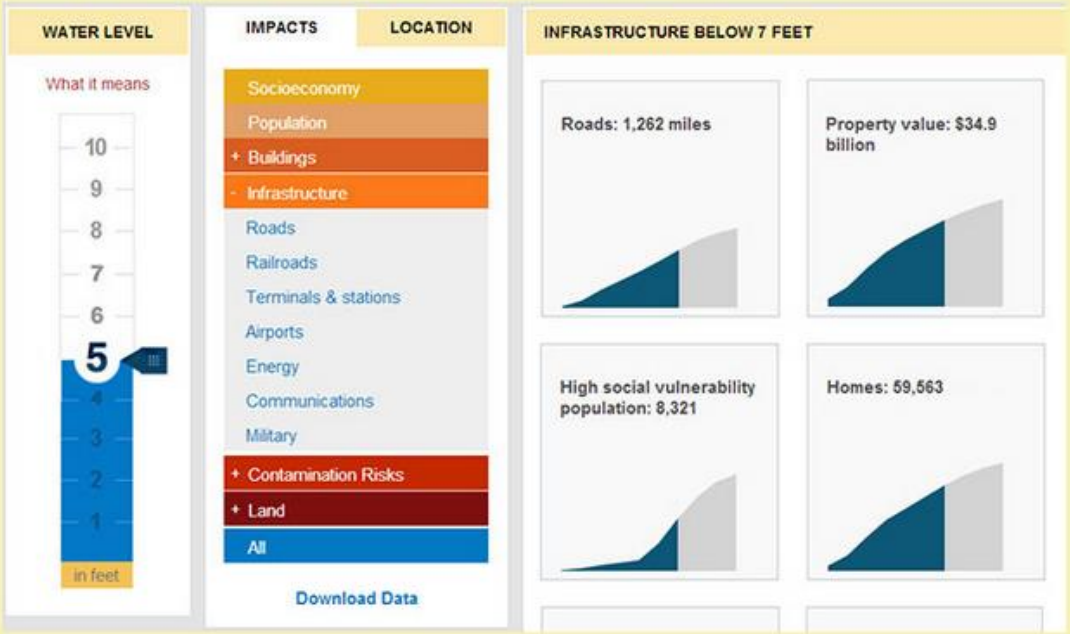
Risk Finder: Florida

See More States | U.S. (v1)

CHOOSE A TOOL: Map | Forecast | Analysis | Comparison

Comprehensive analysis of sea level rise & flood exposure, by place

CLICK TO REVIEW: Florida, Miami, Fort Lauderdale, St. Petersburg, Jacksonville, Broward County, Pembroke Pines, Tampa, 33141, and more.



REPORT
Florida and the Surging Sea

- Science Behind the Tool
- FL Resiliency Resources
- Quick Tutorials / Help
- About
- Feedback

RECEIVE EMAIL UPDATES

Email Address | Sign Up

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

IMPACTS | LOCATION

Important notes

- Socioeconomy
- Population
- + Buildings
- + Infrastructure
- + Contamination Risks
- + Land
- All

Download Data

POPULATION BELOW 7 FEET — PERCENT | TOTAL

Population: 130,086

Caucasian population: 89,713

Population of color: 43,753

African-American population: 14,492

Asian population: 18,719

Hispanic population: 22,251

Native American population: 1,232

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

IMPACTS | LOCATION

Important notes

- Socioeconomy
- Population
- \- Buildings
  - Critical
  - Education, culture & religion
  - Government & community
- \+ Infrastructure
- \+ Contamination Risks
- \+ Land
- All

Download Data

BUILDINGS BELOW 4 FEET — PERCENT | TOTAL

Homes: 63,125	Public safety facilities: 18	Hospitals: 11
Medical facilities: 17	Schools: 26	Public Schools: 14
Colleges and Universities: 19	Libraries: 2	Theater, music & arts buildings: 11

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL | IMPACTS | LOCATION

What it means

Important notes

- Socioeconomy
- Population
- Buildings
  - Critical
  - Education, culture & religion
  - Government & community
- Infrastructure
- Contamination Risks
- Land
- All

Download Data

BUILDINGS BELOW 4 FEET — PERCENT | TOTAL

Homes: 23%	Public safety facilities: 24%	Hospitals: 25%
Medical facilities: 25%	Schools: 12%	Public Schools: 9%
Colleges and Universities: 41%	Libraries: 7%	Theater, music & arts buildings: 37%

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL | IMPACTS | LOCATION

What it means

Important notes

- Socioeconomy
- Population
- - Buildings
  - Critical
  - Education, culture & religion
  - Government & community
- + Infrastructure
- + Contamination Risks
- + Land
- All

Download Data

BUILDINGS BELOW 9 FEET — PERCENT | TOTAL

Homes: 27%	Public safety facilities: 39%	Hospitals: 30%
Medical facilities: 31%	Schools: 16%	Public Schools: 13%
Colleges and Universities: 48%	Libraries: 11%	Theater, music & arts buildings: 40%

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

IMPACTS | LOCATION

Important notes

- Socioeconomy
- Population
- + Buildings
- - Infrastructure
  - Roads
  - Railroads
  - Terminals & stations
  - Airports
  - Energy
  - Communications
  - Military
- + Contamination Risks
- + Land
- All

Download Data

INFRASTRUCTURE BELOW 7 FEET — PERCENT | TOTAL

Roads: 23%

Federal roads: 40%

State roads: 35%

Local roads: 21%

Primary roads: 44%

Secondary roads: 34%

Railroads: 60%

All passenger rail: 29%

Mainline rail: 20%

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

IMPACTS | LOCATION

Important notes

- Socioeconomy
- Population
- + Buildings
- + Infrastructure
- - Contamination Risks
  - Hazardous waste
  - Hazardous materials
  - Wastewater
  - By EPA program
- + Land
- All

Download Data

CONTAMINATION RISKS BELOW 4 FEET — PERCENT | TOTAL

EPA listed sites: 35%

Landfills: 18%

Brownfields: 10%

Hazardous waste sites: 38%

Major hazwaste source sites: 50%

Minor hazwaste source sites: 37%

Unspecified hazardous waste sites: 37%

Hazardous materials facilities: 44%

Extreme hazmat facilities: 100%

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

IMPACTS | LOCATION

Important notes

- Socioeconomy
- Population
- + Buildings
- + Infrastructure
- + Contamination Risks
- - Land
  - Protected lands by area
  - Protected lands by unit
- All

Download Data

LAND BELOW 4 FEET — PERCENT | TOTAL

Land: 21%

Protected land: 22%

Federal protected land: 19%

State protected land: 28%

Local protected land: 16%

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

IMPACTS | LOCATION

Important notes

- Socioeconomy
- Population
- + Buildings
- + Infrastructure
- + Contamination Risks
- - Land
  - Protected lands by area
  - Protected lands by unit
- All

Download Data

LAND BELOW 4 FEET — PERCENT | TOTAL

Lan

Stat
28%

IMPORTANT NOTES

The values on this page assess what sits on land below the selected water level (elevation). They aim to indicate general exposure to future sea level rise and coastal flooding -- not actual impacts or flood areas. Complicating factors include:

Protection. Levees, walls, dams or other features may protect some areas, especially at lower elevations. Data limitations, such as incomplete levee data, make assessing protection difficult. However, click on any tile for estimates. This may be an issue in the Boston area, where certain dams stand 6.8 ft above Mean Higher High Water (MHHW), but are shown protecting Cambridge and other areas only up to 4 ft in our mapping analysis, due to alternate pathways for flow indicated by the elevation data.

Bathtub method. Employing elevation relative to local high tide lines (Mean Higher High Water, or MHHW), this analysis uses near-flat water surfaces statewide to compare exposure. Actual storms create uneven flooding in limited areas.

Elevation error. The laser-based "lidar" elevation data used in this tool includes error. In rare cases, localized error may make large low-lying areas appear mistakenly connected to -- or isolated from -- the ocean at a particular water level. This may be an issue in the Boston area, where certain dams stand 6.8 ft above Mean Higher High Water (MHHW), but are shown protecting Cambridge and other areas only up through 4 ft in our mapping analysis, due to alternate pathways for

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WHAT IT MEANS ✖

Water level means feet above the local high tide line.*

Water can reach any level at different times through different combinations of sea level rise, tide and storm surge.

Sea level has been rising, and scientists agree the rise will accelerate, growing its effect on floods.

See sea level and flood risk projections by decade >>

Technically, feet above local Mean Higher High Water

IMPACTS | LOCATION

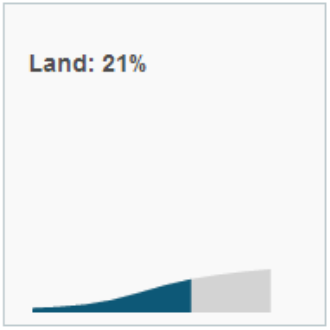
Important notes

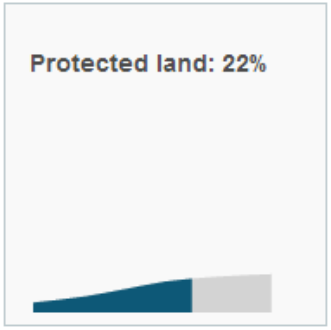
- Socioeconomy
- Population
- + Buildings
- + Infrastructure
- + Contamination Risks
- - Land
  - Protected lands by area
  - Protected lands by unit
- All

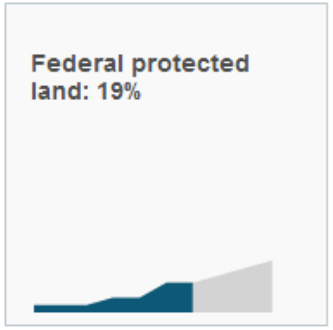
Download Data

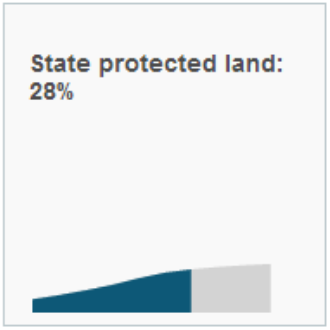
LAND BELOW 4 FEET

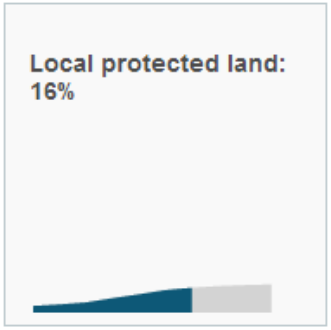
PERCENT | TOTAL











Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL | IMPACTS | LOCATION

What it means

10 9 8 **7** 6 5 4 3 2 1

in feet

Important notes

- Socioeconomy
- Population
- \+ Buildings
- \+ Infrastructure
- \- Contamination Risks
  - Hazardous waste
  - Hazardous materials
  - Wastewater
  - By EPA program
- \+ Land
- All

Download Data

CONTAMINATION RISKS BELOW 4 FEET — PERCENT | TOTAL

EPA listed sites: 35%

Main Method

This analysis counts a site as affected when its listed point coordinates place it on land below the selected water level. Records were extracted from the EPA's Facilities Registry System database, and were screened for spatial accuracy. All inactive facilities were filtered out. This set includes unique records taken from all contamination subcategories in this web tool.

Sources: EPA

Connectivity

249 (96%) sites are on land below 7 ft and connected* to the ocean

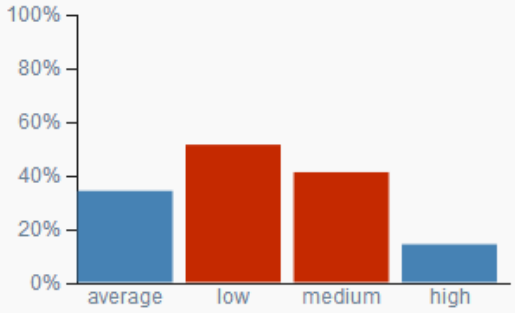
10 (4%) sites are on land below 7 ft and isolated* by ridges or levees

*at water level 7 ft

Analysis assumes levees tall enough and in good condition. Elevation data may omit fine features

Exposure by Social Vulnerability

Percentage of sites affected at ft for areas with different levels of social vulnerability in Boston. Values above Average (in red) show disproportionate exposure. Social vulnerability based on Social Vulnerability Index.



Source for social vulnerability data: The Hazards and Vulnerability Research Institute, U. of South Carolina

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL | IMPACTS | LOCATION

What it means

10
9
8
7
6
5
4
3
2
1
in feet

Important notes

- Socioeconomy
- Population
- \+ Buildings
- \+ Infrastructure
- \- Contamination Risks
  - Hazardous waste
  - Hazardous materials
  - Wastewater
  - By EPA program
- \+ Land
- All

Download Data

CONTAMINATION RISKS BELOW 4 FEET — PERCENT | TOTAL

EPA listed sites: 8%

Main Method

This analysis counts a site as affected when its listed point coordinates place it on land below the selected water level. Records were extracted from the EPA's Facilities Registry System database, and were screened for spatial accuracy. All inactive facilities were filtered out. This set includes unique records taken from all contamination subcategories in this web tool.

Sources: EPA

Connectivity

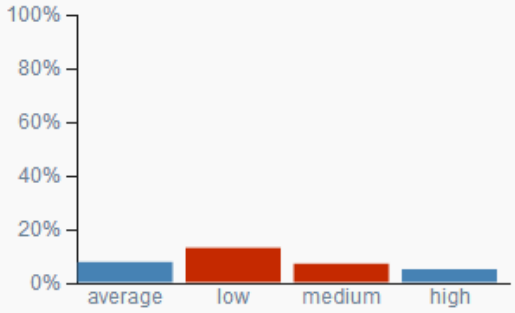
- 15 (27%) sites are on land below 4 ft and connected* to the ocean
- 41 (73%) sites are on land below 4 ft and isolated* by ridges or levees

** at water level 4 ft*

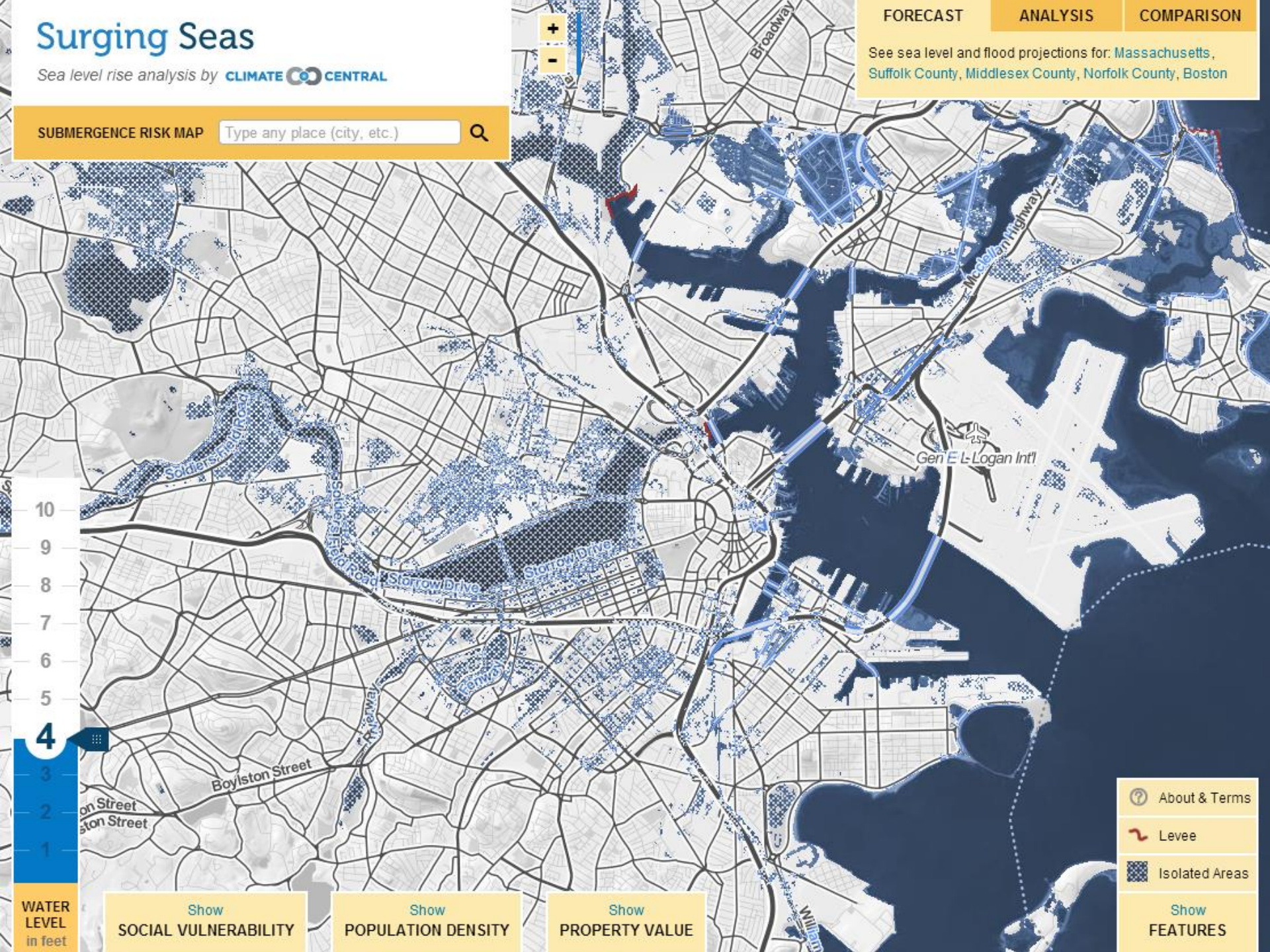
Analysis assumes levees tall enough and in good condition. Elevation data may omit fine features

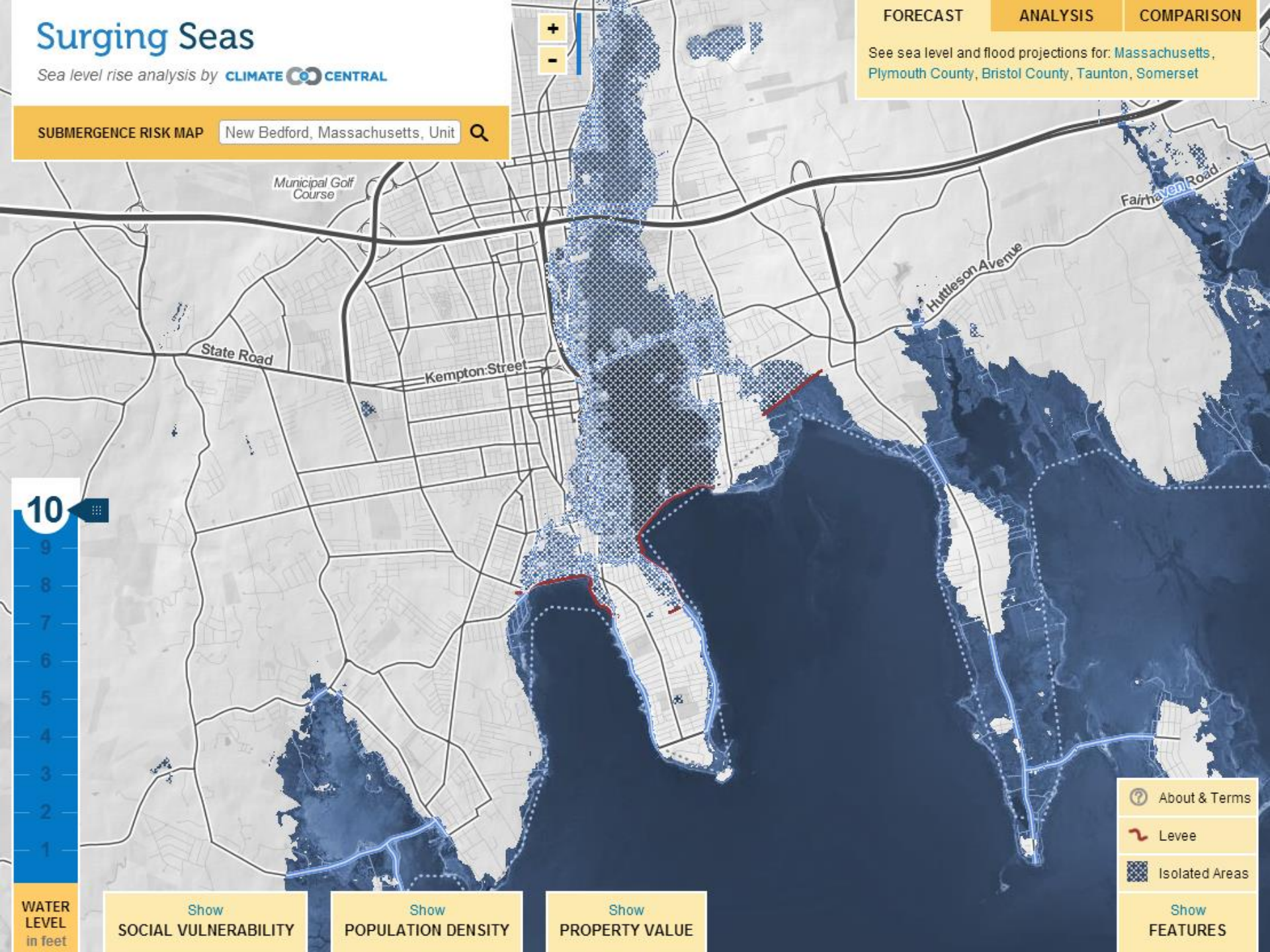
Exposure by Social Vulnerability

Percentage of sites affected at ft for areas with different levels of social vulnerability in Boston. Values above Average (in red) show disproportionate exposure. Social vulnerability based on Social Vulnerability Index.



Source for social vulnerability data: The Hazards and Vulnerability Research Institute, U. of South Carolina


Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
Type any place (city, etc.)
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: Massachusetts, Suffolk County, Middlesex County, Norfolk County, Boston
Broadway
McClellan Highway
Gen E L Logan Int'l
Soldiers Field Road
Storrow Drive
Fenway
Boylston Street
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Show PROPERTY VALUE
About & Terms
Levee
Isolated Areas
Show FEATURES


Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
SUBMERGENCE RISK MAP
New Bedford, Massachusetts, Unit
FORECAST
ANALYSIS
COMPARISON
See sea level and flood projections for: Massachusetts, Plymouth County, Bristol County, Taunton, Somerset
Municipal Golf Course
State Road
Kempton Street
Fairhaven Road
Huttleson Avenue
10
9
8
7
6
5
4
3
2
1
WATER LEVEL in feet
Show SOCIAL VULNERABILITY
Show POPULATION DENSITY
Show PROPERTY VALUE
About & Terms
Levee
Isolated Areas
Show FEATURES

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

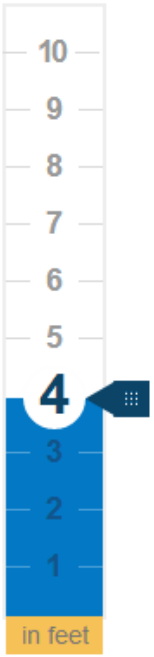
SEA LEVEL RISE AND COASTAL FLOOD RISK

Boston (MA)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means



DOWNLOAD DATA ✖

Name:

Organization:

Email:

Intended Use:

Download Summary Table for Boston

Category-Specific Data

- EPA listed sites -

Download Tile Detail Table: EPA listed sites in Boston

Download Detailed List: EPA listed sites in Boston

CONTAMINATION RISKS BELOW 4 FEET — PERCENT | TOTAL

EPA listed sites: 8%

Main Method

This analysis counts a site as affected when its listed point coordinates place it on land below the selected water level. Records were extracted from the EPA's Facilities Registry System database, and were screened for spatial accuracy. All inactive facilities were filtered out. This set includes unique records taken from all contamination subcategories in this web tool.

Sources: EPA

Connectivity

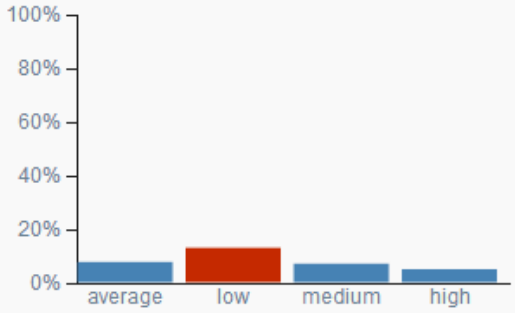
- 15 (27%) sites are on land below 4 ft and connected* to the ocean
- 41 (73%) sites are on land below 4 ft and isolated* by ridges or levees

*at water level 4 ft

Analysis assumes levees tall enough and in good condition. Elevation data may omit fine features

Exposure by Social Vulnerability

Percentage of sites affected at ft for areas with different levels of social vulnerability in Boston. Values above Average (in red) show disproportionate exposure. Social vulnerability based on Social Vulnerability Index.



Source for social vulnerability data: The Hazards and Vulnerability Research Institute, U. of South Carolina

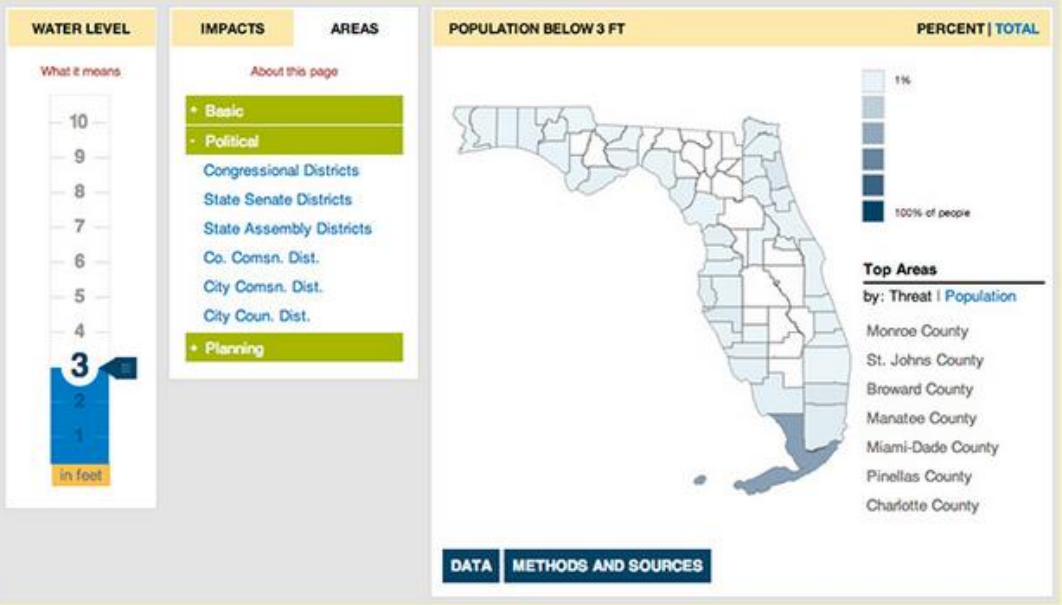
Risk Finder: Florida

See More States | U.S. (v1)

CHOOSE A TOOL: **Map** | **Forecast** | **Analysis** | **Comparison**

Heat maps of sea level rise & flood exposure, by topic

CLICK TO COMPARE: Population, Property, Roads, EPA sites, Schools, Hospitals, Railroads, Power Plants, High Social Vulnerability Population, and more.



REPORT
Florida and the Surging Sea

Science Behind the Tool
FL Resiliency Resources
Quick Tutorials / Help
About
Feedback

RECEIVE EMAIL UPDATES

Email Address | Sign Up

Get

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Reg. Plng. Agency in Massachusetts

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

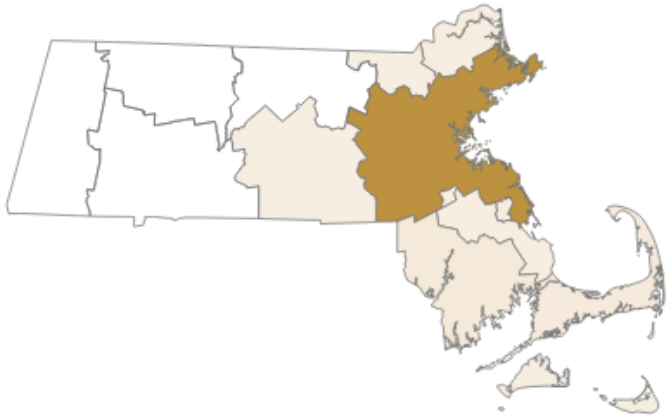
What it means

IMPACTS | AREAS

Important notes

- + Basic
- + Political
- - Planning
  - MPO Districts
  - Reg. Plng. Agency
  - RTAs
  - MBTA Areas
  - DEP Regions
  - HLSP Regions
- + Community

POPULATION BELOW 8 FT — PERCENT | TOTAL



Top Areas

by: Threat | Population

Metropolitan Area Planning Council

Southeast Regional Planning & Economic Development

Cape Cod Commission

Merrimack Valley Planning Commission

Old Colony Planning Council

Martha's Vineyard Commission

Nantucket Planning & Economic Development Commissi

DATA | METHODS AND SOURCES

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Congressional Districts in Massachusetts

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

10
9
8
7
6
5
4
3
2
1
in feet

IMPACTS | AREAS

Important notes

+ Basic
- Political
  - Congressional Districts
  - State Senate Districts
  - State Assembly Districts
  - Towns (MA)
  - Gov. Coun. Dist.
  - City Coun. Dist.
+ Planning
+ Community

POPULATION BELOW 7 FT

PERCENT | TOTAL

1
200,000 people

Top Areas

by: Threat | Population

Congressional District 7
Congressional District 5
Congressional District 8
Congressional District 9
Congressional District 6
Congressional District 4
Congressional District 3

DATA | METHODS AND SOURCES

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

SEA LEVEL RISE AND COASTAL FLOOD RISK

State Senate Districts in Massachusetts

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

10
9
8
7
6
5
4
3
2
1
in feet

IMPACTS | AREAS

Important notes

+ Basic
- Political
Congressional Districts
State Senate Districts
State Assembly Districts
Towns (MA)
Gov. Coun. Dist.
City Coun. Dist.
+ Planning
+ Community

POPULATION BELOW 7 FT

PERCENT | TOTAL

1
83,000 people

Top Areas

by: Threat | Population

First Suffolk & Middlesex District
Second Suffolk & Middlesex District
Middlesex & Suffolk District
Second Suffolk District
Second Middlesex District
Plymouth & Norfolk District
Norfolk & Plymouth District

DATA | METHODS AND SOURCES

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Counties in Massachusetts

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

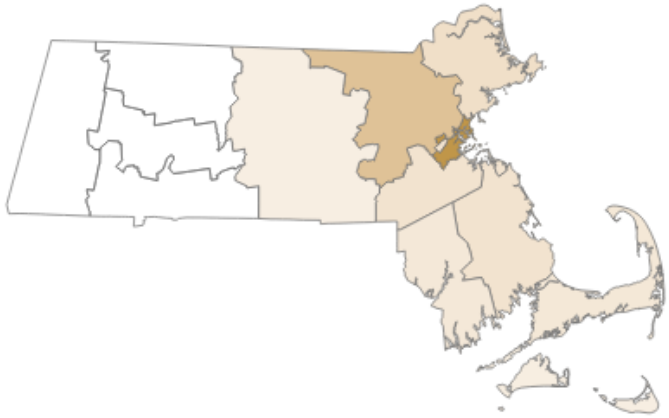
What it means

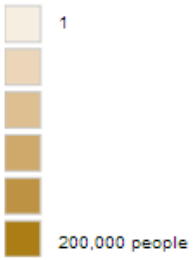
IMPACTS | AREAS

Important notes

- Basic
  - State
  - Counties
  - Cities
  - Towns (Census)
  - Zip Codes
- + Political
- + Planning
- + Community

POPULATION BELOW 7 FT — PERCENT | TOTAL





Top Areas

by: Threat | Population

Suffolk County
Middlesex County
Essex County
Norfolk County
Plymouth County
Barnstable County
Bristol County

DATA | METHODS AND SOURCES

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

SEA LEVEL RISE AND COASTAL FLOOD RISK

Towns (MA) in Barnstable County, MA

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

10
9
8
7
6
5
4
3
2
1
in feet

IMPACTS | AREAS

Important notes

+ Basic
- Political
Congressional Districts
State Senate Districts
State Assembly Districts
Towns (MA)
Gov. Coun. Dist.
City Coun. Dist.
+ Planning
+ Community

POPULATION BELOW 7 FT

PERCENT | TOTAL

Top Areas

by: Threat | Population

Yarmouth
Falmouth
Bourne
Dennis
Barnstable
Provincetown
Sandwich

DATA | METHODS AND SOURCES

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Towns (MA) in Barnstable County, MA

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

10
9
8
7
6
5
4
3
2
1
in feet

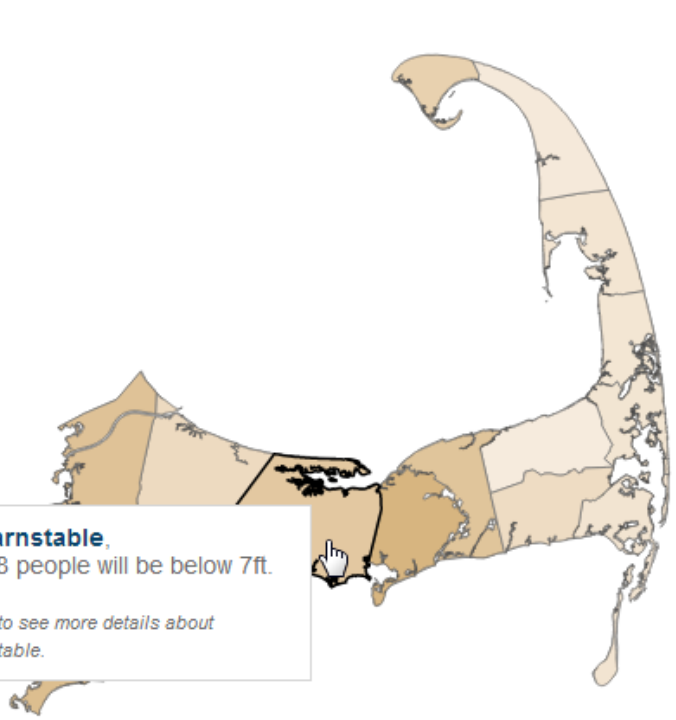
IMPACTS | AREAS

Important notes

+ Basic
- Political
Congressional Districts
State Senate Districts
State Assembly Districts
Towns (MA)
Gov. Coun. Dist.
City Coun. Dist.
+ Planning
+ Community

POPULATION BELOW 7 FT

PERCENT | TOTAL



In **Barnstable**,
1,098 people will be below 7ft.

Click to see more details about Barnstable.

Top Areas

by: Threat | Population

Yarmouth
Falmouth
Bourne
Dennis
Barnstable
Provincetown
Sandwich

DATA | METHODS AND SOURCES

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Barnstable (MA)

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL | IMPACTS | LOCATION

What it means

Important notes

- Socioeconomy
- Population
- + Buildings
- + Infrastructure
- + Contamination Risks
- + Land
- All

Download Data

POPULATION BELOW 7 FEET — PERCENT | TOTAL

Population: 1,098

Caucasian population: 1,041

Population of color: 70

African-American population: 28

Asian population: 12

Hispanic population: 10

Native American population: 12

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Zip Codes in Suffolk County, MA

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

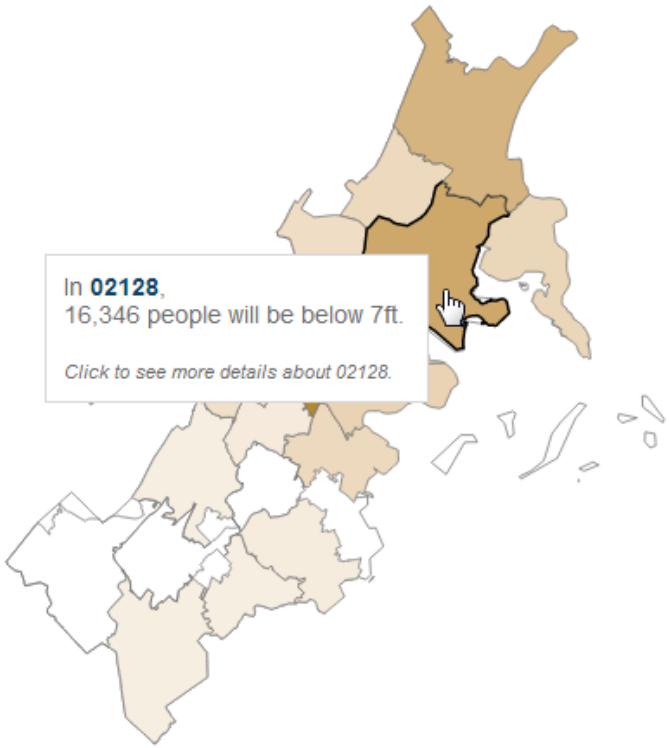
What it means

IMPACTS | AREAS

Important notes

- Basic
  - State
  - Counties
  - Cities
  - Towns (Census)
  - Zip Codes
- + Political
- + Planning
- + Community

POPULATION BELOW 7 FT — PERCENT | TOTAL



Top Areas

by: Threat | Population

02118
02115
02128
02215
02116
02151
02127

DATA | METHODS AND SOURCES

A1: SEA LEVEL RISE AND COASTAL FLOOD EXPOSURE OF POPULATION BY COUNTY IN FL

	A	B	C	D	E	F	G	H	I	J	K
33	TABLE: POPULATION EXPOSED IN FL ON LAND BELOW 1-10 FT (COUNT)										
34											
35		Elevation relative to local high tide line (Mean Higher High Water)									
36		< 1ft	< 2ft	< 3ft	< 4ft	< 5ft	< 6ft	< 7ft	< 8ft	< 9ft	< 10ft
37											
38	BY TOTALS										
39	Broward County	36287	60727	106724	207623	413102	685947	925774	1075596	1203431	1335316
40	Hendry County	7	8	12	129	314	477	672	897	1726	2751
41	Hernando County	210	579	1229	1982	2811	3424	3695	3811	3909	4032
42	Flagler County	867	1403	2352	3781	5220	6759	8525	11279	14475	16987
43	Hillsborough County	12972	15584	20742	30774	49401	72183	94410	116625	137399	154579
44	Holmes County	54	54	54	54	54	54	54	54	54	54
45	Levy County	84	245	527	806	1061	1379	1731	2080	2442	2710
46	Leon County	390	390	390	390	390	390	391	393	394	397
47	Lee County	2602	7000	17609	37318	73437	117159	160635	200461	237435	273266
48	Wakulla County	67	197	457	807	1190	1591	2026	2414	2771	3195
49	Gadsden County	217	217	217	217	239	239	239	239	239	239
50	Clay County	729	1535	2655	4076	5714	7571	9722	12211	15118	18508
51	Sarasota County	974	2583	7004	14389	22960	31499	39406	47820	58507	71089
52	Seminole County	39	108	287	625	1137	1672	2170	2734	3494	4691
53	Escambia County	152	502	1369	2724	4423	6256	8228	11054	14549	17159
54	Gilchrist County	4	6	8	11	15	22	34	49	68	91
55	Citrus County	704	2269	4619	7224	9773	12002	14008	15977	17999	20057
56	Franklin County	65	156	322	560	859	1217	1604	2022	2507	3243
57	Dixie County	81	270	507	684	809	918	1015	1108	1194	1289
58	Orange County	0	0	0	0	1	1	1	1	4	13
59	Okaloosa County	381	873	1694	3225	5288	7491	9926	12711	15922	19439
60	Okeechobee County	0	0	0	0	0	3	11	22	81	253
61	Washington County	65	65	65	65	65	65	66	66	67	68
62	Charlotte County	695	1854	5865	14770	29175	44907	58835	69732	79594	90004
63	Palm Beach County	2892	5903	12359	24433	43789	71244	96118	120345	149975	187779
64	Liberty County	0	0	0	1	1	1	1	1	2	2
65	St. Lucie County	2291	2881	3987	6729	10783	13560	15892	18772	21942	26048
66	Santa Rosa County	227	667	1490	2661	4118	5795	7756	9576	11504	13504
67	Lake County	53	161	371	536	644	711	769	826	878	930

A1 SEA LEVEL RISE AND COASTAL FLOOD EXPOSURE OF SCHOOLS IN MONROE COUNTY, FL

SOURCES AND METHODS

Findings from Surging Seas (SurgingSeas.org), a project of Climate Central (climatecentral.org)

Original data sources and methods detailed on download page and more widely at SurgingSeas.org, including linked reports and scientific papers.

CITATION

Climate Central (2014). Sea level rise and coastal flood exposure of Schools in Monroe County, FL,
in Surging Seas Risk Finder. Retrieved from ssrf.climatecentral.org/#p=L&state=Florida&location=FL_County_12087

DISCLAIMER

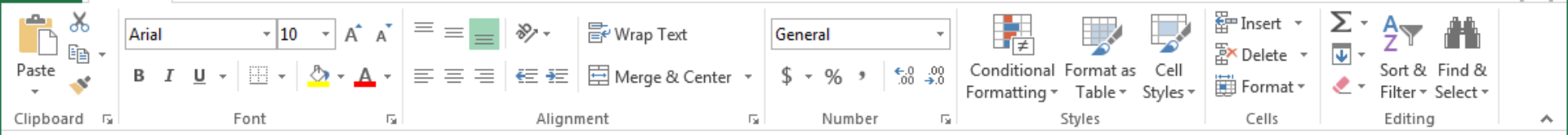
All content found herein is provided solely for personal informational purposes and is provided "AS-IS." You acknowledge and agree that your use and possession of this content is subject to, and you agree to the provisions set forth in, Climate Central's Terms of Use and Privacy Policy (both at http://www.climatecentral.org/about/legal) and Surging Seas Disclaimer (http://sealevel.climatecentral.org/about/disclaimer).

NOTES

- Results based on the elevation of land that structures sit on, relative to local hide tide (MHHW). Results do not factor in structure elevation or details.
- "Total" and vulnerability results based on tidally referenced elevation only. These results do not factor in potential protection from levees, sea walls, or other engineering, or natural features,
- Ocean connectivity results assume that all levees in database are sufficiently high and strong to block flooding at all water levels.
- Best available/obtainable levee datasets were used, but these are incomplete.
- Land elevation values are based on high-accuracy laser ("lidar") measurements, but still include errors.
- Summary or total exposure results, such as the ones in this table, average elevation errors over wide areas, so are more reliable than results for individual facilities or locations.
- Social vulnerability assessed at the Census tract level, but can vary more locally.
- Unit COT means "count over threshold." Certain features are counted as affected when at least 25% of their area or length is affected, such as military bases or airports (runway length).

TABLE: SCHOOLS EXPOSED IN MONROE COUNTY ON LAND BELOW 1-10 FT (COUNT)

	Elevation relative to local high tide line (Mean Higher High Water)									
	< 1ft	< 2ft	< 3ft	< 4ft	< 5ft	< 6ft	< 7ft	< 8ft	< 9ft	< 10ft
Total	0	1	3	7	10	12	19	22	22	23
Connected	0	1	3	7	10	12	19	22	22	23
Not conne	0	0	0	0	0	0	0	0	0	0
In high soc	0	0	0	0	1	1	1	1	1	1
In medium	0	1	1	5	7	7	11	11	11	11
In low soci	0	0	2	2	2	4	7	10	10	11



A1 SEA LEVEL RISE AND COASTAL FLOOD EXPOSURE OF SCHOOLS IN MONROE COUNTY, FL: LIST

and Surging Seas Disclaimer (http://sealevel.climatecentral.org/about/disclaimer).

NOTES

- Results based on the elevation of land that structures sit on, relative to local hide tide (MHHW). Results do not factor in structure elevation or details.
- Results based on tidally referenced elevation only. These results do not factor in potential protection from levees, sea walls, or other engineering, or natural features.
- Land elevation values are based on high-accuracy laser ("lidar") measurements, but still include errors.
- Results for individual facilities or location, such as listed here, are subject to error, and are less reliable than results summarizing exposure for large numbers of facilities.
- All table values come from original source(s) except for LEVEL, which gives the lowest tidally referenced elevation contour the site or facility does not exceed, in feet.

SEA LEVEL RISE AND COASTAL FLOOD EXPOSURE OF SCHOOLS IN MONROE COUNTY, FL ON LAND BELOW 10FT: LIST

LEVEL	ID	NAME	LAT	LON
2f	58697	Grace Lutheran	24.559875	-81.770996
3f	62878	Big Pine Neighborhood Charter	24.669128	-81.359985
3f	58707	Ocean Studies Charter School	25.013489	-80.512207
4f	63114	Monroe Juvenile Detention Center	24.577087	-81.750793
4f	72983	Monroe County School Board	24.554504	-81.787109
4f	62692	Horace O'bryant Junior High School	24.557129	-81.786682
4f	62698	May Sands School	24.554504	-81.786682
5f	63113	Monroe County Student Services/ Migrant/ Vi	24.563721	-81.797424
5f	62880	Stanley Switlik Elementary School	24.71228	-81.094482
5f	62695	Monroe County Superintendent Office	24.563721	-81.797424
6f	58698	Marathon Lutheran School	24.731689	-81.026489
6f	58706	Island Christian School	24.933289	-80.618591
7f	62700	Gerald Adams School	24.581482	-81.745605
7f	62879	Marathon High School and Adult Education	24.703918	-81.077881
7f	62694	Sigsbee Charter School	24.579285	-81.773193
7f	62696	Glynn Archer Elementary School	24.552917	-81.789001
7f	62697	Montessori Elementary Charter School	24.553284	-81.789612
7f	62701	Poinciana Elementary School	24.564087	-81.766113
7f	62917	Treasure Village Montessori Charter School	24.960876	-80.568909
8f	62877	Sugarloaf School	24.660889	-81.529907
8f	62699	Key West High School and Adult Education/(	24.554321	-81.776611
8f	58709	The Academy At Ocean Reef	25.297485	-80.291992
10f	62921	Key Largo School	25.15271	-80.387512

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

SEA LEVEL RISE AND COASTAL FLOOD RISK

Zip Codes in Suffolk County, MA

RISK FINDER: MA | Place name or zip code

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

10
9
8
7
6
5
4
3
2
1
in feet

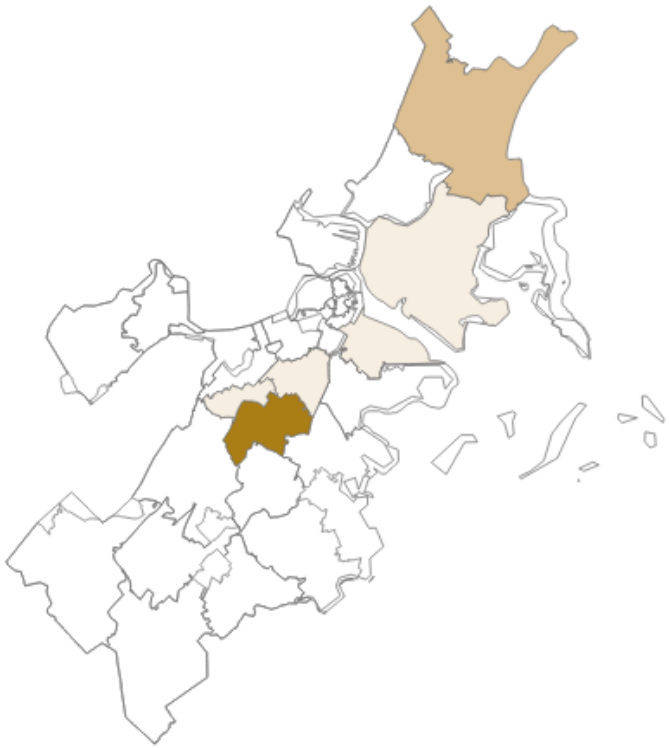
IMPACTS | AREAS

Important notes

+ Socioeconomy
+ Population
+ Buildings
+ Infrastructure
- Contamination Risks
  - EPA listed sites
  - Landfills
  - Brownfields
  - Listed animal waste sources
  - + Hazardous waste
  - + Hazardous materials
  - + Wastewater
  - + By EPA program
+ Land

BROWNFIELDS BELOW 7 FT

PERCENT | TOTAL



Top Areas

by: Threat | Population

02119
02151
02210
02118
02120
02128
02215

DATA | METHODS AND SOURCES

Surging Seas

Sea level rise analysis by CLIMATE CENTRAL

RISK FINDER: MA | Place name or zip code

SEA LEVEL RISE AND COASTAL FLOOD RISK

02119 (MA)

MAP » | FORECAST | ANALYSIS | COMPARISON | REPORT » | MORE ▼

WATER LEVEL

What it means

IMPACTS | LOCATION

Important notes

- Socioeconomy
- Population
- + Buildings
- + Infrastructure
- - Contamination Risks
  - Hazardous waste
  - Hazardous materials
  - Wastewater
  - By EPA program
- + Land
- All

Download Data

CONTAMINATION RISKS BELOW 7 FEET — PERCENT | TOTAL

EPA listed sites: 15

Brownfields: 6

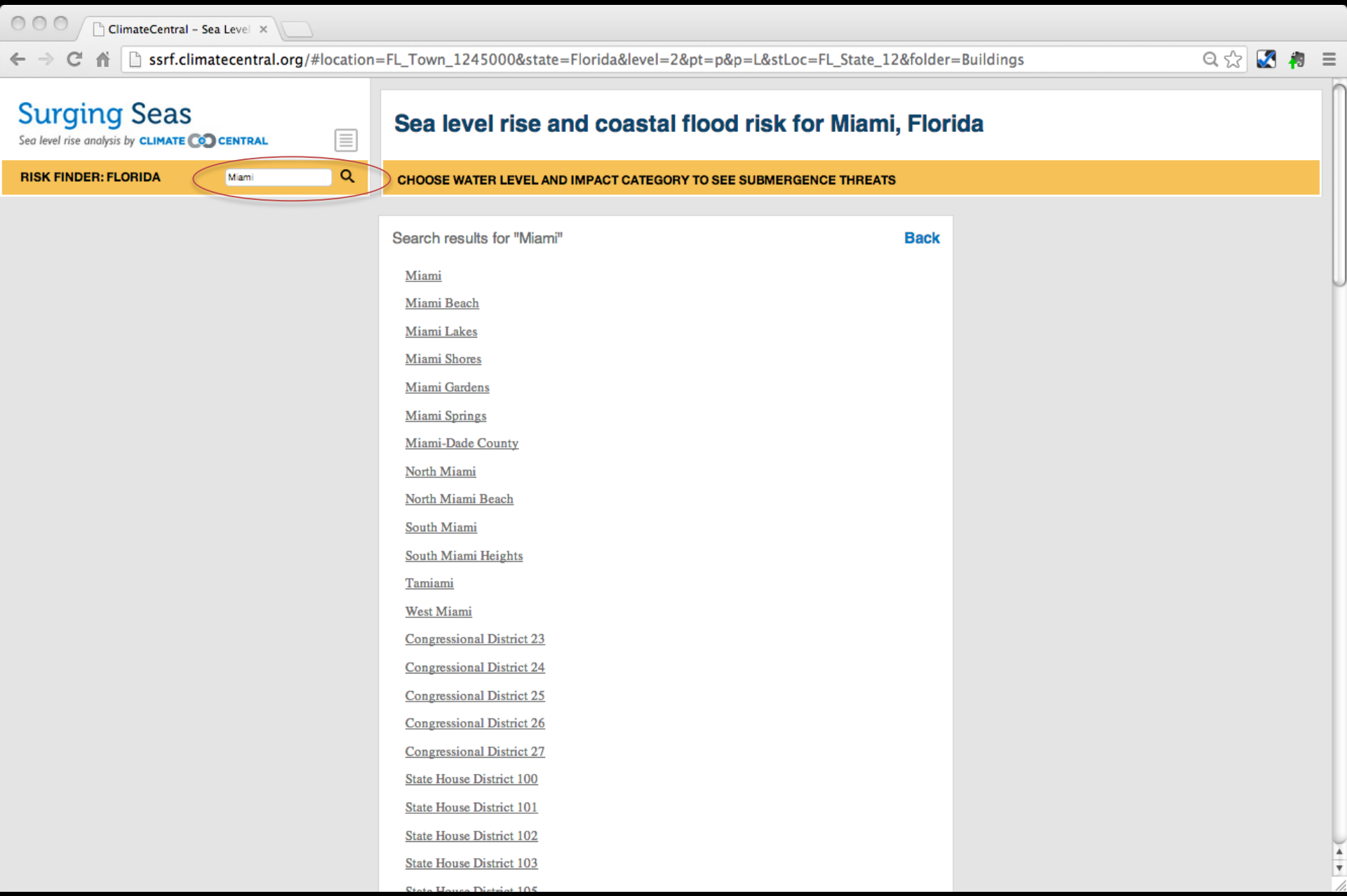
Hazardous waste sites: 9

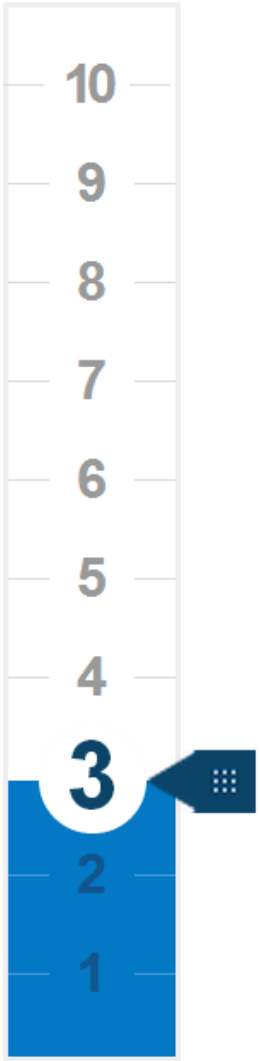
Minor hazwaste source sites: 5

Unspecified hazardous waste sites: 4

ACRES sites: 6

RADINFO sites: 9


ClimateCentral – Sea Level
ssrf.climatecentral.org/#location=FL_Town_1245000&state=Florida&level=2&pt=p&p=L&stLoc=FL_State_12&folder=Buildings
Surging Seas
Sea level rise analysis by CLIMATE CENTRAL
Sea level rise and coastal flood risk for Miami, Florida
RISK FINDER: FLORIDA
Miami
CHOOSE WATER LEVEL AND IMPACT CATEGORY TO SEE SUBMERGENCE THREATS
Search results for "Miami"
Back
Miami
Miami Beach
Miami Lakes
Miami Shores
Miami Gardens
Miami Springs
Miami-Dade County
North Miami
North Miami Beach
South Miami
South Miami Heights
Tamiami
West Miami
Congressional District 23
Congressional District 24
Congressional District 25
Congressional District 26
Congressional District 27
State House District 100
State House District 101
State House District 102
State House District 103



sealevel.climatecentral.org

TechSurge 2014

Technical Support for Coastal Resiliency
ODU Ted Constant Center
June 4, 2014

Dan Rizza
Manager and Research Associate
Program on Sea Level Rise
Climate Central
609-945-7821

drizza@climatecentral.org

CLIMATE CENTRAL