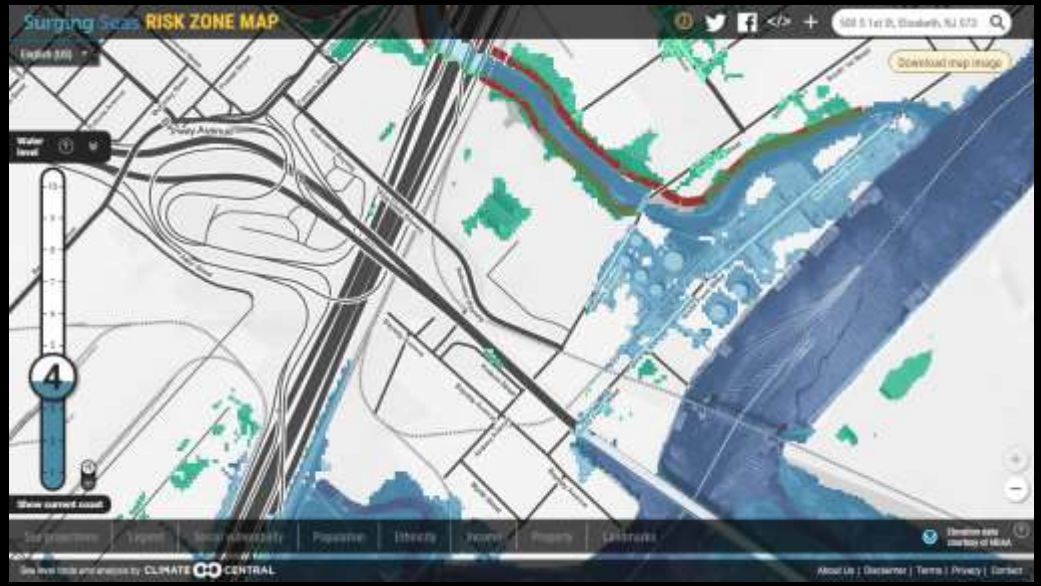
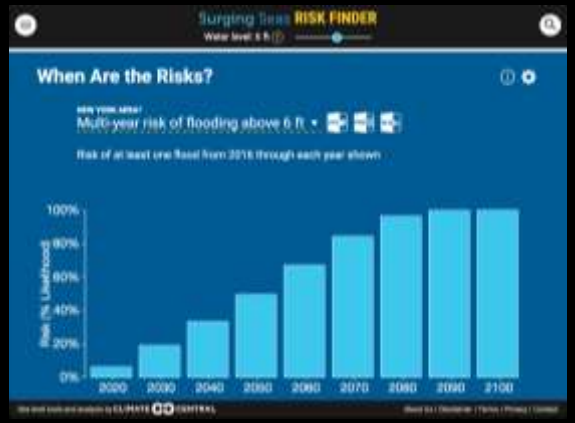
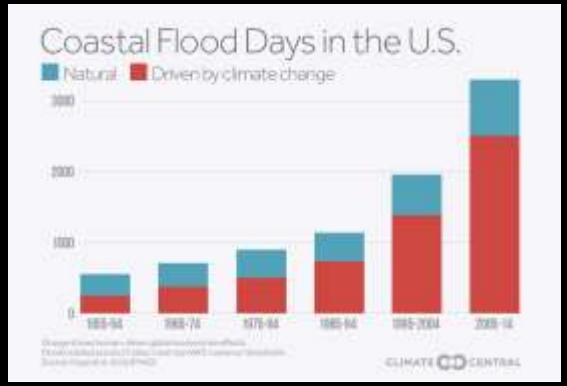
Climate Central's Coastal Flood Risk and Sea Level Rise Tools & Visuals:

Exploring Potential Hurricane Risk Communications & Emergency Response Applications



FEMA's Resilient Nation Partnership Network Third Annual Forum, November 2017
Dan Rizza – Program on Sea Level Rise, Climate Central
drizza@climatecentral.org
SurgingSeas.org





Sea Level Rise & Coastal Flood Risk Tools, Visuals: SurgingSeas.org

Surging Seas

Climate Central

LAUNCH

Overview

This web-based tool allows users to see areas potentially affected by sea level rise and storm surge, down to the neighborhood scale, and with risk timelines. The tool also provides population statistics, summaries of homes and land affected by sea level rise and storm surge, fact sheets, data downloads, action plans, embeddable widgets, and more.

Features

- Visualize threats from sea level rise and storm surge for over 3,000 coastal towns, cities, counties, and states in the contiguous U.S.
- Analyze potentially affected populations and infrastructure
- Get data downloads and embeddable widgets

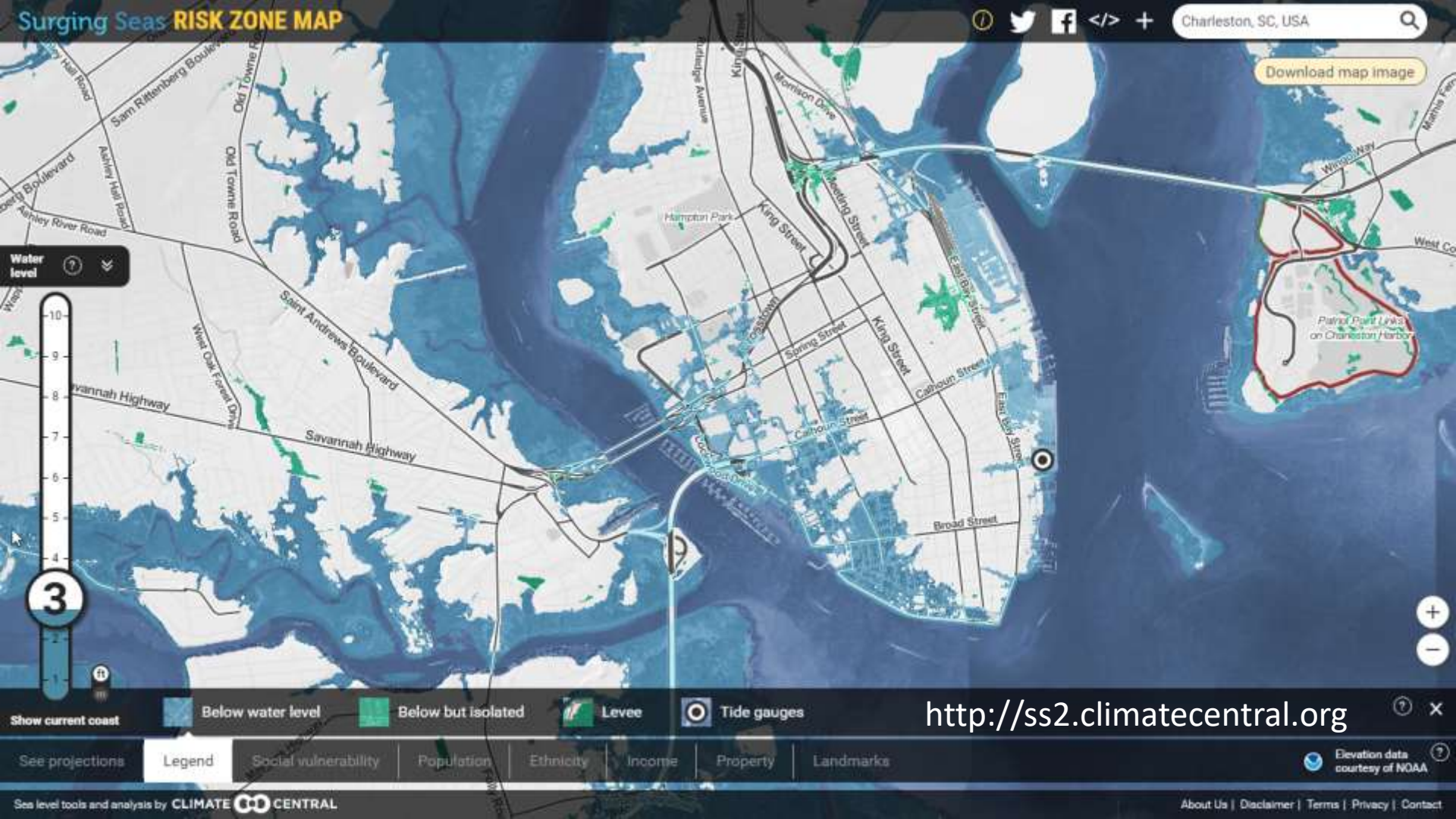
Additional Information

+ Support

Related Resources

Tools	2
Classroom, Instructor-Led	1
Contributing Partners	1

- Climate Central


Surging Seas RISK ZONE MAP
Charleston, SC, USA
Download map image
Water level
3
Show current coast
Below water level
Below but isolated
Levee
Tide gauges
http://ss2.climatecentral.org
See projections
Legend
Social vulnerability
Population
Ethnicity
Income
Property
Landmarks
Elevation data courtesy of NOAA
Sea level tools and analysis by CLIMATE CENTRAL
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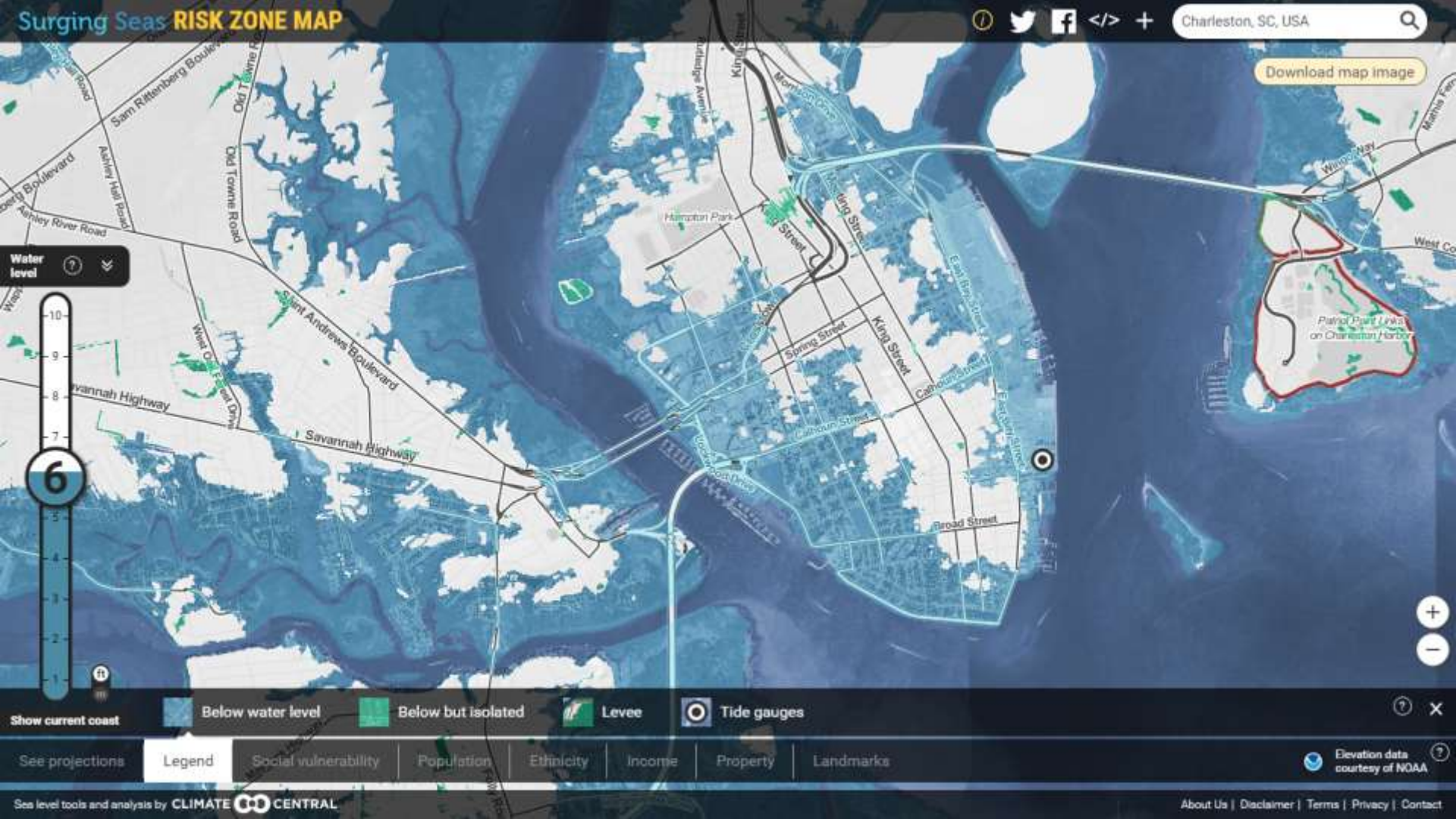
Surging Seas RISK ZONE MAP
Charleston, SC, USA
Download map image
Water level
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Show current coast
Below water level
Below but isolated
Levee
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See projections
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Social vulnerability
Population
Ethnicity
Income
Property
Landmarks
Elevation data courtesy of NOAA
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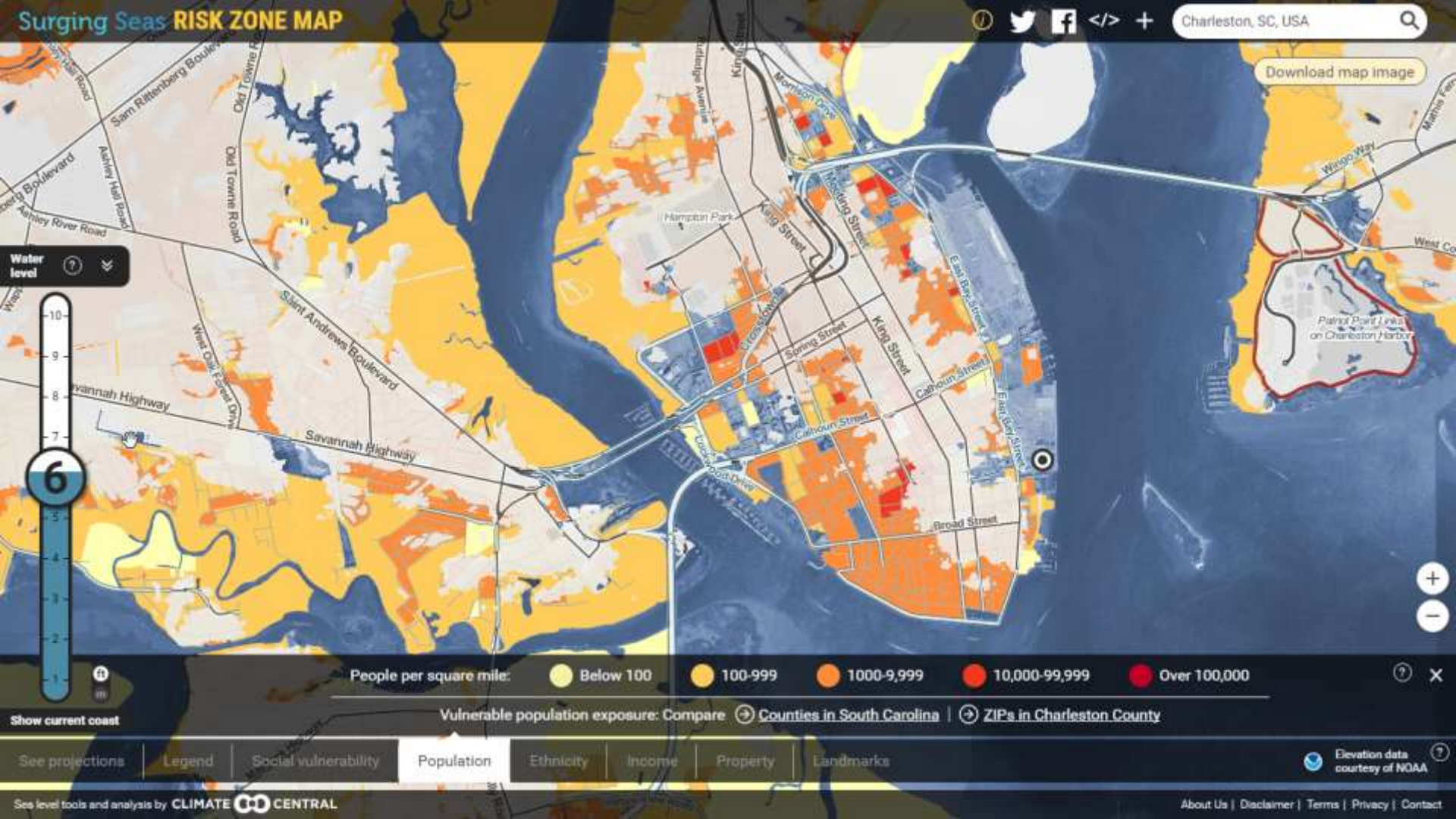
Ashley River Road
Sam Rittenberg Boulevard
Old Towne Road
Ashley Hall Road
Saint Andrews Boulevard
Savannah Highway
King Street
Spring Street
Calhoun Street
Broad Street
Hampton Park
Patriot Point Links
on Charleston Harbor


Surging Seas RISK ZONE MAP
Charleston, SC, USA
Download map image
Water level
10
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1
ft
m
Show current coast
Hampton Park
King Street
Meeting Street
East Bay Street
Spring Street
Calhoun Street
Broad Street
Crosstown
Morrison Drive
Wingo Way
Patriot Point Links
on Charleston Harbor
Ashley River Road
Sam Rittenberg Boulevard
Old Towne Road
Ashley Hall Road
Saint Andrews Boulevard
West Oak Forest Drive
Savannah Highway
People per square mile:
Below 100
100-999
1000-9,999
10,000-99,999
Over 100,000
Vulnerable population exposure: Compare
Counties in South Carolina
ZIPs in Charleston County
See projections
Legend
Social vulnerability
Population
Ethnicity
Income
Property
Landmarks
Elevation data courtesy of NOAA
See level tools and analysis by CLIMATE CENTRAL
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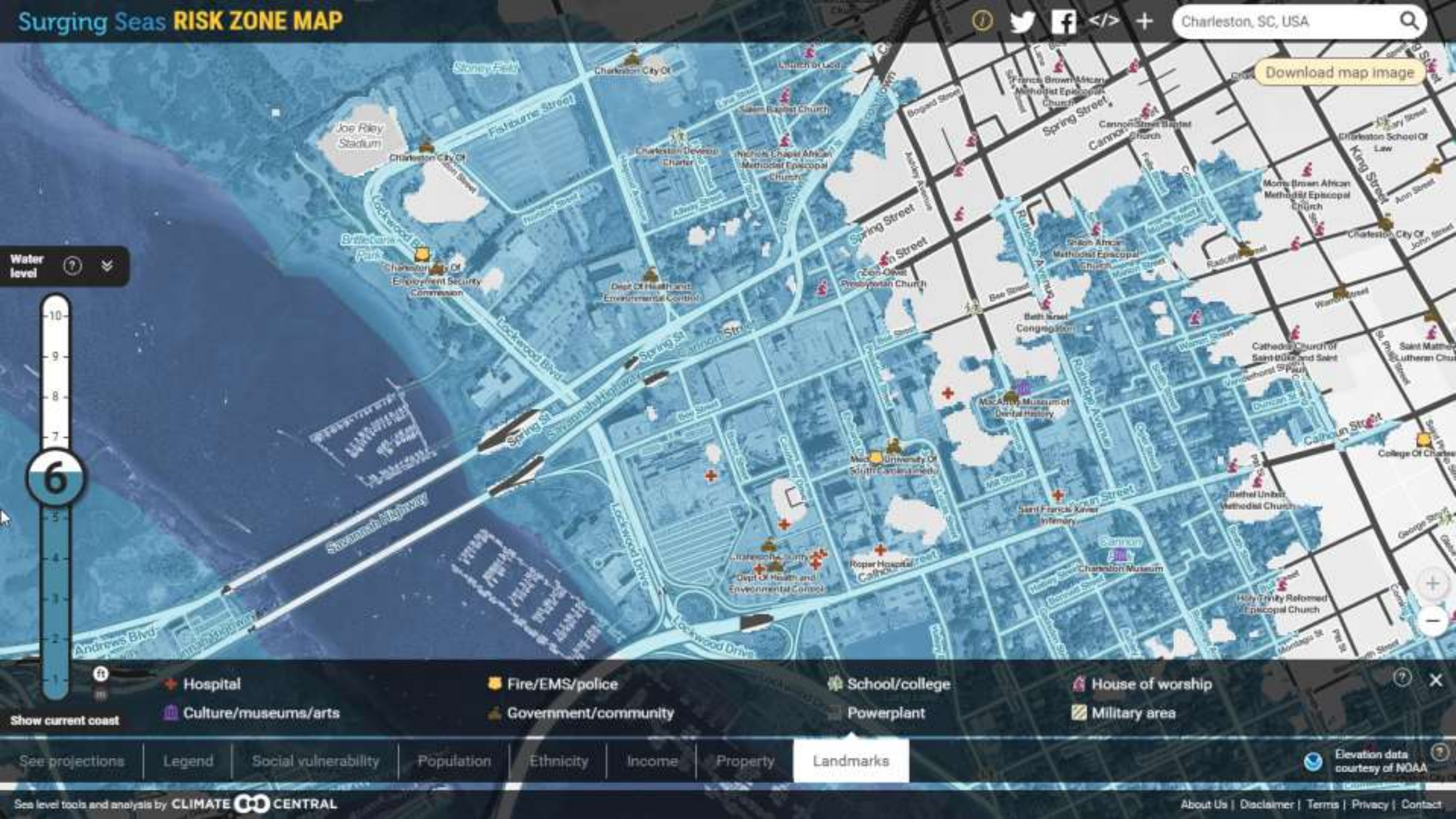
Surging Seas RISK ZONE MAP
Charleston, SC, USA
Download map image
Water level
6
Show current coast
Hospital
Fire/EMS/police
School/college
House of worship
Culture/museums/arts
Government/community
Powerplant
Military area
See projections
Legend
Social vulnerability
Population
Ethnicity
Income
Property
Landmarks
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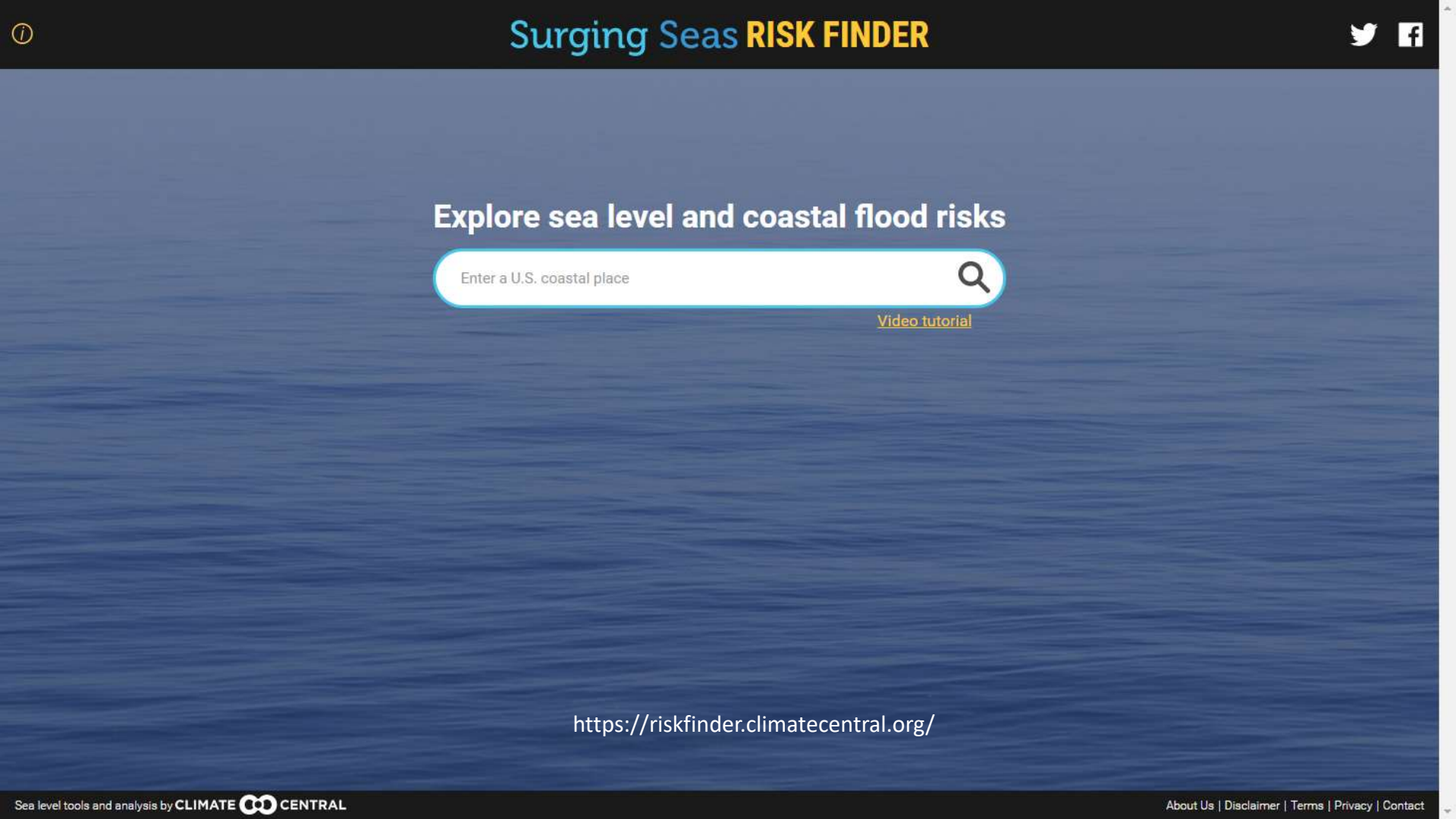
Joe Riley Stadium
Fishburne Street
Lockwood Blvd
Savannah Highway
Spring Street
Cannon Street
Calhoun Street
King Street
Rutledge Avenue
Lockwood Drive
Andrews Blvd
Roper Hospital
Charleston Museum
Medical University Of South Carolina
Saint Francis Xavier Infirmary
Beth Israel Congregation
Zion-Olivet Presbyterian Church
Morris Brown African Methodist Episcopal Church
Bethel United Methodist Church
Holy Trinity Reformed Episcopal Church
MacAulay Museum of Dental History
Charleston School Of Law
College Of Charleston


Surging Seas RISK FINDER
Explore sea level and coastal flood risks
Enter a U.S. coastal place
Video tutorial
https://riskfinder.climatecentral.org/
Sea level tools and analysis by CLIMATE CENTRAL
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New York, NY, USA

Water level (ft)

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

Summary

Scroll or change settings for more info | Video intro

- Warming oceans and melting glaciers and ice sheets are raising global sea levels.
- About 220,000 people in New York live on exposed land below 6 feet (the selected level). More threats↓
- The selected sea level scenario points to a 50% risk of at least one flood over 6 feet taking place between today and 2050 in the New York area. More scenarios↓
- Learn about related places↓ and how to reduce risks↓

DOWNLOADS

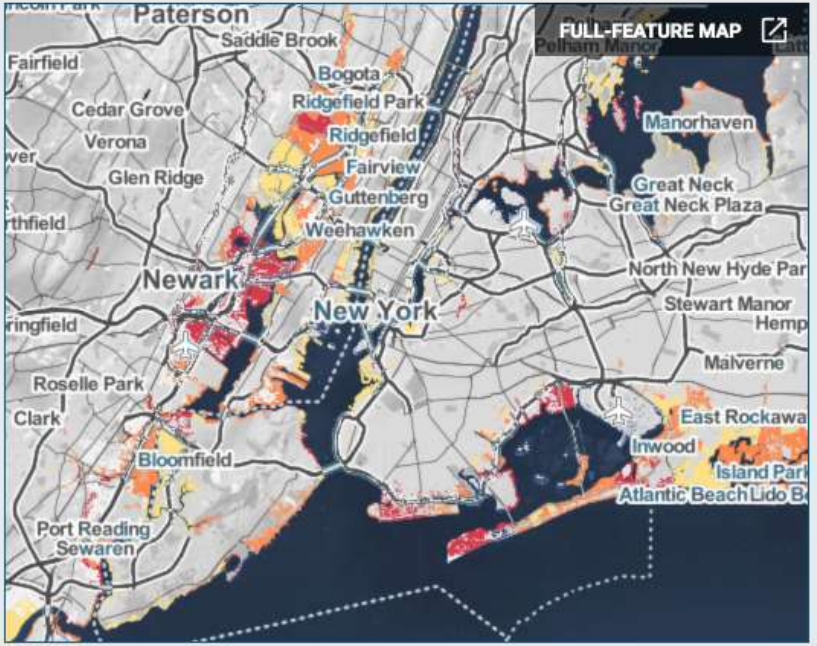
Local fact sheet

Local report

State report

These PDF downloads summarize key information from this tool, for New York ("local" items) or for New York. Find customizable slide, map and data downloads below.

Have more specific needs? Learn about our custom work



New York area land below 6 feet is colored yellow through red to denote populations with low through high social vulnerability. Social vulnerability (e.g. from low income) can compound coastal risk. Maroon lines are levees. See full-feature map for legends and details. Switch to property value map layer

https://riskfinder.climatecentral.org/

When Are the Risks?

Water level (ft)

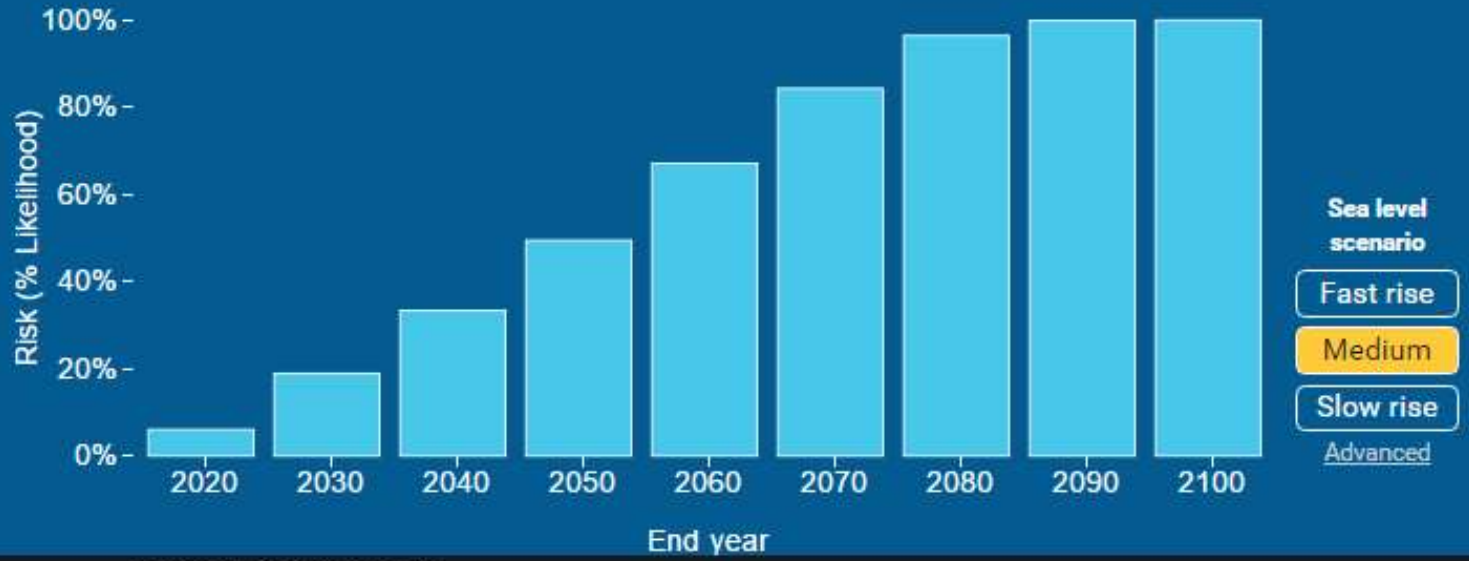
10 9 8 7 **6** 5 4 3 2 1

NEW YORK AREA*

Multi-year risk of flooding above 6 ft ▾

PPT PNG XLS

Risk of at least one flood from 2016 through each year shown



Sea level scenario

Fast rise

Medium

Slow rise

Advanced

Enter a coastal place

When Are the Risks?

Water level (ft)

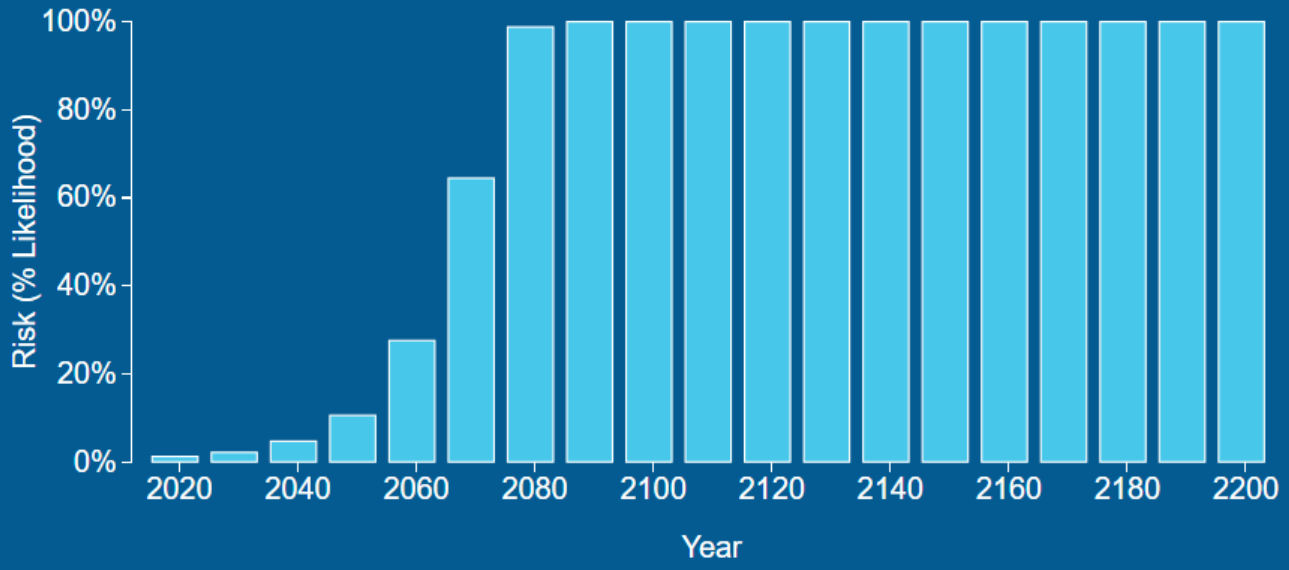
10 9 8 7 6 **5** 4 3 2 1

ATLANTIC CITY AREA*

Single-year risk of flooding above 5 ft

PPT PNG XLS

Risk of at least one flood within each year shown



Sea level scenario

- Extreme
- Fast rise
- Medium
- Slow rise

Advanced

At Atlantic City water level station, 2 miles from Atlantic City

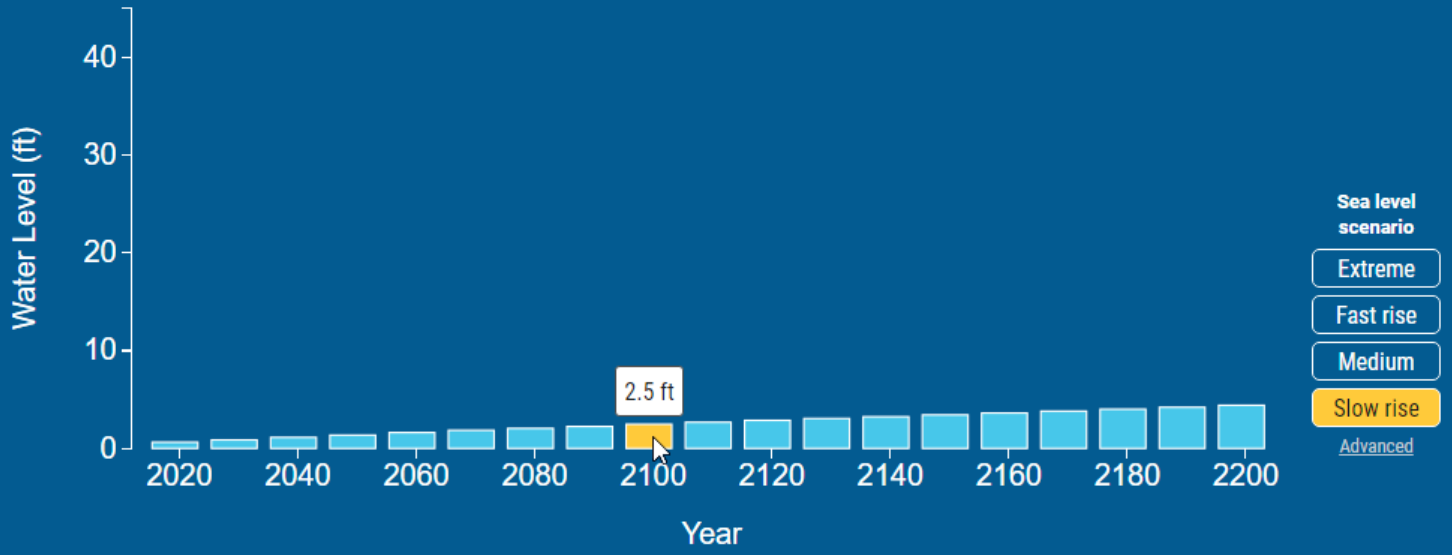
Analysis uses median local sea level projections based on the intermediate scenario from NOAA Technical Report NOS CO-OPS 083 (2017), intended for the 2018 U.S. National Climate Assessment. Key notes

When Are the Risks?

08401 AREA*

Projected sea level rise ▼ PPT PNG XLS

A localized projection



At Atlantic City water level station, 2 miles from 08401

Analysis uses median local sea level projections based on the intermediate low scenario from NOAA Technical Report NOS CO-OPS

Water level (ft)

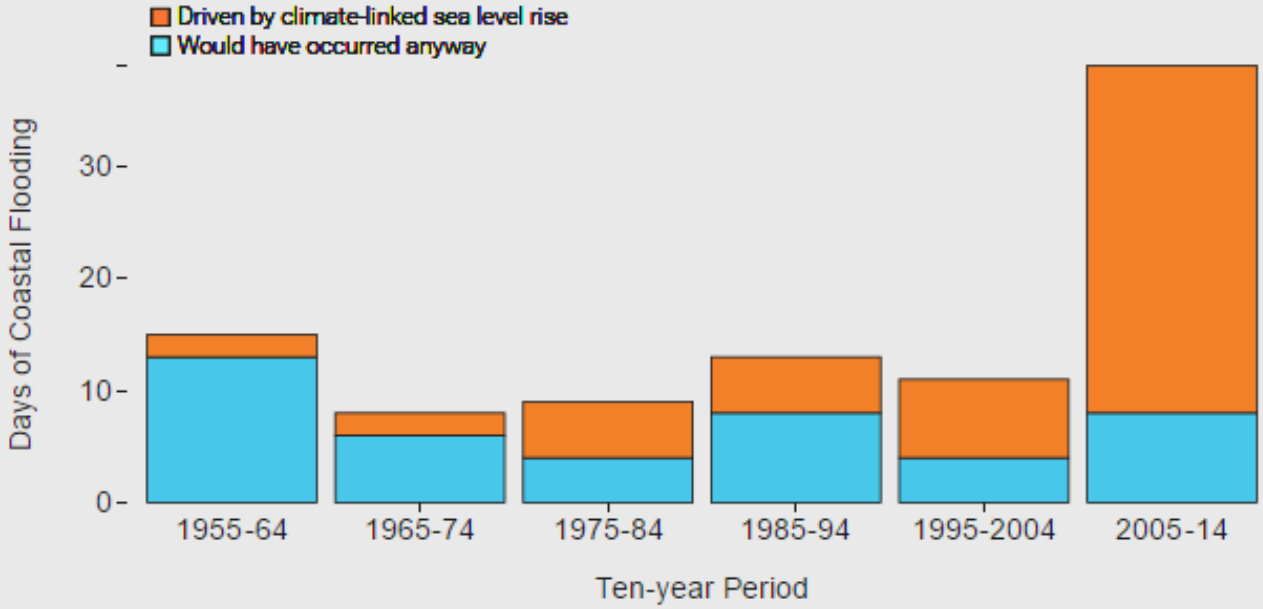
10
9
8
7
6
5
4
3
2
1

Coastal Floods Are Increasing

NEW YORK AREA*

Coastal flood days

PPT PNG



Water level (ft)

10
9
8
7
6
5
4
3
2
1

What Is at Risk?

Population | Buildings | Infrastructure | Contamination Risks | Land

Total population below 6ft in New York

Population: All	Total
Population	219,679
Caucasian population	121,375
Population of color	102,387
High social vulnerability population	90,913
Medium social vulnerability population	77,983
African-American population	65,382
Low social vulnerability population	50,543

Choose a threat to map using the scrollable list above

Total population below 6ft in New York by city neighborhood

PPT PNG XLS

Water level (ft)

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

Population

29,000
21,000
15,000
11,000
5,000
0

Legend values are bin upper limits

How Can I Prepare for Flooding?

SMALLER STEPS 1 2 3 LARGER STEPS

Choose a **LEVEL 2** step to learn about below, or change your desired Level by choosing 1 or 3 above.

Raise Wiring | Anchor | Sewer | Barriers | Boat | Alt Power | Landline | Safe Box

Raise Wiring

Raise electrical wiring above the highest expected flood line to reduce damage to your home. Raising electrical system components in a 1,000 square foot single-floor structure will cost about $1,500 to $2,000.

Text source: FEMA | Photo source: Ben Brennan, FEMA

<< Back to Flood Preparation Homepage

EXPLORE YOUR RISK

Alabama	California
Connecticut	Delaware
Florida	Georgia
Louisiana	Maine
Maryland	Massachusetts
Mississippi	New Hampshire
New Jersey	New York
North Carolina	Oregon
Rhode Island	South Carolina
Texas	Virginia
Washington	Washington, D.C.

Download uses by keyword (gov. downloaders)

CLIMATE CENTRAL

Download uses by keyword (NGO downloaders)

CLIMATE CENTRAL

COASTAL RISKS FOR CHARLESTON, SC

Selected water level: 4 feet. May occur from sea level rise, coastal flooding, or both.

What's at risk on land below 4 feet?[1,2]

- Population: 18,000
- High social vulnerability population: 940
- Homes: 9,600
- Property value: $4.5 Billion
- Hazardous waste sites: 16

4 feet in historical context [3,4]

- Highest observed area flood: 6.8 feet in 1989
- Statistical 1-in-100 year flood height: 3.9 feet
- Most recent flood over 4 feet observed in: not in record

Unnatural Coastal Floods[5]

About two-thirds of U.S. coastal flood days since 1950 would not have met the National Weather Service's local definition of flooding without the few inches so far of human-caused, climate-driven sea level rise.

Rising seas = more floods[6]

- Charleston, SC has already experienced about 11 inches of sea level rise over the last 92 years of records. Climate change is projected to drive much more rise this century.
- This raises the starting point for storm surges and high tides, making coastal floods more severe and more frequent.

When could a 4-foot flood happen?[7,8,9]

- Likelihood by 2030: 10% – 27%
- Likelihood by 2050: 49% – 94%
- Likelihood by 2100: 100% – 100%

The ranges shown derive from the intermediate low vs. highest global sea level scenarios of the 2014 U.S. National Climate Assessment, which point to projected local rises of 2 vs. 6.5 feet by 2100. The lower scenario corresponds to low future levels of heat-trapping pollution, whereas the higher one aims to reflect uncut pollution and maximum ice sheet loss rates.

Find more places, water levels and downloads at riskfinder.org

Land and population below 4 feet in Charleston, SC

Social vulnerability (e.g. from low income) compounds coastal risk. Land below 4 feet is colored according to the legend. Surging Seas uses high-accuracy lidar elevation data supplied by NOAA. Map reflects a uniform sea level and/or flood height. Individual storm surge, tidal or rainfall events cause more complex and uneven water surfaces.

Email sealevel@climatecentral.org to ask about tailored analysis

1 Floods and sea level rise are relative to local high tide lines circa 1992 (mean higher high water across 1983–2001).
2 Values exclude sub-4-ft areas potentially protected by levees, natural ridges, and other features.
3 Climate Central estimates risk by combining local sea level rise projections with floodheight risk statistics based on historic data.
4 Flood risk projections and history are based on records from the NOAA water level station at Charleston – Cooper River Entrance, 4 miles from Charleston, from 1921 to 2013.
5 Sweet, W. V., R. E. Kopp, C. P. Weaver, J. Obeysekera, R. M. Horton, E. R. Thieler, and C. Zervas, 2017: Global and regional sea level rise scenarios for the United States, NOAA Tech. Rep. NOS CO-OPS 083, 75 pp.
6 Sea level projections are localized, and local flood risks projected, based on methods from Tebaldi et al. 2012 (Environmental Research Letters).

Surging Seas
Sea Level Rise Tools & Analysis by
CLIMATE CENTRAL

For more methods, limitations, full citations, see source: riskfinder.org

Citation: Coastal Risks for Charleston, SC. Climate Central. 2/1/2017

SEA LEVEL RISE AND COASTAL FLOODING FAQS

What causes sea level to rise?

- **A warming ocean:** Thermometer and satellite measurements show that the ocean has been warming for more than a century. Water expands as it warms, and the only way the ocean can go is up and out.
- **Shrinking ice:** Warmer air and water temperatures are causing global glaciers and ice sheets on Greenland and Antarctica to melt or to break off into the ocean. Adding water or ice from land to the ocean raises sea level, and is by far the biggest future threat.
- **Sinking land:** In some places, coastal land is sinking, due to a variety of slow, long-term processes not linked to current climate change, or due to pump extraction of water or fossil fuels from underground formations.

What causes climate change?

- The main activity causing climate change is the burning of fossil fuels, which emits heat-trapping pollution.
- Leading scientific bodies agree: *Observations throughout the world make it clear that climate change is occurring, and rigorous scientific research concludes that the greenhouse gases emitted by human activities are the primary driver.*[1]

Can sea level rise be slowed?

- Major cuts in heat-trapping pollution through measures such as a swift global transition to a clean energy economy, climate-friendly agriculture, and protecting forests would reduce future sea level rise.

Does sea level rise affect flooding?

- Sea level rise raises the starting point for waves, tides, and storm surge, making coastal floods more severe and more frequent.
- A February 2016 Climate Central analysis found that about two-thirds of U.S. coastal flood days since 1950 would not have met the National Weather Service's local definition of flooding without the few inches so far of human-caused, climate-driven global sea level rise.

What does the future hold?

- Some future sea level rise is inevitable due to pollution already in the atmosphere, forcing some adaptation.
- Rapid cuts in emissions of heat-trapping pollution would increase the chances of limiting global sea level rise to near 2 feet this century, but continuing unchecked pollution could lead to a rise of more than 6 feet.[2]
- A 2-foot rise would mean widespread, dramatic increases in flooding, and submergence of the very lowest coastal places. A 6-foot rise would pose severe and in cases existential threats to major coastal cities worldwide.
- Many places will be able to reduce sea level rise impacts by establishing defenses, accommodating floods, or relocating some development, at uncertain cost.
- Pollution this century will lock in sea level rise for hundreds of years to come – likely far more than 6 feet on the current path. The final amount will depend on how rapidly the world community can reduce and then stop heat-trapping pollution.

REDUCING YOUR RISK

Preparing yourself and your community

- Actions to curb heat-trapping pollution will reduce sea level rise, but some rise is unavoidable.
- Learn more about the actions you can take yourself at: sealevel.climatecentral.org/flood-preparation
- Make sure leaders in your community know your area's risks by sharing this fact sheet and riskfinder.org
- Surging Seas can help your community participate in FEMA's Community Rating System. Contact us to learn more.
- Climate Central offers tailored mapping, projections and analysis to meet the specific needs of cities, counties, states and businesses, using scenarios and data you can choose: contact sealevel@climatecentral.org to learn more.

Resources available for South Carolina

- South Carolina Sea Grant Consortium: http://www.scseagrant.org/
- South Carolina Department of Health and Environmental Control: Coastal Hazards: http://www.scdhec.gov/HomeAndEnvironment/Water/CoastalManagement/CoastalZoneManagement/CoastalHazards/
- South Carolina Department of Natural Resources: Flood Mitigation Program: http://www.dnr.sc.gov/water/flood/
- For a longer list see: sealevel.climatecentral.org/responses/plans

In the News

Our sea level research has been covered in USA Today, Time, the major networks, CNN, PBS, NPR, AP, Bloomberg, the Washington Post, the New York Times, and hundreds more outlets.

Climate Central

Climate Central is an independent nonprofit, nonadvocacy organization that researches climate impacts. Our web tools are based on peer-reviewed science and are included as resources on national portals such as NOAA's Digital Coast and the U.S. Climate Resilience Toolkit.

Get more analysis at riskfinder.org

1 Statement on climate change from 21 scientific associations (2018). http://www.aaas.org/sites/default/files/2018/01/6.pdf (Accessed July 7, 2016) Learn more at http://climate.nasa.gov/scientific-consensus/

2 Based on local sea level projections from Kopp et al. 2014 (Earth's Future) and more recent Antarctic research in DeConto and Pollard 2016 (Nature). The full citations and methods used: riskfinder.org

Surging Seas
Sea Level Rise Tools & Analysis by
CLIMATE CENTRAL

CLIMATE CENTRAL

Sea level rise and coastal flood risk: Summary for Charleston County, SC

This document is meant as a one-stop summary and brief guide that integrates key findings, methods, interpretation and links from Climate Central's Surging Seas Risk Finder into one narrative. It stands alone or as a jumping-off point.

Sea level rise and flood forecast

Even small amounts of sea level rise make rare floods more common by adding to tides and storm surge. Climate Central has estimated risk by combining local sea level rise projections with historic flood statistics from the NOAA water level station at Charleston, SC, 3 miles from the center of Charleston County. For reference, our extreme values analysis indicates that the "100-year" flood height, is 3.9 feet above local Mean Higher High Water (high tide line)[1]. The highest observed flood at this location, in records from 1921 to 2015, reached 6.76 feet MHHW in 1989. Taken all together, these values suggest that floods above 5 feet likely pose significant concerns.

Based on the National Climate Assessment intermediate high sea level rise scenario, we project 4.1 feet of rise locally by 2100, from a 1992 baseline. Our analysis translates this to 7 percent multi-year risk of at least one flood exceeding 5 feet from 2016 to 2030, a 22 percent risk by from 2016 to midcentury, and a 100 percent risk by 2100. Under the Assessment's highest scenario, these chances increase to 8, 35, and 100 percent, respectively, and we compute a 100 percent risk of at least one flood exceeding 8 feet by the end of the century.

Risk Finder's forecast tool allows exploration of a wide range of other flood heights (1-10ft), risk statistics (e.g., annual flood risk), and localized sea level projections (with choice of scientific models and climate pollution scenarios). See Methods section below for more discussion of the research approach used and important guidance on how to interpret results.

Map and exposure analysis

Understanding exposure to sea level rise and floods requires a good map. Climate Central combined tidal elevation models and lidar-based (laser-based) elevation data supplied by NOAA, plus levee location data from FEMA, to identify both fully exposed and potentially protected land less than 1-10 feet above the local high tide line.

Climate Central's interactive, embeddable online Risk Zone Map shows exposed areas and how they intersect with population density, social vulnerability, property value, and more.

Risk Finder also shows exposure at each water level for dozens of variables, based on data from over ten federal agencies. Here are a few values for Charleston County on land below 5 feet MHHW, in total and excluding land that may be protected by levees or isolation:

Variable	Total Exposure	Excluding isolated areas
Acres of land	121,765	114,725
Population	69,963	64,974
High social vulnerability pop.	3,745	3,174
Housing units	38,355	35,872
Property ($ billions)	19.5	18.6
Road miles	905	880
EPA-listed sites	59	55
Schools	15	13

At 8 feet, 138,704 people (39.6 percent of the total population in Charleston County) and $31,069 million are exposed in total.

Risk Finder offers comprehensive downloads of exposure tables as well as lists of facilities that may be affected, and data sources and methods descriptions for each variable. See Methods section below for more discussion of the general research approach used and important guidance on how to interpret results.

Comparison

Threats vary from place to place. With heat maps and rankings, Risk Finder's comparison module supplies wider regional context for exposure of each variable analyzed, and at any water level.

For example, Charleston County is first out of all Counties in South Carolina for total exposure of homes on land below 5 feet. Charleston County is second if ranked by its *percentage* of homes exposed, and it is first if all Counties are ranked by exposure after excluding areas that appear isolated or protected.

The comparison tool simply offers a different presentation of exposure analysis. Therefore the same methods and interpretative notes apply.

Methods and interpretation

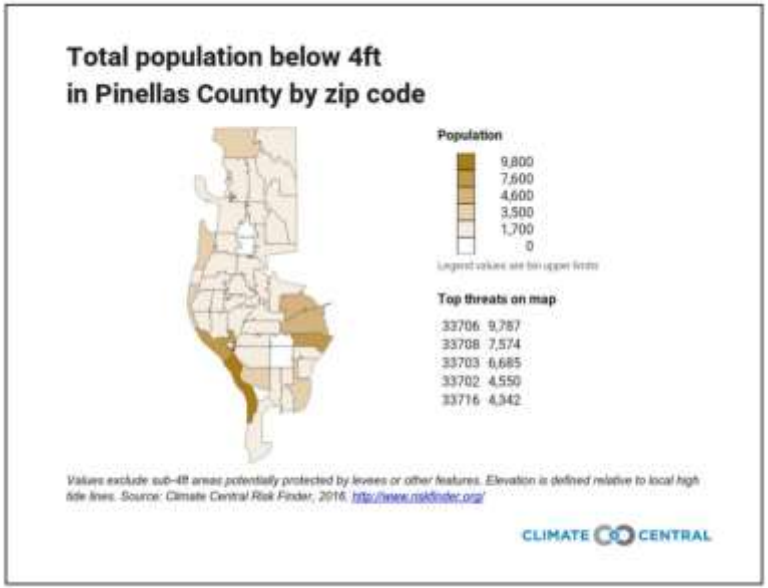
Sea level rise and flood forecast

The projections described here and in Surging Seas Risk Finder are based on analysis specific to a selected water level station site. They may or may not indicate nearby area risks, such as a specific location in Charleston County. Local sea level rise projections are generally similar across neighboring areas. Flood risks can more easily vary across short distances, due to details of local topography and bathymetry and typical storm paths. Tool settings (under "When are the Risks?") allow comparison of results across multiple regional water level stations, to check for general consistency or differences.

The basic methods for this analysis follow Tebaldi et al (2012), plus simple extensions for computing cumulative flood risk. Furthermore, the current analysis improves local accuracy by employing all verified historic hourly water level data available at each NOAA water level station through 2015, instead of limiting inputs to a standard 30-year period as in Tebaldi et al.

Download PowerPoint Slides and Images

Surging Seas Risk Finder provides free PowerPoint slides for your coastal locations that you can customize and use for presentations, reports, or communications.



To create a PowerPoint slide or image:

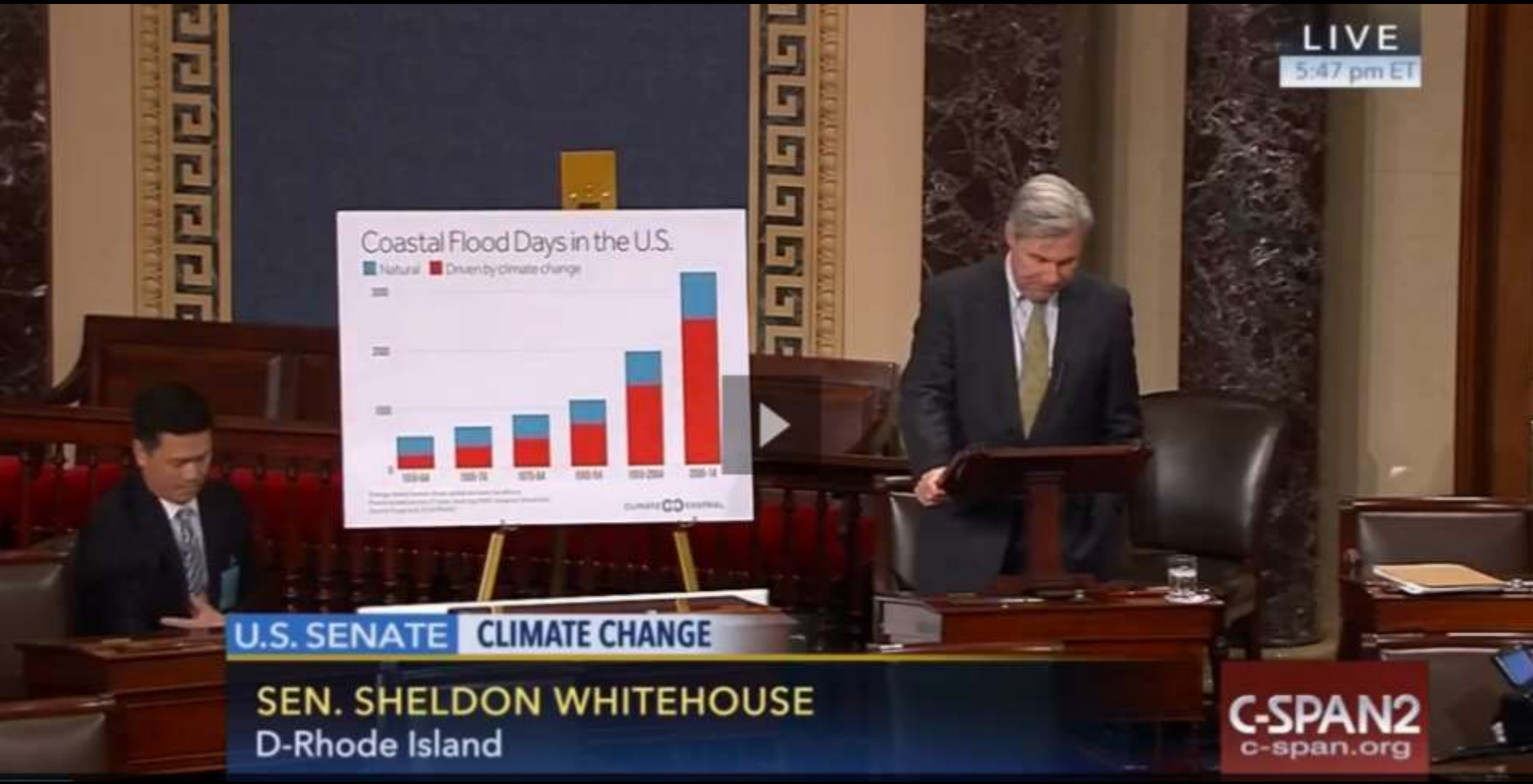
1. Visit riskfinder.org
2. Search for your location (zip code, town, city, county or state)
3. Scroll down to the “What Is at Risk?” section
4. Set the water level
5. Choose the impact variable (population, road miles, schools, etc.) and area type (zip code, county, town, etc.)
6. Click the PowerPoint or PNG icons

Write us at sealevel@climatecentral.org to request slides or images by email.


Rising
Sea
Levels


LOWCOUNTRY
MAYOR BILLY KEYSERLING
CITY OF BEAUFORT


Washington Street
Duke Street
Pistol Street
King Street
North Street
Craven Street
Carteret Street
Craven Street
Port Republic Street
Bay Street
Bay Street
4 FT.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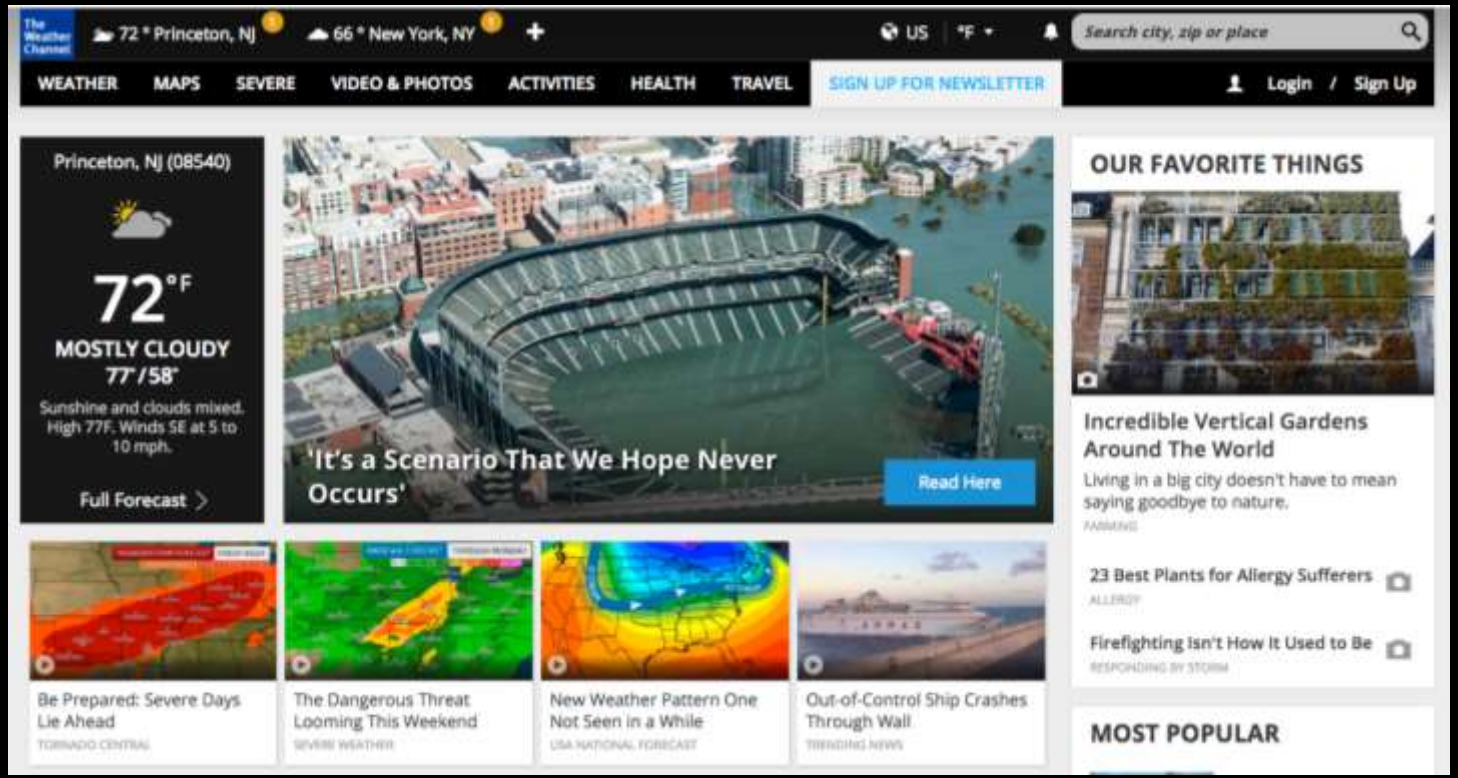
Natural
Driven by climate change
U.S. SENATE
CLIMATE CHANGE
SEN. SHELDON WHITEHOUSE
D-Rhode Island
C-SPAN2
c-span.org

Weather.com homepage

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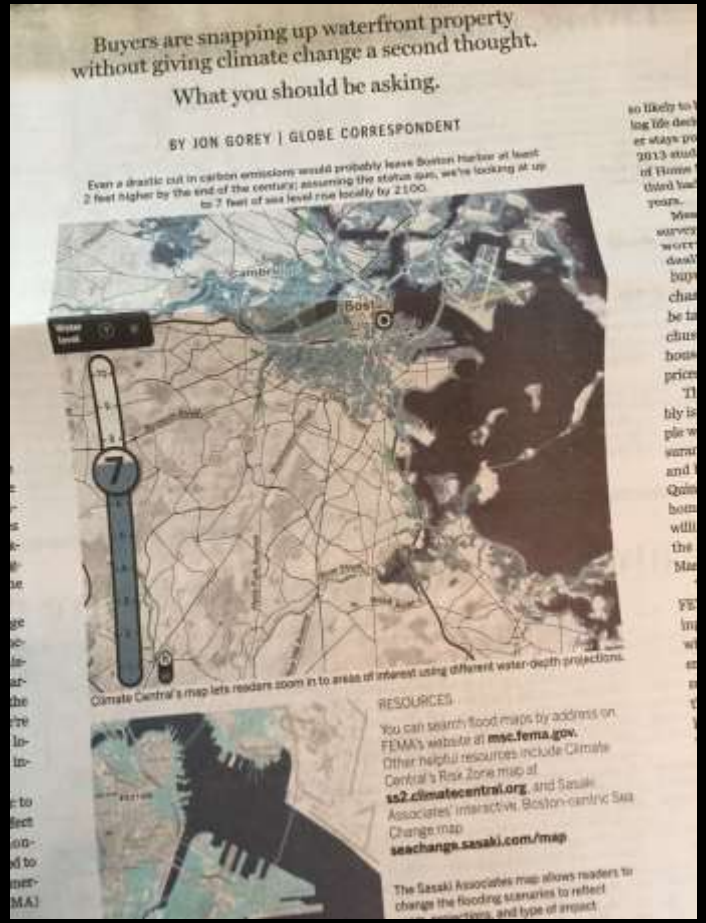
HEADS IN THE SAND?
Inside


Buyers are snapping up waterfront property without giving climate change a second thought.
What you should be asking.
BY JON GOREY | GLOBE CORRESPONDENT
Even a drastic cut in carbon emissions would probably leave Boston Harbor at least 2 feet higher by the end of the century; assuming the status quo, we're looking at up to 7 feet of sea level rise locally by 2100.
Climate Central's map lets readers zoom in to areas of interest using different water-depth projections.
RESOURCES
You can search flood maps by address on FEMA's website at msc.fema.gov.
Other helpful resources include Climate Central's Risk Zone map at ss2.climatecentral.org, and Sasaki Associates' interactive, Boston-centric Sea Change map seachange.sasaki.com/map
The Sasaki Associates map allows readers to

HEADLINES | WHAT TO EXPECT

TONIGHT

-A pleasant and mostly
Dry evening

THIS WEEKEND

-Showers increase, S
Looks especially rai

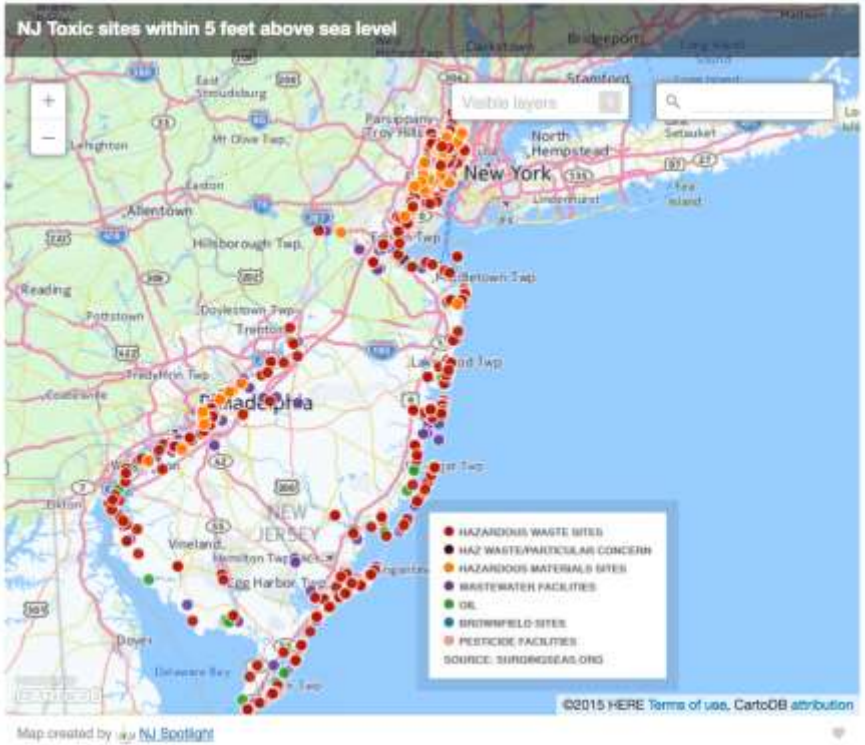
KING TIDE

-High tides 8:52am &
Tides running 14-18" I


DAYS ABOVE 100°
0-5
5-10
10-25
25-50
50+
PREDICTED BY
2100
CHICAGO
26 DAYS
NEW YORK
16 DAYS
LAS VEGAS
138 DAYS
DALLAS
98 DAYS
ATLANTA
39 DAYS
CLIMATE CENTRAL
NBC_AlRoker_Above100by2100_08-23-18_815am
For Internal Use Only

NJ SPOTLIGHT
NEWS, ISSUES AND INSIGHT FOR NEW JERSEY

DIRTY LITTLE SECRETS



of spreading contamination. Using data from Surging Seas, a project of Climate Central, we've mapped nearly 1,700 New Jersey sites listed in the EPA's Facility Registry Service that are within five feet of sea level and thus potentially vulnerable over the coming decades.

Barack Obama

Ben Home

Barack Obama

Politician

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Barack Obama

2 hrs ·

Here's another reason why taking action to fight climate change is so important. http://ofa.bo/r9UW

This is how rising seas will reshape the face of the United States

With unchecked global warming, the locations of over 20 million people's current...

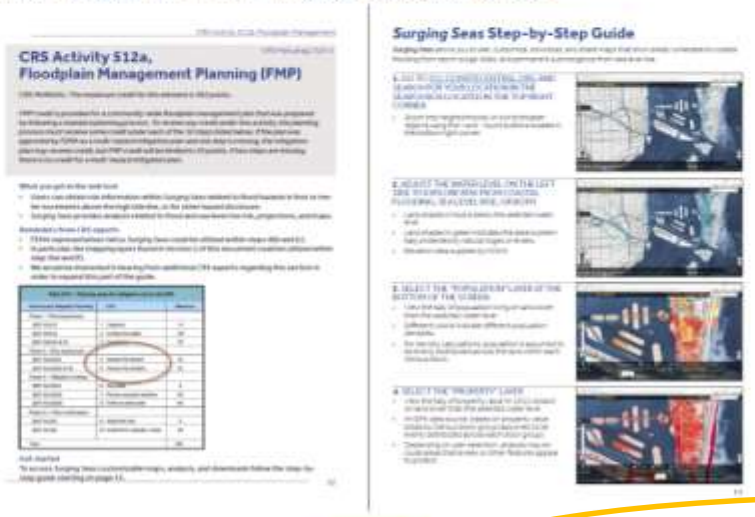
WASHINGTONPOST.COM | BY CHRIS MOONEY

Using the Surging Seas free web tool within FEMA's Community Rating System (CRS)

The *Surging Seas* CRS guide

We have identified many ways the *Surging Seas* web tool could be used to support activities that receive points within the CRS program through conversations with local CRS coordinators and implementers, and with FEMA CRS representatives. This guide provides step-by-step instructions on how to access and obtain information and downloads from the Surging Seas web tool that could be utilized within specific CRS activities in FEMA's Coordinator's Manual (FIA-15/2013).

Sample pages from the *Surging Seas* CRS Guide



Get Guide

http://sealevel.climatecentral.org/crs

USING *SURGING SEAS* WITHIN FEMA'S COMMUNITY RATING SYSTEM (CRS)

Surging Seas
Sea Level Rise Tools & Analysis by
CLIMATE CENTRAL

Updated September, 2017

Do you implement CRS for your coastal community? Learn how the Surging Seas public web tool can support many CRS activities and help you earn points.

The 2017 edition of the CRS Coordinator's Manual includes more opportunities for users to gain credit for considering the impacts of climate change and sea level rise on flood-related issues. Section 404 of the CRS Manual lists several activities that credit consideration of future sea level rise, including elements of Activities 410, 430 and 450. This guide demonstrates how Surging Seas can be used to gain points for these activities and several others.

Table of Contents

http://sealevel.climatecentral.org/crs

Free Tools, Guides, and Resources Applicable to FEMA/NFIP Community Rating System (CRS)

Climate Central's Surging Seas CRS Guide: Find out how you can use Climate Central's free *Surging Seas* web tools to support a wide range of activities that receive points within the FEMA/NFIP CRS program. Provides step-by-step instructions on how to access information and downloads from the tool. Learn more: http://sealevel.climatecentral.org/crs

ASFPM AND CSO CRS Green Guide: Features best practices and case studies derived from interviews with CRS communities earning top-scores for CRS elements that preserve or enhance the natural and beneficial functions of floodplains. Learn more: https://www.floodsciencecenter.org/products/crs-community-resilience/green-guide/

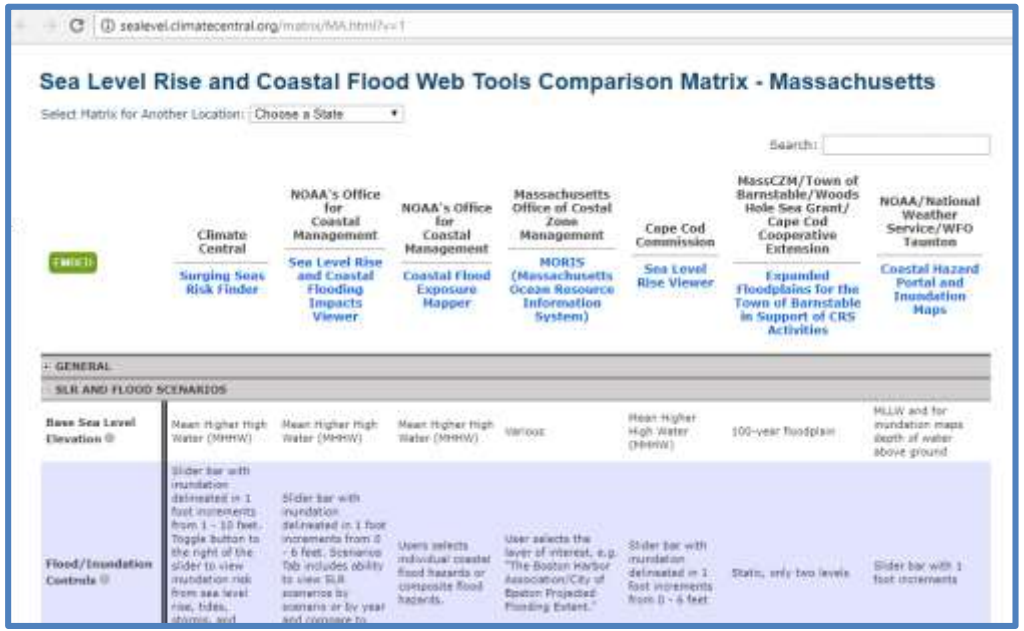
NOAA's new interactive, online *How to Map Open Space for Community Rating System Credit* and companion *GIS Workflow* detail the process for mapping and calculating credits for preserved open space in seven easy to follow steps, with links to helpful data and information sources and job aids. These products will be available this fall on NOAA's Digital Coast under "Training" (Self-Guided) webpage.

TNC: As part of TNC's Coastal Resilience approach and decision support tool, the Community Rating System Explorer app allows planners to more effectively visualize OSP opportunities, explore unprotected parcels to protect for the future, and engage decision makers to influence land management. TNC is partnering with NOAA, Esri, and Microsoft to leverage and scale the app around the U.S., while also coordinating CRS product development and outreach with Digital Coast Partners and Esri to better communicate the importance of protecting open space while guiding users to the tool or workflow that addresses their needs.

Learn more about ASFPM, CSO, NOAA, and TNC efforts: https://www.conservationgateway.org/ConservationPractices/Marine/crr/library/Documents/CRS_factsheet_4_18_17.pdf

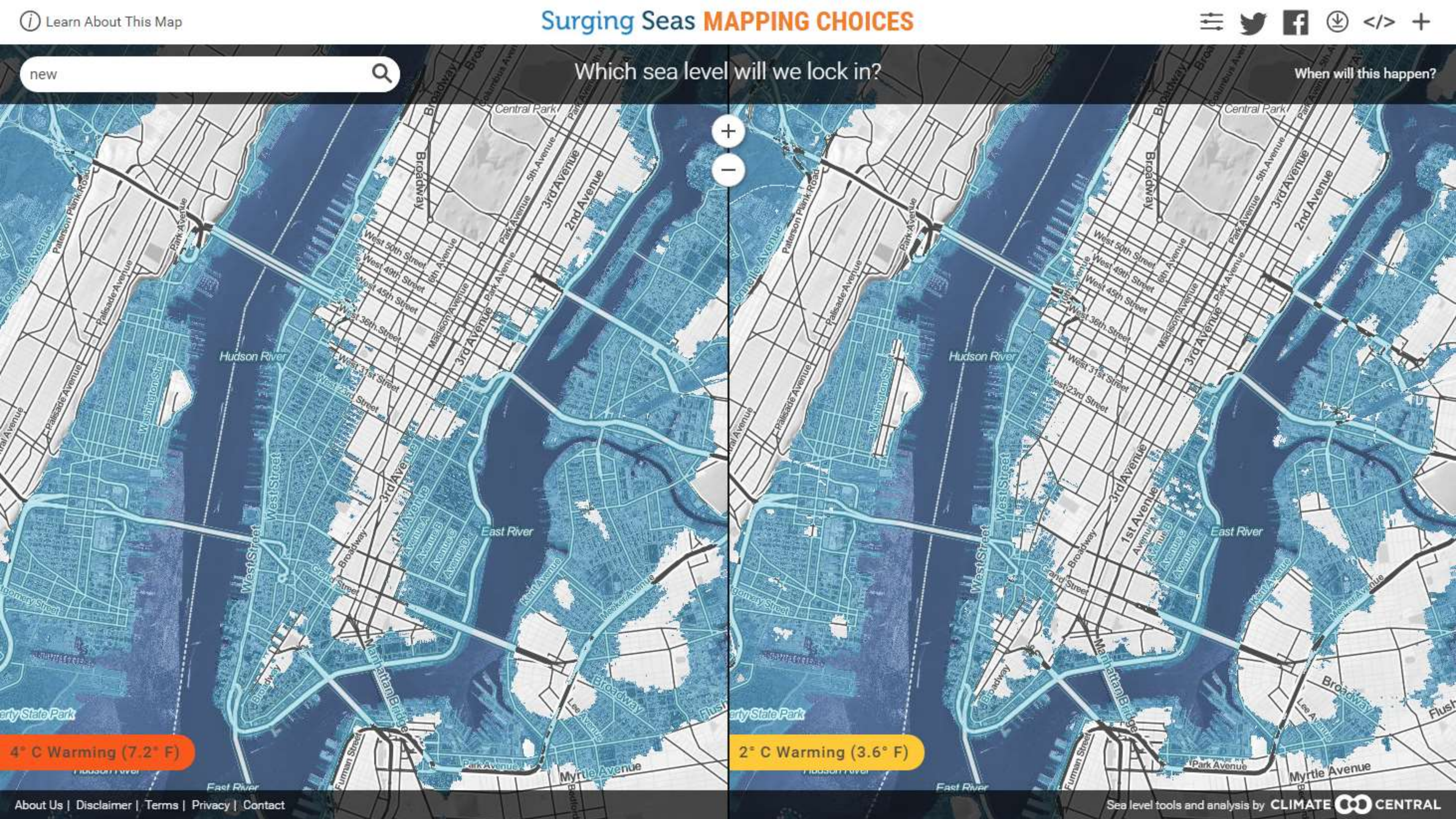
Learn more about the Community Rating System (CRS): http://crsresources.org/

Sea Level Rise and Coastal Flood Web Tools Comparison Matrix



Free web tool created to provide the planning and coastal management communities with an expandable chart to compare the functions and methods of publicly available sea level rise and coastal flood web tools.

http://sealevel.climatecentral.org/matrix/


Learn About This Map
Surging Seas MAPPING CHOICES
new
Which sea level will we lock in?
When will this happen?
Central Park
Broadway
Hudson River
East River
West 50th Street
West 49th Street
West 45th Street
West 36th Street
West 31st Street
West 23rd Street
3rd Avenue
2nd Avenue
Park Avenue
Madison Avenue
5th Avenue
West Street
Manhattan Bridge
Myrtle Avenue
Park Avenue
4° C Warming (7.2° F)
2° C Warming (3.6° F)
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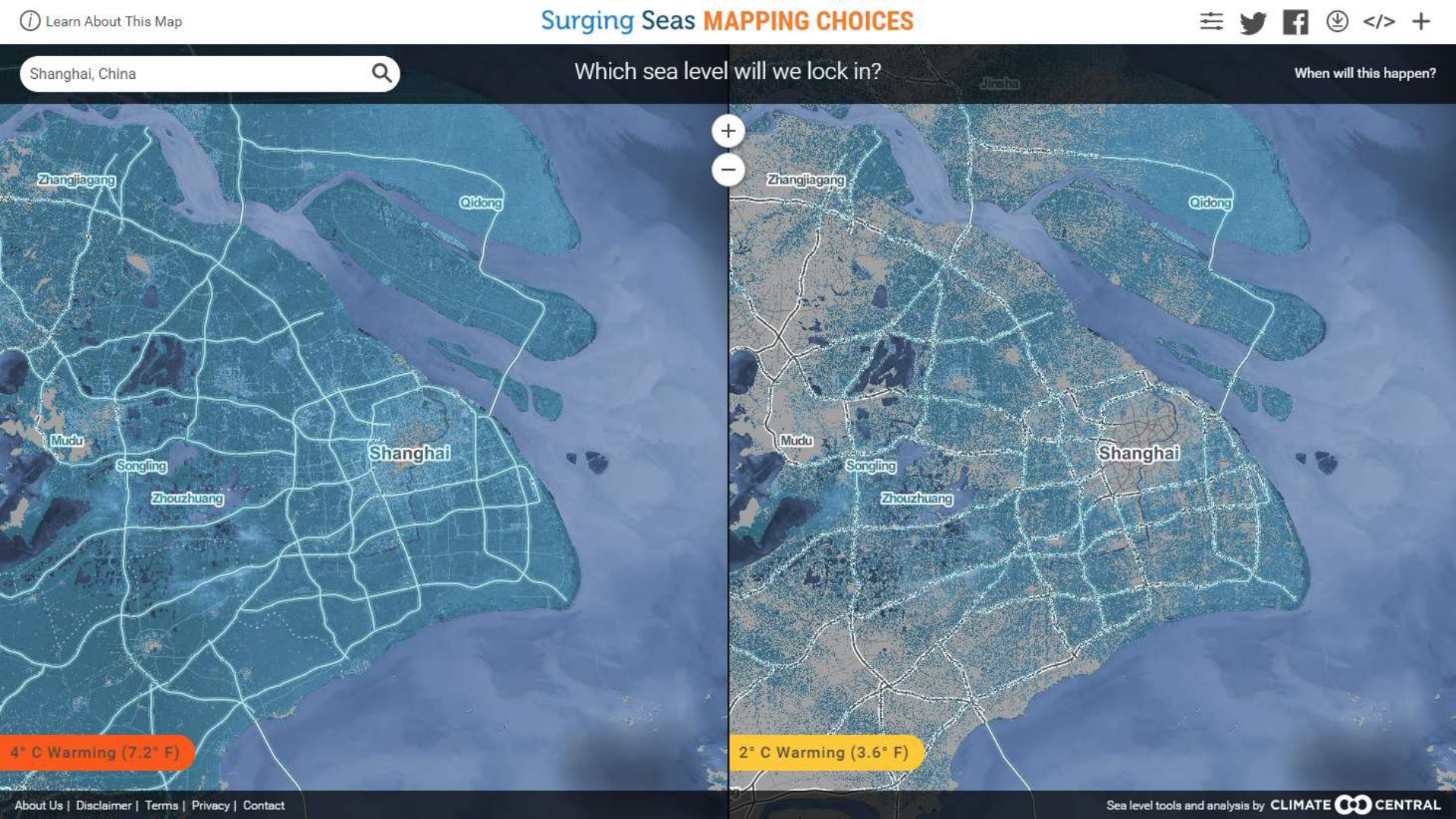
Sea level tools and analysis by CLIMATE CENTRAL


Washington, District of Columbia
Which sea level will we lock in?
When will this happen?
K Street Northwest
I Street Northwest
E Street Northwest
Potomac River
The Mall, Smithsonian Grounds
West Potomac Park
Tidal Basin
Lady Bird Johnson Park / Columbia Island
Washington Channel
Gravelly Point Park
4° C Warming (7.2° F)
1.5° C Warming (2.7° F)


Shanghai, China
Which sea level will we lock in?
When will this happen?
Zhangjiagang
Qidong
Mudu
Songling
Zhouzhuang
Shanghai
4° C Warming (7.2° F)
2° C Warming (3.6° F)

هكذا ستبدو مدن العالم إذا ارتفع معدل الحرارة العالمي درجتين فقط!

آخر تعديث الأربعاء، 11 نوفمبر/تشرين الثاني 2015، 10:18 (GMT +0400)

اخترنا لكم

التغيرات المناخية | الاحتباس الحراري | كوارث طبيعية | سياحة وسفر

هذا ستبدو شوارع مدينة شانغهاي في الصين إذا ارتفع معدل درجة الحرارة العالمية درجتين مئويتين، ما سيسبب بانقراض 5 بالمائة من أصناف المخلوقات الحية في العالم.

1 من 10

دبي، الإمارات العربية المتحدة (CNN)-- سجل شهر يوليو/تموز الماضي أعلى درجات حرارة سجلت في التاريخ. ولم

www.mumbaimirror.com/others/sunday-read/The-danger-from-the-sea/articleshow/49784271.cms

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THE DANGER FROM THE SEA

Mumbai Mirror | Nov 15, 2015, 12.00 AM IST

Comments A A More

By **Reetika Revathy Subramanian**

According to a report, the threat posed to Mumbaikars by climate change is tangible and also imminent. Without adaption, our city will remain at the mercy of continuously rising sea levels.

Pictures often speak a thousand words, but if images recently released by Princeton-based research organisation Climate Central are to be considered, they can also launch a thousand ships (literally at that). As seen above, a 2oC rise in global temperatures will make improbable the obligatory Gateway of India selfie. If temperatures were to rise by 4oC, the monument would become an impossible tourist destination. There is always a certain ambivalence that predictions of the future inspire,

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- 2016 is the chhutti year
- Film review: Hate Story 3
- Residents of high-rises rise to the cha...

FROM OTHERS >>

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- Right-trunked Ganesha? Be careful!
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影響，在氣溫上升4°C的情況下，將有1.45億人的家園將被淹浸。而全球首10個最多人受影響的城市中，有4個來自中國，分別是香港、上海、天津及台州，當中涉及4400萬人口。

（Climate Central/英國《每日電訊報》）

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Posted by 明報即時新聞 on Monday, November 9, 2015

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NATIONAL HURRICANE CENTER

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Local Surge Impacts Information

Surge Overview | National Surge Hazard Maps | Storm Surge Unit | SLOSH | P-SURGE | Surge Products | Local Impacts | FAQ | Resources

While the National Hurricane Center public advisory statements provide tropical cyclone related impacts on a regional scale, the local WFOs coordinate closely with the NHC to provide refined forecast products and warnings on a local level. Two of these products are the Hurricane Local Statement (HLS) and the associated Graphical HLS.

The HLS is a valuable product that can be used as a tool to monitor several different threats (not just surge) and potential impacts to your area. It includes:

- Counties, parishes, or cities affected
- Watches and/or warnings in effect
- Recommended precautionary actions
- Storm surge and storm tide information
- Present winds and the expected time of onset of tropical storm or hurricane-force winds
- Tornado, flood, flash flood, rip current, beach erosion, and inland high wind potential

Below is an example of the storm surge portion of an Hurricane Local Statement:

...STORM SURGE AND STORM TIDE...

TIDE LEVELS REPORTED BETWEEN 330 AND 400 PM SATURDAY
HOUSTON SHIP CHANNEL/MANCHESTER - 10.4 FEET
EAGLE POINT - 7.7 FEET
PIER 21 - 5.8 FEET
PLEASURE PIER - 5.2 FEET
FREEPORT - 2.7 FEET

STORM SURGE FLOODING PERSISTS ALONG THE SHORE OF GALVESTON BAY AND ON THE BOLIVAR PENINSULA. THIS INCLUDES NEIGHBORHOODS NEAR THE SHORE OF CLEAR LAKE...AND THE COMMUNITIES OF SMITH POINT...LA PORTE...SEABROOK...KEMAH...BACLIFF...SAN LEON...AND SURROUNDING AREAS. TIDE LEVELS RANGE FROM 7 TO 11 FEET IN THESE AREAS. BOLIVAR PENINSULA IS COVERED WITH WATER. RAINFALL-INDUCED FLOODING OVER THE LAND AND IN CREEKS AND BAYOUS MUST DRAIN OUT INTO GALVESTON BAY WHICH WILL KEEP WATER LEVELS ON THE BAY ABOVE NORMAL FOR AN EXTENDED PERIOD OF TIME. TIDE LEVELS WILL ONLY SLOWLY SUBSIDE IN THESE AREAS THROUGH TONIGHT...AND WILL NOT RECOVER TO NEAR NORMAL LEVELS UNTIL SUNDAY MORNING.

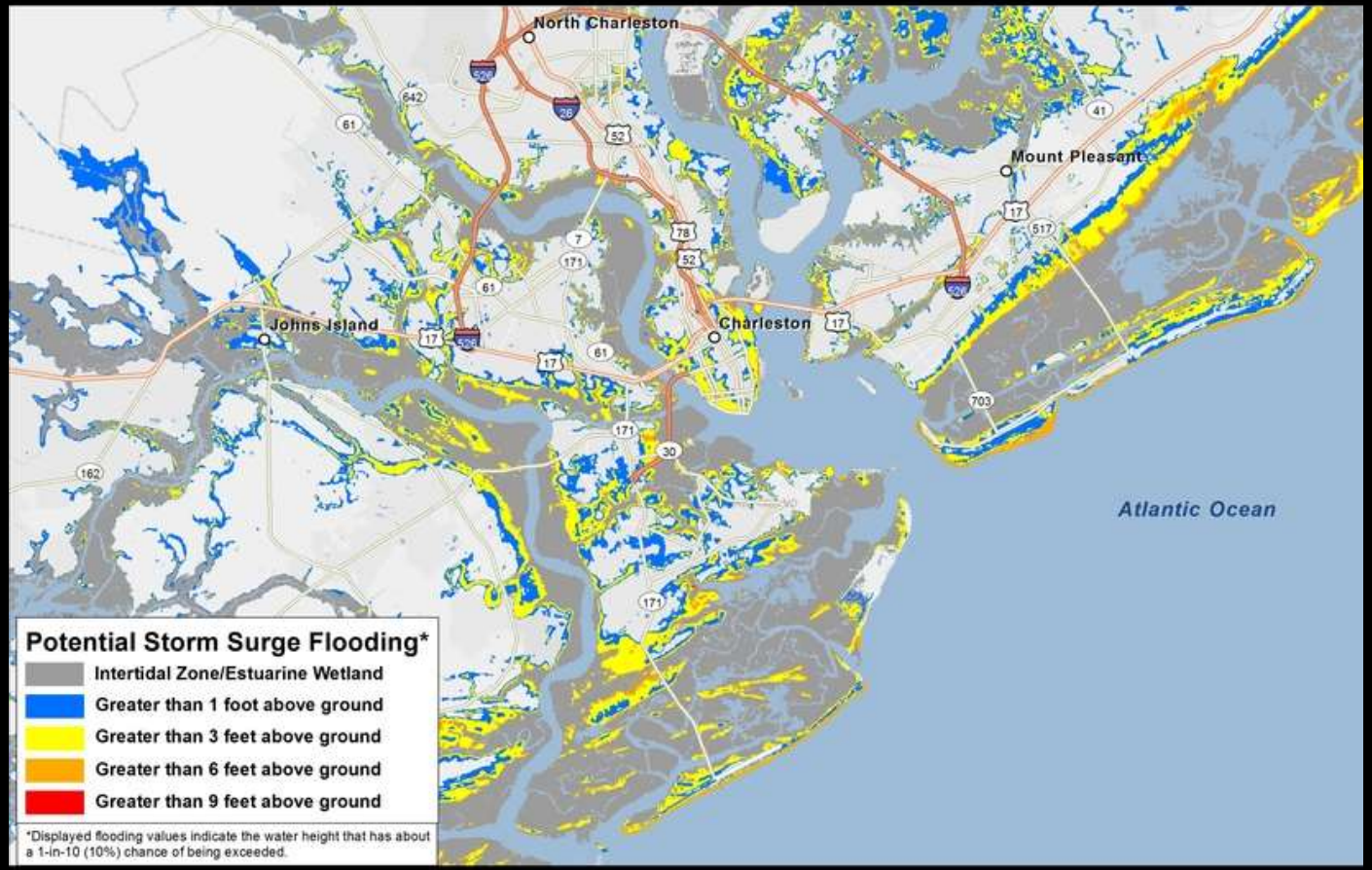
Visit your local National Weather Service office website for more information about local surge impacts under the Hurricane Local Statements (HLS)

Visit your local NWS Office | Go

The State emergency management offices work closely with the NHC in assessing evacuations with respect to coastal storm surge vulnerability. The NHC updates SLOSH basins creating the MOMs and MEOWs which are ultimately used by EMs to drive the nation's evacuation zones.

Visit your State EM office website for more information about local surge evacuation zones

Hurricane X

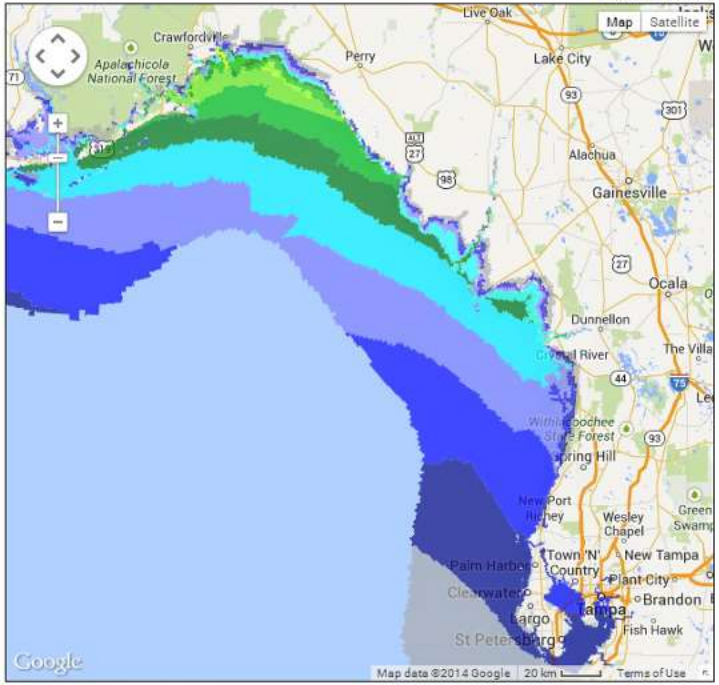


National Hurricane Center
Storm Surge Unit

Tropical Cyclone Storm Surge (with tide) Heights
That Have a 1 in 10 Chance of Being Exceeded
Hurricane Al84psurge1test (2014) Advisory 1
For the 77 hours from 11 AM EDT Wed May 07 to 04 PM EDT Sat May 10

Select Level: 10% Chance of Being Exceeded ▾

View in Google Earth (Active KML)



Lat: 30.3551 Lon: -82.0679 Larger

Legend

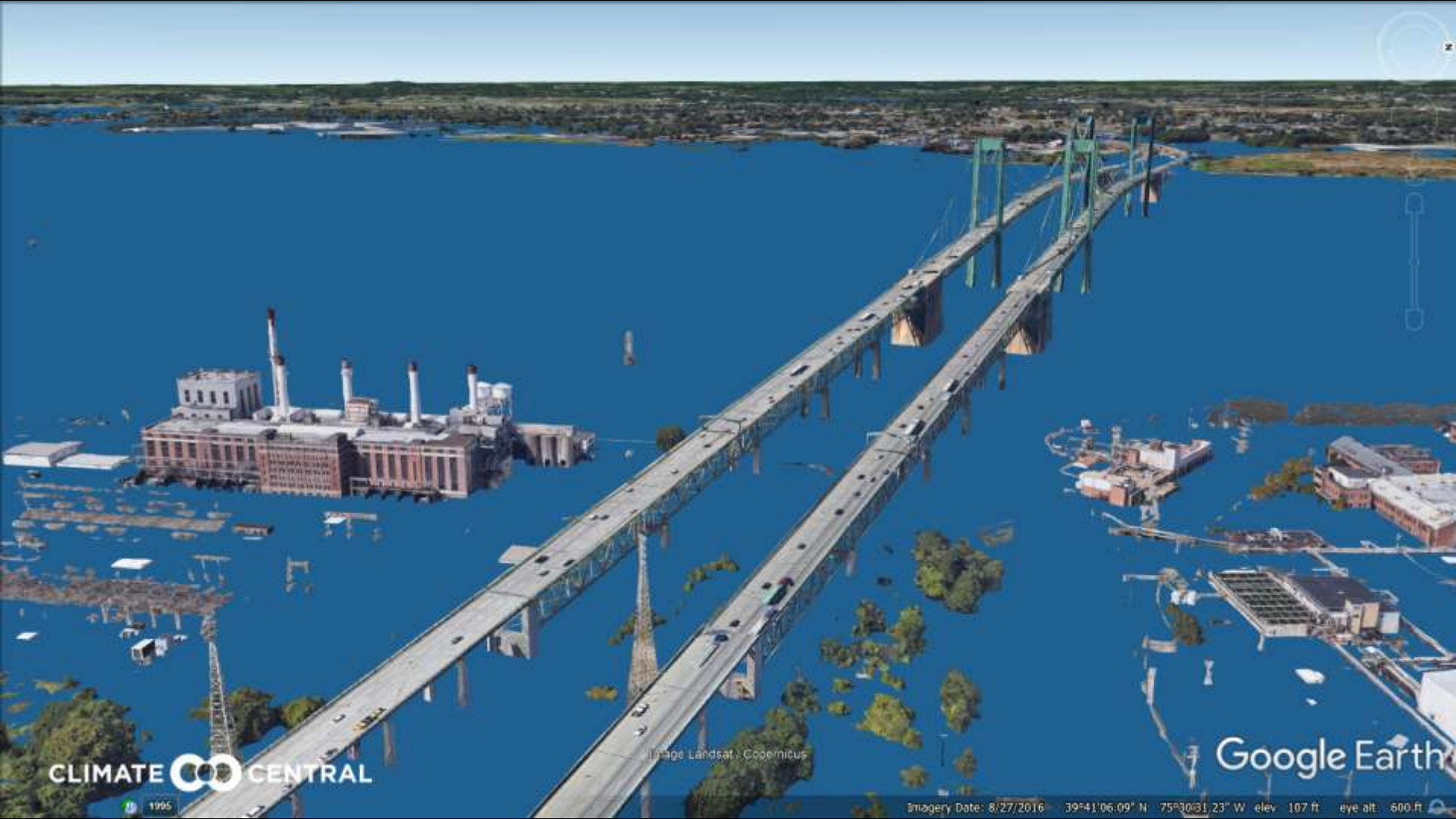
Height above ground (feet)

0 to < 2	11 to < 13	23 to < 25
2 to < 3	13 to < 15	25 to < 27
3 to < 5	15 to < 17	27 to < 29
5 to < 7	17 to < 19	29 to < 36
7 to < 9	19 to < 21	
9 to < 11	21 to < 23	

Disclaimer

Historical Data:
NHC this storm
NHC all storms
MDL

Example 1. Static example of the Probabilistic Storm Surge Heights output. Note that the actual product is interactive with pan and zoom capability.


CLIMATE CENTRAL
1995
Image Landsat / Copernicus
Google Earth
Imagery Date: 8/27/2016 39°41'06.09" N 75°30'31.23" W elev 107 ft eye alt 600 ft


CLIMATE CENTRAL
Image Landsat / Copernicus
Google Earth
2002
Imagery Date: 4/9/2017 39°41'04.51" N 75°30'35.52" W elev 3 ft eye alt 600 ft


CLIMATE CENTRAL
2002
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google Earth
Imagery Date: 4/9/2017 39°41'02.70" N 75°30'31.76" W elev 39 ft eye alt 600 ft


CLIMATE CENTRAL
1992
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data LDEO-Columbia, NSF, NOAA
Google Earth
Imagery Date: 4/9/2017 39°41'00.40" N 75°30'26.54" W elev -1 ft eye alt 600 ft


CLIMATE CENTRAL
1992
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data LDEO-Columbia, NSF, NOAA
Google Earth
Imagery Date: 4/9/2017 39°41'01.42" N 75°30'23.78" W elev -1 ft eye alt 600 ft


CLIMATE CENTRAL
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data LDEO-Columbia, NSF, NOAA
Google Earth
Imagery Date: 8/26/2016 39°41'03.94" N 75°30'23.23" W elev 34 ft eye alt 600 ft


New York
Image Landsat / Copernicus
CLIMATE CENTRAL
Google Earth
1995
40°42'21.27" N 74°00'40.17" W elev 278 ft eye alt 1845 ft


CLIMATE CENTRAL
1995
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image U.S. Geological Survey
Google Earth
40°42'19.53" N 74°00'40.38" W elev 330 ft eye alt 1845 ft


New York
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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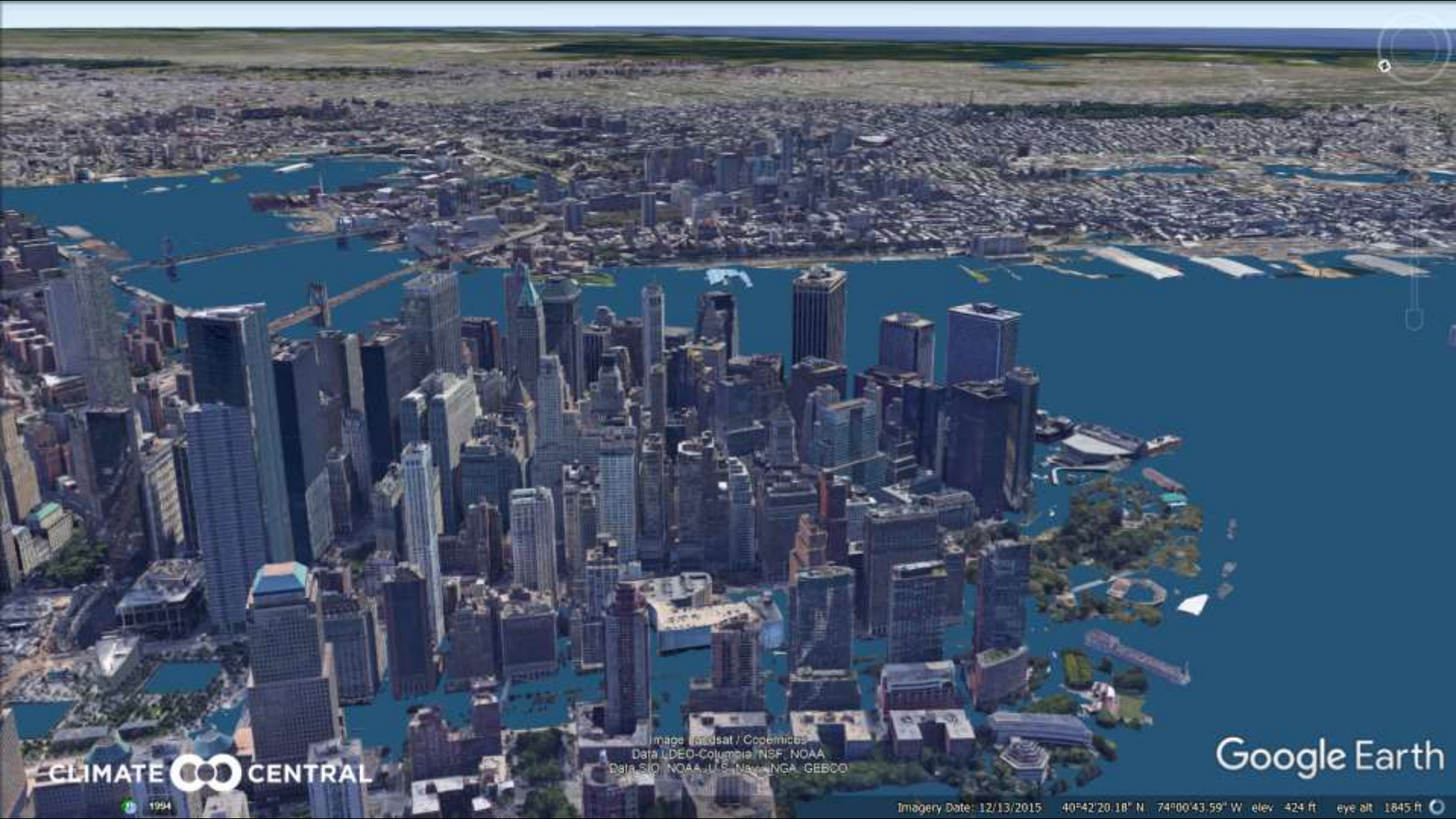
1995
40°42'19.20" N 74°00'40.46" W elev 337 ft eye alt 1845 ft


CLIMATE CENTRAL
1994
Image Landsat / Copernicus
Data LDEO-Columbia, NSF, NOAA
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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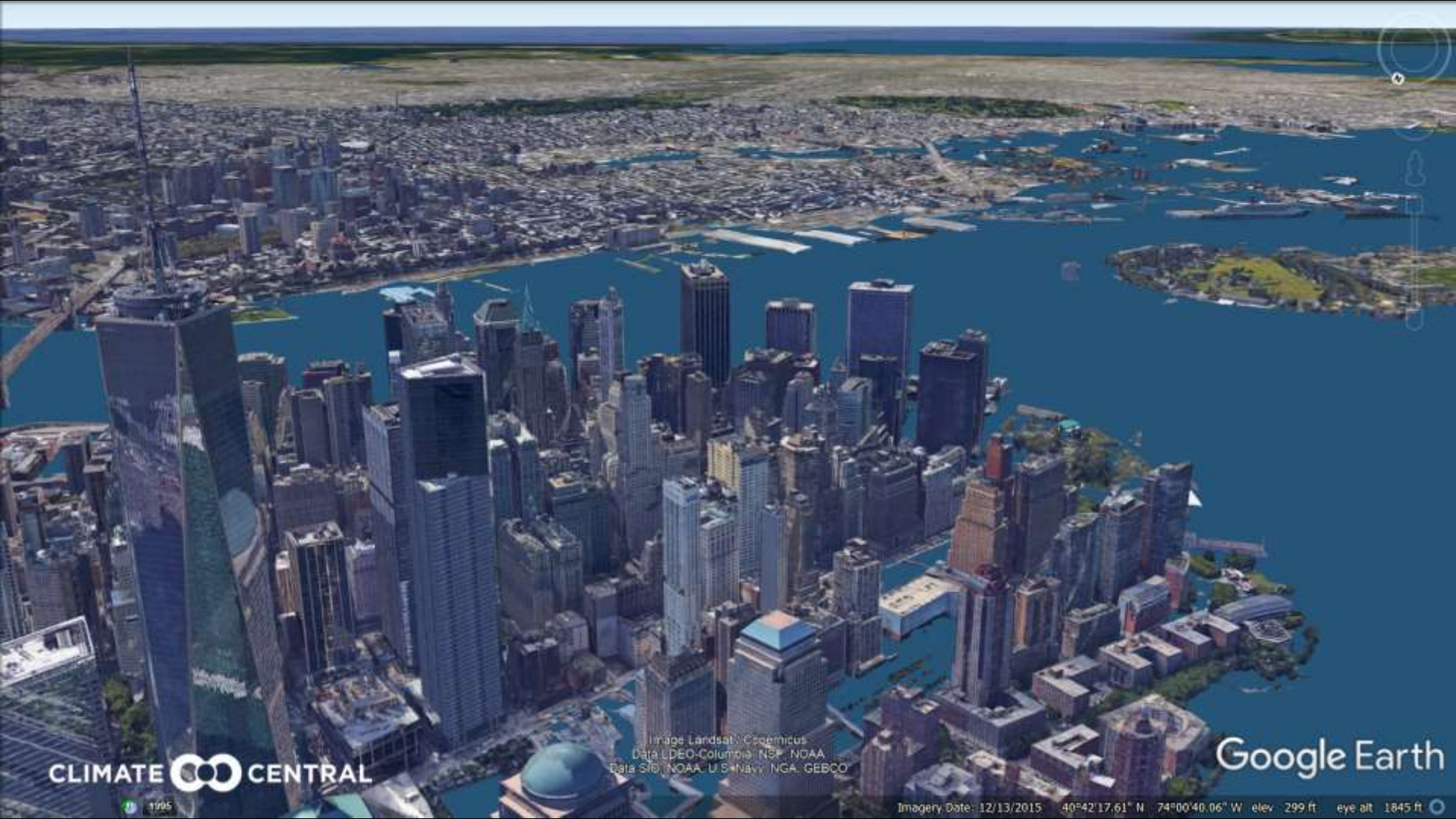
Imagery Date: 12/13/2015 40°42'20.18" N 74°00'43.59" W elev 424 ft eye alt 1845 ft


CLIMATE CENTRAL
1995
Image Landsat / Copernicus
Data LDEO-Columbia, NSF, NOAA
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google Earth
Imagery Date: 12/13/2015 40°42'17.61" N 74°00'40.06" W elev 299 ft eye alt 1845 ft

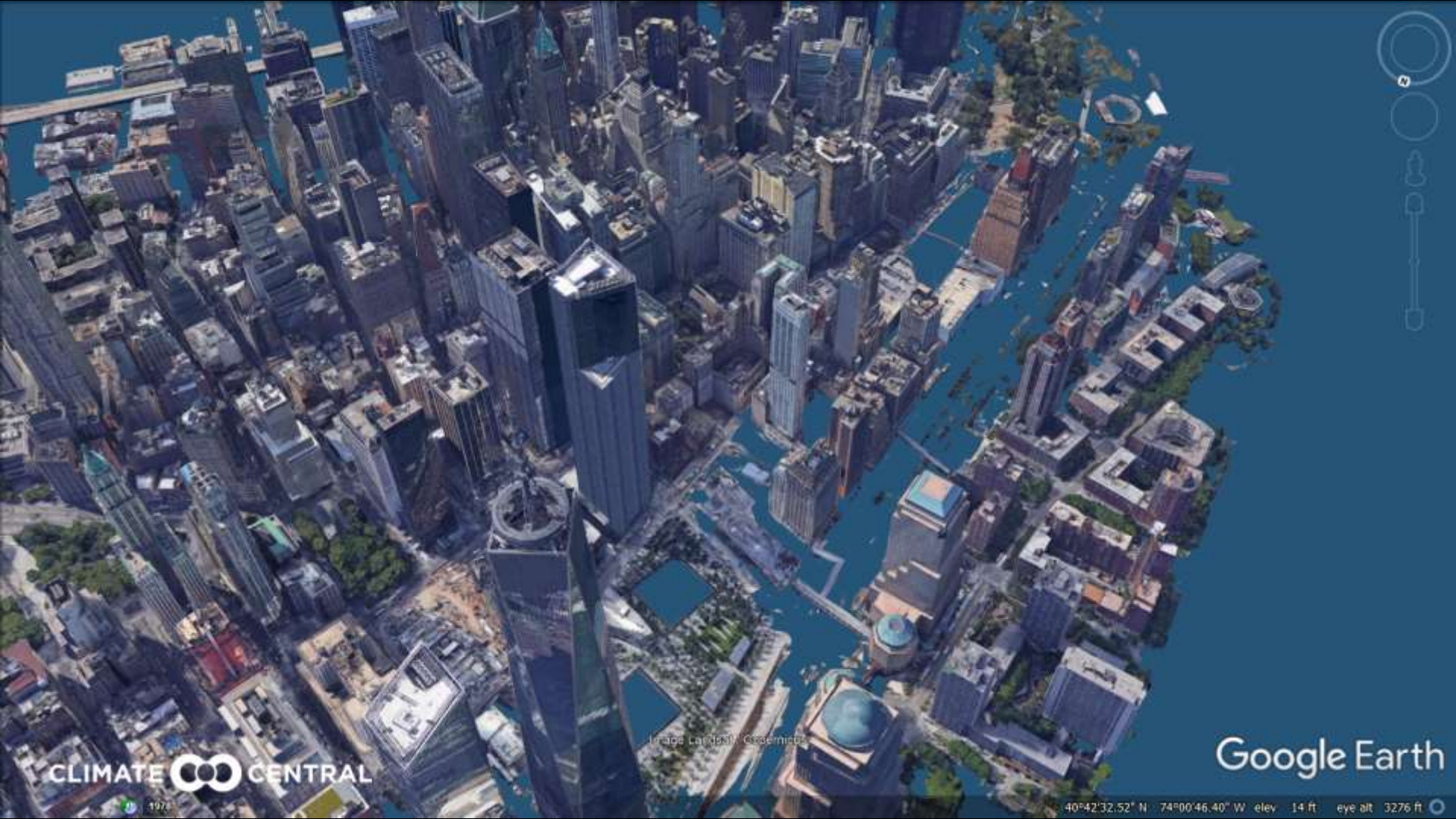

CLIMATE CENTRAL
Google Earth
40°42'32.52" N 74°00'46.40" W elev 14 ft eye alt 3276 ft

Image Landsat / Copernicus
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Google Earth
40°42'39.20" N 74°00'52.58" W elev 13 ft eye alt 3276 ft

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Cindie Lowrey Eichner To all you haters; hurricanes are not a partisan thing. This is dangerous. 25 lives lost already.

Like · Reply · 26 · 18 hrs

8 Replies · 59 mins

Crow John RD - thanks for the post. As you know I'm at Jax Beach - there's likely a mandatory evacuation tomorrow (Thurs), with Cat 4 Matthew arriving on Friday. Didn't want my Jeep to be totaled/damaged by the surge - so today I scrambled to secure a hotel ro... See More

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Here's what the predicted potential storm surge from #Matthew would look like in cities on the Southeast coast buff.ly/2dO4RzP

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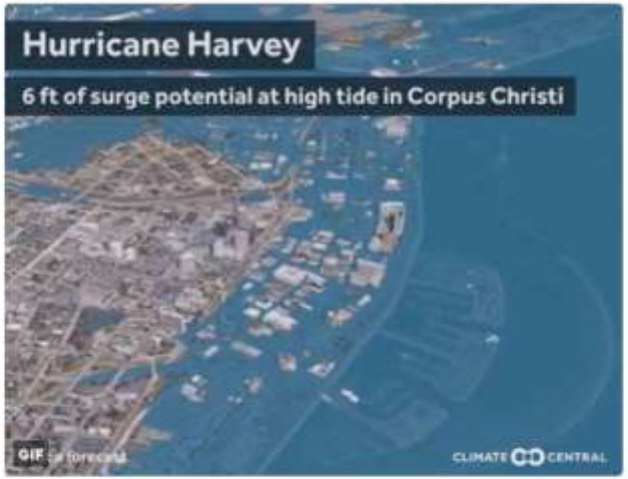
#Harvey could bring dangerous storm surge to the Texas coast at high tide. This is what it could look like in Corpus Christi if that happens



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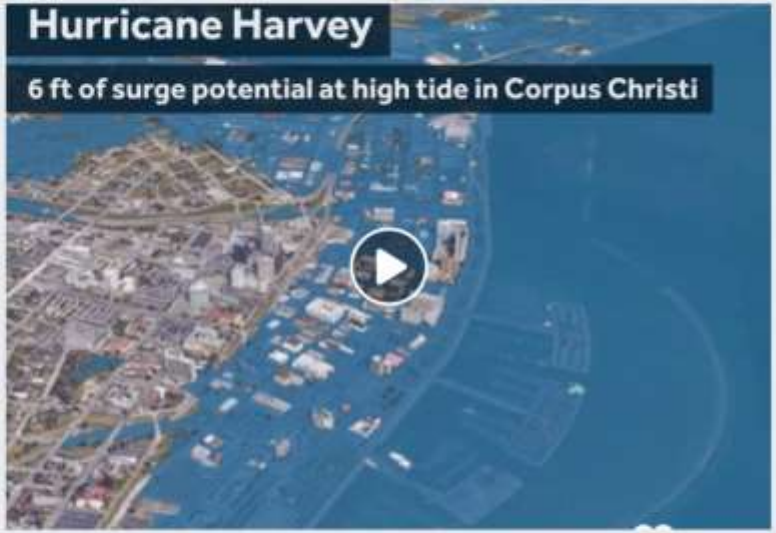

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August 25 ·

Hurricane Harvey could bring dangerous storm surge to the Texas coast at high tide. This is what it could look like in Corpus Christi if that happens.

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