

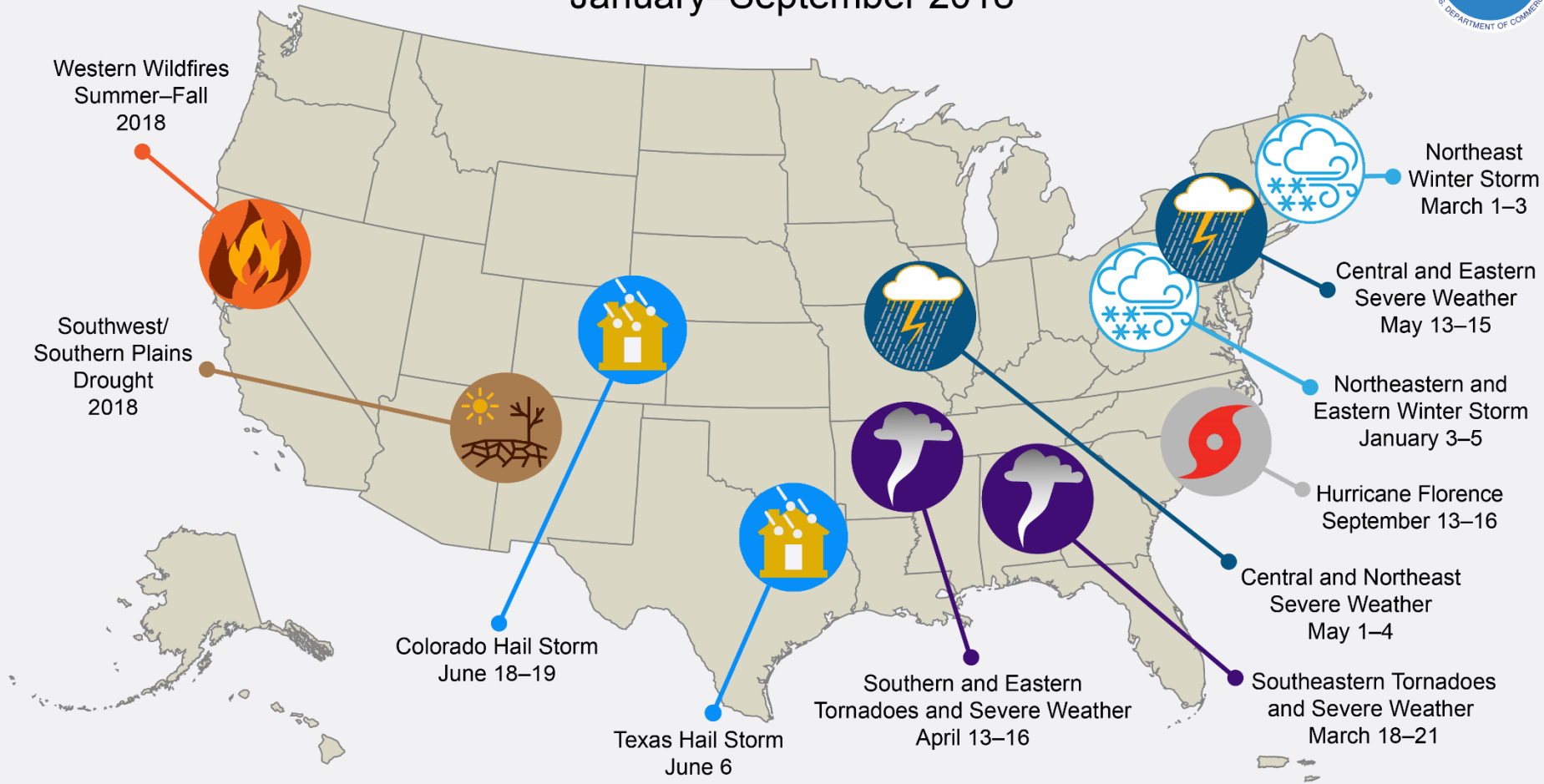
Panel I

Stemming the Tide: Investing in a Resilient Future



Increasing Costs of Natural Disasters

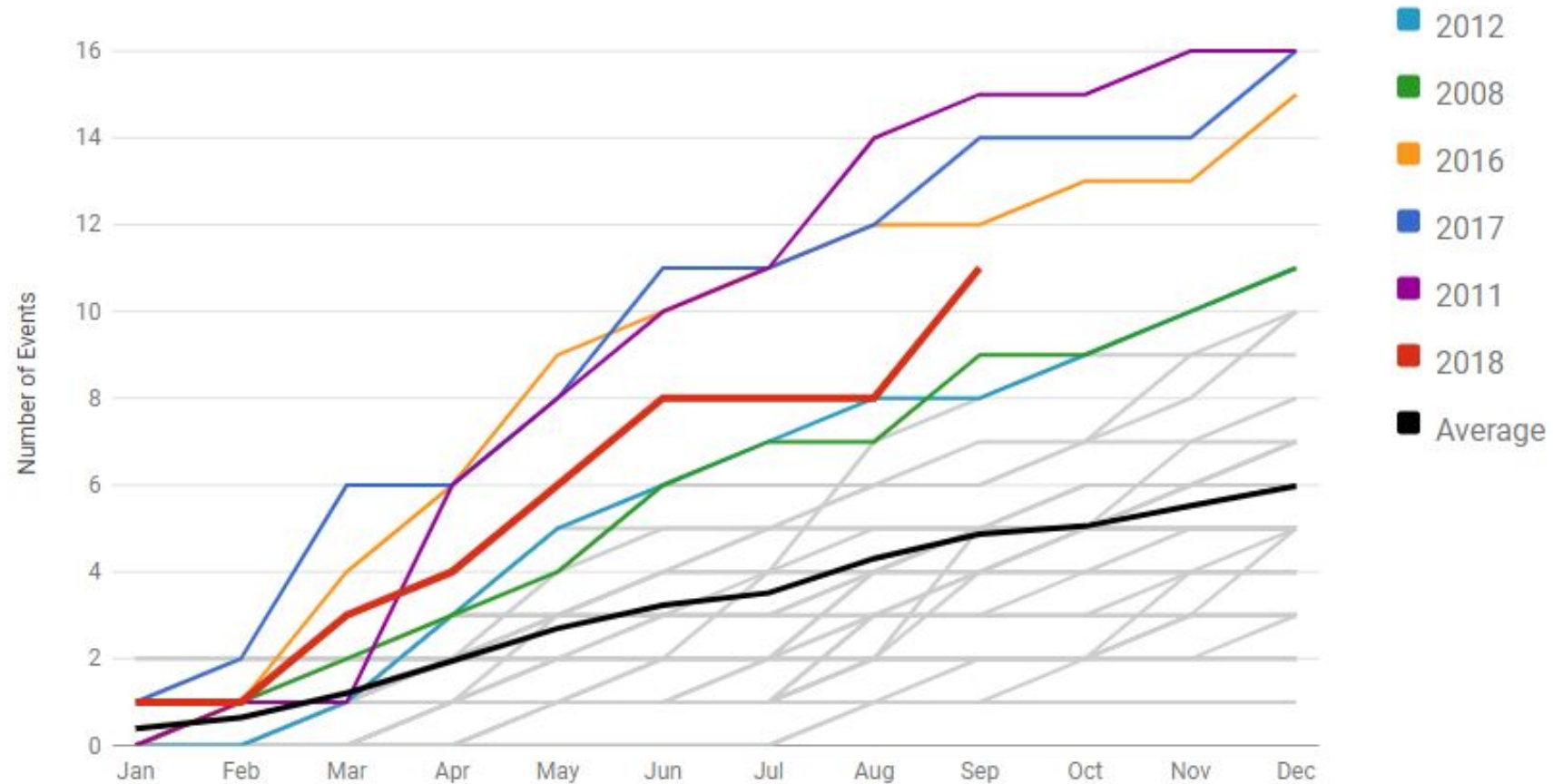
U.S. 2018 Billion-Dollar Weather and Climate Disasters January–September 2018



*This map denotes the approximate location for each of the **11 separate billion-dollar weather and climate disasters** that impacted the United States from January–September 2018.*

1980-2018 Year-to-Date United States Billion-Dollar Disaster Event Frequency (CPI-Adjusted)

Event statistics are added according to the date on which they ended.



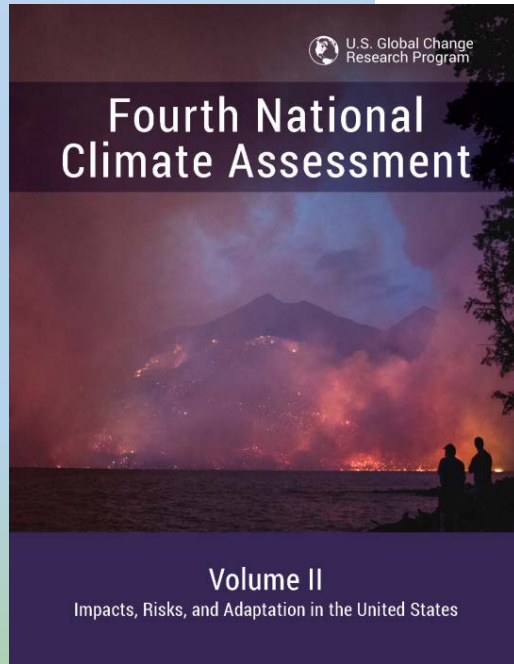
Statistics valid as of October 9, 2018.

IPCC Report

- Continental United States already is **1.0°C (1.8°F) warmer than it was 100 years ago** due to human activities.
- Global warming is likely to reach 1.5°C (2.7°F) between 2030 and 2052 if it continues to increase at the current rate.
- Adaptive capacity will be strained at 2.7°F (1.5°C) of global warming, with site-specific implications for vulnerable regions, ecosystems, and human health



Fourth National Climate Assessment



The figure illustrates the adaptation iterative risk management process. The gray arced lines compare the current status of implementing this process with the status reported by the Third National Climate Assessment in 2014. Darker color indicates more activity. From Figure 28.1 (Source: adapted from National Research Council, 2010. Used with permission from the National Academies Press, © 2010, National Academy of Sciences. Image credits, clockwise from top: National Weather Service; USGS; Armando Rodriguez, Miami-Dade County; Dr. Neil Berg, MARISA; Bill Ingalls, NASA).

Panel 1

Lisa Sharrard

US Flood Solutions, LLC

John Kane

Senate Environment and Public Works Committee

Darlene Finch

NOAA Office for Coastal Management

Tony Pratt

Consultant to the Association of Coastal Towns

Data, Delivery and Dollars: NOAA Contributions to Coastal Resilience

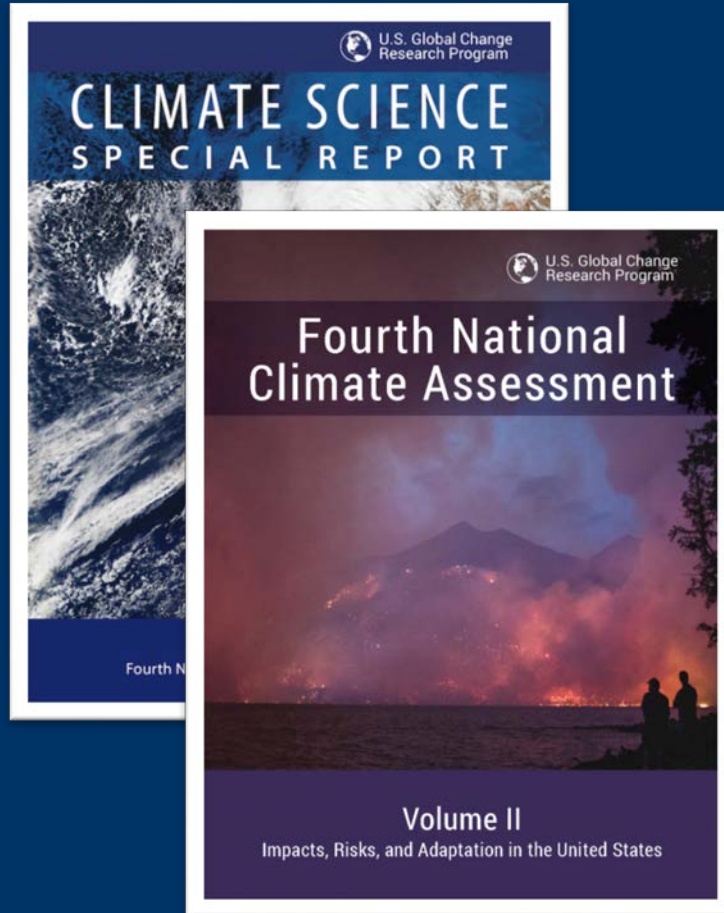
December 5, 2018

Darlene Finch

NOAA Office for Coastal Management

darlene.finch@noaa.gov

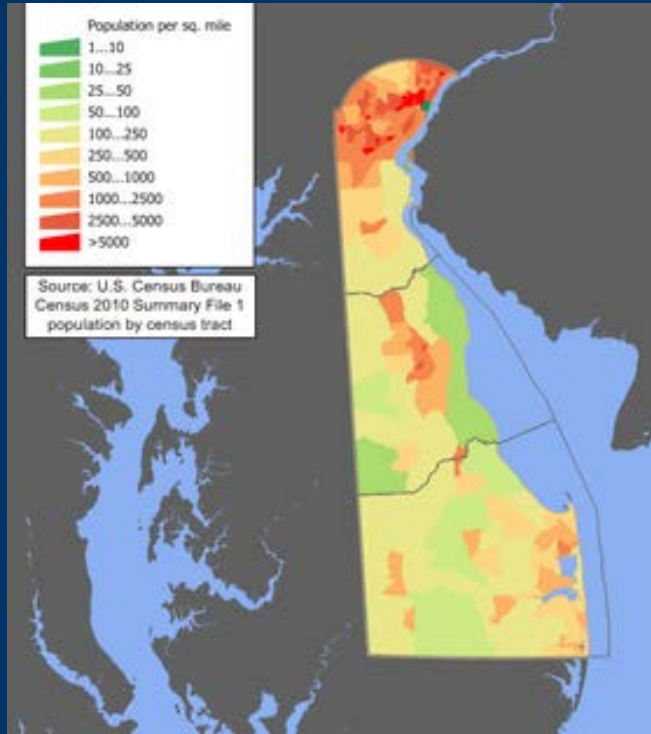
Fourth National Climate Assessment Volume II was just released



- 10 regions and 18 national topics
- Impacts on the quality and quantity of water available . . . increasing risks and costs to agriculture, energy production, industry, recreation, and the environment
- Rising temperatures, extreme heat, drought, wildfire on rangelands, and heavy downpours disrupt agricultural productivity
- Coastal communities are expected to suffer financial impacts as chronic high-tide flooding leads to higher costs and lower property values

Fourth National Climate Assessment - Volume II

Delaware Impacts

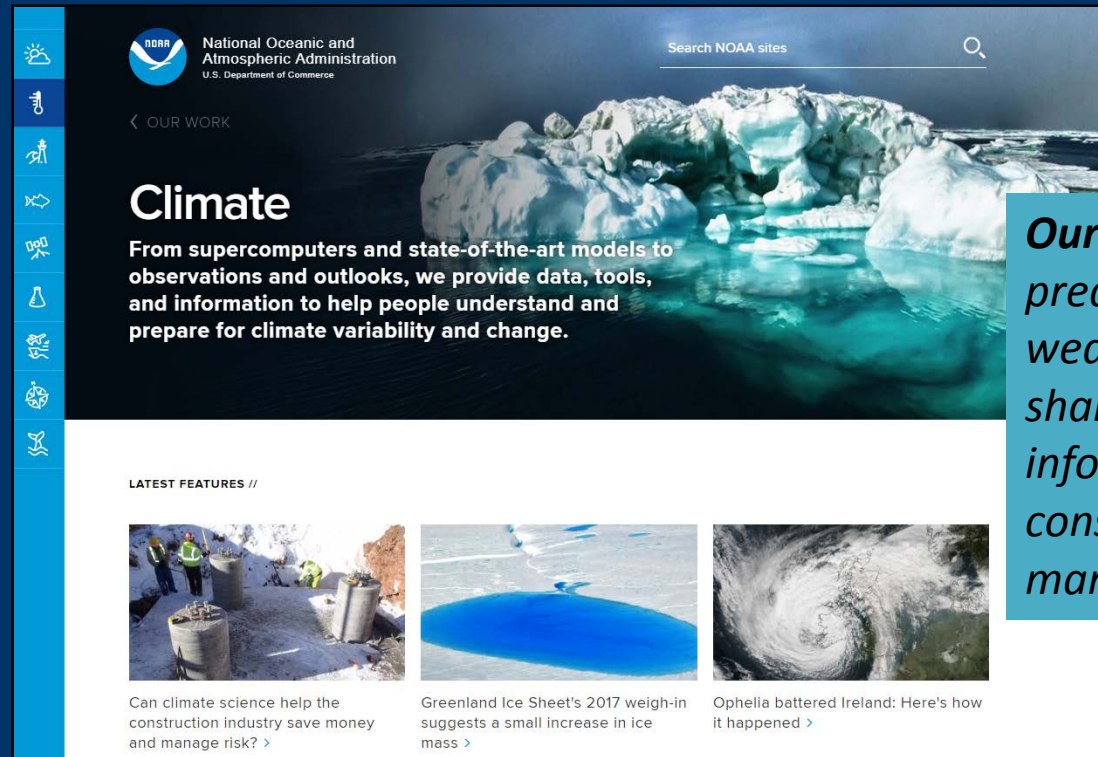


- Milder winters and earlier springs will affect rural economies and ecosystems
- As the lowest lying state, Delaware will confront increased coastal flooding
- By 2100, NJ and DE together could lose more than \$30 billion in lower property values
- Temperature of the northeastern US will increase between 4 and 5.1 degrees F by 2050
- Higher temperatures can lead to a large array of new illnesses and other health risks

***"Facts aren't something we need to believe
to make them true —
we treat them as optional at our peril . . ."***

Dr. Katharine Hayhoe
Atmospheric Scientist
Director, Climate Science Center
Texas Tech University

National Oceanic and Atmospheric Administration (NOAA)

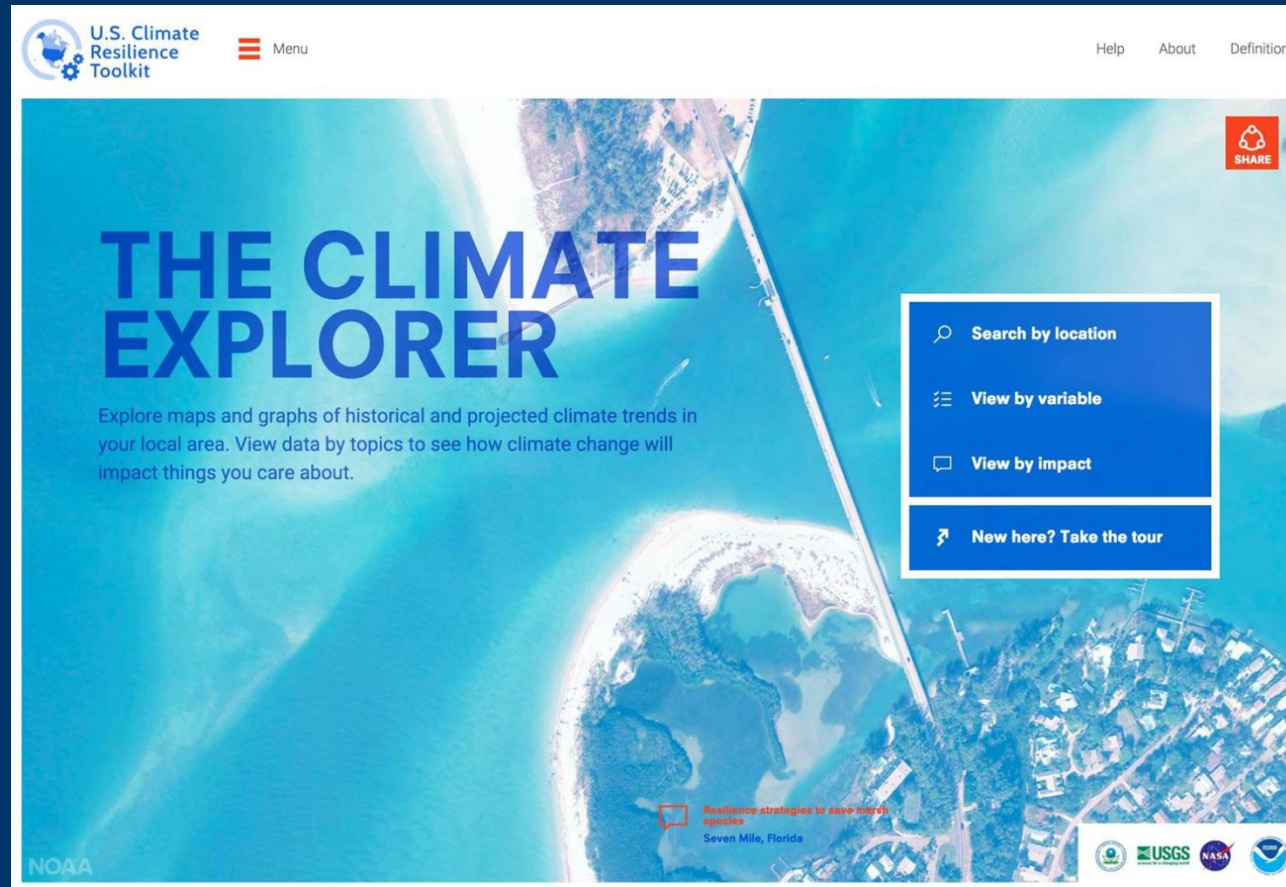


Our mission -- To understand and predict changes in climate, weather, oceans, and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources.

Data: www.climate.gov

The screenshot displays the NOAA Climate.gov website. The top navigation bar includes links for News & Features, Maps & Data, Teaching Climate, About, Contact, FAQs, Site Map, and What's New?. Below this, a secondary navigation bar lists various climate topics: Climate Systems, Causes of Climate Change, Measuring & Modeling Climate, Climate Impacts, Human Responses to Climate, and Nature of Climate Science. The main content area is titled 'Educational Resources: Search the C' and features a search bar and a list of results. One result is highlighted: 'Exploring the Link between Climate Change and Extreme Weather'. The right sidebar contains a 'Climate Data Primer' section, which includes a list of topics: Comparing Climate and Weather, Measuring Climate, Processing Climate Data, Classifying Climate, Interpreting Past Climate, Predicting Climate, Finding Climate Data, and Visualizing Climate Data. The primer text states: 'Are you new to climate data? Ready to learn or review some of the basics? This site will walk you through some of the basics to help you understand and explore climate data. Within the Primer pages, you'll find information on: instruments used to measure weather and climate, how weather observations relate to climate products, how climate scientists check the quality of observations, and tools you can use for exploring climate data. To get started, check out some of climate data people use in everyday life. Folks who are planning outdoor events check climate normals data to help them choose a date. Ranchers, farmers, and outdoor-recreation businesses regularly monitor drought conditions. Weather enthusiasts like to explore extreme storms and record-setting events. People who live near the coast consider how sea level rise might affect them. Students often consider the relationship between global temperature and greenhouse gases. Water companies check precipitation and river levels to monitor water supplies.'

Data: Climate Explorer



National Centers for Environmental Information

... responsible for preserving, monitoring, assessing, and providing public access to the Nation's treasure of climate and historical weather data and information

**NOAA** NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Formerly the National Climatic Data Center (NCDC) — [more about NCEI](#)

Home Climate Information Data Access Customer Support Contact About

National Centers for Environmental Information

NOAA's National Centers for Environmental Information (NCEI) is responsible for preserving, monitoring, assessing, and providing public access to the Nation's treasure of climate and historical weather data and information.

[Learn more about NCEI](#)

How may we assist you?

- I want to search for data at a particular location.
- I want quick access to your products.
- I want to see your monthly climate reports.
- I want to find a specific dataset.
- I want to know about climate change and variability.

NCEI News

Latest NCEI News

There's a lot going on at NCEI. Discover more about us and Earth's climate, oceans, coasts, and geophysics in these featured news stories.

Climate News Archive

Find useful information in our climate news archive, which covers scores of climate-related topics highlighted between 2012 and early 2017.

Latest NCEI News

Advancing the Study of Extreme Events

May 29, 2018
The science of explaining extreme weather events continues to advance. [\[Read more\]](#)

Space Weather Data Takes Flight

May 25, 2018
NCEI's scientists go far beyond data archiving and stewardship when it comes to GOES-R space weather instruments and products. [\[Read more\]](#)


An Eye-Catching Climatology

May 25, 2018
A new climatology of tropical cyclone eye location and size provides unique insight into the history and future of these storms. [\[Read more\]](#)

NCEI Partners


climate.gov
Science Information for a Climate-Smart Nation


weather.gov
THE NATIONAL WEATHER SERVICE


drought.gov
U.S. Drought Portal


globalchange.gov
U.S. Global Change Research Program

Quarterly Climate Impacts and Outlook Northeast Region
March 2018

National - Significant Events for December 2017-February 2018

Selected U.S. Significant Climate Anomalies and Events for February and Winter 2018

December

- The contiguous U.S. drought footprint shrank to 31.3%, down 7.1% from December 2017. Droughts were reported in the Northern High Plains, Central Plains, Mississippi Valley, and South to Northeast. Droughts worsened in the West and Southern High Plains.
- The Northern Rockies to Northern High Plains had a cold and wet Feb. and winter, resulting in near-record high mountain snowpack.
- Much of the East was warm in Feb. - 8 states had a record warm Feb., with 25 additional states experiencing a top 10 warm month.
- A severe weather outbreak on 24 Feb. resulted in two tornado-related fatalities in AR and KY - the first of 2018.
- Record precipitation fell across the South and Midwest. Parts of the Ohio River had the highest crest in over 20 years. The flooding caused at least 6 fatalities.

January

- A significant cold wave in early January was followed by a milder month than ending significant for years with near flooding in the Northeast.

The contiguous U.S. had an average winter temperature of 34.0°F, 1.7°F above the 20th century average. According to NOAA, "Much of the East Coast and West had a warmer-than-average winter." December's average temperature of 34.8°F was 2.1°F above average, and January's average temperature of 32.2°F was 2.1°F above average. February's average temperature of 35.4°F was 1.6°F above average. Globally, it was the third warmest December on record (tied with 2016) and the third warmest January. During winter, the contiguous U.S. received 6.26 inches of precipitation, 0.53 inch below average. December precipitation totaled 1.55 inches, 0.80 inch below average, and January precipitation totaled 1.81 inches, 0.50 inch above average. The U.S. had its 6th wettest February with 2.84 inches of precipitation, 0.71 inch above average.

Highlights for the Northeast

A storm from December 9 to 10 dropped up to 11 inches of snow on the region. While impacts were limited to flight delays and slick roads, it provided the first measurable snow and first inch of snow for more than a dozen major climate sites.

December had been mild until the last week, when a disturbance brought a mix of rain and snow showers and was followed by a [bitter cold snap](#). In New York and New England there were reports of snow falling at up to [3-5 inches per hour and thundersnow](#). Erie, PA had large amounts of lake-effect snow. Records were broken for lowest minimum and maximum temperatures.

A nor'easter impacted the region on January 3-5. See impacts section for details. A [winter storm](#) on February 7 brought up to 12 inches of snow to parts of the region while other areas received up to 0.5 inches of ice accumulation. A mid-February storm brought the first [significant snow](#) to some areas since the January nor'easter. Among the highest snow totals was 10.5 inches in Glen Gardner, NJ. On the heels of the storm was [record-breaking warmth](#). February 20-21 saw temperatures soar into the low 60s to low 80s, which was 20°F to 40°F warmer than normal. Records were broken not only for those days, but also for any February day. Snow melt and rain caused [flooding](#) in parts of the region, which led to closed roads, water rescues, flooded homes, and evacuations.

Regional - Climate Overview for December 2017-February 2018

Precipitation and Temperature Anomalies

Percent of Normal Precipitation (%) December 1, 2017-February 28, 2018



Departure from Normal Temperature (°F) December 1, 2017-February 28, 2018

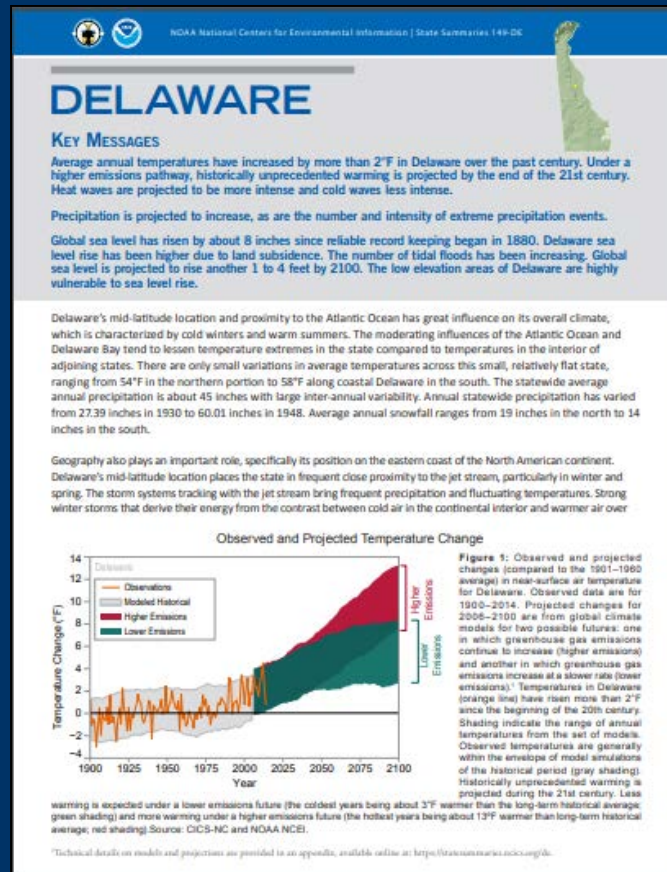


Drought in the Northeast

U.S. Drought Monitor March 15, 2018




Data: State Summary of Climate Information for Delaware



- Average annual temperatures have increased by more than 2°F in Delaware over the past century. . . Heat waves are projected to be more intense and cold waves less intense.
- Precipitation is projected to increase, as are the number and intensity of extreme precipitation events.
- Delaware sea level has risen at the rate of more than 1 foot per century . . . The number of tidal floods has been increasing . . . The low elevation areas of Delaware are highly vulnerable to sea level rise.


Delivering Data: U.S. Climate Resilience Toolkit

<https://toolkit.climate.gov/>





U.S. Climate Resilience Toolkit


[Steps to Resilience](#) [Case Studies](#) [Tools](#) [Topics](#) [Expertise](#)

Search 

Tools

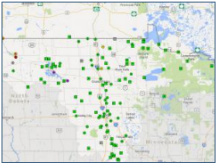
[Clear Filters](#) [Filter by topic:](#)  [Filter by tool function:](#) 

Tools are available to help you manage your climate-related risks and opportunities, and to help guide you in building resilience to extreme events. Browse the list below, or filter by topic and/or tool functionality in the boxes above. To expand your results, click the Clear Filters link.




Adaptation Tool Kit: Sea-Level Rise and Coastal Land Use

This toolkit presents information on 18 different land-use tools (generally used legal devices) that




Advanced Hydrologic Prediction Service


This comprehensive suite of graphical forecast products shows a range of information on current and projected river levels for almost




U.S. Climate Resilience Toolkit

[Steps to Resilience](#) [Case Studies](#) [Tools](#) [Topics](#) [Expertise](#)

Search 



 **Coasts**

Coastal lifelines, such as water and energy infrastructure, and nationally important assets, such as ports, tourism, and fishing sites, are increasingly vulnerable to sea level rise, storm surge, erosion, flooding, and related hazards. Socioeconomic disparities create uneven vulnerabilities.

[Topics](#) > [Coasts](#) >

Key points:

- The risk of flooding has increased in most coastal regions of the United States and its island territories since 1900, and that risk is projected to grow even more this century.

Browse Topics

- > Arctic
- > Built Environment

Delivering Data: Digital Coast

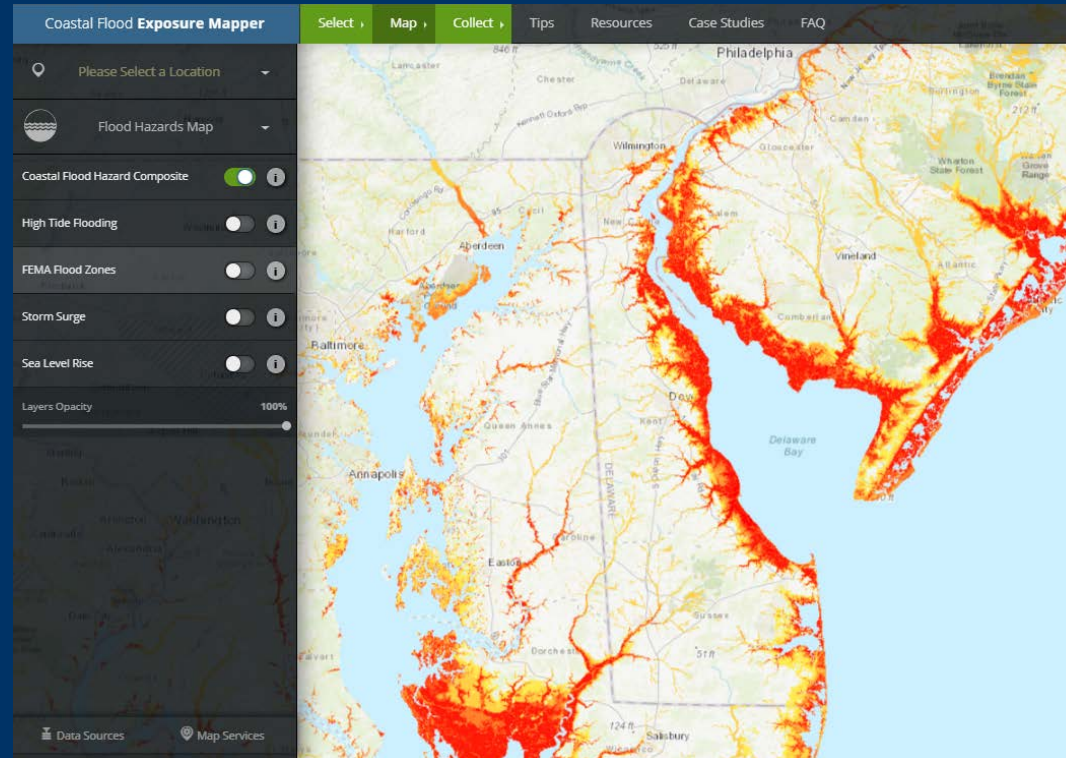
<https://coast.noaa.gov/digitalcoast/>



Resilience Data and Tools

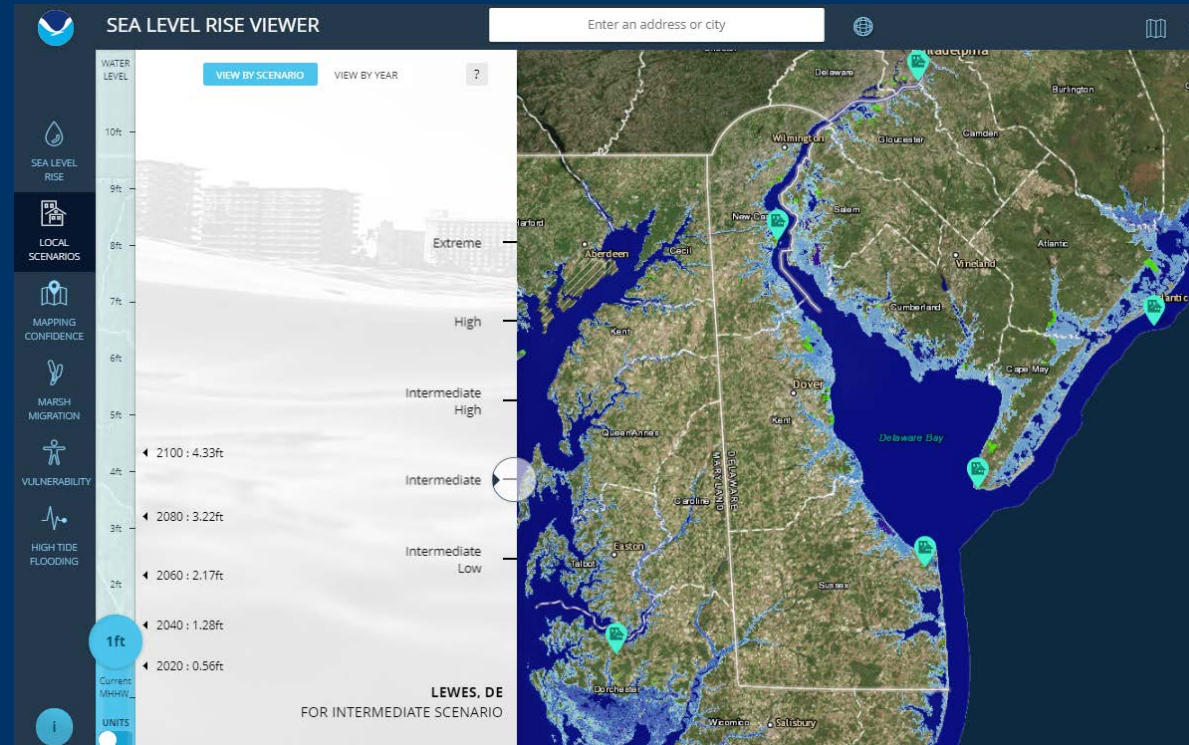
- Coastal Flood Exposure Mapper
- Sea Level Rise Viewer
- Coastal County Snapshots
- Economic: National Ocean Watch (ENOW)
- Guidance and Case Studies
- etc.

Delivering Data: Coastal Flood Hazards Composite



Includes Shallow Coastal Flooding, FEMA Flood Zones, Storm Surge and Sea Level Rise

Delivering Data: Visualizing Sea Level Rise



A screening-level tool that uses best-available, nationally consistent data sets and analyses to visualize coastal flooding impacts.

Thoughts about Data Delivery

- Large amount of data and tools out there to work with, including both historical trends and future projections
- More detailed local data is important – it may exist or you may need to gather
- Most important thing is to be able to take the data and information and apply it to decisions about community resilience. Requires a strong partnership across all levels of government – from individuals to localities to states to the Federal government.
- You can and should take advantage of the experts and their expertise
- You can ‘persuade’ Federal agencies to help you out

Dollars

- NOAA programs with state partners (e.g., Sea Grant, Coastal Management, etc.)
- NOAA Climate Funding Competitions
 - Coastal and Ocean Climate Applications (COCA)
 - Regional Integrated Sciences and Assessment (RISA) & Mid-Atlantic RISA
- NOAA Resilience Funding Competition
 - 2015-16 Regional Coastal Resilience Grants
 - 2017 Coastal Resilience Grants
 - 2018 National Coastal Resilience Fund
 - South Wilmington Freshwater Tidal Wetland Habitat Restoration for Flood Prevention (DE)
 - 2019 ????



Funding Consideration

- Nature of the funding
 - Annual appropriations
 - Focused on statutory authorities
 - National in scope
 - Need to demonstrate results
 - Sooner rather than later
- Federal funding competitions
 - Larger geography (or really innovative)
 - Broader applicability
 - Partnerships
- Keep the long term in mind, but be willing to take smaller steps
- Garner attention and resources in other ways
- Think out of the box (e.g., private investors)
- Think about disaster recovery in advance



Thank you!

Questions?

Thank you!
darlene.finch@noaa.gov