

Hazards & Stressors Research Guide

WHO	This guidance is for the practitioner throughout Step 1.
WHAT	This resource provides information for various tools and information that can be used to research and understand stressors and hazards in the community. The tools are bookmarked to sections of this guidance that briefly describe how they can be used and link out to the tool itself. This exercise will ultimately help inform the potential impacts matrix later in Step 1.
SUPPORTING RESOURCES	Use the following tools and websites to answer key questions about the community and the hazards and stressors. Add your answers to Resource 1.61: ☰ Resource 1.1e Evaluate Hazards and Stressors
INSTRUCTIONS	<ol style="list-style-type: none">1. Read the Key Questions and use the resources suggested. The links will take you to an entry within this document to learn more.2. Use Resource 1.61 ☰ Resource 1.1e Evaluate Hazards and Stressors to answer the questions and make notes.

Key Questions:

Consider these questions while you explore the tools and sources. The tools and sources that are most relevant to answering each are listed as well. Remember to add your findings to Resource 1.61:

[☰ Resource 1.1e | Evaluate Hazards and Stressors](#)

Considering climate hazards and stressors...

1. What is the normal climate for your community?

- [State Climate Summaries](#)
- [Fourth National Climate Assessment](#)
- [Climate Explorer](#)
- [Climate at a Glance \(NOAA\)](#)
- [Drought.gov \(NIDIS\)](#)
- [EJSCREEN \(U.S. EPA\)](#)
- [Community Resilience Estimates Dashboard](#)
- [Resilience Analysis and Planning Tool \(FEMA\)](#)
- [National Risk Index for Natural Hazards \(FEMA\)](#)

2. What is changing or likely to change in the local climate?

- [Fourth National Climate Assessment](#)
- [State Climate Summaries](#)
- [Climate Explorer](#)
- [NOAA National Ocean Service Tides & Currents](#)
- [Climate at a Glance \(NOAA\)](#)

Resources & How to Use

Fourth National Climate Assessment

[The Fourth National Climate Assessment](#) (NCA4) is the authoritative source for our nation and should be considered the primary “trusted source of information” for background climate information and framing. Content is divided into several chapters that fall into categories, including national topics, regions, and responses:

The screenshot shows the navigation menu for the Fourth National Climate Assessment (NCA4). The menu is organized into several categories:

- Front Matter**
 - About this Report
 - Guide to the Report
- Summary Findings**
 - 1. Overview
- National Topics**
 - 2. Our Changing Climate
 - 3. Water
 - 4. Energy Supply, Delivery & Demand
 - 5. Land Cover & Land-Use Change
 - 6. Forests
 - 7. Ecosystems, Ecosystem Services, & Biodiversity
 - 8. Coastal Effects
 - 9. Oceans & Marine Resources
 - 10. Agriculture & Rural Communities
 - 11. Built Environment, Urban Systems, & Cities
 - 12. Transportation
- National Topics (cont.)**
 - 13. Air Quality
 - 14. Human Health
 - 15. Tribes & Indigenous Peoples
 - 16. Climate Effects on U.S. International Interests
 - 17. Sector Interactions, Multiple Stressors, & Complex Systems
- Regions**
 - 18. Northeast
 - 19. Southeast
 - 20. U.S. Caribbean
 - 21. Midwest
 - 22. Northern Great Plains
 - 23. Southern Great Plains
 - 24. Northwest
 - 25. Southwest
 - 26. Alaska
 - 27. Hawai'i & U.S.-Affiliated Pacific Islands
- Responses**
 - 28. Reducing Risks Through Adaptation Actions
 - 29. Reducing Risks Through Emissions Mitigation
- Appendices**
 - 1. Report Development Process
 - 2. Information in the Fourth National Climate Assessment
 - 3. Data Tools & Scenario Products
 - 4. Looking Abroad
 - 5. Frequently Asked Questions

Each chapter contains easy-to-follow key messages and various charts, maps, and graphs that can be downloaded and cited for your own report. In addition, there are case studies throughout each chapter, which can help the practitioner better understand the issues facing a particular community. The NCA4 provides regional context for both climate and non-climate stressors.

How to Use the Fourth National Climate Assessment

To use the NCA4 for your project, begin with the regional chapter for the community. The regional chapters assess current and future risks posed by climate change and what can be done to minimize risk. Challenges, opportunities, and success stories for managing risk are illustrated through case studies.

Next, explore the national topics, especially as they are relevant to the community. Exploring these national topics can help provide some context for the impacts climate change may have on the topic and even some mitigation strategies. For example, in [Chapter 10: Agricultural and Rural Communities](#), topics related to economics, ecology and hydrology, and human health are covered through discussions on crop adaptation and productivity, soil health and water resources, and worker health challenges.

State Climate Summaries

[State Summaries](#) provide a more localized view than the National Climate Assessment, but also include key local case studies. Originally released in 2017, a rolling update is currently underway. The summaries cover historical climate variations and trends, future climate model projections of climate conditions during the 21st century, and past and future conditions of sea level rise and coastal flooding.

How to Use the State Climate Summaries

To begin using the Summaries, choose a state. Within each summary there are three key messages which the content is built around.

Similar to the NCA4, various charts, graphs, and maps at the state-level are provided, which can be used and cited for your own report. These summaries provide a one stop shop for understanding temperature and precipitation trends, coastal trends and drought. Exploring these summaries will help the team determine key climate and non-climate stressors that should be further evaluated for the community.

The Climate Explorer

[The Climate Explorer](#) allows the user to explore interactive graphs and compare time-series maps showing climate projections and observations for any location in the contiguous United States, summarized by county. The Climate Explorer provides downscaled projection data at a county level using the same methods employed in the fourth National Climate Assessment. You can also explore historical temperature and precipitation observations at hundreds of climate stations, and view observed and projected days of high-tide flooding at more than 90 coastal tide-gauge stations. It also provides weather station data that you can query to examine thresholds of interest.

The Climate Explorer provides county-level insights for climate hazards and stressors.

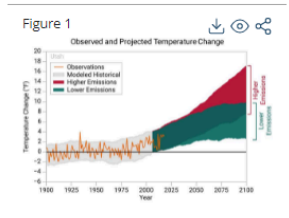
How to Use The Climate Explorer

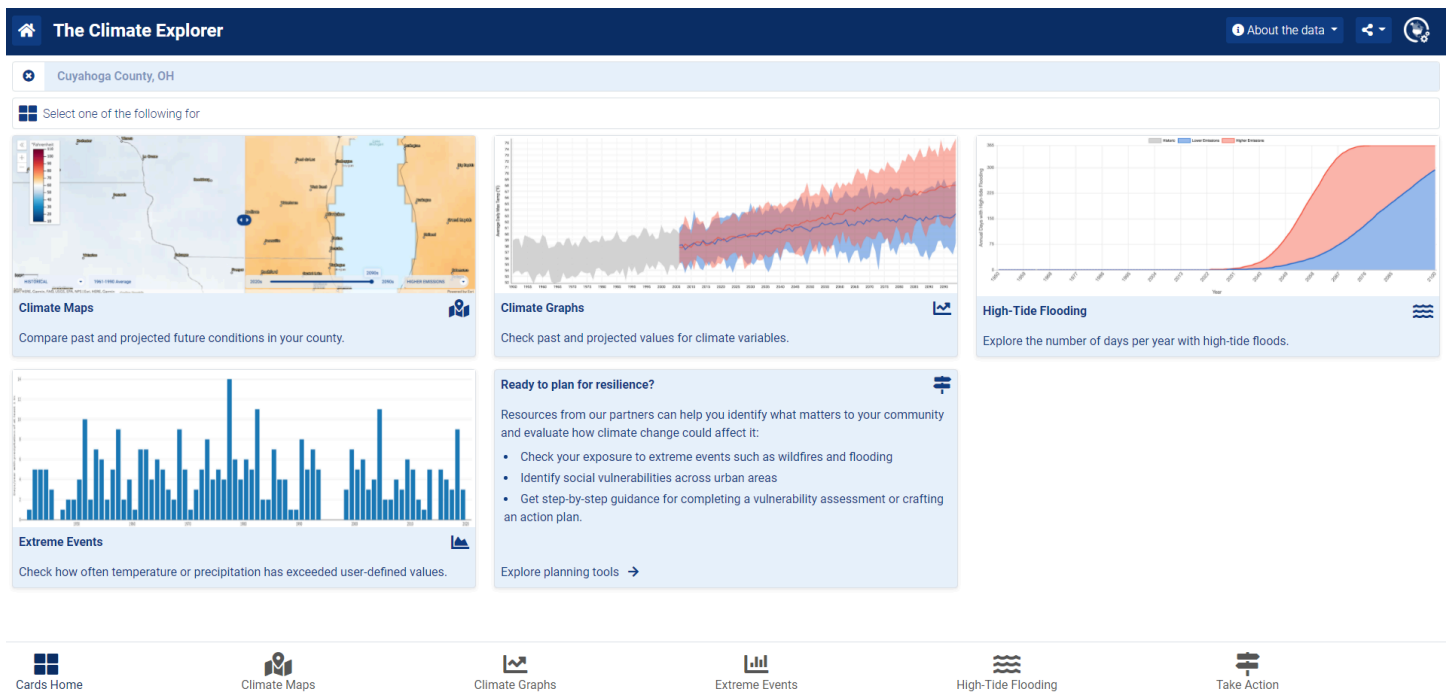
When you enter The Climate Explorer, you will be asked to enter a location. Once you do, you will be provided with options for viewing climate data:

UTAH

Utah is a geographically diverse state with forested, mountainous, and desert regions. It has a varied climate due to its inland continental location and wide range of topography. Elevations across the state range from approximately 2,500 feet in the Virgin River Valley to 13,500 feet in the Uinta Mountains. Based on records from long-term stations, temperatures in the mountains average around 20°F during the winter months, while lower elevations in the southern portion of the state frequently experience days over 100°F in the summer. In the northern part of the state, the Great Salt Lake has a moderating effect on temperatures in its vicinity. The hottest year on record for Utah was 1934 with an average annual temperature of 51.3°F, followed by 2012 with an average annual temperature of 50.9°F.

The early 21st century has been the warmest period on record for Utah (Figure 1). The period from 2000 to 2004 was particularly warm, with the state seeing the largest number of extremely hot days (days with maximum temperature at or above 100°F) in the historical record (Figure 2). In addition to the overall trend of higher temperatures, the state has experienced a dramatic increase in the number of very warm nights (minimum temperature at or above 75°F) and a decrease in the number of very cold nights (minimum temperature at or below 0°F) since 1990 (Figures 3 and 4a).



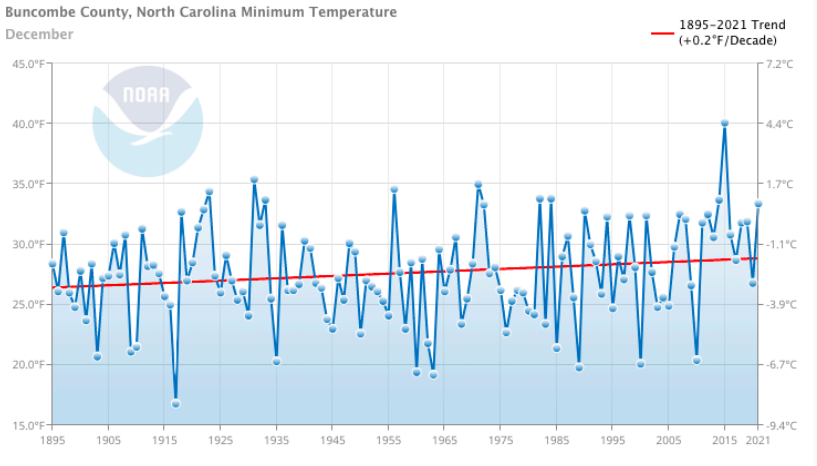


Climate Maps and Climate Graphs provide a variety of metrics for historical trends and future projections, using two emissions pathway scenarios (RCP 4.5 and RCP 8.5). The maps and charts are also downloadable images, which can be used and cited for your report. Extreme Events allows you to choose a reporting station within (or nearby) your area of interest and explore historical occurrences of extreme temperature and precipitation events. If the area is coastal, the High Tide Flooding option can be used to understand the occurrence of high tide floods in a specific area.

Climate at a Glance (NOAA)

[Climate at a Glance](#) allows near-real-time analysis of monthly temperature and precipitation data across the contiguous United States. Users can request data for select cities, states, regions, and the nation as a whole to compare current conditions with the historical record. Data is available for the period 1895 to the present.

The tool is ideal for studies of climate variability and change. The tool’s graphing functions allow users to determine whether, and how much, a given location or area is warming or cooling; or experiencing an overall change in precipitation.



This tool generates time series graphs of Temperature, Precipitation, Heating Degree Days, Cooling Degree Days, and four drought indices from the U.S. Climate Divisional Database. Users select spatial extents as large as the entire contiguous United States and as small as a city within it (data are available for almost 200

selected cities). Time scales range from 1 month to 60 months, and include functions such as Year to date and Previous 12 months. Users can customize the time series graphs by selecting the base period, including a trend line showing change over a decade or a century, or showing a statistically smoothed version of the data. Users can zoom and pan on the interactive graphs.

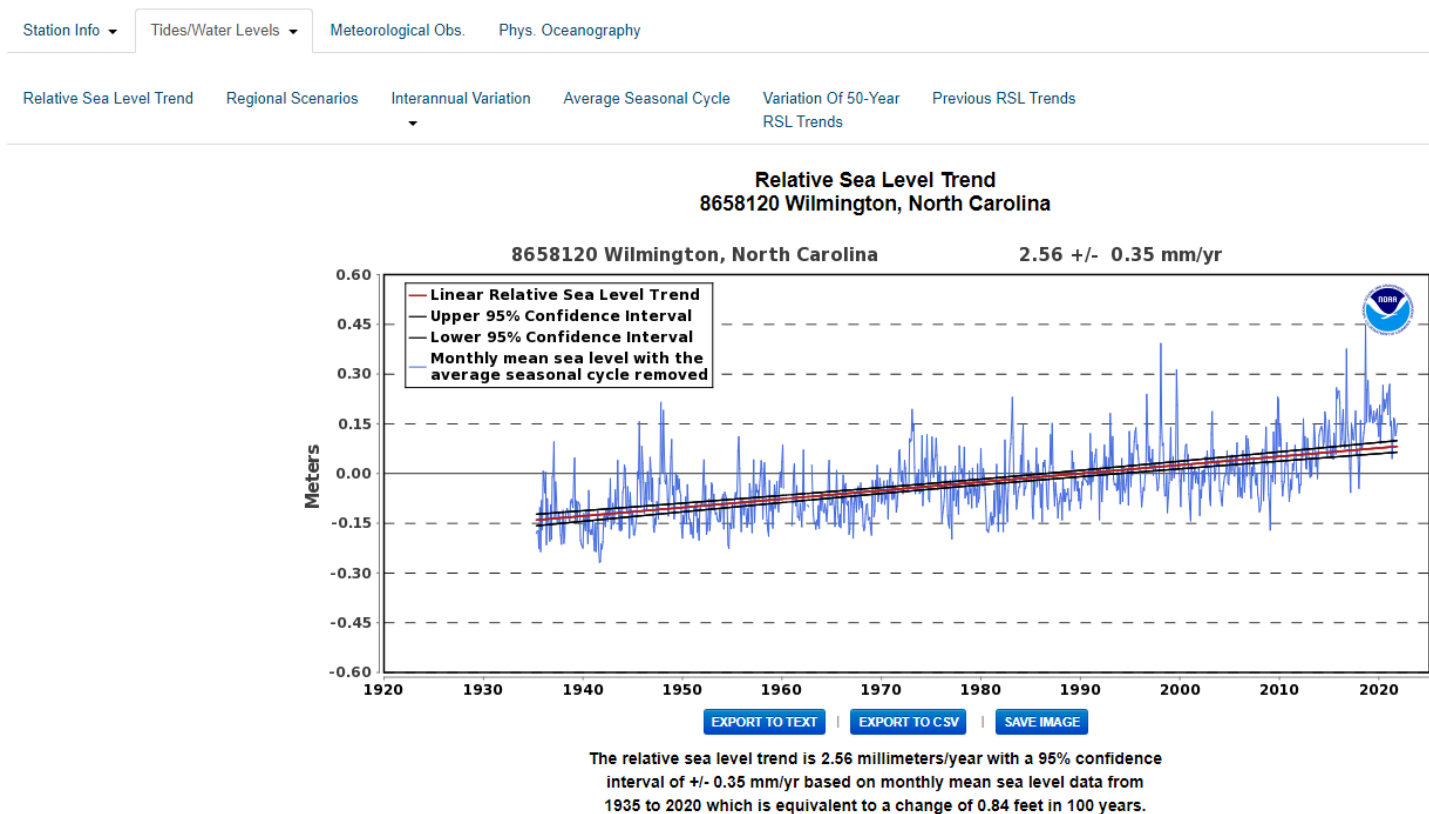
How to Use Climate at a Glance

This tool can be used to collect a variety of data and charts at a very local level by selecting "City" and "Time Series." Once you enter each drop down menu with the desired information, click the "Plot" button to update the graph. The chart is interactive, but can be downloaded as a simple image by right clicking anywhere within it and choosing *View as PNG* and then right clicking and choosing *Save image as...*

The same information can be plotted at the county, divisional, statewide, regional, and national levels.

NOAA National Ocean Service Tides & Currents

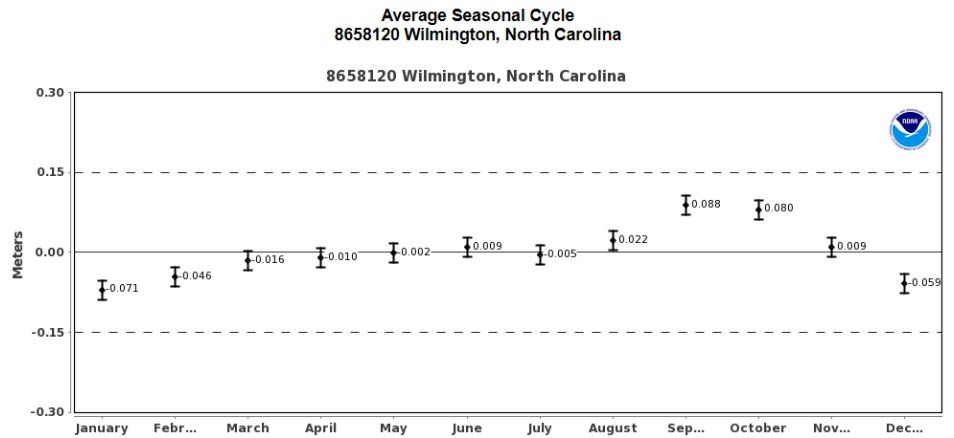
NOAA's [Tides & Currents site](#) provides interactive charts and maps showing sea level trends measured by gauges across the country.



How to Use Tides & Currents

Local relative sea level trends can be viewed by station by clicking on a location in the interactive map and choosing *Linear Trend*. The next page allows you to toggle between Relative Sea Level Trend (shown), Regional Scenarios, Interannual Variation, Average Seasonal Cycle, Variation of 50-year Trends, and Previous Trends. These graphs can be downloaded as images to be used and cited directly in your report.

Each chart provides an additional layer of understanding. For example, the relative trend in sea level rise in Wilmington (above) is increasing. Seasonally, the fall months are seeing higher sea levels (right), which coincide with the Atlantic hurricane season. Sea level rise is a climate-related stressor that exacerbates storm surge.



The National Integrated Drought Information System (NIDIS) Drought Portal

NIDIS is a multi-agency partnership that coordinates drought monitoring, forecasting, planning, and information at federal, tribal, state, and local levels across the country. Drought is a climate-related stressor and can be highly unpredictable. The Drought Portal provides data by state or city for current conditions, various drought indicators (measures), short-term and long-term predictions, and future outlooks. Additional information is provided by sector. These pages discuss current conditions, key issues, and drought impacts, as well as provide resources for planning and preparedness, communication and outreach, and other topics.

Public Health and Drought Conditions View Interactive Map

Social Vulnerability Index
Heat Warnings
AirNow Air Quality Index

This map shows the Center for Disease Control and Prevention's 2018 Social Vulnerability Index (SVI) designations alongside current drought conditions from the U.S. Drought Monitor (USDM). The SVI uses 15 U.S. census variables at tract level (e.g., poverty, lack of vehicle access, crowded housing) to help local officials identify communities that may need support in preparing for or recovering from hazards, like drought. [Learn more.](#)

Social Vulnerability Index (SVI)

High SVI areas in drought

U.S. Drought Monitor

D0 D1 D2 D3 D4

Source(s): [CDC](#), [U.S. Drought Monitor](#)

USDM Updates Weekly - 12/21/21

46.56%

of counties in Moderate to Exceptional (D1-D4) Drought also have high Social Vulnerability risk

0

National Weather Service heat warnings

49

counties with active wildfires

Also through NIDIS, you can link out to the [U.S. Drought Monitor Maps](#). These maps are released weekly and use the same five-class scale. Chances are, if you have seen a drought map of your state, it's in this format. There are current and past maps available at several scales: national, regional, state, watershed, tribal areas, and others. These maps are available for download.

How to Use the NIDIS Drought Portal

Enter your community's name into the search bar and explore current and past drought conditions. There are optional links to a county and state page as well. Some of the images here are available for download to cite and use for your report. The spatial data typically available for drought is not suitable for a detailed vulnerability and risk analysis. However, information related to past drought conditions and future precipitation projections and drought predictions can help a community understand if there may be drought-related impacts to the economy, public health, wildfire, or something else. In this way, communities can still plan to prepare, even if the impacts can't be quantified.

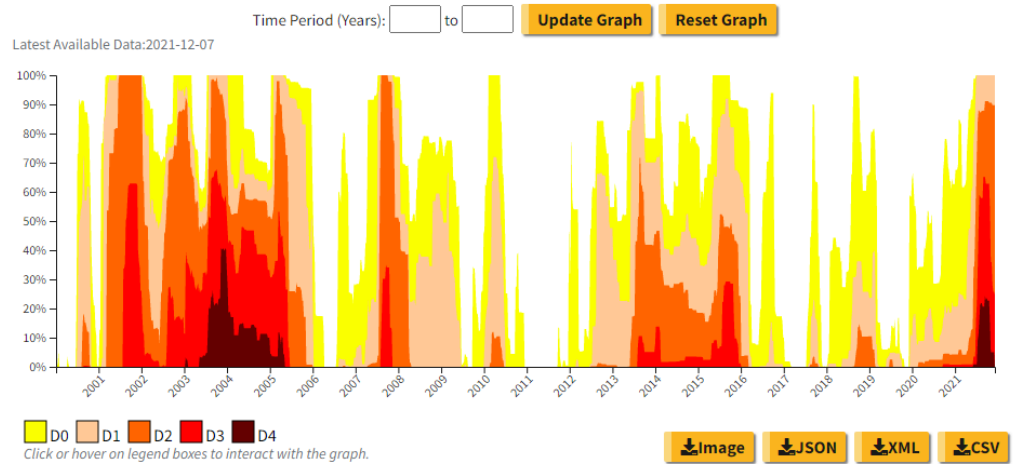
Drought in Idaho from 2000–Present

The U.S. Drought Monitor started in 2000. Since 2000, the longest duration of drought (D1–D4) in Idaho lasted 258 weeks beginning on January 30, 2001, and ending on January 3, 2006. The most intense period of drought occurred the week of December 23, 2003, where D4 affected 40.78% of Idaho land.

[2000 - Present \(Weekly\)](#) [1895 - Present \(Monthly\)](#) [0 - 2017 \(Yearly\)](#)

[Explore Historical Maps](#)

The U.S. Drought Monitor (USDM) is a national map released every Thursday, showing parts of the U.S. that are in drought. The USDM relies on drought experts to synthesize the best available data and work with local observers to interpret the information. The USDM also incorporates ground truthing and information about how drought is affecting people, via a network of more than 450 observers across the country, including state climatologists, National Weather Service staff, Extension agents, and hydrologists. [Learn more.](#)

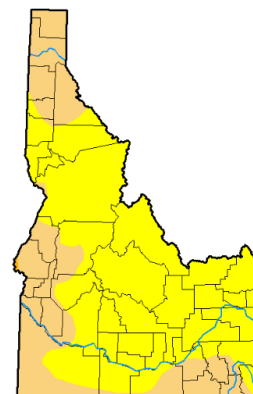


The U.S. Drought Monitor maps (right) can be viewed at a variety of scales and for past or current conditions. These maps can be downloaded directly from the website for use in your report.

Date: Area type: Area:

Map type:

U.S. Drought Monitor Idaho



August 21, 2018
(Released Thursday, Aug. 23, 2018)
Valid 8 a.m. EDT

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	30.77	0.09	0.00	0.00
Last Week 08-14-2018	13.44	86.56	30.77	0.09	0.00	0.00
3 Months Ago 05-22-2018	72.71	27.29	2.81	0.00	0.00	0.00
Start of Calendar Year 01-02-2018	99.97	0.03	0.00	0.00	0.00	0.00
Start of Water Year 09-26-2017	35.98	64.02	15.90	1.23	0.00	0.00
One Year Ago 08-23-2017	55.44	44.56	17.28	0.80	0.00	0.00

Intensity:
■ D0 Abnormally Dry ■ D3 Extreme Drought
■ D1 Moderate Drought ■ D4 Exceptional Drought
■ D2 Severe Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

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<http://droughtmonitor.unl.edu/>

EJScreen: Environmental Justice Screening and Mapping Tool (US EPA)

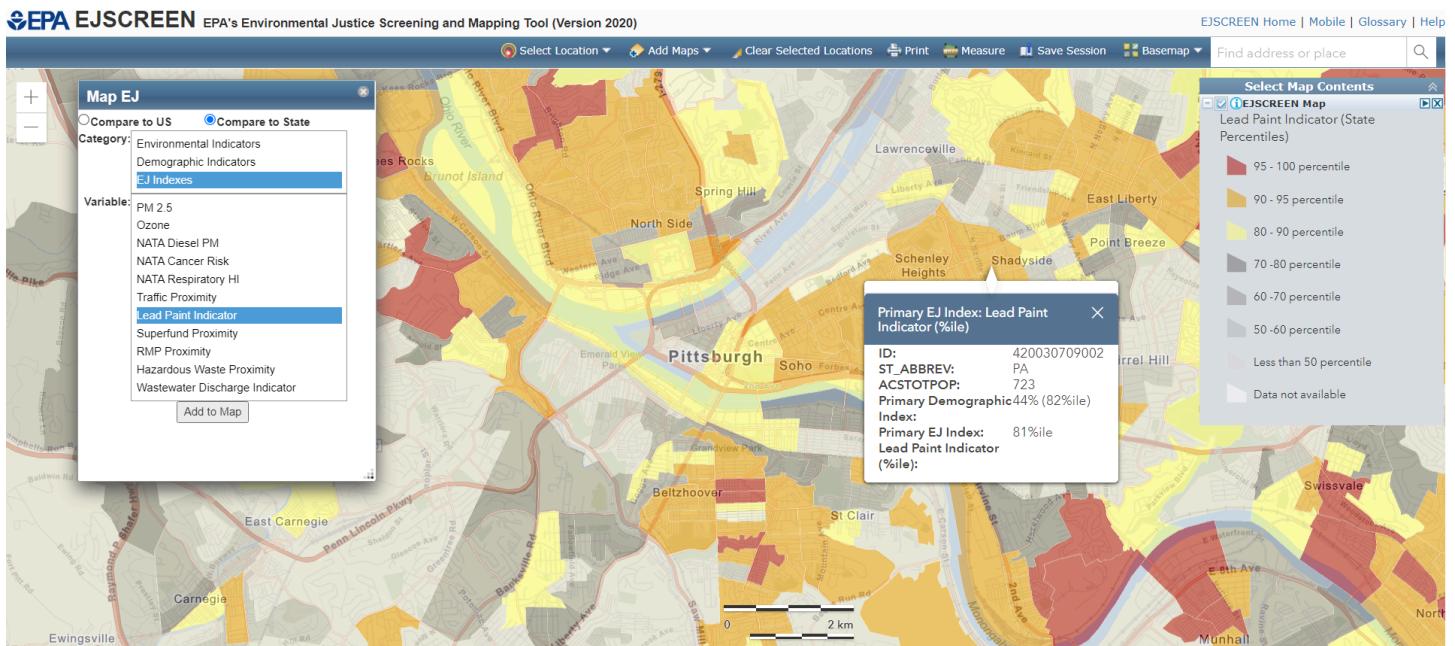
[EJSCREEN: Environmental Justice Screening and Mapping Tool](#) is an environmental justice mapping and screening tool that provides EPA with a nationally consistent dataset and approach for combining environmental and demographic indicators. EJSCREEN users choose a geographic area; the tool then provides demographic and environmental information for that area. All of the EJSCREEN indicators are publicly-available data. EJSCREEN simply provides a way to display this information and includes a method for combining environmental and demographic indicators into EJ indexes.

The tool is a useful exploration tool for investigating non-climate stressors in your community.

How to Use EJScreen

When you enter the tool, you will begin with a blank map. Choose *Select Location* from the top menu and use one of the site selection options provided. Once you add a location, a pop-up menu will appear with several links to different reports. Feel free to explore the links and then close the pop-up to add data to the map (we will return to the pop-up menu later).

Choose *Add Maps* from the top menu. There are three categories to choose from: Environmental Indicators, Demographic Indicators, and EJ Indexes. Environmental and Demographic Indicators are both standalone, while the EJ Indexes option is a combination of the Environmental Indicator and the demographic index (a combination of all Demographic Indicators). Select the category and variable of interest and add it to the map. The map is interactive and provides more information by clicking on an area:



To return to the chart or report pop-up, click on the cross hairs that were placed when you selected a location. In this example, the location selected was Pittsburgh, PA. Although the rest of the information summarized remains the same, the map within the option *Get Printable Standard Reports...* will update based on the map displayed. This and the other available reports can be downloaded as a PDF for a handy reference throughout the project.

Community Resilience Estimates Dashboard (U.S. Census Bureau)

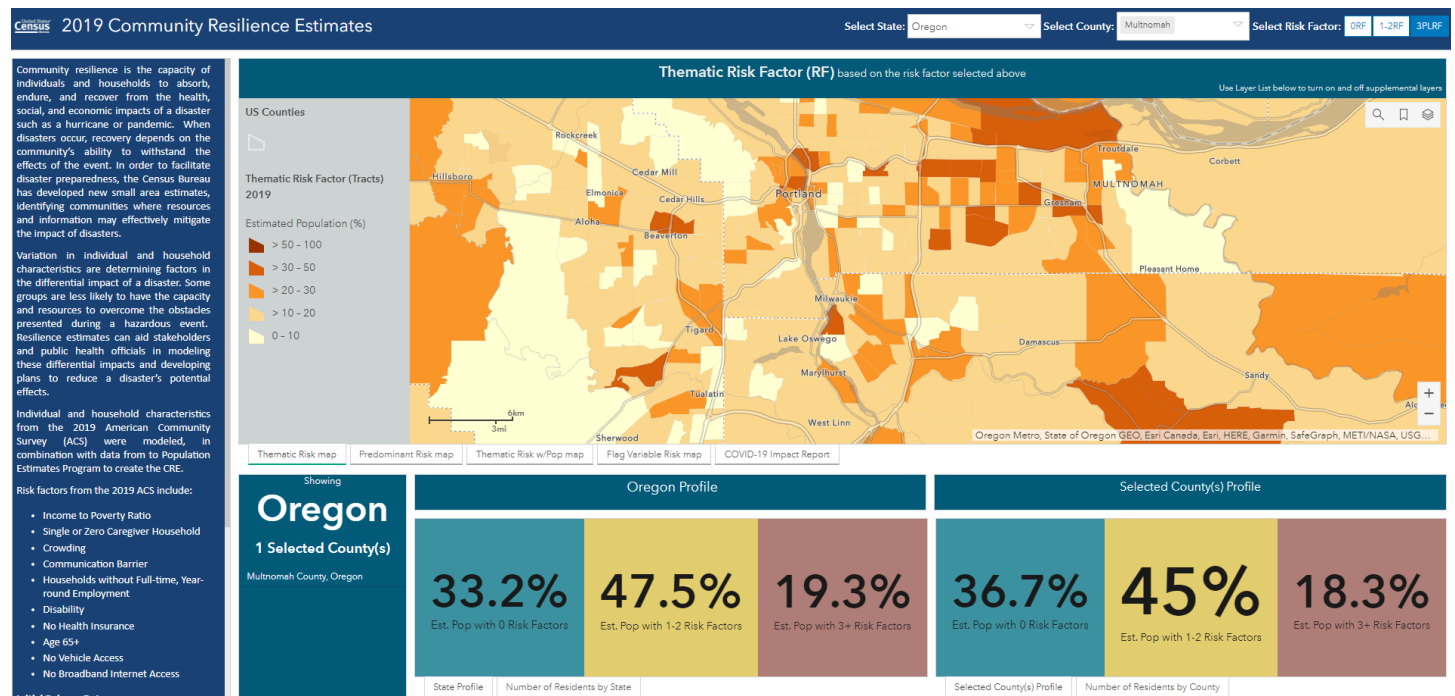
The [U.S. Census Bureau Community Resilience Estimates Dashboard](#) compiles small area estimates to identify communities where resources and information may effectively mitigate the impact of disasters. Individual and household characteristics from the 2019 American Community Survey were modeled, in combination with data from the Population Estimates Program. Risk factors include:

- Income to poverty ratio
- Single or zero caregiver household
- Crowding
- Communication barrier
- Households without full-time, year-round employment
- Disability
- No health insurance
- Age 65+
- No vehicle access
- No broadband internet access

How to Use the Community Resilience Estimates Dashboard

Select state and county from the menu at the top. Additionally, select how you would like the risks grouped: zero risks, 1-2 risks, or three plus risks (remember that the risks are listed above). The interactive dashboard will update as you make these selections.

Although the dashboard only displays summarized information, the basic premise is that areas with more risk factors will be less resilient to disasters.



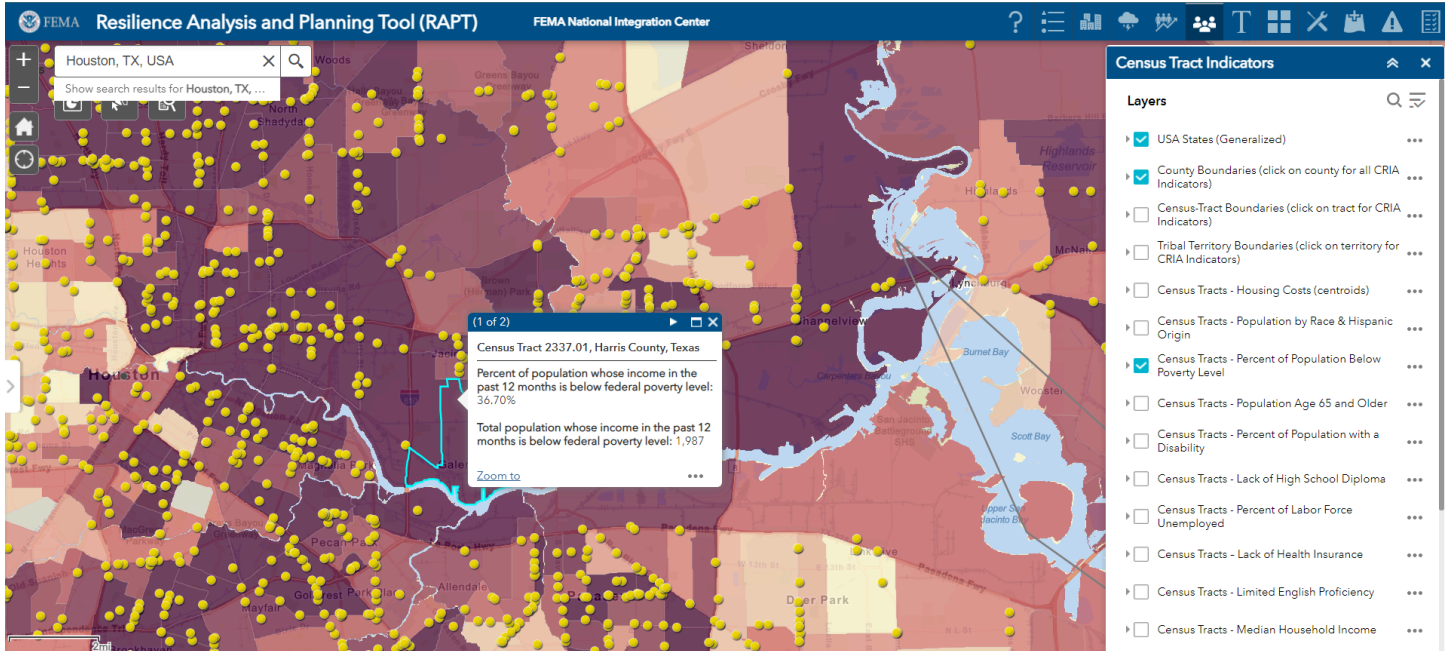
Resilience Analysis and Planning Tool (FEMA)

The [Resilience Analysis and Planning Tool \(RAPT\)](#) allows federal, state, local, tribal and territorial emergency managers and other community leaders to examine the interplay of census data, infrastructure locations, and hazards, including real-time weather forecasts, historic disasters, and estimated annualized frequency of hazard risk. This tool can be used to understand asset locations (using the infrastructure menu), non-climate

stressors (such as developed areas), and a variety of demographic indicators at both the county and census tract levels.

Using the Resilience Analysis and Planning Tool

Begin by selecting a location. From there, add different types of data to the map from the menu at the top. There is no right or wrong way to add data, as it depends on what you would like to visualize for the project. Select an area on the map to further interrogate the data you have added:



Use the Toolbox menu at the top to save the map as an image for your report.

National Risk Index for Natural Hazards

The [National Risk Index](#), created by FEMA, can be used to identify communities at risk to 18 natural hazards. The tool includes the Risk Index, Expected Annual Loss estimates, Social Vulnerability, and Community Resilience at the county or census tract levels. The hazards included in the Risk Index can also be viewed individually, including:

- Coastal Flooding
- Drought
- Earthquake
- Heat Wave
- Hurricane
- Ice Storm
- Landslide
- Lightning
- Tornado
- Tsunami

Using the National Risk Index

Decide between County view and Tract view and select the desired location. The information can be viewed in the interactive map and scrolling sidebar or choose “Create a Report” to view the information in a PDF that can be saved or printed. This report goes into greater detail and provides information through maps, charts, graphs, and tables.