

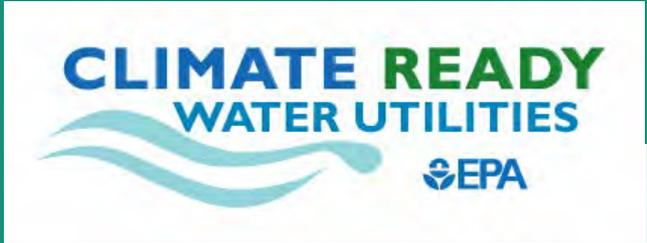
EPA's Climate Resilience Evaluation & Awareness Tool: Supporting Utilities Adapting to the Impacts of Climate Change

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Introduction

- Intro video
- Mission statement/purpose of CRWU
- Process
- Intro to the tool
- Quick run-through
- Other tools for Water Security/Resilience



Intro video on CRWU

https://www.youtube.com/watch?v=fa0oK_jE8Zw

Climate Ready Water Utilities (CRWU) Mission Statement

To provide the water sector with the practical tools and training to adapt to climate change by promoting a clear understanding of climate science and adaptation options.

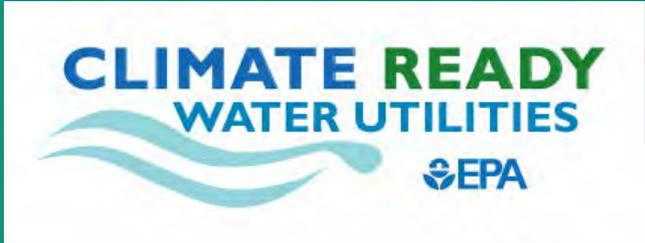


CLIMATE READY PROCESS



The Climate Ready Water Utilities initiative offers practical tools and resources to help the water utility sector understand and adapt to climate change impacts.



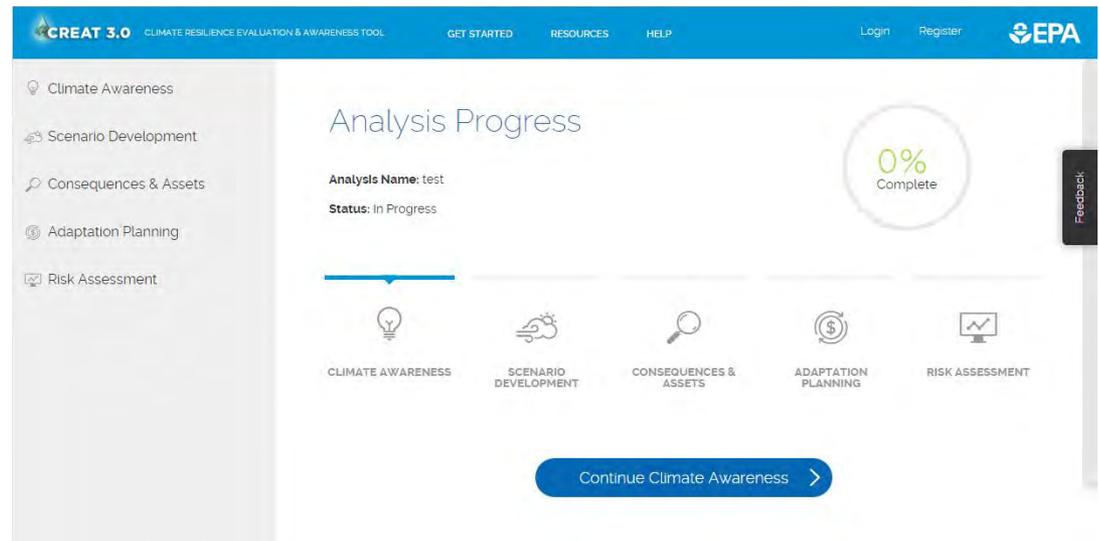


Climate Resilience Evaluation & Awareness Tool (CREAT)

Assess Risks and Plan Adaptation for your Utility

CREAT

- Web-based tool for conducting **risk assessment** of potential climate change impacts at your utility
- Multiple climate scenarios provided to help **capture uncertainty**
- Assessments will help inform **adaptation planning**
- Results from CREAT help utilities compare **monetized risk and adaptation costs**



CREAT 3.0

The screenshot shows the top navigation bar of the CREAT 3.0 website. On the left, it features the CREAT 3.0 logo and the text "CLIMATE RESILIENCE EVALUATION & AWARENESS TOOL". In the center, there are three menu items: "GET STARTED", "RESOURCES", and "HELP". On the right, there are links for "Login" and "Register", followed by the EPA logo. Below the navigation bar is a large hero image of a stormy ocean with white-capped waves crashing. Overlaid on the right side of the hero image are two white text boxes. The top box contains the text: "The **Climate Resilience Evaluation and Awareness Tool** is a risk assessment and planning application for water, wastewater and stormwater utilities." The bottom box contains the text: "**CREAT** helps water sector utilities understand and adapt to climate change."

Discover: Find out which extreme weather events pose significant challenges to your utility and build scenarios to identify potential impacts.

Assess: Identify your critical assets and the actions you can take to protect them from the consequences of climate change on utility operations.

Share: Generate reports describing the costs and benefits of your risk reduction strategies for decision-makers and stakeholders.

Get Started



CREAT 3.0 Process

DEMO



CLIMATE AWARENESS

Provide basic utility information
Increase awareness of climate impacts



SCENARIO DEVELOPMENT

Understand utility risk
Design scenarios of threats based on climate data



CONSEQUENCES & ASSETS

Outline potential consequences
Catalog critical assets



ADAPTATION PLANNING

Inventory current actions that provide resilience
Design adaptation plans



RISK ASSESSMENT

Assess risk from a changing climate
Evaluate adaptation plans



CREAT 3.0

- Explore local climate data
- View links to publications, models, and other tools
- Catalog data and assumptions
- Understand and assess climate impacts
- Compare adaptation options
- Generate reports to support decisions

The screenshot shows the 'Climate Change Basics' page in the CREAT 3.0 interface. The header includes the logo, 'CLIMATE RESILIENCE EVALUATION & AWARENESS TOOL', 'GET STARTED', 'RESOURCES', 'Login', 'Register', and the EPA logo. A left sidebar contains a navigation menu with items like 'Climate Awareness', 'Utility Information', 'Climate Change Basics', 'Current Concerns', 'Awareness Summary', 'Scenario Development', 'Consequences & Assets', 'Adaptation Planning', and 'Risk Assessment'. The main content area features the title 'Climate Change Basics' and a paragraph: 'Click on any region in the map below to learn about climate change impacts in that area. You can also review national or coastal climate impacts and learn about how climate change is expected to impact a specific sector by clicking on the Topic Links.' Below the text is a map of the United States with state boundaries. A 'Feedback' button is visible on the right side.

The screenshot shows the 'Threat Identification' page in the CREAT 3.0 interface. The header is identical to the previous screenshot. The left sidebar highlights 'Scenario Development' and lists 'Scenario Pfinder', 'Threat Identification', 'Baseline Scenario', 'Time Period', 'Projected Scenarios', 'Threat Definition', and 'Scenario Summary'. The main content area has the title 'Threat Identification' and a paragraph: 'Select from the threats below to include in your analysis. Certain threats will be selected by default based on your Current Concerns selection. You can also add custom threats for inclusion in the analysis. Click on the ? below each threat to learn more and view a climate threat example.' Below this are five threat cards: 'Drought' (with a tree icon), 'Ecosystem Changes' (with a leaf icon), 'Floods' (with a house and water icon, and a green checkmark), 'Service Demand (and) Use' (with a faucet icon), and 'Water Quality Degradation' (with a beaker icon). Each card has an information icon (i) below it. A 'Continue' button with a right arrow is at the bottom. A 'Feedback' button is on the right side.



CLIMATE READY
WATER UTILITIES



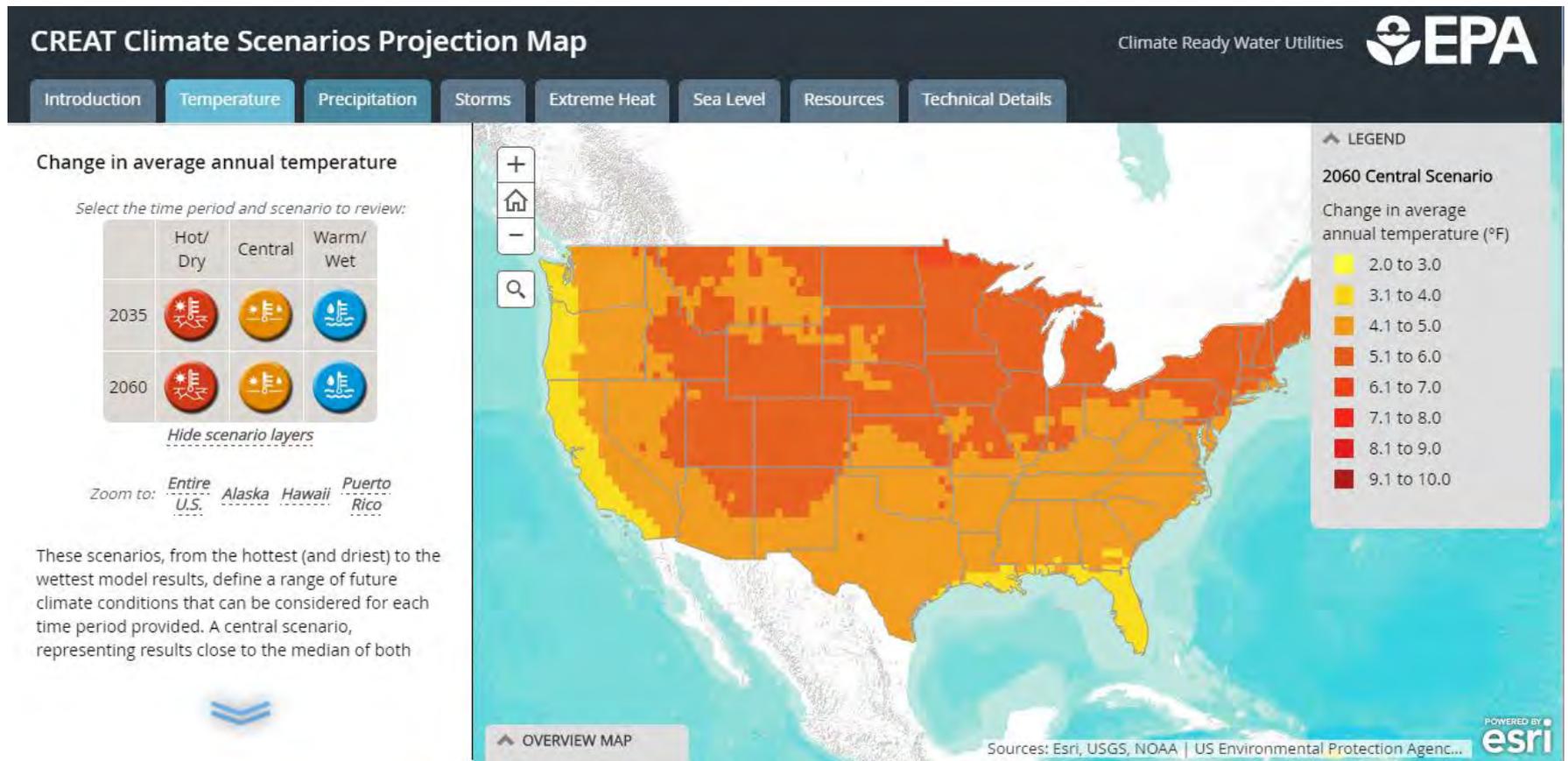
Climate Change Impacts: CREAT Data Services

Explore climate change, related hazards and
adaptation options at your location

Scenario-Based Climate Change Map

LINK

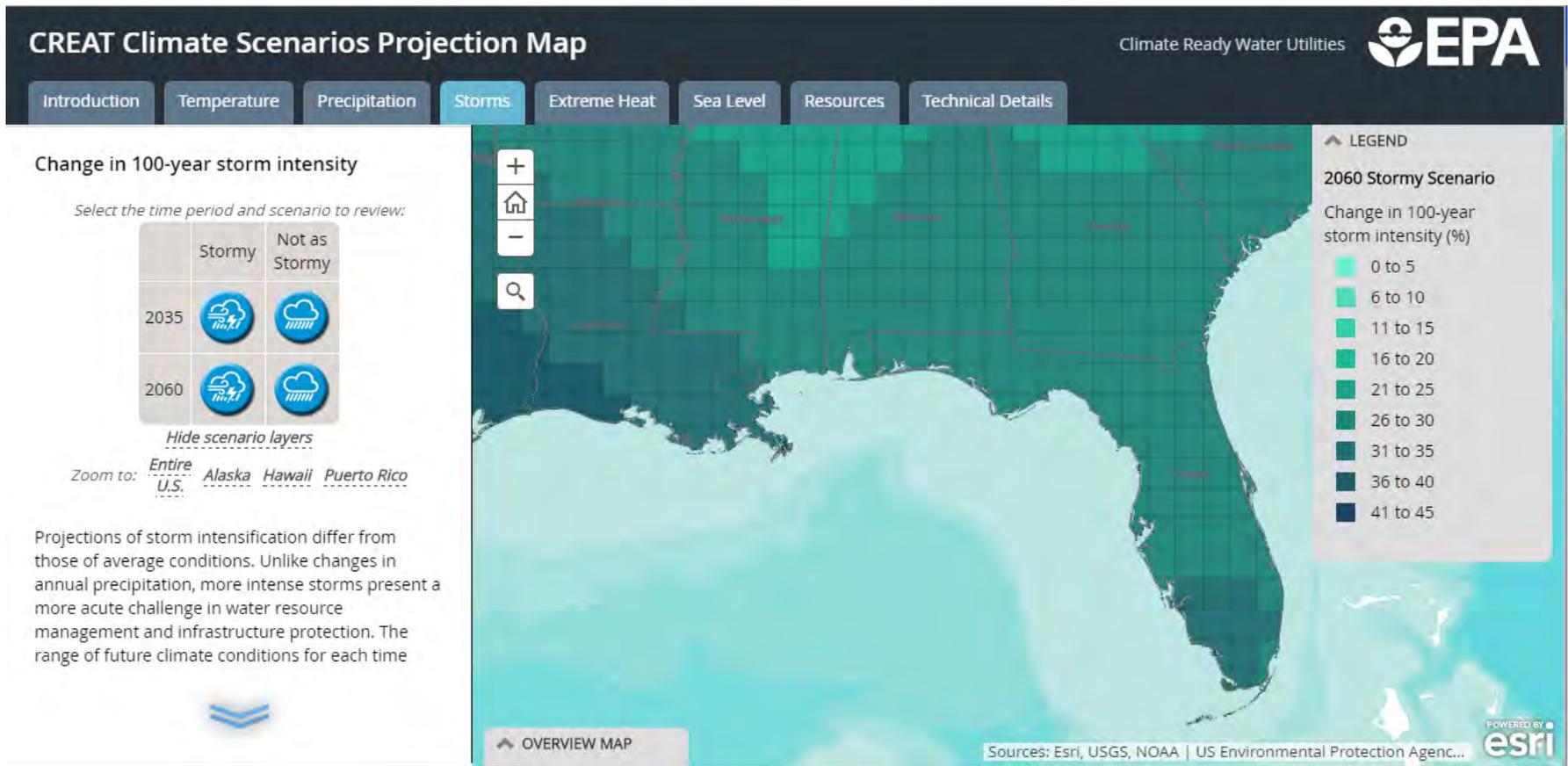
Provides scenarios that capture the range of projected changes in temperature and precipitation from models



Scenario-Based Climate Change Map

LINK

Data includes changes in average conditions and extreme events (hot days and storms), plus sea level rise



Scenario-Based Climate Change Map

[LINK](#)

For the grid cell containing Miami:

Change in Average Annual Temperature

Period	Scenario		
	Hot/ Dry	Central	Warm/ Wet
2035	2.0 °F	1.7 °F	1.5 °F
2060	3.8 °F	3.3 °F	2.8 °F

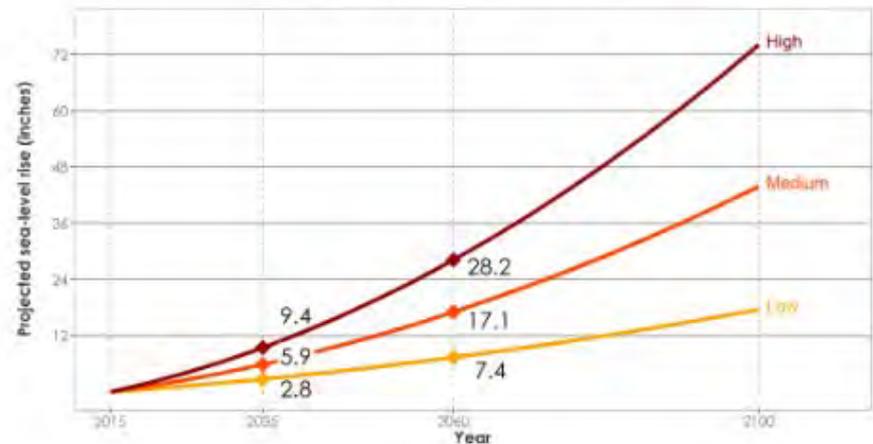
Change in Average Annual Precipitation

Period	Scenario		
	Hot/ Dry	Central	Warm/ Wet
2035	-5.0%	-0.9%	2.3%
2060	-9.8%	-1.7%	4.6%

Change in 100-Year Storm Intensity

Period	Scenario	
	Stormy	Not as Stormy
2035	14.4%	2.8%
2060	28.0%	5.5%

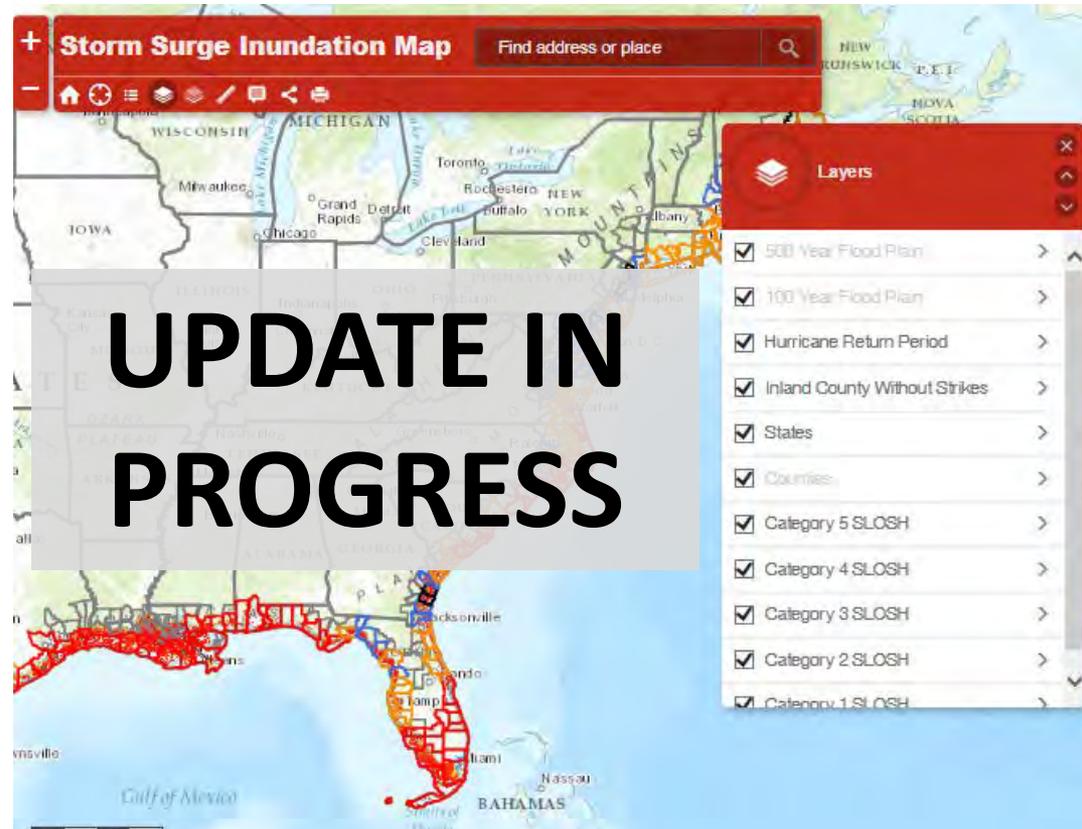
Sea Level Rise Projections



Storm Surge Inundation Map

LINK

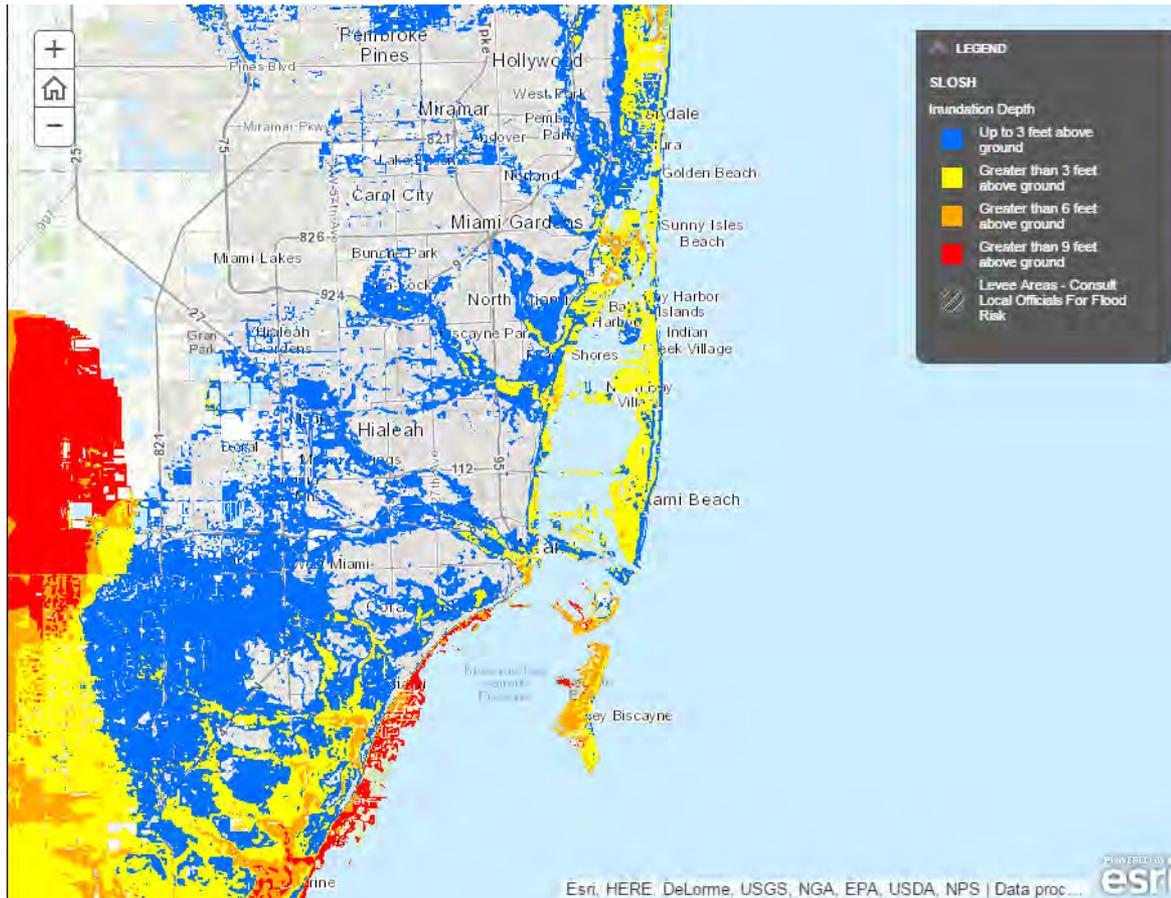
- Access current worst-case coastal storm surge scenarios and hurricane strike frequency information
- Layers include FEMA flood zones and inundation from Sea, Lake, and Overland Surge from Hurricanes (SLOSH) model results



Storm Surge Inundation Map

LINK

For Miami-Dade County:



Category	# of strikes	Return period* (yrs)
1	6	18
2	5	22
3	8	14
4	4	28
5	2	55

*Return period is defined as the average recurrence interval of a hurricane of similar magnitude over an extended period of time, e.g., 1900-2009

- Frequency of storms and potential flood depth useful for planning
- Caution: no consideration of sea level rise or more intense storm events



CLIMATE READY
WATER UTILITIES



Adaptation in Action: CREAT Use at Utilities

Utility Case Study Examples

Case Study and Information Exchange

LINK

Adaptation Case Study and Information Exchange

Climate Ready Water Utilities   



Welcome and Case Studies

Drought

Floods

Ecosystem Changes

Service Demand

Water Quality

Videos

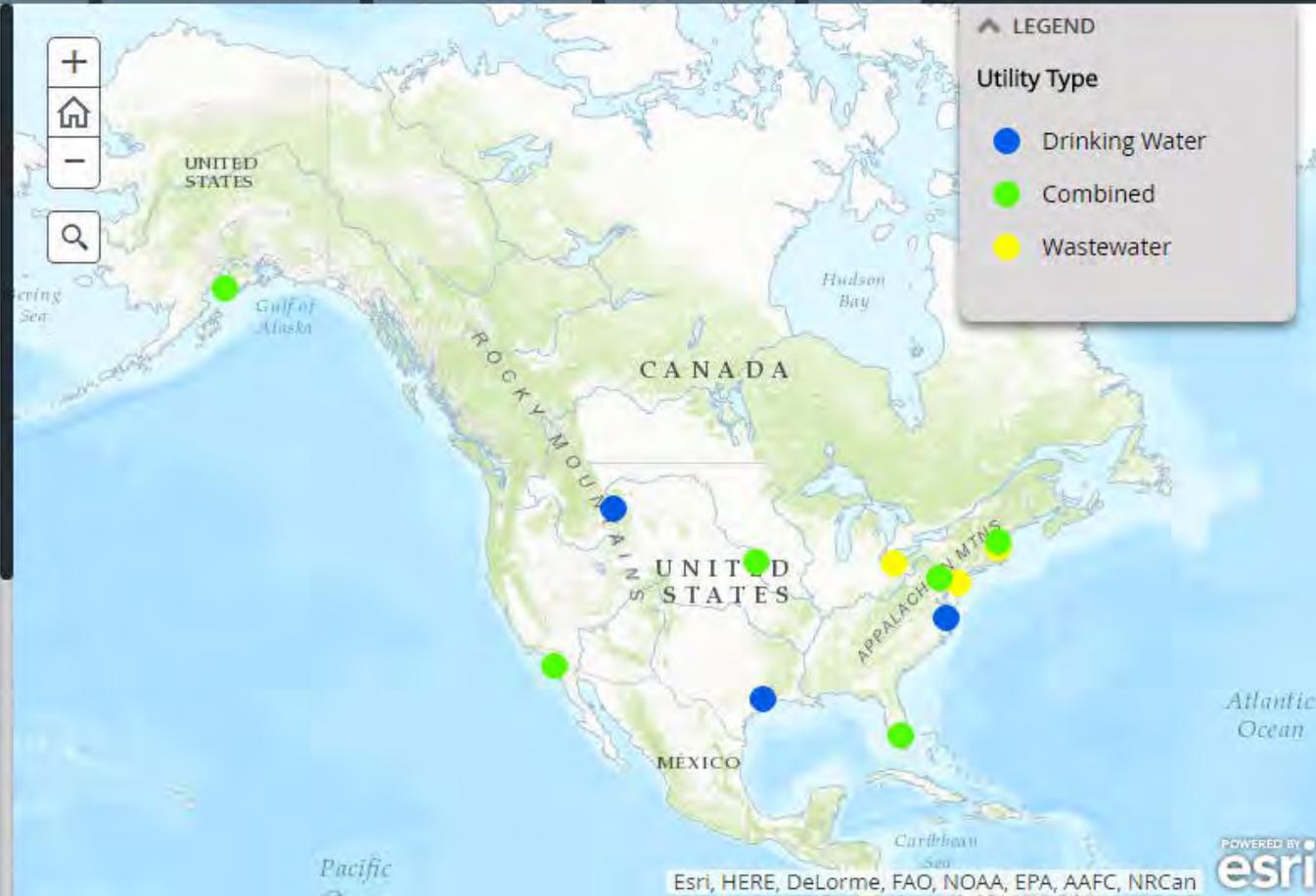
Welcome to the U.S. Environmental Protection Agency's (EPA) Adaptation Case Study and Information Exchange, which has been developed under the Climate Ready Water Utilities (CRWU) initiative. This tool allows water sector -- drinking water, wastewater and stormwater -- utilities to learn about climate change adaptation planning efforts from their peers across the United States.

Water sector utilities are actively planning to address climate change impacts. These efforts and their lessons learned can help to inform other water sector utilities with their own adaptation planning processes and decision making. EPA encourages utilities to connect with one another for information on how their communities can pursue similar adaptation strategies.

How to use this map

Each point on this map represents a drinking water, wastewater or combined utility. Clicking on a point generates a pop-up box that provides the name, type and applicable climate threats facing a particular utility, as well as the corresponding adaptation measures that the utility considered for implementation. Click on the tabs located at the top of the page to filter the utilities by climate threat.

Click the link near the bottom of the pop-up to access a case study that summarizes the utility's



Case Study and Information Exchange

LINK

Adaptation Case Study and Information Exchange

Climate Ready Water Utilities



Welcome and Case Studies

Drought

Encourages utilities to connect with one another for information on how their communities can pursue similar adaptation strategies.

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Click the link near the bottom of the pop-up to access a case study that summarizes the utility adaptation measures and provides contact information for the utility.

Have your own climate adaptation story?

[Click here to share your case study.](#)

Learn more about climate readiness through these resources:

- [Climate Ready Water Utilities Homepage](#)
- [Adaptation Strategies Guide for Water Utilities](#)
- [Climate Resilience Evaluation & Awareness Tool \(CREAT\)](#)
- [Scenario-Based Projected Changes Map](#)

Add Your Story To The Map

Use this form to share your story. Please fill out as many items in the form as you can.

Please provide accurate contact information. EPA will contact you to verify information prior to adding your case study to the map.

1. Enter Information

Utility Name

City

State

Utility Type

Please enter drinking water, wastewater, stormwater or combined facility

Utility Size

Please provide an estimate of the population served

Primary Climate-Related Challenges

Primary climate-related challenges may include drought impacts such as lower quality degradation impacts such as surface water degradation and saline intrusion; ecosystem changes impacts such as wildfires and wetland loss and sea level rise and agricultural needs

255 characters remaining

Case Study: Water and Wastewater Utilities Planning for Climate Change



CITY OF BOZEMAN, MONTANA

Background

The city of Bozeman, Montana provides drinking water services to approximately 38,000 people. Snowpack melt captured in the Sourdough and Hyalite watersheds reaches the 22 million gallons per day (MGD) Sourdough Water Treatment Plant via local creeks and serves as the city's primary water source. In addition, an infiltration gallery and a 3.5 MGD water treatment plant delivers groundwater from the Lyman Creek Spring.

Climate Threats

Drought and wildfire are the two primary climate threats to the city of Bozeman, both of which have the potential to increase with a changing climate. The city of Bozeman is concerned that future droughts will impact management and allocation of their local water resources. Droughts also have the potential to impact water quality because of their tendency to increase the occurrence of blue-green algae. Wildfires in the Sourdough and Hyalite watersheds have the potential to negatively impact water quality due to erosion that can increase turbidity, sedimentation and metal concentrations. Direct damage to equipment, specifically the Hyalite Reservoir and its intake, is also a concern related to wildfire.

Planning Process

To better understand the vulnerabilities of its drinking water infrastructure and operations, the city of Bozeman assessed potential climate change impacts using the U.S. Environmental Protection Agency's (EPA) Climate Resilience Evaluation and Awareness Tool (CREAT). The CREAT assessment brought together individuals from EPA and various departments within the city of Bozeman to think critically about potential climate impacts, prioritize assets and consider possible adaptation options.

Adaptation Measures

The city of Bozeman considered the potential consequences of drought, water quality changes and wildfires on their drinking water assets and operations. To assess each of these potential threats, the city considered how potential adaptive measures would help lower consequences. The table below summarizes how adaptation options were grouped into two packages: those that provided the highest potential return on investment, and those that are included in their Integrated Water Resource Plan (IWRP).

Example Case Studies – Seminole Tribe of Florida

- Assessment focused on demand and wildfire after exploration of flooding risk revealed potential impacts lower than other risks
- Planning efforts encompass multiple communities with different needs and potential hazards



Natural Disasters



Water Supply Management

LOCATION	POTENTIAL ADAPTIVE MEASURES
Brighton Reservation (Wildfire)	Clear tree line near backup generator on the adjacent property at the water treatment plant
	Improve fire wall by replacing fence near facilities
	Relocate the backup generator away from the tree line
Hollywood Reservation (Increased Demand)	Install meters at isolation valves to track water use
	Adopt of drought-tolerant landscaping at the casino and consider irrigation changes
	Implement of a 'Healthy Homes' program to encourage adoption of water-saving devices
	Improve existing groundwater monitoring system
	Conduct community outreach to raise awareness of drought conditions and potential conservation activities

Example Case Studies – Camden County MUA (NJ)

- Assessment focused on improving operations under changing climate conditions as well as addressing potential extreme events
- Planning efforts encompass multiple goals for optimizing energy use and cost along with gains in resilience

GOAL	ADAPTIVE MEASURES
Improve water quality / Reduce CSOs	Capturing excess stormwater using planted trees and rain gardens through the Camden SMART initiative
	"Daylighting" streams that had previously been paved over using a low interest loan from the New Jersey Environmental Infrastructure Trust
	Converting an abandoned building into a riverside park
	Cleaning inlets to optimize the sewer system's performance through changes in operations and maintenance
Improve air quality	Replacing netting systems to optimize the sewer system's performance through changes in operations and maintenance
	Installing catalytic converters to reduce emissions
Minimize costs	Reducing I&I to minimize energy use and cost throughout the CCMUA system
	Using gravity connections as a replacement to municipal pumping stations
	Implementing electric peak shaving
	Using heating loops and energy-efficient equipment to increase total energy efficiency
Reduce energy	Installing a 1.8 megawatt solar panel array through a purchase agreement at no cost to CCMUA, and buying power from the contractor at a discounted rate
	Implementing a sewage-to-heat facility through a grant from the New Jersey Board of Public Utilities which converts latent heat in sewage into heat at the plant
	Building a digester facility to produce enough biogas to meet about 50 to 60% of the utility's power needs
	Installing a 1.8 megawatt solar panel array to provide 10% of energy needs at the wastewater treatment plant

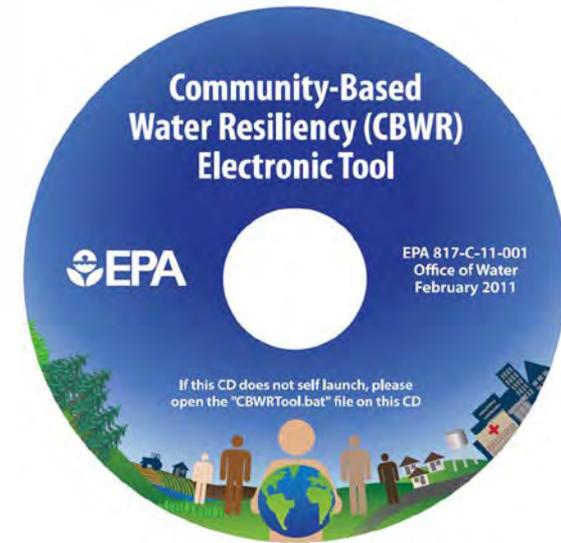


Other CRWU resources

Other Water Security tools

- <https://www.epa.gov/waterresilience>

Recognize & Reduce Risk



Community Based planning



Consequence Analysis

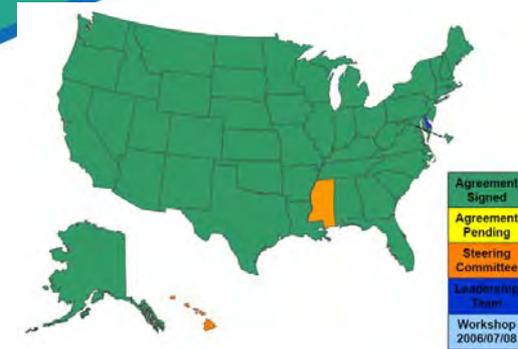
Risk Assessment Methodologies



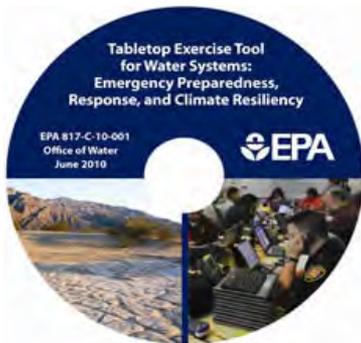
Maintain a Resilient Infrastructure



Water Contaminant Info Tool



Water/Wastewater Agency Response Networks



TTX Tools



FedFUNDS



Thank you!

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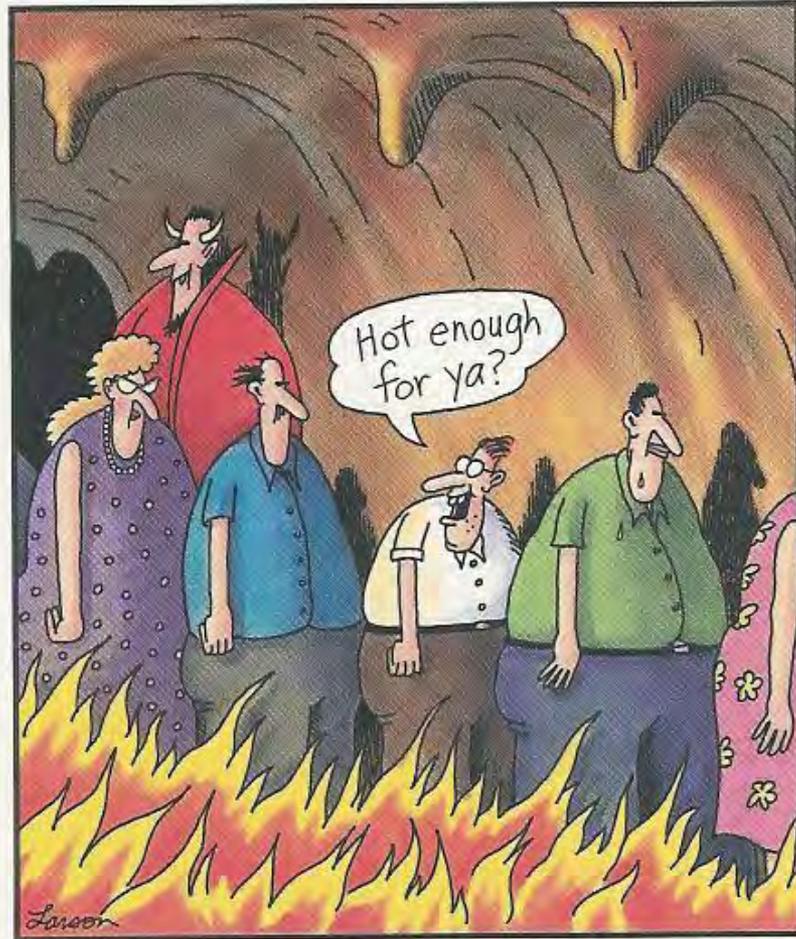
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Questions?



Nerds in hell