



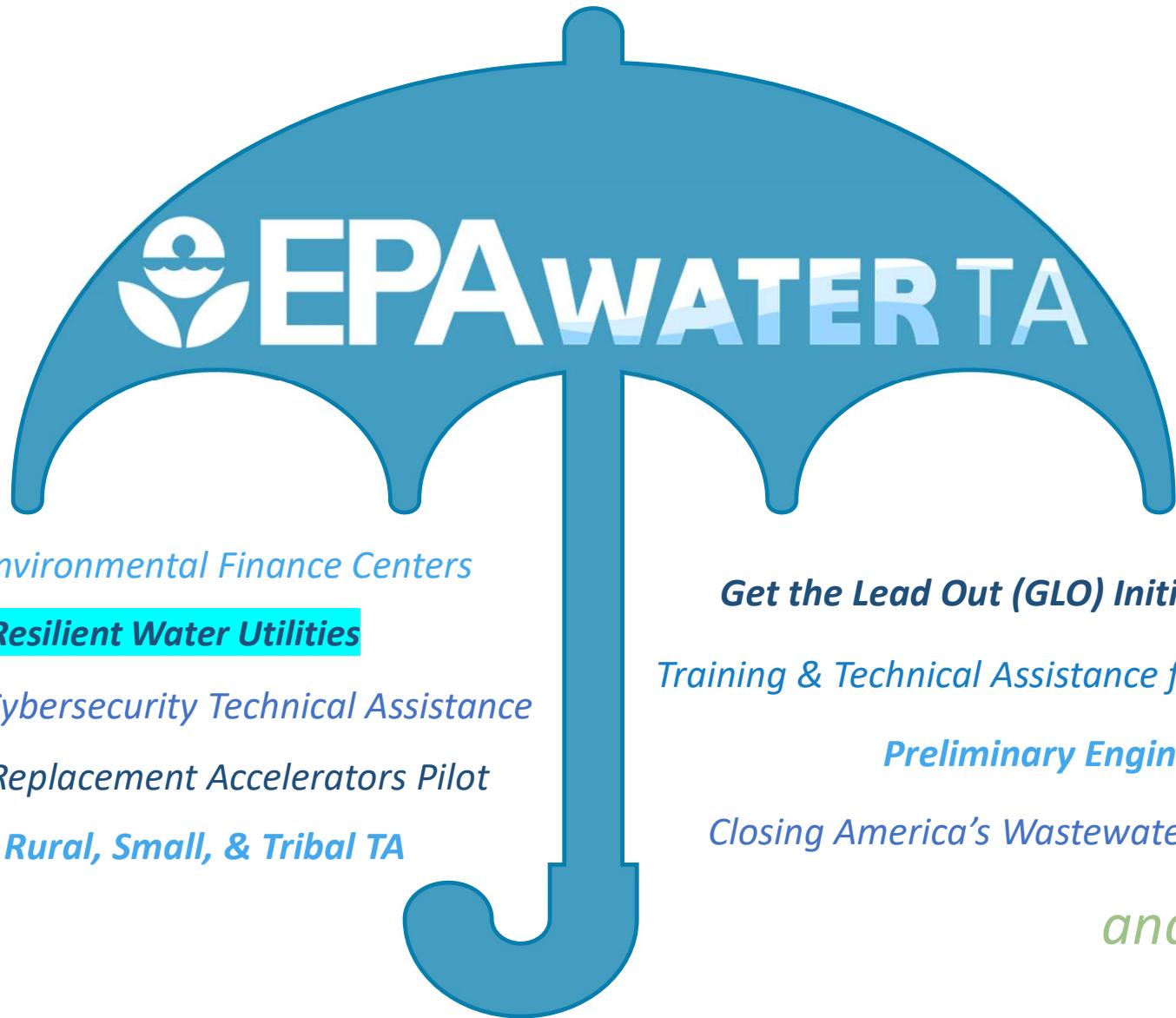
Environmental Protection Agency (EPA) Creating Resilient Water Utilities (CRWU) Initiative

Audrey Ramming | Natural Resources Specialist

SCAN ME



CRWU



Creating Resilient Water Utilities (CRWU): Our Mission

- Provide utilities with the **tools, training, and technical assistance** to increase resilience to climate change
- Promote a clear understanding of **climate science data** and potential **long-term adaptation options**
- Collaborate with utilities and partners to increase our reach and **improve our tools**
- **Improve resilience** in communities that bear disproportionate climate impact
- Non-regulatory



From Left to Right: Griggs Reservoir on Scioto River in OH; Water Replenishment District in Southern CA; Water Sanitation Area in Cincinnati, OH; Water Treatment Plant in San Diego, CA

CRWU Tools and Resources

ACCESS DATA

1. Climate Data Maps
2. Data Access Page
3. Environmental Justice Map

RISK ASSESSMENT APPLICATIONS

4. Resilient Strategies Guide
5. CREAT *

WEB RESOURCES

6. Adaptation Case Study Map
7. Training and Engagement Center
8. Climate Adaptation Funding



1

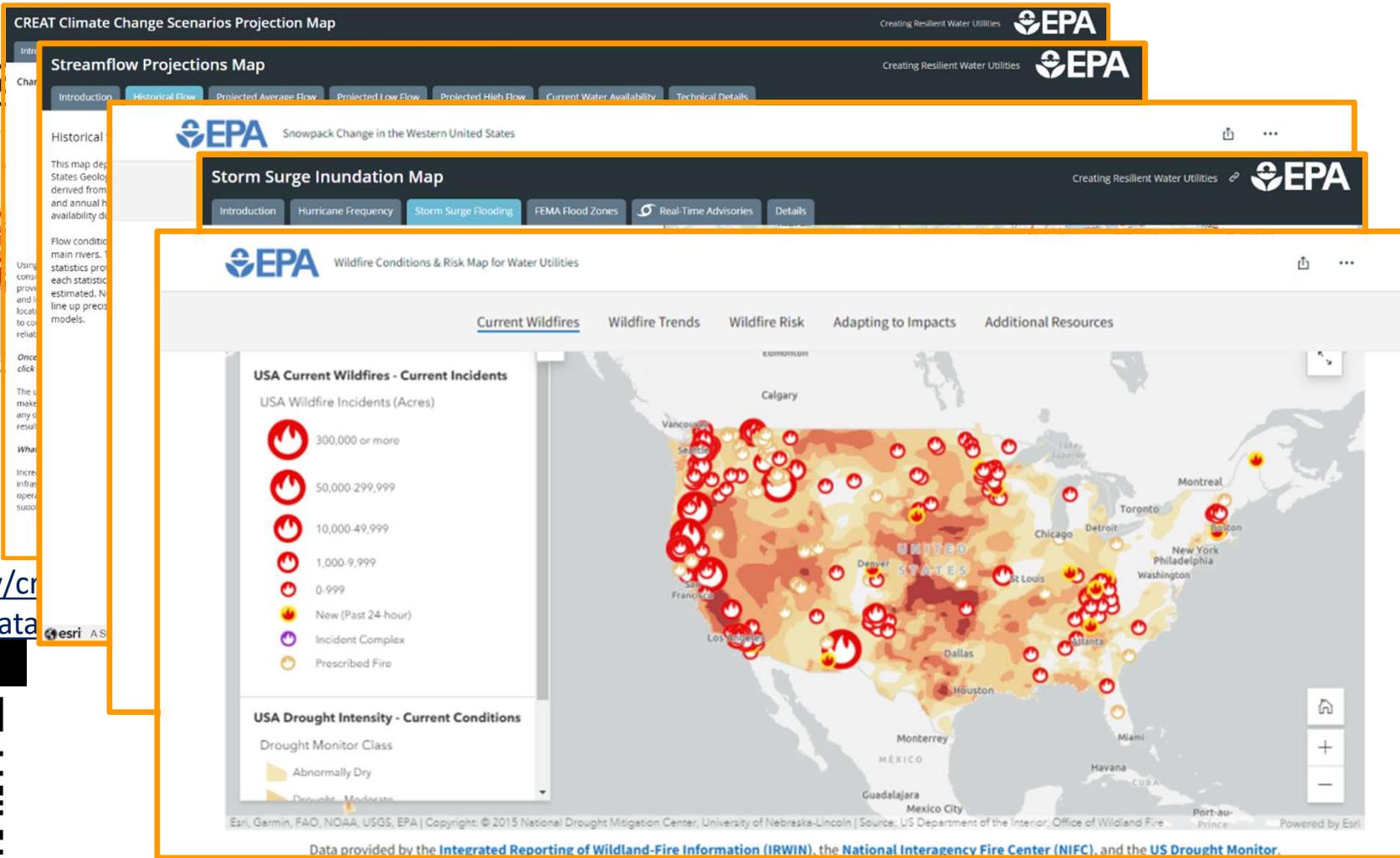
Inter

<https://www.epa.gov/climate-and-weather-data>

SCAN ME



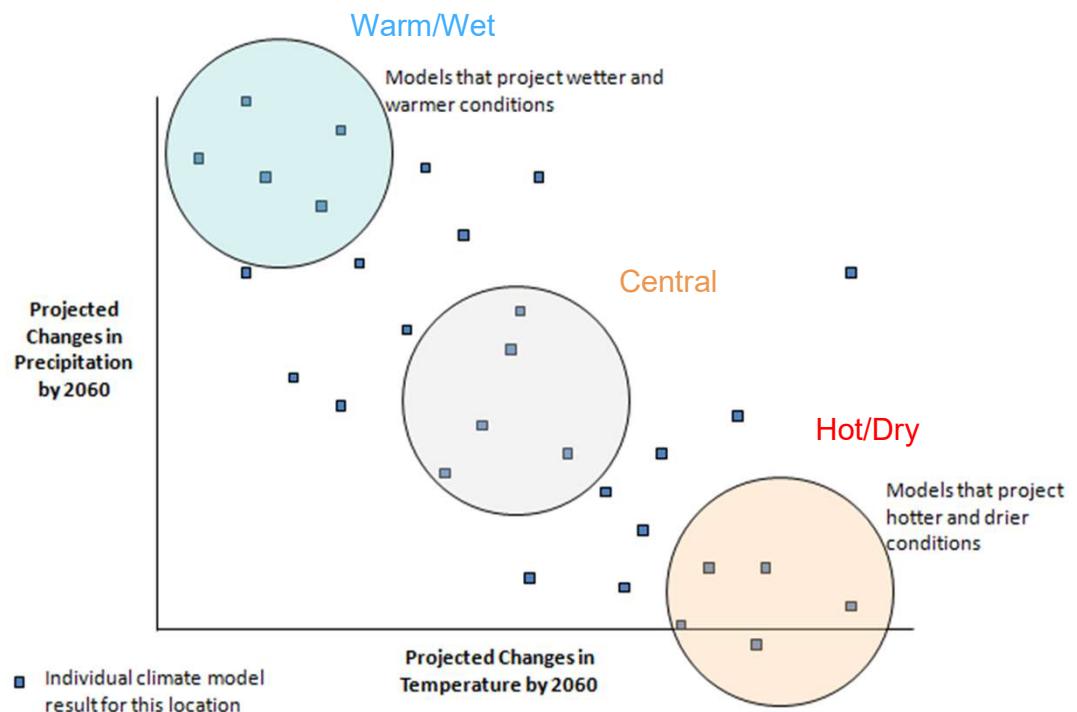
DATA MAPS



5. Wildfire Conditions and Risk Map

Climate Modeling – Future Climate Scenarios

- Climate model data can be difficult to interpret and work with
- CRWU's Climate Projection Maps, Data Access Page, and CREAT combines similarly behaving models to produce possible future climate scenarios
- **Three possible scenarios** help utilities frame potential climate vulnerabilities
- Increases confidence in likely outcomes



CLIMATE TRENDS FOR WYOMING

- **Temperature increases in all months**

- More summer heatwaves
- Warming winter minimums

- **Precipitation increases in most places**

- Relatively minor increases
- Some months become drier
- More heavy precipitation
- Less light precipitation

- **Droughts become longer and more variable**

- **Snowpack declining**

- Warmer winters
- More rain and rain-on-snow events
- Peak occurring earlier

- **Storms become more frequent and intense**

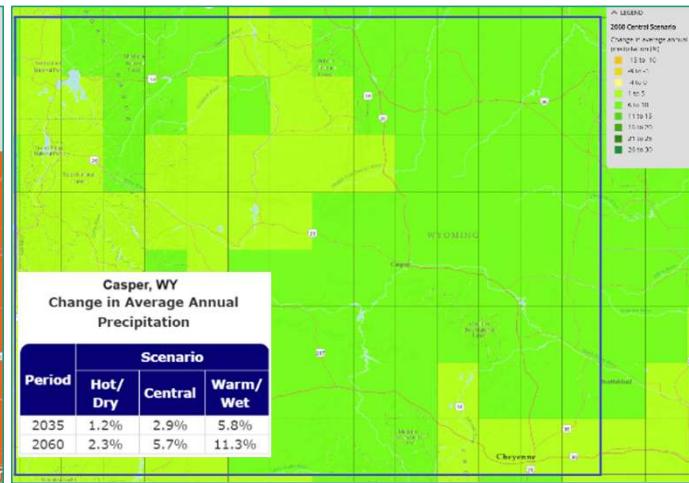
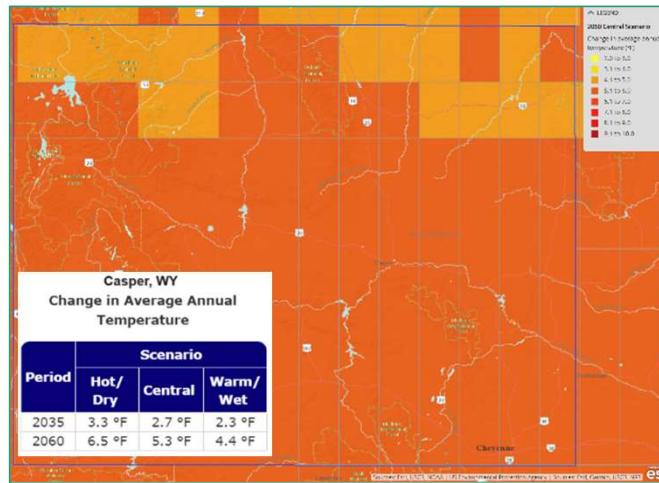
- Increase in heavy precipitation
- Increased tornado risk

- **Wildfire frequency increases**

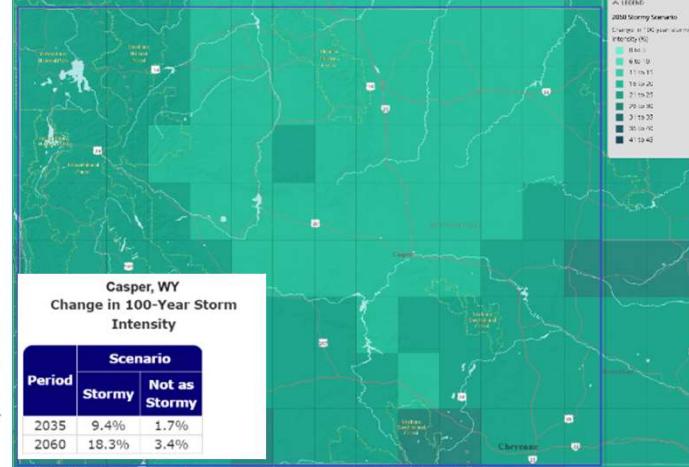
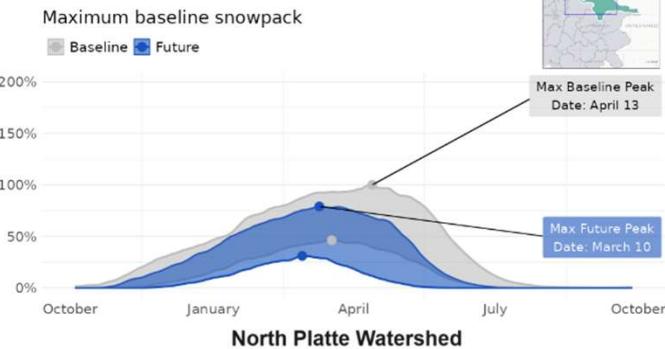
- Acres burned also increasing

- **Increasing flood risk**

- Shift to more winter rain
- Earlier spring rain-on-snow
- Storms with more precipitation
- Rain-driven streamflow peaks are 2.5 times higher than snowmelt-driven peaks on average



Snowpack is displayed as a seasonal time series of the ratio of snow-water equivalent (SWE) to the baseline peak SWE. The shaded ranges depict the range from 10th to 90th percentile for each time period in the North Platte watershed. Models project that the future peak SWE may be 79% of the baseline peak and could occur 34 days earlier.



Creating Resilient Water Utilities (CRWU)

CONTACT US

Access Data from Creating Resilient Water Utilities

Use the Data Access Page Explorer to search for [Climate Resilience Evaluation and Awareness Tool \(CREAT\)](#) data at your location. Enter an address and click the Search button.

Wall Township, New Jersey

Search

Data from CRWU maps and the [Climate Resilience Evaluation and Awareness Tool \(CREAT\)](#) can also be accessed by downloading any of the zipped geospatial files below. Each file contains geospatial data with locations and information for use with geographic information system software.

Downloadable Data

- [CRWU/CREAT Historical Grid Geospatial Data](#) (1 MB): Grid-based historical climate data
- [CRWU/CREAT Projection Grid Geospatial Data](#) (3 MB): Grid-based projected climate data
- [CRWU/CREAT Projection Streamflow Point Geospatial Data](#) (12 MB): Point-based projected streamflow data
- [CRWU/CREAT Projection Streamflow Grid Geospatial Data](#) (1 MB): Grid-based projected streamflow gage data
- [CRWU/CREAT Historical Streamflow Gage Geospatial](#)

CRWU Maps to Visualize Data

- [Coastal Storm Surge Map](#)
- [Climate Change Scenarios Projection Map](#)
- [Streamflow Projection Map](#)



Creating Resilient Water Utilities (CRWU)

CONTACT US

Access Data from Creating Resilient Water Utilities

Selected Address Wall Twp, New Jersey (40.1531,-74.0617)

Data for your location from our maps and CREAT are listed in the tables below. Expand the sections using the  to view the data and a brief description of the dataset. To collapse the sections click the .

- Historical Climate Grid

Grid-based historical climate data. The dataset contains historical hurricane strike frequency, precipitation, and temperature data in a gridded geospatial format. The hurricane strike frequency data source is the International Best Track Archive for Climate Stewardship (IBTrACS). The precipitation and temperature data source is the Parameter-elevation Regressions on Independent Slope Model (PRISM) dataset. Geographic extent of data: CONUS, Alaska, Hawaii, Puerto Rico, and US Virgin Islands. Related CRWU products: [Storm Surge Inundation Map](#); [CREAT](#)

Attribute	Value
Count of all hurricane strikes	7
Start year of record	1900
End year of record	2020
Count of Category 1 hurricane strikes	4
Count of Category 2 hurricane strikes	3
Count of Category 3 hurricane strikes	0
Count of Category 4 hurricane strikes	0
Count of Category 5 hurricane strikes	0
Average total annual precipitation (in) (1981-2010)	47.7
Average total January precipitation (in) (1981-2010)	4.0
Average total February precipitation (in) (1981-2010)	3.0

Creating Resilient Water Utilities (CRWU)

CONTACT US

Access Data from Creating Resilient Water Utilities

Selected Address Wall Twp, New Jersey (40.1531,-74.0617)

Data for your location from our maps and CREAT are listed in the tables below. Expand the sections using the  to view the data and a brief description of the dataset. To collapse the sections click the .

- Historical Climate Grid
- Weather Station Points
- Coastal Gages
- Historic Climate Station Points
- Climate Projection Grid

Grid-based projected climate data. The dataset contains projected future precipitation and temperature trends in a gridded geospatial format. The data source data is an ensemble model output from the Coupled Model Intercomparison Project Phase 5 (CMIP5) dataset, provided as the "Downscaled CMIP3 and CMIP5 Climate and Hydrology Projections" archive by the U.S. Bureau of Reclamation and its collaborators. Geographic extent of data: CONUS, Alaska, Hawaii, Puerto Rico. Related CRWU products: [CREAT Climate Scenarios Projection Map](#); [CREAT](#)

Attribute	Hot/Dry	Central	Wet/Warm
Annual precipitation change (%) (2035 scenarios)	1.3	3.4	5.9
January precipitation change (%) (2035 scenarios)	0.4	6.1	9.7
February precipitation change (%) (2035 scenarios)	3.6	7.0	12.9
March precipitation change (%) (2035 scenarios)	6.3	7.6	6.2

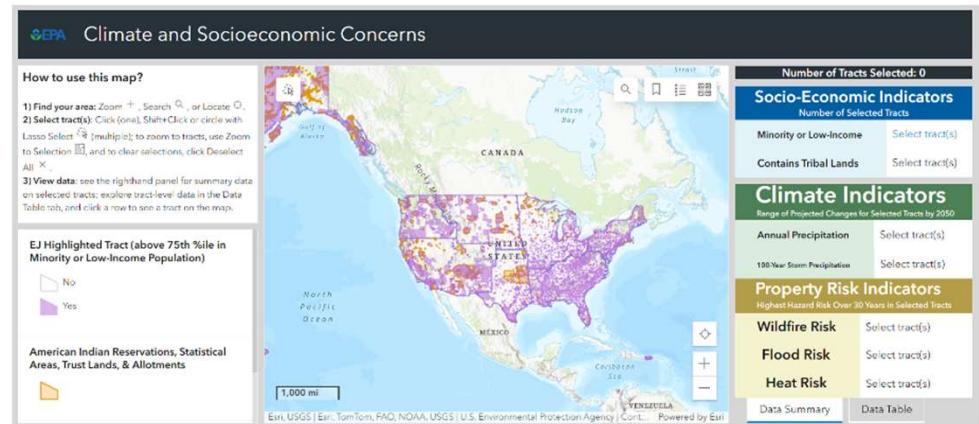
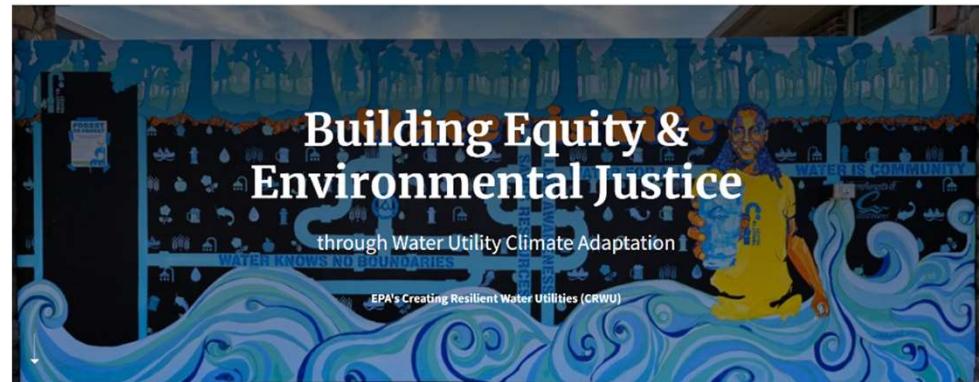
2 Data Access Page

Your location data from our Climate Data Maps and CREAT are listed in tables and available for download.

3

Environmental Justice StoryMap

- Online resource about environmental justice (EJ) and equity approaches in water sector climate adaptation
- Includes background information, data dashboard, case studies, and resources
- Used in CRWU technical assistance to bring EJ into the conversation



CRWU Tools and Resources

ACCESS DATA

1. Climate Data Maps
2. Data Access Page
3. Environmental Justice Map

RISK ASSESSMENT APPLICATIONS

4. Resilient Strategies Guide
5. CREAT *

WEB RESOURCES

6. Adaptation Case Study Map
7. Training and Engagement Center
8. Climate Adaptation Funding



4

Resilient Strategies Guide (RSG)

SCAN ME



RSG

- **Free**, online application for reviewing resilience strategies used by water utilities
- Introduction to **adaptation planning** for those with limited experience
- Provides **strategies** based on location, priorities, and assets
- Provides **funding options** based on selected strategies
- **Final report** summarizes selected strategies to explore during adaptation planning
- Outputs can be imported into the Climate Resilience Evaluation and Awareness Tool (CREAT) to **start your assessment** of selected strategies

Resilient Strategies Guide for Water Utilities

Getting Started Priorities **Assets** Strategies Funding

Report: Resilient Strategies Guide for Water Utilities

This report is provided to help identify and organize adaptation options of interest. Use the information documented in this report as a preliminary step in the process of planning and building resilience strategies. As you continue to monitor conditions and begin implementing resilience options, revisit the Resilient Strategies Guide and revise this report accordingly to inform future planning efforts.

Utility Information

Utility Type: Drinking Water
State/Territory: | Tribal Entity (Midwest)

Assessments

Quick climate facts:
Recent events and observable trends in climate conditions, including rising temperatures, shifts in precipitation patterns and timing, and altered hydrologic cycles, could be the basis for evaluating and improving utility preparedness and resilience. As part of this planning process, utilities may consider the following statements, drawn from U.S. Global Change Research Program assessments and references cited therein, on potential future conditions by the end of the century.

Find

Results

Vulnerabilities

Responses

Priorities

Lake and reservoir levels

Runoff timing and snowpack

Source water quality

Assets

Drinking Water Treatment Plant

EPA

5

Climate Resilience Evaluation and Awareness Tool (CREAT)

- Module-based process with clearly defined goals and reports
- Presents available climate data at the **regional and local levels**
- Multiple scenarios provided to help **capture uncertainty**
- Assessment of current resilience will help inform **adaptation planning**
- Results help utilities compare **risk reduction value** and **implementation costs**

Climate Awareness Report

Potential future climate conditions for Metro Utility (Newark) NJ.

Climate change presents challenges to water, wastewater and stormwater utilities and the communities they serve. These utilities that adapt to these changes may need to raise rates to develop new water supplies and adjust their treatment and operations. Without adaptation, infrastructure and operations designed for historical climate conditions could be overwhelmed or damaged. Main breaks, overflows, and service outages would lead to lost local business revenue and public health concerns. Several changes are possible for your utility's location in Newark, New Jersey and each future has unique challenges to consider:

CLIMATE AWARENESS

Provide basic utility information to increase awareness of impacts

SCENARIO DEVELOPMENT

Understand utility risk and design scenarios of the future based on climate data

RISK ASSESSMENT

Assess risk from a changing climate and evaluate adaptation plans

Climate Awareness Report

Potential Future Climate Conditions for Metro Utility (Newark) NJ

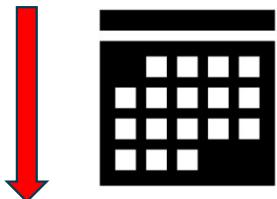
SCAN ME



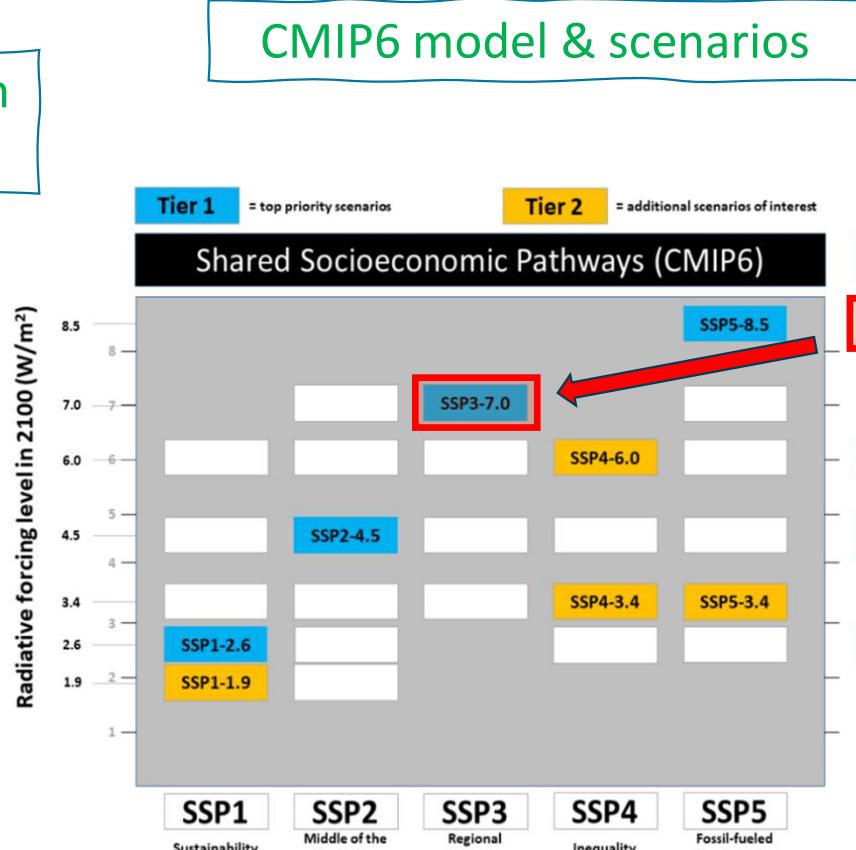
CRWU Tools' Data Updates

Updated projection horizon choices

2035 & 2060



2050 & 2090



LOCA2 downscaling

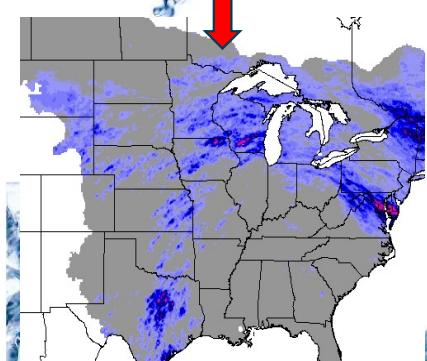
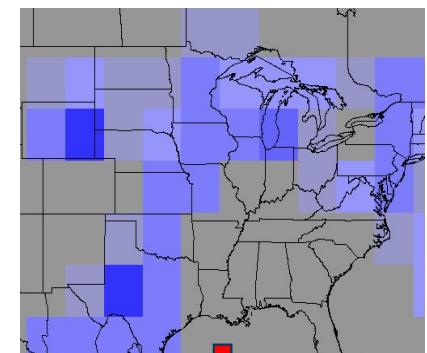


Image Credit: David Lorenz (DWR) 

CRWU Tools and Resources

ACCESS DATA

1. Climate Data Maps
2. Data Access Page
3. Environmental Justice Map

RISK ASSESSMENT APPLICATIONS

4. Resilient Strategies Guide
5. CREAT *

WEB RESOURCES

6. Adaptation Case Study Map
7. Training and Engagement Center
8. Climate Adaptation Funding



CRWU'S Adaptation Case Studies Map for Water Utilities

PUEBLO OF LAGUNA
Utility Authority

DRINKING WATER PLANNING FOR RESILIENCE

Pueblo of Laguna Utility Authority, New Mexico

ABOUT

PoLUU operates three drinking water systems that together provide services to approximately 4,400 customers residing in the Pueblo of Laguna reservation and about 40 miles west of Albuquerque, New Mexico.

CLIMATE CHANGE CHALLENGES

Although precipitation is an existing climate pattern in New Mexico, climate models project temperatures to increase and watershed precipitation trends to shift, likely leading to more frequent and intense droughts, less snowpack, and more intense flooding. PoLUU has observed that the region has already noticed a recent decrease in snowpack, lower river flows, and less groundwater recharge. Such changes will likely decrease surface water resources and groundwater while simultaneously placing water demands on both utility customers and the agricultural sector. PoLUU is committed to addressing climate change and increasing its resilience to ensure its ability to meet water demands in the future. To ensure the provision of clean and safe drinking water services for its community, PoLUU used EPA's Climate Resilient Water Utilities (CRWU) initiative to identify adaptive measures that could make its system more resilient to drought.

RESILIENCE STRATEGIES AND PRIORITIES

PoLUU has already implemented several Current Adaptive Measures to address climate change concerns, including water efficiency and drought. During the climate change risk assessment, the utility also used CREAT to identify several additional Potential Adaptive Measures that may further enhance its resilience to drought.

UTILITY CONTACT:
(Operations Manager)
at Kyle.Leon@pueblooflaguna.org

CASE STUDY | WATER AND WASTEWATER UTILITIES PLANNING FOR RESILIENCE

Current Adaptive Measures

- **AWM System:** Installed advanced metering infrastructure (AMI) to measure water use and identify potential leaks.
- **Aquifer Water Level Monitoring Program:** Conduct monthly monitoring of production wells.
- **Drought Contingency and Management Plans:** Includes drought response measures and corresponding resources that trigger the

FINANCING

The federal government has made significant amounts of funding available for investing in our

- Connect with peer utilities, share experiences, and learn best practices
- ~ 70 CREAT success stories available
- Regular updates with new utilities
- Highlights case studies surrounding certain themes, such as environmental justice, which change quarterly

SCAN ME



Case Studies

EPA

7

CRWU Training & Engagement Center

- Watch recorded regional webinars for water sector stakeholders across 9 climate regions within the U.S.
- Get detailed instruction on CREAT and its Modules
- View utility climate resilience and adaptation videos for water systems in some U.S. communities.

CREAT Training Videos

Click on each video below for more information on CREAT and the How-To's for completing its Modules. See the [Methodology Guide](#) for more information on data sources and methods used in the programming of CREAT.

CREAT Welcome Video



CREAT: Scenario Development Module



CREAT: Consequences and Assets Module



CREAT: Risk Assessment Module



Connect With Us:

- Sign up: [CRWU News](#)
- Email us: crwu.help@epa.gov



Environmental Topics ▾ Laws & Regulations ▾ Report a Violation ▾ About EPA ▾

Creating Resilient Water Utilities (CRWU)

CONTACT US

Training and Engagement Center

More CRWU Resources and Training

- [Showcasing Leading Practices in Climate Adaptation](#) webinar series
- [Climate Resilience Planning Utilizing a One Water Approach](#) webinar series
- [Building Resilience to a Changing Climate](#) webinar series by the Water Utility Climate Alliance

Climate Risk and Resilience Trainings

Become more familiar with CRWU's Climate Data Map, RSG, and CREAT, by exploring the recorded trainings below. Each training series offers the following: climate trends and projections for the region; an introduction to the CRWU initiative and demonstrations of its climate resilience tools; a utility case study; and discussions about financing adaptation and resilient infrastructure projects. Many trainings correspond to the [National Climate Assessment](#) Climate Regions depicted in the map below:



Stories from the Sector



SCAN ME



TRAINING

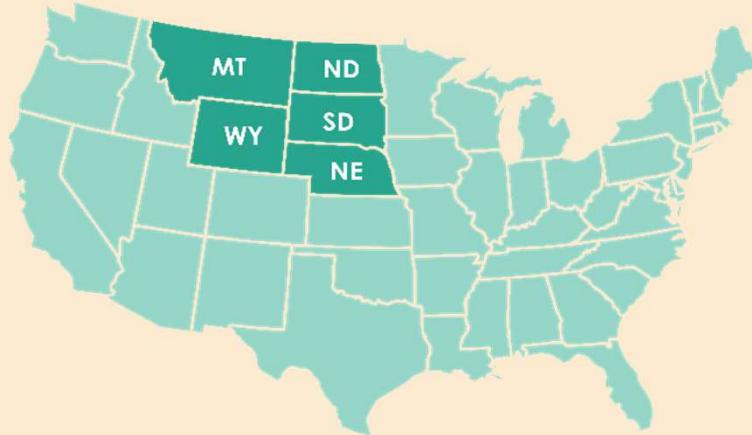
Upcoming CRWU Climate Resilience Training for YOU!

Photos from FY23
Tribal Workshops

Climate Resilience Training for the Northern Great Plains Water Sector

Webinar Series: November 19 & 21 (9:30am – 12pm MST)

Great Northern Plains climate region,
according to the National Climate Assessment



Climate Adaptation Funding

- Points to a variety of sources that fund climate resilience infrastructure projects, pay for operation and maintenance costs, and sustain resiliency programs:
 - Lists Federal Funding Sources
 - Lists Financial Tools
 - Calls out relevant and timely Grant Opportunities

Creating Resilient Water Utilities (CRWU)

- CRWU Home
- Resilient Strategies Guide
- Climate Resilience Evaluation and Awareness Tool
- Climate and Weather Data Maps
- Adaptation Case Studies
- Adaptation Planning in Action Videos
- Environmental Justice StoryMap
- Training and Engagement Center
- Climate Adaptation Funding
- Climate Finance Working Group

Climate Adaptation Funding for Water Sector Utilities

Grant Opportunities

Environmental Protection Agency (EPA)'s Office of Environmental Justice and External Civil Rights (OEJECR)

- [Environmental and Climate Justice Community Change Grants Program \(Community Change Grants\)](#): OEJECR's Community Change Grants will offer \$2 billion in Inflation Reduction Act funds to finance community-driven projects that address climate challenges and reduce pollution while strengthening communities through thoughtful implementation. Read the [Notice of Funding Opportunity](#) here. This funding opportunity is currently listed on [Grants.Gov](#) under opportunity number EPA-R-OEJECR-OCS-23-04. The application period closes on November 21, 2024.
- [Community Change Equitable Resilience Technical Assistance](#): This program will provide free design and project development assistance, community engagement, and partnership development workshops that support climate resilience and environmental justice activities in disaster-prone areas. This program will help eligible entities develop applications to be submitted for grants under the OEJECR Community Change Grant Notice of Funding Opportunity (see bullet above). For more information on the program, eligibility requirements, and possible project types, please [access this link](#). EPA intends to offer this technical assistance to up to 50 recipients nationwide, and the announcement will remain open until 50 recipients have been identified. To request assistance, please complete the following form: [Technical Assistance Request Form](#).

Funding Resilience

The implementation of adaptive measures to address climate impact at water sector utilities are necessary to ensure clean and safe water provisions throughout the nation.

Listed below are funding sources from the Environmental Protection Agency (EPA), the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), the Federal Emergency Management Agency (FEMA), the U.S. Small Business Administration (SBA), and others. These [Federal Funding Sources](#), along with [EPA's Financial Tools](#), will guide you to a variety of sources that fund climate resilience infrastructure projects, pay for operation and maintenance costs, and sustain resiliency programs. Click below to expand each section.



Federal Funding Sources



EPA's Financial Tools



CRWU Tools and Resources

ACCESS DATA

1. Climate Data Maps
2. Data Access Page
3. Environmental Justice Map

***These Tools and Resources
inform CRWU's Technical
Assistance Process...***

WEB RESOURCES

6. Adaptation Case Study Map
7. Training and Engagement Center
8. Climate Adaptation Funding



CRWU Technical Assistance Program for Drinking Water, Wastewater, and Stormwater Utilities (*feat. CREAT*)

Assessment #: Last year: 21; This year: 35; Next year: 45+

TA Process:

- 2-4 months (~35-40 hours)
- Series of Virtual Working Sessions to walk through tools
- Potential for On-Site visit
- Utilities are typically asked to designate a lead staff member to serve as a point-of-contact, other members may include hydrology modelers, engineers, treatment plant managers
- Deliverables: CREAT Assessment Report, Adaptation Plans, Case Study

Coordination:

- Within EPA's larger WaterTA network
 - National and Regional Environmental Finance Centers
 - Funding Coordination
 - Clean Water & Drinking Water SRFs (States and HQ)
 - EPA's WIFIA
 - FEMA's BRIC Program
 - USDA's Rural Development Program



TOWN OF HARTVILLE WATER SYSTEM; HARTVILLE, WYOMING

Fast Facts:

- Combined System, drinking water services for **64** customers
- Average **.0075 MGD**
- Vulnerable Financial Condition
- Reliant on **groundwater** sources
- Two aging pump houses in operation, located 4.5 miles from storage tanks in town

Climate Concerns:

- Drought (reduced groundwater recharge), wildfires, and reduced snowpack

Potential Adaptive Measures:

- Establish Back-up Power at the pump houses
- Construct second transmission line from pump houses to Hartville for redundancy



LARAMIE PUBLIC WORKS DEPARTMENT; LARAMIE, WYOMING

Fast Facts:

- Combined System; drinking water services for **36,000** customers
- Average **4 MGD**, up to 11 MGD during summertime peaks
- Sources include the **Big Laramie River** and **Casper Aquifer**
- 3 major wellfields
- 3 groundwater treatment facilities, 1 surface treatment plant
- Storage Tanks: Two 3.5M gal, One 8.5M gal, Two 1M gal

Climate Concerns:

- Drought (reduced groundwater recharge), temperature changes, reduced snowpack, wildfires, and natural disasters, like wind events

Potential Adaptive Measures:

- Construction of an additional 1M gallon storage tank
- Establishing back-up power in all areas of the system





INTERESTED IN
FREE TECHNICAL
ASSISTANCE
FROM EPA CRWU?



CONTACT US

Curt Baranowski: baranowski.curt@epa.gov

Steve Fries: fries.steve@epa.gov

Aliza Furneaux: furneaux.aliza@epa.gov

Audrey Ramming: ramming.audrey@epa.gov

Nash Keyes: keyes.nash@epa.gov

Geneva Gray: gray.geneva@epa.gov

Drew Robison robison.andrew@epa.gov

Sign Up for [CRWU Newsletter](#)

Email: crwuhelp@epa.gov

CRWU website: www.epa.gov/crwu

