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CLIMATE READY WATER UTILITIES

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Water Smart Innovations
October 6, 2011

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Presentation Outline

- Climate change impacts on utilities
- Overview of CRWU initiative
- Ongoing CRWU efforts
  - Adaptation Strategies Guide
  - Climate Resilience Evaluation and Awareness Tool
  - CRWU Toolbox
- Questions?

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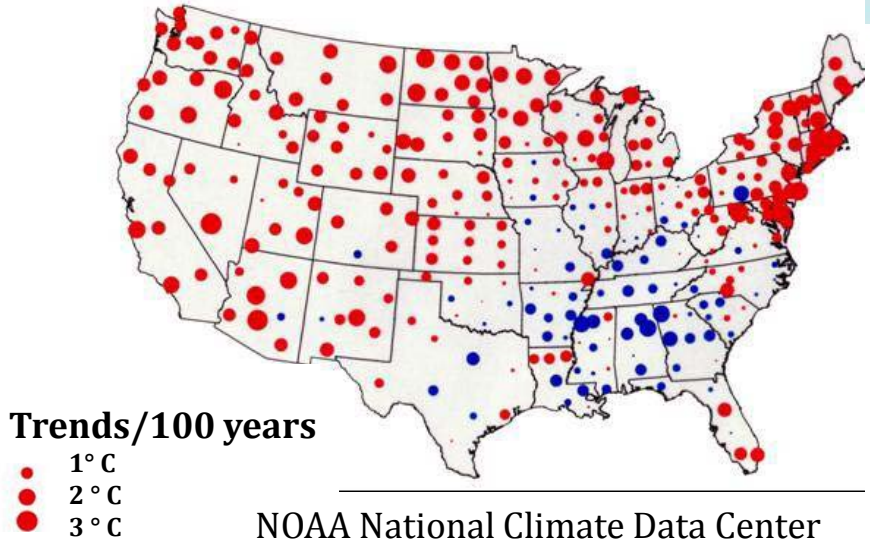
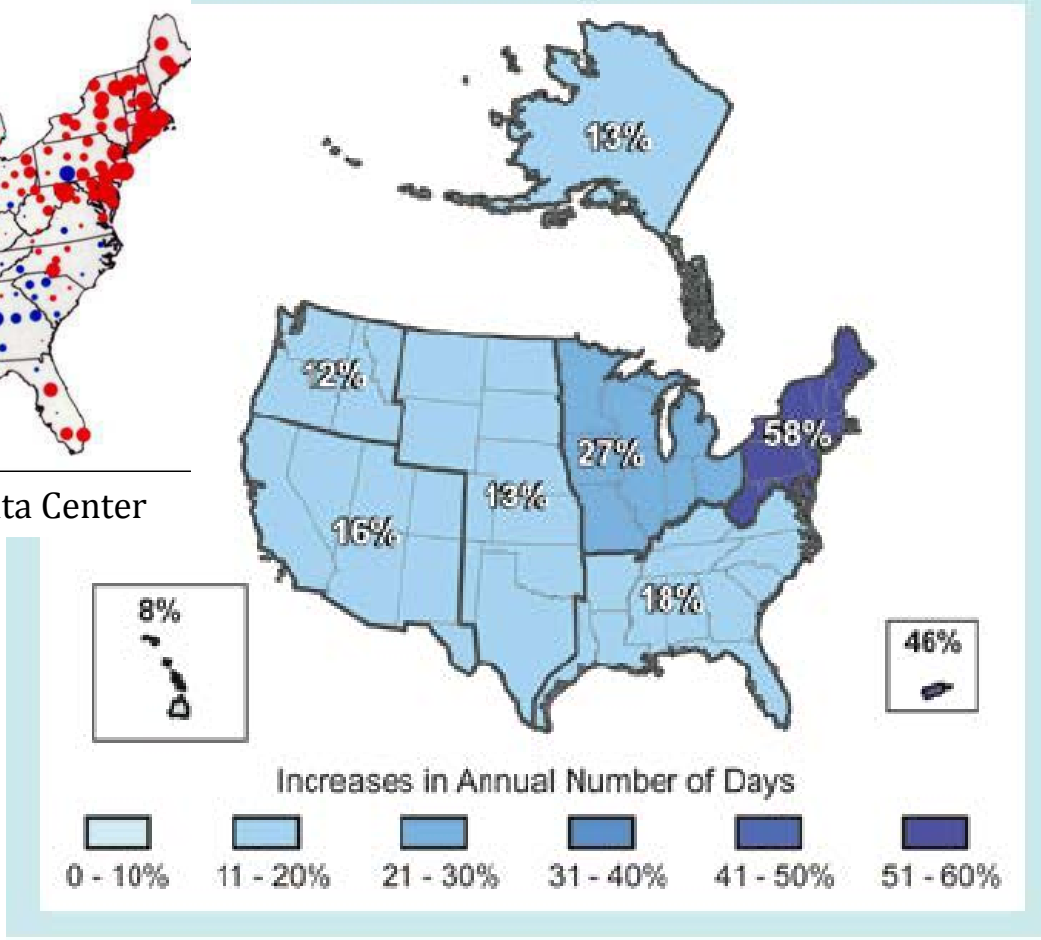
Climate Change Trends



NOAA National Climate Data Center



Groisman et al. 2005

- Increasing temperatures
- Increasing heavy precipitation
- Projections:
  - seasonal drought
  - sea level rise

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Climate Change Impacts

Water Quantity/Quality Issues

- Hydrologic cycle: earlier snow melt, drier summers
- Sea level rise
- Heavy precipitation events: runoff of sediments, nutrients, DOC, pathogens, pesticides, and salt
- Warmer temperatures: lower DO, watershed fires, and algal blooms

Extreme Weather Events

- Hurricanes
- Floods

Operational Rules and Regulatory Issues

- Challenges meeting Environmental and Public Health Missions
- Complex puzzle that challenges water sector sustainability

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Mission

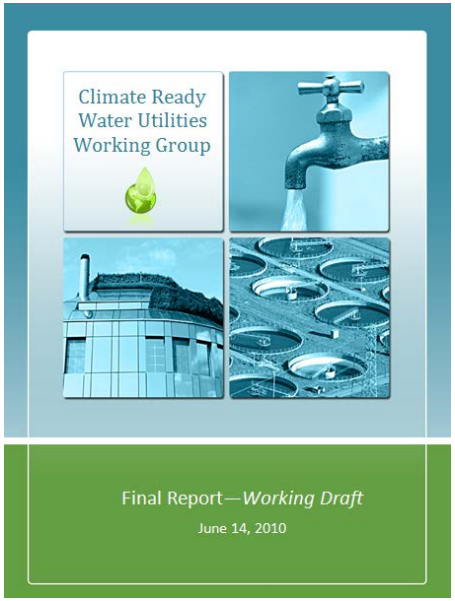
Lead to provide the water sector (drinking water, wastewater, and storm water) with the practical tools, training, and technical assistance needed to adapt to climate change by promoting a clear understanding of climate science and adaptation options.

NDWAC CRWU Report

Final WG report provides EPA with recommendations on developing a CRWU initiative to support water sector climate resiliency.

Developing an Adaptive Response Framework

Fundamental guide to build out the concept of a climate ready water utility, integrates with other tools.



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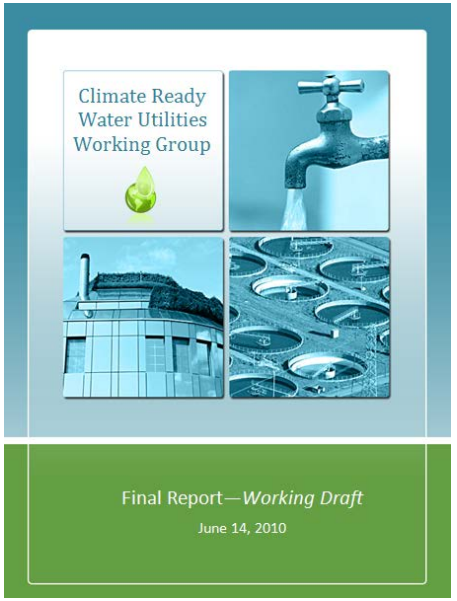
What does CRWU Report Mean for EPA?

- EPA create and implement a CRWU program
- Integrate CRWU into existing EPA efforts
- Coordinate with other federal partners, states, associations, utilities



- Promote watershed planning and encourage adoption of integrated water resources management
- Recommends developing adaptive regulatory capacity

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Adaptive Response Framework

Building out the Concept of Climate Ready

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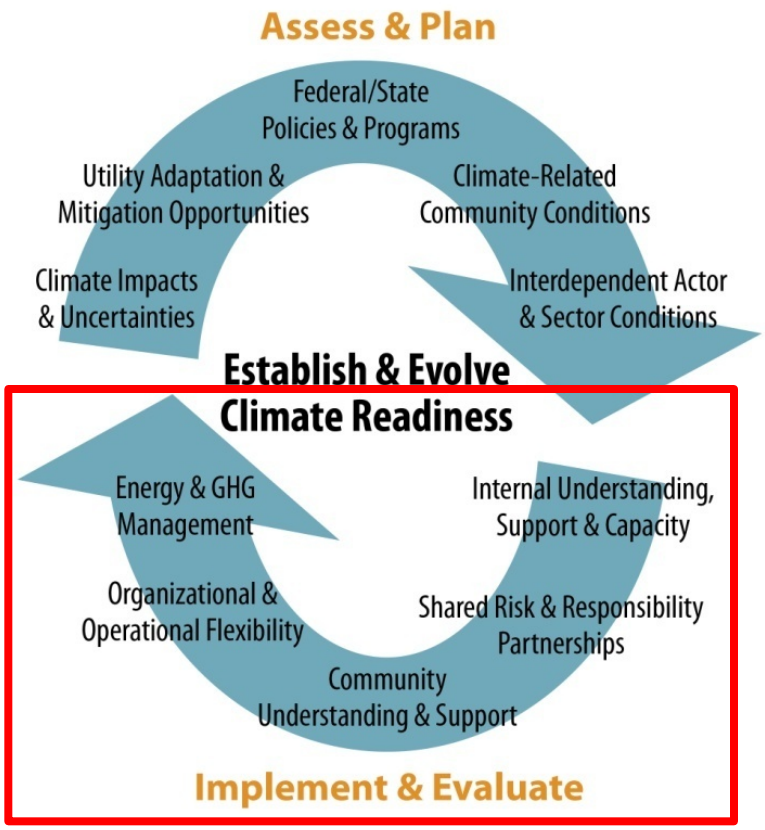
Climate Ready Adaptive Response Framework

STAGE 1:
Assess and Plan

- Impacts and uncertainties
- Utility experience
- Federal/State policies and programs
- Climate-related community conditions
- Critical interdependent sector conditions

Climate Ready Adaptive Response Framework (cont'd)



STAGE 2:
Implement and Evaluate

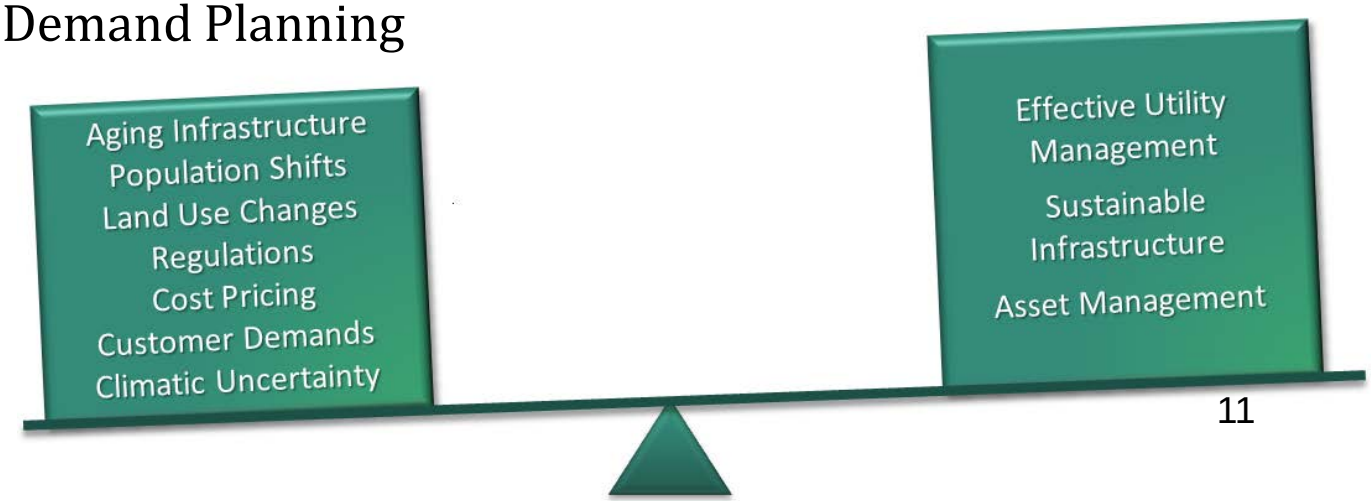
- Community understanding and support
- Shared risk and responsibility partnerships
- Internal understanding, support, and capacity
- Organizational and operational flexibility
- Energy and greenhouse gas management

Approaching Climate Change

Avoid making large, long-term investments that do not consider and reflect climate change

-From Adaptive Response Framework

- Incorporate climate into existing utility practices
  - Asset management
  - Emergency Response Planning
  - Capital Improvements
  - Capacity Building
  - Supply/Demand Planning



CRWU Resources

Climate Resilience Evaluation & Awareness Tool (CREAT) – Risk assessment tool designed to build climate change knowledge and support adaptation planning in the water sector.

Adaptation Strategies Guide – Collection of briefs outlining the potential impacts of climate change and effective adaptation options.

CRWU Toolbox – Searchable resource containing information to support the "Climate Ready" process.

Joint Project with Climate Ready Estuaries – Explore relationships between discharging utilities and estuaries

Table Top Exercise Tool – Scenario-based planning exercises for water utilities

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Climate Resilience Evaluation & Awareness Tool (CREAT)

Overview

CREAT

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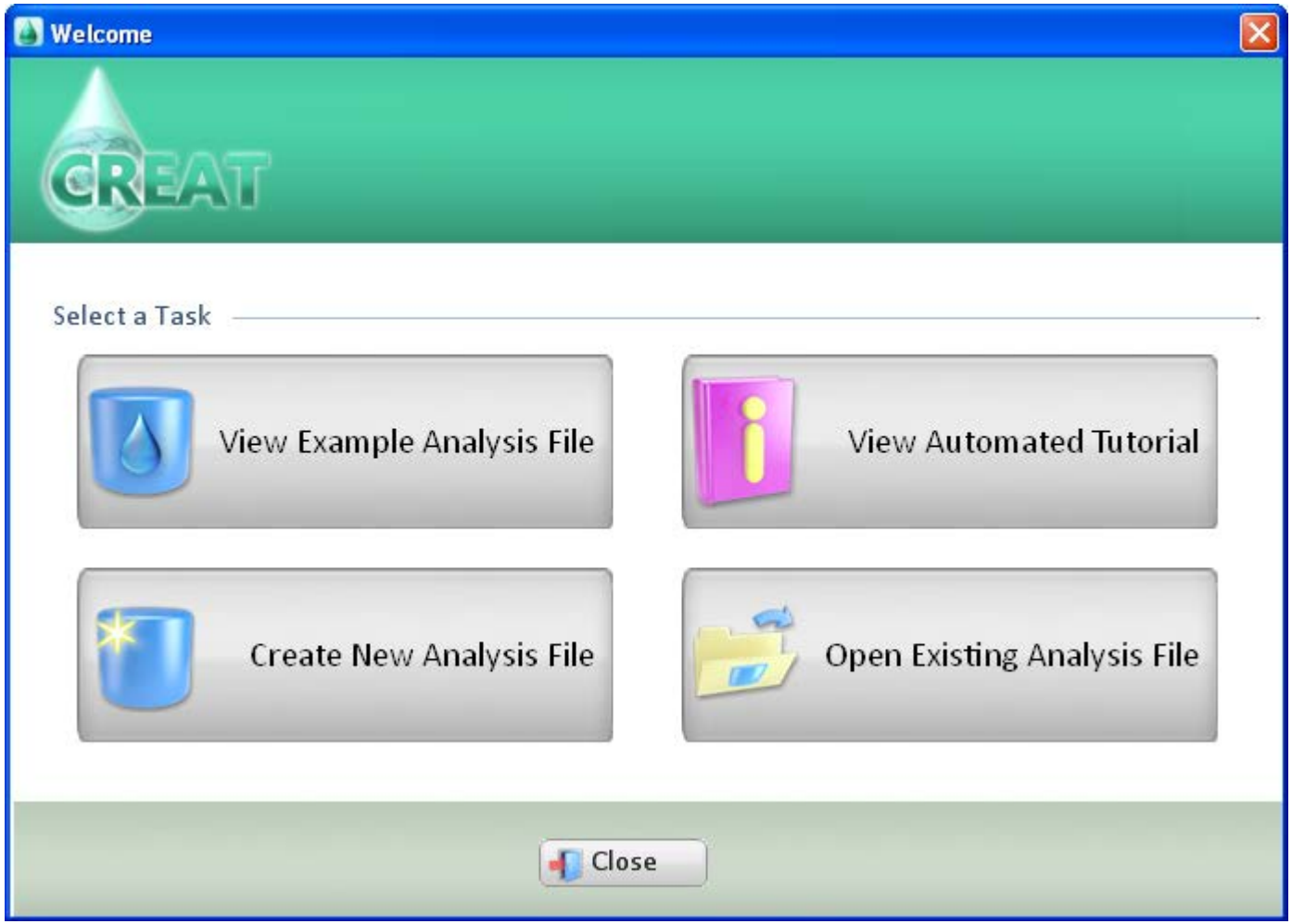
Welcome Screen



CREAT

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CREAT Process

Home

The Climate Resilience Evaluation and Awareness Tool (CREAT) is a risk assessment application for water, wastewater, and combined utilities of all sizes. It helps water and wastewater utility owners and operators in understanding potential climate change threats and in assessing the related risks at their individual utilities

Setup

CREAT captures a variety of information about your utility, including size and ownership structure. You also specify other options used during analysis.

Assets

CREAT provides a standardized list of assets. You can modify the asset inventory to reflect your specific facility (wastewater, water, or water-wastewater).

Threats

CREAT provides a set of descriptive narratives regarding climate change impact and potential threats associated with them. You can select the threats applicable to your utility and define custom ones.

Adaptive Measures

Build a list of adaptive measures that are applicable to your utility. You can copy these from the provided library or create them from scratch. You should specify existing as well as planned measures.

Baseline Analysis

After establishing your initial facility setup, you can determine your current risk level associated with asset/threat combinations over the specified time periods.

Resilience Analysis

After conducting a baseline analysis, you can move forward and consider potential adaptations to your facility to lower the risk associated with specific asset/threat combinations.

Implementation Planning

Use the Implementation Planning module to develop packages of adaptive measures that you may consider for implementation over future time horizons.

Results & Reports

Generate reports of the analysis results developed around your inventories of assets, threats, time periods, or various sorting of any analysis you have conducted.

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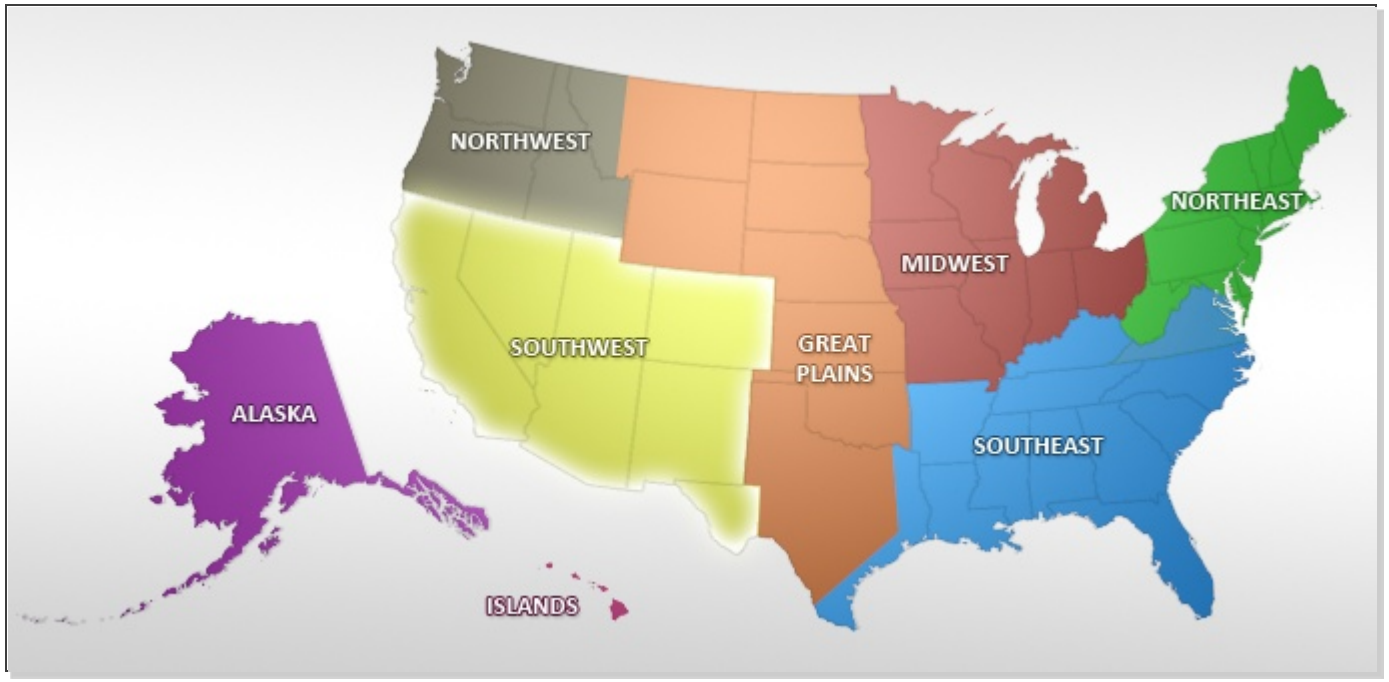
Climate Information



National and regional climate change descriptions → **Climate-related threat descriptions** → **Preliminary adaptation libraries**

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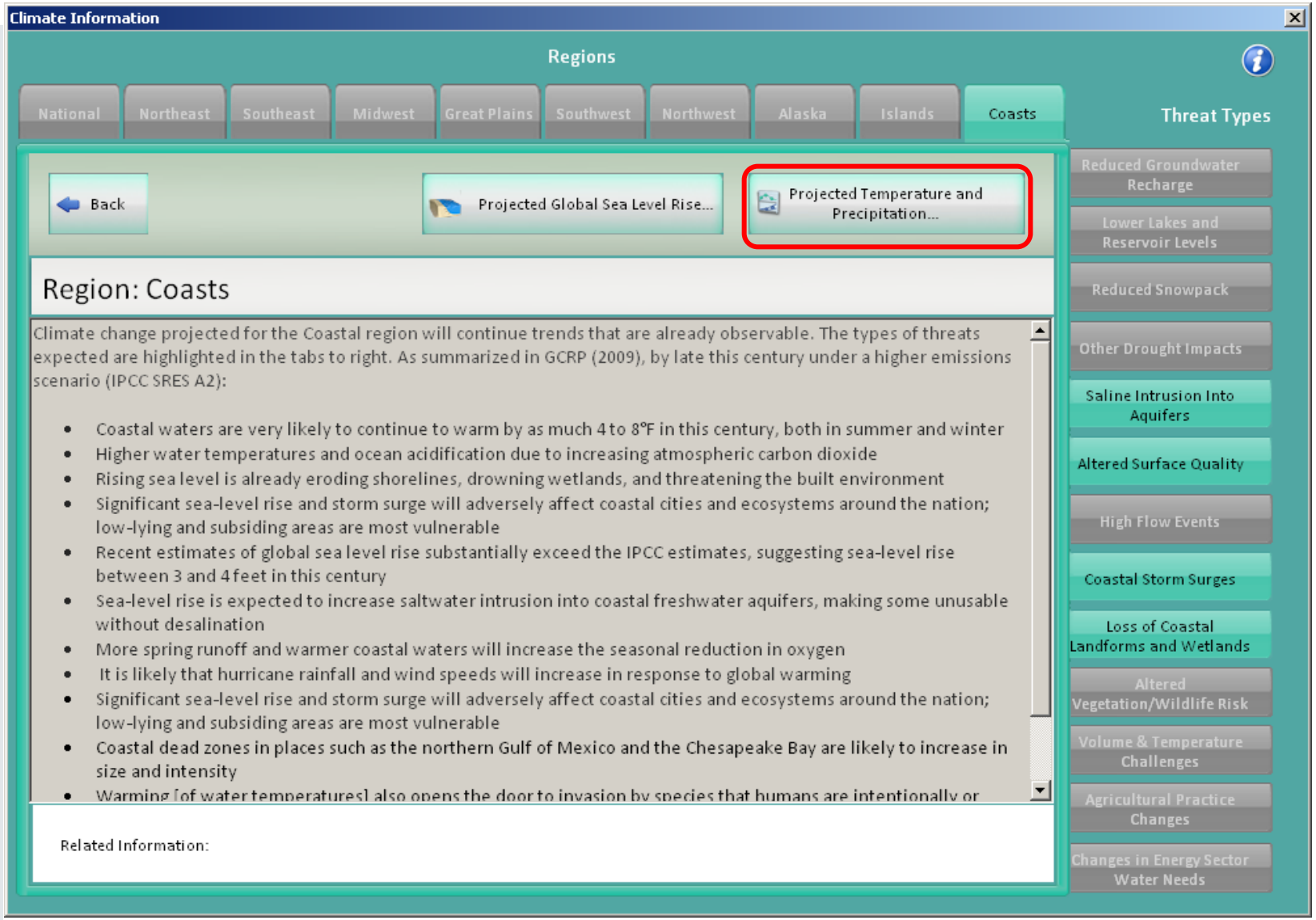
Climate Information



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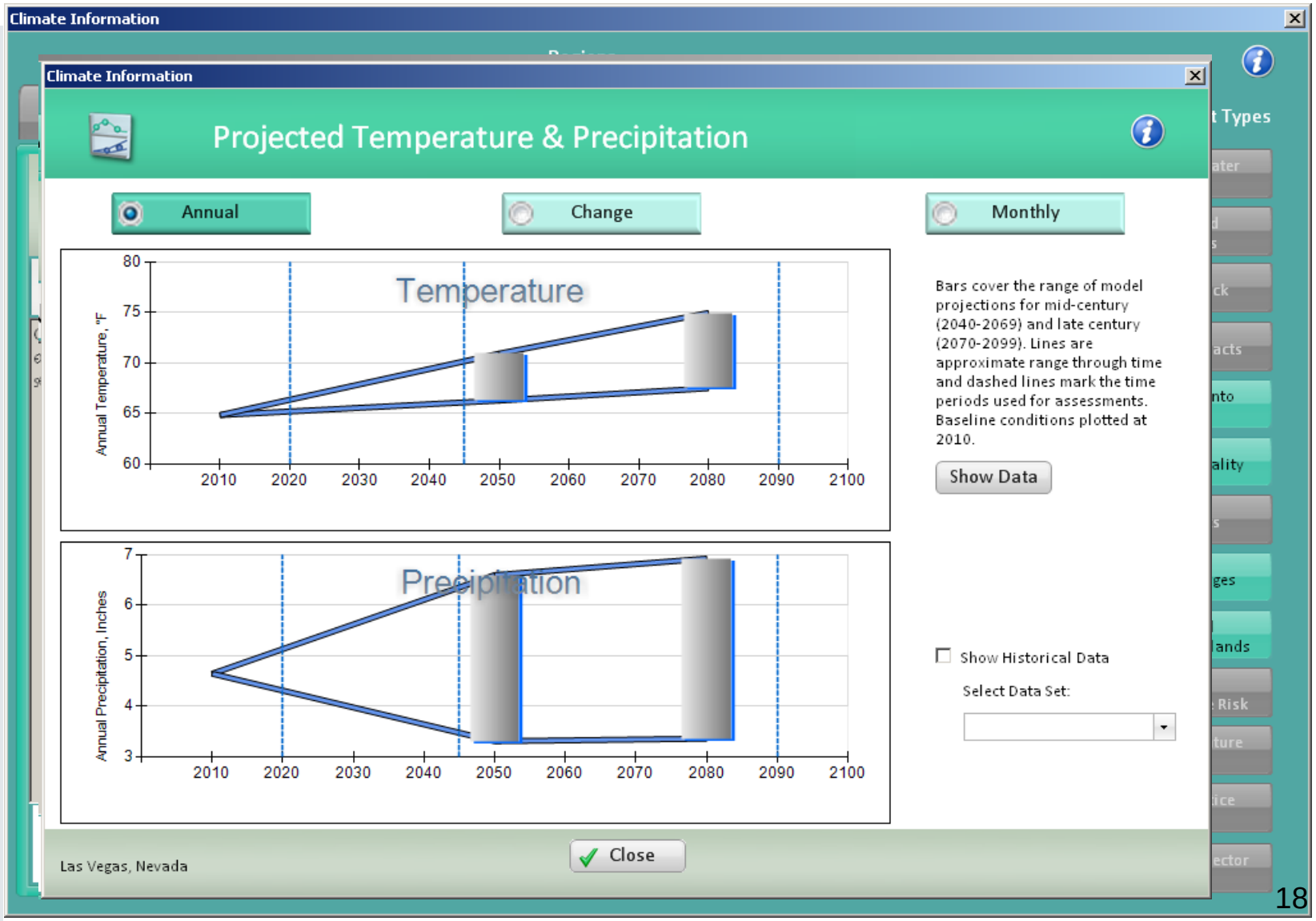
Climate Information



Outreach and Training

- Software is available at: http://water.epa.gov/infrastructure/watersecurity/climate/creat.cfm
- Training and Outreach
- CREAT version 2.0
  - Energy Efficiency
  - Extreme Weather Data
  - Scenario-Based Planning

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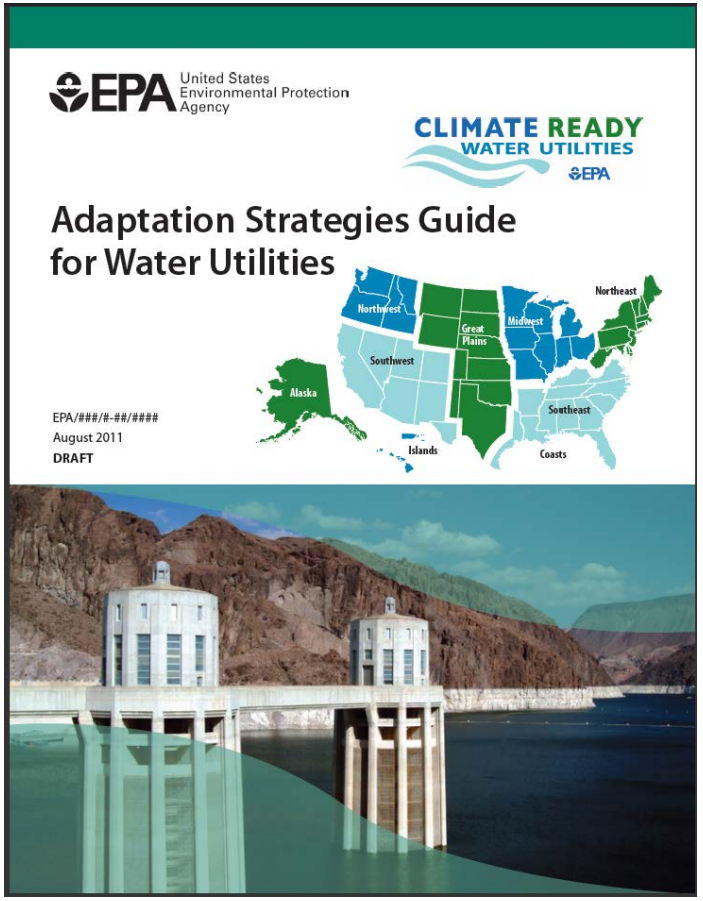
Adaptation Strategies Guide

Promoting a Clear Understanding of Adaptation Options

ASG Overview

- Guide for drinking water and wastewater utilities that have not begun to consider climate change in utility planning
- Navigate guide like a website
- Goals:
  - Present easy-to-understand climate science
  - Translate science into impacts to utilities
  - List adaptation strategies related to impacts
  - Assist in the adaptation planning process



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ASG Overview

- Introduction & What is Adaptation Planning?
- Select from three types of briefs:
  - Regional
  - Challenge Group
  - Challenge
- Adaptation Planning Worksheet
- Glossary

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Regional Briefs

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Regional Brief

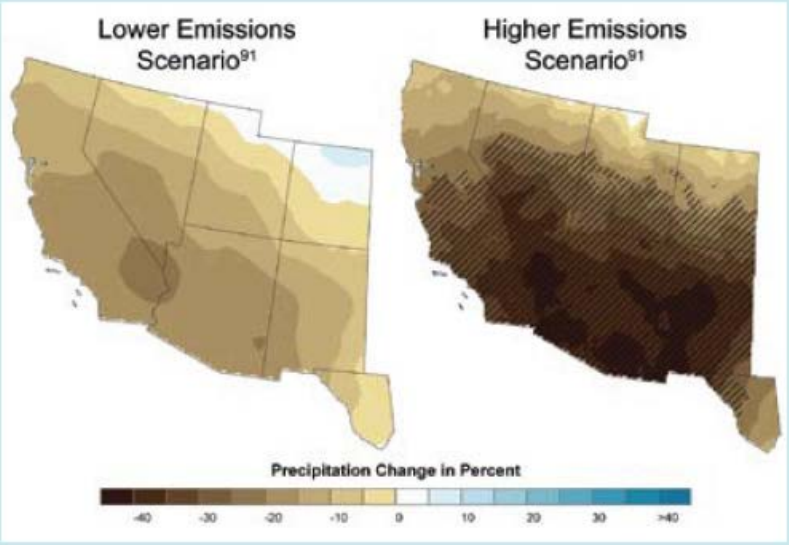
CHALLENGES BY GROUP	DW	WW
Reduced groundwater recharge		

PROJECTED CHANGES

EXAMPLE

Projected Change in Spring Precipitation 2080–2090: Percentage change in March-April-May precipitation for 2080-2099 compared to 1961–1979 for a lower emissions scenario (left) and a higher emissions scenario (right). Confidence in the projected changes is highest in the hatched areas.

SOURCES Hayhoe et al. 2004; Hayhoe et al. 2008; USGCRP 2009.



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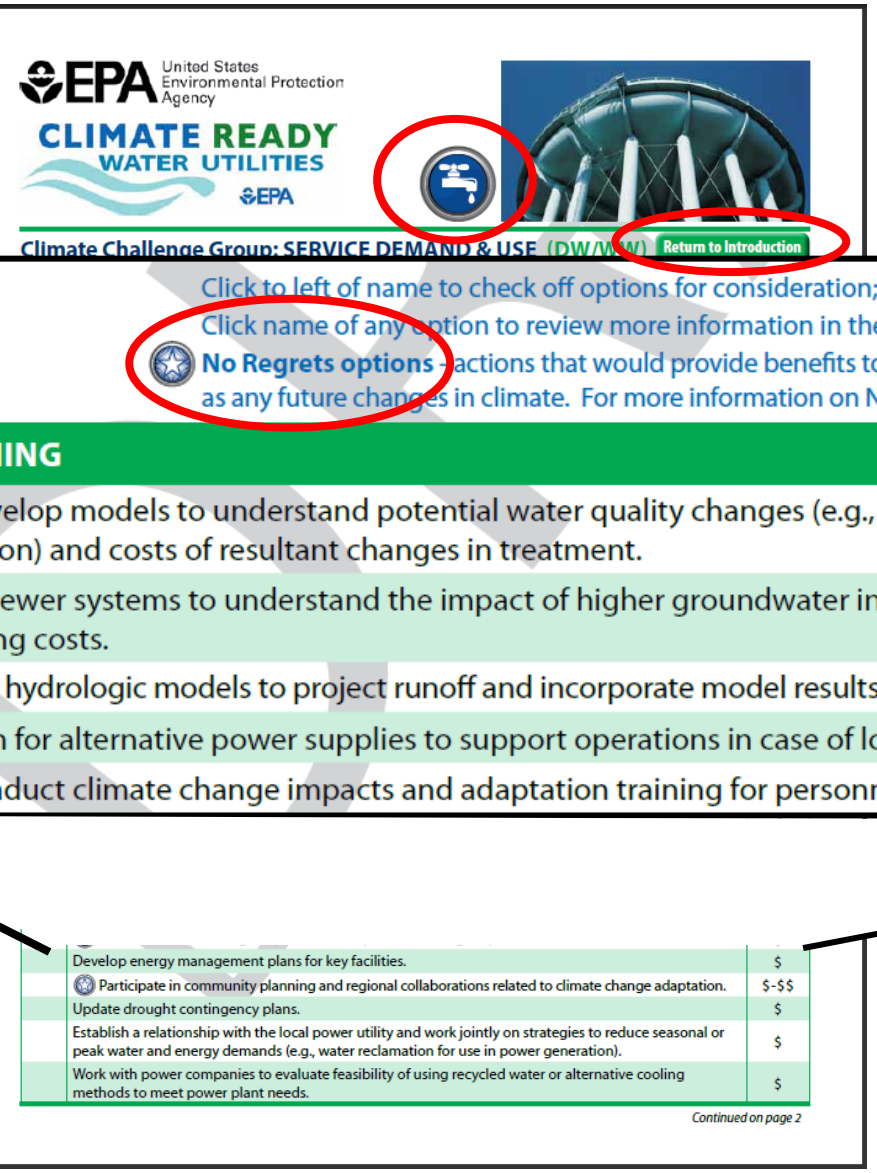
the Southwest = Somewhat relevant

Challenge Group Briefs

- Challenge Summaries



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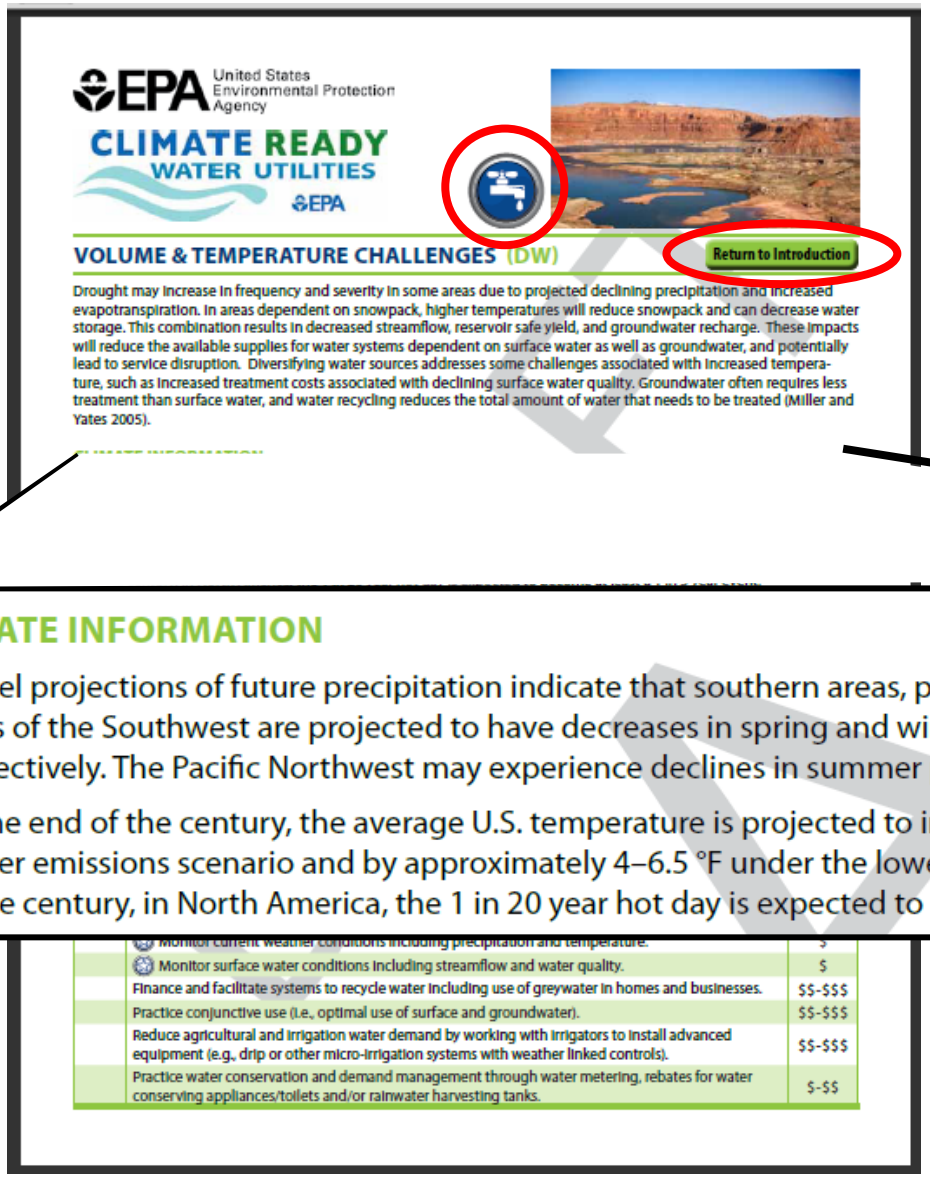
Challenge Briefs



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VOLUME & TEMPERATURE CHALLENGES (DW)

Return to Introduction

Drought may increase in frequency and severity in some areas due to projected declining precipitation and increased evapotranspiration. In areas dependent on snowpack, higher temperatures will reduce snowpack and can decrease water storage. This combination results in decreased streamflow, reservoir safe yield, and groundwater recharge. These impacts will reduce the available supplies for water systems dependent on surface water as well as groundwater, and potentially lead to service disruption. Diversifying water sources addresses some challenges associated with increased temperature, such as increased treatment costs associated with declining surface water quality. Groundwater often requires less treatment than surface water, and water recycling reduces the total amount of water that needs to be treated (Miller and Yates 2005).

CLIMATE INFORMATION

- Model projections of future precipitation indicate that southern areas, particularly the Southwest, will become drier. Some parts of the Southwest are projected to have decreases in spring and winter precipitation of greater than 20% and 40%, respectively. The Pacific Northwest may experience declines in summer precipitation of greater than 30% (USGCRP 2009).
- By the end of the century, the average U.S. temperature is projected to increase by approximately 7–11 °F under the higher emissions scenario and by approximately 4–6.5 °F under the lower emissions scenario (USGCRP 2009). By the end of the century, in North America, the 1 in 20 year hot day is expected to become at least a 1 in 3 year event.

Monitor current weather conditions including precipitation and temperature.	$
Monitor surface water conditions including streamflow and water quality.	$
Finance and facilitate systems to recycle water including use of greywater in homes and businesses.	$$-$$$
Practice conjunctive use (i.e., optimal use of surface and groundwater).	$$-$$$
Reduce agricultural and irrigation water demand by working with irrigators to install advanced equipment (e.g., drip or other micro-irrigation systems with weather linked controls).	$$-$$$
Practice water conservation and demand management through water metering, rebates for water conserving appliances/toilets and/or rainwater harvesting tanks.	$-$$

- Climate information
- List of

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Challenge Briefs

EXAMPLE

The Metropolitan Water District of Southern California (Metropolitan) is a wholesale water supplier for southern California. Metropolitan improved its Integrated Resource Plan in 1996 to enhance and diversify water supply reliability. Over the past decade, imported water supplies have been complemented by aggressive conservation programs, local water recycling, groundwater supplies, enhanced water storage, and conveyance and water transfers. Metropolitan has helped develop more than 75 water recycling and groundwater recovery programs with local agencies through funding incentives. For example, the West Basin Municipal Water District receives secondary, treated wastewater from the City of Los Angeles, treats it to a tertiary level, and delivers it primarily for landscape irrigation and various industrial purposes. A portion of this water is injected to create an exclusion barrier against seawater intrusion into drinking water wells in the South Bay area. This project currently produces more than 20,000 acre-feet of water each year and is expected to expand to around 70,000 acre-feet of water each year by 2025. Moreover, Metropolitan has increased its storage capacity tenfold through the completion of both the Diamond Valley Lake in Hemet, new groundwater storage, and by acquiring contractual storage in state reservoirs. It has also been a leader in voluntary water transfers with agricultural districts. In August 2004, Metropolitan and the Palo Verde Irrigation District (PVID) executed a 35-year agreement under which individual landowners agree not to irrigate up to 29% of the valley's farm land, saving up to 111,000 acre-feet for other uses (Metropolitan 2010).

- Utility case study

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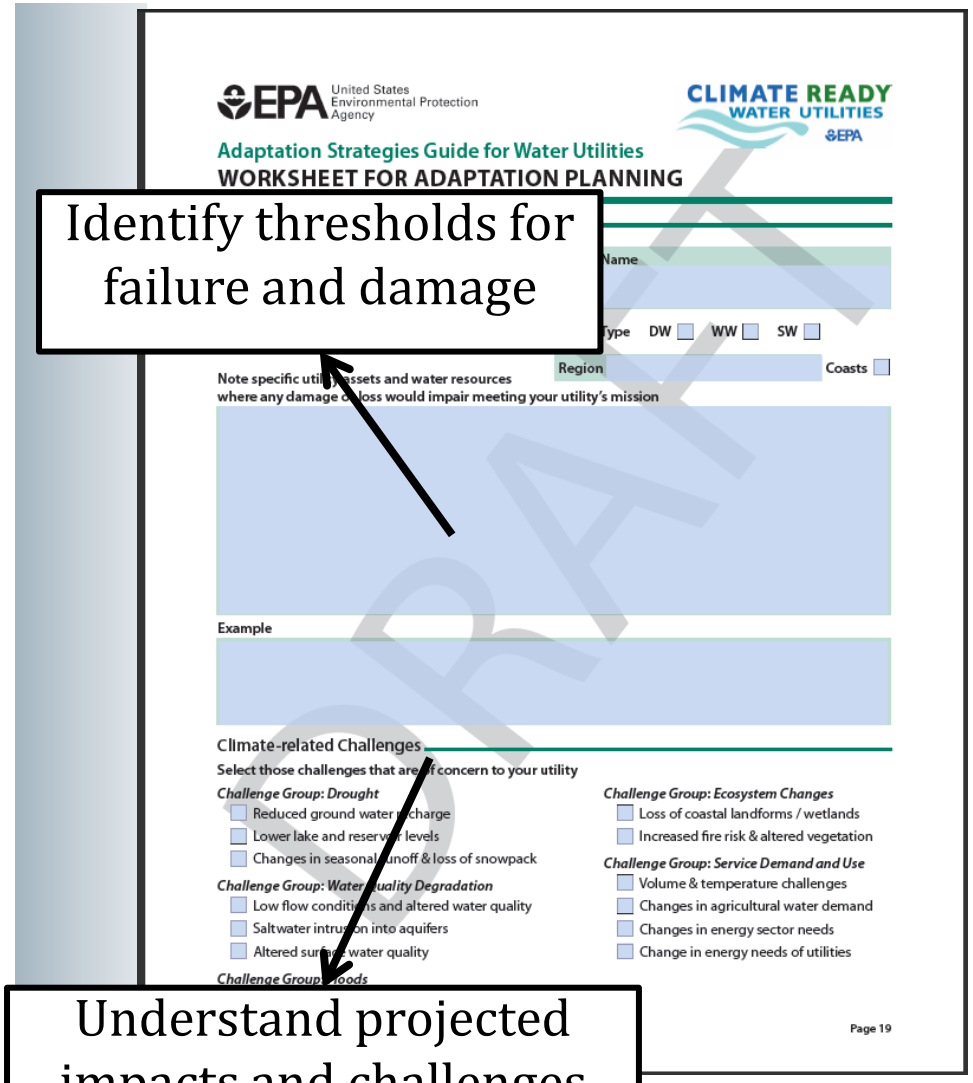
Adaptation Worksheet



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Adaptation Strategies Guide for Water Utilities

WORKSHEET FOR ADAPTATION PLANNING

Name

Type DW WW SW

Region Coasts

Note specific utility assets and water resources where any damage or loss would impair meeting your utility's mission

Example

Climate-related Challenges

Select those challenges that are of concern to your utility

Challenge Group: Drought

- Reduced ground water recharge
- Lower lake and reservoir levels
- Changes in seasonal runoff & loss of snowpack

Challenge Group: Water Quality Degradation

- Low flow conditions and altered water quality
- Saltwater intrusion into aquifers
- Altered surface water quality

Challenge Group: Floods

Challenge Group: Ecosystem Changes

- Loss of coastal landforms / wetlands
- Increased fire risk & altered vegetation

Challenge Group: Service Demand and Use

- Volume & temperature challenges
- Changes in agricultural water demand
- Changes in energy sector needs
- Change in energy needs of utilities

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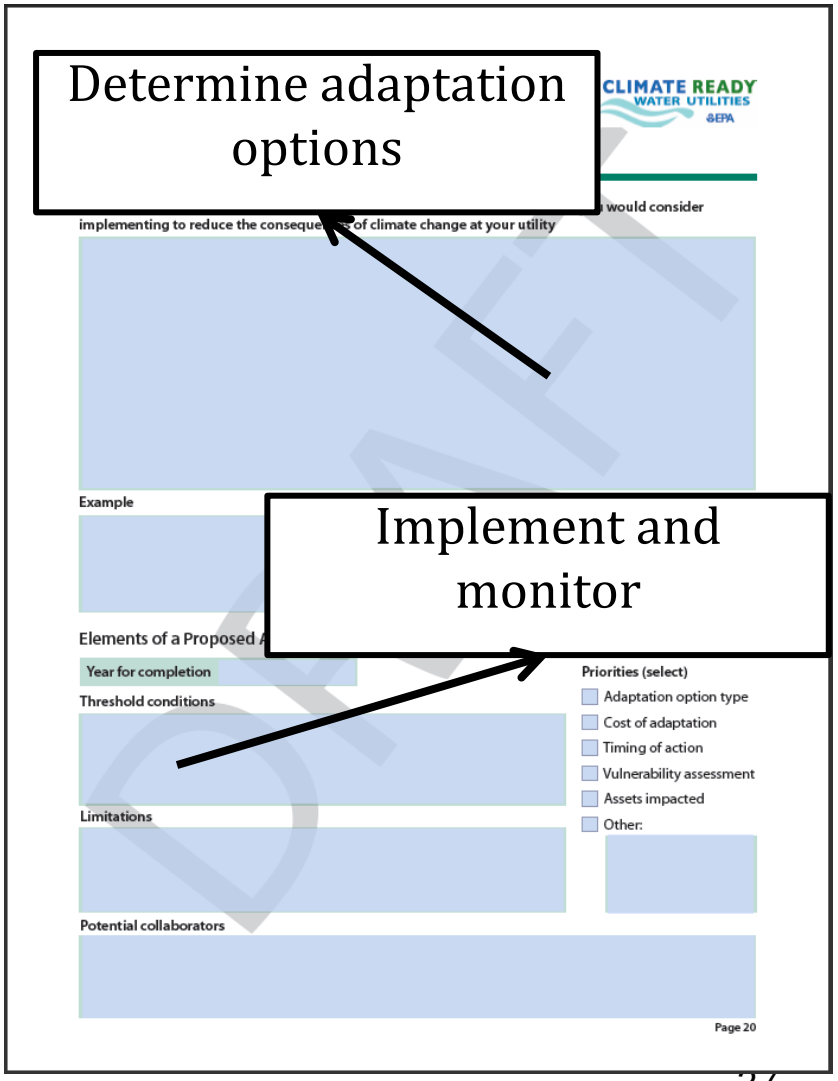
Identify thresholds for failure and damage

Understand projected impacts and challenges



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would consider

implementing to reduce the consequences of climate change at your utility

Example

Elements of a Proposed A

Year for completion

Threshold conditions

Limitations

Potential collaborators

Priorities (select)

- Adaptation option type
- Cost of adaptation
- Timing of action
- Vulnerability assessment
- Assets impacted
- Other:

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Determine adaptation options

Implement and monitor

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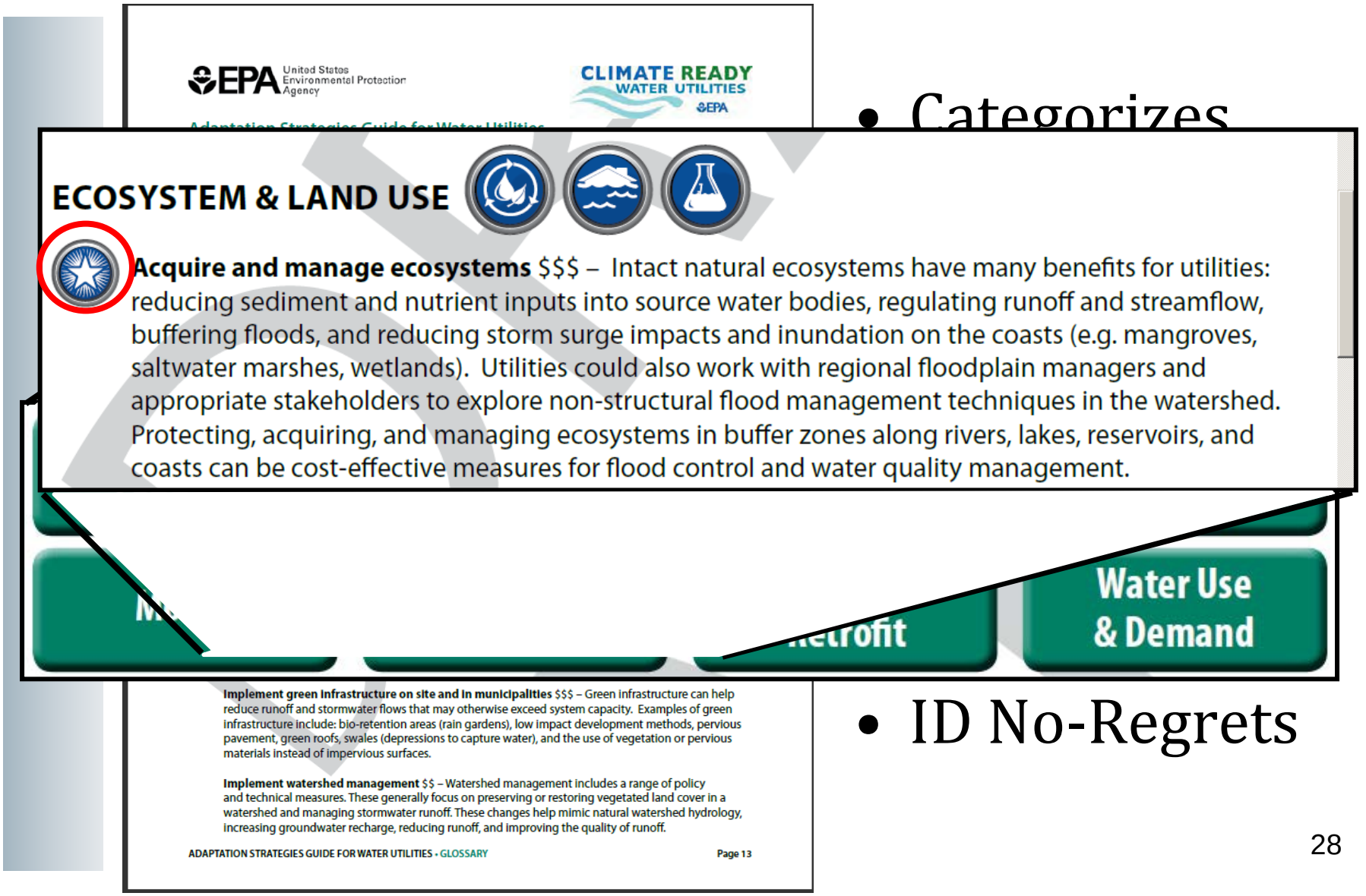
Glossary

- Categorizes



- ID No-Regrets

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CRWU Toolbox

Resources for Planning a Response to Climate Change

CRWU Toolbox

- Searchable database for utilities to obtain resources related to climate change and water
- Searches by utility attributes, climate concerns, and response strategies selected by the user
- Current version contains over 500 resources
  - Publications
  - Current activities
  - Funding opportunities
  - Events
  - Tools and models

CRWU Toolbox

U.S. ENVIRONMENTAL PROTECTION AGENCY

Water Security

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You are here: EPA Home » Water » Ground Water & Drinking Water » Water Security » Climate Ready Water Utilities » CRWU Toolbox

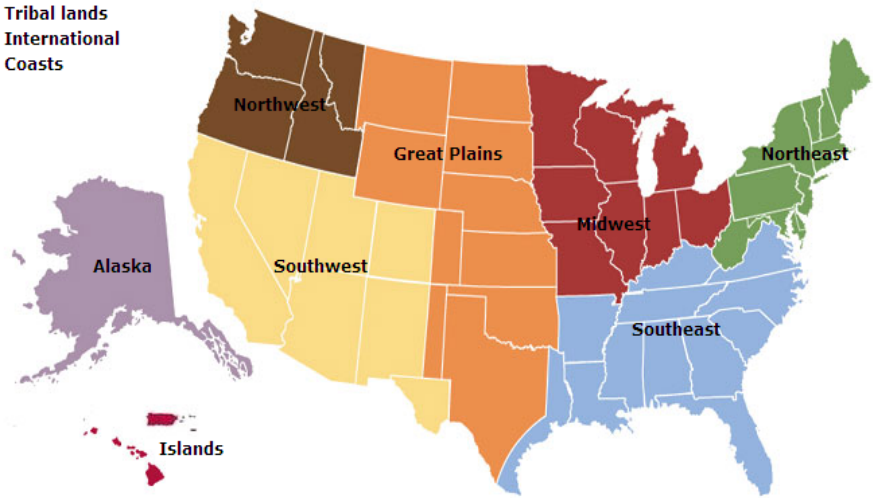
Climate Ready Water Utilities Toolbox

The CRWU Toolbox provides access to resources containing climate-related information relevant to the Water Sector. These resources include several categories of information and can be searched by geographic region, water utility type and size, water resources, climate change impact, and climate change response strategies. These resources will be updated frequently to provide the most current Water Sector climate change information.

This page provides links to non-EPA web sites that provide additonal information about Climate Ready Water Utilities. You will leave the EPA.gov domain and enter another page with more information. EPA cannot attest to the accuracy of information on that non-EPA page. Providing links to a non-EPA Web site is not an endorsement of the other site or the information it contains by EPA or any of its employees. Also, be aware that the privacy protection provided on the EPA.gov domain (see Privacy and Security Notice) may not be available at the external link. EXIT Disclaimer

- Featured Resource
- Region Map
- Activities
- Funding
- Publications and Reports
- Tools and Models
- Training, Workshops & Seminars
- Mitigation Strategies

Select a Region



Features:

- Browse by Tabs
- Region Map
- Highlighted Resources
- Link Direct to Web Page
- Option to Show Searchable Database/Resources List

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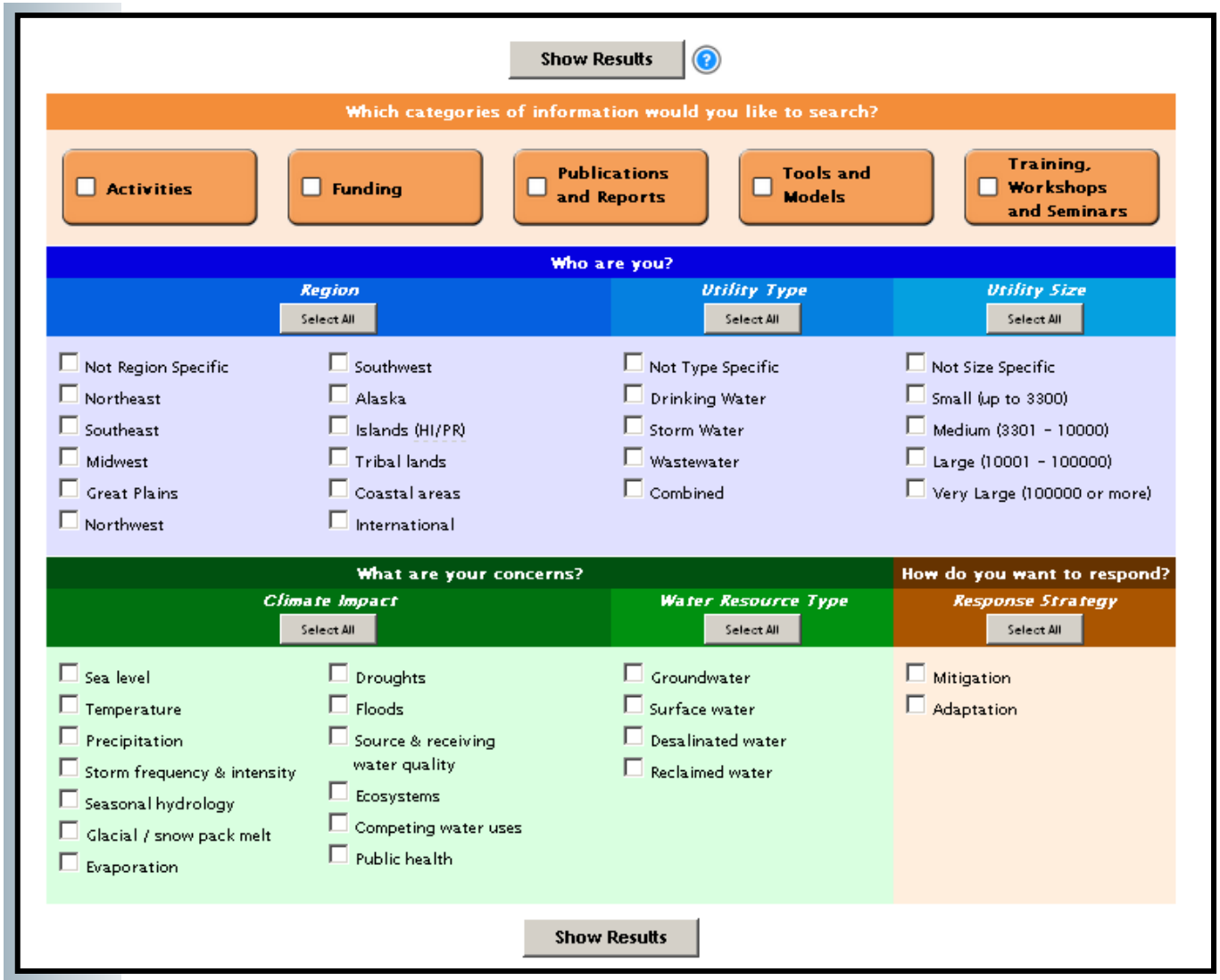
CRWU Toolbox



- Search function
- Choose:
  - Region
  - Utility type & size
  - Climate concerns
  - Water resource
  - Climate response
- Tailored resource list

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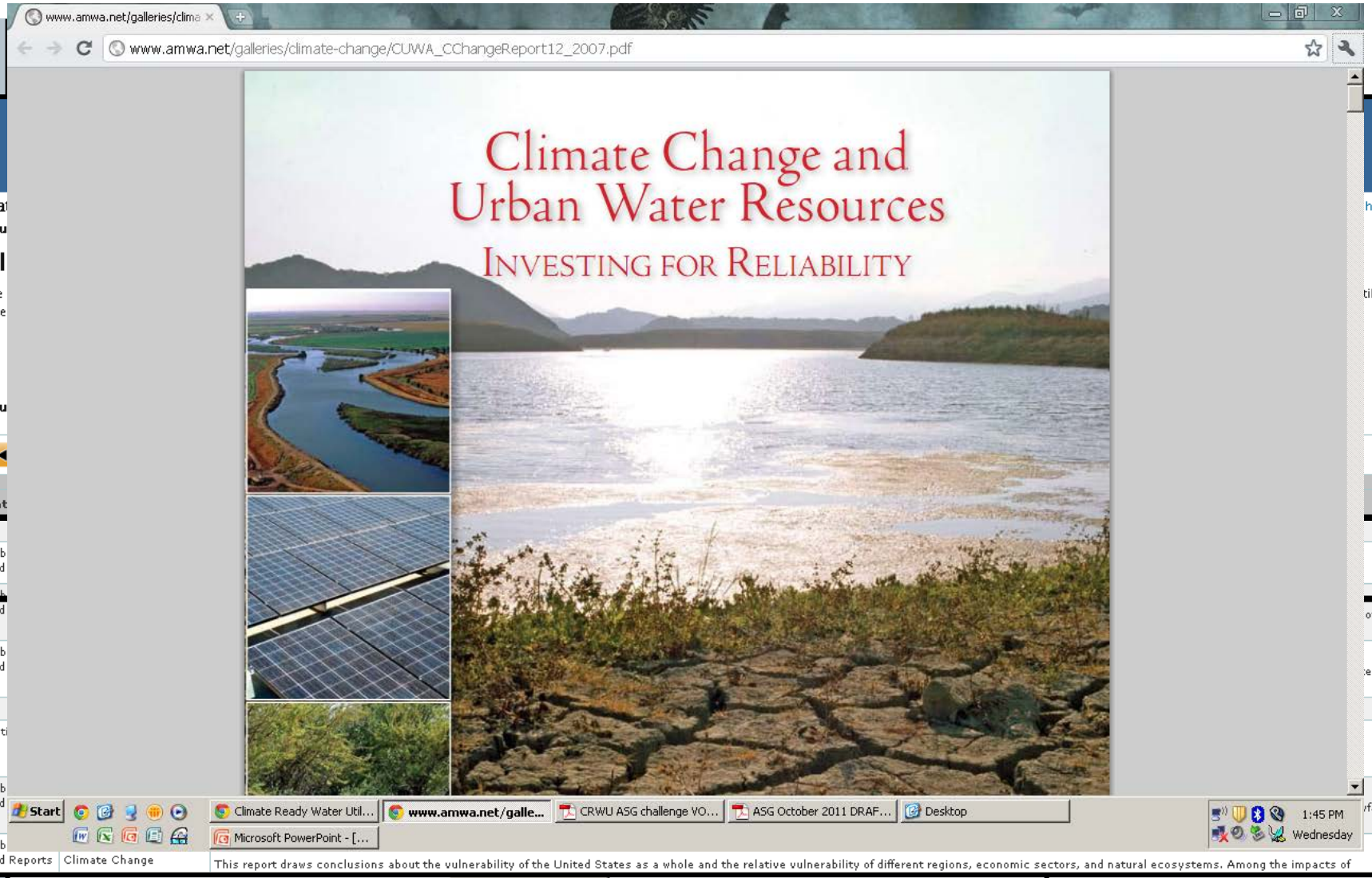

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Want more information?

CRWU website:

http://water.epa.gov/infrastructure/watersecurity/climate/

Sign up for e-newsletters:

EPA Climate Change and Water News: Send a blank email to water_and_climate_change_listserve-subscribe@lists.epa.gov

EPA climate change activities:

http://epa.gov/climatechange

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