United States
Environmental Protection
Agency

Adaptation and Resilience:
CRWU Tools, Concepts and Making the Business Case

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Office of Ground Water and Drinking Water
Creating Resilient Water Utilities (CRWU) Initiative

Overview

- Resilience building process in the water utility
  - EPA's Creating Resilient Water Utilities (CRWU) Program
    - Resilient Strategies Guide
    - Adaptation Case Study and Information Exchange
  - Other EPA resources and tools
- Making the business case for resilience planning
- Communicating resilience planning and efforts

CRWU Mission Statement

The CRWU initiative provides drinking water, wastewater and stormwater utilities with the practical tools, training, and technical assistance needed to increase resilience to extreme weather events.

Through a comprehensive planning process, CRWU assists water sector utilities by promoting a clear understanding of potential long-term adaptation options.

Resilience Building Process

Begin the Resilience Building Process

- There is no one-size-fits-all solution for utilities
- Develop a plan that fits available resources and priorities
  - No Regrets
  - Complements or is built into other utility priorities/funding
    - Sustainability planning
    - Capital planning
    - Capacity building
    - Emergency response activities
  - Varying implementation timeframes
  - Triggers/thresholds
- Collaborate with state and federal authorities, local interdependent sectors (energy, agriculture, forestry) and other nearby utilities

Critical Decision Points

- Why develop a plan for additional resilience?
- How do I plan for resilience?
- What are the options for strategies to include in plans?
- How do I assess these plans and decide what to pursue?
- How do I communicate resilience and the plans I choose?

Critical Decision Points

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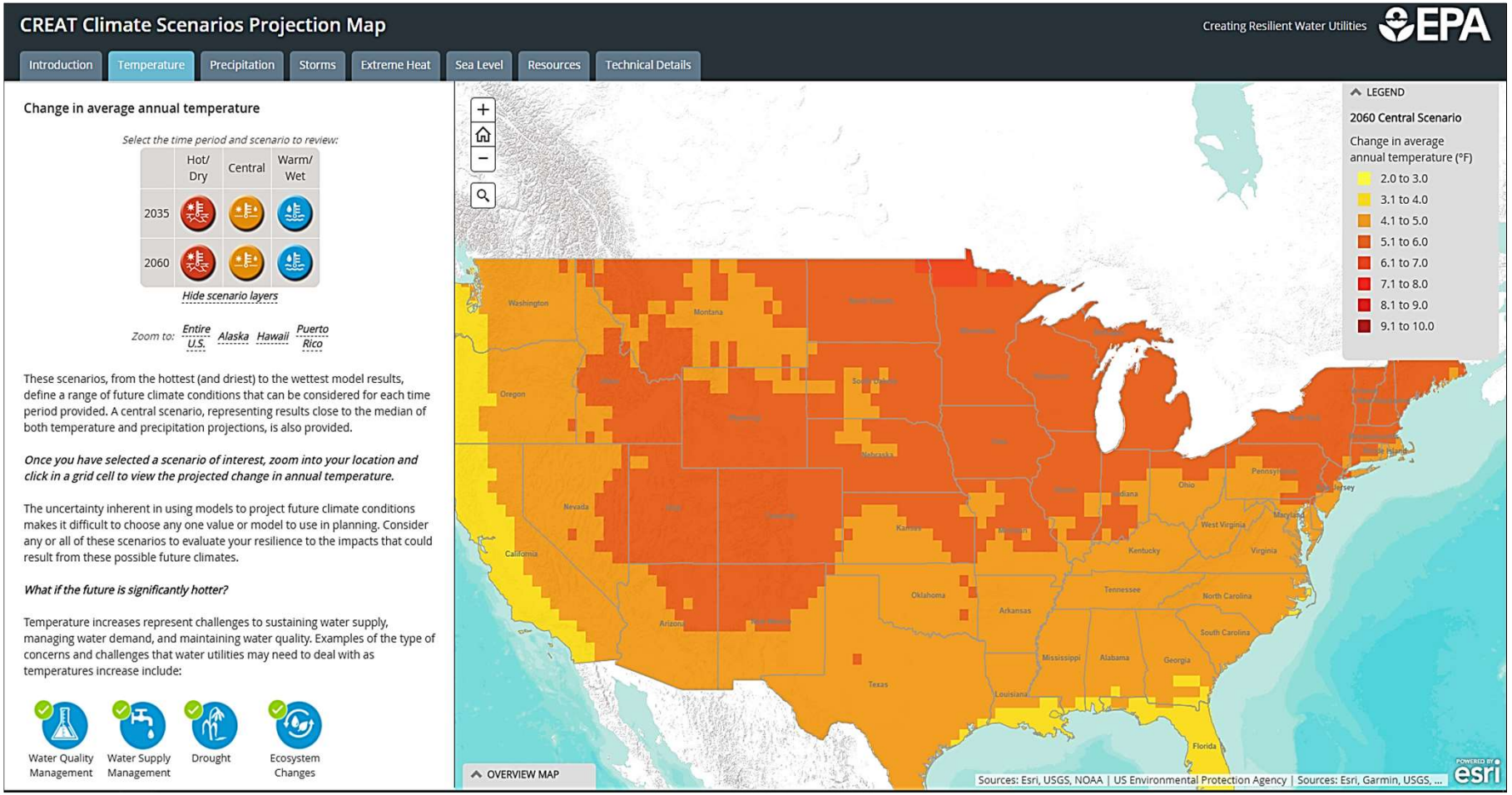
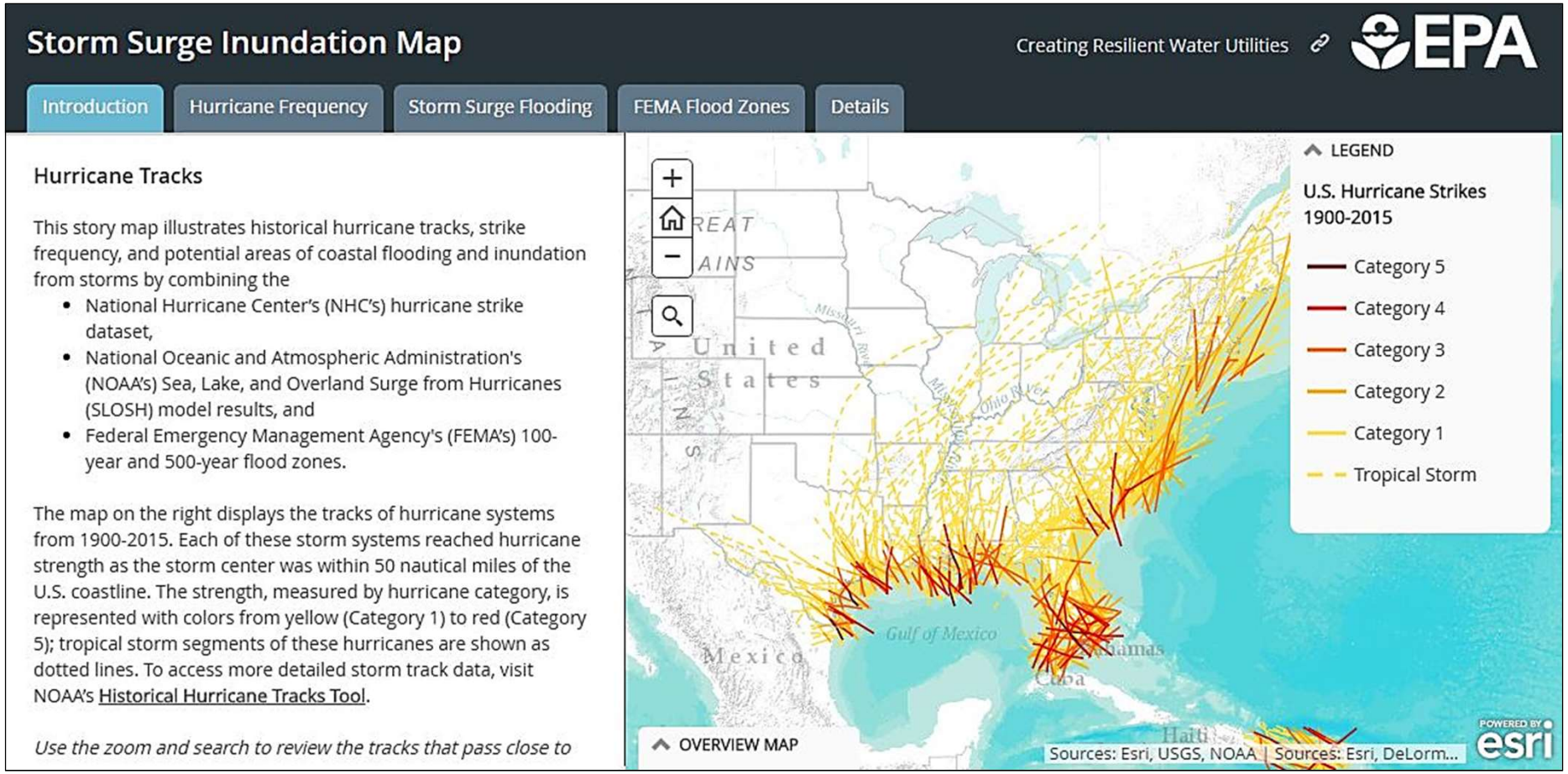
Climate Scenarios Projection Map

Provides scenarios that capture the range of projected changes



Storm Surge Inundation Map

Illustrates potential for flooding in coastal areas, based on hurricane surge models and FEMA flood zones.



Critical Decision Points

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- **How do I plan for resilience?**
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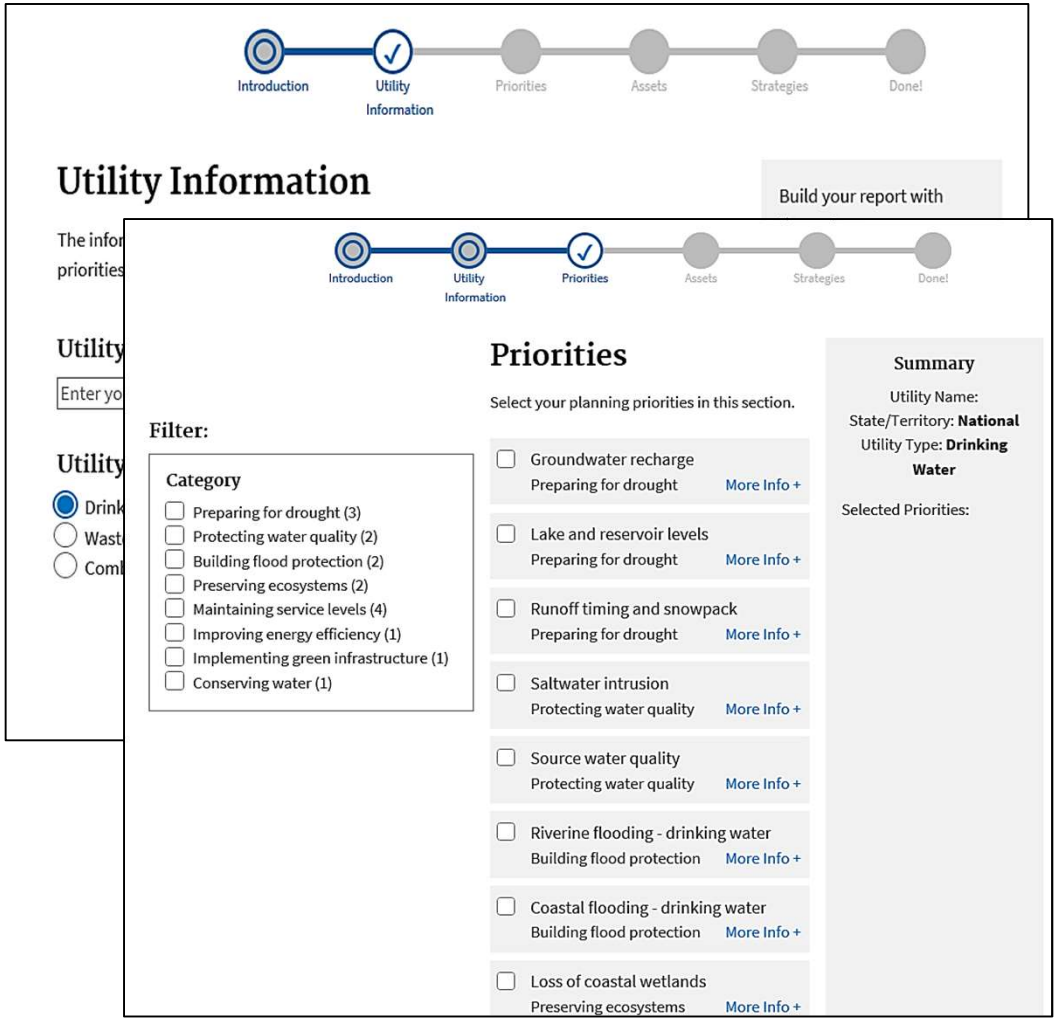
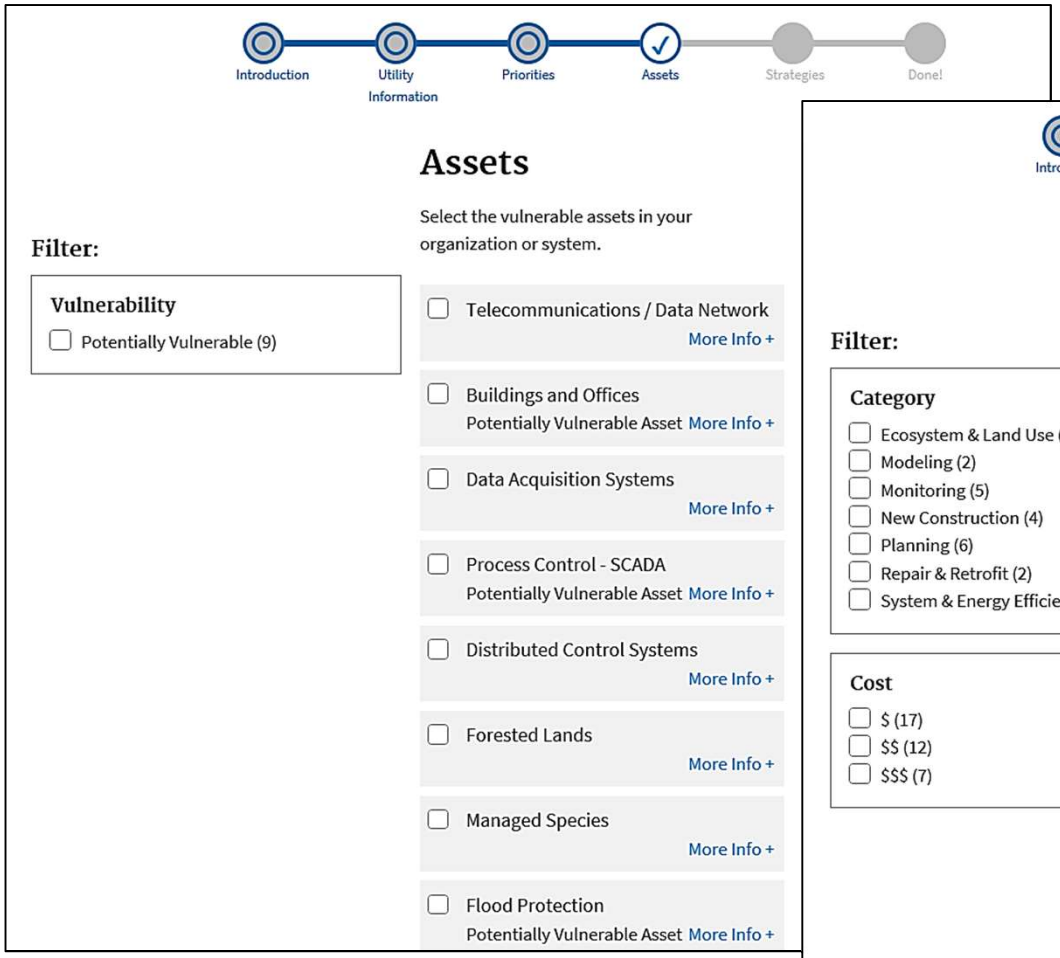
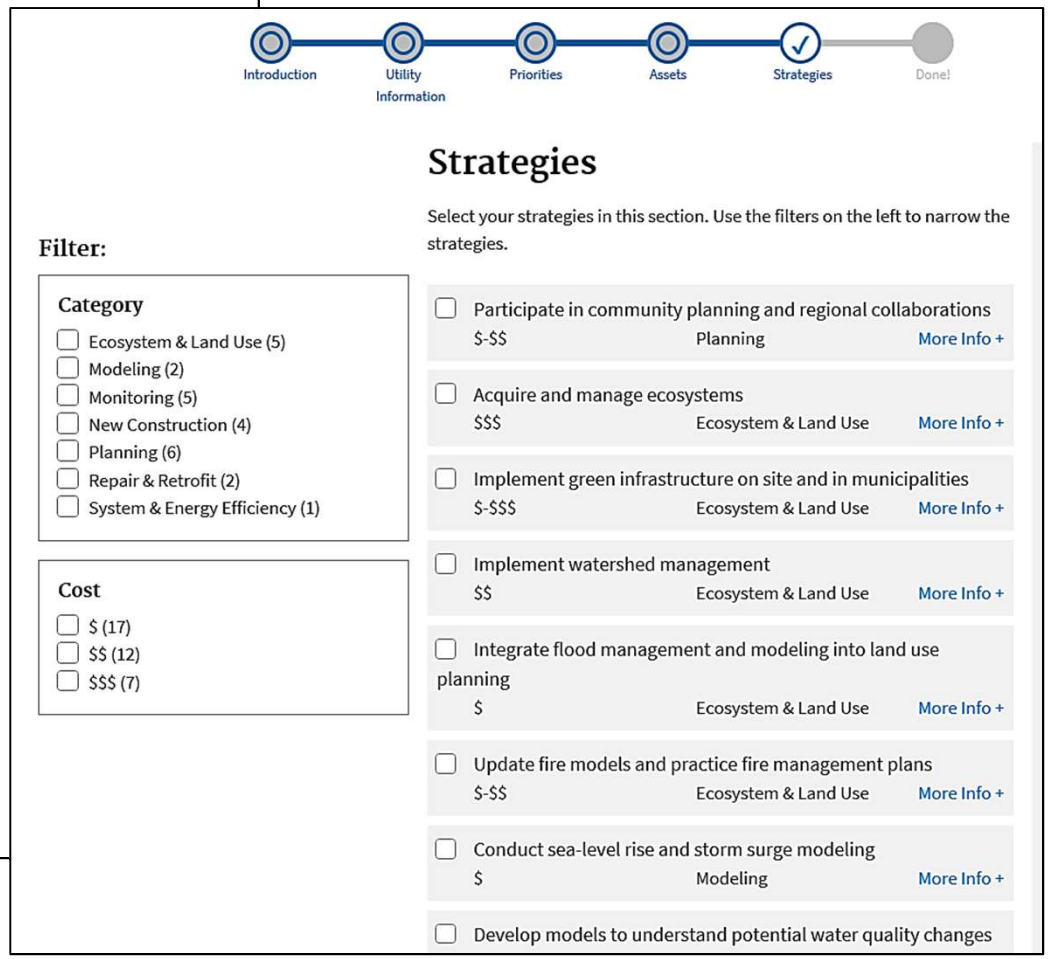
Resilient Strategies Guide

- **Web-based tool**, based on previous Adaptation Strategies Guide publication, for reviewing resilient strategies being used by water utilities
- **Guided process** to review and select priorities, vulnerable assets, and relevant strategies
- Final report documents selected strategies to explore during **adaptation planning**

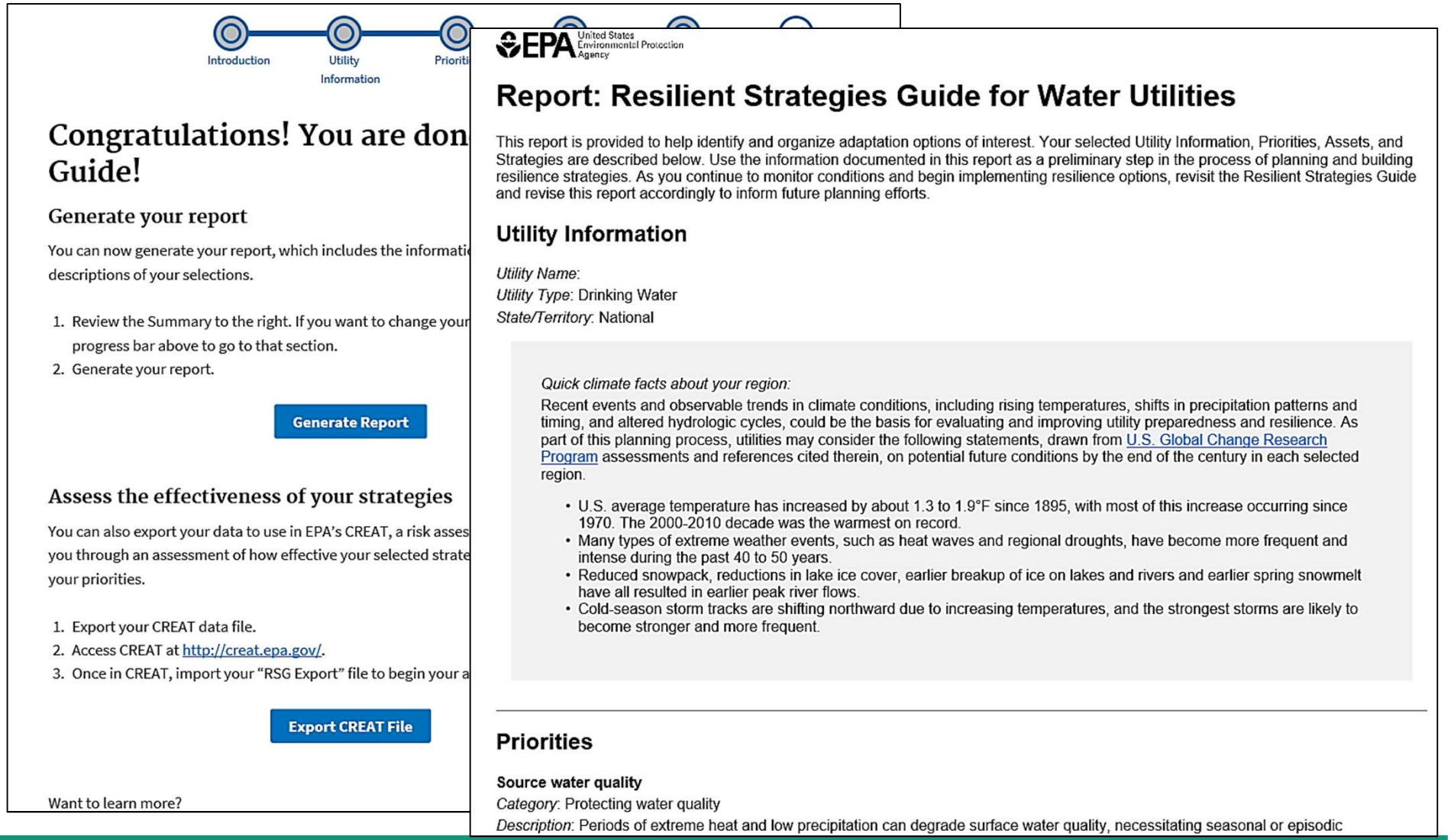


Resilient Strategies Guide

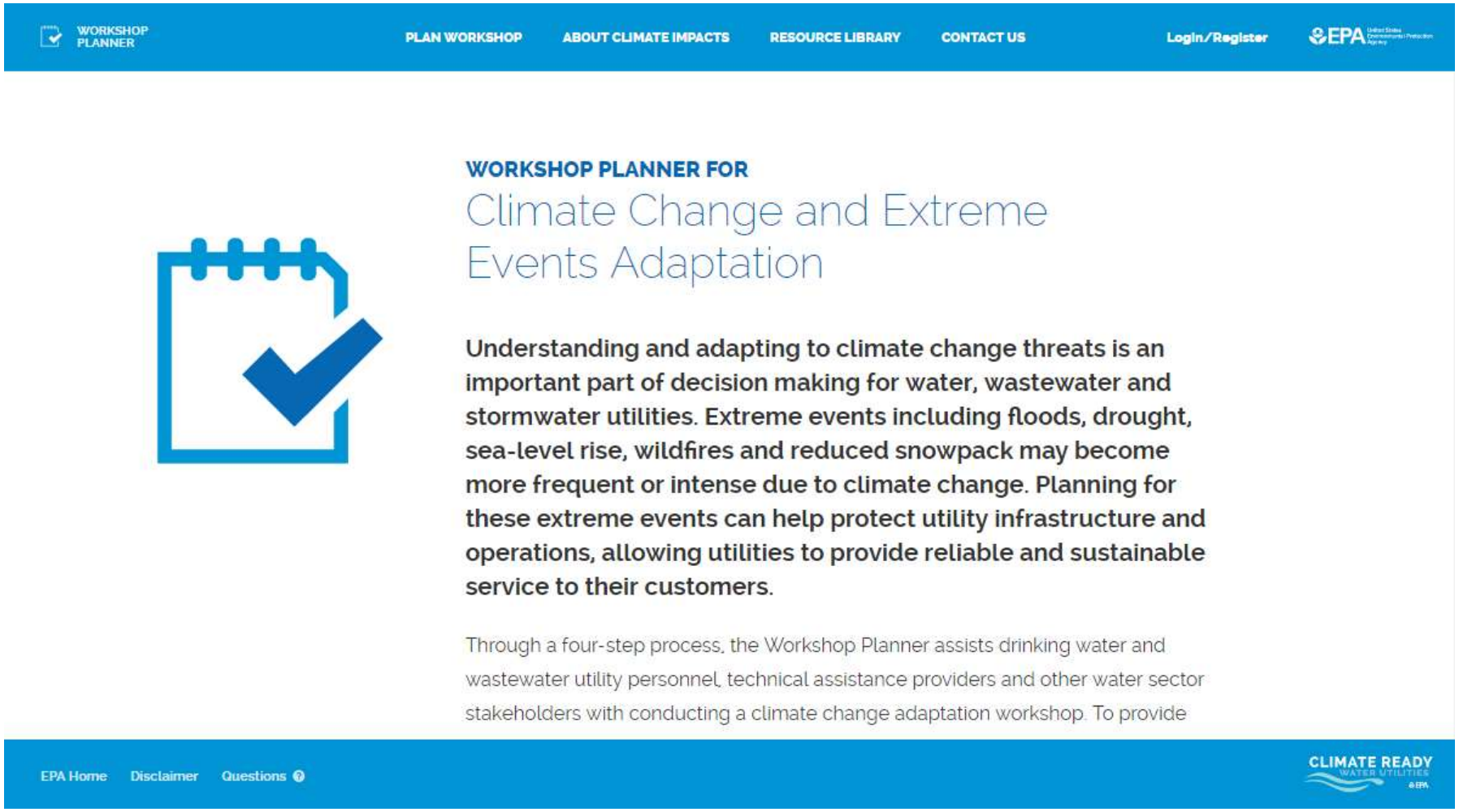




Resilient Strategies Guide: Planning Report



Extreme Events Workshop Planner

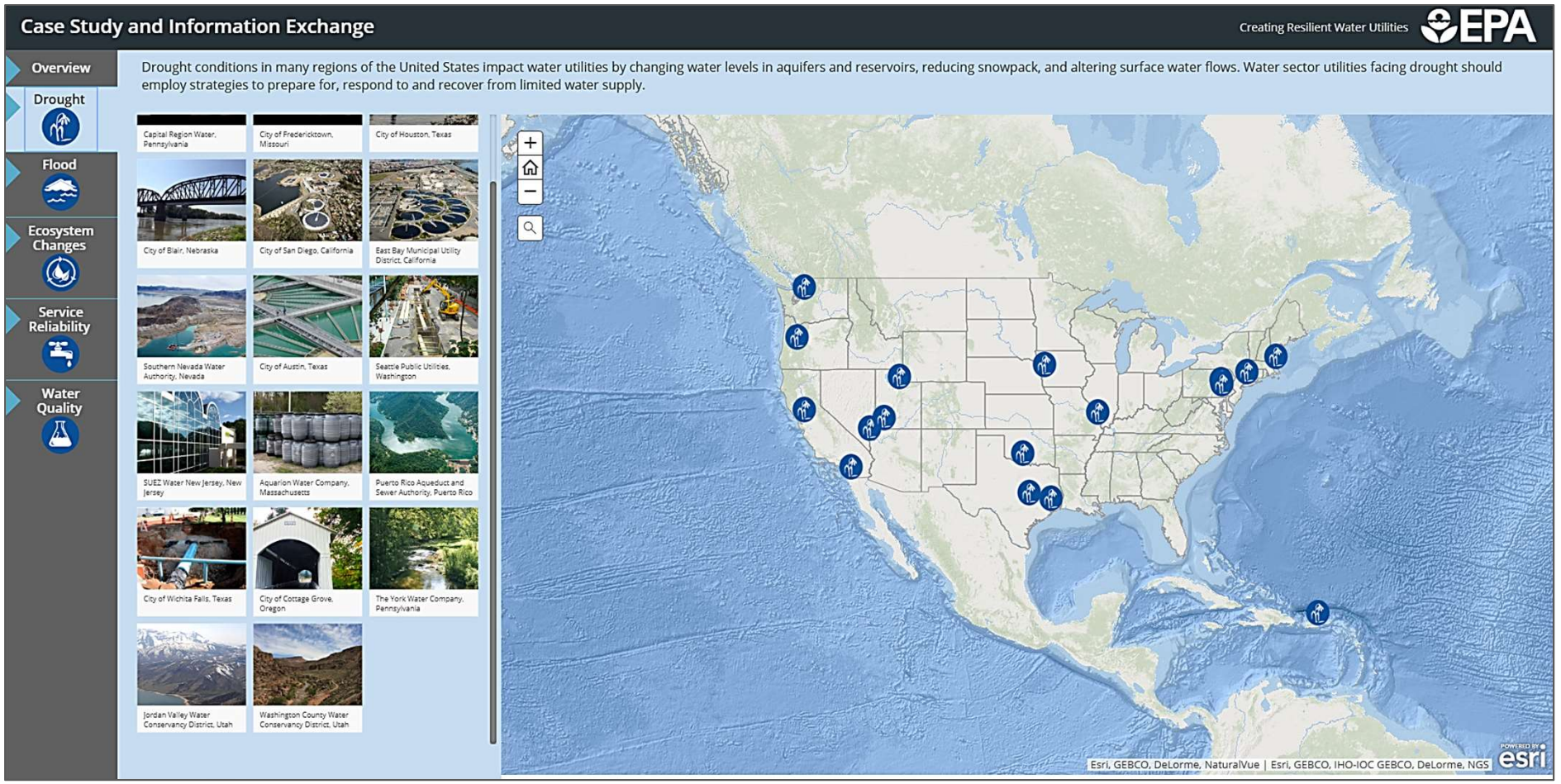


Continue the Resilience Building Process

- Document planning process and revisit periodically (changing priorities, new threats)

- Share and gather experiences with others as part of utility community pursuing additional resilience
  - Common priorities and/or threats
  - Successful strategies
  - Lessons learned

Adaptation Case Study and Information Exchange



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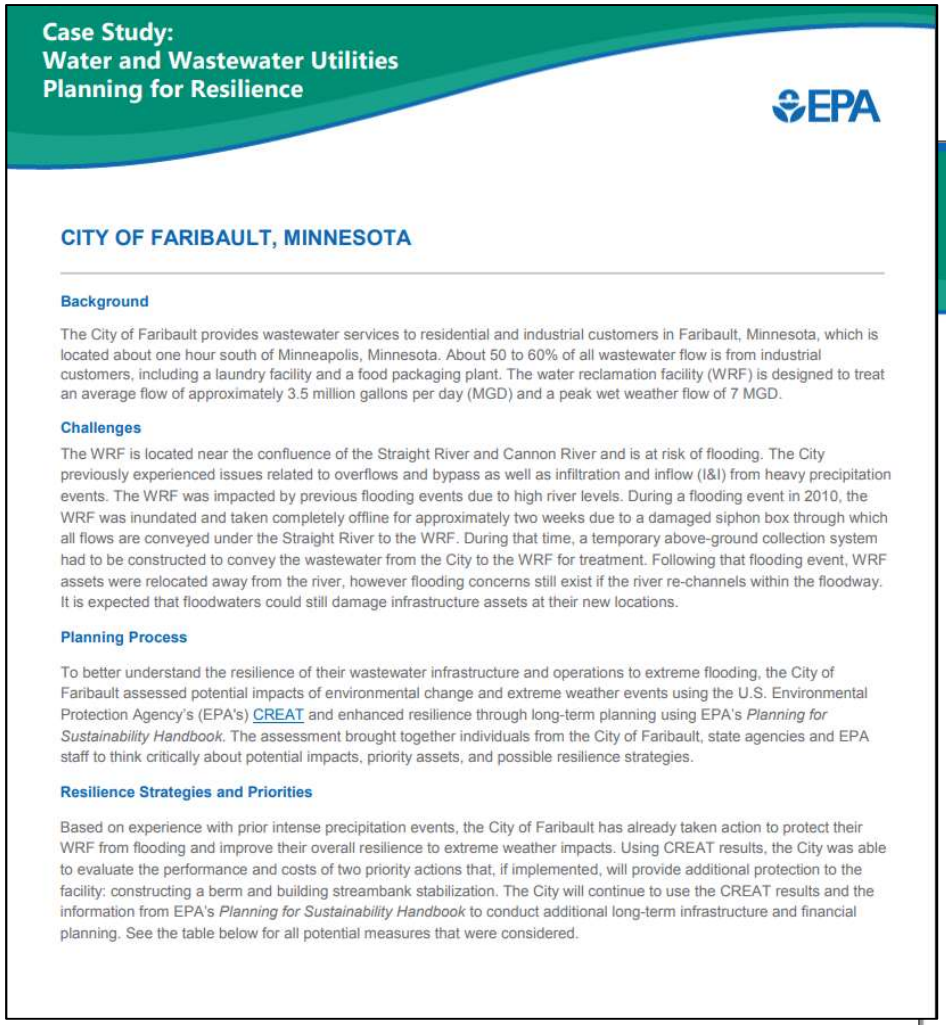


Case Study:
Water and Wastewater Utilities
Planning for Resilience

EPA

CITY OF FARIBAULT, MINNESOTA

Background

The City of Faribault provides wastewater services to residential and industrial customers in Faribault, Minnesota, which is located about one hour south of Minneapolis, Minnesota. About 50 to 60% of all wastewater flow is from industrial customers, including a laundry facility and a food packaging plant. The water reclamation facility (WRF) is designed to treat an average flow of approximately 3.5 million gallons per day (MGD) and a peak wet weather flow of 7 MGD.

Challenges

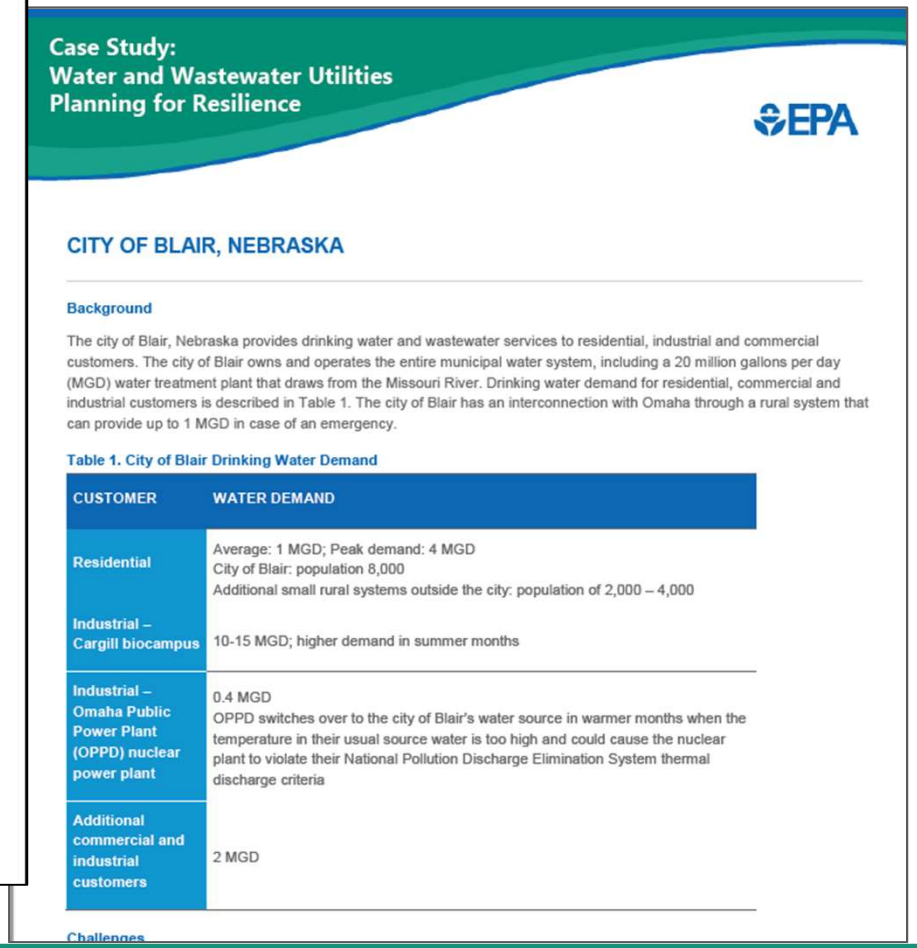
The WRF is located near the confluence of the Straight River and Cannon River and is at risk of flooding. The City previously experienced issues related to overflows and bypass as well as infiltration and inflow (I&I) from heavy precipitation events. The WRF was impacted by previous flooding events due to high river levels. During a flooding event in 2010, the WRF was inundated and taken completely offline for approximately two weeks due to a damaged siphon box through which all flows are conveyed under the Straight River to the WRF. During that time, a temporary above-ground collection system had to be constructed to convey the wastewater from the City to the WRF for treatment. Following that flooding event, WRF assets were relocated away from the river, however flooding concerns still exist if the river re-channels within the floodway. It is expected that floodwaters could still damage infrastructure assets at their new locations.

Planning Process

To better understand the resilience of their wastewater infrastructure and operations to extreme flooding, the City of Faribault assessed potential impacts of environmental change and extreme weather events using the U.S. Environmental Protection Agency's (EPA's) CREAT and enhanced resilience through long-term planning using EPA's *Planning for Sustainability Handbook*. The assessment brought together individuals from the City of Faribault, state agencies and EPA staff to think critically about potential impacts, priority assets, and possible resilience strategies.

Resilience Strategies and Priorities

Based on experience with prior intense precipitation events, the City of Faribault has already taken action to protect their WRF from flooding and improve their overall resilience to extreme weather impacts. Using CREAT results, the City was able to evaluate the performance and costs of two priority actions that, if implemented, will provide additional protection to the facility: constructing a berm and building streambank stabilization. The City will continue to use the CREAT results and the information from EPA's *Planning for Sustainability Handbook* to conduct additional long-term infrastructure and financial planning. See the table below for all potential measures that were considered.



Case Study:
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CITY OF BLAIR, NEBRASKA

Background

The city of Blair, Nebraska provides drinking water and wastewater services to residential, industrial and commercial customers. The city of Blair owns and operates the entire municipal water system, including a 20 million gallons per day (MGD) water treatment plant that draws from the Missouri River. Drinking water demand for residential, commercial and industrial customers is described in Table 1. The city of Blair has an interconnection with Omaha through a rural system that can provide up to 1 MGD in case of an emergency.

Table 1. City of Blair Drinking Water Demand

CUSTOMER	WATER DEMAND
Residential	Average: 1 MGD; Peak demand: 4 MGD City of Blair: population 8,000 Additional small rural systems outside the city: population of 2,000 – 4,000
Industrial – Cargill biocampus	10-15 MGD; higher demand in summer months
Industrial – Omaha Public Power Plant (OPPD) nuclear power plant	0.4 MGD OPPD switches over to the city of Blair's water source in warmer months when the temperature in their usual source water is too high and could cause the nuclear plant to violate their National Pollution Discharge Elimination System thermal discharge criteria
Additional commercial and industrial customers	2 MGD

Challenges

Other EPA Tools and Resources

- Drought Response and Recovery Guide
- Flood Resilience Guide and checklist
- Hazard Mitigation for Natural Disasters Guide
- FedFUNDS
- Water Finance Clearinghouse

Making the Business Case for Resilience

- Financial, operational, and reputational benefits of resilience
  - Continuity and sustained quality of service
  - Benefits associated with avoided costs
    - O&M, treatment, service revenue loss, equipment
  - Adequate water quality and quantity
  - Protection of assets against gradual change and extreme events

Capital Planning and Asset Management

- Proper asset management supports planning for capital improvements and investment
- Asset management and capital planning can support adaptation and resilience planning
  - Build asset risk assessment into asset management plans to identify key assets and risks if damaged/destroyed
  - To prepare for future uncertainty, incorporate capital costs associated with extreme weather events into capital planning

Critical Decision Points

- Why develop a plan for additional resilience?
- How do I plan for resilience?
- What are the options for strategies to include in plans?
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Making the Business Case for Resilience

- Evaluate adaptation and resilience options quantitatively to make the case to decision makers
  - Cost/benefit analysis approach
  - Data collection to support justification of adaptation and resilience options
    - Understand the consequence costs of past events
    - Understand adaptation option costs
    - Investment costs vs. savings over time

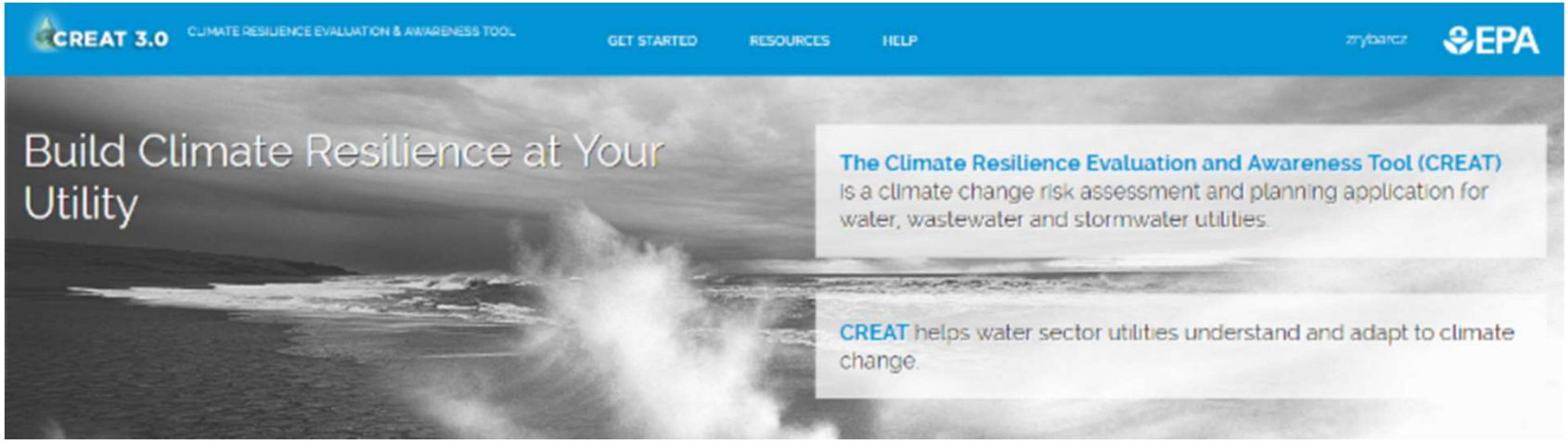
Cost/Benefit Approach

How to decide what adaptation options to implement

Cost to adapt		Cost of impacts	
$$	<	$$$$$	
$$$$$	>	$$$	
$$$	=	$$$	

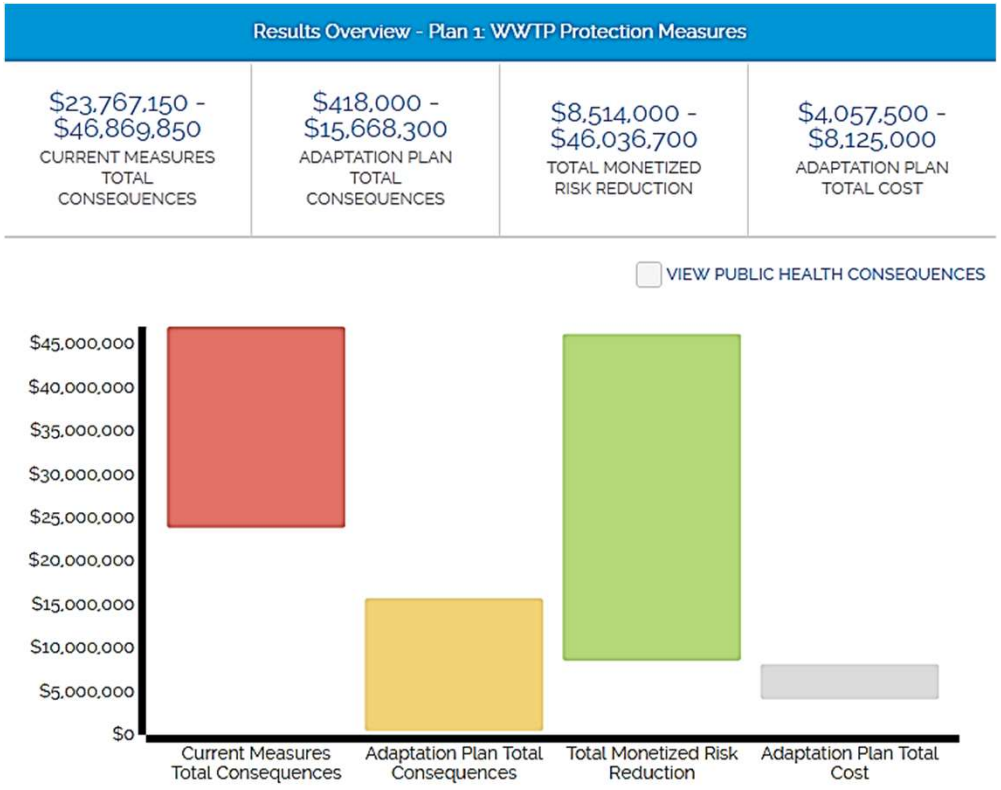
Making the Business Case with CREAT

- Climate Resilience Evaluation and Awareness Tool (CREAT) supports making the case for investment in resilience
  - Analysis which compares implementation costs to risk reduction to support decision making

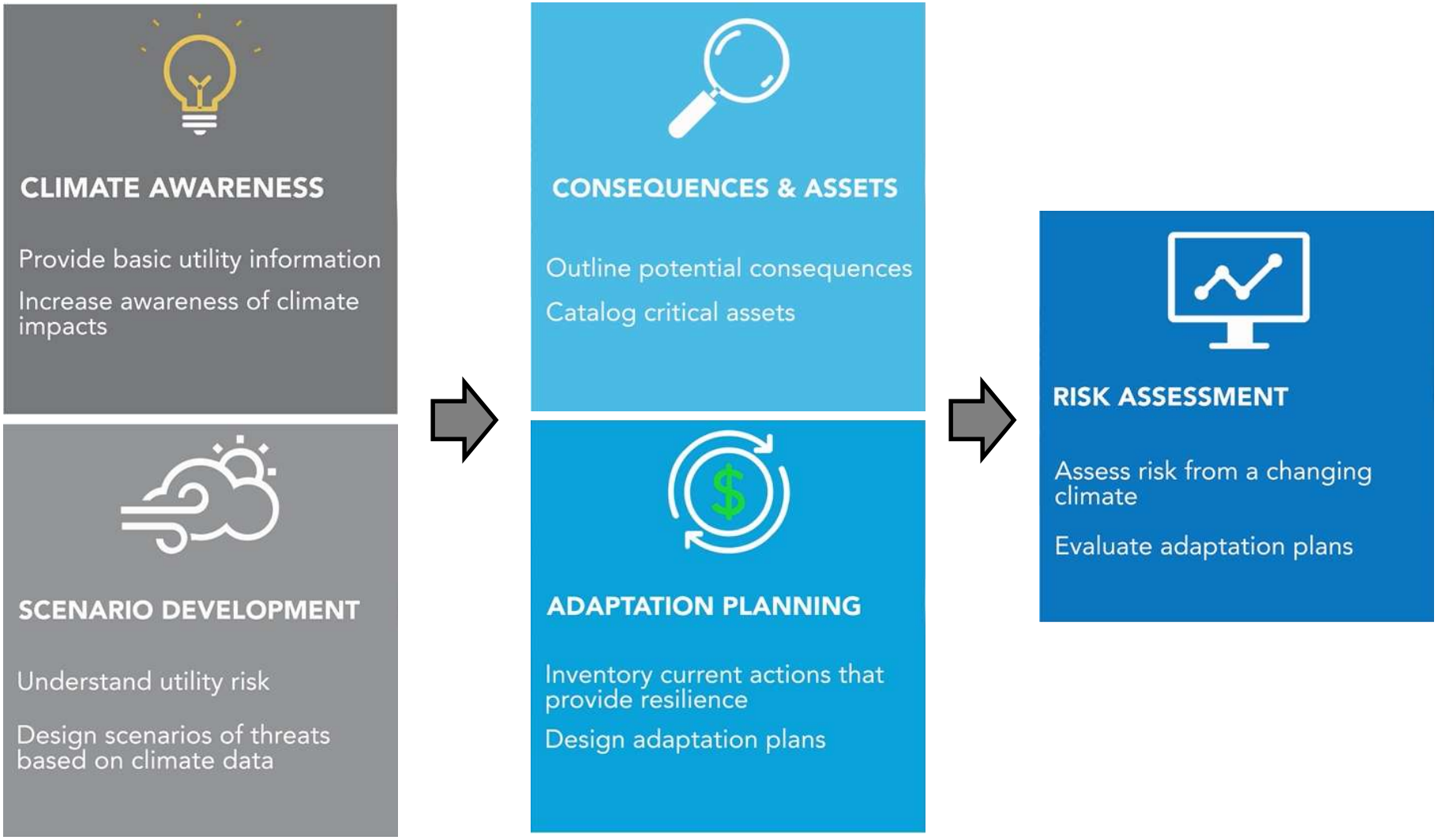


Climate Resilience Evaluation and Awareness Tool (CREAT) 3.0

- **Web-based tool** for assessing risk of potential extreme weather impacts
- **Module-based process** with clearly defined goals and reports
- Multiple scenarios provided to help **capture uncertainty**
- **Assessment of current resilience** will help inform adaptation planning
- Results help utilities compare **risk reduction** and **implementation costs**



CREAT Modules

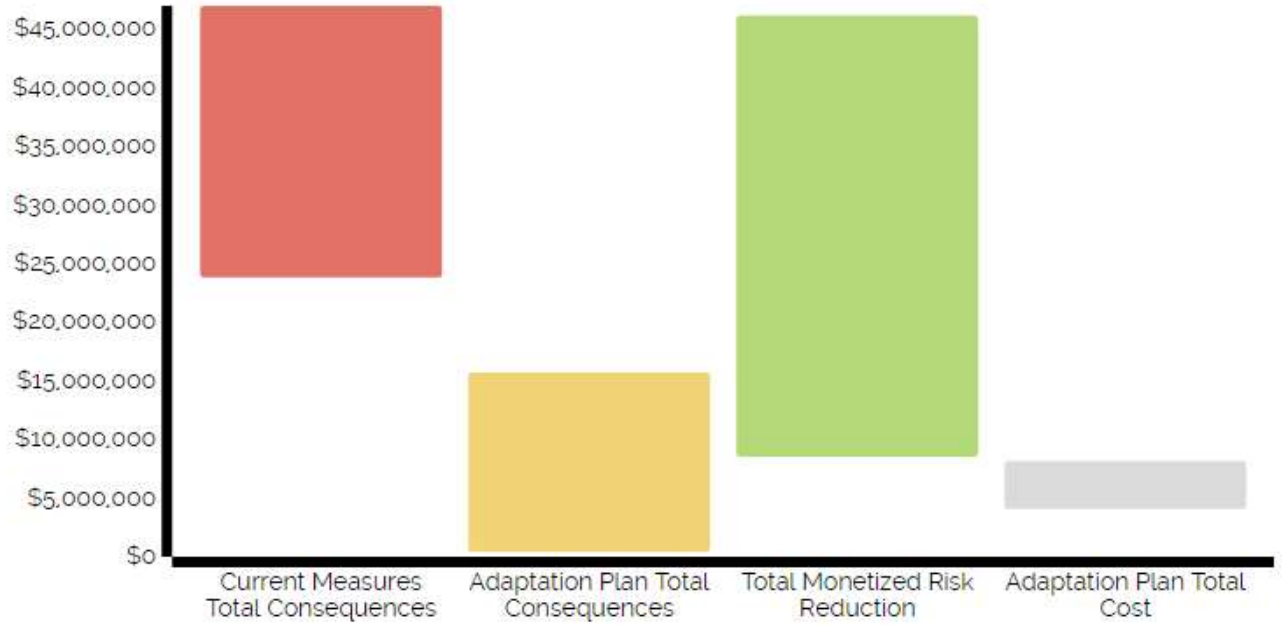


CREAT Outputs: Risk Results

Results Overview - Plan 1: WWTP Protection Measures

$23,767,150 - $46,869,850	$418,000 - $15,668,300	$8,514,000 - $46,036,700	$4,057,500 - $8,125,000
CURRENT MEASURES TOTAL CONSEQUENCES	ADAPTATION PLAN TOTAL CONSEQUENCES	TOTAL MONETIZED RISK REDUCTION	ADAPTATION PLAN TOTAL COST

VIEW PUBLIC HEALTH CONSEQUENCES



Example Cost Benefit Analysis

1. Identify and measure costs of the practice
   - Capital expenditures, operating and ongoing costs
2. Identify and measure benefits of the practice
   - Avoided costs, service reliability, revenue continuity

Some costs and benefits (e.g., regulatory compliance, quality of life, socioeconomic, public health) may be hard to quantify and can be assigned qualitative values.

Example Cost Benefit Analysis: Avoided Cost Assessment

Strategy Costs

- Certain adaptive measures focused on drought mitigation may prevent need for new supply
  - Costs for adaptive measures
    - Conservation Rate Structure (Adaptive Rates)
      - $150,000 for first year
      - $2,000 annually to manage
  - Install external pumps (can be raised/lowered in river as level changes to ensure consistent supply)
    - $400,000 in capital costs
    - $10,000 in annual O&M

Strategy Costs

Year	Capital Cost+Rate Structure	O&M+Rate Structure Management	Total
2018	$550,000	$0	$550,000
2019 - 2027	$0	$12,000 per year	$108,000
Total (10 years)	$550,000	$108,000	$658,000

Example Cost Benefit Analysis: Avoided Cost Assessment

Strategy Avoided Cost Benefits

- Benefit = avoided cost of new augmentation reservoir for high demand (or drought) periods
  - $1,000,000 in capital costs
  - $50,000 in annual O&M
  - Added cost to fill the reservoir

Strategy Avoided Cost Benefits

Year	Avoided O&M Costs for Augmentation Reservoir	Avoided Costs of Capital Cost for New Supplies	Total
2018	$0	$0	$0
2022	$0	$1,000,000	$1,000,000
2023-2027	$50,000 per year	$0	$1,200,000
Total (10 years)	$200,000	$1,000,000	$1,200,000

- **Savings over 10-year period = $1,200,000 - $658,000 = $542,000**

Case Study Example

- Camden County Municipal Utilities Authority is initiating a number of sustainable measures
  - Switched to 100% green energy sources by implementing number of measures funding by $10,000,000 SRF loan.
  - Utility receives about $600,000 in annual energy savings which is more than the yearly payments for the loan.
  - Further, as added benefit, the infrastructure improvements were made when the equipment was also at end of useful life.

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How to Communicate Resilience Planning

- Communicating the importance of resilience planning is vital to actual implementation.
- One size does not fit all when communicating resilience planning – understand your audience and know whose support is needed.
  - Local government/planning/mitigation/financial officials
  - Representatives from other sectors (public health, transportation)
  - Non-profit or other community groups/leaders
  - Community members/rate payers
- Provide quantitative and qualitative support data
  - Value of water
  - Impacts of extreme events on services/benefits of resilience efforts
- Plan outreach/engagement events (workshops, meetings) to share information and gain support
- Anticipate concerns and questions

How to Communicate Resilience Planning

- During today's small group session, we will:
  - Exchange and capture ideas and lessons learned about integrating resilience and adaptation activities into utility operations, as well as strategies to gain support and build partnerships for resilience planning
  - Identify next steps to advance resilience planning efforts

America's Water Infrastructure Act

- America's Water Infrastructure Act (AWIA) became law in 2018.
- AWIA requires each community water system serving more than 3,300 people to assess the risks to and resilience of its system to malevolent acts and natural hazards.
- AWIA has a list of water system components that the risk assessment must include, but AWIA does not require the use of a specific method to conduct the assessment.
- Water systems must submit a certification to EPA that the system conducted the assessment.
- https://www.epa.gov/waterresilience/americas-water-infrastructure-act-2018-risk-assessments-and-emergency-response-plans

America's Water Infrastructure Act Deadlines

Certification Deadlines

Population Served	Risk Assessment	Emergency Response Plan*
≥100,000	March 31, 2020	September 30, 2020
50,000-99,999	December 31, 2020	June 30, 2021
3,301-49,999	June 30, 2021	December 30, 2021

*Emergency response plan certifications are due six months from the date of the risk assessment certification. The dates shown above are certification dates based on a utility submitting a risk assessment on the final due date.

Thank you!

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