Drought Response and Recovery

A Basic Guide for Water Utilities



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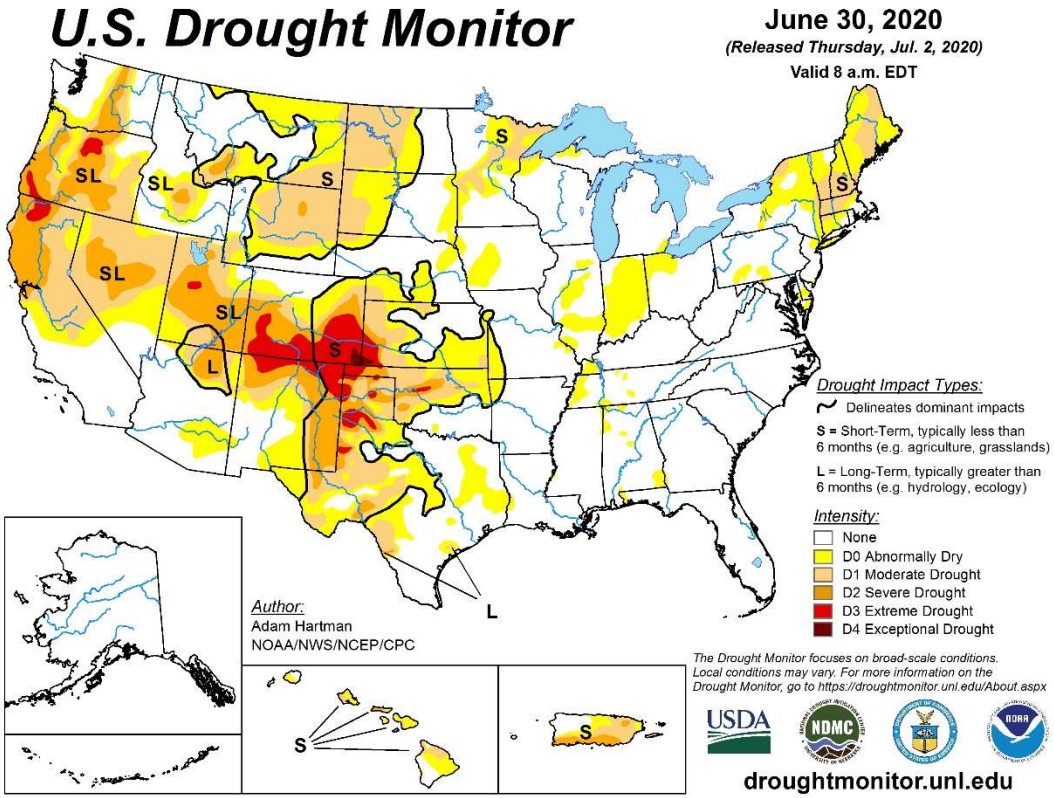
Drought – A National Issue

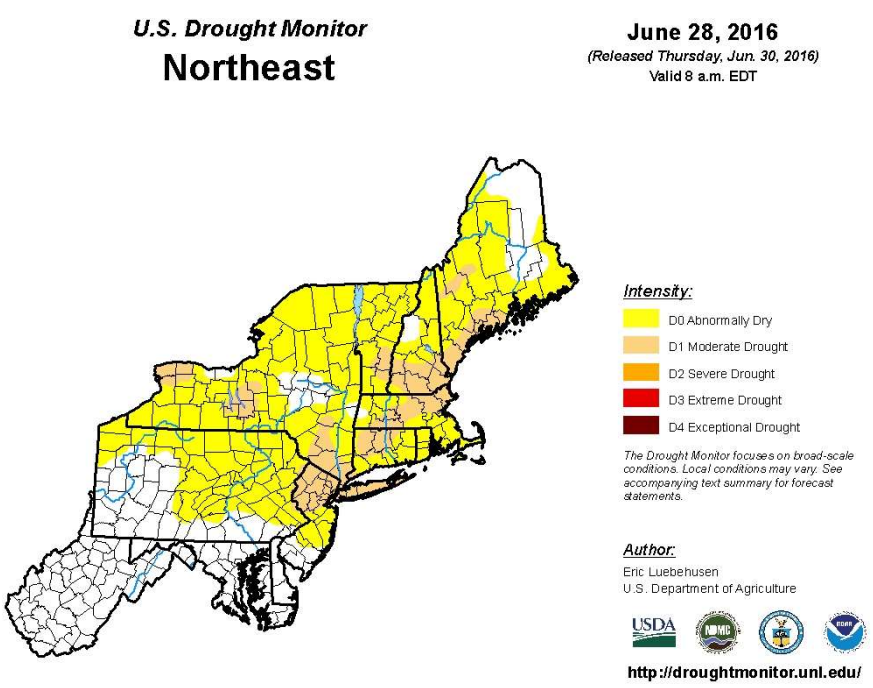


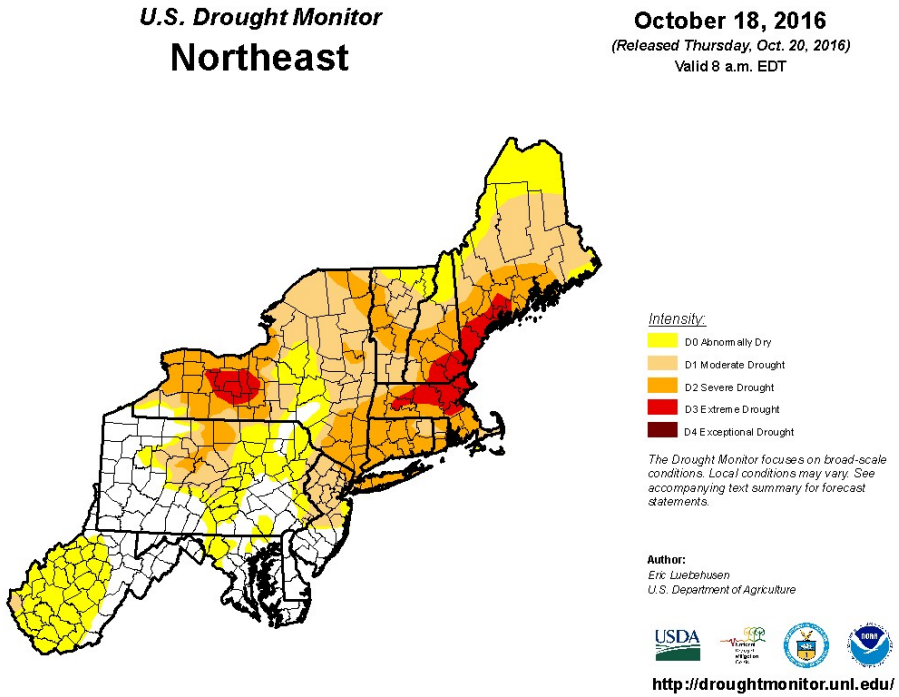
- Drought is a slow moving natural hazard that affects water utilities in **all areas** of the United States
- Drought can deplete water sources, presenting major challenges to utilities

The U.S. Drought Monitor is jointly produced by the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration. Map courtesy of NDMC-UNL.

Drought – Conditions Can Also Change Quickly

Example: New England June 2016 – Oct. 2016





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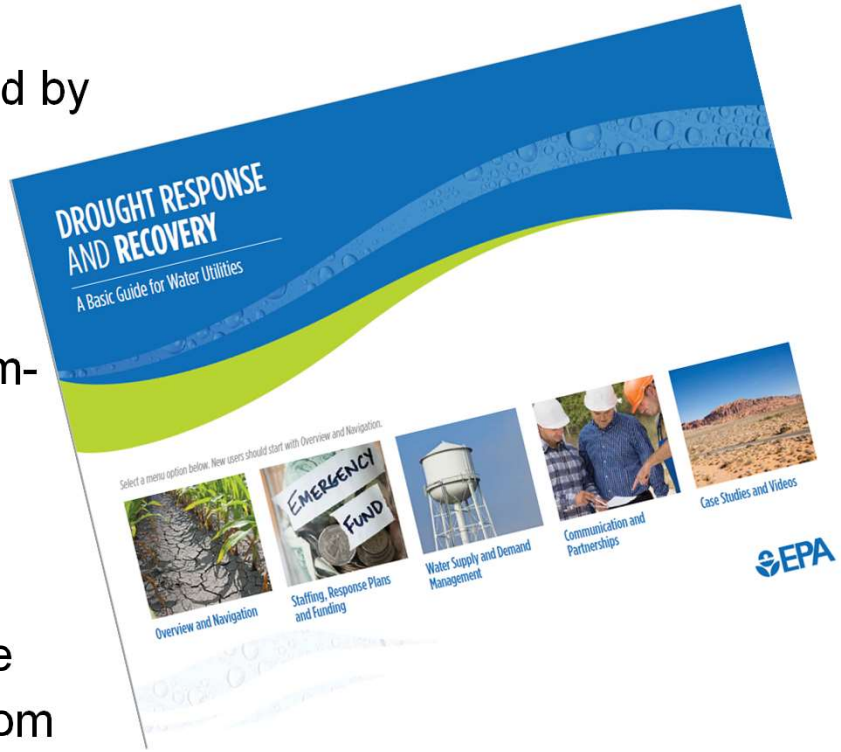
Drought Response and Recovery Guide: Overview

- **Purpose:** provides actionable guidance for drinking water utilities that are currently *responding* to drought. It can also be used by utilities *preparing* for or *recovering* from drought.

- **Audience:** Targeted to small and medium-sized drinking water utilities.

- **Features:**
  - Clickable PDF, navigate like a website
  - Best practices and lessons learned from real utilities
  - Worksheets
  - Links and reference materials for more, related information

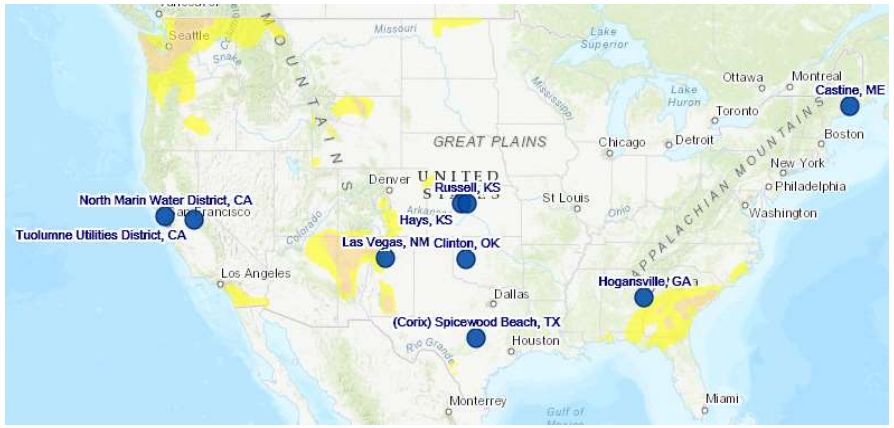


Drought Response and Recovery

Project Approach – Published in 2016; then updated 2018

- Captured lessons learned from six diverse case studies (varying location, system type, etc.) which helped to drive Guide content

- Worked with Water Sector Focus Group throughout Guide development



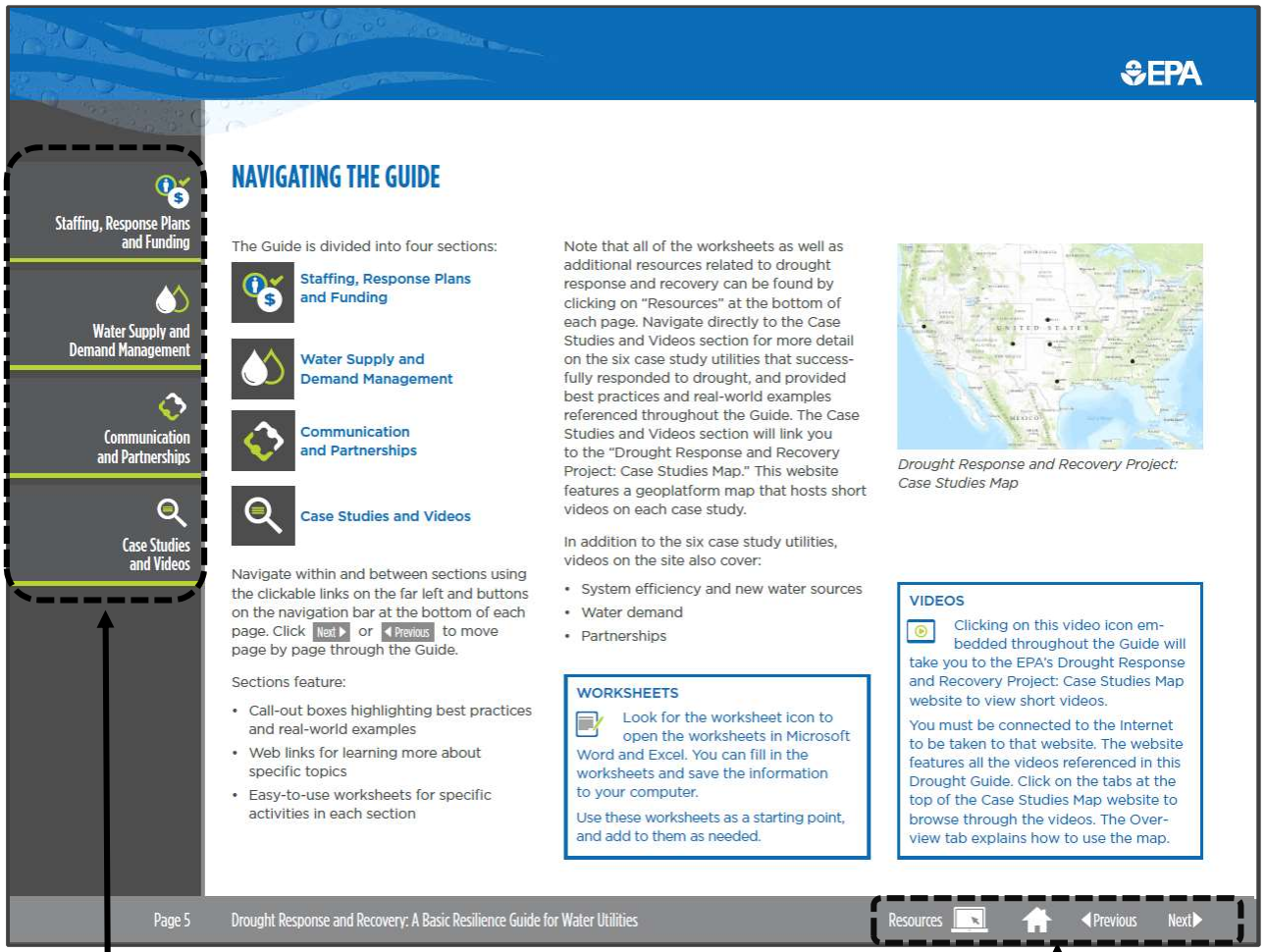
Case Study 8 Visits:

- Tuolumne Utilities District, CA
- Spicewood Beach Water System, TX
- City of Las Vegas, NM
- City of Hogansville, GA
- Cities of Hays and Russell, KS
- City of Clinton, OK
- N. Marin Water District, CA
- Castine Water Department, ME

Guide Home Page

Guide Navigation

Informational and Easy-To-Use



Explore the Drought Guide more easily through:

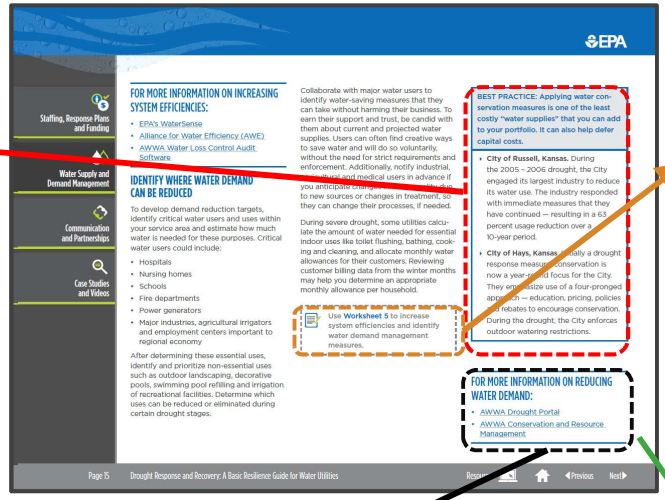
- Simple icons for tabs, worksheets and videos
- Separate boxes embedded throughout that represent certain types of info
- Sections broken up into key areas with bullets

Guide Features

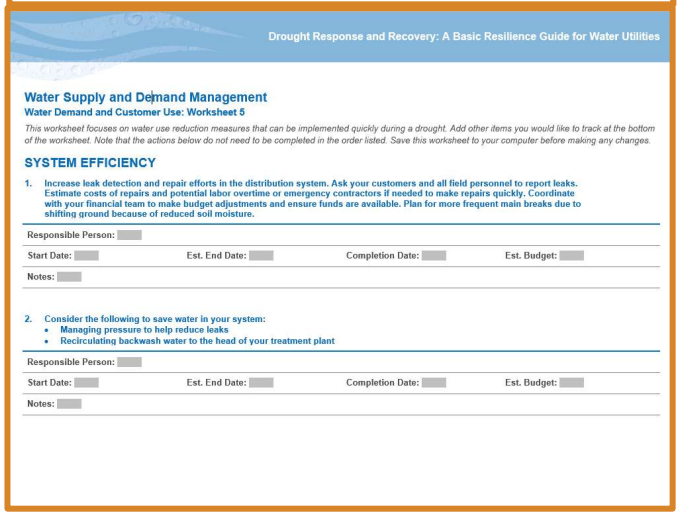
Best Practices, Worksheets, Links and More

BEST PRACTICE: Applying water conservation measures is one of the least costly "water supplies" that you can add to your portfolio. It can also help defer capital costs.

- **(Corix) Spicewood Beach Water System.** The Texas utility's drought response plan established reduction goals and specific drought response measures to curtail non-essential uses and utilize alternate water sources. For example, during Stage 2 drought, the plan includes measures such as 10 to 20 percent reduction in water use, no more than twice per week irrigation during limited hours, no hydrant flushing, and additional measures for pools and outdoor water features.



Use **Worksheet 5** to identify water demand management measures that can be implemented quickly.



FOR MORE INFORMATION ON WATER DEMAND MANAGEMENT:

- Alliance for Water Efficiency (AWE)
- AWWA Drought Portal
- EPA's WaterSense
- AWWA Conservation and Resource Management

After the Drought:

- Continue to implement your leak detection and repair program that ensures a prompt response mechanism for utility staff to make repairs. Prioritize and repair or replace components in the water distribution network that could lead to leaks.
- Look for other ways to use water efficiently throughout your utility or other departments, such as installing low-flow fixtures, retrofitting landscapes and replacing inefficient irrigation systems.
- Initiate a program to conduct annual water loss audits.

Drought Response and Recovery Guide

What's covered?

1) Staffing, Response Plans and Funding

- Developing your drought response team and drought plan
- Training on and exercising drought response (tools and tips)
- Recovering revenue, finding sources of funding

2) Water Supply and Demand Management

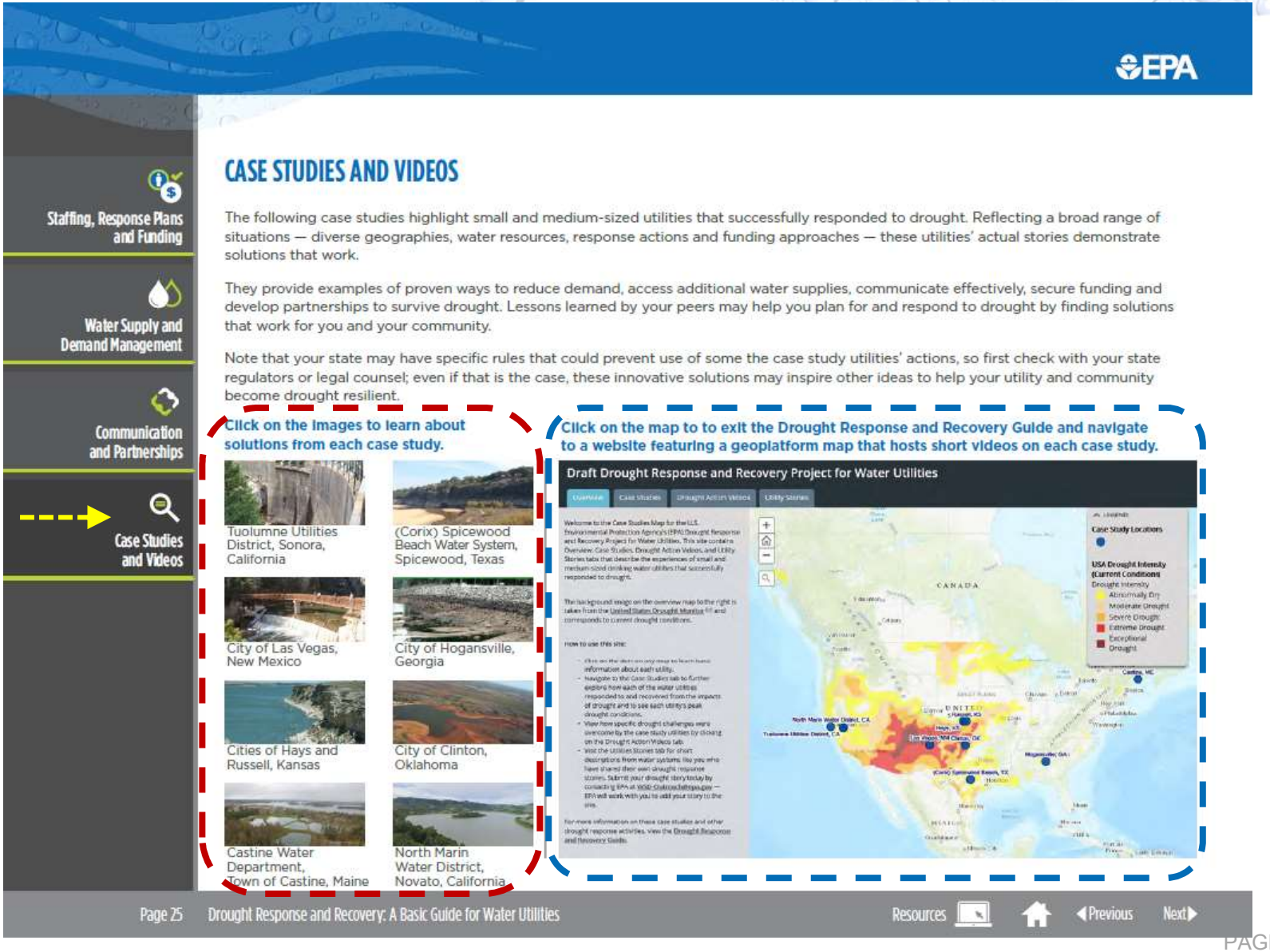
- Estimating available groundwater/surface water supplies
- Improving system efficiency and reducing customer demand
- Identifying options for additional water supplies

3) Communication and Partnerships

- Communicating drought issues/solutions to customers and decision-makers
- Examples of unique partnerships and outreach efforts
- List of suggested partners to consider reaching out to

Drought Response and Recovery Guide

Case Studies and Videos



Case Studies and Videos

EPA

CASE STUDY: Tuolumne Utilities District, Sonora, California

Click on the video icon to go to the Drought Response and Recovery Project for Water Utilities: Case Studies Map to watch a video about the utility's drought response.

SYSTEM DETAILS

- 14 treatment plants provide water for residential, commercial, industrial, wholesale, agricultural uses and fire suppression.
- Approximately 14,150 connections.
- Surface water stored in the Lyons and Pinecrest Reservoirs on Stanislaus River and released into the "Main Canal."
- Reservoirs and the Main Canal are owned and operated by the Pacific Gas and Electric Company (PG&E).
- Allocated approximately 17,000 acre-feet per year of surface water to treatment plants.
- 400 acre-feet per year groundwater used to supply three well systems.

IMPACT

For the Tuolumne Utilities District (TUD), 2013 was the second consecutive year of intense drought, with precipitation at 25 percent of the annual average of 32 inches. During the third quarter of 2013, TUD estimated that reservoir inflows and instream flows would reach an unprecedented low volume of water available for diversion in 2014. Water supplies i
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during the driest year
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days at typical water

Based on hydrologic a
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reduction of 45 perce
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RESPONSE MEASURES

Staffing, Response Plans and Funding

TUD's General Manager convened his management team — District Engineer, Water Master (Operations Manager) and Public Relations Manager — to lead the drought response. The team engaged other staff from operations and engineering to help with

to construct infrastructure needed to supplement existing water supplies: the New Melones Pump Station Project and expansion of the Matelot Reservoir.

Water Supply and Demand Management

TUD took important steps to increase their water supply; for example, they:

- Altered management of flows within the

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CASE STUDY: Tuolumne Utilities District, Sonora, California (Continued)

TUD adopted **water restrictions** and **conservation measures** that led to a

44% reduction in water consumption in the month of May 2014 (compared to 2013).

44% Water Consumption

TUD contacted **local** and **state officials** for potential funding sources and **received approximately**

$768,000 to fund **drought-related projects.**

As savings measures, TUD:

- Reduced evaporative losses by modifying typical delivery canal operations to cut off flow to two ditch canals that provided water for agricultural use and a golf course.
- Accelerated leak repairs in the ditches and distribution pipelines.
- Prohibited all outdoor irrigation.
- Asked customers to eliminate all non-essential water use.
- Enforced the mandatory water use reductions through verbal warnings, written notices (door hangers) and threatened fines.
- Worked with large water users on usage reduction:
  - CAL FIRE (fire department) reduced non-essential training to save water.
  - Sierra Pacific Industries, the largest water user in their system, invested in onsite water recycling and other efficiencies.

Communication and Partnerships

TUD implemented an exhaustive suite of communication tools to raise awareness about the drought, provide conservation tips and inform customers about mandatory conservation requirements. TUD communicated with customers through:

- Press releases, newspaper articles, radio and television interviews.
- Website updates and direct mailings.
- Public hearings, briefings at public meetings and presentations at civic organizations.
- Signage throughout the community.
- Distribution of "conservation kits" contributed by Home Depot and the California Corps.

TUD credits their network of partners with the success of the drought response. For instance, TUD worked collaboratively with the Twain Harte Community Services District to convene a meeting with county and state Office of Emergency Services (OES), California Department of Water Resources and other agencies that were able to provide support, address regulatory constraints or otherwise advance a solution to the drought.

LOOKING FORWARD

Drought response actions taken over the last few years to reduce demand and secure additional water supplies have prepared TUD for extended drought conditions. The utility continues to look for alternative and innovative water supplies, water storage opportunities and ways to maintain efficient water use, so as to increase their resilience to future droughts.

For more information, visit TUD's website Exit

BACK TO CASE STUDY HOME PAGE

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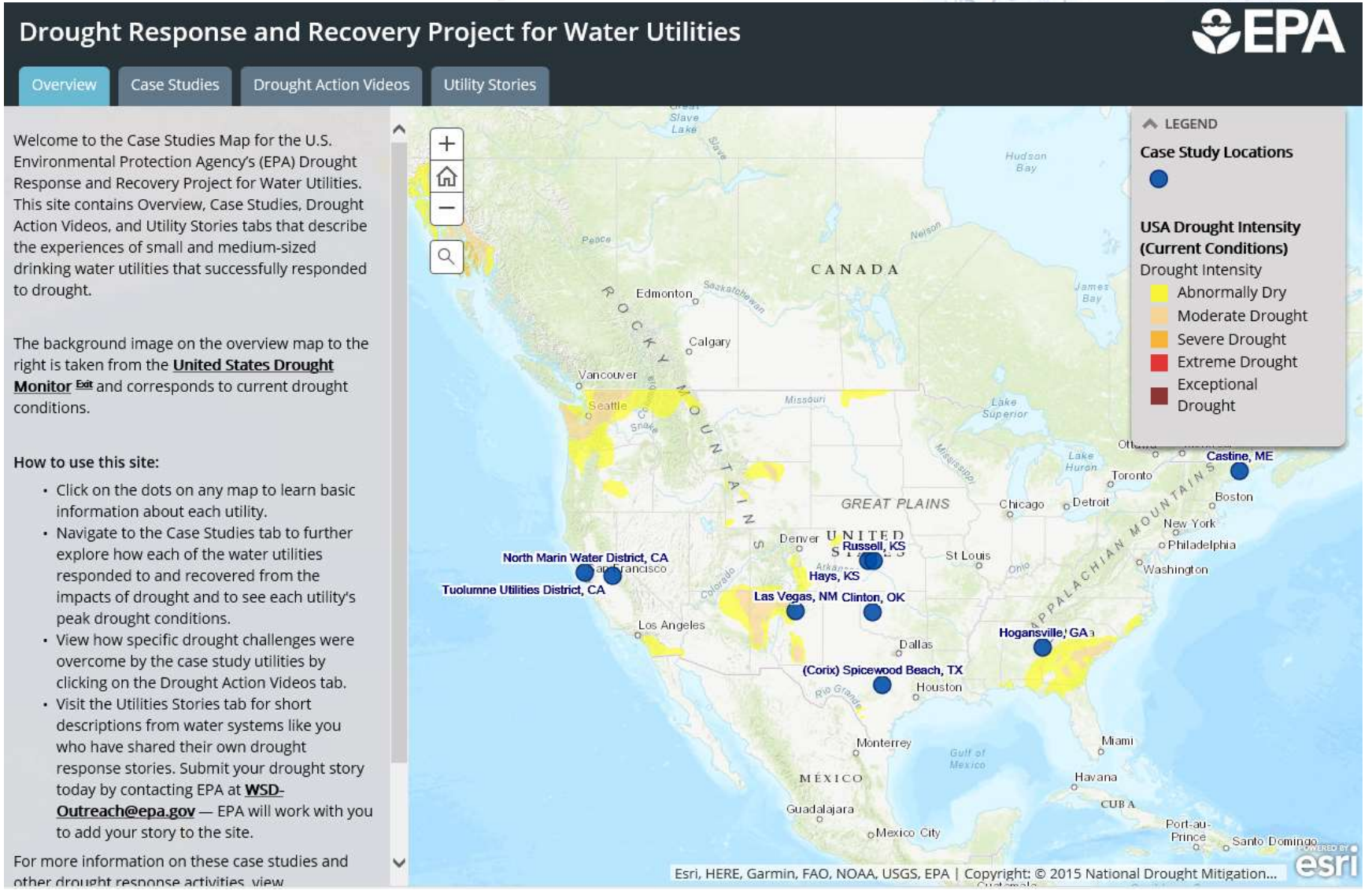
Two-page summary on water utility that includes:

- System details
- Drought response measures taken

Links to external Case Studies Map and Videos

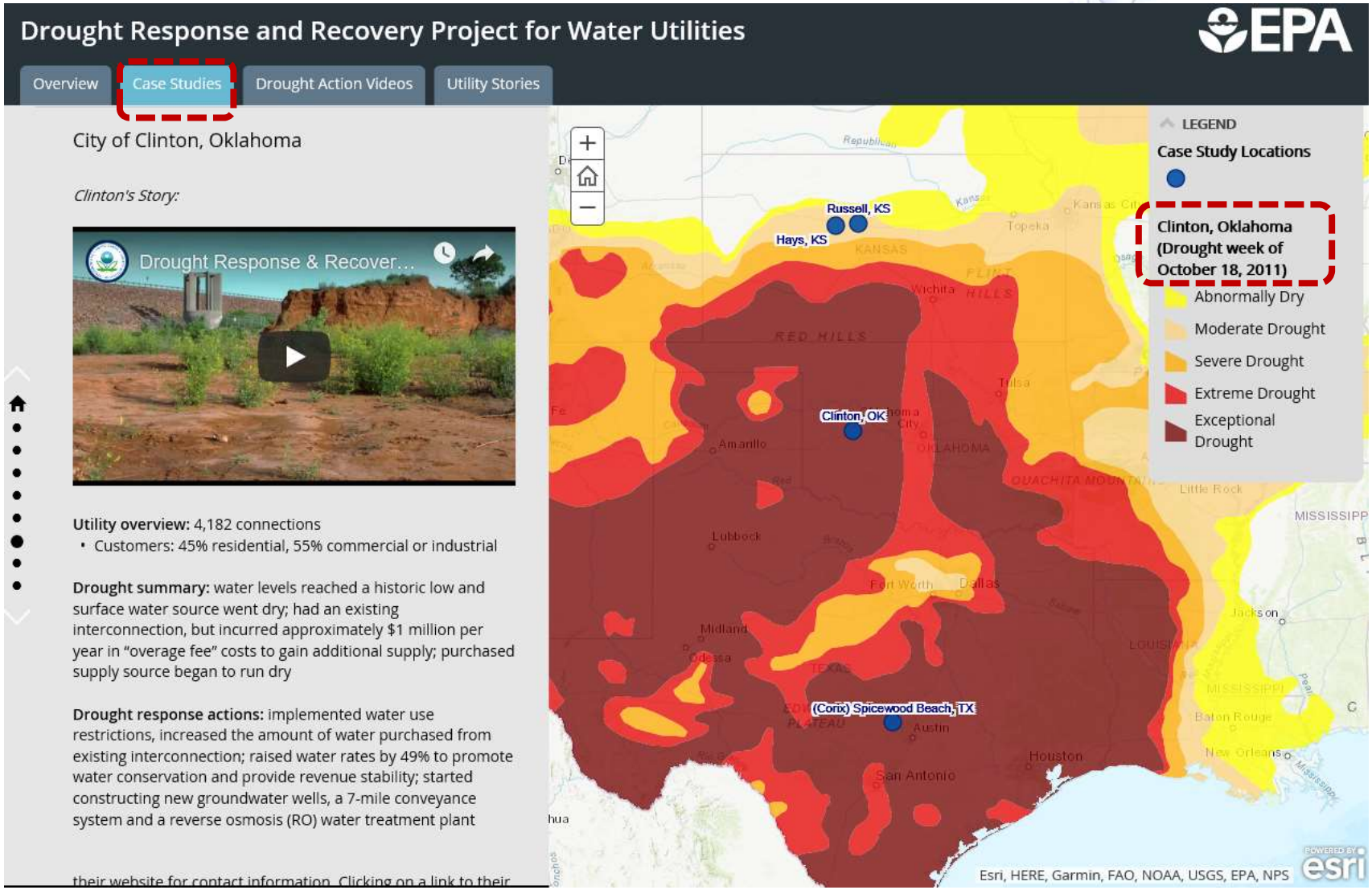
Case Studies Map and Videos Home

Geoplatform

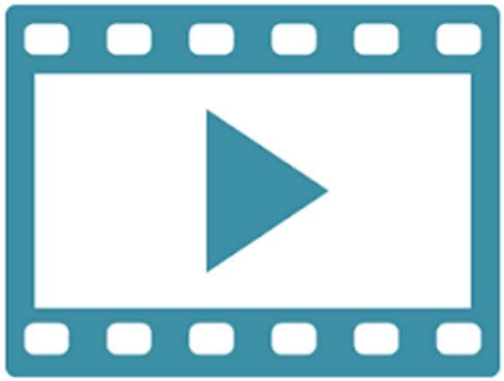


Case Studies Map and Videos

Geoplatform – Clinton, OK



Drought Guide – 2018 Updates

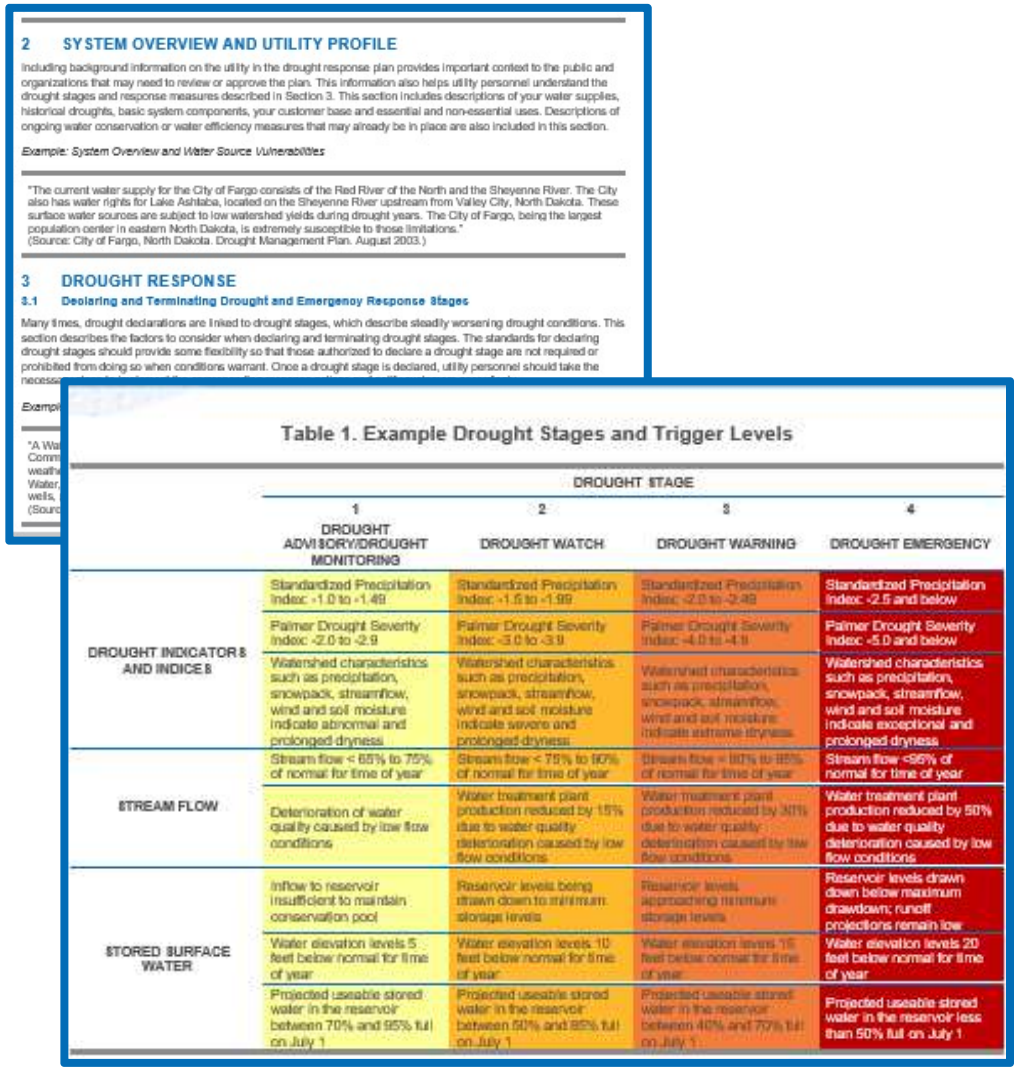


New resources include:

1. A customizable Drought Response Plan template for utilities
2. Two additional video case studies for the Geoplatform/Map
3. A “share your story” section of the Geoplatform/Map

Drought Response Plan Template

Instructions



2 SYSTEM OVERVIEW AND UTILITY PROFILE

Including background information on the utility in the drought response plan provides important context to the public and organizations that may need to review or approve the plan. This information also helps utility personnel understand the drought stages and response measures described in Section 3. This section includes descriptions of your water supplies, historical droughts, basic system components, your customer base and essential and non-essential uses. Descriptions of ongoing water conservation or water efficiency measures that may already be in place are also included in this section.

Example: System Overview and Water Source Vulnerabilities

"The current water supply for the City of Fargo consists of the Red River of the North and the Sheyenne River. The City also has water rights for Lake Ashtabe, located on the Sheyenne River upstream from Valley City, North Dakota. These surface water sources are subject to low watershed yields during drought years. The City of Fargo, being the largest population center in eastern North Dakota, is extremely susceptible to those limitations." (Source: City of Fargo, North Dakota. Drought Management Plan. August 2003.)

3 DROUGHT RESPONSE

3.1 Declaring and Terminating Drought and Emergency Response Stages

Many times, drought declarations are linked to drought stages, which describe steadily worsening drought conditions. This section describes the factors to consider when declaring and terminating drought stages. The standards for declaring drought stages should provide some flexibility so that those authorized to declare a drought stage are not required or prohibited from doing so when conditions warrant. Once a drought stage is declared, utility personnel should take the

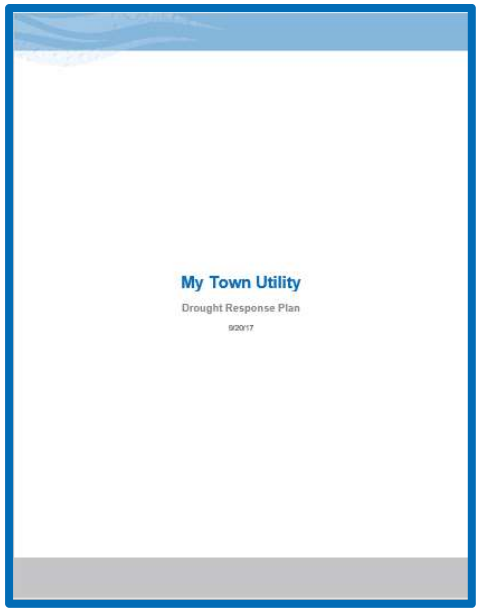
Table 1. Example Drought Stages and Trigger Levels

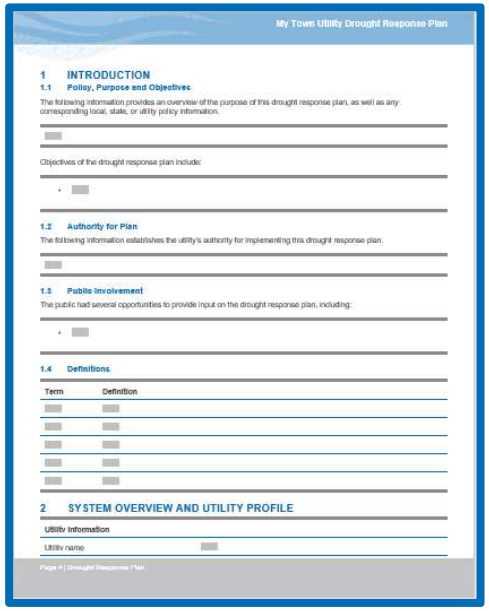
	DROUGHT STAGE			
	1 DROUGHT ADVISORY/DROUGHT MONITORING	2 DROUGHT WATCH	3 DROUGHT WARNING	4 DROUGHT EMERGENCY
DROUGHT INDICATORS AND INDICES	Standardized Precipitation Index: -1.0 to -1.49	Standardized Precipitation Index: -1.5 to -1.99	Standardized Precipitation Index: -2.0 to -2.49	Standardized Precipitation Index: -2.5 and below
	Palmer Drought Severity Index: -2.0 to -2.9	Palmer Drought Severity Index: -3.0 to -3.9	Palmer Drought Severity Index: -4.0 to -4.9	Palmer Drought Severity Index: -5.0 and below
	Watershed characteristics such as precipitation, snowpack, streamflow, wind and soil moisture indicate abnormal and prolonged dryness	Watershed characteristics such as precipitation, snowpack, streamflow, wind and soil moisture indicate severe and prolonged dryness	Watershed characteristics such as precipitation, snowpack, streamflow, wind and soil moisture indicate extreme dryness	Watershed characteristics such as precipitation, snowpack, streamflow, wind and soil moisture indicate exceptional and prolonged dryness
STREAM FLOW	Stream flow < 85% to 75% of normal for time of year	Stream flow < 75% to 90% of normal for time of year	Stream flow < 90% to 95% of normal for time of year	Stream flow <95% of normal for time of year
	Deterioration of water quality caused by low flow conditions	Water treatment plant production reduced by 15% due to water quality deterioration caused by low flow conditions	Water treatment plant production reduced by 30% due to water quality deterioration caused by low flow conditions	Water treatment plant production reduced by 50% due to water quality deterioration caused by low flow conditions
STORED SURFACE WATER	Inflow to reservoir insufficient to maintain conservation pool	Reservoir levels being drawn down to minimum storage levels	Reservoir levels approaching minimum storage levels	Reservoir levels drawn down below maximum drawdown; runoff projections remain low
	Water elevation levels 5 feet below normal for time of year	Water elevation levels 10 feet below normal for time of year	Water elevation levels 15 feet below normal for time of year	Water elevation levels 20 feet below normal for time of year
	Projected useable stored water in the reservoir between 70% and 95% full on July 1	Projected useable stored water in the reservoir between 60% and 85% full on July 1	Projected useable stored water in the reservoir between 40% and 70% full on July 1	Projected useable stored water in the reservoir less than 50% full on July 1

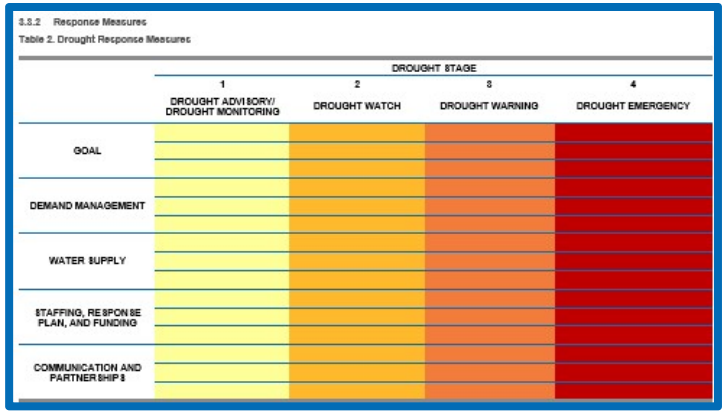
- Assists water and wastewater utilities with developing a drought response plan
- Instructions guide users through the process
- Diverse examples of drought response plans
- Addresses 3 key components
  1. Policy, purpose and objectives
  2. System overview and utility profile
  3. Drought response actions

Drought Response Plan Template

Fillable Template





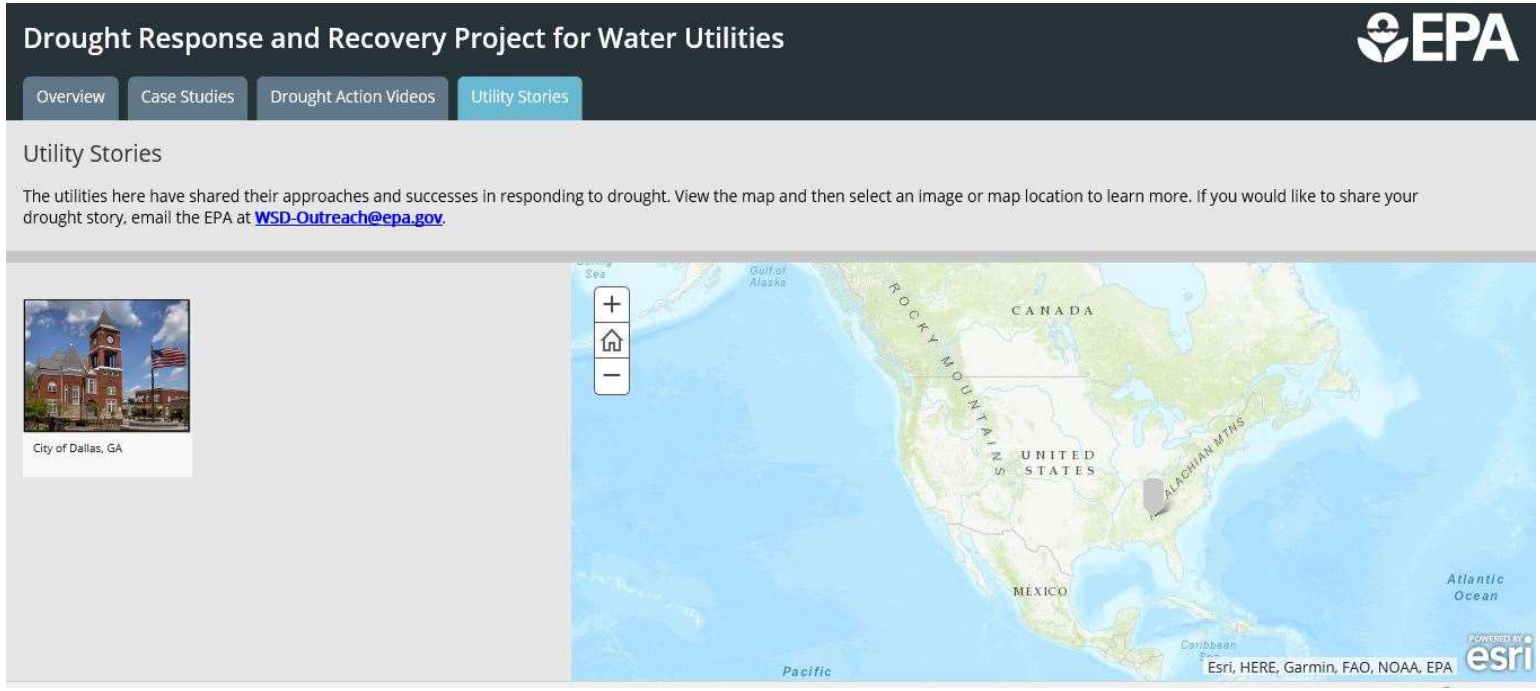


- Customizable, fillable document
- Flexible and adaptive to unique utility needs

Share Your Drought Story

Utility Story

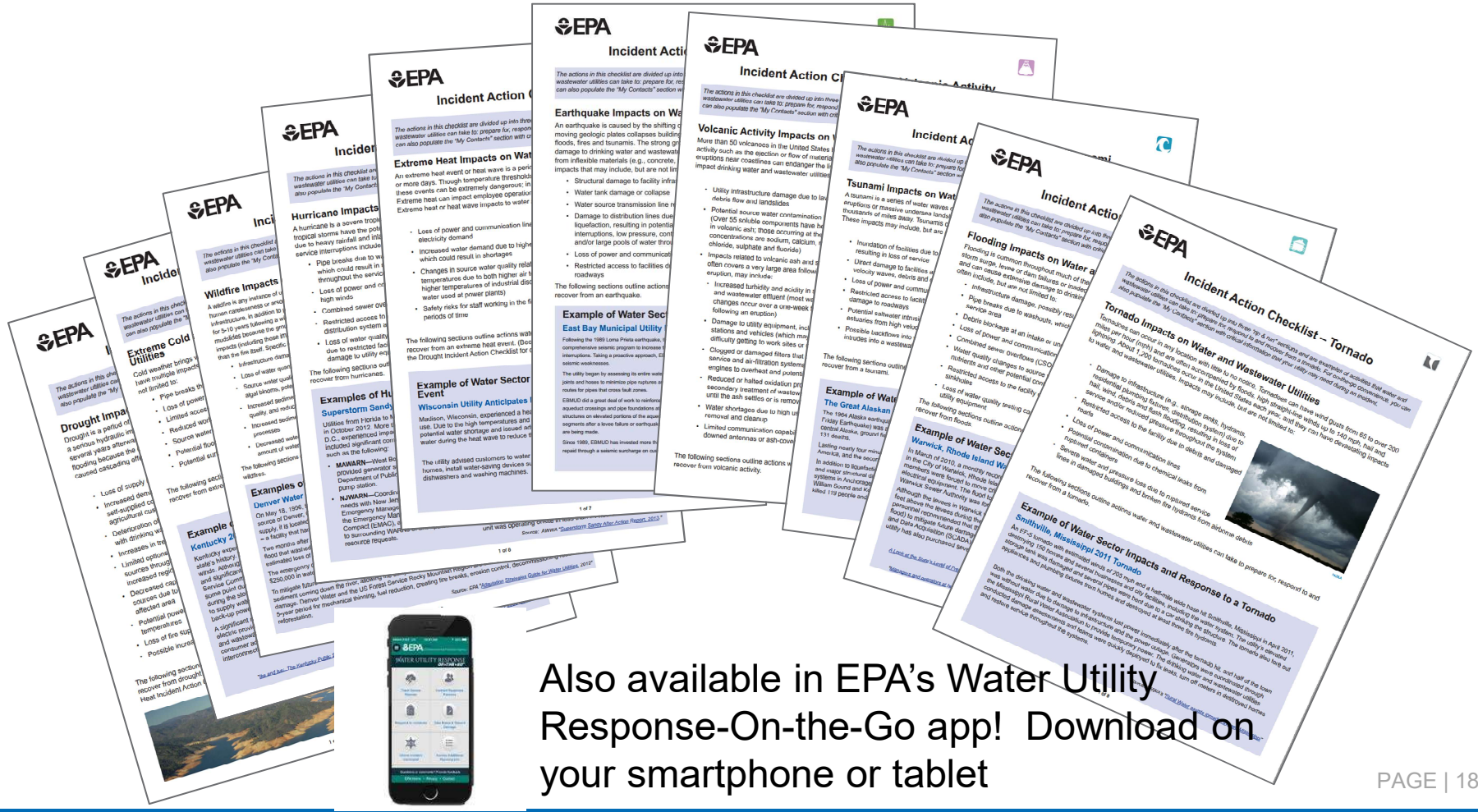
- NEWEST Section of the Drought GeoPlatform
  - The utilities here have shared their approaches and successes in responding to drought. If you would like to share your drought story, email the EPA at WSD-Outreach@epa.gov.



Other WSD Drought Related Products

Drought Incident Action Checklist

- One of twelve “Rip and Run” style checklists that utilities can use to help with preparedness, response and recovery



Also available in EPA’s Water Utility Response-On-the-Go app! Download on your smartphone or tablet

A Few Lessons Learned Along the Way

- Have a water shortage plan
  - Conduct training on the plan. What does it really require to truck in water?
- Water audits are great
  - They are work upfront, but worth it to find out where your real losses and apparent losses are, can save water and money
- Have a short-term and a long-term plan
  - Capital improvements take time and money (including getting approvals). Have a 6-month, 5-year and 10-year plan
- It usually always comes down to money
  - Asset management is key, esp. evaluating rate structures (many systems moving toward higher base rates)
- Don’t ever assume you have enough water
  - If you think you have enough now, then start planning for the next source. No easy water sources anymore.

Drought Response and Recovery Contacts

Access the Guide/Download the PDF at:
https://www.epa.gov/waterutilityresponse/drought-response-and-recovery-guide-water-utilities

.. or Google: "EPA Drought Response Guide"

Questions?

EPA Region 1:
Lynn Gilleland, gilleland.lynn@epa.gov, 617-918-1516
EPA Drought Guide Project Contact:
Dawn Ison, ison.dawn@epa.gov, 513-569-7686

Other EPA Water Resiliency Resources:
https://www.epa.gov/waterutilityresponse and
https://www.epa.gov/waterresilience