



# Drought Response and Recovery

## A Basic Guide for Water Utilities



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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:** Small and medium-sized drinking water utilities.
- **Features:**
  - Clickable PDF, navigate like a website
  - Best practices and lessons learned from real utilities
  - Worksheets



# Drought Response and Recovery

Project Approach – Published in 2016; 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 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

## DROUGHT RESPONSE AND RECOVERY

A Basic Resilience Guide for Water Utilities

Select a menu option below. New users should start with *Overview and Navigation*.



Overview and Navigation



Staffing, Response Plans  
and Funding



Water Supply and Demand  
Management



Communication and  
Partnerships



Case Studies and Videos



Next ▶

# Guide Navigation

## Informational and Easy-To-Use

**NAVIGATING THE GUIDE**

The Guide is divided into four sections:

- Staffing, Response Plans and Funding
- Water Supply and Demand Management
- Communication and Partnerships
- Case Studies and Videos

Note that all of the worksheets as well as additional resources related to drought response and recovery can be found by clicking on "Resources" at the bottom of each page. Navigate directly to the Case Studies and Videos section for more detail on the six case study utilities that successfully responded to drought, and provided best practices and real-world examples referenced throughout the Guide. The Case Studies and Videos section will link you to the "Drought Response and Recovery Project: Case Studies Map." This website features a geoplatform map that hosts short videos on each case study.

In addition to the six case study utilities, videos on the site also cover:

- System efficiency and new water sources
- Water demand
- Partnerships

**WORKSHEETS**

Look for the worksheet icon to open the worksheets in Microsoft Word and Excel. You can fill in the worksheets and save the information to your computer. Use these worksheets as a starting point, and add to them as needed.

**VIDEOS**

Clicking on this video icon embedded throughout the Guide will take you to the EPA's Drought Response and Recovery Project: Case Studies Map website to view short videos. You must be connected to the Internet to be taken to that website. The website features all the videos referenced in this Drought Guide. Click on the tabs at the top of the Case Studies Map website to browse through the videos. The Overview tab explains how to use the map.

Page 5 Drought Response and Recovery: A Basic Resilience Guide for Water Utilities

Resources Home Previous Next

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

Quick navigation between sections and pages

# 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.

Drought Response and Recovery: A Best Practices Guide for Water Utilities

### Water Supply and Demand Management

#### Water Demand and Customer Use: Worksheet 5

The worksheet focuses on water use reduction measures that can be implemented quickly during a drought. Add other items you would like to track at the bottom of the worksheet. Note that the entire report is not used to be completed in the order listed. Save this worksheet to your computer before making any changes.

#### SYSTEM EFFICIENCY

1. Increase leak detection and repair efforts in the distribution system. Ask your customers and all field personnel to report leaks. Estimate costs of repairs and potential labor overtime as emergency contractors if needed to make repairs quickly. Coordinate with your financial team to make budget adjustments and ensure funds are available. Plan for more frequent main breaks due to shifting ground because of reduced soil moisture.

Responsible Person:	Start Date:	Est. End Date:	Completion Date:	Est. Budget:

Notes:

2. Consider the following to save water in your system:

- Managing processes to help reduce leaks.
- Recycling high-quality water to the head of your treatment plant.

Responsible Person:	Start Date:	Est. End Date:	Completion Date:	Est. Budget:

Notes:

### 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

The following case studies highlight small and medium-sized utilities that successfully responded to drought. Reflecting a broad range of situations — diverse geographies, water resources, response actions and funding approaches — these utilities' actual stories demonstrate solutions that work.

They provide examples of proven ways to reduce demand, access additional water supplies, communicate effectively, secure funding and develop partnerships to survive drought. Lessons learned by your peers may help you plan for and respond to drought by finding solutions that work for you and your community.

Note that your state may have specific rules that could prevent use of some the case study utilities' actions, so first check with your state regulators or legal counsel; even if that is the case, these innovative solutions may inspire other ideas to help your utility and community become drought resilient.

Click on the Images to learn about solutions from each case study.



Tuolumne Utilities District, Sonora, California



(Corix) Spicewood Beach Water System, Spicewood, Texas



City of Las Vegas, New Mexico



City of Hogansville, Georgia



Cities of Hays and Russell, Kansas



City of Clinton, Oklahoma



Castine Water Department, Town of Castine, Maine



North Marin Water District, Novato, California

Click on the map to exit the Drought Response and Recovery Guide and navigate to a website featuring a geoplatform map that hosts short videos on each case study.

#### Draft Drought Response and Recovery Project for Water Utilities

Overview Case Studies Drought Action Videos Utility Stories

Welcome to the Case Studies Map for the U.S. Environmental Protection Agency's 1990 Drought Response and Recovery Project for Water Utilities. This site contains Overview, Case Studies, Drought Action Videos, and Utility Stories tabs that describe the experiences of small and medium-sized drinking water utilities that successfully responded to drought.

The highlighted image on the overview map to the right is taken from the United States Drought Monitor and corresponds to current drought conditions.

#### HOW TO USE THIS SITE:

- Visit the site often and only visit the Drought Monitor information about each utility.
- Navigate to the Case Studies tab to further explore how each of the water utilities responded to and recovered from the impacts of drought and to see each utility's peak drought conditions.
- View how specific drought challenges were overcome by the case study utilities by clicking on the Drought Action Videos tab.
- Visit the Utility Stories tab for short descriptions from water utilities that you who have shared their own drought response stories. Submit your drought story today by clicking on the Submit Drought Story button — EPF will work with you to add your story to the site.

For more information on these case studies and other drought response activities, view the Drought Response and Recovery Guide.





# Case Studies and Videos

Two-page summary on water utility that includes:

- System details
- Drought response measures taken

**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 14,350 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 were expected to be even less than during the driest year these supplies could be used at typical water demand.

### 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 water conservation and infrastructure.

#### Water Supply and Demand Management

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


- Altered management of flows within the

**EPA**

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

### 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](#).

← BACK TO CASE STUDY HOME PAGE

Page 27 Drought Response and Recovery: A New Guide for Water Utilities

**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).**

**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 relay canal operation 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 reductions:
  - 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 Twin Harbors 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.

  
**Links to external  
Case Studies Map  
and Videos**

# Case Studies Map and Videos Home

## Geoplatform

### Drought Response and Recovery Project for Water Utilities



Overview

Case Studies

Drought Action Videos

Utility Stories

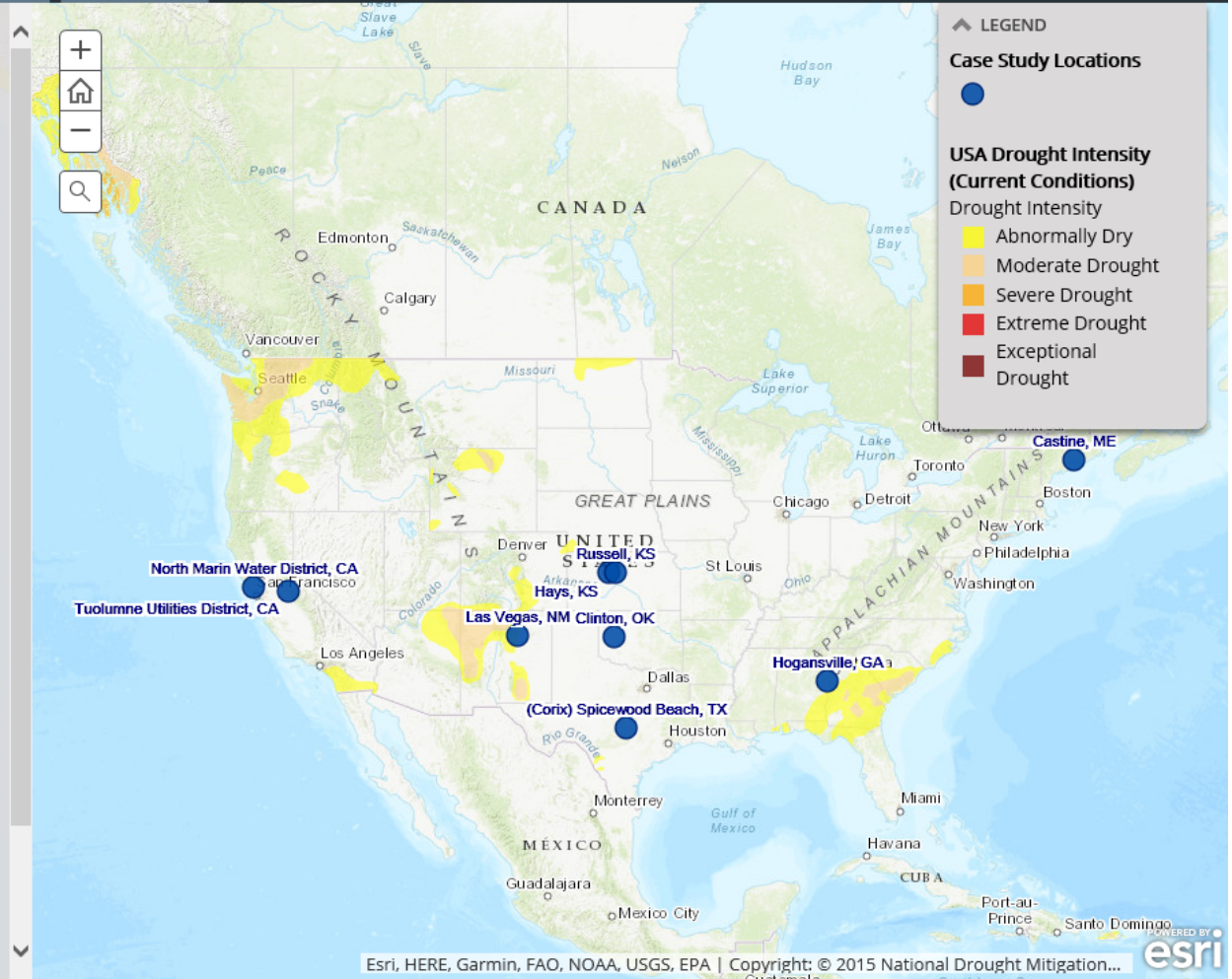
Welcome to the Case Studies Map for the U.S. Environmental Protection Agency's (EPA) Drought Response and Recovery Project for Water Utilities. This site contains Overview, Case Studies, Drought Action Videos, and Utility Stories tabs that describe the experiences of small and medium-sized drinking water utilities that successfully responded to drought.

The background image on the overview map to the right is taken from the [United States Drought Monitor](#) and corresponds to current drought conditions.

#### How to use this site:


- Click on the dots on any map to learn basic information about each utility.
- Navigate to the Case Studies tab to further explore how each of the water utilities responded to and recovered from the impacts of drought and to see each utility's peak drought conditions.
- View how specific drought challenges were overcome by the case study utilities by clicking on the Drought Action Videos tab.
- Visit the Utilities Stories tab for short descriptions from water systems like you who have shared their own drought response stories. Submit your drought story today by contacting EPA at [WSD-Outreach@epa.gov](mailto:WSD-Outreach@epa.gov) — EPA will work with you to add your story to the site.

For more information on these case studies and other drought response activities, view



# Case Studies Map and Videos

Geoplatform – Clinton, OK




## Drought Response and Recovery Project for Water Utilities

Overview **Case Studies** Drought Action Videos Utility Stories

City of Clinton, Oklahoma

Clinton's Story:

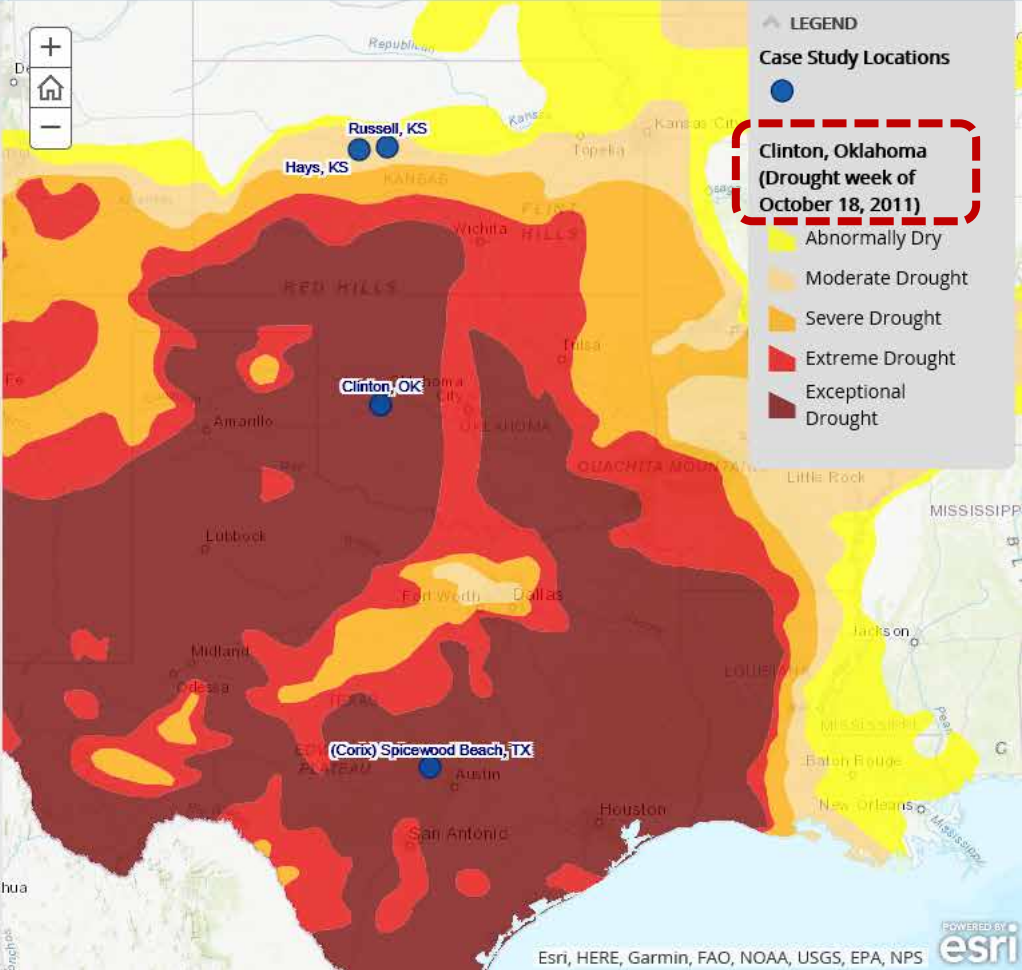


**Utility overview:** 4,182 connections  
• Customers: 45% residential, 55% commercial or industrial

**Drought summary:** water levels reached a historic low and surface water source went dry; had an existing interconnection, but incurred approximately \$1 million per year in "overage fee" costs to gain additional supply; purchased supply source began to run dry

**Drought response actions:** implemented water use restrictions, increased the amount of water purchased from existing interconnection; raised water rates by 49% to promote water conservation and provide revenue stability; started constructing new groundwater wells, a 7-mile conveyance system and a reverse osmosis (RO) water treatment plant

their website for contact information. Clicking on a link to their



LEGEND

Case Study Locations

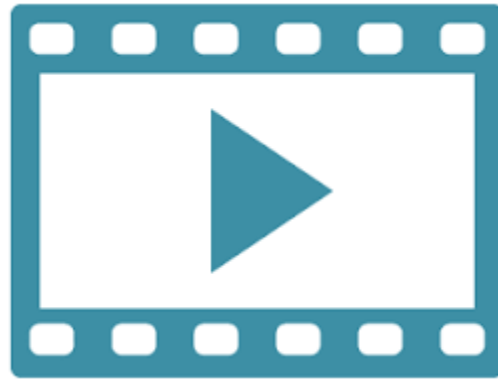
Clinton, Oklahoma (Drought week of October 18, 2011)

- Abnormally Dry
- Moderate Drought
- Severe Drought
- Extreme Drought
- Exceptional Drought

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Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS

# 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
3. A “share your story” section of the Geoplatform

# Share Your Drought Story

## Utility Story

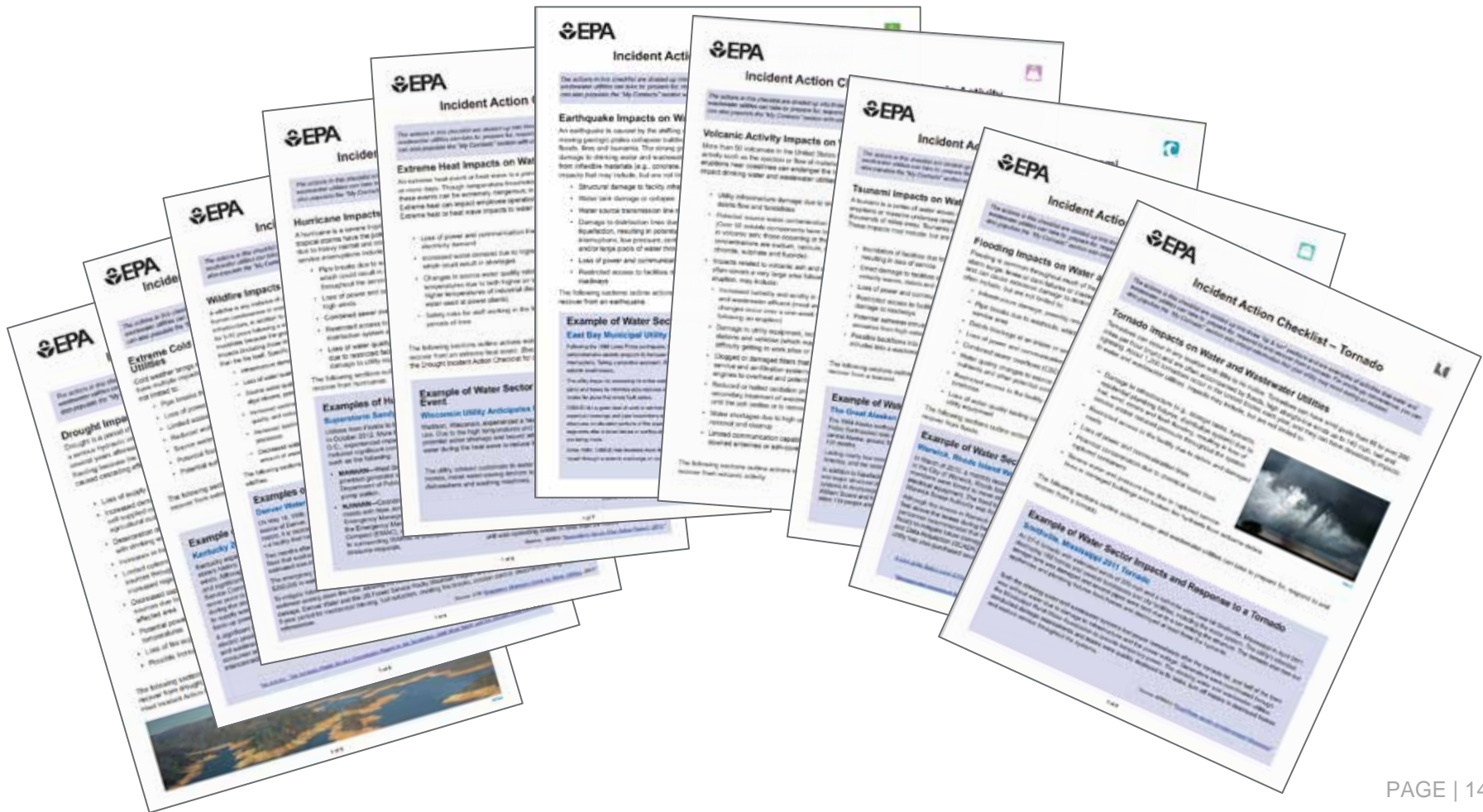
- NEW Section of the Drought GeoPlatform
  - The utilities here have shared their approaches and successes in responding to drought. If you would like to share your drought story, email the EPA at [WSD-Outreach@epa.gov](mailto:WSD-Outreach@epa.gov).

The screenshot displays the EPA website's "Drought Response and Recovery Project for Water Utilities" section. At the top right is the EPA logo. Below the title are four navigation tabs: "Overview", "Case Studies", "Drought Action Videos", and "Utility Stories", with "Utility Stories" being the active tab. The main heading is "Utility Stories". Below this, a paragraph states: "The utilities here have shared their approaches and successes in responding to drought. View the map and then select an image or map location to learn more. If you would like to share your drought story, email the EPA at [WSD-Outreach@epa.gov](mailto:WSD-Outreach@epa.gov)." Below the text is a map of the United States with a grey marker in the Southeast. To the left of the map is a thumbnail image of a brick building with a clock tower, labeled "City of Dallas, GA". The map includes a vertical toolbar with zoom in (+), home, and zoom out (-) icons. The map is credited to Esri, HERE, Garmin, FAO, NOAA, EPA.

# Another WSD Drought Related Product

## Drought Incident Action Checklist

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



# 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

## Q&A



## Questions?

### Contact:

Dawn Ison, [ison.dawn@epa.gov](mailto:ison.dawn@epa.gov), 513-569-7686

Explore at:

<https://www.epa.gov/waterutilityresponse/drought-response-and-recovery-guide-water-utilities>

... or google: "EPA Drought Response Guide"