



# Drought Response and Recovery

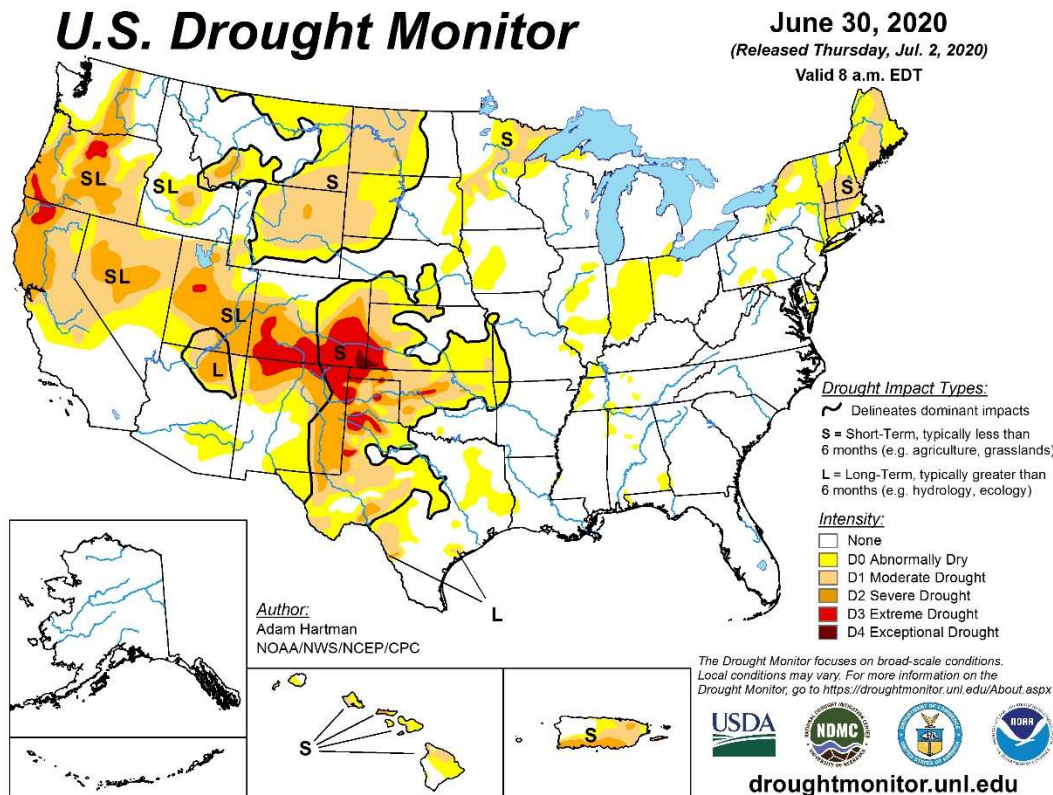
## A Basic Guide for Water Utilities



**Lynn Gilleland**  
**U.S. EPA Region 1, Boston Office**

July 16, 2020

# 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

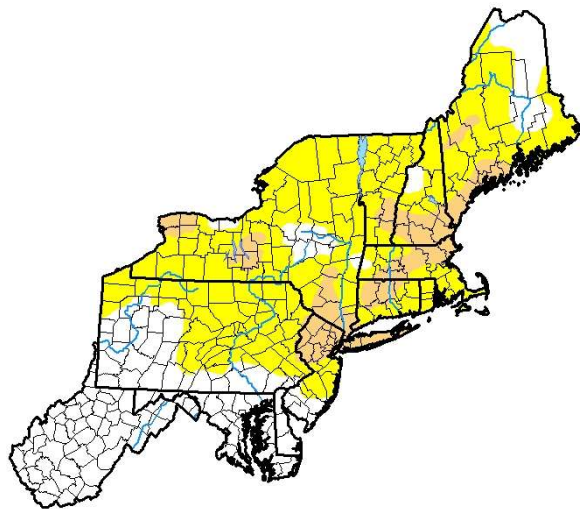
*The U.S. Drought Monitor is jointly produced by the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration. Map courtesy of NDMC-UNL.*

# Drought – Conditions Can Also Change Quickly

*Example: New England June 2016 – Oct. 2016*

**U.S. Drought Monitor  
Northeast**

**June 28, 2016**  
(Released Thursday, Jun. 30, 2016)  
Valid 8 a.m. EDT



**Intensity:**

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

**Author:**

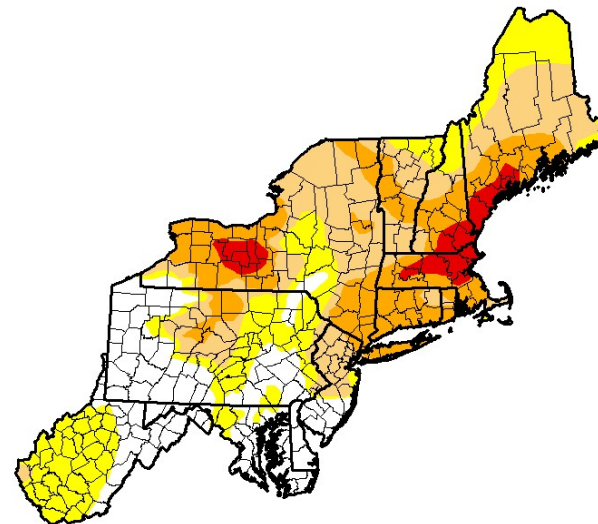
Eric Luebbehusen  
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

**U.S. Drought Monitor  
Northeast**

**October 18, 2016**  
(Released Thursday, Oct. 20, 2016)  
Valid 8 a.m. EDT



**Intensity:**

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

**Author:**

Eric Luebbehusen  
U.S. Department of Agriculture



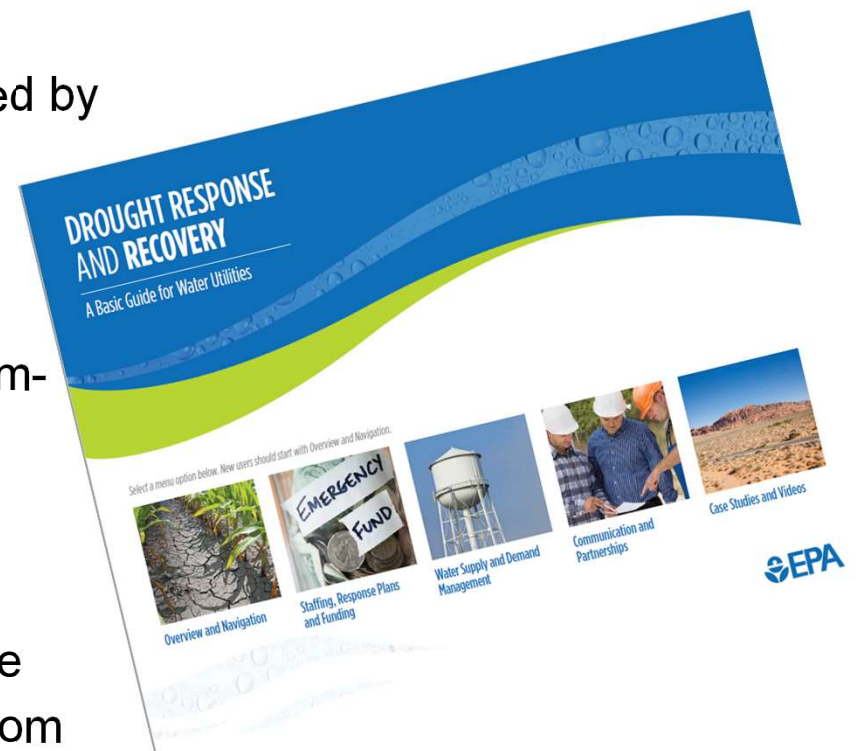
<http://droughtmonitor.unl.edu/>

*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 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

## 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.

Drought Response and Recovery Project: Case Studies 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 Basic Resilience Guide for Water Utilities

**Water Supply and Demand Management**  
Water Demand and Customer Use: Worksheet 5

*This 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 actions below do not need to be completed in the order listed. Save this worksheet to your computer before making any changes.*

**SYSTEM EFFICIENCY**

- 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 or 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:
- Consider the following to save water in your system:**
  - Managing pressure to help reduce leaks
  - Recirculating backwash 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.

Staffing, Response Plans and Funding

Water Supply and Demand Management

Communication and Partnerships

Case Studies and Videos

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 (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 map 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:**

- View the overview 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 more 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 systems. If you who have shared their own drought response stories. Submit your drought story today by contacting us at [epa.drought@epa.gov](mailto:epa.drought@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 the Drought Response and Recovery Guide.

**USA Drought Intensity (Current Conditions)**  
 Drought Intensity  
 Abnormally Dry  
 Moderate Drought  
 Severe Drought  
 Extreme Drought  
 Exceptional Drought

**Case Study Locations**



# 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 14,350 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.

Based on hydrologic and range weather forecasts, historically low precipitation "wet season," on January 15, 2014, TUD prepared an outlook of water supply for the coming year. They shared this information with the TUD board prohibiting and asked customers to reduce water usage by 50 percent. Data indicated a reduction of 45 percent in water consumption in the month of May 2014 (compared to 2013) and a 48 percent reduction in July. This significantly improved the water supply outlook; however, it also reduced TUD's operating revenue.

**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 tactical planning and implementation. TUD also engaged consultants 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

Two-page summary on water utility that includes:

- System details
- Drought response measures taken

**EPA**

## 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).**

**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](#)

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

Resources  [← Previous](#) [Next →](#)

**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

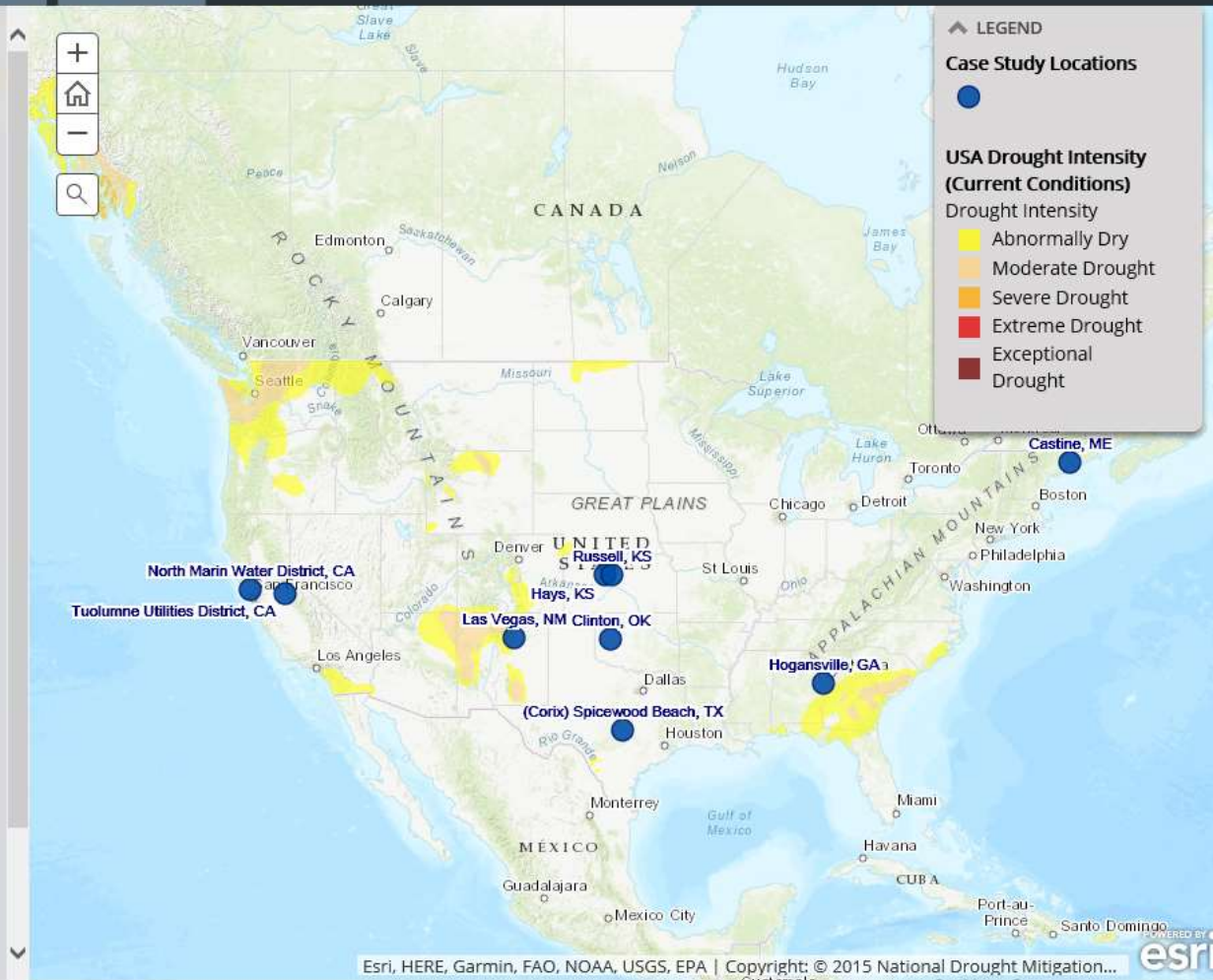
Welcome to the Case Studies Map for the U.S. Environmental Protection Agency's (EPA) Drought Response and Recovery Project for Water Utilities. This site contains Overview, Case Studies, Drought Action Videos, and Utility Stories tabs that describe the experiences of small and medium-sized drinking water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

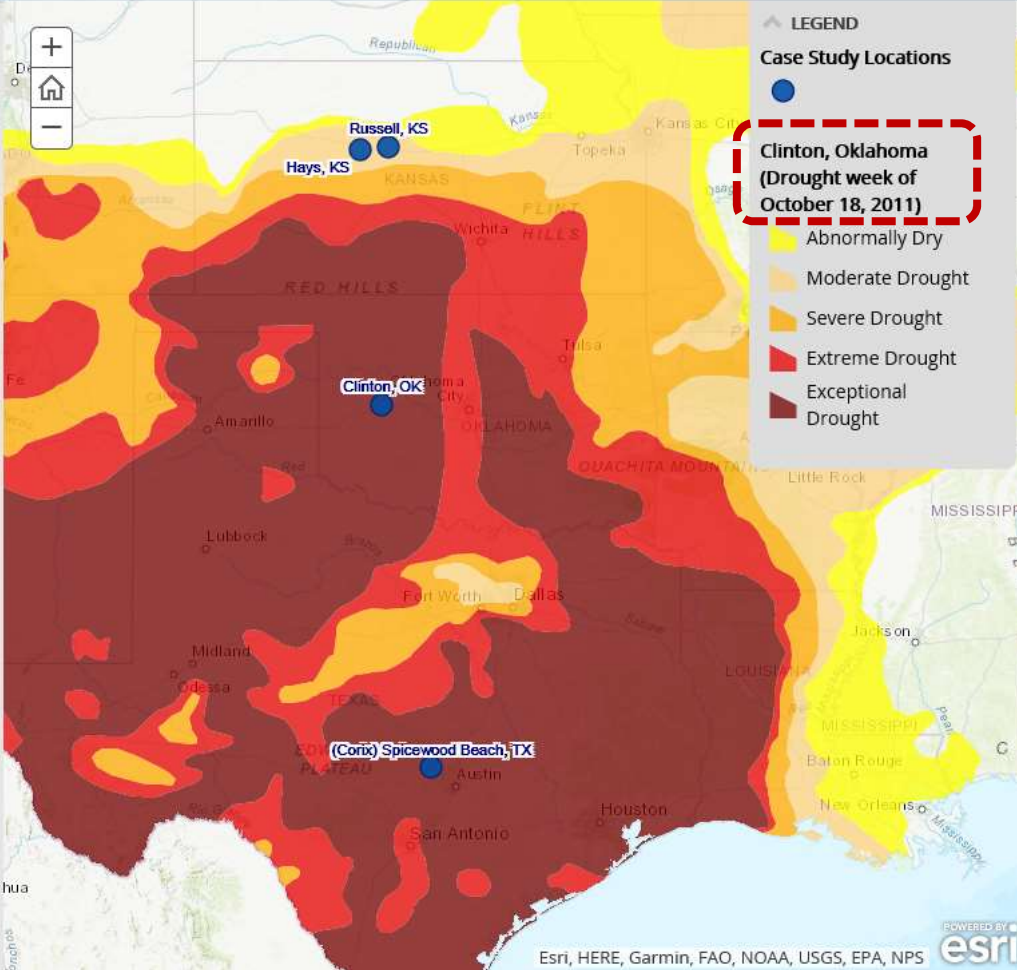


**Utility overview:** 4,182 connections  
• Customers: 45% residential, 55% commercial or industrial

**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)

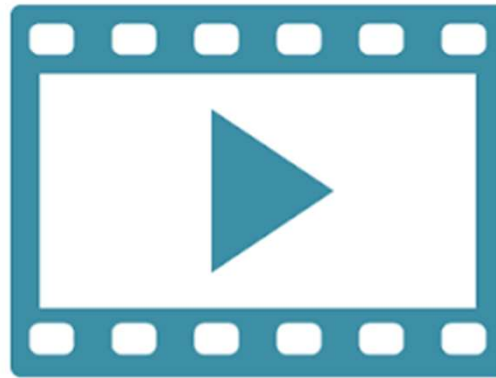
- Abnormally Dry
- Moderate Drought
- Severe Drought
- Extreme Drought
- Exceptional Drought

POWERED BY esri

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/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 Ashlaba, 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 necessary

Example:

\*A Water Commission weather Water wells, (Source

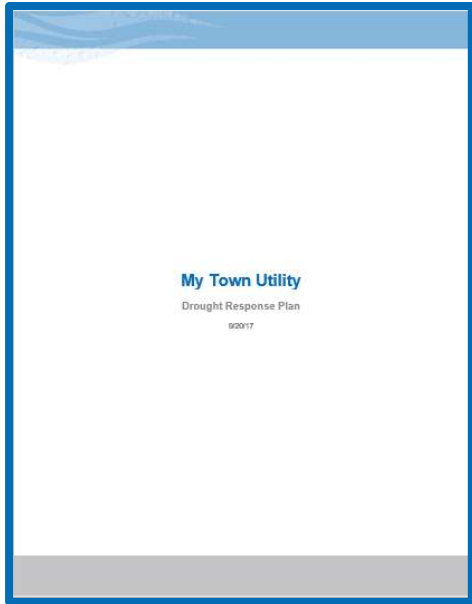
Table 1. Example Drought Stages and Trigger Levels

	DROUGHT STAGE			
	1 DROUGHT ADVISORY/DROUGHT MONITORING	2 DROUGHT WATCH	3 DROUGHT WARNING	4 DROUGHT EMERGENCY
<b>DROUGHT INDICATORS AND INDICES</b>	Standardized Precipitation Index: -1.0 to -1.49 Palmer Drought Severity Index: -2.0 to -2.9 Watershed characteristics such as precipitation, snowpack, streamflow, wind and soil moisture indicate abnormal and prolonged dryness	Standardized Precipitation Index: -1.5 to -1.99 Palmer Drought Severity Index: -3.0 to -3.9 Watershed characteristics such as precipitation, snowpack, streamflow, wind and soil moisture indicate severe and prolonged dryness	Standardized Precipitation Index: -2.0 to -2.49 Palmer Drought Severity Index: -4.0 to -4.9 Watershed characteristics such as precipitation, snowpack, streamflow, wind and soil moisture indicate extreme dryness	Standardized Precipitation Index: -2.5 and below Palmer Drought Severity Index: -5.0 and below Watershed characteristics such as precipitation, snowpack, streamflow, wind and soil moisture indicate exceptional and prolonged dryness
<b>STREAM FLOW</b>	Stream flow < 65% to 75% of normal for time of year Deterioration of water quality caused by low flow conditions	Stream flow < 75% to 80% of normal for time of year Water treatment plant production reduced by 15% due to water quality deterioration caused by low flow conditions	Stream flow < 80% to 85% of normal for time of year Water treatment plant production reduced by 30% due to water quality deterioration caused by low flow conditions	Stream flow < 85% of normal for time of year Water treatment plant production reduced by 50% due to water quality deterioration caused by low flow conditions
<b>STORED SURFACE WATER</b>	Inflow to reservoir insufficient to maintain conservation pool Water elevation levels 5 feet below normal for time of year Projected useable stored water in the reservoir between 70% and 95% full on July 1	Reservoir levels being drawn down to minimum storage levels Water elevation levels 10 feet below normal for time of year Projected useable stored water in the reservoir between 50% and 95% full on July 1	Reservoir levels approaching minimum storage levels Water elevation levels 15 feet below normal for time of year Projected useable stored water in the reservoir between 40% and 70% full on July 1	Reservoir levels drawn down below maximum drawdown; runoff projections remain low Water elevation levels 20 feet below normal for time of year 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



My Town Utility Drought Response Plan

**1 INTRODUCTION**

**1.1 Policy, Purpose and Objectives**  
The following information provides an overview of the purpose of this drought response plan, as well as any corresponding local, state, or utility policy information.

Objectives of the drought response plan include:

- 

**1.2 Authority for Plan**  
The following information establishes the utility's authority for implementing this drought response plan.

**1.3 Public Involvement**  
The public had several opportunities to provide input on the drought response plan, including:

- 

**1.4 Definitions**

Term	Definition

**2 SYSTEM OVERVIEW AND UTILITY PROFILE**

Utility Information  
Utility name: \_\_\_\_\_

Page 1 | Drought Response Plan

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

3.3.2 Response Measures

Table 2. Drought Response Measures

	DROUGHT STAGE			
	1 DROUGHT ADVISORY/ DROUGHT MONITORING	2 DROUGHT WATCH	3 DROUGHT WARNING	4 DROUGHT EMERGENCY
GOAL				
DEMAND MANAGEMENT				
WATER SUPPLY				
STAFFING, RESPONSE PLAN, AND FUNDING				
COMMUNICATION AND PARTNERSHIP				

# 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](mailto:WSD-Outreach@epa.gov).

The screenshot displays the EPA website's 'Drought Response and Recovery Project for Water Utilities' page. The header includes the EPA logo and navigation tabs for 'Overview', 'Case Studies', 'Drought Action Videos', and 'Utility Stories'. The 'Utility Stories' section features a descriptive paragraph and a map of the United States with a marker over the Southeast. A thumbnail image of a building is labeled 'City of Dallas, GA'. The map includes labels for 'ROCKY MOUNTAIN', 'ALABAMA MTS', 'CANADA', 'MEXICO', 'Gulf of Alaska', 'Atlantic Ocean', and 'Caribbean Sea'. The bottom right of the map area says 'POWERED BY esri Esri, HERE, Garmin, FAO, NOAA, EPA'.



# 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

The collage displays several EPA Incident Action Checklists (IACs) for various natural disasters. Each checklist is a 'Rip and Run' style document, meaning it is designed to be quickly reviewed and used in an emergency. The checklists include sections for 'Incident Action Checklist' and 'Recovery'. The disasters covered include Extreme Cold Utilities, Drought Impacts, Wildfire Impacts, Hurricane Impacts, Extreme Heat Impacts on Water, Earthquake Impacts on Water, Volcanic Activity Impacts on Water, Tsunami Impacts on Water, Flooding Impacts on Water, Tornado Impacts on Water and Wastewater Utilities, and an Example of Water Sector Wisconsin Utility Anticipates. Each checklist provides specific actions and recovery steps for utilities to follow during and after the event.

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](mailto:gilleland.lynn@epa.gov), 617-918-1516

### EPA Drought Guide Project Contact:

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

Other EPA Water Resiliency Resources:

<https://www.epa.gov/waterutilityresponse> and  
<https://www.epa.gov/waterresilience>