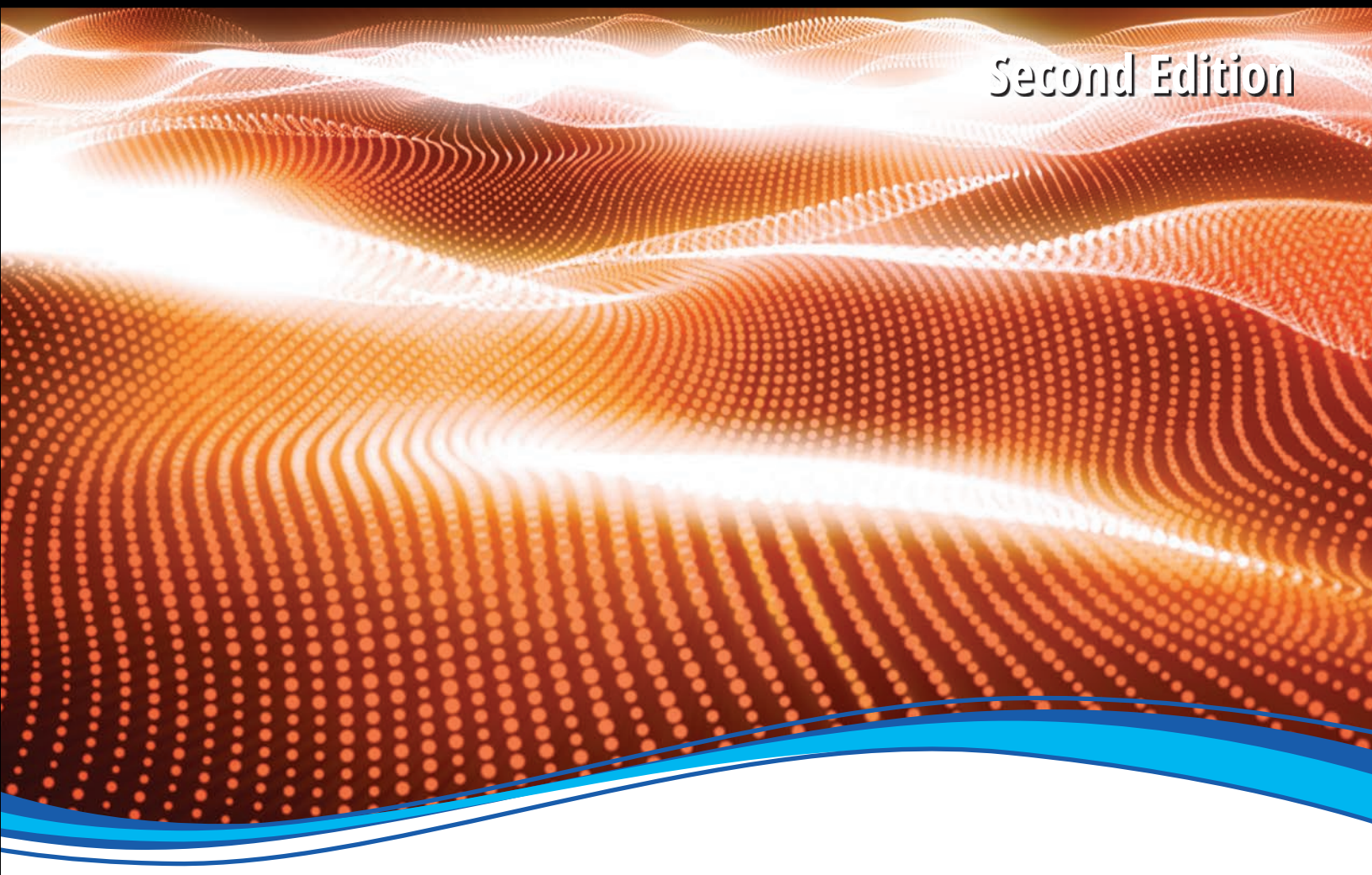
Manual of Water Supply Practices

M60

# Drought Preparedness and Response



Second Edition

American Water Works Association

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M60

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Manual of Water Supply Practices—M60, Second Edition

# Drought Preparedness and Response

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# Contents

**List of Figures** v

**List of Tables** vii

**Acknowledgments** ix

**Introduction** . . . . . 1
Getting the Most Out of This Manual, 2
Definition of A Drought and Water Shortages, 2
Water Shortage Planning, 2
Drought-Related Regulations and Planning Requirements, 3
Seven-Step Planning and Implementation Process, 3
References, 4

**Step 1** **Form a Water Shortage Response Team** . . . . . 5
Selecting the Water Shortage Response Team, 5
Setting Priorities, 8
Establishing Schedules and Maintaining Momentum, 9
Coordination, Cooperation, and Communication, 9
References, 11

**Step 2** **Forecast Supply in Relation to Demand** . . . . . 13
Data Collection, 15
Data Analysis, 20
Is There a Predicted Shortage?, 23
Catastrophic Supply Interruptions, 25
References, 27

**Step 3** **Balance Supply and Demand and Assess Mitigation Options** . . . . . 29
Supply Augmentation Methods, 30
Demand-Reduction Methods, 35
References, 53

**Step 4** **Establish Triggering Levels** . . . . . 55
Trigger Mechanisms, 55
References, 62

**Step 5** **Develop a Staged Demand-Reduction Program** . . . . . 63
Criteria for Demand Reduction During a Water Shortage, 63
Establish Stages, 64
Measures, 66
Managing Customer Expectations, 67
Reference, 73

**Step 6** **Adopt the Plan** . . . . . 75
Involve the Community, 75
Prepare a Revenue Program, 76



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**Step 7** **Implement the Plan. . . . . 79**
Essential Elements of Implementing a Water Shortage Plan, 79
Public Information and Media Program, 83
Drought Recovery and Water Shortage Plan Termination, 86
Conclusions, 88
Reference, 88

**Appendix A** **Water Shortage Planning Checklist. . . . . 89**

**Appendix B** **Additional Sources of Weather and Climate Information . . . . . 93**

**Glossary, 95**

**Index, 97**

**List of Manuals, 101**



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# Figures

2-1 Folsom Reservoir, California, 2010 (top left) and 2013 (top right) before drought and 2014 (bottom) during drought, 14
2-2 Folsom Reservoir, California, 2015 during drought (left) and 2016, near end of drought (right), 15

3-1 Water Saving Hero campaign, 36
3-2 Cobb County Pick 10 Challenge, 36
3-3 Denver Water "Use Only What You Need" campaign, 37
3-4 Public awareness campaign, 37
3-5 San Diego County Water Authority's Twenty-Gallon Challenge, 38
3-6 Water4Otter Program, 39
3-7 Soil amendment rebates offered by the City of Austin, Tex., during a drought, 39
3-8 Demand response to different restrictions—Austin, Tex., 42
3-9 Different irrigation restrictions based on customer type in Austin, Tex., 2013, 43

4-1 Delaware River Basin storage levels, 58
4-2 Model for determining probability of drought, 59
4-3 Multiple supplies affect drought stages, 60

5-1 Austin Water's drought triggers illustrated, 68
5-2 Demand response to a surcharge—San Antonio Water System, 72

7-1 Monitoring targeted versus actual water production, 82
7-2 Example flow chart for regional cooperation, 87



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# Tables

1-1 Example planning timeline, 10

3-1 Supply augmentation methods, 31
3-2 A sample of supplier targets and actual savings during California drought, 2014–2017, 47
3-3 Examples of drought/emergency conservation penalties, 50

4-1 Triggers by type of supply source, 57

5-1 Example stages with demand-reduction goals, 64
5-2a Santa Cruz customer reduction goals by stage, 65
5-2b Santa Cruz customer reduction priorities by stage, 65
5-3 Demand-reduction measures, 66
5-4 City of Santa Cruz summary of demand-reduction actions and measures, 69
5-5 Variation in staged reduction savings, 71

6-1 Example excess use charges, 76
6-2 Water shortage plan budget worksheet, 77



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# Introduction

The world's supply of drinkable fresh water is under increasing pressure. The United Nations (UN) estimates that water scarcity affects more than 40 percent of the global population and is projected to rise due to effects of climate change and population growth (United Nations 2015). Most people in the United States have easy access to water—it simply comes out of their taps, and it is clean and plentiful. However, increasingly, a growing number of communities are experiencing periodic water shortages. A 2014 report by the US Government Accountability Office (GAO) found that 40 out of 50 state water managers expected shortages in some part of their state under average conditions during the 10 years following their 2013 survey (GAO 2014). Some of the challenges contributing to water shortages today include the following:

- Population growth is a factor, even though citizens may be using less water per person.
- Since the 2011 edition of M60 was published, many areas of the United States have experienced their hottest and driest years on record. According to the National Oceanic and Atmospheric Administration (NOAA 2018), 2012 was the warmest year since 1895, and the four warmest years have occurred since 2012.
- Water is delivered through an increasingly complex and aging network of storage, transmission, and distribution systems.
- Water treatment processes have become more sophisticated and costly.
- Energy-related expenses, from transportation to treatment, have increased significantly.
- The environment is taxed to a critical point in numerous key waterways.
- In dry years, many areas have increased their reliance on groundwater, reducing the future availability of those supplies.
- The reliability of water deliveries has diminished as uncertainty and variability increases, as related to climate change, regulatory actions, delivery system security, and other factors.



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There are also new opportunities for reducing the impact of water shortages. Widespread use of the Internet allows for information sharing and communication at a level unimagined in previous decades. New technology allows for more efficient use of water, from commercial cooling towers to smart irrigation controllers. Regional alliances have been established to coordinate water supply and demand management efforts.

M60, *Drought Preparedness and Response*, is designed to help water managers who are facing water shortages. The manual illustrates demonstrated methods of the past as well as new tools and methods. Managing water shortages involves temporarily reducing demand and finding alternate water supplies to temporarily meet demand. Some of these actions will result in permanent changes in water use, such as the installation of efficient toilets. The primary focus of the manual is to provide a step-by-step strategy to anticipate and respond to water shortages through a structured planning process.

AWWA recognizes that the unique aspects of any particular water shortage defy the ability of even the best plans to anticipate and prepare for every contingency. This second edition includes more examples of how water suppliers dealt with multiyear droughts by implementing changes to their programs from year to year or in response to different challenges.

## GETTING THE MOST OUT OF THIS MANUAL

Drought and water shortage planning is not just a best management practice for a water supplier; it is a requirement in a growing number of states and water management districts. M60 can help a water supplier meet regulatory requirements for a water shortage plan (WSP)*, but each user will need to consult the rules in his or her state or province where such requirements exist. Typically, such requirements include responding to the drought of record or other predefined challenges.

The manual was written by water professionals experienced with droughts and contains an abundance of information that will help users to write and amend plans to respond to unique and changing circumstances. Finally, while the goal of planning is to anticipate and prepare for future events, experience has shown that the unanticipated can derail a plan's implementation. This manual provides numerous examples of how water suppliers implemented and changed their plans to fit their unique circumstances in instances in which changes to drought measures or stages were required during a drought.

## DEFINITION OF A DROUGHT AND WATER SHORTAGES

In the most general sense, *drought* is a deficiency of precipitation over an extended period of time, resulting in a *water shortage* for some activity, group, or environmental purpose. A water shortage occurs when supply is reduced to a level that cannot support existing demands. Natural forces, system component failure or interruption, or regulatory actions may cause these water shortages. Such conditions could last two to three months or extend over many years.

## WATER SHORTAGE PLANNING

Providing a reliable supply of water, which is the primary goal of all water suppliers, requires being prepared for water shortages of varying degree and duration.

* Water shortage plans are required planning documents in many states and provinces and are known under different titles such as "drought response plan," "drought management plan," "water shortage contingency plan," or "water shortage response plan." For ease of reading, we use the term *water shortage plan*, or the abbreviation *WSP*, in this manual.



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Proper planning before a shortage occurs allows for the selection of appropriate responses consistent with the varying severity of shortages. Plans are most effective when water suppliers start demand-reduction measures before a severe shortage develops.

If demand-reduction measures are delayed, reserve supplies may be depleted early in an extended shortage, causing unnecessary social and economic harm to the community. A WSP enables a water supplier to assess the risks and reduce the vulnerability of a community to water shortage impacts and to establish priorities that will provide water for public health and safety and minimize impacts on economic activity, environmental resources, and the region's lifestyle.

## DROUGHT-RELATED REGULATIONS AND PLANNING REQUIREMENTS

In many states and provinces, there are regulations that water suppliers must follow when declaring a water shortage emergency that also provide them with authority to enforce emergency measures. Frequently, water suppliers are required to develop and periodically update WSPs as part of their overall water management planning process.

WSPs typically include the following components:

- the policy and legislative intent of the plan, authority for the plan, and public involvement;
- an estimate of supply and demand for five or more consecutive dry years;
- a description of the stages of action to take in response to water shortages;
- a plan for dealing with a catastrophic supply interruption;
- a list of the prohibitions, penalties, and consumption reduction methods used;
- an analysis of expected revenue effects of reduced sales during shortages and proposed measures to overcome those effects; and
- a system to monitor and document water reductions.

## SEVEN-STEP PLANNING AND IMPLEMENTATION PROCESS

Water shortage planning is a dynamic process. It evolves as conditions change and new information becomes available. The WSP includes specific mandatory requirements and penalties that become effective when certain shortage conditions or triggers occur. The chapters of this manual describe a seven-step planning process designed to assist water suppliers facing water shortages. Each chapter includes examples and suggestions for communicating the results of the planning step to the public.

The seven steps discussed in this manual are as follows.

*Step 1: Form a water shortage response team.*
*Step 2: Forecast supply in relation to demand.*
*Step 3: Balance supply and demand and assess mitigation options.*
*Step 4: Establish triggering levels.*
*Step 5: Develop a staged demand-reduction program.*
*Step 6: Adopt the plan.*
*Step 7: Implement the plan.*

*Appendix A: Water Shortage Planning Checklist* provides an overview of the entire planning cycle as a way to track the tasks in each step. Some of the tasks can be performed simultaneously and are not necessarily in the order that a particular water supplier will follow.



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The checklist, combined with the information provided in this manual's seven steps, can help form the foundation of a water supplier's WSP and actions or can be used to update an existing plan.

*Appendix B: Additional Sources of Weather and Climate Information* provides a list of useful federal and state resources on climate and weather that should be consulted as needed to both prepare and implement the WSP.

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