This presentation premiered at WaterSmart Innovations

watersmartinnovations.com
Preparing for Drought with AWWA’s M60 Manual
AWWA M60 Drought Preparedness and Response

- Version 1 released in 2011
- Since its release we have seen major droughts in Texas, the Midwest, and California
- Time was ripe to update and expand the manual
- Maintained basic 7 Step structure
- Version 2 released in June 2019
2nd Edition Primary Authors

Chris Brown, Chris Brown Consulting, Sacramento, CA
Veronica Blette, US Environmental Protection Agency, Washington DC
Toby Goddard, City of Santa Cruz, CA
Jessica Seersma, CSU Department of Civil & Environmental, Fort Collins, CO
Steve Nebiker, Hydrologics, Chapel Hill, NC
Josh Weiss, Hazen and Sawyer, MD
William Granger, City of Sacramento, CA
Lisa Maddaus, Maddaus Water Management, Sacramento, CA
Veva Deheza, National Oceanic and Atmospheric Administration, CO
Dawn Ison, US Environmental Protection Agency, Cincinnati, OH
Nora Mullarkey, Independent consultant, Austin, TX.
Brian Skeens, Jacobs, Atlanta, GA.
Today you’ll hear an overview of the Manual

Get a plan in place before you need it
Understand your limitations
Set reductions realistically
Educate educate educate educate
How to think about the M60

Maybe you are new to your job or just getting started on developing a drought plan for the first time.

Use the manual as a way to help understand the work that goes into a plan. If you are small and the manual is daunting, there are additional resources you can use that will help you take baby steps (e.g., *EPA Drought Response and Recovery: A Basic Guide for Water Utilities*).

Maybe you have an established plan that you update annually or one that aged on the shelf for a few years because you’ve had plenty of rainfall.

Use the manual as a way to revisit your plan and confirm that you’re doing the right things or to learn about things you might do to improve your plan.
<table>
<thead>
<tr>
<th>ONE</th>
<th>Form a Water Shortage Response Team</th>
</tr>
</thead>
<tbody>
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<td>TWO</td>
<td>Forecast Supply in Relation to Demand</td>
</tr>
<tr>
<td>THREE</td>
<td>Balance Supply and Demand: Assess Mitigation Options</td>
</tr>
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<td>FOUR</td>
<td>Establish Triggering Levels</td>
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<td>FIVE</td>
<td>Develop Staged Demand Reduction Program</td>
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<tr>
<td>SIX</td>
<td>Adopt the Plan</td>
</tr>
<tr>
<td>SEVEN</td>
<td>Implement the Plan</td>
</tr>
</tbody>
</table>

The Seven Steps
Form a Water Shortage Response Team

STEP 1
Set priorities

STEP ONE

Avoid irretrievable loss of natural resources

Restrict less essential uses before essential uses

Affect individuals in small groups before affecting large groups or the public as a whole

Minimize adverse financial effects

Implement extensive public information and media relations programs

Example of Principles from 2016 Denver Water Drought Response Plan
Maintain Momentum

- Appoint Leader and Team
- Start by December 1
- Public information campaign
- Prepare through winter/spring regardless of precipitation
- Supplemental supply agreements
- Plan for interconnections
- Modify and test computer programming and billing format
- New staff and equipment as needed
Coordinate, Cooperate, Communicate

WITHIN AGENCY

AMONG AGENCIES, TRIBAL ENTITIES

REGIONALLY

COMMUNITY

STEP ONE
To be prepared, you need to know:

- How much water you can expect to have – weather/climate forecast
- How much water you have – supply availability
- How much water you expect to need – demand forecast

Carry out analyses of past data to answer the questions

- How does supply look? What are the sources? How is the infrastructure?
- How does demand in a normal year look? Demand in a dry year? Demand by customer type?
- Can you meet the demand *without supplemental supplies*?
- How does supply and demand look in a worst case scenario? Including disasters that could affect supply?
Weather/Climate Data

There are a wealth of tools available to help provide you with situational awareness on how weather will affect water availability.

Many new tools and resources from federal agencies and states since Version 1—some aggregate data from multiple sources to provide ease of use.

Drought.gov from the National Integrated Drought Information System (NIDIS) is the granddaddy.

Weekly, monthly, seasonal forecasts and a range of other tools.
Drought Early Warning Systems

Newer initiative of regional networks that collaborate on preparedness and response to build resilience to drought

https://www.drought.gov/drought/regions/dews
Other groups have resources to help

NOAA RISA’s – this is an example of a monthly product of the Southwest RISA – CLIMAS, which is out of the University of Arizona
Examples of Data to be Collected

**Supply**
- Collect supply data (surface, groundwater, recycled, transfers, etc) for past five years or longer and for drought of record.
- Regularly review agreements that give the supplier the ability to provide or receive supplemental supplies during a shortage.

**Demand**
- Collect monthly data by customer class for last five years.
- Consider changes in population or uses that might affect demand.
Examples of Data Analyses to be Conducted

<table>
<thead>
<tr>
<th>Supply</th>
<th>Water Quality</th>
</tr>
</thead>
</table>
| • Develop a range of projections for next five years for all supplies  
  • Consider scenarios without augmentation, worst case, increased uncertainty & variability for all supplies | • Analyze impacts of changes in supply on water quality in supplier and customer distribution systems  
  • Consider need for additional treatment or infrastructure for blending  
  • Consider budget impacts |
| Demand                        |                                                                               |
| • Project dry-year demand w/o a demand reduction program in place  
  ☑ Evaluate monthly demand by customer class by month - inside use by low-use month(s)  
  ☑ Consider water demand of special needs customers |
Catastrophic Supply Interruptions

Think about direct and indirect effects

Coordinate as needed with the utility Emergency Response Plan

<table>
<thead>
<tr>
<th>EARTHQUAKES</th>
<th>FIRES</th>
<th>FLOODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEM FAILURES</td>
<td>POWER OUTAGES</td>
<td>WATER CONTAMINATION</td>
</tr>
</tbody>
</table>
Balance Supply and Demand: Assess Mitigation Options

STEP 3
When there is a shortage, the options are to....

**Augment Supply**
- Leverage existing assets (via flexibility or infrastructure upgrades)
- Increase supplier side efficiency
- Expand portfolio with new sources
- Seek opportunities to collaborate with other agencies

**Reduce Demand**
- Provide public information and education
- Enact restrictions (e.g., water waste ordinance, landscape irrigation)
- Modify pricing
- Consider rationing and allocation
### Allocation Method – Percent Reduction Allotment

(*all account types*)

| + establish minimum/maximum amounts to limit extremes |
| + easy to determine and administer |
| + useful for non-residential *vary based on efficiency* |
| – penalizes conservers |
| – rewards "above average" users |
| – promotes water use during non-shortage periods |

**On the Demand Reduction Side –**

*If you need to go there, think through the Pros and Cons of different allocation methods*
On the Demand Reduction Side –

If you need to go there, think through the Pros and Cons of different allocation methods

Allocation Method –
Per Capita Allotment (*residential*)

| + suitable for extreme shortages  |
| + equitable *base allotment*, sewer charges on number of *residents*  |
| - must determine and update per account occupancy  |
| - water for essential inside use only  |
| - doesn't recognize historic use  |
On the Demand Reduction Side –

If you need to go there, think through the Pros and Cons of different allocation methods

**Allocation Method –**

**Hybrid Per Capita/Percentage**

*(residential)*

| + | equitable recognizes variety of uses |
| + | flexibility *suitable to all stages* |
| + | provides customers greatest control |
| + | recognizes factors like lot size, historic use and economics |
| — | additional staff / computer work to determine allotments |
| — | requires more public education |

**STEP THREE**
Have a Plan to Enforce Requirements

**Water Cops and Community**
- Primarily educational
- Citations occur after first or second warning
- Community support
  - *Fines billing based*
- Repeat offenders require action
- Excess use charge

**Flow Restrictors**
- Repeat offenders undermine equity
- Provide health and safety flow
# Landscape Ordinance Violations

## Water Cop Visits

<table>
<thead>
<tr>
<th>YEARLY</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>No violation found</td>
<td>28</td>
<td>41</td>
<td>33</td>
<td>46</td>
<td>230</td>
<td>764</td>
<td>1124</td>
</tr>
<tr>
<td>Wasting water</td>
<td>6</td>
<td>11</td>
<td>11</td>
<td>18</td>
<td>47</td>
<td>98</td>
<td>191</td>
</tr>
<tr>
<td>Prohibited watering</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>8</td>
<td>126</td>
<td>67</td>
<td>219</td>
</tr>
<tr>
<td>Owner’s leak</td>
<td>11</td>
<td>3</td>
<td>6</td>
<td>11</td>
<td>22</td>
<td>31</td>
<td>84</td>
</tr>
<tr>
<td>Charity car wash</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>47</td>
<td>60</td>
<td>59</td>
<td>95</td>
<td>429</td>
<td>962</td>
<td>1652</td>
</tr>
</tbody>
</table>

San Antonio, Texas
Establish Triggering Levels

STEP 4
Examples of Triggers

- Projected supply at a pre-defined level
- Water quality changes
- Supply interruption
- Environmental changes
- Regional agreements

Consider Triggers by Source

- Groundwater
- River Supplies
- Surface Water Storage
- Combined Sources of Supply
Supply based trigger

Example of triggers at a one-source agency

<table>
<thead>
<tr>
<th>Reservoir storage less than</th>
<th>Drought Stage</th>
<th>Water Use Reduction Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>80%</td>
<td>Stage 1</td>
<td>10-15%</td>
</tr>
<tr>
<td>65%</td>
<td>Stage 2</td>
<td>15-25%</td>
</tr>
<tr>
<td>40%</td>
<td>Stage 3</td>
<td>25-40%</td>
</tr>
<tr>
<td>25%</td>
<td>Stage 4</td>
<td>40%+</td>
</tr>
</tbody>
</table>
Seasonal rule curves tied to system storage and based on past droughts
Multiple Source Decision Tree
Trigger Mechanism Considerations

STEP FOUR

Causes of delays

- Pressure on Board often from business community, developers, agriculture
- Supplier is not ready
- Ill defined triggers

Include flexibility to:

- Move up or down two Stages
- Stay at a Stage and modify demand reduction program for smaller or greater reduction than needed
- Provide a consistent message with local agencies
Develop a Staged Demand Reduction Program

STEP 5
Establish Stages

Example Stages with demand reduction goals

<table>
<thead>
<tr>
<th>Stage</th>
<th>Water Shortage</th>
<th>Demand reduction goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minimum</td>
<td>10 - 15%</td>
</tr>
<tr>
<td>2</td>
<td>Moderate</td>
<td>15 - 25%</td>
</tr>
<tr>
<td>3</td>
<td>Severe</td>
<td>25 - 40%</td>
</tr>
<tr>
<td>4</td>
<td>Critical</td>
<td>40+%</td>
</tr>
</tbody>
</table>
Criteria for Demand Reduction During a Water Shortage

**STEP FIVE**

- **Timing**: can the measures/actions produce results in time?
- **Magnitude of savings**: Will enough water be saved?
- **Season**: are the actions/measures relevant to the time of year?
- **Costs**: How severe are the cost implications of the measures to the customer, relative to the need for action?
Evaluate Demand Reduction Measures

Methods that reduce demand: supported by demand reduction actions

- Public Information Campaign
- Restrictions
- Pricing
- Allocations

Prioritize methods:

- Water savings
- Lead time required to activate measure
- Direct and indirect costs
- Legal or procedural requirements for implementation
Example Actions

**Stage 1 - Voluntary**
- Initiate public information campaign
- Advertise toilet, appliance, equipment rebate programs
- Request 20 gallon-a-day per person reduction
- Suggest shorter showers, no hosing of hard surfaces

**Stage 2 - Restrictions with enforcement**
- Intensify public information, assistance programs
- Restrict irrigation to morning and evening
- No run-off, three times per week watering
- Water by request in restaurants
- Increase rates
Example Actions

**Stage 3 - Mandatory + Customer Outreach**
- Limit days of irrigation
- Tiered pricing with significant price jumps
- Establish allocations
- Provide customer on-site assistance
- Provide multiple demand reduction programs
- Provide customer / business training programs

**Stage 4 - Mandatory**
- Mandatory/critical
- Intensify all efforts
- Manage consumption to stay within water allotments
- Landscape irrigation restrictions
- Fines
Things to think about

STEP FIVE

Estimating savings can be a challenge
- Savings may vary from month to month, difficult to predict
- Savings can be scaled to the normal year demand curve

Supplier may enter Stage before customers implement

Messaging
- Cooperate with local and regional water suppliers to avoid inconsistent drought messages

Beware of the “lag”
- Customer awareness reduced by bi-monthly billing
- Build lag time in triggers
- Leap-frog Stage if lag time is long or not recognized
- Lag time could result in draw down of next year’s reserves and unnecessary economic losses
Adopt the Plan

STEP 6
Process

STEP SIX

INVOLVE THE COMMUNITY

PREPARE REVENUE PLAN*

FORMALIZE COOPERATION WITH LOCAL AGENCIES

ADOPT THE PLAN
Prepare Revenue Plan

Evaluate Revenue by Water Shortage Stage

- Estimate the amount of water use reduction that will be achieved and the associated lost revenue
- Estimate revenue needs – include funds for new water supplies, increased water quality monitoring, and extended multi-year rationing
- Design a rate adjustment or water shortage surcharge that will cover the expected revenue deficit if reserves are not available
- Monitor actual revenue and compare with forecasted; adjust water shortage surcharges as needed, but not too often
Implement the Plan

STEP 7
Implement the Plan

- Staff levels, training and support
- Office space and equipment
- Budget*
- Integration into agency
- Coordination with other agencies
- Computer and billing format capabilities
- Customer assistance*
- Customer appeals
- Special need customers
- Dealing with the media*
- Monitoring of actual use

STEP SEVEN
Budget

**Salaries**
including overtime

**Equipment**
cars, phones, computers, audit materials

**Training**
professional trainers for customer contact, computer databases, conservation audits and assistance

**Materials**
program brochures, conservation info, water waste educational info and door hangers

**Media**
TV, radio and print advertising budget, graphic and recording studio support, events, direct mail

**Programs**
rebates, hand-outs, contests, awards, training for customers & green industry
Customer assistance

- Phone hot-line, including evenings and weekends
- Email distribution list, blogs
- House calls, surveys
- Plumbing and landscaping referrals
- Irrigation system management training and assistance
- Plumbing fixture and appliance recommendations
- Assistance to excess-use customers
- Assistance to disadvantaged communities
Dealing with the media

- Establish good relations with reporters *local print, radio and television*
- Rationing response manager available for questions and interviews
- Consistent message *talking points, sound bites*
- Free media and community support resources
- In response to possible negative media reports, demonstrate how the agency solves customers problems
When the Drought Ends!

**Update**
Update the water shortage plan as needed while the event is fresh in your mind!

**Restore**
Restore utility operations, organization, and services to pre-event levels

**Document**
Document the event and compile records for future reference

**Continue**
Continue to maintain liaisons with external agencies

**Thank**
Publicize gratitude for the community’s cooperation
Thank You!

Veronica Blette  
US EPA WaterSense Program  
blette.veronica@epa.gov

Brian Skeens  
Jacobs  
brian.skeens@jacobs.com

William Granger  
City of Sacramento Water Department  
wgranger@cityofsacramento.org

Chris Brown, Chair of M60 committee  
Chris Brown Consulting  
cbconserv@gmail.com