

ATTACHMENT D

**Washington County Water Conservancy District
Water Conservation Programs: A Comparative Evaluation
Maddaus Water Management, Inc.
(Dec. 17, 2018)**

WASHINGTON COUNTY WATER CONSERVANCY DISTRICT

Water Conservation Programs: A Comparative Evaluation



FINAL

December 17, 2018

Prepared by:



**MADDAUS
WATER
MANAGEMENT INC.**

1. INTRODUCTION



Washington County Water Conservancy District (WCWCD) is a wholesale water supplier. Currently, WCWCD has a robust and comprehensive water conservation program and wants to ensure that its conservation program is, and remains, a top-tier program. To that end, WCWCD has requested a comparison of its current water conservation program to that of other similarly situated western communities.

Maddaus Water Management Inc. (MWM) is recognized as a national expert in water demand forecasting and in the analysis of water efficiency programs. MWM is the lead author of the American Water Works Manual M52 – Conservation Planning. MWM President, Michelle Maddaus, is currently the committee chair of the AWWA Planning and Research Evaluation Committee dedicated to reviewing, researching, and quantifying water conservation across the country. MWM has worked with agencies throughout Utah since 1995. Most recently, in 2018, MWM has been working with Jordan Valley Water Conservancy District on their demand forecasts and conservation savings estimates for their integrated water resources plan.

MWM began working with WCWCD in 2005 and is familiar with its water system and conservation measures and is well poised to conduct this current effort. MWM was on the team that conducted the conservation technical analysis for WCWCD and two other Utah counties as a part of a Water Needs Assessment prepared for the Lake Powell Pipeline Study. The technical analysis was initially conducted in 2010 and updated in 2015 to reflect various revised assumptions and additional conservation efforts.

This comparative evaluation presents water use and efficiency information for various water agencies, including industry leaders located in the western United States, surveyed as part of a study on behalf of WCWCD. WCWCD requested that MWM: (1) review its current water conservation programs; (2) compare these programs to national and international best practices and leading peers; and (3) recommend program modifications or additions designed to further increase its water efficiency savings.

The 2018 survey summarized in this evaluation focused on 10 participating agencies and their water use goals, water efficiency measures, conservation program budgets, program payment mechanisms, and staffing levels. The following information was solicited for each participating agency through online research, phone calls with surveyed agency staff, and submitted survey forms:

- Historical, current, and planned conservation activity and plans;
- Current conservation program budget (total and per capita);
- Equivalent full-time conservation program staff;
- Customer types: wholesale, commercial, urban farms, industrial, residential, etc.;
- Customer use profile: indoor & outdoor use as a percent and per capita;
- Leak management: including water audits, pressure testing, meter and pipe replacement, leak detection and repairs to reduce overall volume of non-revenue water;
- Alternative water sources in use: gray water, reclaimed water, rainwater capture, HVAC condensate;
- New local and state building codes: indoor and outdoor fixture or performance requirements;
- Financial incentives: rebates and incentives including amounts of rebates and targeted and achieved customer participation;
- Price signals to change consumer behavior: type of rate structure currently in place; and
- Communications strategies to change consumer behavior: new or innovative media and marketing approaches, targeted outreach strategies to specific audiences, watering restriction advertisement, software and usage apps, spending comparison to other peer conservation programs

2. WATER USE EFFICIENCY PEER RESEARCH STUDY

The 10 agencies selected for the survey were chosen because they are in arid climates in the western U.S. and for the most part, have mature, successful water conservation programs. As shown in Table 1, the agencies vary in service-size populations from approximately 28,000 in Grand Junction, CO to more than two million in the Southern Nevada Water Authority (SNWA); WCWCD is one of the smallest. The surveyed agencies are in different states and have water demands ranging from 3.2 million gallons day (MGD) to 455 MGD. The primary supply source is surface water for most of the water systems. The surveyed group represents some of the top-tier water conservation programs in the country.

Outdoor water usage is a significant driver in the large volume of water used in the western United States. Additionally, seasonal water use drives peak use for most of the water systems in the region. Outdoor water use among the surveyed agencies varies from 30 to 60 percent, depending on the climate. The variance in outdoor use impacts the focus of a conservation program with the need for more landscape and irrigation conservation measures to attempt to reduce peak water use in higher outdoor water using service areas.

2.1 WCWCD's Water Conservation Program

Water conservation has been a hallmark of WCWCD's focus since 1993 when it approved the Long-term Framework for Water Resources Management, Development, and Protection Plan. In 1996, WCWCD published its first water conservation plan and currently updates the plan every five years to incorporate new technology and concepts. WCWCD coordinates with its municipal partners, the State of Utah and other agencies to maximize and expand conservation efforts.

WCWCD's 2015 water conservation plan includes the following measures:

- Promotion of universal metering
- Secondary water metering
- Smart controller irrigation technology
- Time of day watering ordinances
- Requirement of a water conservation plan for municipal customers
- Water efficient landscape workshops
- Public information programs/school education
- Residential and commercial system water audits, leak detection, and repair
- Free outdoor irrigation efficiency audits for residences and businesses
- Incentive water conservation pricing
- Landscape ordinance requirements
- Incentives to reduce irrigated landscape area in new development (water conservation easements)
- Full-time water conservation manager
- Water conservation demonstration gardens with two full-time horticultural educators
- Water Smart irrigation rebate program
- Water Smart commercial upgrades equipment rebate
- Training and certification of landscape training professionals
- Financial incentives for irrigation upgrades

- Large landscape conservation programs and incentives
- EPA WaterSense appliance rebates
- Statewide water-wise plant list and tagging program
- Public athletic fields conversion to artificial turf grant program
- WaterSense toilet/urinal rebates
- Multi-family high-efficiency washer rebate program
- Funding for local and statewide media campaigns
- Horticultural classes, trainings, and awards
- Maximize use of secondary water systems including using wastewater reuse
- Studying and establishing best management practices for use of high salinity water for landscape

WCWCD periodically monitors the impact of its programs and considers new measures in response to community changes and technological advancements.

2.2 Water Conservation Programs Across Western U.S.

The surveyed agencies have created successful water conservation programs despite varied climates, service area populations and goals. The following table presents a summary of the data collected during the survey.



Table 1. Surveyed Agency Information

	Albuquerque Bernalillo County Water Utility Authority	Colorado Springs Utilities	El Paso Water	City of Grand Junction	City of Phoenix Water Services Department	Salt Lake City Department of Public Utilities	City of Santa Fe	Southern Nevada Water Authority	City of Tucson	Washington County Water Conservancy District
State	New Mexico	Colorado	Texas	Colorado	Arizona	Utah	New Mexico	Nevada	Arizona	Utah
Approx. Population Served	658,238 (2015)	470,513 (2015)	787,208 (2013)	28,125 (2018)	1,648,611 (2017)	316,402 (2016)	83,878 (2017)	2,262,962 (2017)	750,000 (2017)	153,300 (2015)
Major Metro Region(s)	Albuquerque	Colorado Springs	El Paso	Grand Junction	Phoenix	Salt Lake City	Santa Fe	Las Vegas	Tucson	St. George
Number of Agencies Served	1	1	1	1	1	1	1	7	1	7
Service Type Provided	Retail and two small wholesale accounts	Retail	Primarily retail, some wholesale	Retail	Retail	Primarily retail, some wholesale	Retail	Wholesale	Retail	Primarily wholesale, some retail
Service Area Size (sq mi)	190 sq mi	195 sq mi	250 sq mi	9 sq mi	661 sq mi	136 sq mi	53 sq mi	822 sq mi	390 sq mi	200 sq mi
Average System Demand (MGD)	87.5 MGD (2015)	78.6 MGD (2016)	102.3 MGD (2013)	5.3 MGD (2017)	276.0 MGD (2017)	61.1 MGD (2017)	N/A ¹	455.0 MGD (2017)	89.3 MGD (2017)	43.8 MGD (2017)
Annual Conservation Budget²	\$1,615,000	\$850,000	\$1,188,600	\$13,500	\$915,533 ³	\$346,700	N/A ¹	\$15,831,200	\$4,000,000	\$643,543
Conservation Spending (\$/capita)	\$2.45	\$1.81	\$1.51	\$0.48	\$0.56	\$0.62	N/A ¹	\$7.00	\$5.33	\$3.88
Full-time Equivalent Conservation Staff	8.5	6.25	10	0.5	5	1	N/A ¹	20	4	5.75

¹ N/A indicates that data was not available from the agency at the time this document was published.

² Conservation program and budget anticipated to vary based on type of service provided (e.g., wholesale providers may not have authority to set or enforce ordinances). Project costs included in conservation budget may vary by agency and are listed as reported.

³ City of Phoenix annual budget is based on the year 2017.

Table 2 illustrates the highlights of the individual agency conservation programs as provided directly by each survey participant. Program highlights are diverse because agencies are in different stages of their conservation program or have different focus areas.

Table 2. Individual Agency Conservation Program Highlights

Agency	Conservation Program Highlights
Albuquerque Bernalillo County Water Utility Authority, NM	<ul style="list-style-type: none"> • Xeriscape program • Partnerships with irrigation professionals
Colorado Springs Utilities, CO	<ul style="list-style-type: none"> • Tiered water rates
El Paso Water, TX	<ul style="list-style-type: none"> • Discontinued rebates based on successful decrease in GPCD. • Education and public awareness programs • 100% metered
City of Grand Junction, CO	<ul style="list-style-type: none"> • Drought Response Information Project • Annual Children's Water Festival • Low-water-use landscape projects • Leak detection programs • Increasing block rate structures
City of Phoenix, AZ	<ul style="list-style-type: none"> • Integration of water efficient technologies • Development of small residential lots • Transition to desert adapted vegetation • Increased customer water awareness
Salt Lake City, UT	<ul style="list-style-type: none"> • WaterMAPS implementation establishes baseline landscape water needs • CII Analytics assesses water use by business sector • Water Check web-based DIY online application tool • Website www.slcgardenwise.com
City of Santa Fe, NM	<ul style="list-style-type: none"> • EyeOnWater: A free app that customers can use to monitor their water usage in real time. City Water Conservation staff uses the app to notify customers of high continuous flows • New and improved utility billing system in 2017 that helps customers monitor water use, compare use with previous months, and provides breakdown of water, sewer and refuse charges
Southern Nevada Water Authority, NV	<ul style="list-style-type: none"> • Water Smart Homes: Since it began in 2005 nearly 13,000 homes, saving ~14 billion gallons of water, have been built through this program measure • Water Smart Landscape Rebate: As of July 2018, the rebate is \$3 per square foot of grass replaced with a water-efficient landscape
City of Tucson, AZ	<ul style="list-style-type: none"> • 1st place in 2018 for 7th Annual Wyland National Mayor's Challenge for Water Conservation; placed second from 2014-2017; 1st place in 2013
Washington County Water Conservancy District, UT	<ul style="list-style-type: none"> • Requires its municipal customers to have a water conservation plan, tiered water rates, time of day watering restrictions and landscape ordinances • Rebate program • Annual children's water fair • Complimentary home and business irrigation audits • Created Utah's first desert conservation demonstration garden

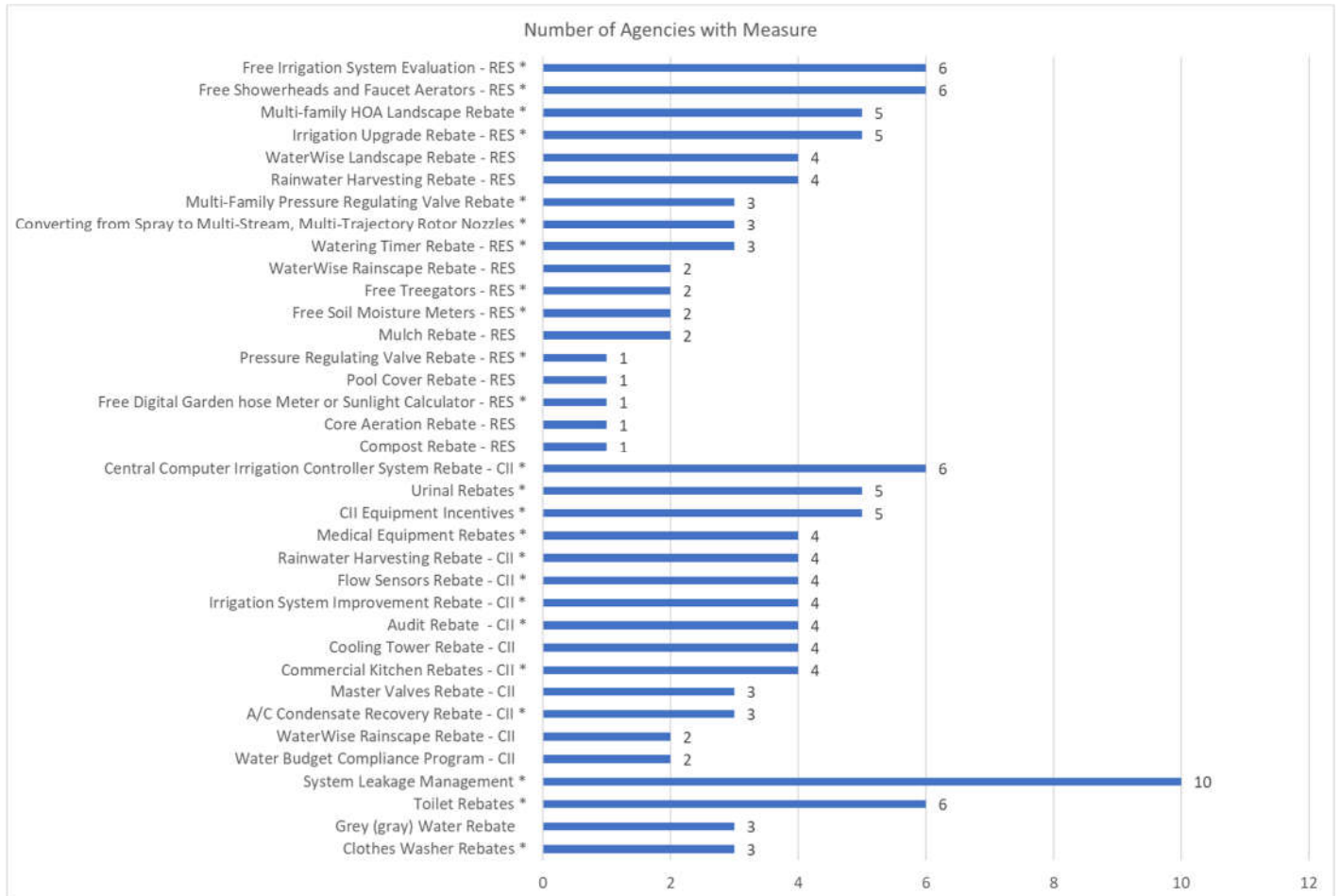
2.3 Survey Measure Results

As shown in Figure 1 below, the most common measures of the 10 water use efficiency programs surveyed are as follows:

- Leakage Management: including water audits, pressure testing, meter and pipe replacement, leak detection and repairs level of non-revenue water (10 agencies)
- Toilet Rebates (6 agencies)
- Free Irrigation System Evaluation - Residential (6 agencies)
- Free Showerheads and Faucet Aerators – Residential (6 agencies)

WCWCD participates in these four most common measurements, including 24 of the 36 displayed in Figure 1.

Figure 1. Number of Agencies Implementing Each Measure



Notes:

1. WCWCD has commercial rebates for any water efficiency (WE) upgrades – either by WE proven device or water savings received.
2. An asterisk (*) indicates this measure is currently offered by WCWCD.
3. RES refers to measures that target residential accounts.
4. CII refers to measures that target commercial, institutional, and/or industrial accounts.

3. COMPARATIVE EVALUATION

Considering the quantity and quality of WCWCD's conservation programs, the commitment of funding and other dedicated resources, water reduction achievements and current/ongoing conservation goals, etc. WCWCD's water efficiency program is on par with other notable programs in the western United States and exceeds those of other entities of a similar size and customer base.

WCWCD has included the most commonly-adopted water conservation measures in its array of programs, and its level of investment is exemplary. The 2015 Water Conservation Plan added measures to enhance conservation above that of the prior 2010 plan, consistent with a pattern of ever-increasing water conservation investment beginning with its first conservation plan in 1996.

In particular, WCWCD's emphasis on secondary water use and metering, re-use, public education, and demonstration gardens, with annual attendance of nearly 120,000, represents a proactive approach to conservation of water resources.

4. RECOMMENDATIONS

Based upon its review of WCWCD's 2015 Conservation Plan, MWM has recommended the adoption of the additional measures set forth below. WCWCD has accepted these recommendations and is in the process of integrating them into its program, which will further enhance its accomplishments to date. Implementing these four measures will be a beneficial investment and will allow WCWCD's strong program to become more cost-effective, sustainable, and robust.

4.1 Reduce Water Loss

The Environmental Protection Agency reports the average loss in water systems across the United States is 16 percent - with up to 75 percent of that loss being recoverable – and has set an industry goal to reduce loss to under 10 percent for non-revenue water (NRW).⁴ NRW is unbilled authorized uses that include everything from water flows to fight fires or flush a system to leaks.

Potable NRW levels are approximately 15% in Washington County; that percent drops to 12% in WCWCD's service area.

Reducing water system loss to leaks, an existing measure in WCWCD's 2015 plan, has the potential to result in significant water savings. MWM recommends incorporating the Infrastructure Leakage Index (ILI) into annual water system audits, continuing efforts to find and repair leaks, and regulating distribution pressure to reduce water loss. MWM also recommends routine calibration and verification of meter accuracy to manage apparent water loss. WCWCD is a wholesale water provider and therefore its ability to reduce water loss on the retail side of the meter is limited. However, WCWCD can work with municipal retail providers in its service area to implement water loss measures.

4.2 Fixture Giveaway

MWM recommends that WCWCD continue and expand distribution of WaterSense-approved, or other low-flow, fixtures. In response to this feedback, WCWCD recently revived the practice of providing free showerheads in the lobby of its office building and coupled it with WaterSense's "Shower Better" campaign. WCWCD also provides free toilet leak-detection tablets, automatic-shutoff hose nozzles, soil moisture sensors, and commercial pre-rinse valves at its office and as a give-away item during promotional events.

⁴ U.S. Environmental Protection Agency. July 2013. Water Audits and Water Loss Control for Public Water Systems, EPA 816-F-13-002. <https://www.epa.gov/sites/production/files/2015-04/documents/epa816f13002.pdf>

4.3 Residential Landscape Rebate

WCWCD currently offers rebates for sprinkler nozzles, weather-based irrigation controllers and drip irrigation systems. MWM recommends that WCWCD work with local nurseries to provide rebates or coupons for the installation of a standard list of water-efficient landscape plants as well. Providing rebates for mulch and a per square foot incentive to remove and replace turf with low water use plants or permeable hardscape could also be evaluated.

4.4 Energy Utility Partnerships

By partnering with local energy providers, WCWCD could offer incentives to customers to save both water and energy. Potential measures variations WCWCD might explore with partners, include offering incentives for efficient clothes washers or hot water on demand systems, or creating a revised site efficiency evaluation that includes both an energy audit and an indoor water efficiency survey.

WCWCD currently offers rebates for efficient washing machines for multi-family dwellings that have common laundry facilities. If WCWCD can find an energy partner to share in rebate costs, offering a similar rebate for single-family homes may produce a water savings benefit to cost ratio in line with other conservation measures. Rebate amounts should reflect the incremental purchase cost, be consistent with relevant state and federal regulations (Department of Energy and Energy Star), and only apply to the best available technology. A rebate might also be provided for the installation of a high efficiency commercial washer (HEW) at commercial sites. As high-efficiency units reach market saturation, this measure will be phased out and eventually stopped.

WCWCD should also evaluate offering incentives for equipping homes with efficient hot water on demand systems. These systems reduce hot water waiting times, thus water waste, and involve placing a pump under the sink that recirculates hot water in the piping system. Recirculation pumps can be installed under the kitchen sink, in the master bath, or wherever hot water waiting times are more than 1/2 minute. Installation requires an electrical outlet, which is not common under bathroom sinks in older homes but is under kitchen sinks. This measure is best targeted at new development.

4.5 Other Measures

Below is a list of short- and long-term measures that WCWCD could consider to further augment its program and continue to be a leader in water conservation in the western United States.

- Support service area retail water providers in implementing ordinances for new development requiring indoor and outdoor efficiency, hot water on-demand systems, water efficient landscaping, etc.
- Fund pilot studies to determine potential impact of new water savings concepts
- Launch an online self-audit application tool for residential and commercial customers
- Partner with various entities and businesses to reduce water use (e.g., when utilities and industries, such as the hotel or restaurant industry, work as a team, the combination of resources and momentum advances project completion)
- Create relationships beyond traditional energy, water, and sewer; continue expanding outreach network to community groups and organizations
- Add more photos and multimedia to website to enhance customer appeal
- Continue utilizing wastewater reuse as an integral component of future water supply (e.g., the Lake Powell Pipeline is projected to provide an additional 28,000 acre feet of recycled water supply)
- Encourage living buildings with net zero water use (see <http://living-future.org/lbc>) and advanced buildings with dual plumbing, onsite wastewater treatment, etc.

- Support marketing and engagement with largest water users in service area
- Support sizeable water conservation projects with effective incentives and advancements to save large amounts of water (such as working with commercial manufacturers on large equipment replacement to save water)
- Advance use of smaller, on-site wastewater reuse systems

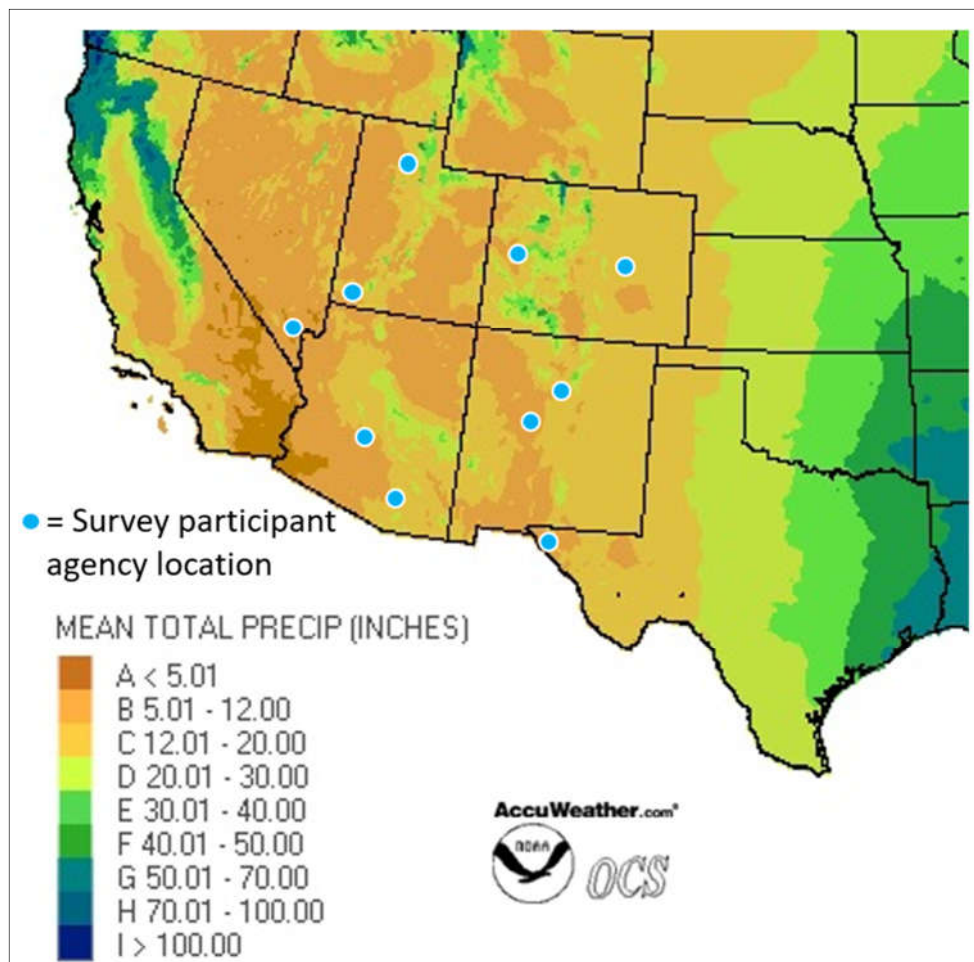
5. SUMMARY

WCWCD has an established, effective water conservation program that includes many of the measures offered by larger utilities with top-tiered programs. WCWCD continues to look for ways to improve its program and has already begun to incorporate recommendations from MWM as outlined in this report.

ACKNOWLEDGEMENTS

Thank you to the following agencies for their participation⁵. Their staff insights and images made this report possible.

- o Albuquerque Bernalillo County Water Utility Authority, NM
- o Colorado Springs Utilities, CO
- o El Paso Water, TX
- o City of Grand Junction, CO
- o City of Phoenix, AZ
- o Salt Lake City, UT
- o City of Santa Fe, NM
- o Southern Nevada Water Authority, NV
- o City of Tucson, AZ
- o Washington County Water Conservancy District, UT



⁵ Agencies that did not provide sufficient information and/or do not have sufficient programs to evaluate were not included in this comparative study.

CONTACT INFORMATION

Additional information is available online for each participating agency.

Agency	Website
Albuquerque Bernalillo County Water Utility Authority	abcwua.org
Colorado Springs Utilities	csu.org
El Paso Water	epwater.org
City of Grand Junction	gjciry.org
City of Phoenix Water Services Department	phoenix.gov
Salt Lake City Department of Public Utilities	slc.gov
City of Santa Fe	santafenm.gov
Southern Nevada Water Authority	snwa.com
City of Tucson	tucsonaz.gov
Washington County Water Conservancy District	wcwcd.org

