



Efficient Residential Water Use

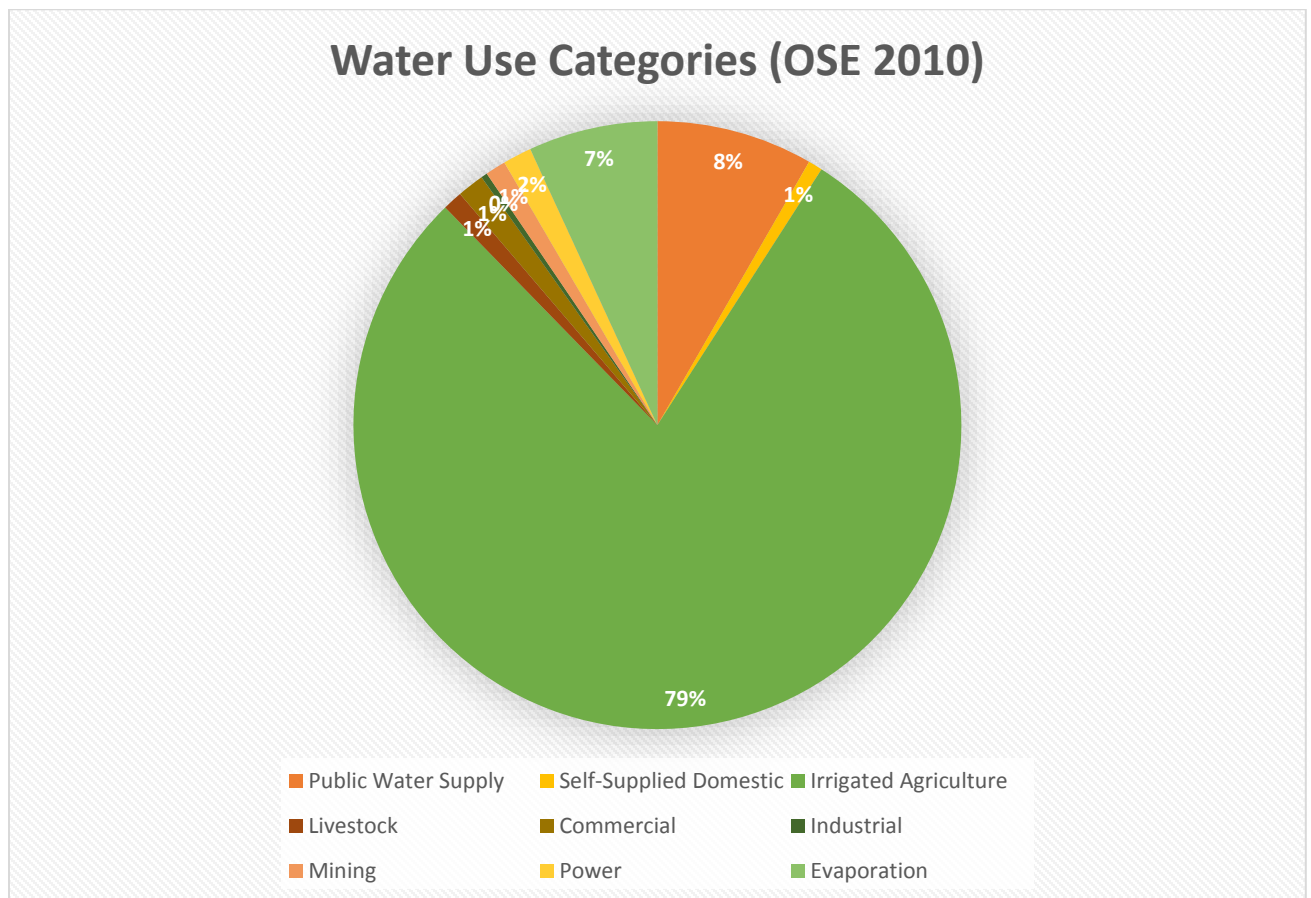
Presented To:
Water & Natural Resources Committee

Submitted By:
NMML Residential Water Use Task Force
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Introduction

Drought prone areas have long been leaders in water conservation out of necessity; drought is a strong motivating factor for local governments to enact water conservation programs, however, a reactionary approach is not always beneficial to the community nor is it well received. To be successful, water conservation programs must be built in incremental steps.

The chart below depicts the water use categories in the State of New Mexico as calculated by the Office of the State Engineer. From the data, Public Water Supply makes up 8% of the water use in the state.



This report is a compilation of water conservation data, information, and best management practices (BMPs) from the four largest cities in the state and includes tools and options for efficient household water use.

Overview

The location in the state, average high temperature, and average annual precipitation vary from city to city. As with the agriculture industry, water use in the cities increases during the summer months for irrigation. The table below shows the temperature in July, the hottest month, and annual precipitation for the four largest cities/utilities.

Average July Temperature and Annual Precipitation

Entity	Average July summer temperature	Average annual precipitation.
ABCWUA	90°	9.39 in
Las Cruces	95°	9.76 in
Rio Rancho	95°	11.63
Santa Fe	86°	14.21 in

Albuquerque Bernalillo County Water Utility Authority



The Albuquerque Bernalillo County Water Utility Authority (“Water Authority”) began its conservation program in 1995. At that time, annual water production was approximately 40 billion gallons which served 445,000 customers. Gallons per capita per day (“GPCD”) was 251. Through an aggressive conservation program the Water Authority reduced its overall production to 30.7 billion gallons in 2015, serving 658,238 customers with a GPCD of only 127.

Albuquerque’s single family residential GPCD was 58 in 2015. Single family residential use has declined by more than 50% since the start of the conservation program and the Water Authority is targeting other users for future conservation savings.

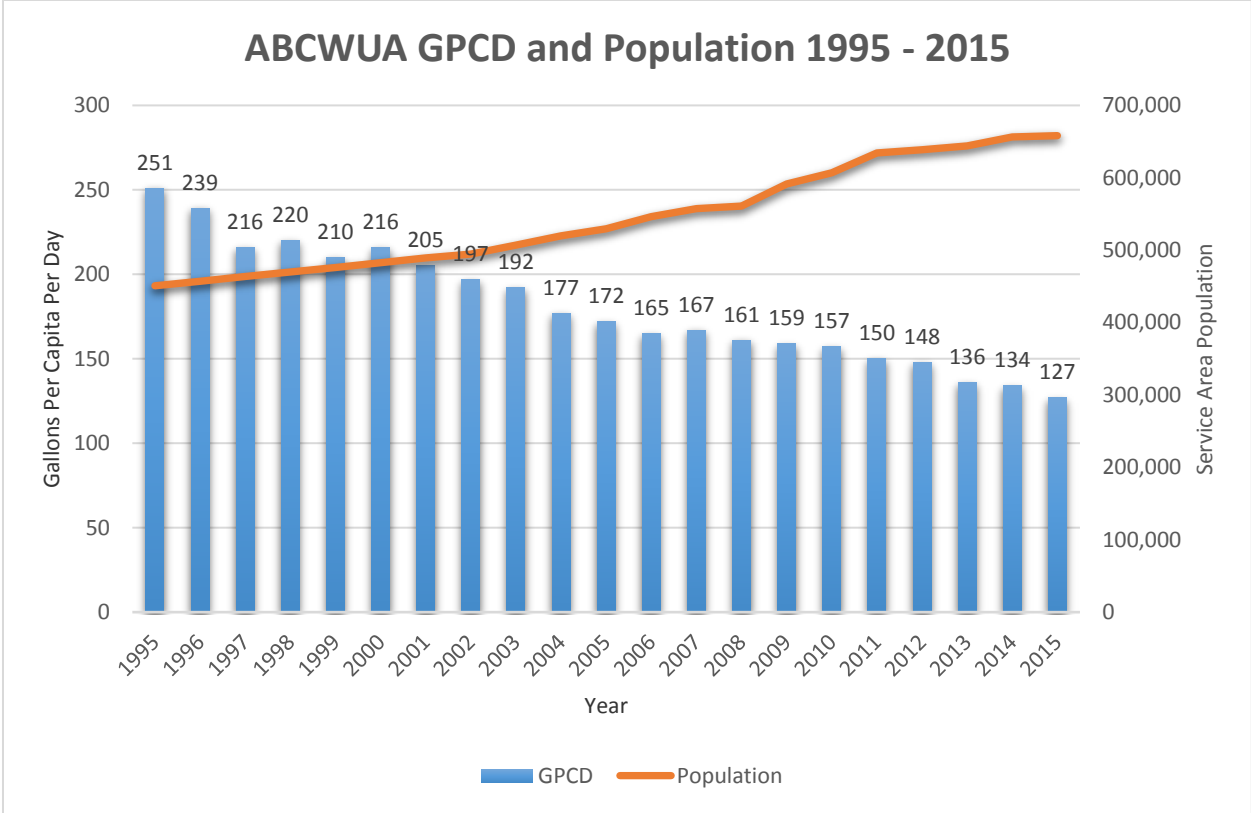


Figure 1: The Water Authority’s system-wide GPCD over time.

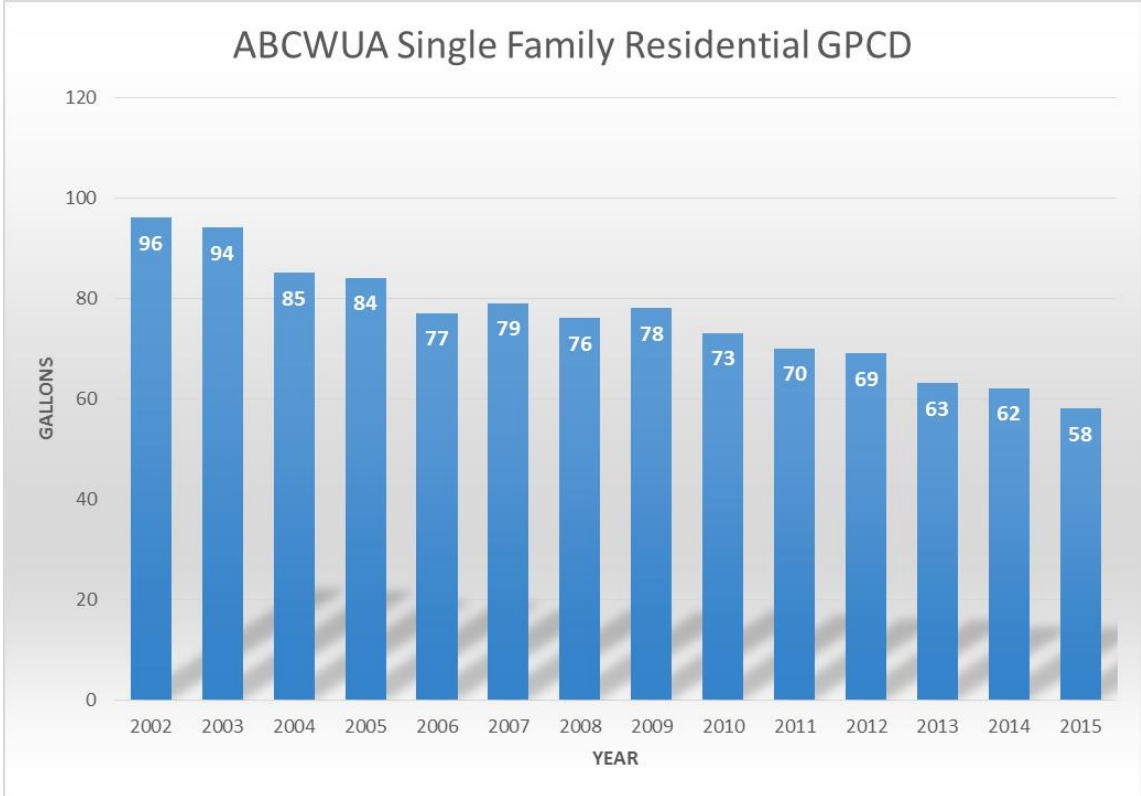


Figure 2: The Water Authority’s single family residential GPCD over time.



City of Las Cruces

The City of Las Cruces Water Conservation Program was launched in 2005. Over 12 months of research went into the planning of this program. In the past 10 years, this program strengthened by the Utilities Department, has stressed transparency, a focus on customer service and, public outreach with regard to conservation.

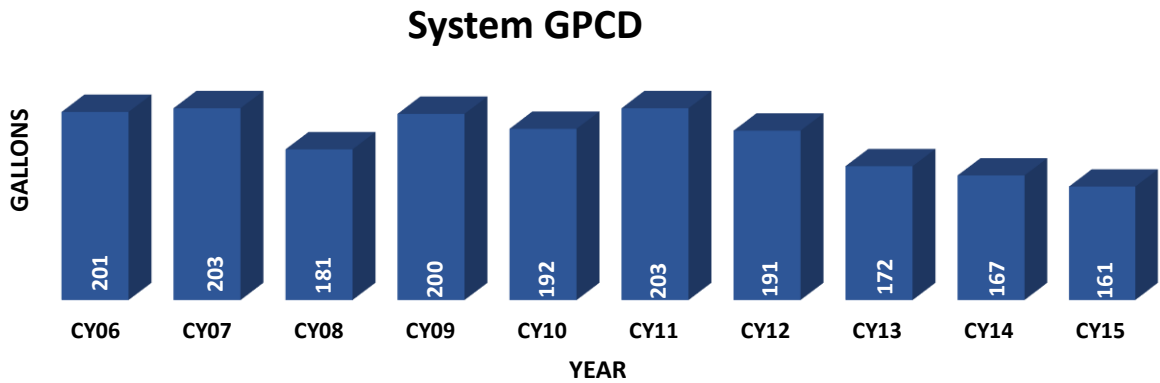


Figure 3: The City of Las Cruces’s system-wide GPCD over time.

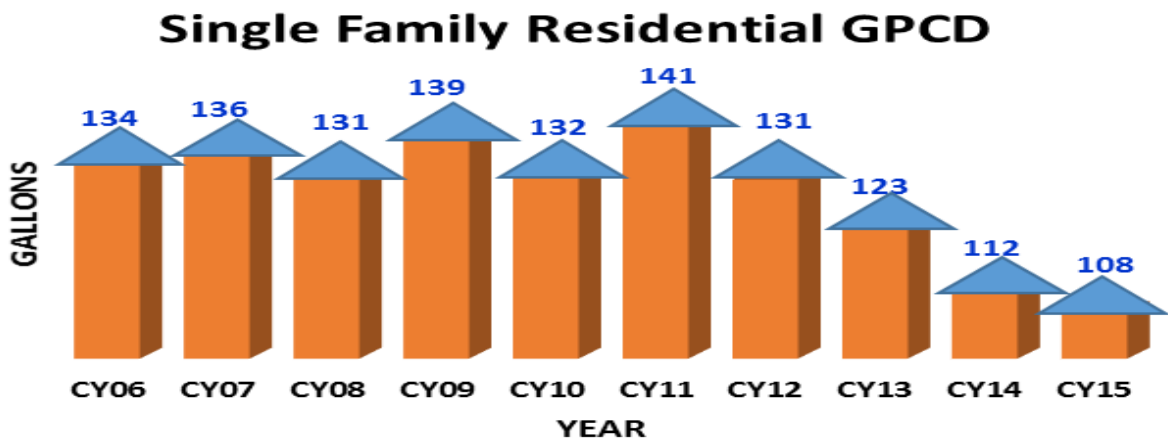


Figure 4: The City of Las Cruces’s single family residential GPCD over time

City of Rio Rancho

The City of Rio Rancho has had a water conservation plan in the form of the City’s Water Resources Management Plan (WRMP) since 2004. The WRMP was updated in 2014 and it is a holistic approach to water management. The WRMP includes recycled (reuse), source water protection, education, supply and infrastructure, economic development, and enforcement.

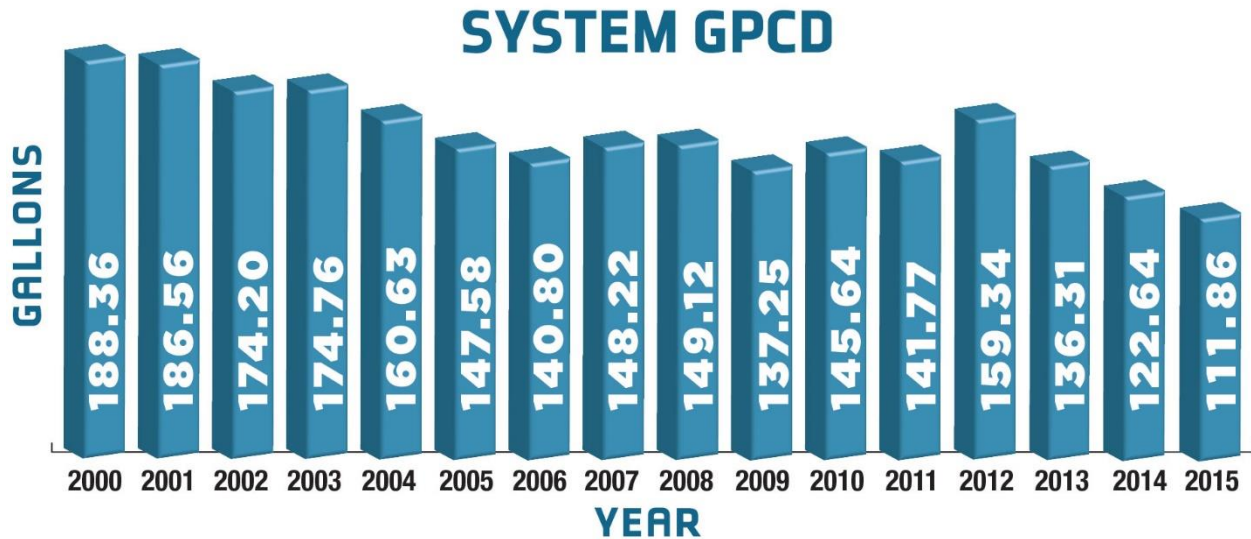


Figure 5: The City of Rio Rancho’s system-wide GPCD over time



Figure 6: The City of Rio Rancho’s single family residential GPCD over time



City of Santa Fe

The City of Santa Fe began its water conservation program after purchasing the water utility in 1995. Over time, the program has changed and expanded to adapt to new standards and technologies, and increasing customer interest in using water more efficiently.

Comprehensive water conservation requirements incorporated into City Code, rebates created and modified to reflect changing technology, a seasonal block pricing structure encouraging water conservation, and educational outreach initiatives have all played a part in reducing the gallons per capita per day (GPCD) from 168 in 1995 to 90 in 2015, which is one of the lowest consumption rates in the southwestern region.

While Santa Fe’s single-family residential GPCD is less than the 55 gallons, pushing GPCD requirements too low could result in a loss of resiliency and demand elasticity during periods of drought. While GPCD is one measure of the effectiveness of a conservation program, it should not be the only consideration: system resiliency and total production capacity must also be considered.

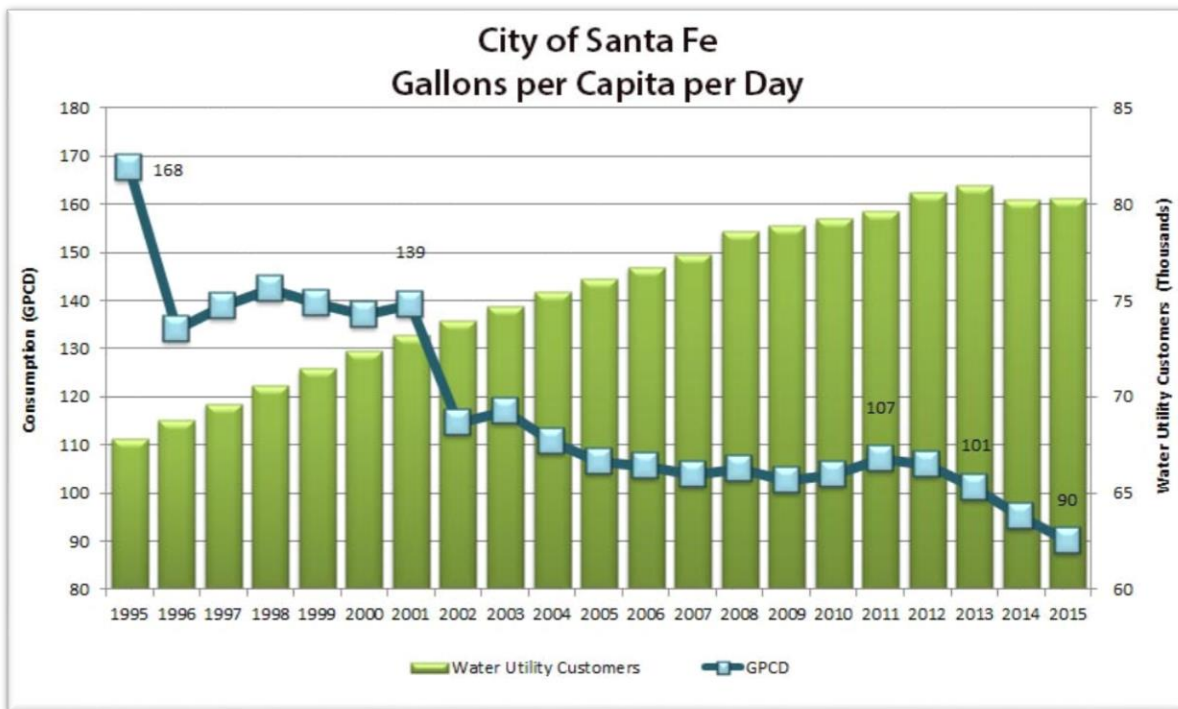


Figure 7: The City of Santa Fe’s system-wide GPCD over time

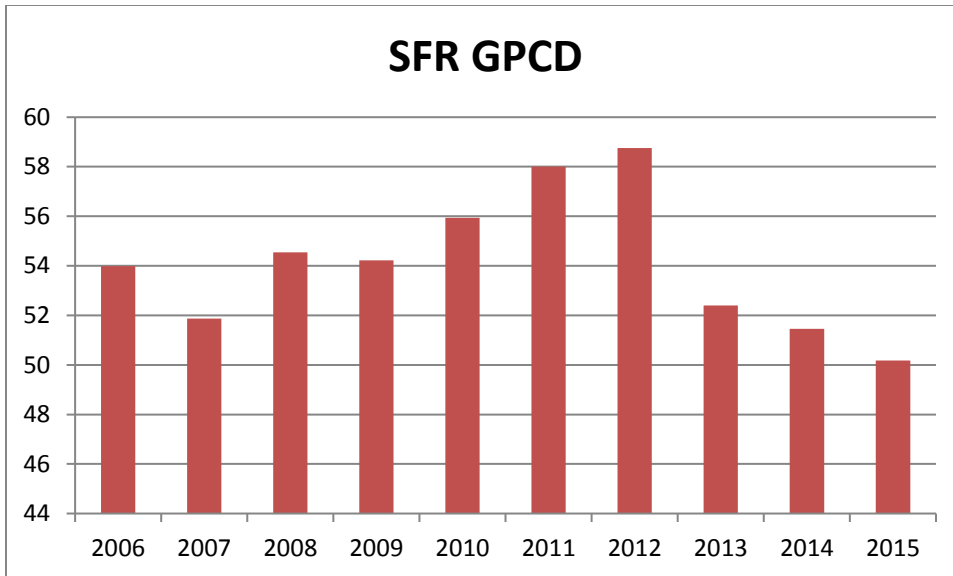


Figure 8: The City of Santa Fe’s Single Family Residential GPCD over time

Statistics

The table below depicts some of the water reduction accomplishments. These results were achieved with aggressive conservation programs that focused on customer education and incentives first while also using deterrent methods such as water waste fines and a water rate structure that incentivized conservation. In addition, City of Albuquerque and Bernalillo County approved and implemented development standards to prohibit large turf areas for new homes which has significantly reduced the amount of water used for new development. The City of Santa Fe has ordinances which incorporated water budgets and water conservation requirements into building codes that also reduced the impacts of new development. Developers are required to offset new demands on the community’s water supplies as part of the permit process.

Entity	Year WC program started	Increasing block rates	Using/sell reuse water	Use AWWA calculator	Use OSE calculator	2015 SFR GPCD	% Water reduction
ABCWUA	1995	Yes	Yes	Yes	Yes	58	49% in 20 years
Las Cruces	2005	Yes	Yes	Yes	Yes	108	20% in 9 years
Rio Rancho	1998	Yes	Yes	Yes	Yes	66	40% in 15 years
Santa Fe	1995	Yes	Yes	Yes	Yes	54	46% in 20 years

Best Management Practices

Entity	Student education	Adult education	Rebates or incentives	Landscape watering ordinance/restrictions
ABCWUA	Yes	Yes	Yes	Yes
Las Cruces	Yes	Yes	No	Yes
Rio Rancho	Yes	Yes	Yes	Yes
Santa Fe	Yes	Yes	Yes	Yes

The table above shows a brief overview of best management practices used by the four cities. Details of the water conservation programs are listed by city.

Albuquerque Bernalillo County Water Utility Authority



The Water Authority’s education program uses many traditional methods to inform our customers about the need to conserve such as TV, radio, bill inserts and billboards, but innovative techniques such as WaterSmart classes that customers earn a bill credit for attending are also used. WaterSmart classes last about one hour and have been offered on efficient watering, gardening in the desert and tree care. Our customers really enjoy these classes because they promote good stewardship of water not just how to effectively water your lawn.

The Water Authority also has an extensive student education program that just won the Water Environment Federation’s annual award for best outreach program. The Water Authority’s student education program offers puppet shows, in-class water experiments, field trips to the Rio Grande for all fourth-grade classes in the service area and tours of the water reclamation plant. The activities don’t just educate the students but also the teachers and chaperones who attend.

Incentive programs are very popular with customers and the Water Authority returns approximately \$1 million each year to its customers in the form of bill credits. Rebates are offered for: high-efficiency toilets, EnergyStar washing machines, hot water recirculation units, swamp cooler thermostats, rain barrels, xeriscaping, tree care and many items to increase outdoor watering efficiency.

The Water Authority enacted a water waste ordinance that prohibits sprinkler irrigation from 11AM – 7PM from April 1st to October 31st. The ordinance also prohibits overflow of irrigation systems into the public right of way or onto adjacent properties. Fines for violations of the ordinance start at \$20 and escalate up to \$2,000 by the ninth violation.

On an annual basis, the Water Authority completes a water use audit which describes the amount of water lost in the system (non-revenue water). The audit is peer reviewed by the American Water Works Association (AWWA). Overall loss in the system has consistently been below seven percent which is considered excellent in the water utility business for utilities our size.

The Water Authority is in the process of adopting an update to the Water Resources Management Strategy which will establish a new water conservation goal of 110 GPCD to be reached by 2037. This new conservation goal will reduce water demand at the end of the 100 year planning period by 50,000 acre-feet annually extending the Water Authority's water supply by many decades.



City of Las Cruces

Key elements of the City of Las Cruces' successful Water Conservation Program are:

- Providing a quality product that meets indoor essential water requirements at block rates starting at 3,000 gallons and a rate structure effective October 1, 2010 incorporated summer and non-summer water charges for all classes of service.
- Water conservation is a result of less water required creating less environmental impact, lower operations and maintenance costs, and increasing our supply.
- Demonstrating leadership in utility stewardship and sustainability by reducing city park water requirements with irrigation audits, building SMART structures, installing water efficient landscapes and supplying reclaimed water
- Completing the American Water Works Audit (AWWA) Reports and NMOSE gallons per capita per day (GPCD) calculator has provided a positive public perception and perspective of the success of the water conservation program.

The Water Conservation Program has many public outreach programs that are designed to assist, inform, and educate all citizens of Las Cruces some of which are;

- The Annual Children's Water Festival educating and informing 3rd & 4th grade school children about water conservation, while offering hands on exhibits and presentations in an outdoor venue.
- Lush and Lean is a series of workshops utilizing multi agency and institutional collaborations in their field of expertise, under the water conservation umbrella.
- Demonstration Garden displaying efficient irrigation methods and native plants for public presentations such as our "Spring Stroll" and self-guided tours
- Water Conservation Compliance Program
- Water Waste "Hotline"
- Outreach and education to students and adult groups
- Free Indoor and Outdoor Water Audits
- Home Buyers Indoor/Outdoor Water Efficiency Evaluation, encouraging water efficient WaterSense labeled and EnergyStar qualified products
- Research in water treatment processes and efficient water technologies

Another asset further extending our water conservation program is our Water Reclamation Facility. An advanced water treatment plant providing Class “A” reclaimed water for irrigation and construction purposes. Utilization of our purple pipe water further safeguards our drinking water supplies.



City of Rio Rancho

The City of Rio Rancho has been completing water audits since 2006 using the American Water Works Association (AWWA) software. The results of the audit give the City an idea of the apparent and real water losses per connection per day, costs for the water loss, both apparent and real, and suggests area for the City to look at to control the apparent and real water loss.

The City has been using the New Mexico Office of the State Engineer (OSE) gallons per capita day (GPCD) calculator since 2007. Using this calculator has given the City a great visual representation of the strides that water conservation efforts are showing.

The Water Conservation Ordinance includes violations and monetary penalties for irrigation outside of the time-of-day restrictions of 7 PM to 11 AM from April 1 to October 31 of each year. Additional violations and penalties occur for hospitality business such as restaurants serving water without request and hotels/motels changing linens daily without giving their patrons an opportunity to reuse the linens. A third aspect to the ordinance is the “fugitive water” violation and penalties to customers who allow water to run off their property onto City right-of-way.

The Water Conservation Office brings many programs and educational opportunities to the citizens and water customers. Some of these programs include:

- Annual Children’s Water Festival for an average of 1,500 4th grade students and teachers
- Water Use Evaluations for water customers
- Irrigation audits for customers with large areas of turf grass
- Outreach and education to student and adult groups
- Rebates on the water bill for toilet replacement, washer replacement, and installation of evaporative cooler thermostats
- “Hot lines” for reporting water leaks in the street and wasting water
- “Leak Letters” to customers when the meter indicates a leak on the customer side

Other City programs that are lowering the water use include:

- Service water line replacement of the old inferior water pipes
- Recycled water program including:
 - 171,130,000 gallons for irrigation in 2015; recycled water use will increase as more parks and schools go on line
 - 800,000 gallons per day with the aquifer injection program; injection will occur in the winter months when water for irrigation is not needed.



City of Santa Fe

A number of strategies have been developed to engage the many audiences that make up the City of Santa Fe. These programs are designed to educate each audience about the benefits of conserving water, as well as provide the necessary knowledge and tools to make the changes which are desired.

- Residential/Commercial Programs
 - Audit/leak detection
 - Irrigation evaluation
 - Residential and Commercial rebates
- Children Programs
 - Poster contest 1st-6th grades
 - Water Fiesta 4th grade
 - In-class and summer program presentations
- Adult Programs
 - Weekly Radio Show
 - Host/Participate in Events
 - Land & Water Summit (NM Xeriscape/Arid LID Conference)
 - Fix-A-Leak Week and other WaterSense Programs
 - Project WET: Water Education for Teachers
 - Drip Classes for the Santa Fe Master Gardeners program
 - Qualified Water Efficient Landscaper (QWEL) Certification Training
- Demonstration Garden

Incentives for the replacement of water using fixtures and appliances with more efficient models have been a vital component of Santa Fe's water conservation program. In addition to keeping up to date with rebates for new technologies, the Water Conservation Office is exploring partnerships with other utilities to improve customer return-on-investment for appliances that save both water and energy.

Conclusions

A proactive approach to water conservation requires consideration of all of the issues faced and resources available. Water challenges in New Mexico are complex; knowledge and planning are key components to developing and implementing effective solutions for the long-term. While GPCD is one measure of the effectiveness of a conservation program, it should not be the only consideration: system resiliency and total production capacity must also be considered.

American Water Works Association (AWWA) supports the following water conservation principles and practices in *M52 Water Conservation Programs – A Planning Manual*:

1. Efficient utilization of sources of supply;
2. Appropriate facility rehabilitation or replacement;
3. Leak detection and repair;
4. Accurate monitoring of consumption and billing based on metered usage;
5. Full cost pricing;

6. Establishment of water-use-efficiency standards for new plumbing fixtures and appliances and the encouragement of conversion of existing high-water-use plumbing fixtures to more efficient designs;
7. Encouragement of the use of efficient irrigation systems and landscape materials;
8. Development and use of educational materials on water conservation;
9. Public information programs promoting efficient practices and water conservation by all customers;
10. Integrated resource planning;
11. Water reuse for appropriate uses; and
12. Continued research on efficient water use practices.

Tools and Resources

Each water utility in New Mexico is unique in its challenges and situations and when planning a water conservation program, each should decide what BPMs would work best for them. Below are listed some recommendations that utilities may consider:

Develop a Public Information Program

Refer to *A Water Conservation Guide for Public Utilities, Section 3*, by NMOSE (2001), for more information on how to develop a well-planned public information program. A successful program will increase the public's awareness about the need to conserve water and inform customers about how to conserve water while also providing a positive public relations benefit for the PWS.

Determine Outreach Program Activities

Refer to *A Water Conservation Guide for Public Utilities, Section 3*, by NMOSE (2001), for more information on how to select activities to inform, encourage, and reinforce the importance of water conservation. In addition, social media is also a very effective method for presenting information to the public. More information on this topic can be found online.

Develop In-School Educational Programs

Refer to *A Water Conservation Guide for Public Utilities, Section 4*, by NMOSE (2001), for more information on how to develop in-school educational programs. To encourage long-term water conservation, it is important to educate students about water conservation and help them to develop water-saving habits. Many excellent water conservation educational materials, complete classroom programs, and websites are available. Contact the NMOSE for more information as they may be available to assist with educational water conservation programming, or visit their website at http://www.ose.state.nm.us/wucp_educators.html.

New Mexico Resources

New Mexico Office of the State Engineer

The NMOSE website, http://www.ose.state.nm.us/conservation_index.html, offers free educational materials and technical assistance for Public Water Suppliers (PWS):

- *Water conservation publications* for indoor and outdoor water conservation are available free of charge. Materials are can be downloaded or ordered in bulk. See the website for titles and ordering information.
- *K-12 classroom materials* are available free of charge. Materials are can be downloaded or ordered in bulk. See the website for titles and ordering information.

Water use and conservation technical assistance includes:

- *The GPCD Calculator*, which is designed to help quantify and track water uses associated with water distribution systems, available for download at http://www.ose.state.nm.us/wucp_gcpd.html.
- *Audit*, which is an Excel spreadsheet-based tool designed to help quantify and track water losses associated with water distribution systems and to identify areas for improved efficiency and cost recovery, available for download at http://www.ose.state.nm.us/wucp_accounting.html.
- *A Water Conservation Guide for Public Utilities and Technical Report 43*, which is a guide developed to help municipalities and community water systems conserve water, available for download at <http://www.ose.state.nm.us/water-info/conservation/pdf-manuals/nm-water-manual.pdf>.
- *The food service water audit program*, which is designed for restaurants and cafeterias within the PWS's water supply systems. It provides instructions, questionnaires, evaluations, reporting information, and supplemental resources on how to conduct a food service industry water audit program within a utility, and is available for download at http://www.ose.state.nm.us/wucp_food_service_audit.html.
- *Other related reports*, available at http://www.ose.state.nm.us/wucp_pws.html.

U.S. Environmental Protection Agency

WaterSense

WaterSense is a division of the U.S. EPA. The main goal of the program is to decrease indoor and outdoor nonagricultural water use through more efficient products, equipment, and programs. By providing a recognizable label on WaterSense-approved products, WaterSense helps consumers easily identify water-efficient products in the marketplace while ensuring product performance and encouraging innovation in manufacturing. The website, <http://www.epa.gov/WaterSense/index.html>, includes a product search and partnership information. Partnerships are free.

Alliance for Water Efficiency (AWE)

AWE is a nonprofit, membership-based organization that strives for efficient and sustainable use of water. A free online library provides access to existing and emerging research. Membership is based on number of connections, which provides reasonable rates for small public water suppliers. Membership also provides access to a water conservation tracking tool that evaluates the costs and benefits of conservation programs. NM has a Member on the Board. AWE's website is <http://www.allianceforwaterefficiency.org>.

American Water Works Association (AWWA)

AWWA is an international nonprofit educational association dedicated to safe water. Founded in 1881 as a forum for water professionals to share information and learn from each other for the common good, AWWA, a paid membership organization, is the authoritative resource for knowledge, information, and advocacy for improving the quality and supply of water in North America and beyond.

AWWA has many resources that will be valuable to any public water supplier. Its website, <http://www.awwa.org>, provides information about news and upcoming events, including

conferences. Look for the specialty conference on water conservation held every two years and for regional conferences through the Rocky Mountain Section. AWWA also provides industry information through manuals and journals.

Audit Software

The AWWA Water Loss Control Committee's free Water Audit Software may be downloaded free of charge by members and nonmembers from <http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx>. (Note: This link takes you to a page where you must register to obtain a login to download this free tool.) The Free Water Audit Software is in Excel and includes 10 worksheets in a spreadsheet file. The software is not intended to provide a full and detailed water audit. (For guidance on comprehensive auditing procedures, see AWWA's M36 manual, *Water Audits and Loss Control Programs*.) However, it allows water utilities to quickly compile a preliminary audit in the standardized and transparent manner that AWWA advocates.

AWWA Conservation Community

This is an online network where water professionals gather to share conservation knowledge. A free AWWA login is required. To create your login, go to <http://www.awwa.org/Resources/index.cfm?navItemNumber=1416>.

AWWA Manuals

Water Conservation Programs – A Planning Manual (AWWA Manual 52) (AWWA, 2006). This detailed manual was written to assist in guiding agencies with a Water Conservation Plan. It discusses water conservation, the need for creating a plan, how to do so, and analyzing and evaluating data. Case studies in the document show examples of effective planning.

Water Audits and Loss Control Programs (AWWA Manual 36) (AWWA, 2009a). This manual discusses how to conduct a water audit. It also discusses creating a program after conducting an audit in order to stop water loss. Manual M36 includes a chapter that advises small systems on obtaining financial and technical resources.

Water Conservation for Small and Medium-Sized Utilities (by Deborah Green and William Maddaus). Written for utilities serving fewer than 100,000 customers, this book provides practical advice and guidance for implementing a water conservation program. With a menu of possible conservation techniques and approaches to choose from, the book lets you customize a program for your utility's particular needs, issues, and customers, regardless of your geographic location.

Water Meters – Selection, Installation, Testing and Maintenance (AWWA Manual 6) (AWWA, 2009b). This is a complete practice manual about water meters for water service. It covers meter types, specifications, installation, testing, maintenance, and repair. The manual provides sample record-keeping forms and reviews the history of

water-use measurement and development of modern meters. It is heavily illustrated with photos, diagrams, and performance specs.

Drought Preparedness and Response (AWWA Manual 60). Preparing for drought and water shortages before they occur is the best defense. This manual will help water managers who are facing water shortages by illustrating how to employ tried-and-true strategies and tactics of drought mitigation, as well as new tools and methods.

All of the Water Conservation professionals employed by the four large utilities included in this report are happy to assist and network with other utilities in the state with water conservation. Additionally, the New Mexico Water Conservation Alliance is a non-profit group that meets regularly to help. Listed below are some of the best management practices used by the four utilities that smaller utilities may consider.

- Meter all water uses; upgrade to AMR or AMI meters
- Complete the AWWA Water Audit software annually
- Complete the OSE GPCD calculator annually
- Write a Water Conservation Plan
- Rebates and incentives for fixture/landscape replacement
- Customer water audits/inspections
- Irrigation audits
- Time of day watering restrictions
- Water by request in the hospitality industry (hotels and restaurants)
- Education and outreach for youth and adults
- Qualified Water Efficient Landscaper (QWEL) Certification Training
- Advertising campaigns and newsletters
- Leak detection of the transmission water lines