

City-by-City Analysis: Summary of Systems and 2001 Programs and Policies

In this appendix, we present information on programs and policies adopted by 13 water providers in our region. Western Resource Advocates collected this information from several sources, including water provider documents, reports, and websites, as well as telephone, email, and written correspondence from water provider representatives in conjunction with the Smart Water survey. To the best of our knowledge, this information is accurate.

At various points during the data gathering and report writing phases of the project, we attempted to check the accuracy of this information with the participating water providers. Most water providers responded with relatively thorough accuracy-check comments. However, three providers did not reply to repeated contact attempts to verify the reported information (City of Albuquerque Public Works Department, Centennial Water and Sanitation District, and Taylorsville-Bennion Improvement District). If an inaccuracy is found, we would appreciate being informed.

With few exceptions, the program and policy descriptions in this appendix do not provide information on program/policy

effectiveness, participation, and/or enforcement. In other words, just because a city has a diverse array of conservation programs and policies listed in Appendix B, does not necessarily mean that these programs and policies are effectively implemented or followed. The limited responses from many of the Smart Water survey participants did not provide enough data to draw such conclusions.



Appendix B

Albuquerque

Albuquerque, New Mexico

Utility Name:

City of Albuquerque Public Works Department

2001 Service Area Population:	482,577
2001 Total Retail Water Sold:	31,693 Million Gallons
2001 Total Water Utility Budget:	n/a
2001 Total Water Utility Employees:	n/a
Service Area:	187 sq. miles

Water Supply Sources and System Overview

From the 1950's until 1997, when Albuquerque's new Water Resources Strategy was adopted, the City of Albuquerque had a single water supply — pumping water from the Middle Rio Grande Aquifer. Historically, the City has been 100 percent dependent on this groundwater source. Significant declines in the water table resulted from years of pumping (over 150 foot drops in some areas). Recent estimates indicate that only about 50 percent of the water that Albuquerque pumps from the aquifer is replenished by natural groundwater recharge processes. This discharge/recharge imbalance has led to the “mining” of the Middle Rio Grande Aquifer, which is triggering land subsidence and damaging the local and regional surface/ground hydrology. The City's adopted Water Resources Strategy was developed to remedy this unsustainable water supply problem.

The Strategy's key component involves the use of surface water from the San Juan-Chama Diversion Project (delivered via the Rio Grande). Once the San Juan-Chama water is delivered, the Strategy names the Middle Rio Grande Aquifer as a drought reserve source. The Strategy also calls for significant water conservation programs and policies (with demand reduction targets), two water reuse/recycling projects, a shallow groundwater irrigation project,

and aquifer storage/recovery (ASR) technology once the planned water purification plant is in service. The ASR effort would enable Albuquerque to draw more river water during wet periods, purify it, and store it in the Aquifer until the groundwater is once again needed as an emergency drought reserve. The Aquifer that now supplies all of Albuquerque's water will be the only secure and available source of water during a severe drought. Therefore, the City intends to significantly reduce its groundwater pumping in order to allow the Middle Rio Grande Aquifer to replenish itself over time.

In summary, the adopted Water Resources Strategy highlights the following water supply objectives:

- Reduce pumping from Aquifer to less than 50,000 acre-feet per year (currently 110,000 acre-feet).
- Draw 94,000 acre-feet from the San Juan-Chama Diversion Project for the consumptive use of 47,000 acre-feet of San Juan-Chama water (used to extinction), and the non-consumptive use of the remaining 47,000 acre-feet of native Rio Grande water (return flows to Rio Grande River).
- Activate two water reuse projects. The North I-25 Reuse Corridor Project will provide 3,900 acre-feet of irrigation and industrial water (for parks, factories, schools, and golf courses). The Southside Recycling Project will provide 3,000 acre-feet of reclaimed water for similar uses.

Appendix B Albuquerque

- Experiment with aquifer storage/recovery technology that would inject treated San Juan-Chama water into the Aquifer, to serve as a drought reserve. Full implementation will be dependent on test results and State regulatory clearance.
- Establish agreements with the Middle Rio Grande Conservancy District to allow up to 900 acre-feet of easily replenished shallow groundwater to be used as raw urban irrigation water.
- Reduce system water demand via aggressive water conservation programs/policies.

2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the City of Albuquerque Public Works Department applied the water use efficiency measures and programs summarized below.

Building Codes:

To maintain consistency with the 1992 U.S. Energy Policy Act (EPAAct), the City of Albuquerque updated its Plumbing Code in 1992 to require water efficient fixtures and appliances in new development (e.g., showerheads, faucets, and toilets).

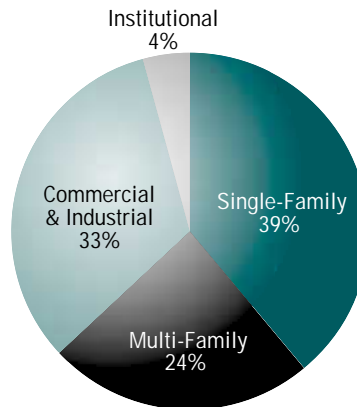
Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

See Indoor Water Use Audit Program section.

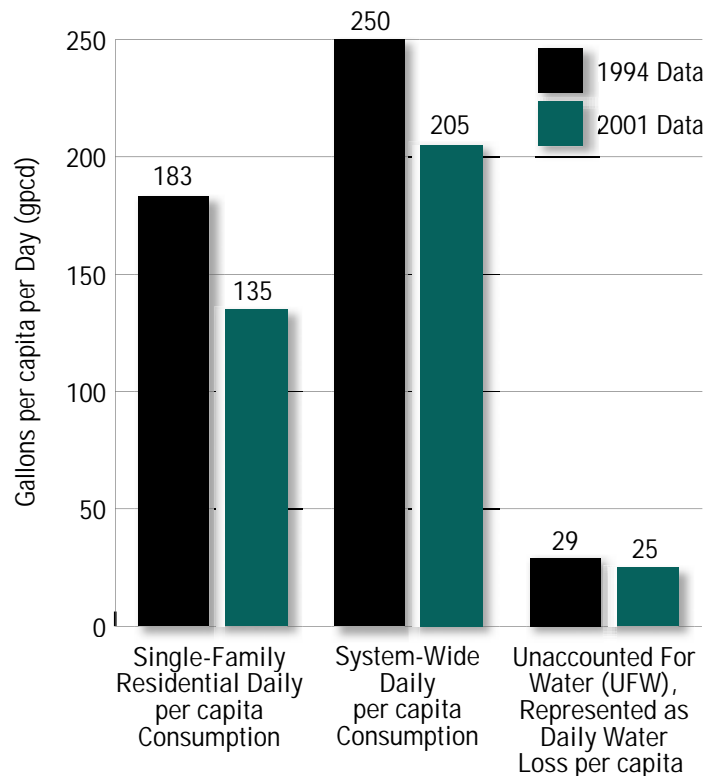
Toilet Rebate Program:

As part of the Albuquerque's Long-Term Water Conservation Strategy, the Public Works Department instituted an ultra-low-flow (ULF) toilet rebate program in 1995. The program remains in place

2001 Albuquerque Water Sales, by Sector



Albuquerque: Changes in Water Use Indicators from 1994 to 2001



today, with a residential toilet rebate of \$125 for the first replaced toilet (\$75 for the second, and \$50 for each toilet thereafter). A commercial toilet rebate of \$90 per toilet is also offered. In 2001, 3,420 toilets were converted to ULF toilets via this program. Since its inception, this toilet

Appendix B

Albuquerque

rebate program accounts for approximately 44,000 converted toilets to date.

Clothes Washer Rebate Program:

In late 1999, Albuquerque initiated a high-efficiency clothes washer rebate program. The program remains in place today, with a \$100 rebate credit per account for the purchase of a front-loading, high efficiency clothes washer from a participating retailer. In 2001, 1,168 clothes washers were converted. Since October 1999, roughly 4,100 clothes washers have been converted to date.

Xeriscape/Landscape Rebate Program:

In September 1996, the City of Albuquerque instituted a Xeriscape rebate program. The program remains in place today, with a \$0.40 per square foot replacement rebate for landscapes converted from turf to Xeriscape. Residential customers can be credited up to \$800 per account, while commercial customers can be credited up to \$5,000 per account. In 2001, 286 landscapes were converted. Since its inception, the program has yielded over 1,800,000 square feet (41.3 acres) of converted landscapes for 1,400 customer accounts.

Xeriscape Demonstration Garden:

The City of Albuquerque did not offer a Xeriscape demonstration garden for public viewing as of 2001.

Water Conservation Education:

The City of Albuquerque's Water Conservation Office provides a wide variety of educational opportunities for the public via various media outlets. The Office's webpage provides extensive information sources such as indoor and outdoor water conservation tips, conservation program/policy summaries, contact information, demand reduction goals, and water use trends. The Office also provides numerous publications, videos, and brochures on water conserva-

tion, Xeriscaping, water supply information, and ecological issues. Items for all age groups are available. The City of Albuquerque also provides water customers with helpful information via water bills and bill stuffers.

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

As of 2001, Albuquerque did not offer an irrigation controller rebate program. Since 2001, the City has begun offering a \$10 rebate credit per account for the purchase of a multi-setting sprinkler timer so that different zones in the yard can be watered for differing amounts of time.

Landscaping Ordinances:

In the mid-1990s, the City of Albuquerque enacted the Water Conservation Landscaping and Water Waste Ordinance. This ordinance requires new private developments to limit landscaped areas of high-water-use plants (including turfgrass) to 20 percent of total landscaped area, or to develop an appropriate water use budget that limits landscape irrigation. If the water budget for a particular development is exceeded, the customer is penalized \$0.21 per every 100 cubic feet in excess of the allowed budget (administered on an annual basis). No high-water-use turf is to be planted in medians, on slopes steeper than 6:1, or in areas that are less than 10 feet in any dimension.

The ordinance also established planting requirements and watering limitations on all city-owned properties. No high-water-use plants are to be used for new City development except for parks and golf courses. City departments are charged the same penalty rate if their annual water budgets are exceeded. According to Albuquerque's water monitoring, single-family residential customers used 28 percent less water after the ordinance went into effect.

Water Use/Waste Ordinances (lawn watering restrictions, wastewater laws, etc.):

The City of Albuquerque's Water Conservation Landscaping and Water Waste Ordinance also restricts wasteful water use in the City. "Water Waste" is any water, other than natural precipitation, that flows or sprays into a public right-of-way, city storm drain, or adjacent private property. The ordinance also prohibits watering from 10 a.m. to 6 p.m., from April through September. The City employs three full-time water waste inspectors and two additional interns during the summer months. Their job is to ensure that all City water account holders are complying with the time of day watering restrictions and the fugitive water regulations. The inspectors are authorized to issue fines that appear on a customer's water bill for failure to observe those regulations. The fine schedule is as follows:

1st Violation	\$20
2nd Violation	\$50
3rd Violation	\$100
4th Violation	\$150
5th Violation	\$200
6th Violation	\$300
7th Violation	\$400
8th Violation	\$500
9th and all Subsequent Violations	\$1000 or \$500 and installation of a flow-restriction device

Indoor Water Use Audit Program:

The City of Albuquerque offers a Residential and Small Commercial Water Audit Program that provides residential and small commercial customers with a free audit of indoor and outdoor use. The audit process takes about an hour and identifies areas where the customer can save more water both indoors and outdoors, and provides free faucet aerators, low-flow showerheads, auto-shutoff hose nozzles, and toilet fill tube diverters (or

displacement devices). Indoor and outdoor leak detection is also an offered service. This program has been in effect since 1996.

Albuquerque's Large Commercial Water Audit Program provides waste efficiency advice and direction to commercial, industrial, and institutional (ICI) customers. In this free program, the auditor conducts an extensive inspection of all areas of the business and completes a report that goes to the customer and to the City of Albuquerque Water Conservation Office. The report identifies areas for water savings and calculates the cost for installing the water-saving devices and/or changing water-wasting practices, and then calculates the time it will take for those changes to pay for themselves through savings on the customer's water bill.

The Water Use Audit Program has sponsored over 125 audits to ICI customers since it began in early 1999. Actual post-audit savings are eight percent on average, with an estimated potential savings of 30 percent. Toilets and landscaping provide the largest potential savings; however, all possible water conservation measures and savings are listed in the report.

Irrigation Audit Program:

See Indoor Water Use Audit Program section.

Leak Detection and Repair:

See Indoor Water Use Audit Program section.

Other Demand-Side Programs

The City of Albuquerque's Large User Ordinance requires customers who use more than 50,000 gallons of water per day to develop a long-range conservation plan to reduce their use. The plans must include a maximum landscape watering limit of 35 inches per year. Converting to low-flow toilets and faucet aerators is also a plan requirement. Plans are reviewed and

Appendix B

Albuquerque

approved by the City of Albuquerque Water Conservation Office. This ordinance was enacted by the City in 1998. The status of enforcement and/or penalties for violating this ordinance is unclear.

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

As of 2001, no ASR projects were in place in the City of Albuquerque. However, Albuquerque's Water Resource Strategy calls for the experimentation and potential use of ASR technology as a way to replenish the Middle Rio Grande Aquifer with treated surface water from the San Juan-Chama Diversion Project. In turn, Albuquerque would use the Aquifer for drought reserve storage capacity. Full implementation of a city-wide ASR project would depend on test results and State regulatory approval.

Dry-Year Leasing (or similar transfers):

The City of Albuquerque has not pursued the dry-year leasing of agricultural water for urban use to date.

Effluent Management (Reclaimed/Reused Water, Recycled Water):

As of 2001, no water reuse/recycling projects were in place in the City of Albuquerque. However, the City's Water Resource Strategy highlights two water reuse/recycling projects for future use, one in the north part of Albuquerque and one in the south. As planned, the North I-25 Reuse Corridor Project will combine recycled wastewater from industrial uses with reclaimed river water to provide 3,900

acre-feet of irrigation and industrial water for parks, factories, schools, and golf courses in the northern parts of Albuquerque. The Southside Recycling Project will provide 3,000 acre-feet of reclaimed water from the Southside Reclamation Plant for industrial and urban irrigation uses.

System Integration (Cooperative supply/system projects):

The City's Water Resource Strategy highlights the importance of regional cooperation and planning, since many independent water districts in the Rio Grande Basin rely heavily on the Middle Rio Grande Aquifer. As an example of this cooperative effort, the Strategy calls for inter-agency agreements with the Middle Rio Grande Conservancy District to allow the use of a shallow groundwater irrigation project (for urban landscape irrigation). Up to 900 acre-feet of raw groundwater could be applied as urban irrigation water according to plans.



Boulder, Colorado

Utility Name:

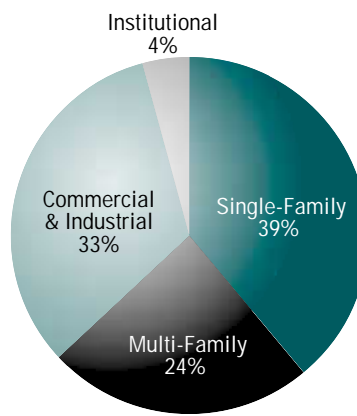
City of Boulder Water Utilities Department

2001 Service Area Population:	113,600
2001 Total Retail Water Sold:	6,511 Million Gallons
2001 Total Water Utility Budget:	\$63,973,955
2001 Total Water Utility Employees:	75
Service Area:	26 sq. miles

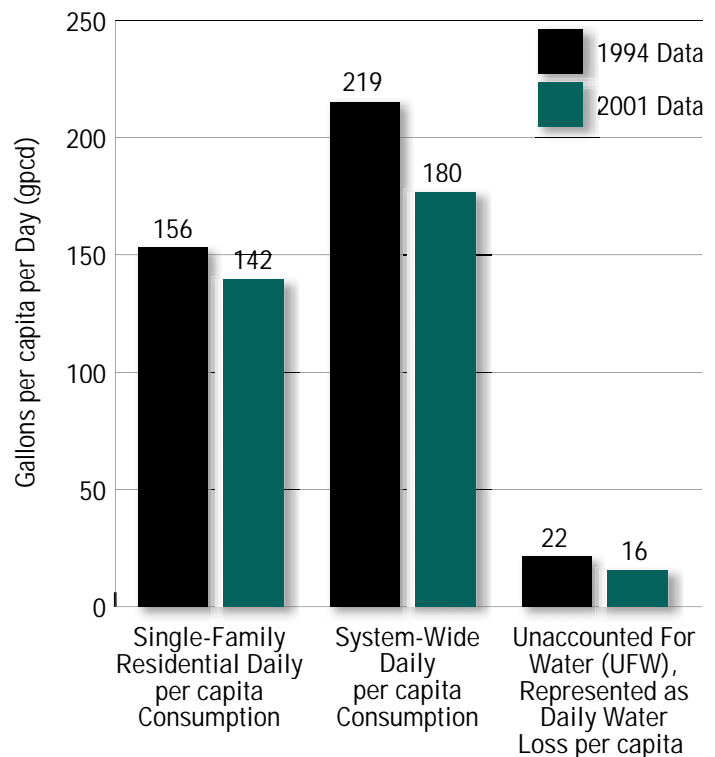
Water Supply Sources and System Overview

The City of Boulder's water supply originates from two distinct sources. Water from the Middle Fork of Boulder Creek (stored in Barker Reservoir) and the Silver Lake Watershed (North Fork of Boulder Creek) merges at the Betasso treatment facility to form one source of water. The second source of water supply originates in the Upper Colorado River. This water is diverted through the system of tunnels, canals, and reservoirs that constitutes the Windy Gap Project and the Colorado-Big Thompson Project (CBT). This diversion water is stored in Boulder Reservoir prior to treatment at the Boulder Reservoir Treatment Facility. In typical years, the flows from the Boulder Creek drainage supply 80 percent of the City's needs, with the remainder supplied by water from the CBT project.

2001 Boulder Water Sales, by Sector



Boulder: Changes in Water Use Indicators from 1994 to 2001



Appendix B

Boulder

2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the City of Boulder Water Utilities Department applied the water use efficiency measures and programs summarized below.

Building Codes:

Aside from meeting the requirements of the 1992 U.S. Energy Policy Act (EPA) and utilizing the Uniform Plumbing Code, the City of Boulder does not have separate building codes that require water efficient fixtures.

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

As of 2001, Boulder Water Utilities did not offer a fixture replacement program.

Toilet Rebate Program:

As of 2001, Boulder Water Utilities did not offer a toilet rebate program.

Clothes Washer Rebate Program:

Boulder Water Utilities has offered a rebate program of up to \$100 on the purchase of a high-efficiency clothes washer (meeting CEE standards) since 1997. The Utility decreased the amount offered to \$75 for purchases made in 2002. Customers are allowed one rebate per five-year period. The Department reports that over 300 clothes washer rebates are processed each year, on average.

Xeriscape/Landscape Rebate Program:

Boulder Water Utilities offers a rebate program for the installation of Buffalograss, Type 609 or Legacy. The rebate has not changed from 2000 to 2002, and it entails

a \$0.25 rebate per square foot of turf, with a maximum limit of \$250.

Xeriscape Demonstration Garden:

The City of Boulder Parks and Recreation Department manages a Xeriscape demonstration garden. This garden is not mentioned or referenced on the Boulder Water Utilities website. However, the Water Conservation Office (WCO) links on the Boulder Water Utilities website mentions many Xeriscaping education opportunities. The WCO organizes a few Xeriscape garden tours every summer, and representatives from the WCO office will provide free onsite landscaping consultation to any Boulder Water Utilities customer.

Water Conservation Education:

In addition to the Xeriscaping educational opportunities mentioned above, the Boulder Water Utilities website provides many other educational sections on water conservation. The Water Conservation Office was founded in 1992 in an effort to reduce water waste, especially during summer months. The Office sponsors many water education events throughout the year in an attempt to increase water use efficiency.

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

Boulder Water Utilities provides rebates for both soil moisture sensors and drip irrigation systems. The Department offers a rebate of up to \$150 on the purchase and installation of Watermark soil moisture sensors made by Irrrometer Co., and a rebate of 50 percent of the materials purchase price (not including installation) of any manufacturer's drip irrigation system.

Landscaping Ordinances:

As of 2001, the City of Boulder did not have any ordinances limiting what

type of landscape could be planted. As of 2003, the City of Boulder has an ordinance that limits the type of landscape that can be planted in non-residential areas.

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

The City of Boulder includes water conservation measures in its Water Utility Ordinance, Article 11-1-49. The ordinance allows the City Manager to impose restrictions, including limiting lawn irrigation to specific days and times of day, as well as excess use charges for those who exceed 15,000 gallons per day or over 60 percent of wintertime use.

Indoor Water Use Audit Program:

The City's Water Conservation Office offers free consultations to businesses and residences. However, the focus of the City's Water Conservation Office appears to be outdoor water use.

Irrigation Audit Program:

Boulder Water Utilities offers a rebate program for irrigation audits on lawns larger than 10,000 square feet. The Utility will rebate up to \$200 for an audit by an Irrigation Association-certified auditor. In addition, as mentioned above, the City's Water Conservation Office offers free consultations to businesses and residences.

Leak Detection and Repair:

Information not provided or available.

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

Boulder does not use groundwater sources, and hence does not have any conjunctive use programs.

Dry-Year Leasing (or similar transfers):

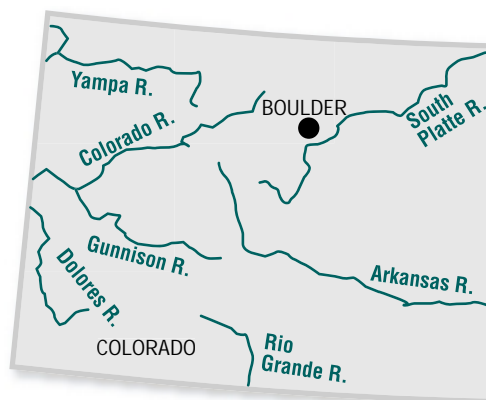
Information not provided or available.

Effluent Management (Reclaimed/Reused water, Recycled water):

A large portion of Boulder's water rights only allow the City to use the water once. Therefore, effluent reuse is not an alternate supply option at this time. Further information not provided or available.

System Integration (Cooperative supply/system projects):

Information not provided or available.



Appendix B

Denver

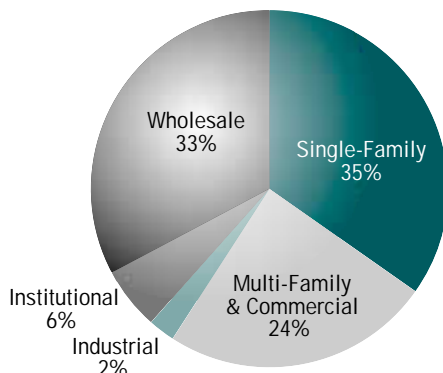
Denver, Colorado

Utility Name:

Denver Water

2001 Service Area Population:	1,081,000
2001 Total Retail Water Sold:	58,385 Million Gallons
2001 Total Water Utility Budget:	\$220,000,000
2001 Total Water Utility Employees:	1,026
Service Area:	328 sq. miles

2001 Denver Water Sales, by Sector



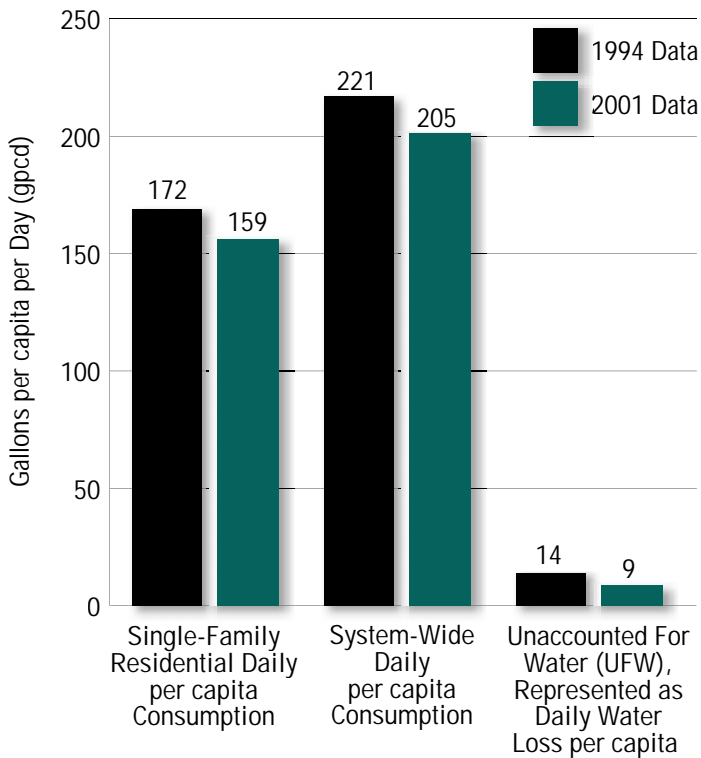
Water Supply Sources and System Overview

Denver Water collects water from three distinct sources: the South Platte Collection System, the Roberts Tunnel Collection System, and the Moffat Tunnel Collection System.

The South Platte Collection System gathers water from the mainstem of the South Platte River, Bear Creek, and Cherry Creek with a complex system of reservoirs, ditches and wells. The Roberts Tunnel Collection System draws water from the Blue River Watershed in Dillon Reservoir and delivers to the Denver area via the Roberts Tunnel. The Moffat Tunnel Collection System collects water from the Williams Fork River, the Fraser River, South Boulder Creek, and Ralston Creek for delivery to the Denver area.

All of this surface water is treated at one of three treatment plants before being distributed to customers. Additionally, Denver Water is currently constructing a water recycling facility, which will eventually deliver over 17,000 acre-feet of reclaimed water for nonpotable uses.

Denver: Changes in Water Use Indicators from 1994 to 2001



2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, Denver Water applied the water use efficiency measures and programs summarized below.

Building Codes:

In 1992, the City and County of Denver enacted a conservation plumbing code to coincide with the passing of the 1992 U.S. Energy Policy Act (EPAAct). However, as of 2001, Denver Water has held the position that mandatory replacement of inefficient household fixtures and appliances is not necessary. Instead, the organization has relied on the long term “natural replacement” of water appliances and fixtures over the planning horizon (based on manufacturing guidelines dictated by the EPAAct).

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

Denver Water began single-family residential retrofits in 1987 and multifamily residential retrofits in 1992. For a variety of reasons, Denver Water discontinued these programs in the early 1990's. No fixture replacement program was in place in 2001.

Toilet Rebate Program:

Denver Water instituted an Ultra-Low-Flow (ULF) toilet rebate program in 1990. The program was discontinued in the early 1990's when EPAAct took effect by requiring ULF toilets in all new construction. As of 2001, this program was no longer in place. However, in the fall of 2002, Denver Water re-instituted an ULF toilet rebate program in response to the 2002 drought conditions. This program expired in July 2003.

Clothes Washer Rebate Program:

As of 2001, Denver Water did not have a washer rebate program, but did distribute brochures about water efficient washers. Denver Water also provides a rebate for multi-family residential and commercial customers of \$7 per 1,000 gallons of water saved with efficient clothes washers. Historically, Denver Water has relied on the natural replacement of clothes washers over the planning horizon without the use of rebates. However, in the fall of 2002, Denver Water instituted a water-efficient clothes washer rebate program in response to the 2002 drought conditions. This program expired in July 2003.

Xeriscape/Landscape Rebate Program:

As of 2001, there was no Xeriscape/landscape rebate program in Denver. Denver Water primarily relies on educational programs for landscaping and Xeriscaping. An irrigation efficiency incentive program was initiated in 1998 to buy back savings from landscape irrigators. The program started slowly and has been increasing steadily since then. As of 2003, Denver Water is in the process of instituting a landscape rebate program.

Xeriscape Demonstration Garden:

Denver Water, the Associated Landscape Contractors of Colorado, and other green industry organizations developed the world's first Xeriscape demonstration garden in 1981. The original portion of the garden was constructed on 1/3 of an acre on the southwest side of Denver Water's Administration Building at a cost \$55,000 (60 percent of which came from private donations). Since the garden first opened to the public in 1982, it has nearly tripled in size to surround the Administration Building. Today there are more than 200 species of drought-tolerant plants on display, including trees, shrubs, perennials, ornamental grasses, and test plots of alternative turf grasses.

Appendix B

Denver

Water Conservation Education:

Denver Water operated an aggressive school education program from 1976 to 1994, when budget cuts ended the program. Subsequently, the organization began training employees to be volunteer speakers/presenters at Denver schools. Since 1999, Denver Water has contracted with the National Energy Foundation to present “Learning To Be Waterwise” in area schools. Denver Water also staffs conservation exhibits and lectures at various public events, neighborhood association meetings, and garden clubs. Denver Water also coordinates public awareness campaigns and advertisements with various news media outlets in the Denver area (*i.e.*, newspapers, local television, etc.).

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

Denver Water provides monetary incentives to companies with ways to improve landscape irrigation efficiency. Denver Water accepts proposals for irrigation products and/or services that save a minimum of five acre-feet (approximately 1,600,000 gallons) per year. This program has been in place since 1996. In addition and more recently, Denver Water pays businesses \$2,200 per acre-foot of proven water savings from irrigation efficiency upgrades or changes to landscape. In June 2002, the incentive price changed to \$4,500/acre-foot.

Landscaping Ordinances:

As of 2001, no such ordinances have been enacted in the City of Denver. However, since 2001, the City and County of Denver passed an ordinance that prohibits new developments from having restrictive covenants that require turf lawns and/or prohibit Xeriscape.

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

Denver Water implements a ten-acre irrigation rule, which was enacted in 1993. Under this rule, Water Board approval is required for the use of potable water to irrigate tracts of land ten acres or more. The rule also requires Board review and approval of landscaping design for any new development or renovation of ten acres or more. Approval is contingent on demonstrating that an alternative source to irrigation with potable water is not reasonably or practically available and that the irrigation is designed to maximize efficiency. Denver Water also has an Operating Rule (12.01) that prohibits water waste.

Indoor Water Use Audit Program:

Denver Water conducts audits of commercial and industrial properties to help find ways to save water.

Irrigation Audit Program:

Denver Water does implement an irrigation audit program. As of 2001, the audit program was voluntary for multi-family residential customers, and on request for industrial and commercial irrigators.

Leak Detection and Repair:

Denver Water states that “Leak detection and repair is an integral part of Denver Water’s efforts to save water.” According to Department documentation, technicians survey water conduits throughout the delivery system every three years, using acoustic instruments to detect leaks before they become too large. When leakage is detected, data on the pipe size, type and location is analyzed by computer to help pinpoint the exact location of the leak. Crews pinpoint and repair an average of 150-200 leaks per year.

Other:

Since 1996, commercial and industrial customers of Denver Water can receive up to \$20,000 for improving the efficiency of their processes through the “Commercial & Industrial Performance Contracting Program”. This program pays companies for improving water efficiency or replacing equipment. Projects earn \$7 per 1,000 gallons saved over a one-year period (based on a minimum savings requirement of 300,000 gallons per year). In June 2002, the incentive price was increased to \$4,500/acre-foot.

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

Although Denver Water does not currently utilize groundwater recharge for storage of excess supply in wet years, there is mention of such conjunctive uses as a possible opportunity to boost supply options in the future. For example, Denver Water’s participation in the South Metro Water Supply study (a multi-agency conjunctive use effort) is an indication of future efforts.

Dry-Year Leasing (or similar transfers):

As of 2001 Denver does not employ dry-year leasing of rights from other (agricultural) water users. The only apparent indication of this type of supply measure involves the right of the city to “call back” water rights to Big Lake Ditch (that Denver allows ranchers to use).

Effluent Management (Reclaimed/Reused water, Recycled water):

Denver Water is in the process of implementing a water reuse facility in the northeast sector of its service area. This plant will treat effluent from the Metro Wastewater Reclamation Plant. The resulting water will be suitable for irrigation and most industrial uses. When complete, the reuse project is expected to supply over 15,000 acre-feet of water per year. Some of Denver’s water supplies are not available for reuse because of Colorado water rights laws. The main sources of reusable water in Denver Water’s collection system are Roberts Tunnel, Meadow Creek System, and transferred agricultural rights.

System Integration (Cooperative supply/system projects):

In 1996, Denver Water began exploring system integration solutions to future water supply problems with many of the surrounding water providers. As of 2001, Denver Water has continued to coordinate water supply efforts with several other agencies and jurisdictions.



Appendix B

El Paso

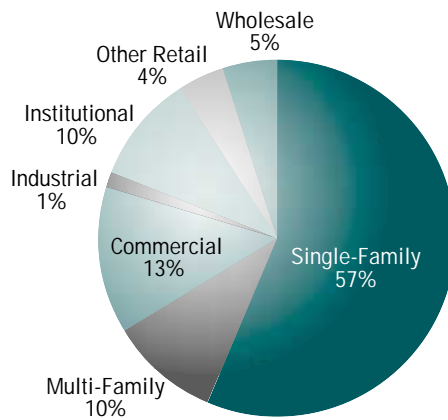
El Paso, Texas

Utility Name:

El Paso Water Utilities

2001 Service Area Population:	645,641
2001 Total Retail Water Sold:	33,639 Million Gallons
2001 Total Water Utility Budget:	\$165,890,000
2001 Total Water Utility Employees:	621
Service Area:	250 sq. miles

2001 El Paso Water Sales, by Sector

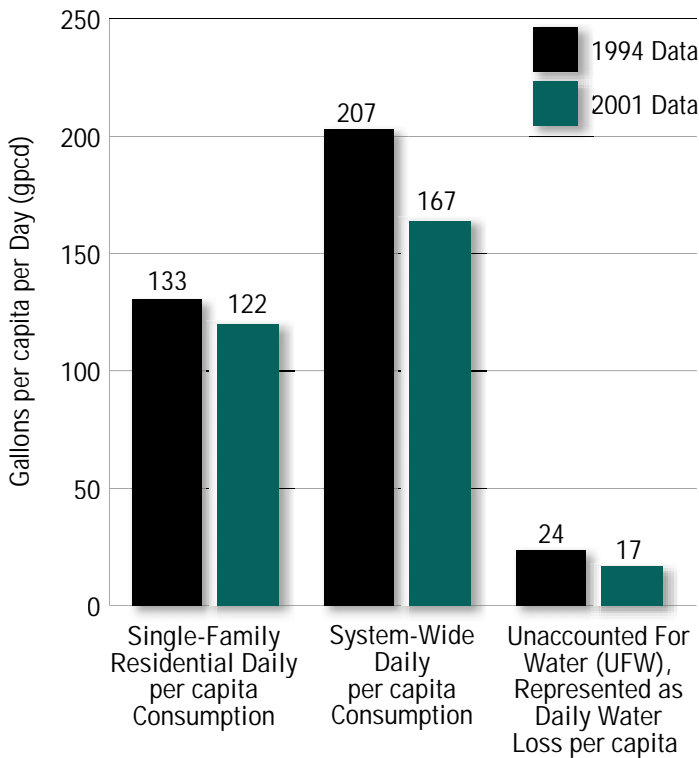


Water Supply Sources and System Overview

El Paso Water Utilities (EPWU) extracts its water from three sources: the Hueco aquifer, the Mesilla aquifer, and Rio Grande River surface water. In 2001, the EPWU pumped 50,438 acre-feet of water from the Hueco aquifer, or bolson. This quantity constituted 41 percent of El Paso's total annual demand. Concurrently, the EPWU pumped 23,823 acre-feet of water from the Mesilla bolson, which represented 20 percent of El Paso's 2001 water demand.

The groundwater sources are tapped by a number of wellfields. The groundwater wellfields consist of shallow, intermediate, and deep aquifer wells. The remainder of El Paso's 2001 supply was diverted from Rio Grande River sources (47,683 acre-feet, or 39 percent). The surface water treatment plants typically operate at full capacity for seven to eight months of the year. During the remaining four to five months of the year, surface water from the Rio Grande is usually unavailable, or the water quality is too poor to be used for the municipal water supply.

El Paso: Changes in Water Use Indicators from 1994 to 2001



2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the El Paso Water Utilities applied the water use efficiency measures and programs summarized below.

Building Codes:

In 1991, the City of El Paso amended its plumbing code to require the installation of Ultra-Low-Flow toilets (ULF at 1.6 gallons per flush), and water-efficient showerheads and faucets (2.5 gallons-per-minute) in all new construction and remodeling jobs. The plumbing code restricts the size of the bleed-off lines for air conditioner units to no bigger than 1/8" inside diameter. The code also requires swimming pools to be equipped with filtration or recycling systems and recommends that they be covered when not in use to reduce water loss through evaporation.

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

In 2000, the EPWU distributed over 160,000 low-flow showerheads to its customers. The Utility asserts that preliminary evaluations show a decrease of one billion gallons in wastewater sewer flows due to showerhead replacement program in the year that followed its inception (thus reducing water demand by a similar amount).

Toilet Rebate Program:

Since 1991, the EPWU has implemented an Ultra-Low-Flow toilet rebate program. EPWU customers can receive a 75 percent rebate (up to \$100 per toilet) for replacing an existing less-efficient toilet with a ULF toilet. Since the inception of

this program, 34,000 toilets have been replaced.

Clothes Washer Rebate Program:

In recent years, the EPWU instituted a water-efficient clothes washer rebate program. EPWU residential customers can receive a \$200 rebate by purchasing and installing a low-water use, horizontal-axis washing machine. This rebate is actually given through the El Paso Electric Company. EPWU records indicate that 544 machines have qualified for the rebate since the program's inception.

Xeriscape/Landscape Rebate Program:

The EPWU offers a landscape/turf-replacement rebate program to all pre-existing residential, commercial, and industrial EPWU customers (i.e., not applicable to new homes). The program provides an incentive to convert already-established turf areas to water-efficient landscape designs that incorporate drought-tolerant plants and water-efficient horticulture practices. Originally, the Utility paid \$0.50/square-foot of turf replaced with an approved landscape. In 2002, the EPWU raised the rebate amount to \$1.00/square-foot of replacement. By the end of 2002, EPWU asserts that this rebate program has involved 385 participants that removed about 29 acres of turfgrass, resulting in a water savings of approximately 23 million gallons. During the summer months of 2002, EPWU data indicates that residential customers were saving 150 to 180 gallons per day per account due to this turf replacement program (which was during the 2002 drought).

Xeriscape Demonstration Garden:

It does not appear that the EPWU manages or promotes a Xeriscape demonstration garden. However, the EPWU website does contain a list of water smart plants and local retailers who carry them.

Appendix B

El Paso

Appendix B

El Paso

Water Conservation Education:

The EPWU provides a variety of water conservation education opportunities to the public. These include monthly conservation messages on the back of bills, periodic bill stuffers, billboards, TV, radio, newspaper and displays at city-wide shows, fairs, and festivals as well as presentations to civic groups and other organizations.

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

As of 2001, the EPWU did not provide any rebate or retrofit programs for irrigation components.

Landscaping Ordinances:

The City of El Paso has two landscaping ordinances on the books; one addressing commercial developments and one for residential developments. The Commercial Landscape Ordinance sets minimum landscape standards for new commercial buildings, or renovation permits. This ordinance restricts narrow and sloped grassy areas and requires irrigation systems to be designed by State Licensed Irrigators. The Residential Landscape Ordinance prohibits turf on parkways, narrow or sloped areas of new construction (unless irrigated with a subsurface irrigation system).

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

In 1991, the City of El Paso enacted the Water Conservation Ordinance, which applies to any person who uses water from the El Paso Water Utilities supply system. This ordinance includes mandatory year-round limitations or restrictions on certain water use activities, as listed below:

- No residential landscape watering on Mondays.
- Customers can irrigate their landscapes three days per week, year-round as follows:

- EVEN numbered addresses are allowed to water Tues., Thurs., and Sat.
- ODD numbered addresses are allowed to water Wed., Fri., and Sun.
- Schools, parks, cemeteries, golf courses and industrial sites are allowed to water Mon., Wed., and Fri.
- From April 1 through September 30, outdoor watering is only permitted before 10:00 a.m. or after 6:00 p.m. on designated EVEN or ODD days.

- Car washing is only allowed if a bucket and/or a hand-held hose equipped with a positive shut-off nozzle is used. During a water emergency, washing vehicles will only be permitted at commercial establishments equipped with treatment and recycling systems.

- Any activity that causes water to spray or flow into the street or public right-of-way is prohibited and considered a violation. Violations are class C misdemeanors in nature and fines range from \$50 to \$500. Washing sidewalks, driveways, patios and other non-porous surfaces with a hose is prohibited except to eliminate dangerous conditions. After the inspector's notification, leaks must be repaired within five working days. Failure to do so might result in a citation.

In 1992, the Ordinance established a requirement for "Large Water Users" (averaging 10,000 gallons or more per day) to submit a water conservation plan containing a water use report, identified areas for reduction and the re-use of water, and specified conservation goals as a condition for new or continued service. In addition to the water conservation plan, the Public Service Board requires "Very Large Water Users" (averaging over 100,000 gallons/day) to submit a water use justification report and to re-use water as a condition

for new or expanded service.

Indoor Water Use Audit Program:

The EPWU provides free, individualized indoor and outdoor water use audits to all of its customers. In these audits, the EPWU water conservation technicians check toilets for leaks, review overall water use, and provide suggestions for improvements. In addition, in-ground irrigation systems are checked for efficiency and a computer-generated irrigation schedule is mailed to the customer.

Irrigation Audit Program:

See Indoor Water Use Audit Program above.

Leak Detection and Repair:

The EPWU has a two-person leak detection crew with leak detection equipment.

Other Rebate Programs:

Recently, the EPWU began offering a Refrigerated Air Conditioning Conversion Program to residential customers who install or convert to energy-efficient, central refrigerated air conditioning systems. Eligible customers receive a \$300 rebate from the Utilities. According to EPWU data, converting from an evaporative cooler to a refrigerated air system can save 17,000 gallons of water per year.

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

In 1985, the Fred Hervey Water Reclamation Plant became operational. The plant is essentially a combined water and wastewater treatment plant, which treats wastewater to drinking water quality stan-

dards. The treated effluent replenishes the Hueco Bolson through a series of ASR injection wells. In 2001, 735.8 million gallons were injected into the Hueco Bolson. There are also plans for similar conjunctive uses in the future. With the majority of El Paso's water supply being generated from groundwater sources, the water supply system certainly lends itself to potential conjunctive uses in wet years. Also see Supplemental Supply Plans below.

Dry-Year Leasing (or similar transfers):

Dry-year leasing water transfers have not been used by the EPWU to date. However, the City has acquired two large underground water supplies from ranches to use as future contingency sources. Also see Supplemental Supply Plans below.

Effluent Management (Reclaimed/Reused water, Recycled water):

The EPWU has been delivering reclaimed water to the El Paso customers since 1963. The EPWU is considered a pioneer in water reclamation and has attained international recognition for its extensive use of recycled water. The current reclaimed water system primarily applies to industrial use and landscape irrigation. Wastewater from within the EPWU collection area is collected and treated at one of EPWU's four Wastewater Reclamation Plants using advanced or tertiary treatment. The result is a high water quality that has earned the EPWU the reputation as operating the first wastewater treatment plant in the world to meet Drinking Water Standards for its reclaimed water.

The other three treatment plants meet the highest possible quality rating of Type I reclaimed water as described in Texas State regulations and monitored by the Texas Natural Resource Conservation Commission (TNRCC). The EPWU currently supplies the El Paso Electric Company,

Appendix B

El Paso

Painted Dunes Golf Course, Ascarate Golf Course and the Bowen Ranch with over two million gallons per day of reclaimed water. Also see Supplemental Supply Plans below.

Supplemental Supply Plans

The following quotations are excerpts from the EPWU website. The plan references in these excerpts highlight the importance of using multiple efficient supply options.

“The City of El Paso and the EPCWID on April 17, 1989, signed a Memorandum of Understanding to work together on a long-range Water Resource Management Plan (Plan) for the El Paso area. Boyle Engineering Corp., which prepared the Plan, concluded, what previously had been ascertained by other investigators, that the Hueco bolson would be exhausted of all fresh waters which economically could be retrieved by approximately the year 2025, causing massive water supply shortages to the El Paso area. This is further verified by the new U.S. Geological Survey ground water model.”

“To avoid such a catastrophe the Plan proposed a new strategy for meeting El Paso’s water demand of 294,700 acre-feet/year by the year 2040. The components of the Plan are shown in the figure entitled El Paso Projected Source of Supply. The first component of El Paso’s future water supply is water conservation. The second component is water reuse. El Paso is presently, or is planning to utilize, at least a portion of wastewater effluent from its three waste water treatment

plants and the Fred Hervey Water Reclamation Plant. The third component is increased use of surface water coupled with aquifer storage and recovery in the Hueco Bolson. During wet years of high flow in the Rio Grande, additional raw surface water would be treated and recharged to the Hueco Bolson. The Hueco thereby would serve as an underground reservoir to be utilized for water supply during dry years of reduced flow in the Rio Grande. The desalination of brackish ground water is the fourth component. The fifth component is groundwater pumped from the Mesilla Bolson. Withdrawals from the Mesilla are expected to increase somewhat over the next decade and remain constant thereafter.”

“The El Paso Water Utilities continues to evaluate available water supply sources. It has acquired two ranches in West Texas, the Antelope Valley Ranch and the Wild Horse Valley Ranch, both having significant amounts of ground water in storage. These ranches are being held as a contingency to assure El Paso’s future water supply.”



Grand Junction, Colorado

Utility Name:

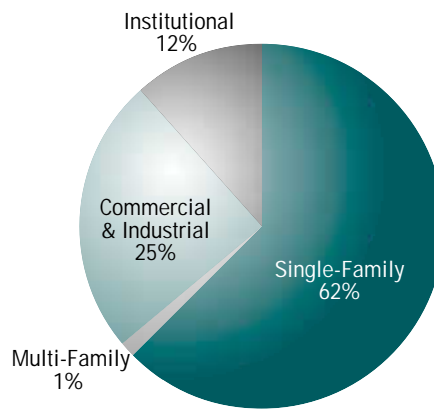
City of Grand Junction Water Utilities Department

2001 Service Area Population:	25,545
2001 Total Retail Water Sold:	1,897 Million Gallons
2001 Total Water Utility Budget:	\$3,993,007
2001 Total Water Utility Employees:	25
Service Area:	10 sq. miles

Water Supply Sources and System Overview

According to the Department's website, the City of Grand Junction provides water for its customers by maintaining and operating "the reservoirs on Grand Mesa, the Juniata and Purdy Mesa reservoirs, two twenty-mile long raw water flowlines, intake and diversion structures on streams and ditches in three drainage basins."

2001 Grand Junction Water Sales, by Sector



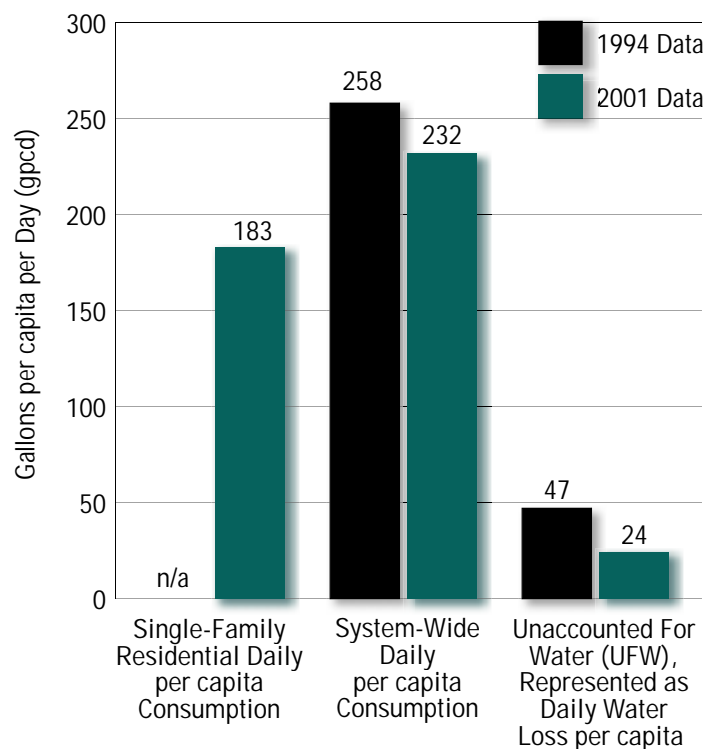
2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the City of Grand Junction Water Utilities Department applied the water use efficiency measures and programs summarized below.

Building Codes:

As of 1996, Mesa County (which includes the City of Grand Junction within its Uniform Building Code jurisdiction) did have a plumbing code that requires all new buildings to have moderate water-saving devices. As per code, showerheads must have a maximum rating of 3.0 gallons per minute, toilets must have a maximum rating of 3.5 gallons per flush cycle,

Grand Junction: Changes in Water Use Indicators from 1994 to 2001



Note: 1994 SFR consumption data not available

Appendix B

Grand Junction

and faucets must have a maximum rating of 2.75 gallons per minute.

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

The City of Grand Junction sponsored a residential retrofit pilot program in 1991 and 1992, which outfitted 100 residents with efficient showerheads, toilets, and faucets. The project demonstrated that water savings were achieved, but it appears that the program was not continued.

Toilet Rebate Program:

The City of Grand Junction did not offer a toilet rebate program, as of 2001.

Clothes Washer Rebate Program:

The City of Grand Junction did not offer a clothes washer rebate program, as of 2001.

Xeriscape/Landscape Rebate Program:

The City of Grand Junction did not offer a Xeriscape/landscape rebate program, as of 2001.

Xeriscape Demonstration Garden:

The Grand Junction Water Utilities Department indicates that several private Xeriscape demonstration gardens are available for viewing throughout the valley. The City is planning its own demonstration garden at the new City Hall in 2004 with the cooperation of the Parks Department.

Water Conservation Education:

The City of Grand Junction sends out bimonthly newsletters to all citizens, which can include information on the city's water resources and conservation issues. Additionally, the City offers tours of the water treatment plant with a conservation theme, and helps sponsor the regional Annual Children's Water Festival where

conservation issues are taught to fifth-grade students.

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

The City of Grand Junction did not offer an irrigation controller retrofit or rebate program, as of 2001.

Landscaping Ordinances:

No water-efficient, or Xeriscape, landscaping ordinance was in place as of 2001. As of 2003, the City's landscaping ordinance is under review. The City is considering relaxing the ordinance so that it requires less water-intensive plantings in new developments. The City has received numerous complaints from developers and the public about the code requiring too many water-intensive plantings.

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

The City of Grand Junction has had a water waste ordinance on the books since the 1970's.

Indoor Water Use Audit Program:

The Grand Junction Water Utilities Department has offered voluntary indoor water use audit services since 1996. However, according to Department officials, customer response and involvement has been minimal.

Irrigation Audit Program:

The Grand Junction Water Utilities Department did not offer an irrigation audit program in 2001 or prior. However, as of 2003, the City has developed an outdoor water use audit program in conjunction with an area master gardener program. Customers pay a minimal charge to cover travel costs for master gardener's site visit.

Leak Detection and Repair:

The City of Grand Junction employs a full-time leak and maintenance crew that responds to leaks and performs leak detection operations. The crew's tasks include pressure drop surveys, use of geophones, and the investigation of dirty water complaints.

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

The City of Grand Junction Water Utilities Department does not implement groundwater recharge in its water system.

Dry-Year Leasing (or similar transfers):

It does not appear that the Department is pursuing dry-year leasing as a supply option. The City of Grand Junction typically has sufficient water resources in times of drought, which makes dry-year leasing unlikely. However, the City is planning on decreasing the amount of its water that it sells to agricultural users over the next 50 years to support the growing municipal demand.

Effluent Management (Reclaimed/Reused water, Recycled water):

Grand Junction does not implement an effluent management system to reuse or recycle water back into the system. However, treated wastewater is reused at the treatment facility for process water and for irrigation.

System Integration (Cooperative supply/system projects):

The City of Grand Junction has integrated its system with the nearby Clifton Water District and Ute Water Conservancy District. These three water providers interconnected their systems to maximize efficiency in response to the drought of 1977.



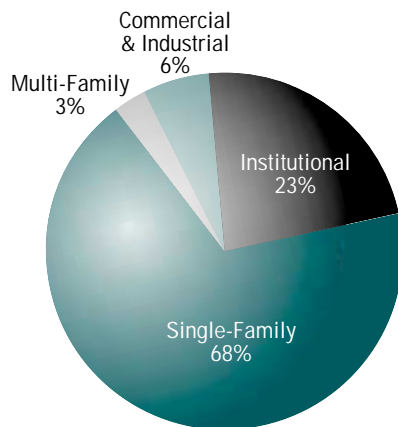
Appendix B

Highlands Ranch

Highlands Ranch, Colorado

Utility Name:	
Centennial Water & Sanitation District	
2001 Service Area Population:	80,000
2001 Total Retail Water Sold:	5,336 Million Gallons
2001 Total Water Utility Budget:	\$48,566,183
2001 Total Water Utility Employees:	60
Service Area:	20 sq. miles

2001 Highlands Ranch (Centennial W&SD) Water Sales, by Sector



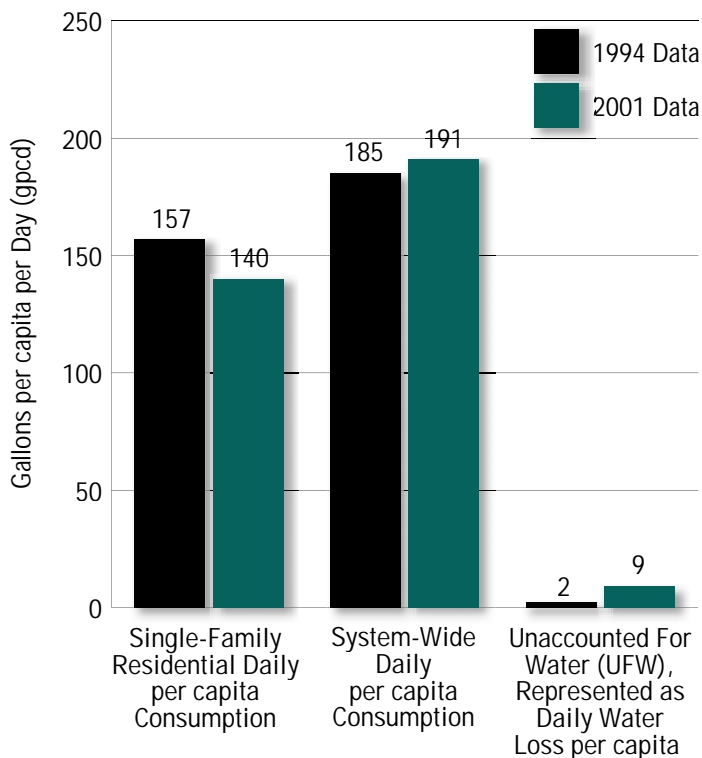
Water Supply Sources and System Overview

Centennial Water and Sanitation District's water supply is drawn from the South Platte River and groundwater aquifers located beneath Highlands Ranch. Raw water from both sources is stored in McLellan Reservoir and eventually treated at the Joseph Blake Water Treatment Plant. The District possesses groundwater rights for 17,000 acre-feet of water per year and surface water rights for 10,000 acre-feet per year. The District has historically relied upon its groundwater sources, but has made a large effort in the past decade to decrease dependency on the groundwater sources. In 1997, the entire quantity of delivered water originated from the District's South Platte River surface supply sources.

With growth continuing in Highlands Ranch, the Centennial Water and Sanitation District has chosen to implement a supply plan that balances the use of both surface and groundwater sources. The District aims to use its surface water rights as its primary source, with the groundwater supply serving as a secondary source as well as an emergency dry-year source. The District estimates that a built-out Highlands Ranch will generate a water demand of roughly 22,500 acre-feet per year. By this point in time, up to 7,000 acre-feet of groundwater may be produced per year.

In addition, since 1992, Centennial Water and Sanitation District has imple-

Highlands Ranch: Changes in Water Use Indicators from 1994 to 2001



mented a groundwater recharge project that replenishes the groundwater aquifers with treated surface water during wet years. From 1992 to 2001, the District injected 5,963 acre-feet of treated water into the aquifer. In 1997, roughly 1,200 acre-feet of water were pumped into the aquifer. The District aims to achieve a groundwater recharge capacity of approximately 3,000 acre-feet in one year. The actual quantity of groundwater recharge in a given year is dependent on surface supply availability and other operational attributes.

2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the Centennial Water and Sanitation District applied the water use efficiency measures and programs summarized below.

Building Codes:

Plumbing codes that require the installation of water-efficient fixtures in new homes (low-flow showerheads and faucets, and ULF toilets) are in place. This coincides with the requirements of the 1992 U.S. Energy Policy Act (EPA) and the Uniform Plumbing Code.

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

There is no indication that the Centennial Water and Sanitation District implemented a fixture replacement program in 2001. The District did not provide sufficient information.

Toilet Rebate Program:

There is no indication that the District implemented a toilet rebate program in 2001. The District did not provide sufficient information.

Clothes Washer Rebate Program:

There is no indication that the District implemented a clothes washer rebate program in 2001. The District did not provide sufficient information.

Xeriscape/Landscape Rebate Program:

There is no indication that the District implemented a Xeriscape/landscape rebate program in 2001. The District did not provide sufficient information.

Xeriscape Demonstration Garden:

While Centennial does not operate/manage its own Xeriscape demonstration garden, the District does advertise the nearby Denver Xeriscape demonstration garden. The Centennial website also offers educational information related to Xeriscaping.

Water Conservation Education:

The Centennial Water and Sanitation District website contains a tutorial on Xeriscaping. The District also distributes educational brochures on Xeriscaping and other conservation methods to its customers.

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

There is no indication that the District implemented an irrigation timer or rain sensor retrofit or rebate program in 2001. The District did not provide sufficient information.

Landscaping Ordinances:

The Centennial Water and Sanitation District website indicates that Highlands Ranch does not have ordinances requiring turf lawns. However, there is no mention of a specific ordinance limiting the use of turf or other water-intensive landscaping options.

Appendix B

Highlands Ranch

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

There is no indication that the District or Highlands Ranch had water waste ordinances in effect during non-drought periods, in 2001. The District did not provide sufficient information.

Indoor Water Use Audit Program:

A "System-wide water audit" program is mentioned on the District website. However, the District did not provide sufficient information.

Irrigation Audit Program:

A "System-wide water audit" program is mentioned on the Centennial Water and Sanitation District website. However, the District did not provide sufficient information.

Leak Detection and Repair:

Centennial tests all valves and hydrants every year, and has equipment to locate leaks if they are suspected. System leaks are repaired accordingly.

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

The Centennial Water and Sanitation District prides itself on its progressive conjunctive use operation, also known as Aquifer Storage and Recovery (ASR). The District operates the oldest groundwater recharge program in Colorado, which began operation in 1992. As of 2001, the District's groundwater recharge project included 13 deep bedrock aquifer wells that have been retrofitted for ASR operations, with four additional wells scheduled to be added. The District recharged nearly

6,000 acre-feet of water between 1992 and 2001. The projected annual capacity for the injection wells is targeted at 3,000 acre-feet per year. However, the actual amount of treated water injected into the aquifers in any given year is dependent on surface water yields from the South Platte River, day-to-day plant and well operations, and other operational factors.

Dry-Year Leasing (or similar transfers):

Dry-year leasing is not one of the supply-side solutions that the Centennial Water and Sanitation District was pursuing as of 2001.

Effluent Management (Reclaimed/ Reused water, Recycled water):

The District did not have any reclamation/reuse facilities or projects as of 2001.

System Integration (Cooperative supply/system projects):

The Centennial Water and Sanitation District is an active participant in the Douglas County Water Resource Authority (DCWRA), an organization comprised of 17 water districts that are, collectively and individually, working to meet long term water needs of the Douglas County area. Assessing the potential for larger-scale conjunctive use has been a recent effort of the Authority and many of its members.



Las Vegas, Nevada

Utility Name:

Las Vegas Valley Water District (LVVWD)

Member of Southern Nevada Water Authority (SNWA)

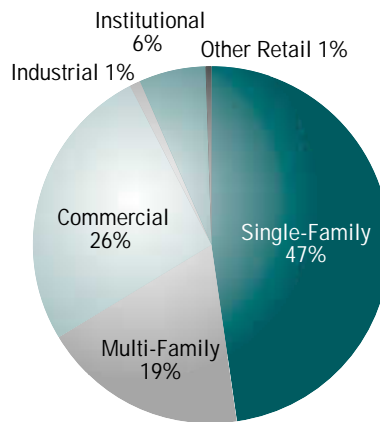
2001 Service Area Population:	1,021,475
2001 Total Retail Water Sold:	106,463 Million Gallons
2001 Total Water Utility Budget:	\$264,628,291
2001 Total Water Utility Employees:	839
Service Area:	307 sq. miles

Water Supply Sources and System Overview

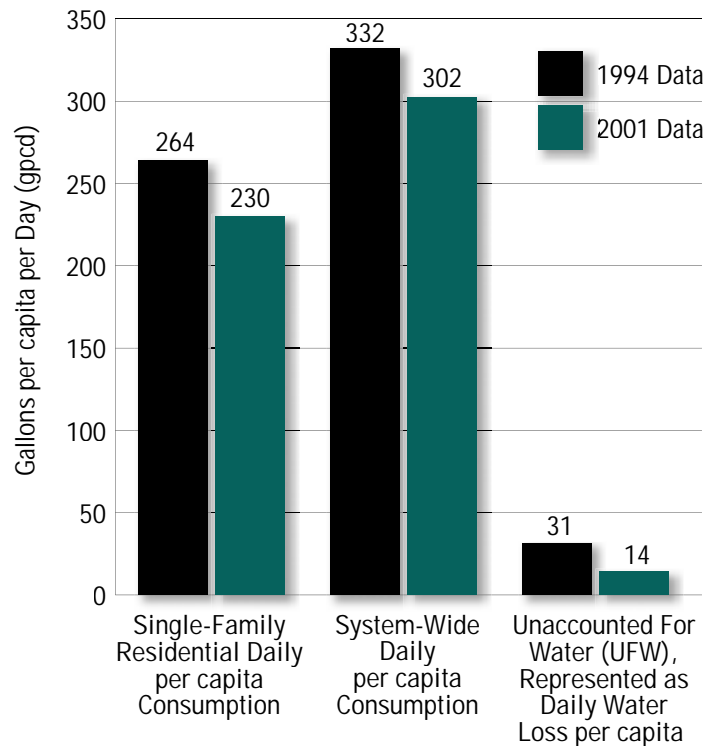
The Las Vegas Valley Water District (LVVWD) serves the City of Las Vegas and portions of Clark County (not including the City of North Las Vegas) with water that originates from groundwater aquifers and a diversion project that taps Lake Mead on the Colorado River. The District asserts that current consumption and population growth rates will necessitate the development of new water sources by 2010.

The LVVWD was instituted in 1947 by the State of Nevada legislature in order to minimize the decline of groundwater levels due to over-pumping of wells. At that time, the State of Nevada proposed to import Colorado River water from Lake Mead to the Las Vegas Valley to accommodate future growth. The first stage of this two-stage diversion project was eventually completed in 1971, titled the Southern Nevada Water System. This system treated Colorado River water and transmitted it to the City of Las Vegas. The system's first-stage capacity was 200 million gallons per day. In 1977, construction of the second stage began. Construction was complete in April 1982, increasing capacity to 400 million gallons per day. In 2000, the Lake Mead Intake #2 was opened to provide a critical backup to the older line.

2001 Las Vegas Water Sales, by Sector



Las Vegas: Changes in Water Use Indicators from 1994 to 2001



Appendix B

Las Vegas

In addition to the Colorado River water rights, the LVVWD operates 80 groundwater wells capable of producing 180 million gallons per day. The District also operates 22 groundwater recharge wells that are dedicated to recharging the groundwater basin with treated water during winter months.

The Southern Nevada Water Authority (SNWA) was formed in 1991 as the wholesale provider of water resources in the region. The SNWA serves to develop new water sources and better manage existing and future sources for Southern Nevada water providers and cities. These water providers include: Las Vegas Valley Water District, Big Bend Water District, the Cities of Boulder City, Henderson, Las Vegas (which provides wastewater services for the cities of Las Vegas and North Las Vegas), North Las Vegas (which provides water to its residents), and the Clark County Sanitation District. The SNWA also provides the majority of conservation programs that are available to LVVWD customers (as well as all customers of the above-listed water utilities). The SNWA is governed by a board of representatives that is made up of representatives from each of the above-mentioned cities and utility providers.

2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the Las Vegas Valley Water District and the Southern Nevada Water Authority applied the water use efficiency measures and programs summarized below. All known programs and policies offered to LVVWD customers are listed, regardless of enacting agency (SNWA or LVVWD).

Building Codes:

Every jurisdiction served by the SNWA has enacted the Uniform Plumbing Code, which requires the use of efficient fixtures in compliance with the 1992 National Energy Policy Act, in any new or refurbished building. The City of Las Vegas requires the installation of hot water recirculating pumps in homes permitted after October 1, 1997.

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

The SNWA operates an indoor fixture replacement program that offers free indoor retrofit kits. The retrofit kit is designed for homeowners with wasteful fixtures in older homes that are not required to upgrade to fixtures that are more efficient by law. Included in the kit are low-flow showerheads, toilet flappers and diverters, and aeration devices for bathroom and kitchen faucets.

Toilet Rebate Program:

Although the SNWA offers retrofit toilet parts (e.g., flappers and diverters), the Authority has not offered a toilet rebate program as of 2001.

Clothes Washer Rebate Program:

In recent years, the SNWA offered all customers \$50 or \$75 rebates for efficient washers purchased. This program was in effect in 2001, but has since been discontinued.

Xeriscape/Landscape Rebate Program:

The SNWA offers a rebate program for conversions of turf to water-efficient landscapes. In 2001, this program resulted in rebates for 2.3 million square feet of turf converted to water-efficient landscapes in both the residential and commercial sectors of the SNWA service area.

Xeriscape Demonstration Garden:

Several Xeriscape demonstration gardens exist within the SNWA jurisdiction, including the 2.5-acre Desert Demonstration Gardens, which offers free classes and free admission.

Water Conservation Education:

The SNWA educates the public on incentive programs and other water conservation measures through television, radio, and print advertisements. The SNWA also operates a water conservation hotline, a comprehensive website, and a youth education program for the Clark County School District.

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

The SNWA offers a rebate on water bills for any of its residential or commercial customers who replace inefficient irrigation clocks with more efficient models. The SNWA credits a residential customer's water bill up to \$45 for a 6 to 8-program clock and up to \$55 for a 9 to 12-station clock. This program does not appear to include the use of rain sensors.

Landscaping Ordinances:

The City of Las Vegas and Clark County both have very comprehensive and similar landscaping ordinances, which were enacted prior to 2001. The Clark County landscaping ordinance is found in Chapter 30, section 64.030, and the City of Las Vegas ordinance is in Chapter 29, section 22.030 of the City's Zoning Ordinance. To minimize water waste, these provisions include rules stating: no development chartered after 1992 is allowed to require residents to maintain turf instead of Xeriscape; areas of turf within non-residential and multi-family residential developments shall not exceed thirty percent of landscaped area; and turf cannot be grown near sidewalks and in certain types of development.

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

Cities under the SNWA umbrella have adopted ordinances to restrict watering during hot times of day, to limit amount of turf at public facilities and golf courses, and to assess fines for water waste. A provision limiting the types of irrigation allowed is included in the landscaping ordinances of both Clark County and the City of Las Vegas (mentioned in the Landscape Ordinances section above). Both ordinances require drip irrigation systems for non-turf applications and require the use of reclaimed waste water for golf course irrigation, if available. Both Clark County and the City of Las Vegas list these irrigation rules under subsection (f) of their respective landscaping ordinances.

Indoor Water Use Audit Program:

The SNWA does not offer onsite visits to its customers. Instead it offers a water audit kit that customers can implement themselves, and then report their findings to see if they apply for indoor rebates or retrofits. The kit includes a water-flow measuring bag for faucets and showerheads, and toilet leak detection tablets.

Irrigation Audit Program:

The SNWA offers free evaluations of customers' irrigation systems, which include suggesting areas of potential upgrades to save water and advice on how to set irrigation clocks.

Leak Detection and Repair:

The SNWA requires each water purveyor it provides water for (including Las Vegas Valley Water District) to complete distribution system water auditing every five years to find leaks in its distribution system. In addition, purveyors must advise customers on how to detect leaks on their own. However, the Las Vegas Valley Water District has determined that five-year com-

Appendix B

Las Vegas

prehensive water audits would not be cost-effective due to the small amount of Unaccounted For Water. Instead, the District investigates anomalies in demand and actively performs leak detection on a small-scale basis.

Other Demand Side Conservation Programs:

SNWA commercial customers who can demonstrate a savings of at least one million gallons of water annually can earn up to \$50,000 credit on their water bill.

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

The LVVWD uses groundwater recharge with 22 wells that pump treated Colorado River water into groundwater aquifers during low-use winter months (see water supply summary above). This conjunctive use is implemented every year, not only in wet years. Currently, this artificial recharge program recharges about 30,000 acre-feet per year. Future Las Vegas water plans will apply conjunctive use via the Arizona Water Banking Authority.

Dry-Year Leasing (or similar transfers):

According to the SNWA 2002 Water Resource Plan (March 2002), there are not enough Colorado River water rights used by agriculture in Nevada for the SNWA to pursue dry-year leasing options.

Effluent Management (Reclaimed/ Reused Water, Recycled Water):

Southern Nevada Water Authority directs its reclaimed and treated wastewater either to the Colorado River via the Las Vegas Wash for return-flow water right credits, or to landscape irrigation and

power plants in the Las Vegas area. The use of reclaimed water for irrigation and power plants in the Las Vegas area does not actually increase the amount of water that is available to Southern Nevada. As the amount of reclaimed water use increases in the Las Vegas area, the accumulated return-flow credits decrease, thus decreasing the amount of water it can draw from the Colorado River supply.

System Integration (Cooperative supply/system projects):

The entire Southern Nevada area has one integrated system of water supply under the SNWA. The umbrella agency manages water distribution and explores potential future sources and conservation measures for the entire area. Additionally, the SNWA has entered into an agreement with the Arizona Water Banking Authority, which banks Arizona's unused Colorado River water rights by pumping the excess water into groundwater aquifers to be sold to account holders in Arizona and neighboring states at a later date. Under the agreement, the AWBA will provide 1.2 million acre-feet of water credits for the SNWA, which will pay for all costs associated with acquiring, storing, and recovering the water.



Mesa, Arizona

Utility Name:

City of Mesa Utilities Department

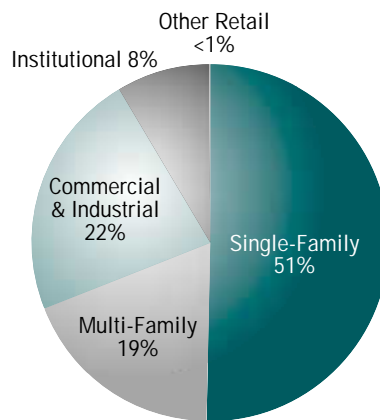
2001 Service Area Population:	440,000
2001 Total Retail Water Sold:	30,804 Million Gallons
2001 Total Water Utility Budget:	\$45,000,000
2001 Total Water Utility Employees:	114
Service Area:	122 sq. miles

Water Supply Sources and System Overview

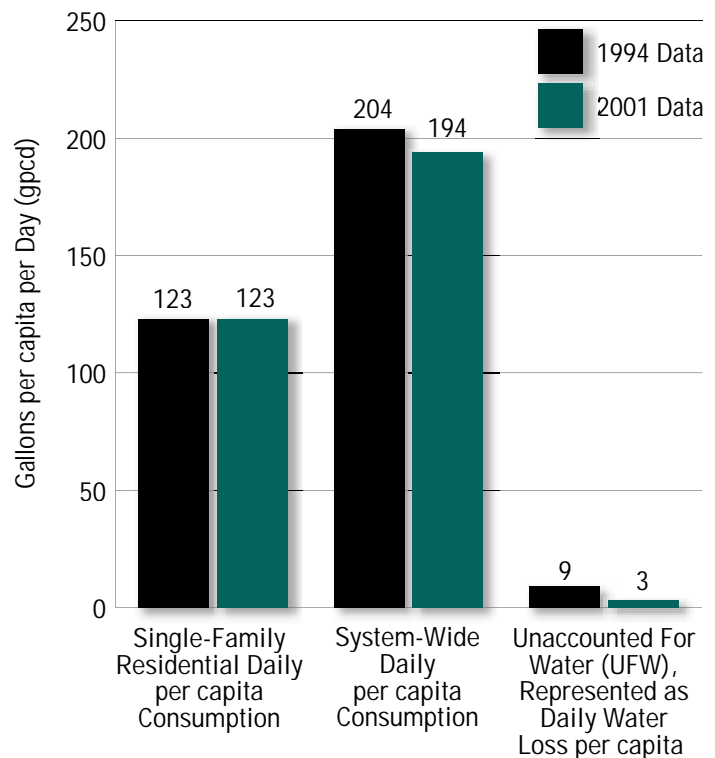
The majority of Mesa's water comes from the Salt River Project and the Central Arizona Project, with the remainder coming from various other surface and ground-water sources, as well as reclaimed water. The five primary sources are described as follows:

- Salt River Project (SRP) water. SRP is currently Mesa's largest water supplier providing Salt River and Verde River water to meet about one-half of Mesa's demands. Current demand for SRP water is approximately 56,000 acre-feet per year.
- Central Arizona Project (CAP) water. CAP is a Federal reclamation project authorized by Congress in 1968. Water is diverted from the Colorado River near Lake Havasu and flows through Yuma, Maricopa, Pinal, and Pima Counties to its terminus in Tucson. The open concrete-lined canal is expected to deliver an average of 1.2 million acre-feet annually over a period of 50 years. Mesa has a CAP contract for 36,388 acre-feet, almost 30 percent of the City's water supply. This water is used primarily in the eastern portion of Mesa's service area.
- Roosevelt Water Conservation District (RWCD) water. This water can only be used on RWCD

2001 Mesa Water Sales, by Sector



Mesa: Changes in Water Use Indicators from 1994 to 2001



Appendix B

Mesa

lands. Mesa has approximately 8,000 acres in the RWCD service area. In most years, Mesa is entitled to about 3,200 acre-feet of surface water from its lands within RWCD.

- **Reclaimed water.** Mesa currently produces approximately 40,000 acre-feet of reclaimed water every year. Mesa's direct uses for reclaimed water are limited to non-drinking water purposes such as irrigation and industrial uses. Reclaimed water can also be recharged artificially into the aquifer and recovered as groundwater for later use. By recharging this water to the aquifer, Long Term Storage Credits are created. Later, groundwater is pumped from a permitted recovery well, and the Long Term Storage Credits are recovered. Mesa has approximately 25,000 acre-feet of Long Term Storage Credits for reclaimed water. Mesa recently signed an agreement with the Gila River Indian Community through which Mesa ultimately will deliver 29,400 acre-feet per year of reclaimed water to the Gila River Indian Community and receive in exchange 23,530 acre-feet per year of CAP water. This agreement allows Mesa to exchange what is essentially a non-potable irrigation supply for a supply that can be used for domestic purposes.
- **Groundwater.** Groundwater use is subject to the Groundwater Management Act of 1980, which set a goal of balancing groundwater withdrawals and recharge in the Phoenix area by 2025. The Groundwater Management Act also set conservation requirements for Mesa and other Valley cities. It requires Mesa to prove that enough water will be available to serve projected growth for the next 100 years.

2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the City of Mesa Utilities Department applied the water use efficiency measures and programs summarized below.

Building Codes:

In addition to following the requirements of the 1992 U.S. Energy Policy Act (EPA Act), the City of Mesa also adopted a water-efficiency plumbing code in 1990, which applied to new construction and renovations. However, this ordinance was repealed in 1994 when the Arizona State Plumbing Regulation went into effect.

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

As of 2001, the City of Mesa Utilities Department did not offer a fixture replacement program.

Toilet Rebate Program:

As of 2001, the City of Mesa Utilities Department did not offer a toilet rebate program.

Clothes Washer Rebate Program:

As of 2001, the City of Mesa Utilities Department did not offer a clothes washer rebate program.

Xeriscape/Landscape Rebate Program:

The City of Mesa Utilities Department has had a landscape rebate program on the books since 1984, titled the Water Development Fee Rebate Program. This program applies to customers and developers who install low water-use landscapes. The intent of this program is to

encourage a permanent reduction in the amount of water used for landscaping purposes. A refund of up to 25 percent of the amount of the water development fee is given, depending on property type and landscaping design. Some of the interesting components and requirements of this program are as follows:

- An inorganic ground cover must be used for a minimum of 67 percent of the landscapable area of the property or development. Inorganic may include: gravel, decomposed granite, river rock, bark, kool-deck, etc.
- Drought-resistant shrubs and trees must be the predominant accent plants used.
- No fountains can exist unless they are of a “cascading, non-spray” design.
- No body of water can exist (including swimming pools) that has a surface area greater than 12,300 square feet, unless the body of water is located in a public recreation facility owned or operated by the federal, state or local government or treated effluent is the sole source used to fill and refill the body of water. The surface area of a pool or lake counts the same as grass in calculating ground cover percentages.
- No golf course or similar water-consuming recreational facility can be a part of the development, unless such facility uses no more than 4.8 acre-feet of water per acre per year or utilizes treated effluent for the sole source when available as determined by the City.
- In those projects where common area landscaping constitutes the majority (more than 50 percent) of the total landscapable area and is controlled by a homeowners association, the common area landscaping must meet program requirements before any individual property owners will be eligible for the program.

Xeriscape Demonstration Garden:

The City of Mesa manages a Xeriscape demonstration garden that is open to the public and advertised on their website. According to the City’s website: “The Xeriscape garden provides the public an opportunity to view attractive, practical and efficient Xeriscape designs free of charge. Working together, the City of Mesa, Mesa Community College (MCC) and the U. S. Bureau of Reclamation recently completed a series of enhancements to the garden including new plants, improved educational signage, an updated irrigation system and an improved self-guided tour feature.”

Water Conservation Education:

In recent years, the Mesa Water Utilities Department developed the “*Water – Use it Wisely*” campaign to increase awareness of water conservation and its importance. The campaign is now regional, being supported by 14 other cities and organizations. To complement this campaign, the Department offers a variety of free landscape classes on topics such as landscape watering, drip irrigation, and Xeriscape landscaping. A variety of free brochures and literature are also available on topics such as Xeriscape landscaping, efficient landscape watering, plants guides, and other conservation tips.

In addition, the Mesa Water Utilities Department has a strong partnership with the City of Mesa Public Schools. Water conservation has been part of the science curriculum in both second and fourth grades since 1986. The curriculum includes the science of water, water resources, and water conservation. A puppet show that reinforces the concepts taught in the science units, is available to the schools free of charge. This program reaches about 15,000 students every school year. A water conservation science unit is also available for the seventh grade students.

Appendix B

Mesa

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

As of 2001, the City of Mesa Utilities Department did not offer an irrigation timer or rain sensor rebate program.

Landscaping Ordinances:

Although a comprehensive mandatory landscaping ordinance does not exist in the City of Mesa, development guidelines recommend no more than 50 percent turf in new developments. These guidelines are apparently voluntary. However, the City has enacted an ordinance that restricts use of potable water in artificial lakes and turf-related facilities. Owners of such facilities must apply more efficient water sources for the turf or facilities, and must attain a permit by the City.

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

The City of Mesa does have a water waste ordinance on the books. The ordinance enables police enforcement for water users who allow water to flow on public streets. However, according to Department staff, enforcement of this ordinance typically results in warnings, not fines.

Indoor Water Use Audit Program:

The City of Mesa offers self-audit kits to residential customers upon request. The City also conducts site visits and prepares water budgets for both indoor and outdoor water use in multi-family residential communities.

Irrigation Audit Program:

See Indoor Water Use Audit Program section above.

Leak Detection and Repair:

All Mesa customers have a leak detection dial on their water meters, allowing self leak detection. However, as of 2001, the Department did not operate a system-wide leak detection/repair program.

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

Mesa implements an active groundwater recharge program that is associated with other Phoenix-area water districts, surrounding Indian communities, the SRP, and the Arizona Water Banking Authority. Mesa's recharged groundwater credits are stored for future use from a donor source per the Arizona Groundwater Management Act of 1980. According to the Water Resources Element Draft Plan, "The City owns approximately 24,000 acre-feet per year of recharge capacity at the Granite Reef Underground Storage Project (GRUSP), and has an additional 6,000 acre-feet per year capacity at the Northwest WRP Ponds. (Please refer to the Aquifer Storage and Recovery (ASR) and Conjunctive Use section listed under the City of Phoenix Water Services Department in this Appendix for more information on GRUSP). The City also has the ability to recharge into the RWCD and SRP groundwater savings facilities, yielding potentially tens of thousands of acre-feet of additional storage capacity." Interestingly, Mesa also receives recharge credits for water recharged incidentally (*i.e.*, from watering lawns or dust control). According to the Draft Plan, "Mesa is credited with approximately 4,800 acre-feet of incidental recharge each year."

The City of Mesa is also involved in other inter-governmental cooperative recharge efforts in the Phoenix metro area. The Agua Fria Linear Recharge Project is one example. For more information on this project, please refer to the Aquifer Storage and Recovery (ASR) and Conjunctive Use section listed under the City of Phoenix Water Services Department in this Appendix.

Dry-Year Leasing (or similar transfers):

The City of Mesa does not appear to be pursuing dry-year leasing programs based on the information on the City's website and other City documents. However, the City has purchased farmland for future use of the associated groundwater rights. Through this purchase, Mesa now owns approximately 28,000 acre-feet per year of groundwater rights in Pinal County. Mesa currently does not use this water source. The lands are currently leased to farmers, who apply the water rights to agricultural use and pay a groundwater tax directly to the Department of Water Resources.

Effluent Management (Reclaimed/Reused water, Recycled water):

Mesa operates a reclaimed water program. Reclaimed water is used for irrigation and industrial purposes and is exchanged for Gila River Indian Community CAP credits. It appears that most of Mesa's 40,000 acre-feet per year of reclaimed water is used in the Gila River Indian Community exchange (as described in the Water Supply Sources and System Overview section above).

System Integration (Cooperative supply/system projects):

The City of Mesa treats and "wheels" roughly 6,500 acre-feet per year of Central Arizona Project (CAP) water to the City of Chandler, the City of Apache Junction, and the Arizona Water Company. In this case, "wheeling" refers to the delivery of treated water to other water districts via Mesa's delivery system. In addition, the City of Mesa is in the process of building a new wastewater reclamation plant in partnership with the Town of Gilbert and the Town of Queen Creek. System integration efforts are also being implemented with the Gila River Indian Community. As

described in the Water Resource Element Draft Plan Goals Section, Mesa is interested in pursuing additional integration efforts, "[Mesa intends to] continue to explore and develop new and innovative ways to make better use of Mesa's water resources through exchanges, intergovernmental agreements, and other legal arrangements."

In addition, the City of Mesa is a member of the Sub-Regional Operating Group (SROG). The SROG is a group of municipal districts in the Phoenix metro area that collaborate on a variety of water supply projects and plans. Phoenix, Mesa, Tempe, Scottsdale, and Glendale are all members of the SROG. One recent SROG effort has been the Agua Fria Linear Recharge Project. The intent of this intergovernmental effort is to integrate systems in a way that distributes costs and benefits of alternative water supply projects across all participating districts.



Appendix B

Phoenix

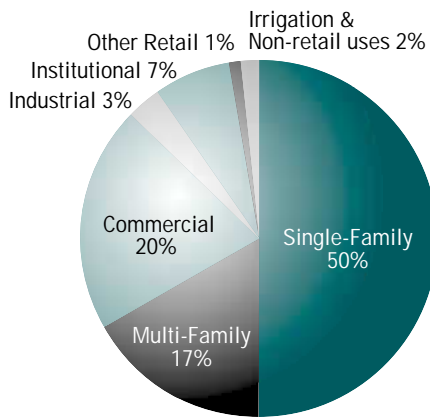
Phoenix, Arizona

Utility Name:

City of Phoenix Water Services Department

2001 Service Area Population:	1,284,000
2001 Total Retail Water Sold:	100,194 Million Gallons
2001 Total Water Utility Budget:	\$558,699,363
2001 Total Water Utility Employees:	1,206
Service Area:	514 sq. miles

2001 Phoenix Water Sales, by Sector

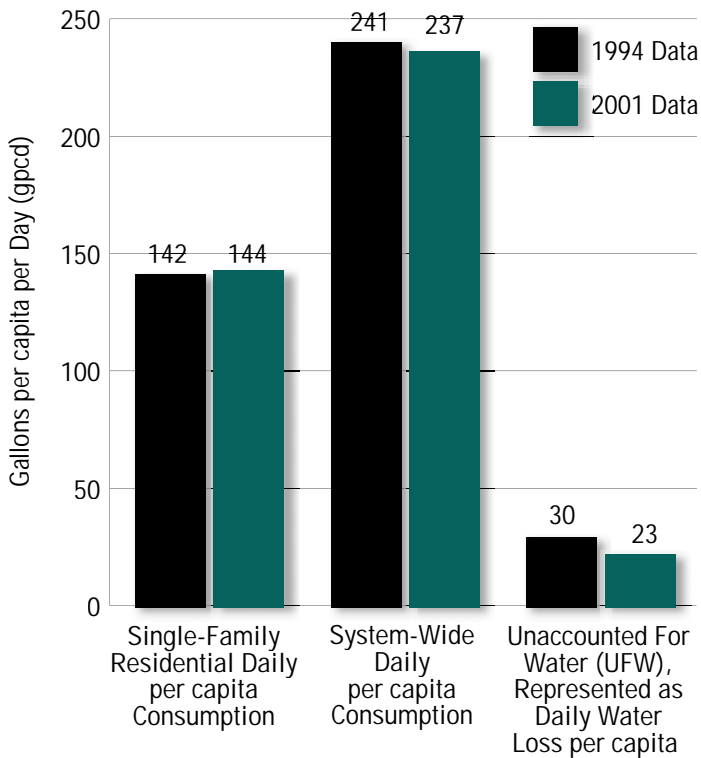


Water Supply Sources and System Overview

The majority of consumed water in Phoenix originates from surface water sources. The Salt River Project (SRP) provides water from reservoirs on the Salt River and Verde River and, to a much lesser extent, groundwater wells. Water provided by the SRP serves customers in the "On-Project Area," which is south of the Arizona Canal and was the original Phoenix area served by the SRP.

The Central Arizona Project (CAP) is a separate diversion project that diverts Colorado River water to "Off-Project Area" Phoenix customers. Off-Project Area customers also use water from water reclamation plants. All surface water is treated at one of five water treatment plants before distribution. Phoenix derives less than five percent of its water from groundwater wells. The city has made an effort to reduce the amount of water used from the wells so that it can be stored for future drought emergencies.

Phoenix: Changes in Water Use Indicators from 1994 to 2001



2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the City of Phoenix Water Services Department applied the water use efficiency measures and programs summarized below.

Building Codes:

In 1990, the City of Phoenix enacted a plumbing code that requires all new construction or renovation projects to install efficient plumbing fixtures. The code calls for “low consumption” toilets (1.6 gallon-per-flush toilets) and 3.0 gallon-per-minute showerheads as well as efficient faucet heads and urinals in both public and private buildings.

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

Phoenix has had a plumbing retrofit program in place since 1985, which provides eligible customers with low-flow showerheads, toilet tank water displacement devices, and faucet aerators free of charge. According to the City’s Drought Management Plan of April 2002, over 200,000 homes have participated in this program. In recent years, this program was replaced by a retrofit program that specifically targets low-income areas and provides efficiency devices and replacements for toilets, showerheads, faucets, and evaporative coolers.

Toilet Rebate Program:

As of 2001, the Phoenix Water Services Department did not offer a toilet rebate program. The City did not anticipate any economic advantage to providing a toilet rebate based on the City’s wastewater treatment and water supply capacities. Additionally, the City feels that the

1990 plumbing code requiring 1.6 gallons-per-flush toilets in all new construction, reconstruction, and renovation projects will lead to phase-out of the older and less efficient toilets.

Clothes Washer Rebate Program:

As of 2001, the City of Phoenix Water Services Department did not offer a clothes washer rebate.

Xeriscape/Landscape Rebate Program:

As of 2001, the City of Phoenix Water Services Department did not offer a landscape rebate program.

Xeriscape Demonstration Garden:

The City of Phoenix does not manage its own Xeriscape demonstration garden. However, through a long-term association, the City and the Desert Botanical Gardens jointly sponsor water conservation workshops. In addition, the City of Phoenix, the Arizona Department of Commerce, the SRP, and the Desert Botanical Gardens have teamed up to sponsor a water-efficient demonstration home at the Botanical Gardens site.

Water Conservation Education:

The Water Services Department is involved in several water conservation education programs, including education of children and adults. The education takes the form of classes and mailings that range from water resource issues to indoor and outdoor conservation measures. The City sponsors teacher training programs via Project Wet, a national program that promotes teacher education on water issues. In addition, the Department provides Phoenix schools and libraries with educational books and supplies on water conservation. The Department is also involved in many educational programs to promote Xeriscape, including classes for all customers and marketing programs directed at home builders.

Appendix B

Phoenix

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

As of 2001, the City of Phoenix Water Services Department did not offer an irrigation timer or rain sensor rebate program.

Landscaping Ordinances:

The City of Phoenix includes landscaping design standards in the development review sections of the City's Zoning Ordinance. These standards stipulate that no more than 50 percent of the landscaped area, or 10 percent of the net lot area, shall be planted in turf or other high water use plants (for all new development proposals). The City's Zoning Ordinance also requires that water features on non-residential properties be designed to minimize water loss by preventing leaks and recycling water. Additionally, the City regulates the amount of water allotted to facilities with landscapes of over ten acres of turf. Exceeding the allotments can result in water use surcharges.

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

Phoenix does have a water waste ordinance. However, the only water waste ordinances enforced to date are the "water in the streets" codes (§31-8 and §23-33).

Indoor Water Use Audit Program:

The Water Services Department provides free indoor water audits to large water users in the industrial, business, and government sectors. The Department also conducts site visits for multi-family residential and commercial water users. As of 2001, there were no indoor audit programs for single-family residential customers. However, the Department did run a toilet leak pilot program in 1989 that provided self-testing instructions for 210,000 customers. While the program appeared successful and the City intended to implement it on a large scale, it does not appear that it has been expanded to date.

Irrigation Audit Program:

The Department does conduct irrigation audits for commercial landscapes free of charge. As of 2001, there were no irrigation audit programs in place for single-family residential customers. However, at the time of this report publication, the Department is in the process of developing a web-based self-audit program in conjunction with the University of Arizona.

Leak Detection and Repair:

The Water Services Department does implement a leak detection and repair program. According to the Drought Management Plan of 2002, "The resources devoted to this effort are based on the relative value of the water saved. During a drought, as water becomes more precious, greater focus would be placed on leak detection and repair." Leak detection could also occur through the cities audit programs for industrial, multi-family residential, commercial, and institutional customers. For system leaks, the City holds itself to a standard that the leak will be repaired within five days of its detection.

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

Groundwater recharge is one of the top long-term priorities of the City because of the 1980 Arizona Groundwater Management Act, which protects groundwater levels. The City of Phoenix is involved with groundwater recharge both through direct efforts as well as indirectly through the Arizona Water Banking Authority (AWBA). The AWBA is responsible for the underground storage of excess Central Arizona Project (CAP) water throughout Arizona as a hedge against

potential Colorado River shortfalls due to drought. The AWBA recharge activities are not run by the City, but the City participates in them with other municipalities and state government agencies.

One of the largest recharge projects located in the Phoenix area is the Granite Reef Underground Storage Project (GRUSP), which began operation in 1994. GRUSP was developed through a partnership between Salt River Project (SRP), the Salt River-Pima-Maricopa-Indian Community, and the cities of Phoenix, Mesa, Tempe, Scottsdale, Chandler, and Gilbert. The GRUSP facility is operated by SRP, and owned by SRP and the partnering entities. GRUSP is located on Indian Community land, in the Salt River bed just west of SRP's Granite Reef Dam.

The Arizona Department of Water Resources permits GRUSP to store 200,000 acre-feet per year. The water is stored in the East Valley's natural underground aquifer. In 2000, the GRUSP water banking facility received more than 90,000 acre-feet of water. Since 1994, GRUSP has received nearly a half million acre-feet of water. The majority of this volume was stored on behalf of the AWBA for future use by area cities and towns in the event of a CAP water shortage.

Most of the water stored at GRUSP is Colorado River water that is diverted via the CAP aqueduct, which is connected to the SRP canal system near Granite Reef Dam. GRUSP enables the State of Arizona to maximize the use of its Colorado River entitlement. The Central Arizona Water Conservation District operates CAP and coordinates with SRP to establish water deliveries to GRUSP.

Phoenix and the other municipal members of the Sub-Regional Operating Group (SROG) are currently proceeding through the conceptual planning stages of the Agua Fria Linear Recharge Project. This project would involve recharging the Agua Fria River basin with reclaimed water from the 91st Avenue WWTP. The majority

of the metro area's reclaimed water is currently reused for agricultural irrigation and industrial uses. The SROG estimates that 13 to 20 billion gallons of this water currently is unused during low demand months and is discharged to the Salt River. The conceptual plans call for the discharge of reclaimed water into several dry riverbeds or washes, which allows the water to percolate into the bed of the Agua Fria River. Linear recharge refers to the use of in-stream groundwater recharge into multiple locations along a river basin.

Independently, the City of Phoenix is pursuing several other recharge projects. Currently, groundwater is passively recharged in winter months with reclaimed water from the Cave Creek Water Reclamation Plant. The treated water is released into the normally dry Cave Creek Wash during low-use winter months, allowing natural percolation into the groundwater aquifer. In summer months, the reclaimed water is used for turf irrigation. At this site, the City is considering other options such as recharge wells to improve efficiency.

The City also maintains permits to store water at "groundwater savings" facilities operated by the Salt River Project and Roosevelt Irrigation District. These permits allow the City to deliver CAP water or effluent (respectively) to district farmers in-lieu of the groundwater that would have been pumped. The City obtains credits to pump groundwater in the future. The City is also initiating development of an aquifer management plan in the northeast portion of its service area. This plan will ensure a long-term balance between recharge and pumping (or "groundwater recovery") activities.

Dry-Year Leasing (or similar transfers):

The water exchange between the City of Phoenix and the Roosevelt Irrigation District mentioned below in the Effluent Management section is not technically a

Appendix B

Phoenix

dry-year lease. However, this arrangement is an agricultural-to-municipal transfer that optimizes the differing needs and water rights of the two providers. The City has also purchased agricultural land in western Arizona for future use of associated groundwater rights. The land is currently leased to farmers until the groundwater is needed.

Effluent Management (Reclaimed/Reused water, Recycled water):

The City of Phoenix has very active effluent management programs in place. One program involves delivering 30,000 acre-feet of treated wastewater from a reclamation plant in the City to the Roosevelt Irrigation District (RID) in exchange for higher quality groundwater rights owned by the RID. The groundwater is transferred to the SRP, which supplies 20,000 Acre-feet of water to treatment plants in the City and another 10,000 acre-feet to an Indian community. Another reclamation program involves the Cave Creek Water Reclamation Plant (CCWRP), which began delivering reclaimed water for turf irrigation in 2000. During winter months when the demand for turf irrigation water is low, the CCWRP water is released into the Cave Creek wash, where it will passively recharge the aquifer via percolation (see Conjunctive Use section). In 1999, the City purchased a site to develop another water reclamation plant that will serve northwest Phoenix.

System Integration (Cooperative supply/system projects):

The City of Phoenix participates in a variety of cooperative supply projects. One cooperative effort is the Sub-Regional Operating Group (SROG), as mentioned above. The SROG is a group of municipal districts in the Phoenix metro area that jointly own the regional 91st Avenue Wastewater Treatment Facility, and collaborate on a variety of water supply projects and plans. Phoenix, Mesa, Tempe, Scottsdale, and Glendale are all members of the SROG. One recent SROG effort has been the Agua Fria Linear Recharge Project.



Scottsdale, Arizona

Utility Name:

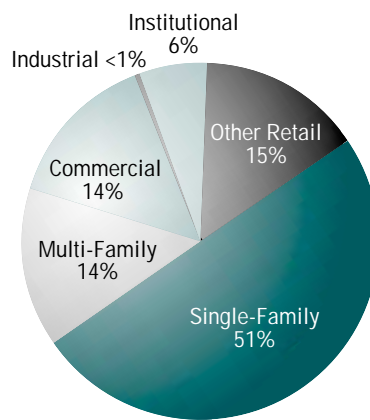
City of Scottsdale Water Resource Department

2001 Service Area Population:	212,000
2001 Total Retail Water Sold:	24,999 Million Gallons
2001 Total Water Utility Budget:	\$42,070,129
Total Water Utility Employees:	140
Service Area:	188 sq. miles

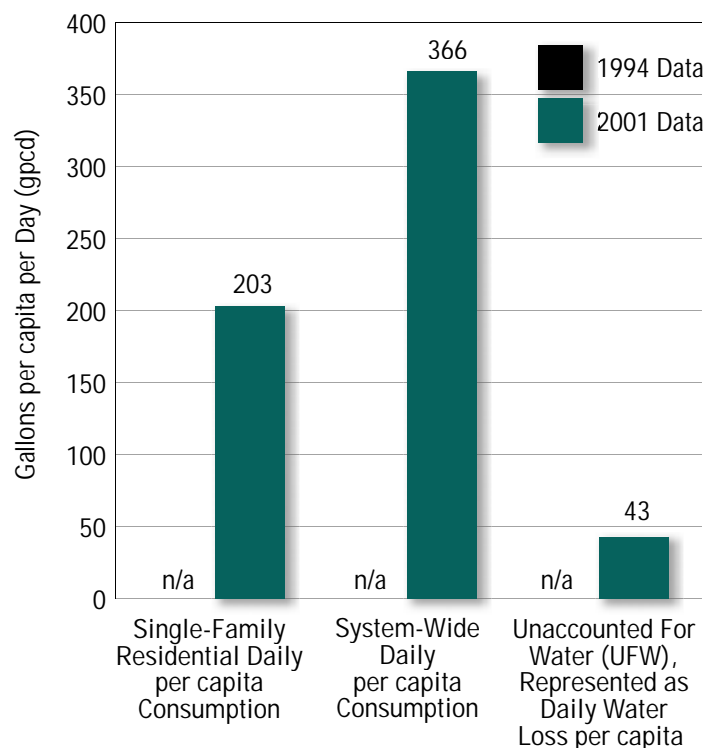
Water Supply Sources and System Overview

The City of Scottsdale's water supply comes from both groundwater and surface water sources. The two major surface water sources are the Colorado River, via the Central Arizona Project (CAP), and the Verde and Salt Rivers, via the Salt River Project (SRP) operated in Phoenix. Water from the SRP is treated in Phoenix and piped to Scottsdale, while water from the CAP is treated in Scottsdale at the City's CAP water treatment plant after arriving in Scottsdale via the CAP aqueduct system. Groundwater pumped from 31 wells operated by the City is used to satisfy the demands in the northern portion of Scottsdale, as well as supplement the surface water supplies in the southern part of the City.

2001 Scottsdale Water Sales, by Sector



Scottsdale: Changes in Water Use Indicators from 1994 to 2001



Note: 1994 data not available

Appendix B

Scottsdale

2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the City of Scottsdale Water Resource Department applied the following water use efficiency measures and programs summarized below.

Building Codes:

Aside from meeting the requirements of the 1992 U.S. Energy Policy Act (EPA) and the Arizona state plumbing regulations, the City of Scottsdale does not appear to have separate building codes that require water-efficient fixtures.

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

The City of Scottsdale offers a rebate of \$5 for each showerhead with a flow rate of 2.75 gallons per minute or lower. The City also offers free faucet aerators.

Toilet Rebate Program:

The City of Scottsdale does offer a toilet rebate program. The City will allow for a rebate of up to \$75 for the installation of a ULF toilet (1.6 gallons per flush).

Clothes Washer Rebate Program:

As of 2001, Scottsdale did not implement a clothes washer rebate program.

Xeriscape/Landscape Rebate Program:

The City of Scottsdale offers a rebate for installation of Xeriscape landscapes. Low-water-use plants selected from the Phoenix AMA Low-Water-Use Plant List must cover 75 percent of the landscapable area (not including hardscapes). The amount of the rebate is based on calculations to determine the amount of water

that would be used on the lot without Xeriscape, and is honored as a one-time rebate on a water bill of up to \$500. Although a landscape rebate program existed in Mesa during 2001, the program described here took effect on January 1, 2002. The newer program improved upon the previous program.

Xeriscape Demonstration Garden:

In 2001, a Xeriscape demonstration garden did not exist in Scottsdale. However, as of early 2003, the City of Scottsdale is in the process of designing a Xeriscape demonstration garden near the intersection of Hayden Road and McDonald Drive.

Water Conservation Education:

The City of Scottsdale is involved in water conservation education through its water conservation workshop classes. These workshops provide information on a variety of water use topics, including: Xeriscape landscaping, horticulture techniques, drip irrigation design and installation, sprinkler system maintenance and repair, and irrigation controller information. The City also sponsors a school education program according to the Arizona Municipal Water Users Association (AMWUA) website.

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

As of 2001, an irrigation controller rebate program was not offered in Scottsdale. However, in January 2002, the City of Scottsdale began offering a rebate for the installation of new electronically activated automatic irrigation controllers. The controller rebate is a one-time \$50 rebate on a water bill for the purchase of the irrigation controller.

Landscaping Ordinances:

The City of Scottsdale has a water conservation ordinance that includes regu-

lations on new landscapes, water features, and water fountains. The ordinance limits the amount of water intensive landscape, such as turf, to ten percent of the total landscapable area in new commercial and industrial landscapes, as well as the common areas of new residential developments. The ordinance also limits the amount of water intensive landscape allowed for model homes in new developments to no more than ten percent of the total lot area. Decorative fountains and water features must be approved by the City before they are installed to ensure that they don't waste water.

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

Scottsdale has a water waste clause included in its water conservation ordinance. The City only enforces the ordinance based on complaints from citizens. Apparently, the City uses this ordinance as an educational tool by issuing warnings, instead of imposing fines for violations. However, the ordinance stipulates fines as the enforcement mode of the ordinance.

Indoor Water Use Audit Program:

The City of Scottsdale advertises a self audit kit that is available to all of its customers free of charge. The kit is a simple way for water customers to find any inefficiency in their indoor water use through self-assessment of their appliances, fixtures, and water use behavior.

The City of Scottsdale Water Resources Department also offers an audit program that provides interior and exterior assessments to determine water leaks and/or high water use. The Meter Master Data logger is used and placed on the water meter for a period of seven days. The family goes about their usual business and their water use is logged. A software program allows Department staff to determine the interior and exterior water uses.

Irrigation Audit Program:

See Indoor Water Use Audit Program section above.

Leak Detection and Repair:

See Indoor Water Use Audit Program section above.

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

- Granite Reef Underground Storage Project (GRUSP)
The City of Scottsdale has partial ownership in the GRUSP facility along with SRP and several other Phoenix area cities. The facility is permitted to recharge up to 200,000 acre-feet/year of Salt/Verde River, CAP, and Colorado River supplies. Scottsdale has been issued a permit to recharge up to 10,000 acre-feet/year at the facility. The City's permit allows recharge of CAP and Modified Roosevelt Dam New Conservation Space water at the GRUSP facility. Refer to ASR section of the City of Phoenix Water Services Department for more information on GRUSP.
- Salt River Project Groundwater Savings Facility (GSF)
The SRP GSF is a project that allows cities to deliver CAP water to SRP, which in turn provides CAP water to its customers in lieu of pumped groundwater. The project is based on the purchase of excess CAP supplies from the operator of the CAP system, the Central Arizona Water Conservation District (CAWCD), for use at the GSF. The water used is then

Appendix B

Scottsdale

credited to the city's long-term storage account. Scottsdale has been issued a storage permit that allows the City to store up to 20,000 acre-feet/year of CAP water at the SRP GSF. The current permit expires on December 31, 2005. The City has recharged water through the SRP GSF since 1996; between 1996 and 2000, it stored a total of 52,660 acre-feet. During 2001, the City recharged 7,000 acre-feet of additional water at the GSF.

- **Water Campus Underground Storage and Recovery Facility**
In 1998, the City received a permit for an aquifer recharge project at the Water Campus reclamation facility. The permit allows the City to recharge both CAP water and reclaimed water at the facility. The City can store up to 16,800 acre-feet/year until December 1, 2010, and then up to 33,400 acre-feet/year thereafter until expiration of the permit in August 2018. The City began full-scale operation of the Water Campus underground storage facility in 1999. In 2001, a total of 6,100 acre-feet of CAP water and reclaimed water were stored at the facility. Also see Effluent Management section below.

Dry-Year Leasing (or similar transfers):

The City of Scottsdale has not pursued dry-year leasing water transfers to date.

Effluent Management (Reclaimed/Reused water, Recycled water):

- **Water Campus Water Reclamation Facility.**
The Water Campus consists of a Water Reclamation Plant (WRP) that produces reclaimed water for golf course irrigation purposes and an Advanced Water Treatment Facility (AWTF) that further treats reclaimed water to

drinking water standards and raw CAP water for recharge through a series of dry wells. Phases 1 and 2 of the facility have been completed with a production capacity of 12 mgd. The WRP treats wastewater generated north of the CAP Canal that flows to the plant by gravity and, through a pumpback system, a portion of the flows generated north of Doubletree Ranch Road. Wastewater treatment residuals are returned to the regional interceptor system for conveyance to the 91st Avenue Wastewater Treatment Plant (WWTP) for treatment and disposal.

The WRP was designed to supply irrigation water to golf courses in north Scottsdale. When golf course demand is less than the WRP effluent flows, the excess effluent from the WRP is further treated at the AWTF and is recharged.

The AWTF has two separate process trains. The primary train includes reverse osmosis with microfiltration pretreatment. The product water from this train is of drinking water quality and is directed to the groundwater recharge facilities. The second process train consists of only microfiltration and provides supplemental treatment capacity to treat peak wastewater flows during wet weather periods. During periods of low flow, the supplemental microfiltration units are also used to treat raw CAP water. The treated CAP water is then recharged, providing the City with additional recharge credits. All reverse osmosis reject water is returned to the regional interceptor for treatment and disposal at the 91st Avenue WWTP.

Three additional phases are planned for the Water Campus and the ultimate capacity of the facility is proposed to be 24 mgd.

System Integration (Cooperative supply/system projects):

The City of Scottsdale has entered into cooperative agreements with many water providers to acquire their CAP subcontract entitlements. Since 1994, Scottsdale has entered into exchange agreements with eight CAP subcontract holders unable to utilize their CAP water. The City has acquired nearly 22,000 acre-feet of CAP water in this fashion. The exchanging entities received funding to acquire alternative water supplies, as described below.

One example of system integration involves an agreement between the CAP, the City of Scottsdale, the City of Nogales, and the Mayer Domestic Water Improvement District (MDWID). Through this agreement, the City of Scottsdale will receive the CAP entitlements of Nogales and MDWID. In the exchange, Nogales and Mayer will receive funding for alternative water supplies. Communities and districts like Nogales and MDWID (with CAP water allocation rights) are unable to receive direct CAP deliveries. Legal provisions and policies adopted by the Arizona Department of Water Resources and the CAP allow these communities to benefit from their CAP rights by entering into exchange agreements. (Drawn from U.S. Water News Online archives, found at www.uswaternews.com/archives/arcrights/7capboa2.html).

In addition, the City of Scottsdale is a member of the Sub-Regional Operating Group (SROG). The SROG is a group of municipal districts in the Phoenix metro area that collaborate on a variety of water supply projects and plans. Phoenix, Mesa, Tempe, Scottsdale, and Glendale are all members of the SROG. One recent SROG effort has been the Agua Fria Linear Recharge Project. The intent of this inter-governmental effort is to integrate systems in a way that distributes costs and benefits of alternative water supply projects across all participating districts.

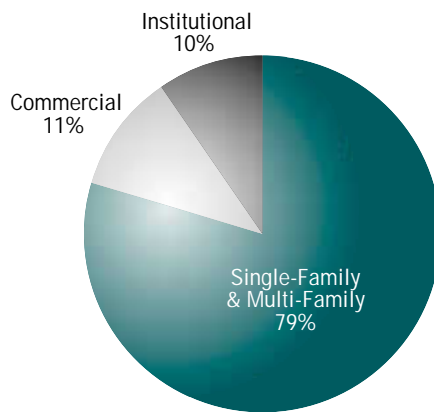


Appendix B Taylorsville

Taylorsville, Utah

Utility Name: Taylorsville-Bennion Improvement District	
Member of Jordan Valley Water Conservancy District (JVWCD)	
2001 Service Area Population:	62,000
2001 Total Retail Water Sold:	4,825 Million Gallons
2001 Total Water Utility Budget:	\$11,180,657
2001 Total Water Utility Employees:	23
Service Area:	12 sq. miles

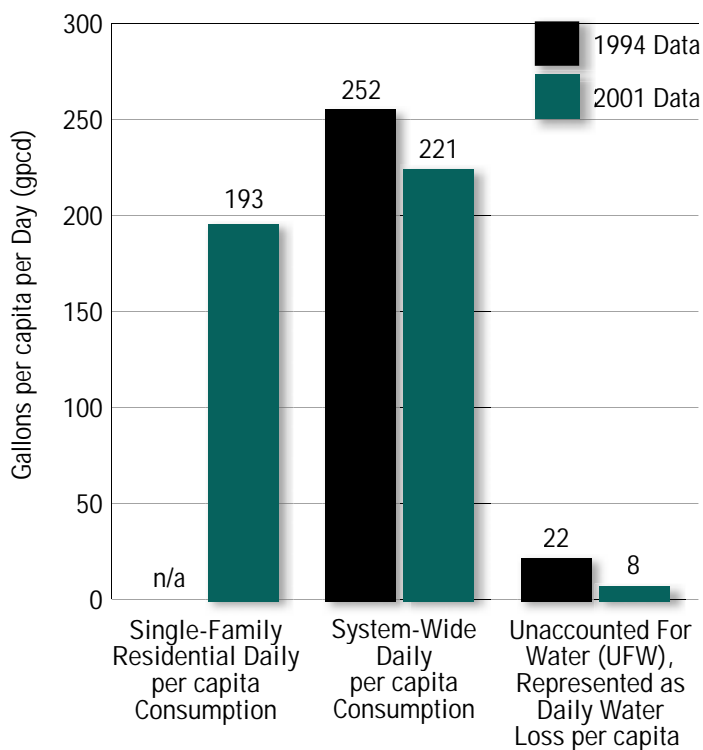
2001 Taylorsville Water Sales, by Sector



Water Supply Sources and System Overview

The Taylorsville-Bennion Improvement District (TBID) is affiliated with the larger Jordan Valley Water Conservancy District (JVWCD) in central Utah. The JVWCD is a large regional water provider in the Salt Lake County area that provides water wholesale to many municipalities and water districts, including the TBID. In 2001, the TBID distributed roughly 15,000 acre-feet of water. According to JVWCD documentation, approximately one-third of this water (approx. 5,000 acre-feet) comes from the JVWCD sources and about two-thirds of water (approx. 10,000 acre-feet) comes from groundwater sources operated by the TBID. The JVWCD sources include groundwater wells, the Deer Creek Reservoir (known as the Provo River Project), and Central Utah Project (Colorado River water).

Taylorsville: Changes in Water Use Indicators from 1994 to 2001



Note: 1994 data not available for SFR accounts

2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the Taylorsville-Bennion Improvement District, in conjunction with the Jordan Valley Water Conservancy District, applied the following water use efficiency measures and programs summarized below.

Building Codes:

Aside from meeting the requirements of the 1992 U.S. Energy Policy Act (EPA) and utilizing the Uniform Plumbing Code, the City of Taylorsville does not appear to have separate building codes that require water efficient fixtures.

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

There is no indication that the TBID or JWCD implemented a fixture replacement program in 2001. The TBID did not provide sufficient information.

Toilet Rebate Program:

Toilet rebates were not available to TBID customers in 2001. However, the JWCD was in the process of researching toilet rebate programs. The JWCD implemented a pilot ultra-low-flow (ULF) toilet program in 2001, which would determine if water savings from ULF toilets would warrant a rebate program.

Clothes Washer Rebate Program:

There is no indication that the TBID or JWCD implemented a clothes washer rebate program in 2001. The TBID did not provide sufficient information.

Xeriscape/Landscape Rebate Program:

There is no indication that the TBID or JWCD implemented a landscape rebate program in 2001. The TBID did not provide sufficient information.

Xeriscape Demonstration Garden:

The JWCD operates a water-efficient landscape demonstration garden that is open to the public, including residents of the TBID service area. The garden focuses on the use of both drought-resistant native plants and drought-resistant turf types.

Water Conservation Education:

The JWCD operates a conservation education program called the "Slow the Flow, Save H₂O" campaign. The program utilizes billing stuffers, door hangers, stickers, and t-shirts to promote all conservation programs offered by the JWCD. There is no information on any conservation education programs operated directly by the TBID, however, the JWCD programs appear to reach TBID customers.

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

There is no indication that the TBID or JWCD implemented an irrigation timer or rain sensor retrofit or rebate program in 2001. The TBID did not provide sufficient information.

Landscaping Ordinances:

The JWCD has drafted a model landscape ordinance for commercial businesses and a separate draft for residential water users. Included in the model ordinance are provisions requiring landscapes that meet specific water budgets for new developments. The ordinances would need to be adopted by municipalities within the service area of the JWCD in order to enact and enforce these landscaping principles. According to the JWCD website, it

Appendix B Taylorsville

Appendix B

Taylorsville

does not appear that Taylorsville or Bennion have adopted these model ordinances to date.

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

It is unclear whether Taylorsville or Bennion have water waste ordinances. The TBID did not provide sufficient information.

Indoor Water Use Audit Program:

There is no indication that the TBID or JWWCD implemented an indoor water use audit program in 2001. The TBID did not provide sufficient information.

Irrigation Audit Program:

The JWWCD and its member agencies, including TBID, offer outdoor water use audits free of charge to customers. The program is run through the Utah State University Extension offices. Students who are studying horticulture are employed through this program on a summer internship basis to help local residents conserve water used for irrigation.

Leak Detection and Repair:

It is unclear whether TBID implements a leak detection and repair program. The TBID did not provide sufficient information.

Other Demand Side Conservation Programs:

The TBID operates a water usage section on its website that allows customers to determine how much water they have used over the past year. By entering their account numbers into the website query, customers are able to view previous account statistics in order to determine how much water they are using and act accordingly. It is unclear whether the TBID's site provides information on usage that is more recent than the previous billing statement (e.g., real-time data).

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

The JWWCD is currently involved in a groundwater recharge project. The project captures snowmelt in the spring that would otherwise run into the Great Salt Lake and injects the water (after chemically treating it) into a storage aquifer for future use. According to the *Salt Lake County Water Conservancy District Water Conservation Plan of 1999* (the Salt Lake County Water Conservancy District changed its name to the JWWCD shortly after publication of this document), the annual savings of water from this recharge project is 5,800 acre-feet. There is no indication that the TBID operates an independent groundwater recharge system. The TBID did not provide sufficient information.

Dry-Year Leasing (or similar transfers):

The JWWCD has been actively buying farmland irrigation rights to convert the water to municipal use. According to the *Salt Lake County Water Conservancy District Water Conservation Plan of 1999*, the District has acquired an additional 15,000 acre-feet per year with these contracts. There is no indication that the TBID is part of a dry-year leasing arrangement with surrounding agricultural water users. The TBID did not provide sufficient information.

Effluent Management (Reclaimed/Reused water, Recycled water):

The JWWCD and the TBID do not appear to be utilizing effluent management programs. The Salt Lake County

Water Conservancy District Water Conservation Plan of 1999 cites such programs as being economically infeasible at the time of publication.

System Integration (Cooperative supply/system projects):

The JWCD in itself is a multi-district integrated system of cooperating water providers. However, the JWCD appears to act independently from other providers in the area, which include the Metropolitan Water District of Salt Lake City (MWDSL). However, the sources of supply for these

two large providers of wholesale and retail water are somewhat intertwined and cooperation between the two is likely to occur even though it is not explicitly mentioned in the available documents.



Appendix B Taylorsville

Appendix B

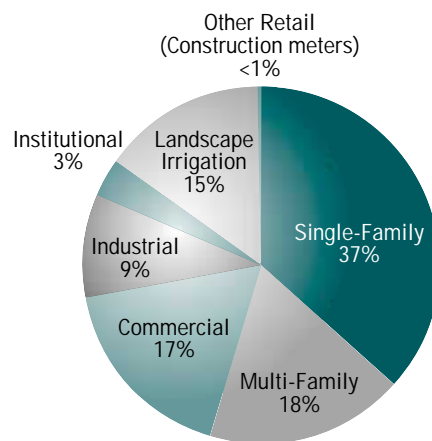
Tempe

Tempe, Arizona

Utility Name: Tempe Water Utilities Department

2001 Service Area Population:	171,000
2001 Total Retail Water Sold:	18,389 Million Gallons
2001 Total Water Utility Budget:	\$35,072,000
2001 Total Water Utility Employees:	130
Service Area:	42 sq. miles

2001 Tempe Water Sales, by Sector



Water Supply Sources and System Overview

The majority of Tempe's water comes from the Salt and Verde Rivers via the Salt River Project (SRP), which is supplemented with supplies from the Central Arizona Project (CAP) water that originates in the Colorado River. The system is also backed up with seven groundwater wells during water shortage periods. More specifically, the City of Tempe is contracted to purchase 4,315 acre-feet of CAP water per year. Whereas, Tempe's allotment of SRP water varies each year, depending on the SRP system's water availability.

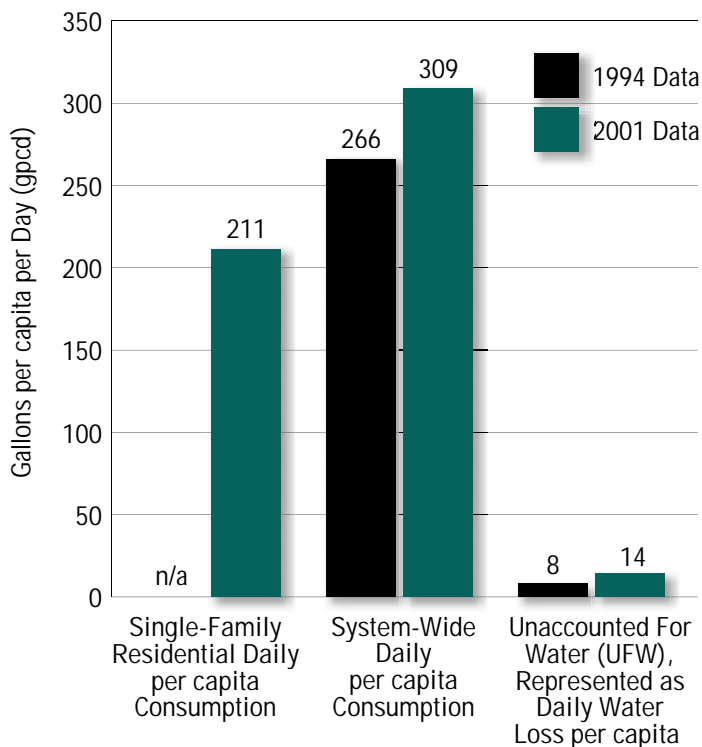
2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the City of Tempe Water Utilities Department applied the water use efficiency measures and programs summarized below.

Building Codes:

In 1980, the City of Tempe revised its plumbing code to require efficient water fixtures and toilets. This code requirement coincides with the intentions of the 1992

Tempe : Changes in Water Use Indicators from 1994 to 2001



Note: 1994 data not available for SFR accounts

U.S. Energy Policy Act (EPA) which followed years later.

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

The City of Tempe Water Utilities Department administers a residential indoor efficiency retrofit program. Through this program, the City provides free plumbing retrofit kits to customers residing in homes that were built prior to 1980. After 1980, the low-flow plumbing ordinances mandated new homes to be equipped with such devices. The plumbing retrofit kit includes an ultra-low-flow showerhead (less than 3 gal./min.); sealant tape; a toilet dam to partition off part of the toilet tank; a “toilet tummy” (an alternate toilet volume displacement device); two faucet aerators; and leak detection tablets. The Water Utilities Department estimates that the kit can generate a water savings of 22 gallons per day (8,000 gallons per year) for a family of three. Homeowners who qualify for the program can receive up to two kits (depending on house and household size).

Toilet Rebate Program:

The City of Tempe offers a toilet rebate program to replace high-volume flush toilets with ultra-low-flow (ULF) models. The program offers a 50 percent rebate, up to \$75, to Tempe homeowners who replace non-conserving toilets (3.5 gallons per flush or greater) with ULF toilets (1.6 gallons or less per flush). The Water Utilities Department estimates that ULF toilets can save as much as 8,800 gallons of water per year for a family of three (depending on the type of non-conserving toilet replaced).

Clothes Washer Rebate Program:

As of 2001, Tempe did not offer a clothes washer rebate program.

Xeriscape/Landscape Rebate Program:

Tempe has been offering a landscape rebate program since 1992, and has demonstrated success with the program. Through this program, the City offers \$100 to homeowners who install or convert to a low-water-use landscape or Xeriscape. The Water Utilities Department estimates that a Xeriscape landscape requires only 50 percent of the water needed to maintain an equal-sized Bermuda turf lawn (which can yield a water savings of as much as 25,000 gallons per year). Since its inception in October 1992, the City estimates that this landscape rebate program has converted over 700 residential turf landscapes to Xeriscapes. More specifically, over 2 million square feet of residential turf landscape has been converted to drought/desert-tolerant landscape under this program.

Xeriscape Demonstration Garden:

Tempe has two dedicated Xeriscape demonstration gardens (Tempe Public Library and Tempe Women’s Club Park).

Water Conservation Education:

The Tempe Water Utilities Department provides a variety of water conservation education programs. One unique program is the School Gardening Grant Program, which issues grant monies to schools to fund the planting of low-water-use gardens. The City also provides educational information on its website pertaining to Xeriscaping, water use efficiency self-auditing, access to educational brochures, as well as links to other online educational sites.

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

As of 2001, an irrigation controller or rain sensor retrofit or rebate program was not in effect.

Appendix B

Tempe

Landscaping Ordinances:

The City of Tempe has a non-residential landscape ordinance limiting the amount of turf or high water-use landscape that can be installed in new non-residential developments. Tempe also has a new model home ordinance, restricting the use of turf around model homes for new developments.

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

The City of Tempe has a water waste ordinance on the books (“Prohibit-ing the Wasting of Water” ordinance). This ordinance is not intended to regulate or prevent the beneficial use of water on property in the Tempe service area. It prohibits and discourages water waste.

Tempe’s definition of water waste includes: allowing water to run off landscaped areas to other areas where it serves no beneficial use (e.g., streets, alleys, public utility easements, or parking areas); hosing down of driveways, sidewalks, and other hardscape; washing vehicles in a manner that uses excess water; and any use of water in excess of that reasonably necessary to accomplish the intended task. The ordinance also regulates the excessive use, loss, or escape of water through breaks, leaks, or malfunctions of private plumbing, irrigation, and distribution systems. According to Water Utilities Department staff, this ordinance is rarely enforced with fines without first issuing several warnings.

Indoor Water Use Audit Program:

The Tempe Water Utilities Department provides self-directed water audit kits as well as in-home water audits upon request. See Indoor Fixture Replacement Programs (showerheads, faucets, etc.) section above for more details on the self-audit kits.

Irrigation Audit Program:

The Water Utilities Department instructs residents on irrigation techniques and maintenance twice per year. Residents are given all of the practical skills to design, install, and maintain an efficient irrigation system.

Leak Detection and Repair:

The Tempe Water Utilities Department initiated a 10-year leak detection and repair program for the complete water distribution system in 2002. Ten percent of the distribution system will be monitored for leaks each year, with repairs scheduled when leaks are discovered. The first 10 percent area of the distribution system was monitored in 2002. The oldest portions of the distribution system are to be surveyed first. Prior to this program, the Water Utilities Department operated an ongoing leak detection program that focused on specific, older portions of the distribution system where water main breaks had occurred.

Other Conservation Programs:

Tempe offers a unique water conservation grant program that provides financial incentives to commercial/industrial customers (Commercial/Industrial Water Conservation Grant Program). Any commercial or industrial water user that can demonstrate overall water savings of greater than 15 percent through process changes (i.e., water recycling, cooling tower process, etc.) and landscape irrigation reductions will qualify for a commercial/industrial grant from the City. The program provides grants to qualified applicants that cover 25-50 percent of the total cost of the project, with a cap of \$20,000.

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

Tempe has been actively participating in a number groundwater recharge projects over the past ten years. Four current groundwater recharge projects are as follows:

- Granite Reef Underground Storage Project (GRUSP). Tempe owns capacity in the GRUSP recharge site, a 200+ acre recharge project adjacent to the Salt River east of Tempe. Tempe has recharged CAP water at this site during some years starting in 1994. In other years Tempe has leased its GRUSP capacity to the Arizona Water Banking Authority (see more detailed description of this project under the City of Phoenix summary).
- Tempe Ken McDonald Golf Course Groundwater Recharge Project. This project is permitted by the State of Arizona to store up to 3 million gallons per day (MGD) of reclaimed water in the upper alluvial aquifer unit. The pilot project utilized vadose zone injection well recharge technology. The full-scale project will incorporate deeper ASR injection wells. This project will come online after an expansion of the Tempe Kyrene Reclamation Plant is completed in 2005.
- Salt River Project Groundwater Savings Facility (GSF). This is a cooperative in-lieu recharge program between the Salt River Project (SRP), Tempe, and other Valley of the Sun municipalities. Excess CAP water is delivered in-lieu of groundwater pumping pursuant to vested rights. (Also see City of Scottsdale summary for more details on the SRP GSF)

- New Magma Irrigation & Drainage District GSF. This is a cooperative in-lieu recharge program similar to SRP GSF program.

Through these groundwater recharge programs, Tempe has recharged over 85,000 acre-feet of predominantly CAP water to the East Salt River Valley aquifer over the past decade.

Tempe is also a member of the 91st Avenue Wastewater Treatment Plant partnership (Sub-Regional Operating Group, or SROG) along with Phoenix, Mesa, and Scottsdale, as described in previous sections. As a member of the SROG, Tempe also plans to participate in the Agua Fria Linear Recharge Project, to recharge and store effluent for future recovery. More information on these recharge examples is listed in the Aquifer Storage and Recovery (ASR) and Conjunctive Use section of the Phoenix summary in this Appendix.

Dry-Year Leasing (or similar transfers):

As of 2001, Tempe apparently had no programs under this category.

Effluent Management (Reclaimed/Reused water, Recycled water):

The Tempe Water Utilities Department operates the Kyrene Water Reclamation Facility, with a treatment capacity of 4.5 MGD. The facility currently produces about 3.7 MGD of high quality effluent. Reclaimed water from this facility is currently reused at two sites: the Tempe Ken McDonald Municipal Golf Course, for turf irrigation, and the SRP Kyrene Electrical Generating Station, for cooling and industrial use.

Since the 250 MW SRP Generating Station came online in 2002 nearly all of the reclaimed water produced by the Tempe Kyrene Reclamation Facility is used at these two sites, most of it by the SRP Generating Station. The reclaimed water

Appendix B

Tempe

Appendix B

Tempe

used at the golf course and the SRP Facility is exchanged for surface water supplies from SRP, under terms of the SRP/Tempe Water Delivery and Use Agreement and Tempe's State Certificate of Water Exchange Enrollment. When additional reclaimed water production capacity comes online after the Kyrene Reclamation Facility expansion in 2005, the Ken McDonald Golf Course Recharge Project will be used to recharge some of this new effluent, and other irrigation reuse opportunities will be examined.

Through SROG, the City of Tempe will continue to actively participate in effluent reuse and storage projects associated with the 91st Avenue WWTP, where most of Tempe's wastewater flows are treated.

System Integration (Cooperative supply/system projects):

Tempe is pursuing system integration plans to optimize the available water resources. The reclaimed water exchanges that Tempe and SRP have developed are good examples of cooperative water supply projects that involve the City of Tempe. Tempe provides reclaimed water to the SRP Kyrene Generating Station for cooling and industrial use. In exchange, Tempe receives additional surface water resources from SRP for use throughout the Tempe water service area.

The multi-party GRUSP recharge facility is another example of a cooperative water supply/management project. The Valley of the Sun cities and SRP jointly plan for and manage the storage of water at this facility, either through direct use or leasing to other parties such as the Arizona Water Banking Authority.

In addition, the City of Tempe is a member of the Sub-Regional Operating Group (SROG). The SROG is a group of municipal districts in the Phoenix metro area that collaborate on a variety of water supply projects and plans. Phoenix, Mesa, Tempe, Scottsdale, and Glendale are all members of the SROG. One recent SROG effort has been the Agua Fria Linear Recharge Project. The intent of this inter-governmental effort is to integrate systems in a way that distributes costs and benefits of alternative water supply projects across all participating districts.

In addition to the above examples, Tempe maintains a back-up water interconnect with the City of Chandler system, and a second back-up interconnect with the City of Phoenix system.



Tucson, Arizona

Utility Name: City of Tucson Water Department

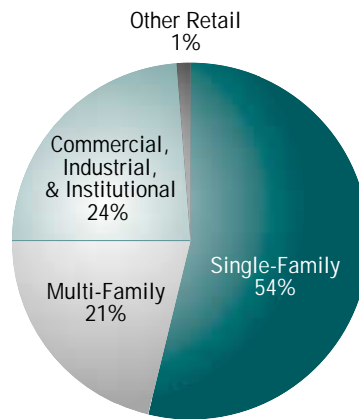
2001 Service Area Population:	630,000
2001 Total Retail Water Sold:	34,392 Million Gallons
2001 Total Water Utility Budget:	\$103,000,000
2001 Total Water Utility Employees:	590
Service Area:	300 sq. miles

Water Supply Sources and System Overview

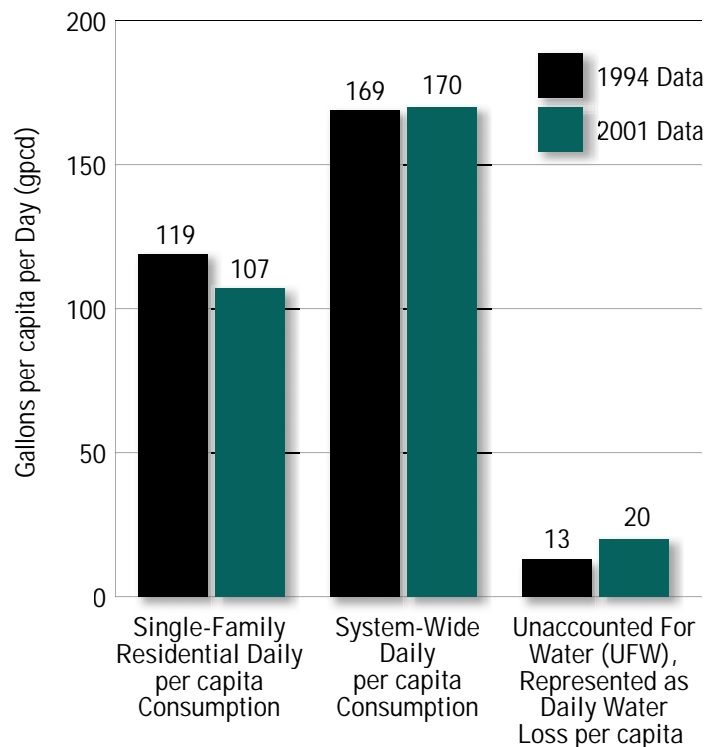
The vast majority of Tucson's water comes from groundwater sources, which have been mined at an unsustainable rate over the years. Tucson does not have water rights in the Salt River, Verde River, or Gila River, as Phoenix does. To remedy the situation and meet the requirements of the 1980 Arizona Groundwater Management Act, the City of Tucson intends to use its rights with the Central Arizona Project (CAP), which delivers Colorado River water to southern Arizona. However, instead of directly using surface CAP deliveries, Tucson plans to use its 148,000 Acre-feet of CAP water in various agricultural exchange and groundwater recharge programs. Over its 110-year planning period, Tucson's water resource plan involves the study and development of: water conservation, CAP water, water reuse and recycling, and groundwater sources.

Tucson's water supply infrastructure includes 3,500 miles of pipelines and over 20 reservoirs. These reservoirs are currently used to store groundwater in the event that demand exceeds groundwater-pumping rates.

2001 Tucson Water Sales, by Sector



Tucson: Changes in Water Use Indicators from 1994 to 2001



Appendix B

Tucson

2001 Demand-Side Efficiency Measures (Water Conservation)

During 2001, the City of Tucson Water Department applied the water use efficiency measures and programs summarized below.

Building Codes:

In 1982, the City of Tucson adopted a revised plumbing code, which required all new construction projects to incorporate low-flow plumbing fixtures. Included in the ordinance are requirements for low-flow toilets (4 gals. per flush or lower), low-flow faucets (4 gals. per minute or lower), and low-flow showerheads (3 gals. per minute or lower). The plumbing code was revised again in 1991 to include ultra-low-flow toilets (ULF toilets @ 1.6 gal. per flush) toilets, and 2.5 gallon per minute showerheads and faucets.

Indoor Fixture Replacement Programs (showerheads, faucets, etc.):

From 1993 to 1995, the City of Tucson provided senior citizens and low-income homeowners with ULF toilets, low-flow showerheads, and other water-efficiency retrofits free of charge. From 1996 to the present, the City's Zanjero water use audit program has continued to offer low-flow retrofits (e.g., faucet aerators) and other water-saving devices to customers (effective in 2001). See Indoor Water Use Audit Program section below.

Toilet Rebate Program:

In 1991, the City of Tucson instituted a toilet rebate program to replace toilets in older homes with ULF toilets (1.6 gallon per flush). According to Tucson's Water Conservation Program Plan, this rebate

program was discontinued. However, the above-mentioned ULF toilet replacement program for low income and senior citizen customers took its place in 1993.

Clothes Washer Rebate Program:

As of 2001, the City did not offer a clothes washer rebate program.

Xeriscape/Landscape Rebate Program:

To date, the City has not offered a Xeriscape/landscape rebate program.

Xeriscape Demonstration Garden:

The City of Tucson supports Xeriscape demonstration gardens at the Tucson Botanical Gardens and other locations. The Tucson Botanical Gardens demonstration has been open to the public since the 1980s.

Water Conservation Education:

The City of Tucson began its water conservation education program in the late 1970s with its "Beat the Peak" program that was instituted in response to high consumption rates (205 gallons per capita per day). The education programs have grown to include school education as well as classes and brochures directed towards adults. In addition the City offers water-efficiency training programs for landscaping contractors in the Tucson area.

Irrigation Timer and/or Rain Sensor Retrofit or Rebate:

As of 2001, the City did not offer an irrigation controller rebate or retrofit program.

Landscaping Ordinances:

The City of Tucson passed a Landscaping Ordinance in 1991. The ordinance requires the use of Xeriscaping principles and low-water-use plants in commercial and multi-family residential developments. The ordinance is administered

and enforced via plan/design review and inspection, as part of the City's development review and building permit issuance processes.

Water Use/Waste Ordinances (lawn watering restrictions, wasted water laws, etc.):

The City of Tucson passed the Water Waste and Theft Ordinance in 1984, which authorizes the City to issue citations for waste that results from irrigation overspray, driveway flooding, water running onto public rights-of-way or another homeowner's property. The ordinance gives City representatives the authority to enter private property to inspect suspected violations. In June 2000, the City amended this Ordinance to include penalties for not repairing broken sprinklers and leaks. The revisions also included higher fines. A first-time offense results in a \$250 fine, while repeat offenders pay \$500. Offenders are also given the option of attending a Water Management course in lieu of the fine. Although the City holds the right to issue the above fines as penalties, the primary intent of the ordinance enforcement is to serve as a water-efficiency education tool.

Indoor Water Use Audit Program:

In 1996, the Zanjero Program began offering free indoor and outdoor water audits for residential customers. The program currently consists of a group of six Zanjeros who have been trained in indoor and outdoor water conservation and a wide variety of related water issues. The Zanjeros check for leaks, measure showerhead and faucet flow rates, search for special water uses (e.g., pools, spas, misting systems, etc.), and analyze the efficiency of the irrigation system. New low-flow fixtures, faucet aerators, or other water-saving devices are installed, if necessary. The customer receives the results of the analysis, along with advice on how to decrease their water use, and their water bills.

In order to ensure the Zanjero Program has the greatest opportunity to make a significant change in Tucson's overall water use, Tucson Water targeted the first year of the program at residential customers who use more than 25 ccf (hundred cubic feet) in any month of the year. These water users typically have the greatest opportunities for reductions in overall water use. Approximately 36,000 residential customers qualified for the first year of this program. These customers received a letter inviting their participation in the Zanjero Program. Even though the initial invitations were targeted at high water users, the program is open to all Tucson Water customers.

Irrigation Audit Program:

In the 1990s, the City of Tucson and Pima County started the "Low 4 Program," which resulted in 200 audits of large commercial and multifamily irrigators. Additionally, in 1996, the Zanjero Program began offering indoor and outdoor water audits for residential customers (as described in the Indoor Water Use Audit Program section above).

Leak Detection and Repair:

Tucson implements an active leak detection program for individual customers through its Zanjero audit program (as described above in the Indoor Water Use Audit Program section). Although a proactive system-wide leak detection program does not yet exist in Tucson, the City utilizes leak detection and repair equipment in reaction to reported system leaks. Furthermore, to address the district's Unaccounted for Water levels, the City is in the process of considering and developing a system-wide leak detection and repair program.

Appendix B

Tucson

2001 Supply-Side Efficiency Measures

Aquifer Storage and Recovery (ASR) and Conjunctive Use:

The City of Tucson is planning several recharge projects to successfully utilize its CAP water during low-use months. Currently, the City recharges reclaimed water from its Roger Road Reclamation Plant during the winter months when irrigation use is low. The water is recharged into special basins near Roger Road and the Santa Cruz River and then recovered for use in summer months.

In the spring of 2001, Tucson began using approximately 18 million gallons of water per day from the Clearwater Renewable Resource Facility, which was constructed to help utilize all of Tucson's CAP water rights. The Central Avra Valley Storage and Recovery Project is the conjunctive use component of the overall Clearwater Facility. This Project uses Colorado River water (via the CAP) to recharge groundwater basins. The three basins currently used by the Project are recharged with about five billion gallons of Colorado River water annually. The Colorado River water is blended with groundwater after being naturally filtered through the soil. Eventually, the City hopes that the Project will provide more than half of the City's water supplies, therefore lessening the use of groundwater supplies as required by the Arizona Groundwater Management Act. By 2003, it is estimated that 60,000 acre-feet of water will be recharged into 11 groundwater recharge basins. This groundwater could then be recovered for municipal use via a new wellfield containing about 25 deep, high-capacity wells.

In addition, the City is involved with state/regional Arizona Water Banking

Authority (AWBA) agreements that utilize aquifer storage and recovery practices to store excess CAP water in groundwater basins, to be used during drought years.

Dry-Year Leasing (or similar transfers):

Local dry-year leasing is not a consideration in Tucson due to the City's reliance on groundwater/recharge water, which does not run dry in drought years. However, the City is involved in exchange programs with local farmers (see System Integration, below). In addition, as mentioned in the above section, Tucson is involved with AWBA agreements. The AWBA projects store CAP water in groundwater basins for dry-year use.

Effluent Management (Reclaimed/Reused water, Recycled water):

In 1980, the City of Tucson began its water reclamation program. The City reuses water from the water reclamation facility for irrigation in parks, schools, and golf courses. The Tucson Water Department claims to have one of the largest community reclaimed water systems in the United States. The Department website states that, "We deliver reclaimed water to nearly 400 sites, including: 13 golf courses; 32 parks; 35 schools (the University of Arizona and Pima Community College included); and more than 300 single family homes." According to system data, in 2001, Tucson's reclaimed water program saved 3.4 billion gallons of potable water by using reclaimed water instead.

System Integration (Cooperative supply/system projects):

One interesting example of cooperative efforts is Tucson's involvement with local agricultural water users as an attempt to enhance its water supply options. Farmers tend to have water rights to potable groundwater and Tucson has water

rights to untreated CAP water that can be used for irrigation. This type of water exchange process is called indirect recharge credits. Exchanging these water rights is beneficial to Tucson, but there are some complications involved as well, which include Tucson's need to develop and utilize groundwater recharge projects to augment the groundwater supply. In addition to the recharge issues, Arizona water law requires that the groundwater that is exchanged for CAP water must be pumped from the same Groundwater Active Management Area where the CAP water is used (in an indirect recharge credit agreement). As a result of this clause, the transportation and delivery of water can be problematic and costly.



Appendix B

Tucson

Appendix B

Water Conservation Contact Information for Water Providers in Smart Water Survey

City of Albuquerque Public Works Department

Water Conservation Office
Telephone: 505-768-3655
Website: www.cabq.gov/waterconservation/

City of Boulder Water Utilities Department

Telephone: 303-441-3200
Website: www.ci.boulder.co.us/publicworks/depts/utilities/conservation/index.html

Denver Water Conservation Department

Telephone: 303-628-6159
Website: www.denverwater.org/conservation/conservframe.html

El Paso Water Utilities

Conservation Department
Telephone: 915-594-5508
Website: www.epwu.org

City of Grand Junction Water Utilities Department

Telephone: 970-244-1554
Website: www.gjcity.org/CityDeptWebPages/PublicWorksAndUtilities/WaterServices/WaterServices.htm

Centennial Water and Sanitation District (Highlands Ranch)

Telephone: 303-791-0430
Website: www.highlandsranch.org/Centennial.html

Las Vegas Valley Water District

Telephone: 702-258-SAVE (7283)
Website: www.lvwwd.com/html/index.html

City of Mesa Utilities Department

Water Conservation
Telephone: 480-644-3306
Website: www.ci.mesa.az.us/utilities/conservation/default.asp

City of Phoenix Water Services Department

Telephone: 602-262-6251
Website: phoenix.gov/WATERSERVICES/

City of Scottsdale Water Resources Department

Water Conservation Division
Telephone: 480-312-5650
Website: www.scottsdaleaz.gov/departments/deptDetail.asp?deptID=26

Taylorville-Bennion Improvement District

Telephone: 801-968-9081
Website: www.tbid.org/

City of Tempe Water Utilities Department

Telephone: 480-350-8207
Website: www.tempe.gov/water/default.asp

City of Tucson Water Department

Conservation Office
Telephone: 520-791-4331
Website: www.ci.tucson.az.us/water/conservation/conservation.html