

DROP BY DROP



ways Texas cities can conserve water...

and what 19 cities around the state are—and are not—doing to make it happen.





Acknowledgments

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Introduction

Managing and protecting our water resources is one of the most critical issues facing Texas today. Demographers are predicting the state's population will double by the middle of the century, putting more pressure on existing water supplies. At the same time, climate scientists are warning us that climate change could cause severe droughts in Texas more often than in the past.

The impacts on the state's natural resources could be dramatic. Our rivers, streams and aquifers are already under stress. In many river systems, the state has issued more water rights than would be available during dry years, while many aquifers are being pumped faster than rainfall can replenish them.

In the face of this emerging reality, it only makes sense for Texas' cities to manage their water supplies as effectively as possible. Increasing water-use efficiency allows communities to do more with the water supplies they already have, and postpone or even eliminate the need for expensive and environmentally damaging new water supplies such as reservoirs or long-distance pipelines.

This report highlights seven individual aspects of municipal water-use efficiency: pricing structure, goal-setting, replacement of older toilets, funding, outdoor watering ordinances, non-toilet retrofit programs, and educational outreach. These measures were chosen because they give a broad overview of a water utility's conservation program, but there are other effective efficiency techniques not explored here, such as turf removal incentives, rainwater harvesting, development ordinances, and reducing water loss in the distribution system.

The fundamental measure of a city's conservation efforts is not its suite of programs, but rather its progress in improving water use efficiency. Two cities in Texas, San Antonio and El Paso, have achieved remarkable success by this measure. For example, San Antonio has reduced its water use by almost 100 gallons per capita per day (gpcd) over the past quarter-century.

This report surveys conservation programs in 19 cities around the state with differing population sizes, service areas, and geographic locations. The starting points for our reviews were the water conservation plans that utilities were required to submit to the Texas Commission on Environmental Quality (TCEQ) or Texas Water Development Board by May 1, 2009.

Our purpose in writing this report was to shed some light on the efforts these cities are currently making to conserve water. The kind of reductions achieved by San Antonio and El Paso do not happen without strong programs in place. We hope this report will encourage water utilities to take additional measures, such as those outlined here, to become more efficient in the way they use water. We also hope citizens will use the results to become better informed about the possibilities for conservation by their water supplier.

Our findings indicate that the quality and extent of water conservation programs in Texas' cities vary considerably. While some water utilities have begun to realize the potential of water efficiency, many others have yet to take full advantage of the cheapest, most reliable, and most sustainable source of water—the one that's already on tap.

City Summaries: On the next page are short summaries of our findings for each of the 19 cities in our survey. Please see the tables included in the report for additional explanation and information on how a city fared on a given measure. Neither these summaries nor this report is intended as a comprehensive evaluation of each city's efforts at water conservation, as it is possible that cities have efficiency programs in place that are not captured by the seven measures we considered. Nonetheless, these summaries should give a reader a good starting point for understanding a given city's conservation strengths and areas that need improvement.



City Summaries

Arlington has a modest toilet replacement program, and the city restricts outdoor watering during the day. Arlington plans to reduce its per capita water use but could set a more aggressive goal. The city does have a robust informational website, www.savearlingtonwater.com.

Austin has recently implemented a suite of strong conservation programs. Austin had the most progressive rate structure in our sample. The capitol city also has a strong outdoor watering ordinance and an aggressive toilet replacement program. However, Austin's per capita water use is still quite high, and its 10-year reduction goal is just moderate.

Beaumont has an aggressive goal to reduce its water use, which it plans to do through fixing leaks in their distribution system. However, the city's other water conservation programs need improvement. For example, Beaumont's pricing structure was one of the weakest in our sample.

Brownsville reports low rates of water use, and its 10-year goal indicates the city plans to continue to reduce per capita consumption. However, the city does not have an outdoor watering ordinance or any kind of retrofit program. The city's pricing structure could also be strengthened.

Corpus Christi reports a very high per capita water use and has a weak conservation goal. Corpus Christi does have some conservation programs, including restrictions on daytime watering and a moderately progressive price structure, but could do more to reduce its water use.

College Station has a fairly comprehensive set of conservation programs for a city of its size. The city has low per capita water use but its 10-year goals do not project further reductions.

Dallas has the highest per-person water use in our sample and the city has set a weak 10-year reduction goal. The city has recently

put some moderate programs in place but these programs could be strengthened significantly. With its large population and high water use, there is huge opportunity for additional water savings.

El Paso has long been recognized as a leader in conservation in the state. Its current efficiency programs rate moderate to strong, however, and the city's 10-year goal actually allows for an increase in per capita water use.

Fort Worth has relatively high water use. The city has recently implemented some moderate efficiency programs, such as a new toilet replacement program, and has set a moderate reduction goal. However, the city should strengthen its existing programs and seek a more ambitious goal.

Garland has a weak per capita reduction goal and does not have much in the way of conservation programs. For example, the city does not have an outdoor watering ordinance. The city does sponsor occasional toilet give-aways.

Houston is the biggest city in the state and does not have a water conservation department or an extensive conservation program. The city's current water use is fairly low but that likely is due—at least in part—to the city's relatively wet climate. With a serious water conservation program, Houston could reduce its per capita use appreciably.

Huntsville has high per capita water use and a moderate 10-year goal. Huntsville does not have an outdoor watering ordinance nor any kind of retrofit program, and its pricing structure could be strengthened.

Katy has fairly high per capita water use, and its plans to reduce future water use further are not notable. It was the smallest city in the survey.

Laredo currently has a high gpcd but has set a strong 10-year goal. However, Laredo does

not have strong programs in the measures considered here. For example, the city does not have a toilet replacement or other retrofit program in place and does not restrict outdoor watering.

Lubbock has the weakest pricing structure in our sample: excessive water users end up paying significantly less per unit than frugal users. The city does have a time of day outdoor watering limitation but does not have any kind of retrofit program.

Pasadena reports low rates of water use, and the city plans to continue to reduce its per capita consumption rates. However, the city does not have an outdoor watering ordinance or any kind of retrofit program and the city's pricing structure could be strengthened.

Plano's conservation programs need improvement. Its current pricing structure rewards excessive water use, and the city does not have any kind of outdoor watering ordinance. The Texas Water Development Board has determined that Plano's water conservation plan, as submitted, is incomplete.

San Antonio has set the bar for effective and diverse water efficiency programs in Texas and across the country. The city's per capita goal is strong and it has many efficiency programs, such as a strong toilet replacement program. While the water pricing structure could be more strongly tiered, San Antonio's rate structure is the only one in our survey that creates a dedicated source of funding for its conservation programs.

Tyler has a strong 10-year reduction goal. How the city intends to achieve that goal is not clear, however, because the city does not have strong programs in the measures considered here. For example, the city does not currently have any kind of retrofit program, and it does not restrict outdoor watering. Additionally, Tyler's pricing structure could be strengthened.



Pricing: Fair rate structures can impact demand

Water is a valuable resource and in scarce supply in many parts of the state. Economists have long argued that effective water pricing can do much to increase water-use efficiency. For example, an analysis of over one hundred published studies found strong evidence that using the price of water to retail water customers to manage water demand is more cost-effective than implementing non-price conservation programs.¹

To encourage customers to use water efficiently, a utility's price structure should charge low rates to frugal water users and significantly higher rates to the heaviest users. For example, water customers in Tucson, Arizona who use 11,000 gallons or less pay just \$1.39 per thousand gallons, while those who use over 34,000 gallons a month pay roughly \$10 per thousand gallons. Boulder, Seattle and other cities have similarly tiered rates.

These tiered pricing systems can be effective at lowering water use because a large portion of a city's water supply is used by a fairly small percentage of the population. The City of Albuquerque has found that half of its households use, on average, three times as much water as the other half.²

A relatively small handful of users is exceptionally profligate with water and these individuals are largely insensitive to water prices as they are currently set. In 2008, the top ten water users in the city of Dallas collectively used an astonishing 60 million gallons of water.³ An earlier 2003 National Wildlife Federation analysis of the Dallas Water Utility's residential accounts shows that the top 5% of water users in that city used over 25% percent of its water.⁴

Texas water planners already encourage Texas cities to have a "non-promotional" or "conservation-oriented" rate structure. All but two of the cities in our sample did have a rate structure where the price per unit rises as more water is used. In most cities, however, the signal sent by the pricing structure was not particularly strong. When monthly fees were factored into the rate structure, heavy users usually pay little more—and often less—per thousand gallons than frugal water users.

The cities of Tyler and Beaumont were the only ones in our survey that did not have an inclining block rate pricing structure. Beaumont charges a flat rate and Tyler actually decreases its prices for heavier users.

In November 2009, the Austin Water Utility implemented sharply rising rates, with a top tier of \$10 per thousand gallons for those who use more

Our Recommendation:

Utilities should have a strongly tiered rate structure with affordable prices for those who use water efficiently and significantly higher water rates, when assessed as an effective rate that includes fees, for customers who use excessive amounts of water. Additional revenue generated from the higher rates on the high-volume users should be dedicated to fund the water conservation program.



than 25,000 gallons a month. These rates are significantly higher than top-tier rates in most Texas cities. The average Austin household uses around 8,500 gallons of water a month and would not be affected by the highest rates.⁵ The Austin Water Utility has low-to-average rates for more frugal water users.

Additional revenues from a city’s top rates can be used as a dedicated funding source for a utility’s water conservation programs. More than half the revenue from Albuquerque’s summer excessive use surcharge is allocated to its water conservation program. Much of this funding is returned to Albuquerque residents through rebates and other incentives.⁶ The San Antonio Water System has a similar program, devoting nine cents per 100 gallons of the cities’ top water rate to the help fund residential water conservation program.

Evaluation:

Strong: Customers who use 25,000 gallons per month pay over \$1 *more* per thousand gallons than customers who use 5,000 gallons per month

Moderate: Customers who use 25,000 gallons per month pay *within a \$1 range* per thousand gallons of customers who use 5,000 gallons per month

Weak: Customers who use 25,000 gallons per month pay over \$1 *less* per thousand gallons than customers who use 5,000 gallons per month

	Effective cost per 1,000 gallons for customer using 5,000 gallons a month*	Effective cost per 1,000 gallons for customer using 25,000 gallons a month*	Evaluation
Arlington	\$3.41	\$2.99	Moderate
Austin	\$2.91	\$6.21	Strong
Beaumont	\$4.54	\$3.52	Weak
Brownsville	\$3.51	\$2.72	Moderate
College Station	\$4.22	\$3.41	Moderate
Corpus Christi	\$3.45	\$4.24	Moderate
Dallas	\$2.63	\$3.04	Moderate
El Paso**	\$4.17	\$3.82	Moderate
Fort Worth	\$3.94	\$4.02	Moderate
Garland	\$4.30	\$4.07	Moderate
Houston	\$3.79	\$4.32	Moderate
Huntsville	\$3.50	\$2.69	Moderate
Katy	\$2.88	\$2.58	Moderate
Laredo	\$2.35	\$1.71	Moderate
Lubbock	\$6.27	\$4.56	Weak
Pasadena	\$2.75	\$3.46	Moderate
Plano	\$3.49	\$2.22	Weak
San Antonio	\$2.26	\$2.59	Moderate
Tyler	\$2.91	\$1.98	Moderate

*Calculations include monthly fees and exclude wastewater charges. Prices were calculated using: a 5/8 meter; summer rates where applicable; inside city limits rates where applicable.

** Information from El Paso Water Utility; assumes customer’s winter consumption was city-wide average.



Goals: Efficiency doesn't happen by accident

Setting an ambitious efficiency goal and making the public aware of that goal is one important component of a water efficiency program. Cities in the United States and around the world have used public water-use reduction goals effectively.

In 1995 the city of Albuquerque, New Mexico adopted a water conservation program that included a goal of reducing per capita water use by 30 percent by 2004, a decrease of 75 gallons per capita per day (gpcd) over just 9 years.¹ The utility has successfully reduced its gpcd from 252 in 1994 to 161 in 2008. The Albuquerque Water Utility Authority is continuing to work to reduce its water use even further.

Texas law requires water utilities that are mandated to create and submit to the State of Texas water conservation plans to set specific, quantifiable five- and ten-year goals for water savings, including goals for municipal use in gallons per capita per day (gpcd). In 2004, a state water conservation task force created by the Texas Legislature recommended that water utilities reduce their per capita water use by a minimum of 1% per year until their water use reaches 140 gallons per capita per day.² This goal was a compromise for a large state with widely varying rainfall patterns—many cities are able to get water use below this 140 gpcd target.

Municipalities are likely to see an ongoing reduction in per capita water use as new water-conserving fixtures and appliances are phased in. A state law passed in 2009 requires that all toilets sold after 2014 be “high-efficiency toilets” that use 20% less water than the current standard. Federal law also requires that all washing machines currently sold be more water efficient than conventional top-loading machines. The decrease in water use resulting from the gradual phasing in of these new appliances and fixtures will help make the recommended minimum one percent annual reduction a readily achievable goal.

Unfortunately, many of Texas' water utilities have set weaker goals than the task force's 1% annual reduction/140 gpcd recommendation. Several cities project quite modest decreases, even though their water use remains significantly above 140 gpcd. It seems unlikely that a water utility would achieve any kind of significant increase in water use efficiency without making a commitment, in the form of a clear goal, to do so.

Our Recommendation:

Water utilities with relatively moderate rates of water use should set five and ten year goals that meet the 1% annual reduction/140 gpcd recommendation made by the task force. Utilities with higher rates of water use should set more aggressive goals. Texas's water resources are limited; establishing adequate conservation goals should be a prerequisite for the granting of new rights to state water or access to state funding for new supplies.

What is “gpcd”?

Gallons per capita per day (gpcd) is a common approach to calculating water use. It includes the water we use at our homes (both indoors and out), as well as in schools, restaurants, and workplaces. Many factors can influence how much water a given city uses, including climate, land use patterns, amount of commercial activity, the number of leaks in the distribution infrastructure, and the effectiveness of the city's water conservation program.

The simplest way to calculate gpcd is to determine the number of gallons a city uses every day and divide it by total population. In practice, gpcd figures from different sources are likely to have been calculated somewhat differently. The Texas Water Development Board's water use survey figures do not include water used for heavy industry or manufacturing. Many cities also choose to exclude reused wastewater from their gpcd calculations in order to reduce their gpcd on paper. There is a real need to standardize the methods for calculating gallons per capita per day so that comparisons may be more accurately made across cities.



Evaluations: Our rankings are generally based on the state Water Conservation Implementation Task Force recommendation made in 2004 that water utilities reduce their per capita water use by a minimum of 1% per year until per capita water use reaches 140 gallons per capita per day.

Strong: Cities with goals *clearly exceeding* the task force's 1% annual reduction/140 gpcd recommendation.

Moderate: Cities with goals that *meet but do not clearly exceed* the task force's 1% annual reduction/140 gpcd recommendation.

Weak: Cities with goals that *do not meet* the task force's 1% annual reduction/140 gpcd recommendation. Cities with goals over 200 gpcd. Cities whose goals allowed for an increase. Cities without an approved conservation plan.

	Current GPCD*	5-year goal*	10-year goal*	Evaluation	Notes
Arlington	161	153	146	Moderate	Meets the 1% reduction goal, further reductions encouraged.
Austin	170	156	150	Moderate	Meets the 1% reduction goal, further reductions encouraged.
Beaumont	183	181	140	Strong	Exceeds the 1% reduction goal, further reductions encouraged. Beaumont's projected improvements in GPCD are largely based on its current program of improving its leaky distribution system.
Brownsville	124	120.9	114.9	Strong	Exceeds the 1% reduction goal, further reductions possible with strong conservation programs.
College Station	137	137	137	Moderate	Meets the 140 gpcd goal, but does not plan for further reductions.
Corpus Christi	234	223	212	Weak	Meets the 1% reduction goal but per capita water use remains over 200, which is very high.
Dallas	240	227	223	Weak	Does not meet the 1% reduction goal. Per capita water use remains the highest in our survey and much more can be done.
El Paso	133	140 or below	140 or below	Weak	Current water use is low but 10-year goal allows for increase.
Fort Worth	192	179	170	Moderate	Meets 1% reduction goal, further reductions encouraged
Garland	161	157	154	Weak	Does not meet 1% reduction goal
Houston	140	137	136	Moderate	Houston's goal meets the task force's 140 gpcd target, but given the city's lack of a serious efficiency program, we think Houston could set a more ambitious goal.
Huntsville	206	204	184	Moderate	Meets 1% reduction goal, further reductions encouraged.
Katy	182	175	170	Weak	Does not meet 1% reduction goal.
Laredo	190	170	150	Strong	Exceeds the 1% reduction goal but further reductions encouraged.
Lubbock	190	180	170	Moderate	Meets 1% reduction goal, further reductions encouraged.
Pasadena	121.79	2%	5%	Strong	Currently exceeds the 140 gpcd goal and plans for further reductions.
Plano	--	--	--	Weak	Plano's conservation plan was ruled incomplete by TWDB.
San Antonio	NA	110/ 120/ 133	106/ 116/ 126	Strong	San Antonio has ambitious GPCD goals and a strong track record of meeting its goals. It uses a dry year/normal year/wet year format for expressing these goals, a logical choice for a city where a significant amount of water use is for outdoor landscaping.
Tyler	176.33	167.5	149.8	Strong	Exceeds the 1% reduction, further reductions encouraged.

*The figures given here are from each city's current water conservation plan. As the cities created these plans at different times, the 5-year goals and 10-year goals do not necessarily refer to the same chronological years. This information is available in the appendix.



Toilet replacement: A new throne for every home

All toilets are not created equal—the humble commode has seen incredible technological improvements over the past half-century. Toilets created prior to the 1950s used roughly 7 gallons per flush. The “water saving” toilets of the 1980s needed around 4 gallons to flush. After 1992, all toilets sold in Texas were required to use 1.6 gallons per flush or less. And today, the “high efficiency” or “dual-flush” toilets use an average of 1.28 gallons per flush or less.

Toilets last for a long time—the typical lifespan is 25 years, but a given toilet can last as long as fifty years—and many of the older, less efficient models are still in use. Water utilities across the country have begun to speed up the replacement rate through various types of incentive programs. When pre-1992 toilets are replaced with dual-flush models, these programs provide reliable savings to the water utility of roughly 12,000 gallons a year per household.

The 2004 Water Conservation Implementation Task Force recommended that water utilities do retrofits on at least 5% percent of eligible units each year. Within ten years of implementing a program, the utility should aim to retrofit at least 50 percent of eligible single-family homes and multi-family units with the most efficient toilets.¹

These retrofit programs can work in various forms: Cities can make toilets available for free or at a reduced price, or make retrofitting mandatory upon resale. Most of the cities in Texas with toilet retrofit programs are installing high-efficiency toilets that average 1.28 gallons per flush. Cities need to design these programs carefully to ensure they speed up the natural replacement cycle and evaluate them regularly to ensure their continued cost-effectiveness.

When well-designed, toilet replacement programs achieve reliable and cost-effective savings. For example, the Fort Worth Water Department has estimated that the 7,000 toilets it intends to replace this year will save 85 million gallons of water annually and will cost the city just \$0.33 per thousand gallons. This compares favorably to what the city estimates it will cost to get water from the new reservoirs proposed through the regional water planning process.² As a bonus, the Water Department will have less wastewater to treat.

Our Recommendation:

All major Texas water utilities should tap into this low-priced and reliable water source by replacing as many of the pre-1992 toilets in their service area as is practical and cost-effective.



The Austin Water Utility estimates that roughly three-quarters of the pre-1992 toilets in its service area have already been replaced—many through the city’s various programs—but that 142,000 higher-flush toilets remain in use today.³ Given that Austin has one of the most aggressive toilet replacement programs in the state, one can assume that the percentage of older toilets still in use elsewhere is likely to be higher.

Evaluation: To earn a Strong ranking, a city needs to be doing retrofits on roughly 5% of eligible units annually, following the Water Conservation Implementation Task Force recommendation. A city that has, or has had, any kind of ongoing toilet replacement program earned a Moderate ranking. A city with no toilet replacement program earned a Weak evaluation.

	% of housing units in city limits built prior to 1992*	# toilets replaced annually**	Evaluation	Notes**
Arlington	71%	600	Moderate	
Austin	69%	20,000	Strong	The Austin Water Utility has replaced a total of 137,000 toilets through its various programs.
Beaumont	85%	0	Weak	
Brownsville	66%	0	Weak	
College Station	58%	0	Moderate	College Station has \$8,000 budgeted for a pilot toilet replacement program in 2010.
Corpus Christi	80%	0	Weak	
Dallas	82%	4,200	Moderate	DWU has replaced roughly 13,000 toilets since its voucher program began in July 2007.
El Paso	76%	0	Moderate	Between 1991 and 2007 El Paso changed out a total of 54,000 toilets, but the replacement program recently has been phased out.
Fort Worth	66%	7,000	Moderate	Fort Worth started its program in the fall of 2009.
Garland	83%	50	Weak	Garland has occasional toilet trade-in events, but not an ongoing program.
Houston	80%	0	Weak	With close to 600,000 housing units dating from before 1992, there is strong potential for a toilet replacement program in Houston.
Huntsville	67%	0	Weak	
Katy	Data not available	0	Weak	
Laredo	57%	0	Weak	
Lubbock	73%	0	Weak	
Pasadena	85%	0	Weak	
Plano	55%	0	Weak	
San Antonio	72%	20,000-25,000	Strong	The San Antonio Water System has replaced roughly 120,000 toilets over the 15 years the program has been in place.
Tyler	84%	0	Weak	

*After 1992, all toilets sold in Texas were required to use 1.6 gallons per flush. Even without a toilet replacement program, a percentage of houses built before 1992 have likely already replaced their higher-flush toilets with new models through natural replacement. Estimates in this column were calculated using the U. S. Census Bureau American Community Survey Table S2504: Physical Housing Characteristics for Occupied Housing Units. The 2008 1-Year Estimates were used for all cities except Huntsville, where the data comes from the 2006-2008 3-Year Estimates. The City of Katy is too small to be included in the American Community Survey.

**Information in these two columns column comes from the cities' water conservation plans, the water utilities' websites and conversations with utility staff.



Conservation funding: Money changes everything

Water conservation is generally the most cost-effective way to stretch a city's water supplies. The city of San Antonio estimates it spends an average of \$250 per acre-foot on its efficiency programs, far less than the cost of new water supplies.¹

While water conservation programs are cost-effective, most are not free. In order to make significant improvements in water use efficiency, a utility needs to fund its conservation programs and put staff in place to manage them.

The chart on the next page details the number of water service connections and the amount of funding for water conservation programs for a selection of eight Texas cities which provide retail water service. Comparing the number of connections and the total amount of water conservation funding budgeted by different cities provides additional perspective about the levels of funding committed to boost efficient use of water.

While funding levels are important, it is also important to use the money available effectively to maximize water savings per dollar spent. Some programs, such as tiered pricing structures, can actually generate revenue or have a neutral impact on a utility's bottom line.

Many of the smaller cities in our survey did not have water conservation departments or any staff devoted to conservation efforts. The city of College Station was an exception and shows that even a small staff can implement effective programs. By contrast, Houston, the largest city in the state, did not have a separate conservation department or any staff devoted full-time to water conservation. Over the past five to ten years, cities such as Austin, Fort Worth, and Dallas have significantly ramped up their conservation efforts.

Our Recommendation:

All major Texas water utilities should create water conservation departments and should fund this department adequately. Water conservation should be a separate line-item in the budget and the city should make sure its conservation dollars are being used effectively. More moderately sized utilities should make reasonable commitments of funding and staff to water conservation efforts.



Evaluation: The cities of Austin and San Antonio currently have the highest levels of funding per connection. We rated these cities as Strong. Cities that have water conservation programs with any significant levels of funding were rated as Moderate. Cities without water conservation programs were rated as Weak.

	# of connections	Water conservation budget	Notes	Evaluation
Austin	207,300	\$6,810,301	Austin appears to have the highest level of funding per connection in our survey.	Strong
Beaumont	43,500	No funds budgeted specifically for water conservation. The city does fund a school curriculum and has a small budget for printing informational brochures.	Beaumont also has a multi-year program to improve its leaky distribution system and thus improve water-use efficiency.	Weak
College Station*	35,000	No funds budgeted specifically for water conservation. The city has some funds for publicity and rebate programs and has 1.5 FTEs who work on conservation.	It is unusual for a city of College Station's size to have any staff dedicated to water conservation.	Moderate
Dallas	324,000	\$3,654,811. This includes 1.3M for the "Save Water, Nothing Can Replace It" multi-media ad campaign.	Dallas has a significant budget for conservation programs, but spends less per connection than either San Antonio or Austin.	Moderate
El Paso	198,000	\$861,100	El Paso has a significant budget for conservation programs, but spends less per connection than either San Antonio or Austin.	Moderate
Fort Worth	240,750	\$1,693,283	Fort Worth has a significant budget for conservation programs, but spends less per connection than either San Antonio or Austin.	Moderate
Houston	500,000	No funds budgeted specifically for water conservation. The utility does have public outreach and education staff who work on water education generally.	The largest city in the state needs to step up its conservation efforts.	Weak
San Antonio	347,000	\$5,500,000	San Antonio has a serious conservation program with a high level of funding per connection.	Strong

The information in this table comes from personal communications with staff at each utility. Each city creates its budget somewhat differently and the figures in the conservation budget column may not necessarily be "apples-to-apples" comparisons.



Outdoor watering ordinances: Water wisely

In most Texas cities, total water use rises significantly during the hot and dry summer months, largely due to outdoor landscape watering. The Texas Water Development Board estimates that about half of the water used on landscaping is wasted due to over-watering or runoff.¹

There are many factors influencing how much of a city's water is used outdoors, including climate, lot size, and demographics. Since people generally water far less during the winter, looking at a city's ratio of the volume of water used during summer months compared to the volume of water used during winter months can give insight into how much water is used on landscaping. For example, in the city of Houston the winter/summer ratio is just 1:1.2², indicating a 20% rise in summertime water use. Lubbock may be more typical, with a winter/summer ratio of around 1:1.6.³

Most Texas cities place restrictions on outdoor watering during times of drought, but ordinances regulating landscape watering have also proved highly effective at curbing water use during normal rainfall years. Landscape watering in San Antonio has fallen by 30% from its pre-2000 levels.⁴ The city of Austin estimates that its recent summer watering ordinance saved between 5 million and 9 million gallons of water a day in the summer of 2008.⁵

Outdoor watering ordinances generally come in two forms: a limit on watering during daytime hours and the creation of a weekly watering schedule. Many Texas cities restrict watering during the heat of the day as significant amounts of that water are lost to evaporation. Many homeowners also water their lawns more frequently than is necessary. Experts recommend watering infrequently so grass and other plants will grow deep root systems that will help them during a long, hot summer. Restrictions on how often homeowners can water simply reinforces this beneficial practice.

Many cities, such as El Paso, have also implemented programs where they incentivize heavy water users to replace thirsty lawn grass with native or adapted plants. Other cities, such as San Antonio, are financing research into drought-tolerant grasses and landscape plants. These types of efforts, while important, are not explored in this report.

Our Recommendation:

To insure that water for landscaping is used as effectively as possible, cities should encourage once-a-week watering and should restrict lawn watering to no more than twice a week even during years of normal rainfall. Landscape watering during the heat of the day should be prohibited, subject only to limited exceptions. In order to help reinforce consistent patterns, the time-of-day restriction should apply throughout the year.



Evaluation: Cities with both daytime watering restrictions and weekly watering schedules that apply during non-drought periods were rated Strong. Cities with just a daytime watering limit were rated Moderate. Cities that did not have either of these conservation measures were given a ranking of Weak.

	Daytime watering limit	Weekly watering schedule	Evaluation
Arlington	Yes	No	Moderate
Austin	Yes (summer only for residential, year-round for other users)	Yes (summer only for residential, year-round for other users)	Strong
Beaumont	No	No	Weak
Brownsville	No	No	Weak
College Station	Yes (year-round)	No (voluntary only)	Moderate
Corpus Christi	No	No	Weak
Dallas	Yes (summer only)	No	Moderate
El Paso	Yes (summer only)	Yes	Strong
Fort Worth	Yes (year-round)	No	Moderate
Garland	Yes (year-round)	No	Moderate
Houston	No	No	Weak
Huntsville	No	No	Weak
Katy	No	No	Weak
Laredo	No	No	Weak
Lubbock	Yes (summer only)	No	Moderate
Pasadena	No	No	Weak
Plano	No	No	Weak
San Antonio	Yes (year-round)	No	Moderate
Tyler	No	No	Weak

Information for the table comes from the individual city's websites. Absence of information online about watering ordinances was interpreted to mean that the city does not have restrictions or does not promote or enforce them.



Retrofit programs: Taking advantage of new technologies

Changing out older toilets is not the only way newer technologies can be employed to save water. Newer water-conserving faucets, showerheads, washing machines and the spray-rinse valves used in restaurants all provide opportunities for meaningful indoor water savings. For example, older showerheads can use as much as 5.5 gallons per minute. A standard showerhead purchased today will save customers roughly three gallons per minute, and there are ultra-efficient models on the market that can save consumers roughly four gallons per minute. Energy Star-rated washing machines save 17 gallons per load or up to 7000 gallons a year for an average family.¹ Replacing these types of older fixtures and appliances also saves energy. Less water used means less water that needs to be heated by the homeowner and less water that needs to be treated and pumped by the utility.

San Antonio and Austin have a variety of rebate programs. Both cities have washing machine incentive programs offering customers a \$100 rebate with their purchase of high efficiency models. Dallas Water Utilities offers a \$90 rebate for new, efficient washing machines. Showerhead replacement programs exist in Garland, Arlington and San Antonio. A few cities, including Dallas, San Antonio, and Austin, have programs that provide assistance with leak repairs and retrofits to low-income families.

Reducing overly high water pressure is one way to save water throughout a home. Austin offers a \$100 incentive for existing customers to reduce high pressure while Arlington has a goal of initiating a pressure-reducing valve replacement or rebate program in the future.

Our Recommendation:

Cities—particularly cities seeking new water supplies—should take advantage of these dependable savings by creating cost-effective retrofit programs.

	Non-toilet retrofit programs
Arlington	Yes
Austin	Yes
Beaumont	No
Brownsville	No
College Station	Yes
Corpus Christi	No
Dallas	Yes
El Paso	No
Fort Worth	Yes
Garland	Yes
Houston	No
Huntsville	No
Katy	No
Laredo	No
Lubbock	No
Pasadena	No
Plano	No
San Antonio	Yes
Tyler	No



Educating the public: Awareness is the beginning

All the cities in our survey included some ways of promoting conservation to the public in their conservation plans; however, these programs vary considerably in scope.

The San Antonio Water System has a wide variety of creative outreach programs. For example, the city includes information in customers' water bills that not only informs customers about ways to conserve water, but also compares a customer's water use to average use throughout the city. SAWS also uses the Internet effectively, with in-depth information available on its website and a widely-read weekly email. The conservation staff educates professional landscapers on water-saving plants and methods and has a "Gardening in the Neighborhood" program that targets certain neighborhoods every week. SAWS also has a series of programs for educating students about conservation, these start with second-graders and go on through high school.

Austin has adopted a variety of programs to increase public awareness. For example, the city has teamed up with the Lower Colorado River Authority to work on the Water IQ campaign, a public awareness project that was an outgrowth of the recommendations of the state's Water Conservation Implementation Task Force in 2004. The city has comprehensive information on its website and is working to build an online water audit tool that will help customers analyze their water use. In addition, the city has a speakers bureau, seminars for irrigation professionals and a water theft education program.

Many cities sponsor elementary school curriculums such as Learning To Be WaterWise that are used in 5th and 6th grade classrooms. Corpus Christi's Toby Globy Eco-Action is a bilingual program which targets pre-kindergarten to 2nd grade students. El Paso's "Willie," a water drop mascot, often visits school groups and youth organizations when the El Paso Conservation Department makes presentations.

Many of the cities surveyed provide educational programs on xeriscaping, a method of gardening that reduces the need for supplemental water. Corpus Christi created a Xeriscape Learning Center and Design garden that includes a demonstration garden and educational gazebo with an interactive topographic map of the Nueces River basin.

Smaller cities tend to have less extensive public education and outreach programs. Katy was the smallest city in our sample, and its plan does not include any details on public education and awareness. One exception to the general statement about smaller cities was College Station, which has extensive information available on its website and makes 6,000 direct customer contacts annually.

Our Recommendation:

Educating the public about ways to use water efficiently can reduce water use, build public support for additional conservation measures, and improve a utility's image as a wise steward of our natural resources. Large and moderate-sized utilities should invest in reasonable public education programs.



Conclusion

Our review of the municipal water conservation plans indicates that while progress is being made, there remain several important areas for improvement. In our review, it was clear that two cities stood out as having strong programs in most or all of the measures we looked at: San Antonio and Austin. San Antonio has long been a national leader in water conservation and has achieved impressive success. Austin recently has begun to step up its programs.

Other cities, such as Dallas and Fort Worth, have greatly improved their water conservation programs over the past several years. These two cities can now be said to have initiated moderately strong programs in many of the areas we considered.

The City of Houston, however, had very little in the way of an active conservation program. Given that Houston is actively seeking new water rights and supplies to meet projected future water demands, the city's Public Works Department might be able to address a significant amount of water demands on a more cost-effective basis by ramping up its efforts to achieve more efficient use of existing water supplies.

It was perhaps unsurprising that many of the smaller cities did not have aggressive plans or programs in place. However, there are options for increasing efficiency, such as effectively-tiered pricing systems, that cost very little to implement and save significant amounts of water.

One caveat to our review of water conservation plans around the state is that the programs and components of these plans must be implemented, and implemented effectively. This analysis did not focus on implementation, although some information about whether these programs are actually being put into place is included in this report. Those water suppliers required to develop water conservation plans will now be required to submit annual reports on implementation of the plans to the appropriate state agency, beginning May 1 of 2010. Texans should carefully review these implementation reports to make sure that their water suppliers are living up to the commitments made in their water conservation plans.

Overall, there are still many ways Texas' cities can become more efficient in the way they use water. Cities with levels that soar over 140 gpcd should create, and effectively implement, proactive programs to reduce their per capita water use as improved efficiency is usually the cheapest and most environmentally benign way to provide water for the projected 40 million people projected to live in Texas by mid-century.



Appendix A: Legal requirements for conservation planning

Texas leaders have recognized that municipal water conservation is an important part of planning to meet future water supply needs. Water conservation requirements first appeared in Texas law in the 1985 House Bill 2. Among other provisions, that law stated that the Texas Water Commission (which was later merged into the agency that became the Texas Commission on Environmental Quality) should grant an application for a surface water right only if “the applicant has provided evidence that reasonable diligence will be used to avoid waste and achieve water conservation....”

In 1997, the 75th Texas Legislature signed into law Senate Bill 1, which amended Section 11.1271 of the Texas Water Code.¹ Under this statute, all existing surface water permit holders of 1,000 acre-feet or more for municipal, industrial or other uses, and irrigation permits of 10,000 acre-feet a year or more were required to develop, submit, and implement water conservation plans. These plans were required to be consistent with regional water plans and to include “reasonable water conservation measures.”²

In 2003, the legislature required new or modified water conservation plans to be submitted by May 1, 2005 and to include quantified five-year and 10-year water savings targets.³ Targets must include goals for water loss programs and goals for municipal use in gallons per capita per day. Pursuant to rules adopted by the Texas Commission on Environmental Quality (TCEQ) in response to that 2003 legislation, ongoing updates to plans were required by May 1, 2009, and then every five years thereafter.⁴

Senate Bill 1094 in 2003 created the Water Conservation Implementation Task Force, which included representatives from a broad variety of stakeholder groups. The group was commissioned with developing a guide to best management practices for water conservation. The Task Force also developed a set of water conservation policy recommendations, including a statewide average goal of 140 gallons per person per day or less for all municipal water user groups. The Task Force also recommended that any entity using above that amount should strive for a minimum of a 1% per year reduction in total gpcd until that goal is obtained.⁵

In 2007, the 80th Texas Legislature amended Section 13.146 of the Texas Water Code by requiring retail public water utilities that provide potable water service to 3,300 or more connections to submit a water conservation plan to the Texas Water Development Board (TWDB). These plans were due on May 1, 2009.

A water conservation plan and program is one that contains long-term elements such as ongoing public education activities, universal metering, water accounting and estimated water savings from reuse/recycling activities, leak detection and repair, and other conservation activities. The plans are required by law to establish specific and quantified 5- and 10-year targets and goals, which for municipal use must be in gallons per capita per day, for total water diverted or treated and for water loss; a schedule for implementing the plan to achieve targets and goals; a method of tracking progress and effectiveness of implementation; and a water rate structure which is cost-based and which does not encourage the excessive use of water.⁶ The Water Code also requires an annual report be provided to the TWDB and TCEQ on the implementation of the water conservation plans on May 1 of each year.⁷



Appendix B: Summaries of municipal conservation plans

The information included in Appendix B, in most cases, is taken directly from the conservation plans that were submitted by each city to Texas Commission on Environmental Quality and/or the Texas Water Development Board and should be considered current as of the effective date of those plans. Program changes could have occurred since then. These plans were the starting points for much of the analysis done elsewhere in the report. In some cases city ordinances, websites, and direct contact with the city were used to find information not included in the submitted conservation plans. The City of Plano does not have an approved water conservation plan; therefore a summary could not be provided.

The summaries are included in alphabetical order, by city name:

Arlington
Austin
Beaumont
Brownsville
College Station
Corpus Christi
Dallas
El Paso
Fort Worth
Garland
Houston
Huntsville
Katy
Laredo
Lubbock
Pasadena
San Antonio
Tyler

	Arlington Water Utilities
Total per capita use (GPCD)	161 (2009)
Five-year water savings target (GPCD)	153 (2014)
Ten-year water savings target (GPCD)	146 (2019)
Metering	AWU has a program, developed using American Water Works Association (AWWA) standards, for universal metering, meter testing, meter repair, and periodic meter replacement; planning on an automated meter reading pilot program that will replace 17,000 meters and provide faster leak detection and repair
Leak detection and repair/water loss accounting	Conducts annual water audits; the City will continue to investigate leak detection technologies; AWU and other city department crews report evidence of leaks and pipeline breaks within the distribution system (once identified, leaks/breaks are quickly repaired); customized computer application with ranking system allows AWU to prioritize repairs
Water rate structure	Increasing block rate structure (unit price increases with increasing monthly water use), fixed monthly fee based on meter size which increases as meter size increases, commodity charge per 1,000 gallons which increases as the volume of water increases
Public education/outreach	Promotes the City's water conservation measures; includes billing inserts on water conservation at least once at year (inserts include material from the City, TWDB, TCEQ, and other sources); encourages local media coverage of water conservation issues/importance of; notifies local organizations, schools, and civic groups of presentations on water conservation by AWU staff; distributes information on Texas Smartscape principles/water conservation using brochures and other materials; water conservation information/links available online at www.SaveArlingtonWater.com ; promotes EPA's WaterSense partnership program by encouraging citizens to purchase labeled products; promotes regional/local conservation and education events/literature; public service announcements on radio/TV/newspapers; regional water conservation public education support

<p>School education</p>	<p>WaterWise Program: multidimensional educational curriculum for 5th grade students (working to deploy program within Arlington ISD); Major Rivers Program: targets 4th grade students within Arlington ISD</p>
<p>Retrofit/ rebate programs</p>	<p>Residential high-efficiency toilet replacement program: will identify established neighborhoods with older toilets and offer resident a WaterSense-labeled toilet (goal to install 600 toilets each year); low-flow shower head and sink aerator replacement programs (goal to install 300 shower heads and/or sink aerators each year); pressure reduction in the system of for individual customers: pressure-reducing valve replacement or rebate program offered to qualified participants (goal to have this program adopted within the next year)</p>
<p>Audit programs</p>	<p>Residential irrigation system audits: residents with an average summer monthly usage of 25,000 gallons will be offered a free irrigation system audit (goal to conduct 50 audits each year)</p>
<p>Ordinance requirements/ restrictions</p>	<p>Landscape water management regulations: prohibition of outdoor watering with sprinklers from 10 a.m. - 6 p.m. year-round, requirement that all new irrigation systems include operational rain/freeze sensors, etc.; prohibition on wasting water ordinance: this measure will adopt/enforce an ordinance to prohibit wasteful practices (goal to have ordinance adopted in the next 5 years); restrictions/requirements for irrigation systems and reclaimed water</p>
<p>Water reuse</p>	<p>Plans to be a participating wholesale customer in the City of Fort Worth's reclaimed water project at Village Creek Wastewater Treatment Plant (this project will serve a nearby golf course, sports center, and landfill within the City)</p>
<p>Additional water conservation strategies</p>	<p>Conservation-oriented water rates; ordinances, plumbing codes or rules on water-conserving fixtures; replacement or retrofit of water-conserving plumbing fixtures; reuse and recycling of wastewater; pressure control and/or reduction in the distribution system and/or for customer connections; considerations for landscape water management regulations; monitoring method; additional conservation ordinance provisions</p>

	Austin Water Utility
Total per capita use (GPCD)	170.43 (2009)
Five-year water savings target (GPCD)	156 (2014)
Ten-year water savings target (GPCD)	149.95 (2019)
Metering	Universal metering; wholesale customer meters routinely tested; considering using SCADA system
Leak detection and repair/water loss accounting	AWU performs leak detection/contracts for leak detection services to locate subsurface leaks in water distribution system, reported leaks are located using sounding equipment, repair information entered into database; AWU's Water Loss Audit Report follows TWDB's recommendation; Water Accountability Committee: responsible for annual water loss audits, uses Infrastructure Leakage Index (ILI) to measure water loss
Water rate structure	Non-promotional water rate structure: increasing block rate structure for single-family residential water billing; water rates for multi-family, industrial/commercial/institutional, and golf course customers do not increase with the volume of water used; wholesale customers have separate rates
Public education/outreach	Advertising in local media sources; "WaterWise Newsletter" e-newsletter; water conservation presentations given to interest groups; Water Conservation Speakers Bureau allows groups to schedule a speaker; WaterWise Irrigation Professionals Seminar offered to licensed professional irrigators and aspiring license-holders, promotes water-efficient irrigation systems; water conservation tips/links on webpage; Peak Day Management Campaign: mandatory watering days, year-round restrictions, watering schedule; Water Waste Program: customers are offered assistance in irrigation system repair, fines/citations for a failure to respond, 3-1-1 information hotline; Water Theft Education Program; Water IQ: educates customers about source of water supply; Online Water Audit Tool: will help customers analyze their water use

<p>School education</p>	<p>City of Austin and AISD developed a water wise educational curriculum program: 5th grade Water in Our World curriculum, 6th grade Down the Drain program; AISD’s Environmental Stewardship Envisioning Committee promotes stewardship for campuses, facilities, etc.</p>
<p>Retrofit/ rebate programs</p>	<p>Water Conservation Division offers \$100 incentive for existing customers to reduce high pressure; AWU offer rebates for WaterWise trees, bushes, and shrubs for high-volume customers using 20,000 gallons/month during the summer; AWU offers rebates for rainwater harvesting systems for residential/commercial properties (offers a rebate for new rain barrels, sells them for discounted price)</p> <p>Residential: offers free toilet program/rebate program for homes constructed prior to 1992 (replaces up to 3 inefficient models with high-efficiency models); offers free low-flow shower heads and faucet aerators to all customers; offers \$100 rebate toward the purchase of efficient clothes washers; HELP Program: will provide free water-saving plumbing repairs for low-income AWU customers in single-family homes and duplexes; Direct Install Toilet Program: will provide high-quality, high-efficiency toilets and qualified installation at no cost to multifamily properties.</p> <p>ICI: offers toilet replacement options, rebates for high-efficiency washing machines, and rebates for installation of new water-saving equipment; offers free-pre-rinse spray valve replacements</p>
<p>Audit programs</p>	<p>Free irrigation audit program for high-volume water users (also free for residential/commercial customers); AWU offers free multifamily/commercial audits of overall water consumption ICI: offers free restaurant water audits</p>
<p>Ordinance requirements/ restrictions</p>	<p>Restrictions/requirements for plumbing fixtures (postponed), submeter installation, inefficient fixtures, cooling tower management, car wash facilities/equipment, commercial clothes washers, water use management, residential/commercial irrigation systems, landscape soil-depth, a WaterWise landscape option, analyses of irrigation systems (put on hold)</p>
<p>Water reuse</p>	<p>All but one City-owned golf course use raw or reuse water for irrigation; uses about 3 MGD (about 3% of wastewater received at wastewater treatment plants) and plans to expand to 5.95 MGD</p>
<p>Additional water conservation strategies</p>	<p>Ensure funding for leak detection contract; ensure funding for reclaimed water projects; adjust utility water rates to encourage conservation (implementation of new rate structure delayed); require conservation by wholesale customers; explore alternative water sources (gray water); increase water efficiency in City facilities (ensure compliance with mandatory watering schedule); reduce excessive water use due to high pressure (offers incentive); establish program to alert customers of potential leaks during winter months; expand public education program; create Citizens’ Advisory Group on Water Conservation; enhance water theft prevention</p>

	City of Beaumont
Total per capita use (GPCD)	183 (2007) 194 (2008) - Not used for analysis due to salt water intrusion caused by Hurricane Ike that required extensive flushing for over 2 months
Five-year water savings target (GPCD)	181 (2009)
Ten-year water savings target (GPCD)	140 (2018)
Metering	2000 - City started conducting an annual test of all its meters 3 inches and larger. This program will continue to be a part of the standard operations.
Leak detection and repair/water loss accounting	City executed a contract with ADS Environmental Services to identify leaks in distribution system; this program started in February 2007 and was completed in April 2008. The leaks found have been repaired by City forces. The City is in the process of buying leak detection equipment to conduct daily in-house leak detection.
Water rate structure	Flat rate structure
Public education/outreach	Adopted a five year educational program (2009 through 2013) that will continue to educate the public by presenting brochures at community centers, town hall meetings, schools and entertainment festivals.
School education	The City is sponsoring water conservation school programs and projects.
Retrofit/rebate programs	No current retrofit or rebate programs exist.

<p>Audit programs</p>	<p>The City will conduct a self audit for all its facilities every two years.</p>
<p>Ordinance requirements/ restrictions</p>	
<p>Water reuse</p>	<p>Currently no water reuse programs in place.</p>
<p>Additional water conservation strategies</p>	<p>In 2000 the City adopted an aggressive water line replacement program which continues to replace approximately 20,000 linear feet of water lines/year that are corroded or unlined cast iron.</p> <p>In the next five years the City will continue to include inserts in the water bills to educate the public on water conservation.</p> <p>The City of Beaumont Code Enforcement section adopted the use of plumbing fixtures that promotes water conservation and will continue to enforce such measures.</p>

	Brownsville Public Utilities Board
Total per capita use (GPCD)	124 (2008)
Five-year water savings target (GPCD)	120.9 (2014)
Ten-year water savings target (GPCD)	114.9 (2019)
Metering	<p>BPUB has a policy that all water users, including BPUB uses and water supply sources, be metered; universal metering. BPUB test and replaces meters based on information obtained from the BPUB's Customer Service Department's High and Low Program and Meter Reader Reports. Meters are tested and replaced based on low or no consumption, leaks, high consumption (wear and tear on the meter), and age. Meters two inches and larger are tested and replaced based on information obtained by the BPUB Customer Service Department, wear and tear on the meter, and age. Meters that do not meet BPUB policy accuracy limits of 95% to 101.5% are replaced.</p> <p>BPUB's long-range goal is to complete the installation of the Automatic Meter Reader.</p>
Leak detection and repair/water loss accounting	<p>BPUB will continue to undertake the following actions to prevent leaks: complete the Elevated Water Tank Repair Project and continue to periodically repair and conduct maintenance on the elevated water tanks; continue the Leak Detection Program of the distribution system and inspect the transmission and delivery system on a yearly basis; continue Valve Maintenance/Location Program to facilitate system shut offs, the program includes annual inspection and operation of valves that are 12 inches or larger; continue to use records of leak frequency as a guide to determine the cost effectiveness of line replacement.</p>
Water rate structure	Inverted or increasing block structure to promote water conservation
Public education/outreach	<p>Water Conservation Education Program with the theme, "Get Water Wise." Program includes a Water Smart Garden, public workshops, classroom presentations, radio, television and newspaper advertising, and distribution of water conservation material.</p> <p>Annual Water Conservation Public Information Campaign - includes Brochures and bill inserts; Bill Messages (water conservation and water rate information will be included); BPUB website (where water conservation and water savings tips and mandatory water conservation restrictions can be found); Media (press releases, editorials and/or advertisements targeting one particular household-water using utility or item, and methods for conserving water will be submitted to the local media for possible publication)</p>

<p>School education</p>	<p>BPUB expanded its water conservation school education program to include school presentations to promote water conservation; targets grades 1 through 6</p>
<p>Retrofit/ rebate programs</p>	<p>Currently the BPUB conducts Water Conservation Workshops to groups upon request; also distributes leak detection dye tablets and toilet bags to customers at no cost.</p> <p>As a long-range goal, the BPUB plans to conduct a needs assessment study to expand its retrofit program to include water conservation kits - items that may be included in the kits are faucet aerators, low flow showerheads, dye tablets and toilet bags.</p>
<p>Audit programs</p>	<p>Obeying the Texas Legislature Texas Water Code, BPUB conducts a water audit at least every five years. Latest one was in December of 2007. BPUB will complete the Water Audit Reporting Form based on 2009 data and will submit the form to the TWDB by May 1, 2010 and annually thereafter as required.</p> <p>Within the first year of implementation of the Conservation Plan, BPUB will implement a number of applicable pending projects and programs recommended in the 2007 Audit. By December 2012, BPUB will complete another Water Distribution Audit to comply with the requirement that a water loss audit be conducted every five years.</p>
<p>Ordinance requirements/ restrictions</p>	<p>Ordinance adopted in 1999 states:" No more than 50 percent of the area of the visible "landscape improvements" shall include lawn(s) containing grass.</p> <p>Section 288.5 of the TCEQ rules and regulations requires that wholesale water supply contracts adopt the Water Conservation Plan. The BPUB contracted with its two wholesale customers, El Jardin Water Supply Corporation and Brownsville Navigation District before Section 288.5 went into place and will therefore incorporate the requirements upon renewal or major amendment to these contracts.</p>
<p>Water reuse</p>	<p>Currently no water reuse programs in place.</p>
<p>Additional water conservation strategies</p>	<p>In May 1999, BPUB installed a "Water Smart" demonstration garden in front of the BPUB Administration Building adjacent to a bus stop and middle school; It is a demonstration garden that includes drought tolerant plants and best water conservation practices in landscaping.</p> <p>The City of Brownsville has adopted the 2000 International Plumbing Code which includes water conservation requirements for new construction and renovations.</p>

	City of College Station
Total per capita use (GPCD)	137 (2008)
Five-year water savings target (GPCD)	137 (2013)
Ten-year water savings target (GPCD)	137 (2018)
Metering	<p>Universal metering: All service connections in the City are metered; all production wells, pumping stations, interconnections, irrigation, swimming pools, parks, and municipal structures operated by the City are metered.</p> <p>Meters at water production pumps stations are calibrated and tested annually in accordance with American Water Works Association (AWWA) standards to provide a minimum accuracy of plus or minus five percent.</p>
Leak detection and repair/water loss accounting	<p>Leak detection and repair program that features a work order prioritization system for leaks needing repair and an inventory of equipment and materials needed to promptly repair all detected or reported leaks. The City's annual rehabilitation program to upgrade its water distribution system also addresses high volume leaks. The City also conducts an annual distribution system rehabilitation program that replaces the high water loss sections of the distributed system.</p> <p>City has a goal of maintaining unaccounted-for water at or below 10%. City will continue to meet this target and investigate ways to improve water accountability at or above 90%.</p>
Water rate structure	<p>Inclining water rate structure; current rate structure charges monthly service charges based on meter size, plus a uniform rate per thousand (1000) gallons up to 10,000 gallons. After 10,000 gallons, the rate per thousand increases \$0.60 per thousand gallons per 5000 block up to 26,000 gallons. All residential usage above 26,000 gallons is billed at a uniform rate of \$4.86 per thousand (1000) gallons.</p>
Public education/outreach	<p>Public education program typically makes at least 6,000 direct customer contacts each year through presentations, booths at community fairs, and plant tours. The City: makes water conservation information available to new customers, makes residential water audits available to all customers, provides exhibits at public events, publishes water conservation information in the City's utility bill insert, participates in community environmental education activities with the City of Bryan and other local organizations, supports annual events and demonstrations relating to water conservation.</p>
School education	<p>The City coordinates educational presentations, lectures, and demonstrations for schools. The City also provides book covers with a water conservation message for College Stations ISD students.</p>

<p>Retrofit/ rebate programs</p>	<p>The City is evaluating the feasibility and cost effectiveness of implementing an Ultra-Low Flow (ULF) rebate program or similar incentive program that would offer cash rebates or other incentives to water customers that replace old toilets, showerheads, and other fixtures with new ULF models. The City is hopeful to have rebate programs enacted FY 09-10.</p>
<p>Audit programs</p>	<p>The Water Services Department generates a monthly water loss report that compares metered production with metered consumption, as well as accounted-for and unaccounted-for water losses. The City will also complete a detailed water system audit following TWDB guidelines at least once each year.</p>
<p>Ordinance requirements/ restrictions</p>	<p>The City has adopted the International Plumbing Code, which requires the use of water saving, Ultra Low Flow (ULF) fixtures to be installed in new construction and in the replacement of plumbing in existing structures.</p>
<p>Water reuse</p>	<p>City hopes to complete the first phase of its water reuse program by 2011 which includes extending reclaimed water infrastructure to the City's two main parks: veterans park and Athletic Complex, and Central Park.</p>
<p>Additional water conservation strategies</p>	<p>The City provides information about the methods and benefits of water conserving landscaping practices and devices, through public education to homeowners, business owners, landscape architects and designers, and irrigation professionals. Methods encouraged include: the use of Xeriscape and "Water Wise" landscaping techniques, the use of drip irrigation systems, making sure that ornamental fountains and similar water features are designed to recycle water, and working with area landscape supply businesses and nurseries to encourage them to sell locally adapted, drought tolerant plants and grasses.</p>

	Corpus Christi Water Department
Total per capita use (GPCD)	234 (2008)
Five-year water savings target (GPCD)	223 (2013)
Ten-year water savings target (GPCD)	212 (2018)
Metering	The City has initiated an Automatic Meter Reading (AMR) Program to accurately record usage and integrate data into their billing system (more than 65% of the City's water meters have been installed with this technology); plans to use SCADA technology; metering required of all connections (fully implemented metering BMP)
Leak detection and repair/water loss accounting	Water department tracks leak detection/repair activities and evaluates its success using the asset management software; plans to incorporate AWWA M36 Water Audits and Leak Detection Manual recommended methodology
Water rate structure	Increasing block rate structure for residential customers: recovers the cost of providing service and billing for water based on actual metered water use (rates include a consumption charge where the highest-volume users pay the highest prices)
Public education/outreach	Water conservation programs are directed to the general public through media awareness campaigns, demonstration gardens, public events, and partnership with other entities; a \$76,700 budget funds a multi-tiered media campaign (radio/TV/print); billboard advertisement is used to promote the City's water conservation campaign; the City's website includes indoor/outdoor conservation tips, etc.; printed brochures about xeriscaping are available to the public (one contains information on Purple Water-Wise Plant Labels, which are affixed to drought-tolerant plants at retail nurseries); Xeriscape Learning Center and Design Garden: includes a demonstration garden with more than 100 plant varieties, an educational gazebo, The Water Story Exhibit, showcases, an 8-foot interactive topographic map of the Nueces River Basin, a second gazebo that features practical landscape ideas/photographs, and educational Walk 'n' Talk Tours; City Call Center allows customers to request water conservation kits and information

<p>School education</p>	<p>A \$33,000 budget funds school programs; Major Rivers: incorporated into the 4th grade curriculum; Toby Globy Eco-Action: targets pre-kinder-2nd grade students (bilingual program); Learning to be Water Wise: used in 5th grade classrooms, provides kits with faucet aerators, toilet leak detector tablets, etc.; Workshop for Daycare Teachers; Water Source Book: includes activities/experiments for grades 6-8; Coastal Bend Teacher Resource Extravaganza: provides environmental resources to teachers; Museum of Science and History: offers guided tours to school groups; the City provides teaching materials at public events; Tour of the Water Treatment Plant: student groups are offered tours; Water IQ: the City plans to adopt the TWDB's new educational program targeting middle school students by 2010</p>
<p>Retrofit/ rebate programs</p>	<p>Plumbing assistance: the City is developing an affordability program to provide plumbing assistance to low-income residential customers seeking to repair plumbing fixtures in their homes</p>
<p>Audit programs</p>	<p>Top-down water audit, using existing records and some estimation, and bottom-up audit (performed at least once every five years per the requirements of HB 3338)</p>
<p>Ordinance requirements/ restrictions</p>	<p>Prohibition on wasting water: restrictions for decorative water fountains, irrigation systems/practices, etc.; the City has adopted a Landscape Ordinance that encourages efficient water use; plans to evaluate the adoption of a rain sensor ordinance; may require ET controllers on new/refurbished irrigation systems; plans to incorporate various BMPs; restrictions/requirements for irrigation systems, washing of cars, boats, etc., fire hydrants, ornamental fountains, washing of paved surfaces, water provided at restaurants, water used for dust control, scenic ponds/lakes, and meter connections</p>
<p>Water reuse</p>	<p>The City will explore the potential of expanding irrigation of golf courses with reclaimed wastewater (2-3% of treated wastewater is currently reclaimed to irrigate golf courses and a baseball field)</p>
<p>Additional water conservation strategies</p>	

	Dallas Water Utilities
Total per capita use (GPCD)	
Five-year water savings target (GPCD)	227 (2010)
Ten-year water savings target (GPCD)	223 (2015)
Metering	Universal metering; all meters are tested/calibrated; periodic meter replacement occurs at 10/15-year intervals
Leak detection and repair/water loss accounting	Has an extensive leak detection and repair program, currently has \$13.6 billion budget for maintenance of distribution system; operates 23 four-person repair crews and a two-person crew for hard-to-find leaks; utilizes Fluid Conservation Systems (FCS) leak detection units
Water rate structure	Non-promotional water rate structure: increasing block structure, customers are billed a water meter service charge which increases their meter sizes, customers are billed for water usage (increased usage=higher unit cost for water); wholesale customers have rates as well
Public education/outreach	Multi-media Public Awareness Campaign: educates residents about water conservation through print, radio, billboards, television, direct distribution of materials, special events and exhibits, and the internet; Water-Wise Landscape Tour of Homes & Awards Program: showcases water-efficient landscapes, seminars for homeowners offered every spring/fall on low-water-use plants; water bill inserts (include water conservation tips); brochures (bilingual) about water-saving landscapes, irrigation practices, etc.; speakers, films, and presentations available to the public; Drinking Water Week: promotes the benefits of water conservation; DWU website provides tips, publications, etc.; restrooms in DWU and major City of Dallas buildings contain water conservation signs; Xeriscape Program
School education	Environmental Education Initiative (EEI): designed to educate schoolchildren about water conservation and solid waste recycling, hands-on presentations and curriculum for K-12th grade students; DWU provides water educational book covers, presentations, and a poster contest, curriculum aids/materials, and a summer mural art contest

<p>Retrofit/ rebate programs</p>	<p>Minor plumbing repair program (MPR): offers free assistance to low-income families with minor plumbing problems/fixtures that may cause water waste (includes toilets, shower heads, faucet aerators, and water heaters); “New Throne for Your Home” toilet voucher program: offers up to \$90 per toilet to replace existing high-flow toilets with efficient models (for DWU customers with homes built before 1992); “Spray to Save!” Pre-Rinse Spray Nozzle Program: DWU provides free low-flow nozzles/aerators for restaurants (includes free installation/training, evaluations for toilet replacements, leaky faucets, etc.); Rain and Freeze Sensor Rebate Program (expired in 2004)</p>
<p>Audit programs</p>	<p>Irrigation System Inspection Program: DWU offers free automatic sprinkler system check-ups; Cooling Tower Audits Program: offers evaluations/inspections/recommendations</p>
<p>Ordinance requirements/ restrictions</p>	<p>Lawn and landscape irrigation: violations punishable by fines for water waste due to sprinkler system leaks, runoff, operation from 10 a.m. - 6 p.m., etc.</p>
<p>Water reuse</p>	<p>2004 project provided direct reuse water to City-owned golf course for irrigation; Recycled Water Implementation Plan aims to provide reclaimed water to meet peak day demand of 18.25 MGD by 2010 (also projects indirect reuse to be 120 MGD); DWU sells wastewater treatment plant effluent to customers at a discounted rate</p>
<p>Additional water conservation strategies</p>	

	El Paso Water Utilities
Total per capita use (GPCD)	133 (2008)
Five-year water savings target (GPCD)	Maintain a level at, or below 140 gpcd until 2020
Ten-year water savings target (GPCD)	Maintain a level at, or below 140 gpcd until 2020
Metering	Universal metering for both customer and public uses; all metering devices are accurate to better than 5% within the designated flow range of the instrument; meter accuracy is verified by ongoing testing and a program of meter replacement; meter replacement program is a long-term plan to replace meters at a rate that maintains a ten year average meter age
Leak detection and repair/water loss accounting	Maintained a water loss rate of less than 10% for the last 7 years; 8.61% unaccounted for water in 2008; has a leak detection program (has saved more than 700 million gallons of water/year); Permalog system utilizes over 10,000 leak detection units throughout the water distribution system to monitors for leakage using acoustic-based monitoring techniques; when a leak is identified, the unit will send a signal to the EPWU staff with the location of the leak
Water rate structure	Non-promotional rate structure: increasing block rate structure; charges for water service are based on the customer's average winter consumption (AWC), which is the average of the amount of water used during the previous December, January, and February billings
Public education/outreach	The Carlos M. Ramirez Tech2O Center (in its second full year of operation as a water education facility) - the Center serves educators, students, policy makers and the public by providing meeting places and resources to promote the understanding and study of water and water issues. This Center includes a 250-seat auditorium, a training center, interactive exhibits, and display and demonstration projects. The Water Conservation Department also offers brochures and conservation literature for all age groups; these materials are available to teachers and civic organizations who want more information on water efficient landscaping, free services and incentive programs offered to customers, and conservation tips for every household.

<p>School education</p>	<p>The El Paso Water Utilities Water Conservation program holds workshops and training sessions throughout the community on various subjects related to water conservation; there were 182 presentations made to local schools and community groups during the FY 08-09, with a goal set at 200 for FY 09-10; The Conservation Department makes presentations to school groups and youth organizations that often include a visit by EPWU "Willie" the water drop mascot. Development of the "Willie" character has allowed greater visibility in promoting water conservation.</p>
<p>Retrofit/ rebate programs</p>	<p>No current retrofit or rebate programs exist.</p>
<p>Audit programs</p>	<p>No current audit programs exist.</p>
<p>Ordinance requirements/ restrictions</p>	<p>Residential watering is not allowed on Mondays, even numbered addresses are allowed to water on Tuesdays, Thursdays and Saturdays while odd numbered addresses, as well as schools, parks, cemeteries and industrial sites are allowed to water on Wednesdays, Fridays and Sundays; From April 1 through September 30, outdoor watering is allowed only before 10:00 a.m. or after 6:00 p.m.; "Wasting water" is prohibited and defined as including: Landscape watering on the wrong day and/or wrong time, Allowing water to flow into public right of way or storm water drainage system, Failure to repair a leak within five working days of the discovery of the same, Washing down impervious surfaces, except in emergencies to remove spills of hazardous materials or eliminate dangerous conditions.</p>
<p>Water reuse</p>	<p>Wastewater within the EPWU service area is collected and treated at one of four EPWU wastewater reclamation plants using advanced secondary or tertiary treatment; high water quality earned EPWU the reputation of operating the first wastewater treatment plant in the world to meet drinking water standards for its reclaimed water; supplies golf courses, city parks, school grounds, apartment landscapes, construction, and industrial sites with over 5.25 million gallons/day of reclaimed water; also used for the operation of treatment plants (in-plant use) and to recharge the Hueco Bolson through injection wells and infiltration basins; goal for reuse water is to increase water reuse from 10% of total wastewater to 15% during the next ten year planning period (CY 2020)</p>
<p>Additional water conservation strategies</p>	

	Fort Worth Water Department
Total per capita use (GPCD)	192 (2008)
Five-year water savings target (GPCD)	179 (2015) Wholesale customer target: 180 (2015)
Ten-year water savings target (GPCD)	170 (2020) Wholesale customer target: 175 (2020)
Metering	Universal metering, meter testing, meter repair, and periodic meter replacement are in place and have been developed using AWWA standards; implemented a meter exchange program that provides for the annual replacement of meters in the system that do not register accurate water flow (replaced more than 49,000 meters since 2006)
Leak detection and repair/water loss accounting	Conducted the first International Water Association (IWA) standard water audit in Texas: the system water audit can be used to monitor the total level of non-revenue water in the system; the audit evaluates the marginal costs and costs of service, so analyses can help develop the cost-benefit scenarios (conducted annually); uses state-of-the-art technologies/techniques to search for leaks; utilizes field technicians/acoustic leak-noise detectors to target leaks
Water rate structure	Conservation-oriented water rate structures in place (continues to refine rate structures to enhance water conservation); currently operates using a 4-tier residential rate structure and a 2-tier irrigation rate structure
Public education/outreach	Utilizes water bill inserts; participates in educational events promoting water conservation; recently established a Customer Advisory Committee with representation from a spectrum of customer classes/City departments (goal to promote community awareness of the City's plans)
School education	Provides education programs for grades 4-5 in schools within the Fort Worth ISD; programs include: Waterama and Major Rivers for 4th grade and Waterwise for 5th grade; program intended to increase the use of curricula among Fort Worth ISD and other school districts within the city limits and wholesale customer boundaries; program intended to be incorporated regionally through interaction with the Tarrant Regional Water District
Retrofit/rebate programs	Pre-rinse spray valve retrofits will be offered to ICI customers in 2010 in the form of a pilot program

<p>Audit programs</p>	<p>Water/cooling system audits will be offered to ICI customers in 2010 in the form of pilot programs</p>
<p>Ordinance requirements/restrictions</p>	<p>Existing ordinance which prohibits wasting water (watering between 10 a.m. and 6 p.m. year round); irrigation ordinance requires only licensed irrigators to alter existing, or install new irrigation systems within the City</p>
<p>Water reuse</p>	<p>Conducts a small amount of reuse from its Village Creek Wastewater Treatment Plant and is currently investigating a number of other plans (will be developed in more detail by 2015)</p>
<p>Additional water conservation strategies</p>	<p>Piloted District Metered Areas (DMAs) which are part of current BMP leakage control zones; performance indicators/audits will be integrated into the City's water conservation plan to improve accountability/transparency within the system; the City will continue to review the possibilities of pressure control in pilot zones within city limits; City landscape ordinance will include incentives for using native/adapted flora; conducted pilot programs to assess different water-saving methodologies/technologies at athletic fields (synthetic turf, etc.); the City will retrofit various buildings/parks during the next 5 years by installing efficient toilets, faucets, etc.</p>

	City of Garland
Total per capita use (GPCD)	161 (2009)
Five-year water savings target (GPCD)	157 (2013)
Ten-year water savings target (GPCD)	154 (2018)
Metering	Universal metering: the Director shall endeavor to meter all water connections, take monthly meter readings at each pumping station that pumps water into the City's water distribution system, and test all large meters one every 5 years and all small meters as needed (all meters shall be replaced on a 15-year cycle); the meter readings shall be recorded in a record-keeping database
Leak detection and repair/water loss accounting	The amount of unaccounted-for water shall be monitored on an annual basis and maintained below 12% (if amount exceeds 12%, the Director shall take necessary actions); the Director shall monitor water lines by visual inspection and sound amplifiers on a daily basis for potential water leaks; any deficiencies shall result in upgrades/replacements
Water rate structure	Three-tier increasing block rate structure: discourages water waste, replaces the existing uniform rate type structure
Public education/outreach	The Director shall endeavor to: publish information in a newspaper of general circulation in the City like the "City Press," post information on the City's website, provide utility bill inserts highlighting water conservation material, arrange to have water conservation presentations at meetings at the request of the organization, provide water conservation kits for residents who live along replaced water mains, and provide water conservation material and the Texas Smartscape CD at City public buildings
School education	Water conservation presentations at schools
Retrofit/rebate programs	Shower head Replacement Program: provides low-flow shower heads to customers with shower heads greater than 2.5 GPM

<p>Audit programs</p>	<p>No current audit programs exist.</p>
<p>Ordinance requirements/restrictions</p>	<p>The City has established criminal penalties for tampering with, bypassing, or diverting water distributed by the Water Department; the Plumbing Code requires new toilets, shower heads, and faucets be sold to meet reduced water use requirements; it is an offense for an owner or employee of a food service establishment to serve water to a patron unless requested by the patron; restrictions/requirements for lawn and landscape irrigation and rain sensing devices and freeze gauges</p>
<p>Water reuse</p>	<p>Treated wastewater plant effluent is reused at the City's two wastewater treatment facilities for plant wash down, on-site plant irrigation, and chlorination/dechlorination; additional reuse includes diversion of treated effluent to a local power plant; the Director shall continue to identify additional opportunities for reuse</p>
<p>Additional water conservation strategies</p>	

	City of Houston
Total per capita use (GPCD)	140 (2008)
Five-year water savings target (GPCD)	137 (2015)
Ten-year water savings target (GPCD)	136 (2020)
Metering	Universal metering: applies to retail customers and public users, includes testing, repair, and periodic meter replacement; the City maintains a program to pull, test, and replace any meters determined to be functioning outside these parameters
Leak detection and repair/water loss accounting	A leak detection and repair program is in place to reduce unaccounted-for water; areas of the water distribution system in which leaks and line breaks occur are systematically prioritized and scheduled for repair; uses system surveying and ultrasonic equipment to find/repair leaks; meter readers watch for and report signs of illegal connections; a monthly report is produced to monitor water loss and unaccounted-for water; if unaccounted-for water exceeds future goals, the City will implement a more intensive audit to determine the source of water loss. Agricultural: the Coastal Water Authority has a SCADA system in place to monitor major canals
Water rate structure	Non-promotional: cost-based water rate structure that discourages the excessive use of water; existing structure includes inclining blocks and single unit rates for water/sewer pricing
Public education/outreach	The City maintains a staff for its Public Education and Information program; Annual Water Festival: event is used to showcase the water conservation program's message and promote awareness to local schools and the general public Agricultural: the City cooperates with the Texas Agricultural Extension Service, the TCEQ, and other state agencies to educate customers in improved water management practices
School education	School Education Curriculum Program: the Public Education and Outreach group has presented to over 24,000 people, promoting water efficiency, source water protection, and the importance of clean drinking water; group also provides presentations along with water conservation retrofit kits to local school students throughout the Houston area

<p>Retrofit/ rebate programs</p>	<p>No current retrofit or rebate programs exist.</p>
<p>Audit programs</p>	<p>Esplanade Audit Program: esplanades within the City that are identified as the largest water users are inspected for problems and encouraged to make corrections; Esplanade Deed of Gift Program: allows commercial/public entities that own/manage esplanade properties within the City to deed the sites to the City (City will pay for water usage and monitor the sites, while the owner is responsible for planting, watering, etc.); Plan Review of Irrigation Requirements in New Construction; Public Fountain/Pool Water Audit and Repair</p>
<p>Ordinance requirements/ restrictions</p>	<p>Adopted “Acceptance of esplanade irrigation systems by the city” ordinance that requires an irrigation program or outdoor water audit program to target the top 25% of irrigation customers and irrigators of landscapes larger than 3 acres and inform them of current irrigation efficiency and possible water savings; restrictions/requirements for water shortages, wholesale water customers, irrigation, swimming pools, water pipes, water leakage, etc.</p>
<p>Water reuse</p>	<p>The City of Houston’s Hermann Park Golf Course has been using recycled water for greens maintenance since 1999</p>
<p>Additional water conservation strategies</p>	<p>Pressure Reduction Program: the City utilizes 76 pressure-reducing valves throughout its water distribution system to control excessively high pressures; the City has identified water conservation measures/practices in the agricultural sector</p>

	City of Huntsville
Total per capita use (GPCD)	206 (2008)
Five-year water savings target (GPCD)	204 (2015)
Ten-year water savings target (GPCD)	184 (2020)
Metering	Each meter has an accuracy of plus or minus five percent for raw water and treated water. Water for all customers, including public and governmental users, is metered. Meters are calibrated on an annual basis by the City of Huntsville personnel to maintain the required accuracy and are repaired and/ or replaced as needed.
Leak detection and repair/water loss accounting	<p>Meter readers watch for and report signs of illegal connections, crews look for and report evidence of leaks in the water distribution system, and maintenance crews respond quickly to repair leaks reported by the public and city personnel. Areas of water distribution system where numerous leaks and line breaks occur are targeted for replacement as funds are available.</p> <p>Goal of reducing unaccounted for water by 2.3% in the 5 to 10 year goals</p>
Water rate structure	Non promotional water rate structure; minimum monthly charge for first 3,000 gallons; specific charge per 1,000 gallons over 3,000 gallons
Public education/ outreach	Include inserts on water conservation with water bills at least twice per year; notify local organizations, schools, and civic groups that the City of Huntsville staffs are available to make presentations on the importance of water conservation and ways to save water; make the Consumer Confidence Report, and water conservation brochures, and other water conservation materials available to the public; make information on water conservation available online
School education	No information on school education included in plan.
Retrofit/ rebate programs	No information on retrofit or rebate programs included in plan.
Audit programs	The City of Huntsville will conduct a water audit using the outline provided by the TWDB. The city will conduct water audits using American Water Works Association guidelines published in Water Audits and Leak Detection.
Ordinance requirements/ restrictions	With the exception of the ordinance that adapts this water conservation plan, no other ordinances are included in plan.
Water reuse	No information on water reuse included in plan.
Additional water conservation strategies	None

	City of Katy
Total per capita use (GPCD)	182 (2008)
Five-year water savings target (GPCD)	175 (2009-2014)
Ten-year water savings target (GPCD)	170 (2014-2025)
Metering	The City meters 100% of the connections to the distribution system including municipal uses and practices a meter change-out program whereby meters are changed out every 10-15 years. Larger meters are field tested and repaired for accuracy. The City does not use repaired meters in the system.
Leak detection and repair/water loss accounting	The City makes a bimonthly accounting of water delivery efficiencies that is maintained and reviewed on an annual basis. Leaks are reported by any municipal employee as well as the general public. The Water Plants are monitored daily and system pressure is checked carefully. All leaks are repaired the same day or as soon as practicable.
Water rate structure	The City has base rates determined by the size of the meter, and a declining block rate.
Public education/outreach	The City will support programs to educate the public regarding water conservation. No specific details or programs are given.
School education	The City will partner with schools to educate students. No specific details or programs are given.
Retrofit/rebate programs	The City does not offer a program for the replacement or retrofit of water conserving plumbing fixtures in existing structures other than what would be required through the permitting process for re-models and building upgrades.
Audit programs	No audit programs are included in plan.
Ordinance requirements/restrictions	City operates under the 2003 International Plumbing Code.
Water reuse	The City has no program regarding the reuse of gray water.
Additional water conservation strategies	None

	City of Lubbock
Total per capita use (GPCD)	190 gpcd
Five-year water savings target (GPCD)	180 gpcd (2011)
Ten-year water savings target (GPCD)	170 gpcd (2016) 160 gpcd (2020)
Metering	Lubbock individually meters all water usage except for water utilized for fire protection.
Leak detection and repair/water loss accounting	Lubbock has an aggressive leak detection and repair program and a computerized billing system. The city's universal metering program has a water delivery accuracy rate of 95%. Lubbock has a replacement program for old water lines that are prone to leaks and breaks, and responds to customer complaints about low leaks and tracks them down through a variety of measures.
Water rate structure	Inclining block rate structure, base water charge \$18
Public education/outreach	The City will support programs to educate the public regarding water conservation activities that support its goals. This includes educating the general public on the need for and practices of water conservation through PSAs, participation in home and garden shows, coordination of efforts with the Chamber of Commerce, West Texas Home Builders Association, and Lubbock Apartment Association.
School education	Lubbock presents water conservation programs in kindergarten through twelfth grade in the school system.
Retrofit/rebate programs	No programs were listed.
Audit programs	Lubbock ordinance does not include any audit programs
Ordinance requirements/restrictions	Lubbock has a water conservation ordinance that may be accessed via the web at, http://water.ci.lubbock.tx.us/pdf/strategic/swspsec5.pdf
Water reuse	Lubbock does not have a water reuse program.
Additional water conservation strategies	Programs that have been considered or may be considered by the City are landscape design and maintenance, rain and freeze sensors on automatic commercial irrigation systems, plumbing retrofit or rehabilitation programs, controlling unaccounted for water, and by reusing treated wastewater and stormwater.

	City of Pasadena
Total per capita use (GPCD)	121.79
Five-year water savings target (GPCD)	Reduce gpcd by 2%
Ten-year water savings target (GPCD)	Reduce gpcd by 5%
Metering	The City has universal metering of both customer and public uses of the water. The meters are tested, repaired and replaced as needed on an annual basis. The water system is audited monthly to determine illegal connections and abandoned services.
Leak detection and repair/water loss accounting	The City has an continuous program of leak detection, repair and water loss accounting for the transmission, delivery, and distribution system in order to control water loss.
Water rate structure	The City's water rate is cost-based and discourages excessive use of water. The revised rate structure was adopted by City Council in 2008.
Public education/outreach	The City will: designate a Public Works Department staff member to ensure other Pasadena employees carry out the City's Water Conservation Program, make water conservation presentations at institutions, organizations and groups, provide and distribute water conservation brochures to citizens, issue press releases on water conservation tips and rates, issue public service announcements for use by local news media, produce water conservation information to new water customers at the time service is established, and continue Public Works Department staff attendance and participation in water conservation program training offered by State agencies and professional organizations.
School education	The Pasadena conservation plan does not include information on school education
Retrofit/rebate programs	The Pasadena conservation plan does not include information on retrofit/rebate programs.
Audit programs	The Pasadena conservation plan does not include information on audit programs
Ordinance requirements/restrictions	The City abides by the 1991 Texas Legislation on plumbing fixtures.
Water reuse	The Pasadena conservation plan does not include information on reuse programs.
Additional water conservation strategies	None

	San Antonio Water System
Total per capita use (GPCD)	
Five-year water savings target (GPCD)	110/120/133 (dry/normal/wet year) (2014)
Ten-year water savings target (GPCD)	106/116/126 (dry/normal/wet year) (2019)
Metering	Universal metering - metering of all connections; Supervisory Control and Data Acquisition (SCADA) system monitors pumpage; all new meters are tested
Leak detection and repair/water loss accounting	Adopted International Water Association (IWA) water audit to determine “unaccounted for” water; 4 leak detection crews assist Distribution and Collection crews in leak repair
Water rate structure	Non-promotional water rate structure: inverted block rate structure for residential users (high volume water users pay a higher per unit rate); Non-residential users (schools, businesses) have a “base/excess use” rate on uses other than irrigation; 9 cents per 100 gallons of the 4th block funds the conservation program
Public education/outreach	Participates in Spring Bloom, Festival of Flowers, Garden Jazz Party, Xeriscape Garden Tour, and Watersaver Awards (public speaking); media outreach through public service announcements, ad campaigns, TV/radio/newspaper commercials; conservation e-newsletter; Seasonal Irrigation Program/E-newsletter; Community Conservation Committee (CCC) recommends conservation programs to SAWS; “The Watermark” water bill insert; public informed through fairs, stakeholder meetings, and town hall meetings; “Gardening in the Neighborhood” program targets certain neighborhoods on Saturdays to promote conservation; partnering with CPS Energy on neighborhood outreach; demonstration gardens open to the public; Watersaver Landscape Specialist Program: educates professional landscapers; Industrial, Commercial, and Institutional Water Consultations: SAWS helps companies identify water-saving opportunities

<p>School education</p>	<p>H2O University initiatives include: Student Water Action Team (SWAT)- field trip based, high school program where over 300 students commit to a yearlong service project; 2nd grade curriculum module- includes Adventures of Watershed Willie and Cactus Callie (used by over 16,000 students); Educator’s Learning Institute- provides water related workshops for over 350 educators each year; H2O Heroes- kids club that promotes water education</p>
<p>Retrofit/ rebate programs</p>	<p>Residential: Kick-the-Can: toilet distribution program; Season to Save Community Challenge: incentive program (for each toilet picked up, an incentive will be paid to a non-profit group); Wash Right: provides customers with \$100 rebate for the purchase of an approved high efficiency washing machine; Plumbers to People: provides leak repairs and retrofits to qualified low-income homeowners; Hot Water on Demand: provides users with a \$150 rebate for this device; Watersaver Landscape Rebate Program: customers who have proven water savings on bill at the end of the year due to landscape modifications receive a rebate.</p> <p>Industrial/Commercial/Institutional (ICI): Commercial and Non-Profit Toilet Programs: SAWS offers rebates/free water-saving toilets to schools, businesses, etc.; Large Scale Retrofit Program: allows large scale water users to apply for rebates for installation of water-saving retrofits; High Efficiency Washing Machines: \$100 rebates for customers who purchase these</p>
<p>Audit programs</p>	<p>Residential: Home Water Audits: free program, identifies leaks, technical field investigator recommends ways to conserve; Irrigation check-ups (free); Residential Outdoor Water Use Program: helps highest-volume water users (pilot project); Five Acre Irrigation Check-ups: properties are required to submit annual check-ups by city ordinance; ICI: Cooling Tower Audits (free)</p>
<p>Ordinance requirements/ restrictions</p>	<p>Restrictions/requirements for power washers, vehicle wash fundraisers, irrigation systems, annual irrigation system analyses, cooling towers, ice machines, commercial dining facilities, vehicle wash facilities, vacuum systems, certain plumbing fixtures, coin-operated washing machines, hot water lines, condensate collection, rain sensors, xeriscape option, model homes, zonal systems, turf grass soil support, turf grass dormancy qualities, irrigation system use</p>
<p>Water reuse</p>	<p>Aims to provide 35,000 acre-feet/year of reclaimed water to golf courses and other ICI customers</p>
<p>Additional water conservation strategies</p>	<p></p>

	City of Tyler
Total per capita use (GPCD)	176.33 (2008)
Five-year water savings target (GPCD)	167.5
Ten-year water savings target (GPCD)	149.8
Metering	A previously implemented citywide meter change-out program has been completed. A meter program will continue and include the following: failed meters will be replaced when located; meters replaced through the city's contract with Johnson Controls have a ten year warranty; 2% of meters will be tested annually to be within 5% accuracy; all municipal connections will be metered for increased accuracy of water use; a street cleaner water use tracker method will be put in place and monitored; unauthorized taps or water thefts will be assessed a charge for the illegal tap, and disconnection of the illegal tap.
Leak detection and repair/water loss accounting	Leak detection program will be implemented to monitor the system for leaks; all water utilities staff will be trained; records will be kept to track the repair of the leak including the length of time for repair, pressure of the repaired line, and approximate amount of water lost due to leak. The system water audit will help the city to reach their target goal for water loss at an ILLI of 3.
Water rate structure	Currently has a "Promotional" rate structure but over the first five years of the plan, a "Conservation" type rate structure will be analyzed and weighed. If this structure is found to be beneficial to the City, the City Council will vote on the issue of changing the current "Promotional" rate structure to a "Conservation" rate structure.
Public education/outreach	First year program/activities: A fact sheet explaining the Conservation Plan will be made publically available; an article will be placed in the local newspaper, correlated with Fact Sheet preparation and will include information on how to acquire the "Homeowner's Guide", highlights of water saving methods, and elaboration on available brochures; make homeowner's guides to saving water available to new customers. Long-term program will consist of the following activities each year after the first year of the program: newspaper article targeting household water using appliances or items and methods for conserving water; brochures relating to outside household use, and car washing, lawn watering, correlated to weather predictions will be mailed to customers; homeowner's guides will continue to be available.

<p>School education</p>	<p>Educational materials will be given to area schools for use with taught curriculum to emphasize the importance of conservation (target goal is to reach 10% of students on an annual basis, on a tiered program); educational tours of the water and wastewater treatment facilities are given to area school.</p>
<p>Retrofit/ rebate programs</p>	<p>The City advises customers of low water demand items, shower heads, toilet dams, etc., by mail and/or publication of newspaper articles, emphasizing the importance of water saving devices. The City will contact local suppliers of plumbing supplies advising suppliers of the water saving drive content. Suppliers will be requested to stock low water usage fixtures and low water use supplies.</p>
<p>Audit programs</p>	<p>The City will implement the System Water Audit and Water Loss BMP from the TCEQ and TWDB Best Management Practices Guidelines starting in the first year and in phases through the remainder of the first five year planning period.</p> <p>The City will conduct a system water audit in two parts, the first of which is known as a "Top Down" audit (where the city will use existing records to determine estimated annual water loss). The City has set a target goal of an ILI of 3. If the goal is not met within the first twelve months of implementing the BMP, the city will continue with the second step of the water audit.</p> <p>The second step, a "bottom-up" audit, will be implemented over the remainder of the five year period and involves a detailed investigation of policies and procedures of the utility.</p>
<p>Ordinance requirements/ restrictions</p>	<p>Through an ordinance already in place, the city requires water users to be conservation minded when watering and using water whether it is residential or commercial.</p>
<p>Water reuse</p>	<p>Area industrial customers will be contacted to determine if reuse and recycling is being employed. At this time wastewater reuse is not possible by the City of Tyler; the location of the wastewater treatment plant with relation to industrial users is not conducive - the City is not located in an arid section of Texas and therefore reuse for irrigation purposes has not been developed.</p>
<p>Additional water conservation strategies</p>	



Endnotes

Pricing

¹Olmstead, Shelia M. "Managing Water Demand: Price vs. Non-Price Conservation Programs." July 2007. Pioneer Institute. http://www.hks.harvard.edu/fs/rstavins/Monographs_&_Reports/Pioneer_Olmstead_Stavins_Water.pdf.

²City of Albuquerque Drought Management Strategy. Feb 2003. http://www.abcwua.org/pdfs/Droght_Mgt_Strat.pdf.

³Friedman, Scott. "Drought Schmout: Wealthy Drain Millions of Gallons." NBCDFW. Aug 4, 2009. Article: <http://www.nbcdfw.com/news/local-beat/Drought-Schmout-Wealthy-Drain-Millions-of-Gallons-of-Water.html>. List of water users: <http://media.nbclocalmedia.com/documents/water+consumption.pdf>.

⁴National Wildlife Federation analysis of 207,935 single-family Dallas Water Utility customer accounts. Data from the months of June 2002-May 2003. Unpublished.

⁵Price, Asher. "Top 10 users from the Austin Water Utility." Austin-American Statesman. Aug 17, 2009. <http://www.statesman.com/news/content/news/stories/local/2009/08/17/0817water.html>.

⁶United States Environmental Protection Agency. *Cases in Water Conservation: How Efficiency Programs Help Water Utilities Save Water and Avoid Costs*. July 2002. http://www.epa.gov/WaterSense/docs/utilityconservation_508.pdf.

Goals

¹City of Albuquerque Drought Management Strategy.

²Texas Water Development Board, *Water Conservation Implementation Task Force Report to the 79th Legislature*. Nov 2004. http://www.twdb.state.tx.us/assistance/conservation/TaskForceDocs/WCITF_Leg_Report.pdf.

Toilet replacement

¹Water Conservation Implementation Task Force Report to the 79th Legislature.

²Reed, Micah. Personal communication, Nov 19, 2009.

³Austin Water Utility, Presentation to the Resource Management Commission, Nov 17, 2009.

Conservation funding

Dana Nichols, personal communication Nov 4, 2009

Outdoor watering ordinances

¹Texas Water Development Board. "Texas Lawn Watering Guide." <http://www.twdb.state.tx.us/assistance/conservation/conservationpublications/lawn%20watering%20guide.pdf>.

²Sierra Club Questionnaire "Questions Regarding Your City's Municipal Water Conservation Plan and the Implementation of the Plan"

³Data from "City of Lubbock Utility Profile and Water Conservation Plan." April 29, 2009.

⁴San Antonio Water System. "Water Resource Plan Update 2005." http://www.saws.org/our_water/waterresources/waterresourceplan/WaterResourcePlanUpdate20050621.pdf

⁵Meszaros, Greg. "City Council Briefing: Water Conservation Strategies." July 23, 2009.

Retrofit programs

¹"Save in so many ways!" http://www.energystar.gov/index.cfm?c=clotheswash.clothes_washers_save_money

Appendix A

¹75th Leg., ch. 1010, § 1.03 eff. Sept. 1, 1997.

²Tex. Water Code § 11.1271(a).

³78th Leg., ch. 688 § 1, eff. June 20, 2003

⁴Title 30, Texas Administrative Code, Section 288.30.

⁵TWDB, Water Conservation Implementation Task Force Report to the 79th Legislature (Nov. 2004).

⁶To be administratively complete, the plan must meet all minimum requirements contained in TCEQ rule Title 30, Texas Administrative Code (TAC), Chapter 288.

⁷Texas Water Code, Sec. 16.402; TWDB is required to review the plans to ensure consistency with the requirements of Sec. 11.1271 of the Texas Water Code.