

# SOLUTIONS

2009

SAVING WATER FOR THE FUTURE



**USE ONLY  
WHAT YOU  
NEED.**

 DENVER WATER  
denverwater.org

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As Denver Water continues its commitment to serve as a wise steward of Colorado's water resources and a good neighbor in the communities where we live and work, we also continue our focus on encouraging wise water use. Creating a culture of water conservation in Denver dates back to 1936 when Denver Water advertised on street trolleys asking customers to help save water. The modes of transportation and communication have changed, but the message remains the same.



It's in the spirit of this message that I'm pleased to introduce the 2009 issue of *Solutions: Saving Water for the Future*. I hope the information and programs outlined in this publication inspire you to consider new ideas for smart water use, ensuring the availability of this most precious resource for future generations. And remember the call: "Use Only What You Need."

A handwritten signature in black ink that reads "H.J. Barry". The signature is stylized and cursive.

Sincerely,  
H.J. "Chips" Barry  
Manager, Denver Water



Ambassadors clad in *Use Only What You Need* sandwich boards canvassed the city throughout the summer of 2008 to spread the conservation message.

## Coaxing Customers to Use Only What They Need

### Denver Water is racing the clock.

Three years ago, the utility kicked off a 10-year plan to speed up the pace of conservation in its service area. The goal: to reduce overall water use 22 percent by 2016. The purpose: to help provide adequate future supplies for a growing customer base.

Although the water-saving measures Denver residents adopted during the severe drought of 2002-2004 continue to reduce demand for treated water, the population served by Denver Water is expected to increase by 40 percent by 2050. The conservation plan is designed

to prevent water use from returning to pre-drought levels by encouraging customers to make permanent changes in their water use habits. These changes combined with other measures that make up the plan also will reduce future demand, and buy Denver Water a little more time before demand surpasses supply.

The conservation plan entices customers to conserve through a collection of water-saving incentives proffered in the form of money, equipment or both; a troupe of technicians trained to help customers uncover ways to lower their

consumption and their bills; and a lighthearted advertising campaign centered around the theme "Use Only What You Need."

Legally sanctioned Operating Rules — for example, a prohibition on lawn watering between 10 a.m. and 6 p.m. — are part of the plan, and visits from a force of water cops who patrol neighborhoods during the summer irrigation season help remind customers to abide by these rules. A customer's first violation elicits a conversation about the importance of wise water use, but subsequent violations can result in fines.

Much of the water being saved by customers derives from incentives offered through four targeted conservation programs:

- Rebates for low-water-use fixtures and appliances
- Performance contracts with commercial, industrial, and institutional (governmental) customers
- Irrigation efficiency contracts with homeowners associations and other irrigation-only customers
- Indoor fixture retrofits in low-income housing and nonprofit facilities

In 2008, these four programs saved 487 acre-feet of water, enough to serve more than 1,200 households for an entire year. (An acre-foot, or 325,851 gallons, is enough to cover Denver's Invesco Field at Mile High with a foot of water.) Denver Water spent more than \$2.8 million on incentives to facilitate these savings, a one-time investment that will continue to yield water savings year after year.

Much of Denver Water's progress toward winning its race to that 2016 water use reduction goal can be attributed to its award-winning advertising campaign.

advertising campaign. Sometimes edgy, always playful, and usually emblazoned on an orange background, the ads proclaim variations on the theme "Use Only What You Need." Although they make use of conventional venues like billboards, bus signs and TV spots, they also appear on yard signs, sandwich boards sported by roving conservation ambassadors,

and towering, barrel-shaped sculptures parked in public areas around the city. The barrels are designed to help people visualize how much water is wasted by leaky toilets and broken sprinkler heads.

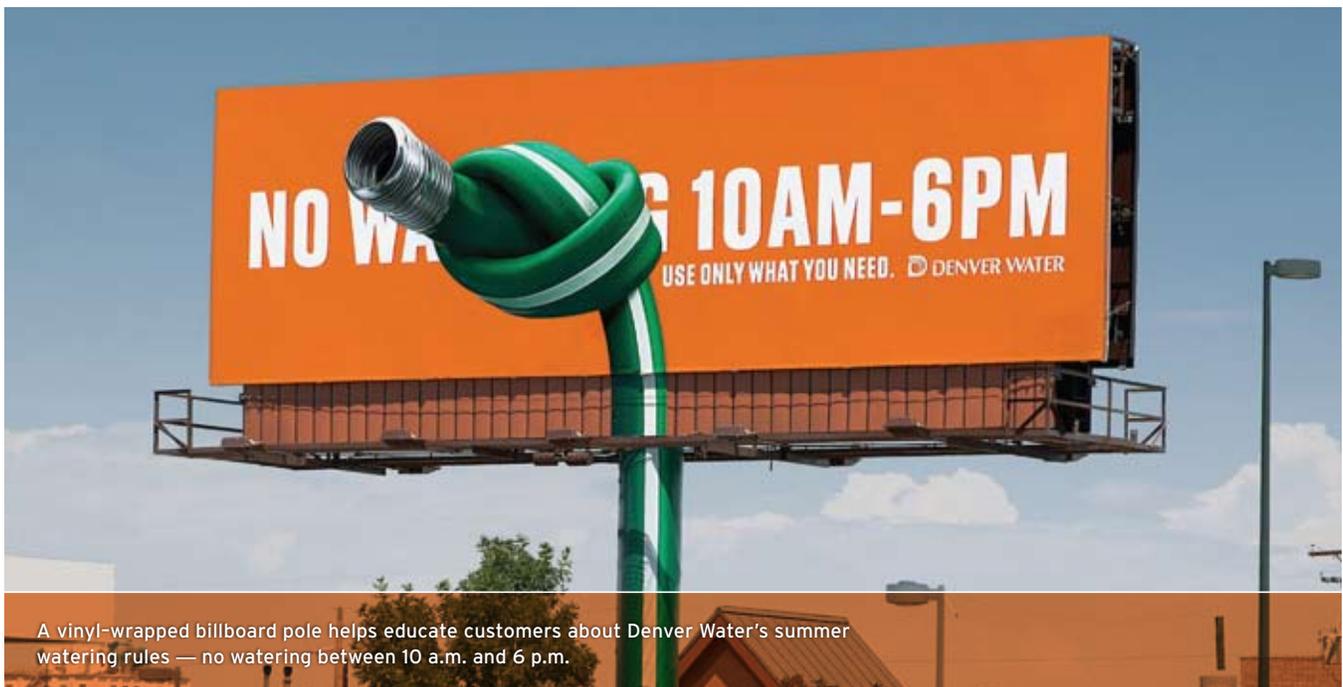
Once the 10-year race is won and the goal to cut water use by 22 percent is reached, Denver Water's next challenge will be to help customers sustain this level of efficiency. Financial incentives will continue to play a role, and customers will frequently be reminded to use only what they need. But given the utility's

expanding customer base and the uncertainties associated with climate change, the race clock won't stop, and the finish line will likely keep moving.

— Nancy Zeilig

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In addition to financial incentives, much of Denver Water's progress toward winning its race to that 2016 water use reduction goal can be attributed to its award-winning



A vinyl-wrapped billboard pole helps educate customers about Denver Water's summer watering rules — no watering between 10 a.m. and 6 p.m.

# Investing in Conservation is a Commitment to the Future

Denver Water’s conservation programs account for 70 percent of the money Colorado water providers spend on water conservation, according to a 2007 study conducted by the Colorado Water Conservation Board (CWCB). This figure is especially noteworthy given that Denver Water serves only 25 percent of the state’s population.

Other Front Range communities such as Aurora, Boulder and Colorado Springs account for another 20 percent of water conservation expenditures in the state. This means Colorado’s smaller communities spend less than 10 percent of the funds devoted to water efficiency programs.

“The big roadblocks are staff time and money,” said Ben Wade, water conservation coordinator in CWCB’s Office of Water Conservation and Drought Planning. “Most small town utilities have only one person dedicated to conservation programs.”

Wade said utilities that want to create conservation programs can seek advice from CWCB as well as from organizations such as Colorado WaterWise and the Colorado Foundation for Water Education. “Small water providers need technical training and guidance on how to develop cost-effective conservation programs,” said Paul Lander, who recently served

as executive director of Colorado WaterWise. “We advised them to work together to attract more resources.”

“Other utilities can also get ideas from Denver Water’s programs,” Wade said. “They can use scaled-down versions of its conservation measures.”

“We on the Western Slope salute Denver Water for its cutting edge initiatives,” said Jim Pokrandt, who’s responsible for communications and education at the Colorado River Water Conservation District based in Glenwood Springs. “It’s all about driving home a new water use ethic across Colorado so people realize water is not an unlimited resource here in the arid West.”

— Nancy Zeilig

DENVER WATER’S CONSERVATION INCENTIVES AND WATER SAVINGS—2008

PROGRAM	INCENTIVE	ESTIMATED WATER SAVINGS (ACRE-FEET)	DENVER WATER EXPENDITURES (\$)
Residential Rebates for Clothes Washers	9,561 rebates	110	1,436,000
Residential Rebates for High-Efficiency Toilets	1,636 rebates	29	204,500
Residential Rebates for Low-Flow Toilets	1,241 rebates	19	31,050
Performance Contracts with Commercial, Industrial, and Institutional customers	8 contracts	91	273,329
Irrigation Efficiency Contracts	20 contracts	185	162,220
Fixture Retrofits for Low-Income Housing and Nonprofit Agencies	1,817 residences	53	714,589
<b>TOTAL</b>		<b>487</b>	<b>2,821,688</b>

## DID YOU KNOW?

In 2008, the Use Only What You Need campaign distributed 10,000 plant stakes at local garden centers to be used with Xeriscape-friendly plants. Through the Web site [useonlywhatyouneed.org](http://useonlywhatyouneed.org), 2,500 shirts, 2,500 canvas totes, 3,000 yard signs and 500 magnets were given away. And the “running toilet” created a Facebook profile named Johnny Flush, who had accumulated nearly 900 friends before retiring for the season.

# Coping With Climate Change

Water utilities, like Boy Scouts, need to be prepared. Whether confronting an emergency such as a drought or watershed fire or a gradually developing challenge like worldwide climate change, a utility needs contingency plans in place to manage potential interruptions in its water supply.

Regardless of the cause of recent changes in the Earth's climate, the Intergovernmental Panel on Climate Change has stated that "global warming is unequivocal." The panel, which shared the 2007 Nobel Peace Prize with former Vice President Al Gore, was established by the United Nations in 1988 and comprises 2,500 scientists from more than 130 countries.

• 4 So if scientists consider global warming inevitable, how should a water utility prepare to address potential effects on its supplies?

## ANALYZING POTENTIAL EFFECTS OF CLIMATE CHANGE

Denver Water's manager of water resources, Marc Waage, provides these recommendations for water utilities to determine how climate change could affect their systems:

- Assess the utility's vulnerability. A vulnerability assessment involves examining research on the regional ramifications of climate change, analyzing projected changes, estimating the impact on water supply and use, and determining what changes the utility is most sensitive to.



The water levels at Cheesman Reservoir significantly dropped during the drought in 2002. Systemwide, Denver Water's reservoirs were only 43 percent full in March 2003.

- Identify the utility's options for adapting to those changes and formulate plans for implementing them.
- Don't assume the future will be just like the past. As utility managers and planners pinpoint options for adapting to the effects of climate change, consider a variety of future scenarios in addition to historical hydrology records.

## ASSESSING VULNERABILITY

As part of a vulnerability assessment conducted in 2007, Denver Water examined two simplified scenarios to see what challenges it might have to contend with as a result of projected temperature hikes. The analysis made use of an existing hydrologic model created by the National Weather Service's Colorado River Basin Forecast Center (see table for results).

"We know we're vulnerable," said Waage. "We need to enhance system reliability and flexibility, and we need to keep a diverse portfolio of water resources."

EFFECT OF POTENTIAL TEMPERATURE CHANGES ON WATER SUPPLY AND STREAMFLOWS			
CHANGE IN PRECIPITATION	TEMPERATURE INCREASE	STREAMFLOW REDUCTION	WATER SUPPLY REDUCTION
None	+ 2 degrees F	- 7 percent	- 7 percent
None	+ 5 degrees F	- 19 percent	- 14 percent

## INVESTING IN A POOL OF WATER RESOURCES

Denver Water's portfolio of water resources includes:

**Conservation.** Denver's Board of Water Commissioners has decided that, for now, water saved as a result of its accelerated conservation program will be used to augment the utility's "strategic reserves" — buffer supplies kept in storage reservoirs for use during supply or demand uncertainties. Unexpected changes in supply and demand can be caused by various types of constraints, including climate change, drought, watershed damage, loss of water rights and temporary service disruptions.

"But conservation likely can't do multiple duty in our water system," Waage said. "We'll need the saved water either to satisfy the pressures of population growth or to boost strategic reserves so we can adapt to climate change and address other uncertainties."

**Water reuse.** Denver Water's Recycled Water Plant began operation in 2004. It currently supplies about 4,000 acre-feet of highly treated wastewater to irrigation and industrial customers each year, saving enough potable water to serve almost 10,000 households. The recycled water is delivered through more than 50 miles of purple pipes, whose color distinguishes them from potable water distribution mains. Among the largest users of Denver Water's recycled supply are Xcel Energy's Cherokee Power Plant, the Denver Zoo and numerous municipal parks and golf courses.

**Increased storage capacity.** Plans to enlarge existing storage capacity at Gross Reservoir would add another 18,000 acre-feet of water supply to the Moffat Collection System in the north end of Denver Water's service area. The Moffat system is one of Denver Water's three major sources of supply. The additional storage would not only mitigate supply vulnerabilities but also would add reliability and balance to the water system overall.

"The challenges climate change presents to Denver Water are not unique," Waage said. "Water utilities across Colorado are grappling with the same issues, so it's important that we work together in planning for the future. Regardless of what specific changes we face down the road, using water efficiently will help us be better prepared to deal with them."

— Nancy Zeilig

## Denver Water's Achievements Praised

Denver Water's commitment to water conservation, environmental stewardship and industry leadership garnered accolades in 2008, including the following:

- 2008 North American Municipal Water Service Providers Green Excellence Award, presented by Frost & Sullivan, a consulting firm that helps companies expand their businesses. Green Excellence Awards are given to corporations and other organizations that have "excelled in green product technology innovation and service achievements that promote sustainability," according to Frost & Sullivan. To receive the award, an organization must demonstrate a commitment to reducing its dependence on nonrenewable resources and diminishing its overall environmental impact.
- 2008 Public Communications Achievement Award, presented by American Water Works Association, an international association of drinking water professionals. The award goes to utilities that demonstrate a "strong, broad-based commitment to public outreach and communications," according to the association.

— Ann Depperschmidt

### DID YOU KNOW?

The summer of 2008 brought Denver residents low precipitation and a record-breaking 24-day streak of temperatures reaching 90 degrees or higher, making 2008 one of the driest irrigation seasons on record. Despite the dry heat, Denver Water customers used less water than they did before the 2002 drought. From April through August 2008, Denver Water customers used 42.4 billion gallons of water — 8 percent more than the amount used during the same period in 2007 (when the weather was more typical) but about 16 percent less than the amount used in the summers leading up to the 2002 drought.

## DNC Flush with Water Savings

Before the 2008 Democratic National Convention brought some 50,000 delegates, media representatives, politicians and other visitors to the city, Denver Water and Colorado Convention Center officials made a series of water-saving changes to improve the center's efficiency. Denver Water provided about 300 new water-efficient toilets and urinals for the city to install in the center, saving it thousands of gallons of water each month.



© Denver Museum of Nature & Science

## Museum Preserves and Now Conserves

The Denver Museum of Nature & Science will save an estimated **4.8 million gallons** of water a year, thanks to Denver Water's provision of new water-efficient fixtures, including 124 toilets, 48 urinals and 120 faucets. After crews took out the old, water-wasting fixtures, the museum recycled all the materials — from old porcelain toilets to the 814 pounds of cardboard the new ones were shipped in — to maintain the eco-friendly nature of the project.

## Plumb Green, Save Blue

Who better to help homeowners conserve water than plumbers? That's the thought behind GreenPlumbers, a nationwide training and accreditation program that teaches licensed plumbers about the benefits of conserving water and reducing greenhouse gas emissions.

GreenPlumbers works with government agencies, water utilities and other organizations to present training workshops for plumbers on topics such as water-efficient products, solar hot water systems, heating and cooling appliances and other technologies. GreenPlumbers' goal is to train 50,000 plumbers over the next five years.

Denver Water sponsored two GreenPlumbers training workshops in 2008 and will sponsor three in 2009. Also in 2009, the utility's Conservation Section will offer a pilot program to targeted Denver Water customers whose indoor water use is high. Homeowners selected for the program will receive high-efficiency toilets, showerheads and aerators installed by an accredited GreenPlumber, who also will conduct a water audit for the household.



**GreenPlumbers**  
CREATING SUSTAINABLE COMMUNITIES  
USA

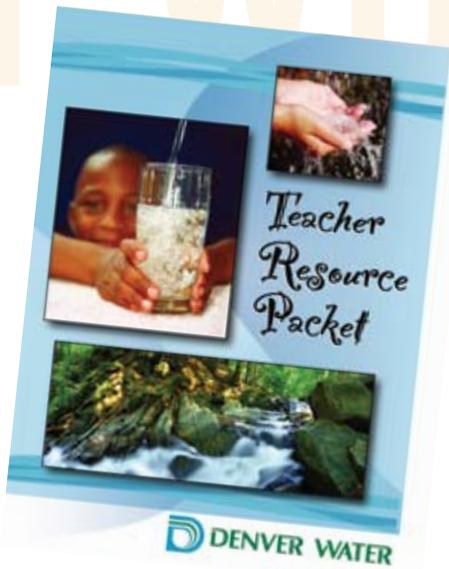
For more information about GreenPlumbers, visit [www.greenplumbersusa.com](http://www.greenplumbersusa.com).

## Recycled Water Reaches Stapleton and Lowry

Stretching limited supplies by treating reclaimed wastewater for nonpotable uses is becoming more common in the semi-arid West. Denver Water's recycling operation began in 2004. In 2008, the utility completed a series of multi-year projects to extend its recycled water system to the Stapleton and Lowry neighborhoods in northeast Denver. The recycled water irrigates parks and golf courses in these newly developed communities. Adding these neighborhoods to the system brings Denver Water's recycled water deliveries to 4,000 acre-feet per year, saving enough potable water to supply **10,000 households**.



Stapleton's many parks now receive recycled water.



## Good Habits Start Young

Fifth-grade teachers in Denver Public Schools now have their own resource packet to help students learn about water issues unique to Colorado. The packet “gives Denver school kids a local perspective on water issues,” said Matt Bond, Denver Water community relations specialist. The packet, which was distributed to all Denver fifth-grade teachers in the spring of 2008, includes worksheets, transparencies, a glossary, readings, teacher tips, classroom activities and a DVD. Denver Water distributed the packets again in spring 2009.

## Excess Water Use Gets Cuffed

Denver Water’s Conservation Section launched a water use enforcement program in 2008, the first time the utility employed monitors since enacting emergency water use restrictions during the 2002 drought. The water use monitors made more than **4,500 stops** to educate customers about water waste during the summer outdoor watering season, and a hot line for customers to report water waste received more than **2,500 calls** in 2008. The enforcement program will continue in 2009.



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## Ensuring Our Future Doesn't Run Dry

Just as a roadmap is indispensable for a driving trip, a long-range plan is essential for charting the course of a water utility’s future operations.

In 2008 Denver Water’s staff and Board began work on an updated Integrated Resource Plan (IRP), a comprehensive plan that will guide decisions about the utility’s water collection, treatment, distribution and recycling systems over the next 40 years. The utility’s conservation activities are a key component of this long-range plan.

Unique to this update is the use of scenario planning to address potential supply uncertainties. Instead of using current water use trends and past supply patterns to arrive at a single forecast of future supply and demand, the new IRP will outline responses to a range of alternative circumstances. This approach assumes that past supply and demand patterns are unlikely to remain the same in light of climate change and shifting environmental and political attitudes.

The long-range planning effort will continue through 2009, with publication of the completed plan slated for 2010.



# Practicing What They Preach

Staff members at Denver Water don't subscribe to the axiom "Do as I say, not as I do." Upholding the same high standards they expect of customers, they strive to practice wise water use in all the utility's operations and facilities.

## PROMOTING WATER-WISE LANDSCAPES

The Xeriscape demonstration garden surrounding Denver Water's

attractive landscapes and efficient water use: detailed planning and design, soil analysis and improvement, careful selection and grouping of plants, limited turf areas, mulching, efficient irrigation and proper maintenance.

## DETECTING AND REPAIRING LEAKS

Aging or damaged distribution mains can be a significant source of water waste. To keep Denver Water's

said Garth Rygh, Denver Water's superintendent of water control. "Smaller leaks are typically scheduled for repair the next business day."

## AUTOMATING IRRIGATION SCHEDULES

The central control system that manages irrigation at Denver Water's properties started with five sites. Now it includes 16 — the administration complex, various pump stations and all three treatment plants. During the irrigation season, the computerized system adjusts run times at each site every day. Adjustments are based on



Jason Millheim, conservation engineer, and Cindy Moe, industrial water conservation engineer, stand near Denver Water's cooling tower on the roof of the utility's administration building. Because of a change in the treatment process, Denver Water now saves more than 250,000 gallons of water annually in its cooling tower.

Administration Building attests to the appeal of water-wise landscaping. Its low-water-use perennials, grasses, trees and shrubs of assorted heights, colors, textures and fragrances are as attractive and distinctive as thirstier landscapes. The garden was constructed in three phases, beginning in 1981 and ending in 1995, and now covers nearly a full acre. It exemplifies seven principles that promote

treated water delivery system as leak-free as possible, staff members use sonic measuring devices to check for leaks. They cover the entire system — more than 2,600 miles of pipe — about every four years.

"Significant leaks are repaired immediately, either by replacing part of the pipe or installing a clamp repair around the source of the leak,"

evapotranspiration (ET) data from two dedicated weather stations and on data from electronic rain gauges that measure precipitation at each irrigation site. (ET is the amount of water lost to the atmosphere from soil and plant surfaces.)

"The computer calculates each system's run time according to ET readings at the weather stations," said Chris Pope, Denver Water's grounds foreman.

“Then it logs any rainfall recorded at each site, subtracts that from the amount of water the irrigation system is programmed to apply and reduces the run time accordingly. The control system also shuts down individual irrigation systems during rainfall.”

Tim LaPan, Denver Water’s landscape architect, estimated that the centralized irrigation control system and the new water-efficient landscapes save approximately 80 acre-feet of water each year.

including the one at Denver Water’s administrative campus. “The towers in the pilot project used cooling water for an average of 5.5 cycles,” said Cindy Moe, Denver Water’s industrial water conservation engineer.

In comparison, the cooling tower at Denver Water recirculates cooling water many more times before a portion is drained off through a process called blowdown and fresh water is added. “In 2007, our cooling tower averaged 8.2 cycles before blowdown, saving us

“In summer, 100 vehicles might go through the facility in a day,” said Greg Clark, Denver Water’s plumbing shop foreman. “With heavy use like that, we have to send some wash water to the sanitary sewer, but most of the time we can reclaim all the water. We limit the number of times our vehicles can be washed to no more than once a week.”

Before the recycling system was constructed, the facility used an average of 40 gallons of water for every vehicle washed, or approximately 48,000 gallons per year. Now, it uses only 14 gallons per wash, roughly

## “Denver Water’s fleet vehicles are cleaned at an on-site facility that recycles at least 60 percent of its wash water.”

### RECIRCULATING COOLING WATER

Cooling towers typically use significant amounts of water to operate air conditioning and refrigeration equipment, particularly if they circulate the water only a few times before sending it down the drain. But water use at these towers can be reduced by running the cooling water through several cycles before any of it is replaced.

A pilot project conducted by Denver Water and Denver Wastewater Management tracked water consumption at 11 local cooling towers,

103,700 gallons more per year than if it had operated at 5.5 cycles,” said Moe. But a recent change in the treatment process now allows the cooling tower to recirculate water for at least 50 cycles. That brings total water savings from Denver Water’s cooling tower to more than 250,000 gallons a year.

### RECYCLING VEHICLE WASH WATER

Denver Water’s fleet vehicles are cleaned at an on-site facility that recycles at least 60 percent of its wash water. Depending on how heavily the facility is used, up to 100 percent of the water can be recycled.



Denver Water recycles water at its on-site car wash, and fleet vehicles cannot be washed more than one time per week.

16,800 gallons per year, so the recycling system saves more than 31,000 gallons each year.

For staff members at Denver Water, a big part of promoting wise water use is practicing what they preach.

— Nancy Zeilig

### DID YOU KNOW?

When the Democratic National Convention came to town in August 2008, Denver Water partnered with Project Planet to distribute hotel room door hangers, pillow cards and bathroom placards encouraging guests to use their towels and bed linens more than once. Studies indicate that hotels participating in this program save an average of 6,000 gallons of water per month for every 100 guestrooms.

# Residential Customers Save Money With Rebates

Travis McGrath has worked as a Colorado River guide in the Grand Canyon for 11 years. He understands the desert and river ecology and knows that water in the West is a scarce and valuable resource.

"It's just something that's near and dear to my heart," the Lakewood resident and Denver Water customer said. "We have to keep all the rivers flowing."

That's why he's doing his part to use less water. Since buying his home two years

ago, McGrath has replaced his inefficient toilets and washing machine with high-efficiency models. He took advantage of Denver Water's rebate program, which pays up to \$150 for certain high-efficiency appliances, to make his purchases easier on his budget.

## RESIDENTIAL REBATE APPLICATIONS RISE IN 2008

McGrath isn't alone in taking advantage of Denver Water's rebate program. In 2008, indoor residential rebate applications increased 42 percent compared with 2007. "Our rebate program increases a lot every year as more and more retailers promote it and as more and more people find out about it," said Stacy Smith, conservation specialist with Denver Water.

By the end of 2008, Denver Water had issued more than 12,000 rebates for water-efficient clothes washers and toilets. According to a Conservation Section analysis, residential customers who received rebates for water-efficient fixtures and appliances in 2006 have reduced their indoor water use by about 20 percent.

The Conservation Section also offers rebates for weather-based irrigation system controllers and rain sensors to encourage residential customers to conserve water outdoors.

## WATER SAVINGS ALSO TRIM COSTS

McGrath said his water bills always have been relatively cheap, but he plans to monitor his bills to see if he notices significant changes in his water use as a result of replacing his toilets



Denver Water customer Travis McGrath stands beside his new high-efficiency clothes washer. The purchase yielded him a Denver Water rebate.

and washing machine. But, he said, he replaced the fixtures to save water, not necessarily to lower his water bill.

"I'm just trying to make small changes without breaking the bank," McGrath said. "There are so many small things you can do that will make a difference."

This spring, he plans to begin putting in a landscape that's more friendly to

#### STEWARDSHIP REQUIRES MINDFULNESS

McGrath also is taking other steps to cut down on his carbon footprint. He has been composting for two years and recently replaced an aluminum single-pane patio door that "you could see the dollar bills shooting out of in the wintertime" with a double-pane tempered patio door he found

wash the driveway, use a broom. Be conscious of how hard people and the planet work to give us the resources we take for granted."

— Ann Depperschmidt

## Residential customers who received rebates for water-efficient fixtures and appliances in 2006 have reduced their indoor water use by about 20 percent.

Colorado's semi-arid climate — replacing sections of Kentucky bluegrass with low-water-use plants and planting a vegetable garden in an area that naturally receives a healthy dose of sunlight and moisture.

"Denver seems to be becoming more and more of a desert, with high temperatures in the low 100s in the summer and hardly any rain," he said. "It really bothers me when there are streams of water running down the street from people washing their cars and hosing their driveways."

at Habitat for Humanity's Home Improvement Outlet.

He has installed more insulation in his attic and around the crawlspace, replaced light bulbs with compact fluorescent bulbs and salvaged oak hardwood floors from a house about to be bulldozed for installation in his living room.

McGrath encouraged others to take small steps toward conserving water and reducing their impact on the environment by learning more about how to take care of it. "Just be conscious of where the resources come from," he said. "Instead of using the hose to

## Conservation Sleuths Solve the Mystery of High Bills

Customers who receive a water bill that's inexplicably high can call Denver Water to request an audit of their water use. Serving as detectives in response to these requests, the Conservation Section's technicians conducted 370 high-bill audits in 2008.

The first thing a technician investigates is the customer's water meter. If the meter shows a constant flow, the technician then takes a look at all the water uses inside the house or business facility. If the audit occurs during irrigation season, the customer's outdoor water uses are scrutinized as well.

In most cases, the technician discovers a leaky toilet. Getting to the bottom of a leak involves placing blue-dye tabs in the toilet tank. If the water in the toilet bowl turns blue after a 20- to 30-minute wait, that's an unmistakable clue that there's a leak. Once the leak is repaired, the customer's water use and water bill typically drop by 19 percent. Case closed.

— Nancy Zeilig

### DID YOU KNOW?

In 2007, Denver Water provided 8,731 rebates for clothes washers, high-efficiency toilets and low-flow toilets to its residential customers at a total cost of \$1,285,100. In 2008, Denver Water provided 12,438 rebates to residential customers at a cost of \$1,671,550. In this one-year period, residential rebates rose by 42 percent.

# Partnership Helps Low-Income Customers Receive Water-Efficient Fixtures

Joe Vargas positioned the new toilet where the old, inefficient one used to be, tilted it to the side, wiggled it a bit and settled it into place before grabbing his tools and securing the porcelain fixture to the floor.

The Mile High Youth Corps member was doing more than just helping Denver Water replace inefficient fixtures in low-income housing; he was learning a “green collar” trade as well.

“The environmental education component fits in nicely with what we’re trying to do,” said Patrick Lundberg, Mile High Youth Corps coordinator for the Denver Water retrofitting project. Youth corps members learn valuable job skills, gain confidence and teach others about the importance of water conservation. “They installed it, it’s working, it’s saving water and it’s saving customers on their bills too,” Lundberg said.

## NONPROFIT PREPARES YOUNG PEOPLE FOR WORKFORCE

The Mile High Youth Corps is a nonprofit organization that teaches young people in their late teens to early 20s technical job skills to prepare them for the workforce. Much of the youth corps’ focus is related to green-collar jobs, a term for the growing eco-friendly job industry.

“In a short time, they become very excited about what they’re doing,” Lundberg said. “They’ll say something like, ‘Over the weekend, I was at a restaurant and I noticed that they had this kind of toilet.’”

Denver Water’s partnership with the youth corps started in 2007, when Donna Pacetti, Denver Water’s local government conservation coordinator, was searching for a way to replace inefficient toilets in low-income housing. The Mile High Youth Corps had a contract with the governor’s office to complete energy audits for customers participating in LEAP, the state’s low-income energy assistance program. Because of the youth corps’ work with low-income households, knowledge in energy assessments and focus on youth development, Pacetti suggested a similar partnership with Denver Water.

So in 2007, the youth corps started on the project, installing 850 water-efficient toilets in LEAP customers’ homes. In 2008, Denver Water expanded the youth corps’ job to include nonprofits and churches. Because of that, corps members nearly doubled the number of toilet installations they had completed the year before. And in 2009, organizers hope to double the 2008 numbers as well, said Cindy Moe, Denver Water’s industrial water conservation engineer.

## REPLACING TOILETS ADDS UP TO MAJOR WATER SAVINGS

Replacing an old toilet (2.5 gallons-per-flush or more) with a high-efficiency one (1.28 gallons-per-flush) saves the average household roughly 1,000 gallons of water per month, Moe said. And when multiple households reduce their water consumption by that much, the savings add up. The Mile High Youth Corps project helped save 31.7 million gallons of water in 2008 — roughly the amount used by 250 homes in one year.

It’s also typically cheaper for Denver Water to conserve water with a project such as retrofitting toilets than to develop new water supplies. For the youth corps project, Denver Water spent less than \$7,000 per acre-foot of saved water, far less than the cost to develop new water supplies.

And customers see an immediate drop in consumption and water bills. For the LEAP customers who first received retrofits in 2007, most have seen an average 15 percent drop in water consumption, Moe said. “The results are immediate,” she said. “And everyone is happy.”

## LAKWOOD HOUSING AUTHORITY REAPS EFFICIENCY BENEFITS

Lakewood Housing Authority, a local nonprofit that provides people with low-income housing, was one of the organizations to receive new water-efficient fixtures courtesy of Denver Water. Denver Water provided the housing authority with new water-efficient toilets,



sink faucet sets and shower kits in two apartment communities: Belmar Groves Apartments and Maplewood Apartments.

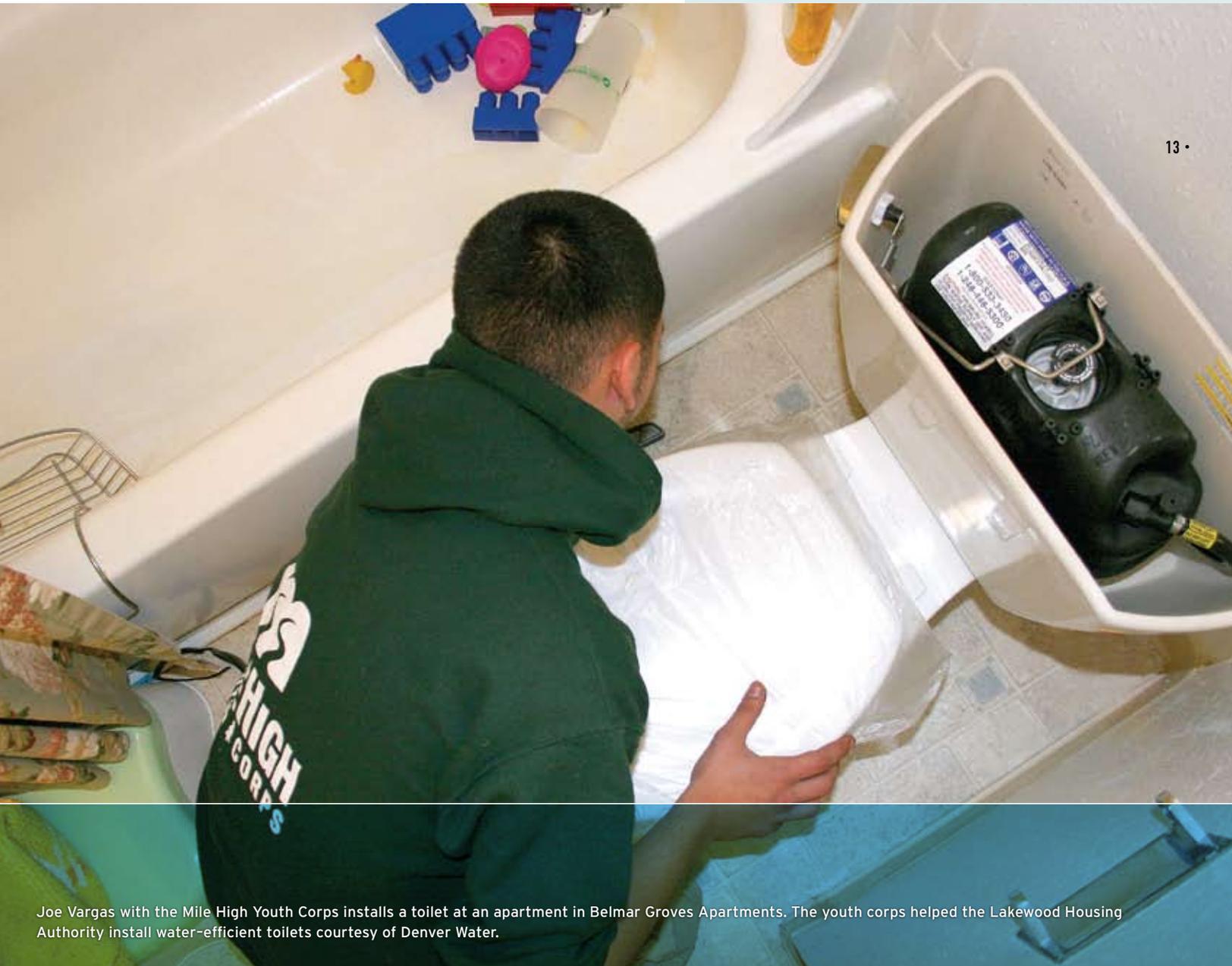
The utility also will conduct irrigation system audits at six of the housing authority's apartment communities to identify locations of water waste and to make recommendations for further savings.

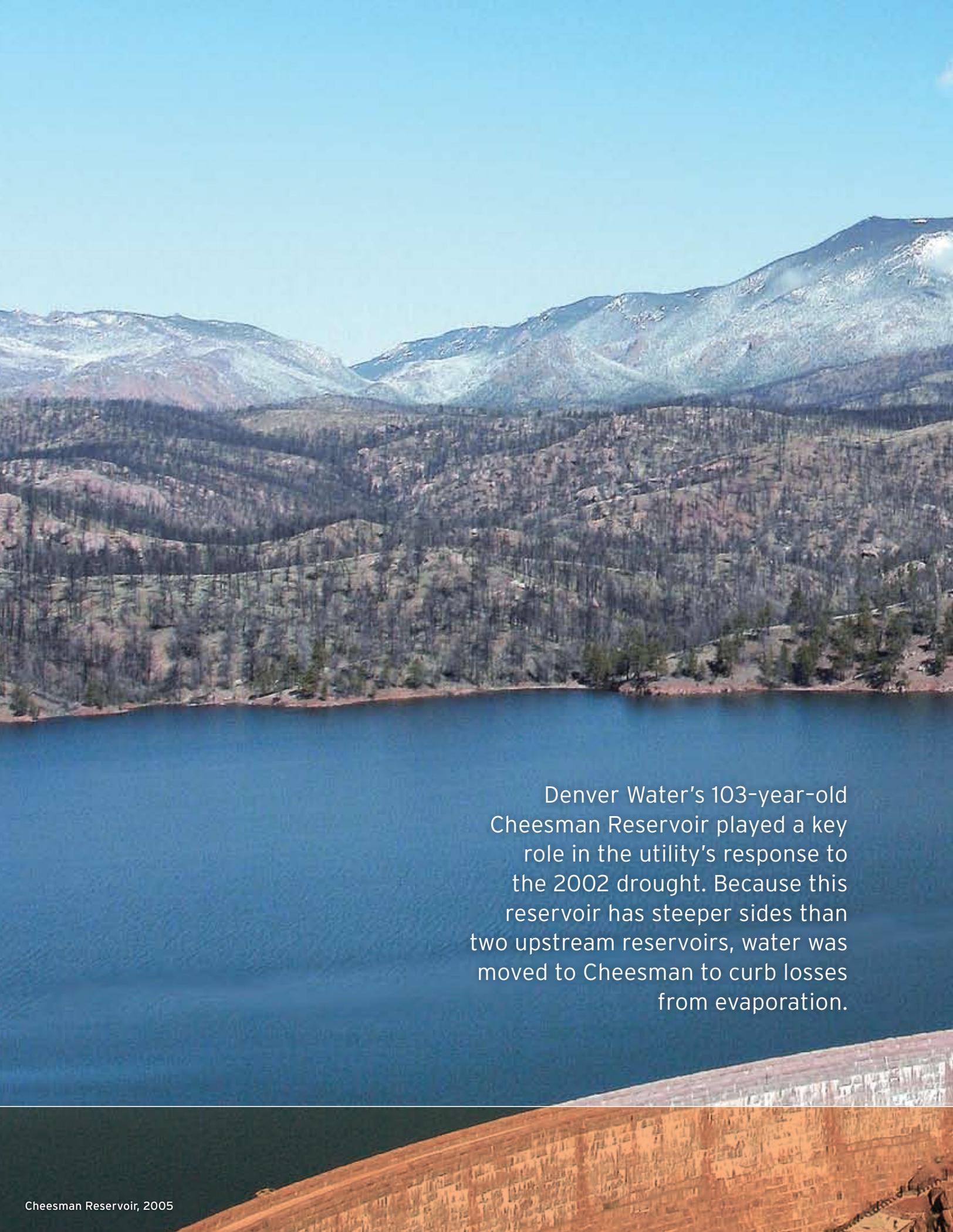
All together, the housing authority will save an estimated 9 acre-feet of water each year — the amount used by about 22 families in one year. "We try very hard to push for efficiency in all sorts of regards," said Brendalee Connors, property asset manager for Lakewood Housing Authority. "To have a partnership like this really helps."

— Ann Depperschmidt

## DID YOU KNOW?

To help state government set an example for eliminating water waste, Denver Water has allocated \$500,000 to provide state facilities in its service area with water-efficient hardware over the next five years. The water-saving devices can include toilets, urinals, showerheads, faucet aerators, rain sensors, and evapotranspiration controllers. The state will install the new equipment at selected properties by a specified date.





Denver Water's 103-year-old Cheesman Reservoir played a key role in the utility's response to the 2002 drought. Because this reservoir has steeper sides than two upstream reservoirs, water was moved to Cheesman to curb losses from evaporation.



# Stopping Profits from Going Down the Drain

Boosting the bottom line is always a boon for business, whether the operation is a small local enterprise or a multinational corporation.

Two Denver businesses — a Vietnamese restaurant called the T-Wa Inn and a manufacturing facility owned by Frito-Lay — have trimmed their operating costs and boosted their profits through water-efficiency performance contracts with Denver Water.

Denver Water pays commercial, industrial and institutional customers that qualify up to \$40,000 for improving the efficiency of their water use. To qualify, projects must meet a minimum water savings requirement of 300,000 gallons per year. Then they earn \$14 for every thousand gallons of water saved during a 12-month monitoring period. Many types of projects qualify for contracts, including installation of water-efficient equipment, reuse applications, cooling tower modifications and changes to cleaning processes.

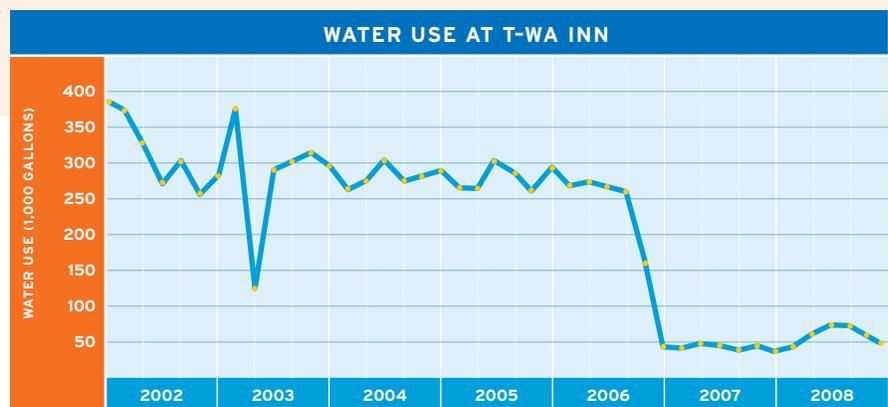
## RESTAURANT REPLACES WATER-WASTING COMPRESSOR

The T-Wa Inn is saving 1.4 million gallons of water a year after replacing its walk-in refrigerator's old water-cooled compressor with an air-cooled model. The restaurant earned an incentive payment of almost \$20,000,

which more than offset the \$9,000 cost of purchasing the new compressor and having it installed. Plus, the eatery continues to cut its overhead by saving some \$2,900 a year on its water bills and another \$2,800 on its sewer bills.

all the water, and the meter was still running," Tran said. When he checked our refrigerator's cooling system, he discovered the problem."

The water-cooled compressor had been in place since the restaurant opened in the early 1980s. It ran 24 hours, seven days a week, and sent 2.75 gallons of water down the drain every minute. The air-cooled compressor eliminates this waste. The restaurant also received



The performance contract came about because Linda Tran, T-Wa Inn's manager, was puzzled that the restaurant's water bill was so high. When she called Denver Water to ask why, technician Jerome Patterson went to the site and checked every water line in the building. "He shut off

rebates for replacing its five toilets with high-efficiency models, and its kitchen and restrooms now boast water-efficient faucets.

## FRITO-LAY PLANT INSTITUTES REUSE PROGRAMS

On a larger scale, the local Frito-Lay plant is saving 27 million gallons of water a year since recycling water in three of its production processes. The facility entered into three performance contracts, one for each process modified, and earned incentive payments totaling \$120,000 — the \$40,000 maximum for each contract. In addition, the plant is saving more than \$60,000 a year on its water bills and more than \$45,000 on its sewer bills.



Denver Water conservation technician Jerome Patterson troubleshoots on site.



Denver Water conservation technician Heather Clark performs an audit at a homeowner's association. In addition to helping commercial customers boost their bottom lines, Denver Water helps irrigation customers identify leaks and ensure their sprinkler systems are running efficiently.

The Denver plant manufactures all three of the company's core products — potato chips, Fritos and tortilla chips. It produces 50 million pounds of potato chips a year. Once again, Jerome Patterson conducted an audit to help the customer identify ways to save water.

Under two of the contracts with Denver Water, the plant began recycling some of the water used to clean field debris from the raw potatoes and to remove starch from the sliced potatoes before they go into the fryer. Under the third contract, the facility began using recycled water in the kettles where the

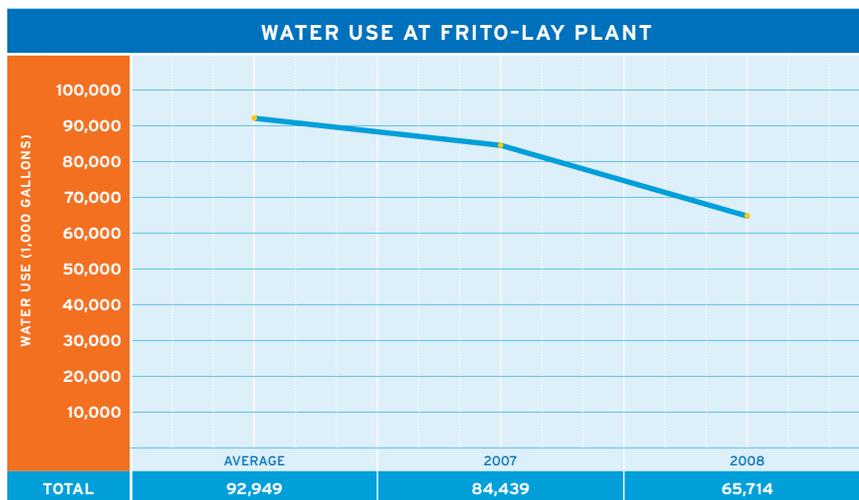
corn kernels are cooked and soaked before being milled and turned into tortilla chips. Not having to reheat all the water used in the kettles helps the plant save energy as well as water.

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In 2007, the Denver facility won Frito-Lay's award for best performance for total conservation — including electricity and natural gas, as well as water. "We review our operational performance at the end of every day," said Michael Iglio, the plant's technical manager. "How much water did we use yesterday? Where did it go and why? We compare these statistics so we can catch any blip in our operations quickly."

With the help of Denver Water, these two businesses are no longer sending part of their profits down the drain.

— Nancy Zeilig



**DID YOU KNOW?**

In 2008 Denver Water signed eight new water-efficiency performance contracts, completed 10 and initiated four additional contracts. Water savings from this program in 2007-2008 totaled 306 acre-feet, enough water to serve 765 households for a year.

# Helping Suburban Water Users Conserve



Denver Botanic Gardens at Chatfield has a successful water-savings agreement with Denver Water.

Customers who use large volumes of water are obvious candidates for water conservation incentives, and agencies that irrigate parks and recreational areas are among the largest users of Denver Water's supplies.

Denver Water has been helping the City and County of Denver conserve water by paying for equipment and materials that support efficient water use. In 2008, the utility expanded its effort to accelerate water conservation in the metro area by encouraging suburban agencies to take advantage of its water-savings incentives as well.

Three large-water-use customers in Jefferson County are currently participating in water-efficiency projects: Lakewood Urban Parks, Foothills Park and Recreation District and Denver Botanic Gardens at Chatfield. The projects include amending soil before seeding it with new turf, modernizing equipment used to communicate data for managing irrigation systems, and connecting dedicated weather stations and evapotranspiration (ET) controllers to centrally controlled irrigation systems.

## LAKESWOOD URBAN PARKS

Lakewood's Urban Parks Division irrigates approximately 320 acres of land consisting of some 90 parks, medians and rights-of-way. According to a formal water-savings

agreement, Denver Water will pay for four weather stations and four ET controllers to be strategically placed throughout the municipality. The weather stations will provide data to the division's centrally controlled irrigation system, and irrigation schedules will be adjusted every day.

In the past, ET rates for the city's parks were calculated from data gathered outside the Lakewood service area.

Data from the new weather stations will more accurately represent weather conditions within the city and allow irrigation schedules to be customized for specific areas.

Data from the new weather stations will more accurately represent conditions within the city and allow irrigation schedules to be customized.

"Right now, we manually download data to our central control system, and it issues a single, systemwide command," said Steve Carpenter, the division's manager. "If it's raining, the system sends out a command to water at zero percent of the ET rate instead of 100 percent. But if we're getting rain in one part of town and not another, we can't adjust for that. The new weather stations will allow the control system to issue four separate commands."

Denver Water will pay about \$5,000 for each weather station and almost \$2,800 for each ET controller, for a total of \$31,281. The new equipment will be installed and operational by the first of May — about the time the division usually starts irrigating — and is expected to save 6.51 acre-feet of water per year. Denver Water's expenditures represent a cost of \$4,805 per acre-foot of saved water.



© Scott Dressel-Martin

#### FOOTHILLS PARK AND RECREATION DISTRICT

Foothills Park and Recreation District maintains 52 parks, 32 miles of trails and five reservoirs encompassing more than 2,250 acres of public land. With Denver Water's help, the district is replacing its outdated 800-MHz radio-frequency communication equipment with an Internet-based Supervisory Control and Data Acquisition (SCADA) System.

The SCADA System, for which Denver Water will pay \$73,500, will control 42 irrigated sites and eliminate reliability problems caused by lost or fractured data.

"With the radio-frequency apparatus, I never knew whether our control system received the information I sent," said Gary Ramos, supervisor of Foothills' urban parks. "The SCADA System will also make my life easier because I'll be able to access it wherever I am — whether I'm in the office, out in the field or at home."

The district has been using roughly 81 million gallons of water a year to irrigate 167 acres of bluegrass turf, but a master plan to be completed in 2009 will downsize both those numbers. The new SCADA System will track how many gallons of water are applied at each site.

"The SCADA System's monitoring ability will allow us to quickly correct over-watering problems," Ramos said. "We'll help Denver Water meet its conservation goals, and they'll help us meet our conservation plan and our budget."

#### DENVER BOTANIC GARDENS AT CHATFIELD

Denver Botanic Gardens at Chatfield is a nature preserve located near Chatfield Reservoir in Littleton. The facility includes nature trails, display gardens, a historical farm and picnic areas. In summer 2009, it will introduce a new outdoor concert venue — a re-graded, fan-shaped amphitheater for audiences of up to 5,000 people.

Under Chatfield's water-savings agreement, Denver Water paid \$47,018 for 650 cubic yards of soil amendment for the amphitheater's turf, to be seeded in the spring, and an on-site weather station and ET controller that will help ensure the five acres of new turf and six acres of existing wildflower meadow are watered efficiently.

"We're located right along the foothills, and only a few miles in any direction the wind and rainfall can vary quite a bit," said Larry Vickerman, Chatfield's director. "Now we'll be able to determine our own ET rates."

Because the project includes five acres of new turf, it technically won't reduce water demand. But the compost is expected to save 20 percent of the amount of water required to irrigate turf installed over non-amended soil. Collectively, the compost, weather station and ET controller will keep Chatfield's annual irrigation rate at or under 18 gallons per square foot of turf, which is considered efficient.

Vickerman said Chatfield's agreement with Denver Water fits the facility's mission. "It's our responsibility to conserve water," he said. "We all figured that out in 2002 when the drought showed us how tenuous our water supply is in Colorado. If you can maintain your landscape and also save water, why wouldn't you?"

— Nancy Zeilig

#### DID YOU KNOW?

Although Denver Water's combined service area is fixed in size, the population within this boundary is expected to grow by 40 percent by 2050. The current population served by Denver Water is 1.3 million people. A typical household uses an average of 125,000 gallons of water per year.

# Back to School

DENVER WATER PARTNERS WITH JEFFCO SCHOOLS TO REPLACE FIXTURES

By the end of 2009, James Ennis will have installed almost 600 toilets, several hundred urinals and about 650 faucets. "As I'm putting more in, I'm learning faster ways to do it," the Jefferson County Public Schools journeyman said. "By the time I get to the fifth or sixth school, it'll be nothing at all."

Ennis is one of five plumbers who are installing nearly 2,500 water-efficient toilets, more than 700 high-efficiency urinals and about 2,000 automatic faucets in Jeffco Schools' facilities within Denver Water's service area — all provided by Denver Water.

"We're always interested in conservation," said Jim Faes, energy manager at Jefferson County Public Schools. "But typical school budgets are always tight. We try to do a lot with not much."

## WATER-EFFICIENT FIXTURES WILL GO IN 84 SCHOOLS

With the help of Denver Water's suburban conservation coordinator, Liz Gardener, and industrial water conservation engineer, Cindy Moe, the district put together a proposal outlining its needs for water-efficient toilets, urinals and faucets in 84 schools and requesting replacement models from Denver Water.

Some of the district's schools had urinals that used four gallons of water per flush and toilets that sucked down

3.5 gallons or more per flush. With the agreement signed and approved by Denver's Board of Water Commissioners, those inefficient fixtures will be replaced with 1.28-gallon-per-flush

toilets, quarter-gallon-per-flush urinals and automatic faucets over the course of the year. The district is responsible for installing the fixtures.

## SCHOOLS WILL SAVE ENOUGH WATER FOR 540 FAMILIES

The partnership with Denver Water will save Jeffco Schools 217 acre-feet of water annually, roughly the amount

Jeffco Schools' new fixtures, courtesy of Denver Water, will save 71 million gallons of water annually.



Zack Kurtz, a third-grader at Dutch Creek Elementary School in Littleton, washes his hands using one of the school's new automatic faucets supplied by Denver Water.

of water used by 540 families in a year. Buying new plumbing fixtures and conducting water audits at the schools will cost Denver Water about \$1.2 million, or \$5,500 per acre-foot of saved water. That's much less than the cost of developing new water supplies.

"It's cheaper to conserve water than it is to look for new supplies," Moe said. "And we're not forcing people to change their behavior. We're just putting in a new device."

The deal also helps the school district with maintenance issues. All the toilets, urinals and faucets are the same model, which makes buying replacement parts and making repairs easier on the plumbers, said Rich Anderson, the district's master plumber.

The touchless faucets also help students maintain better hygiene while learning about water conservation, journeyman Ennis said. The project is worth it, he said, even if he will be installing new toilets, urinals and faucets for months to come.

"The first toilet (installation) took me three hours," Ennis said. "Now it takes me an hour or an hour and 15 minutes. But then you do so many, you can install them with your eyes closed."

— Ann Depperschmidt

## DID YOU KNOW?

A leak that drips just five drops every 30 seconds will waste almost 300 gallons of water a year.



Denver Water recycles the old toilets once they have been replaced with efficient models. The porcelain can be crushed and reused in road base and other materials.

## New Toilets for Tots

Toilets are typically the largest source of indoor water consumption, and Denver Water's conservation staff had a busy year dealing with them in 2008. In addition to the project with Jeffco Public Schools, the group worked with various other schools and nonprofits to replace water-guzzling toilets with more efficient ones.

Once all the toilets had been replaced, crews took the old toilets to a designated recycling bin that holds up to 250 toilets. The receptacle is emptied regularly so the porcelain can be crushed and reused in road bases and other materials.

Among the Conservation Section's latest school projects:

- The Denver Waldorf School: This K-12 school was built in the 1920s and still had fixtures as old as the building. The school, a nonprofit, turned to Denver Water for help. Denver Water bought 26 efficient toilets for the school, two toddler toilets, 20 sinks with automatic faucets and three flush valves for urinals. The fixtures will save the school about 2.5 acre-feet of water annually, roughly the amount of water used by six families each year. The project cost Denver Water about \$9,800 per acre-foot of water saved, still less than the cost of developing new supplies.
- Toddler potties: Denver Water also installed four toddler toilets at Mile High Montessori, a nonprofit school. These high-efficiency toilets are smaller than standard toilets and come in primary colors.

— Ann Depperschmidt

A large billboard advertisement for Denver Metro. The billboard has a bright orange background. On the left, the word "BROKEN" is written in large, white, bold, sans-serif capital letters. To the right of "BROKEN", the word "SINKING" is written in a similar font, but it is partially obscured by a dynamic splash of blue water that appears to be spraying upwards from the bottom of the billboard. The water splash is detailed with many droplets and bubbles. The billboard is mounted on a dark metal structure with a walkway and railings. The background is a clear blue sky with some light clouds.

**BROKEN SINKING**

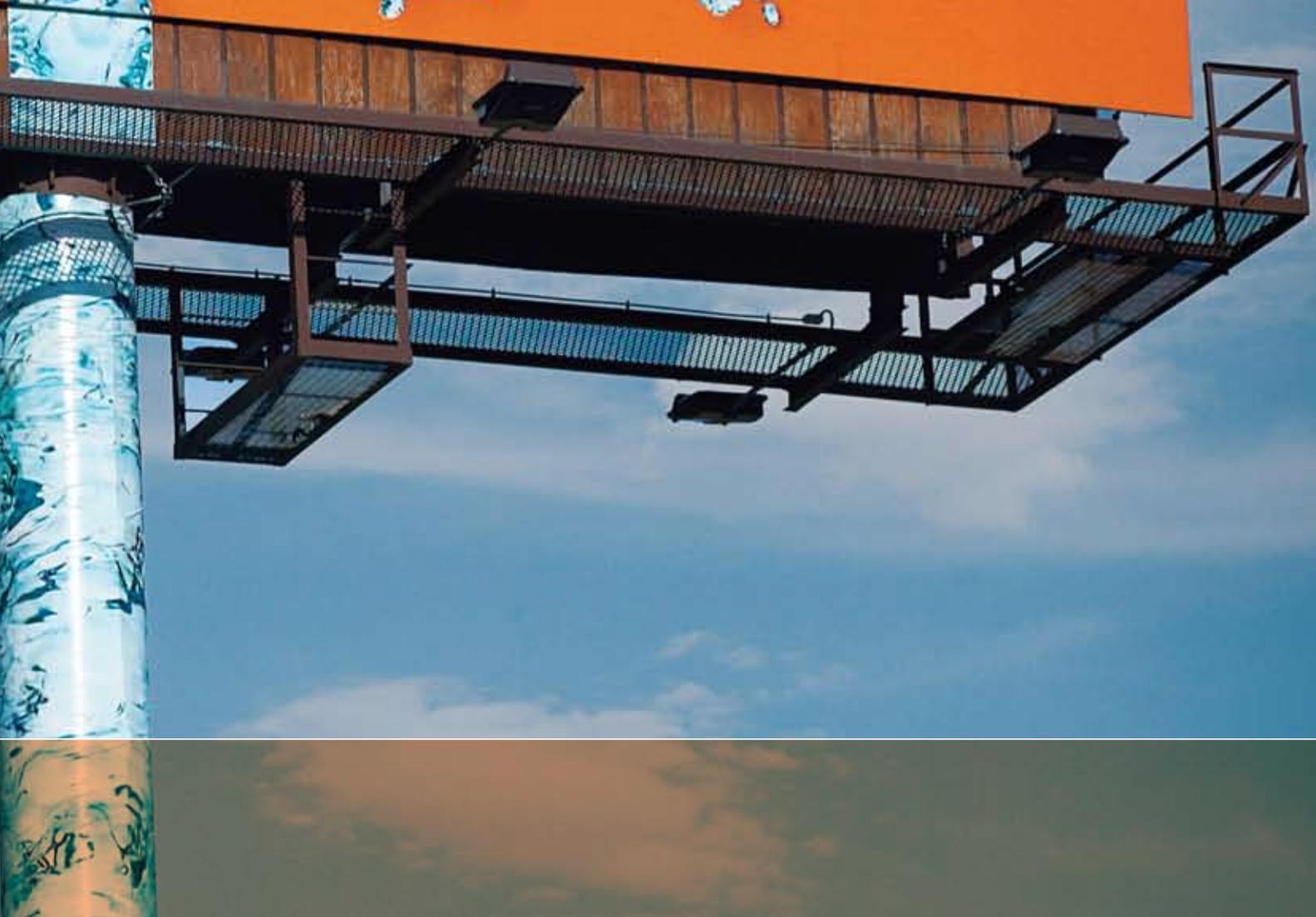
A vinyl-wrapped billboard pole gives the illusion of water spraying up out of the ground and urges customers to fix broken sprinklers.



# DON'T WASTE WATER

USE ONLY WHAT YOU NEED.

 DENVER WATER



# Water Efficiency Doesn't Require Giving Up a Green Lawn



Denver Water customers care a lot about water conservation, but they still want green lawns.

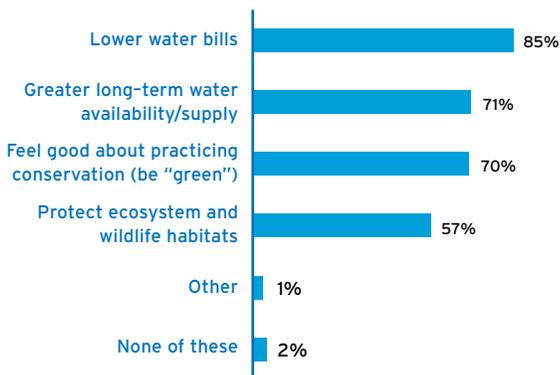
"We knew people cared about their grass, but many people care a whole lot more than we thought," said Trina McGuire-Collier, Denver Water's community relations manager, referring to a recent customer survey. "Many are willing to do what we ask up to a point, but if it costs them their green grass, they won't do it."

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## SURVEY DETAILS CONSERVATION OPPORTUNITIES

In late 2008, Denver Water's advertising agency, Sukle Advertising + Design, commissioned a survey to identify water conservation opportunities for 2009. More than 800

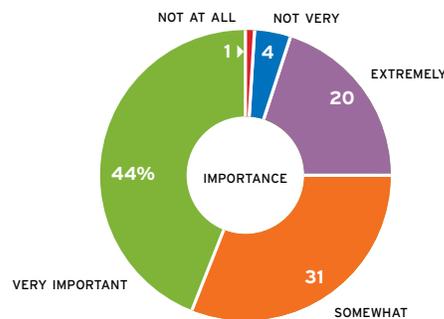
### Top Reasons Water Users Conserve



adults who live in Denver Water's service area were surveyed for the study, which addressed topics about conservation attitudes, lawn-watering schedules and irrigation methods, among other issues.

The survey's findings help Denver Water's conservation and community relations sections develop effective ways to teach customers about water efficiency while recognizing the barriers customers have to using less water.

### Importance of a Green Lawn



Higher income households (\$100k+) are especially likely to place high importance on having a green lawn compared with lower income households (74% vs. 57%)

The survey found that the two most important reasons homeowners conserve water are because they want to save money on water bills and they feel a moral obligation to conserve in Colorado's semi-arid climate. Still, two-thirds of homeowners say the prestige and pride associated with green lawns is an important consideration for them.

That finding is important for conservation specialists to keep in mind when they talk to customers about water use, said Melissa Elliott, Denver Water's conservation manager. Conservation specialists have to make it clear to customers that they can use water wisely and still maintain green lawns. They can encourage customers to learn about the appropriate amount of water needed for a specific type of



turf, the amount of precipitation the lawn receives and other landscaping factors, she said. “You can have a green lawn and be very efficient,” Elliott said. “That’s been proven over and over again.”

**FINDINGS CHALLENGE DENVER WATER TO HELP CUSTOMERS SAVE WATER**

Most people surveyed said they follow Denver Water’s watering rules by not watering between 10 a.m. and 6 p.m. and limiting their watering to three times a week or less. But more than

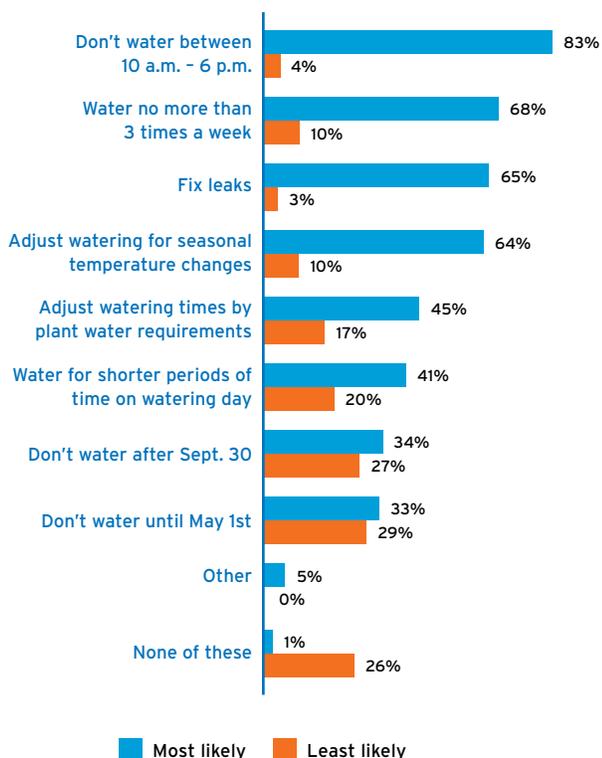
half start watering before May 1, which is Denver Water’s recommended start date for irrigating lawns in the summer, and more than three-fourths continue watering in October and later, after the Sept. 30 stop date Denver Water recommends.

That challenges Denver Water to educate customers about the ineffectiveness of watering so early or so late in the year, when most lawns are exiting or entering a dormant stage, Elliott said.

“People think it turns the lawn green faster, but the lawn will turn green from spring moisture and warmer temperatures on its own,” she said.

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**Likely Watering Habits to Help Conserve Water**



Most of the people surveyed use a sprinkler system to water their lawns. Of those people, 72 percent say it’s important to adjust watering amounts for seasonal temperature and precipitation changes, but a little more than half actually do. The survey also found a similar gap in the number of people who said it’s important to maintain sprinkler systems and prevent leaks versus those who actually do.

“The sprinkler system is underground, so we don’t tend to think about it at all,” Elliott said. “And the sprinkler system clock can be intimidating.”

Because of that, Denver Water encourages its customers to experiment with their controllers by cutting back watering times by two minutes to see what happens. If the grass stays green, customers should cut back another two minutes.

“I don’t think people purposely over-water their lawns,” Elliott said. “We just need to help them become more water-efficient.”

— Ann Depperschmidt

