Texas Water Savers
News of Water Conservation and Reuse in Texas

Volume 1, Number 2, Summer 1994

Letter From the Editor

In our first issue of *Texas Water Savers*, we requested that agencies, consultants, businesses and other groups that believe in water conservation contact us to see if they would like to help sponsor this newsletter.

We are pleased to announce that the Texas Water Development Board has become the first sponsor of the newsletter. Through the work of Mike Personett, Bill Hoffman, J.D. Beffort, and others in TWDB's Water Conservation Section, the Board was able to help the Texas Water Resources Institute secure a grant from the Governor's Office. That grant provides start-up funding to publish and mail the first five issues of *Texas Water Savers*.

The Board's Conservation Section plays a prominent role in supporting research and technology transfer programs that encourage water conservation. This includes municipal, industrial, and residential conservation, agricultural water savings and public education about water conservation. Over the past decade, TWDB has spent roughly $2 million from its general research and planning fund on research directly related to water conservation and water reuse. The Board also provides grants and low-interest loans to utilities for water and wastewater programs that emphasize conservation, reuse, and recycling and funds research on water conservation issues.

We hope that many others will want to follow the lead of the TWDB and join them as financial sponsors that support the newsletter. The overall goal is to receive enough financial support to continue producing the newsletter if grant funds are no longer available.

If your company or organization is interested in becoming a sponsor, please contact me at (409) 845-8571 or TWRI Director Wayne Jordan at (409) 845-1851. We will happy to provide you with additional information on how you can help sponsor the newsletter and to explain the benefits of supporting what we feel is a very important effort.

Sincerely,
Ric Jensen
Editor, *Texas Water Savers*

Has SB 587 Really Saved Water?

Two years ago, the Texas Legislature passed Senate Bill 587, which required that only water-conserving models of indoor plumbing fixtures would be sold in the State. The law applies to faucets, shower heads, toilets, and urinals. It required that dishwashing and clothes washing machines display labels of estimated water use. The plumbing fixture law "enforces" water conservation by prohibiting the sale of indoor plumbing fixtures that do not meet standards for water conservation.

The City of Houston recently featured a demonstration of "Retro-Fit Freddie," which is a display of indoor plumbing fixtures and how they use and conserve water.

Some Texas cities have seen declines in per capita water use over the last several years, but it is hard to pinpoint if this bill or some other factor is the reason for the savings. More than likely, the conservation is a result of a combination of increased public awareness, aggressive water pricing strategies, and the plumbing fixture bill.

The full effect of the plumbing fixture bill is not expected to be apparent for another few years. The Texas Natural Resources Conservation Commission (TNRCC) estimates this bill may result in an average savings of 22 gallons per person per day over a 50-year period. When multiplied by some 17 million people, that's 374 million gallons per day or about 136 billion gallons of water saved per year. In fact, the TNRCC expects that up to half of all projected municipal water conservation will be a direct result of the plumbing fixture bill. The TNRCC is using these anticipated savings in its planning efforts for the year 2050. The plans are based on the belief that within 50 years, all plumbing fixtures will have been replaced with the water savers. TNRCC points out that progress may come even faster with retrofit programs, and with the marketing of low-flow dishwashers and clothes washing machines.

The plumbing fixture bill is not a retrofit bill -- it does not mandate replacement of conventional fixtures with water-conserving ones. By restricting the sale of plumbing fixtures to only those that are water-savers, the bill may gradually cause most current conventional devices to be replaced with water-efficient models. The bill also does not regulate the *installation* of plumbing fixtures by homeowners statewide. Homeowners

could purchase a 3.5 gallon per flush (gpf) toilet in Arkansas or Oklahoma, bring it back to Texas, and install it legally according to S.B. 587. This has been a source for some confusion since a number of cities in Texas *do* regulate the installation of plumbing fixtures. Houston, Austin, El Paso, Dallas, and Amarillo are among the which prohibit the installation of indoor plumbing fixtures that do not meet the water conservation standards.

Another problem is that conventional fixtures that were "on the shelf" when the law took effect were grandfathered in with no penalty for sale. In other words, stores can keep on selling conventional plumbing devices that were purchased before the law took effect. Some estimate that it may take 2 - 3 years for those fixtures to be completely sold out and the water-saving fixtures to fully take over.

However, it may be become more difficult, if not impossible, to purchase plumbing fixtures that do not save water in the near future. Many states have enacted laws for indoor plumbing fixtures. Shortly after the Texas law was passed, a federal law was also passed and went into effect January 1. The federal law enforces the *manufacture* (not sale) of plumbing fixtures according to water conservation standards that are, for all intents and purposes, the same as those enforced in Texas.

Those standards are:

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toilets        1.6 gallons per flush
urinals        1.0 gallons per flush
faucets        2.2 gpm at 60 psi
showerheads    2.5 gpm at 80 psi
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There are no international plumbing fixture bills at this time.

NOTE: More information on how SB 587 affects water conservation can be obtained from Bill Hoffman of the TWDB at (512) 463-7932.

Texas Industries Save Water

Ensuring that water is available for Texas' industrial water users is a cornerstone in the State's economic future. It follows that the ability of Texas industries to conserve, reuse, and wisely use water will be the foundation for that future. Great strides have been made in water conservation and reuse, with many Texas industries breaking ground in the development of ways to stretch the valuable resource.

Industrial use of fresh water now accounts for more than 40% of non-agricultural water use in Texas, and is expected to continue to increase. Rising water costs, limited water supplies, and issues such as waste minimization, pre-treatment, and pollution control are making industries and the utilities that serve them take a new look at the role for increased water-use efficiency, water reuse, and other technologies. Industrial water conservation (which includes the array of reuse, reclamation, improved efficiency, and similar processes) has been motivated by economic and regulatory incentives.

Since industries are typically required to pay for effluent treatment and discharge by volume, saving water is nearly always an economic advantage because it reduces overall wastewater treatment costs. In most industries, treatment costs far outweigh the actual cost of raw water. Increasingly stringent laws regulating environmental impacts of industrial discharge have motivated industries to minimize the amount of effluent that actually leaves the plant. In many cases, some type of effluent reuse or recycling is introduced as industries strive to minimize discharges. As new plants are built, it is likely that internal recycling technology will be incorporated as a means of avoiding the high cost of retrofitting later on.

Examples of water conservation exist in Texas for almost every industrial sector. In an effort to learn more about statewide progress in industrial water conservation, the TWDB recently commissioned a survey that was performed by Pequod Associates, a California company specializing in industrial water use efficiency. More than 350 industries throughout Texas were surveyed. They supplied valuable information on industrial water use and conservation in this State. The survey results indicate that many Texas industries have already achieved significant water savings. Reported water savings ranged from little or no savings in the organic chemicals industry to a 19% savings in food processing and 33% savings in the semiconductor industry.

The most common conservation practices reported were: 1) recycling of cooling and process water; 2) sequential reuse; 3) improved control systems; and 4) process modifications. Other savings included retrofit of plumbing fixtures, improved landscape irrigation, automatic shutoffs, and similar practices. While many facilities reported having room for improved water use efficiency, some industries are already known for their ardent water reuse. In the petroleum and refining industry, for example, it is not uncommon for plants to reuse water up to 50 times before discharging it. "High-tech" industries are another example of widespread conservation. Large amounts of water are used in the semiconductor industry for rinsing and cleaning etched wafers, but significant water savings are being realized through programs to increase employee awareness, collect rainfall, and efficiently water landscapes.

The efforts of Texas industries to make the most of limited water have shown that industrial water conservation can lead not only to water savings, but also to lower production costs, regional economic development, and more efficient and thorough wastewater treatment.

NOTE: More information on the Pequod report and the water conservation programs of the TWDB can be obtained by calling Bill Hoffman at (512) 463-7932. Also, the Spring issue of the *Texas Water Resources* newsletter focused on industrial conservation. To obtain a copy, call TWRI at (409) 845-8571. Ask for Volume 20, Number 1.

Meetings

The Soil and Water Conservation Society will host the **Catch the Conservation Wave** conference August 8 - 10 in Norfolk, VA. Presentations will focus on ecosystem based watershed projects, managing for change, complexity, and diversity, achieving

conservation goals through existing programs and policies; and public-private partnerships in conducting conservation. For more information, contact SWCS at (301) 649-3675.

The **American Society of Landscape Architects** will hold its annual meeting and exposition October 8 - 11 in San Antonio, Texas. The focus this year will be on water, with more than 20 workshops on water that include design techniques and new technologies. Topics include wetland construction and restoration, plant communities, mitigation banking, streambank restoration, floodplain management, river "greenways," water and environmental management, landscape irrigation, and urban watershed restoration. For details, contact ASLA at (202) 686-2752.

The 67th Annual Conference and Exposition of the **Water Environment Federation** will meet October 16 - 20 in Chicago, IL. The general theme of the meeting will be water quality issues. Sessions will deal with water and wastewater treatment, regulatory issues, pollution monitoring and management, and the impact of wastewater on water quality. For details, call (703) 684-2475.

A **National Symposium on Protecting Rural America's Water Resources** titled "Partnerships for Pollution Solutions" will take pace October 23-26 in Washington, DC. The meeting is sponsored by the Ground Water Protection Council. Sessions will focus on pollution prevention, the role of monitoring and scientific assessment, problem identification, resource protection, and management practices. For details call the Council at 1-800- 762-0190.

The 14th **International Symposium on Lake, Reservoir, and Watershed Management** will meet Oct. 31 - Nov. 5 at Orlando, FL. The meeting is sponsored by the North American Lake Management Society. It features sessions on lakes, reservoirs, water quality, nonpoint source control, and restoration of impaired sites. For details, call (414) 392-2162.

The 30th Annual Conference of the **American Water Resources Association** will meet November 6 - 10 in Chicago, IL. The conference will be devoted to looking at water resource problems and solutions for the year 2000. Symposiums will deal with water quality issues and assessing water quality trends. For details, call AWRA at (301) 493-8600.

The Texas Water Resources Institute (TWRI) is now organizing the **Water for Texas Conference**. The Conference is planned for January 26-27 in Austin. The meeting will focus on the importance of water research. A call for papers will be issued shortly. Topics will include water conservation and water use efficiency. Additional details are available by contacting TWRI at (409) 845-1851.

City of Bryan Recognizes Water Saving Businesses

Promoting water conservation and water reuse among businesses, and recognizing a conservation job well-done are the goals of a new Bryan water conservation program.

The City of Bryan Office of Water Services held its first annual contest in May to honor outstanding efforts by businesses and governmental offices in Bryan to save water. The competition consisted of categories for large and small private business, and government offices. Three local businesses were recognized for excellence in water conservation.

Awards were made to the Brazos Transit System for its bus wash water recycling system, Transit Mix Concrete and Materials for its reuse of water to rinse concrete trucks, and Central Texas Word Processing, an office machines company that incorporates xeriscape landscaping and an employee awareness program for general water conservation practices (such as keeping leaks fixed and washing company vans at commercial car washes where water is recycled).

This water reclamation system is installed for the Brazos Transit System. The system will kill bacteria. Water and soap are separated and reused.

The Brazos Transit System is building a new bus washing system that will use reclaimed water. Brazos Transit anticipates opening the new, $40,000 facility this August. The system will replace a manual spray washing facility that does not use reclaimed water . Brazos Transit washes 50 vehicles daily, and uses about 300 gallons of water per bus. The water drains to the storm sewer system.

The new bus washing system at Brazos Transit will still be a hand-wash system, although plans call for upgrading to an automated system in the future. Runoff will drain to a retention tank and then be pumped into a reclamation system. Water and soap will be separated and the soap will be saved and reused. The water will be treated and pumped into a holding tank to be reused again and again. Solids that settle or are suspended will be reduced to a powder which will be disposed of by Hotsy, the company that designed the reclamation system. Hotsy is a major manufacturer of water reclamation systems for the bus industry.

Brazos Transit expects its annual water consumption to drop to below 2,000 gallons. The only loss from the reclamation system is through evaporation. Brazos Transit is installing the system with grants from the Federal Transit Administration and from the Governor's Office. Future plans include converting to an automated wash system, and developing and installing a rainfall collection system.

The ready-mix concrete business is another sector where high water use makes water conservation a necessary part of everyday business operation. Bryan's Transit Mix Concrete and Materials has long incorporated conservation practices into its operation by reusing "mix" water to rinse the concrete trucks. The business services approximately 20 loaded concrete trucks a day, all of which must be rinsed out after each use. At approximately 200 gallons of rinse water per truck per day, the business is saving an estimated 1.5 million gallons of water a year by reusing water.

The company built a facility in 1973 to serve as a collection point for concrete base material, which includes sands, gravels, small amounts of concrete, and water. Each day, the concrete trucks dump this waste into a series of three concrete-lined holding pits. The sides of the pits have slots that are stuffed with hay bales, which filter the water. Solids settle to the bottom of the pits. The relatively clean wastes then flow into a fourth holding tank. Filtered water from the tank is used each day for rinsing out concrete trucks.

The ready-mix concrete business is water intensive. Each load of concrete requires 250 gallons of water for the mix, plus an additional 100 gallons that must be hauled separately for use at the pouring site if needed. According to R.L. Smith,, general manager of Transit Mix, water conservation is a must in the ready-mix business. The water recycling and reuse program at Transit Mix has paid for itself in lower water bills, in spite of the $4,000 to $5,000 annual maintenance and operational cost for the reuse system.

NOTE: More information on the City of Bryan's Water Conservation Program can be obtained by contacting Michelle LaVigne at Bryan Water Utilities at (409) 361-3635.

Research Shows That Low-Flow Toilets Save Water and Money in El Paso

It's a well known fact that low-flow toilets use less water than conventional models that were not designed to save water. The earliest toilets used about 10 gallons of water per flush. Today, the conventional toilet uses about 4.5 gallons of water per flush. More efficient low-flow toilets now use about 3 gallons per flush while ultra-low-flow toilets use only about 1.6 gallons per flush.

Replacing a conventional toilet with an ultra-low-flow model would save about 32 gallons of water a day for a typical household that flushes about 11 times daily. Annual savings could total about 12,000 gallons of water.

Saving water by replacing conventional toilets with low-flow models sounds simple. Until recently, there has been some confusion over the effectiveness of water-saving plumbing fixtures such as low-flow toilets. It has been difficult to tell how much water was being saved by any given device, since multiple devices were often installed simultaneously. In addition, the cost effectiveness of using water-saving plumbing fixtures has often been questioned.

Recently, research in El Paso is demonstrating that most households can not only afford to install low-flow toilets, they probably can't afford not to. The study addressed whether

cities can afford to subsidize the replacement of conventional toilets with ultra-low flow models to save both water and wastewater treatment costs.

The research was led by Anthony Tarquin and Srinivasa Vagwala of the Civil Engineering Department of the University of Texas at El Paso; John Sutton of El Paso Water Utilities; and Peter Chan of the engineering firm of Parkhill, Smith, and Cooper. Low-flow toilets that were installed in El Paso in September, 1991 resulted in an average household water savings of about 18% over 18-months. They also saved the City of El Paso nearly $1 per 1,000 gallons in water and wastewater treatment costs. Similar studies in California and elsewhere have confirmed the El Paso results.

The researchers conducted the study in response to a request by the City of El Paso to learn more about the effectiveness of its water conservation programs. The study was part of the City's effort to take stock of its water conservation programs, and to evaluate their effectiveness.

El Paso's reliance on diminishing ground and surface water supplies motivated the City to introduce one of the strictest water conservation programs in the country. In addition to a tiered water pricing system and other water conservation incentives, El Paso began a project in 1991 to encourage installation of ultra-low-flow toilets in existing houses. The City offered a rebate of 75% of the cost of toilet replacement for new toilets that use 1.6 gallons of water or less per flush. In all, 2,466 homes took part in the rebate program, and 4,096 toilets were replaced. The average cost of new toilets was $115, with the average rebate of $76. The cost to the homeowner for each toilet replacement was about $90, including a $50 installation fee.

The researchers initiated a complex water use tracking system in order to collect data on toilet water use in the participating houses. Water use information was collected from a representative sample of the participating homes for the 12-month period before and after the installation of the low-flow units. The researchers found that average water savings was about 18% per household. In a survey about the program, participating households responded that they needed to flush their units more than once (to dispose of solid waste) about 30% of the time. However, flushing an ultra-low-flow toilet twice still uses less water than one conventional flush.

The research also found that average time to pay back the individual investment through realized water savings was 2.5 years. The City saves as well. The current cost for water and sewer is about $1.38/1,000 gallons. The research showed that the equivalent cost of providing water and sewer services to households with low-flow toilets was only about $0.40/1,000 gallons. That means that El Paso is saving nearly $1 for every 1,000 gallons of water provided and subsequently treated for homes where low-flow toilets are used. Those savings are significant and show that El Paso's leadership in implementing water conservation programs is now paying off.

A paper on this subject was presented at Conserv 93 and was included in the proceedings. For more information, contact Tarquin at (915) 747-5464.

Austin Saves Water By Providing Free Low-Flow Toilets to Customers With Low, Fixed, Incomes

The City of Austin has long been a leader in Texas in working for water conservation. Now Austin is outdoing even itself. Beginning June 1, the City has been providing, *free of charge*, ultra-low-flow (ULF) toilets to at least 400 households with low or fixed incomes. Installing the ULF toilets is expected to reduce indoor water consumption by 20% for an annual savings of about $30 for a one-person household. The savings will be greater for larger households.

The 1.6 gallons per flush (gpf) toilets are being provided to households wishing to replace conventional toilets. To qualify for the program, the households must receive water bills directly from the City of Austin, must meet specified income guidelines, or must have participated in Austin's free weatherization program. The program is being carried out in nine target neighborhoods (Anderson, Dove Springs, Rosewood, Blackland, Guadalupe, Saint Johns, Blackshear, Montopolis, and Springdale/Webberville).

Just over one month into the program, the City had already provided 130 households with ULF toilets. Austin expects to replace the remaining 270 units within 2 or 3 months They plan to extend the program so that a total of 1,600 toilets will be provided in 15 months. The Environmental and Conservation Services Department anticipates a large number of requests for the offer, since they received approximately 250 calls in response to a recent billing "stuffer" advertising the program. In addition, the office plans to contact through direct mail some 2,000 customers who automatically qualify for the ULF toilet program, because they participated in the City's free weatherization project.

Other requirements for the program include living in a home built before July 1, 1991; agreeing to replace all existing showerheads that use 2.5 or more gallons per minute with low-flow showerheads, that are also provided free; ability to pick up and install the new ULF toilets; and responsibility for scheduling an inspection of the new toilets within 14 days after they have been installed.

Once a customer's application has been approved, they receive a voucher for an ULF toilet and information on specifically when and where to pick up the unit and how to install it. Customers are instructed to keep their old toilets until their inspection is complete. After that, customers may have the ULF toilet distributors dispose of the old toilets for them.

The program, known as the ULF Toilet Outreach Program, is being sponsored by the Environmental and Conservation Services Department and the Water and Wastewater Utility of the City of Austin. The purpose is to promote and facilitate water conservation for persons with low or fixed incomes. Previous ULF toilet programs were directed toward those with middle incomes. The practice of giving away free ULF toilets is a departure from the past two years, when the City offered up to a $40 rebate for each toilet that was replaced with ULF models. The rebate provided an incentive for many households to replace their conventional toilets, but the customer's share of toilet cost and

installation (typically about $100) prohibited many persons with low or fixed incomes from taking part.

By providing the initial 400 new ULF toilets, the City expects to save about 4.8 million gallons of water per year. When 1,600 units are replaced, savings would add up to about 24 million gallons of water over 15 months. The savings in wastewater treatment costs that are associated with this water savings are expected to more than repay the initial cost of providing the toilets. If all goes well, Austin will continue the program for years to come; in the meantime, the Toilet Rebate Program is still open to all customers.

More information can be obtained by calling Tony Gregg of the Austin Environmental and Conservation Services Section at (512) 499-3557.

Houston to Begin Work on "Comprehensive" Water Conservation Plan

The City of Houston will soon begin to develop a comprehensive water conservation plan to address projected water supply shortages. The work is being funded by a $125,000 grant from the Texas Water Development Board (TWDB), with matching and in-kind funds from the City of Houston. The plan will replace one adopted in 1987, which consisted primarily of education and public information. The new plan is expected to take an aggressive and pro-active approach to addressing anticipated water supply problems.

Education is a major part of the City of Houston's water conservation efforts. In May (which is "Water Conservation Awareness Month"), the City sponsored special activities at the Houston Zoo. One highlight (see above) was a children's play that emphasized the need for water conservation. The play featured appearances by Rusty Starr (a 7-foot frog), Al the alligator, Sharky the shark, and "big game hunter" Dan Thibaut.

Municipal water needs for the city of Houston are anticipated to nearly double to 625,000 acre-feet per year (AF/yr) over the next 50 years. An active water conservation program is expected to reduce projected needs by about 63,000 AF/yr. The water conservation plan will address these issues in detail.

The plan is being developed as part of the Trans-Texas Water Program, a comprehensive state-wide water supply plan being developed for Texas. Water conservation is one of the keystones of the Trans-Texas Program. Major growth centers within the Trans-Texas Program with potential water shortages are required to prepare comprehensive water conservation plans. Those

centers include Houston, Corpus Christi, San Antonio, and Austin.

TNRCC to Conduct Survey on Conservation

The Texas Natural Resource Conservation Commission (TNRCC) will soon mail out some 8,000 questionnaires to gather information on water conservation attitudes, and on the results of the water conservation programs which have been introduced in the State over the last five years. The questionnaires are being sent to about 5,000 public water supply system operators, 2,000 industrial sites, and 1,000 individuals throughout the state who have recently participated in municipal, industrial, or agricultural water conservation programs.

The goal of the survey is to better understand the factors that motivate individuals, companies, industries, and communities to conserve water, the different ways that people conserve water, and the actual water savings experienced throughout Texas. Results of the survey will be used to help design future water conservation and reuse programs throughout the State.

For details, call Carol Stuewe at the TNRCC at (512) 239-6126.

TWDB Introduces Conservation Kits for Water Utilities

Texas water utility managers are invited to send for a free kit of water conservation training and public awareness materials. Produced by the Texas Water Development Board (TWDB), "Water for Texas - A Utility Manager's Guide to Water Conservation," will help with planning and promoting local water conservation programs. A manual, video, and sample packet of the TWDB's water conservation literature will aid in training utility employees and informing customers of the potential for conservation. Special radio and television public service announcements are also available for special order. Specific topics covered by materials in the kit include:

- the status of water in Texas;
- why a utility should adopt a water conservation program;
- the steps in developing a water conservation program;
- how to develop a water conservation public awareness program;
- what consumers should know about conserving water;
- how to reduce unaccounted-for water;
- water reuse; and
- what institutional, commercial, and industrial water customers need to know about conserving water.

To order a kit, contact the Texas Water Development Board at (512) 463-8422.

UTEP Research Examines Water Conservation Issues Confronting El Paso, Juarez

Water conservation along the El Paso/Ciudad Juarez border is being implemented courtesy of Mother Nature. A recent study has concluded that water managers in that area can either optimize the system or struggle with its abuse for decades to come. Charles Turner, professor of Civil Engineering at the University of Texas, El Paso, recently completed a study of the long term management options and the short term urgency for international cooperation in the region.

Turner's study concluded that the sustainable limit of water usage in the region may have already been surpassed, with very little cushion for the present population, and virtually no room for future growth. In spite of that, the region continues to have rampant growth.

Through extensive conservation efforts introduced in El Paso, sustainability of water resources is expected to be attainable. Water use is expected to nearly double from 123,000 acre feet per year (AF/yr) in 1990 to about 226,000 AF/yr in 2040.

El Paso's overall plan includes: a move away from reliance on the Hueco Bolson aquifer system to greater reliance on the Rio Grande (the only renewable water source in the region); reuse of wastewater for golf course watering; sequential industrial reuse; aquifer recharge; mandatory xeriscaping; rate structures designed to lower summer peak use; toilet replacement programs; lawn watering restrictions; and an aggressive public awareness program.

In contrast, the water supply plan for Ciudad Juarez is not as clear. Turner's study concludes that the population of Juarez continues to increase while its water resource base is decreasing. El Paso may be able to reach water sustainability without Juarez, as it has the financial and technical resource to accomplish this. Juarez cannot. If Juarez is left to its own resources, the problems may worsen, bringing economic and environmental hardship to the entire region. True teamwork will be necessary to keep up with this very fundamental issue.

Turner's study results were published in the conference proceedings of Conserve '94. For more information, contact Turner at (915) 747-5464.

Desalination Holds Promise in Lower Rio Grande Valley

Desalination is a means of conserving fresh water and can be an important component in an overall water conservation program. Desalinated water can replace conventional water in irrigation, in some industrial processes, and for drinking water. Removing salts from brackish water is one way of making the most of limited water resources.

Studies are now underway to determine if desalting groundwater in the Lower Rio Grande Valley may be a practical way to augment water supplies for municipal and industrial purposes.

While desalination has never been prevalent, it may be more widespread than one imagines. There are currently 69 existing membrane-type desalting plants and 10 distillation-type plants operating across the State. Desalting can be accomplished in a number of ways, including reverse osmosis (RO) and electrodialysis reversal (EDR), which are both membrane processes. Both types of processes are used in industry and municipal utility plants in Texas. Most are for producing ultra-pure water for the electronics industry, with the majority of the plants in Lubbock, Dallas, and Austin. In addition, a number of power plants across the State use desalting processes to produce boiler feed water, which needs to be relatively pure to avoid excessive scaling problems. Additionally, a handful of municipal utilities, large apartment complexes, and hospitals employ desalination (RO and EDR) to create more palatable, pure water with a lower content of dissolved solids. Most of the existing desalting operations in Texas, though, are characterized as efforts to provide higher quality water, and not necessarily to stretch a limited water supply.

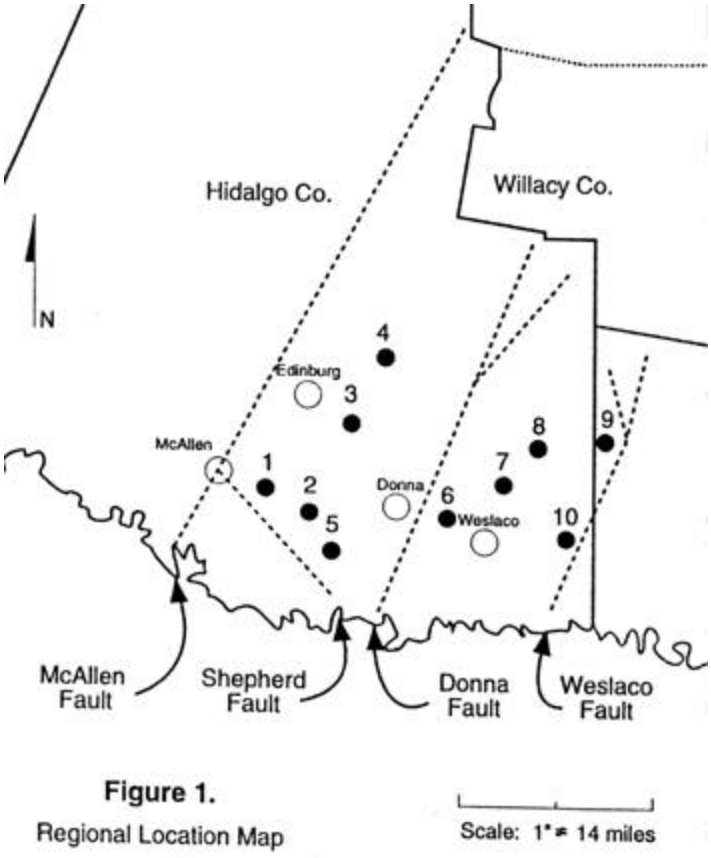


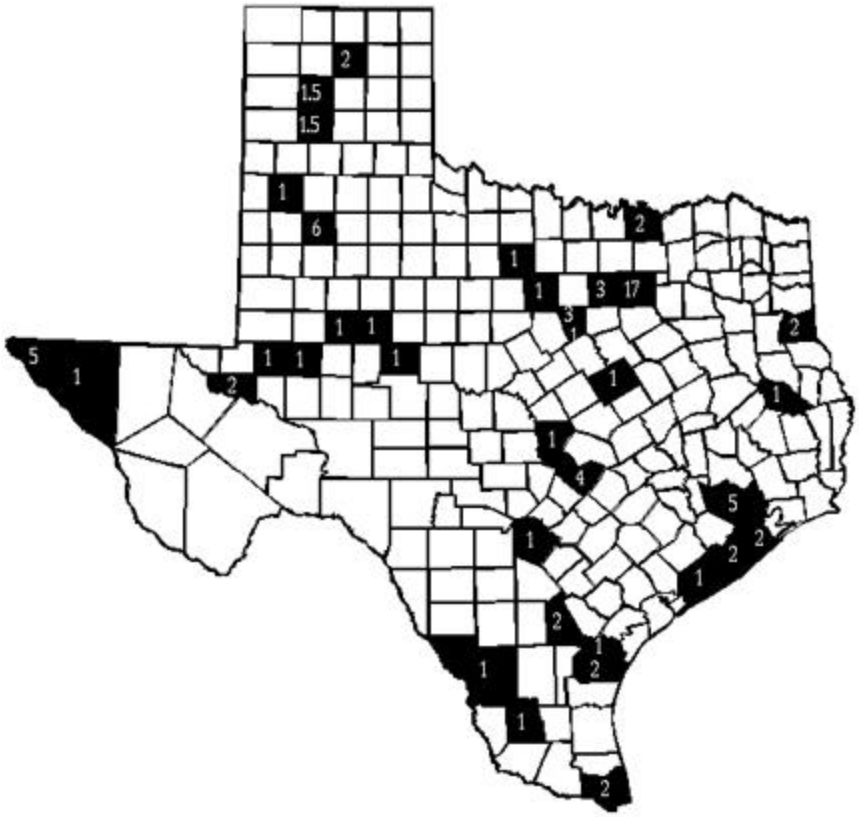
Figure 1.
Regional Location Map

The study of geothermal and geopressured groundwater utilized a number of deep research wells in Hidalgo County.

While desalination is being used throughout the State, it has been too expensive to be practical for truly widespread use. This is due in part to energy costs to power desalination processes, and the cost of the process itself. Often, there are other water supply alternatives available that are cheaper, so desalination has not been employed to a large extent in Texas. However, as high-quality water becomes harder to get by conventional means, desalination may come into its time. In the Lower Rio Grande Valley, the use of desalination may become a necessity -- not an extravagance. Virtually all of the water in the valley is spoken for. When "new" water is needed, one must try to purchase existing water rights, pump groundwater and live with its poor quality, or pump groundwater and utilize some kind of treatment or desalination process.

The possibility of desalting groundwater in the Lower Rio Grande Valley presents a unique opportunity in that the need for desalination comes out of the need for water

conservation. Large supplies of shallow and deep brackish groundwater exist in the Lower Rio Grande Valley that might be key to enabling economically viable desalination in the region. The deep groundwater supplies (about 9,000 feet below the surface), are geopressured, and geothermal. According to a recent study at the University of Texas-Pan American (UTPA), they may contain enough thermal energy to power desalting units.



Desalination plants are now operating throughout Texas. Counties with desalting plants are shaded and the number of plants per county is shown.

The study was conducted by Robert Rodgers of the UTPA Geology Department and Kleber-Denny, Inc. of Houston and was sponsored by the Texas Water Development Board (TWDB). The goal was to determine whether desalination would be one practical means of stretching the scarce freshwater supplies in the Lower Rio Grande Valley. Rodgers found that groundwaters in the eastern most part of Hidalgo County are relatively shallow, have low salinity, moderate temperatures, and are geopressured. Those deposits appear to be an optimum area for production of usable water in the near future. Deeper deposits with higher levels of total dissolved solids may require more intensive treatment and may have to be phased into the supply stream as demand requires.

Desalination success stories from projects around Texas are forming the foundation for an increasing demand for desalinated water, and are motivating efforts to increase its availability. This is especially true in the Lower Rio Grande Valley, where the City of Harlingen and a local Fruit-of-the-Loom plant have teamed up to combine desalination and wastewater reuse to provide industry with the quality of water it needs, save the City substantial sums on wastewater treatment, and reduce the industrial drain on potable water supplies for municipal use. Another textiles and apparel industry may soon follow and utilize some of the brackish and geothermal, geopressured groundwater (after desalination) in a new plant in Harlingen.

In the Fruit-of-the-Loom partnership, the City of Harlingen takes 2 million gallons per day (mgd) of its treated wastewater (which would normally just be discharged) and further treats it using reverse osmosis (RO) processing. The desalted water is provided to the Fruit-of-the-Loom plant for use as process water. The plant, in turn, pretreats the wastewater and sends it back to the City for full, final treatment at Fruit-of-the-Loom expense. Fruit-of-the-Loom would like to expand the treatment facility to 3 mgd capacity, which would utilize most of the City's wastewater. When additional industries locate in the Harlingen area and build a water partnership with the City, brackish groundwater will be able to provide source water for desalination, rather than municipal wastewater. Likely, the shallower brackish supplies will be used first, with the development of full-scale desalination using the deep geothermal resource coming along within the next 10 years.

Interest in desalination is not limited to the Lower Rio Grande Valley. Waters from Lake Granbury (on the Brazos River) and Lake Texoma (which straddles the Texas-Oklahoma border) are desalinated and used for municipal needs south and southwest of Ft. Worth and in the Sherman area. Lake Granbury supplies Hood and Johnson Counties with 3.5 million gallons per day (mgd). The 4 mgd desalination facility at Lake Texoma is under construction, and can be expanded to 11 mgd.

The main difference between existing desalting plants such as those at Lakes Granbury and Texoma, and the technology under study in the Lower Rio Grande River Valley is the all-important presence of geothermal energy potential. Water utilities within the research area are awaiting the results of this study. Rodgers' study speaks directly to the need to conserve water, and implement related strategies such as reuse, recycling, and the use of geothermal energy.

With luck, the successes in Harlingen and North Texas will spread to other communities in the Valley and elsewhere in Texas where water supply problems prevail. As Rodgers' study continues, it may become more apparent that water can be economically desalted for municipal and industrial use. When combined with geothermal energy, the prospects are even brighter.

NOTE: J.D. Beffort (TWDB) is a expert on desalting methods and saline water resources in Texas. He can be reached at (512) 463-7989. Rodgers can be contacted at (210)