Texas Water Resources Institute

Texas Water Resources

August 1999
Volume 24
No. 4

Improving Drought Preparedness

State Agencies Team Up to Help Water Suppliers Ready for Future Water Shortages, Emergencies

By Ric Jensen
TWRI Information Specialist

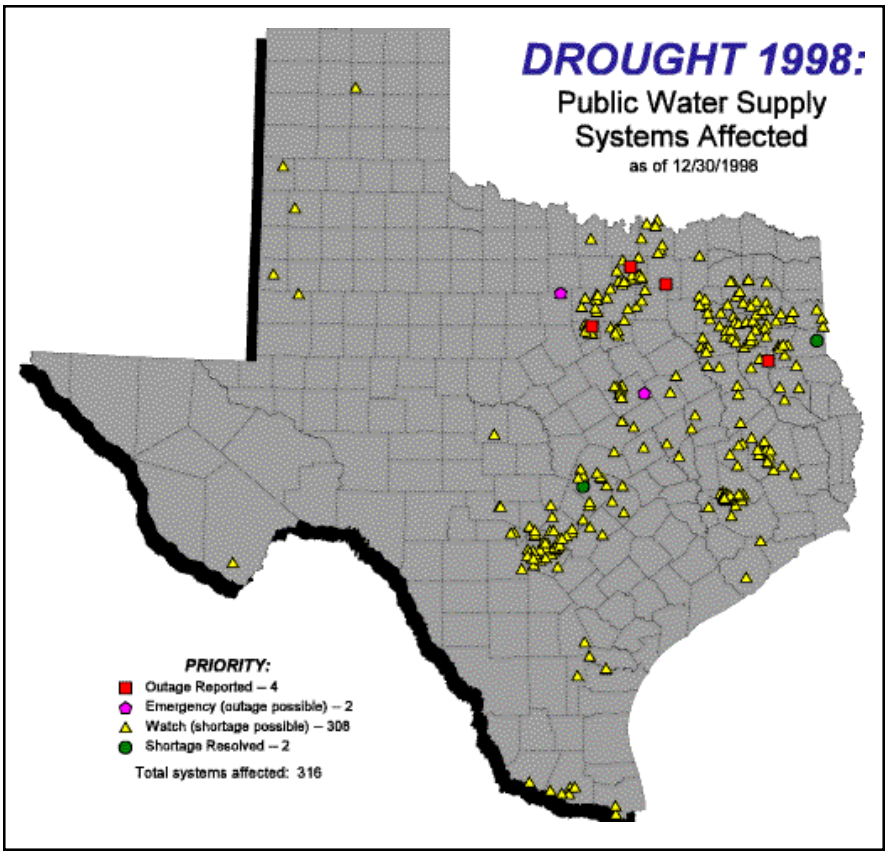
In many parts of Texas, the prospect of recurring drought seems to be inevitable. It's hard to find a water utility manager who hasn't experienced many occasions in which there simply wasn't enough water to go around.

The adverse impact of droughts on water utilities and water supplies was dramatically illustrated in the summers of 1996 and 1998. When the 1996 drought occurred, more than 340 public water suppliers reported they had implemented water use restrictions. During 1998, 307 public water systems reported they were "affected" by the drought. In many cases, suppliers could not produce enough water to meet demands. A recent study commissioned by the Texas Natural Resource Conservation Commission (TNRCC) suggests that many, if not most, of the 4,450 public water supply systems in Texas do not have procedures or plans in place for managing limited water supplies and heightened water demands during droughts.

The existence and use of drought contingency plans should be a major help for Texas water suppliers and their customers in many instances — not only when prolonged hot and dry spells occur. In many recent droughts, water shortages were aggravated by breakdowns in water supply, treatment, and distribution systems. In other words, droughts are not the only threat that water managers have to worry about.

A key point which has to be made is to clarify the subtle differences between drought contingency and water conservation efforts. The goal of most conservation programs is to achieve lasting improvements in water use efficiency. On the other hand, the desired outcome of drought planning and management efforts is to dramatically reduce water demands or to utilize alternative water sources during a short-term crisis (usually caused by droughts or some other emergency).

This issue of *Texas Water Resources* is the third in a series which recaps presentations made at the 1998 Texas Water Resources Institute (TWRI) Water for Texas Conference. While the first two issues addressed water supplies and water demands, this newsletter describes information given at the Conference about drought management. For example, speakers at the Conference who explored drought management issues included Mike Personett of Turner, Collie & Braden, Inc., Tom Milwee of the Texas Division of Emergency Management (DEM), Chris Brown of the San Antonio Water System (SAWS), and Eduardo Garaña of the City of Corpus Christi Water Division. Recent information about drought preparedness efforts from other sources is also provided.



The Proceedings from the 1998 Water for Texas Conference can by purchased by contacting TWRI at (409) 845-1851 or twri@tamu.edu.

The Effect of Senate Bill 1 on Drought Planning Requirements

In 1997, the Texas Legislature passed Senate Bill (SB) 1, which is a comprehensive water resources management act. SB1 significantly strengthened requirements for drought management and water conservation planning.

SB1 requires that drought contingency plans be developed by municipal, wholesale, and irrigation water suppliers, including river authorities and water districts. Because of the provisions of SB1, more than 600 public water suppliers (each of which serves more than 3,300 connections) were required to submit drought contingency plans to the TNRCC by September 1999. Another 4,000 smaller water suppliers were mandated to develop drought management plans by September 2000.

Prior to the passage of SB1, drought management plans were only required as part of water conservation plans when cities and utilities sought financial assistance from the TWDB, or when these entities applied for new water rights from the TNRCC.

SB1 revised many of the specific rules which apply to drought planning in Texas in such broad areas as notifying the public, as well as coordinating efforts among agencies and organizations affected by droughts (see Figure 1).

The new rules require that, when a water shortage results from a drought, reductions in irrigation water supplies are to be divided equally among all customers on a pro rata basis.

A thorny issue that still has to be resolved centers on irrigation districts which, directly or indirectly, supply water to cities and other urban suppliers. The problem is to ensure that irrigation districts will be able to continue delivering raw water to municipal customers, even if irrigation supplies run low or are exhausted. In 1996 levels in Amistad and Falcon Reservoirs (in the Lower Rio Grande Valley) fell so low that there was barely enough water to "push" or maintain the volume of flows needed to deliver the water to municipalities.

Similarly, SB1 requires that drought contingency plans increase the coordination between wholesale water suppliers and water districts to better define how limited water supplies will be allocated during water shortages.

"We don't need another drought as a wake-up call to spur this state into action," said John Baker, a Commissioner with the TNRCC. "The requirements in Senate Bill 1 put citizens of Texas in a much better position to deal with the next drought. After all, droughts are a certainty and these measures will help us be prepared for the next one."

How Texas Responds to Droughts

At the Conference, Mike Personett of Turner Collie & Braden Inc. described efforts to review the latest literature about drought contingency planning as well as to gather data about practices now used in Texas. The purpose of this project, which is funded by the TNRCC, is to assist the agency in developing rules and guidelines that can be used to imple-

Figure 1
Key Ways in Which SB1 Affects Drought Planning Efforts

• Community water systems which provide service to 3,300 or more connections, wholesale water suppliers, and irrigation districts must submit drought contingency plans to the TNRCC by September 1999. Community water systems serving fewer customers must prepare drought management plans by September 2000.

• The public has to be informed of the development of drought contingency plans and must be given an opportunity to provide input.

• Provisions for addressing drought management strategies must be included in regional water plans.

• Water suppliers must document that they have coordinated drought contingency efforts with the regional water planning group in which they are located.

• Drought contingency plans must include specific criteria to initiate and terminate drought response stages, a description of data to be collected, specific water supply or demand management measures to be implemented during each stage, procedures for granting variances, and methods which will be used to enforce mandatory water use restrictions.

• The TNRCC will consider drought contingency measures when reviewing applications for interbasin transfers.

• A related bill, HB 2660, establishes a State-level drought response plan and identifies the specific duties of the Texas Drought Preparedness Council.

ment drought contingency planning efforts required in SB1. The project involved a literature search as well as a survey of 42 public water suppliers, eight wholesale water suppliers, and five irrigation districts. The researchers wanted to identify experiences of Texas water suppliers which implemented drought response measures in 1996 and to use this information to develop consensus-based recommendations about which strategies work best.

Some of the questions the consultants wanted to resolve include the number of drought response stages typically used in Texas, how "trigger conditions" are defined, what types of drought response measures have been utilized, and the means through which mandatory water use restrictions are enforced.

What do the results show? First, most large water utilities in Texas have already prepared drought contingency plans, but only a few of these have actually had to implement response measures. Second, small communities are generally less prepared to deal with droughts and know little about how vulnerable they may actually be. Third, most drought contingency plans in Texas rely mainly on demand management measures (for example, initiating fines for excessive water use), but give little heed to supply management (developing alternative sources for use in emergencies). Fourth, a substantial number of Texas cities have developed drought management plans with three stages (for mild, moderate and severe conditions) although some water providers utilize five stages. Fifth, many communities report that there is a high degree of compliance with voluntary as well as mandatory drought management measures. Finally, the report indicates that alternate-day lawn watering schedules, which are widely used, are often not effective in reducing water use and may actually be counterproductive. As an alternative, the report suggests that people could be allowed to water landscapes twice each week.

Results of the literature search identified the process many utilities go through when developing drought contingency plans (see Figure 2). According to Personett, a key principle that should be considered is that even though it's difficult to predict the occurrence, duration, and intensity of droughts, water managers can still anticipate and plan for them. "If policies and procedures for implementing drought response measures are prepared in advance," he says, "the risk and impacts of water shortages can be mitigated."

The Texas Drought Preparedness Council

Tom Milwee of DEM described efforts among State agencies to coordinate efforts to respond to droughts. In 1999, the Texas Legislature enacted House Bill 2660 which created the Texas Drought Preparedness Council. The Council replaces the Drought Response and Monitoring Committee. The bill designates that the coordinator of the Division of Emergency Management of the Governor's Office is the State drought manager. Other entities appointed to the Council include representatives of the Texas Water Development Board (TWDB), the TNRCC, the Texas Parks and Wildlife Department, the Texas Department of Agriculture, the State Soil and Water Conservation Board, the Texas Department of Housing and Community Affairs, the Texas Forest Service, the Texas Department of Transportation, the Texas Department of Economic Development. The Governor can also appoint a representative of groundwater management interests as well as any other entity.

The Council is charged with assessing drought and water supply conditions and reporting findings to the public. It also advises the Governor about significant drought conditions. Other functions of the Council include recommending specific provisions for a State response to drought-related disasters and advising regional water planning groups about related issues. The Council also ensures effective coordination of drought planning activities among Federal, State, and local agencies. It is required to report to the Legislature in January of each odd-numbered year about drought conditions in Texas.

The Council has the authority to determine if drought conditions exist within individual counties. When a county-wide drought condition is declared, the Council is required to give notice to the chairman of the appropriate regional water planning group as well as each entity or individual required to develop a water conservation plan. The Council is required to develop, implement, and update a comprehensive Statewide preparedness plan which can help mitigate the effects of droughts. The Statewide plan is to provide for timely and systematic data collection, analyses, and dissemination of drought information and to define the duties and responsibilities of state agencies. A key role of the Council is to develop a mechanism to improve the timely and accurate assessment of likely drought impacts on agriculture, industries, and cities, as well as natural resources and wildlife.

Figure 2.
Basic Steps in Developing Drought Contingency Plans

- **Assess the vulnerability of water supplies to droughts of varying intensities and durations.**
- **Define specific triggering criteria to initiate and terminate drought response measures. The severity of these measures should respond to the extent of the impact of the drought.**
- **Identify and evaluate short-term water supply and demand management responses.**
- **Design a comprehensive drought contingency plan which includes trigger conditions, multiple response stages, and procedures for monitoring, notification and enforcement.**
- **Formally adopt the plan as well as needed rules and ordinances.**

Building Effective Drought Response Programs

According to Chris Brown, then the Conservation Director for the San Antonio Water System (SAWS), it may be more acceptable to the public to integrate the goals of on-going conservation plans with drought management objectives.

At the Conference, Brown described SAWS' efforts to implement and enforce water use restrictions in response to the 1998 drought. For example, SAWS developed an educational campaign which featured a dramatic public service announcement designed to appear to be an emergency broadcast. Television viewers first were alerted to the sound of dripping water, followed by specific water use restrictions which had been introduced by SAWS in response to declining water levels. Other educational components of the SAWS drought management plan included bill inserts, flyers, and door hangers with phone numbers consumers could call to report water-wasting violations. SAWS also provided tips that customers could use to cut back on water use.

Because of the success of these educational efforts, more than 4,200 telephone calls were reported via the hotline during the drought (from June to September). Once SAWS received and investigated a complaint, a customer services representative visited the alleged offenders and provided educational information about drought restrictions and water conservation requirements. Brown reported that most of the violations observed by SAWS staff during these customer visits were for wasting water (68%) or watering during the daytime (25%).

As the drought worsened, SAWS stepped up enforcement efforts, advised responsible parties that they had been observed violating water use ordinances, and, ultimately, filed citations through the city court system. Only a few cases eventually made their way to the courts. In most instances, people abandoned repeated water-wasting practices before they were forced to appear in court.

At the same time, SAWS also considered whether variances to drought management ordinances should be approved. Most of the variances were approved. Typically, they involved requests to water new landscapes or to powerwash sidewalks.

The net result of these efforts, according to Brown, was that overall water use decreased significantly as the drought wore on. He says the most important lesson which can be learned from this SAWS experience is that education, when coupled with provisions for enforcement, is a key component of any drought management plan. Educational programming helps the public understand why water use must be curtailed during droughts and be more supportive of these efforts. As a consequence of the drought, SAWS is now considering how to better and more rapidly implement water cutbacks during "critical" drought periods.

Essential Vs. Non-Essential Water Use During Droughts

At the Conference, Eduardo Garaña, the Water Superintendent of the City of Corpus Christi, discussed how drought management plans may affect "non-essential" water users. When a severe water shortage occurs, for example, many drought management plans severely limit how much water can be used for non-essential uses (typically landscape irrigation).

In determining whether a use is essential or non-essential, Garaña suggests that utilities focus on examining whether individual uses of water are effective and efficient. In other words, does water really need to be used for a specific purpose? If so, is it being utilized as efficiently as possible?

Finally Garaña recommends that conservation management plans be introduced before drought management plans are needed. This may lessen the potential adverse reaction of the public to drought plans.

Work of the TNRCC and TWDB to Aid Drought Planning Efforts

To help water suppliers and communities develop drought management programs, the TNRCC and TWDB sponsored a series of planning workshops at 12 sites throughout Texas. At the workshops, participants received a copy of *The Handbook for Drought Contingency Planning*. A floppy disk which accompanies the handbook includes a "fill in the blanks" model water suppliers can use to develop a simple drought contingency strategy which meets the minimum TNRCC regulatory requirements. These materials can also be downloaded from the TWDB World Wide Web site at http://twdb.state.tx.us/conservation.html.

It should be noted, however, that agencies developing drought contingency plans are encouraged to go beyond this simplistic approach and develop a more comprehensive program which specifically addresses local needs and conditions.

Another useful resource developed by the TNRCC to assist in planning efforts is the *Drought Reference Manual*. This user-friendly fact sheet includes a "drought risk test" (a simple checklist water suppliers can use to gauge whether their utility risks a water outage), and basic tips on getting water districts ready to deal with droughts. The manual also discusses short-term strategies to deal with droughts and other water supply emergencies (including the use of alternative water sources) as well as when privately-owned utilities should consider implementing water rationing.

How could the TNRCC improve its drought planning efforts? That was the emphasis of a recent evaluation performed for the agency conducted by Turner Collie & Braden. Key recommendations of this study are that the TNRCC may want to provide more specific information about the contents which are required in drought contin-

gency plans (for example, better defining essential and non-essential uses, requiring that specific drought triggering criteria be developed, and broadening the types of allowable response measures to include the option of augmenting water supplies or using alternative sources). The report cautions that the rules should still be flexible enough to allow managers and planners to develop strategies which are tailor-made for local conditions. Another recommendation was that the TNRCC should provide more thorough guidance and technical assistance to entities required to prepare these plans.

Drought response efforts of TWDB involve monitoring and communicating information about drought conditions, providing staff assistance to drought-impacted areas, and encouraging efficient water use.

University Efforts to Provide Drought Assistance

Because agricultural activities can be severely disrupted by droughts, the Agricultural Program of the Texas A&M University System has created an on-going Drought Task Force. The Task Force is led by Travis Miller, a TAEX Specialist in the Soil and Crop Science Department. Other Task Force members include TAEX specialists from other academic subject areas (for example, horticulture and agricultural engineering) as well as Agricultural Program professionals from throughout Texas.

A significant part of the Task Force's work is to help make professionals throughout the System aware of potential and ongoing droughts and to develop specific recommendations to lessen adverse impacts. A significant result of the Task Force's work is a notebook which contains fact sheets discussing the effect of droughts on agricultural profitability and how people can deal with economic hardships incurred by droughts. In addition, other fact sheets describe how droughts can lessen water quality used for irrigation, and how to best manage dairy, livestock, rangeland, and pastures, as well as cotton, corn, and grain sorghum production during times when water is short.

Although much of the Task Force focuses on agricultural issues, substantial information has also been produced for urban residents. For example, fact sheets have also been produced informing industry professionals about drought management for horticultural crops and such large landscaped areas as parks and golf courses, as well as tips homeowners can use to save lawns and landscapes that may be threatened by droughts.

At Texas A&M International University in Laredo, a Drought Relief Information Center has been established. The Center provides information on South Texas conditions through a World Wide Web site (http://www.tamiu.edu/coba/drought) as well as annual conferences focusing on this topic.

Summary

Unfortunately, it seems that the occurrence of future droughts is something Texans can likely count on. The facts are simple — much of the State has always been prone to droughts, there are few "new" water supplies left to be developed, often the water supply capacity needs to be increased, and an expanding urban and suburban population is creating ever-growing water demands. As a result, it seems inevitable that Texas will often be plagued by droughts and other short-term water shortages.

Fortunately, however, it is still possible to develop proactive contingency plans and strategies to prepare in advance for droughts and to better deal with their effects. Certainly, the crafters of SB1 realized this when they developed and passed landmark legislation that makes the creation and use of drought management plans a high priority.

Over the short-term, the task is relatively simple. The vast majority of water suppliers (wholesale, retail and for irrigation) are now developing drought management plans. Hopefully these will be generated with some thoughtfulness and foresight and will not simply be copies of a vaguely-worded "one size fits all" template not tailored for local conditions.

Throughout the long-term, the challenge will likely be more complex. That will occur as we find out how well these drought management plans function in practice and how well and easily they are implemented.

For More Information

Brown, Chris, "Building an Effective Drought Management Program: Ongoing Public Education Backed up by Enforcement," Proceedings *of the TWRI Water for Texas Conference*, 1998.

Drought Activities of the TNRCC, TNRCC, 1999.

Drought Contingency Planning Survey and Evaluation, Prepared by Turner Collie & Braden, Inc. for the TNRCC, 1998.

Drought Reference Manual (Regulatory Guidance Document RG-226), TNRCC, April 1999.

Drought Response and Monitoring Committee End of Year Report, Texas Division of Emergency Management, 1998.

Garaña, Eduardo, "Essential vs. Non-Essential Water Uses — The Eye of the Beholder," *Proceedings of the TWRI Water for Texas Conference*, 1998.

Handbook for Drought Contingency Planning for Irrigation Water Suppliers, Texas Natural Resource Conservation Commission (*TNRCC), May 1999.*

Handbook for Drought Contingency Planning for Retail Public Water Suppliers, Texas Natural Resource Conservation Commission (*TNRCC), May 1999.*

Handbook for Drought Contingency Planning for Wholesale Water Suppliers, Texas Natural Resource Conservation Commission (*TNRCC), May 1999.*

Milwee, Tom, "Texas Emergency Management," *Proceedings of the TWRI Water for Texas Conference*, 1998.

Personett, Mike, "The Fundamentals of Drought Contingency Planning," *Proceedings of the TWRI Water for Texas Conference*, 1998.

Staff Manual for the Review of Water Conservation Plans for Drinking Water Systems and Wholesale Water Suppliers (Report RG-323), TNRCC Water Quantity Division, 1998.

Texas Drought Management Strategies, Agricultural Communications Department, Texas A&M University, 1998.

WWW Resources About Drought Contingency Planning

TWDB Drought Monitoring Activities — http://www.twdb.state.tx.us/rio/hydro/drought.html

TWDB Water Conservation Programs (this includes downloadable forms and documents for drought planning) — http://www.twdb.state.tx.us/conservation/index.html

TNRCC — http://www.tnrcc.state.tx.us/water/wu/drought/index.html

DEM — http://www.txdps.state.tx.us/dem/dryindex.htm

National Drought Mitigation Center (University of Nebraska) — http://enso.unl.edu/ndmc/

News from TWRI

TWRI has published a new technical report by Ralph Wurbs and Emery Sisson of the Texas A&M University Civil Engineering Department. Individual copies of the report, *Comparative Evaluation of Methods for Distributing Naturalized Streamflows from Gaged to Ungaged Sites (TR-179).*

TWRI recently funded two new projects. In one effort, TWRI provided a grant to researcher Fred Boadu and student Mildred Van Volkom of the Agricultural Economics Department. The focus of this project is to carry out a comprehensive literature search about water issues facing colonias. The goal is to identify how water marketing and water wastewater reuse can provide additional water resources for these areas.

TWRI also provided funds for a literature search which will be conducted by researcher Stephen Ricke and graduate student Kristin Medvedev of the Poultry Science Department. This effort will investigate the fate of fecal bacteria in the environment with a specific emphasis on wastes from poultry operations.

To order Wurbs' technical report or for more details on any TWRI project, contact the Institute at (409) 845-1851 or twri@tamu.edu.

Texas Water Resources

is published quarterly by
the Texas Water Resources Institute.
Wayne R. Jordan, Director
Ric Jensen, Editor and Graphic Design
TWRI is supported by funds provided in part by the U.S. Geological Survey, U.S. Department of the Interior, as authorized by the Water Resources Research Act of 1984. Subscriptions are available free upon request. For details, call TWRI at 409-845-8571. The fax number is 409-845-8554; e-mail: twri@tamu.edu; WWW URL: http://twri.tamu.edu.

Texas Water Resources Institute
301 Scoates Hall
Texas A&M University
College Station, Texas 77843-2118

ADDRESS CORRECTION REQUESTED

NON-PROFIT ORG.
U.S. POSTAGE PAID
COLLEGE STATION, TEXAS
PERMIT NO. 215