6 WATER CONSERVATION AND DROUGHT MANAGEMENT RECOMMENDATIONS

Water conservation is a potentially feasible water savings strategy that can be used to preserve the supplies of existing water resources. For municipalities and manufacturers, advanced drought planning and conservation can be used to protect their water supplies and increase reliability during drought conditions. Some of the demand projections developed for SB1 Planning incorporate an expected level of conservation to be implemented over the planning period. For municipal use, the assumed reductions in per capita water use are the result of the implementation of the State Water-Efficiency Plumbing Act. Among other things, the Plumbing Act specifies that only water-efficient fixtures can be sold in the State of Texas. Savings occur because all new construction must use water-efficient fixtures, and other fixtures will be replaced at a fairly steady rate. On a regional basis, the Plumbing Act results in about a seven percent reduction in municipal water use (10,688 acre-feet per year) by year 2060. Additional municipal water savings can be expected from the Federal mandate for energy efficient clothes washing machines that went into effect in 2007.

TWDB also included conservation savings in the steam electric power demands and irrigation demands. Demands for steam electric power were developed on a state-wide basis and these demands assume that long-term power needs will be met with high water efficient facilities. The estimated water savings associated with the higher efficient power plants is nearly 27 percent of the total demands or 12,300 acre-feet per year in Region F. Based on factors developed by the TWDB, irrigation demands are expected to decline approximately 4.6 percent over the planning period (2010 to 2060), primarily due to conservation. Reductions in demands due to conservation were not quantified by the TWDB for manufacturing, mining and livestock needs.

SB1 requires each region's water plan to address drought management and conservation for each supply source within the region. This includes both groundwater and surface water. Frequent recurring drought is a fact of life in Region F. Droughts have occurred in almost every decade since the 1940s. Recent experience with critical drought conditions attests to the effectiveness of water conservation and drought management in the region. The City of San Angelo reduced its municipal water use from approximately 19,000 acre-feet per year in 1997 to

less than 16,000 acre-feet per year in 2005. Other cities in Region F have reported similar reductions in demand in response to drought. These reductions are at least partially due to the implementation of drought response activities included in the municipality's drought plan. However, according to city officials, the most significant factor in reducing water consumption is public awareness of drought conditions and voluntary reductions in water use. Other cities, such as Midland, are pursuing aggressive water conservation programs that include using xeriscaping and efficient irrigation practices for public properties such as parks and buildings, and reuse of treated effluent for municipal and manufacturing supplies.

A municipal water conservation survey was conducted in Region F as part of this water plan update to determine municipal water conservation strategies being implemented in Region F, and the costs and water savings associated with the strategies. Thirteen cities were surveyed regarding their conservation efforts, and selected cities were interviewed to obtain further information on their conservation practices. The thirteen cities selected represent a range of locations and sizes in Region F. They included Andrews, Ballinger, Big Spring, Bronte, Eden, Fort Stockton, Junction, Menard, Midland, Odessa, Pecos, San Angelo, and Snyder. Four cities which returned surveys and demonstrated active conservation programs were interviewed via teleconference: Menard, Midland, Odessa, and San Angelo. The results of this survey and analysis show that most cities are implementing one or more conservation strategies, but funding is key to continued success and increased conservation efforts. Several cities expressed interest in wastewater reuse for municipal and industrial purposes. Cities have great difficulty tracking water saving from most conservation practices. Quantified savings are available only from specific projects such as pipeline replacement or reuse projects. Reuse and System Water Audit and Water Loss are two conservation best management practices that showed the greatest overall savings. For the complete Municipal Conservation Survey study see Volume II.

As part of the assessment of conservation opportunities in Region F, the results of water loss audit reports for water suppliers in Region F were reviewed. TAC §358.6, requiring retail public water utilities to complete and submit a water loss audit form to the Texas Water Development Board every five years, with the first report submitted in March 31, 2006. The data from these reports for Region F water providers are discussed in more detail in Section 1.9 of this plan.

Fifty-four water providers in Region F submitted water loss audits. Based on these reports, the percentage of total water loss for Region F is slightly greater than seven percent, which is within the accepted range of water loss (less than or equal to twelve percent). When evaluated by types of water provider (cities, water supply corporations, water conservation and improvement districts and the special utility districts), only water supply corporations reported water losses higher than 12 percent. One possible explanation for this is the large service areas with low population densities characteristic of rural water supply corporations. For the water suppliers that fall under the water supply corporation category, there may be few cost effective options in reducing water loss. The amount of real losses in Region F from the 54 public water suppliers totaled 454 million gallons in 2006. This represents 1.1 percent of the total estimated municipal water demand for the region. Based on these findings, the region is adequately addressing municipal water loss. Measures that are currently in place to control water loss should continue.

Although water conservation is part of the culture of the region, the challenge for future water conservation activities in Region F will be the development water conservation programs that are cost-effective, meet state mandates, and result in permanent real reductions in water use. Development of water conservation programs will be a particular challenge for smaller communities which lack the financial and technical resources needed to develop and implement the programs. Any water conservation activities should take into account the potential adverse impacts of lost revenues from water sales and the ability of communities to find alternative sources for those revenues. State financial and technical assistance will be required to meet state mandates for these communities.

Irrigation conservation can potentially save the most water of any water conservation method. However, without technical and financial assistance it is unlikely that aggressive irrigation conservation programs will be implemented.

Although water conservation and drought management have proven to be effective strategies in Region F, the Region F Water Planning Group believes that water conservation should not be relied upon exclusively for meeting future needs. The region will need to develop additional surface water, groundwater and alternative supplies to meet future needs. However, each entity that is considering development of a new water supply should monitor on-going

conservation activities to determine if conservation can delay or eliminate the need for a new water supply project.

The Region F Water Planning Group recognizes that it has no authority to implement, enforce or regulate water conservation and drought management practices. The water conservation and drought management practices described in this chapter and elsewhere in this plan are intended only as guidelines. Water conservation and drought management strategies determined and implemented by municipalities, water providers, industries or other water users supersede the recommendations in this plan and are considered to be consistent with this plan.

6.1 Water Conservation Plans

The TCEQ defines water conservation as "a strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water."[1]

The State of Texas in §11.1271 of the Texas Water Code requires water conservation plans for all municipal and industrial water users with surface water rights of 1,000 acre-feet per year or more and irrigation water users with surface water rights of 10,000 acre-feet per year or more. Water conservation plans are also required for all water users applying for a state water right, and may also be required for entities seeking state funding for water supply projects. Recent legislation passed in 2003 requires all conservation plans to specify quantifiable 5-year and 10-year conservation goals. While achieving these goals is not mandatory, the goals must be identified. In 2007, § 13.146 of the Texas Water Code was amended requiring retail public suppliers with more than 3,300 connections to submit a water conservation plan to the TWDB.

Table 6.1-1
Municipal, Industrial and Irrigation Water Users in Region F
Required to Submit Water Conservation Plans

Municipal/Industrial Water Rights Holders		
Brown County WID #1	City of Menard	Texas Parks and Wildlife Department
City of Ballinger	City of San Angelo[1]	Murpaks INC
City of Big Spring[1]	City of Sweetwater[2]	San Angelo Water Supply Corporation
City of Brady	City of Winters	Luminant Generation Company
City of Coleman	CRMWD	Upper Colorado River Authority
City of Junction		
Retail Public Suppliers		
City of Andrews	City of Midland	City of Pecos
City of Brownwood	City of Odessa	City of Snyder
Irrigation Water Rights Holders		
Pecos County WCID #1	San Angelo Water Supply Corporation	Red Bluff Water Power Control District
Reeves County WID #1	Wayne Moore & W H Gilmore	

Notes:
1. These entities are also required to develop a conservation plan as a retail public provider.
2. City of Sweetwater is located in the Brazos G region but holds water rights in Region F.

In the Region F area, 16 entities hold municipal or industrial rights in excess of 1,000 acre-feet per year and five entities have irrigation water rights greater than 10,000 acre-feet per year. Each of these entities is required to develop and submit to the TCEQ a water conservation plan. In addition, six retail public suppliers are required to submit conservation plans to the TWDB. A list of the users in Region F which are required to submit water conservation plans is shown in Table 6.1-1. Many more water users have contracts with regional water providers for 1,000 acre-feet per year or more. Presently, these water users are not required to develop water conservation plans unless the user is seeking state funding. However, TCEQ rules require that a wholesale water provider include contract language requiring water conservation plans or other conservation activities from its customers to assist in meeting the goals of the wholesale water provider's plan.

To assist entities in the Region F area with developing water conservation plans, model plans for municipal water users (wholesale or retail public water suppliers), industrial users and irrigation districts are included in Appendix 6A. Each of these model plans address the 2008 TCEQ requirements and is intended to be modified by each user to best reflect the activities appropriate to the entity.

6.2 Evaluation of Potential Savings from Water Conservation

Regional F recommendations that municipal water suppliers consider the following conservation practices:

- Education and public awareness programs,
- Reduction of unaccounted for water through water audits and maintenance of water systems,
- Water rate structures that discourage water waste, and
- Reuse.

These practices were used to evaluate the potential for water conservation for municipal water users with needs. Savings for passive implementation of water-efficient clothes washers was included as well. Implementing these practices could save over 10,000 acre-feet of water by 2060.

Irrigation is the largest water user in Region F and the category with the largest needs. The irrigation conservation activities evaluated in Section 4.2.7 of this plan focus on efficient irrigation practices. In addition to these practices, the region encourages research into development of drought-tolerant crops, implementation of a region-wide evapo-transpiration and soil moisture monitoring network, and, where applicable, water-saving improvements to water transmission systems. Implementation of irrigation conservation activities could save over 72,000 acre-feet of water by 2060.

Manufacturing water use is a minor demand in Region F, accounting for less than 2 percent of the water use in the region. From a regional perspective, savings due to implementation of manufacturing water conservation practices would not be significant. Most manufacturing needs are associated with water supply needs for municipalities. For regional planning purposes, water conservation strategies were developed for municipalities with needs, not for the manufacturers who purchase water from those municipalities. The region

recommends that manufacturing water users be encouraged to develop and implement site-specific water conservation practices through their contracts with the municipalities, as required by TCEQ. (TCEQ requires that all contracts for water from municipal and wholesale water providers include language requiring water conservation plans or other water conservation measures.)[2]

Most of the mining water use in Region F is used in oil and gas production. In accordance with §27.0511 of the Texas Water Code, Region F encourages the use of alternatives to fresh water for oil and gas production whenever it is economically and technically feasible to do so. Furthermore, Region F recognizes the regulatory authority of the Railroad Commission and the TCEQ to determine alternatives to fresh water use in the permitting process. Because oil and gas production is already a regulated industry, Region F does not feel that additional conservation measures are needed.

Most of the livestock demand in Region F is for free-range livestock. Region F encourages individual ranchers to adopt practices that prevent the waste of water for livestock. However, the savings from these practices will be small and difficult to quantify. Therefore, livestock water conservation will not be considered in the planning process.

Steam-electric demands in Region F almost double over the planning period. However, there are insufficient supplies at most existing generation facilities to support the expected growth in demand. As an alternative to using water, Region F in consultation with representatives of the power generators in the area has developed an analysis of alternative cooling technologies that use little or no water. A description of these technologies can be found in Section 4.5. Because these technologies reduce the amount of water needed for power generation, using these technologies can be considered a water conservation strategy. Implementing this strategy could save over 24,000 acre-feet of water by 2060. These strategies are implemented by industry and are considered alternative strategies in the Region F Plan. Rising water costs and limited additional supplies will require increased water efficiency in industrial processes.

Estimates of water conservation savings for Region F in this plan are shown in Table 6.1-2. This table shows the amount of conservation that is estimated in the water demands (as a demand reduction) and the amount of additional water savings that are estimated through conservation

water management strategies. The demands used in regional water planning already assume some conservation, and these are shown under the heading Savings in Demand in Table 6.1-2. Municipal reductions are the results of implementation of plumbing codes requiring more water efficient fixtures. Irrigation demands include a reduction in expected demand due to the passive implementation of more efficient irrigation practices (this is upgrades to irrigation equipment due to natural replacements). Steam electric power demands developed for the 2006 regional water plans assumed that new facilities would utilize more efficient cooling technologies and reduce water usage per kilowatt-hour generated. The amounts under the heading Savings in Recommended Water Management Strategies in Table 6.1-2 are the additional savings that could be realized by implementation of the water conservation management strategies mentioned at the beginning of this section. Figure 6.1-1 shows the projected conservation savings over the planning period.

Some of the savings in the recommended strategies may have been realized, but are included in the total strategy savings because the projected demands do not account for these savings. This is the case of irrigation conservation in some counties. Data gathered as part of the Irrigation Survey Special Study found that the adoption rates advanced irrigation equipment are much higher in Reagan and Glasscock Counties than assumed for the irrigation conservation strategy.

Figure 6.1-1
Projected Conservation Savings in Region F

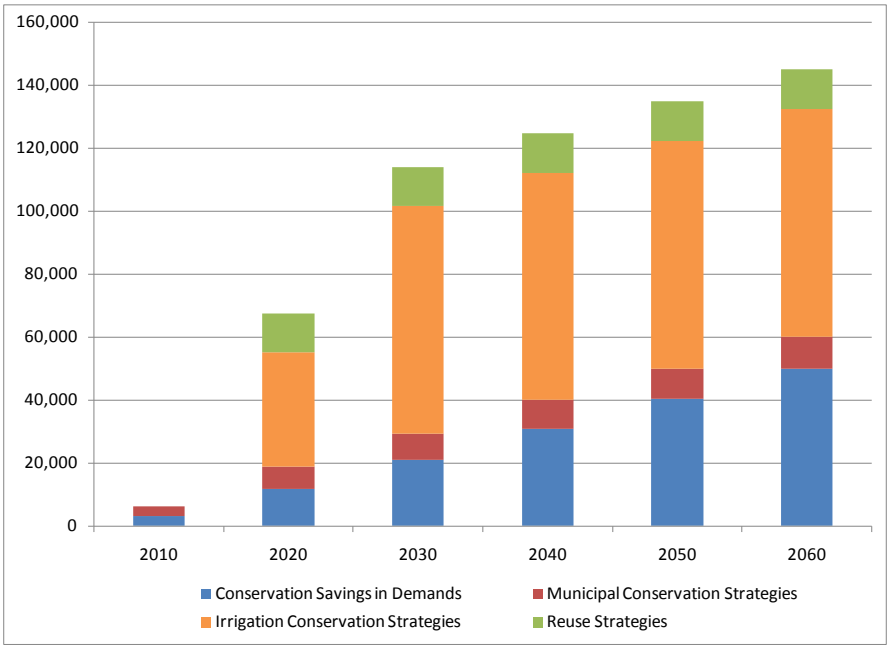

Table 6.2-1
Water Conservation Savings in Region F
-Values in Acre-feet per Year-

	2010	2020	2030	2040	2050	2060
Savings in Demands						
Municipal Conservation	2,302	4,887	7,210	9,553	10,533	10,688
Irrigation	0	5,379	10,760	16,145	21,526	26,832
Steam Electric	828	1,636	2,945	5,258	8,330	12,330
Total Conservation Saving from Demands	*3,130*	*11,902*	*20,915*	*30,956*	*40,389*	*49,850*
Savings in Recommended Water Management Strategies						
Municipal Conservation	3,214	7,022	8,358	8,965	9,605	10,259
Irrigation Conservation	0	36,125	72,244	72,245	72,246	72,247
Reuse	0	12,380	12,380	12,490	12,490	12,490
Total Conservation Saving from Strategies	*3,214*	*55,527*	*92,982*	*93,700*	*94,341*	*94,996*
Total Conservation Savings	**6,344**	**67,429**	**113,897**	**124,656**	**134,730**	**144,846**

Adjusting the adoption rates without adjusting the projected demands would not accurately represent the projected need for irrigation water. This may also apply to some cities that have successfully implemented conservation programs and lowered per capita water use. These adjustments to demands and conservation savings will be made for the 2016 regional water plan.

6.3 Drought Contingency Plans

Drought management is a temporary strategy to conserve available water supplies during times of drought or emergencies. This strategy is not recommended to meet long-term growth in demands, but rather acts as a means to minimize the potential for adverse impacts or water supply shortages during drought. The TCEQ requires drought contingency plans for wholesale and retail public water suppliers and irrigation districts. A drought contingency plan may also be required for entities seeking state funding for water projects.

Drought contingency plans typically identify different stages of drought and specific triggers and response for each stage. In addition, the plan must specify quantifiable targets for water use reductions for each stage, and a means and method for enforcement. As with the water conservation plans, drought contingency plans are to be updated and submitted to the TCEQ by May 1, 2009.

Model drought contingency plans were developed for Region F and are included in Appendix 6B. Each plan identifies four drought stages: mild, moderate, severe and emergency. The recommended responses range from notification of drought conditions and voluntary reductions in the "mild" stage to mandatory restrictions during an "emergency" stage. Entities using the model plan can select the trigger conditions for the different stages and appropriate responses for each stage.

6.4 Drought Response by Source

As required by TAC §357.5(e)(7), each region's water plan must include "factors specific to each source of water supply to be considered in determining whether to initiate a drought response, and actions to be taken as part of the response." This includes both groundwater and surface water sources. Where possible, existing drought management plans have been reviewed to develop consistent drought trigger conditions and management actions for each source. Specific information on drought trigger conditions may be found in Appendix 6C.

6.5 List of References

[1] TAC 30 §288.1

[2] TAC 30 §288.2(a)(2)(C) and TAC §288.5(a)(1)(G)