

Region F Water Planning Group

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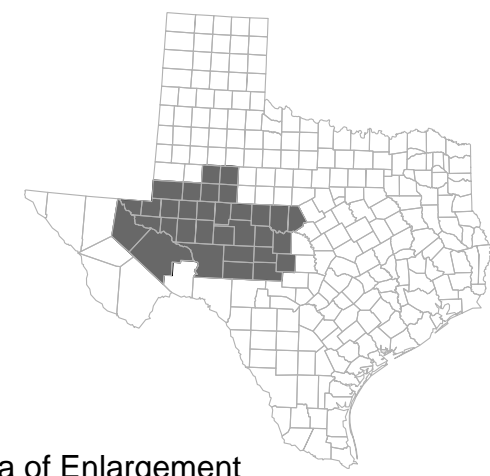
EXECUTIVE SUMMARY

This report presents the *Region F Water Plan* developed in the third round of Senate Bill One regional water planning process. Region F includes all of 32 counties in West Texas, as shown in Figure ES-1. This report presents the results of a five-year planning effort to develop a plan for water supply for the region through 2060.

The *2011 Region F Water Plan* was developed under the direction of the 21-member Region F Water Planning Group and adopted by the planning group on October 25, 2010.

The Region F Plan includes the following chapters:

1. Description of Region
2. Current and Projected Population and Water Demand Data for the Region
3. Water Supply Analysis
4. Identification, Evaluation, and Selection of Water Management Strategies Based on Needs
5. Impacts of Water Management Strategies on Key Parameters of Water Quality and Impacts of Moving Water from Rural and Agricultural Areas
6. Water Conservation and Drought Management Recommendations
7. Description of How the Regional Water Plan is Consistent with Long-Term Protection of the State's Water Resources, Agricultural Resources, and Natural Resources
8. Unique Stream Segments/Reservoir Sites/Legislative Recommendations
9. Infrastructure Financing Recommendations
10. Plan Adoption and Public Participation



Area of Enlargement

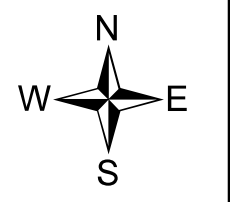
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Figure

FN JOB NO	CMD07215
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DATE	April 2010
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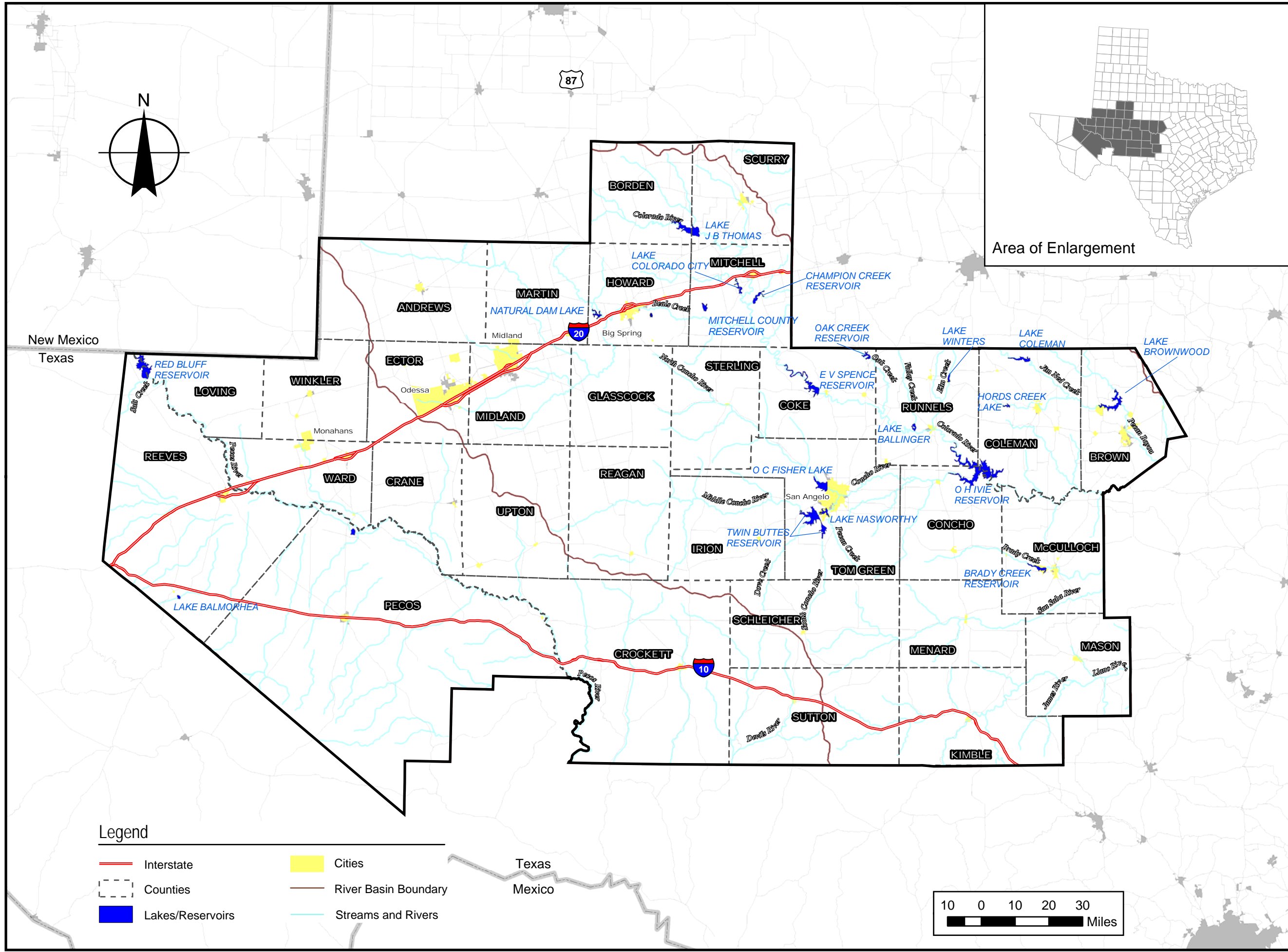
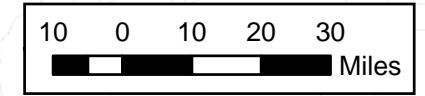

Region F

General Location Map



Legend

-  Interstate
-  Counties
-  Lakes/Reservoirs
-  Cities
-  River Basin Boundary
-  Streams and Rivers

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ES.1 Current Water Needs and Supplies in Region F

As of the 2000 census, the population of Region F was 578,814. The three most populous counties in Region F, Ector, Midland, and Tom Green, have 59 percent of the region's population. Six cities in Region F had a population of more than 10,000 people as of year 2000. These six cities included 57 percent of the population in Region F.

ES.1.1 Physical Setting

Most of Region F is located in the upper portion of the Colorado Basin and in the Pecos portion of the Rio Grande Basin. A small portion of the region is in the Brazos Basin. Figure ES-1 shows the major streams in Region F. Precipitation increases from west to east across the region, as does the average runoff. Evaporation increases from southeast to northwest. The patterns of rainfall, runoff, and evaporation result in more abundant water supplies in the eastern portion of the region.

Region F includes 17 major water supply reservoirs that provide most of the region's surface water supply. Four major aquifers and seven minor aquifers provide groundwater supplies to Region F.

ES.1.2 Water Use

In the year 2006, Region F used nearly 610,000 acre-feet of water. Approximately 69 percent of the current water use in Region F is for irrigated agriculture, followed by municipal, mining, steam-electric power generation, livestock watering, and manufacturing.

ES.1.3 Current Sources of Water

The Region F surface water supplies are associated primarily with major reservoirs. Region F does not import a significant amount of surface water from outside the region. However, Region F exports surface water to the cities of Sweetwater and Abilene, both in the Brazos G Region. The City of Sweetwater owns and operates Oak Creek Reservoir in Region F. The City of Abilene has a contract to purchase water out of O.H. Ivie Reservoir in Region F.

Approximately 65 to 70 percent of the water used in Region F is supplied by groundwater. Eleven aquifers provide groundwater supplies in Region F. Region F has 15 Underground Water Conservation Districts (GCDs) that oversee the use of water from the aquifers in the region. Ten

of these GCDs formed an alliance known as the West Texas Regional Groundwater Alliance that promotes conservation, preservation, and beneficial use of water in Region F.

Region F has identified 13 “major springs” in the region that are important for water supply or other natural resources protection. These major springs include: San Solomon, Giffin, Sandia, Comanche, Diamond Y, Spring Creek, Dove Creek, Rocky Creek, Anson, Lipan, Kickapoo, Clear Creek, and San Saba Springs.

ES.1.4 Water Providers in Region F

Water providers in Region F include 202 water user groups and seven wholesale water providers. The wholesale water providers include the Colorado River Municipal Water District, Brown County Water Improvement District Number 1, Upper Colorado River Authority, the City of Odessa, the City of San Angelo, the Great Plains Water System, and University Lands.

ES.2 Projected Need for Water

ES.2.1 Population Projections

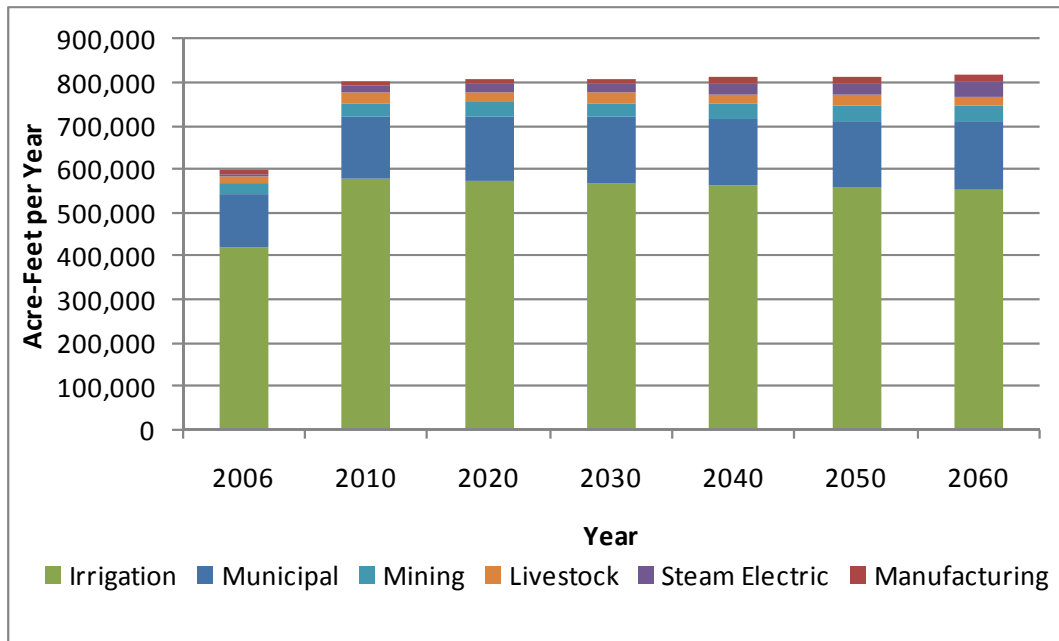
The population of Region F is projected to grow from 578,814 in the year 2000 to 724,094 in 2060, an average growth rate of 0.37 percent per year. The population projections were developed by the Texas Water Development Board (TWDB). The relative distribution of population in Region F is expected to remain stable throughout the planning period. All but three of the counties are generally rural counties and are expected to remain so into the future. The distribution of the projected population by county and city is discussed in Chapter 2.

ES.2.2 Demand Projections

Figure ES-2 shows the projected demands for water by category of use in Region F. The total historical water use was about 600,000 acre-feet in the year 2006 and is projected to be as much as 803,376 acre-feet in 2010 and 814,991 in 2060. The significant increase in water use between the historical year 2006 data and the year 2010 projections is due to irrigation demands. Region F believes that recent historical water use for irrigation is not indicative of the potential for irrigation water use in the region. During the recent drought irrigation demand was suppressed because of low crop prices and reduced water supply. The adopted projections are an estimate of what the irrigation demand could have been with higher crop prices and sufficient

water supplies. Irrigation water demands are projected to make up the majority of the water use in Region F.

**Figure ES-2
Projected Water Demand in Region F by Use Category**



ES.2.3 Water Supply Analysis

As required by TWDB rules, the available surface water supplies are derived from Water Availability Models (WAMs), Full Authorization Run (Run 3). The WAMs were developed by the Texas Commission on Environmental Quality (TCEQ). Three WAMs are available in Region F: (a) the Colorado WAM, which covers most of the central and eastern portions of the region, (b) the Rio Grande WAM, which covers the Pecos Basin, and (c) the Brazos WAM. The WAMs allocate water based on priority without regard to geographic location, agreements between water right holders, or type of use. As a result, the Colorado WAM significantly underestimates the total surface water supply in Region F.

Groundwater provides most of the irrigation water used in the region, as well as a significant portion of the water used for municipal and other purposes. Groundwater is primarily found in four major and seven minor aquifers that vary in quantity and quality (Figures 1.2-1 and 1.2-2). Total groundwater supply is determined using aquifer recharge plus a portion of the water in storage. The portion of groundwater supply from storage is based on either (1) management

policies of the various groundwater conservation districts in the region, or (2) historical trends in areas with no groundwater conservation district. Supply for the Trinity aquifer in Brown County is based on the Managed Available Groundwater (MAG) value as determined by the TWDB. This is the only groundwater source in Region F that had an adopted Desired Future Condition and MAG by December 2009.

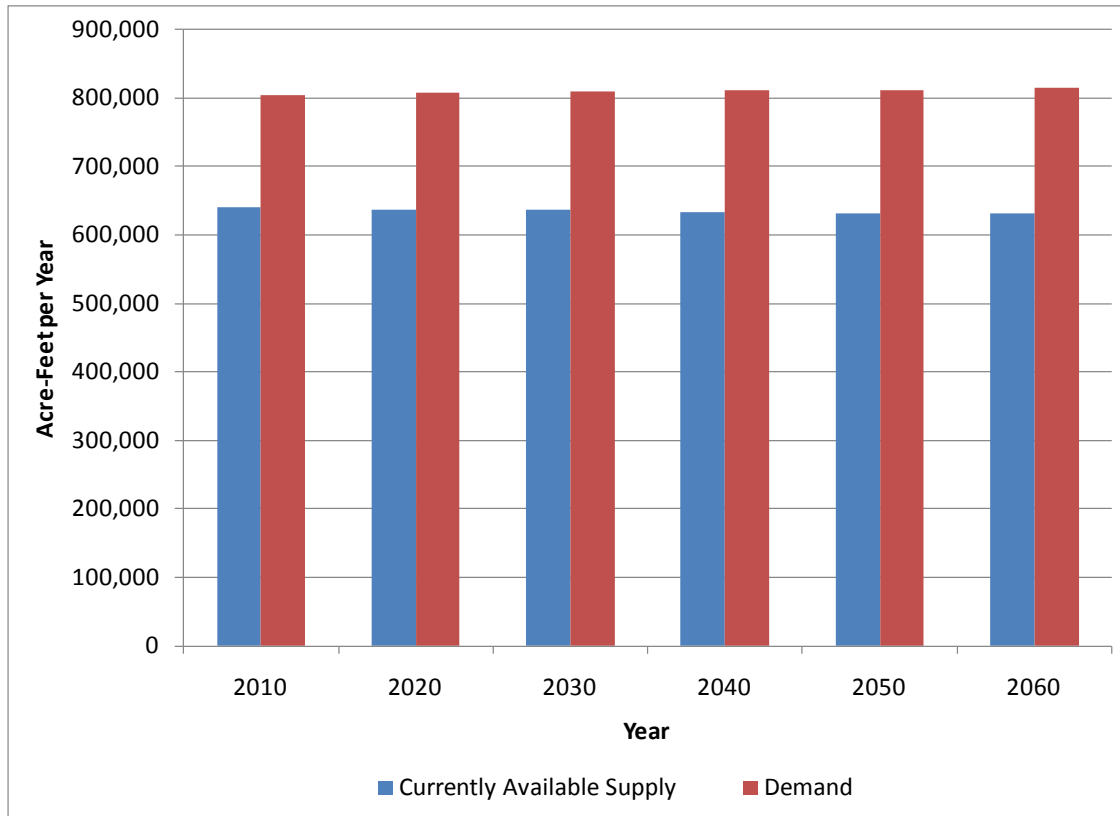
Not all of the water supplies in the region are currently available to users. Water supply may be limited by the yield of reservoirs, well field capacity, aquifer characteristics, water quality, water rights, permits, contracts, regulatory restrictions, raw water delivery infrastructure or water treatment capacity. Based on current limitations, in 2060 there will be about 632,000 acre-feet per year of available water supply in the region.

ES.2.4 Comparison of Supply and Demand

Figure ES-3 shows a comparison of the available water supply to Region F and projected demands. Surface water supplies are significantly reduced from the historical year 2000 use because of the assumptions used in the Colorado WAM (see Section 3.2). With a projected 2060 demand of 814,991 acre-feet per year, Region F has a projected regional shortage of about 183,000 acre-feet per year by 2060. Considering individual water user groups, the collective projected shortage is nearly 220,000 acre-feet per year.

Irrigation, municipal, and steam-electric demands have the largest shortages. Typically, the counties with the largest irrigation needs are those with large irrigation demands and limited groundwater supplies. Most of the municipal needs are a result of underestimation of available supply according to the Colorado WAM. Steam-electric generation needs are a result of projected growth in demands that exceeds the available supply, as well as the impacts on supply due to the Colorado WAM.

**Figure ES-3
Comparison of Currently Available Supplies and Projected Demands**



ES.2.5 Socio-Economic Impact of Not Meeting Projected Water Needs

According to the comparison of supply and demand, Region F could face significant shortages in water supply over the planning period for some water users. To assess the potential socio-economic impacts of these shortages, the TWDB conducted an evaluation of failing to meet the projected water needs in Region F. This analysis found that a one-year drought could result in substantial losses of jobs and income to the region (approximately 18 percent), resulting in a population loss of about 7 percent.

ES.3 Identification and Selection of Water Management Strategies

The Region F Water Planning Group identified and evaluated a wide variety of potentially feasible water management strategies in developing this plan. Water supply availability, costs and environmental impacts were determined for conservation and reuse efforts, the connection of existing supplies, and the development of new supplies.

As required by the TWDB regulations, the evaluation of water management strategies was an equitable comparison of all feasible strategies and considered the following factors:

- Evaluation of quantity, reliability, and cost of water diverted and treated
- Environmental factors
- Impacts on other water resources and on threats to agricultural and natural resources
- Significant issues affecting feasibility
- Consideration of other water management strategies affected

ES.3.1 Water Conservation and Reuse

The Region F Water Planning Group considered three major categories of water conservation: municipal, irrigation and steam-electric power generation. Overall, in Region F more than 82,500 acre-feet of water could be conserved by 2060.

The recommended water conservation activities for municipal water users in Region F are:

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

Irrigation is the largest water user in Region F and the category with the largest needs. The irrigation conservation activities evaluated as part of this plan focus on efficient irrigation practices.

ES.3.2 Recommended Water Management Strategies

Table ES-1 lists the recommended water management strategies by type for Region F. In total, the Region F plan includes water management strategies to develop or use approximately 251,000 acre-feet per year of additional supplies by 2060, including new well fields, desalination, reuse and voluntary redistribution. The most significant strategy in the Region F plan is subordination of senior water rights. This strategy, which was developed in conjunction with the Lower Colorado Region (Region K) in the second round of regional planning, reserves over 72,000 acre-feet of surface water for use in Region F in 2060. Of this amount, approximately 34,000 acre-feet per year is used to meet projected water shortages. Nearly 23,000 acre-feet of existing and/or future supplies will be made available to other water users through voluntary redistribution of supplies, some of which is made available through subordination and

other strategies. Overall, with all strategies in place, by 2060 the total available supply for Region F water user groups is approximately 829,000 acre-feet per year. Additional supply is available to wholesale water providers for future customers or use beyond this planning cycle.

Irrigation demands in some years for 16 counties are not met with this plan due to limited water existing supplies and lack of cost effective alternative sources of water. Steam-electric demands in three counties are not met because of lack of supplies in the demand location and uncertainty regarding how the steam-electric power industry will meet these demands.

Water quality is an important factor in Region F water supplies, particularly for municipal use. Communities in Region F are being pressured to expend limited public and private financial resources to meet water quality standards for arsenic, radionuclides, and secondary water constituents. Meeting these standards is particularly difficult for small communities in the region.

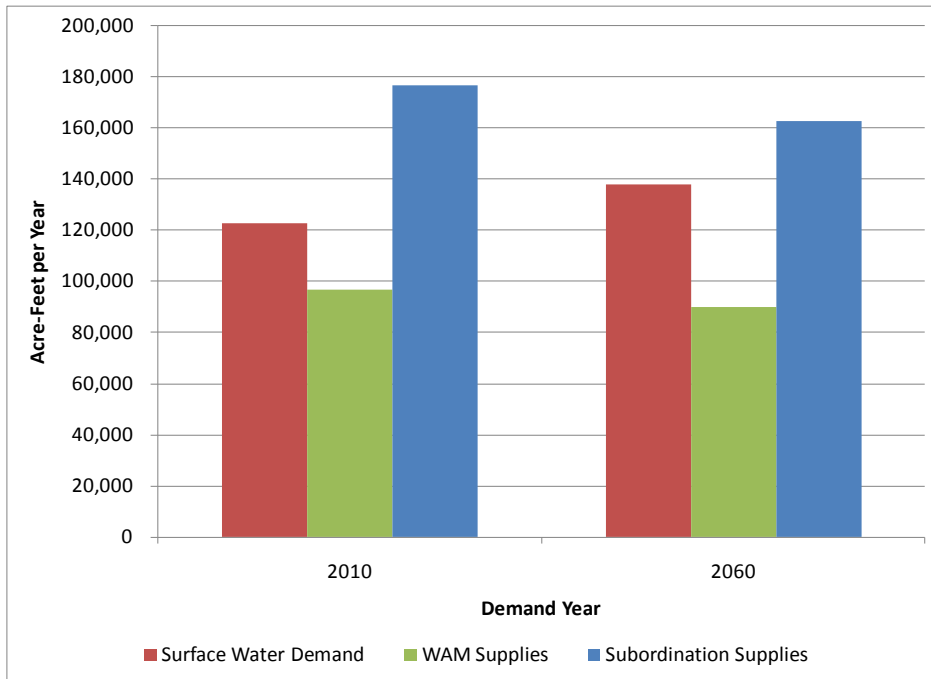
Figure ES-4 shows the comparison of surface water supply and demand for Region F with and without the subordination agreement. Figure ES-5 shows the makeup of the nearly 829,000 acre-feet per year of supplies proposed for water user groups in the region in 2060.

Table ES-1
Recommended Water Management Strategies by Type

Water Management Strategy	2060 Supply (Acre-Feet per Year)	Implementation Cost
Conservation	82,423	\$68,650,668
Desalination ^a	16,050	\$213,760,990
New Groundwater	33,960	\$437,621,000
Infrastructure Improvements	2,440	\$31,628,900
Reuse	12,490	\$130,906,000
Subordination ^b	72,207	\$0
Voluntary Redistribution ^c	22,866	\$8,964,000
Other ^d	8,363	\$23,023,000
<i>Total</i>	<i>250,799</i>	<i>\$914,554,558</i>

- a Includes 9,500 ac-ft of supply not assigned to a particular water user group.
- b Includes all available water from Subordination Strategy, including supplies not assigned to a water user group.
- c. This strategy uses existing supplies or water developed from other strategies.
- d. Includes brush control and bottled water programs.

**Figure ES-4
Comparison of Supplies and Demands in Region F
With and Without the Subordination Strategy**



**Figure ES-5
Current and Recommended Sources of Water Available to Region F
Water User Groups as of 2060**

