2 CURRENT AND PROJECTED POPULATION AND WATER DEMAND DATA FOR THE REGION

2.1 Introduction

In November 2003,[1] the Texas Water Development Board (TWDB) approved population and water demand projections for Region F for use in the 2006 regional water plan. As part of the 2010 regional water plan update, these projections were reviewed by the region and revised as needed. There are no recommended revisions to population projections. The region decided to wait until after the 2010 U.S. Population Census to adjust populations if needed. The only recommended revision to water demands is for steam electric power in Mitchell County, which was reduced from 9,100 to 5,023 acre-feet in 2010 and 14,730 to 4,140 acre-feet in 2060.

The TWDB distributes its population and demand projections into Water User Groups (WUGs). A WUG is defined as one of the following:

- Cities with population of 500 or more,
- Individual utilities providing more than 0.25 million gallons per day (MGD) for municipal use,
- Rural/unincorporated areas of municipal water use, known as County Other (aggregated on a county/basin basis),
- Manufacturing (aggregated on a county/basin basis),
- Steam electric power (aggregated on a county/basin basis),
- Mining (aggregated on a county/basin basis),
- Irrigation (aggregated on a county/basin basis), or
- Livestock (aggregated on a county/basin basis).

Each WUG has an associated water demand. Only municipal WUGs have population projections.

To simplify the presentation of these data all projections in this chapter are aggregated by county. Projections divided by WUG, county and basin may be found in Appendix 2A.

The projections were developed by decade and cover the period from 2010 to 2060.

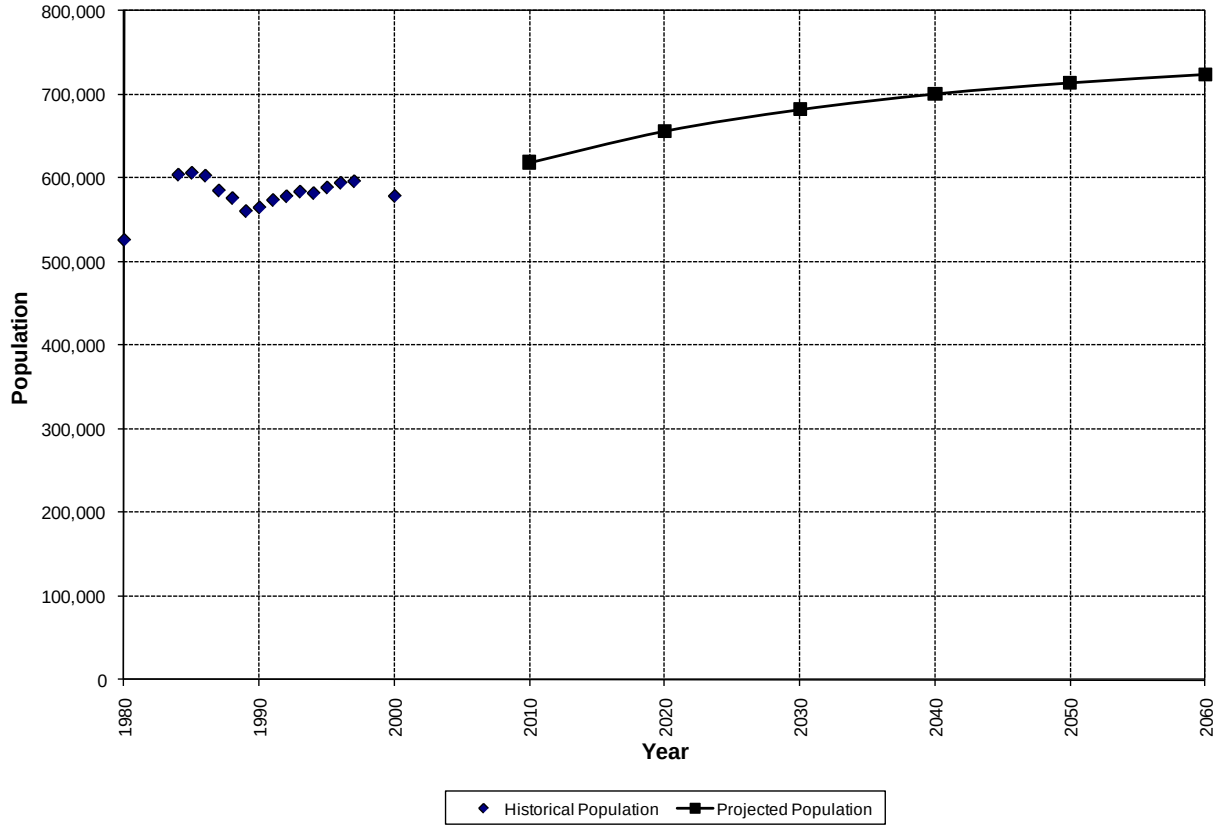
2.2 Population Projections

Table 2.2-1 presents the historical year 2000 and projected populations for the counties in Region F. Figure 2.2-1 compares the region's historical population between 1980 and 2000 and the projected population through 2060. Figure 2.2-2 shows the geographical distribution of the population projections for the years 2000 and 2060. Population projections divided by WUG, county and basin are in Table 2A-1 of Appendix 2A.

Table 2.2-1
Historical and Projected Population by County

County	Historical	Projected					
	2000	2010	2020	2030	2040	2050	2060
Andrews	13,004	14,131	15,078	15,737	16,358	16,645	16,968
Borden	729	792	820	782	693	644	582
Brown	37,674	39,324	40,602	40,959	40,959	40,959	40,959
Coke	3,864	3,748	3,750	3,750	3,750	3,750	3,750
Coleman	9,235	9,141	9,149	9,149	9,149	9,149	9,149
Concho	3,966	4,467	4,628	4,628	4,628	4,628	4,628
Crane	3,996	4,469	4,990	5,272	5,487	5,718	5,961
Crockett	4,099	4,482	4,840	4,966	5,022	5,139	5,244
Ector	121,123	132,759	144,073	154,160	163,141	170,307	177,026
Glasscock	1,406	1,582	1,783	1,891	1,921	1,915	1,954
Howard	33,627	34,574	35,438	35,719	35,719	35,719	35,719
Irion	1,771	1,888	1,938	1,892	1,774	1,680	1,606
Kimble	4,468	4,660	4,702	4,702	4,702	4,702	4,702
Loving	67	67	67	67	67	67	67
McCulloch	8,205	8,235	8,377	8,377	8,377	8,377	8,377
Martin	4,746	5,203	5,696	5,935	6,082	5,934	5,633
Mason	3,738	3,817	3,856	3,876	3,886	3,891	3,896
Menard	2,360	2,493	2,528	2,528	2,528	2,528	2,528
Midland	116,009	124,710	134,022	140,659	145,595	148,720	151,664
Mitchell	9,698	9,736	9,714	9,545	9,332	9,069	8,521
Pecos	16,809	17,850	18,780	19,300	19,580	19,630	19,246
Reagan	3,326	3,791	4,182	4,381	4,367	4,213	4,010
Reeves	13,137	14,281	15,451	16,417	17,219	17,949	18,527
Runnels	11,495	11,610	12,025	12,339	12,686	12,956	13,298
Schleicher	2,935	3,159	3,387	3,491	3,533	3,594	3,658
Scurry	16,361	16,998	17,602	17,923	18,092	18,203	18,203
Sterling	1,393	1,529	1,680	1,744	1,766	1,717	1,739
Sutton	4,077	4,479	4,737	4,780	4,762	4,773	4,725
Tom Green	104,010	112,138	118,851	123,109	125,466	127,333	127,752
Upton	3,404	3,757	4,068	4,185	4,278	4,400	4,518
Ward	10,909	11,416	11,710	11,846	11,846	11,846	11,846
Winkler	7,173	7,603	7,956	8,023	8,041	7,890	7,638
Total	*578,814*	*618,889*	*656,480*	*682,132*	*700,806*	*714,045*	*724,094*

Figure 2.2-1
Historical and Projected Population of Region F



1. Historical data provided by the Texas Water Development Board.[2] Data from 1981 to 1983 are not available. Projected population was approved by TWDB for the second round of regional water planning and adopted for this plan.

The population projections for each county are derived from the 2000 U.S. Census. The projections use a standard methodology known as the *cohort-component method*. This method is based upon historical birth and survival rates of the region's population. More information on the methodology used for the population projections may be found in the TWDB publication *Water for Texas – Today and Tomorrow: A 1996 Consensus-Based Update to the Texas Water Plan Vol. III, Water Use Planning Data Appendix.*[3]

TWDB projects the region's total population to increase from 578,814 in 2000 to 724,094 in 2060, an average growth rate of 0.37 percent per year. TWDB projects the total population for Texas to increase from 20,851,790 in 2000 to 46,323,826 in 2060, a growth rate of 1.3 percent per year.

The relative distribution of population in Region F is expected to remain stable throughout the 50-year planning period. Almost 80 percent of the people in Region F live in urban areas or small to moderate sized rural communities. Three counties, Midland, Ector and Tom Green, account for nearly half of the region's population. These counties contain the cities of Midland, Odessa and San Angelo, respectively. Each of these cities had a year 2000 population between 85,000 and 95,000.

Twenty-nine of the thirty-two counties that comprise Region F are generally rural. Twenty-one counties have populations of less than 10,000. Two of these counties, Loving and Borden, have populations of less than 1,000. These twenty-nine counties are expected to remain primarily rural throughout the planning period. Some counties, particularly those in the eastern portion of Region F, are beginning to see an influx of weekend, recreational and other non-resident population from other parts of the state. Because this population is counted by the census as residing in another region, this population growth and the resulting water demand are not reflected in the TWDB-approved projections.

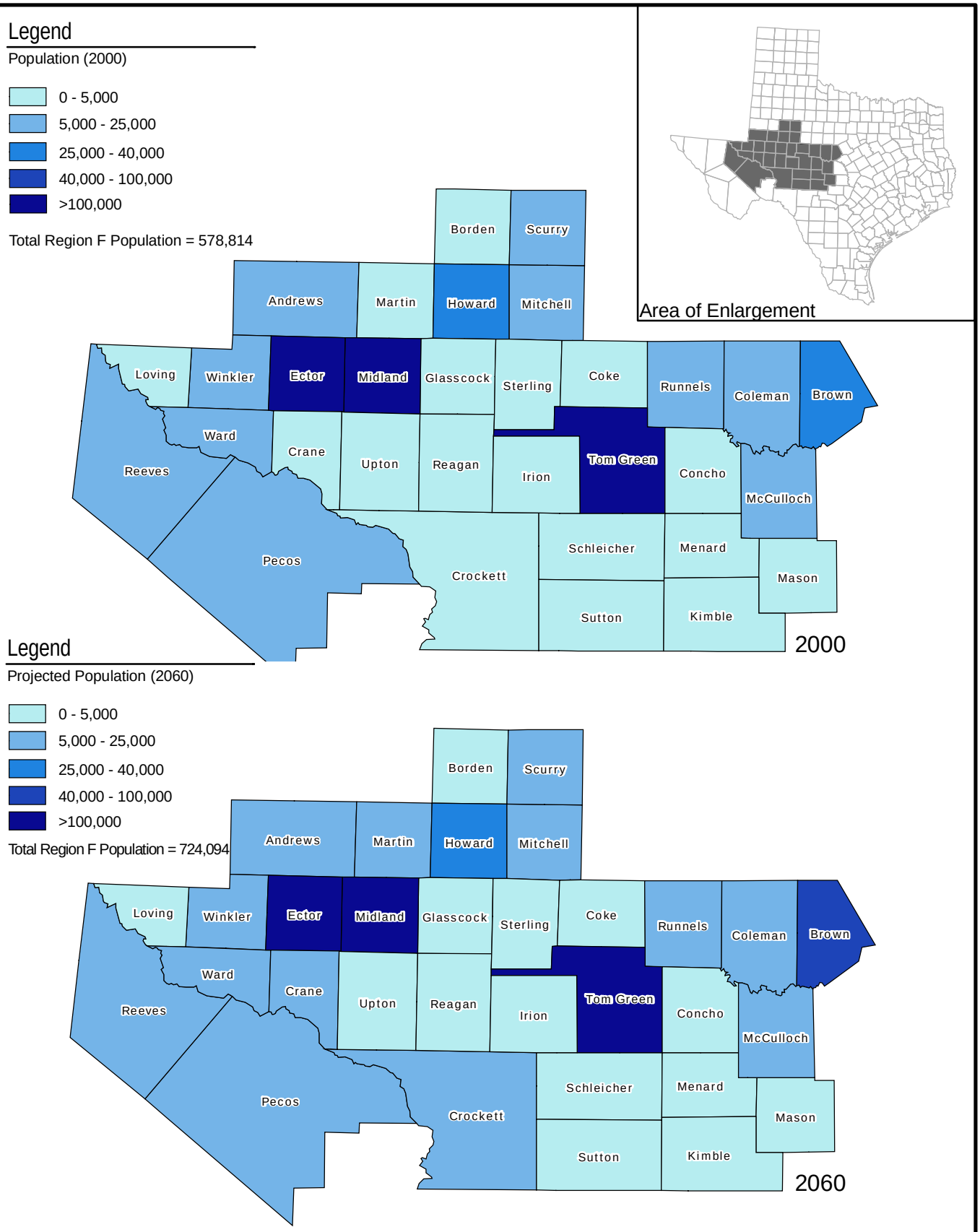
2.3 Historical and Projected Water Demands

TWDB divides its water demand projections into six water use categories:

- *Municipal* – residential and commercial uses, including landscape irrigation,
- *Manufacturing* – various types of heavy industrial use,
- *Irrigation* - irrigated commercial agriculture,
- *Steam Electric Power Generation* – water consumed in the production of electricity,
- *Livestock Watering* – water used in commercial livestock production, and
- *Mining* – water used in the commercial production of various minerals, as well as water used in the production of oil and gas.

Municipal water use is the only category subdivided into individual entities such as cities and other water providers. All other categories are aggregated into county/basin units.

Each category has annual water demand projections for the years 2010, 2020, 2030, 2040, 2050, and 2060. These projections are not the same as the average day and peak-day projections used in planning for municipal water supply distribution systems.



Freese and Nichols
4055 International Plaza, Suite 200
Fort Worth, TX 76109 - 4895
Phone - (817) 735 - 7300

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Region F

Population Distribution by County 2000-2060

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2.2-2

FIGURE

The average day projection is the amount of water expected to be delivered during a normal day. A peak-day projection is the maximum amount of water expected to be delivered during the highest demand day, typically expressed in million gallons per day (MGD). The TWDB water demand projections are the volume of water expected to be used during a dry year and are usually expressed in acre-feet (one acre-foot equals 325,851 gallons).

The water demand projections for the 2006 water plan were developed in conjunction with the TWDB and regional stakeholders. The Region F Water Planning Group solicited input from selected cities, water providers, county judges, and steam electric power generators. The projections were then compared to historical data and other projections and evaluated for anomalies such as recent water use exceeding future predictions, changes in trends in per capita water use since 1990, etc. The final recommended demands were approved by the region and the TWDB for the 2006 Region F Water Plan. These projections are the basis for the water demands in the updated 2011 Region F Water Plan.

Subsequent to the completion of the 2006 regional water plans, the TWDB contracted with the Bureau of Economic Geology (BEG) to develop water demand projections for power generation in Texas.[4] The region reviewed the data in the report and it was recommended that Region F adopt the projections developed for the 2006 Region F Water Plan for all counties with a reduction in demand in Mitchell County. For Mitchell County, it was recommended that the projected demands be limited to the currently available supply in the county for this use. The review and recommendations for steam electric power are further discussed in Section 2.3.4.

Table 2.3-1 and Figure 2.3-1 present the TWDB-approved total water demand projections for the region by water-use type through 2060. Table 2.3-2 summarizes the historical year 2006 use and the projected water use by county. Figure 2.3-2 shows the geographical distribution of the year 2006 historical water use and year 2060 total water demand projections by county. A discussion of the demand projections by each use type is presented in Sections 2.3.1 through 2.3.6.

The significant increase in total water use between the historical year 2006 data and the year 2010 projections is mainly due to irrigation demands. Region F feels that historical year 2006 water use for irrigation is not indicative of the potential for irrigation water use in the region. More information on the region's projected irrigation demands may be found in Section 2.3.3.

Steam electric projects are also higher than the historical 2006 use. Several power generation facilities in Region F have recently ceased operation. The future use of these facilities is uncertain.

Table 2.3-1
Water Demand Projections for Region F by Use Category
(Values in Acre-Feet per Year)

Use Category	Historical	Projected					
	2006[a]	2010	2020	2030	2040	2050	2060
Municipal	121,620	141,965	147,828	151,280	153,206	155,340	157,632
Manufacturing	11,914	9,757	10,595	11,294	11,960	12,524	13,313
Irrigation	418,636	578,606	573,227	567,846	562,461	557,080	551,774
Steam Electric	3,732	18,138	19,995	22,380	25,324	28,954	33,418
Mining	26,905	31,850	33,097	33,795	34,479	35,154	35,794
Livestock	15,207	23,060	23,060	23,060	23,060	23,060	23,060
Total	598,014	*803,376*	*807,802*	*809,655*	*810,490*	*812,112*	*814,991*

a. Data are from the TWDB.

b. Historical mining data are from 2005. The mining data for 2006 includes only self-reported usage, which is not representative of all mining use in the region.

Figure 2.3-1
Projected Water Demand in Region F by Use Category

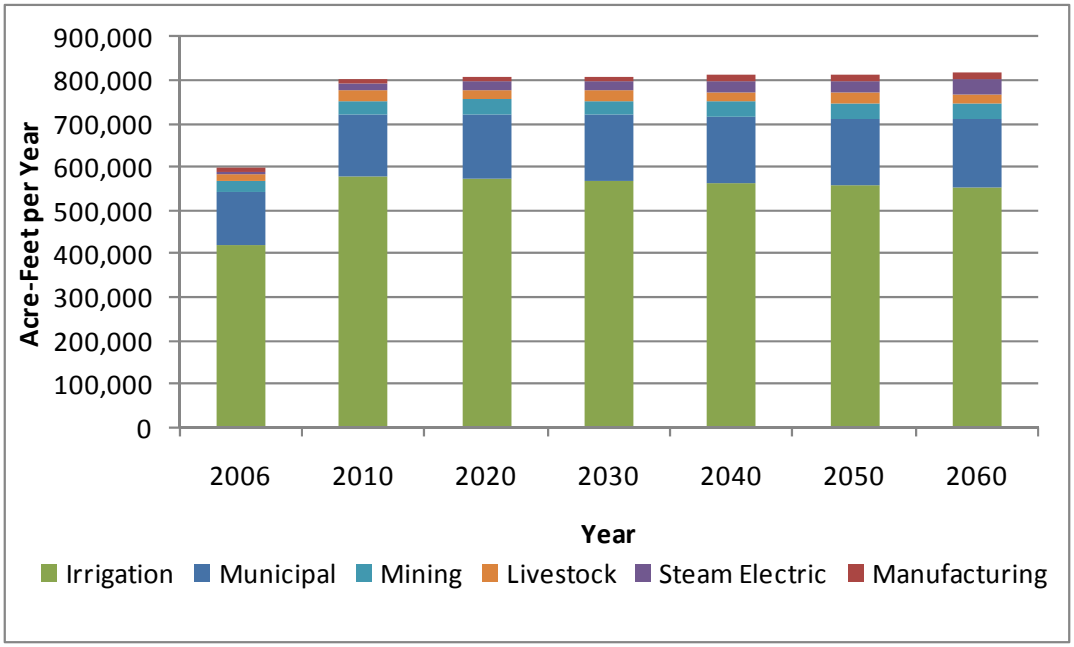
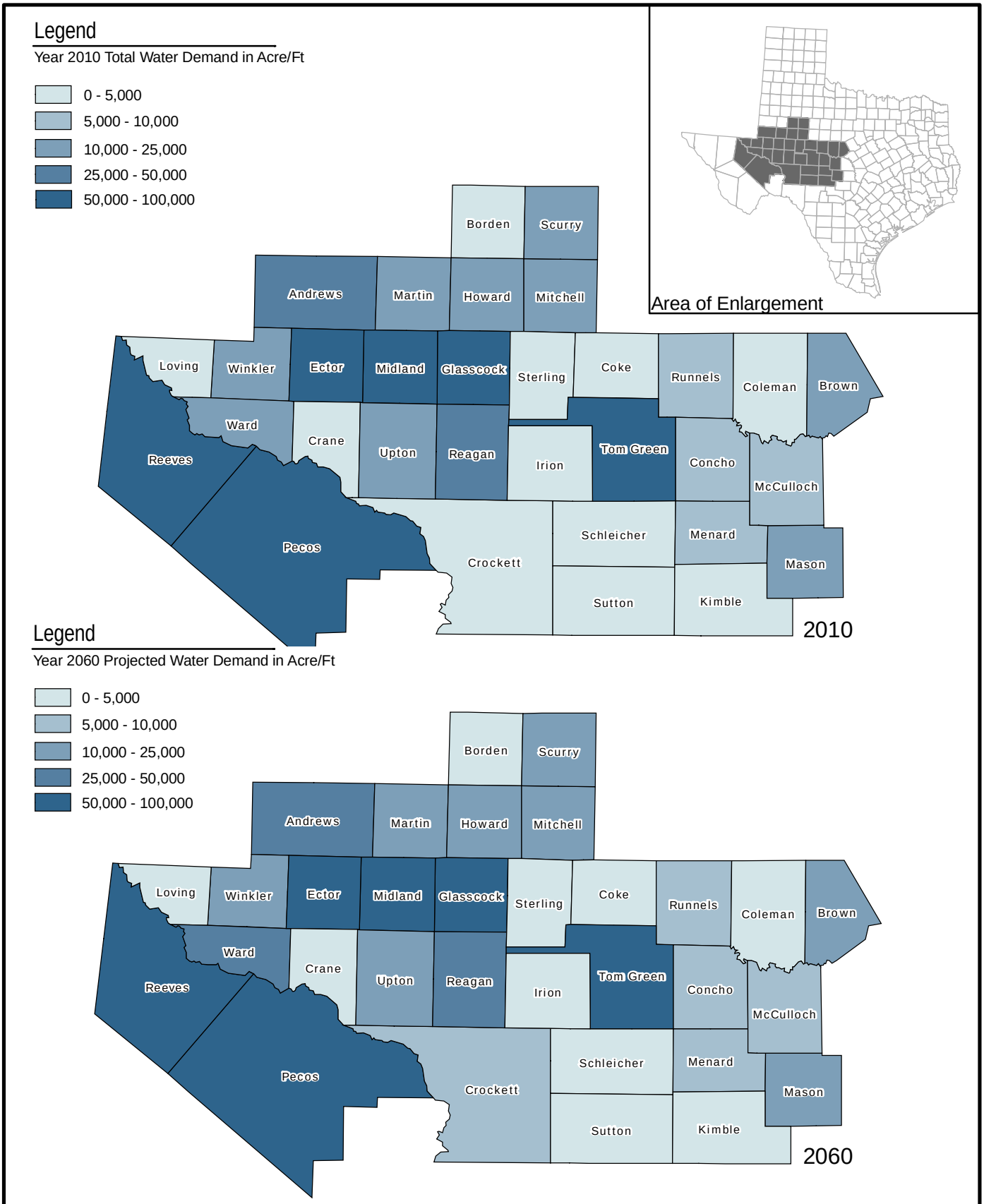


Table 2.3-2
Total Historical and Projected Water Demand by County
(Values in Acre-Feet per Year)

County	Historical	Projected					
	2006 [a]	2010	2020	2030	2040	2050	2060
Andrews	35,219	38,579	38,550	38,413	38,261	38,059	37,892
Borden	3,488	3,836	3,805	3,778	3,744	3,717	3,689
Brown	19,165	24,119	24,221	24,173	24,053	24,011	24,040
Coke	1,965	3,098	3,070	3,121	3,179	3,257	3,354
Coleman	3,458	4,536	4,509	4,477	4,447	4,429	4,429
Concho	8,879	5,945	5,947	5,921	5,890	5,869	5,853
Crane	6,622	3,969	4,097	4,159	4,201	4,258	4,323
Crockett	2,498	4,604	4,543	4,708	4,873	5,110	5,387
Ector	32,915	53,556	59,000	62,670	66,493	70,656	75,320
Glasscock	46,924	52,690	52,287	51,878	51,458	51,037	50,628
Howard	13,785	15,904	16,118	16,122	16,064	16,064	16,184
Irion	1,247	3,623	3,563	3,491	3,411	3,337	3,268
Kimble	4,422	3,574	3,592	3,598	3,601	3,606	3,641
Loving	111	664	663	658	657	655	654
McCulloch	17,193	7,101	7,167	7,183	7,190	7,205	7,270
Martin	8,932	16,098	15,875	15,629	15,371	15,085	14,787
Mason	9,577	12,053	11,904	11,750	11,595	11,445	11,305
Menard	3,271	7,161	7,138	7,110	7,083	7,058	7,039
Midland	54,747	75,806	77,236	78,097	78,534	78,836	79,259
Mitchell	8,919	12,824	12,584	12,327	12,060	11,796	11,500
Pecos	74,653	85,897	84,826	83,661	82,434	81,178	79,854
Reagan	21,966	39,940	39,550	39,059	38,502	37,919	37,336
Reeves	94,581	110,088	109,479	108,809	108,090	107,382	106,701
Runnels	5,726	8,059	8,102	8,123	8,143	8,172	8,229
Schleicher	2,071	3,743	3,763	3,745	3,707	3,681	3,662
Scurry	10,289	10,217	10,393	10,393	10,357	10,346	10,373
Sterling	1,135	2,090	2,101	2,090	2,068	2,034	2,020
Sutton	3,265	4,159	4,195	4,160	4,105	4,068	4,020
Tom Green	70,681	132,935	133,952	134,464	134,624	134,938	135,230
Upton	12,079	20,575	20,420	20,208	19,986	19,780	19,584
Ward	10,871	22,477	21,656	22,202	22,863	23,743	24,870
Winkler	7,360	13,456	13,496	13,478	13,446	13,381	13,290
Total	*598,014*	*803,376*	*807,802*	*809,655*	*810,490*	*812,112*	*814,991*

a. Data are from the TWDB. Historical mining data are from 2005.



Freese and Nichols
4055 International Plaza, Suite 200
Fort Worth, TX 76109 - 4895
Phone - (817) 735 - 7300

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Region F

Total Water Demand by County 2010-2060

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FIGURE

2.3.1 Municipal Water Demand Projections

Municipal water demand consists of both residential and commercial use, including water used for landscape irrigation. Residential use includes water used in single and multi-family households. Commercial use includes business establishments, public spaces and institutions, but does not include most industrial water use. Industrial water demand projections are included in the manufacturing category.

Municipal projections were developed for each city of more than 500 people and water utilities that provide 0.25 MGD or more. TWDB aggregates rural populations and towns of less than 500 people into the County Other classification. The municipal projections are the only projections developed for individual water providers such as cities and other water providers. TWDB aggregates all other demand categories by county and river basin.

TWDB used a three-step process to calculate municipal water demands. First, population projections were developed for each municipal WUG. Second, per capita water use projections were developed. (Population projections are discussed in Section 2.2.) Finally, the per capita water demand projections were multiplied by the population projections to determine the annual municipal water demand for each WUG.

Per Capita Water Use Projections

Future water use is calculated by multiplying the population of a region, county or city by a calculated per capita water use. *Per capita water use*, expressed in gallons per capita per day (gpcd), is the average daily municipal water use divided by the population of the area. It includes the amount of water used by each person in their daily activities, water used for commercial purposes, and landscape watering. This definition of per capita water use does not include water used for manufacturing or other non-municipal purposes (if it can be distinguished from other uses), or water sold to another entity. (This definition of per capita use is not the same as the definition adopted by the Water Conservation Implementation Task Force. The Task Force definition does not differentiate between municipal use and non-municipal use or outside sales[5].)

The TWDB based the per capita water demand projections on year 2000 annual municipal water use divided by the 2000 population. In some cases, the projections were adjusted if the

year 2000 water use was not indicative of historical water use by a WUG. In Region F, several WUGs were under water use restrictions in 2000 and their per capita water use was adjusted upward.

The TWDB assumes that per capita water use will show a downward trend over the planning period as a result of the State Water-Efficiency Plumbing Act. Among other things, the Plumbing Act requires that only water-saving plumbing fixtures may be sold in Texas. The TWDB determined the per capita water demand savings based upon the expected rate of replacement of old plumbing fixtures with water-conserving models and the number of new housing units expected in the region. The actual amount of estimated savings can vary somewhat depending upon the age of housing units in a WUG's service area.

Table 2.3-3 shows the average per capita water use for each decade in Region F and compares these values to average values for the state. Average per capita water use for Region F is expected to decline from 205 gpcd in 2010 to 194 gpcd in 2060, a reduction of 5 percent. This compares to the statewide average of 171 gpcd for the year 2010 declining to 162 gpcd by 2060.

Table 2.3-3
Comparison of Per Capita Water Use and Municipal Conservation Trends

Region F	**Base***	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Per Capita Use (gpcd)	206	205	201	198	195	194	194
Decline from Year 2000		1	5	8	11	12	12
% Decline from Year 2000		1%	3%	4%	5%	6%	6%
Statewide	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Per Capita Use (gpcd)	173	171	168	166	164	162	162
Decline from Year 2000		2	5	7	10	11	11
% Decline from Year 2000		1.5%	3%	4%	5%	6%	6%

Source: Data are from TWDB[6].

* In most cases per capita demand projections are based on year 2000 water use. However, in Region F other years may have been used that are more indicative of historical water demand trends, particularly for water users under restrictions in the year 2000. This results in a base per capita water use of 206 gpcd. In Region F, the actual year 2000 per capita water use was 198 gpcd.

Municipal Water Demand

The TWDB calculated the municipal water demand projections by multiplying the population projections by the average per capita water use projections. As shown in Table 2.3-4, the total municipal water demand for Region F is expected to increase from 141,965 acre-feet per

year in 2010 to 157,632 acre-feet per year in 2060, an increase of 11 percent over the planning period. This compares to an expected 73 percent increase in municipal demand statewide.

Table 2.3-4
Municipal Water Demand Projections for Region F Counties
(Values in Acre-Feet Per Year)

	Historical	Projected					
County	**2006 [a]**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Andrews	2,736	3,625	3,821	3,937	4,041	4,093	4,173
Borden	144	175	179	169	148	136	123
Brown	6,812	7,106	7,173	7,111	6,978	6,932	6,932
Coke	389	771	766	755	742	737	737
Coleman	1,767	1,874	1,846	1,814	1,784	1,766	1,766
Concho	578	873	892	884	870	865	865
Crane	1,125	1,256	1,389	1,453	1,497	1,556	1,623
Crockett	1,267	1,707	1,831	1,865	1,870	1,909	1,949
Ector	26,553	28,708	30,634	32,271	33,757	35,208	36,725
Glasscock	145	181	196	203	200	197	201
Howard	5,787	7,308	7,372	7,310	7,190	7,140	7,140
Irion	198	238	239	227	208	194	185
Kimble	835	1,148	1,142	1,129	1,113	1,104	1,104
Loving	7	11	11	10	10	10	10
McCulloch	2,388	2,252	2,263	2,236	2,205	2,190	2,190
Martin	597	788	843	858	860	832	789
Mason	854	932	926	916	905	898	900
Menard	332	458	455	446	438	435	435
Midland	31,965	32,568	34,202	35,301	35,976	36,517	37,180
Mitchell	1,390	1,703	1,671	1,621	1,559	1,499	1,409
Pecos	4,220	4,816	4,991	5,071	5,090	5,079	4,980
Reagan	1346	1,035	1,123	1,167	1,148	1,103	1,049
Reeves	3,264	3,834	4,082	4,272	4,416	4,571	4,713
Runnels	1,320	2,091	2,140	2,174	2,207	2,250	2,319
Schleicher	425	723	775	795	794	806	824
Scurry	1,918	3,666	3,714	3,721	3,695	3,696	3,696
Sterling	239	349	377	387	386	373	379
Sutton	1,110	1,472	1,540	1,539	1,517	1,514	1,499
Tom Green	17,846	23,494	24,257	24,648	24,664	24,833	24,888
Upton	808	942	1,007	1,024	1,033	1,059	1,088
Ward	3,041	3,484	3,521	3,522	3,482	3,469	3,469
Winkler	1,890	2,377	2,450	2,444	2,423	2,369	2,292
Total	*123,296*	*141,965*	*147,828*	*151,280*	*153,206*	*155,340*	*157,632*

a. Data are from the Texas Water Development Board

The total estimated water savings associated with the implementation of the State Water-Efficiency Plumbing Act by county is presented in Table 2.3-5. Water-saving plumbing fixtures are expected to save almost 10,700 acre-feet per year by 2060.

Table 2.3-5
Expected Savings from Implementation of Plumbing Code for Region F Counties
(Values in Acre-Feet Per Year)

County	2010	2020	2030	2040	2050	2060
Andrews	67	123	181	243	266	271
Borden	4	6	9	9	10	9
Brown	135	304	430	564	610	610
Coke	10	24	35	47	53	53
Coleman	27	58	89	120	137	137
Concho	17	30	39	53	58	58
Crane	21	42	61	80	90	93
Crockett	25	43	61	78	86	88
Ector	382	807	1,329	1,824	2,048	2,147
Glasscock	7	16	21	28	30	31
Howard	116	238	360	480	530	530
Irion	7	14	19	23	25	23
Kimble	21	37	50	66	75	75
Loving	0	1	1	1	1	1
Martin	23	45	66	89	93	88
Mason	13	26	39	52	59	59
McCulloch	31	59	87	118	133	133
Menard	11	21	29	38	40	40
Midland	557	1,166	1,667	2,180	2,392	2,438
Mitchell	32	59	80	104	117	110
Pecos	55	132	195	253	276	271
Reagan	18	38	50	64	67	63
Reeves	75	133	197	264	299	309
Runnels	37	86	130	179	203	208
Schleicher	13	28	38	51	57	58
Scurry	76	158	221	284	306	306
Sterling	7	13	18	24	25	26
Sutton	24	41	57	73	79	78
Tom Green	399	939	1,368	1,798	1,978	1,984
Upton	16	34	47	62	69	71
Ward	51	105	146	186	199	199
Winkler	26	62	90	117	124	120
Total	*2,303*	*4,888*	*7,210*	*9,552*	*10,535*	*10,687*

Data are from the Texas Water Development Board

2.3.2 Manufacturing Projections

Manufacturing use is the water used by industries in producing various products. In Region F much of the manufacturing water use is associated with the generation of products from sand and gravel operations and the energy industry. In recent years the water use for these industries in McCulloch, Midland and Reeves Counties have shown substantial increases over the year 2000 water use. The year 2000 was the basis year in developing manufacturing water use projections, and as a result the manufacturing projections in these counties are lower than the water use reported in 2006. Since this change in water use is recent and may not reflect long-term trends Region F will continue to monitor the manufacturing water use in these counties to determine if revisions are warranted for the 2016 plan. No revisions were made to the manufacturing water use projections for this water plan update.

To produce the projections used for the 2006 regional water plans, the TWDB developed relationships between water use and unit production of a product. TWDB then calculated the water demand projections based on expected statewide growth in unit production of each type of product. TWDB then distributed the growth in demand to each county. It was assumed that the types of industry located in a particular county would remain the same throughout the planning period.

Manufacturing water demand accounts for only one percent of the region's total water use and is concentrated in a few counties. Ector, Howard and Tom Green Counties are expected to have the largest manufacturing demands for the region with a combined total use of over 9,000 acre-feet per year by 2060. Total manufacturing water use is expected to increase from 9,757 acre-feet in 2010 to 13,313 acre-feet by 2060, an increase of 3,556 acre-feet (see Table 2.3-6). Although TWDB projects a 36 percent increase in manufacturing demands from 2010 to 2060, manufacturing is expected to remain a relatively small amount of the region's total demands. Statewide, manufacturing demand is expected to increase by 67 percent over the same period.

Table 2.3-6
Manufacturing Water Demand Projections for Region F Counties
(Values in Acre-Feet Per Year)

County	Historical	Projected					
	2006 [a]	2010	2020	2030	2040	2050	2060
Andrews	47	0	0	0	0	0	0
Borden	0	0	0	0	0	0	0
Brown	422	577	636	686	734	775	837
Coke	0	0	0	0	0	0	0
Coleman	3	6	6	6	6	6	6
Concho	0	0	0	0	0	0	0
Crane	0	0	0	0	0	0	0
Crockett	41	0	0	0	0	0	0
Ector	1,982	2,759	2,963	3,125	3,267	3,376	3,491
Glasscock	0	0	0	0	0	0	0
Howard	2,233	1,648	1,753	1,832	1,910	1,976	2,099
Irion	0	0	0	0	0	0	0
Kimble	68	702	767	823	880	932	1,002
Loving	0	0	0	0	0	0	0
McCulloch	2,475	844	929	1,004	1,075	1,137	1,233
Martin	53	39	41	42	43	44	47
Mason	0	0	0	0	0	0	0
Menard	3	0	0	0	0	0	0
Midland	786	164	182	198	213	226	245
Mitchell	0	0	0	0	0	0	0
Pecos	88	2	2	2	2	2	2
Reagan	0	0	0	0	0	0	0
Reeves	1,433	720	741	756	770	781	825
Runnels	17	63	70	76	82	87	94
Schleicher	0	0	0	0	0	0	0
Scurry	8	0	0	0	0	0	0
Sterling	0	0	0	0	0	0	0
Sutton	0	0	0	0	0	0	0
Tom Green	1,906	2,226	2,498	2,737	2,971	3,175	3,425
Upton	4	0	0	0	0	0	0
Ward	0	7	7	7	7	7	7
Winkler	108	0	0	0	0	0	0
Total	*11,677*	*9,757*	*10,595*	*11,294*	*11,960*	*12,524*	*13,313*

a. Data are from the TWDB.

2.3.3 Irrigation Projections

Irrigated agriculture is the largest user of water in Region F. Irrigation use can vary substantially from year to year depending on the number of irrigated acres, weather, crop prices, government programs and other factors. These projections are for dry-year conditions and represent the maximum demand expected during the planning period. During most of the planning period, irrigation demand will probably be less than predicted.

An irrigation study conducted during this planning cycle reviewed the historical irrigation water use for six counties in Region F: Glasscock, Midland, Reagan, Reeves, Pecos and Tom Green. These counties represent over 70 percent of the irrigation demand in the region and 76 percent of the projected irrigation shortage. Data were collected from multiple sources on the historical water use, irrigated acreages and adoption of irrigation equipment. The study found that while there are some differences in reported irrigation use, the data provided by the TWDB was the most comprehensive. The biggest differences in data occur in counties with a wide variety of crops or non-major crops (such as fruit). The study did find that the use of more efficient irrigation methods is increasing in the six counties. In Glasscock and Reagan Counties most of the crops are currently being irrigated with either sprinkler or drip.

This study was conducted with considerable input from Region F planning group members and the public. Based on the findings of the study, it was recommended that the region continue to monitor irrigation water use data and collect available information on irrigation conservation efforts across the region. It was also recommended that region retain the projected irrigation demands developed for the 2006 Region F Water Plan with the understanding that a more complete review of the irrigation demands will be conducted for the 2016 regional water plan. Based on the data collected on conservation equipment, it was recommended that the adoption rates for conservation equipment be reviewed as part of the irrigation conservation strategies discussed in Chapter 4 of this plan. A copy of the study is included in Volume II.

The irrigation projections adopted for Region F for 2010 are based on the historical reported irrigation water use in each county. These projections are considerably higher than the historical water use in the year 2006. This is mostly associated with the limited availability of surface water for irrigation in Menard, Pecos, Reeves, Tom Green, and Ward Counties. The projections

adopted by Region F are more indicative of potential irrigation demand with stable cotton prices and unrestricted surface water supplies.

Table 2.3-8 shows the irrigation water demands by county in Region F. The projected annual water use for irrigation was reduced from the 2010 estimates by the expected savings associated with the implementation of more efficient irrigation practices due to replacement of irrigation equipment with more efficient models. These reductions were determined by TWDB. Table 2.3-7 summarizes the reduction in irrigation demand for the region for each decade and compares these reductions to statewide totals. Figure 2.3-3 compares historical irrigation water use data to the Region F irrigation projections.

Table 2.3-7
Comparison of Region F Irrigation Demand Projections to Statewide Projections

Region F	2010	2020	2030	2040	2050	2060
Irrigation (ac-ft)	578,606	573,227	567,846	562,461	557,080	551,774
Decline from Year 2010	0	5,379	10,760	16,145	21,526	26,832
% Decline	0%	1%	2%	3%	4%	5%
Statewide						
Irrigation (ac-ft)	10,061,165	9,626,239	9,282,167	9,007,934	8,680,985	8,354,329
Decline from Year 2010	0	434,926	778,998	1,053,231	1,380,180	1,706,836
% Decline	0%	4%	8%	10%	14%	17%

Note: Data are from the TWDB

Agricultural use accounted for 72 percent of Region F's total water use in 2006. By 2060, irrigation is expected to continue to be a major water use and could be as much as 68 percent of the region's total water demand. Statewide irrigation demand is projected to be 56 percent of total demand in the year 2010 and 38 percent of statewide demand in 2060. The counties with the largest irrigation water use are Tom Green, Reeves, Pecos, Glasscock, Midland, Reagan and Andrews Counties. These counties are expected to account for 78 percent of the region's irrigation demand in 2060.

Figure 2.3-3
Comparison of Historical Water Use to Projected Irrigation Water Demand for Region F

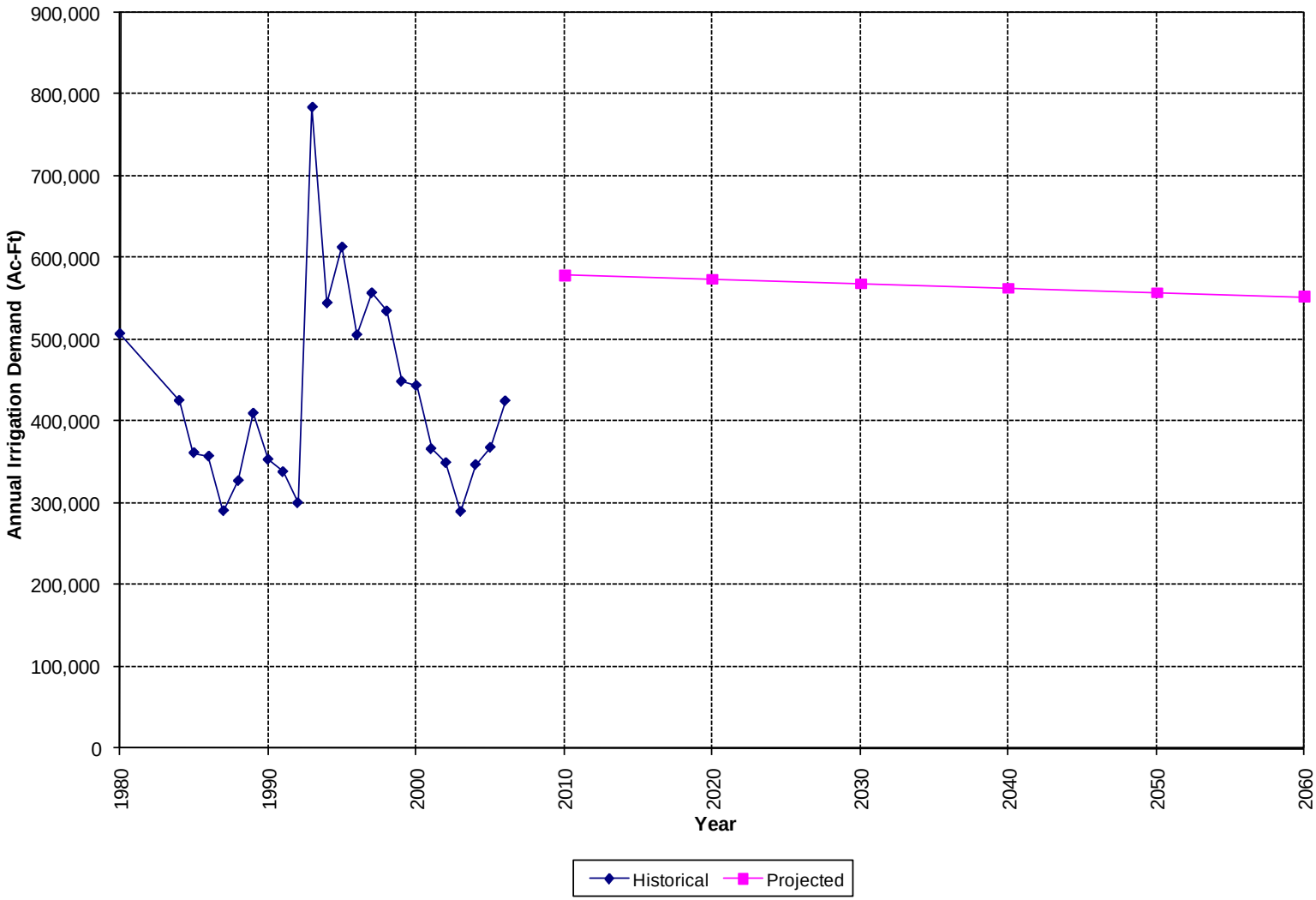

Table 2.3-8
Irrigation Water Demand Projections for Region F Counties
(Values in Acre-Feet per Year)

County	Historical	Projected					
	2006 [a]	2010	2020	2030	2040	2050	2060
Andrews	30,459	32,608	32,334	32,062	31,788	31,516	31,245
Borden	2,322	2,690	2,687	2,682	2,680	2,675	2,673
Brown	9,467	12,313	12,272	12,230	12,189	12,146	12,105
Coke	965	936	936	934	933	933	933
Coleman	742	1,379	1,379	1,379	1,379	1,379	1,379
Concho	7,727	4,297	4,280	4,262	4,245	4,229	4,213
Crane	0	337	337	337	337	337	337
Crockett	485	525	518	508	498	492	482
Ector	1,450	5,533	5,466	5,402	5,335	5,271	5,204
Glasscock	46,579	52,272	51,854	51,438	51,021	50,603	50,190
Howard	3,155	4,799	4,744	4,690	4,635	4,581	4,527
Irion	700	2,803	2,742	2,682	2,621	2,561	2,501
Kimble	3,054	985	948	913	877	841	807
Loving	0	581	580	576	575	573	572
McCulloch	3,477	2,824	2,789	2,754	2,718	2,683	2,649
Martin	15,726	14,324	14,073	13,822	13,571	13,321	13,075
Mason	6,830	10,079	9,936	9,792	9,648	9,505	9,363
Menard	2,578	6,061	6,041	6,022	6,003	5,981	5,962
Midland	24,687	41,493	41,170	40,848	40,526	40,203	39,884
Mitchell	7,306	5,534	5,507	5,479	5,452	5,425	5,398
Pecos	70,194	79,681	78,436	77,191	75,945	74,700	73,475
Reagan	18,741	36,597	35,990	35,385	34,779	34,174	33,579
Reeves	88,925	103,069	102,196	101,323	100,448	99,575	98,710
Runnels	3,834	4,331	4,317	4,298	4,279	4,260	4,241
Schleicher	1,005	2,108	2,067	2,024	1,982	1,939	1,897
Scurry	5,763	2,815	2,723	2,630	2,537	2,444	2,355
Sterling	656	648	621	595	569	543	518
Sutton	1,677	1,811	1,777	1,742	1,708	1,673	1,639
Tom Green	49,140	104,621	104,362	104,107	103,852	103,593	103,338
Upton	7,301	16,759	16,521	16,285	16,047	15,809	15,576
Ward	4,736	13,793	13,624	13,454	13,284	13,115	12,947
Winkler	4,912	10,000	10,000	10,000	10,000	10,000	10,000
Total	*424,593*	*578,606*	*573,227*	*567,846*	*562,461*	*557,080*	*551,774*

a. Data are from the Texas Water Development Board

2.3.4 Steam Electric Power Generation

The steam electric power generation water demand projections for the 2006 Region F Water Plan were developed by a TWDB-sponsored study by a consortium representing the Texas power industry[7]. The study, conducted in 2003, developed water demands for steam electric based on state-wide projections of power usage. The water demands needed to produce the projected power were distributed to each county based on existing facilities and information from the 2001 state water plan.

Since the initial 2003 study was completed, there have been tremendous changes in the energy industry. Several facilities located within Region F have been mothballed or retired. These include power generation facilities in Coke, Tom Green, Mitchell, Pecos and Crockett Counties. In response to these changes and other statewide trends, the TWDB contracted with the Bureau of Economic Geology (BEG) to update water demand projections for power generation in Texas. This report provided a comprehensive review of existing and planned power needs for Texas.

With the current uncertainty in the power industry, it is nearly impossible to accurately predict the location and need for future water demands for steam electric power. The recent closings of power facilities may represent a shift in demand locations or an opportunity for future development. The projections developed by the BEG were reviewed and considered by the region. Based on the possibilities for future power development, it was recommended that Region F retain the projections developed for the 2006 Region F Water Plan for all counties except Mitchell County. For Mitchell County, it was recommended that the reliable supply from the Champion Creek/Colorado City reservoir system be used as the water demand. This is because the available water for power use is limited from these sources, and it is assumed that additional electric generating facilities beyond what can be readily supplied by the region's water sources will likely be cooled through alternative technology.

Based on the adopted projections, steam electric water demand in Region F is expected to almost double, increasing from 18,138 acre-feet per year in 2010 to 33,418 acre-feet per year in 2060. Table 2.3-9 summarizes the projections for steam electric demands. Statewide, steam electric demand is expected to increase from 733,179 acre-feet per year in 2010 to 1,620,411 acre-feet per year in 2060 .

2.3.5 Mining Projections

The mining category includes water used in both the production of minerals and the production of oil and gas. (Water used in the processing of minerals or oil and gas into a finished product is considered under the manufacturing use category.) The TWDB mining water demand projections are based on water-use survey data for various types of mineral production. TWDB used historical data to calculate factors relating output to water use. These factors were applied to projections of future output for each commodity. It was assumed that the geographical location of production would remain constant throughout the 50-year planning period. Future water conservation measures are not built into the projections.

The oil and gas industry has played an important role in the development of West Texas and still accounts for a large percentage of its total payroll. Over the past five years there have been considerable changes in the oil and gas industry with rapidly fluctuating energy prices and improved production technologies. This has resulted in an apparent increase in mining activities associated with the oil and gas industry across the state, including some parts of Region F. Other mining activities, such as sand, gravel and stone production, represent a small portion of the region's economy and water demands.

To assess the potential impacts of recent oil and gas activities on the water use, a review was conducted of the Railroad Commission of Texas (RRC) data. According to the Railroad Commission of Texas (RRC), the primary use of freshwater in oil and gas production is for enhanced recovery (i.e. water flooding). The second highest use is for drilling and completion activities, which includes well fracing. The data available from the RRC indicate that the percentage of freshwater used for enhanced recovery is only about 3 percent of the total water used for this purpose. Saline water accounts for most of the water used for enhanced recovery. Based on 2007 estimates, injection for enhanced recovery within Region F is greatest in Andrews, Crockett, Ector, Pecos and Sutton Counties. New drilling permits were the highest in Andrews, Crockett, Ector, Midland, Pecos, Sutton and Upton Counties (greater than 250 new permits per year over the past nine years), so these counties have the greatest potential for (increased or continued) water use for drilling activities.

The RRC data were used to estimate water use by the three major types of usage: 1) enhanced recovery, 2) drilling, and 3) well fracing. It was assumed that three percent of total

injected fluids used for enhanced recovery was fresh water. Water required for drilling was estimated from new drilling permits between 2000 and 2008. Water used for well fracing purposes was based on the number of fracing events in horizontal and vertical wells. In Region F, the volumes used for fracing are relatively small compared to the volumes required for enhanced recovery and drilling.

Comparison of total mining demand estimated by TWDB for 2005 (26,905 acre-feet) with the estimate for oil and gas use with the RRC data (21,533 acre-feet) indicate that the estimates are similar for Region F as a whole. Individual county comparisons yield mixed results with the RRC-based use higher for some counties and the TWDB demands higher in others. Counties with potentially higher water use than shown in the current mining projections include Pecos and Sutton and Crockett Counties (differences are greater than 1,000 acre-feet per year).

For the 2006 water plan the TWDB expected water demand for oil and gas production to increase slightly over the 50-year planning period. This assumption may still be valid and the recent increases in mining activities in Region F may be in response to short-term price increases of oil and gas rather than long-term trends. To better characterize the mining activities across the state the TWDB has contracted with the Bureau of Economic Geology to assess the water use for mining. This study will not be available for this plan update, but should be available for the 2016 regional water plans. In the interim, Region F will continue to monitor the oil and gas activities in the region to determine if revisions are warranted for the 2016 plan. For the 2011 water plan update, no revisions were made to the mining water use projections.

The mining demands for Region F are projected to increase from 31,850 acre-feet in 2010 to 35,794 acre-feet in 2060. This water use represents about 4 percent of the total water demand in Region F. Statewide mining use is expected to account for less than 2 percent of the state's water demands. Table 2.3-10 compares Region F's mining projections to statewide projections. A summary of the projected mining demands by county is presented in Table 2.3-11.

Table 2.3-9
Steam Electric Water Demand Projections for Region F Counties
(Values in Acre-Feet per Year)

County	Historical	Projected					
	2006 [a]	2010	2020	2030	2040	2050	2060
Andrews	0	0	0	0	0	0	0
Borden	0	0	0	0	0	0	0
Brown	0	0	0	0	0	0	0
Coke	0	310	247	289	339	401	477
Coleman	0	0	0	0	0	0	0
Concho	0	0	0	0	0	0	0
Crane	0	0	0	0	0	0	0
Crockett	0	973	776	907	1,067	1,262	1,500
Ector	3,875	6,375	9,125	10,668	12,549	14,842	17,637
Glasscock	0	0	0	0	0	0	0
Howard	604	0	0	0	0	0	0
Irion	0	0	0	0	0	0	0
Kimble	0	0	0	0	0	0	0
Loving	0	0	0	0	0	0	0
Martin	0	0	0	0	0	0	0
Mason	0	0	0	0	0	0	0
McCulloch	0	0	0	0	0	0	0
Menard	0	0	0	0	0	0	0
Midland	0	0	0	0	0	0	0
Mitchell	29	5,023	4,847	4,670	4,493	4,317	4,140
Pecos	0	0	0	0	0	0	0
Reagan	0	0	0	0	0	0	0
Reeves	0	0	0	0	0	0	0
Runnels	0	0	0	0	0	0	0
Schleicher	0	0	0	0	0	0	0
Scurry	0	0	0	0	0	0	0
Sterling	0	0	0	0	0	0	0
Sutton	0	0	0	0	0	0	0
Tom Green	0	543	777	909	1,069	1,264	1,502
Upton	0	0	0	0	0	0	0
Ward	3,099	4,914	4,223	4,937	5,807	6,868	8,162
Winkler	0	0	0	0	0	0	0
Total	*7,607*	*18,138*	*19,995*	*22,380*	*25,324*	*28,954*	*33,418*

a. Data are from the Texas Water Development Board

Table 2.3-10
Comparison of Region F Mining Projections to Statewide Totals

Region F	2010	2020	2030	2040	2050	2060
Mining (ac-ft)	31,850	33,097	33,795	34,479	35,154	35,794
Change from Yr 2010	0	1,247	1,945	2,629	3,304	3,944
% Increase	0%	3.9%	6.1%	8.3%	10.4%	12.4%
Statewide [a]	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Mining (ac-ft)	296,106	313,302	296,347	284,877	284,515	292,169
Change from Yr 2010	0	17,196	241	-11,229	-11,591	-3,937
% Change	0%	6%	0%	-4%	-4%	-1%

a. Source: Data are from the TWDB[(6)].

2.3.6 Livestock Watering

Livestock watering accounted for slightly more than 2 percent of the water use in Region F in 2006. The livestock projections relate the water needs per head for each type of livestock and each type of livestock operation. The number of head in each county was estimated from information provided by the Texas Agricultural Statistics Service. Total water use for each county was calculated by multiplying the number of head by the estimated water demand per head of livestock. Livestock water use was considered to be constant after the year 2010. Projections are only available for counties and are not available for specific livestock operations.

Livestock demand in Region F is expected to remain constant at 23,060 acre-feet per year throughout the planning period (see Table 2.3-12). Statewide livestock demand is expected to be 371,923 acre-feet per year in 2060.

Table 2.3-11
Mining Water Demand Projections for Region F Counties
(Values in Acre-Feet per Year)

County	Historical	Projected					
	2005 [a]	2010	2020	2030	2040	2050	2060
Andrews	1,702	1,908	1,957	1,976	1,994	2,012	2,036
Borden	806	690	658	646	635	625	612
Brown	1,227	2,487	2,504	2,510	2,516	2,522	2,530
Coke	293	488	528	550	572	593	614
Coleman	16	18	19	19	19	19	19
Concho	0	0	0	0	0	0	0
Crane	5,418	2,221	2,216	2,214	2,212	2,210	2,208
Crockett	24	402	421	431	441	450	459
Ector	4,283	9,888	10,519	10,911	11,292	11,666	11,970
Glasscock	7	5	5	5	5	5	5
Howard	1,793	1,783	1,883	1,924	1,963	2,001	2,052
Irion	125	122	122	122	122	122	122
Kimble	91	71	67	65	63	61	60
Loving	3	2	2	2	2	2	2
McCulloch	140	154	159	162	165	168	171
Martin	788	674	645	634	624	615	603
Mason	0	6	6	6	6	6	6
Menard	0	0	0	0	0	0	0
Midland	960	677	778	846	915	986	1,046
Mitchell	141	115	110	108	107	106	104
Pecos	356	159	158	158	158	158	158
Reagan	1,742	2,036	2,165	2,235	2,303	2,370	2,436
Reeves	97	182	177	175	173	172	170
Runnels	41	44	45	45	45	45	45
Schleicher	108	125	134	139	144	149	154
Scurry	2,152	3,107	3,327	3,413	3,496	3,577	3,693
Sterling	0	590	600	605	610	615	620
Sutton	108	80	82	83	84	85	86
Tom Green	59	73	80	85	90	95	99
Upton	3,885	2,662	2,680	2,687	2,694	2,700	2,708
Ward	189	153	155	156	157	158	159
Winkler	351	928	895	883	872	861	847
Total	*26,905*	*31,850*	*33,097*	*33,795*	*34,479*	*35,154*	*35,794*

a. Source: Data are from the Texas Water Development Board

Historical data for mining are reported for 2005. In 2006, the TWDB changed the methodology of reporting mining use to include only data provided to the TWDB through the annual survey and other mining use that can be confirmed. This resulted in significantly lower estimates of mining water use across the state.

Table 2.3-12
Livestock Water Demand Projections for Region F Counties
(Values in Acre-Feet per Year)

County	Historical	Projected					
	2006[a]	2010	2020	2030	2040	2050	2060
Andrews	275	438	438	438	438	438	438
Borden	216	281	281	281	281	281	281
Brown	1,302	1,636	1,636	1,636	1,636	1,636	1,636
Coke	318	593	593	593	593	593	593
Coleman	930	1,259	1,259	1,259	1,259	1,259	1,259
Concho	574	775	775	775	775	775	775
Crane	79	155	155	155	155	155	155
Crockett	681	997	997	997	997	997	997
Ector	248	293	293	293	293	293	293
Glasscock	193	232	232	232	232	232	232
Howard	215	366	366	366	366	366	366
Irion	223	460	460	460	460	460	460
Kimble	375	668	668	668	668	668	668
Loving	101	70	70	70	70	70	70
McCulloch	616	1,027	1,027	1,027	1,027	1,027	1,027
Martin	128	273	273	273	273	273	273
Mason	1,248	1,036	1,036	1,036	1,036	1,036	1,036
Menard	398	642	642	642	642	642	642
Midland	349	904	904	904	904	904	904
Mitchell	309	449	449	449	449	449	449
Pecos	932	1,239	1,239	1,239	1,239	1,239	1,239
Reagan	137	272	272	272	272	272	272
Reeves	862	2,283	2,283	2,283	2,283	2,283	2,283
Runnels	813	1,530	1,530	1,530	1,530	1,530	1,530
Schleicher	532	787	787	787	787	787	787
Scurry	504	629	629	629	629	629	629
Sterling	296	503	503	503	503	503	503
Sutton	371	796	796	796	796	796	796
Tom Green	1,688	1,978	1,978	1,978	1,978	1,978	1,978
Upton	119	212	212	212	212	212	212
Ward	72	126	126	126	126	126	126
Winkler	99	151	151	151	151	151	151
Total	*15,203*	*23,060*	*23,060*	*23,060*	*23,060*	*23,060*	*23,060*

a. Source: Data are from the Texas Water Development Board

2.4 Wholesale Water Providers

As part of the development of the regional water plan, demands were identified for the wholesale water providers in Region F. A wholesale water provider has wholesale water contracts for 1,000 acre-feet per year or is expected to contract for 1,000 acre-feet per year or more over the planning period. The wholesale water providers in Region F are the Colorado River Municipal Water District (CRMWD), Brown County Water Improvement District Number 1 (BCWID), Upper Colorado River Authority (UCRA), the City of Odessa, the City of San Angelo, the Great Plains Water System, and University Lands.

2.4.1 Colorado River Municipal Water District (CRMWD)

CRMWD provides raw surface and groundwater to both its member cities and to others through various contracts. CRMWD provides all of the water used by its member cities: Odessa, Big Spring and Snyder. The City of Odessa also uses reuse water for non-potable uses. Midland, San Angelo, Robert Lee, Abilene and Millersview-Doole WSC have other sources of water and rely on CRMWD for part of their supply. The remaining municipal contract holders rely entirely on CRMWD for water. Manufacturing water is provided through municipal users. Most mining contracts are for water from CRMWD's chloride control projects. Table 2.4-1 shows the projected water demands for current CRMWD customers. New CRWMD customers are discussed in Chapter 4.

2.4.2 Brown County Water Improvement District No. 1 (BCWID)

BCWID provides both raw and treated water for municipal, manufacturing and irrigation purposes. Most BCWID customers are located in Brown County. The District provides treated water to the Cities of Brownwood and Bangs and Brookesmith SUD. The District provides water to the City of Santa Anna in Coleman County, Coleman County WSC and to users in Coleman and Mills Counties through Brookesmith SUD. Coleman County WSC has customers in Coleman, Brown, Runnels, Callahan and Taylor Counties. For the purposes of this plan, it is assumed that half of the demand for Coleman County WSC will be met by supplies from the District. The District also currently provides raw water to the City of Early, industries and irrigation. By 2010, it is expected that BCWID will provide treated water to the City of Early and its customers (Zephyr WSC).

Table 2.4-1
Expected Demands for the Colorado River Municipal Water District [a]
(Values in Acre-Feet per Year)

Member City	County(ies)	Basin	2010	2020	2030	2040	2050	2060
Odessa	Ector & Midland	Colorado	20,427	21,187	21,850	22,645	23,722	24,984
Ector County UD	Ector	Colorado	1,480	1,847	2,177	2,473	2,706	2,932
Manufacturing	Ector	Colorado	1,243	1,296	1,307	1,298	1,257	1,221
Big Spring	Howard	Colorado	6,016	6,077	6,035	5,945	5,915	5,915
Manufacturing	Howard	Colorado	989	1,052	1,099	1,161	1,227	1,350
Snyder	Scurry	Colorado	2,792	2,834	2,844	2,829	2,832	2,832
County-Other	Scurry	Colorado	200	200	200	200	200	200
Rotan	Fisher	Brazos	278	271	249	231	222	203
		Member Cities Total	*33,425*	*34,764*	*35,761*	*36,782*	*38,081*	*39,637*
Customer	**County(ies)**		**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Robert Lee	Coke	Colorado	351	346	342	338	336	336
County Other	Coke	Colorado	105	97	95	92	91	91
Coahoma	Howard	Colorado	183	185	183	180	177	177
Stanton [b]	Martin	Colorado	0	0	0	0	0	0
Midland 1966 Contract [c]	Midland	Colorado	16,624	18,257	0	0	0	0
Midland Ivie Contract	Midland	Colorado	10,925	10,699	10,473	10,246	10,021	9,795
County Other	Midland	Colorado	21	21	21	21	21	21
Manufacturing	Midland	Colorado	28	31	34	37	39	42
Abilene	Taylor	Brazos	10,974	10,751	10,528	10,304	10,081	9,858
San Angelo	Tom Green	Colorado	13,282	13,046	12,809	12,571	12,335	12,098
Millersview-Doole WSC [d]	Concho, McCulloch, Runnels & Tom Green	Colorado	500	500	500	500	0	0
Ballinger	Runnels	Colorado	600	600	600	600	0	0
County Other	Ward	Rio Grande	400	400	400	400	400	400
Mining	Howard	Colorado	1,476	1,576	1,617	1,656	1,694	1,745
Mining	Coke	Colorado	318	358	380	402	423	444
		Customer Total	*55,787*	*56,867*	*37,982*	*37,347*	*35,618*	*35,007*
		CRMWD Total	***89,212***	***91,631***	***73,743***	***74,129***	***73,699***	***74,644***

a Does not include potential new customers identified in the planning process or contract renewals.
b Stanton contract expires in December 2009.
c Midland 1966 contract expires in December 2029.
d Millersview-Doole WSC contract expires in October 2041.

The demands in table 2.4-2 are for current BCWID customers. It is likely that BCWID will acquire new customers in the future. Potential new customers are discussed in Chapter 4.

Table 2.4-2
Expected Demands for the Brown County Water Improvement District No. 1 [a]
(Values in Acre-Feet per Year)

Customer	County	Basin	2010	2020	2030	2040	2050	2060
Brownwood	Brown	Colorado	3,896	3,927	3,889	3,816	3,792	3,792
County Other	Brown	Colorado	385	385	379	370	367	367
Manufacturing	Brown	Colorado	577	636	686	734	775	837
Bangs	Brown	Colorado	265	266	262	256	254	254
Santa Anna	Coleman	Colorado	200	197	193	190	187	187
Brookesmith SUD	Brown, Coleman & Mills	Colorado	1,394	1,412	1,404	1,377	1,368	1,367
Zephyr WSC	Brown	Colorado	399	404	399	391	387	387
Coleman County WSC	Brown & Coleman	Colorado	200	200	200	200	200	205
Early	Brown	Colorado	799	812	810	801	797	797
Irrigation	Brown	Colorado	6,970	6,970	6,970	6,970	6,970	6,970
BCWID Total			*15,085*	*15,209*	*15,192*	*15,105*	*15,097*	*15,163*

a. Does not include potential new customers identified in the planning process

2.4.3 The Upper Colorado River Authority (UCRA)

UCRA owns the water rights in O.C. Fisher Reservoir and Mountain Creek Reservoir. Water from O.C. Fisher is contracted to the Cities of San Angelo and Miles. Mountain Creek Reservoir is used exclusively by the City of Robert Lee. The projected demands presented in Table 2.4-3 are the estimated drought-year supplies available from these sources. Mountain Creek has no reliable supply under these conditions. During normal to wet years, more water may be used from these sources than is indicated in Table 2.4-3.

Table 2.4-3
Expected Demands for the Upper Colorado River Authority
(Values in Acre-Feet per Year)

Customer	County	Basin	Contract Amount	2010	2020	2030	2040	2050	2060
San Angelo	Tom Green	Colorado	80,400	3,637	3,518	3,400	3,282	3,163	3,045
Miles	Runnels	Colorado	200	200	200	200	200	200	200
Robert Lee	Coke	Colorado	250	0	0	0	0	0	0
Paint Rock	Concho	Colorado	50	25	25	25	25	25	25
UCRA Total			*80,900*	3,862	3,743	3,625	3,507	3,388	3,270

2.4.4 The Great Plains Water Supply System

Table 2.4-4 shows the expected demands for the Great Plains Water Supply System. Historically, Great Plains provided water for oil field operations in Gaines, Andrews and Ector Counties, as well as a small amount of municipal water in Ector County. A new power generation facility near Odessa is now a major customer. Supplies for steam electric generation in Ector County have been fixed at the current use levels until a strategy to provide the additional supply is developed. No additional supply is available in either Gaines or Andrews Counties because the Ogallala aquifer has been fully allocated in those counties.

Table 2.4-4
Expected Demands for the Great Plains Water Supply System
(Values in Acre-Feet per Year)

Customer	County	Basin	2010	2020	2030	2040	2050	2060
County Other	Ector	Colorado	64	64	64	64	64	64
Steam-Electric	Ector	Colorado	5,156	5,156	5,156	5,156	5,156	5,156
Great Plains WSC Total			*5,220*	*5,220*	*5,220*	*5,220*	*5,220*	*5,220*

2.4.5 The City of Odessa

Table 2.4-5 shows the expected demands for the City of Odessa. The City of Odessa is a CRMWD member city. Odessa sells treated water to the Ector County Utility District. The city also provides water for manufacturing in Ector County. A portion of the manufacturing demand is met by treated effluent from the city.

Table 2.4-5
Expected Demands for the City of Odessa
(Values in Acre-Feet per Year)

Water User Group	County(ies)	Basin	2010	2020	2030	2040	2050	2060
Odessa	Ector & Midland	Colorado	21,927	22,687	23,350	24,145	25,222	26,484
Ector County UD	Ector	Colorado	1,480	1,847	2,177	2,473	2,706	2,932
Manufacturing	Ector	Colorado	2,743	2,946	3,107	3,248	3,357	3,471
City of Odessa Total			*26,150*	*27,480*	*28,634*	*29,866*	*31,285*	*32,887*

2.4.6 The City of San Angelo

Table 2.4-6 shows the expected demands for current customers of the City of San Angelo. The city provides treated water to Millersview-Doole WSC, the City of Miles and a few rural customers outside the city limits. Most of the water used for manufacturing in Tom Green County is also provided by the city. The city has contracted a portion of the supply from Lake Nasworthy to a power generation facility located on the lake. At this time, this facility is shut down, and it is uncertain when it will be restarted. The demands shown for Tom Green County irrigation are associated with water for Tom Green County WCID #1. Water is provided to the irrigation district from Twin Buttes Reservoir and the city's wastewater treatment plant.

Table 2.4-6
Expected Demands for the City of San Angelo
(Values in Acre-Feet per Year)

Water User Group	County	Basin	2010	2020	2030	2040	2050	2060
San Angelo	Tom Green	Colorado	20,800	21,418	21,734	21,744	21,907	21,969
County Other & Millersview-Doole WSC	Tom Green	Colorado	250	250	250	250	250	250
Miles	Runnels	Colorado	200	200	200	200	200	200
Manufacturing	Tom Green	Colorado	2,226	2,498	2,737	2,971	3,175	3,425
Steam-Electric	Tom Green	Colorado	543	777	909	1,021	1,021	1,021
Irrigation	Tom Green	Colorado	26,500	26,500	26,500	26,500	26,500	26,500
San Angelo Total			*50,519*	*51,643*	*52,330*	*52,686*	*53,053*	*53,365*

2.4.7 University Lands

University Lands manages the University of Texas System Permanent University Fund lands in West Texas. Several well fields in Region F are located on properties managed by University Lands, including the CRMWD Ward County Well Field (contract expires in 2019), the City of Midland's Paul Davis Well Field in Andrews and Martin Counties (contract expires in 2033) and the City of Andrews' well field (contract expires in 2035).

Table 2.4-7 summarizes the expected demands from leases with University Lands. These demands assume that contracts with University Lands will be renewed for the remainder of the planning period.

Table 2.4-7
Expected Demands from University Lands [a]
(Values in Acre-Feet per Year)

Recipient	Source County	Basin	2010	2020	2030	2040	2050	2060
CRMWD [b]	Ward	Rio Grande	5,200	5,200	5,200	5,200	5,200	5,200
Andrews [c]	Andrews	Colorado	671	708	730	750	760	773
Midland [d]	Andrews	Colorado	1,237	1,237	1,237	0	0	0
	Martin	Colorado	3,485	3,485	3,485	0	0	0
University Lands Total			*10,593*	*10,630*	*10,652*	*5,950*	*5,960*	*5,973*

a Demands assume that contracts with University Lands will be renewed for the duration of the planning period.
b The contract between CRMWD and University Lands will expire in 2019.
c The contract between Andrews and University Lands will expire in 2035. Andrews obtains approximately 20 percent of supply from University Lands.
d The contract between Midland and University Lands will expire in 2033. The City of Midland expects its well field on University Lands will be depleted by 2035. No supply is assumed after this time.

2.5 List of References

[1] Texas Water Development Board: *Final Historical and Projected Water Use Data for Region F*, November 5, 2003.

[2] Texas Water Development Board: Historical Water Use Summary Data for Region F, available at www.twdb.state.tx.us, downloaded June 2009.

[3] Texas Water Development Board: *Water for Texas – Today and Tomorrow: A 1996 Consensus-Based Update to the Texas Water Plan, Volume III*, Water Use Planning Data Appendix, Austin, 1996.

[4] Bureau of Economic Geology. *Water Demand Projections for Power Generation in Texas*, prepared for the Texas Water Development Board, January 2009.

[5] Texas Water Development Board: Water Conservation Implementation Task Force Report to the 79th Legislature, November 2004.

[6] Texas Water Development Board, DB12 database, March 2010.

[7] Representatives of Investor-Owned Utilities of Texas: *Power Generation Water Use in Texas for the Years 2000 through 2060 Final Report*, prepared for the Texas Water Development Board, January 2003.