

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

2.1 Introduction

In 2002 and 2003, the Texas Water Development Board (TWDB) developed population and water demand projections for Region F for use in the 2006 regional water plan^{1,2,3}. As part of the regional water planning process, these projections were reviewed by the regions and revised as needed based on input from cities, counties and water user groups. The Region F Regional Water Planning Group (RWPG) requested revisions to the population projections in December of 2002 and the demand projections in October of 2003. The TWDB approved the final projections in November 2003⁴.

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,
- 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.

Chapter 2 Region F

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. Population projections divided by WUG, county and basin are in Table 2A-1 of Appendix 2A.

County	Historical			Proje	ected		
	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

Table 2.2-1Historical and Projected Population by County



Figure 2.2-1 Historical and Projected Population of Region F

Historical data provided by the Texas Water Development Board⁵. Data from 1981 to 1983 are not available. Projected population approved by TWDB for the second round of regional water planning.

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*⁶. Information regarding the review and revision of the population projections by the Region F may be found in the December 2002 *Proposed Population Projections Revisions for Region F*⁷.

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 45,533,734 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. Twentyone 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 nonresident 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. 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 Region F Water Planning Group reviewed the water demand projections for municipal, manufacturing, steam electric power generation and mining using a three-step process:

- A survey was sent to selected cities, water providers, county judges, and steam electric power generators. These surveys asked each entity to evaluate their TWDB projections. The consultant team compiled the survey data and responded to requests for revision.
- The projections were 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. If any of the anomalies indicated that the projections should be revised, the consultants contacted the affected entities for further review.
- A report was prepared summarizing the results of the survey and evaluations, noting any
 projections that merited revision. The report was sent to the members of the RWPG for
 review and comment. This report was then submitted to the TWDB for consideration of
 suggested water demand adjustments.

The results of this process are summarized in the October 2003 report *Proposed Revisions to Region F Water Demands*⁸.

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 2000 use and the projected water use by county. Figure 2.3-2 shows the geographical distribution of the year 2000 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 2000 data and the year 2010 projections is due to irrigation demands. Region F feels that historical year 2000 water use

for irrigation is not indicative of the potential for irrigation water use in the region. More information may be found in Section 2.3.3.

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

Use Category	Historical		Projected						
	2000	2010	2020	2030	2040	2050	2060		
Municipal	128,410	141,965	147,828	151,280	153,206	155,340	157,632		
Manufacturing	8,365	9,757	10,595	11,294	11,960	12,524	13,313		
Irrigation	394,362	578,606	573,227	567,846	562,461	557,080	551,774		
Steam Electric	17,749	22,215	22,769	26,620	31,312	37,033	44,008		
Mining	29,379	31,850	33,097	33,795	34,479	35,154	35,794		
Livestock	17,431	23,060	23,060	23,060	23,060	23,060	23,060		
Total	595,696	807,453	810,576	813,895	816,478	820,191	825,581		

Data are from the TWDB⁴.





County	Historical	Projected						
	2000	2010	2020	2030	2040	2050	2060	
Andrews	38,356	38,579	38,550	38,413	38,261	38,059	37,892	
Borden	3,187	3,836	3,805	3,778	3,744	3,717	3,689	
Brown	21,375	24,119	24,221	24,173	24,053	24,011	24,040	
Coke	2,845	3,098	3,070	3,121	3,179	3,257	3,354	
Coleman	2,783	4,536	4,509	4,477	4,447	4,429	4,429	
Concho	3,815	5,945	5,947	5,921	5,890	5,869	5,853	
Crane	3,859	3,969	4,097	4,159	4,201	4,258	4,323	
Crockett	4,032	4,604	4,543	4,708	4,873	5,110	5,387	
Ector	40,501	53,556	59,000	62,670	66,493	70,656	75,320	
Glasscock	35,828	52,690	52,287	51,878	51,458	51,037	50,628	
Howard	15,035	15,904	16,118	16,122	16,064	16,064	16,184	
Irion	2,724	3,623	3,563	3,491	3,411	3,337	3,268	
Kimble	2,754	3,574	3,592	3,598	3,601	3,606	3,641	
Loving	412	664	663	658	657	655	654	
McCulloch	6,848	7,101	7,167	7,183	7,190	7,205	7,270	
Martin	16,950	16,098	15,875	15,629	15,371	15,085	14,787	
Mason	11,652	12,053	11,904	11,750	11,595	11,445	11,305	
Menard	3,988	7,161	7,138	7,110	7,083	7,058	7,039	
Midland	62,155	75,806	77,236	78,097	78,534	78,836	79,259	
Mitchell	18,156	16,901	15,358	16,567	18,048	19,875	22,090	
Pecos	79,953	85,897	84,826	83,661	82,434	81,178	79,854	
Reagan	18,769	39,940	39,550	39,059	38,502	37,919	37,336	
Reeves	80,770	110,088	109,479	108,809	108,090	107,382	106,701	
Runnels	3,499	8,059	8,102	8,123	8,143	8,172	8,229	
Schleicher	3,474	3,743	3,763	3,745	3,707	3,681	3,662	
Scurry	9,248	10,217	10,393	10,393	10,357	10,346	10,373	
Sterling	1,886	2,090	2,101	2,090	2,068	2,034	2,020	
Sutton	3,460	4,159	4,195	4,160	4,105	4,068	4,020	
Tom Green	52,750	132,935	133,952	134,464	134,624	134,938	135,230	
Upton	16,138	20,575	20,420	20,208	19,986	19,780	19,584	
Ward	22,971	22,477	21,656	22,202	22,863	23,743	24,870	
Winkler	5,523	13,456	13,496	13,478	13,446	13,381	13,290	
Total	595,696	807,453	810,576	813,895	816,478	820,191	825,581	

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

Data are from the TWDB⁴.



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 recently adopted by the Water Conservation Implementation Task Force (Task Force). The Task Force definition does not differentiate between municipal use and non-municipal use or outside sales⁹.)

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 as a whole. 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.

Region F	Base*	2010	2020	2030	2040	2050	2060
Per Capita Use (gpcd)	206	205	201	198	195	194	194
Decline from Year 2000	ĺ	1	5	8	11	12	12
% Decline from Year 2000	[1%	3%	4%	5%	6%	6%
Statewide	2000	2010	2020	2030	2040	2050	2060
Statewide	2000	2010	2020	2030	2040	2050	2000
Per Capita Use (gpcd)	173	171	168	165	163	162	162
Decline from Year 2000		3	5	8	10	12	12
% Decline from Year 2000		2%	3%	5%	6%	7%	7%

 Table 2.3-3

 Comparison of Per Capita Water Use and Municipal Conservation Trends

Notes: Data are from TWDB¹⁰.

* 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			Proje	cted		
County	2000	2010	2020	2030	2040	2050	2060
Andrews	3,394	3,625	3,821	3,937	4,041	4,093	4,173
Borden	165	175	179	169	148	136	123
Brown	6,886	7,106	7,173	7,111	6,978	6,932	6,932
Coke	757	771	766	755	742	737	737
Coleman	1,623	1,874	1,846	1,814	1,784	1,766	1,766
Concho	699	873	892	884	870	865	865
Crane	1,138	1,256	1,389	1,453	1,497	1,556	1,623
Crockett	1,579	1,707	1,831	1,865	1,870	1,909	1,949
Ector	26,692	28,708	30,634	32,271	33,757	35,208	36,725
Glasscock	167	181	196	203	200	197	201
Howard	6,881	7,308	7,372	7,310	7,190	7,140	7,140
Irion	178	238	239	227	208	194	185
Kimble	972	1,148	1,142	1,129	1,113	1,104	1,104
Loving	11	11	11	10	10	10	10
McCulloch	2,266	2,252	2,263	2,236	2,205	2,190	2,190
Martin	645	788	843	858	860	832	789
Mason	889	932	926	916	905	898	900
Menard	427	458	455	446	438	435	435
Midland	30,627	32,568	34,202	35,301	35,976	36,517	37,180
Mitchell	1,728	1,703	1,671	1,621	1,559	1,499	1,409
Pecos	4,571	4,816	4,991	5,071	5,090	5,079	4,980
Reagan	923	1,035	1,123	1,167	1,148	1,103	1,049
Reeves	3,608	3,834	4,082	4,272	4,416	4,571	4,713
Runnels	1,550	2,091	2,140	2,174	2,207	2,250	2,319
Schleicher	671	723	775	795	794	806	824
Scurry	3,206	3,666	3,714	3,721	3,695	3,696	3,696
Sterling	324	349	377	387	386	373	379
Sutton	1,361	1,472	1,540	1,539	1,517	1,514	1,499
Tom Green	17,963	23,494	24,257	24,648	24,664	24,833	24,888
Upton	865	942	1,007	1,024	1,033	1,059	1,088
Ward	3,378	3,484	3,521	3,522	3,482	3,469	3,469
Winkler	2,266	2,377	2,450	2,444	2,423	2,369	2,292
Total	128,410	141,965	147,828	151,280	153,206	155,340	157,632

Data are from the Texas Water Development Board⁴

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

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

(Values in Acre-Feet Per Year)

Data are from the Texas Water Development Board⁴

2.3.2 Manufacturing Projections

Manufacturing use is the water used by industries in producing various products. To produce the projections, 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 period⁶.

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 41 percent over the same period.

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.

The irrigation projections adopted for Region F are substantially different from the 2002 TWDB projections developed by the TWDB and are considerably higher than historical water use in the year 2000. The Region F Water Planning Group feels that the number of irrigated acres in the year 2000 was suppressed because of low cotton prices, changes to farm programs, and lack of available surface water for irrigation in Brown, Menard, Pecos, Sutton, Tom Green, and Ward Counties. The projections adopted by Region F are more indicative of potential irrigation demand with stable cotton prices and surface water supplies.

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

County	Historical		Projected						
	2000	2010	2020	2030	2040	2050	2060		
Andrews	0	0	0	0	0	0	0		
Borden	0	0	0	0	0	0	0		
Brown	479	577	636	686	734	775	837		
Coke	0	0	0	0	0	0	0		
Coleman	5	6	6	6	6	6	6		
Concho	0	0	0	0	0	0	0		
Crane	0	0	0	0	0	0	0		
Crockett	0	0	0	0	0	0	0		
Ector	2,432	2,759	2,963	3,125	3,267	3,376	3,491		
Glasscock	0	0	0	0	0	0	0		
Howard	1,453	1,648	1,753	1,832	1,910	1,976	2,099		
Irion	0	0	0	0	0	0	0		
Kimble	582	702	767	823	880	932	1,002		
Loving	0	0	0	0	0	0	0		
McCulloch	680	844	929	1,004	1,075	1,137	1,233		
Martin	34	39	41	42	43	44	47		
Mason	0	0	0	0	0	0	0		
Menard	0	0	0	0	0	0	0		
Midland	135	164	182	198	213	226	245		
Mitchell	0	0	0	0	0	0	0		
Pecos	2	2	2	2	2	2	2		
Reagan	0	0	0	0	0	0	0		
Reeves	644	720	741	756	770	781	825		
Runnels	52	63	70	76	82	87	94		
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	1,861	2,226	2,498	2,737	2,971	3,175	3,425		
Upton	0	0	0	0	0	0	0		
Ward	6	7	7	7	7	7	7		
Winkler	0	0	0	0	0	0	0		
Total	8,365	9,757	10,595	11294	11,960	12,524	13,313		

Texas Water Development Board, 2003⁴

Chapter 2 Region F

The irrigation projections are based on the moving average of reported irrigation water use in each county in recent years. From this starting point, the annual water use for irrigation was reduced by the expected savings due to implementation of more efficient irrigation practices. 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. Additional information may be found in the October 2003 *Proposed Revisions to Region F Water Demands*⁸.

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)	10,341,131	9,976,301	9,581,833	9,202,620	8,839,094	8,552,224
Decline from Year 2010	0	364,830	759,298	1,138,511	1,502,037	1,788,907
% Decline	0%	4%	7%	11%	15%	17%

 Table 2.3-7

 Comparison of Region F Irrigation Demand Projections to Statewide Projections

Note: Data are from the TWDB¹⁰.

Agricultural use accounted for 66 percent of Region F's total water use in 2000 and is projected to be 72 percent of the region's demand in the year 2010. By 2060, irrigation could be as much as 67 percent of the region's water demand by 2060 (see Table 2.3-8). Statewide irrigation demand is projected to be 56 percent of total demand in the year 2010 and 39 percent of statewide demand in 2060. The counties with the largest irrigation water demands are Tom Green, Reeves, Pecos, Glasscock, Midland and Andrews Counties. These counties are expected to account for 72 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



	Historical			Proje	cted		
County	2000	2010	2020	2030	2040	2050	2060
Andrews	32,882	32,608	32,334	32,062	31,788	31,516	31,245
Borden	1,879	2,690	2,687	2,682	2,680	2,675	2,673
Brown	10,112	12,313	12,272	12,230	12,189	12,146	12,105
Coke	937	936	936	934	933	933	933
Coleman	0	1,379	1,379	1,379	1,379	1,379	1,379
Concho	2,574	4,297	4,280	4,262	4,245	4,229	4,213
Crane	337	337	337	337	337	337	337
Crockett	160	525	518	508	498	492	482
Ector	2,694	5,533	5,466	5,402	5,335	5,271	5,204
Glasscock	35,456	52,272	51,854	51,438	51,021	50,603	50,190
Howard	4,853	4,799	4,744	4,690	4,635	4,581	4,527
Irion	2,105	2,803	2,742	2,682	2,621	2,561	2,501
Kimble	637	985	948	913	877	841	807
Loving	358	581	580	576	575	573	572
McCulloch	2,859	2,824	2,789	2,754	2,718	2,683	2,649
Martin	14,575	14,324	14,073	13,822	13,571	13,321	13,075
Mason	10,223	10,079	9,936	9,792	9,648	9,505	9,363
Menard	3,143	6,061	6,041	6,022	6,003	5,981	5,962
Midland	30,483	41,493	41,170	40,848	40,526	40,203	39,884
Mitchell	5,564	5,534	5,507	5,479	5,452	5,425	5,398
Pecos	74,236	79,681	78,436	77,191	75,945	74,700	73,475
Reagan	15,879	36,597	35,990	35,385	34,779	34,174	33,579
Reeves	75,477	103,069	102,196	101,323	100,448	99,575	98,710
Runnels	920	4,331	4,317	4,298	4,279	4,260	4,241
Schleicher	2,150	2,108	2,067	2,024	1,982	1,939	1,897
Scurry	2,908	2,815	2,723	2,630	2,537	2,444	2,355
Sterling	637	648	621	595	569	543	518
Sutton	1,473	1,811	1,777	1,742	1,708	1,673	1,639
Tom Green	30,415	104,621	104,362	104,107	103,852	103,593	103,338
Upton	12,471	16,759	16,521	16,285	16,047	15,809	15,576
Ward	13,963	13,793	13,624	13,454	13,284	13,115	12,947
Winkler	2,002	10,000	10,000	10,000	10,000	10,000	10,000
Total	394,362	578,606	573,227	567,846	562,461	557,080	551,774

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

Texas Water Development Board, 2003⁴

2.3.4 Steam Electric Power Generation

The steam electric power generation water demand projections were developed by TWDBsponsored study by a consortium representing the Texas power industry¹¹. The study 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. With the uncertainty in the power industry following deregulation, it is nearly impossible to accurately predict the location and need for future water demands. While the projections may not accurately reflect current activities, it is assumed that they represent the projected needs on a regional and state-wide basis. Based on the TWDB projections, steam electric water demand in Region F is expected to almost double, increasing from 22,215 acre-feet per year in 2010 to 44,008 acre-feet per year in 2060. This increase will make steam electric demands the third largest water use category in the region by 2060, behind agricultural irrigation and municipal. Table 2.3-9 summarizes the projections for steam electric demands. Statewide, steam electric demand is expected to increase from 755,170 acre-feet per year in 2010 to 1,533,556 acre-feet per year in 2060¹⁰.

2.3.5 Mining Projections

The mining category includes water used in both the production of minerals and the production of oil and gas. 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 analysis⁶. Table 2.3-10 compares Region F's mining projections to statewide 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. However, oil field flooding in Region F, the primary water use associated with production of oil and gas, has declined in recent years. Other mining activities, such as sand, gravel and stone production, represent a small portion of the region's economy and water demands. The TWDB expects that water demand for oil and

2-19

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

	Historical			Proje	ected		
County	2000	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	372	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	1,171	973	776	907	1,067	1,262	1,500
Ector	0	6,375	9,125	10,668	12,549	14,842	17,637
Glasscock	0	0	0	0	0	0	0
Howard	0	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	10,280	9,100	7,621	8,910	10,481	12,396	14,730
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	566	543	777	909	1,069	1,264	1,502
Upton	0	0	0	0	0	0	0
Ward	5,360	4,914	4,223	4,937	5,807	6,868	8,162
Winkler	0	0	0	0	0	0	0
Total	17,749	22,215	22,769	26,620	31,312	37,033	44,008

Texas Water Development Board, 2003 $^{\rm 4}$

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	2000	2010	2020	2030	2040	2050
Mining (ac-ft)	255,455	265,423	271,308	272,619	275,446	284,088
Change from Yr 2010	0	9,968	15,853	17,164	19,991	28,633
% Increase	0%	4%	6%	7%	8%	11%

 Table 2.3-10

 Comparison of Region F Mining Projections to Statewide Totals

Note: Data are from the TWDB⁴.

gas production will increase somewhat over the planning period, resulting in a net increase in demand of 3,944 acre-feet per year by 2060. Mining 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 water use. A summary of the projected mining demands by county is presented in Table 2.3-11.

2.3.6 Livestock Watering

Livestock watering accounted for slightly less than 2 percent of the water use in Texas in 2000. The projections use information developed by the Texas A&M Agricultural Extension Service to 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.

The Region F RWPG increased the TWDB projections for the region by 32 percent to account for revised water use for different livestock categories and water use for wildlife associated with the hunting industry in the region. 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 404,397 acre-feet per year in 2060.

County	Historical			Proje	cted		
	2000	2010	2020	2030	2040	2050	2060
Andrews	1,761	1,908	1,957	1,976	1,994	2,012	2,036
Borden	883	690	658	646	635	625	612
Brown	2,427	2,487	2,504	2,510	2,516	2,522	2,530
Coke	405	488	528	550	572	593	614
Coleman	16	18	19	19	19	19	19
Concho	0	0	0	0	0	0	0
Crane	2,240	2,221	2,216	2,214	2,212	2,210	2,208
Crockett	355	402	421	431	441	450	459
Ector	8,481	9,888	10,519	10,911	11,292	11,666	11,970
Glasscock	7	5	5	5	5	5	5
Howard	1,536	1,783	1,883	1,924	1,963	2,001	2,052
Irion	123	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	845	674	645	634	624	615	603
Mason	6	6	6	6	6	6	6
Menard	0	0	0	0	0	0	0
Midland	515	677	778	846	915	986	1,046
Mitchell	141	115	110	108	107	106	104
Pecos	163	159	158	158	158	158	158
Reagan	1,742	2,036	2,165	2,235	2,303	2,370	2,436
Reeves	203	182	177	175	173	172	170
Runnels	41	44	45	45	45	45	45
Schleicher	105	125	134	139	144	149	154
Scurry	2,606	3,107	3,327	3,413	3,496	3,577	3,693
Sterling	560	590	600	605	610	615	620
Sutton	75	80	82	83	84	85	86
Tom Green	59	73	80	85	90	95	99
Upton	2,599	2,662	2,680	2,687	2,694	2,700	2,708
Ward	147	153	155	156	157	158	159
Winkler	1,104	928	895	883	872	861	847
Total	29,379	31,850	33,097	33,795	34,479	35,154	35,794

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

Texas Water Development Board, 2003 $^{\rm 4}$

County	Historical	Projected								
	2000	2010	2020	2030	2040	2050	2060			
Andrews	319	438	438	438	438	438	438			
Borden	260	281	281	281	281	281	281			
Brown	1,471	1,636	1,636	1,636	1,636	1,636	1,636			
Coke	374	593	593	593	593	593	593			
Coleman	1,139	1,259	1,259	1,259	1,259	1,259	1,259			
Concho	542	775	775	775	775	775	775			
Crane	144	155	155	155	155	155	155			
Crockett	767	997	997	997	997	997	997			
Ector	202	293	293	293	293	293	293			
Glasscock	198	232	232	232	232	232	232			
Howard	312	366	366	366	366	366	366			
Irion	318	460	460	460	460	460	460			
Kimble	472	668	668	668	668	668	668			
Loving	40	70	70	70	70	70	70			
McCulloch	903	1,027	1,027	1,027	1,027	1,027	1,027			
Martin	851	273	273	273	273	273	273			
Mason	534	1,036	1,036	1,036	1,036	1,036	1,036			
Menard	418	642	642	642	642	642	642			
Midland	395	904	904	904	904	904	904			
Mitchell	443	449	449	449	449	449	449			
Pecos	981	1,239	1,239	1,239	1,239	1,239	1,239			
Reagan	225	272	272	272	272	272	272			
Reeves	838	2,283	2,283	2,283	2,283	2,283	2,283			
Runnels	936	1,530	1,530	1,530	1,530	1,530	1,530			
Schleicher	548	787	787	787	787	787	787			
Scurry	528	629	629	629	629	629	629			
Sterling	365	503	503	503	503	503	503			
Sutton	551	796	796	796	796	796	796			
Tom Green	1,886	1,978	1,978	1,978	1,978	1,978	1,978			
Upton	203	212	212	212	212	212	212			
Ward	117	126	126	126	126	126	126			
Winkler	151	151	151	151	151	151	151			
Total	17.431	23,060	23,060	23,060	23,060	23.060	23.060			

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

Texas Water Development Board, 2003⁴

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. The wholesale water providers: 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 are described in Chapter 1.

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. Midland, San Angelo, Robert Lee, Abilene and Millersview-Doole WSC have other sources of water and only 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 water to the City of Santa Anna in Coleman County and to users in Coleman and Mills Counties through Brooksmith SUD. BCWID will soon provide water to Coleman County WSC to supplement water from Lake Coleman. Coleman County WSC has customers in Coleman, Brown, Runnels, Callahan and Taylor Counties. For the purposes of this plan, it is assumed that all of the BCWID water provided to Coleman County WSC will be used in Brown and Coleman Counties.

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

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	21,927	22,687	23,350	24,145	25,222	26,484
Big Spring	Howard	Colorado	6,016	6,077	6,035	5,945	5,915	5,915
Snyder	Scurry	Colorado	2,792	2,834	2,844	2,829	2,832	2,832
Memb	er Cities Total		30,735	31,598	32,229	32,919	33,969	35,231
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
Ector County UD	Ector	Colorado	1,480	1,847	2,177	2,473	2,706	2,932
Manufacturing	Ector	Colorado	243	446	607	748	857	971
Coahoma	Howard	Colorado	183	185	183	180	177	177
Manufacturing	Howard	Colorado	989	1,052	1,099	1,161	1,227	1,350
Stanton ^b	Martin	Colorado	0	0	0	0	0	0
Midland 1966	Midland	Colorado	16,624	18,257	0	0	0	0
Midland Ivie Contract	Midland	Colorado	14,951	14,948	14,945	14,942	14,940	14,937
County Other	Midland	Colorado	21	21	21	21	21	21
Manufacturing	Midland	Colorado	28	31	34	37	39	42
County-Other	Scurry	Colorado	200	200	200	200	200	200
Rotan	Fisher	Brazos	278	271	249	231	222	203
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	706	728	747	759	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		62,609	64,560	46,433	46,515	45,749	45,805
	CRMWD Total		93,344	96,158	78,662	79,434	79,718	81,036

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

b Stanton contract expires in 2010.

c Midland 1966 contract expires in 2026.

d Millersview-Doole WSC contract expires in 2044.

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	229	229	223	214	211	211
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,	Colorado	1,394	1,412	1,404	1,377	1,368	1,367
	Coleman							
	& Mills							
Zephyr WSC	Brown	Colorado	399	404	399	391	387	387
Coleman County WSC	Brown &	Colorado	231	234	230	226	225	227
	Coleman							
Early	Brown	Colorado	799	812	810	801	797	797
Irrigation	Brown	Colorado	6,970	6,970	6,970	6,970	6,970	6,970
BC	CWID Total		14,960	15,087	15,066	14,997	14,966	15,029

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

* 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 what 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	2010	2020	2030	2040	2050	2060
San	Tom	Colorado	3,762	3,643	3,525	3,407	3,288	3,170
Angelo	Green							
Miles	Runnels	Colorado	100	100	100	100	100	100
Robert	Coke	Colorado	250	250	250	250	250	250
Lee								
UC	CRA Total		4,112	3,993	3,875	3,757	3,638	3,520

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 2010 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. Great Plains is assumed to supply all of the water from the Ogallala aquifer used for mining purposes in Andrews County.

 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	351	351	351	351	351	351
Steam-Electric	Ector	Colorado	6,375	6,375	6,375	6,375	6,375	6,375
Great Plains	WSC Total	C	6,726	6,726	6,726	6,726	6,726	6,726

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 o	f 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. For this plan, power generation demands from Lake Nasworthy have been limited to 1,021 acre-feet per year, the maximum amount of water used for steam electric generation in 1999.

	a 4	р і	2010	2020	2020	20.40	2050	20/0
WUG Name	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	Tom Green	Colorado	250	250	250	250	250	250
& Millersview-								
Doole WSC								
Miles	Runnels	Colorado	100	100	100	100	100	100
Manufacturing	Tom Green	Colorado	2,226	2,498	2,737	2,971	3,175	3,425
Steam-Electric	Tom Green	Colorado	543	777	909	1,069	1,264	1,502
Irrigation	Tom Green	Colorado	26,500	26,500	26,500	26,500	26,500	26,500
	Total		50.419	51.543	52.230	52.634	53,196	53.746

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

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 2008) and the City of Andrews' well field (contract expires in 2010). 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 2.4-7Expected Demands from University Lands a(Values in Acre-Feet per Year)

Recipient	Source	Basin	2010	2020	2030	2040	2050	2060
	County							
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
	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 2010. Andrews obtains approximately 20 percent of supply from University Lands.

d The contract between Midland and University Lands will expire in 2008. The City of Midland expects its well field on University Lands will be depleted by 2035.

2.5 List of References

² Texas Water Development Board: *Draft Historical and Projected Water Use Data for Regional Planning Groups*, December 20, 2002.

³ Texas Water Development Board: *Revised Draft Historical and Projected Water Use Data for Region F*, May 2, 2003.

⁴ Texas Water Development Board: *Final Historical and Projected Water Use Data for Region F*, November 5, 2003.

⁵ Texas Water Development Board: Historical summary data for Region F, April 1999.

⁶ 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.

⁷ Freese and Nichols, Inc.: *Proposed Population Projections Revisions for Region F*, December 2002.

⁸ Freese and Nichols, Inc.: *Proposed Revisions to Region F Water Demands*, October 2003.

⁹ Texas Water Development Board: Water Conservation Implementation Task Force Report to the 79th Legislature, November 2004.

¹⁰ Texas Water Development Board, DB07 database, June 2005.

¹¹ 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.

¹ Texas Water Development Board: *Draft Historical and Projected Population Data for Regional Planning Groups*, August 23, 2002.