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CHAPTER 2.0 : CURRENT AND PROJECTED POPULATION & WATER DEMAND FOR THE RIO GRANDE REGION

The primary goal in preparing the Rio Grande Regional Water Plan is to estimate current and future water demands within the region. In the following chapters, water demand projections are compared with estimates of currently available water supplies to identify the location, extent, and timing of any future water shortages or surpluses. Texas Water Development Board (TWDB) rules (§357.7, Texas Administrative Code) require that the results of the analyses of current and projected population and water demands be reported by city, by county, by river basin, and by categories such as irrigation, mining, manufacturing, municipal, livestock, and steam electric. Exhibit B (1.1.2) provides updated guidelines:

“The development of new population and water demand projections will be the most relevant feature of the first phase of this next round of planning. TWDB staff will prepare draft population and water demand projections for all the regions and their water user groups.”

TWDB staff projections were approved by the board for use in regional water plans. These projections are the main reference tools for this chapter dealing specifically with population growth and associated water demands.

Table 2.1 summarizes the Rio Grande Regional Water Planning Area’s projected population and expected water demand through the year 2060, delineated by category of use. All tables and graphs are based on data provided by TWDB.

As specified in Section 357.7 (d)(2), Title 31 of the TAC, entities wishing to revise population or demand projections address their requests through their respective regional water planning group. If a planning group concurs, they submit requests to the Executive Administrator of the TWDB. TWDB staff coordinates reviews of each request with the TCEQ, Texas Parks and Wildlife Department, and the Texas Department of Agriculture. Designated representatives from each agency must approve each revision. The TWDB’s governing board (Board) is responsible for approving and adopting final population and water demand projections.

Requests to the Board should be submitting to the Executive Administrator in the form of memorandums from planning groups describing: 1) what they wish to revise and how revisions compare to Board-adopted 2006 projections for each decade of the planning horizon, and 2) language clearly describing the justification and methodology for developing revised projections. Memorandums should be accompanied by spreadsheets comparing requested revisions to Board-adopted 2006 estimates. Spreadsheets should be forwarded electronically to Connie Townsend.

Table 2.1: Population and Water Demand Projections Summary for the Rio Grande Regional Water Planning Area (RGRWPA)

Regional Total Projection	D2010	D2020	D2030	D2040	D2050	D2060
Population	1,628,278	2,030,994	2,470,814	2,936,748	3,433,188	3,935,223
Irrigation (AF/YR)	1,546,886	1,403,124	1,332,439	1,274,020	1,274,020	1,274,020
Livestock (AF/YR)	5,817	5,817	5,817	5,817	5,817	5,817
Manufacturing (AF/YR)	7,509	8,274	8,966	9,654	10,256	11,059
Mining (AF/YR)	4,186	4,341	4,433	4,523	4,612	4,692
Municipal (AF/YR)	291,468	357,312	429,196	505,408	587,288	671,065
Steam Electric (AF/YR)	13,463	16,864	19,716	23,192	27,430	32,598
Total Water Demand (AF/YR)	1,869,329	1,795,732	1,800,567	1,822,614	1,909,423	1,999,251

The regional water plan projects the Rio Grande Region's population to more than triple over the next 50 years, increasing from approximately 1.62 million people at present to 3.94 million by 2060. This dramatic growth is the principal factor underlying projected increases in municipal, manufacturing, and steam electric water demands. However, in terms of total demand within this region, projected increases in urban water demands are slightly offset by projected *decreases* in irrigation water demand. The result is a projected approximate *increase* of 14 percent in total water demand over the 50-year planning period.

The following sections of this chapter describe the methodology used to develop these projections. This chapter also presents projections of population and water demand for cities, for major providers of municipal and manufacturing water, and for categories of water use including municipal, manufacturing, irrigation, steam electric power generation, mining, and livestock. Projected demands are also provided for each of the two river basins and the one coastal basin partially located within this region.

2.1 TWDB GUIDELINES FOR REVISIONS TO POPULATION AND WATER DEMAND PROJECTIONS

To have a better standard of guidelines for calculating accurate population and water demand projections, a second round of planning was conducted, resulting in development of Exhibit B – a new set of guidelines adopted by the TWDB in accordance with all provisions of 31 Texas Administrative Code (TAC) Chapter 357. Provisions set forth in the TAC or TWDB agency rules take precedence over guidelines set forth in Exhibit B. Exhibit B Section 4.2 explains the process:

“Population and water demand projections for 2010 through 2060 for the state, counties, cities, and county-other (including utility sub-components) will be reviewed through a process coordinated by the Executive Administrator of the TWDB with the Planning Groups, TNRCC [now TCEQ], TDA, and the TPWD.

New population projections, using a standard cohort-component procedure, will be developed using the 2000 Census and other pertinent sources.

Projections will be developed first at the county level; then the projections will be allocated to municipal and county-other water user groups.”

TWDB met regularly with representatives of the various parties involved to achieve consensus. The projections were extensively evaluated before reaching final draft stage. Then, after lengthy analysis of population and water demand projections, TWDB approved these projections.

2.2 POPULATION PROJECTIONS

Population and water demand revisions incorporated up-to-date information. This section contains information on the planning group’s methodology – a four-step process based on TWDB guidelines.

The first step was to project the living population at the beginning of the year who are expected to survive to the target year. The second step was to determine approximate net migration of this population; net migration rates were multiplied by adjusted population figures in the launch year. The third step was to project the number of births and net impact of mortality and migration on the youngest age group. The fourth step was to combine results from the mortality, migration, and fertility modules. This methodology is further explained in SB1 and Exhibit B. Race and gender were considered in calculating these projections.

Population is the main factor in calculating total municipal water demand, including residential and commercial uses, and this data was then used to calculate each city’s base per capita water use. Overall, municipal water demand projections are the product of three variables: current and projected population, per capita water use, and assumptions about the effects of certain water conservation measures. Therefore, future water savings resulting from installation of more water-efficient fixtures (according to the 1991 State Water-Efficient Plumbing Act) were also a consideration.

Population of the eight counties comprising the Rio Grande Regional Water Planning Area is projected to grow at an average rate of nearly 2 percent annually over the 50-year planning period. This suggests an increase from approximately 1.62 million residents in 2010 to over 3.93 million in 2060. Table 2.2 presents these projections, by county, for each decade of the planning period. Cameron and Hidalgo Counties lead with the highest total populations, while Webb County is forecast to experience the greatest proportionate annual increase for the region.

2.2.1 Revisions to Population Projections

The revisions that Region M made to their originally-requested population projections used the TWDB’s recommended regional totals as guidance. The State Data Center (SDC) identified 23 cities within Region M that were growing faster than their anticipated growth rate from the 2006 State Water Plan (SWP).

The TWDB recommended using a 3% population increase above the 2006 SWP through each decade. Therefore, SDC projections could not be used for the 23 cities due to an overall regional increase of 5%. However, the SDC projections could be used if the expected population growth for the 23 cities was offset with a reduction in population in County-other. This option was deemed unacceptable by the Region M Board.

Using a maximum regional population increase of 3% above the 2006 SWP, the population growth for each city identified by the SDC as having grown faster than projected was reduced by 38%. For instance, the SDC indicated that the City of Brownsville’s anticipated population in 2010 was 6% greater than identified in the 2006 SWP. In order to meet the maximum increase as identified by the TWDB (3% of the regional total) while at the same time not decreasing the county-other population, the City of Brownsville was projected to have a 3.7% population increase over the 2006 SWP. This same methodology was recreated for each of the 23 cities identified by the SDC.

The five counties that were then affected by the increases were Cameron, Hidalgo, Willacy, Starr, and Maverick.

Figure 2.1: RGRWPA Population Projections (by decade)

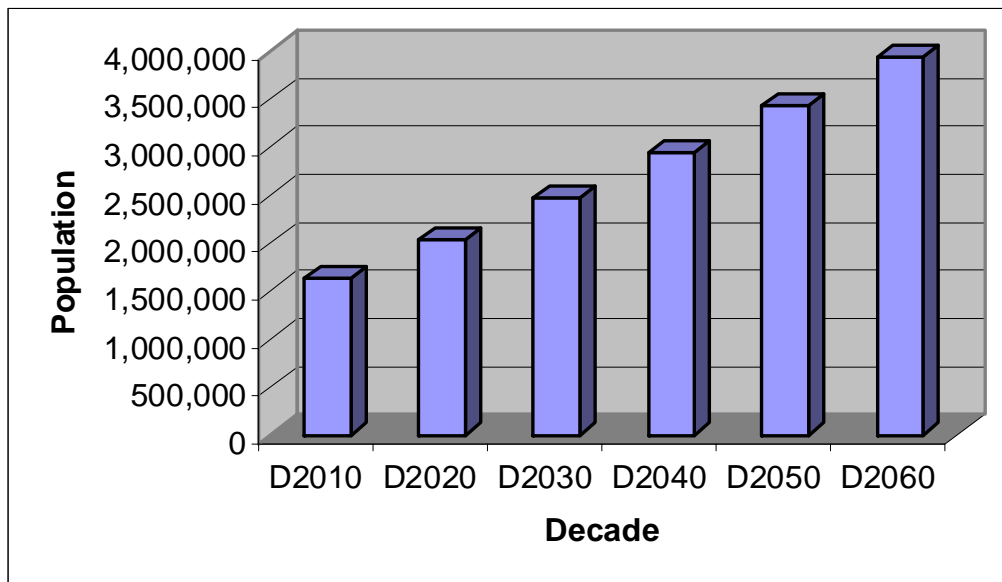


Table 2.2: RGRWPA Population - Projections by County

County Name	2010	2020	2030	2040	2050	2060
CAMERON	424,762	510,697	599,672	688,532	777,607	862,511
HIDALGO	775,858	987,920	1,225,227	1,481,812	1,761,811	2,048,909
JIM HOGG	5,593	5,985	6,286	6,538	6,468	6,225
MAVERICK	58,252	67,929	77,165	85,292	92,831	99,091
STARR	69,379	83,583	98,262	113,102	127,802	141,961
WEBB	257,647	333,451	418,332	511,710	613,774	721,586
WILLACY	22,763	25,212	27,455	29,276	30,542	31,205
ZAPATA	14,025	16,217	18,415	20,486	22,354	23,733
Totals	1,628,279	2,030,994	2,470,814	2,936,748	3,433,188	3,935,223

Figure 2.2: River Basins in the RGRWPA¹

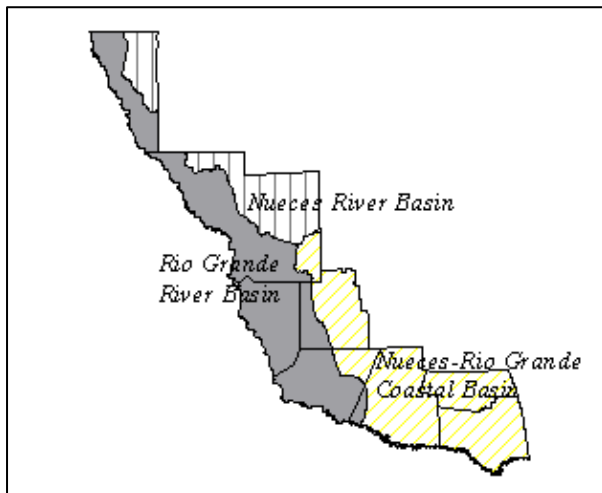


Table 2.3: Population Projection by River Basin and Decade

River Basin	2010	2020	2030	2040	2050	2060
NUECES-RIO GRANDE	1,217,796	1,514,908	1,839,558	2,182,565	2,547,905	2,915,287
RIO GRANDE	409,683	515,154	630,177	752,946	883,874	1,018,348
NUECES	799	932	1,079	1,237	1,409	1,588
Total	1,628,278	2,030,994	2,470,814	2,936,748	3,433,188	3,935,223

¹ As discussed in Chapter 1, the Rio Grande Regional Water Planning Area covers a portion of the Nueces and Rio Grande River Basins, as well as a portion of the Nueces Rio Grande Coastal Basin.

2.3 WATER DEMAND PROJECTIONS

Total annual water demand for the Rio Grande Regional Water Planning Area is projected to *increase* until 2010, then *decrease* until 2030, and then steadily *increase* until 2060. This trend is attributable to diminishing irrigated acreage and rising urban populations, especially in the Rio Grande Valley, as land use changes from agriculture to urbanization (see Figure 2.3).

Consequently, over time, total water demand for irrigation in the region is projected to fall from the current 82.9 percent to 59.1 percent by 2060. During the same period, municipal water demands are projected to increase from 15.5 percent at present to 37.7 percent in 2060. Figures 2.4 and 2.5 show the relative projected water demand, by type of use, for the years 2000 and 2060.

Figure 2.3: RGRWPA Total Water Demand Projections

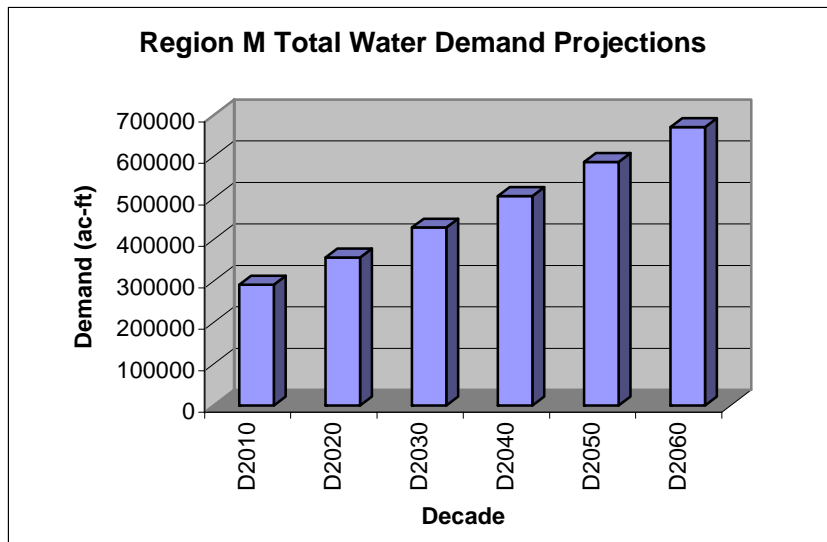


Figure 2.4: Year 2010 Total Water Demand by Type of Use

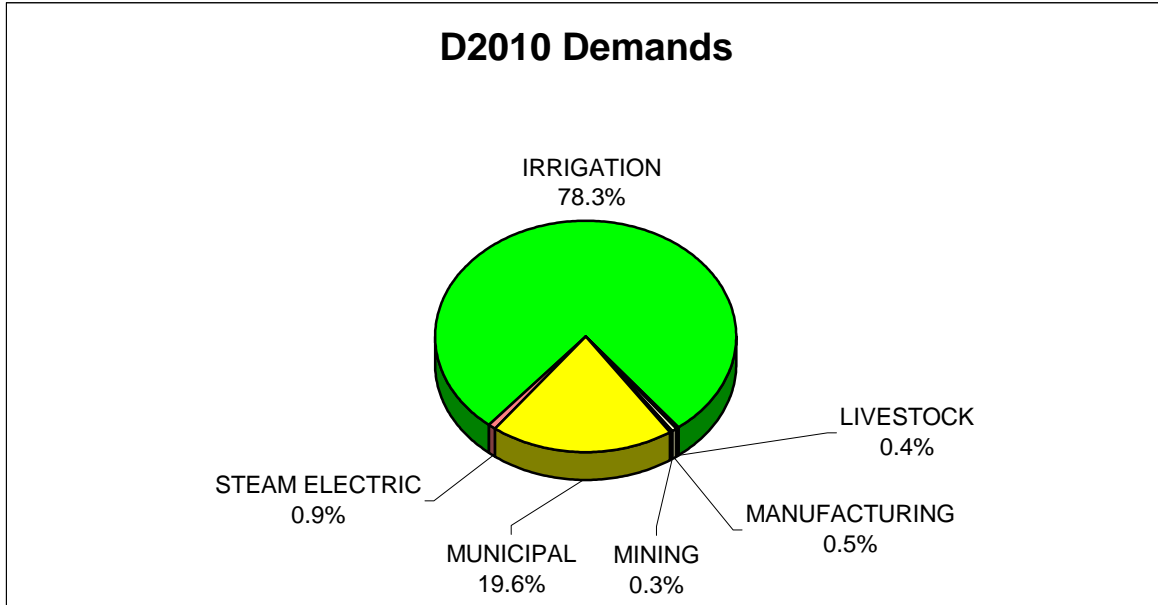
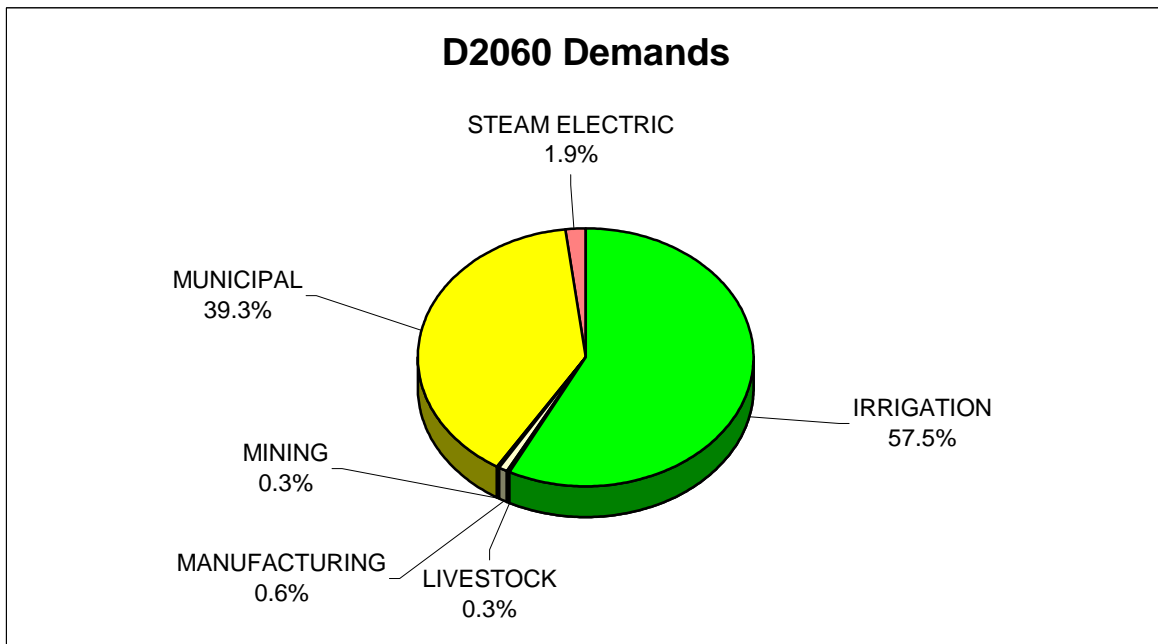


Figure 2.5: Year 2060 Total Water Demand by Type of Use

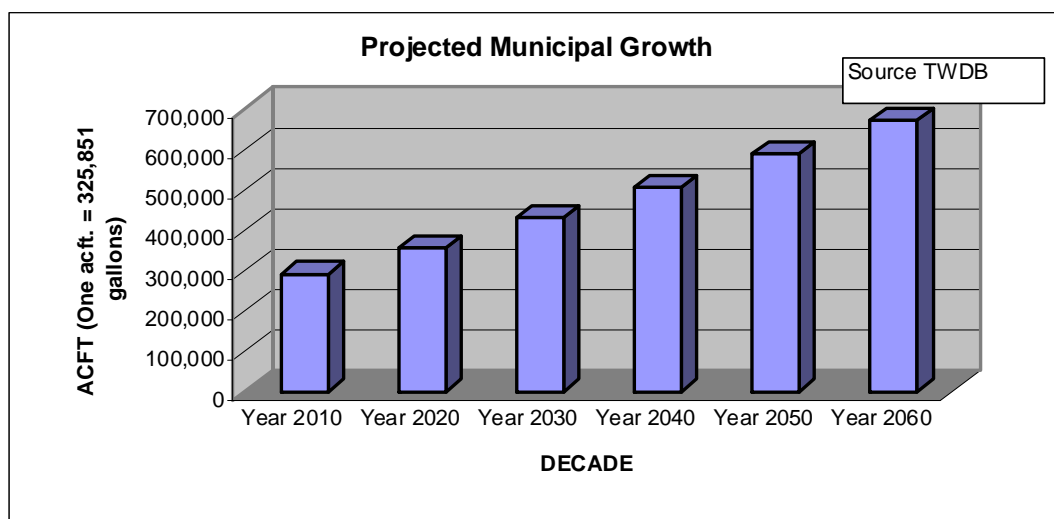


2.3.1 Projections for Municipal Water Demand

Municipal water consumption is calculated from data about residential, institutional, and commercial users. Factors affecting future municipal water use are population growth, climatic conditions, and water conservation practices. Because the region’s population is projected to at least triple over the next 50 years, growth in municipal water use is inevitable.

Overall, annual municipal water demand within the region is projected to almost double from 2010 to 2060 (see Figure 2.6). While this represents a major increase over the planning period, growth in water usage is significantly slower than rate of population growth. These projections are attributable to anticipated improvements in municipal water use efficiency and in water savings associated with the adoption of various conservation measures such as those proposed in the 1991 State Water Efficient Plumbing Act.

Figure 2.6: Projected RGRWPA Municipal Demand



PROJECTIONS

Table 2.4: Municipal Water Demand Projections by County (in acre-feet per year)

County Name	Year 2010	Year 2020	Year 2030	Year 2040	Year 2050	Year 2060
Cameron	89,555	106,553	123,873	141,599	159,379	176,749
Hidalgo	117,193	145,679	177,947	212,579	251,155	291,206
Jim Hogg	903	966	1,016	1,056	1,044	1,005
Maverick	9,561	10,872	12,139	13,245	14,327	15,259
Starr	13,671	16,175	18,794	21,432	24,093	26,698
Webb	54,884	70,772	88,564	108,134	129,525	152,122
Willacy	3,398	3,692	3,960	4,177	4,324	4,396
Zapata	2,303	2,603	2,903	3,186	3,441	3,630
Total	291,468	357,312	429,196	505,408	587,288	671,065

The region's municipal water demand is projected to triple in the next 50 years, increasing from 283,739 acre-feet per year in 2010 to 635,851 acre-feet per year in 2060. Table 2.4 presents this projected growth, by county. As indicated, demand is concentrated in Cameron, Hidalgo, and Webb counties, which together account for nearly 89 percent of municipal water consumption in the region. Cameron County alone accounts for 38 percent, Hidalgo County accounts for 39 percent, and Webb County accounts for 19 percent of the region's municipal water use.

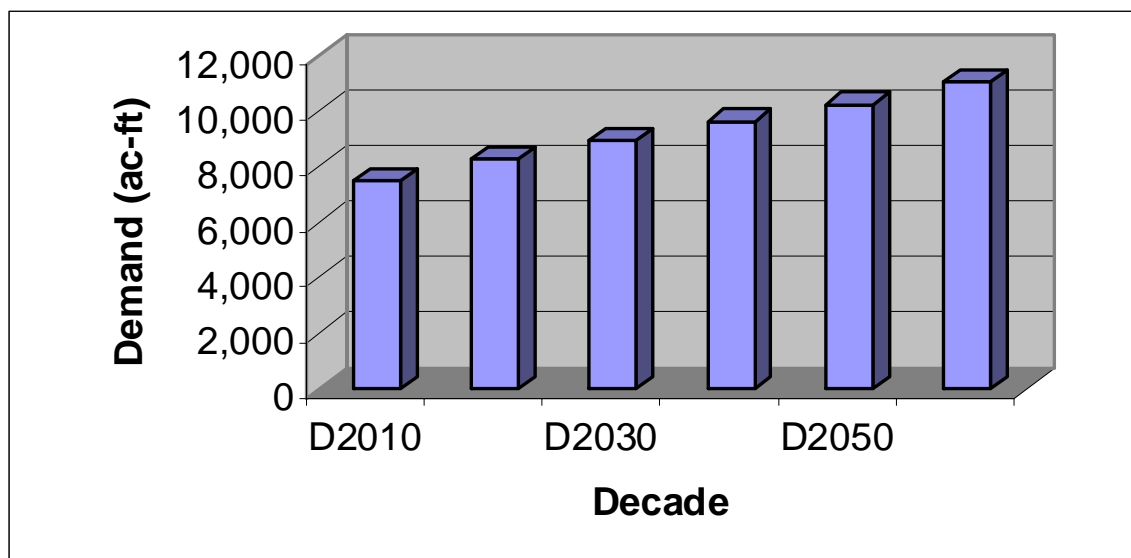
2.3.2 Projections for Manufacturing Water Demand

For SB 1 planning purposes, manufacturing water use is defined as the cumulative water demand on county and river basins for all industries within specified industrial classifications (SIC) determined by the TWDB. Projections of manufacturing water use, developed by the TWDB and employed in the 1997 State Water Plan, were used as default projections in this report, except where better information warranted a revision. Exhibit B (4.2.4) states the following plan of research for calculating estimates of manufacturing water demand:

- *“Complete industry surveys to update water use efficiency estimates developed for the 2002 State Water Plan.*
- *Analyze the impact of technology adoption, and input substitution on the relationship of water used to output.*
- *Develop projections of industry output and associated water use by county.”*

The region's demand for manufacturing water is projected to increase from approximately 7,509 acre-feet per year in 2010 to 11,059 acre-feet per year by 2060 (see Figure 2.7), primarily due to projected population growth in Cameron and Hidalgo Counties. The TWDB has no data to enable similar projections for Jim Hogg, Starr, and Zapata Counties. Table 2.5 illustrates projected demand for manufacturing water in each of the counties and shows that Cameron and Hidalgo Counties will account for 98 percent of the total manufacturing need.

Figure 2.7: Projected RGRWPA Manufacturing Demand



PROJECTIONS

Table 2.5: Manufacturing Water Demand by County (in acre-feet per year)

COUNTY	2010	2020	2030	2040	2050	2060
CAMERON	4,156	4,590	4,983	5,372	5,709	6,165
HIDALGO	3,236	3,559	3,851	4,143	4,403	4,742
JIM HOGG	0	0	0	0	0	0
MAVERICK	64	69	73	77	80	85
STARR	0	0	0	0	0	0
WEBB	28	31	34	37	39	42
WILLACY	25	25	25	25	25	25
ZAPATA	0	0	0	0	0	0
Total	7,509	8,274	8,966	9,654	10,256	11,059

2.3.3 Projections for Irrigation Water Demand

Irrigation Districts make up nearly 85% of the total regional demand for water. In the previous rounds of regional planning, demand analyses were performed for a multitude of Water User Groups (WUGs) in the region, including the classification of irrigation water users as a county-wide group (i.e. Irrigation-Cameron County). Utilizing this classification system creates a difficult set of circumstances in which to accurately evaluate irrigation water users, including the development of accurate water supply and demand figures, and developing water management strategies for implementation.

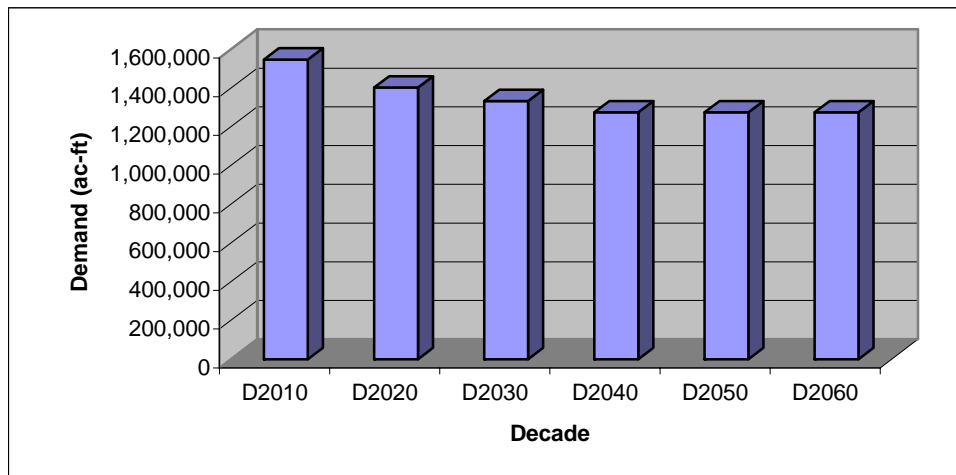
In terms of regional water planning, the analysis of individual Irrigation Districts will allow for a better understanding of the Region’s water demand. The region will be better able to evaluate specific water management strategies needed to meet future water deficits.

A thorough analysis of irrigation water demand data is critical. In Region M, irrigation demand is primarily based on the available supply from the Amistad/Falcon reservoir system. During droughts, supply is limited and allowable irrigation water is allocated accordingly, resulting in a received reduction in demand. Ultimately, the demand on any given Irrigation District would be such that all land in the District that is included as flat-rate acreage would have the option to receive irrigation water. In turn, Irrigation Districts typically own enough irrigation water rights to serve irrigation water users within their boundaries should the water be available in the reservoir.

In order to break down the irrigation demand from the Amistad/Falcon system (1,180,278 ac-ft) into by-county use, water rights associated with the Amistad/Falcon system were compiled and compared. For instance, irrigators in Cameron County hold 31.7 percent of all Region M irrigation water rights. This percentage was multiplied by the base year demand to arrive at the Cameron County base year demand for Amistad/Falcon water (374,585 ac-ft). The same methodology was used for each county in the region. As described earlier, additional water sources exist to provide irrigation water. They were treated as “supply equals demand” and were simply added to the Amistad/Falcon demands.

The region’s annual demand for irrigation water is projected to decrease from 1,163,633 acre-feet per year in 2010 to 981,749 acre-feet per year in 2060 (see Figure 2.8). This lower demand estimate arises from spreading urbanization which reduces irrigable acreage, primarily in Cameron and Hidalgo Counties.

Figure 2.8: Projected RGRWPA Irrigation Water Demand



PROJECTIONS

Table 2.6: Irrigation Water Demand Projections by Districts in Cameron County (in acre-feet per year)

Water Districts	2010	2020	2030	2040	2050	2060
Adams Garden Irrigation District No. 19	18,624	19,281	19,955	19,955	19,955	19,955
Bayview Irrigation District No. 11	15,836	14,006	12,402	12,402	12,402	12,402
Brownsville Irrigation District	40,186	29,798	22,164	22,164	22,164	22,164
Cameron County Irrigation District No. 2	137,738	121,821	107,867	107,867	107,867	107,867
Cameron County Irrigation District No. 6	47,244	41,785	36,998	36,998	36,998	36,998
Cameron County Water Improvement District No. 16	3,419	3,024	2,677	2,677	2,677	2,677
Hidalgo and Cameron County Irrigation District #9	125,925	105,301	86,365	86,365	86,365	86,365
Harlingen Irrigation District-Cameron County No. 1	84,479	80,175	76,127	76,127	76,127	76,127
La Feria Irrigation District-Cameron County No. 3	69,722	63,795	58,419	58,419	58,419	58,419
Santa Maria Irrigation District-Cameron County No. 4	8,763	8,367	7,992	7,992	7,992	7,992
Valley Acres Water District	1,974	1,980	1,986	1,986	1,986	1,986
County-Other	47,343	58,946	121,875	63,456	63,456	63,456
Cameron Total	601,253	548,279	554,827	496,408	496,408	496,408

Table 2.7: Irrigation Water Demand Projections by Districts in Hidalgo County (in acre-feet per year)

Water Districts	2010	2020	2030	2040	2050	2060
Delta Lake Irrigation District	99,699	98,835	97,895	97,895	97,895	97,895
Donna Irrigation District-Cameron County No. 2	77,425	73,274	69,379	69,379	69,379	69,379
Engleman Irrigation District	17,874	16,151	14,442	14,442	14,442	14,442
Hidalgo and Cameron County Irrigation District No. 9	109,555	91,612	75,138	75,138	75,138	75,138
Hidalgo County Irrigation District No. 1	68,611	51,121	36,812	36,812	36,812	36,812
Hidalgo County Water Improvement District No. 3	7,815	5,823	4,193	4,193	4,193	4,193
Hidalgo County Irrigation District No. 13	2,498	1,005	410	410	410	410
Hidalgo County Irrigation District No. 16	26,426	21,856	18,109	18,109	18,109	18,109
Hidalgo County Water Control and Improvement District No. 18	4,731	3,913	3,242	3,242	3,242	3,242
Hidalgo County Irrigation District No. 2	82,550	61,506	44,290	44,290	44,290	44,290
Hidalgo County Water Improvement District No. 5	13,464	12,643	11,796	11,796	11,796	11,796
Hidalgo County Irrigation District No. 6	36,154	29,901	24,775	24,775	24,775	24,775
Hidalgo County Irrigation District No. 19	2,138	841	281	281	281	281
Santa Cruz Irrigation District No. 15	79,967	76,296	72,449	72,449	72,449	72,449
United Irrigation District of Hidalgo County	55,402	45,821	37,966	37,966	37,966	37,966
Valley Acres Water District	13,213	13,253	13,292	13,292	13,292	13,292
County-other	0	7,896	16,032	16,032	16,032	16,032
Hidalgo Total	697,522	611,747	540,501	540,501	540,501	540,501

Table 2.8: Irrigation Water Demand Projections by Districts in Willacy County (in acre-feet per year)

Water Districts	2010	2020	2030	2040	2050	2060
Delta Lake Irrigation District	75,212	74,560	73,851	73,851	73,851	73,851
County-other	18,890	20,251	21,051	21,051	21,051	21,051
Willacy Total	94,102	94,811	94,902	94,902	94,902	94,902

Cameron County is projected to comprise 31.2 percent and 33.1 percent of the total demand for irrigation water in 2000 and 2060, respectively.

Hidalgo County currently accounts for 50.5 percent of the total irrigation demand, decreasing to 46.2 percent in 2060. Not coincidentally, these two counties have the highest percentage of water rights associated with the Amistad/Falcon system.

Important to note is that irrigation demands are highly variable from year to year. Overall agricultural economic conditions, weather conditions, and water availability are factors directly influencing the demand for irrigation water.

Market prices of agricultural commodities influence the amount of irrigated acreage planted each year and the types of crops planted. Also, above-normal or below-normal precipitation in irrigated areas can either suppress or increase irrigation demand, and because Amistad/Falcon irrigation use is based on water availability, irrigation shortages can have the effect of suppressing water demand.

Table 2.9: Irrigation Water Demand Projections by Counties (in acre-feet per year)

COUNTY	2010	2020	2030	2040	2050	2060
CAMERON	601,253	548,279	554,827	496,408	496,408	496,408
HIDALGO	697,522	611,747	540,501	540,501	540,501	540,501
JIM HOGG	817	817	817	817	817	817
MAVERICK	95,040	91,693	87,863	87,863	87,863	87,863
STARR	31,191	30,108	29,070	29,070	29,070	29,070
WEBB	20,507	19,548	18,654	18,654	18,654	18,654
WILLACY	94,102	94,811	94,902	94,902	94,902	94,902
ZAPATA	6,454	6,121	5,805	5,805	5,805	5,805
TOTAL	1,546,886	1,403,124	1,332,439	1,274,020	1,274,020	1,274,020

2.3.4 Projections for Steam Electric Water Demand

The TWDB [Exhibit B (4.2.4)] states a specific plan of research for estimating demand for steam electric water:

"The plan of research includes:

- *Description of water-consuming systems currently used in power generation facilities.*
- *Estimation of water consumption rates for each identified water-consuming system.*
- *Correlation of current state population with current electric use by region.*
- *Projection of electric power consumption requirements by county and for the state, based on population projections.*
- *Identification of current and potential water sources for demand by power generation.*
- *Estimation of future water use by power generation.*
- *Development and application of allocation methodology to derive demand projections by county."*

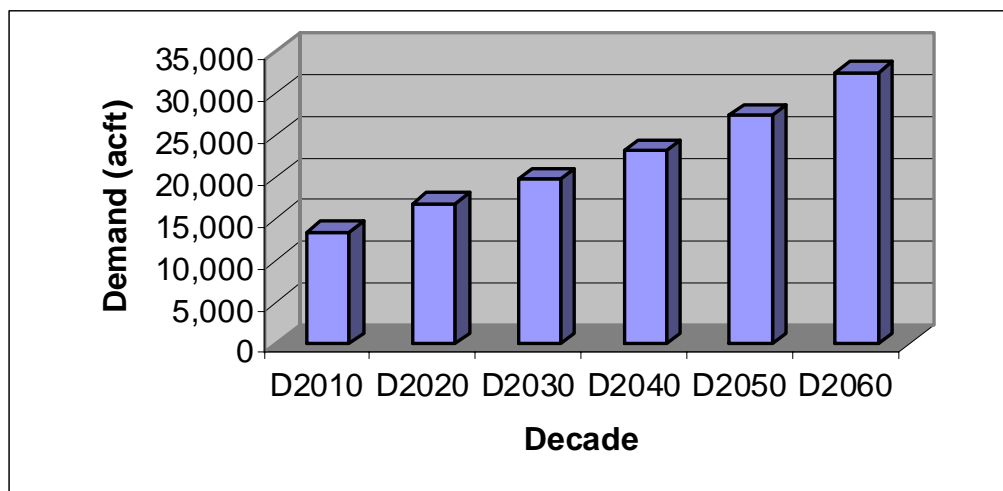
Annual demand for steam electric water is projected to increase from 13,463 acre-feet per year in 2010 to 32,598 acre-feet per year in 2060 (see Figure 2.9).

Most of this increase is expected to occur between 2000 and 2010 as a result of adding new capacity for generating steam electric power in Cameron and Webb counties.

Table 2.10 presents the projected demand for steam electric water, by county, for each of the region’s eight counties. Cameron County makes up 12 percent of the demand. Hidalgo County accounts for 77 percent, and Webb County accounts for 11 percent. TWDB has no data about demand for steam electric water in Jim Hogg, Maverick, Starr, Willacy, and Zapata Counties.

The TWDB received a 2008 study from the Bureau of Economic Geology (BEG) related to steam electric water demands for existing steam electric water users. Each planning group had the option to determine if they wished to use water demand figures as supplied by the TWDB or the BEG. However, BEG numbers were based on assumptions that differ than previous TWDB studies resulting in large deviations from the 2007 State Water Plan. The Regional Water Planning Group (Region M) took a stance suggesting using the 2007 State Water Plan numbers because of the worst case scenario evaluation.

Figure 2.9: Projected RGRWPA Steam Electric Water Demand



PROJECTIONS

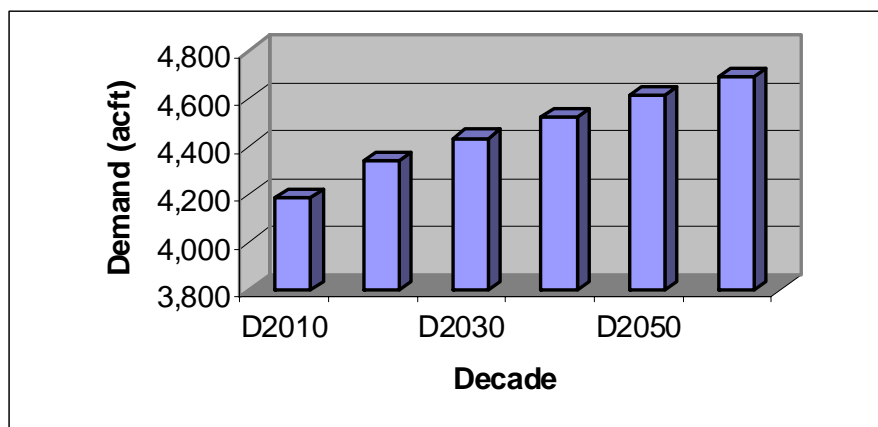
Table 2.10: Steam Electric Water Demand Projections by County (in acre-feet per year)

COUNTY	2010	2020	2030	2040	2050	2060
CAMERON	1,616	1,523	1,780	2,094	2,477	2,944
HIDALGO	10,355	14,151	16,545	19,462	23,018	27,354
JIM HOGG	0	0	0	0	0	0
MAVERICK	0	0	0	0	0	0
STARR	0	0	0	0	0	0
WEBB	1,492	1,190	1,391	1,636	1,935	2,300
WILLACY	0	0	0	0	0	0
ZAPATA	0	0	0	0	0	0
TOTAL	13,463	16,864	19,716	23,192	27,430	32,598

2.3.5 Projections for Mining Water Demand

The state’s default demand projections for mining water were based on forecasts of future production levels (sorted by mineral category) and their water use rates. These production projections are derived from state and national historic water use rates and are constrained by accessible mineral reserves in the region. Demand for mining water represents less than 1 percent of the region’s total water needs and is expected to remain relatively constant over the 50-year planning period (see Figure 2.10). Use of mining water is greatest in Webb County (32.6 percent), Starr County (31 percent), and Hidalgo County (30.9 percent). In contrast, Willacy County has the lowest *demand* (less than 1 percent). Table 2.11 represents projected demand for mining water, by county, for the region. In the future, the regional water planning group must identify the potential for water use of gas wells.

Figure 2.10: Projected RGRWPA Mining Water Demand



PROJECTIONS

Table 2.11: Mining Water Demand Projections by County (in acre-feet per year)

COUNTY	2010	2020	2030	2040	2050	2060
CAMERON	6	6	6	6	6	6
HIDALGO	1,442	1,561	1,633	1,704	1,774	1,836
JIM HOGG	33	36	37	38	39	40
MAVERICK	156	162	166	169	172	175
STARR	1,315	1,355	1,373	1,390	1,407	1,426
WEBB	1,204	1,192	1,189	1,187	1,185	1,180
WILLACY	6	6	6	6	6	6
ZAPATA	24	23	23	23	23	23
TOTAL	4,186	4,341	4,433	4,523	4,612	4,692

2.3.6 Projections for Livestock Water Demand

The TWDB’s livestock water use projections were developed using Texas Agricultural Statistics Service’s estimates of the numbers and types of livestock, and the Texas

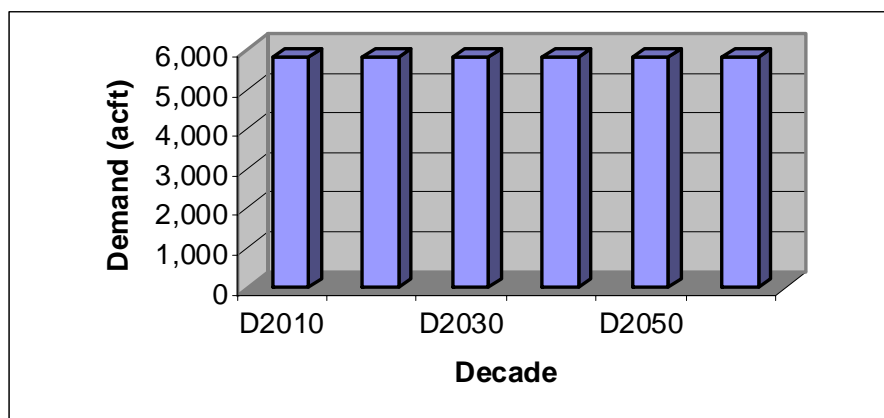
A&M Agricultural Extension Service’s estimates of water usage rates for each type of livestock.

Total livestock water is determined by multiplying consumption for a given livestock type by the number of that type of livestock in each of the eight counties. Exhibit B (Section 4.2.4) states:

“The 2006 Regional Water Plan will maintain the same rates of change in livestock water demand as included in the 2002 State Water Plan. Base water use for 2000 will be adjusted using the 2000 livestock inventory along with adjustments in water use per unit, based on research by the Texas Agricultural Experiment Station.”

Livestock types are breeding cattle, dairy cattle, feed cattle, hogs, pigs, sheep, goats, hens, broilers, and horses. Surprisingly, demand for livestock water is low compared with other water demands, comprising only 1% of the region’s total water usage. By year 2060, the figure is projected to drop to 0.4% of total water demand.

Figure 2.11: Projected RGRWPA Livestock Water Demand



Livestock water demand is relatively uniform over the eight-county area and is projected to remain fairly constant over the 50-year planning period (see Figure 2.11). Table 2.12 presents these projected demands, by county.

PROJECTIONS

Table 2.12: Projected Livestock Water Demand by County (in acre-feet per year)

COUNTY	2010	2020	2030	2040	2050	2060
CAMERON	1,103	1,103	1,103	1,103	1,103	1,103
HIDALGO	681	681	681	681	681	681
JIM HOGG	518	518	518	518	518	518
MAVERICK	260	260	260	260	260	260
STARR	1,117	1,117	1,117	1,117	1,117	1,117
WEBB	1,513	1,513	1,513	1,513	1,513	1,513
WILLACY	151	151	151	151	151	151
ZAPATA	474	474	474	474	474	474
TOTAL	5,817	5,817	5,817	5,817	5,817	5,817

2.3.7 Needs for Wholesale Water Providers

Texas Water Development Board guidelines in Exhibit B state that a wholesale water provider is any person or entity, including river authorities and irrigation districts, that has contracts to sell more than 1,000 acre-ft of water wholesale in any one year during the five years immediately preceding the adoption of the last regional water plan. Table 2.13 below indicates the water providers that meet the TWDB guidelines to designate them as Wholesale Water Providers for this region. Demand projection figures were compiled through the TWDB's database for the region.

DEMAND PROJECTIONS

Table 2.13: Projected Wholesale Water Provider Demand (in acre-feet per year)

	2010	2020	2030	2040	2050	2060
Delta Lake Municipal Authority	8,200	8,200	8,200	8,200	8,200	8,200
City of Eagle Pass	5,429	5,743	6,069	6,358	6,693	7,020
Harlingen Waterworks System	19,238	19,238	19,238	19,238	19,238	19,238
Laguna Madre WD	2,345	3,463	4,619	5,771	6,923	8,019
City of McAllen	29,801	34,930	40,903	47,260	54,363	61,885
Sharyland WSC	5,036	5,755	6,561	7,432	8,384	9,361
Southmost Regional Water Authority	11,844	11,844	11,844	11,844	11,844	11,844
North Alamo WSC	13,090	17,465	22,334	27,562	33,226	38,994
Totals	94,983	106,638	119,768	133,665	148,871	164,561

2.3.8 Other Potential Water Demands

These other potential water demands could affect the regional water supply if developed within the region, but currently no action has been taken.

Ethanol Production

Over the next 20 years, the water consumed by energy production is supposed to increase at a faster rate than any other sector. In fact, the amount of water projected to be consumed by energy production is greater than for any other sector other than irrigation.

There has been issued a Technical Memorandum that examines estimated water demand for various energy and non energy sectors.

Nation Energy Technology Laboratory's Existing Plants Research Program, which has an energy-water research effort that focuses on water use at power plants, illustrates the dependency of future energy production on adequate water supplies.

The report projects water consumption at the national and regional levels for the following energy production sectors: oil (crude oil exploration and production, liquids from unconventional sources, and refining), coal (mining and slurry transportation), gas (processing, pipeline transport, and gas from tight sands and shale), biofuels (biodiesel and ethanol production), and hydrogen production. It also projects water consumption for irrigation, domestic/public, industrial/commercial, and livestock uses.

While the growth in water consumption by the energy sector dominates the water-demand forecast over the period, by far the single largest projected consumer of water within the energy sector is biofuels production. Water consumption for biofuels production is projected to increase by 19 billion gallons per day (bgd), or by 2.5 times, between 2005 and 2030. Most of this increase is for the production of corn-based ethanol, which is projected to increase by nearly 13 bgd and accounts for roughly 60% of the nation's total projected increase in water consumption over the next 20 years. Water consumption is expected to more than double for industrial and commercial use in the United States by 2030. According to a report from the U.S. Government Accountability Office, experts have been working on using alternative water sources such as brackish water for biofuel production. However implementing this can be costly. Also, newly innovated dry cooling systems and thermo chemical processes have the potential to reduce the amount of water used by biorefineries, but many of these other options remain untested at the commercial scale

Water-demand projections were derived by multiplying sector-specific water-demand coefficients (e.g., gallons of water consumed per barrel of oil produced with enhanced oil recovery) times sector-specific energy production projections prepared by the U.S. Department of Energy's Energy Information Administration. Projections were made at the national and regional level. Because regions vary depending on energy sectors (e.g., coal

supply regions for coal mining, U.S. Census regions for biofuels), a geographical information system was used to prepare overlay maps to allow for visual comparison of regional water-demand trends over the projection period.

The report's analysis of the extent and location of water demand by competing users can help policymakers identify potential constraints for energy supply and production and can identify areas (e.g., biofuels production) that need further research.

Such knowledge can also help decision makers develop policy and technology recommendations to avoid potential supply issues and to ensure that the nation's energy demands are met in a cost-effective manner.

²A company called BioFuels Energy Corporation was planning to build Texas' first cellulosic ethanol plants. ³The company was planning on building a demonstration distillery in Raymondville to evaluate a number of feed stocks used in the production of various fuels, including E85, a low proof ethanol, as well as biodiesel and aviation fuels for airplanes and jets. The low proof ethanol (130 proof) would be produced for use as fuel in a microturbine generator to help power an electric car.

The BioFuels Energy Corporation also planned to build a manufacturing facility where it would construct proprietary distillation parts for cellulosic ethanol production.

Another area of concern is oil wells, which potentially could use a significant amount of water as well.

Hidalgo County Drainage District No. 1

Another potential project is being conducted by Hidalgo County Irrigation District which is studying the possibility of developing municipal water within the drainage network of the county. The potential of this project could approximate 10% more water for the total needs of the county.

² Ethanol Production Plants are not being considered at this time in the region.

³ Conversations with Joe Barrera of Brownsville Irrigation District and Troy Allen of Delta Lake Irrigation District have confirmed no Ethanol Production Plants are being considered.

**ATTACHMENT 2-1
2010 REGIONAL PROJECTIONS**

2010 Regional Water Plan
Population and Water Demand Projections Summary for Region M

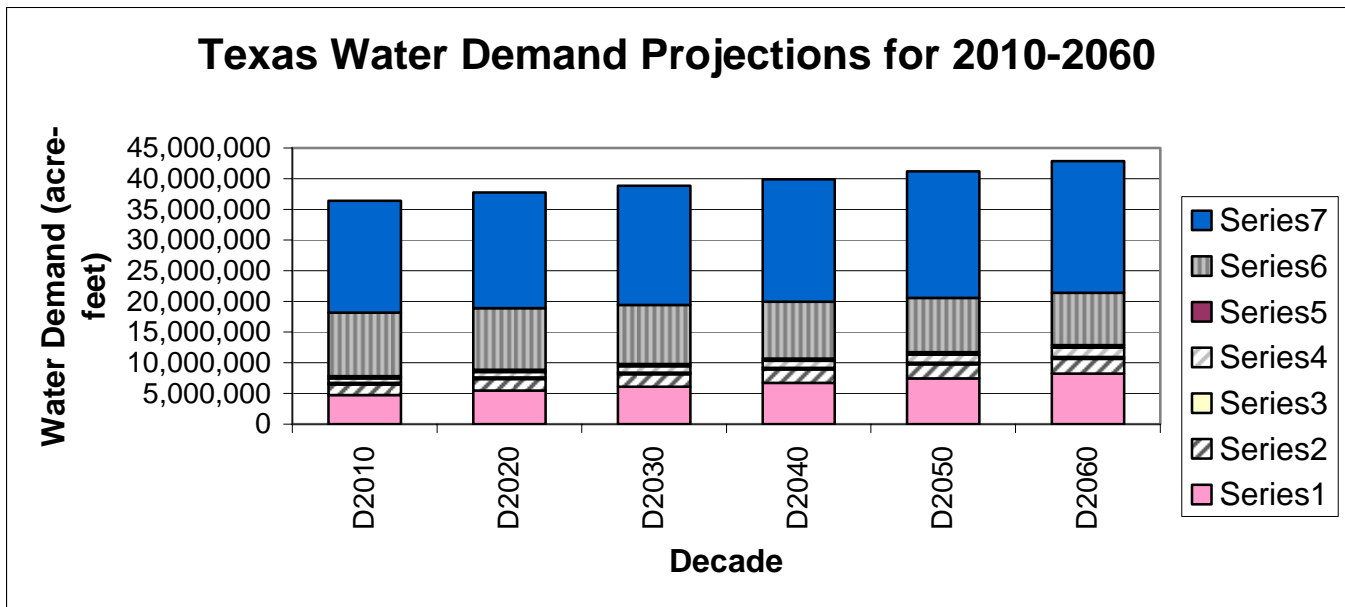
	Regional Total Projection					
	D2010	D2020	D2030	D2040	D2050	D2060
Population	1,628,278	2,030,994	2,470,814	2,936,748	3,433,188	3,935,223
Irrigation (AF/YR)	1,546,886	1,403,124	1,332,439	1,274,020	1,274,020	1,274,020
Livestock (AF/YR)	5,817	5,817	5,817	5,817	5,817	5,817
Manufacturing (AF/YR)	7,509	8,274	8,966	9,654	10,256	11,059
Mining (AF/YR)	4,186	4,341	4,433	4,523	4,612	4,692
Municipal (AF/YR)	291,468	357,312	429,196	505,408	587,288	671,065
Steam Electric (AF/YR)	13,463	16,864	19,716	23,192	27,430	32,598
Total Water Demand (AF/YR)	1,869,329	1,795,732	1,800,567	1,822,614	1,909,423	1,999,251

Region M Population Projection by County

	D2010	D2020	D2030	D2040	D2050	D2060
Cameron	424,762	510,697	599,672	688,532	777,607	862,511
Hidalgo	775,858	987,920	1,225,227	1,481,812	1,761,811	2,048,909
Jim Hogg	5,593	5,985	6,286	6,538	6,468	6,225
Maverick	58,252	67,929	77,165	85,292	92,831	99,091
Starr	69,370	83,583	98,262	113,102	127,802	141,961
Webb	257,647	333,451	418,332	511,710	613,774	721,586
Willacy	22,763	25,212	27,455	29,276	30,542	31,205
Zapata	14,025	16,217	18,415	20,486	22,354	23,733
REGION M TOTAL	1,628,278	2,030,994	2,470,814	2,936,748	3,433,188	3,935,223

**2010 Regional Water Plan
Summary of Water Demand Projections for the state of Texas (ac-ft)**

	D2010	D2020	D2030	D2040	D2050	D2060
MUNICIPAL	4,761,887	5,473,988	6,109,591	6,727,858	7,438,852	8,245,271
MANUFACTURING	1,696,145	1,861,979	2,009,101	2,153,850	2,275,681	2,389,593
MINING	255,455	265,423	271,308	272,619	275,446	284,088
STEAM ELECTRIC	737,170	868,580	1,012,212	1,156,170	1,321,733	1,515,556
LIVESTOCK	344,495	374,724	381,241	388,243	395,945	404,397
IRRIGATION	10,401,624	10,035,674	9,637,689	9,250,160	8,878,320	8,587,930
TEXAS TOTAL	18,196,776	18,880,368	19,421,142	19,948,900	20,585,977	21,426,835



2010 Regional Water Plan								
Municipal Water Demand Projections for 2010 - 2060 (in acft1)								
Region M								
Region	WUG Name	County Name	D2010	D2020	D2030	D2040	D2050	D2060
M	BROWNSVILLE	CAMERON	45,312	54,105	62,990	72,260	81,481	90,584
M	COMBES	CAMERON	225	266	309	351	394	434
M	COUNTY-OTHER	CAMERON	6,970	7,812	8,709	9,572	10,485	11,424
M	EAST RIO HONDO WSC	CAMERON	2,519	3,344	4,197	5,046	5,897	6,705
M	EL JARDIN	CAMERON	1,970	2,454	2,953	3,450	3,949	4,420
M	HARLINGEN	CAMERON	11,795	13,306	14,814	16,364	17,998	19,662
M	INDIAN LAKE	CAMERON	52	64	77	90	102	114
M	LA FERIA	CAMERON	909	1,131	1,361	1,590	1,818	2,036
M	LAGUNA MADRE WD	CAMERON	2,345	3,463	4,619	5,771	6,923	8,019
M	LAGUNA VISTA	CAMERON	329	399	476	554	633	713
M	LOS FRESNOS	CAMERON	797	1,068	1,348	1,627	1,906	2,171
M	LOS INDIOS	CAMERON	238	286	336	385	434	481
M	MILITARY HIGHWAY WSC	CAMERON	1,551	1,906	2,273	2,639	3,005	3,353
M	OLMITO WSC	CAMERON	992	1,394	1,810	2,224	2,638	3,033
M	PALM VALLEY	CAMERON	412	407	400	393	389	387
M	PALM VALLEY ESTATES UD	CAMERON	86	111	137	163	189	214
M	PORT ISABEL	CAMERON	2,668	2,891	3,122	3,351	3,581	3,799
M	PRIMERA	CAMERON	632	775	923	1,073	1,225	1,369
M	RANCHO VIEJO	CAMERON	320	311	305	297	295	292
M	RIO HONDO	CAMERON	429	459	490	520	556	593
M	SAN BENITO	CAMERON	4,386	5,036	5,724	6,435	7,144	7,853

M	SANTA ROSA	CAMERON	350	418	489	559	629	696
M	SOUTH PADRE ISLAND	CAMERON	2,526	3,176	3,849	4,520	5,191	5,829
M	VALLEY MUD #2	CAMERON	863	863	863	863	863	863
		CAMERON Total	90,566	108,707	127,441	146,115	164,893	182,856
M	ALAMO	HIDALGO	2,413	3,243	4,172	5,178	6,276	7,403
M	ALTON	HIDALGO	3,401	4,275	5,253	6,312	7,469	8,655
M	COUNTY-OTHER	HIDALGO	9,886	13,072	16,626	20,536	24,981	29,542
M	DONNA	HIDALGO	2,461	2,755	3,073	3,431	3,843	4,293
M	EDCOUCH	HIDALGO	540	599	666	743	831	927
M	EDINBURG	HIDALGO	9,227	11,617	14,414	17,248	20,594	24,023
M	ELSA	HIDALGO	1,181	1,237	1,306	1,380	1,476	1,582
M	HIDALGO	HIDALGO	1,114	1,515	1,945	2,419	2,961	3,517
M	HIDALGO COUNTY MUD #1	HIDALGO	1,733	2,454	3,261	4,135	5,089	6,067
M	LA JOYA	HIDALGO	447	519	596	682	781	890
M	LA VILLA	HIDALGO	244	242	241	239	239	242
M	MCALLEN	HIDALGO	29,781	34,930	40,903	47,260	54,363	61,885
M	MERCEDES	HIDALGO	2,055	2,163	2,298	2,440	2,634	2,852
M	MILITARY HIGHWAY WSC	HIDALGO	1,405	1,649	1,923	2,220	2,544	2,877
M	MISSION	HIDALGO	11,065	14,063	17,419	20,960	25,064	29,269
M	NORTH ALAMO WSC	HIDALGO	12,317	16,535	21,261	26,374	31,959	37,688
M	PALMHURST	HIDALGO	1,168	1,805	2,519	3,292	4,135	5,001
M	PALMVIEW	HIDALGO	897	1,258	1,661	2,098	2,575	3,064
M	PENITAS	HIDALGO	157	160	161	165	171	180
M	PHARR	HIDALGO	9,420	11,550	13,948	16,595	19,445	22,491
M	PROGRESO	HIDALGO	597	762	946	1,146	1,363	1,587
M	SAN JUAN	HIDALGO	3,720	5,149	6,750	8,482	10,373	12,314
M	SHARYLAND WSC	HIDALGO	5,036	5,755	6,561	7,432	8,384	9,361
M	SULLIVAN CITY	HIDALGO	557	737	939	1,158	1,396	1,641
M	WESLACO	HIDALGO	5,901	6,658	7,523	8,481	9,566	10,731
		HIDALGO Total	116,723	144,702	176,365	210,406	248,512	288,082

M	COUNTY-OTHER	MAVERICK	2,727	3,249	3,742	4,183	4,573	4,926
M	EAGLE PASS	MAVERICK	5,429	5,743	6,069	6,358	6,693	7,020
M	EL INDIO WSC	MAVERICK	1,293	1,637	1,962	2,244	2,502	2,711
		MAVERICK Total	9,449	10,629	11,773	12,785	13,768	14,657
M	COUNTY-OTHER	STARR	6,228	7,663	9,141	10,663	12,141	13,631
M	LA GRULLA	STARR	867	919	976	1,038	1,104	1,175
M	RIO GRANDE CITY	STARR	2,962	3,234	3,545	3,840	4,171	4,513
M	RIO WSC	STARR	498	654	815	978	1,138	1,292
M	ROMA CITY	STARR	2,946	3,333	3,737	4,156	4,585	5,017
		STARR Total	13,501	15,803	18,214	20,675	23,139	25,628
M	COUNTY-OTHER	WEBB	1,388	1,575	1,786	2,025	2,296	2,599
M	EL CENIZO	WEBB	697	1,027	1,396	1,801	2,245	2,713
M	LAREDO	WEBB	52,517	67,741	84,788	103,541	124,038	145,690
M	RIO BRAVO	WEBB	1,137	1,581	2,078	2,625	3,222	3,854
M	WEBB COUNTY WATER UTILITY	WEBB	247	350	467	594	734	882
		WEBB Total	55,986	72,274	90,515	110,586	132,535	155,738
M	COUNTY-OTHER	WILLACY	215	213	212	211	210	209
M	LYFORD	WILLACY	333	351	368	382	398	412
M	NORTH ALAMO WSC	WILLACY	773	930	1,073	1,188	1,267	1,306
M	RAYMOND VILLE	WILLACY	1,726	1,783	1,834	1,876	1,904	1,918
M	SAN PERLITA	WILLACY	109	118	127	134	139	141
M	SEBASTIAN MUD	WILLACY	267	321	371	411	438	451
		WILLACY Total	3,423	3,716	3,985	4,202	4,356	4,437

M	COUNTY-OTHER	ZAPATA	1,232	1,514	1,792	2,048	2,293	2,474
M	ZAPATA (CDP)	ZAPATA	1,050	1,050	1,050	1,050	1,050	1,050
		ZAPATA Total	2,282	2,564	2,842	3,098	3,343	3,524
		Region M Total	295,111	364,232	439,480	519,175	604,110	690,190

1) An ac-ft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.
 Projections last updated on 11/19/0

2010 Regional Water Plan							
Manufacturing Water Demand Projections for 2010 - 2060 (in acft ¹)							
Region M							
Region	County Name ²⁾	D2010	D2020	D2030	D2040	D2050	D2060
M	CAMERON	4,156	4,590	4,983	5,372	5,709	6,165
M	HIDALGO	3,236	3,559	3,851	4,143	4,403	4,742
M	JIM HOGG	0	0	0	0	0	0
M	MAVERICK	64	69	73	77	80	85
M	STARR	0	0	0	0	0	0
M	WEBB	28	31	34	37	39	42
M	WILLACY	25	25	25	25	25	25
M	ZAPATA	0	0	0	0	0	0
	Region M Total	7,509	8,274	8,966	9,654	10,256	11,059

1) An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.
 2) If the "(P)" is present for a county entry, then the county has been split by Regional boundaries and the data listed in the row represent only the county's water demands within the particular region, not the county's total.

2010 Regional Water Plan							
Mining Water Demand Projections for 2010 - 2060 (in acft ¹)							
Region M							
Region	County Name ²⁾	D2010	D2020	D2030	D2040	D2050	D2060
M	CAMERON	6	6	6	6	6	6
M	HIDALGO	1,442	1,561	1,633	1,704	1,774	1,836
M	JIM HOGG	33	36	37	38	39	40
M	MAVERICK	156	162	166	169	172	175
M	STARR	1,315	1,355	1,373	1,390	1,407	1,426
M	WEBB	1,204	1,192	1,189	1,187	1,185	1,180
M	WILLACY	6	6	6	6	6	6
M	ZAPATA	24	23	23	23	23	23
	Region M Total	4,186	4,341	4,433	4,523	4,612	4,692

1) An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.
 2) If the "(P)" is present for a county entry, then the county has been split by Regional boundaries and the data listed in the row represent only the county's water demands within the particular region, not the county's total.

2011 Regional Water Plan							
Steam Electric Water Demand Projections for 2010 - 2060 (in acft¹)							
Region M							
Region	County Name²⁾	D2010	D2020	D2030	D2040	D2050	D2060
M	CAMERON	1,616	1,523	1,780	2,094	2,477	2,944
M	HIDALGO	10,355	14,151	16,545	19,462	23,018	27,354
M	JIM HOGG	0	0	0	0	0	0
M	MAVERICK	0	0	0	0	0	0
M	STARR	0	0	0	0	0	0
M	WEBB	1,492	1,190	1,391	1,636	1,935	2,300
M	WILLACY	0	0	0	0	0	0
M	ZAPATA	0	0	0	0	0	0
	Region M Total	13,463	16,864	19,716	23,192	27,430	32,598

¹⁾ An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.

²⁾ If the "(P)" is present for a county entry, then the county has been split by Regional boundaries and the data listed in the row represent only the county's water demands within the particular region, not the county's total.

2010 Regional Water Plan							
Livestock Water Demand Projections for 2010 - 2060 (in acft¹)							
Region M							
Region	County Name²⁾	D2010	D2020	D2030	D2040	D2050	D2060
M	CAMERON	1,103	1,103	1,103	1,103	1,103	1,103
M	HIDALGO	681	681	681	681	681	681
M	JIM HOGG	518	518	518	518	518	518
M	MAVERICK	260	260	260	260	260	260
M	STARR	1,117	1,117	1,117	1,117	1,117	1,117
M	WEBB	1,513	1,513	1,513	1,513	1,513	1,513
M	WILLACY	151	151	151	151	151	151
M	ZAPATA	474	474	474	474	474	474
	Region M Total	5,817	5,817	5,817	5,817	5,817	5,817

¹⁾ An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.

²⁾ If the "(P)" is present for a county entry, then the county has been split by Regional boundaries and the data listed in the row represent only the county's water demands within the particular region, not the county's total.

**2010 Regional Water Plan
Irrigation Water Demand Projections by County (ac-ft/year)**

	D2010	D2020	D2030	D2040	D2050	D2060
Cameron	601,253	548,279	554,827	496,408	496,408	496,408
Hidalgo	697,522	611,747	540,501	540,501	540,501	540,501
Jim Hogg	817	817	817	817	817	817
Maverick	95,040	91,693	87,863	87,863	87,863	87,863
Starr	31,191	30,108	29,070	29,070	29,070	29,070
Webb	20,507	19,548	18,654	18,654	18,654	18,654
Willacy	94,102	94,811	94,902	94,902	94,902	94,902
Zapata	6,454	6,121	5,805	5,805	5,805	5,805
Total	1,546,885	1,403,124	1,332,439	1,274,020	1,274,020	1,274,020

2010 Regional Water Plan						
Regional and State Total Population Projections for 2010 - 2060						
	P2010	P2020	P2030	P2040	P2050	P2060
A - Panhandle	388,104	423,380	453,354	484,954	516,729	541,035
B - Region B	210,642	218,918	223,251	224,165	223,215	221,734
C - Region C	6,625,282	7,966,389	9,093,847	10,246,795	11,559,990	13,087,849
D - North East Texas	772,163	843,027	908,748	978,298	1,073,570	1,213,095
E - Far West Texas	855,466	1,018,479	1,161,232	1,283,725	1,405,966	1,527,713
F - Region F	618,889	656,480	682,132	700,806	714,045	724,094
G - Brazos G	1,882,896	2,168,682	2,458,075	2,739,717	3,034,798	3,332,100
H - Region H	5,775,097	6,707,045	7,679,397	8,653,377	9,739,109	10,897,526
I - East Texas	1,090,382	1,166,057	1,232,138	1,294,976	1,377,760	1,482,448
J - Plateau	135,723	158,645	178,342	190,551	198,594	205,910
K - Lower Colorado	1,359,677	1,657,025	1,936,324	2,181,851	2,447,058	2,713,905
L - South Central Texas	2,460,599	2,892,933	3,292,970	3,644,661	3,984,258	4,297,786
M - Rio Grande	1,628,278	2,030,994	2,470,814	2,936,748	3,433,188	3,935,223
N - Costal Bend	617,143	693,940	758,427	810,650	853,964	885,665
O - Llano - Estacado	486,311	512,405	528,437	535,967	537,255	527,210
P - Lavaca	49,491	51,419	52,138	51,940	51,044	49,663
Texas State Total	24,956,143	29,165,818	33,109,626	36,959,181	41,150,543	45,642,956

References

"U.S. GAO - Energy-Water Nexus: Many Uncertainties Remain about National and Regional Effects of Increased Biofuel Production on Water Resources." *U.S. Government Accountability Office (U.S. GAO)*. Web. 20 Jan. 2010. <<http://www.gao.gov/products/GAO-10-116>>.