

# Texas Water Development Board



## 2016 Region M Water Plan Chapter 4: Water Needs

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## List of Abbreviations

MAG	Managed Available Groundwater
RO	Reverse Osmosis
SB1	Senate Bill #1
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
WMS	Water Management Strategy
WSC	Water Supply Corporation
WUG	Water User Group
WWP	Wholesale Water Provider

## Chapter 4. Water Needs

### 4.1 Introduction

The primary emphasis of the regional water supply planning process established by Senate Bill (SB) 1 is the identification of current and future water needs and the development of strategies for meeting those needs. This chapter describes the projected needs, based on the demands described in Chapter 2 and supplies discussed in Chapter 3.

The objective is to identify which Water User Groups will have a Need, defined here as a shortage between projected demands and supplies. Drought year needs may be the result of any combination of the following scenarios, among others:

- high drought year demand,
- long-term demand growth,
- limited source availability, either
  - contractually, as in municipal water rights, or
  - hydraulically, as with irrigation water rights,
- limitations of existing infrastructure, as with well-field or treatment plan capacity, or
- use of short-term supplies.

Water Management Strategies and specific projects are discussed in Chapter 5 as the recommended methods to meet these shortages.

#### 4.1.1 Approach

Needs were identified for each of the six types of WMS: municipal, irrigation, livestock, manufacturing, steam-electric power generation, and mining. Chapter 2 describes the methodology for demand projections for each WUG type, and Chapter 3 discusses the approach for determining existing supplies. For each WUG (each municipal WUG and each county-wide aggregate for the other 5 types of users), the supplies and the demands are compared to estimate the needs. Surpluses, where the currently available supplies exceed demands, are shown as a zero in the needs evaluations. This ensures that a surplus for one location does not automatically cancel out a shortage for another entity. For any surplus that is moved from one entity/geographical area to another, a water management strategy is identified in Chapter 5.

For Wholesale Water Providers (WWPs) that are also WUGs, their needs are shown here based on the supplies or portions of supplies that have been identified to meet their WUG needs. WWP supplies to other WUG are included as a supply for that WUG. WWPs that do not have a demand associated to them independent of the WUG they supply are not shown here.

## 4.2 Regional Needs Summary

### 4.2.1 Regional Needs by WUG

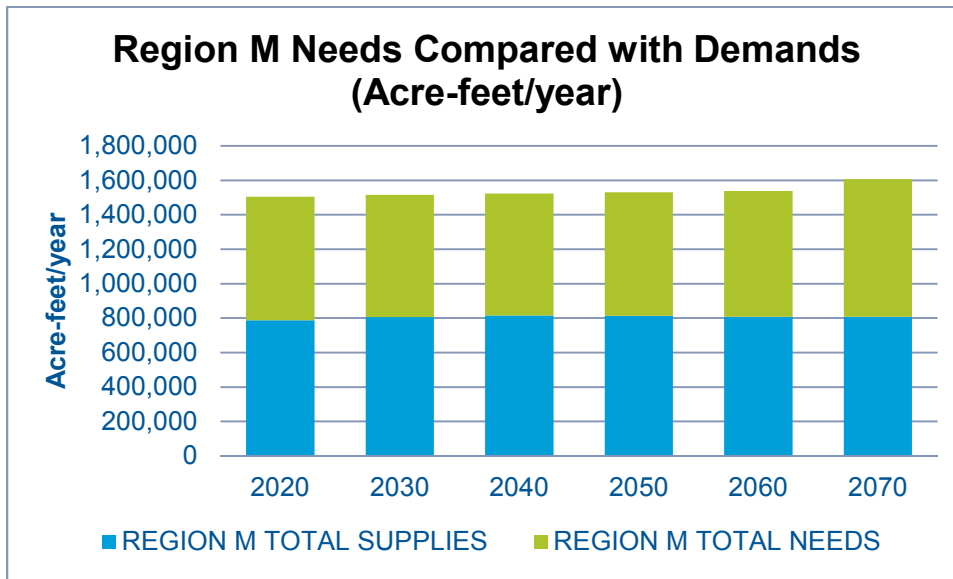


Figure 4-1 Total Regional Needs, Shown as a Portion of Total Demands (Acre-feet/year)

The vast majority of needs in Region M come from irrigation. This is to be expected, as the irrigation demand projections are based on estimated use in a year where supplies are not limited from the reservoirs and there is little rainfall, or the highest demand scenario, whereas the supplies are based on the drought of record. This shortage will be partially addressed both with supply increase, through improvements to the conveyance systems, and is managed through on-farm conservation measures, both discussed in detail in Chapter 5.

Table 4-1 Water Needs by WUG Type (Acre-feet/year)

WUG	2020	2030	2040	2050	2060	2070
<b>Irrigation Needs</b>	658,049	608,580	557,158	502,526	447,439	448,029
<b>Municipal Needs</b>	48,534	86,393	132,173	190,834	251,976	312,410
<b>Mining Needs</b>	5,290	4,641	5,488	5,565	5,758	6,337
<b>Steam Electric Power Needs</b>	2,984	5,635	8,866	12,805	17,608	23,501
<b>Manufacturing Needs</b>	2,529	3,388	4,243	4,994	5,992	7,067
<b>Livestock Needs</b>	0	0	0	0	0	0
<b>Total Needs</b>	<b>717,386</b>	<b>708,637</b>	<b>707,928</b>	<b>716,724</b>	<b>728,773</b>	<b>797,344</b>

Municipal needs are also significant, and increase rapidly over the planning horizon. One consideration when evaluating municipal needs is that some entities may have sufficient water for a year with normal precipitation, but show a need for a drought year. While one-time purchases of water, rather than contractual agreements or purchase of water rights, is often used as a stopgap measure, it is not a reliable drought year supply strategy. Chapter 5 recommends the purchase of water rights, as well as development of new sources, conservation, and other strategies, in order to address current and future needs of municipal WUG and WWP.

Industrial users (mining, steam-electric, and manufacturing) supplies were evaluated based on data provided to TWDB and TCEQ regarding groundwater wells, surface water use, and purchase of water from public water supplies. Needs in these categories will likely also require increased cooperation with municipalities for reuse of wastewater effluent as well as conservation and water efficiency measures.

#### 4.2.2 *Regional Needs by County*

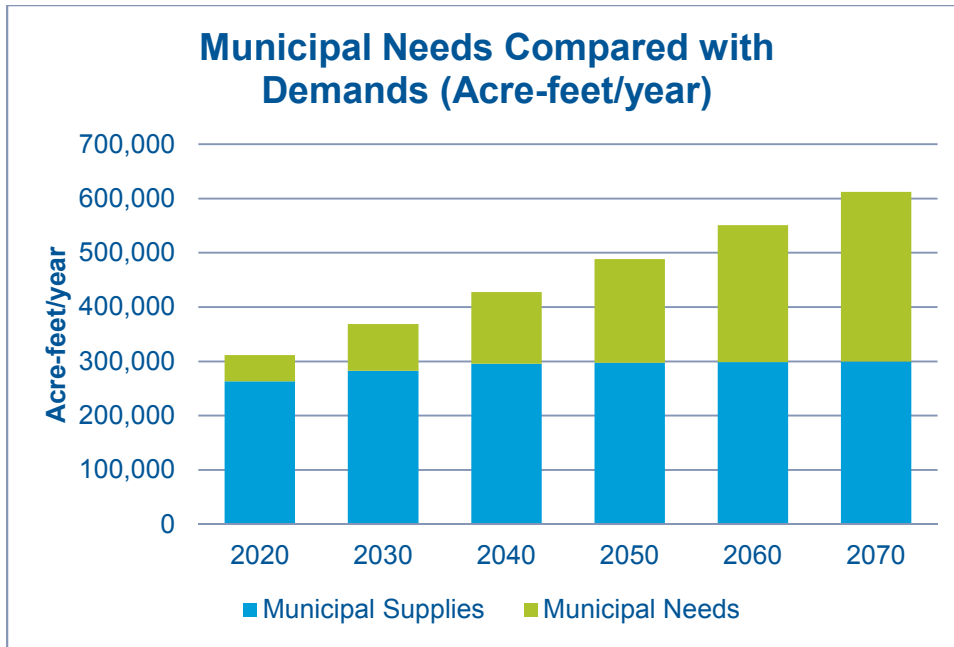
The needs in Region M follow a similar distribution as the demands, focused heavily in Cameron and Hidalgo Counties, as shown in Table 4-2. There are some needs anticipated in each county in 2020, which will be evaluated individually in following sections.

**Table 4-2 Needs by County (Acre-feet/year)**

<b>County</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Cameron County	206,026	193,330	187,351	183,864	182,476	198,668
Hidalgo County	431,898	439,406	446,258	450,263	454,524	497,403
Jim Hogg County	239	237	244	295	368	404
Maverick County	15,775	15,488	14,771	13,816	13,253	13,709
Starr County	7,992	6,579	5,199	6,176	7,140	8,127
Webb County	4,294	2,204	2,387	10,181	17,998	25,450
Willacy County	49,376	49,445	49,529	49,627	50,075	49,994
Zapata County	1,786	1,948	2,189	2,502	2,939	3,589
<b>Total Needs</b>	<b>717,386</b>	<b>708,637</b>	<b>707,928</b>	<b>716,724</b>	<b>728,773</b>	<b>797,344</b>

### 4.3 **Municipal Needs**

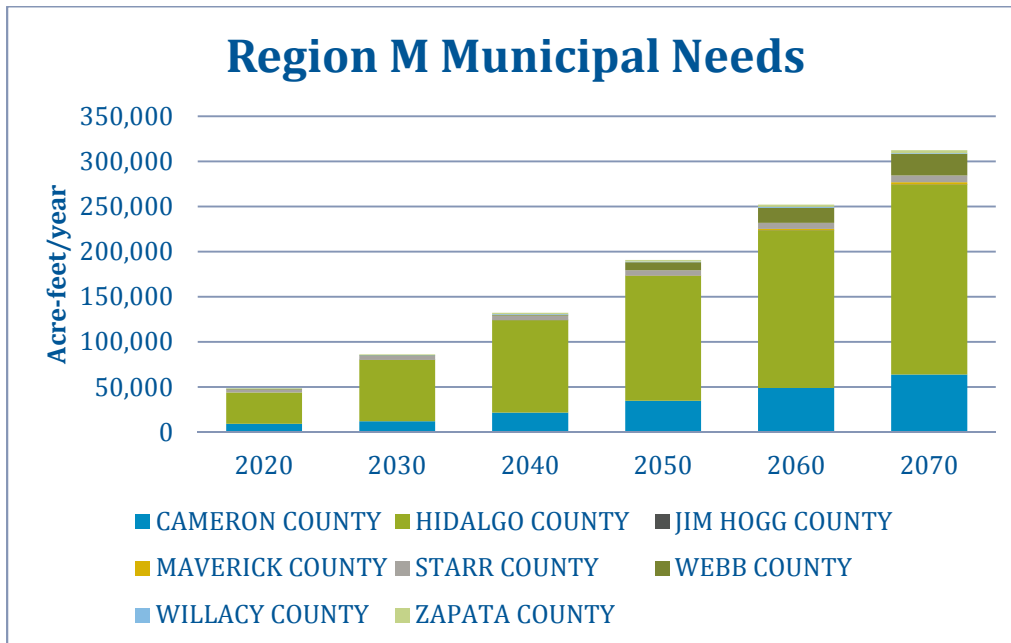
The rate of population growth in Region M is similar to the growth rate across Texas. The Demand distribution is heavily concentrated in Cameron and Hidalgo Counties, and in the Laredo area in Webb County. Current supplies are estimated to be slightly less than 2020 demands for municipalities. In some cases a need shown here indicates that drought-year demands exceed reliable supplies, although that need may be regularly met by short-term contracts for water. Other municipalities may experience persistent shortage, especially those communities that rely solely on groundwater or utilities with infrastructure limitations.



**Figure 4-2** Municipal Needs, Shown as a Portion of Municipal Demands (Acre-feet/year)

The need for municipal water is shown in green in Figure 4-2 and increases to 45% of the total demand by 2070. Figure 4-3 shows each county’s portion of the total regional municipal needs. The population centers are shown in Figure 4-4. Municipal demands for each county are discussed in the following sections.

Chapter 5 describes water management strategies that have been identified to address projected municipal needs.



**Figure 4-3** Regional Municipal Needs, Shown by County (Acre-feet/year)



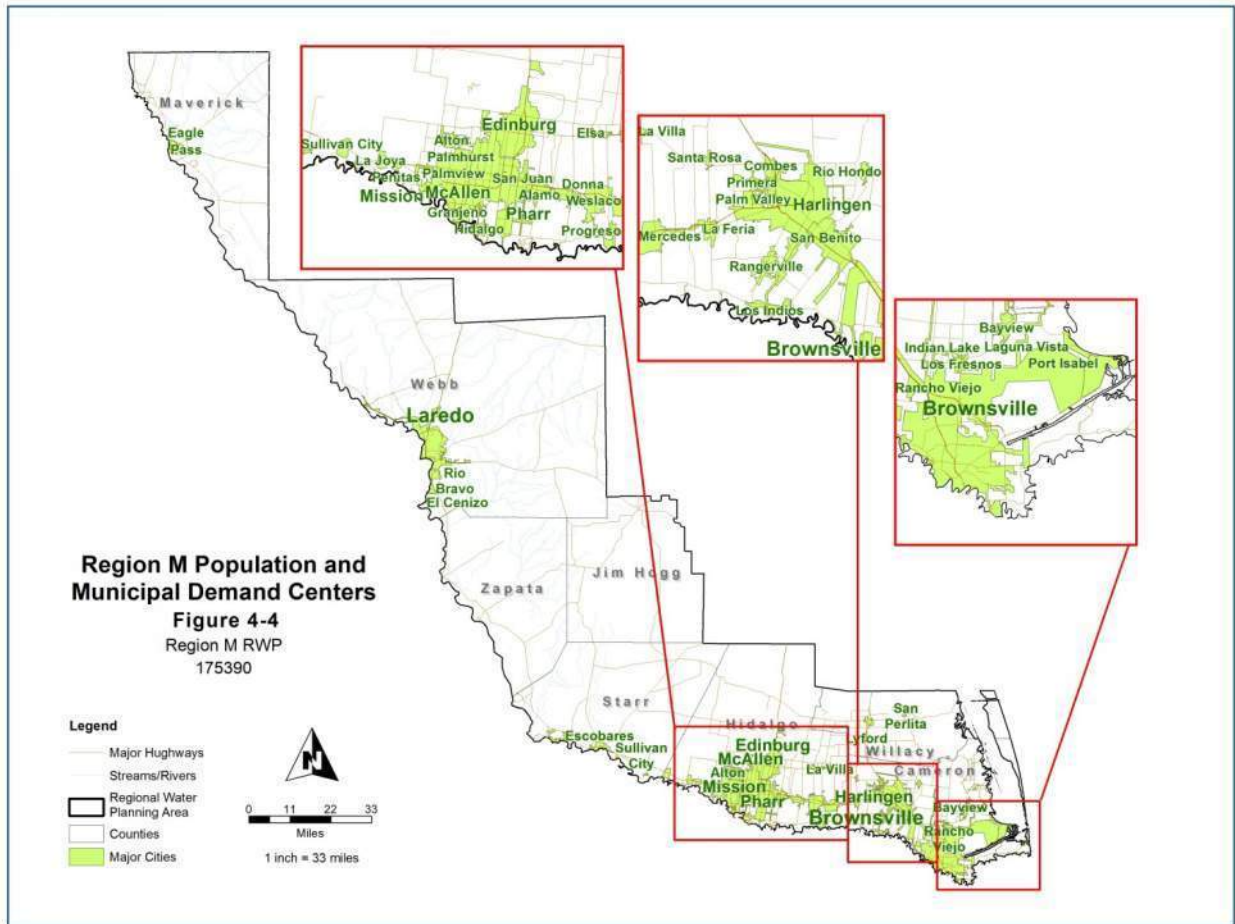


Figure 4-4 Region M Population and Municipal Demand Centers

4.3.1 Regional Water Supply Corporations

Needs for Water Supply Corporations (WSC) that serve multiple counties are shown as aggregated in Table 4-3 and listed separately in each County section below. If supply and demand centers are not fully connected across the WSCs, new interconnections across their service areas may allow for these WSCs to meet future needs as one system. In other cases strategies may be better supplied near the location of the demand, requiring separate strategies in each area. (Sharyland WSC is a large Regional WSC, but is only in Hidalgo County and therefore not listed here.)

Table 4-3 Regional Water Supply Corporation Needs (Acre-feet/year)

WSC	2020	2030	2040	2050	2060	2070
AGUA SUD	1,080	2,615	4,207	5,852	7,543	9,204
EAST RIO HONDO WSC	268	801	1,385	2,036	2,734	3,458
MILITARY HIGHWAY WSC	1,253	2,220	3,226	4,307	5,439	6,578
NORTH ALAMO WSC	1,603	6,943	12,419	18,016	23,708	29,283

### 4.3.2 Cameron County Municipal Needs

Cameron County is projected to have the second-largest share of municipal needs, behind Hidalgo County, as shown in Table 4-4. The largest individual need comes from County-Other, which may be indicative of the lack of reliable drought year supplies to individuals that live outside of a city or the service area of a Water Supply Corporation (WSC).

Most of the entities within Cameron County are at least in part served by irrigation districts and surface water. For this source, the most common limiting factor is water rights and the efficiency of conveyance infrastructure. There has been increased groundwater development in Cameron County, which in many cases requires advanced treatment like Reverse Osmosis (RO). In these cases, the cost of extraction and treatment of groundwater can be a limiting factor, which impacts the rate of development of new well fields and treatment facilities.

**Table 4-4 Cameron County Municipal Needs Projections (Acre-feet/year)**

WUG	2020	2030	2040	2050	2060	2070
<b>Brownsville</b>	0	0	4,385	11,196	18,439	25,919
<b>Combes</b>	0	36	75	123	176	232
<b>County-Other</b>	5,117	5,468	5,862	6,360	6,937	7,544
<b>East Rio Hondo WSC</b>	0	319	895	1,535	2,214	2,917
<b>El Jardin WSC</b>	204	431	672	947	1,244	1,552
<b>Harlingen</b>	0	0	1,697	3,933	6,332	8,813
<b>Indian Lake</b>	14	1	9	19	28	38
<b>La Feria</b>	106	254	412	593	789	992
<b>Laguna Vista</b>	1,106	1,502	1,907	2,347	2,801	3,268
<b>Los Fresnos</b>	0	0	0	0	0	45
<b>Los Indios</b>	59	76	94	116	141	166
<b>Military Highway WSC</b>	632	1,097	1,576	2,088	2,625	3,174
<b>North Alamo WSC</b>	4	20	33	49	64	79
<b>Olmito WSC</b>	0	82	188	310	439	574
<b>Palm Valley</b>	0	39	80	126	177	229
<b>Port Isabel</b>	603	793	990	1,212	1,450	1,695
<b>Primera</b>	0	26	80	144	215	289
<b>Rancho Viejo</b>	0	0	0	0	104	262
<b>Rio Hondo</b>	0	0	0	0	0	0
<b>San Benito</b>	0	0	0	306	923	1,564
<b>Santa Rosa</b>	57	87	120	162	210	260
<b>South Padre Island</b>	1,466	1,993	2,530	3,113	3,716	4,336
<b>Total</b>	<b>9,368</b>	<b>12,224</b>	<b>21,605</b>	<b>34,679</b>	<b>49,024</b>	<b>63,948</b>

### 4.3.3 Hidalgo County Municipal Needs

Hidalgo County has the largest share of municipal needs in the region, shown in Table 4-5. Within the county, almost all of the municipalities are served by irrigation districts, with some groundwater. Therefore, the majority of the supplies are limited by the water rights that are held by each entity, as well as the efficiency of the conveyance infrastructure.

**Table 4-5 Hidalgo County Municipal Needs Projections (Acre-feet/year)**

WUG	2020	2030	2040	2050	2060	2070
Agua SUD	774	1,917	3,104	4,331	5,591	6,828
Alamo	1,004	1,682	2,380	3,099	3,837	4,560
Alton	785	1,238	1,704	2,178	2,657	3,127
County-Other	1,365	2,488	3,645	4,806	5,966	7,104
Donna	0	151	685	1,244	1,827	2,400
Edcouch	28	89	154	224	300	375
Edinburg	4,016	6,802	9,675	12,617	15,624	18,570
Elsa	0	54	212	380	558	733
Hidalgo	360	755	1,163	1,580	2,006	2,424
Hidalgo County MUD #1	298	410	529	651	777	902
La Joya	0	0	0	0	56	200
La Villa	29	82	139	197	258	318
McAllen	7,297	15,788	24,444	33,291	42,317	51,132
Mercedes	281	706	1,149	1,616	2,107	2,589
Military Highway WSC	388	727	1,084	1,474	1,882	2,288
Mission	8,022	12,514	17,100	21,764	26,494	31,115
North Alamo WSC	1,060	6,197	11,494	16,918	22,445	27,865
Palmhurst	354	571	791	1,013	1,235	1,452
Palmview	103	257	416	580	748	914
Penitas	83	212	345	481	619	755
Pharr	106	2,116	4,204	6,366	8,598	10,790
Progreso	157	303	455	612	774	933
San Juan	1,897	3,193	4,527	5,899	7,306	8,685
Sharyland WSC	75	178	286	400	520	638
Sullivan City	3,041	4,737	6,475	8,267	10,109	11,911
Weslaco	3,076	4,754	6,474	8,243	10,055	11,828
<b>Total</b>	<b>34,599</b>	<b>67,921</b>	<b>102,634</b>	<b>138,231</b>	<b>174,666</b>	<b>210,436</b>

#### 4.3.4 Jim Hogg County Municipal Needs

Jim Hogg County has very little municipal demand and shows a small municipal need in Table 4-6. WUGs in Jim Hogg County do not have direct access to Rio Grande water with current infrastructure. Hebbronville is the only town that meets the criteria to be listed as a WUG, but small towns and villages that comprise County-Other include Guerra, Agua Nueva, Las Lomitas, Randado, South Fork Estates, and Thompsonville. The limiting factor for groundwater supplies can be both the existing well-field capacities as well as the characteristics of the aquifer(s).

**Table 4-6 Jim Hogg County Municipal Needs Projections (Acre-feet/year)**

WUG	2020	2030	2040	2050	2060	2070
County-Other	0	0	0	0	0	0
Hebbronville	0	24	46	81	117	153
<b>Total</b>	<b>0</b>	<b>24</b>	<b>46</b>	<b>81</b>	<b>117</b>	<b>153</b>

#### 4.3.5 *Maverick County Municipal Needs*

Maverick County does not have a significant municipal need until 2050, as shown in Table 4-7. Eagle Pass is the only incorporated city in Maverick County, but there are eight census-designated places that are included in the County-Other projections (Edison Road, Elm Creek, El Indio, Las Quintas Fronterizas, Rosita North, and Rosita South). The total county's population, according to the 2010 census, was 54,258. Maverick County Water Control and Improvement District No. 1 serves some of these unincorporated areas. Maverick County's population is concentrated along the Rio Grande, so the limiting factor on supplies is likely to be water rights.

**Table 4-7** Maverick County Municipal Needs Projections (Acre-feet/year)

WUG	2020	2030	2040	2050	2060	2070
<b>County-Other</b>	0	0	0	0	0	0
<b>Eagle Pass</b>	0	0	0	559	1,427	2,268
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>559</b>	<b>1,427</b>	<b>2,268</b>

#### 4.3.6 *Starr County Municipal Needs*

Municipal needs in Starr County are primarily in the County-Other category, shown in Table 4-8. Starr County's population is concentrated along the Rio Grande, so the limiting factor on supplies is likely to be water rights. However, the primary need is County-Other, which includes many areas that are not served by surface water, and are therefore limited by access to groundwater. Some areas in northeastern Starr County are experiencing dropping water levels, which require new or deepened wells.

**Table 4-8** Starr County Municipal Needs Projections (Acre-feet/year)

WUG	2020	2030	2040	2050	2060	2070
<b>Agua SUD</b>	4	10	15	19	24	28
<b>County-Other</b>	2,702	3,018	3,321	3,669	4,016	4,338
<b>Escobares</b>	0	0	0	0	0	0
<b>La Grulla</b>	0	0	0	0	0	0
<b>Rio Grande City</b>	136	559	957	1,372	1,761	2,117
<b>Rio WSC</b>	66	105	143	183	221	257
<b>Roma</b>	0	0	0	0	0	63
<b>Union WSC</b>	381	464	545	630	710	785
<b>Total</b>	<b>3,289</b>	<b>4,156</b>	<b>4,981</b>	<b>5,873</b>	<b>6,732</b>	<b>7,588</b>

#### 4.3.7 *Webb County Municipal Needs*

Webb County is the largest county in Region M, but is relatively sparsely populated outside of Laredo and the cities south of Laredo along the Rio Grande. The population of the county, at the time of the 2010 census was 250,304, 94% of which was in Laredo. Limitations on access to water in this county are both related to surface water rights and availability of groundwater and existing infrastructure with which to access groundwater. Table 4-9 shows municipal need projections in Webb County.

**Table 4-9 Webb County Municipal Needs Projections (Acre-feet/year)**

WUG	2020	2030	2040	2050	2060	2070
County-Other	721	885	1,061	1,232	1,394	1,541
El Cenizo	0	0	0	0	36	98
Laredo	0	0	0	7,610	15,179	22,059
Rio Bravo	0	0	0	0	37	130
<b>Total</b>	<b>721</b>	<b>885</b>	<b>1,061</b>	<b>8,842</b>	<b>16,646</b>	<b>23,828</b>

#### 4.3.8 Willacy County Municipal Needs

Willacy County, although not on the Rio Grande, is primarily supplied by water diverted from the river in Cameron and Hidalgo Counties and delivered to users in Willacy County via Irrigation Districts. North Alamo WSC and East Rio Hondo WSC have also developed groundwater resources to supplement their surface water supplies, including brackish groundwater desalination. Need projections for Willacy County are shown in Table 4-10.

**Table 4-10 Willacy County Municipal Needs Projections (Acre-feet/year)**

WUG	2020	2030	2040	2050	2060	2070
County-Other	0	0	0	0	0	0
East Rio Hondo WSC	0	1	1	2	3	4
Lyford	0	0	0	0	0	0
North Alamo WSC	44	231	397	554	704	844
Raymondville	0	0	0	0	0	0
San Perlita	12	37	63	92	121	148
Sebastian Mud	0	0	0	0	8	26
<b>Total</b>	<b>56</b>	<b>269</b>	<b>461</b>	<b>648</b>	<b>836</b>	<b>1,022</b>

#### 4.3.9 Zapata County Municipal Needs

Zapata County accounts for a small portion of the Region's municipal needs, shown in Table 4-11. There is very little groundwater pumping documented in Zapata County.

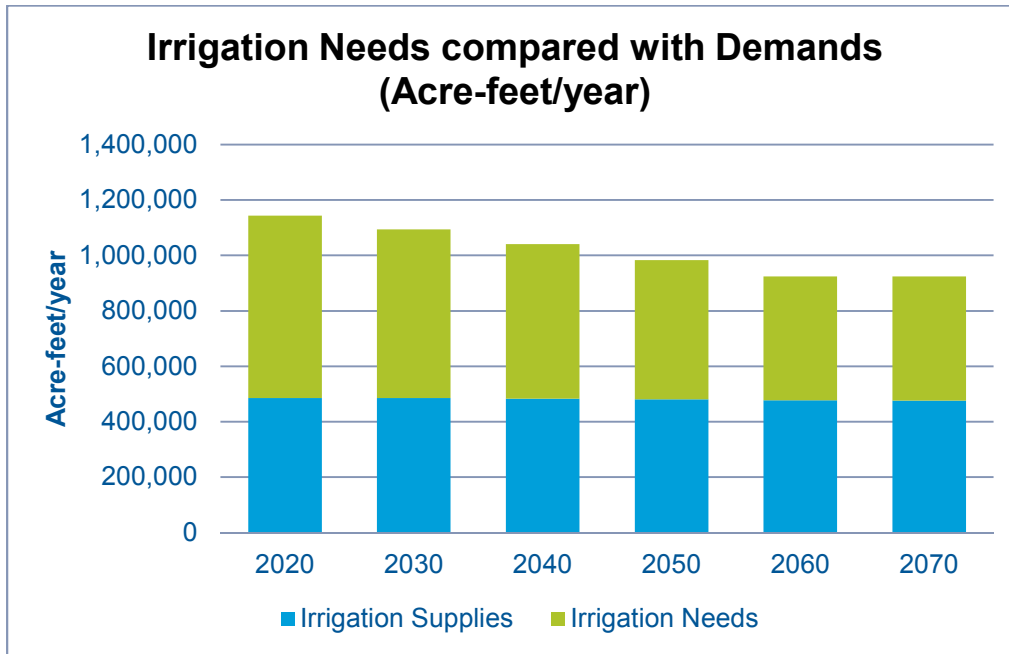
**Table 4-11 Zapata County Municipal Needs Projections (Acre-feet/year)**

WUG	2020	2030	2040	2050	2060	2070
County-Other	204	265	336	414	495	580
San Ygnacio MUD	0	0	0	0	37	77
Zapata County Waterworks	297	649	1,049	1,507	1,996	2,510
<b>Total</b>	<b>501</b>	<b>914</b>	<b>1,385</b>	<b>1,921</b>	<b>2,528</b>	<b>3,167</b>

## 4.4 Irrigation Needs

Irrigation is the largest water user in Region M, and has the largest need. This is because the needs are calculated based on the maximum demand estimate and a minimum supply. Because irrigation surface water rights are filled only after all domestic, municipal, and industrial water is set aside, supplies are vulnerable to drought. The portion of demand that is met (supplies) and

the resulting needs are shown in Figure 4-5 for each decade. There is a detailed discussion on how Irrigation demands are estimated in Chapter 2, and more information about how water is allocated on the Rio Grande in Chapter 3.



**Figure 4-5** Irrigation Needs, Shown as a Portion of Irrigation Demands (Acre-feet/year)

Irrigation needs are the highest in Cameron and Hidalgo Counties, where there is the most farmland irrigated with surface water. Needs are projected to decrease slightly as a result of decreasing demand. Increased Irrigation District efficiency and on-farm conservation may alleviate some of the impacts of drought on productivity for farmers. The needs shown in Table 4-12 represent the extent of shortage anticipated by farmers in years of limited supply.

**Table 4-12** Irrigation Needs Projection by County and River Basin (Acre-feet/year)

County	Basin	2020	2030	2040	2050	2060	2070
Cameron	Nueces-Rio Grande	83,512	168,272	153,163	136,911	121,245	121,505
Cameron	Rio Grande	11,423	10,451	9,487	8,449	7,447	7,466
Hidalgo	Nueces-Rio Grande	376,535	348,278	317,742	283,018	246,784	247,253
Hidalgo	Rio Grande	15,687	14,510	13,239	11,793	10,281	10,303
Jim Hogg	Nueces-Rio Grande	211	190	178	191	221	221
Jim Hogg	Rio Grande	28	23	20	23	30	30
Maverick	Nueces	0	0	0	0	0	0
Maverick	Rio Grande	14,112	13,070	12,151	11,263	10,452	10,516
Starr	Rio Grande	4,654	2,284	0	0	0	0
Webb	Rio Grande	1,298	1,310	1,322	1,334	1,345	1,357
Willacy	Nueces-Rio Grande	49,304	49,158	49,052	48,963	49,223	48,956
Zapata	Rio Grande	1,285	1,034	804	581	411	422
<b>Total</b>		<b>558,049</b>	<b>608,580</b>	<b>557,158</b>	<b>502,526</b>	<b>447,439</b>	<b>448,029</b>

### 4.5 Steam Electric Power Generation Needs

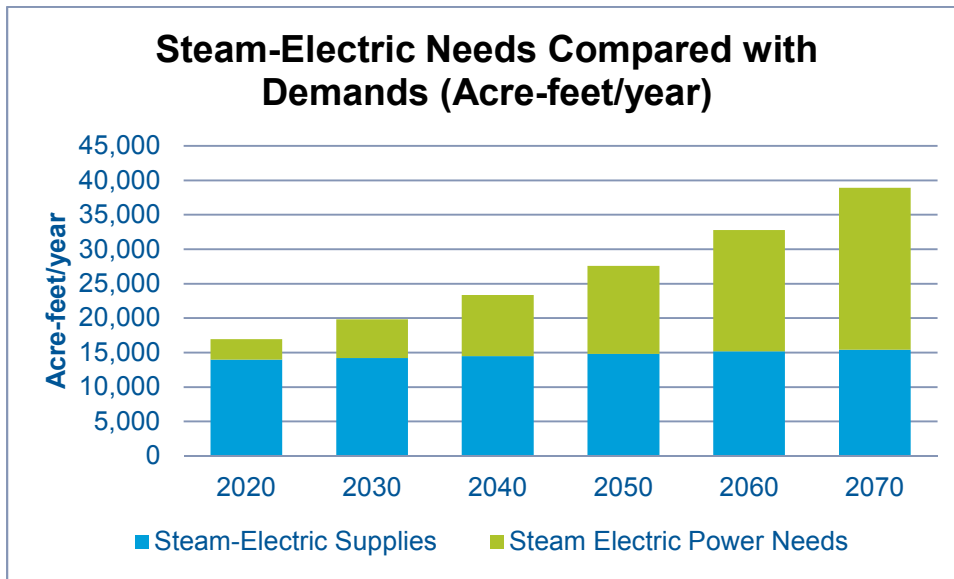


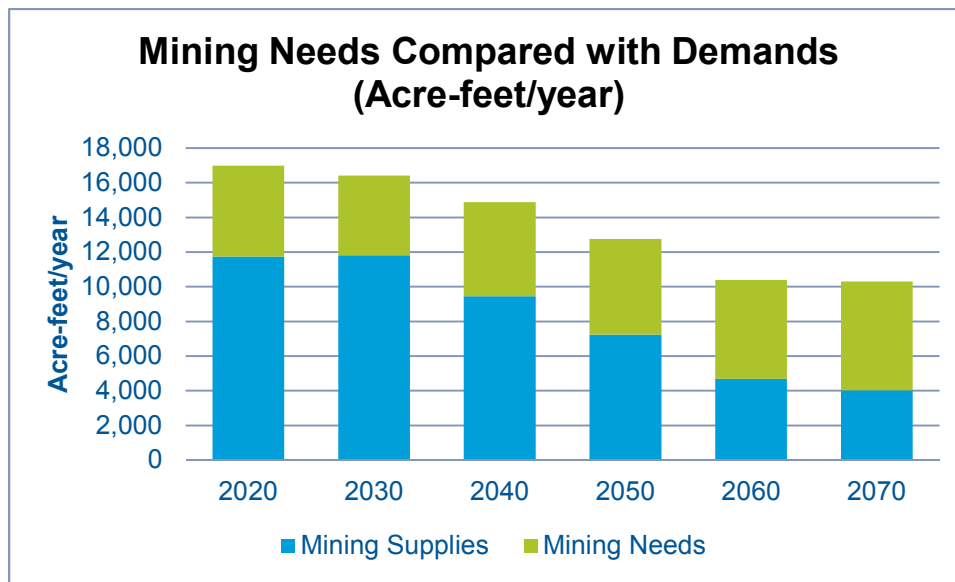
Figure 4-6 Steam-Electric Needs, Shown as a Portion of Steam Electric Demands (Acre-feet/year)

The current supplies for Steam Electric power generation meet about 91% of the 2020 demands (Figure 4-6). This stems, in part, from the anticipated near-term growth of power generation demands, the likelihood of some short-term contractual water, and from increasingly efficient power generation in terms of consumptive water use. This will be discussed in Chapter 5 as a strategy for addressing the needs of steam-electric power generation. Table 4-13 shows Steam Electric needs projections.

Table 4-13 Steam-Electric Needs Projection by County and River Basin (Acre-feet/year)

County	Basin	2020	2030	2040	2050	2060	2070
Cameron	Nueces-Rio Grande	1,036	1,293	1,607	1,990	2,457	2,941
Hidalgo	Nueces-Rio Grande	1,948	4,342	7,259	10,815	15,151	20,304
Webb	Rio Grande	0	0	0	0	0	256
<b>Total</b>		<b>2,984</b>	<b>5,635</b>	<b>8,866</b>	<b>12,805</b>	<b>17,608</b>	<b>23,501</b>

## 4.6 Mining Needs



**Figure 4-7 Mining Needs, Shown as a Portion of Mining Demands (Acre-feet/year)**

Current mining supplies appear to meet about 71% of the 2020 demands for mining water (Figure 4-7). The apparent shortage is in part due to low reliability for Rio Grande mining water rights to in drought years, so the estimates of availability are significantly lower than what is available in a normal year. Increased use of recycled water at oil and gas wells is discussed as a water management strategy in Chapter 5, and accounts for a projected reduction in mining demands. Because of reporting limitations, there may be additional mining supplies from groundwater that would exceed the Managed Available Groundwater (MAG) values for some aquifer/county/river basin areas. Mining needs are shown in Table 4-14.

**Table 4-14 Mining Needs Projection by County and River Basin (Acre-feet/year)**

County	Basin	2020	2030	2040	2050	2060	2070
Cameron	Nueces-Rio Grande	0	0	0	0	0	0
Hidalgo	Nueces-Rio Grande	1,235	1,956	2,495	3,072	3,736	4,575
Hidalgo	Rio Grande	147	204	246	292	344	410
Jim Hogg	Nueces-Rio Grande	0	0	0	0	0	0
Jim Hogg	Rio Grande	0	0	0	0	0	0
Maverick	Nueces	323	472	512	385	261	169
Maverick	Rio Grande	1,261	1,862	2,019	1,516	1,013	649
Starr	Nueces-Rio Grande	49	78	96	115	139	169
Starr	Rio Grande	0	60	120	185	265	365
Webb	Nueces	688	2	0	0	0	0
Webb	Nueces-Rio Grande	120	5	0	0	0	0
Webb	Rio Grande	1,467	0	0	0	0	0
Willacy	Nueces-Rio Grande	0	2	0	0	0	0
Zapata	Rio Grande	0	0	0	0	0	0
<b>Total</b>		<b>5,290</b>	<b>4,641</b>	<b>5,488</b>	<b>5,565</b>	<b>5,758</b>	<b>6,337</b>



As discussed in Chapter 2, the mining, oil and gas industry has very few requirements for reporting the volumes of groundwater used. Additionally, some Class A and B water rights have been reclassified as ‘Multi-Use’ which allows both irrigation and mining use. This is an impediment to evaluating current and future availabilities, and may result in over-allocation of some aquifers or mis-allocation of supplies.

### 4.7 Manufacturing Needs

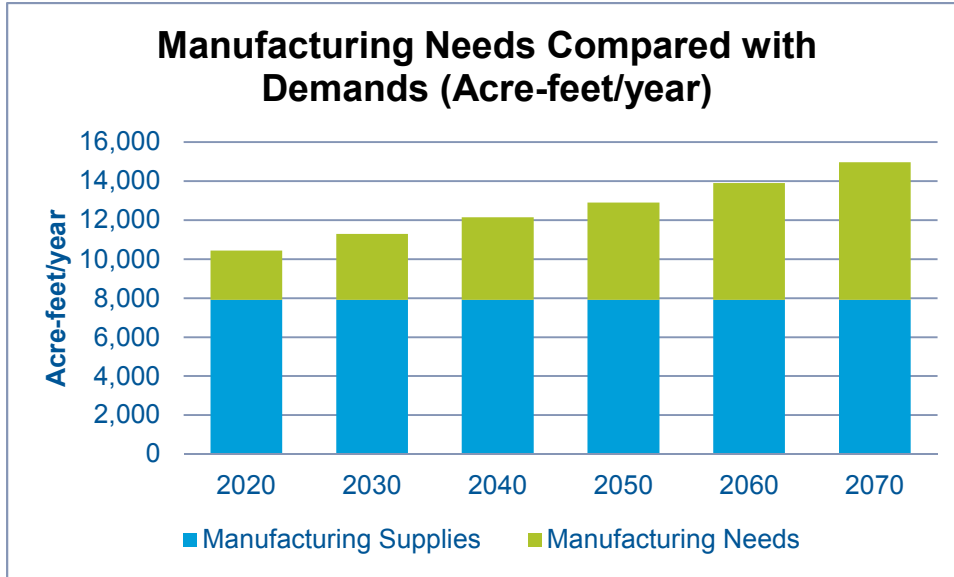


Figure 4-8 Manufacturing Needs, Shown as a Portion of Manufacturing Demands (Acre-feet/year)

Manufacturing needs are shown in Figure 4-8 and Table 4-15. Water demand associated with manufacturing is met by both groundwater and surface water, and comprises a relatively small portion of the regional demand and need. Current supplies meet 51% of 2020 projected demands. The need likely results in part from the date of most recent supply data (2013) being seven years from the first date of demand data (2020), and due to some portion of supplies from short-term contracts for water.

Table 4-15 Manufacturing Needs Projection by County and River Basin (Acre-feet/year)

County	Basin	2020	2030	2040	2050	2060	2070
Cameron	Nueces-Rio Grande	687	1,090	1,489	1,835	2,303	2,808
Hidalgo	Nueces-Rio Grande	1,747	2,195	2,643	3,042	3,562	4,122
Maverick	Rio Grande	79	84	89	93	100	107
Starr	Rio Grande	0	1	2	3	4	5
Webb	Nueces	0	2	4	4	6	8
Webb	Rio Grande	0	0	0	1	1	1
Willacy	Nueces-Rio Grande	16	16	16	16	16	16
<b>Total</b>		<b>2,529</b>	<b>3,388</b>	<b>4,243</b>	<b>4,994</b>	<b>5,992</b>	<b>7,067</b>

### 4.8 Livestock Needs

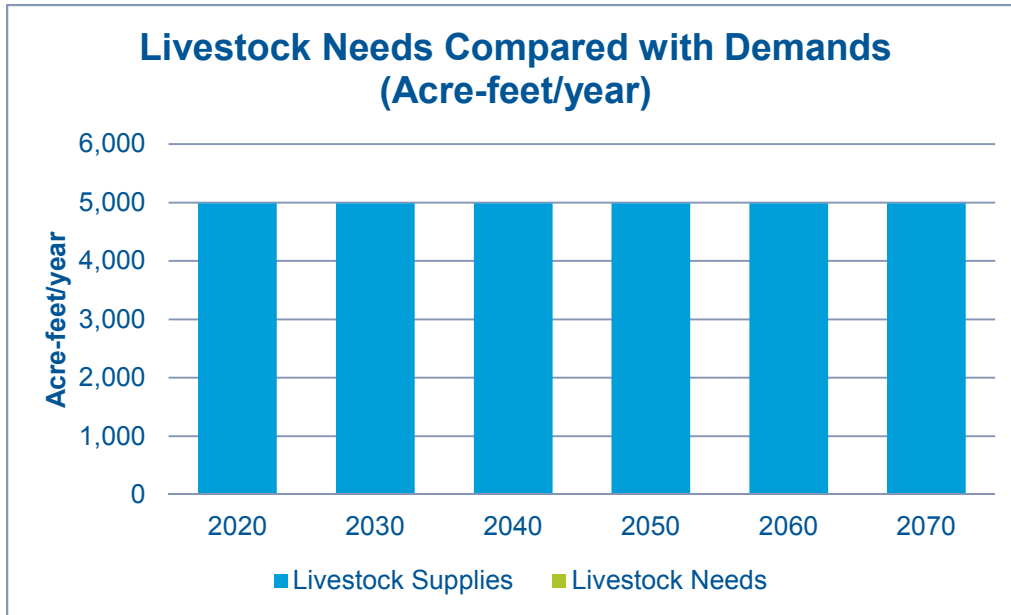


Figure 4-9 Livestock Needs, Shown as a Portion of Livestock Demands (Acre-feet/year)

Livestock demands are met by numerous groundwater wells, ephemeral streams and ponds, as well as surface water diversions, often classified together with lawn watering contracts or referred to here as Livestock Local Supplies. These supplies are expected to be sufficient to meet the needs of the (stable) livestock demand, and therefore there is not a Need for livestock. In particular areas there may be some difficulty providing sufficient water in a drought year, but overall ranchers are expected to manage their livestock within the available supplies.

### 4.9 Unmet Needs

Unmet needs after WMS include the needs that remain after the demand reduction and/or supply from all conservation and WMS are applied to an entity’s initial need. For Region M there are no unmet needs for Municipal, Steam Electric, Manufacturing, or Livestock WUG. The remaining unmet needs for Irrigation and Mining are presented in Table 4-16.

Table 4-16 Summary of Unmet Needs for Region M (Acre-feet/year)

County	Basin	WUG	2020	2030	2040	2050	2060	2070
Cameron	Nueces-Rio Grande	Irrigation	163,370	150,607	138,749	126,068	114,058	109,605
Cameron	Nueces-Rio Grande	Manufacturing	65	391	544	542	541	537
Cameron	Rio Grande	Irrigation	10,137	9,324	8,567	7,757	6,990	6,707
Hidalgo	Nueces-Rio Grande	Irrigation	271,498	243,145	214,381	183,363	151,750	141,441
Hidalgo	Nueces-Rio Grande	Manufacturing	0	0	566	736	738	743
Hidalgo	Nueces-Rio Grande	Mining	865	1,495	1,956	2,458	3,040	3,779
Hidalgo	Rio Grande	Irrigation	11,460	10,281	9,081	7,790	6,474	6,045
Hidalgo	Rio Grande	Mining	117	169	204	244	290	348
Maverick	Nueces	Mining	270	403	437	322	208	125

County	Basin	WUG	2020	2030	2040	2050	2060	2070
Maverick	Rio Grande	Mining	1,052	1,587	1,722	1,264	805	472
Starr	Nueces-Rio Grande	Mining	36	62	78	95	117	144
Starr	Rio Grande	Irrigation	3,714	2,624	1,601	662	0	0
Starr	Rio Grande	Mining	0	6	60	119	191	281
Webb	Nueces	Mining	378	0	0	0	0	0
Webb	Nueces-Rio Grande	Mining	68	0	0	0	0	0
Webb	Rio Grande	Irrigation	343	351	359	366	372	381
Webb	Rio Grande	Mining	795	0	0	0	0	0
Willacy	Nueces-Rio Grande	Irrigation	38,842	36,918	35,114	33,346	31,936	29,899
Zapata	Rio Grande	Irrigation	774	655	554	458	390	399
<b>Total</b>			<b>503,784</b>	<b>458,018</b>	<b>413,973</b>	<b>365,590</b>	<b>317,900</b>	<b>300,906</b>

In a drought year Irrigation and Mining surface water rights are only allocated after Domestic, Municipal, and Industrial water rights have been filled, which is one of the reasons why these WUG have a large need. Conservation strategies were recommended for Irrigation and Mining WUG as On-Farm Conservation and Implementation of Best Management Practices and savings from those WMS were applied to their initial needs. However, there is not sufficient water available within conservation limits to meet needs in an economically feasible way. Both irrigation and mining are industries that are able to adjust to utilize variable amounts of water, and in a drought year the demands for these industries are not feasibly met.

A social and economic impacts evaluation of projected water shortages if no WMS are implemented provided by TWDB can be found in Chapter 6.