CHAPTER 2
POPULATION AND WATER DEMAND

This page intentionally left blank.

2 POPULATION AND WATER DEMAND

Planning for the wise use of the existing water resources in the Plateau Region requires a reasonable estimation of current and future water needs for all water-use categories. Regional population and water demand data was initially provided to the Plateau Water Planning Group (PWPG) at the beginning of the planning period, which incorporated data from the Texas Demographic Center (TDC) and the U.S. Census Bureau's 2020 census count. The PWPG requested revisions to specific population and municipal water demand categories for use in the *2026 Plateau Region Water Plan*, which were subsequently approved by the TWDB. Thus, the population and water demand projections shown in this chapter are derived from a combination of TWDB data and the approved revisions.

The PWPG made available the draft population and water demand summary tables to municipalities, water providers, county judges, and non-municipal water-use representatives, and solicited all entities within the Region to submit desired changes to the projections along with supporting technical information justifying these changes. After thoughtful consideration, the PWPG chose to accept the draft population and water demand estimates and to include the TWDB approved revision requests provided by the water utilities. However, the PWPG did express reservations with the way that these population numbers are derived and strongly feel that the data provided by the TWDB does not represent the growth that many of the individual communities are experiencing. Requested revisions in the draft population and municipal water demand projections are outlined in more detail in Section 2.1.1 and Section 2.1.2 below.

Population projections and associated water demand projections have been assembled by utility service areas rather than political boundaries in order to better plan for the actual water-supply service entity. Earlier regional and State water plans had been aligned with political boundaries, such as city limits rather than water utility service areas. TWDB rule changes now define a municipal water user group (WUG) as being utility-based, and thus emphasis of the development of population and municipal water demands for the 2026 Regional Water Plans focus upon the utility-service area boundaries.

2.1 POPULATION

2.1.1 Population Projection Methodology

County population projections are prepared by the Texas Demographic Center (TDC) and are based on the TDC's 2022 county-level projected demographic trends, including birth and survival rates and net migration rates of population groups defined by age, gender, and race/ethnicity.

Since the 2020 U.S. Census data was released after the publication of the 2021 Plateau Region Water Plan, regional and county population totals were altered in the projections by the TWDB. Key changes from the previous planning cycle's projection methodology are as follows: (1) individual Water User Groups (WUGs) were adjusted to be representative of retail water service area boundaries rather than political city limit boundaries, as was done in the 2021 Plans, (2) the TWDB population projections for the regional and State water plans have always relied initially on county-level population projections from the Texas Demographic Center (TDC). In the past, the TWDB had altered the resulting regional plan population projections in certain counties by holding them constant in future periods to avoid projecting declining populations (and thus allowing for a potential underestimation of projected population for such counties). For the 2026 Regional Water Plans, the draft county population projections followed the trends projected by the TDC, including declines, and (3) future savings from additional faucet and dishwasher replacements were not considered necessary for inclusion in the draft plumbing code savings projections for this current planning cycle. Based on the effective year of the relevant plumbing code standards and the useful life of these items, the expected water efficiency savings by replacement and new growth would reasonably be fully realized by the first projected decade of 2030.

Population projections represent permanent residents, and not seasonal or transient populations. The population projection methodology was performed in two steps: (1) projections at the county-level, and (2) then projections at the WUG-level. County-level population projections were generally developed by examining three migration scenarios:

- Zero migration: no net migration (natural growth only),
- 1.0 migration: net migration rates of 2010 to 2020 ("full-migration scenario"), and
- 0.5 migration: 2010 to 2020 migration rates halved ("half-migration scenario").

The TWDB staff used the full-migration scenario to extend the TDC's projections to 2080 and to develop WUG-level projections. Although the TDC strongly recommends use of the half-migration scenario for long-term planning, the TWDB drafted populations for all planning regions using one consistent scenario. The half-migration scenario was also provided by the TWDB to the Regional Water Planning Groups (RWPGs) for consideration.

The PWPG determined it was most appropriate to utilize the full-migration scenario for both Bandera and Kerr Counties. All other counties within the Region were approved using the half-migration scenario for the basis of developing the population projections. Additionally, a national undercount in population was applied demographically to the Region per WUG. The Hispanic population was under-represented by five percent, and the Black population was under-represented by 3.3 percent. Lastly, the PWPG identified within the Region that individual communities are growing at significantly different rates than was projected in the 2021 Regional Water Plan. To account for this growth, all WUGs were surveyed, soliciting more recent information on growth, water use and/or future demands. In the case of Laughlin

Air Force Base, the PWPG submitted a population of 4,010 which was reported by the WUG, in the year 2020 and 2021 annual Water Use Survey (WUS) and proposed holding constant throughout the planning horizon. The TWDB did not approve this request due to the quarter population for Laughlin Air Force Base being 1,574. The TWDB indicated that adequate justification was not provided to support the higher population. With the addition of the undercount analysis, the total population for Laughlin Air Force Base was approved for 1,640 and is held constant throughout the planning horizon.

The projected municipal population is allocated to water systems or utilities that provide an average of more than 100 acre-feet per year for municipal use. This newly defined municipal WUG includes water systems that vary from privately-owned, systems serving institutions, facilities owned by the State and Federal government, and all other retail public utilities that meet the 100 acre-feet criteria.

Rural "county-other" population is calculated as the difference between the total projected population of the utility service areas and the total projected county population. Population is then projected from the 2020 base year by decade to the year 2080. However, individual WUGs were adjusted to reflect a utility-based boundary (not political boundary) as a baseline population to be projected for the use of this *Plan*. A more detailed explanation of the TWDB population projection methodology is available at

https://www.twdb.texas.gov/waterplanning/data/projections/methodology/index.asp.

The PWPG expresses concern that the population projections do not recognize the impact to the municipal and rural population and its related water demand that occurs as the result of seasonal vacationers, hunters, and absentee land-owner homes, especially in the rural counties. The PWPG recommends that for future regional water plans, that a region be allowed to adjust the total regional population rather than having to adjust individual county populations to achieve a non-changeable total population.

2.1.2 Current and Projected Population

In the year 2020, the U.S. Census Bureau performed a census count, which provides the base year for future population projections. Although the PWPG approved the 2020 census count, to include the requested revisions, members again expressed concern that the census does not recognize the significant seasonal population increase that occurs as the Region draws large numbers of hunters and recreational visitors, as well as absentee landowners who maintain vacation, retirement, and hunting properties. Therefore, an emphasis is being made in this planning document, especially for the rural counties, to recognize a need for more water than is justified simply from the population-derived water demand quantities.

The cohort-component model used to project population growth does not adequately account for expected business and market factors that can influence population growth. Several Kerr County organizations are actively pursuing market development and business growth in order to maintain a consistent double-digit growth rate not reflected in the long-term population forecast. Similar underestimations may also occur elsewhere in the Region.

Population projections by decade for water utilities and county rural areas in the Plateau Region are listed in Table 2-1. The projected year-2030 population for the entire Region is 140,468 of which 80 percent

reside in Kerr and Val Verde Counties (

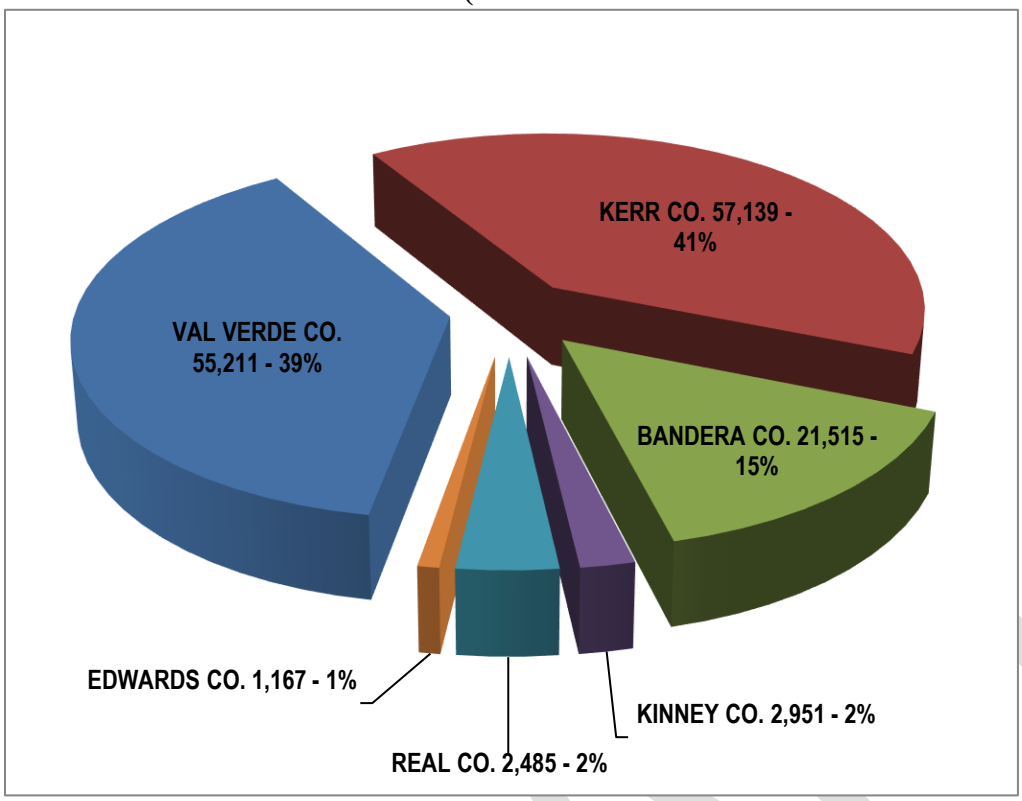

Figure 2-1). Del Rio, with a year-2030 projected population of 35,932 is the largest community in the Region. The Regional population is projected to increase by approximately 10 percent to 154,530 by the year 2080, which is an increase of 14,062 citizens (Figure 2-2). The water demand table (Table 2-2) depicts water demand for county-other use as equally distributed throughout the rural portion of each county, whereas in reality, county-other population and water demand are often concentrated in smaller areas of the county, such as unincorporated communities, subdivisions and mobile home parks.

Population estimates do not consider rural population density, which concentrates water demand and strains available local water supplies. Figure 2-3 shows the concentration of rural population in the eastern portions of both Kerr and Bandera Counties. The challenge of meeting the water needs for these concentrated rural areas is addressed in water management strategies provided in Chapter 5.

Table 2-1. Plateau Region Population Projections

	2030	2040	2050	2060	2070	2080
Bandera County - Guadalupe Basin						
County-Other	111	113	115	118	120	123
Guadalupe Basin Total Population	**111**	**113**	**115**	**118**	**120**	**123**
Bandera County - Nueces Basin						
County-Other	1,041	1,062	1,083	1,105	1,127	1,150
Nueces Basin Total Population	**1,041**	**1,062**	**1,083**	**1,105**	**1,127**	**1,150**
Bandera County - San Antonio Basin						
Bandera	1,949	1,988	2,028	2,069	2,111	2,152
Bandera County FWSD #1	1,074	1,095	1,117	1,140	1,163	1,186
County-Other	17,340	17,690	18,046	18,411	18,778	19,150
San Antonio Basin Total Population	**20,363**	**20,773**	**21,191**	**21,620**	**22,052**	**22,488**
Bandera County Total Population	**21,515**	**21,948**	**22,390**	**22,843**	**23,300**	**23,760**

Edwards County - Colorado Basin						
Rocksprings	416	333	267	227	187	147
County-Other	127	102	81	69	57	45
Colorado Basin Total Population	**543**	**435**	**348**	**296**	**244**	**192**
Edwards County - Nueces Basin						
Rocksprings	250	200	160	137	113	88
County-Other	313	250	201	171	141	111
Nueces Basin Total Population	**563**	**450**	**361**	**308**	**254**	**199**
Edwards County - Rio Grande Basin						
County-Other	61	49	39	33	27	21
Rio Grande Basin Total Population	**61**	**49**	**39**	**33**	**27**	**21**
Edwards County Total Population	**1,167**	**934**	**748**	**637**	**525**	**412**
Kerr County - Colorado Basin						
County-Other	590	617	636	667	698	727
Colorado Basin Total Population	**590**	**617**	**636**	**667**	**698**	**727**
Kerr County - Guadalupe Basin						
Kerrville	33,035	34,549	35,614	37,318	39,037	40,680
Kerrville South Water	3,600	3,764	3,880	4,066	4,253	4,432
County-Other	19,667	20,566	21,201	22,216	23,237	24,217
Guadalupe Basin Total Population	**56,305**	**58,879**	**60,695**	**63,600**	**66,527**	**69,329**
Kerr County - Nueces Basin						
County-Other	8	9	9	9	10	10
Nueces Basin Total Population	**8**	**9**	**9**	**9**	**10**	**10**
Kerr County - San Antonio Basin						
County-Other	236	247	254	266	279	290
San Antonio Basin Total Population	**236**	**247**	**254**	**266**	**279**	**290**
Kerr County Total Population	**57,139**	**59,752**	**61,594**	**64,542**	**67,514**	**70,356**

Table 2-2. (continued) Plateau Region Population Projections

	2030	2040	2050	2060	2070	2080
Kinney County - Nueces Basin						
County-Other	21	20	19	19	19	18
Nueces Basin Total Population	**21**	**20**	**19**	**19**	**19**	**18**
Kinney County - Rio Grande Basin						
Brackettville	1,077	1,020	983	960	937	914
Fort Clark Springs MUD	1,372	1,299	1,252	1,223	1,194	1,164
County-Other	481	455	439	428	418	408
Rio Grande Basin Total Population	**2,930**	**2,774**	**2,674**	**2,611**	**2,549**	**2,486**
Kinney County Total Population	**2,951**	**2,794**	**2,693**	**2,630**	**2,568**	**2,504**
Real County - Colorado Basin						
County-Other	31	26	22	19	16	14
Colorado Basin Total Population	**31**	**26**	**22**	**19**	**16**	**14**
Real County - Nueces Basin						
Camp Wood	339	288	246	214	181	149
Leakey	210	179	153	133	113	92
County-Other	1,905	1,621	1,383	1,203	1,020	836
Nueces Basin Total Population	**2,454**	**2,088**	**1,782**	**1,550**	**1,314**	**1,077**
Real County Total Population	**2,485**	**2,114**	**1,804**	**1,569**	**1,330**	**1,091**
Val Verde County - Rio Grande Basin						
Del Rio Utilities Commission	35,932	36,018	36,105	36,191	36,278	36,365
Laughlin AFB	1,640	1,640	1,640	1,640	1,640	1,640
County-Other	17,639	17,915	18,144	18,229	18,315	18,402
Rio Grande Basin Total Population	**55,211**	**55,573**	**55,889**	**56,060**	**56,233**	**56,407**
Val Verde County Total Population	**55,211**	**55,573**	**55,889**	**56,060**	**56,233**	**56,407**
Region J Total Population	**140,468**	**143,115**	**145,118**	**148,281**	**151,470**	**154,530**

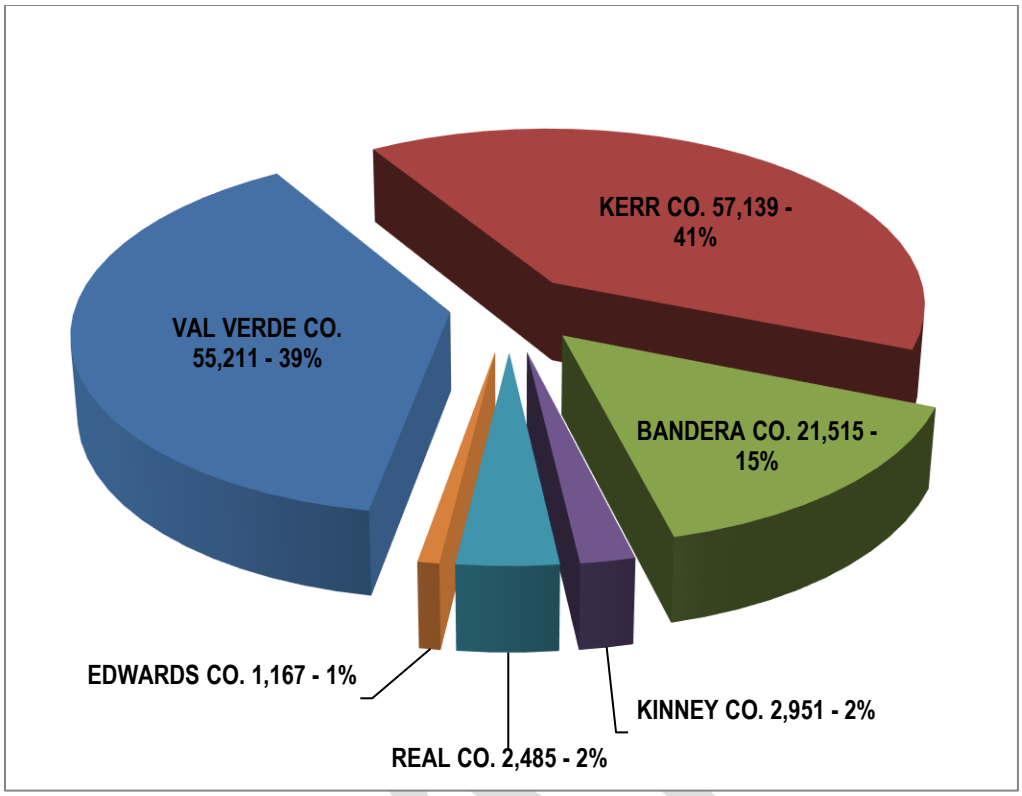

Figure 2-1. Year 2030 Population Projection

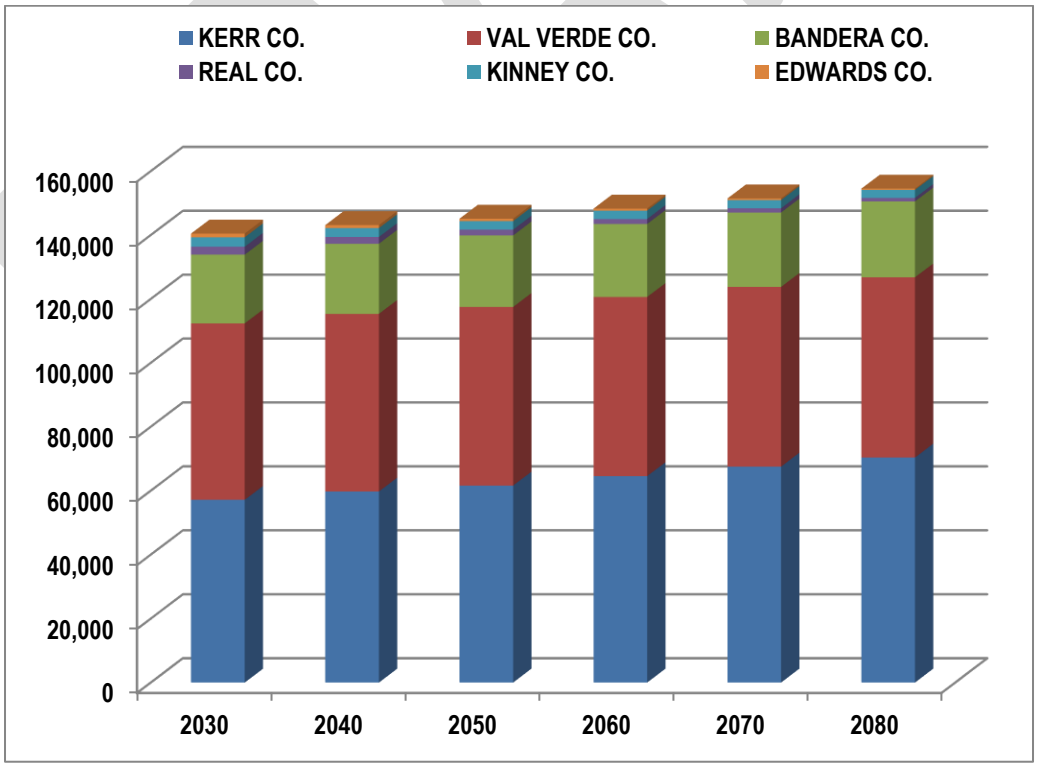

Figure 2-2. Regional Population Projection

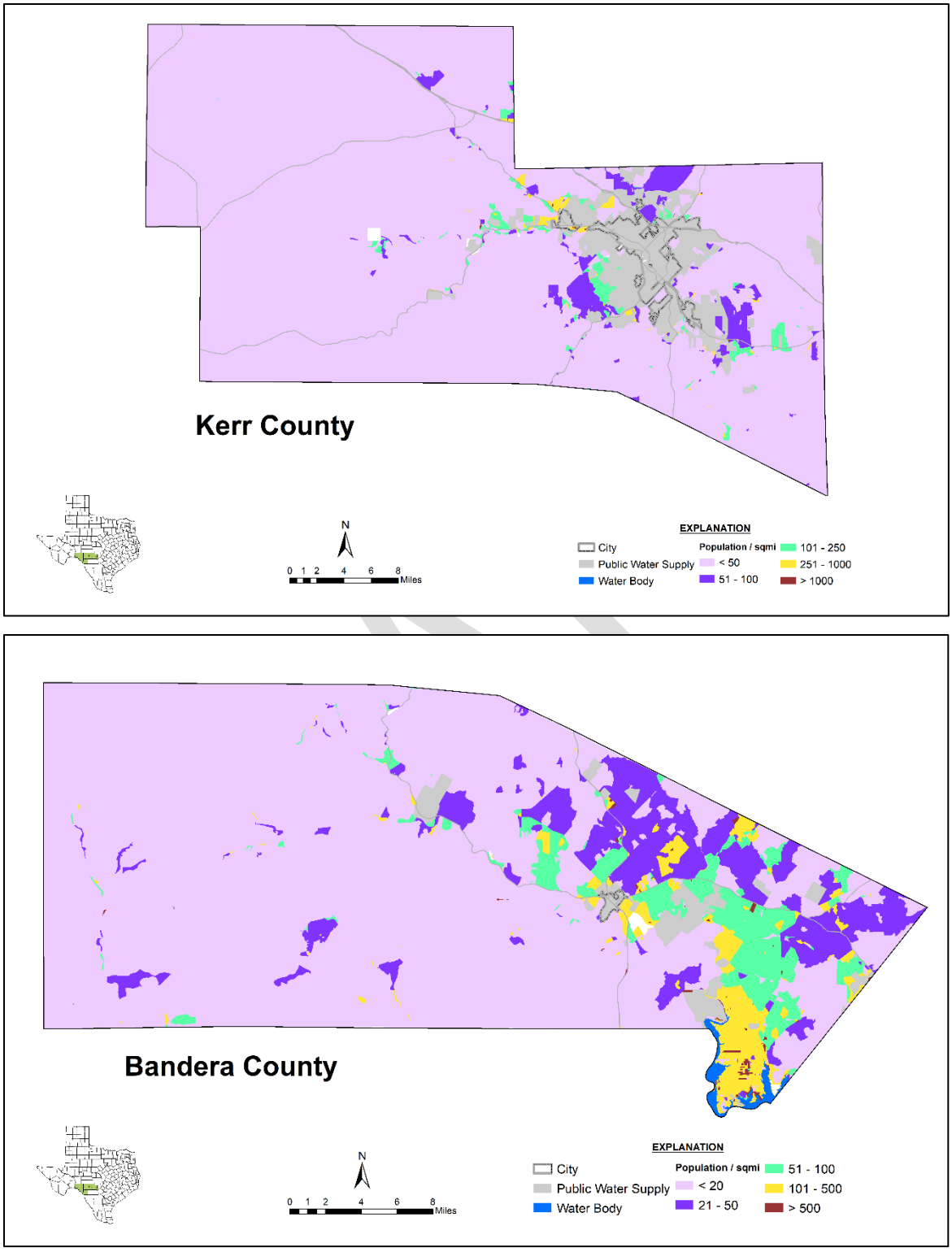

Figure 2-3. Rural Population Concentration in Kerr and Bandera Counties

2.2 WATER DEMAND

2.2.1 Water Demand Projections

A major component of water planning is the establishment of accurate water demand estimates for all water-use categories. Categories of water use include (1) municipal, (2) county-other (rural domestic), (3) manufacturing, (4) irrigation, (5) livestock, and (6) mining. There is no recognized water use in the Plateau Region for "steam-electric power generation." Other water-use categories that are not quantified in this *Plan* include environmental and recreational needs and are addressed in Section 2.3.

Municipal water demand projections are a function of population projections, baseline per capita use measured in units of Gallons per Capita per Day (GPCD), and projected plumbing code savings. The following four steps are used in developing municipal water demand projections for WUGs: (1) develop population projections, (2) determine the baseline GPCD by WUG, (3) develop plumbing code savings projections by WUG, and (4) calculate municipal water demand projections.

In 2020 the TWDB was granted funding by the United States Geological Survey (USGS) to contract with the University of Texas Bureau of Economic Geology (UTBEG) to conduct a review of the projection methodology previously used for the mining category. The TWDB determined that the projections need to better reflect reported historical water use. The mining industry in Texas is critical to the State's and the Nation's economy, and the availability of adequate water is essential to many mining sectors. Accurate water-use estimates, and long-range projections associated with this industry are critical to the Texas water planning process. A more descriptive report can be found here: https://www.twdb.texas.gov/waterplanning/data/projections/MiningStudy/index.asp.

Regardless of methodologies, the Planning Group anticipates that water demand is likely underestimated and, therefore, an emphasis is being made in this planning document to recognize a need for more water than is justified simply from the population-derived water demand quantities.

Table 2-2 lists the current and future projected regional water demand by county and water-use category. Figure 2-4 shows projected water demand by county in acre-feet per year. Water demand is reported in "acre-feet"; one acre-foot is equivalent to a quantity of water one-foot deep occupying one acre, or 325, 851 gallons.

Figure 2-5 presents the distribution of water demand in the Region by the six water-use categories. From the 2030 decade to the 2080 decade the total water demand in the Region is projected to increase from 50,980 acre-feet to 53,522 acre-feet.

The potential role of conservation is an important factor in projecting future water-supply requirements. In this *Plan*, conservation is included in the municipal projections as a measure of expected savings based on requirements of the State plumbing code. All other conservation practices are discussed in terms of water-supply management strategies in Chapter 5 and as a component of drought management plans in Chapter 7.

As stated previously, the PWPG is concerned that the population and subsequent water demand projections throughout the Region may be understated due to the large number of temporary residents in the Region including hunters, tourists and absentee landowners. In addition to these factors, water demand may be understated in Kerr County (as well as elsewhere in the Region) because the cohort-

component model does not reflect market and business factors that are expected to increase water demand in the County, especially in the municipal and manufacturing use category. Population estimates do not consider population density, which concentrates water demand and strains available local water supplies.

The following sections present an overview of water-supply demands for Major Water Providers (MWPs) and for each of the six-designated water-use categories and include methods and assumptions used in the State's consensus water planning process.

Table 2-2. Plateau Region Water Demand Projections
(Acre-Feet per Year)

	2030	2040	2050	2060	2070	2080
Bandera County - Guadalupe Basin						
County-Other	12	12	13	13	13	13
Livestock	1	1	1	1	1	1
Guadalupe Basin Total Water Demand	**13**	**13**	**14**	**14**	**14**	**14**
Bandera County - Nueces Basin						
County-Other	113	115	117	120	122	124
Mining	1	1	1	1	1	1
Livestock	64	64	64	64	64	64
Irrigation	325	325	325	325	325	325
Nueces Basin Total Water Demand	**503**	**505**	**507**	**510**	**512**	**514**
Bandera County - San Antonio Basin						
Bandera	347	353	360	367	374	382
Bandera County FWSD #1	342	348	355	363	370	377
County-Other	1,888	1,916	1,954	1,993	2,033	2,074
Mining	1	1	2	2	2	2
Livestock	232	232	232	232	232	232
Irrigation	1,301	1,301	1,301	1,301	1,301	1,301
San Antonio Basin Total Water Demand	**4,111**	**4,151**	**4,204**	**4,258**	**4,312**	**4,368**
Bandera County Total Water Demand	**4,627**	**4,669**	**4,725**	**4,782**	**4,838**	**4,896**
Edwards County - Colorado Basin						
Rocksprings	109	87	70	59	49	39
County-Other	15	12	9	8	7	5
Livestock	62	62	62	62	62	62
Irrigation	103	103	103	103	103	103
Colorado Basin Total Water Demand	**289**	**264**	**244**	**232**	**221**	**209**
Edwards County - Nueces Basin						
Rocksprings	66	53	42	36	30	23
County-Other	36	28	24	19	16	13
Mining	12	12	12	12	12	12
Livestock	256	256	256	256	256	256
Irrigation	128	128	128	128	128	128
Nueces Basin Total Water Demand	**498**	**477**	**462**	**451**	**442**	**432**
Edwards County - Rio Grande Basin						
County-Other	7	6	4	4	3	2
Livestock	156	156	156	156	156	156
Irrigation	87	87	87	87	87	87
Rio Grande Basin Total Water Demand	**250**	**249**	**247**	**247**	**246**	**245**
Edwards County Total Water Demand	**1,037**	**990**	**953**	**930**	**909**	**886**
Kerr County - Colorado Basin						
County-Other	96	100	103	108	113	118
Livestock	28	28	28	28	28	28
Irrigation	97	97	97	97	97	97
Colorado Basin Total Water Demand	**221**	**225**	**228**	**233**	**238**	**243**
Kerr County - Guadalupe Basin						
Kerrville	7,839	8,174	8,426	8,829	9,236	9,625
Kerrville South Water	457	475	490	513	537	560
County-Other	3,200	3,332	3,436	3,599	3,765	3,923
Manufacturing	27	28	29	30	31	32
Mining	201	201	201	201	201	201
Livestock	815	815	815	815	815	815
Irrigation	1,865	1,865	1,865	1,865	1,865	1,865
Guadalupe Basin Total Water Demand	**14,404**	**14,890**	**15,262**	**15,852**	**16,450**	**17,021**

Table 2-2. (continued) Plateau Region Water Demand Projections
(Acre-Feet per Year)

	2030	2040	2050	2060	2070	2080
Kerr County - Nueces Basin						
County-Other	1	1	1	2	2	2
Livestock	3	3	3	3	3	3
Nueces Basin Total Water Demand	**4**	**4**	**4**	**5**	**5**	**5**
Kerr County - San Antonio Basin						
County-Other	38	40	41	43	45	47
Livestock	43	43	43	43	43	43
Irrigation	66	66	66	66	66	66
San Antonio Basin Total Water Demand	**147**	**149**	**150**	**152**	**154**	**156**
Kerr County Total Water Demand	**14,776**	**15,268**	**15,644**	**16,242**	**16,847**	**17,425**
Kinney County - Nueces Basin						
County-Other	3	3	3	3	3	2
Livestock	49	49	49	49	49	49
Irrigation	2,357	2,357	2,357	2,357	2,357	2,357
Nueces Basin Total Water Demand	**2,409**	**2,409**	**2,409**	**2,409**	**2,409**	**2,408**
Kinney County - Rio Grande Basin						
Brackettville	528	499	481	470	459	447
Fort Clark Springs MUD	727	688	663	647	632	616
County-Other	65	61	59	57	56	56
Livestock	193	193	193	193	193	193
Irrigation	4,377	4,377	4,377	4,377	4,377	4,377
Rio Grande Basin Total Water Demand	**5,890**	**5,818**	**5,773**	**5,744**	**5,717**	**5,689**
Kinney County Total Water Demand	**8,299**	**8,227**	**8,182**	**8,153**	**8,126**	**8,097**
Real County - Colorado Basin						
County-Other	3	3	2	2	2	1
Irrigation	17	17	17	17	17	17
Colorado Basin Total Water Demand	**20**	**20**	**19**	**19**	**19**	**18**
Real County - Nueces Basin						
Camp Wood	147	124	106	92	78	64
Leakey	143	121	104	90	77	62
County-Other	210	177	151	131	111	92
Manufacturing	2	2	2	2	2	2
Livestock	261	261	261	261	261	261
Irrigation	308	308	308	308	308	308
Nueces Basin Total Water Demand	**1,071**	**993**	**932**	**884**	**837**	**789**
Real County Total Water Demand	**1,091**	**1,013**	**951**	**903**	**856**	**807**
Val Verde County - Rio Grande Basin						
Del Rio Utilities Commission	12,977	12,985	13,017	13,048	13,079	13,110
Laughlin AFB	969	967	967	967	967	967
County-Other	2,400	2,424	2,455	2,466	2,478	2,490
Manufacturing	8	8	8	8	8	8
Mining	97	105	114	122	129	137
Livestock	492	492	492	492	492	492
Irrigation	4,207	4,207	4,207	4,207	4,207	4,207
Rio Grande Basin Total Water Demand	**21,150**	**21,188**	**21,260**	**21,310**	**21,360**	**21,411**
Val Verde County Total Water Demand	**21,150**	**21,188**	**21,260**	**21,310**	**21,360**	**21,411**
Region J Total Water Demand	**50,980**	**51,355**	**51,715**	**52,320**	**52,936**	**53,522**

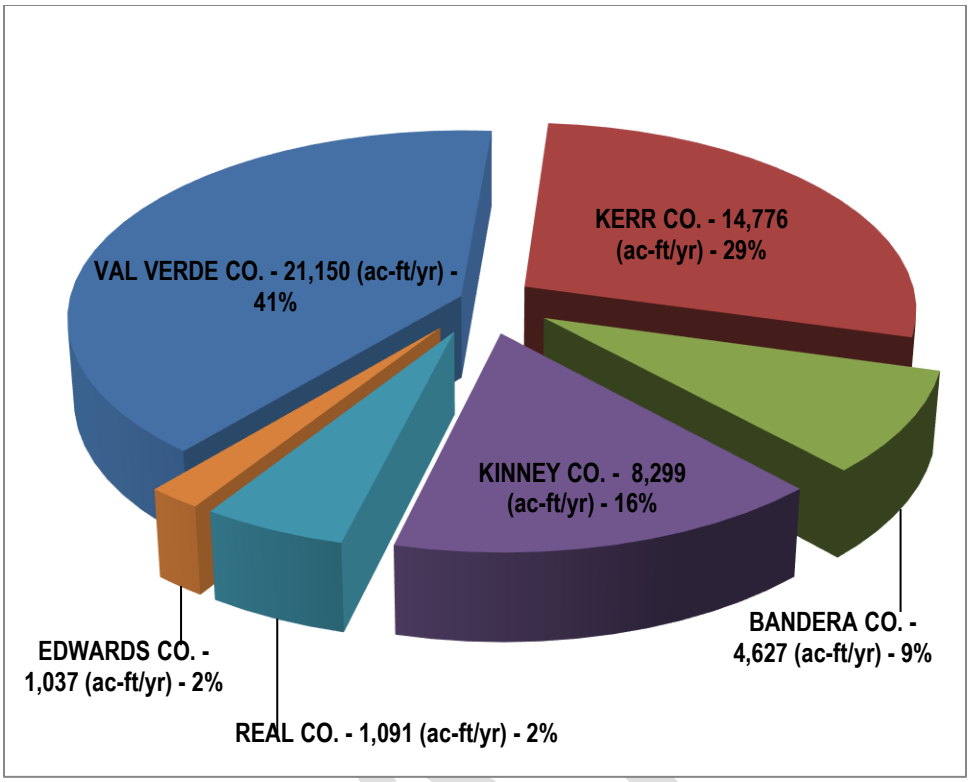

Figure 2-4. Year 2030 Projected Water Demand by County

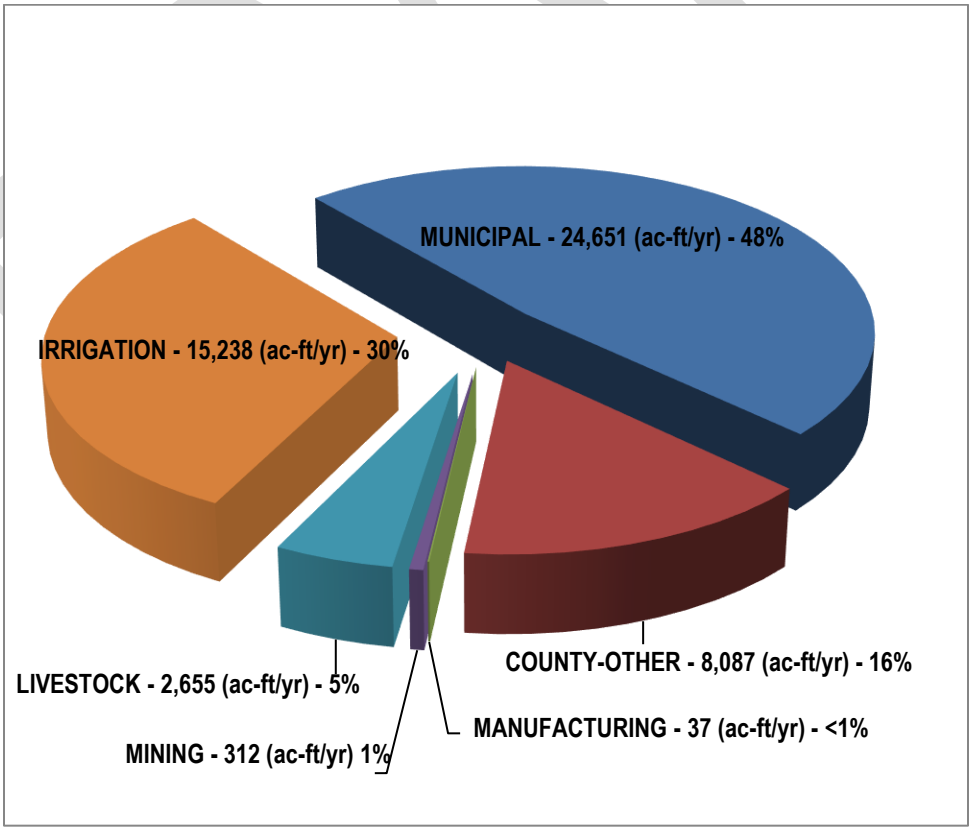

Figure 2-5. Year 2030 Projected Water Demand by Water Use Category

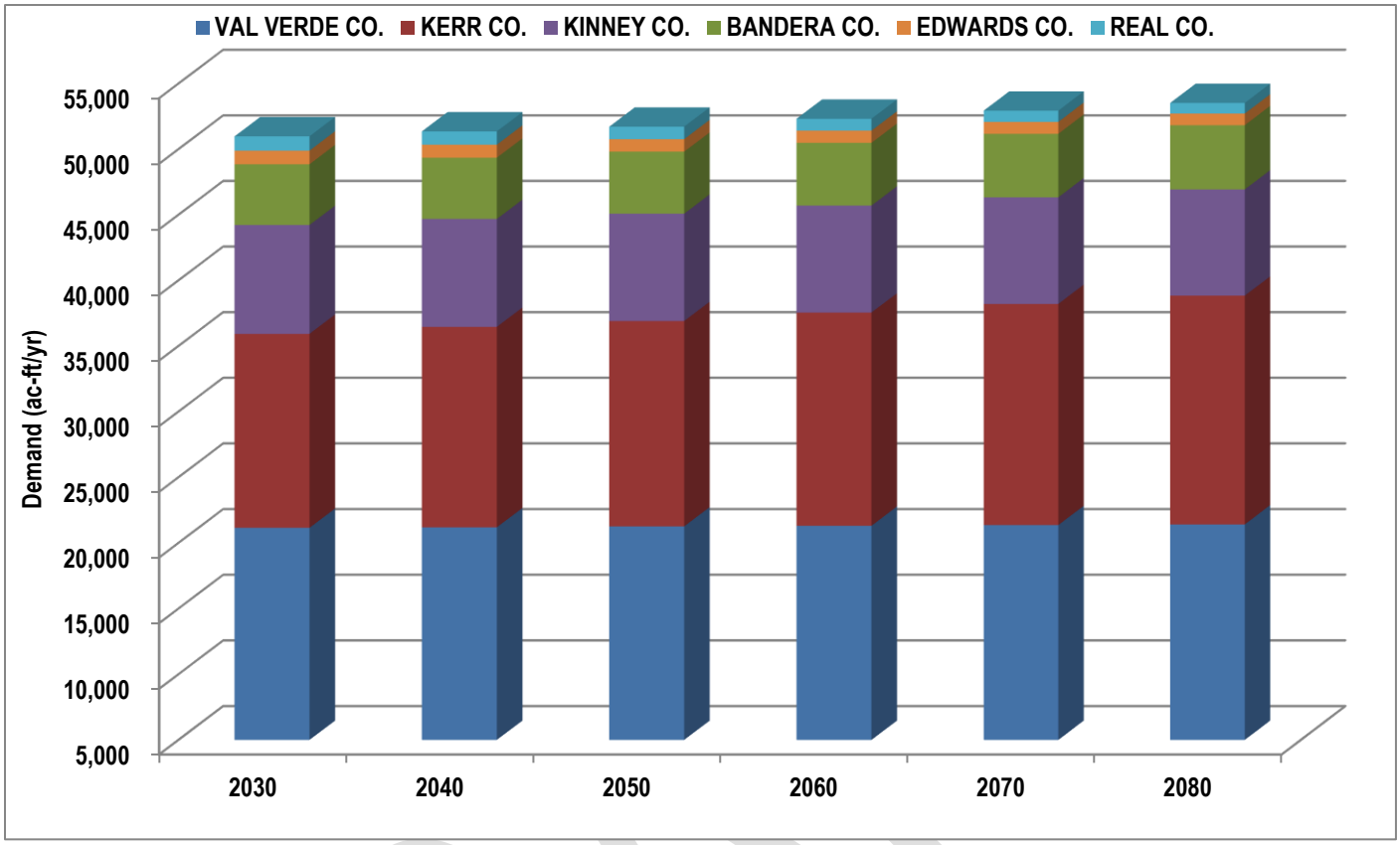

Figure 2-6. Projected Water Demand by County

2.2.2 Municipal and County-Other

The quantity of water used for municipal and county-other is heavily dependent on population growth, climatic conditions, and water conservation measures. For planning purposes, municipal water use comprises both residential and commercial. Commercial water use includes business establishments, public offices, and institutions. Residential and commercial uses are categorized together because they are similar types of uses i.e., they both use water primarily for drinking, cleaning, sanitation, air conditioning, and landscape watering. Also included in this category is water supplied to golf courses from municipal supply sources. Water use within a utility service area that is not included in the quantification of municipal demand, is that used in manufacturing and industrial processes that are self-supplied.

Municipal and county-other water demand is calculated based on utility service boundaries designated in the population projections process and include rural domestic use. Projected municipal and county-other water demand is based on the year 2020 per-capita water use, which is calculated with year 2020 population counts divided into reported water use for the same year. Per-capita water use in communities with significant non-residential water demands, such as commercial customers will appear abnormally high. Table 2-3 presents municipal savings due to the expected installation of more water efficient fixtures and appliances. The conservation adjusted per-capita water use is then applied to each of the decade population estimates to produce the projected water demand for each entity. Table 2-4 presents the municipal and county-other projected water use for each decade in the current planning cycle.

Table 2-3. Municipal Savings Due to Plumbing Fixture Requirements
(Acre-Feet per Year)

County	Entity Name	2030	2040	2050	2060	2070	2080
Bandera	Bandera	11	13	13	13	13	14
	Bandera County FWSD#1	6	6	6	6	6	7
	County-Other	100	113	115	117	120	122
Edwards	Rocksprings	4	3	3	2	2	1
	County-Other	3	2	2	2	1	1
Kerr	Kerrville	191	224	231	242	253	263
	Kerrville South	19	22	23	24	25	26
	County-Other	110	129	133	139	145	152
Kinney	Brackettville	5	6	6	5	5	5
	Fort Clark Springs MUD	8	8	8	8	7	7
	County-Other	3	3	3	3	3	3
Real	Camp Wood	2	2	2	1	1	1
	Leakey	1	1	1	1	1	1
	County-Other	11	10	9	8	6	5
Val Verde	Del Rio	185	208	208	209	209	210
	Laughlin AFB	10	12	12	12	12	12
	County-Other	90	105	106	107	107	108
Total		**758**	**866**	**879**	**898**	**918**	**937**

Municipal (and county-other) water demand in the Plateau Region is projected to increase from 32,731 acre-feet in 2030 to 35,232 acre-feet by 2080 (Table 2-4). Because municipal water demand is directly related to population, Val Verde County has the highest demand in the Region.

Table 2-4. Municipal and County-Other Water Demand Projection
(Acre-Feet per Year)

County	2030	2040	2050	2060	2070	2080
Bandera	2,702	2,744	2,799	2,856	2,912	2,970
Edwards	226	180	145	122	102	80
Kerr	11,631	12,122	12,497	13,094	13,698	14,275
Kinney	1,323	1,251	1,206	1,177	1,150	1,121
Real	503	425	363	315	268	219
Val Verde	16,346	16,376	16,439	16,481	16,524	16,567
County Total Demand	**32,731**	**33,098**	**33,449**	**34,045**	**34,654**	**35,232**

A significant portion of the municipal water demand in Bandera and Kerr Counties is assigned to the county-other category. This category represents the aggregation of utilities that provide less than an average of 100 acre-feet per year, as well as rural areas not served by a water utility in a given county. Table 2-5 presents a listing of water systems that comprise the county-other category along with the corresponding annual water use survey data (2015-2019).

Table 2-5. County-Other Water Supply Entities
(Acre-Feet per Year)

	2015	2016	2017	2018	2019
Bandera County-Other					
Pecan Grove	5	6	5	6	5
Hill Country MHP	-	-	5	5	5
Latigo Ranch Subdivision	4	6	6	7	10
Lakehills Homestead & RV Park	-	0	-	0	0
Summit Ridge	-	-	-	-	14
Medina WSC	98	50	50	42	48
Lake Medina Shores	92	113	117	125	126
Bandera River Ranch 1	65	57	60	61	45
Bandera ISD - Bandera High School	-	-	-	-	-
Bandera ISD - Alkek Elementary	-	-	-	-	-
Bandina	-	-	-	-	-
Bandera Homestead Condominiums	-	-	-	-	-
TPWD Lost Maples SNA	-	-	-	-	-
Enchanted River Estates	54	41	38	38	34
Flying L Ranch PUD	47	52	53	58	58
Lakewood Water	28	28	28	28	28
The Falls WSC	13	15	17	20	16
Ranch Hills WSC	13	14	14	11	10
River Bend Estates	13	16	14	17	15
Blue Medina Water	13	13	13	13	13
Elmwood Estates	10	10	10	10	10
Bear Springs Trails WSC	5	6	10	6	7
Comanche Cliffs	3	12	3	14	3
Medina Highlands	3	3	3	5	5
San Julian Creek Estates	-	0	0	0	0
Medina Childrens Home	13	14	16	19	14
Cielo Rio Ranch Water System	9	-	9	10	13
Bridlegate Subdivision	32	32	38	43	42
Bandera County-Other Total Water Use	**474**	**449**	**451**	**472**	**437**
Edwards County-Other					
Barksdale WSC	15	15	16	17	14
Edwards County-Other Total Water Use	**15**	**15**	**16**	**17**	**14**

Table 2-5. (continued) County-Other Water Supply Entities
(Acre-Feet per Year)

	2015	2016	2017	2018	2019
Kerr County-Other					
Hermann Sons Home	15	14	14	13	13
Mo-Ranch Presbyterian Assembly	58	53	62	60	61
Forest Oaks MHP	4	4	4	4	4
Heavens MHP	-	-	-	-	-
Silver Hills Park	5	4	6	4	4
Triple T RV Resort	4	7	11	13	7
Sky Harbor Ranchettes Water System	11	13	7	8	5
Saddle Mountain Water Cooperative	13	18	12	15	12
Solar Village HOA	3	4	4	3	3
Fall Branch Estates	5	4	5	6	6
Camp La Junta	11	12	13	12	16
Camp Mystic	14	13	13	12	12
Youth Camps Inc. - Pot O Gold Ranch	6	10	6	7	6
Bonita Homeowners Association	1	2	2	2	1
Buckhorn Lake Resort	10	8	9	19	16
Camp Camp	4	6	5	5	7
Camp Chrysalis	4	3	3	3	3
Camp Rio Vista	13	13	13	13	13
Camp Stewart	20	22	25	20	9
Camp Waldemar	23	26	22	21	27
Johnson Creek RV Resort	2	3	3	4	3
Echo Hill Ranch	1	1	2	2	3
Heart O'the Hills Camp	8	9	9	11	12
Las Colinas of Kerrville	10	11	9	9	11
Hill Country Youth Ranch	13	13	12	12	12
Hillcrest Inn	3	4	5	3	3
LaHacienda Treatment Center	15	16	15	17	19
Hill Country Youth Ranch-Enhanced Horizons	1	1	2	1	3
Starlite Recovery Center	11	12	12	12	8
Camp Tecaboca	3	3	2	3	2
Texas Lions Camp	13	29	16	20	14
USDA Livestock Insect Research Lab	4	2	3	3	3
Hill Country Camp	5	6	7	9	5
Boy Scouts of America	9	11	9	10	7
Hill Country Arts Foundation	1	2	1	2	1
Turtle Creek Industries (Kamp Kickapoo)	0	0	0	1	0
Comanche Trace Ranch	9	4	3	4	4
Ingram Dam Center, LLC	0	0	0	1	2
Camp Verde General Store	3	3	2	2	2
YMCA-Roberts Ranch	0	0	0	0	1
Japonica Hills HOA	6	5	7	10	6
Old River Road RV Resort	0	2	6	9	13
Oak Forest Subdivision	52	45	52	48	65
Westwood Park Water System	24	28	27	28	30
Nickerson Farm Water System	13	37	30	27	21
Verde Park Estates	13	14	16	16	15
Hills & Dales	12	12	12	13	12
Center Point	9	9	10	10	10
Pecan Valley Water System	12	10	12	16	14
Rustic Hills WSC	6	7	7	7	6
Park Place Subdivision	10	9	9	11	10

Table 2-5. (continued) County-Other Water Supply Entities
(Acre-Feet per Year)

	2015	2016	2017	2018	2019
Kerr County-Other					
Center Point North Water System	20	16	17	18	21
Center Point Taylor System	35	37	37	41	45
Kerrville VA Hospital	56	61	57	52	53
Village West Water System	9	9	8	9	7
Camp Flaming Arrow	5	9	10	8	7
Camp Honey Creek	8	9	11	9	7
Ranchero Estates	6	6	9	8	6
TX Dot Kerr County SRA	4	3	4	4	6
Riverfront MHP	14	18	16	14	14
Ingram Tom Moore High School	17	22	19	16	19
City of Kerrville Schreiner Park	6	12	7	5	6
Armadillo Junction RV Park	2	3	3	3	2
Westcreek Estates Water System	40	47	38	52	54
Ingram Water Supply	480	486	488	568	461
Guadalupe Heights Utility	50	45	49	45	45
Canyon Springs Water Works	53	77	73	43	36
Erlund Subdivision	57	61	69	97	67
Southern Hills	50	52	52	62	59
Woods WSC	38	36	36	35	34
Hunt Community Group WSC	36	24	27	28	26
Bumble Bee Hills	31	31	40	44	40
Mary Mead Water System	34	44	20	26	15
Sleepy Hollow	22	20	20	22	21
Fremount Water Company LLC	25	23	28	27	25
Aqua Vista Utilities Company	25	26	28	29	29
Northwest Hills Subdivision	23	23	22	27	30
Kamira Water System	20	17	18	17	15
Wilderness Park	17	12	13	15	15
Bear Paw Ranch	29	29	30	29	31
Royal Oaks Water	13	12	10	12	14
Hill River Country Estates MHP	13	14	16	15	17
Shalako Water Supply	15	11	12	13	11
Horseshoe Oaks Water System	6	6	6	6	9
Castlecomb Water System	12	10	8	10	10
Four Seasons	88	94	85	88	88
Oak Ridge Estates Water System	8	8	8	9	8
Verde Hills WSC	9	10	11	7	10
Split Rock Water System	6	7	9	8	8
Real Oaks Subdivision	9	8	8	7	14
Heritage Park Water Service	5	5	5	6	6
Cherry Ridge Water Company	6	7	8	6	4
Windwood Oaks Water System	4	4	4	5	5
Shermans Mill WSC	3	5	4	3	3
Vista Hills	2	3	2	3	3
Wood Trail Water Supply	17	17	15	15	17
Woodhaven MHP	5	5	6	7	7
Cedar Springs MHV	6	7	8	7	7
Oak Grove MHP	32	24	24	26	17
Ingram Oaks Retirement Community	35	36	37	35	35
Hill Country Ranch Estates	4	5	5	5	5
Serenity Water LLC	13	15	15	14	10

Table 2-5. (continued) County-Other Water Supply Entities
(Acre-Feet per Year)

	2015	2016	2017	2018	2019
Kerr County-Other					
Cypress Springs	37	42	37	43	41
Scenic Valley MHP	15	20	20	17	19
Kerr Villa MHP	11	7	3	7	9
Hideaway MHP	7	7	6	7	7
Country Hills Water	3	4	3	4	3
Cherokee MHP	8	6	-	-	-
Blue Ridge MHP	6	10	6	6	11
Falling Water Subdivision	21	24	26	25	21
Saddlewood Subdivision	44	43	49	52	50
Kerr County-Other Total Water Use	**2,170**	**2,282**	**2,243**	**2,384**	**2,207**
Kinney County-Other					
City of Spofford	11	13	12	15	11
Kinney County-Other Total Water Use	**17**	**17**	**17**	**14**	**14**
Real County-Other					
The Ridge at Frio River Water System	-	-	2	2	2
H.E.B. Family Foundation	-	-	-	-	-
Oakmont Village Saddle Mountain WSC	17	16	17	19	20
Real WSC	17	19	21	24	23
Twin Forks Estates WSC	15	16	17	19	17
Frio Canon Water	-	-	-	13	14
Crown Mountain WSC	-	-	5	6	5
Real County-Other Total Water Use	**49**	**51**	**55**	**62**	**60**
Val Verde County-Other					
Holiday Travel L Park	-	-	0	1	1
American Campground	-	-	0	0	12
San Pedro Village	-	-	0	0	0
Rough Canyon Condos	-	-	4	4	9
Langtry WSC	-	-	-	-	-
Amistad Village Water System	-	-	-	-	-
TPWD Seminole Canyon SHP	-	-	-	-	-
Seguro Water Company	-	-	-	-	-
Laughlin AFB Recreation Area	-	-	-	-	-
Val Verde County WCID Comstock	65	66	71	70	72
Upper San Pedro Canyon Subdivision	34	45	42	43	43
Del Grande Mobile Home Association	26	26	23	23	23
La Caleta Estates	18	18	18	18	18
Devils Shores WSC	13	13	15	14	14
Lago Vista Water System	6	6	6	6	6
Lake Ridge Water System	-	0	0	0	0
Val Verde County-Other Total Water Use	**162**	**174**	**175**	**174**	**176**
Region J County-Other Total Water Use	**2,888**	**2,988**	**2,956**	**3,124**	**2,907**

Note: No survey data provided (-)

2.2.3 Major Water Providers

Recent TWDB rule changes (31TAC §357.30(4)) now require regional water planning groups to identify "Major Water Providers" as opposed to "Wholesale Water Providers" as performed in previous plans. A Major Water Provider (MWP) is defined as a significant public or private WUG or Wholesale Water Provider (WWP) whose significance is determined by the RWPG and provides water for any water-use

category in a regional water planning area. This rule revision gives regional water planning groups more flexibility in identifying which large water providers ought to be reported in their regional water plan.

The PWPG has developed and adopted the following definition of an MWP and feels that this definition captures all significant municipal WUGs or WWPs that provide water for other water-use categories within the Region.

> ***"An entity that currently provides significant water supplies (>10,000 acre-feet per year) to other users and which will continue to develop new supplies to meet future needs of those whom they supply during the period covered by this Plan."***

Del Rio Utilities is the only entity in the Plateau Region to meet this criterion. In addition to its own use, the utility provides water to Laughlin Air Force Base and subdivisions outside of the City. Del Rio also provides water and wastewater services to two colonias, Cienegas Terrace and Val Verde Park Estates. Table 2-6 shows the distribution of water demand supplied by Del Rio Utilities in the Rio Grande River Basin.

Table 2-6. Del Rio Major Water Provider Water Demand (Acre-Feet per Year)

County	Basin	Water User Group	2030	2040	2050	2060	2070	2080
Val Verde	Rio Grande	Del Rio Utilities	12,977	12,985	13,017	13,048	13,079	13,110
		Laughlin AFB (94%)	969	967	967	967	967	967
		County-Other (6%)	2,400	2,424	2,455	2,466	2,478	2,490
Total Wholesale Demand			**16,346**	**16,376**	**16,439**	**16,481**	**16,524**	**16,567**

2.2.4 Manufacturing

Manufacturing water use is one of the three largest uses of water in Texas. In the 2022 State Water Plan, approximately 1.7 million acre-feet was reported within the 2020 planning decade. This represents 10 percent of total water use in the State. In the Plateau Region, manufacturing and industrial water use that is self-supplied is quantified separately from municipal use even though the demand centers may be located within a utility service area. Draft manufacturing water demand projections are based on the highest county aggregated manufacturing water use in the most recent five years (2015 through 2019) of reported annual water use survey data. Values from the water use survey used in the max year calculation consist of gross intake (withdrawals and purchases) minus any sales to other entities. Fresh surface water and groundwater were included in this net use. Additionally, volumes of reuse water, such as treated effluent, and brackish groundwater used by manufacturing facilities were included in the historical water-use estimates and the water demand projections. Rather than holding projected demands constant from 2030 through 2080, as seen in the previous water plan, the TWDB projected water demands linearly using the County Business Patterns (CBP) historical number of manufacturing establishments. In the Plateau Region, the use of water for manufacturing purposes is only recognized in Kerr, Real and Val Verde Counties (Table 2-7).

Table 2-7. Manufacturing Water Demand Projection
(Acre-Feet per Year)

County	2030	2040	2050	2060	2070	2080
Bandera	0	0	0	0	0	0
Edwards	0	0	0	0	0	0
Kerr	27	28	29	30	31	32
Kinney	0	0	0	0	0	0
Real	2	2	2	2	2	2
Val Verde	8	8	8	8	8	8
County Total Demand	**37**	**38**	**39**	**40**	**41**	**42**

2.2.5 Irrigation

Irrigated agriculture is the biggest user of water in Texas. Approximately 7.5 million acre-feet was represented within the 2020 planning decade, of the 2022 State Water Plan. Irrigation water use represents 45 percent of total water use in the State. This is 10 percent greater than municipal water use, which ranks as the second largest use of water State-wide. On a regional level, irrigation accounts for an estimated 15,238 acre-feet per year, approximately 84 percent of the total non-municipal water use.

Irrigation water demand projections utilize an average of TWDB's 2015 through 2019 irrigation water-use estimates as a base. Those values are held constant between 2030 and 2080. Annual water-use estimates are developed at the county level by applying a calculated evapotranspiration-based "crop water need" estimate to reported irrigated acreage from the Farm Service Agency (FSA). These estimates are then adjusted based on surface water release data from TCEQ and Texas Water Masters and comments from Groundwater Conservation Districts. In counties where the total groundwater availability over the planning period is projected to be less than the groundwater portion of the baseline water demand projections, the irrigation water demand projections are held constant for 10 years beyond the point that the groundwater availability falls below the baseline demand, in most cases 2030 to 2040, after projected demands will begin to decline, to be compatible with the groundwater availability. However, this approach to a 'groundwater constrained' area presently does not occur in the Plateau Region.

In addition to the TWDB irrigation methodology described above, The PWPG reviewed annual historical water-use estimates spanning across the previous 10 years (2011 through 2020). These estimates are produced using information from the annual water-use survey and can be found on the TWDB's website: https://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/index.asp.

The revised data shown on Table 2-8 include the maximum annual historical water-use estimates for all counties within the Plateau Region. These values will be held constant throughout the planning horizon (2030 through 2080). This approach was found satisfactory for use in this current regional water plan.

Statewide, irrigation water demands are expected to decline over time. More efficient canal delivery systems have improved water-use efficiencies of surface water irrigation. More efficient on-farm irrigation systems have also improved the efficiency of groundwater irrigation. Other factors that have contributed to decreased irrigation demands are declining groundwater supplies and the voluntary transfer of water rights historically used for irrigation to municipal uses.

Kinney County has the highest irrigation water use in the Region (44 percent). Edwards and Kinney Counties are the only counties in which irrigation use is greater than municipal use (Table 2-8). Elsewhere in the Region, most irrigation that occurs is for the watering of pastures and hay fields. Because of the typically rocky and uneven terrain throughout much of the Region, irrigation of

commercial row crops is minimal. On a regional basis, water used for irrigation is projected to be held constant at approximately 15,238 acre-feet per year over the 50-year planning horizon. However, as any irrigator can attest, climate, water availability, and the market play key roles in how much water is actually applied on a year-by-year basis.

The PWPG is concerned about the accuracy of the irrigation surveys and believes that there is significantly more irrigation water use than is documented. For example, numerous small, irrigated exotic and wildlife feed plots are likely not identified. Also, groundwater used to irrigate golf courses, if not provided by municipalities, may not be accounted for in the irrigation survey estimates. These withdrawals may have a significant impact on local supplies.

Table 2-8. Irrigation Water Demand Projection
(Acre-Feet per Year)

County	2030	2040	2050	2060	2070	2080
Bandera	1,626	1,626	1,626	1,626	1 ,626	1,626
Edwards	318	318	318	318	318	318
Kerr	2,028	2,028	2,028	2,028	2,028	2,028
Kinney	6,734	6,734	6,734	6,734	6,734	6,734
Real	325	325	325	325	325	325
Val Verde	4,207	4,207	4,207	4,207	4,207	4,207
County Total Demand	**15,238**	**15,238**	**15,238**	**15,238**	**15,238**	**15,238**

2.2.6 Livestock

Texas leads the Nation in the number of farms and ranches, with 248,416 farms and ranches covering 127 million acres (Texas Department of Agriculture, 2023). Although livestock production is an important component of the Texas economy, the industry consumes a relatively small amount of water. A total of 328,950 acre-feet per year, was the State-wide reported water use in 2020. This represents two percent of total water use in the State. Within the Plateau Region, livestock water use is 15 percent of the total non-municipal water use.

Livestock water demand projections are a combination of an average of the 2015 through 2019 water-use survey information provided by the TWDB, which is based on livestock inventory data from the National Agricultural Statistical Service (NASS) and the Texas Department of Agriculture, and per head water use consumptions by animal class (Table 2-9). County-level water-use estimates are calculated by applying a water use coefficient for each livestock category to county-level inventory estimates. The rate of change for projections from the 2021 Regional Water Plan was then applied to the new base. Many counties chose to hold the base constant throughout the planning horizon. Data highlighted in grey within the *2026 PRWP* column were updates made to the 2021 assumptions, to include the new water use per head coefficients.

Table 2-9. Estimated per Head Daily Water Use Comparison, (2021 and 2026 RWPs) (in gallons)

TWDB category	Subcategory	2021 RWP water use (gal/head/day)	2026 RWP water use (gal/head/day)
Cattle	Milk	75	55
	Fed & other cattle	15	15
Chickens	Non-broilers	0.086	0.09
	Broilers	0.077	0.09
Turkeys	Turkeys	0.2	0.2
Equine	Horses, ponies, mules, burros, & donkeys	12	12
Hogs	Hogs	11	5
Sheep	Sheep	2	2
Goats	Milk	0.5	2

Source: University of Georgia - College of Agricultural and Environmental Sciences, 2009

For water-supply planning purposes, in the *2026 Plateau Region Water Plan*, livestock water demand is held constant throughout the 50-year planning period. However, reality dictates that during prolonged drought periods, when poor range conditions exist and/or during unfriendly market conditions, livestock herds are generally reduced, thus resulting in significantly less water demand. Kerr County has the greatest livestock water use (889 acre-feet per year) in the Region (Table 2-10).

In recent years, an expanding use of groundwater in the Region has been to fill and maintain artificial lakes that primarily are intended to add aesthetic value to the property. Although not quantified, the amount of water pumped from local aquifers for this purpose is likely significant and is not reflected in the water demand estimates provided in this chapter. To manage the volume of groundwater used for this purpose, the Headwaters Groundwater Conservation District in Kerr County permits a maximum production of one acre-foot (325,851 gallons) per year.

Exotic game ranching has become commonplace throughout the State and is quite evident in the Plateau Region counties. Bandera and Kerr Counties have the largest population of exotic game in the State (Texas A&M Exotics on the Range). The total number of exotic game likely may equal or even exceed domestic livestock. Yet the livestock water demand projections reported in this *Plan* do not fully reflect this water use.

High game fences that come with the exotic game industry often block the ability of both native and exotic game to access surface water, thus requiring more wells and groundwater use. Groundwater is also often used to irrigate small acreage feed plots for these animals. Future water plans will need to attempt to quantity this specific use and include it in the overall total projected water needs in the State.

In an analysis report prepared for the PWPG in 2010, “Water Use by Livestock and Game Animals in the Plateau Regional Water Planning Area,” the amount of water used by various exotic game species is estimated. However, the report states that there is insufficient data on the number of animals in the Region to make an estimate of total use. Estimates made by the Real-Edwards Conservation and Reclamation District find that approximately 602 and 233 acre-feet per year in Edwards and Real Counties is consumed by exotic game animals.

Table 2-10. Livestock Water Demand Projection
(Acre-Feet per Year)

County	2030	2040	2050	2060	2070	2080
Bandera	297	297	297	297	297	297
Edwards	474	474	474	474	474	474
Kerr	889	889	889	889	889	889
Kinney	242	242	242	242	242	242
Real	261	261	261	261	261	261
Val Verde	492	492	492	492	492	492
County Total Demand	**2,655**	**2,655**	**2,655**	**2,655**	**2,655**	**2,655**

2.2.7 Mining

Total water use for all purposes in Texas in 2019 was approximately 14.1 million acre-feet per year. Water use by the mining industry is about 395,000 acre-feet per year, representing approximately three percent of total water use in the State. In the Plateau Region, mining water use is approximately two percent of the total non-municipal water use. Mining water use is projected to increase slightly over the planning horizon, primarily as a result of increased demand for aggregate industry products.

Although the Texas mineral industry is foremost in the production of crude petroleum and natural gas in the United States, it also produces a wide variety of important nonfuel minerals. In all instances, water is required in the mining of these minerals either for processing, leaching to extract certain ores, controlling dust at the plant site, or for reclamation.

Mining water demand projections were reevaluated in this current cycle of regional water planning. United States Geological Survey (USGS) granted funding to the TWDB for a study on mining use and projections through the Water Use and Research Data Program. Through a contract between TWDB and University of Texas Bureau of Economic Geology, the 2011-2012 study was updated. The new report titled “Water Use by the Mining Industry in Texas” was published in August of 2022. The goals of this report were to: (1) provide a comprehensive and quantitative assessment of mining water use across Texas, and (2) improve the development process and accuracy of water use estimates and water demand projections. For more detail, the complete report can be found on the TWDB’s website: https://www.twdb.texas.gov/waterplanning/data/projections/MiningStudy/index.asp.

In Texas, there is an ongoing need for additional fresh water sources, and an unregulated/largely unknown amount of freshwater use occurs in the exploration for oil and gas within the State. The Oil and Gas industry is strongly encouraged to use brackish and / or recycled water in exploration so that fresh water can be preserved for human needs. Table 2-11 presents the mining water demand projections within the Plateau Water Planning area.

Table 2-11. Mining Water Demand Projection
(Acre-Feet per Year)

County	2030	2040	2050	2060	2070	2080
Bandera	2	2	3	3	3	3
Edwards	12	12	12	12	12	12
Kerr	201	201	201	201	201	201
Kinney	0	0	0	0	0	0
Real	0	0	0	0	0	0
Val Verde	97	105	114	122	129	137
County Total Demand	**312**	**320**	**330**	**338**	**345**	**353**

2.3 ENVIRONMENTAL AND RECREATIONAL WATER NEEDS

Environmental and recreational water use in the Plateau Region is not quantified but is recognized as being an important consideration as it relates to the natural community in which the residents of this Region share and appreciate. In Chapter 1, environmental and recreational resources are identified and described. In this section, the water resources needed to maintain these functions are discussed. Water-supply sources that serve environmental needs are characterized in Chapter 3 and potential water-supply strategy consequences on the environment are analyzed in Chapter 5.

All living organisms require water. The amount and quality of water required to maintain a viable population, whether it is plant or animal, is highly variable. While some individuals are capable of migrating long distances in search of water (birds, larger mammals, etc.), others are stationary (plants, fishes, etc.) and must rely on existing supplies.

Natural and environmental resources are often overlooked when considering the consequences of prolonged drought conditions. As water supplies diminish during drought periods, the balance between both human and environmental water requirements becomes increasingly competitive. A goal of this *Plan* is to provide for the health, safety, and welfare of the human community, with as little detrimental effect to the environment as possible. To accomplish this goal, the evaluation of strategies to meet future water needs includes a distinct consideration of the impact that each implemented strategy might have on the environment.

As discussed in Section 2.2.6 (livestock), an expanding use of groundwater in the Region has been to fill and maintain artificial lakes. Although this use may exert stress on the local aquifer system, the resulting impoundments do provide aesthetic value to the property and a water source for wildlife.

Recreational activities that involve human interaction with the outdoors environment are often directly dependent on water resources such as fishing, swimming and boating; while a healthy environment enhances many others, such as hunting, hiking, and bird watching. Thus, it is recognized that the maintenance of the regional environmental community's water-supply needs serves to enhance the lives of citizens of the Plateau Region as well as the multitude of annual visitors to this Region.

In Chapter 5, each water management strategy contains an environmental impact assessment. A review of these strategies reveals that while some strategies may contain variable levels of negative impact, other strategies may likely have a positive effect. Negative environmental impacts are generally associated with the lowering of aquifer water levels due to increased groundwater withdrawals and its potential to cause a reduction or cessation of spring flow. Also, of concern is that lowered water levels could deplete supplies in shallow livestock wells, which are often the only available source of water for some wildlife. The positive environmental aspect of the strategies is that during severe drought conditions when normal wildlife water supplies may naturally diminish, new supply sources might be developed such that wildlife could benefit. Water-supply availability estimated for surface water management strategies in Chapter 5 follow the modeled application of environmental flow standards in TCEQ 30 TAC Chapter 298 rules or the 1997 Consensus Criteria for Environmental Needs.

This page intentionally left blank