CHAPTER 3

REGIONAL WATER SUPPLY SOURCES

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3 REGIONAL WATER SUPPLY SOURCES

From the semi-arid Hill Country to the arid Rio Grande Basin, both groundwater and surface water are critical resources for the livelihood of the citizens of the Plateau Region and the environment in which they reside. Chapter 3 explores the current and future availability of all water supply resources in the Region including groundwater, surface water, springs, and reuse. The water demand and supply availability analysis developed in Chapters 2 and 3, respectively, form the basis for identifying in Chapter 4 the areas within the Plateau Region that potentially could experience supply shortages in future years. The following tables list water supplies available to meet future needs (demands) reported in Chapter 2.

- Table 3-1 lists groundwater and surface water availability as estimated in each identified source (aquifer, river, spring) by county and river basin. Water source availability analyses, including water-quality concerns, are discussed in more detail in Section 3.1 (groundwater) and Section 3.2 (surface water).

- Table 3-2 lists water supplies available to municipal utilities and general water use categories based on the current infrastructure ability of each to obtain water supplies. These abilities primarily include existing infrastructure, water-rights limitations, and Groundwater Conservation District (GCD) permit limitations.

- Table 3-3 lists water supplies available to Del Rio Utilities as a major water provider.

Only three municipal utilities within the Plateau Region derive municipal supplies from surface water or spring sources. The City of Kerrville currently uses surface water from the Guadalupe River in conjunction with their groundwater supply. Kerrville also injects excess treated surface water into the Trinity Aquifer through an aquifer storage and recovery (ASR) facility.

The City of Del Rio obtains most of its water supply from San Felipe Springs, which issues from the Edwards limestone. The ~~s~~Spring water is treated to drinking water standards in a ~~new~~ microfiltration plant prior to distribution. For planning purposes, San Felipe Springs is recognized as a surface water source that falls within the Rio Grande Run-of-River. Currently, due to critically low water levels in the spring, the City of Del Rio has been forced to drill a pilot well approximately 250 feet below the surface in hopes of obtaining a supplemental source of water supply.

Camp Wood in Real County is supplied from Old Faithful Springs on a tributary of the Nueces River. Similar to the San Felipe Springs, Old Faithful Springs' water levels are also very low due to prolonged drought conditions, making the Spring an unreliable water supply source. The City of Camp Wood is working on developing two shallow groundwater alluvium wells that will provide a more reliable source of water supply.

All other communities in the Region are totally dependent on groundwater sources for their supplies. All water supplies based upon contracts are assumed to be renewed.

Table 3-1. Water Source Availability (Acre-Feet per Year)

Groundwater	County	Basin	Salinity*	2030	2040	2050	2060	2070	2080
Austin Chalk Aquifer	Kinney	Nueces	Brackish	875	875	875	875	875	875
Austin Chalk Aquifer	Kinney	Rio Grande	Brackish	1,894	1,894	1,894	1,894	1,894	1,894
Edwards-BFZ Aquifer	Kinney	Nueces	Fresh	6,319	6,319	6,319	6,319	6,319	6,319
Edwards-BFZ Aquifer	Kinney	Rio Grande	Fresh	2	2	2	2	2	2
Edwards-Trinity (Plateau) Aquifer	Bandera	Guadalupe	Fresh	81	81	81	81	81	81
Edwards-Trinity (Plateau) Aquifer	Bandera	Nueces	Fresh	38	38	38	38	38	38
Edwards-Trinity (Plateau) Aquifer	Bandera	San Antonio	Fresh	1,890	1,890	1,890	1,890	1,890	1,890
Edwards-Trinity (Plateau) Aquifer	Kerr	Colorado	Fresh	17	17	17	17	17	17
Edwards-Trinity (Plateau) Aquifer	Kerr	Guadalupe	Fresh	962	962	962	962	962	962
Edwards-Trinity (Plateau) Aquifer	Kerr	Nueces	Fresh	5	5	5	5	5	5
Edwards-Trinity (Plateau) Aquifer	Kerr	San Antonio	Fresh	3	3	3	3	3	3
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Edwards	Colorado	Fresh	2,305	2,305	2,305	2,305	2,305	2,305
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Edwards	Nueces	Fresh	1,631	1,631	1,631	1,631	1,631	1,631
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Edwards	Rio Grande	Fresh	1,740	1,740	1,740	1,740	1,740	1,740
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Kinney	Nueces	Fresh	12	12	12	12	12	12
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Kinney	Rio Grande	Fresh	70,329	70,329	70,329	70,329	70,329	70,329
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Real	Colorado	Fresh	277	277	277	277	277	277
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Real	Guadalupe	Fresh	3	3	3	3	3	3
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Real	Nueces	Fresh	7,243	7,243	7,243	7,243	7,243	7,243
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Val Verde	Rio Grande	Fresh	50,000	50,000	50,000	50,000	50,000	50,000
Ellenburger-San Saba Aquifer	Kerr	Colorado	Fresh	200	200	200	200	200	200
Ellenburger-San Saba Aquifer	Kerr	Guadalupe	Fresh	1,802	1,802	1,802	1,802	1,802	1,802
Frio River Alluvium Aquifer	Real	Nueces	Fresh	2,145	2,145	2,145	2,145	2,145	2,145
Hickory Aquifer	Kerr	Colorado	Fresh	0	0	0	0	0	0
Hickory Aquifer	Kerr	Guadalupe	Fresh	0	0	0	0	0	0
Nueces River Alluvium Aquifer	Edwards	Nueces	Fresh	1,787	1,787	1,787	1,787	1,787	1,787
Nueces River Alluvium Aquifer	Real	Nueces	Fresh	1,787	1,787	1,787	1,787	1,787	1,787
Trinity Aquifer	Bandera	Guadalupe	Fresh	76	76	76	76	76	76
Trinity Aquifer	Bandera	Nueces	Fresh/Brackish	903	903	903	903	903	903
Trinity Aquifer	Bandera	San Antonio	Fresh/Brackish	6,305	6,305	6,305	6,305	6,305	6,305
Trinity Aquifer	Kerr	Colorado	Fresh	318	318	318	318	318	318
Trinity Aquifer	Kerr	Guadalupe	Fresh/Brackish	14,056	13,767	13,450	13,434	13,434	13,434
Trinity Aquifer	Kerr	Nueces	Fresh	0	0	0	0	0	0
Trinity Aquifer	Kerr	San Antonio	Fresh	471	471	471	471	471	471
Trinity Aquifer ASR	Kerr	Guadalupe	Fresh	453	453	453	453	453	453
Groundwater Total Source Availability				**175,929**	**175,640**	**175,323**	**175,307**	**175,307**	**175,307**

Groundwater	County	Basin	Salinity*	2020	2030	2040	2050	2060	2070
Austin Chalk Aquifer	Kinney	Nueces	Brackish	875	875	875	875	875	875
Austin Chalk Aquifer	Kinney	Rio Grande	Brackish	1,894	1,894	1,894	1,894	1,894	1,894
Edwards-BFZ Aquifer	Kinney	Nueces	Fresh	6,319	6,319	6,319	6,319	6,319	6,319
Edwards-BFZ Aquifer	Kinney	Rio Grande	Fresh	2	2	2	2	2	2
Edwards-Trinity (Plateau) Aquifer	Bandera	Guadalupe	Fresh	81	81	81	81	81	81
Edwards-Trinity (Plateau) Aquifer	Bandera	Nueces	Fresh	38	38	38	38	38	38
Edwards-Trinity (Plateau) Aquifer	Bandera	San Antonio	Fresh	1,890	1,890	1,890	1,890	1,890	1,890
Edwards-Trinity (Plateau) Aquifer	Kerr	Colorado	Fresh	245	245	245	245	245	245
Edwards-Trinity (Plateau) Aquifer	Kerr	Guadalupe	Fresh	1,015	1,015	1,015	1,015	1,015	1,015
Edwards-Trinity (Plateau) Aquifer	Kerr	Nueces	Fresh	5	5	5	5	5	5
Edwards-Trinity (Plateau) Aquifer	Kerr	San Antonio	Fresh	12	12	12	12	12	12
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Edwards	Colorado	Fresh	2,305	2,305	2,305	2,305	2,305	2,305
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Edwards	Nueces	Fresh	1,631	1,631	1,631	1,631	1,631	1,631
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Edwards	Rio Grande	Fresh	1,740	1,740	1,740	1,740	1,740	1,740
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Kinney	Nueces	Fresh	12	12	12	12	12	12
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Kinney	Rio Grande	Fresh	70,329	70,329	70,329	70,329	70,329	70,329
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Real	Colorado	Fresh	277	277	277	277	277	277
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Real	Guadalupe	Fresh	3	3	3	3	3	3
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Real	Nueces	Fresh	7,243	7,243	7,243	7,243	7,243	7,243
Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	Val Verde	Rio Grande	Fresh	50,000	50,000	50,000	50,000	50,000	50,000
Ellenburger-San Saba Aquifer	Kerr	Colorado	Fresh	200	200	200	200	200	200
Ellenburger-San Saba Aquifer	Kerr	Guadalupe	Fresh	1,802	1,802	1,802	1,802	1,802	1,802
Frio River Alluvium Aquifer	Real	Nueces	Fresh	2,145	2,145	2,145	2,145	2,145	2,145
Hickory Aquifer	Kerr	Colorado	Fresh	0	0	0	0	0	0
Hickory Aquifer	Kerr	Guadalupe	Fresh	0	0	0	0	0	0
Nueces River Alluvium Aquifer	Edwards	Nueces	Fresh	1,787	1,787	1,787	1,787	1,787	1,787
Nueces River Alluvium Aquifer	Real	Nueces	Fresh	1,787	1,787	1,787	1,787	1,787	1,787
Trinity Aquifer	Bandera	Guadalupe	Fresh	76	76	76	76	76	76
Trinity Aquifer	Bandera	Nueces	Fresh/Brackish	903	903	903	903	903	903
Trinity Aquifer	Bandera	San Antonio	Fresh/Brackish	6,305	6,305	6,305	6,305	6,305	6,305
Trinity Aquifer	Kerr	Colorado	Fresh	318	318	318	318	318	318

~~**Table 3-1. (Continued). Water Source Availability (Acre-Feet per Year)**~~

~~Groundwater~~	~~County~~	~~Basin~~	~~Salinity*~~	~~2020~~	~~2030~~	~~2040~~	~~2050~~	~~2060~~	~~2070~~
~~Trinity Aquifer~~	~~Kerr~~	~~Guadalupe~~	~~Fresh/Brackish~~	~~14,129~~	~~14,056~~	~~13,767~~	~~13,450~~	~~13,434~~	~~13,434~~
~~Trinity Aquifer~~	~~Kerr~~	~~Nueces~~	~~Fresh~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~
~~Trinity Aquifer~~	~~Kerr~~	~~San Antonio~~	~~Fresh~~	~~471~~	~~471~~	~~471~~	~~471~~	~~471~~	~~471~~
~~Trinity Aquifer ASR~~	~~Kerr~~	~~Guadalupe~~	~~Fresh~~	~~453~~	~~453~~	~~453~~	~~453~~	~~453~~	~~453~~
~~**Groundwater Total Source Availability**~~				~~**176,292**~~	~~**176,219**~~	~~**175,930**~~	~~**175,613**~~	~~**175,597**~~	~~**175,597**~~

Reuse Source Name | Type	County	Basin	Salinity*	2030	2040	2050	2060	2070	2080
Direct Reuse	Kerr	Guadalupe	Fresh	5,000	5,000	5,000	5,000	5,000	5,000
Direct Reuse	Bandera	San Antonio	Fresh	310	310	310	310	310	310
Reuse Total Source Availability				**5,310**	**5,310**	**5,310**	**5,310**	**5,310**	**5,310**

Surface Water	County	Basin	Salinity*	2030	2040	2050	2060	2070	2080
Colorado Livestock Local Supply	Real	Colorado	Fresh	0	0	0	0	0	0
Colorado Run-of-River	Edwards	Colorado	Fresh	25	25	25	25	25	25
Guadalupe Livestock Local Supply	Kerr	Guadalupe	Fresh	457	457	457	457	457	457
Guadalupe Run-of-River	Bandera	Guadalupe	Fresh	3	3	3	3	3	3
Guadalupe Run-of-River	Kerr	Guadalupe	Fresh	1,502	1,502	1,502	1,502	1,502	1,502
Medina Lake/Reservoir	Reservoir	San Antonio	Fresh	0	0	0	0	0	0
Nueces Livestock Local Supply	Real	Nueces	Fresh	52	52	52	52	52	52
Nueces Run-of-River	Bandera	Nueces	Fresh	13	13	13	13	13	13
Nueces Run-of-River	Edwards	Nueces	Fresh	94	94	94	94	94	94
Nueces Run-of-River	Real	Nueces	Fresh	1,752	1,752	1,752	1,752	1,752	1,752
Rio Grande Livestock Local Supply	Edwards	Rio Grande	Fresh	77	77	77	77	77	77
Rio Grande Livestock Local Supply	Kinney	Rio Grande	Fresh	49	49	49	49	49	49
Rio Grande Livestock Local Supply	Val Verde	Rio Grande	Fresh	25	25	25	25	25	25
Rio Grande Run-of-River	Kinney	Rio Grande	Fresh	1,035	1,035	1,035	1,035	1,035	1,035
Rio Grande Run-of-River	Val Verde	Rio Grande	Fresh	13,739	13,739	13,739	13,739	13,739	13,739
San Antonio Livestock Local Supply	Bandera	San Antonio	Fresh	73	73	73	73	73	73
San Antonio Run-of-River	Bandera	San Antonio	Fresh	2	2	2	2	2	2
Surface Water Total Source Availability				**18,898**	**18,898**	**18,898**	**18,898**	**18,898**	**18,898**
Region J Source Availability Total				**200,137**	**199,848**	**199,531**	**199,515**	**199,515**	**199,515**

~~Surface Water~~	~~County~~	~~Basin~~	~~Salinity~~	~~2020~~	~~2030~~	~~2040~~	~~2050~~	~~2060~~	~~2070~~
~~Colorado Run-Of-River~~	~~Edwards~~	~~Colorado~~	~~Fresh~~	~~32~~	~~32~~	~~32~~	~~32~~	~~32~~	~~32~~
~~Guadalupe Run-Of-River~~	~~Bandera~~	~~Guadalupe~~	~~Fresh~~	~~3~~	~~3~~	~~3~~	~~3~~	~~3~~	~~3~~
~~Guadalupe Run-Of-River~~	~~Kerr~~	~~Guadalupe~~	~~Fresh~~	~~1,375~~	~~1,375~~	~~1,375~~	~~1,375~~	~~1,375~~	~~1,375~~

~~Medina Lake/Reservoir~~	~~Bandera~~	~~San Antonio~~	~~Fresh~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~
~~Nueces Run-Of-River~~	~~Bandera~~	~~Nueces~~	~~Fresh~~	~~5~~	~~5~~	~~5~~	~~5~~	~~5~~	~~5~~
~~Nueces Run-Of-River~~	~~Edwards~~	~~Nueces~~	~~Fresh~~	~~94~~	~~94~~	~~94~~	~~94~~	~~94~~	~~94~~
~~Nueces Run-Of-River~~	~~Real~~	~~Nueces~~	~~Fresh~~	~~1,751~~	~~1,751~~	~~1,751~~	~~1,751~~	~~1,751~~	~~1,751~~
~~Rio Grande Run-Of-River~~	~~Kinney~~	~~Rio Grande~~	~~Fresh~~	~~3,616~~	~~3,616~~	~~3,616~~	~~3,616~~	~~3,616~~	~~3,616~~
~~Rio Grande Run-Of-River~~	~~Val Verde~~	~~Rio Grande~~	~~Fresh~~	~~13,776~~	~~13,776~~	~~13,776~~	~~13,776~~	~~13,776~~	~~13,776~~
~~San Antonio Run-Of-River~~	~~Bandera~~	~~San Antonio~~	~~Fresh~~	~~2~~	~~2~~	~~2~~	~~2~~	~~2~~	~~2~~
~~**Surface Water Total Source Availability**~~				~~**20,654**~~	~~**20,654**~~	~~**20,654**~~	~~**20,654**~~	~~**20,654**~~	~~**20,654**~~
~~**Region J Total Source Availability**~~				~~**205,356**~~	~~**205,283**~~	~~**204,994**~~	~~**204,677**~~	~~**204,661**~~	~~**204,661**~~

* Salinity field indicates whether the source availability is considered ‘fresh’ (less than 1,000 mg/L), ‘brackish’ (1,000 to 10,000 mg/L), ‘saline’ (10,001 mg/L to 34,999 mg/L), or ‘seawater’ (35,000 mg/L or greater). Sources can also be labeled as ‘fresh/brackish’ or ‘brackish/saline’, if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

Table 3-2. Existing Supply (Acre-Feet per Year)

		2030	2040	2050	2060	2070	2080
Bandera County							
Guadalupe Basin							
County-Other	Edwards-Trinity (Plateau) Aquifer	31	31	31	31	31	31
Livestock	Edwards-Trinity (Plateau) Aquifer	9	9	9	9	9	9
Guadalupe Basin Total Existing Supply		**40**	**40**	**40**	**40**	**40**	**40**
Nueces Basin							
County-Other	Edwards-Trinity (Plateau) Aquifer	38	38	38	38	38	38
County-Other	Nueces Run-of-River	0	0	0	0	0	0
County-Other	Trinity Aquifer	251	251	251	251	251	251
Mining	Trinity Aquifer	1	1	1	1	1	1
Livestock	Edwards-Trinity (Plateau) Aquifer	0	0	0	0	0	0
Livestock	Trinity Aquifer	44	44	44	44	44	44
Irrigation	Nueces Run-of-River	13	13	13	13	13	13
Irrigation	Trinity Aquifer	326	326	326	326	326	326
Nueces Basin Total Existing Supply		**673**	**673**	**673**	**673**	**673**	**673**
San Antonio Basin							
Bandera	Trinity Aquifer	496	496	496	496	496	496
Bandera County FWSD 1	Trinity Aquifer	439	439	439	439	439	439
County-Other	Edwards-Trinity (Plateau) Aquifer	388	388	388	388	388	388
County-Other	San Antonio Run-Of-River	0	0	0	0	0	0
County-Other	Trinity Aquifer	4,467	4,467	4,467	4,467	4,467	4,467
Mining	Edwards-Trinity (Plateau) Aquifer	2	2	2	2	2	2
Livestock	Edwards-Trinity (Plateau) Aquifer	96	96	96	96	96	96
Livestock	Local Surface Water Supply	73	73	73	73	73	73
Livestock	Trinity Aquifer	74	74	74	74	74	74
Livestock	Direct Reuse	310	310	310	310	310	310
Irrigation	Guadalupe Run-Of-River	3	3	3	3	3	3
Irrigation	San Antonio Run-Of-River	2	2	2	2	2	2
Irrigation	Trinity Aquifer	829	829	829	829	829	829
San Antonio Basin Total Existing Supply		**7,179**	**7,179**	**7,179**	**7,179**	**7,179**	**7,179**
Bandera County Total Existing Supply		**7,892**	**7,892**	**7,892**	**7,892**	**7,892**	**7,892**
Edwards County							
Colorado Basin							
Rocksprings	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	806	806	806	806	806	806
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	36	36	36	36	36	36
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	115	115	115	115	115	115
Irrigation	Colorado Run-Of-River	25	25	25	25	25	25
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	78	78	78	78	78	78
Colorado Basin Total Existing Supply		**1,060**	**1,060**	**1,060**	**1,060**	**1,060**	**1,060**
Nueces Basin							
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	83	83	83	83	83	83
County-Other	Nueces River Alluvium Aquifer	4	4	4	4	4	4

Mining	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	4	4	4	4	4	4
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	203	203	203	203	203	203
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	109	109	109	109	109	109
Irrigation	Nueces Run-of-River	94	94	94	94	94	94
Nueces Basin Total Existing Supply		**497**	**497**	**497**	**497**	**497**	**497**
Rio Grande Basin							
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	17	17	17	17	17	17
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	113	113	113	113	113	113
Livestock	Local Surface Water Supply	77	77	77	77	77	77
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	72	72	72	72	72	72
Rio Grande Basin Total Existing Supply		**279**	**279**	**279**	**279**	**279**	**279**
Edwards County Total Existing Supply		**1,836**	**1,836**	**1,836**	**1,836**	**1,836**	**1,836**
Kerr County							
Colorado Basin							
County-Other	Edwards-Trinity (Plateau) Aquifer	17	17	17	17	17	17
Livestock	Edwards-Trinity (Plateau) Aquifer	0	0	0	0	0	0
Irrigation	Edwards-Trinity (Plateau) Aquifer	0	0	0	0	0	0
Colorado Basin Total Existing Supply		**17**	**17**	**17**	**17**	**17**	**17**
Guadalupe Basin							
Kerrville	Direct Reuse	2,425	2,425	2,425	2,425	2,425	2,425
Kerrville	Ellenburger – San Saba Aquifer	89	89	89	89	89	89
Kerrville	Guadalupe Run-Of-River	150	150	150	150	150	150
Kerrville	Trinity Aquifer	3,277	3,277	3,277	3,277	3,277	3,277
Kerrville	Trinity ASR	453	453	453	453	453	453
Kerrville South Water	Trinity Aquifer	387	387	387	387	387	387
County-Other	Edwards-Trinity (Plateau) Aquifer	397	397	397	397	397	397
County-Other	Guadalupe Run-Of-River	16	16	16	16	16	16
County-Other	Trinity Aquifer	5,111	5,111	5,111	5,111	5,111	5,111
Manufacturing	Edwards-Trinity (Plateau) Aquifer	20	20	20	20	20	20
Manufacturing	Guadalupe Run-Of-River	77	77	77	77	77	77
Manufacturing	Trinity Aquifer	0	0	0	0	0	0
Mining	Edwards-Trinity (Plateau) Aquifer	0	0	0	0	0	0
Mining	Guadalupe Run-Of-River	72	72	72	72	72	72
Mining	Trinity Aquifer	54	54	54	54	54	54
Livestock	Edwards-Trinity (Plateau) Aquifer	230	230	230	230	230	230
Livestock	Local Surface Water Supply	457	457	457	457	457	457
Livestock	Trinity Aquifer	143	143	143	143	143	143
Irrigation	Guadalupe Run-Of-River	1,187	1,187	1,187	1,187	1,187	1,187
Irrigation	Trinity Aquifer	1,360	1,360	1,349	1,333	1,333	1,333
Guadalupe Basin Total Existing Supply		**15,905**	**15,905**	**15,894**	**15,878**	**15,878**	**15,878**
Nueces Basin							
County-Other	Edwards-Trinity (Plateau) Aquifer	2	2	2	2	2	2
Livestock	Edwards-Trinity Plateau Aquifer	3	3	3	3	3	3

Nueces Basin Total Existing Supply		**5**	**5**	**5**	**5**	**5**	**5**
San Antonio Basin							
County-Other	Edwards-Trinity (Plateau) Aquifer	1	1	1	1	1	1
County-Other	Trinity Aquifer	65	65	65	65	65	65
Livestock	Edwards-Trinity (Plateau) Aquifer	2	2	2	2	2	2
Irrigation	Edwards-Trinity (Plateau) Aquifer	0	0	0	0	0	0
Irrigation	Trinity Aquifer	63	63	63	63	63	63
San Antonio Basin Total Existing Supply		**131**	**131**	**131**	**131**	**131**	**131**
Kerr County Total Existing Supply		**16,058**	**16,058**	**16,047**	**16,031**	**16,031**	**16,031**
Kinney County							
Nueces Basin							
County-Other	Edwards-BFZ Aquifer	5	5	5	5	5	5
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	1	1	1	1	1	1
Livestock	Edwards-BFZ Aquifer	66	66	66	66	66	66
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	11	11	11	11	11	11
Irrigation	Edwards-BFZ Aquifer	2,357	2,357	2,357	2,357	2,357	2,357
Nueces Basin Total Existing Supply		**2,440**	**2,440**	**2,440**	**2,440**	**2,440**	**2,440**
Rio Grande Basin							
Brackettville	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	645	645	645	645	645	645
Brackettville	Rio Grande Run-Of-River	0	0	0	0	0	0
Fort Clark Springs MUD	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	1,371	1,371	1,371	1,371	1,371	1,371
County-Other	Austin Chalk Aquifer	65	65	65	65	65	65
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	69	69	69	69	69	69
Livestock	Austin Chalk Aquifer	108	108	108	108	108	108
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	46	46	46	46	46	46
Livestock	Local Surface Water Supply	49	49	49	49	49	49
Irrigation	Austin Chalk Aquifer	952	952	952	952	952	952
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	3,425	3,425	3,425	3,425	3,425	3,425
Irrigation	Rio Grande Run-Of-River	1,035	1,035	1,035	1,035	1,035	1,035
Rio Grande Basin Total Existing Supply		**7,765**	**7,765**	**7,765**	**7,765**	**7,765**	**7,765**
Kinney County Total Existing Supply		**10,205**	**10,205**	**10,205**	**10,205**	**10,205**	**10,205**
Real County							
Colorado Basin							
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	9	9	9	9	9	9
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	20	20	20	20	20	20
Colorado Basin Total Existing Supply		**29**	**29**	**29**	**29**	**29**	**29**
Nueces Basin							
Camp Wood	Nueces Run-of-River	0	0	0	0	0	0
Leakey	Frio River Alluvium Aquifer	577	577	577	577	577	577
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	176	176	176	176	176	176
County-Other	Frio River Alluvium Aquifer	352	352	352	352	352	352
County-Other	Nueces River Alluvium Aquifer	1	1	1	1	1	1
County-Other	Nueces Run-of-River	0	0	0	0	0	0
Manufacturing	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	0	0	0	0	0	0

Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	209	209	209	209	209	209
Livestock	Local Surface Water Supply	52	52	52	52	52	52
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	192	192	192	192	192	192
Irrigation	Nueces Run-of-River	1,752	1,752	1,752	1,752	1,752	1,752
Nueces Basin Total Existing Supply		**3,311**	**3,311**	**3,311**	**3,311**	**3,311**	**3,311**
Real County Total Existing Supply		**3,340**	**3,340**	**3,340**	**3,340**	**3,340**	**3,340**
Val Verde County							
Rio Grande Basin							
Del Rio Utilities	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	0	0	0	0	0	0
Del Rio Utilities	Rio Grande Run-Of-River	7,461	7,461	7,461	7,461	7,461	7,461
Laughlin AFB	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	0	0	0	0	0	0
Laughlin AFB	Rio Grande Run-Of-River	1,080	1,080	1,080	1,080	1,080	1,080
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	2,632	2,632	2,632	2,632	2,632	2,632
County-Other	Rio Grande Run-Of-River	360	360	360	360	360	360
Manufacturing	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	8	8	8	8	8	8
Mining	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	99	99	99	99	99	99
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	467	467	467	467	467	467
Livestock	Local Surface Water Supply	25	25	25	25	25	25
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	143	143	143	143	143	143
Irrigation	Rio Grande Run-Of-River	4,207	4,207	4,207	4,207	4,207	4,207
Rio Grande Basin Total Existing Supply		**16,482**	**16,482**	**16,482**	**16,482**	**16,482**	**16,482**
Val Verde County Total Existing Supply		**16,482**	**16,482**	**16,482**	**16,482**	**16,482**	**16,482**
Region J Total Existing Supply		**55,813**	**55,813**	**55,802**	**55,786**	**55,786**	**55,786**

		~~2020~~	~~2030~~	~~2040~~	~~2050~~	~~2060~~	~~2070~~
~~**Bandera County**~~							
~~**Guadalupe Basin**~~							
~~County-Other~~	~~Edwards-Trinity (Plateau) Aquifer~~	~~34~~	~~34~~	~~34~~	~~34~~	~~34~~	~~34~~
~~Livestock~~	~~Edwards-Trinity (Plateau) Aquifer~~	~~9~~	~~9~~	~~9~~	~~9~~	~~9~~	~~9~~
~~**Guadalupe Basin Total Existing Supply**~~		~~**43**~~	~~**43**~~	~~**43**~~	~~**43**~~	~~**43**~~	~~**43**~~
~~**Nueces Basin**~~							
~~County-Other~~	~~Edwards-Trinity (Plateau) Aquifer~~	~~38~~	~~38~~	~~38~~	~~38~~	~~38~~	~~38~~
~~County-Other~~	~~Nueces Run-of-River~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~
~~County-Other~~	~~Trinity Aquifer~~	~~399~~	~~399~~	~~399~~	~~399~~	~~399~~	~~399~~
~~Livestock~~	~~Edwards-Trinity (Plateau) Aquifer~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~
~~Livestock~~	~~Trinity Aquifer~~	~~44~~	~~44~~	~~44~~	~~44~~	~~44~~	~~44~~
~~Irrigation~~	~~Nueces Run-of-River~~	~~5~~	~~5~~	~~5~~	~~5~~	~~5~~	~~5~~
~~Irrigation~~	~~Trinity Aquifer~~	~~279~~	~~279~~	~~279~~	~~279~~	~~279~~	~~279~~
~~**Nueces Basin Total Existing Supply**~~		~~**765**~~	~~**765**~~	~~**765**~~	~~**765**~~	~~**765**~~	~~**765**~~
~~**San Antonio Basin**~~							
~~Bandera~~	~~Trinity Aquifer~~	~~534~~	~~534~~	~~534~~	~~534~~	~~534~~	~~534~~
~~Bandera County FWSD 1~~	~~Trinity Aquifer~~	~~75~~	~~75~~	~~75~~	~~75~~	~~75~~	~~75~~
~~County-Other	Bandera River Ranch 1~~	~~Trinity Aquifer~~	~~69~~	~~69~~	~~69~~	~~69~~	~~69~~	~~69~~
~~County-Other	Lake Medina Shores~~	~~Trinity Aquifer~~	~~55~~	~~55~~	~~55~~	~~55~~	~~55~~	~~55~~

County-Other	Trinity Aquifer	58	58	58	58	58	58
County-Other	Edwards-Trinity (Plateau) Aquifer	379	379	379	379	379	379
County-Other	San Antonio Run-Of-River	0	0	0	0	0	0
County-Other	Trinity Aquifer	4,356	4,356	4,356	4,356	4,356	4,356
Livestock	Edwards-Trinity (Plateau) Aquifer	111	111	111	111	111	111
Livestock	Trinity Aquifer	85	85	85	85	85	85
Irrigation	Guadalupe Run-Of-River	3	3	3	3	3	3
Irrigation	San Antonio Run-Of-River	2	2	2	2	2	2
Irrigation	Trinity Aquifer	684	684	684	684	684	684
San Antonio Basin Total Existing Supply		**6,411**	**6,411**	**6,411**	**6,411**	**6,411**	**6,411**
Bandera County Total Existing Supply		**7,219**	**7,219**	**7,219**	**7,219**	**7,219**	**7,219**
Edwards County							
Colorado Basin							
Rocksprings	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	871	871	871	871	871	871
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	57	57	57	57	57	57
Mining	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	7	7	7	7	7	7
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	471	471	471	471	471	471
Irrigation	Colorado Run-Of-River	32	32	32	32	32	32
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	78	78	78	78	78	78
Colorado Basin Total Existing Supply		**1,516**	**1,516**	**1,516**	**1,516**	**1,516**	**1,516**
Nueces Basin							
County-Other | Barksdale WSC	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	110	110	110	110	110	110
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	155	155	155	155	155	155
County-Other	Nueces River Alluvium Aquifer	8	8	8	8	8	8

		2020	2030	2040	2050	2060	2070
Edwards County							
Nueces Basin							
Mining	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	9	9	9	9	9	9
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	206	206	206	206	206	206
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	109	109	109	109	109	109
Irrigation	Nueces Run-of-River	94	94	94	94	94	94
Nueces Basin Total Existing Supply		**691**	**691**	**691**	**691**	**691**	**691**
Rio Grande Basin							
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	30	30	30	30	30	30
Mining	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	14	14	14	14	14	14
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	110	110	110	110	110	110
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	70	70	70	70	70	70
Rio Grande Basin Total Existing Supply		**224**	**224**	**224**	**224**	**224**	**224**
Edwards County Total Existing Supply		**2,431**	**2,431**	**2,431**	**2,431**	**2,431**	**2,431**
Kerr County							
Colorado Basin							
County-Other	Edwards-Trinity (Plateau) Aquifer	64	64	64	64	64	64

Mining	Edwards-Trinity (Plateau) Aquifer	3	3	3	3	3	3
Livestock	Edwards-Trinity (Plateau) Aquifer	47	47	47	47	47	47
Irrigation	Edwards-Trinity (Plateau) Aquifer	92	92	92	92	92	92
Colorado Basin Total Existing Supply		**206**	**206**	**206**	**206**	**206**	**206**
Guadalupe Basin							
Kerrville	Guadalupe Run-Of-River	150	150	150	150	150	150
Kerrville	Trinity Aquifer	3,605	3,605	3,605	3,605	3,605	3,605
Kerrville	Trinity ASR	453	453	453	453	453	453
Kerrville	Direct Reuse	2,425	2,425	2,425	2,425	2,425	2,425
Kerrville South Water	Trinity Aquifer	387	387	387	387	387	387
County-Other	Center Point	Trinity Aquifer	11	11	11	11	11	11
County-Other	Center Point North WS	Trinity Aquifer	23	23	23	23	23	23
County-Other	Center Point Taylor System	Trinity Aquifer	43	43	43	43	43	43
County-Other	Hills & Dales Estates	Trinity Aquifer	18	18	18	18	18	18
County-Other	Nickerson Farm WS	Trinity Aquifer	22	22	22	22	22	22
County-Other	Oak Forest South Water	Trinity Aquifer	80	80	80	80	80	80
County-Other	Park Place Subdivision	Trinity Aquifer	14	14	14	14	14	14
County-Other	Pecan Valley	Trinity Aquifer	12	12	12	12	12	12

		2020	2030	2040	2050	2060	2070
Kerr County							
Guadalupe Basin							
County-Other	Rustic Hills Water	Trinity Aquifer	9	9	9	9	9	9
County-Other	Verde Park Estates	Trinity Aquifer	16	16	16	16	16	16
County-Other	Westwood WS	Trinity Aquifer	28	28	28	28	28	28
County-Other	Edwards-Trinity (Plateau) Aquifer	616	616	616	616	616	616
County-Other	Guadalupe Run-Of-River	10	10	10	10	10	10
County-Other	Trinity Aquifer	7,636	7,636	7,636	7,636	7,636	7,636
Manufacturing	Edwards-Trinity (Plateau) Aquifer	20	20	20	20	20	20
Manufacturing	Guadalupe Run-Of-River	11	11	11	11	11	11
Manufacturing	Trinity Aquifer	17	17	17	17	17	17
Mining	Edwards-Trinity (Plateau) Aquifer	14	14	14	14	14	14
Mining	Guadalupe Run-Of-River	77	77	77	77	77	77
Mining	Trinity Aquifer	31	31	31	31	31	31
Livestock	Edwards-Trinity (Plateau) Aquifer	230	230	230	230	230	230
Livestock	Trinity Aquifer	143	143	143	143	143	143
Irrigation	Guadalupe Run-Of-River	1,127	1,127	1,127	1,127	1,127	1,127
Irrigation	Trinity Aquifer	533	533	533	533	533	533

Guadalupe Basin Total Existing Supply		**17,761**	**17,761**	**17,761**	**17,761**	**17,761**	**17,761**
Nueces Basin							
County-Other	Edwards-Trinity (Plateau) Aquifer	0	0	0	0	0	0
Livestock	Edwards-Trinity (Plateau) Aquifer	3	3	3	3	3	3
Nueces Basin Total Existing Supply		**3**	**3**	**3**	**3**	**3**	**3**
San Antonio Basin							
County-Other	Edwards-Trinity (Plateau) Aquifer	3	3	3	3	3	3
County-Other	Trinity Aquifer	258	258	258	258	258	258
Livestock	Edwards-Trinity (Plateau) Aquifer	9	9	9	9	9	9
Irrigation	Edwards-Trinity Plateau Aquifer	0	0	0	0	0	0
Irrigation	Trinity Aquifer	63	63	63	63	63	63
San Antonio Basin Total Existing Supply		**333**	**333**	**333**	**333**	**333**	**333**
Kerr County Total Existing Supply		**18,303**	**18,303**	**18,303**	**18,303**	**18,303**	**18,303**
Kinney County							
Nueces Basin							
County-Other	Edwards-BFZ Aquifer	29	29	29	29	29	29
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	5	5	5	5	5	5
Livestock	Edwards-BFZ Aquifer	66	66	66	66	66	66
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	7	7	7	7	7	7
Irrigation	Edwards-BFZ Aquifer	2,357	2,357	2,357	2,357	2,357	2,357
Nueces Basin Total Existing Supply		**2,464**	**2,464**	**2,464**	**2,464**	**2,464**	**2,464**
Rio Grande Basin							
Brackettville	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	645	645	645	645	645	645
Brackettville	Rio Grande Run-Of-River	0	0	0	0	0	0
Fort Clark Springs MUD	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	1,371	1,371	1,371	1,371	1,371	1,371
County-Other	Austin Chalk Aquifer	80	80	80	80	80	80
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	85	85	85	85	85	85

		2020	**2030**	**2040**	**2050**	**2060**	**2070**
Kinney County							
Rio Grande Basin							
Livestock	Austin Chalk Aquifer	226	226	226	226	226	226
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	95	95	95	95	95	95
Irrigation	Austin Chalk Aquifer	952	952	952	952	952	952
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	3,425	3,425	3,425	3,425	3,425	3,425
Irrigation	Rio Grande Run-Of-River	3,616	3,616	3,616	3,616	3,616	3,616
Rio Grande Basin Total Existing Supply		**10,495**	**10,495**	**10,495**	**10,495**	**10,495**	**10,495**
Kinney County Total Existing Supply		**12,959**	**12,959**	**12,959**	**12,959**	**12,959**	**12,959**
Real County							
Colorado Basin							
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	15	15	15	15	15	15
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	18	18	18	18	18	18
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	188	188	188	188	188	188
Colorado Basin Total Existing Supply		**221**	**221**	**221**	**221**	**221**	**221**
Nueces Basin							
Camp Wood	Nueces Other Local Supply	0	0	0	0	0	0
Leakey	Frio River Alluvium Aquifer	298	298	298	298	298	298

County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	156	156	156	156	156	156
County-Other	Frio River Alluvium Aquifer	311	311	311	311	311	311
County-Other	Nueces River Alluvium Aquifer	5	5	5	5	5	5
County-Other	Nueces Run-of-River	0	0	0	0	0	0
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	176	176	176	176	176	176
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	187	187	187	187	187	187
Irrigation	Nueces Run-of-River	1,751	1,751	1,751	1,751	1,751	1,751
Nueces Basin Total Existing Supply		**2,884**	**2,884**	**2,884**	**2,884**	**2,884**	**2,884**
Real County Total Existing Supply		**3,105**	**3,105**	**3,105**	**3,105**	**3,105**	**3,105**
Val Verde County							
Rio Grande Basin							
Del Rio Utilities	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	0	0	0	0	0	0
Del Rio Utilities	Rio Grande Run-Of-River	6,135	6,135	6,135	6,135	6,135	6,135
Laughlin AFB	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	60	60	60	60	60	60
Laughlin AFB	Rio Grande Run-Of-River	871	871	871	871	871	871
County-Other	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	2,904	2,904	2,904	2,904	2,904	2,904
County-Other	Rio Grande Run-Of-River	460	460	460	460	460	460
Mining	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	39	39	39	39	39	39
Livestock	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	506	506	506	506	506	506
Irrigation	Edwards-Trinity (Plateau), Pecos Valley & Trinity Aquifer	276	276	276	276	276	276
Irrigation	Rio Grande Run-Of-River	6,310	6,310	6,310	6,310	6,310	6,310
Rio Grande Basin Total Existing Supply		**17,561**	**17,561**	**17,561**	**17,561**	**17,561**	**17,561**
Val Verde County Total Existing Supply		**17,561**	**17,561**	**17,561**	**17,561**	**17,561**	**17,561**
Region J Total Existing Supply		**61,578**	**61,578**	**61,578**	**61,578**	**61,578**	**61,578**

Table 3-3. Del Rio Utilities Major Water Provider Supply (Acre-Feet per Year)

County	Basin	Major Water Provider	Receiving Entity	2030	2040	2050	2060	2070	2080
Val Verde	Rio Grande	Del Rio Utilities	City of Del Rio	6,021	6,021	6,021	6,021	6,021	6,021
			Laughlin AFB	1,080	1,080	1,080	1,080	1,080	1,080
			County Other	360	360	360	360	360	360
Total Wholesale Supply				**7,461**	**7,461**	**7,461**	**7,461**	**7,461**	**7,461**

3.1 GROUNDWATER RESOURCES

The principal aquifers in the Plateau Region are the Trinity, Edwards-Trinity (Plateau), Edwards (Balcones Fault Zone), Austin Chalk, Frio, ~~and~~ Nueces River Alluviums, and ~~new to this *Plan*~~, the Ellenburger-San Saba Aquifer (Figure 3-1). Aquifer descriptions provided in this chapter are relatively limited; more detailed hydrogeological characterization of the aquifers may be obtained from reports published by the TWDB, USGS, UTBEG, and other agencies and universities. The water quality of aquifers is relatively good and a detailed discussion on water-quality characteristics and issues is provided in Chapter 1, Section 1.4.5.

Two water-source characterization studies were conducted during a previous planning period. The first study, "*Occurrence of Significant River Alluvium Aquifers in the Plateau Region, 2010*" identifies and quantifies viable groundwater sources in shallow alluvial aquifers that parallel many of the major streams in the Region. As a result of the study, substantial volumes were estimated for the Frio and Nueces River Alluvium Aquifers in Real and Edwards Counties.

The second study, "*Groundwater Data Acquisition in Edwards, Kinney and Val Verde Counties, Texas, 2009*" was performed to assist in the further characterization of the Edwards and associated aquifers in the western part of the Plateau Region. The project included four general tasks: (1) review of existing aquifer evaluations, field studies and new well data, (2) performance of dye tracer tests to analyze groundwater flow direction and speed, (3) measurement of water levels in wells during two seasonal periods, and (4) review of recent water quality sampling projects. These two reports can be viewed at (www.ugra.org/plateau-water-planning-group).

The Ellenburger-San Saba Aquifer ~~is~~ was added to ~~this *Plan*~~ the previous plan as a new source. During this cycle of regional water planning, ~~Recent~~ there was a test hole exploration, pumping test results, and water chemistry analysis which ~~have~~ verified that this aquifer ~~as~~ does provide a potential source of water ~~to~~ that can meet the supply needs of northeastern Kerr County. In 2023, the City of Kerrville assumed ownership of the new Ellenburger production well, which produced approximately 89 acre-feet.

Over much of the Region, water levels generally fluctuate with seasonal precipitation and are highly susceptible to declines during drought conditions. Water levels generally recover during wet periods; however, a long-term decline is being observed in some Trinity Aquifer wells in the eastern portion of the Region where pumping is exceeding the capacity of the local aquifer to fully recharge.

Discharge from the aquifers occurs naturally through springs and artificially by pumping from wells. Some discharge also occurs through leakage from one water-bearing unit to another and through natural down-gradient flow out of the Region.

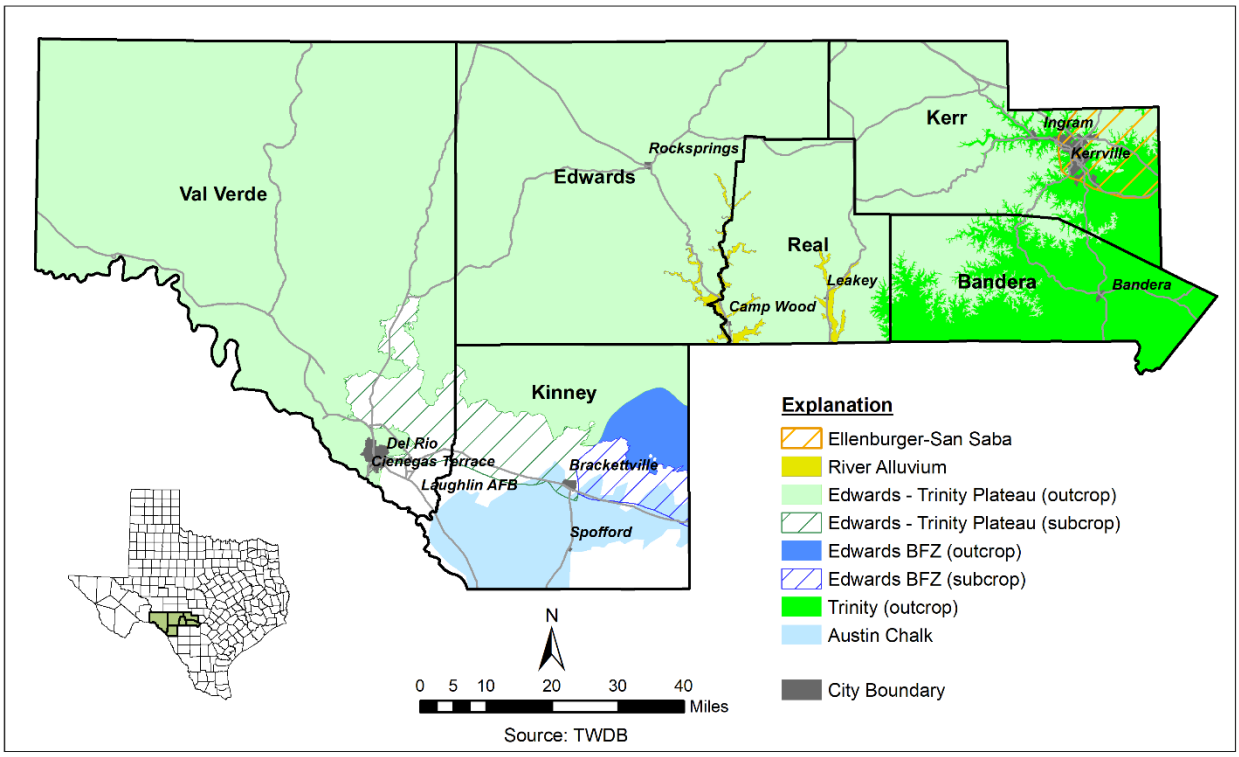

Figure 3-1. Groundwater Sources

3.1.1 Groundwater Availability

Base flow to the many rivers and streams that flow through the Plateau Region is principally generated from the numerous springs that issue from rock formations that form the major aquifers in the Region. The Plateau Region contains the headwaters of the Guadalupe, San Antonio, Medina, Sabinal, Frio, Nueces, and West Nueces Rivers; and tributaries to the Rio Grande and Colorado River such as the Pecos, Devils, and South Llano Rivers. Flow in these rivers and streams is critical to the Plateau Region in that it provides municipal drinking water, supplies irrigation and livestock needs, maintains environmental habitat, and supports a thriving ecological and recreational tourist economy. Water users downstream of the Plateau Region (Regions K, L, and M) likewise have a stake in maintaining and protecting spring-fed base flows of rivers that originate in the Plateau Region.

It is thus recognized that sustaining flow in these important rivers and streams is highly dependent on maintaining an appropriate water level in the aquifer systems that feed the supporting springs. With the sustainability of local water supplies and the economic welfare of the Region in mind, the PWPG defines groundwater availability *as a maximum level of aquifer withdrawal that results in an acceptable level of long-term aquifer impact such that the base flow in rivers and streams is not significantly affected beyond a level that would be anticipated due to naturally occurring conditions.* In so defining groundwater availability, the planning group establishes a policy decision to protect the long-term water supply and related economic needs of the Plateau Region. The PWPG acknowledges and supports GCD's regulatory authority over permitted withdrawals from aquifers within their respective boundaries.

Groundwater availability as listed in Table 3-1in this ~~*2021*~~*2026* *Plateau Region Water Plan* is based on the Modeled Available Groundwater (MAG) volumes that may be produced on an average annual basis to achieve a Desired Future Condition (DFC) as adopted by Groundwater Management Areas (GMAs) (per Texas Water Code §36.001). The GMA process is explained in more detail in Chapter 1, Section 1.1.5. Groundwater availability for these sources is calculated by modeling or standard geohydrologic methods. Table 3-4 lists the methodology used to calculate groundwater source availability.

Table 3-4. Groundwater Availability Methodology

Source Supply	County	Basin	Methodology
Austin Chalk Aquifer	Kinney	Rio Grande	0.6% (0.006) of average annual rainfall (22 in) over the aquifer outcrop (189,377 acres) as recharge. Calculated by Planning Group consultant (Carollo).
		Nueces	Not an official TWDB aquifer and not modeled. Total availability values of 875 acre-feet/year are from RWP22 Database with a source description based on Robert Bradley's analysis of the number of wells in the TWDB Groundwater Database. GMA10
Nueces River Alluvium Aquifer	Edwards	Nueces	Recharge plus 0.1 volume of water in storage. See Plateau Region Report: Occurrence of Significant River Alluvium Aquifers in the Plateau Region (2010). www.ugra/plateau-water-planning-group
	Real	Nueces	
Frio River Alluvium Aquifer	Real	Nueces	
Ellenburger/San Saba Aquifer	Kerr	Colorado	Annual availability of 0.007 acre-feet/acre/year over 286,000 acres of prime production zone in eastern Kerr County. See Sec 3.1.8 of this 2026 Plan.
		Guadalupe	
Edwards-BFZ Aquifer	Kinney	Nueces	GMA10 MAG
		Rio Grande	
Edwards Group of the Edwards-Trinity (Plateau) Aquifer	Kerr	Colorado	GMA9 Non-Relevant, TWDB modeled run compatible with DFC, which was provided to PWPG.
		Guadalupe	
		Nueces	
		San Antonio	
	Bandera	Guadalupe	GMA9 MAG
		Nueces	
		San Antonio	
Edwards-Trinity (Plateau), Pecos Valley, Trinity Aquifer	Edwards	Colorado	GMA7 MAG
		Nueces	
		Rio Grande	
	Kinney	Nueces	
		Rio Grande	
	Real	Colorado	
		Nueces	
		Guadalupe	

Table 3-4. (continued) Groundwater Availability Methodology

Source Supply	County	Basin	Methodology
Edwards-Trinity (Plateau), Pecos Valley, Trinity Aquifer	Val Verde	Rio Grande	
Trinity Aquifer	Bandera	Guadalupe	GMA9 MAG
		Nueces	
		San Antonio	
	Kerr	Colorado	
		Guadalupe	
		Nueces	
		San Antonio	

3.1.2 Trinity Aquifer

Located mostly in the Hill Country counties of Bandera and Kerr, the Trinity Aquifer system is composed of deposits of sand, clay and limestone of the Glen Rose and Travis Peak formations of the Lower Cretaceous Trinity Group where they are not overlain by Edwards Limestone. Limited exposures of Trinity also occur in southern Edwards and Real Counties. The water-bearing units include, in descending order, the Glen Rose Limestone, Hensell Sand, Cow Creek Limestone, Sligo Limestone and Hosston Sand. The Glen Rose formation is divided informally into upper and lower members. Based on their hydrologic relationships, the water-bearing rocks of the Trinity Group, collectively referred to as the Trinity Aquifer system, are organized into the following aquifer units.

- Upper Trinity Aquifer - Upper member of the Glen Rose Limestone
- Middle Trinity Aquifer - Lower Member of the Glen Rose Limestone, Hensell Sand and Cow Creek Limestone
- Pine Island / Hammet Shale - confining bed
- Lower Trinity Aquifer - Sligo Limestone and Hosston Sand

Because of fractures, faults and other hydrogeological factors, the Upper, Middle and Lower Trinity Aquifer units often are in hydraulic communication with one another and collectively should be considered a leaky-aquifer system.

3.1.2.1 Upper and Middle Trinity Aquifer

The upper member of the Glen Rose, when weathered on the land surface, creates the distinctive "stair-step" topography found throughout the hilly train of the Hill Country. The upper Glen Rose, which forms the Upper Trinity Aquifer, often contains water with total dissolved solids (TDS) often exceeding 1,000 milligrams per liter (mg/l), especially in wells that penetrate “gyp” (evaporite) beds. Water percolating through evaporite beds has a tendency to be high in sulfate and generally should be sealed off in a well. Upper Trinity wells are generally shallow and are mostly used for domestic and livestock purposes.

The Middle Trinity Aquifer, consisting of lower Glen Rose, Hensell, and Cow Creek formations, generally contains TDS of less than 1,000 mg/l. In the Hill Country region, the primary contribution to

poor water-quality occurs in wells that do not adequately case off water from evaporite beds in the upper part of the Glen Rose (Upper Trinity Aquifer). Water levels in Upper and Middle Trinity wells fluctuate with seasonal precipitation and are highly susceptible to declines during drought conditions. Radium has been detected in some Trinity wells in Kerr County.

3.1.2.2 Lower Trinity Aquifer in Bandera and Kerr Counties

Separating the Middle and Lower Trinity is the Hammett Shale (sometimes referred to as the Pine Island Shale). The approximately 60-foot thick formation acts as a confining bed, or barrier to cross-formational flow in most areas, and thus divides the producing sections of the Middle and Lower Trinity Aquifer units.

The Lower Trinity Aquifer is composed of sandy limestone, sand, clay and shale of the Sligo and Hosston formation. The Lower Trinity thins toward the northeast and is completely missing or coalesces with upper Trinity units near the Llano Uplift. The Lower Trinity is principally a water supply source for the Cities of Bandera and Kerrville and for a few private water-supply companies and resorts.

Yields from wells completed into the Lower Trinity are generally unpredictable and vary greatly. The greater depth and difficulty of sealing off the Hammett Shale make completing wells into the Lower Trinity more difficult and more expensive. However, in some areas, the Lower Trinity has higher yields and better water quality than shallower aquifers. Recharge to the Lower Trinity in Bandera and Kerr Counties likely occurs primarily by lateral underflow from the north and west. The overlying Hammett Shale mostly prevents vertical movement of water downward except possibly in highly fractured or faulted areas.

3.1.3 Edwards-Trinity (Plateau) Aquifer

The Edwards-Trinity (Plateau) Aquifer consists of lower Cretaceous age saturated limestone and dolomite formations of the Edwards Group and underlying sediments of the Trinity Group where they occur underlying the Edwards Plateau. The upper Edwards portion of the aquifer system is generally more porous and permeable than the underlying Trinity. Numerous springs that form the headwaters of several eastward and southerly flowing rivers, occur where the contact between the base of the Edwards and the top of the Trinity is exposed at the land surface. See Section 3.3 for a more detailed discussion pertaining to groundwater / surface water relationship.

In Kinney and Val Verde Counties, the Edwards Aquifer consists of groundwater contained in the Salmon Peak and McKnight units of the Devils River Limestone. Aquifer thickness is as much as 1,000 feet. San Felipe and Los Moras Springs in Val Verde and Kinney Counties issue from the Edwards and is the primary municipal supply source for the City of Del Rio.

Recharge to the aquifer occurs primarily by the downward percolation of surface water from streams draining off the Edwards Plateau to the north and west and by direct infiltration of precipitation on the outcrop. Some water enters the Region in the aquifer as underflow from counties up gradient (generally north).

The Glen Rose Limestone is the primary unit in the underlying Trinity in the southern part of the Plateau. The Aquifer generally exists under water-table conditions; however, where the Glen Rose is fully saturated and a zone of low permeability occurs near the base of the overlying Edwards, artesian conditions exist.

Reported well yields commonly range from less than 50 gallons per minute (gpm) where saturated thickness is thin to more than 1,000 gpm where large-capacity wells are completed in jointed and cavernous limestone. There are little pumping withdrawals from the Aquifer over most of its extent, and water levels have generally fluctuated only with seasonal precipitation. In some local instances, water levels have declined as a result of increased pumping.

3.1.4 Edwards (BFZ) Aquifer

In the Plateau Region, the Edwards-Balcones Fault Zone (BFZ) Aquifer is designated only in eastern Kinney County at its westernmost extent. The Edwards portion of the Edwards-Trinity (Plateau) Aquifer and the Edwards of the Edwards (BFZ) Aquifer are the same geologic formation and their boundary is arbitrarily established by the TWDB. There is no significant hydrologic boundary between the outcrops of these two aquifer systems, thus groundwater in the Edwards-Trinity freely moves down gradient into the Edwards (BFZ).

The Edwards (BFZ) Aquifer exists under water-table conditions in the outcrop and under artesian conditions where it is confined below the overlying Del Rio Clay in its downdip extent. Water in the Aquifer generally moves from the recharge zone toward natural discharge points such as Las Moras Springs at Brackettville. Additional water is lost from the Kinney County area as underflow that leaves the County to the east into Uvalde County (Region L). Very little pumping has occurred from this Aquifer in Kinney County, and therefore water levels have remained relatively constant with only minor changes over time.

3.1.5 Austin Chalk Aquifer

The Austin Chalk Aquifer occurs in the southern half of Kinney County primarily south of Highway 90. A veneer of sand and gravel deposits cover much of the southwest portion of Kinney County, which provides a soil base for agricultural production. Crops grown in this area are irrigated with mostly brackish quality groundwater pumped from the underlying Austin Chalk Aquifer. Much less production is apparent in the Nueces River Basin in the eastern part of the County. Recharge to the Austin Chalk is from precipitation and stream loss over the outcrop area and likely from Edwards Aquifer underflow through faults located up-gradient.

A wide range of production rates exists for wells completed in the Austin Chalk. The best production from the Aquifer occurs in areas that have been fractured or contain numerous solution openings. Most wells only discharge enough water for domestic or livestock use, but a few wells are large enough for irrigation purposes. The largest reported yield for an Austin Chalk well in Kinney County is 2,000 gpm (Bennett and Sayre, 1962). Most of the more productive wells completed in the Austin Chalk are located along Las Moras Creek.

3.1.6 Frio River Alluvium Aquifer

The Frio River Alluvium in central Real County extends over an area of approximately 9,530 acres. Recharge to the Aquifer is from cross-formational flow from the adjacent Edwards-Trinity Aquifer and direct infiltration of precipitation. Water supplies for the City of Leakey and other rural domestic homes are derived from this small Aquifer. Because of the limited extent of this Aquifer and its shallow water

table, the aquifer system is readily susceptible to diminished supplies during drought conditions and potentially from over pumping. Also, due to its shallow nature, the Aquifer is susceptible to contamination from surface sources.

3.1.7 Nueces River Alluvium Aquifer

The Nueces River Alluvium between Edwards and Real Counties extends over an area of approximately 24,450 acres. Recharge to the Aquifer is from cross-formational flow from the adjacent Edwards-Trinity Aquifer and direct infiltration of precipitation. Water supplies for the Community of Barksdale and rural domestic homes are derived from this small Aquifer. As with the Frio Alluvium, the Nueces River Alluvium Aquifer is readily susceptible to diminished supplies during drought conditions and potentially from over pumping, and to contamination from surface sources.

3.1.8 Ellenburger – San Saba Aquifer

Recent advances in aquifer research has suggested the desirability of adding the Ellenburger-San Saba Aquifer in Kerr County to the list of available groundwater sources in the Plateau Planning Region. ~~Although no production wells in the Ellenburger are currently in use, the Headwaters GCD has authorized rules for future permitting of this resource.~~ In December 2016, a~~A~~n exploratory test well (Headwaters GCD Monitor Well #17) in the northeast corner of Kerr County was completed in the Ellenburger Limestone to a total depth of 1,153 feet below ground level. ~~land surface in December 2016~~. A subsequent 24-hour pumping test was performed on the test well, which produced 600 gallons per minute with 69 feet of drawdown. The results suggest a transmissivity range of 7,920 to 12,670 gpd/ft. Water samples were collected and analyzed for chemical quality. Total dissolved solids are 498 mg/l and all constituents are within both primary and secondary drinking-water standards.

In September 2020, the Headwater GCD contracted with Wet Rock Groundwater Services (WRGS), to further explore the groundwater resources of the geologic units beneath the Trinity Aquifer, specifically the units in the Llano Uplift Aquifer System, and ultimately to provide public supply to the City of Kerrville. McKinley Drilling completed Well #19 in July 2020 to Texas Commission on Environmental Quality (TCEQ) public water supply well standards. Upon completion of the well, both McKinley Drilling and WRGS coordinated to perform a 36-hour aquifer test on Well #19 while utilizing the nearby City of Kerrville ASR Well #3 as an observation well.

During the 36-hour aquifer test, Well #19 was pumped at an average rate of 793 gallons per minute (gpm) with an initial pumping rate of 800 gpm and a final pumping rate of 772 pgm with 153.4 feet of drawdown, resulting in a specific capacity of 5.03 gpm/ft. Approximately 24-hours after the pump started, the pumping rate was reduced to 772 gpm to ensure the water level did not reach the pump. During the test, the water level dropped approximately 135 feet within the first 12-hours of pumping, then slowly declined and oscillated throughout the remainder of the pumping phase. After the pump was shut off, recovery was measured in the pumping well for approximately three hours; during that time, the water level recovered by approximately 86%. (Report of Findings: Aquifer Test Results of the Headwaters GCD Monitoring Well No. 19, 2020).

Well #19 is completed within the Ellenburger Formation of the Ellenburger-San Saba Aquifer, where the well is screened in the most productive zone within the formation, which is between 615 and 710 ft. below ground level, according to the geologists from the Headwater GCD. Ownership of Well #19

eventually transferred to the City of Kerrville and in 2023, the well produced a total of 89 acre-feet. This well is now an active production well for their public water system.

Groundwater Management Area 9 (GMA9), along with the Headwater GCD, ~~-~~is currently working with Jerry Shi and others, on updating the TWDB Llano Uplift Groundwater Availability Model (LUGAM) to include the Ellenburger-San Saba Aquifer within layer 5. This modification to the model will classify the Ellenburger-San Saba Aquifer in Kerr County as relevant. During the next round of GMA planning, GMA9 will agree on a Desired Future Condition (DFC) and submit that data to the TWDB. Based on the approved DFC, the TWDB will then issue a MAG volume for the inclusion of the next round of regional water planning. ~~classifying the Ellenburger-San Saba Aquifer in Kerr County as non-relevant, and therefore the Texas Water Development Board (TWDB) has not issued a MAG volume for this aquifer in Kerr County. The TWDB Llano Uplift Groundwater Availability Model (LUGAM) (Shi and others, 2017) does include the Ellenburger-San Saba as layer 5.~~

~~The Headwaters GCD has been assisted by a voluntary group of local geologists that has refined the structural component of the conceptual model. Their findings are that the most potentially viable part of the Aquifer lies within the eastern half of the County and that within this portion the hydraulic conductivity can be defined between two values, 0.3 feet/day in the less permeable portion and 3.5 feet/day in the more productive areas.~~

~~Based on this refined structure and resulting hydraulic conductivities, LBG-Guyton (now WSP USA) was tasked with running the TWDB LUGAM with the above modifications for the identified 286,000-acre eastern portion of Kerr County. To assess the impact of Ellenburger pumping on water level decline, 20 hypothetical wells were added to the selected area and five pumping scenarios (2,000; 5,000; 10,000; 15,000 and 20,000 acre-feet per year) were applied to these wells. The potential groundwater availability calculated for these five pumping scenarios are as follows:~~

~~**Table 3-5. Ellenburger Aquifer Availability**~~

~~Pumping Scenario~~	~~Annual Availability (acre-feet/acre)~~	~~Annual Availability (gallons/acre)~~
~~2,000 acre-feet/year~~	~~0.007~~	~~2,300~~
~~5,000 acre-feet/year~~	~~0.017~~	~~5,700~~
~~10,000 acre-feet/year~~	~~0.035~~	~~11,400~~
~~15,000 acre-feet/year~~	~~0.052~~	~~17,100~~
~~20,000 acre-feet/year~~	~~0.07~~	~~22,800~~

~~Calculated water-level declines resulting from the above pumping scenarios ranged from a minimum of less than five feet with the 2,000 acre-feet/year, to an average of 35 to 40 feet with the 20,000 acre-feet/year pumping rate.~~

For Regional Water Planning purposes, it is proposed that ~~until actual production is monitored,~~ the ~~2021~~*2026* *Plateau Region Plan* will adopt a conservative Ellenburger-San Saba Aquifer availability rate of 0.007 acre-feet/acre/year over the 286,000-acre productive area or a total of 2,002 acre-feet/year. This volume is subdivided between the Colorado and Guadalupe river basins in eastern Kerr County into 200 acre-feet/year and 1,802 acre-feet/year respectfully.

3.1.9 Public Supply Use of Groundwater

All communities in the Plateau Region rely partially or completely on groundwater supply sources. Even the spring sources (classified as surface water) used by Del Rio and Camp Wood originate from aquifers. The higher concentration of wells in Kerr and Bandera Counties related to population growth may present water supply availability problems in the future. Public supply wells serving communities in Edwards, Kinney, Real and Val Verde Counties are not anticipated to have long-term declines due to the relatively smaller quantities of water that are needed to serve these communities. Also, no long-term water-quality deterioration has been detected in groundwater supplies for these communities. Long-term viability of the aquifers serving these other communities appears to be acceptable. However, new wells should be located outside the local areas of pumping influence of the existing wells. Although no evidence of contamination from surface sources have been detected in public-supply groundwater sources in the Plateau Region, a wellhead protection program should be considered by all communities.

3.1.9.1 City of Bandera

The City of Bandera is primarily dependent on wells completed into the Lower Trinity Aquifer and must compete for this water with numerous private wells in the County. However, a new Middle Trinity well was recently completed, which will provide some backup to the Lower Trinity well supply. Long-term viability of the Trinity Aquifer as a supply source for Bandera and outlying areas will require implementation of management policies aimed at establishing withdrawals based on the sustainable yield of the Aquifer.

City of Bandera Well No. 69-24-202 shows a consistent decline from the 1950s through the 1990s, with a total of approximately 400 feet of water level decline. Most of the water withdrawn by Bandera public supply wells is produced from the Lower Trinity (Hosston) which receives very little vertical recharge

and an undetermined amount of lateral underflow from the north and west of the well fields. Because of the continuous water-level decline in these well fields, the City, with the assistance of the BCRAGD, should monitor levels to anticipate production reductions.

3.1.9.2 Bandera County FWSD #1

Bandera County FWSD #1 provides water to the Pebble Beach subdivision and obtains its water from wells completed in the Trinity Aquifer. This District currently has four active wells and competes for this water with numerous private wells within the County. Growing subdivisions will increase water demands, causing the District to consider the need for additional supply.

3.1.9.3 City of Kerrville

The City of Kerrville is dependent on conjunctive use of surface water from the Guadalupe River, ~~and~~ groundwater from Lower Trinity Aquifer wells and one new production well within the Ellenburger-San Saba Aquifer. Kerrville Wells No. 4 and No. 11 experienced declines of as much as 200 feet through the early to mid-1980s. Between the early to mid-1980s and the early 1990s, water levels in these two wells increased by as much as 200 feet in response to the decreased pumpage by the City when surface water sources were brought on-line. Since 1998, water levels have remained relatively constant.

The only long-term water-quality degradation trend observed in Kerrville public-supply wells is noted in the increase in sodium, chloride and total dissolved solids in the City's Travis Well No. 14 during the late 1960s to mid-1970s. The well showed steady increases in sodium (18 to 72 mg/l), chloride (55 to 200 mg/l), and total dissolved solids (417 to 624 mg/l) between 1968 and 1976. This corresponded with the time period that large drawdowns in water levels were occurring in the Kerrville area. This well is designated as an "Emergency Only" well and does not have a pump/motor installed. ~~is not used for production.~~

The City of Kerrville operates an aquifer storage and recovery (ASR) operation where treated surface water is injected into the Lower Trinity Aquifer to maintain aquifer pressure and provide a source for peak demand periods. This particular operation consists of two wells, ASR #1 and ASR #2. This strategy aides in resiliency during various circumstances, including drought conditions or other production restraints. In addition to ASR, the City's groundwater network consists of nine well sites.

Specific strategies to meet Kerrville's future water needs are addressed in Chapter 5. If additional wells are needed for increasing supply needs, the City could consider ~~locating~~ exploring new wells outside the local area of pumping influence. The City will continue to ~~cooperate~~ coordinate ~~with~~ efforts ~~of~~ with the local Groundwater Conservation Districts to establish aquifer management policies.

3.1.9.4 City of Rocksprings

The City of Rocksprings obtains its water supply from wells completed in the Edwards Limestone of the Edwards-Trinity (Plateau) Aquifer. They are currently using a well that is located on Live Oak Street. Drilled in 2007, it is estimated to produce 500 gallons per minute. Total gallons used in 2023 was 52,081,000. The City's Sharp (artesian) Well, is currently under maintenance, and should be back in production by the end of 2024. This well was originally drilled in 1952. This rural community has little competition for groundwater and, thus, its supply is considered dependable. ~~A new well has been drilled and is currently being connected to the City's distribution system.~~

3.1.9.5 City of Brackettville and Fort Clark Springs MUD

Water wells completed in the Edwards portion of the Edwards-Trinity (Plateau) Aquifer produce water used for municipal supply in these two adjacent communities. Las Moras Springs, an identified major spring, also exists at the same location of the Fort Clark Springs wells. Under existing conditions, there appears to be sufficient supply to meet futures needs. The Kinney County GCD is currently evaluating potential impacts that might result from increased future pumping within the District.

3.1.9.6 City of Camp Wood

Camp Wood located in southwestern Real County derives its water supply mostly from Old Faithful Springs, along with a completed new well in the underlying Edwards-Trinity Aquifer~~.~~ The spring has reportedly always flowed. However, with increasing population and the drilling of additional wells in the area, the spring may experience decreasing flow during drought periods in the future. ~~To supplement its supply, the City has completed a new well in the underlying Edwards-Trinity Aquifer.~~

3.1.9.7 City of Leakey

The City of Leakey obtains its water supply from shallow water wells ranging in depth from 34 to 42 feet in the Frio River Alluvium Aquifer. The City competes for groundwater from this small Aquifer with numerous private domestic wells. Trinity Aquifer wells in the local area have proven to be unreliable and often contain poor-quality groundwater.

3.1.9.8 City of Del Rio

The City of Del Rio is supplied with water from San Felipe Springs, which issue from the Edwards portion of the Edwards-Trinity (Plateau) Aquifer. The water is collected through pumps set in the ~~s~~Springs, treated with microfiltration and chlorine and then distributed to the City, Laughlin Air Force Base, and outlying neighborhoods.

The average discharge of San Felipe Springs since Lake Amistad was filled is about 110 cubic feet per second or about 80,000 acre-feet/yr. During recent droughts, the spring discharge has fallen below 50 cfs or, extrapolated over one year, about 36,000 acre-feet. Recent droughts as compared to the 1950s drought would be appropriate to use as a drought-condition gage because the filling of Amistad Lake has generally increased the spring flow after the late 1960s.

Due to prolonged drought conditions, the San Felipe Springs is no longer a reliable water supply source. Currently, the City of Del Rio is exploring an alternative source of water supply. Del Rio plans to drill one pilot well within the Edwards-Trinity (Plateau) Aquifer to a depth of approximately 200-250 feet. It is anticipated that this pilot well will produce roughly 3,223 acre-feet per year. If the project is a success, the City has plans to drill a second well. The City recognizes the importance of transitioning away from the drought impacted spring flows, to a more reliable water supply source that can sustain future growth.

3.1.10 Agricultural Use of Groundwater

Because of the arid conditions and lack of well-developed soils over much of the Region, irrigated agricultural activities are generally limited in most of the counties. Low well yields common throughout much of the Region also limit the development of large-scale irrigation. Water quality, however, is not generally a limiting factor for irrigation in the Region. Kinney County has the greatest amount of agricultural use of water. The acreage of land irrigated by groundwater in the year 2000 in each county as

reported in TWDB Report 347 is, from most to least, Kinney, 4,865 acres; Bandera, 173 acres; Val Verde, 145 acres; Kerr, 57 acres; Edwards, 40 acres; and Real, 15 acres. In addition, numerous surveyed small feed plots for game are irrigated with groundwater. 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, the Headwaters Groundwater Conservation District in Kerr County documents approximately 700 acres being irrigated just with groundwater.

A review of historical and current data suggests that there has been no long-term change in regional water levels or water quality as a result of agricultural pumping. Local water-level declines occur during the irrigation season but generally recover during the off-season. Although irrigation conservation efficiencies could be improved, currently used equipment and practices are not resulting in depletion of the aquifers. At the current rate of agricultural use, groundwater of sufficient quantity in the Edwards-Trinity (Plateau), Edwards (BFZ), and Austin Chalk Aquifers should remain available for future agricultural use. However, the competition for Trinity Aquifer water between municipal and agricultural needs in Bandera and Kerr Counties is increasing. The Bandera County River Authority and Groundwater District and the Headwaters Groundwater Conservation District are both actively involved in managing the use of groundwater in these counties.

3.1.11 Brackish Groundwater Desalination Sources

~~Most groundwater in the Plateau Region contains total dissolved solids (TDS) concentrations of less than 1,000 mg/l and thus meets drinking water standards. Groundwater of slightly poorer quality (1,000 to 3,000 mg/l) occurs in the Trinity Aquifer in some areas. Elevated levels of calcium sulfate resulting from the dissolution of evaporate beds in the upper Glen Rose is the primary source of higher TDS groundwater. Productivity from this aquifer source makes desalination a marginal option at this time.~~

In the Plateau Region, shallow groundwater from the surface down to approximately 800 to 1,000 feet in depth contains total dissolved solids (TDS) concentrations of less than 1,000 mg/l and thus meets drinking water standards. Groundwater of slightly poorer quality (1,000 to 2,999 mg/l TDS) occurs in the Trinity Aquifer in some areas within the Region. Elevated levels of calcium sulfate in higher TDS groundwater are the result of dissolution of evaporite beds in the Lower Glen Rose formation.

Brackish water is defined by the TWDB as having TDS in the range from 1,000 to 9,999 mg/l. In the Plateau Region, brackish groundwater typically occurs in three areas: (1) as isolated pockets within freshwater aquifers, (2) as isolated areas near the base of the Cretaceous System in southern portions of the Plateau Region, and (3) near the base of the Paleozoic System in northern portions of the Region.

No appreciable groundwater has ever been found below the Cretaceous System in the buried Pennsylvanian Ouachita fold belt. However, the deep, narrow Val Verde Basin developed in front of the buried Ouachita mountain range. The Val Verde Basin extends over the Plateau Region north of the Ouachita fold belt and thins to the north. This Basin holds a vast amount of saline water at depths that range from 800 to 25,000 feet. Although brackish groundwater in the range of 1,000 to 9,999 mg/l TDS occurs only within a few hundred feet in depth of the freshwater-saline water interface, the groundwater below the brackish zone ranges up to about 180,000 mg/l TDS (average seawater is 35,000 mg/l). Thus, a vast source of saline water is available in the Region but would require desalination for use as a source of drinking water.

3.2 SURFACE WATER SUPPLIES

The Plateau Region straddles several different river basins, rather than generally following a single river basin or a large part of a single river basin (Figure 3-2). From west to east, these basins include the Rio Grande, Nueces, Colorado, San Antonio, and Guadalupe. The headwaters of three of these river basins (Nueces, San Antonio, and Guadalupe), as well as major tributaries of the Rio Grande and Colorado River, originate in this Region.

The availability of water from surface water sources under drought-of-record conditions depend on two components: water that is physically present (usually substantially reduced during a drought-of-record since by definition it is the most severe) and the authorized amount per existing water right adjudications. The Texas Commission on Environmental Quality (TCEQ) maintains Water Availability Models (WAMs) for evaluating water rights applications to help determine if water would be available for a newly requested water right or amendment, or if an amendment might affect other water rights. The "Run 3" WAM scenario primarily used by the TCEQ for these purposes has a key assumption that all water rights in each basin are allowed to divert their full authorized amount when water is available, following appropriation in priority date order. The "Run 3" scenario also reflects the conservative assumption that no return flows (i.e., discharges) are present.

Use of the TCEQ WAMs allows for the performance of a simulation of availability and diversion for all water rights in a river basin based on naturalized flows over a specified hydrologic period in a manner that includes the key assumptions used for permitting by the State, and is consistent with TWDB regional planning guidelines.

~~Available surface water supplies under drought-of-record conditions depend on two components: water that is physically present (usually substantially reduced during a drought-of-record since by definition it is the most severe) and the authorized amount per existing water right adjudications. Use of the Texas Commission on Environmental Quality (TCEQ) Water Availability Models (WAMs) allows for the performance of a simulation of availability and diversion for all water rights in a river basin based on naturalized flows over a specified hydrologic period. These models generally follow an appropriation of water in priority date order, but appropriation order from upstream to downstream may also be simulated. The TCEQ WAMs of the five Plateau Region river basins have been used to determine surface water availability during a drought-of-record.~~

The TCEQ WAMs of the five Plateau Region river basins denoted below have been used for the purposes of the 2026 Plateau Regional Water Plan to determine surface water source availability during a drought-of-record.

- Rio Grande River Basin WAM Run 3 – Version Oct. 1, 2023 - Hydrologic period 1940-2018.
- Nueces River Basin WAM Run 3 – Version Oct. 1, 2023 – Hydrologic period 1934-1996.
- Colorado River Basin WAM Run 3 – Version Oct. 1, 2023 – Hydrologic period 1940-2016.
- San Antonio River Basin WAM Run 3 – Version Oct. 1, 2023 – Hydrologic period 1934-1989.
- Guadalupe River Basin WAM Run 3 – Version Oct. 1, 2023 – Hydrologic period 1934-1989.

~~The simulations used to determine water availability assume that all water rights in each basin are allowed to divert the full authorized amount when water is available, following appropriation in priority date order. They also reflect the conservative assumption that no return flows are present, as is consistent with both TWDB regional planning guidelines and TCEQ modeling of water availability and permitting.~~

Municipal run-of-river calculations use the unmodified TCEQ WAM Run 3 to ensure that all monthly demands are fully met. Area-capacity relations of major reservoirs ~~was~~ have been adjusted to reflect sedimentation conditions for 2020 through 2070, consistent with the approved Hydrologic Variance Request developed and submitted by the Plateau Regional Water Planning Group. Drought-of-record source amounts by county and river basin are provided in Table 3-1. Water Source Availability (Acre-Feet per Year). A list of all authorized surface water rights in the Region is available in Appendix 3A.

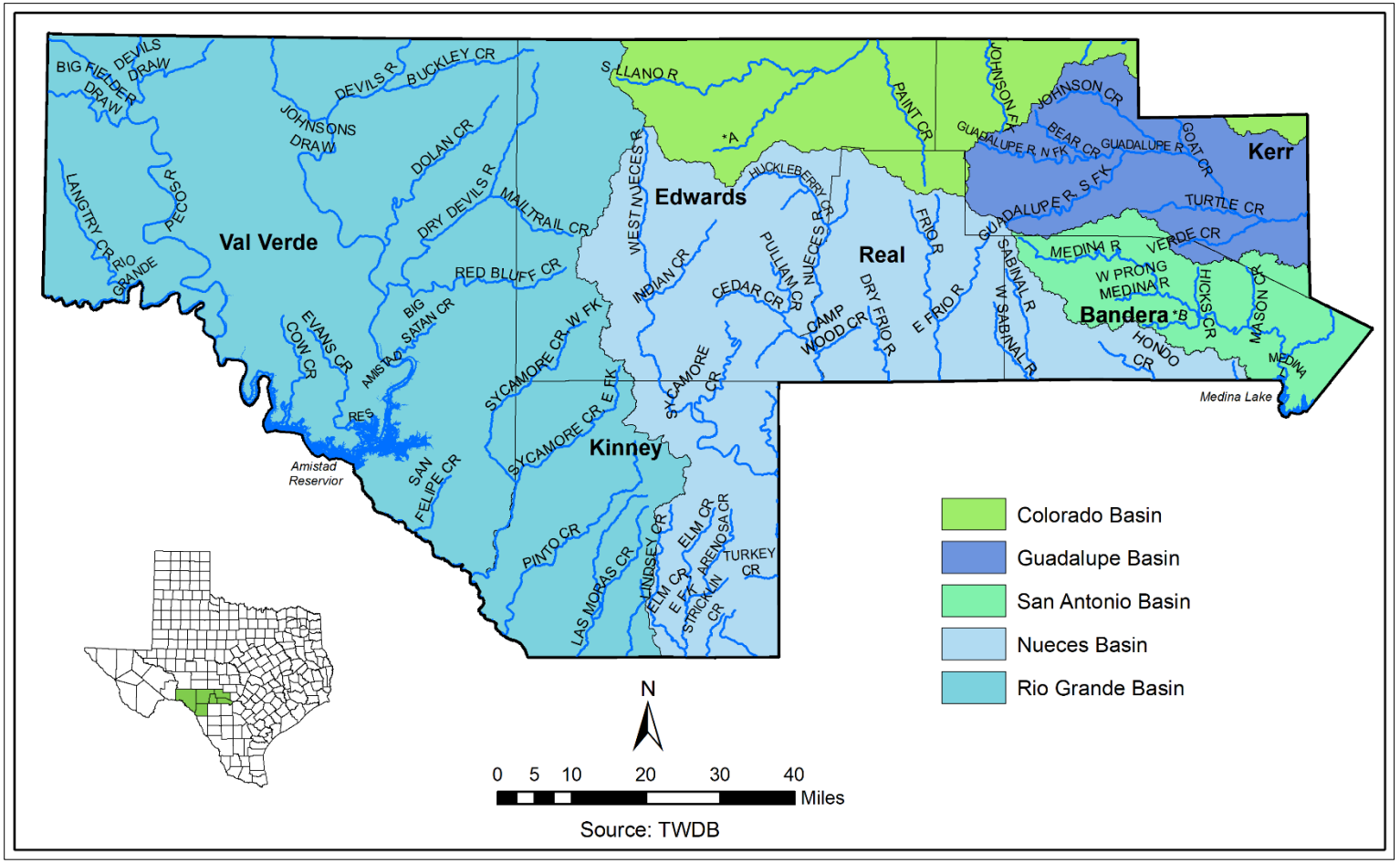

Figure 3-2. Surface Water Sources

The term "run-of-the-river" is used to distinguish water rights with diversion points directly on a watercourse from water rights with diversion points on a reservoir or backed by storage. Generally, run-of-the-river water rights, also referred to as "direct diversions", are less dependable than water rights on reservoirs because of the lack of storage. However, run-of-the-river diversions are often very convenient, especially for irrigators and small entities, because a diversion point on a watercourse can be located extremely close to the location where the water will be consumed, thereby negating the need to pipe the water over long distances.

Diversions under a drought-of-record are extracted from results of a WAM simulation for each basin. For purposes of this *Plan*, a drought-of-record supply for run-of-the-river diversions is categorized by use (municipal, irrigation, industrial and other) and by county. Supply amounts on river segments have always been difficult to assess due to the lack of storage to catch excess flows. In this *Plan*, the reliable supply for run-of-the-river diversions for non-municipal use is expressed as the minimum annual diversion for each category during the hydrologic period considered in the water availability models. The reliable supply for run-of-the-river diversions for municipal use is expressed as the minimum monthly diversion amount that is available in all months of the hydrologic period considered in the water availability models.

Drought-of-record supply amounts for reservoirs are on a firm-yield basis. To understand firm yield, one must understand the concept of "mass balance" - the simple but true principle of physics that mass can neither be created nor be destroyed (i.e., what goes in must come out). In practical terms as applied to a reservoir, the water going in (inflows from drainage areas of tributaries feeding the reservoir site and direct precipitation upon the reservoir itself) equals the water going out (evaporation off the lake surface plus water spilled over the dam plus any water allowed to pass through the dam to satisfy senior water rights downstream plus the demand placed on the reservoir plus other factors which may exist). The operation of a reservoir is simulated under various demands, iterating the simulation to find a demand that the reservoir can supply consistently throughout a repeat of the historical hydrologic record. Demand is termed the "firm yield" of the reservoir if for every year of the historical hydrologic record (even during a drought-of-record) the reservoir can successfully supply the demand placed on it.

Canyon Reservoir and the Medina/Diversion system are potential water supply reservoirs for the Plateau Region's future water needs. Although neither reservoir currently serves a water need within the Region, both reservoirs could likely do so in the future. Although recreational use of streams and lakes serves an important function in the Plateau Region, its use has no impact on reservoir yields, as these uses are non-consumptive.

3.2.1 Rio Grande Basin (Including the Pecos and Devils River)

The Rio Grande, or Rio Bravo as it is known in Mexico, forms the border between the United States and Mexico. International treaties govern the ownership and distribution of the water in this river. Under the 1906 Treaty, the United States is obligated to deliver 60,000 acre-feet annually from the Rio Grande to Mexico, except in the cases of severe drought or serious accident to the irrigation system in the United States. Diversion of this allotment occurs upriver in El Paso. The 1944 Treaty addresses the waters in the international segment of the Rio Grande from Fort Quitman, Texas to the Gulf of Mexico. The United States receives 1/3 of the flow from six tributaries (Rio Conchos, San Diego, San Rodrigo, Escondido,

Salado Rivers, and Las Vacas Arroyo), provided that the running average over a five-year period cannot be less than 350,000 acre-feet/yr.

While the International Boundary and Water Commission is responsible for implementing the allocation of water on the U.S. side, the Watermaster office of TCEQ administers the allocation of Texas' share of the international waters. The two reservoirs located in the middle of the lower Rio Grande, the Amistad and Falcon, store the water regulated by the Watermaster. The Watermaster oversees Texas' share of water in the Rio Grande and its Texas tributaries from Fort Quitman to Amistad Dam, excluding drainage basins of the Pecos River and Devils River.

The Pecos River forms a portion of the boundary between Terrell County in the Far West Texas Region and Crockett County in Region F before reaching Langtry in Val Verde County in the Plateau Region. The Devils River originates in Sutton County and proceeds generally southward through Val Verde County before reaching Amistad International Reservoir. There are no surface-water rights on the Pecos and Devils Rivers within the Plateau Region.

Flow of the Pecos River within the Plateau Region is inconsistent, with livestock and wildlife watering apparently being the only use made of whatever water that may remain in the River. Independence Creek, a large spring-fed creek in northern Terrell County west of Val Verde County, is the most important of the few remaining freshwater tributaries to the lower Pecos River. Independence Creek's contribution increases the Pecos River water volume by 42 percent at the confluence and reduces the total suspended solids by 50 percent, thus improving both water quantity and quality (Nature Conservancy of Texas descriptive flier).

Flows of the Devils River are gaged at the Spafford Crossing near Comstock in Val Verde County. This gage (USGS 08449400) began recording in 1978 and was discontinued in 1985. Therefore, it does not record flows for the 1950s. However, from 1978 through 1985 the flows are consistently between approximately 100 and 300 cfs, with rare spikes ranging from 4,000 cfs up to 50,000 cfs. These spikes result from unusually intense but short rainfall events. In absence of data for the 1950s-drought period and considering the generally low and undependable flows within the Devils River, a realistic estimate of the drought-of-record amount of supply from the Devils River within the Plateau Region is zero.

3.2.2 Amistad International Reservoir on the Rio Grande

The Amistad International Reservoir is located on the border between the United States and Mexico near the City of Del Rio and was constructed jointly by the two nations. It was completed in 1968 with a maximum capacity of 5,250,000 acre-feet, 3,505,000 acre-feet of which are used for water conservation. The water is distributed among downstream users of Mexico and the United States. Amistad is not a source of supply for the Plateau Region, as the City of Del Rio and downstream irrigators in Val Verde County obtain their supply primarily from San Felipe Springs and Creek. Thus, the constraints on Amistad Reservoir as a source of water supply for the Plateau Region are the existing water rights held by water rights holders and enforced by the Rio Grande Watermaster.

Goodenough Spring is inundated by Lake Amistad and was at one time considered the third largest spring in Texas. The spring, which discharges from the Edwards-Trinity (Plateau) Aquifer, still provides a significant flow contribution to the Rio Grande.

3.2.3 Nueces River Basin

The upper Nueces River Basin lies in Edwards, Real, Bandera, and Kinney Counties, with the main stem Nueces forming a portion of the border between Real County and Edwards County. Headwater tributaries of the Nueces River located in the Plateau Region include the Sabinal River and Hondo Creek in Bandera County, the West Nueces River in Edwards and Kinney Counties, and the Frio, East Frio, and Dry Frio Rivers in Real County. Although undocumented, in some places there appears to be an amount of underflow occurring through gravel beds that line long stretches of the river bottom.

Total authorized diversions by water rights on the Nueces River within the Plateau Region are 11,419 acre-feet/year. Most of this amount (10,116 acre-feet/year or 88 percent) is for irrigation use. Diversions for municipal use total 1,259 acre-feet/year. The City of Camp Wood holds the largest municipal right for 1,000 acre-feet/year. Small water rights for other uses have a total authorized diversion of 44 acre-feet/year.

The TCEQ Water Availability Model for the Nueces River Basin was used to evaluate surface water supplies. The model includes data through the year 1996, and addresses the drought-of-record of the 1950's.

3.2.4 Colorado River Basin

The headwaters of the South Llano River, a tributary of the Colorado River, lie in Edwards County. There are three water rights on the South Llano River and Paint Creek within the Plateau Region for irrigation use. The combined authorized amount of these rights is 180 acre-feet/year.

The TCEQ Colorado River Basin WAM was used to evaluate the supply for these rights. This model covers the period ~~2013~~2016. Hydrologic data for these streams suggests that the drought-of-record occurred in 2011. The minimum annual diversion for the three rights is 32 acre-ft/yr.

3.2.5 San Antonio River Basin

The headwaters of the San Antonio River lie in Bandera County. Most water right authorizations from the San Antonio Basin are run-of-the-river diversions for irrigation use. Run-of-the-river diversions exclude authorizations on Medina Lake. Eight authorized water rights on the Medina River main stem total 236 acre-feet/year. Of these eight water-right holders on the River, six use the water for irrigation. The sum of these six irrigation rights totals 227 acre-feet/year. Of the remaining two water-right holders, one is for 9 acre-feet of water per year used by an individual for municipal purposes, and the other is for a non-consumptive recreation reservoir owned by the City of Bandera. This recreation-only reservoir is for non-consumptive use only.

Since the Guadalupe-San Antonio WAM covers the period 1934-1989, it is appropriate to consider if the drought of 1996 exceeded the severity of the drought of the mid-1950s. USGS gage 08178880 on the Medina River at Bandera just downstream of State Highway 173 gives a lowest annual streamflow amount at 33.7 cubic feet per second (cfs) (approximately 24,600 acre-feet/year) in 1996. However, this gage did not begin recording until 1982, and therefore records from the 1950s drought are missing and cannot be compared directly to the low flows of 1996. Data for the 1950s at the Bandera gage as extracted from the Guadalupe-San Antonio River Basin WAM indicates an annual naturalized flow of 2,662 acre-feet in 1956. Regulated flows would be even lower once upstream diversions and

impoundments are accounted for. Therefore, based on estimates of the Guadalupe-San Antonio Basins WAM, the drought of the 1950s represents the drought-of-record conditions for the San Antonio Basin in the Plateau Region.

3.2.6 Medina Lake on the Medina River

Medina Lake was constructed in 1911 to provide irrigation water for farmers to the southwest of San Antonio. Although commonly referred to as Medina Lake, the lake is actually a system consisting of Medina Lake and Diversion Lake. Impounded in 1913, Diversion Lake is approximately 4 miles downstream of Medina Lake.

Diversions from the dual-lake system are authorized only from Diversion Lake, as per the water right held by Bexar-Medina-Atascosa Water Control and Improvement District #1 (BMAWCID#1). BMAWCID#1's Adjudication Certificate No. 19-2130C authorizes the District to divert up to 65,830 acre-feet/year of water for irrigation, municipal and industrial use, up to 750 acre-feet/year specifically for domestic and livestock purposes, and up to 170 acre-feet/year specifically for municipal use.

BMAWCID#1 has signed contracts to supply several irrigators and a development corporation with water. In January 2000, BMAWCID#1 signed a contract with Bexar Metropolitan Water Authority indicating that BMAWCID#1 will sell 20,000 acre-feet/year to the Authority for municipal use.

Bandera County currently has a Water Supply Agreement with BMAWCID#1 for purchase of up to 5,000 acre-feet/year; however, this agreement is not currently associated with the infrastructure necessary to carry out the purchase and subsequent distribution of the water.

Loss of impounded water from Medina Lake to the Trinity Aquifer and Diversion Lake to the Edwards Aquifer reduces the firm yield of the system. This loss has long been known to be substantial. Quantification of water recharging the aquifers has been elusive, as different estimates of recharge have resulted in different firm-yield estimates for the system. In 1957, a Bureau of Reclamation study estimated the firm annual yield of the Medina Lake/Diversion Lake system to be 27,500 acre-feet/year if the lake system were operated under an agricultural (irrigation) demand only scenario, but it estimated 29,700 acre-feet/year as the firm yield for municipal and industrial demand. Due to effects of seepage around the dam and of recharge to the underlying aquifers, Espey Huston estimated a firm yield of zero for Medina Lake in 1994, based on the relationship they found between the Lake stage and recharge. HDR Engineering modified the Espey Huston stage-recharge curves for its Trans-Texas report and cited 8,770 acre-feet/year as the firm yield. According to previous communications, HDR assumed diversions would be from Medina Lake rather than from Diversion Lake and that all irrigation use would be curtailed. This assumption does not comply with existing conditions as regards to water right authorizations.

The latest USGS report, "Assessment of Hydrogeology, Hydrologic Budget, and Water Chemistry of the Medina Lake Area, Medina and Bandera Counties, Texas," maintains that earlier methods of estimating recharge (Lowry, Espey Huston curves as modified by HDR for the Trans-Texas report) overestimate recharge. Overestimation of recharge would result in an underestimation of firm yield; however, the USGS report did not include a firm-yield estimate for the reservoir system.

The TCEQ Guadalupe-San Antonio River Basins WAM incorporates the HDR Trans-Texas method of estimating recharge and probably provides the best overall data (water rights, inflows determined by

water rights) available at this time. The model was thus used to determine a firm yield of the Medina/Diversion system of zero acre-feet/year.

3.2.7 Guadalupe River Basin

Within the Plateau Region, the Guadalupe River Basin occurs almost exclusively within Kerr County. The Basin drains approximately 510 square miles at Kerrville, and approximately 839 square miles at Comfort near the eastern county line. The River originates almost entirely within western Kerr County as three branches (Johnson Creek, North Fork, and South Fork) merge west of Kerrville to form the main river course. A study report titled Spring Flow Contribution to the Headwaters of the Guadalupe River in Western Kerr County (2005) was prepared for the PWPG (http://www.ugra.org/plateau-water-planning-group).

The total amount of authorized water rights for the Guadalupe River within the Plateau Region is 21,020 acre-feet/year. Municipal use accounts for 8,076 acre-feet/year. Holders of these water rights include the City of Kerrville, the Upper Guadalupe River Authority (UGRA), and independent persons.

The City of Kerrville and the UGRA own the largest municipal water rights. Certificate of Adjudication 1996, 5394-B, 2026 and Permit 3505 are held by Kerrville. UGRA holds Permit 5394-A. Authorized diversions from the Guadalupe River associated with these water rights are taken from an 840-acre on-channel reservoir located in the City of Kerrville and are pumped from the reservoir to Kerrville's water treatment plant. A summary of the pertinent information for their water rights is shown in Table 3-6.

Texas Parks and Wildlife Department owns a continuous flow-through water right for 5,780 acre-feet/year used for the Heart of the Hills Fisheries Science Center, consumptive use is approximately 400 acre-feet/year. Industrial use permits are authorized for 17 acre-feet/year and irrigation rights for 6,904 acre-feet/year. The remaining water-rights holders use their water for mining, hydroelectric power, and recreation. One individual holds a water right (35,125 acre-feet/year) for hydroelectric use; however, this right has not been exercised. Kerr County holds the rights for three non-consumptive recreation-use reservoirs in and near Kerrville.

Table 3-6. Municipal Water Rights for Kerrville and UGRA

Water Rights Permit	Authorized Diversion (acre-ft/yr)	Permit Holder	Priority Data	Storage (acre-feet)	Restrictions
1996 (amended 4/10/98)	225 (Mun.)	Kerrville	4/4/1914		
3505	3,603	Kerrville	5/23/1977	840	Max diversion rate = 9.7 cfs Divert only when reservoir is above 1,608 ft msl
5394A and 5394-B (amended 4/10/98)	2,169	Kerrville (Kerrville Municipal use)	1/6/1992	Utilizes the storage authorized for Permit 3505	Max combined diversion rate for water rights #3505 and #5394 = 15.5 cfs. Minimum instream flow requirements vary from 30 to 50 cfs during year.
	2,000	UGRA (County Municipal use)			

Note: Permit 2026 (priority 1961) 54 ac/ft municipal use.

During winter months when there is surplus surface water supply, a portion of the treated water is injected into the Lower Trinity Aquifer for subsequent use during the typically dry summer months. This aquifer storage and recovery (ASR) program has been in full operation since 1998.

Both the City of Kerrville and the UGRA have within their authorizations (Permits Nos. 5394B and 5394A respectively) a Special Condition addressing the seasonal distribution of allowed diversions. The Special Condition stipulates that during the months of October through May, the permittees may divert only when the flow of the Guadalupe River exceeds 50 cfs, and during the months of June through September, the permittees are authorized to divert only when the flow of the Guadalupe River exceeds 30 cfs. Another Special Condition common to both permittees is that, when inflows to Canyon Reservoir are less than 50 cfs, each permittee is to restrict diversions to allow a flow of at least 50 cfs to pass through. Yet another Special Condition imposed on both permittees is that diversions may be made only when the level of UGRA Lake is above 1,608 feet above mean sea level.

Pursuant to a Memorandum of Understanding (MOU) between the Guadalupe-Blanco River Authority (GBRA) and the Commissioner's Court of Kerr County, the South Central Texas Water Planning Group (Region L) recognizes a potential commitment of approximately 2,000 acre-feet/year from the firm yield of Canyon Reservoir for the calendar years 2021 through 2050. GBRA's hydrology studies indicate that a commitment of about 2,000 acre-feet/year would be necessary to allow permits for 6,000 acre-feet/year to be issued by TCEQ for diversions in Kerr County.

Data from the Corps of Engineers show a computed inflow into Lake Canyon of 132,900 acre-feet/year in 1996. The Guadalupe-San Antonio WAM estimates naturalized flows to be 27,800 acre-feet in 1956. The USGS gage 08167000 on the Guadalupe River at Comfort gives a lowest annual streamflow amount of 14.5 cfs (approximately 10,585 acre-feet/year) occurring in 1956. This gage has been recording since 1939. Interestingly, statistics for the gage include the fact that, for water years 1939 through 1997, the mean annual runoff was 157,800 acre-feet or approximately 216 cfs, and that 90 percent of these flows exceeded 25 cfs. This puts the 1956 occurrence of 14.5 cfs within the 0 to 10 percent non-exceedance category. In calendar year 1996, the annual mean was 151 cfs and the median was 85 cfs. The mean and median for 1997 exceeded the 1996 values. These facts seem to substantiate that the drought-of-record for Kerr County occurred in 1956, not in 1996, as consistent with most other areas of the State.

3.2.8 San Felipe Springs

The City of Del Rio has a water right authorizing it to divert 11,416 acre-feet/year from San Felipe Springs for municipal use. San Felipe Manufacturing and Irrigation Company has a water right authorizing it to divert 4,962 acre-feet/year for irrigation use and 50 acre-feet/year for industrial use. No data exists for flows during the drought of the 1950s. The only available records are from USGS gage 08452800 maintained by the IBWC at San Felipe Springs that covers the period of February 1961 to present. The minimum annual amount during this time period was 36,580 acre-feet/year (occurring in 1963).

3.2.9 Old Faithful Springs

Issuing from the upper Glen Rose Limestone portion of the Edwards-Trinity (Plateau) Aquifer, Old Faithful Springs is the primary water supply for the City of Camp Wood. The Spring has been a dependable source and was reported to have continuously flowed during the 1950s drought. There is current concern that the increase in the number of wells being drilled in the area may lower the local water table and thus negatively impact spring flow. The Spring is privately owned and may not be available for City use after the current contract expires.

3.2.10 Surface Water Rights

The right to use surface water from streams and lakes is permitted through the State of Texas. A list of all authorized surface water rights in the Region is available in Appendix 3A.

Major downstream water rights include those in Region L supplied by the Guadalupe-Blanco River Authority out of Canyon Lake and by the Bexar-Medina-Atascosa WCID#1 out of the Medina/Diversion system. The firm yields of Canyon and Medina limit the amount of water available for appropriation in both the Plateau Region and Region L. Major downstream water rights in Region M (i.e., cities and irrigators on the Rio Grande downstream from Amistad Reservoir) do not limit the amount of water available for appropriation in the Plateau Region because currently the Plateau Region does not depend on the Falcon-Amistad system. TCEQ's Lower Rio Grande Watermaster allocates water rights on the Rio Grande according to the supply in the Amistad Reservoir and in accordance with the 1944 International Treaty with Mexico.

3.3 GROUNDWATER/SURFACE WATER RELATIONSHIP

In the natural environment, water is constantly in transition between the land surface and underground aquifers. Under certain conditions, stream losses percolate downward to underlying aquifers as recharge; while in other cases, aquifers give up water to the land surface in the form of springs and seeps.

Most of the Plateau Region occurs at higher elevations that constitute the headwaters of the numerous streams and tributaries that frequent this Region. At these elevations, significant quantities of water exit the aquifer systems through springs and form the base flow of the surface streams. Downstream, only a portion of that water may render the underground system. For this reason, these streams are generally gaining throughout much of their extent within the Plateau Region. Spring flows are also environmentally important in that they are the primary source of water for wildlife in the area. These discharges from springs are thus the primary source of continuous flow to the rivers downstream and, therefore, their protection is warranted. Springs are so common to this headwater region that a popular beverage slogan touted "From the Land of 1,100 Springs".

Some of the largest springs in the Region, such as San Felipe Springs (Val Verde County) and Las Moras Springs (Kinney County), issue from the Edwards limestone. However, numerous other springs issue from either the Edwards or Glen Rose Limestones. Many of the springs, such as Fessenden Spring (Kerr County), issue near the contact between the Edwards and the upper Glen Rose Limestones. Smaller springs are more prevalent where they issue from the Glen Rose, particularly in Bandera and Kerr Counties.

Most springs located in the headwaters of rivers that traverse the eastern part of the Region issue from the contact between the Edwards limestone and underlying upper Glen Rose limestone. Most well production in this area is from deeper aquifers and, therefore, little impact to spring flow from the pumping is anticipated. However, as new development expands to the west, care should be given to potential water level declines that could diminish spring flow and base flow to the rivers.

Springs located in the western part of the Region issue primarily from the Edwards Limestone. Because of limited pumping of groundwater from wells in the Del Rio area, San Felipe Springs has not had to compete for source water. A significant increase in groundwater pumpage immediate up dip and to the east of the springs may lower the water table sufficiently to affect flow from the springs. Because much of the recharge areas for the contributing zones of these western springs occur in remote areas, very little information is available concerning the relationship between the springs and the underlying aquifers.

Gain/loss studies are needed to identify stream segments that are critical to aquifer recharge and spring discharge. The studies can be used to identify where recharge structures would be most efficient and where most river base-flow gain occurs. Specific candidate areas occur over the plateau area that is underlain by Edwards Limestone, especially in the upper tributaries of all the rivers. Gain/loss studies of tributaries in the vicinity of Del Rio would be beneficial in understanding the recharge areas that contribute to San Felipe Springs.

Two supplemental study reports were prepared for the *Plateau Region Water Plan* that address springs. The first report. "Springs of Kinney and Val Verde Counties, 2005" considers the location and geohydrology of springs in Kinney and Val Verde Counties, and the second report, "Spring Flow Contribution to the Headwaters of the Guadalupe River in Western Kerr County, Texas, 2005" relates spring flow in western Kerr County to base flow in the three branches of the upper Guadalupe River.

3.4 WATER REUSE

While recycling is a term generally applied to aluminum cans, glass bottles, and newspapers, water can be recycled as well. Water recycling is reusing treated wastewater for beneficial purposes such as agricultural and landscape irrigation, industrial processes, toilet flushing, and replenishing a groundwater aquifer (referred to as groundwater recharge or ASR for aquifer storage and recovery). Water is sometimes recycled and reused onsite; for example, when an industrial facility recycles water used for cooling processes. A common type of recycled water is water that has been reclaimed from municipal wastewater, or sewage. The term "water recycling" is generally used synonymously with water reclamation and water reuse.

Kerrville treats its wastewater to TCEQ type 1 level. The treated wastewater is pumped through a dedicated pipeline for reuse as irrigation water for the Scott Schreiner Municipal Golf Course, the Hill Country Youth Soccer Fields, Kerrville Sports Complex, Schreiner University, River Hills Golf Course, Tivy High School Sports Fields, Kerr County Animal Shelter, and the golf course at Comanche Trace Ranch & Golf Club. Additional treated water is sold by the truckload for construction projects. The remaining wastewater is released into Third Creek, which flows into Flatrock Lake on the Guadalupe River. That water is then available for use downstream of Kerrville. Additionally, the City has reserved approximately 0.5 MGD of treated effluent above its current reuse contract obligations for future potable or non-potable reuse. In an effort to further reduce potable water demand and dependency on groundwater and surface water supplies, the City expanded its non-potable reuse delivery capacity by constructing a 95 million gallon (292 ac-ft.) off-channel storage pond adjacent to the wastewater treatment plant. ~~Future expansion of Kerrville's reuse project is anticipated to yield approximately 1 million gallons per day.~~ The Cities of Del Rio and Bandera also have wastewater treatment capacities with the potential for ~~future~~ reuse applications.

Existing direct reuse supply availability as shown in Table 3-1 is listed as:

- Kerr County – Guadalupe Basin – 5,000 acre-feet/year
  (City of Kerrville permitted volume)
- Bandera County – San Antonio Basin – 310 acre-feet/year
  (City of Bandera average discharge)

Future direct reuse supply availability not shown in Table 3-1:

- Val Verde County – Rio Grande basin – 3,100 acre-feet/year
  (Del Rio Utilities Commission permitted volume)

3.5 LOCAL SUPPLY

"Local Supplies" are limited, unnamed individual surface water supplies that, separately, are available only to particular non-municipal WUGs. These supplies are generally contained within "stock tanks" that catch precipitation runoff and are used primarily for livestock watering, but at times may be available for other local needs such as mining. For planning purposes, the volume of runoff water in these catchment basins is considered to be significantly reduced during drought-of-record conditions and does not include any groundwater that might be pumped into them.

For the purposes of the *2026 Plateau Region Water Plan*, the historical water-use estimates (2011-2021) for irrigation, livestock, manufacturing, mining and steam-electric, generated directly from the TWDB's Water Use Database was considered in determining existing local surface water supply volumes. These reports reflect the most current and accurate data made available to the State agency. New to this *Plan*, is the "Livestock Local Surface Water Supply" category found on Table 3-2, of which provides an additional 733 acre-feet per decade, of existing surface water supply to the Region, throughout the planning horizon.

~~No documentation has been identified that quantifies the available supply during a drought of record for these local supplies. Thus, per TWDB guidelines established for the regional water planning process, it has been assumed for the purposes of the 2021 Plateau Region Water Plan that all local supplies not represented by a specific, identified water right are zero ac-ft per year.~~

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APPENDIX 3A
AUTHORIZED SURFACE WATER RIGHTS

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APPENDIX 3A. AUTHORIZED SURFACE WATER RIGHTS

AS EXTRACTED FROM TCEQ'S ACTIVE WATER RIGHTS MASTER FILE

Water Right Number	Type	County	River Order Permit	Name	Stream	Use	Amount in Ac-Ft/Yr	Acreage	Res Cap in Ac-Ft	Remarks
2027-000	6	Bandera	7720000000	ROBERT L PARKER SR ET AL	VERDE CRK	IRRG	8	3		
2028-000	6	Bandera	7750000000	HOWARD E BUTT	PALMER CRK	OTHER			30	
2103-000	6	Bandera	5903000000	O S PETTY	HONEY CRK	IRRG	96	38		
2104-000	6	Bandera	5902000000	CLARENCE E LAUTZENHEISER	N PRONG MEDINA RIVER	IRRG	20.24	23.85		AMEND 9/29/88, 8/22/89
2105-000	6	Bandera	5901500000	STEVEN L PRICHARD TRUSTEE	MICKLE	IRRG	5.44	8.16	5	
2105-000	6	Bandera	5901500000	NEAL INCORPORATED	MICKLE	IRRG	7.32	10.99	5	
2106-000	6	Bandera	5901450000	BREWINGTON LAKE RANCH ASSN	BREWINGTON CRK	REC	190		190	
2107-000	6	Bandera	5901100000	JOEL HELD, TRUSTEE/JJJ RANCH	N PRONG MEDINA RIVER	IRRG	19	25		OUT OF A 1666.5 ACRE TRACT
2108-000	6	Bandera	5900100000	BEN & KAY MAYBERRY FAM PART	ROCKY CRK	IRRG	19.82	14.41		ALSO KERR CO
2108-000	6	Bandera	5900100000	WALTER A WILLOUGHBY	ROCKY CRK	IRRG	24.18	17.59		ALSO KERR CO
2109-000	6	Bandera	5897200000	NEVIN MARR	N PRONG MEDINA RIVER	IRRG	2	10		AMEND 1-21-83 INCREASE ACRES
2110-000	6	Bandera	5897000000	DONALD F & MARTHA M MEAD	N PRONG MEDINA RIVER	IRRG	21	12		
2111-000	6	Bandera	5896000000	TEXAS PETROLEUM CO. TR EST	COLLINS CRK	IRRG	4	2	16	
2112-000	6	Bandera	5894500000	MRS MARY WINKENHOWER	ELAM CRK	IRRG	27	27		JOINTLY OWNS 27 AF TO IRR 27 ACRES
2113-000	6	Bandera	5894000000	SUSAN CRAWFORD TRACY	W PRONG MEDINA RIVER	IRRG	35	45		OUT OF A 156 ACRE TRACT
2114-000	6	Bandera	5892000000	PHIL A GROTHUES ET UX	UNNAMED TRIB	IRRG	5.705	20.715		
2114-000	6	Bandera	5892000000	INMANN T DABNEY JR ET UX	UNNAMED TRIB	IRRG	6.542	23.756		
2114-000	6	Bandera	5892000000	RICHARD E WILSON	UNNAMED TRIB	IRRG	3.753	13.629		
2115-000	6	Bandera	5891500000	DAVID R SCHMIDT MD ET AL	BAUERLEIN CRK	IRRG	15	16		
2116-000	6	Bandera	5891000000	PAUL LAVON GARRISON	W PRONG MEDINA RIVER	IRRG	36	36		
2116-000	6	Bandera	5891000000	GEORGE C. YAX	W PRONG MEDINA RIVER	IRRG	15	15	162	
2117-000	6	Bandera	5889000000	G. MILTON JOHNSON, ET UX	MEDINA RIVER	IRRG	7	7		OUT OF A 175.5 ACRE TRACT
2118-000	6	Bandera	5888870000	DAVID J BRASK	UNNAMED TRIB	IRRG	16	16		
2119-000	6	Bandera	5888090000	RAYMOND HICKS	MEDINA RIVER	IRRG	3	8		
2120-000	6	Bandera	5888051000	BANDERA ELECTRIC COOP INC	MEDINA RIVER	IRRG	2	4		7/8/82 ADD DIV PT
2121-000	6	Bandera	5888087000	ANN DARTHULA MAULDIN	INDIAN CRK	IRRG	31.03	8.27		
2121-000	6	Bandera	5888087000	TOLBERT S WILKINSON ET UX	INDIAN CRK	IRRG	69.47	18.53		AMEND 7/30/90

Water Right Number	Type	County	River Order Permit	Name	Stream	Use	Amount in Ac-Ft/Yr	Acreage	Res Cap in Ac-Ft	Remarks
2121-000	6	Bandera	5888087000	JOHN W DINSE ET UX	INDIAN CRK	IRRG	49.5	13.2		
2122-000	6	Bandera	5887330000	DON HICKS	MEDINA RIVER	MUNI	9			
2123-000	6	Bandera	5887150000	DON F TOBIN	MEDINA RIVER	IRRG	152	61		OUT OF A 452 ACRE TRACT
2124-000	6	Bandera	5887130000	EVANGELINE RATCLIFFE WILSON	SAN JULIAN CRK	IRRG	3	5		
2125-000	6	Bandera	5887129000	PETER K SHAVER ET UX	SAN JULIAN CRK	IRRG	18	30		
2126-000	6	Bandera	5887105000	STANLEY D ROSENBERG ET UX	MEDINA RIVER	IRRG	47	36		
2127-000	6	Bandera	5887100000	JERRY B PARKER ET AL	MEDINA RIVER	IRRG	16	8		
2128-000	6	Bandera	5887050000	JOE H BERRY	SADDLE CRK	IRRG	14	12	3	
2129-000	6	Bandera	5887000000	JOE H BERRY	PRIVILEGE CRK	IRRG	40	33	110	
2135-000	6	Bandera	5660000000	KITTIE NELSON FERGUSON	SAN GERONIMO CRK	IRRG	5	5	28	
3176-000	6	Bandera	2851020000	TEXAS PARKS & WILDLIFE DEPT	CAN CRK	MUNI	7			
3176-000	6	Bandera	2851020000	TEXAS PARKS & WILDLIFE DEPT	CAN CRK	IRRG		3		
3177-000	6	Bandera	2850500000	BETTY F LEIGHTON	SABINAL RIVER	MUNI	4			
3178-000	6	Bandera	2850000000	KING & JEWEL FISHER	SABINAL RIVER	IRRG	40	56	2	AMENDED 6/21/96
3179-000	6	Bandera	2825000000	JOHN K HARRELL	SABINAL RIVER	IRRG	28.196	95.257		
3179-000	6	Bandera	2825000000	BARBARA JEAN GROTH ET VIR	SABINAL RIVER	IRRG	8.804	29.743		
3184-000	6	Bandera	2675000000	ENRIQUE S PALOMO ET UX	SPRING CRK	IRRG	10	5	42	
3185-000	6	Bandera	2651700000	W H THOMPSON JR	WILLIAMS CRK	IRRG	15	5	2	CURRENT OWNER UNKNOWN, 5/98
3186-000	6	Bandera	2651500000	DOROTHY BAIRD MATTIZA	WILLIAMS CRK	IRRG	128	88	73	
3187-000	6	Bandera	2651000000	CHESTER N POSEY ET UX	WILLIAMS CRK	IRRG	23	21	15	
3188-000	6	Bandera	2650000000	W J SCHMIDT	HONDO CRK	IRRG	24	47	16	
3693-000	1	Bandera	5887260000	GERALD H PERSYN	UNNAMED TRIB BANDERA CRK	REC			11	
3824-000	1	Bandera	5887295000	CITY OF BANDERA	MEDINA RIVER	REC			22	
3825-000	1	Bandera	7718000000	ROBERT L PARKER SR ET AL	VERDE CRK	REC			277	
3853-000	1	Bandera	5888230000	ROCK CLIFF RESERVOIR LAND ASSN	SPIRES CRK	REC			925.4	AMENDED 2/17/98: IMPOUNDMENT AND EXP
3909-000	1	Bandera	5888150000	MAUDEEN M MARKS	MONTAGUE HOLLOW	REC			500	DOMESTIC, LIVESTOCK & REC
3944-000	1	Bandera	5887120000	CONOCO INCORPORATED	UNNAMED TRIB MEDINA RIVER	REC			180	2 DAMS
3949-000	1	Bandera	5886550000	CASTLE LAND & LIVESTOCK CO INC	BEAR CRK	REC	33		33	DOM & LIVESTOCK - SC
4026-000	1	Bandera	5887125000	HILL COUNTRY MANAGEMENT CORP	SAN JULIAN	REC			3	ALSO DOM & LIVESTOCK

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5097-000	1	Bandera	5890300000	DON CODY ET UX	W PRONG MEDINA RIVER	IRRG	120	72		EXP 2/2/2016 BY CONTRACT 1610;AMEND 9/94
5186-000	1	Bandera	2824000000	HILL COUNTRY SPRING WATER TX	SPRING	MUNI	161			BOTTLED WATER, .049 RES
5204-000	1	Bandera	2840000000	ROGER E. CANTER ET UX	SABINAL RIVER	IRRG	60	20		
5305-000	1	Bandera	2621000000	UTOPIA SPRING WATER INC	W SECO CRK	MUNI	72			
5339-000	1	Bandera	5888089000	YMCA/GREATER HOUSTON AREA	INDIAN CRK	REC			30	
5342-000	1	Bandera	5890200000	RENE H GRACIDA	W PRONG MEDIA	REC			7	
5475-000	1	Bandera	2850600000	GALLERIA HOLDING, LTD	JERNIGAN CRK	IRRG	26	18	63	2 RESERVOIRS
5575-000	1	Bandera	2850900000	ALBERT R GAGE ET UX	MARLER CRK	IRRG	12	6		SC: FLOW RESTRICTIONS
13202-000	1	Bandera		FLYING “L” GUEST RANCH, LTD.		IRRG	383			Recreation
13631-000	1	Bandera		RR 417, LLC		IRRG	40			Recreation
1527-000	6	Edwards	1750010000	ADDISON LEE PFLUGER	HUFFMAN SPRING	IRRG	32	20	1	
1528-000	6	Edwards	1735000000	RUTH MCLEAN BOWERS	PAINT CREEK	IRRG	60	54	58	CO 134, 2 RES
2451-000	6	Edwards	1750000000	ADDISON LEE PFLUGER ET AL	S LLANO RIVER	IRRG	88	74	7	AMEND 5/9/83
3017-000	6	Edwards	9520000000	RAY H EUBANK	RUTH DRAW	IRRG	50	50		AMEND 7/3/84
3023-000	6	Edwards	9195000000	DONALD P TARPEY	NUECES RIVER	IRRG	108	27		
3024-000	6	Edwards	9170000000	DOUGLAS B & MARGARET MARSHALL	NUECES RIVER	IRRG	65	43		
3038-000	6	Edwards	8900000000	ROYCE I REID ESTATE	PULLIAM CRK	IRRG	48	20		
3039-000	6	Edwards	8800000000	OLGA H. CLOUDT, ET AL	PULLIAM CRK	IRRG	75	50	8	
3039-000	6	Edwards	8800000000	OLGA H. CLOUDT, ET AL	PULLIAM CRK	IRRG	30	20		
3040-000	6	Edwards	8790000000	J R WILLIAMS ET AL	PULLIAM CRK	IRRG	34	17		
3041-000	6	Edwards	8780000000	JOSEPH C WILLIAMS	PULLIAM CRK	IRRG	60	44		1/2 INTEREST IN 60 AF FOR IRR OF 44 AC
3042-000	6	Edwards	8779000000	J R WILLIAMS ET AL	PULLIAM CRK	IRRG	22	13		
3043-000	6	Edwards	8760000000	JOY JERNIGAN OWENS	PULLIAM CRK	IRRG	32	16		
3044-000	6	Edwards	8700010000	SUSAN PETTY ARNIM ET AL	CEDAR CRK	IRRG	6	12		
3044-000	6	Edwards	8700010000	SUSAN PETTY ARNIM ET AL	CEDAR CRK	IRRG	20			
3044-000	6	Edwards	8700010000	SUSAN PETTY ARNIM ET AL	CEDAR CRK	IRRG	4	20		
3046-000	6	Edwards	8460500000	NORMA JEAN EASLEY	PULLIAM CRK	IRRG	30	59		
3047-000	6	Edwards	8400000000	BRUCE I HENDRICKSON ET UX	CLEAR CRK	IRRG	6	6	11	
3048-000	6	Edwards	8340000000	L A MALACHEK ET AL	PULLIAM CRK	IRRG	27	14		

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3049-000	6	Edwards	7630010000	EDWARDS CO INVEST. PARTNER	PULLIAM CRK	IRRG	250	400		
3049-000	6	Edwards	7630010000	BRUCE I HENDRICKSON ET UX	PULLIAM CRK	IRRG	350	150		
3070-000	6	Edwards	7041600000	E B CARRUTH, JR, TRUST	W NUECES RIVER	IRRG	200	184		
3070-000	6	Edwards	7041600000	E B CARRUTH, JR, TRUST	W NUECES RIVER	REC			19	
3957-000	1	Edwards	8550000000	S A WILLIAMS	CEDAR CRK	IRRG	40	40		AMEND 1/13/87
4006-000	1	Edwards	8790100000	BAY-HOUSTON TOWING CO	PULLIAM	IRRG	150	75		
4278-000	1	Edwards	8920000000	BERRYMAN INVESTMENTS INC	PULLIAM CRK	IRRG	4.34	7.38		OWNS DAM & RESERVOIR
4278-000	1	Edwards	8920000000	SAM P WORDEN ET UX	PULLIAM CRK	IRRG	5.66	9.62		
1930-000	6	Kerr	9570000000	HERSHEL REID ET UX	FLAT ROCK CRK	IRRG	69	66	35	
1932-000	6	Kerr	9560000000	PRESBYTERIAN MO-RANCH ASSEMBLY	N FRK GUADALUPE RIVER	MUNI	60			AMEND 6/7/94
1932-000	6	Kerr	9560000000	PRESBYTERIAN MO-RANCH ASSEMBLY	N FRK GUADALUPE RIVER	IRRG	14	7		AMEND 6/7/94
1932-000	6	Kerr	9560000000	PRESBYTERIAN MO-RANCH ASSEMBLY	N FRK GUADALUPE RIVER	REC	25		20	AMEND 6/7/94
1934-000	6	Kerr	9527000000	CHARLES K HICKEY JR ET AL	DRY CRK	IRRG	0.45	0.68		
1934-000	6	Kerr	9527000000	KATHY JAN FREEMAN	DRY CRK	IRRG	1.55	2.32		
1935-000	6	Kerr	9525100000	CHARLES K HICKEY JR ET AL	N FRK GUADALUPE RIVER	IRRG	8	8		
1936-000	6	Kerr	9523000000	WILLIAM H ARLITT JR ET UX	N FRK GUADALUPE RIVER	IRRG	17	6	5	
1936-000	6	Kerr	9523000000	WILLIAM H ARLITT JR ET UX	INDIAN CRK	IRRG	134	48		
1937-000	6	Kerr	9515200000	BOY SCOUTS- ALAMO AREA	BEAR CRK	REC			10	
1938-000	6	Kerr	9515000000	LOUIS H STUMBERG	N FRK GUADALUPE RIVER	IRRG	2	4		
1938-000	6	Kerr	9515000000	LOUIS H STUMBERG	N FRK GUADALUPE RIVER	IRRG	15	22		
1939-000	6	Kerr	9512000000	LOUIS H STRUMBERG	GRAPE CRK	IRRG	3	6	6	
1940-000	6	Kerr	9511000000	B E QUINN III ET AL	N FRK GUADALUPE RIVER	IRRG	32	16	10	
1941-000	6	Kerr	8154502000	DELMAR SPIER AGENT	TURTLE CRK	IRRG	6	9	5	
1943-000	6	Kerr	9505000000	J CONRAD PYLE, ET AL	N FRK GUADALUPE RIVER	MUNI	14			
1945-000	6	Kerr	9485010000	JOHN P HILL	N FRK GUADALUPE RIVER	IRRG	25	20		
1946-000	6	Kerr	9485000000	JOHN P HILL ADMINISTRATOR	N FRK GUADALUPE RIVER	IRRG	11	9		
1947-000	6	Kerr	9480000000	GUAD VALLEY LOT OWNERS ASSN	N FRK GUADALUPE RIVER	IRRG	6	10		AMEND 3/6/91
1947-000	6	Kerr	9480000000	GUAD VALLEY LOT OWNERS ASSN	N FRK GUADALUPE RIVER	MUNI	3			
1948-000	6	Kerr	9489000000	JOHN H DUNCAN	BRUSHY CRK	IRRG	7	7		

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1949-000	6	Kerr	9488000000	WILLIAM O CARTER, TRUSTEE	HONEY CRK	IRRG	6	2		OUT OF A 80 ACRE TRACT
1949-000	6	Kerr	9488000000	WILLIAM O CARTER, TRUSTEE	HONEY CRK	IRRG	27	9		
1950-000	6	Kerr	9487000000	JOHN H DUNCAN	HONEY CRK	IRRG	6	20	13	ALSO USE 7
1953-000	6	Kerr	9476000000	LAURA B LEWIS ET VIR	N FRK GUADALUPE RIVER	IRRG	40	24		
1956-000	6	Kerr	9897000000	RIVER INN ASSOC OF UNIT OWNERS	S FRK GUADALUPE RIVER	REC			50	
1956-000	6	Kerr	9897000000	RIVER INN ASSOC OF UNIT OWNERS	S FRK GUADALUPE RIVER	MUNI	10			AMEND 4/19/84, 1/4/85
1957-000	6	Kerr	9880000000	BILLIE R VALICEK	S FRK GUADALUPE RIVER	REC			10	
1958-000	6	Kerr	9780000000	T J MOORE ESTATE	CYPRESS CRK	IRRG	20	10	100	
1961-000	6	Kerr	9670000000	LAVERNE CRIDER MOORE ET VIR	S FRK GUADALUPE RIVER	MUNI	3			
1961-000	6	Kerr	9670000000	LAVERNE CRIDER MOORE ET VIR	S FRK GUADALUPE RIVER	IRRG	1	3		
1963-000	6	Kerr	9620000000	LAWRENCE L GRAHAM ET AL	S FRK GUADALUPE RIVER	IRRG	2	12	21	AMEND 9/10/85
1963-000	6	Kerr	9620000000	LAWRENCE L GRAHAM ET AL	S FRK GUADALUPE RIVER	REC			16	AMENDS 5/26/83 CHG PUR USE & ADD RES
1964-000	6	Kerr	9400000000	VIRGINIA MOORE JOHNSTON	TEGENER	IRRG	10	10	12	
1967-000	6	Kerr	9305000000	SARAH HICKS BUSS	UNNAMED TRIB	REC	20			ALSO USE 1, AMEND 3/19/91
1968-000	6	Kerr	9261000000	LOUIS DOMINGUES	GUADALUPE RIVER GUADALUPE RIVER	IRRG	10	20		
1969-000	6	Kerr	9260000000	TOMMIE SMITH BLACKBURN	GUADALUPE RIVER	INDU	15		15	USE 2: MILLING
1969-000	6	Kerr	9260000000	TOMMIE SMITH BLACKBURN	KELLY CRK	IRRG	49	80		USE 3 - DIVERTING FROM KELLY CREEK
1969-000	6	Kerr	9260000000	TOMMIE SMITH BLACKBURN	GUADALUPE RIVER	IRRG	59			USE 3 - DIVERTING FROM GUADALUPE RIVER
1969-000	6	Kerr	9260000000	TOMMIE SMITH BLACKBURN	GUADALUPE RIVER	HYDRO				USE 5; NONCONSUMPTIVE
1970-000	6	Kerr	9220000000	CARL HAWKINS	GUADALUPE RIVER	MUNI	10			
1970-000	6	Kerr	9220000000	CARL HAWKINS	GUADALUPE RIVER	IRRG	32	25		
1971-000	6	Kerr	9140000000	COUNTY OF KERR	GUADALUPE RIVER	REC			450	
1972-000	6	Kerr	9110000000	WESLEY ELLEBRACHT	WELSH BR	IRRG	0.8	0.8		
1972-000	6	Kerr	9110000000	WELCH CREEK PARTNERS LTD	WELSH BR	IRRG	5.15	5.15		
1972-000	6	Kerr	9110000000	ARANSAS BAY COMPANY	WELSH BR	IRRG	0.05	0.05		
1973-000	6	Kerr	9100000000	SHELTON RANCHES INC	SMITHS BR	IRRG	10	10	6	
1974-000	6	Kerr	9050000000	SHELTON RANCHES INC	SMITHS BR	IRRG	70	35	15	ALSO JOHNSON CREEK
1975-000	6	Kerr	9025000000	TEXAS PARKS & WILDLIFE DEPT	FESSENDEN BR	INDU	400			FISH HATCHERY & GAME PRESERVE
1975-000	6	Kerr	9025000000	TEXAS PARKS & WILDLIFE DEPT	FESSENDEN BR	INDU	5780		72	2 IMP & A POND; USES 3, 1 & 7; EXP 2012

Water Right Number	Type	County	River Order Permit	Name	Stream	Use	Amount in Ac-Ft/Yr	Acreage	Res Cap in Ac-Ft	Remarks
1976-000	6	Kerr	8950000000	F P ZOCH III TRUST & ZEE RANCH	FESSENDEN BR	IRRG	29	14		
1976-000	6	Kerr	8950000000	F P ZOCH III TRUST & ZEE RANCH	FESSENDEN BR	REC			184	
1977-000	6	Kerr	8839000000	TEXAS CATHOLIC BOYS' HOME	JOHNSON CRK	IRRG	23	23	23	
1978-000	6	Kerr	8815000000	A J RUST	JOHNSON CRK	IRRG	33	65		
1979-000	6	Kerr	8808000000	KEITH S MEADOW	BYAS CRK	IRRG	18	6		
1980-000	6	Kerr	8805000000	A L MOORE	JOHNSON CRK	IRRG	12	6		
1981-000	6	Kerr	8800000000	JACK D CLARK JR ET AL	JOHNSON CRK	IRRG	32	16		
1981-000	6	Kerr	8800000000	JACK D CLARK JR ET AL	JOHNSON CRK	IRRG	143	76		OUT OF A 111.9 ACRE TRACT
1982-000	6	Kerr	8775000000	LOLA DEAN SMITH	JOHNSON CRK	IRRG	133	50	12	
1983-000	6	Kerr	8770000000	N V MAMIMAR	JOHNSON CRK	IRRG	32	17		JOINTLY OWN 32 & 67 AF TO IRR 17 & 35 AC
1983-000	6	Kerr	8770000000	N V MAMIMAR	JOHNSON CRK	IRRG	67	35		JOINTLY OWN 32 & 67 AF TO IRR 17 & 35 AC
1983-000	6	Kerr	8770000000	DAVID J COPELAND ET UX	JOHNSON CRK	IRRG				JOINTLY OWN 32 & 67 AF TO IRR 17 & 35 AC
1983-000	6	Kerr	8770000000	DAVID J COPELAND ET UX	JOHNSON CRK	IRRG				JOINTLY OWN 32 & 67 AF TO IRR 17 & 35 AC
1984-000	6	Kerr	8750000000	MICHAEL E & GAIL SEARS	JOHNSON CRK	IRRG	1	2		
1985-000	6	Kerr	8746000000	ROBERT B O'CONNOR JR ET UX	JOHNSON CRK	IRRG	80	31		
1987-000	6	Kerr	8744000000	REGINALD E WARREN JR	JOHNSON CRK	IRRG	90	30		
1988-000	6	Kerr	8720000000	JIMMIE L QUERNER SR ESTATE	FALL BR	IRRG	128	64		ALSO GILLESPIE CO
1990-000	6	Kerr	8650000000	DOROTHY L JENKINS ET AL	JOHNSON CRK	IRRG	3	1		
1991-000	6	Kerr	8615001000	LAZY HILLS GUEST RANCH INC	HENDERSON BR	IRRG	21	28		
1992-000	6	Kerr	8600000000	MARK A RYLANDER ET AL	JOHNSON CRK	IRRG	23	15		
1993-000	6	Kerr	8550000000	ROY LITTLEFIELD	JOHNSON CRK	IRRG	50	50	4	
1994-000	6	Kerr	8500000000	M H & MARY FRANCES MONTGOMERY	GUADALUPE RIVER	IRRG	5	4		
1995-000	6	Kerr	8451000000	HENRY GRIFFIN CONSTRUCTION CO	GOAT CRK	IRRG	11	11	6	
1996-000	6	Kerr	8287000000	KERRVILLE, CITY OF	GUADALUPE RIVER	MUNI	150			AMEND 3/19/91, 4/10/98: DIV PT #4.SC.
1996-000	6	Kerr	8287000000	KERRVILLE, CITY OF	GUADALUPE RIVER	IRRG	75	44	75	AMEND 3/19/91, 4/10/98: DIV PT #4.SC.
1997-000	6	Kerr	8310000000	DARRELL G LOCHTE ET AL	GUADALUPE RIVER	MINE	143			
1997-000	6	Kerr	8310000000	DARRELL G LOCHTE ET AL	GUADALUPE RIVER	INDU	2			
1998-000	6	Kerr	8295000000	C W SUNDAY	TOWN CRK	IRRG	22.3	22.3	10	
1998-000	6	Kerr	8295000000	JOSE A LOPEZ ET UX	TOWN CRK	IRRG	4.18	4.18		

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1999-000	6	Kerr	8297000000	KERRVILLE STATE HOSPITAL	UNNAMED TRIB GUADALUPE RIVER	REC	44		44	
2000-000	6	Kerr	8260010000	RIVERHILL COUNTRY CLUB INC	GUADALUPE RIVER	IRRG	350	160	70	8/31/87
2001-000	6	Kerr	8255000000	CARL D. MEEK	GUADALUPE RIVER	IRRG	295	194		AMEND 4/9/92,5/12/95.DIFF PRIORITY DATES
2002-000	6	Kerr	8230000000	COMANCHE TRACE RANCH & GOLF CL	GUADALUPE RIVER	IRRG	136	99		
2003-000	6	Kerr	8250000000	WHEATCRAFT, INC.	GUADALUPE RIVER	IRRG	42	21		
2003-000	6	Kerr	8250000000	SHELTON RANCH CORPORATION	GUADALUPE RIVER	MINE	10			
2004-000	6	Kerr	8200000000	COUNTY OF KERR	GUADALUPE RIVER	REC			720	ALSO USE 8
2005-000	6	Kerr	8185500000	HARRIET BOCKHOFF ESTATE	GUADALUPE RIVER	IRRG	59	98		
2006-000	6	Kerr	8174000000	FARM CREDIT BANK OF TEXAS	GUADALUPE RIVER	IRRG	179.06	512.55		AMEND 2/3/88,6/18/90. MAX COMB. CFS:4.0
2006-000	6	Kerr	8174000000	FARM CREDIT BANK OF TEXAS	GUADALUPE RIVER	IRRG	83.94			AMEND 2/3/88, 6/18/90
2006-000	6	Kerr	8174000000	1967 SHELTON TRUSTS PART ET AL	GUADALUPE RIVER	IRRG	106.9	78.55		AMEND 2/3/88, 6/18/90
2006-000	6	Kerr	8174000000	1967 SHELTON TRUSTS PART ET AL	GUADALUPE RIVER	IRRG	50.1			AMEND 2/3/88, 6/18/90
2006-000	6	Kerr	8174000000	KENNETH W WHITEWOOD ET UX	GUADALUPE RIVER	IRRG	34.04			AMEND 2/3/88, 6/18/90, 11/22/96
2006-000	6	Kerr	8174000000	KENNETH W WHITEWOOD ET UX	GUADALUPE RIVER	IRRG	15.96			AMEND 2/3/88, 6/18/90, 11/22/96
2006-000	6	Kerr	8174000000	KENNETH W WHITEWOOD ET UX	GUADALUPE RIVER	IRRG	100	76		AMEND 2/3/88, 6/18/90, 11/22/96
2007-000	6	Kerr	8160000000	RAY ELLISON JR	SPRING CRK	IRRG	31	31	50	
2008-000	6	Kerr	8156160000	LUTHERAN CAMP CHRYSALIS	TURTLE CRK	MUNI	11		12	
2009-000	6	Kerr	8155750000	FRANCIS C & WILLADEAN BOLEN	BUSHWACK CRK	IRRG	5	5	5	
2010-000	6	Kerr	8155700000	G ROBERT SWANTNER JR ET UX	BUSHWACK CRK	IRRG	7	5	5	OUT OF 68.8 ACRE TRACT
2011-000	6	Kerr	8155000000	H J GRUY	TURTLE CRK	IRRG	80	50	10	
2012-000	6	Kerr	8154501000	SANDRA BLAIR	TURTLE CRK	IRRG	1	1	5	
2013-000	6	Kerr	8154500000	FELIX R & LILLIAN STEILER REAL	WEST CRK	IRRG	11	12		
2014-000	6	Kerr	8152000000	LEAH MARTHA STEPHENS	TURTLE CRK	IRRG	6.36	5.63		
2014-000	6	Kerr	8152000000	BENNO OOSTERMAN ET UX	TURTLE CRK	IRRG	6.36	5.63		
2014-000	6	Kerr	8152000000	JOHN M LEBOLT TRUSTEE	TURTLE CRK	IRRG	9.02	7.98		
2015-000	6	Kerr	8151000000	JAMES E NUGENT	GUADALUPE RIVER	IRRG	27	21		
2016-000	6	Kerr	8150500000	DORIS J HODGES	GUADALUPE RIVER	IRRG	8	8		
2017-000	6	Kerr	8050000000	COUNTY OF KERR	GUADALUPE RIVER	REC			87	ALSO USE 8
2018-000	6	Kerr	8049000000	LEE ANTHONY MOSTY	GUADALUPE RIVER	IRRG	154	94		

Water Right Number	Type	County	River Order Permit	Name	Stream	Use	Amount in Ac-Ft/Yr	Acreage	Res Cap in Ac-Ft	Remarks
2020-000	6	Kerr	7970000000	ROBERT LEE MOSTY	GUADALUPE RIVER	IRRG	60	30		
2021-000	6	Kerr	7940000000	RAYMOND F MOSTY ET AL	GUADALUPE RIVER	IRRG	103	45	5	
2022-000	6	Kerr	7950000000	ROBERT LEE MOSTY	GUADALUPE RIVER	IRRG	17	119	20	
2023-000	6	Kerr	7935000000	ROY A GREEN	GUADALUPE RIVER	IRRG	7	3		
2024-000	6	Kerr	7924990000	CARL E RHODES	GUADALUPE RIVER	IRRG	114	125		
2025-000	6	Kerr	7925000000	HARRY J WRAY	GUADALUPE RIVER	IRRG	155	80		JOINTLY OWNS 155 AF TO IRR 80 ACRES
2025-000	6	Kerr	7925000000	DAVID B WRAY	GUADALUPE RIVER	IRRG				JOINTLY OWNS 155 AF TO IRR 80 ACRES
2025-000	6	Kerr	7925000000	BYNO SALSMAN ET UX	GUADALUPE RIVER	IRRG				JOINTLY OWNS 155 AF TO IRR 80 ACRES
2026-000	6	Kerr	7920000000	ELGIN JUNG	GUADALUPE RIVER	IRRG	3.309	2.118		
2026-000	6	Kerr	7920000000	ZANE H ROBINSON ET UX	GUADALUPE RIVER	IRRG	53.945	34.52		
2026-000	6	Kerr	7920000000	RONNIE W SCHLOTTMAN ET UX	GUADALUPE RIVER	IRRG	17.83	11.41		
2026-000	6	Kerr	7920000000	KENNETH W WHITEWOOD ET UX	GUADALUPE RIVER	IRRG	149.916	44.72		AMENDED 11/22/96
2029-000	6	Kerr	7710000000	ROLAND WALTERS	PRISON CANYON	IRRG	25	200	420	& CO 010, 10/5/82 ADD DIV PT
2030-000	6	Kerr	7704000000	JAMES S ERNST	UNNAMED TRIB VERDE CRK	IRRG	247		120	
2030-000	6	Kerr	7704000000	PETE R SMITH	UNNAMED TRIB VERDE CRK	IRRG	19			
2031-000	6	Kerr	7701000000	JOSEPH PAUL MILLER ET UX	GUADALUPE RIVER	IRRG	115	80		AMEND 11/4/85
2032-000	6	Kerr	7700700000	DAVID M LEIBOWITZ ET UX	GUADALUPE RIVER	IRRG	10	6		
2033-000	6	Kerr	7699900000	JAVIER G REYES ET UX	GUADALUPE RIVER	IRRG	90	90		
2034-000	6	Kerr	7699500000	CHESTER P HEINEN ET AL	GUADALUPE RIVER	IRRG	2	6		
2037-000	6	Kerr	7652500000	GENE ARTHUR ALLERKAMP	CYPRESS CRK	IRRG	5	6.33		
2037-000	6	Kerr	7652500000	JANICE CHARLOTTE BULLARD	CYPRESS CRK	IRRG	5	6.34		
2037-000	6	Kerr	7652500000	ROMAN LUNA ET UX	CYPRESS CRK	IRRG	10	12.67		
2037-000	6	Kerr	7652500000	CURTIS BERNARD ALLERKAMP	CYPRESS CRK	IRRG	5	6.33		
2037-000	6	Kerr	7652500000	WERNER WAYNE ALLERKAMP	CYPRESS CRK	IRRG	5	6.33		
2038-000	6	Kerr	7652000000	HARRY E REEH	CYPRESS CRK	IRRG	15	15		
2039-000	6	Kerr	7650500000	FRED SAUR	CYPRESS CRK	IRRG	7	7		
2040-000	6	Kerr	7650000000	A C & DOROTHY PFEIFFER	CYPRESS CRK	IRRG	10	5		
2041-000	6	Kerr	7645000000	THOMAS L BRUNDAGE ET AL	CYPRESS CRK	IRRG	134	57		AMEND 2/1/85
2042-000	6	Kerr	7644800000	E J & VIRGINIA DOWER	CYPRESS CRK	IRRG	209	125		
2043-000	6	Kerr	7644600000	MARY LEE EDWARDS	CYPRESS CRK	IRRG	19.57	14.68		

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2043-000	6	Kerr	7644600000	EDGAR SEIDENSTICKER ET UX	CYPRESS CRK	IRRG	16.85	12.63		
2043-000	6	Kerr	7644600000	L J MANNERING ET UX	CYPRESS CRK	IRRG	3.58	2.69		
2437-000	6	Kerr	9550000000	CHLOE CULLUM KEARNEY ET AL	N FRK GUADALUPE RIVER	REC			100	D&L. RESERVOIR JOINTLY OWNED BY SEVERAL.
2437-000	6	Kerr	9550000000	DAN W BACON ET UX	N FRK GUADALUPE RIVER	REC				D&L. RESERVOIR JOINTLY OWNED BY SEVERAL.
2438-000	6	Kerr	9528000000	LUTZ ISSLIEB ET AL	N FRK GUADALUPE RIVER	IRRG	30	18	30	
2439-000	6	Kerr	9510000000	DALE B AND MARSHA G ELMORE	N FRK GUADALUPE RIVER	IRRG	8	8	20	AMEND 10/29/90
2440-000	6	Kerr	9507000000	L F SCHERER	N FRK GUADALUPE RIVER	IRRG	1	1		
2441-000	6	Kerr	9490000000	SILAS B RAGSDALE	N FRK GUADALUPE RIVER	IRRG	21	105		
2442-000	6	Kerr	9486000000	LUTHER GRAHAM	HONEY CRK	IRRG	28	14	17	
2443-000	6	Kerr	9476500000	JOHN H DUNCAN	HONEY CRK	IRRG	40	20	25	
2444-000	6	Kerr	9980000000	BRUCE F. HARRISON	S FRK GUADALUPE RIVER	IRRG	6	3	10	
2444-000	6	Kerr	9980000000	BRUCE F. HARRISON	S FRK GUADALUPE RIVER	REC			17	
2445-000	6	Kerr	9680000000	CAMP MYSTIC INC	CYPRESS CRK	IRRG	12	15		
2445-000	6	Kerr	9680000000	CAMP MYSTIC INC	CYPRESS CRK	MUNI	14		20	
2446-000	6	Kerr	9675000000	BOB/KAT INC	S FRK GUADALUPE RIVER	IRRG	10	10		
2446-000	6	Kerr	9675000000	BOB/KAT INC	S FRK GUADALUPE RIVER	MUNI	10			
2447-000	6	Kerr	9625000000	CAMP LA JUNTA INC	S FRK GUADALUPE RIVER	IRRG	26	15	30	
2447-000	6	Kerr	9625000000	CAMP LA JUNTA INC	S FRK GUADALUPE RIVER	MUNI	14			& RECREATION
2448-000	6	Kerr	9350000000	ALICE CYNTHIA SIMKINS	TEGENER CRK	IRRG	6	5		
2449-000	6	Kerr	9310000000	BILLIE ZUBER ET AL	GUADALUPE RIVER	IRRG	17	25.5		AMEND 9/24/93:ADD ACREAGE.JUNIOR PRIORTY
2450-000	6	Kerr	7999000000	ROBERT L MOSTY ET AL	GUADALUPE RIVER	IRRG	158	117		
3769-000	1	Kerr	8300010000	CITY OF KERRVILLE	GUADALUPE RIVER	MUNI	3603		840	
3769-000	1	Kerr	8300010000	CITY OF KERRVILLE	GUADALUPE RIVER	IRRG		192		USING 2450 AF WASTEWATER FROM SEWAGE.SC
3846-000	1	Kerr	7715000000	T & R PROPERTIES	PALMER CRK	REC	322		322	
3896-000	1	Kerr	8276000000	KENNETH W & MARCIA C MULFORD	RATTLESNAKE	MUNI			13	3 TRACTS 34.55 AC, ALSO REC
3904-000	1	Kerr	8275500000	CITY OF KERRVILLE	QUINLAN CRK	IRRG	80	56	10	& REC-2 RES-146-AC TR-EXPIRES 20 YEARS
4007-000	1	Kerr	7703100000	PECAN VALLEY RANCH OWNERS ASSO	ELM CRK	REC			157	ALSO DOMESTIC & LIVESTOCK
4034-000	1	Kerr	9040000000	SHELTON RANCHES INC	JOHNSON CRK	REC			122	2 RES, SEE FILE, & ADJ 1974

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4223-000	1	Kerr	9105000000	SHELTON RANCHES INC	JOHNSON CRK	IRRG	20	14	39	
4298-000	1	Kerr	8294800000	ALISON B MENCAROW LIVING TRUST	TOWN CRK	IRRG	12	18		AMEND 12/10/91
4486-000	1	Kerr	7644900000	JAY & HILDA POTH	CYPRESS CRK	IRRG	70	35		RATE SEE 18-2041
5060-000	1	Kerr	8710000000	HORACE COFER ASSOCIATES, INC	FALL BR CRK	IRRG	10	12		
5122-000	1	Kerr	8150800000	JAMES C STORM	GUADALUPE RIVER	IRRG	75	50	8	
5315-000	1	Kerr	8294000000	DANA G KIRK TRUSTEE	E TOWN CRK	OTHER				PRIVATE WATER
5322-000	1	Kerr	8705000000	E RAND SOUTHARD ET UX	FALL BR	REC				
5331-000	1	Kerr	9660000000	KATHLEEN B FLOURNOY, ET AL	S FRK GUADALUPE RIVER	MUNI	15		30	& RECREATION
5331-000	1	Kerr	9660000000	KATHLEEN B FLOURNOY, ET AL	S FRK GUADALUPE RIVER	IRRG	96	30		
5348-000	1	Kerr	9526000000	BRYON DONZIS	N FRK GUADALUPE RIVER	IRRG	5	4		
5352-000	1	Kerr	9650000000	BONITA OWNERS ASSOC INC	S FRK GUADALUPE RIVER	IRRG	2	2		
5394-000	1	Kerr	8300010000	UPPER GUADALUPE RIVER AUTH	GUADALUPE RIVER	MUNI	1661			FIRM YIELD BASIS. AMENDED 4/10/98. SCS.
5394-000	1	Kerr	8300010000	UPPER GUADALUPE RIVER AUTH	GUADALUPE RIVER	MUNI	339			FIRM YIELD BASIS. AMENDED 4/10/98. SCS.
5394-000	1	Kerr	8300010000	CITY OF KERRVILLE	GUADALUPE RIVER	MUNI	761			FIRM YIELD BASIS. AMENDED 4/10/98. SCS.
5394-000	1	Kerr	8300010000	CITY OF KERRVILLE	GUADALUPE RIVER	MUNI	339			RUN OF RIVER BASIS. AMENDED 4/10/98.SCS
5394-000	1	Kerr	8300010000	CITY OF KERRVILLE	GUADALUPE RIVER	MUNI	1069			RUN OF RIVER BASIS. AMENDED 4/10/98.SCS
5402-000	1	Kerr	8155300000	TURTLE CREEK INDUSTRIES INC	TURTLE CRK	REC				
5444-000	1	Kerr	8490000000	EUGENE D ELLIS ET UX	GUADALUPE RIVER	IRRG	10	25.5		
5479-000	1	Kerr	7701250000	CITY SOUTH MANAGEMENT CORP	GUADALUPE RIVER	IRRG	566	283		AMENDED 3/13/98
5495-000	1	Kerr	9800000000	LOIS & JOSEPH WESSENDORF ET AL	S FRK GUADALUPE RIVER	REC			9	
5521-000	1	Kerr	8300050000	DON D WILSON	GUADALUPE LAKE	IRRG	30	30		GUADALUPE RIVER
5531-000	1	Kerr	8185700000	LEE ROY COSPER ET UX	GUADALUPE RIVER	IRRG	80	40		
5536-000	1	Kerr	7701350000	ROBERT H & CHARLOTTE JENNINGS	GUADALUPE RIVER	IRRG	400	200		
5541-000	1	Kerr	9476150000	BASHARDT LTD	N FRK GUADALUPE RIVER	IRRG	14	15		
5641-000	1	Kerr		MARLIN R MARCUM		IRRG	1	2		SUBJECT TO MAINT OF CONTRACT &
5737-000	1	Kerr		SYLVIA SIEKER		IRRG	1			AGREEMENT
12246-000	1	Kerr		ELIZABETH CARTER		REC			6.84	
12938-000	1	Kerr		RIVER MOUNTAIN RANCH		RFC				

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2671-000	6	Kinney	4950000000	MAVERICK CO WCID 1	RIO GRANDE	IRRG	134900	45000		& CO 162, AMEND 8/22/86,9/22/88,10/30/98
2671-000	6	Kinney	4950000000	MAVERICK CO WCID 1	RIO GRANDE	MUNI	2049			AMEND 8/22/86,9/22/88,10/30/98
2671-000	6	Kinney	4950000000	MAVERICK CO WCID 1	RIO GRANDE	REC	196			AMEND 8/22/86,9/22/88,10/30/98
2671-000	6	Kinney	4950000000	MAVERICK CO WCID 1	RIO GRANDE	HYDRO	1085966			AMEND 8/22/86,9/22/88,10/30/98
2673-000	6	Kinney	4950000000	LENDELL MARTIN ET UX	MUD CRK	IRRG	52	35	16	
2674-000	6	Kinney	4950000000	CLYDE M BRADLEY	MUD CRK	IRRG	20	15		RATE SEE 23-2673
2675-000	6	Kinney	4950000000	SHERWOOD GAINES TRUSTEE	MUD CRK	IRRG	60	30		RATE SEE 23-2673
2676-000	6	Kinney	4950000000	JEWEL FOREMAN ROBINSON	PINTO CRK	IRRG	252	126		
2678-000	6	Kinney	4950000000	JOHNNY E RUTHERFORD	PINTO CRK	IRRG	135	90		
2679-000	6	Kinney	4950000000	CITY OF BRACKETTVILLE	LAS MORAS SPRING	MUNI	3			
2680-000	6	Kinney	4950000000	ELISE AULGUR HUNTSMAN ET AL	LAS MORAS CRK	IRRG	15	15		JOINT OWNER OF 15 AF TO IRR 15 ACRES
2680-000	6	Kinney	4950000000	ANN A LEGG & ERNESTINE A LOPEZ	LAS MORAS CRK	IRRG				JOINT OWNER OF 15 AF TO IRR 15 ACRES
2681-000	6	Kinney	4950000000	EARL H NOBLES	LAS MORAS CRK	IRRG	10	10		
2682-000	6	Kinney	4950000000	BERNARD C MEISCHEN ET AL	LAS MORAS CRK	IRRG	25	25		
2682-000	6	Kinney	4950000000	CHARLES W GAEBLER ET AL	LAS MORAS CRK	IRRG	75	75		+50 AF FROM 7 RES FOR STOCK RAISING
2683-000	6	Kinney	4950000000	ANDREW P MALINOVSKY JR	LAS MORAS CRK	IRRG	60	30		
2684-000	6	Kinney	4950000000	BEN S JONES	ELM CRK	IRRG	47	26	6	
2686-000	6	Kinney	4950000000	ROBERT H MEISCHEN, ET AL	LAS MORAS CRK	IRRG	300	300		
2686-000	6	Kinney	4950000000	ROBERT H MEISCHEN, ET AL	LAS MORAS CRK	MUNI	50			4 RESERVOIRS
2687-000	6	Kinney	4950000000	CELIA R DE PLAZA, ET AL	LAS MORAS CRK	IRRG	110	55		
2913-000	6	Kinney	4950000000	MOODY RANCHES INC	RIO GRANDE	IRRG	5500	3000	17	
2913-000	6	Kinney	4950000000	MOODY RANCHES INC	RIO GRANDE	IRRG	500	250		
3071-000	6	Kinney	7023010000	LLOYD L DAVIS	W NUECES RIVER	OTHER			25	IMPOUNDMENT
4365-000	1	Kinney	7028000000	ROBERT L MOODY JR	SPRING BR	REC	10		42	4 RES
4389-000	1	Kinney	4950000000	FORT CLARK SPRINGS ASSOC INC	LAS MORAS CRK	REC				
4517-000	1	Kinney	4950000000	FORT CLARK SPRINGS ASSOC INC	LAS MORAS CRK	REC			3	
1610-000	9	Medina	5700000000	L KEN EVANS	MEDINA RIVER	IRRG	20			LAKE MEDINA, EXP 2016
3016-000	6	Real	9615000000	JOHN H WATTS III ET UX	E PRONG NUECES RIVER	IRRG	4	2		SC. TWO PRIORITY DATES. AMEND 7/10/98
3016-000	6	Real	9615000000	JOHN H WATTS III ET UX	E PRONG NUECES RIVER	IRRG	54	27		SC. TWO PRIORITY DATES. AMEND 7/10/98
3018-000	6	Real	9450000000	LEWIS CLECKLER ET UX	SPRING CRK	IRRG	22.7	12.1		BULLHEAD HOLLOW

Water Right Number	Type	County	River Order Permit	Name	Stream	Use	Amount in Ac-Ft/Yr	Acreage	Res Cap in Ac-Ft	Remarks
3018-000	6	Real	9450000000	EL CAMINO GIRL SCOUT COUNCIL	SPRING CRK	IRRG	7.3	3.9		BULLHEAD HOLLOW
3019-000	6	Real	9410000000	SARAH M DAVIS	BULLHEAD CRK	IRRG	80	40		
3019-000	6	Real	9410000000	SARAH M DAVIS	BULLHEAD CRK	IRRG		13		
3020-000	6	Real	9320000000	H C MCCARTY JR ET UX	BULLHEAD CRK	IRRG	34.736	17.368		
3020-000	6	Real	9320000000	F WALTER CONRAD JR ET UX	BULLHEAD CRK	IRRG	85.264	42.632		
3021-000	6	Real	9198500000	DSD, INC	BULLHEAD CRK	IRRG	418	210		
3022-000	6	Real	9190000000	MARVIN L BERRY	UNNAMED TRIB NUECES RIVER	IRRG	259	300	14	TRIB OF NUECES RIVER
3022-000	6	Real	9190000000	MARVIN L BERRY	UNNAMED TRIB NUECES RIVER	IRRG	485			
3025-000	6	Real	9150000000	WILLIAM C & WANDA LEA LANE	DRY CRK	IRRG	40	20	1	
3026-000	6	Real	9075000000	JOHN A DANIEL ET UX	DRY CRK	IRRG	16	8	90	
3027-000	6	Real	9050000000	J F ALSOP	DRY CRK	IRRG	20	10		
3028-000	6	Real	9040000000	CLARENCE W HARRISON ET UX	DRY CRK	IRRG	15.43	7.72	43	
3028-000	6	Real	9040000000	CLARENCE W HARRISON ET UX	DRY CRK	REC			4	
3028-000	6	Real	9040000000	W THOMAS TAYLOR ET UX	DRY CRK	IRRG	4.36	2.18		
3029-000	6	Real	9008000000	HENRY D ENGELKING	NUECES RIVER	IRRG	43	52		
3034-000	6	Real	9004000000	HERBERT C JEFFRIES ET UX	NUECES RIVER	IRRG		2		SEE ADJ 3030
3036-000	6	Real	9000000000	SALVADOR ORTIZ ET AL	NUECES RIVER	IRRG	125	50		
3037-000	6	Real	8950000000	DAVID WELDON TINDLE	NUECES RIVER	IRRG	25	25		
3050-000	6	Real	8000000000	W A MALEY	E CAMP WOOD CRK	IRRG	28	14		
3051-000	6	Real	7980000000	ROBERT J LLOYD ET UX	E CAMP WOOD CRK	IRRG	1.42	1.42		
3051-000	6	Real	7980000000	WANNA LOU LLOYD	E CAMP WOOD CRK	IRRG	4.08	4.08		
3052-000	6	Real	7970000000	BARRY BLANKS MCHALEK ET UX	E CAMP WOOD CRK	IRRG	5	5		SEE ADJ 3051
3053-000	6	Real	7960000000	BARRY BLANKS MCHALEK ET UX	E CAMP WOOD CRK	IRRG	1	1		SEE ADJ 3051
3054-000	6	Real	7950000000	JOHN CHAMBERS ET AL	E CAMP WOOD CRK	IRRG	10	10		SEE ADJ 3051
3055-000	6	Real	7900000000	WILLIAM C & PATRICIA K SUTTON	E CAMP WOOD CRK	IRRG	105	130	2	
3056-000	6	Real	7810000000	ROY GIBBENS	E CAMP WOOD CRK	IRRG	18	9	4	
3056-000	6	Real	7810000000	ROY GIBBENS	E CAMP WOOD CRK	IRRG	2			
3057-000	6	Real	7800000000	MAGELEE V SWIFT	E CAMP WOOD CRK	IRRG	21	16	8	SEE ADJ 3056
3057-000	6	Real	7800000000	MAGELEE V SWIFT	E CAMP WOOD CRK	IRRG	10	4	4	

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3058-000	6	Real	7740000000	DOROTHY MERRITT ANDERSON	NUECES RIVER	IRRG	8	8		
3059-000	6	Real	7730000000	F L JR & CHARLOTTE HATLEY	NUECES RIVER	IRRG	11	7		
3060-000	6	Real	7631000000	E E GILDART	NUECES RIVER	IRRG	42	21		
3060-000	6	Real	7631000000	E E GILDART	NUECES RIVER	IRRG	54	26		
3060-000	6	Real	7631000000	E E GILDART	NUECES RIVER	IRRG	35	46		
3061-000	6	Real	7630000000	E E GILDART	NUECES RIVER	IRRG	31	31		
3062-000	6	Real	7550000000	JOANNE FRIEND	NUECES RIVER	IRRG	46	46		
3145-000	6	Real	3900000000	GEORGE S HAWN INTERESTS ET AL	S P/L P W FRIO RIVER	REC			27	
3145-000	6	Real	3900000000	GEORGE S HAWN INTERESTS ET AL	S P/L P W FRIO RIVER	REC			68	
3145-000	6	Real	3900000000	GEORGE S HAWN INTERESTS ET AL	S P/L P W FRIO RIVER	IRRG	156	78		
3146-000	6	Real	3850000000	JAMES W HALE ET AL	W FRIO RIVER	REC			16	
3147-000	6	Real	3810000000	DIAMOND J RANCH INC	W FRIO RIVER	IRRG	165	55		
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	REC	3.5		10	
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	IRRG	6.5	2		UPPER SINGING HILLS RESERVOIR
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	REC	11		11	UNNAMED DOWNSTREAM RESERVOIR (D-0340)
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	IRRG	34.8	12.9		UNNAMED RESERVOIR (D-0340)
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	IRRG	6.7	2.5		UNNAMED RESERVOIR (D-0340)
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	REC	25.08		25.08	LINNET'S WINGS DAM (D-0220);AMEND 3/91
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	IRRG	3.2	1.2		LINNET'S WINGS DAM (D-0220)
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	REC	34		68.7	LAITY LODGE DAM (D-0240);AF/WATERFALL
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	IRRG	4	2		LAITY LODGE DAM (D-0240)
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	REC	5.51		5.51	LOWER SINGING HILLS DAM (D-0280)
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	IRRG	4.1	1.5		LOWER SINGING HILLS DAM (D-0280)
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	REC	2.64		2.64	SILVER CREEK DAM (D-0300)
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	REC	0.24		0.24	LOWER SILVER CREEK DAM (D-0320)
3148-000	6	Real	3750000000	H. E. BUTT FOUNDATION	E FRIO RIVER	REC	17.86		17.86	ECHO VALLEY DAM (D-0360)
3149-000	6	Real	3660000000	ORA L ROGERS ESTATE	E FRIO RIVER	IRRG	30	28		
3150-000	6	Real	3655000000	R F BINDOCK	E FRIO RIVER	IRRG	3	11		

Water Right Number	Type	County	River Order Permit	Name	Stream	Use	Amount in Ac-Ft/Yr	Acreage	Res Cap in Ac-Ft	Remarks
3151-000	6	Real	3620000000	KATHERINE MAXINE MORELAND	E FRIO RIVER	IRRG	67	30		
3152-000	6	Real	3600000000	DAN AULD, JR	E FRIO RIVER	IRRG	324	162		
3153-000	6	Real	3490000000	JOHN J BURDITT, ET AL	UNNAMED TRIB E FRIO RIVER	IRRG	15	50		
3153-000	6	Real	3490000000	JOHN J BURDITT, ET AL	UNNAMED TRIB E FRIO RIVER	IRRG	23			
3154-000	6	Real	3430000000	JAMES TREES	YOUNGBLOOD SPRING	IRRG	2	6		
3155-000	6	Real	3420000000	LOTTIE N WRIGHT	FRIO RIVER	IRRG	164	43		
3156-000	6	Real	3400000000	H P COOPER ET AL	FRIO RIVER	IRRG	20	22		
3156-000	6	Real	3400000000	H P COOPER ET AL	FRIO RIVER	IRRG	2			
3157-000	6	Real	3350000000	E F BAYOUTH, MD PENSION PLAN	FRIO RIVER	IRRG	250	125		AMEND 1/9/85. CURRENT OWNER UNKNOWN 5/98
3158-000	6	Real	3375000000	LOMBARDY IRRIGATION CO	FRIO RIVER	IRRG	1600	800	6	ALSO COUNTY 232
3159-000	6	Real	3294000000	SAM G HARRISON	FRIO RIVER	IRRG	140	70		
3160-000	6	Real	3290000000	GRACIA BASSETT HABY	FRIO RIVER	IRRG	60	100		JOINTLY OWNS 60 AF TO IRR 100 ACRES
3160-000	6	Real	3290000000	THEODORE R REED TRUSTEE	FRIO RIVER	IRRG				JOINTLY OWNS 60 AF TO IRR 100 ACRES
3161-000	6	Real	3289500000	R L HUBBARD	DRY FRIO CRK	IRRG	17	21		
3162-000	6	Real	3287500000	CARL A. DETERING, JR., ET AL	UNNAMED TRIB BUFFALO CRK	IRRG	5	25	15	
3180-000	6	Real	2799000000	LANA J STORMONT	UNNAMED TRIB W SABINAL RIVER	IRRG	5	10		
3878-000	1	Real	3645000000	C B SLABAUGH	CYPRESS CRK	IRRG	40	30		68-AC TR, SC, AMEND 11/12/84
3978-000	1	Real	9421000000	N M FITZGERALD JR ESTATE	FLYNN CRK	IRRG	187	63		156.95-AC TR, SC
4008-000	1	Real	9172500000	DOUGLAS B & MARGARET MARSHALL	NUECES RIVER	IRRG	400	200		AMEND 12/15/81 INCR AC-FT, ACRES, CFS
4094-000	1	Real	3905500000	GEORGE S HAWN INTERESTS ET AL	W FRIO RIVER	IRRG	56	28	9	OUT OF 1118 ACRES
4169-000	1	Real	7910000000	ROARING SPRINGS RANCH INC	CAMP WOOD CRK	IRRG	15	10	41	6 RES & REC
4169-000	1	Real	7910000000	ROARING SPRINGS RANCH INC	CAMP WOOD CRK	MUNI	15			
4405-000	1	Real	7760000000	CITY OF CAMP WOOD	UNNAMED TRIB NUECES RIVER	MUNI	1000			
4405-000	1	Real	7760000000	CITY OF CAMP WOOD	UNNAMED TRIB NUECES RIVER	IRRG	83	16		
4413-000	1	Real	8240000000	WILLIAM C SUTTON ET UX	CAMP WOOD CRK	REC			2	
5009-000	1	Real	3830000000	JACKSON L BABB ET AL	W FRIO RIVER	IRRG	60	30		
2653-000	6	Val Verde	4950000000	PHIL B FOSTER	CIENEGAS CRK &/OR THE RIO GRANDE	IRRG	122.25	61.13		AMEND 10/15/91

Water Right Number	Type	County	River Order Permit	Name	Stream	Use	Amount in Ac-Ft/Yr	Acreage	Res Cap in Ac-Ft	Remarks
2653-000	6	Val Verde	4950000000	DAVID B TERK ET AL	CIENEGAS CRK	IRRG	27.75	13.87		AMEND 10/15/91
2654-000	6	Val Verde	4950000000	THURMAN W OWENS	CIENEGAS CRK	IRRG	26	13		RATE SEE 23-2653
2655-000	6	Val Verde	4950000000	JOSE C OVIEDO ET UX	CIENEGAS CRK	IRRG	28	14		RATE SEE 23-2653
2656-000	6	Val Verde	4950000000	RANDOLPH J N & SHARON M ABBEY	CIENEGAS CRK	IRRG	68	43		RATE SEE 23-2653
2657-000	6	Val Verde	4950000000	RONALD J PERSYN ET UX	CIENEGAS CRK	IRRG	150	75		RATE SEE 23-2653
2657-000	6	Val Verde	4950000000	RONALD J. PERSYN, ET UX	CIENEGAS CRK	IRRG	150	68		SEE 23-2653 RATE; AMEND 10/89
2657-000	6	Val Verde	4950000000	RONALD J. PERSYN, ET UX	CIENEGAS CRK	IRRG		89		AMEND 8/2/94
2659-000	6	Val Verde	4950000000	JOHN F QUALIA	CIENEGAS CRK	IRRG	112	56		FOR RATE SEE 23-2653
2660-000	6	Val Verde	4950000000	JOSE A CORTINAS ET AL	CIENEGAS CRK	IRRG	16	5		
2660-000	6	Val Verde	4950000000	LJB ENTERPRISES	CIENEGAS CRK	IRRG	296	99		
2661-000	6	Val Verde	4950000000	BARBARA GULICK RATHKE, ET AL	CIENEGAS CRK	IRRG	120	40	10	
2662-000	6	Val Verde	4950000000	CAPITOL AGGREGATES INC	CIENEGAS CRK	MINE	166	17		AMEND 11/2/87
2663-000	6	Val Verde	4950000000	ALFREDO GUTIERREZ JR	CIENEGAS CRK	IRRG	24	8		
2664-000	6	Val Verde	4950000000	SAN FELIPE A MFG & I COMPANY	SAN FELIPE CRK	IRRG	4950	1700		AMEND 12/16/88, 10/31/94
2664-000	6	Val Verde	4950000000	SAN FELIPE A MFG & I COMPANY	SAN FELIPE CRK	IRRG	6		6	IMPOUNDMENT #1
2664-000	6	Val Verde	4950000000	SAN FELIPE A MFG & I COMPANY	SAN FELIPE CRK	IRRG	6		6	IMPOUNDMENT #2
2664-000	6	Val Verde	4950000000	SAN FELIPE A MFG & I COMPANY	SAN FELIPE CRK	INDU	50			AMENDMENT EXP 12/31/96
2665-000	6	Val Verde	4950000000	JOSE OVIEDO JR ET UX	SAN FELIPE CRK	IRRG	60	40		AMENDED 9/13/96
2666-000	6	Val Verde	4950000000	PETRA ABREGO MUNOZ	SAN FELIPE CRK	IRRG	23.56	7.85		
2669-000	6	Val Verde	4950000000	RODOLFO MOTA	SAN FELIPE CRK	IRRG	6	2		
2670-000	6	Val Verde	4950000000	VICTOR D BOLNER	SAN FELIPE CRK	IRRG	6	3		
2672-000	6	Val Verde	4950000000	CITY OF DEL RIO	SAN FELIPE CRK	MUNI	4416			
2672-000	6	Val Verde	4950000000	CITY OF DEL RIO	SAN FELIPE CRK	MUNI	7000			
2811-000	6	Val Verde	4950000000	RIO BRAVO INC	CIENEGAS CRK &/OR THE RIO GRANDE	IRRG	51.08	997.97	47	& REC/DOM, AMEND 1/84,6/91

Water Right Number	Type	County	River Order Permit	Name	Stream	Use	Amount in Ac-Ft/Yr	Acreage	Res Cap in Ac-Ft	Remarks
2811-000	6	Val Verde	4950000000	DAVID B TERK	CIENEGAS CRK	IRRG	114.64	95.38		
2912-000	6	Val Verde	4950000000	MOODY RANCHES INC	SAN FELIPE CRK	IRRG	800	400	10	
3880-000	1	Val Verde	4950000000	SOUTH TEXAS ELECTRIC CO-OP INC	RIO GRANDE	HYDRO	1500000			AMEND 12/14/87. POWER POOL WITH MEDINA.
3880-000	1	Val Verde	4950000000	MEDINA ELECTRIC CO-OP INC	RIO GRANDE	HYDRO				AMEND 12/14/87. POWER POOL WITH S.TX.EL.
5506-000	1	Val Verde	4950000000	DEL RIO, CITY OF	SAN FELIPE CRK	REC			0.19	WATER PARK LANDING POOL

January 2021

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