CHAPTER 3

REGIONAL WATER SUPPLY SOURCES

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3 REGIONAL WATER SUPPLY SOURCES

Whether it flows in rivers or percolates through underground rock formations, water sustains life and thus is our most important natural resource. In the Chihuahuan Desert environment of Far West Texas, water supply availability takes on a more significant meaning than elsewhere in the State. With evaporation far exceeding rainfall, planning for the most efficient management of limited water supplies is essential.

Chapter 3 explores the current and future availability of all water-supply resources in the Region including surface water, groundwater, and reuse - all of which is contained within the Rio Grande River Basin. 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 Far West Texas that potentially could experience supply shortages in future years. Water supply availability from each recognized source is estimated during drought-of-record conditions, which allows each entity and water-use category to evaluate conditions when their supply source is at its most critical availability level. The following are major considerations regarding water supply sources.

- Except for controlled flows in the Rio Grande, very little surface water can be considered as a reliable source of supply in Far West Texas, especially in drought-of-record conditions. In this chapter, two primary surface water sources are considered: the Rio Grande and the Pecos River. Other ephemeral creeks and springs (cienegas) are important sources for livestock supply, wildlife habitat, recreational resources and, to a limited extent, for irrigated agriculture. The availability of water in the Rio Grande and Pecos River to meet existing water rights, including municipal water rights, is determined by the TCEQ Rio Grande Water Availability Model (WAM). All permanent surface water rights are listed in Appendix 3A.
- The availability of groundwater is based on TWDB provided Modeled Available Groundwater (MAG) as developed through the Groundwater Management Area (GMA) process. For aquifers that MAG volumes have not been assigned, groundwater availability is calculated separately.
- Direct reuse refers to wastewater that is reused without first being discharged into a stream or other watercourse. Direct reuse of water for El Paso Water is based on recently reported direct reuse as reported by the TWDB and expected completion of the City's Advanced Purified Water Treatment project by 2030. Indirect reuse refers to wastewater that is first discharged to a stream or watercourse before being diverted for use. The indirect reuse supply is used primarily during the irrigation season.
- El Paso Water continues to assume the role as the designated "Regional Water Supply Planner" (see Chapter 1, Section 1.1.6). Under the El Paso County Priority Groundwater Management Area, promulgated by the El Paso County Commissioner's Court, there are currently no groundwater limitations or specific requirements detailing groundwater availability.
- Water supplies based upon contracts are assumed to be renewed if they expire during the planning horizon.

Water supplies available to meet projected demands are reported in Tables 3-1, 3-2 and 3-3. Table 3-1 indicates the maximum amount of water supply that can be obtained from each unique supply source. Table 3-2 lists water supplies that are available to municipal utilities and other water-user categories, based on current infrastructure, legal limitations, and the physical availability of water from each source.

Table 3-3 lists supplies available to major/wholesale water providers. The amounts listed for municipal utilities and the "county-other" category (representing small communities and rural households) are based on TCEQ estimates of infrastructure capacities.

Table 3-1. Water Supply Source Availability (Rio Grande River Basin)
(Acre-Feet per Year)

Groundwater	County	Salinity	2030	2040	2050	2060	2070	2080
Bone Spring-Victorio Peak Aquifer	Hudspeth	Fresh | Brackish	101,400	101,400	101,400	101,400	101,400	101,400
Capitan Reef Complex Aquifer	Brewster	Fresh | Brackish	583	583	583	583	583	583
Capitan Reef Complex Aquifer	Culberson	Fresh | Brackish	7,580	7,580	7,580	7,580	7,580	7,580
Capitan Reef Complex Aquifer | Non-Relevant	Hudspeth	Fresh | Brackish	5,408	5,408	5,408	5,408	5,408	5,408
Capitan Reef Complex Aquifer | Non-Relevant	Jeff Davis	Fresh	0	0	0	0	0	0
Edwards-Trinity (Plateau), Pecos Valley, Trinity Aquifer	Jeff Davis	Fresh	284	284	284	284	284	284
Edwards-Trinity (Plateau) Aquifer	Brewster	Fresh | Brackish	1,394	1,394	1,394	1,394	1,394	1,394
Edwards-Trinity (Plateau) Aquifer | Non-Relevant	Culberson	Fresh	399	399	399	399	399	399
Edwards-Trinity (Plateau), Pecos Valley, Trinity Aquifer	Terrell	Fresh	1,420	1,420	1,420	1,420	1,420	1,420
Hueco-Mesilla Bolson Aquifer	El Paso	Fresh | Brackish	435,000	435,000	435,000	435,000	435,000	435,000
Hueco-Mesilla Bolson Aquifer	Hudspeth	Fresh | Brackish	45,000	45,000	45,000	45,000	45,000	45,000
Igneous	Brewster	Fresh	2,587	2,586	2,583	2,582	2,582	2,582
Igneous	Culberson	Fresh	99	99	99	99	99	99
Igneous	Jeff Davis	Fresh	4,585	4,585	4,585	4,585	4,585	4,585
Igneous	Presidio	Fresh	4,065	4,065	4,065	4,065	4,065	4,065
Marathon Aquifer	Brewster	Fresh	7,327	7,327	7,327	7,327	7,327	7,327
Other Aquifer | Brewster Cretaceous	Brewster	Fresh	1,484	1,484	1,484	1,484	1,484	1,484
Other Aquifer | Rio Grande Alluvium	El Paso	Brackish	57,043	57,043	57,043	57,043	57,043	57,043
Other Aquifer | Rio Grande Alluvium	Hudspeth	Brackish	52,518	52,518	52,518	52,518	52,518	52,518
Other Aquifer | Diablo Plateau	Hudspeth	Fresh	26,400	26,400	26,400	26,400	26,400	26,400
Rustler Aquifer | Non-Relevant	Brewster	Brackish | Saline	0	0	0	0	0	0
Rustler Aquifer | Non-Relevant	Culberson	Brackish | Saline	53	53	53	53	53	53
Rustler Aquifer | Non-Relevant	Jeff Davis	Fresh	0	0	0	0	0	0
West Texas Bolsons Aquifer | Upper Salt Basin	Culberson	Brackish	16,851	16,851	16,851	16,851	16,851	16,851
West Texas Bolsons Aquifer | Wild Horse, Michigan & Lobo	Culberson	Fresh | Brackish	35,678	35,601	35,551	35,509	35,419	35,347

Table 3-2. (continued) Water Supply Source Availability (Rio Grande River Basin)
(Acre-Feet per Year)

Groundwater	County	Salinity	2030	2040	2050	2060	2070	2080
West Texas Bolsons Aquifer | Upper Salt Basin | Non-Relevant	Hudspeth	Brackish	321	321	321	321	321	321
West Texas Bolsons Aquifer | Red Light Draw, Eagle Flat, Green River Valley	Hudspeth	Fresh | Brackish	4,582	4,582	4,582	4,582	4,582	4,582
West Texas Bolsons Aquifer | Green River Valley, Wild Horse, Michigan, Lobo, Ryan Flat	Jeff Davis	Fresh | Brackish	6,138	6,071	6,043	6,024	5,986	5,958
West Texas Bolsons Aquifer | Ryan Flat	Presidio	Fresh	8,983	8,835	8,711	8,642	8,586	8,503
West Texas Bolsons Aquifer | Green River Valley, Presidio-Redford	Presidio	Fresh | Brackish	7,743	7,743	7,743	7,743	7,743	7,743
Groundwater Total Source Availability			**834,925**	**834,632**	**834,427**	**834,296**	**834,112**	**833,929**

Reuse	County	Salinity	2030	2040	2050	2060	2070	2080
Direct Reuse	Brewster	Fresh	193	193	193	193	193	193
Direct Reuse	El Paso	Fresh	6,000	6,000	6,000	6,000	6,000	6,000
Indirect Reuse	El Paso	Fresh	29,289	30,569	31,372	31,881	32,398	32,922
Indirect Reuse	Hudspeth	Fresh	334	334	334	334	334	334
Reuse Total Source Availability			**35,816**	**37,096**	**37,899**	**38,408**	**38,925**	**39,449**

Surface Water	County	Salinity	2030	2040	2050	2060	2070	2080
Rio Grande Livestock Local Supply	Brewster	Fresh	25	25	25	25	25	25
Rio Grande Livestock Local Supply	Culberson	Fresh	15	15	15	15	15	15
Rio Grande Livestock Local Supply	El Paso	Fresh	19	19	19	19	19	19
Rio Grande Livestock Local Supply	Hudspeth	Fresh	80	80	80	80	80	80
Rio Grande Livestock Local Supply	Jeff Davis	Fresh	24	24	24	24	24	24
Rio Grande Livestock Local Supply	Presidio	Fresh	49	49	49	49	49	49
Rio Grande Livestock Local Supply	Terrell	Fresh	4	4	4	4	4	4
Rio Grande Run-of-River	Brewster	Fresh	7,759	7,759	7,759	7,759	7,759	7,759
Rio Grande Run-of-River	El Paso	Fresh	44,270	44,270	44,270	44,270	44,270	44,270
Rio Grande Run-of-River	Hudspeth	Fresh	916	916	916	916	916	916
Rio Grande Run-of-River	Jeff Davis	Fresh	19	19	19	19	19	19
Rio Grande Run-of-River	Presidio	Fresh	10,452	10,452	10,452	10,452	10,452	10,452
Rio Grande Run-of-River	Terrell	Fresh	432	432	432	432	432	432
Surface Water Total Source Availability	**Surface Water Total**		**64,064**	**64,064**	**64,064**	**64,064**	**64,064**	**64,064**
Region E Total Source Availability	**Region E Total**		**934,805**	**935,792**	**936,390**	**936,768**	**937,101**	**937,442**

Table 3-2. Water User Group Existing Water Supply (Rio Grande River Basin)
(Acre-Feet per Year)

WUG Name	Source Description	2030	2040	2050	2060	2070	2080
Brewster County							
Alpine	Direct Reuse	193	193	193	193	193	193
Alpine	Igneous Aquifer | Brewster County	2,064	2,064	2,064	2,064	2,064	2,064
Alpine	Igneous Aquifer | Jeff Davis County	2,065	2,065	2,065	2,065	2,065	2,065
Lajitas Municipal Services	Other Aquifer | Brewster Cretaceous Alluvium	331	331	331	331	331	331
Marathon WSSS	Marathon Aquifer	242	242	242	242	242	242
Study Butte Terlingua Water System	Other Aquifer | Brewster Cretaceous Alluvium	387	387	387	387	387	387
County-Other	Edwards-Trinity Plateau Aquifer	10	10	10	10	10	10
County-Other	Igneous Aquifer	207	207	207	207	207	207
County-Other	Other Aquifer | Brewster Cretaceous Alluvium	301	301	301	301	301	301
Mining	Igneous Aquifer	52	52	52	52	52	52
Livestock	Capitan Reef Complex Aquifer	38	38	38	38	38	38
Livestock	Edwards-Trinity Plateau Aquifer	125	125	125	125	125	125
Livestock	Igneous Aquifer	144	144	144	144	144	144
Livestock	Local Surface Water Supply	25	25	25	25	25	25
Livestock	Marathon Aquifer	19	19	19	19	19	19
Livestock	Other Aquifer | Brewster Cretaceous Alluvium	144	144	144	144	144	144
Irrigation	Igneous Aquifer	120	119	116	115	115	115
Irrigation	Marathon Aquifer	128	128	128	128	128	128
Irrigation	Other Aquifer | Brewster Cretaceous Alluvium	321	321	321	321	321	321
Irrigation	Rio Grande Run-Of-River	7,759	7,759	7,759	7,759	7,759	7,759
Brewster County Total Existing Supply		**14,675**	**14,674**	**14,671**	**14,670**	**14,670**	**14,670**
Culberson County							
Van Horn	West Texas Bolsons Aquifer	1,218	1,218	1,218	1,218	1,218	1,218
County-Other	Edwards-Trinity Plateau Aquifer	1	1	1	1	1	1
County-Other	Rustler Aquifer	1	1	1	1	1	1
County-Other	West Texas Bolsons Aquifer	68	68	68	68	68	68
Manufacturing	West Texas Bolsons Aquifer	5	5	5	5	5	5
Mining	Capitan Reef Complex Aquifer	2,000	2,000	2,000	2,000	2,000	2,000
Mining	Rustler Aquifer	0	0	0	0	0	0
Mining	West Texas Bolsons Aquifer	2,045	2,045	2,045	2,045	2,045	2,045
Livestock	Capitan Reef Complex Aquifer	54	54	54	54	54	54
Livestock	Edwards-Trinity Plateau Aquifer	19	19	19	19	19	19
Livestock	Igneous Aquifer	82	82	82	82	82	82
Livestock	Local Surface Water Supply	15	15	15	15	15	15

Table 3-2. (continued) Water User Group Existing Water Supply (Rio Grande River Basin)
(Acre-Feet per Year)

WUG Name	Source Description	2030	2040	2050	2060	2070	2080
Culberson County							
Livestock	Rustler Aquifer	31	31	31	31	31	31
Livestock	West Texas Bolsons Aquifer	158	158	158	158	158	158
Irrigation	Capitan Reef Complex Aquifer	5,526	5,526	5,526	5,526	5,526	5,526
Irrigation	West Texas Bolsons Aquifer	32,156	32,079	32,029	31,987	31,897	31,825
Culberson County Total Existing Supply		**43,379**	**43,302**	**43,252**	**43,210**	**43,120**	**43,048**
El Paso County							
Anthony	Hueco-Mesilla Bolson Aquifer	1,847	1,847	1,847	1,847	1,847	1,847
East Montana Water System	Hueco-Mesilla Bolson Aquifer	2,810	2,810	2,810	2,810	2,810	2,810
El Paso County Tornillo WID	Hueco-Mesilla Bolson Aquifer	629	629	629	629	629	629
El Paso County WCID 4	Hueco-Mesilla Bolson Aquifer	1,363	1,363	1,363	1,363	1,363	1,363
El Paso Water Utilities	Direct Reuse	6,000	6,000	6,000	6,000	6,000	6,000
El Paso Water Utilities	Hueco-Mesilla Bolson Aquifer	115,000	115,000	115,000	115,000	115,000	115,000
El Paso Water Utilities	Rio Grande Run-Of-River	10,000	10,000	10,000	10,000	10,000	10,000
Federal Correctional Institution La Tuna	Hueco-Mesilla Bolson Aquifer	2,017	2,017	2,017	2,017	2,017	2,017
Fort Bliss and East Biggs	Hueco-Mesilla Bolson Aquifer	5,503	5,503	5,503	5,503	5,503	5,503
Haciendas Del Norte WID	Hueco-Mesilla Bolson Aquifer	306	306	306	306	306	306
Horizon Regional MUD	Hueco-Mesilla Bolson Aquifer	4,828	4,828	4,828	4,828	4,828	4,828
Horizon Regional MUD	Other Aquifer | Rio Grande Alluvium	1,578	1,578	1,578	1,578	1,578	1,578
Lower Valley WD	Hueco-Mesilla Bolson Aquifer	4,356	4,356	4,356	4,356	4,356	4,356
Paseo Del Este MUD 1	Hueco-Mesilla Bolson Aquifer	5,647	5,647	5,647	5,647	5,647	5,647
County-Other	Hueco-Mesilla Bolson Aquifer	6,678	6,678	6,678	6,678	6,678	6,678
Manufacturing	Hueco-Mesilla Bolson Aquifer	9,493	9,493	9,493	9,493	9,493	9,493
Manufacturing	Rio Grande Run-Of-River	39	39	39	39	39	39
Mining	Hueco-Mesilla Bolson Aquifer	871	891	910	929	946	962
Mining	Other Aquifer | Rio Grande Alluvium	1,477	1,477	1,477	1,477	1,477	1,477
Steam Electric Power	Hueco-Mesilla Bolson Aquifer	8,880	8,880	8,880	8,880	8,880	8,880
Livestock	Hueco-Mesilla Bolson Aquifer	151	151	151	151	151	151
Livestock	Local Surface Water Supply	19	19	19	19	19	19
Livestock	Other Aquifer | Rio Grande Alluvium	24	24	24	24	24	24

Table 3-2. (continued) Water User Group Existing Water Supply (Rio Grande River Basin) (Acre-Feet per Year)

WUG Name	Source Description	2030	2040	2050	2060	2070	2080
El Paso County							
Irrigation	Hueco-Mesilla Bolson Aquifer	7,392	7,392	7,392	7,392	7,392	7,392
Irrigation	Other Aquifer | Rio Grande Alluvium	53,964	53,964	53,964	53,964	53,964	53,964
Irrigation	Rio Grande Indirect Reuse	29,289	30,569	31,372	31,881	32,398	32,922
Irrigation	Rio Grande Run-Of-River	34,231	34,231	34,231	34,231	34,231	34,231
El Paso County Total Existing Supply		**314,392**	**315,692**	**316,514**	**317,042**	**317,576**	**318,116**
Hudspeth County							
Esperanza Water Service	Hueco-Mesilla Bolson Aquifer	484	484	484	484	484	484
Hudspeth County WCID 1	West Texas Bolsons Aquifer	532	532	532	532	532	532
County-Other | Dell City	Bone Spring-Victorio Peak Aquifer	42	42	42	42	42	42
County-Other	Hueco-Mesilla Bolson Aquifer	14	14	14	14	14	14
County-Other | Fort Hancock WCID	Other Aquifer | Rio Grande Alluvium	179	179	179	179	179	179
Mining	Hueco-Mesilla Bolson Aquifer	56	56	56	56	56	56
Mining	Other Aquifer | Rio Grande Alluvium	5	5	5	5	5	5
Mining	West Texas Bolsons Aquifer	0	0	0	0	0	0
Livestock	Bone Spring-Victorio Peak Aquifer	83	83	83	83	83	83
Livestock	Capitan Reef Complex Aquifer	7	7	7	7	7	7
Livestock	Hueco-Mesilla Bolson Aquifer	10	10	10	10	10	10
Livestock	Local Surface Water Supply	80	80	80	80	80	80
Livestock	Other Aquifer | Diablo Plateau	277	277	277	277	277	277
Livestock	West Texas Bolsons Aquifer	69	69	69	69	69	69
Irrigation	Bone Spring-Victorio Peak Aquifer	68,495	68,495	68,495	68,495	68,495	68,495
Irrigation	Capitan Reef Complex Aquifer	4,213	4,213	4,213	4,213	4,213	4,213
Irrigation	Hueco-Mesilla Bolson Aquifer	1,683	1,683	1,683	1,683	1,683	1,683
Irrigation	Other Aquifer | Rio Grande Alluvium	52,187	52,187	52,187	52,187	52,187	52,187
Irrigation	Rio Grande Indirect Reuse	334	334	334	334	334	334
Irrigation	Rio Grande Run-Of-River	916	916	916	916	916	916
Hudspeth County Total Existing Supply		**129,666**	**129,666**	**129,666**	**129,666**	**129,666**	**129,666**
Jeff Davis County							
Fort Davis WSC	Igneous Aquifer	468	468	468	468	468	468
County-Other	Pecos Valley | Edwards-Trinity (Plateau) Aquifer	0	0	0	0	0	0
County-Other	Igneous Aquifer	233	233	233	233	233	233
County-Other | City of Valentine	West Texas Bolsons Aquifer	0	0	0	0	0	0

Table 3-2. (continued) Water User Group Existing Water Supply (Rio Grande River Basin)
(Acre-Feet per Year)

WUG Name	Source Description	2030	2040	2050	2060	2070	2080
Jeff Davis County							
Mining	Igneous Aquifer	153	153	153	153	153	153
Livestock	Pecos Valley | Edwards-Trinity (Plateau) Aquifer	0	0	0	0	0	0
Livestock	Igneous Aquifer	299	299	299	299	299	299
Livestock	Local Surface Water Supply	24	24	24	24	24	24
Livestock	West Texas Bolsons Aquifer	63	63	63	63	63	63
Irrigation	Pecos Valley | Edwards-Trinity (Plateau) Aquifer	0	0	0	0	0	0
Irrigation	Igneous Aquifer	1,118	1,118	1,118	1,118	1,118	1,118
Irrigation	West Texas Bolsons Aquifer	315	315	315	315	315	315
Jeff Davis County Total Existing Supply		**2,673**	**2,673**	**2,673**	**2,673**	**2,673**	**2,673**
Presidio County							
Marfa	Igneous Aquifer	2,097	2,097	2,097	2,097	2,097	2,097
Presidio	West Texas Bolsons Aquifer	2,460	2,460	2,460	2,460	2,460	2,460
County-Other	Igneous Aquifer	58	58	58	58	58	58
County-Other	West Texas Bolsons Aquifer	39	39	39	39	39	39
Livestock	Igneous Aquifer	270	270	270	270	270	270
Livestock	Local Surface Water Supply	49	49	49	49	49	49
Livestock	West Texas Bolsons Aquifer	171	171	171	171	171	171
Irrigation	Igneous Aquifer	770	770	770	770	770	770
Irrigation	Rio Grande Run-Of-River	10,452	10,452	10,452	10,452	10,452	10,452
Irrigation	West Texas Bolsons Aquifer	1,477	1,477	1,477	1,477	1,477	1,477
Presidio County Total Existing Supply		**17,843**	**17,843**	**17,843**	**17,843**	**17,843**	**17,843**
Terrell County							
Terrell County WCID 1	Edwards-Trinity Plateau | Pecos Valley | Trinity Aquifers	476	476	476	476	476	476
County-Other	Edwards-Trinity Plateau | Pecos Valley | Trinity Aquifers	43	43	43	43	43	43
Mining	Edwards-Trinity Plateau | Pecos Valley | Trinity Aquifers	141	141	141	141	141	141
Livestock	Edwards-Trinity Plateau | Pecos Valley | Trinity Aquifers	179	179	179	179	179	179
Livestock	Local Surface Water Supply	4	4	4	4	4	4
Irrigation	Edwards-Trinity Plateau | Pecos Valley | Trinity Aquifers	473	473	473	473	473	473
Irrigation	Rio Grande Run-Of-River	432	432	432	432	432	432
Terrell County Total Existing Supply		**1,748**	**1,748**	**1,748**	**1,748**	**1,748**	**1,748**
Region E Existing Water Supply		**524,376**	**525,598**	**526,367**	**526,852**	**527,296**	**527,764**

Note: Water Supply capacity based on current infrastructure, existing contracts, and source supply availability under drought-of-record conditions. All WUGs and supplies are within the Rio Grande Basin.

Table 3-3. Far West Texas Major Water Provider Supplies (Rio Grande River Basin) (Acre-Feet per Year)

Major Water Provider	Source Supply	Existing Water Supply (Acre-Feet/Year)					
		2030	2040	2050	2060	2070	2080
El Paso County WID#1	Rio Grande Indirect Reuse	29,289	30,569	31,372	31,881	32,398	32,922
	Rio Grande Alluvium Aquifer	53,964	53,964	53,964	53,964	53,964	53,964
	Rio Grande Run-Of-River	34,231	34,231	34,231	34,231	34,231	34,231
	Hueco-Mesilla Bolson Aquifer	7,392	7,392	7,392	7,392	7,392	7,392
	Total Supply	**124,876**	**126,156**	**126,959**	**127,468**	**127,985**	**128,509**
El Paso Water	Direct Reuse	6,000	6,000	6,000	6,000	6,000	6,000
	Hueco-Mesilla Bolson Aquifer	115,000	115,000	115,000	115,000	115,000	115,000
	Rio Grande Run-Of-River	10,000	10,000	10,000	10,000	10,000	10,000
	Total Supply	**131,000**	**131,000**	**131,000**	**131,000**	**131,000**	**131,000**
Lower Valley Water District	Hueco-Mesilla Bolson Aquifer	4,356	4,356	4,356	4,356	4,356	4,356
	Total Supply	**4,356**	**4,356**	**4,356**	**4,356**	**4,356**	**4,356**
Horizon Regional MUD	Hueco-Mesilla Bolson Aquifer	4,828	4,828	4,828	4,828	4,828	4,828
	Rio Grande Alluvium Aquifer	1,578	1,578	1,578	1,578	1,578	1,578
	Total Supply	**6,406**	**6,406**	**6,406**	**6,406**	**6,406**	**6,406**

3.1 SURFACE WATER

Surface water supplies in the Far West Texas Region are obtained from the Rio Grande River and Pecos River, a tributary of the Rio Grande. During drought-of-record conditions, there is very little reliable surface water in the Region, except for controlled releases from the Rio Grande Project in New Mexico.

In accordance with regional planning rules and guidelines, the Far West Texas Region used the Full Authorization Run (Run 3) of the TCEQ approved water availability model (WAM) of the Rio Grande Basin for determining surface water availability in the Region. The WAM is a computer model of the Rio Grande watershed that evaluates surface water availability based on Texas water rights. It is maintained by the TCEQ for the purpose of reviewing and granting new surface water right permits and required by TWDB to evaluate surface water availability for regional water planning purposes. The amount of water that can be diverted by a water right is referred to as the water availability and may be less than the permitted amount.

The prior appropriation doctrine governs surface water law in Texas and can be summarized as "first in time is first in right." Each water right in the WAM is assigned a priority date that determines the order in which water is allocated among water rights in the Rio Grande Basin. In times when there are shortages, water rights with older priority dates are given preference when allocating water. The oldest water rights in the Rio Grande WAM date to the late 1800s and correspond to the date when water was first put to beneficial use under the laws of Texas.

In contrast to other regions, the available surface water supplies in Far West Texas consist almost entirely of run-of-river supplies except for small impoundments for domestic and livestock purposes and water provided through the Rio Grande Project. A run-of-river right is authorized to divert from a stream but does not have authorization for a large volume of storage. Such rights may have small volumes of storage to facilitate diversions. According to Texas law, water users with small impoundments up to 200 acre-feet for domestic and livestock purposes do not require a water right. The Bureau of Reclamation's Rio Grande Project includes releases from Elephant Butte and Caballo Reservoirs, which are large reservoirs located on the Rio Grande in New Mexico, as well as run-of-river flows entering Texas from New Mexico. These flows are governed by operating policies of the Bureau of Reclamations, Texas water rights and contractual agreements within the irrigation districts served by the Rio Grande Project.

As required by TWDB guidance, the assessment of surface water availability in the Far West Texas Region was conducted to reflect water supplies that are currently available for use. The available supply from a run-of-river irrigation water right is calculated as the minimum annual diversion during the period-of-record (1940-2018) as simulated in the WAM. Rights used for municipal or industrial purposes are evaluated individually. The water availability assessment includes updates to new water right permits, current operating policies and contractual agreements. The following changes were made to the WAM to more accurately reflect the current conditions and operations of the Region and are consistent with the assumptions used in previous Far West Texas water plans, except where noted.

- The supply from the Rio Grande Project is based on the lowest annual WAM supply delivered to the entities served by the Project, which occurred in 2013. The supply from the Project does not include return flows, which were evaluated separately. Entities served by the Rio Grande Project include El Paso Water, El Paso County Water Improvement District #1, and irrigators in Hudspeth County.
- The demand pattern for irrigation rights upstream of Fort Quitman, which are the water rights receiving water from the Rio Grande Project, was modified so that diversions only occur from March through October to be consistent with actual operation of the Project.
- Modeling proposed by Region F in the Balmorhea area of the Pecos Basin was incorporated into the modified WAM. These changes are related to San Solomon Springs and Giffin Springs flows,

which in the unmodified TCEQ WAM were being passed downstream instead of being used by the water rights dependent on those springs. In reality, these flows would be lost before they reached the Pecos River, resulting in what is termed a futile call. This change had not been included in previous water plans for the Far West Texas Region.

These modifications were approved by the Executive Administrator (EA) of the Texas Water Development Board in a letter to the Chairman of the Far West Texas Water Planning Group, dated December 21, 2023. The results of the modified WAM indicate that the reliable surface water supply in Far West Texas totals 63,848 acre-feet per year throughout the planning period (2030 to 2080) (Table 3-1). Of that, the Rio Grande Project supplies 44,897 acre-feet per year (i.e. the minimum WAM diversion in 2013) to water users in El Paso and Hudspeth Counties. The apportionment of Rio Grande Run-of-River is explained below in Table 3-4.

Table 3-4. Surface Water Source Availability Methodology

<table>
<tr><th>Water Supply Source</th><th>County</th><th>Annual Availability (Acre-Feet/Year)</th><th>Remarks</th></tr>
<tr><td rowspan="7">Rio Grande Run-of-River</td><td>Brewster</td><td>7,759</td><td>WAM Run 3</td></tr>
<tr><td>El Paso</td><td>44,270</td><td>WAM Run 3 minimum annual by water rights in El Paso County. These water rights get their supplies from the Rio Grande Project.</td></tr>
<tr><td rowspan="2">Hudspeth</td><td rowspan="2">916</td><td>Hudspeth County water rights upstream of Fort Quitman get 627 acre-feet of water from the Rio Grande Project.</td></tr>
<tr><td>Hudspeth County irrigators also get 287 (WAM) below Fort Quitman that are not included in the Rio Grande Project totals.</td></tr>
<tr><td>Jeff Davis*</td><td>19</td><td>WAM Run 3</td></tr>
<tr><td>Presidio</td><td>10,452</td><td>WAM Run 3</td></tr>
<tr><td>Terrell</td><td>432</td><td>WAM Run 3; Lower Rio Grande = 152 & Pecos River = 280. Total = 432</td></tr>
</table>

Note: Water used by the City of Balmorhea in Region F.

3.1.1 Rio Grande

Waters of the Rio Grande (Mexico's Rio Bravo) originate in the San Luis Valley, the principal drainage basin of the San Juan Mountains in southwestern Colorado, and in the mountain ranges of northern New Mexico. The river flows southward through New Mexico, and then forms the international boundary between the Mexican States of Chihuahua, Coahuila, Nuevo Leon, Tamaulipas, and the State of Texas. The Rio Grande's total length is approximately 1,896 miles, with approximately 1,248 making the international boundary between Texas and Mexico. Figure 3-1 illustrates the drainage basins of the Rio Grande within the Far West Texas Region.

The water supply available from the Upper Rio Grande is affected by climatic conditions in Colorado and northern New Mexico. Although dams have been built on the River in New Mexico to provide a degree of control, floods and droughts still take their toll in the Region. Most of the Rio Grande's flow upstream of Fort Quitman is diverted at the Mesilla Dam in New Mexico to support irrigation in Dona Ana County, New Mexico and at the American Dam in Texas to supply irrigation and municipal demands in Texas. Water is also diverted at the International Dam for delivery through the Acequia Madre to supply irrigation demand in Mexico as stipulated by Treaty. Downstream from El Paso, most of the flow in the River consists of irrigation return flow, and both treated and untreated municipal wastewater discharge from both sides of the border, and occasional rainfall runoff.

The flow from Fort Quitman to Presidio is often intermittent, leading this segment to be commonly referred to as the "Forgotten River." The River becomes a permanent stream again at the junction where the Mexican river, the Rio Conchos, enters the Rio Grande upstream of Presidio. From Presidio downstream through the Big Bend until it reaches the Amistad Reservoir, the Rio Grande often lacks sufficient flow to adequately support minimum recreational, environmental, or agricultural needs; and during dry periods, may fall significantly short of supplying such needs.

Under drought conditions in the upper catchment basin, flows in the Rio Grande are significantly reduced and are allotted by the United States Bureau of Reclamation (USBR) in accordance with a prearranged schedule. Low releases and diversions significantly affect downstream water users who are highly dependent on a steady source of river water. In addition, such low releases result in a degradation of the River's water and environmental quality.

American Heritage River Initiative – The Rio Grande, from El Paso to Laredo, is one of only 14 rivers in the United States, and the only river in Texas, to receive the American Heritage River designation. Established in 1997, the American Heritage River Initiative recognizes rivers, or segments of rivers, that have played a significant role in the history and culture of the region it traverses. The Initiative gives Federal support to voluntary community-led work that benefits riverfront communities. Some of the possible benefits of being designated an American Heritage River are increased opportunities in commerce and trade, recreational improvements along the River, incorporation of wildlife habitats, and cultural stimulation. The American Heritage River Initiative does not conflict with matters of State and local government jurisdiction, such as water rights, land-use planning and water-quality standards. Also, the initiative does not impair the authority of each state to allocate quantities of water within its jurisdiction.

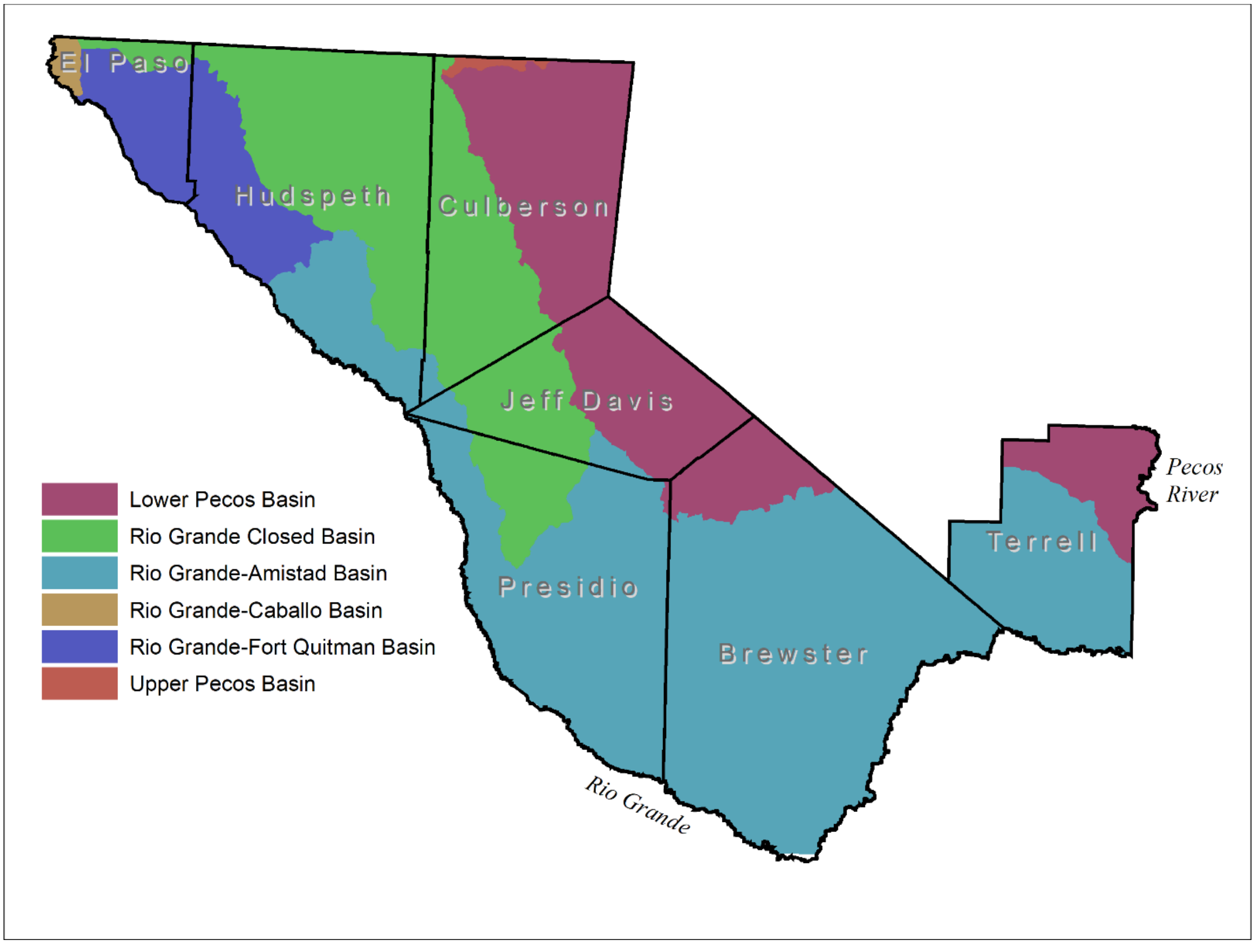

Figure 3-1. Rio Grande Drainage Basins within the Far West Texas Region

Rio Grande Wild and Scenic River – In 1978, Congress designated a 196-mile reach of the Rio Grande, from the Coahuila-Chihuahua State line, near Mariscal Canyon, to the Terrell-Val Verde County line, a "Wild and Scenic River." Approximately 69 miles of the designated River stretch is within Big Bend National Park. This segment of the River has been designated by the Texas Legislature, on the recommendation of the Far West Texas Water Planning Group (FWTWPG), as an "Ecologically Unique River Segment" and is discussed in further detail in Chapter 8.

3.1.1.1 Rio Grande Treaties and Compact

Water demand related to irrigation use and population growth has impacted the Rio Grande since the 1800s. Water appropriations and shortages have spawned lawsuits, as well as the involvement of the Federal government in the management of the River. The following sections describe efforts by State and national governments to address many of the complex management issues associated with the Rio Grande.

1906 International Treaty – Under the 1906 International Treaty, the United States is obligated to deliver 60,000 acre-feet of water annually from the Rio Grande to Mexico, except in case of extraordinary drought or serious accident to the irrigation system in the United States. The 60,000 acre-feet must be delivered, at no cost to Mexico and in accordance with a monthly distribution schedule from February through November, in the bed of the Rio Grande at the headworks of the Acequia Madre (International Dam). The International Boundary and Water Commission (IBWC)/Comisión International de Límites y Aguas (CILA) is the designated binational agency that oversees the yearly delivery of international waters to Mexico. The U.S. Bureau of Reclamation (USBR) calculates the allocations in coordination with the IBWC.

Rio Grande Compact – The Rio Grande Compact signed in 1938 is a Tri-State agreement, approved by the U.S. Congress and ratified by the states of Colorado, New Mexico and Texas. The Rio Grande Compact Commission, which administers the Compact, is comprised of a Commissioner from each of the states and a nonvoting chairman appointed by the President of the United States. The Compact encompasses the waters of the Rio Grande from the southern Colorado headwaters to above Fort Quitman, Texas and apportions them between the three states. It sets out a schedule of the water delivery obligation of Colorado at the Colorado/New Mexico state line and the obligation of New Mexico to deliver water to Texas via Rio Grande Project reservoirs at Elephant Butte and Caballo. Releases from the reservoirs are measured downstream of Caballo Reservoir.

1944 International Treaty – The 1944 International Treaty addresses the waters in the international segment of the Rio Grande from Fort Quitman, Texas to the Gulf of Mexico. The Treaty allocates water in the River based on percentage of flows in the River from each country's tributaries to the Rio Grande. The 1944 Treaty also stipulates that one-third of the flow of the Rio Conchos in Mexico is allotted to the United States. The Rio Conchos is the largest tributary of the Rio Grande. The treaty requires that the combined flow of the Rio Conchos and five other tributaries (San Diego, San Rodrigo, Escondido, Salado Rivers and Las Vacas Arroyo) shall have an annual average of not less than 350,000 acre-feet. The IBWC/CILA is responsible for implementing the treaties between the United States and Mexico. In previous years, the required minimum flow was not met.

3.1.1.2 Rio Grande Project and the El Paso County Water Improvement District #1

The Rio Grande Project is an irrigation storage and flood control Federal reclamation project administered by the USBR. Elephant Butte and Caballo Reservoirs in southern New Mexico and the diversion dams at the headings of the main canals make up the Project's primary facilities. Built in 1915 and fed by the Rio Grande, Elephant Butte is the largest reservoir in New Mexico and provides water for approximately 90,000 acres of farmland. In the summer of 2013, Elephant Butte Reservoir dwindled to its lowest level in 40 years, and thus represents the drought of record in terms of irrigation-use impact.

The Project delivers water to the Elephant Butte Irrigation District (EBID) and the El Paso County Water Improvement District No. 1 (EPCWID#1). The EBID encompasses all the project lands in New Mexico south of the Caballo Reservoir and delivers water to farmlands in New Mexico. The Project also delivers water to Mexico in accordance with the Treaty of 1906. In 1979 and 1980, the two Irrigation Districts took over the operation and maintenance responsibilities of most of the respective irrigation works within the boundaries of each entity. Legal titles to the rights-of-way of irrigation canals and drains were transferred from the United States to the Districts in January 1996.

El Paso County Water Improvement District No. 1 – In Texas, the Rio Grande Project provides water for 69,010 acres of water-right lands (i.e. irrigated lands within the District that have a right to water from the Project), all of which are located within the boundaries of the EPCWID #1. The District contains 156 square miles, with over 350 miles of canals and laterals in the distribution system, and over 269 miles in the drainage system. Water is delivered through canals and laterals to more than 2,205 turnouts, irrigating crops of cotton, alfalfa, pecans, chilies, wheat, milo, vegetables, pastures and family gardens. Since 1941, EPCWID#1 has delivered water to the City of El Paso (El Paso Water) for municipal and industrial use through contracts among the District, the City and the USBR. The City of El Paso also owns or leases farmland with water rights, which it uses for municipal purposes.

Project Water Allocation – Deliveries of Rio Grande Project water is based on irrigation requirements authorized for the Project and are agreed on by the two Irrigation Districts and the USBR. The annual allotment of Rio Grande Project water downstream of the Caballo Reservoir is determined by the USBR by the first of December for the following water year based on the estimated amount of usable water in storage on the first day of January and the predicted inflows for the following year. USBR projects the inflow to Elephant Butte Reservoir using snowpack and gauging stations data from the upper reaches of the Rio Grande.

Total releases from Project storage during a full-allotment year average approximately 764,000 acre-feet. Total diversions, however, average approximately 932,000 acre-feet per year, exceeding the releases by 168,000 acre-feet. The difference between the two is attributable to irrigation and municipal return flows, operation spills from upstream users, and rainfall runoff. During years of full supply allocation, the total diversions are 495,000 acre-feet to EBID in New Mexico, 376,000 acre-feet to EPCWID#1 in Texas, and 60,000 acre-feet to.

Currently, the City of El Paso's (El Paso Water) authority to use water from the Project arises from its ownership of 2,000 acres of land with rights to use water, approximately 5,542 acres of 50- and 75-year term City of El Paso Irrigation Water Assignments (Leases) for rights to use water from urbanized land parcels, and approximately 3,088 acres of Lower Valley Water District (LVWD) leases. The rights to use water from the LVWD leases are transferred to El Paso Water (EPWater) on an annual basis in exchange for a wholesale supply of water from the City utility. EPWater receives an annual allocation for water leased and land ownership categories based on the yearly allocation and the provisions of the respective contracts. During a full allocation year, EPWater has rights to divert 65,000 acre-feet of Rio Grande Project water from all contract sources. The conversion of rights to use water from agricultural to municipal and industrial use must be contracted with the EPCWID#1 and the USBR. EPWater has also finalized an agreement with EPCWID#1 to acquire additional raw water based on EPCWID#1's operation of new shallow wells intended for drought relief. The 2001 Third Party Implementing Contract with EPCWID#1 converts to municipal and industrial use Project water saved from canal lining, operational efficiencies, and other miscellaneous water sources. EPWater has also negotiated and agreed in principal on the terms of a Third-Party Implementing Contract that would allow it to contract for the conversion of rights to use water directly from farmers through the use of short-term "Forbearance Contracts."

In recent decades, the amount of water released from Caballo Reservoir for the Rio Grande Project has been trending downward (Figure 3-2). The year with the least amount of flow below Caballo Dam was 2013, also corresponds to the lowest available supply from WAM Run 3. 2021 and 2022 were also years of low water availability. Releases from Caballo Reservoir are used to meet the needs of water users in New Mexico, Texas and Mexico, and so are higher than the amounts shown in Table 3-1, which is only for Texas users. For the purposes of regional water planning, the 2013 availability can be thought of as the new drought-of-record for the Rio Grande Project.

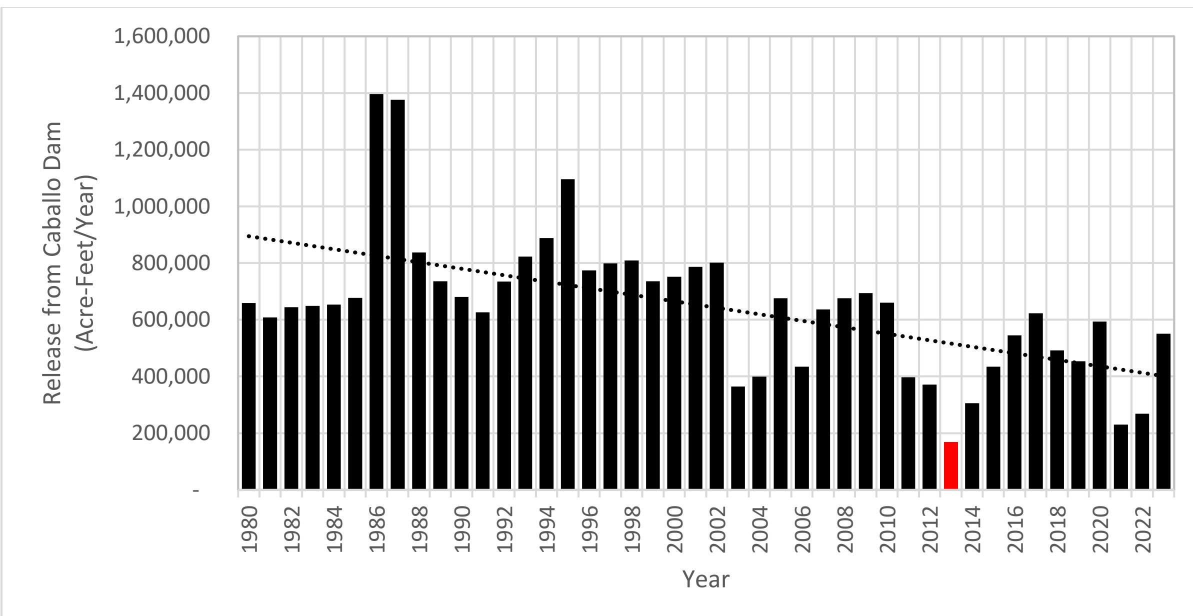

Figure 3-2. Annual Releases from Caballo Dam
(Data from 1980 to 2013 is from USGS Gage 08362500 Rio Grande Below Caballo Dam, NM. Data from 2014 to 2023 is from the USBR Water Information System)

The Rio Grande Water Availability Model (WAM) has a period of record from 1940 to 2018 and includes the recent drought. In 2013, the WAM shows 44,897 ac-ft of water available from the Rio Grande Project, which was divided between users in El Paso and Hudspeth Counties. Table 3-5 summarizes the allocation of water from the Rio Grande Project for water users in Far West Texas.

EPCWID#1 allocates the Rio Grande Project water to users in El Paso County and irrigators in Hudspeth County upstream of Fort Quitman. According to the WAM, users in El Paso County receive 98.6% of the Rio Grande Project water (44,270 acre-feet per year in 2013) and users in Hudspeth County upstream of Fort Quitman receive 10.4% of the allocation (627 acre-feet per year in 2013). Users in Hudspeth County downstream of Fort Quitman also receive water from the Rio Grande River, but not as part of the Rio Grande Project. This amount is 289 acre-feet per year according to the WAM, for a total of 916 acre-feet per year from the Rio Grande River for Hudspeth County (Table 3-1). In El Paso County, Rio Grande Project water is used by EPW and EPCWID#1. 10,000 acre-feet per year of the Rio Grande Project water reserved for El Paso County is allocated to EPW based on historical deliveries. The remaining 34,270 acre-feet per year stays with EPWID#1 for irrigation in El Paso County (Table 3-2 and Table 3-3).

Table 3-5. Supplies from Rio Grande Project
(Acre Feet per Year)

Water User Group	2030	2040	2050	2060	2070	2070
El Paso Water	10,000	10,000	10,000	10,000	10,000	10,000
El Paso County Irrigation	34,270	34,270	34,270	34,270	34,270	34,270
Hudspeth County Irrigation[1]	627	627	627	627	627	627
Total	**44,897**	**44,897**	**44,897**	**44,897**	**44,897**	**44,897**

[1.] Hudspeth County Irrigation also receives 289 acre-feet per year from water rights below Fort Quitman, which are not part of the Rio Grande Project.

3.1.1.3 Hudspeth County Conservation and Reclamation District No. 1

The HCCRD #1, headquartered in Fort Hancock, was created in 1924 to provide irrigation waters to 18,300 acres of Rio Grande bottomlands that are located downstream of the El Paso-Hudspeth County line to Fort Quitman. The District diverts tailwater, returns, and excess flows from the Rio Grande Project. Water reuse and recycling are its primary operations; the District does not provide potable water.

Water sources include untreated water from permitted Rio Grande diversions, drainage waters, return flows from farming operations, operational waste associated with the USBR's Rio Grande Project, and return flows from El Paso Water and wastewater treatment plants. The supply to the District is completely dependent on the EPCWID #1 annual operations, and therefore can be unpredictable. When flows are erratic, the District utilizes drought contingency planning. If a mild to moderate shortage is predicted, users are notified of the expected shortage. For severe shortages, when supply is less than half of demand, agricultural producers are asked to prioritize water requests based upon crop needs.

3.1.1.4 Rio Grande Watermaster

Rio Grande water below Ft. Quitman is stored in two reservoirs located in the middle (Amistad) and lower (Falcon) segments of the River. A binational commission determines the allocation of these international waters between Mexico and the U.S. (Texas). The TCEQ Rio Grande Watermaster administers Texas' share of the international water in this portion of the Rio Grande and its Texas tributaries, excluding the drainage basins of the Pecos and Devils Rivers.

3.1.1.5 Rio Grande Water Quality

The quality of water in the segment of the Rio Grande that flows through Far West Texas varies significantly from specific locations and season of the year. Of prime consideration is that there is little natural flow in the River. The TNRCC's (predecessor name of TCEQ) inventory of water quality in the State (TNRCC, 1996) cites drainage area and a wide range of geologic and climatic conditions in Far West Texas as factors responsible for water-quality conditions in the Rio Grande. Heavy metals and pesticides have been identified along the course of the Rio Grande. Elevated fecal coliform and nutrient levels occur in the River downstream of border cities, primarily because of untreated wastewater from Mexico. Table 3-6 shows the water quality status of water segments in the Region according to the 2022 303(d) list developed for Texas. Additional discussion on Rio Grande water quality is provided in Chapter 1, Section 1.8.

Table 3-6. Water Quality Status for Rio Grande Segments According to the 303(d) List

<table>
<tr><th>Segment ID</th><th>Segment Name</th><th>AU ID</th><th>Parameter</th><th>Category</th><th>Carry Forward</th></tr>
<tr><td rowspan="8">2306</td><td rowspan="8">Rio Grande Above Amistad Reservoir</td><td>2306_01</td><td>Sulfate in water</td><td>5b</td><td>N</td></tr>
<tr><td>2306_02</td><td>Sulfate in water</td><td>5b</td><td>N</td></tr>
<tr><td>2306_03</td><td>Sulfate in water</td><td>5b</td><td>N</td></tr>
<tr><td>2306_04</td><td>Sulfate in water</td><td>5b</td><td>N</td></tr>
<tr><td>2306_05</td><td>Sulfate in water</td><td>5b</td><td>N</td></tr>
<tr><td>2306_06</td><td>Sulfate in water</td><td>5b</td><td>N</td></tr>
<tr><td>2306_07</td><td>Sulfate in water</td><td>5b</td><td>N</td></tr>
<tr><td>2306_08</td><td>Sulfate in water</td><td>5b</td><td>N</td></tr>
<tr><td rowspan="9">2307</td><td rowspan="9">Rio Grande Below Riverside Diversion Dam</td><td rowspan="2">2307_01</td><td>Chloride in water</td><td>5c</td><td>N</td></tr>
<tr><td>Total dissolved solids in water</td><td>5c</td><td>N</td></tr>
<tr><td rowspan="2">2307_02</td><td>Chloride in water</td><td>5c</td><td>N</td></tr>
<tr><td>Total dissolved solids in water</td><td>5c</td><td>N</td></tr>
<tr><td rowspan="3">2307_03</td><td>Bacteria in water (Recreation Use)</td><td>5c</td><td>Y</td></tr>
<tr><td>Chloride in water</td><td>5c</td><td>N</td></tr>
<tr><td>Total dissolved solids in water</td><td>5c</td><td>N</td></tr>
<tr><td rowspan="2">2307_04</td><td>Bacteria in water (Recreation Use)</td><td>5c</td><td>N</td></tr>
<tr><td>Chloride in water</td><td>5c</td><td>N</td></tr>
</table>

Table 3-6. (continued) Water Quality Status for Rio Grande Segments According to the 303(d) List

Segment ID	Segment Name	AU ID	Parameter	Category	Carry Forward
2307	Rio Grande Below Riverside Diversion Dam	2307_04	Total dissolved solids in water	5c	N
		2307_05	Bacteria in water (Recreation Use)	5c	N
			Chloride in water	5c	N
			Total dissolved solids in water	5c	N
2308	Rio Grande Below International Dam	2308_01	Bacteria in water (Recreation Use)	5c	N
2310	Lower Pecos River	2310_01	Sulfate in water	5c	N
			Total dissolved solids in water	5c	N
		2310_02	Sulfate in water	5c	N
			Total dissolved solids in water	5c	N
2311	Upper Pecos River	2311_03	Depressed dissolved oxygen in water	5b	N
2314	Rio Grande Above International Dam	2314_01	Bacteria in water (Recreation Use)	5c	N

Notes:

Category: One of seven subcategories assigned to each impaired parameter to provide information about water quality status and management activities on that water body. The categories are defined below:

Category 5: Available data and/or information indicate that at least one designated use is not being supported or is threatened, and a TMDL is needed.

- **Category 5a:** A TMDL is underway, scheduled, or will be scheduled.
- **Category 5b:** A review of the standards for the water body will be conducted before a management strategy is selected.
- **Category 5c:** Additional data and information will be collected or evaluated before a management strategy is selected.
- **Category 5n:** Water body does not meet its applicable Chl a criterion, but additional study is needed to verify whether exceedance is associated with causal nutrient parameters or impacts to response variables.

Carry Forward: Some previously listed impairments did not have adequate data to re-assess in 2022 and were carried forward from 2020 and remain impaired.

3.1.1.6 Long-Term Reliability of the Rio Grande

The long-term reliability of Rio Grande water is sporadic. Aside from the legal mechanisms governing allocation of the water from the Rio Grande Project and the allocation of water between the two nations of Mexico and the United States, the meteorologic and hydrologic reality is that the flows in the West Texas portion of the Rio Grande are dependent on climatic regions totally apart from the climatic regime of Far West Texas. If a drought occurs in Colorado, the El Paso area is essentially thrown into a drought-like scenario and flows downstream of Presidio are largely dependent on hydrologic conditions in northern Mexico. As the science of drought prediction matures, it could become a useful source of information for modeling the long-term availability of water in the Rio Grande headwaters.

3.1.1.7 Rio Grande Channelization

In 1933, the United States and Mexico signed a Convention entitled, “Rectification of the Rio Grande,” in which the two countries agreed to provide flood protection to urban, suburban and agricultural lands and stabilize the international boundary line. Construction work authorized by this Convention addressed channel aggrading due to the flat gradient and low velocities of the Rio Grande and the new channels that tended to form on lower ground during flood flows. The rectified channel between its upper end at Cordova Island, near El Paso, to its lower end reduced the original river channel length from 155.2 miles to 85.6 miles and increased the gradient from about two feet per mile to 3.2 feet per mile. The Rectification Project also included the construction of three toll-free bridges. Construction commenced in March 1934 and was completed in 1938.

The other important joint project with Mexico, the Rio Grande Boundary Preservation Project, carries out the provisions of Article IV of the 1970 "Treaty to Resolve Pending Boundary Differences and Maintain the Rio Grande and Colorado River as the International Boundary." The Project covers the Rio Grande's 194-mile reach between Fort Quitman and Haciendita, Texas and addresses sedimentation as well as the phenomenon of salt cedars choking the channel. In some places the channel is nearly obliterated, and lands on both sides of the River are subject to periodic flooding from flash floods of tributary arroyos. The final Environmental Impact Statement for the Boundary Preservation Project was completed in 1978. In the United States, the Boundary Preservation Project was constructed in reaches based on contracts issued and inspected by the IBWC's United States Section.

Construction was completed for Reach I but was interrupted for other reaches by an extended period of flooding in 1981. Subsequent work done by IBWC's United States Section was tied to the Mexican Section's schedule; February of 1986 marked the end of U.S. Section construction work anywhere within the Boundary Preservation Project.

Funding to continue maintenance of the completed channel work has not been received since 1985; consequently, sediment plugs on the large tributary arroyos and high flows in the River have caused overtopping of the banks with the result that the channel has deviated from its original alignment. It is this deviation from channel alignment that concerns IBWC and which is properly termed "re-channelization." IBWC's perspective is that re-channelization of the Rio Grande is a treaty requirement, and that re-channelization offers some water salvage potential when combined with removal of salt cedar.

3.1.1.8 Forgotten River Reach of the Rio Grande

Reduced flows below Fort Quitman have resulted in a long stretch of the Rio Grande (known as the "Forgotten River") with no defined channel and riparian vegetation that has become a tamarisk thicket. The Rio Grande within this reach follows a sinuous channel for almost 200 river miles from about 13 miles downstream of Fort Quitman to about six miles upstream of Presidio. The high flows and periodic floods necessary to maintain the river channels have been reduced significantly over the past several decades.

In 2004, the TCEQ voiced concerns related to floodplain and riverine function, environmental resources, water quality, agriculture, and watershed hydrology. At the request of TCEQ, the Albuquerque Division of the US Army Corps of Engineers conducted a reconnaissance level investigation of the Forgotten River, which culminated in recommendations that the "Forgotten River Reach" study proceed into the feasibility phase to develop comprehensive watershed management recommendations. In response, several studies have been conducted that examine environmental resources, water supply, groundwater recharge, flooding and erosion, geology, cultural resources, and history. The latest feasibility study by the US Army Corps of Engineers, published in January 2008, provides recommendations pertaining to a needed systematic watershed approach to understanding the dynamics of the river environment. The study also presents an opportunity for local, State, and Federal agencies to work together in developing solutions to managing the varied resources of the Forgotten River Reach.

3.1.1.9 Rio Grande Interstate Litigation

The Rio Grande is an interstate and international river that originates in Colorado, flows in a southerly direction into and through New Mexico and into Texas, where the River is a significant water resource in Far West Texas with far reaching economic and social ties to the Region. To ensure an equitable divide and apportionment of Rio Grande water, Colorado, New Mexico and Texas signed the Rio Grande Compact in 1938, which a year later was approved by the United States pursuant to an Act of Congress.

In 2013, the State of Texas brought a complaint against the State of New Mexico and the State of Colorado in the Supreme Court of the United States contesting that:

> ***New Mexico has, contrary to the purpose and intent of the Rio Grande Compact, allowed and authorized Rio Grande Project water intended for use in Texas to be intercepted and used in New Mexico. New Mexico's actions, in allowing and authorizing the interception of Rio Grande Project water intended for use in Texas, violates the purpose and intent of the Rio Grande Compact, causing grave and irreparable injury to Texas.***
>
> ***New Mexico, through the actions of its officers, agents and political subdivisions, has increasingly allowed the diversion of surface water, and has allowed and authorized the extraction of water from beneath the ground, downstream of Elephant Butte Dam, by individuals or entities within New Mexico for use within New Mexico. The excess diversion of Rio Grande surface water and the hydrologically connected underground water downstream of Elephant Butte Reservoir adversely affects the delivery of water that is intended for use within the Rio Grande Project in Texas.***

The FWTWPG recognizes the potential impact of diminished water-supply availability from the Rio Grande from this interstate issue and encourages the State of Texas to continue its pursuit of rectifying the problem through whatever action is deemed most appropriate.

3.1.2 Pecos River

Originating in the Sangre de Cristo Mountains of northern New Mexico, the Pecos River flows 926 miles south into Texas, and discharges into the channel of the Rio Grande near the upper reaches of Amistad Reservoir. The Pecos is the largest Texas tributary that flows into the Rio Grande (Figure 3-1), contributing an average of 9.5 percent of the average annual streamflow into the Rio Grande. The River forms the easternmost border of the Far West Texas planning region along the northeast corner of Terrell County.

Pecos River flow upstream of the Region is controlled by releases from Red Bluff Reservoir near the Texas–New Mexico state line, where storage in the reservoir is affected by the required delivery of water from New Mexico (see Section 3.1.2.1 below). Water from this portion of the watershed is high in salt content and is used by downstream irrigators growing salt-tolerant crops. The Pecos contributes 29.5 percent of the annual salt load into Amistad Reservoir. Independence Creek in northern Terrell County within the Far West Texas region contributes about half of the Pecos flow and its fresh quality improves salinity in the River.

3.1.2.1 Pecos River Compact

Signed by Texas and New Mexico in 1948 and approved by Congress the following year, the Pecos River Compact provides for a Commission to administer the apportionment and diversion of Pecos River waters. The Compact repeatedly refers to the "1947 Condition," which is a Pecos River Basin situation defined in the Compact Commission's Report of the Engineering Advisory Committee. The terms of the Pecos River Compact can be summarized by the following four points:

- New Mexico cannot decrease the Pecos flow at the New Mexico/Texas border to a point less than that of the 1947 condition. When determining the quantity of Texas water for the 1947 condition, waters of the Delaware River are apportioned to Texas.
- Of the beneficial consumptive use of water salvaged in New Mexico on the River, Texas shall receive 43 percent and New Mexico 57 percent.
- Any water salvaged by beneficial use, but which is not beneficially consumed, shall be apportioned to New Mexico. Any water salvaged in Texas shall go to Texas.
- Beneficial consumptive use of unappropriated floodwaters shall go equally to Texas and to New Mexico.

The Pecos River Compact allows Texas and New Mexico to build additional reservoir capacity to replace unusable reservoir capacity, for the utilization of salvaged water and unappropriated floodwaters as apportioned by the Compact and for making more efficient use of water. Each state shall work with agencies to solve the salinity problem in the Pecos, and each may construct and operate facilities to prevent flood damage.

Texas and New Mexico were involved in a lawsuit over New Mexico's obligation to deliver water to Texas was decided and ordered by the U.S. Supreme Court in 1988 (485 U.S. 388). The decree requires New Mexico to abide by the terms of the Pecos River Compact and resulted in the appointment of a Pecos River Master. This River Master has several duties, including but not limited to, calculating water obligations every year, delivering reports of these calculations, reviewing plans proposed by New Mexico and considering written objections by Texas, and modifying proposed plans as deemed necessary.

3.1.2.2 Water Allocation and Water Rights

Pecos water delivered to Texas is stored in Red Bluff Reservoir and is allocated by a master irrigation control district to seven other irrigation districts downstream; each district then apportions the waters to individual farmers. The irrigation districts are in Loving, Ward, Reeves and Pecos Counties, which lie in Far West Texas' neighboring Region F.

Within the portion of the Pecos watershed within the borders of the Far West Texas planning region, the TCEQ water-rights master file lists five water rights on unnamed tributaries of the Pecos River (Certificates of Adjudication 5462 through 5466). These water-rights holders, located in Terrell County, are authorized to divert 873.25 acre-feet of water per year for irrigation purposes (Appendix 3A). There are also ten water rights located in Jeff Davis County on Limpia Creek and other streams in the Davis Mountains area. These water rights are not reliable during drought.

3.1.2.3 Significant Pecos River Basin Tributaries

Phantom Creek – Phantom Creek originates from groundwater discharging at Phantom Spring in Jeff Davis County in the Far West Texas region. The Creek flows northeastward into Reeves County (Region F), where it gains additional flow from San Solomon, Giffin, Saragosa, East Sandia and West Sandia Springs. Surface flow in the Creek, however, does not reach the Pecos River, but rather infiltrates into the farmland south of the town of Pecos. Phantom Creek is a source of water for irrigation in southern Reeves County. The U.S. Bureau of Reclamation manages the spring property and holds two water rights for the annual diversion of as much as 18,900 acre-feet of water for irrigation, however, this volume is rarely available.

A study performed by the TWDB in 2003 reports that flow in Phantom Spring has experienced significant decline over the past several drought years, declining from more than 10 cubic feet per second (cfs) during the 1930s to less than one cfs during the recent drought period. Recently Phantom Spring has ceased flowing on several occasions and a pump has been installed into the spring pool to support species residing at the spring outfall.

Independence Creek – Independence Creek, a spring-fed creek in northern Terrell County, is the most important of the freshwater tributaries to the lower Pecos River. Caroline Spring flows at a rate of 3,000 to 5,000 gpm and comprises about 25 percent of the Creek's flow. The inflow of Independence Creek adds a vital source of fresh water that doubles the flow of the Pecos River and reduces the salinity by half or more.

Independence Creek hosts a variety of bird and fish species, some of which are extremely rare. For the Proserpine shiner, Rio Grande darter, headwater catfish, and several other native fishes, Independence Creek is an important refuge during stressful Pecos River conditions. Following periods of low-water quality and occasional algae blooms on the Pecos River, fish populations in the clear waters of the Creek help to repopulate the River after a fish kill. The Nature Conservancy of Texas manages a significant portion of Independence Creek, including Caroline Spring, as a natural preserve. The reach of Independence Creek managed by the Nature Conservancy is recommended as an Ecologically Unique Stream Segment by the FWTWPG.

3.1.2.4 Pecos River Watershed Protection Plan

The Pecos River is the lifeblood of many communities within its reaches, and serves as a major water source for irrigation, recreational uses, and recharge for underlying aquifers. However, the flows of the once great Pecos River have dwindled due to natural and man-induced causes. Because water quality and streamflow has declined, the aquatic community of the Pecos River has been drastically altered. To address these river issues, the Pecos River Basin Assessment Program was initiated in 2004 by the Texas Water Resources Institute of Texas A&M University (http://pecosbasin.tamu.edu/). The project was funded by the Texas Soil and Water Conservation Board through the U.S. Environmental Protection Agency-Clean Water Act Grant. Components of the project include:

- A basin assessment of stream channel morphology, riparian vegetation, land use, salinity mapping, water inflows and outflows, aquatic habitats, historic perspectives and economic modeling.
- Educational programs working with various state and local agencies to assemble a series of publications and organize a series of educational meetings targeted at landowners, stakeholders and policymakers in the watershed.
- Monitoring programs consisting of data collection, analysis, and water-use studies intended to estimate the effect of salt concentration and fate of water salvaged through salt cedar control.

"A Watershed Protection Plan for the Pecos River in Texas" was published in 2008 and updated in 2013 (http://pecosbasin.tamu.edu/assessment-program/). The WPP for the Pecos River in Texas recommends management strategies that typically address more than one concern. The Plan includes an in-depth overview that defines the watershed and its characteristics and provides some of the history behind the current issues. As a primer on management strategies, the WPP also discusses past and current uses of the River and watershed. Landowners' concerns about the Pecos River watershed are discussed, management strategies are recommended, costs are estimated, technical assistance is outlined, and timelines for implementing these strategies and a program to address each concern are included. The plan includes:

- Identification of the causes and sources of pollutants
- Estimation of expected pollutant reductions
- Identification of critical areas of the watershed
- Description of the management measures needed
- Estimation of the costs of technical assistance and sources of funding
- Information and educational outreach component
- Implementation schedule
- Milestones to assess the effectiveness of plan implementation
- Criteria for assessing success
- Long-term monitoring efforts

3.2 GROUNDWATER

Other than irrigation use and a portion of El Paso Water municipal use from the Rio Grande, almost all other water use in Far West Texas is supplied from groundwater sources. Although not as large in areal extent as some aquifers in the State, such as the Ogallala and the Carrizo-Wilcox, individual aquifers in Far West Texas are more numerous (10 TWDB designated and 3 FWTWPG designated listed below) than in any of the other planning regions State-wide (Figure 3-3).

TWDB designated groundwater sources:

- Hueco Bolson
- Mesilla Bolson
- West Texas Bolsons
    - Salt Basin
        - Upper Salt Basin
        - Wild Horse and Michigan Flats
        - Lobo Flat
        - Ryan Flat
    - Presidio / Redford
    - Green River Valley
    - Red Light Draw
    - Eagle Flat
- Bone Spring-Victorio Peak
- Igneous (Davis Mountains Igneous)
- Edwards-Trinity (Plateau)
- Capitan Reef Complex
- Marathon
- Rustler
- Pecos Valley (Balmorhea Alluvium)

FWTWPG designated groundwater sources:

- Rio Grande Alluvium
- Edwards-Trinity of Brewster County (Brewster Cretaceous)
- Diablo Plateau

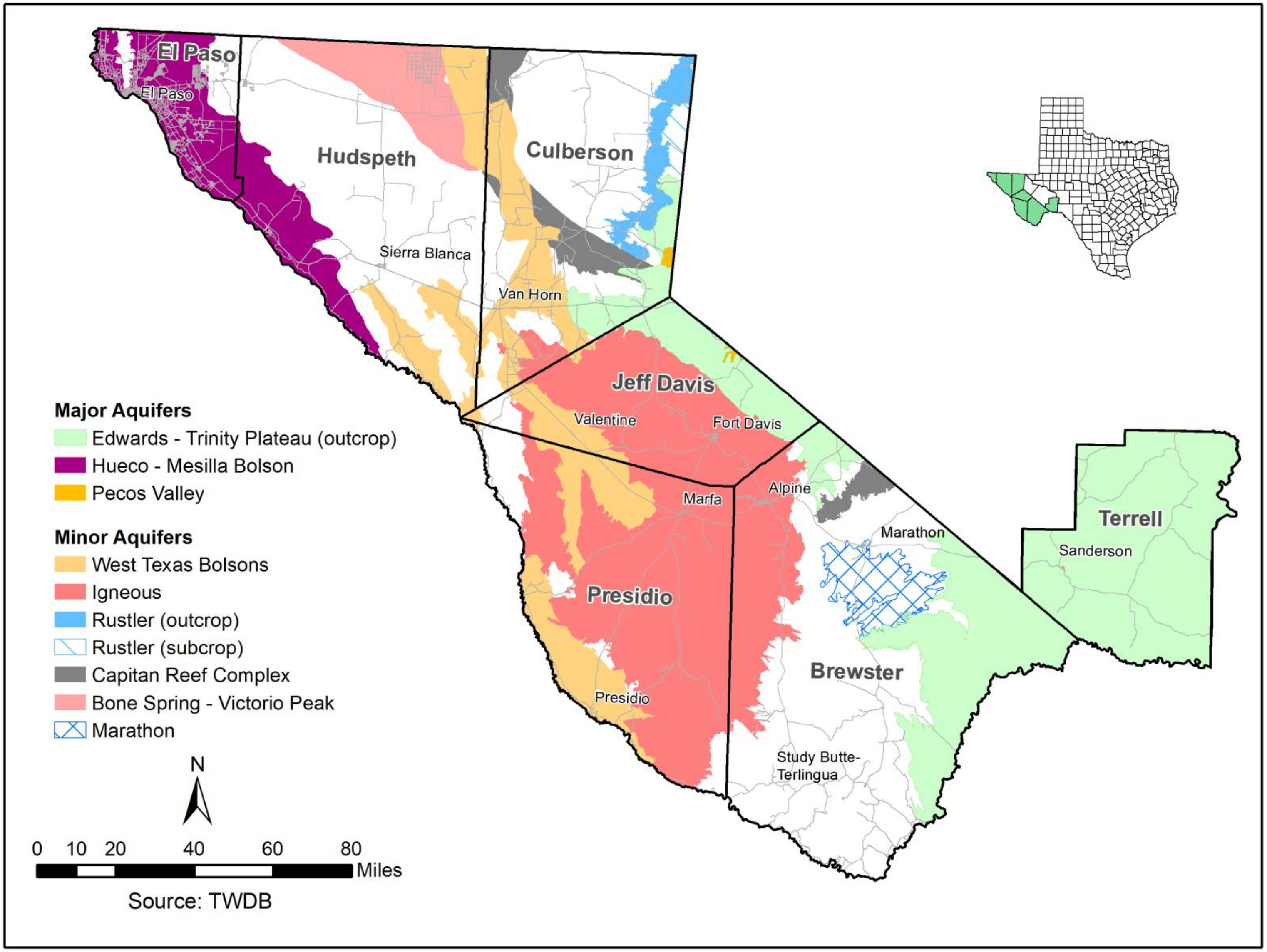

Figure 3-3. Major and Minor Aquifers

Aquifers in the Region can be categorized into three basic types; bedrock, bolson and alluvium. Bedrock aquifers are those where groundwater flows through permeable fractures in hard-rock formations (limestone, dolomite, volcanic basalt, etc.). Aquifers of this type include the Bone Spring-Victorio Peak, Capitan Reef, Edwards-Trinity, Rustler, Marathon, and Igneous. Bolson aquifers occur in thick silt, sand, and gravel deposits that fill valleys between the numerous mountain ranges. Bolson aquifers in the Region include the Hueco, Mesilla, and the various individual aquifers that comprise the West Texas Bolson Aquifer group. Alluvial aquifers occur in the floodplain deposits adjacent to riverbeds and are often hydrologically connected to the surface water body. The Rio Grande Alluvium Aquifer is in this category. Water quality characteristics of these aquifers are discussed in Chapter 1, Section 1.8.

The FWTWPG has continuously acknowledged the need to increase the reliability of groundwater availability estimates by supporting the acquisition of additional data that can be used to characterize the many aquifers in the Region. Interim TWDB-funded projects were performed during previous planning periods in which new well data, water quality analyses, and aquifer parameters ascertained through pumping tests, were developed. Project reports are accessible on the Rio Grande Council of Government website at http://westtexaswaterplanning.org/, and include:

- Igneous Aquifer System of Brewster, Jeff Davis and Presidio Counties, Texas (2001)
- West Texas Bolsons and Igneous Aquifer System Groundwater Availability Model Data Collection (2003)
- Groundwater Data Acquisition in Far West Texas (2009)
- Groundwater Data Acquisition and Analysis for the Marathon and Edwards-Trinity (Plateau) Aquifers (2010)

The evaluation of groundwater availability as reported in this *2026 Plan*, including MAG volumes and local analyses, is based on previous geohydrologic studies, groundwater data including historical use contained in State and Federal databases, and groundwater availability models (GAMs). Regardless of the specific method used to calculate groundwater supply availability, all analyses include the consideration of four basic components: (1) recharge to the aquifer, (2) recoverable storage capacity within the aquifer, (3) lateral movement into and out of the aquifer, and (4) withdrawals from the aquifer. Table 3-7 lists the methodologies used to estimate total groundwater source availability as reported in Table 3-1. Table 3-8 lists the Desired Future Conditions (DFCs) established by groundwater conservation districts for their assigned Groundwater Management Areas (GMAs). These aquifer conditions are used to assess the Modeled Available Groundwater (MAG) supply availability for designated aquifers. Groundwater availability is calculated separately for aquifers for which MAG volumes have not been assigned (Table 3-7).

Table 3-7. Groundwater Source Availability Methodology

<table>
<tr><th>Water Supply Source</th><th>County</th><th>Methodology</th></tr>
<tr><td rowspan="2">Hueco-Mesilla Bolson</td><td>El Paso</td><td>GMA Non-DFC process. RWPG approved values. Same as the 2021 Plan. 90% of Hueco total from Hutchison model plus 25,000 acre-feet from Mesilla.</td></tr>
<tr><td>Hudspeth</td><td>GMA Non-DFC process. RWPG approved values. Same as the 2021 Plan. 10% of Hueco total based on Hutchison model.</td></tr>
<tr><td rowspan="4">Edwards-Trinity (Plateau)</td><td>Brewster</td><td>GMA 4 MAG</td></tr>
<tr><td>Culberson</td><td rowspan="2">GCD Non-Relevant. TWDB modeled run compatible with DFC, which was provided to the FWTWPG for consideration.</td></tr>
<tr><td>Jeff Davis</td></tr>
<tr><td>Terrell</td><td>GMA 7 MAG</td></tr>
<tr><td>Bone Spring - Victorio Peak</td><td>Hudspeth</td><td>GMA 4 MAG</td></tr>
<tr><td rowspan="4">Capitan Reef Complex</td><td>Brewster</td><td rowspan="2">GMA 4 MAG</td></tr>
<tr><td>Culberson</td></tr>
<tr><td>Jeff Davis</td><td>GCD Non-Relevant TWDB-Null</td></tr>
<tr><td>Hudspeth</td><td>GCD Non-Relevant (TWDB-Null). The average between the max. 8-year annual historical pumpage use (2008-2015) that was utilized in the 2021 Plan (8,695 acre-feet = 2008); and the max. 11-year annual historical pumpage use (2011-2021) that was reviewed for the development of the 2026 Plan (2,120 acre-feet = 2011). This data is provided by the TWDB groundwater historical pumpage use surveys.</td></tr>
<tr><td rowspan="4">Igneous</td><td>Brewster</td><td rowspan="4">GMA 4 MAG</td></tr>
<tr><td>Culberson</td></tr>
<tr><td>Jeff Davis</td></tr>
<tr><td>Presidio</td></tr>
<tr><td>Marathon</td><td>Brewster</td><td>GMA 4 MAG</td></tr>
<tr><td rowspan="3">Rustler</td><td>Brewster</td><td rowspan="3">GCD Non-Relevant. TWDB modeled run compatible with DFC, which was provided to the FWTWPG for consideration.</td></tr>
<tr><td>Culberson</td></tr>
<tr><td>Jeff Davis</td></tr>
<tr><td>West Texas Bolson
(Red Light Draw)</td><td>Hudspeth</td><td rowspan="5">GCD Non-Relevant. GAM recharge from TWDB Contract Report (June 2004).</td></tr>
<tr><td>West Texas Bolson
(Eagle Flat)</td><td>Hudspeth</td></tr>
<tr><td>West Texas Bolson
Green River Valley)</td><td>Hudspeth</td></tr>
<tr><td>West Texas Bolson
(Green River Valley)</td><td>Jeff Davis</td></tr>
<tr><td>West Texas Bolson
(Green River Valley)</td><td>Presidio</td></tr>
<tr><td>West Texas Bolson
(Presidio-Redford)</td><td>Presidio</td><td>GMA 4 MAG</td></tr>
<tr><td rowspan="2">West Texas Bolson
(Upper Salt Basin)</td><td>Hudspeth</td><td>GCD Non-Relevant (TWDB-Null). The average between the max. 8-year annual historical pumpage use (2008-2015) that was utilized in the 2021 Plan (429 acre-feet = 2008); and the max. 11-year annual historical pumpage use (2011-2021) that was reviewed for the development of the 2026 Plan (212 acre-feet = 2011). This data is provided by the TWDB groundwater historical pumpage use surveys.</td></tr>
<tr><td>Culberson</td><td>GCD Non-Relevant (TWDB-Null). TWDB Report AA 10-38 MAG.</td></tr>
<tr><td>West Texas Bolson
(Wild Horse, Michigan and Lobo)</td><td>Culberson</td><td>GMA 4 MAG</td></tr>
</table>

Table 3-7. (continued) Groundwater Source Availability Methodology

Water Supply Source	County	Methodology
West Texas Bolsons (Ryan)	Jeff Davis	GMA 4 MAG
	Presidio	
Other Aquifer (Brewster Cretaceous)	Brewster	GCD Non-Relevant (TWDB-Null). The average between the max. 8-year annual historical pumpage use (2008-2015) that was utilized in the *2021 Plan* (1,896 acre-feet = 2008); and the max. 11-year annual historical pumpage use (2011-2021) that was reviewed for the development of the *2026 Plan* (1,071 acre-feet = 2011). This data is provided by the TWDB groundwater historical pumpage use surveys.
Other Aquifer (Diablo Plateau)	Hudspeth	RWPG Assigned. Recharge rate of 3% of average annual rainfall (11 inches/yr.) over 1,500 square miles of outcrop.
Other Aquifer (Balmorhea Alluvium)	Jeff Davis	RWPG Assigned. 2017 reported use by GCD.
Other Aquifer (Rio Grande Alluvium)	El Paso	GCD Non-Relevant (TWDB-Null). The average between the max. 8-year annual historical pumpage use (2008-2015) that was utilized in the *2021 Plan* (57,922 acre-feet = 2008); and the max. 11-year annual historical pumpage use (2011-2021) that was reviewed for the development of the *2026 Plan* (56,163 acre-feet = 2011). This data is provided by the TWDB groundwater historical pumpage use surveys.
	Hudspeth	GCD Non-Relevant (TWDB-Null). The average between the max. 8-year annual historical pumpage use (2008-2015) that was utilized in the *2021 Plan* (52,478 acre-feet = 2008); and the max. 11-year annual historical pumpage use (2011-2021) that was reviewed for the development of the *2026 Plan* (52,558 acre-feet = 2011). This data is provided by the TWDB groundwater historical pumpage use surveys.

Table 3-8. GMA Aquifer Desired Future Conditions

GMA	County	Aquifer	Desired Future Condition for the Period from 2010-2060
4	Brewster	Edwards-Trinity (Plateau)	3-ft drawdown
		Igneous	10-ft drawdown
		Marathon	0-ft drawdown
		Capitan Reef Complex	0-ft drawdown
	Culberson	Capitan Reef Complex	50-ft drawdown
		Salt Basin portion of the West Texas Bolsons	78-ft drawdown
		Igneous	66-ft drawdown
	Hudspeth	Bone Spring-Victorio Peak	0-ft drawdown for the period from 2010-2060, averaged across the portion of the aquifer within the boundaries of the district
	Jeff Davis	Igneous	20-ft drawdown
		Salt Basin portion of the West Texas Bolsons	72-ft drawdown
	Presidio	Igneous	14-ft drawdown
		Salt Basin portion of the West Texas Bolsons	72-ft drawdown
		Presidio-Redford Bolson	72-ft drawdown

Table 3-8. (continued) GMA Aquifer Desired Future Conditions

GMA	County	Aquifer	Desired Future Condition for the Period from 2010-2060
7	Kinney	Edwards-Trinity (Plateau)	Total net drawdown in Kinney County in 2070, as compared with 2010 aquifer levels, shall be consistent with maintenance of an annual average flow of 23.9 cfs and an annual median flow of 23.9 cfs at Las Moras Springs
	Val Verde	Edwards-Trinity (Plateau)	Total net drawdown in Val Verde County in 2070, as compared with 2010 aquifer levels, shall be consistent with maintenance of an average annual flow of 73-75 mgd at San Felipe Springs
	Edwards	Edwards-Trinity (Plateau), Pecos Valley and Trinity	Total net drawdown not to exceed 2 feet in 2070 as compared to 2010 aquifer levels
	Real	Edwards-Trinity (Plateau), Pecos Valley and Trinity	Total net drawdown not to exceed 4 feet in 2070 as compared to 2010 aquifer levels
	Terrell	Edwards-Trinity (Plateau), Pecos Valley and Trinity	Total net drawdown not to exceed 2 feet in 2070 as compared to 2010 aquifer levels

3.2.1 Hueco Bolson Aquifer

The Hueco Bolson Aquifer is a major source of groundwater for cities in El Paso and Hudspeth Counties, as well as Ciudad Juarez, Mexico. The Hueco Bolson extends southeastward from the Franklin Mountains in El Paso County to the southern end of the Quitman Mountains in Hudspeth County. The eastern boundary of the Bolson is established by the Diablo Plateau in El Paso and Hudspeth Counties and the Malone and Quitman Mountains in Hudspeth County. Northward, the Hueco extends into New Mexico, where it is hydrologically connected to the Tularosa Basin Aquifer. The Hueco Bolson also extends southward into the Mexican State of Chihuahua, where it is bounded by a series of mountain ranges that trend toward the southeast from Ciudad Juarez to near the southernmost point of the Quitman Mountains in Texas.

The Hueco Bolson consists of deposits of basin fill with a maximum thickness of approximately 10,000 feet along its western edge. The upper part of the basin fill consists of silt, sand and gravel. The lowermost deposits are made up largely of clay and silt. Only portions of the upper several hundred feet along the western edge of the Bolson fill are known to contain fresh to slightly saline water. East and below the freshwater zone, the Aquifer contains large volumes of brackish quality groundwater, which is currently being desalinated for public supply use by El Paso Water and Horizon MUD. Where Hueco Bolson sediments directly underlie Rio Grande alluvial sediments, the two units are hydrologically connected. Recent data analysis and computer modeling indicate that the Hueco Bolson Aquifer can continue to be sustainably developed well beyond previous estimates.

The TWDB officially designates the Hueco and Mesilla Bolsons as a single major-aquifer system (Figure 3-3) and reports its combined source availability in El Paso and Hudspeth Counties as a single volume of 480,000 acre-feet per year (Table 3-1). However, the two bolsons are not hydrologically connected. For this *2026 Plan*, The Hueco and Mesilla Bolsons Aquifer is subdivided as follows:

El Paso County:

Hueco Bolson – 410,000 af/y

Mesilla Bolson – 25,000 af/y

Hudspeth County:

Hueco Bolson – 45,000 af/y

3.2.2 Mesilla Bolson Aquifer

The Mesilla Bolson Aquifer is located west of the Franklin Mountains and is part of a larger bolson that extends from southern New Mexico to northern Mexico. The Bolson deposits consist of approximately 2,000 feet of clay, silt, sand, and gravel. Three water-bearing zones have been identified based on water levels and quality. The shallow zone includes the overlying Rio Grande Alluvium. El Paso Water maintains a municipal wellfield in the Mesilla Bolson Aquifer near Canutillo. For the *2026 Plan*, Mesilla Bolson source availability is estimated to be approximately 25,000 acre-feet per year (see Hueco Bolson availability above).

3.2.3 West Texas Bolsons Aquifer

The West Texas Bolsons Aquifer is a minor aquifer in Far West Texas that's made up of several basins, or bolsons. The Aquifer is made up of eroded materials, such as clay, silt, volcanic rock, and limestone, that vary by location. The water quality varies by location, ranging from fresh to slightly or moderately saline.

3.2.3.1 Salt Basin Bolson

The Salt Basin is the largest of the West Texas Bolson Aquifers extending from the New Mexico state line on the western side of the Guadalupe Mountains southward to near Marfa in northern Presidio County. The basin is subdivided into five distinct, but hydrologically connected areas referred to as "flats" that contain significant quantities of groundwater that are being produced for municipal, irrigation, and livestock use. These sub-aquifers include, from north to south Upper Salt, Wild Horse, Michigan, Lobo, and Ryan Flats. Water supplies used by the oil and gas industry are derived from this Aquifer source.

Upper Salt Basin is not currently identified as part of the TWDB-designated West Texas Bolsons Minor Aquifer system but is listed here because it is recognized as a source supply for specified water-user categories in this *Plan*. The Upper Salt Basin is the northern extension of Wild Horse Flat and is described separately because of a difference in water quality and primary use. The Aquifer generally produces brackish to slightly saline groundwater to low-capacity wells primarily serving livestock needs.

Wild Horse Flat and Michigan Flat lie to the south of the Upper Salt Basin and are hydrogeologically interconnected with the northernmost part of Lobo Valley. Mountains bound the Wild Horse-Michigan Flat area along its western, eastern and southeastern margins. The Wild Horse-Michigan Flat watershed covers an area of approximately 1,000 mi^2 with a storage area of approximately 375 mi^2. The Wild Horse Flat area of the basin is a source of municipal supply for the Towns of Van Horn (Culberson County) and

Sierra Blanca (Hudspeth County). The Wild Horse-Michigan Flat Aquifer is a major source of domestic and stock water for ranches and of irrigation water for farms in the valley.

Lobo Flat lies southwest of Wild Horse and Michigan Flats and is bound by mountains along its western and eastern margins. The Bolson watershed covers an area of 350 mi^2, with a groundwater storage area of 130 mi^2. The largest part of the storage area (75 mi^2) is in Culberson County, and a smaller part (55 mi^2) lies within Jeff Davis County. The Bolson is not a source of municipal supply; however, it is a source of domestic and stock water for ranches and a significant source of irrigation water.

Ryan Flat is the southernmost extension of the Salt Basin. The Bolson watershed covers an area of 1,410 mi^2, and the storage area is 525 mi^2. The largest part of the storage area (360 mi^2) is in Presidio County, and a smaller area (165 mi^2) extends northward into Jeff Davis County, where it is the source of municipal supply for the Town of Valentine. It is also the source of domestic water, stock water for ranches, and a source of irrigation water for farms. Well completion information and pumping records from the Antelope Valley Ranch, owned by El Paso Water, indicate that a zone of saturated, permeable, fractured volcanic rocks from 1,000 to as much as 3,000 feet thick underlies the bolson fill in Ryan Flat.

3.2.3.2 Presidio-Redford Bolson

In Texas, the Presidio-Redford Bolson extends along the Rio Grande from Candelaria to outcrops of volcanic rocks six to 10 miles southeast of Presidio. The Redford extension of the Bolson continues along the Rio Grande for another 12 miles. The Bolson is bounded along the northeast by the Chinati Mountains and along the southeast by the Cienega Mountains, the Black Hills, and the Bofecillos Mountains. This is an area of approximately 480 mi^2. Saturated thickness is conservatively estimated to be 500 feet beneath this area. The Presidio-Redford Bolson is the source of municipal supply water for the Town of Presidio and the Mexican community of Ojinaga. It is also the source supply for domestic, irrigation and livestock use.

3.2.3.3 Green River Valley Bolson

The Green River Valley Bolson lies in parts of Hudspeth, Jeff Davis and Presidio Counties. It is bordered by the Eagle Mountains on the west, the Van Horn Mountains on the east, and the Rio Grande on the south. The Green River Valley watershed covers an area of 160 mi^2, however the storage area is only 40 mi^2. Green River Valley is the smallest of the West Texas Bolsons and is a source of water only for ranches in the basin. A few abandoned wells give witness to a history of irrigation.

3.2.3.4 Red-Light Draw Bolson

Red Light Draw, located in Hudspeth County, is situated between the Eagle Mountains along the north-northeast and the Quitman Mountains along the southwest. The Rio Grande is the southern border of the basin. The drainage area of the Red-Light Draw Bolson watershed is estimated to be 370 mi^2 and an aquifer area of 185 mi^2. The Red-Light Draw Bolson is a source of water only for ranches in the basin, and at its southern end for a research station operated by the University of Texas at El Paso.

3.2.3.5 Eagle Flat Bolson

The Eagle Flat Bolson, located in Hudspeth County, is situated between the Eagle Mountains along the south-southwest, the Diablo Plateau along the north, and the Carrizo and Van Horn Mountains along the east. The drainage area of the Bolson watershed is estimated to be 560 mi^2 and the basin-fill covers an area of 156 mi^2. Only the southeastern part of the Basin is regarded as having potential for the development of groundwater resources. The Eagle Flat Bolson is not a source of supply for municipalities in Hudspeth County. The unincorporated Town of Sierra Blanca, located in the western region of the Basin, obtains water from a wellfield operated by the Town of Van Horn in Wild Horse Flat.

3.2.4 Bone Spring-Victorio Peak Aquifer

The Bone Spring-Victorio Peak Aquifer underlies the Dell Valley area of northeastern Hudspeth County between the Salt Flat Basin and the Guadalupe Mountains on the east and the Diablo Plateau on the west. The Aquifer, which extends northward into the Crow Flats area of New Mexico, is used primarily for irrigation, but is also the public water supply source for Dell City. In 2007 the TWDB significantly enlarged the designated area of the Aquifer to a total of 710 mi^2 by extending its western and southern boundary.

The Aquifer consists of carbonate rocks (limestone and dolomite) of early Permian age. Groundwater in the Aquifer occurs under water-table conditions in interconnected solution cavities of variable size and dimension that formed along joints, fractures and bedding planes. Water-bearing zones have been encountered in wells as deep as 2,000 feet. The productivity of a well completed in the Aquifer is dependent on the number and size of cavities penetrated by the well bore. Well yields are reported to range from 150 gpm to as much as 4,000 gpm. The depth to groundwater within the irrigated region of Dell Valley ranges from approximately 35 feet along the eastern side of the valley to 325 feet on the west. Although the water table has declined since pre-development, static water levels have remained relatively constant since the late 1970s.

There are four principal components of recharge to the Bone Spring-Victorio Peak Aquifer:

- Precipitation that falls over watersheds that drain toward Dell Valley infiltrates rapidly along fractures and solution features such as sinkholes;
- The Sacramento River, which drains the Sacramento Mountains of New Mexico, discharges large volumes of water to the subsurface in the lowlands that border the mountain catchments;
- Lateral inflow of groundwater from areas to the north and the west; and
- Return flow from irrigation in Dell Valley.

During the irrigation season, the direction of groundwater flow is highly influenced by pumping wells, which create cones of depression in the water table. If pumping rates were not managed, significant water-level declines could result in highly saline water from the Salt Flats migrating westward into the fresher zones. However, chemical analyses of wells along the eastern border of the Valley have not indicated a significant influx of saline water. The Hudspeth County Groundwater Conservation District engages management rules to ensure the water table remains at a sustainable level.

3.2.5 Igneous Aquifer (Davis Mountains Igneous)

The Igneous Aquifer system comprises all contiguous Tertiary igneous (volcanic) formations underlying the Davis Mountains and adjacent areas primarily in Brewster, Jeff Davis and Presidio Counties. Most of the Aquifer's areal extent is underlain by a thickness ranging from 1,000 to 4,000 feet; however, most wells are less than 1,000 feet in depth. The Aquifer is not a single homogeneous aquifer but rather a system of complex water-bearing formations that are in varying degrees of hydrologic communication.

The extent of the Igneous Aquifer as illustrated in Figure 3-3. Major and Minor Aquifers represents a new boundary established in recent studies of the Aquifer system. Groundwater is stored in the fissures and fractures of intrusive and extrusive rocks of volcanic origin. The chemical quality of the Aquifer is generally good to excellent and well yields generally range from small to moderate.

Over 40 separately named volcanic units have been identified, each of which are highly variable in nature. Water quality of the Aquifer is relatively good and generally meets safe drinking water standards. Alpine, Marfa and Fort Davis, along with a growing rural population, derive their municipal supplies from this Aquifer.

3.2.6 Edwards-Trinity (Plateau) Aquifer

The Edwards-Trinity (Plateau) Aquifer in Far West Texas is the westernmost extension of a vast groundwater system that underlies the Edwards Plateau east of the Pecos River and the Stockton Plateau west of the River. The Aquifer is exposed over an area of 4,690 mi^2 in Terrell (2,350 mi^2), Brewster (1,460 mi^2), Jeff Davis (530 mi^2) and Culberson (350 mi^2) Counties. It is the source of municipal water for the City of Sanderson (Terrell County); a source of domestic water in Brewster, Culberson, and Terrell Counties; a source of irrigation water in Brewster and Terrell Counties; a source of stock water in all four counties; and a source of water for oil and gas operations in Terrell County.

The Aquifer consists of saturated sediments of the Cretaceous age Trinity Group formations and the overlying carbonate rocks (limestone and dolomite) of the Comanche Peak, Edwards, and Georgetown formations. Groundwater occurs under water-table conditions in the four Far West Texas counties.

The hydrogeology of the Edwards-Trinity (Plateau) Aquifer in Far West Texas is not understood as well as in areas to the east, where the Aquifer is a major source of supply for the municipal, industrial and agricultural sectors of the economy.

3.2.7 Capitan Reef Complex Aquifer

The Capitan Reef formed along the margins of the Delaware Basin, a Late Paleozoic sea. In Texas, the reef formed along the western and eastern edges of the basin in arcuate strips 10 to 14 miles wide. The reef is exposed in the Guadalupe and Apache Mountains of Culberson County and in the Glass Mountains of Brewster County. In other areas, the Reef is found only in the subsurface. It extends northward into New Mexico, where it is a source of fresh water for the City of Carlsbad. The Capitan Reef Aquifer is composed of up to 2,000 feet of massive to cavernous dolomite and limestone, bedded limestone, and reef talus. In many areas of Culberson and Hudspeth Counties, the yields of wells are commonly more than 1,000 gpm. Further to the south, in the Apache Mountains of Culberson County, well yields appear to be in the range of 400 gpm. There is no reported production data for the Glass Mountains portion of the Capitan Reef.

The Aquifer is not currently a source of municipal supply; however, El Paso Water owns land over the Aquifer in Culberson County and may tap the Aquifer for municipal supply in the future. Most of the groundwater pumped from the Aquifer in Far West Texas is used for irrigation in Culberson and Hudspeth Counties.

3.2.8 Marathon Aquifer

The Marathon Aquifer is located entirely within the north-central area of Brewster County, where it is the source of municipal supply for the Town of Marathon, and of domestic and stock water for ranches in the area. The Marathon area is underlain by complexly faulted and folded Paleozoic rocks having a total thickness of 21,000 feet and occupying an area of approximately 390 mi^2. The most significant water-bearing formation of the Aquifer is the Marathon Limestone (early Ordovician age).

Groundwater in the Marathon Aquifer generally occurs under unconfined conditions in crevices, joints and cavities; however artesian conditions are common in areas where the Paleozoic rocks are buried beneath younger formations. Existing water wells have penetrated up to 900 feet, however most wells are generally less than 250 feet deep. Many of the shallow wells in the area actually produce water from alluvial deposits that overlie rocks of the Marathon Aquifer. The depth to groundwater is generally less than 150 feet, and depths of less than 50 feet are not uncommon. Groundwater in the Aquifer is typically of good quality but hard.

3.2.9 Rustler Aquifer

The Rustler Aquifer, located in eastern Culberson County, is exposed in a southwest-trending belt that begins at the northeast corner of the County. The Aquifer dips toward the east and is found in the subsurface in easternmost Culberson County and Jeff Davis County. Approximately 803 mi^2 of land in Far West Texas are underlain by the Rustler Aquifer. The Rustler Aquifer is a source of water for irrigation and livestock. High concentrations of dissolved solids render the formation unsuitable as a source of municipal and domestic supply. The Rustler Aquifer consists mainly of dolomite, limestone, and gypsum of the Rustler Formation (Permian age). Groundwater is produced primarily from solution channels, caverns and collapsed breccia zones. The Aquifer is under water-table conditions in the outcrop recharge zone in eastern Culberson County and is under artesian conditions elsewhere.

3.2.10 Pecos Valley Aquifer (Balmorhea Alluvium)

The Balmorhea Alluvium Aquifer, located in a small area along the Jeff Davis and Reeves county line, is recognized in this *Plan* due to its use as a municipal supply source for the City of Balmorhea and the Madera Valley WSC. The TWDB classifies this area as belonging to the Pecos Valley Aquifer; however, the erosion-derived gravel sequence is unlike the sand and silts of the Pecos Valley Alluvium, and recharge is also unique to runoff from the slopes of the Davis Mountains.

3.2.11 Other Groundwater Resources

Also shown in Figure 3-3. Major and Minor Aquifers, are large areas of Far West Texas that are depicted as not underlain by major or minor aquifers. The map, however, should not be interpreted as an indication that such areas are devoid of groundwater, but rather as a reflection of the current level of understanding of the extent of known groundwater resources in the Region.

Rio Grande Alluvium Aquifer

The Rio Grande Alluvium forms the flood plain of the Rio Grande in El Paso and Hudspeth Counties. Averaging approximately 200 feet in thicknesses, the alluvial aquifer is hydrologically connected to the underlying Hueco Bolson. TWDB Report 246 states that the Rio Grande Alluvium Aquifer within El Paso County contains about 1.4 million acre-feet of theoretically recoverable groundwater having less than 2,500 mg/l dissolved solids. Groundwater contained within the Rio Grande alluvial sediments generally has high concentrations of dissolved solids (typically greater than 2,000 mg/l) and requires desalination to meet drinking-water standards. However, it is a source of irrigation water in El Paso and Hudspeth Counties whenever flow in the Rio Grande is insufficient to support agricultural operations. These irrigation wells are capable of annually producing approximately 80,000 acre-feet in El Paso County and 15,000 acre-feet in Hudspeth County from the Aquifer. In addition, the Horizon Regional MUD pumps alluvial groundwater for municipal use, which must be desalinated to meet safe drinking water standards.

For this *Plan*, groundwater availability from the Rio Grande Alluvial Aquifer in El Paso County is 130,380 acre-feet per year, calculated as 89,330 acre-feet per year effective recharge plus five percent of water in storage to a depth of 200 feet and with a salinity range of 1,000 to 2,000 mg/l (TWDB Report 246). Groundwater availability from the Aquifer in Hudspeth County is estimated at approximately 11.5 percent of that in El Paso County, or 15,000 acre-feet per year.

Edwards-Trinity Aquifer of Brewster County (Brewster Cretaceous)

In southern Brewster County, the small communities of Study Butte and Terlingua, as well as the Lajitas Golf Resort, obtain groundwater from underlying Cretaceous formations that are geologically equivalent to the Edwards-Trinity (Plateau) Aquifer. Wells recently drilled to supply water for the Lajitas golf courses have demonstrated that groundwater of likely significant quantity is present in this Aquifer system. However, very little data has been collected pertaining to this Aquifer. The Lajitas' wells are relatively deep, the temperature of the water is warm, and the water contains elevated radioactivity. The FWTWPG recommends that this Aquifer be studied in more detail.

Diablo Plateau Aquifer

The Permian and Cretaceous rock formations that make up the subsurface of the Diablo Plateau of central and northern Hudspeth County may have large volumes of groundwater in storage. Although the Aquifer system has not been adequately researched, Hutchison (2008) included a portion of this Aquifer system in a flow simulation model of the Bone Springs-Victorio Peak Aquifer. Also, several wells have been drilled that testify to the existence of an underground supply.

For this *Plan*, groundwater availability for the eastern and southern portion of the Diablo Plateau is conservatively calculated as 26,400 acre-feet per year effective recharge based on three percent (drought rate) of average annual rainfall (11 inches) times the areal extent of the designated portion of the Aquifer (1,500 mi^2 or 960,000 acres).

3.2.12 Groundwater Conditions in Municipal Wellfields

All communities in the Far West Texas Region rely partially or completely on groundwater supply sources. This section presents groundwater conditions in municipal wellfields within the Region.

3.2.12.1 Brewster County

City of Alpine – The City of Alpine operates 13 active and four backup municipal supply wells in three wellfields (the Musquiz, Sunny Glen, and Town wellfields). Approximately 65 percent of the City's water comes from the Musquiz wellfield located 10 miles to the north. Another 30 percent comes from the Sunny Glen wellfield, which is regarded as having greater storage capacity, located eight miles to the northwest. The remaining five percent is produced by several small wells located around the City. While official reports indicate that water levels have remained relatively stable, there have been notable fluctuations in recent years, particularly in the Sunny Glen and Town wells. Volcanic aquifers, like those supplying Alpine, generally have low storage capacity, making effective monitoring and management crucial.

The Brewster County Groundwater Conservation District (BCGCD) actively monitors these aquifers as part of its broader mission to manage, protect, and conserve groundwater resources. Their efforts include measuring water levels through metered wells and issuing production permits that ensure sustainable water usage across the Region. Additionally, the District coordinates with other regional water planning groups to establish desired future conditions (DFCs) for groundwater management.

It is locally understood that the water table has been drawn down on the decadal timeframe of intensive urban development since the 1880s, from historical accounts of artesian springs and hand dug wells in town. Recent efforts to deepen wells within the Sunny Glen field increased yields from less than 100 gpm to as much as 500 gpm. In response to periodic drops in water levels, especially during droughts, the City has activated its Drought Contingency Plan (DCP), instituting voluntary conservation measures like limiting lawn watering. Upgrades to both the wellfields and the distribution system are actively underway to ensure long-term water security and better manage these fluctuations.

Community of Marathon – The Marathon Water and Sewer Service Corporation provides water to the Community of Marathon from two wells screened in the Marathon Aquifer. Water levels have remained stable in the vicinity of the Community, and there are no reported major water quality problems. There are no other sources of groundwater near the Community.

Communities of Terlingua and Study Butte – The Study Butte Water Supply Corporation (WSC), which provides water to the towns of Study Butte and Terlingua, has developed two wells in the Cretaceous Santa Elena Limestone and the capacity of either well can sufficiently supply daily needs. Water levels have remained relatively stable, but little is known about how high-production wells into the same formation 10 miles away might affect local static water levels. Radiological activity in the untreated water consists mainly of Radon gas and radium 226, which are present in levels barely above detection limits. Radon levels are drastically reduced by mechanically assisted gassing, and the particulate R226 can be filtered out in such a quantity as to leave both an excellent product water and to pose no problems for disposal. This water system has one of the most sophisticated rural public water treatment facilities in West Texas, combining reverse osmosis desalination and other more traditional technologies to produce a product of superior taste and quality. The Study Butte WSC has been approved for TWDB funding and is currently working to install 250 radio-read meters, 10 system check valves, and 4,500 feet of 4-inch and 8-inch water line.

Resort of Lajitas – The Resort of Lajitas currently relies on two deep, large-bore wells of varying water quality drilled into Cretaceous formations. Depending on location, wells have demonstrated artesian characteristics, with completed static level as much as 700 feet above the level where the formation was entered. The water is chemically similar to that found 10 miles away by the Terlingua-Study Butte WSC and poses similar treatment problems. Most water produced by the Lajitas Resort water system is for golf course and turf irrigation from a combination of sources. A state-of-the-art electro-dialysis desalination plant provides high quality product for municipal use by residents, employees, and resort guests. No change in aquifer levels has been reported since the onset of high-volume pumping in 2000, but little reliable data is available for either recharge rates or total pumping volumes.

3.2.12.2 Culberson County

Town of Van Horn – Municipal supply for the Town of Van Horn is derived from four active city-owned wells in the Wild Horse Flat Aquifer. Water levels near Van Horn have remained stable. Other than fluoride concentrations that have been reported to range from 2.3 to 3.1 mg/l, all other dissolved constituents are within their respective safe drinking-water standards. The current wellfield has significant expansion capability if additional production is needed to meet increased demand. The City is replacing all water meters to better monitor water use.

3.2.12.3 El Paso County

City of El Paso (El Paso Water) and Vicinity – The production of groundwater from wellfields in the vicinity of El Paso and in Ciudad Juarez has created a large cone of depression in the potentiometric surface beneath each city. El Paso Water has made considerable efforts in its water resources management to help stabilize groundwater levels and controlling the intrusion of brackish groundwater into fresh portions of the Hueco Bolson Aquifer.

Use of two surface water treatment plants (Jonathan Rogers and Canal Water Treatment) have allowed El Paso Water to maximize its production of renewable surface water and reduce the amount of groundwater pumping. This coupled with the Aquifer Recharge program using highly treated wastewater effluent (to drinking water standards) has allowed El Paso Water to better manage the groundwater resources for long- term sustainability.

Brackish groundwater in the Hueco is now considered an important source of water supply for El Paso Water through the use of reverse osmosis technology at the Kay Bailey Hutchison Desalination plant and with 10 well head reverse osmosis units.

El Paso Water will continue to manage the Aquifer for long-term sustainability by maximizing use of river water when available. This will help reduce the heavy long-term pumping of the Aquifer, and thus reduce the excessive depletion of the Aquifer.

3.2.12.4 Hudspeth County

Community of Sierra Blanca – Water provided to the Community of Sierra Blanca by the Hudspeth County Water Control and Improvement District #1 is from a well located near the airport northwest of the Town of Van Horn in Culberson County. The well produces groundwater from the Wild Horse Flat Aquifer where water levels near the well have remained relatively constant and water quality has been acceptable. Groundwater from the well feeds into the Van Horn water supply and from there is diverted by pipeline to Sierra Blanca under a contract between the District and the City of Van Horn. There is substantial room for expansion if an additional well is needed to meet increased demand. Also, a larger diameter pipeline is being considered for transporting this water to Sierra Blanca. Since 1970, Sierra Blanca has drilled as many as five wells near the town in unsuccessful attempts to develop local sources of groundwater.

City of Dell City – Dell City relies on three wells (only one of which is currently active) completed in the Bone Spring-Victorio Peak Aquifer for municipal water, which is brackish and must be desalinated. The Bone Spring-Victorio Peak Aquifer is capable of supporting production from additional municipal supply wells if needed.

Communities of Fort Hancock and McNary – Fort Hancock and McNary have relied on groundwater provided by one well owned by the Fort Hancock WCID and on 11 wells owned by the Esperanza FWSD#1. All production is from the Rio Grande Alluvium Aquifer. Water levels fall in response to extended drought conditions in the Region, but the owner of the Esperanza FWSD #1 reports that water levels usually recover quickly after periods of rainfall. Water quality is a problem in the area, as TDS ranges from approximately 1,000 mg/l to as much as 2,500 mg/l. Other dissolved solids in excess of drinking water standards are fluoride and manganese. The possibilities for expansion are limited by the occurrence of saline groundwater in both the Rio Grande Alluvium and the Hueco Bolson Aquifer.

3.2.12.5 Jeff Davis County

Community of Fort Davis – The Fort Davis Water Supply Corporation (FDWSC) provides water to the Community of Fort Davis and the surrounding area from three wells completed in the Igneous Aquifer. Water levels in the vicinity of the wells have remained stable, and other than elevated fluoride, there are no reported problems with water quality. FDWSC is considering connecting to a private public-supply well east of town in the future.

Town of Valentine – The Town of Valentine relies on one municipal water-supply well completed in the Ryan Flat Aquifer. The well produces an average rate of 59 gpm with 201 feet of water level drawdown. An emergency backup well owned by the Valentine Independent School District can provide water to the school and to a small number of residences if the City well goes down; however, this will not keep up with normal usage. Water levels near Valentine have remained stable, and there are no reported problems with water quality. Under consideration is a proposal to drill a second municipal water-supply well. The Ryan Flat Aquifer appears to have ample capacity to support additional well development for Valentine.

3.2.12.6 Presidio County

City of Marfa – The City of Marfa depends on three city-owned wells for all its municipal water needs. Two of the wells can produce as much as 1,100 gpm, and the third well yields an additional 450 gpm. The Tertiary volcanic formations of the Igneous Aquifer are the source of groundwater. Other than fluoride, which has been reported at concentrations ranging from 2.5 to 3 mg/l, all other dissolved solids are below their respective safe drinking-water standards, and TDS are typically less than 400 mg/l. The City of Marfa recently drilled a new well to replace an older well that was no longer functioning.

City of Presidio – The City of Presidio derives its municipal water from four wells located east of the City along Alamito Creek, which tap into the Presidio Bolson Aquifer at depths of approximately 530 feet. The Presidio Bolson Aquifer, composed primarily of alluvial and lacustrine sediments, provides relatively good water quality, as reflected by the total dissolved solids level of 374 mg/l, well below EPA limits for safe drinking water. However, groundwater availability in the area can be sensitive to both drought and over-extraction, given the Aquifer's limited recharge rate and semi-arid climate.

The design of the City's water system focuses on addressing these challenges. Groundwater is pumped from the Aquifer to serve the City's 1,783 residential connections, producing approximately 800,000 gallons per day. However, the system has faced issues related to high water pressure, which causes frequent line breaks and water loss. To mitigate these problems, the City implemented improvements such as the construction of a dedicated transmission line between storage tanks, allowing for better pressure management and reduced water losses. Additionally, expansion efforts have extended service northward along Highway 67 to meet growing demand.

3.2.12.7 Terrell County

Community of Sanderson – The Terrell County WCID#1 provides municipal water to the Community of Sanderson from 14 active public supply wells that produce groundwater from the Edwards-Trinity (Plateau) Aquifer. The wells are in three fields; four in the north field, three in the middle field, and seven in the south field. Water levels have remained stable; and water quality is not reported to be a problem for the Community.

3.2.13 Groundwater Exports

Jeff Davis is the only county from which water is exported to other areas outside of its borders. As shown by Table 3-9 below, in 2023 the City of Alpine pumped 511 acre-feet from four wells in the Musquiz well field in southeastern Jeff Davis County. All other exports go to Reeves County. In 2023 the City of Balmorhea and the Madera Valley WSC extracted 101 and 183 acre-feet respectively, from the Edwards-Trinity (Plateau) & Pecos Valley Alluvium Aquifers in northeastern Jeff Davis County.

Table 3-9. Far West Texas 2023 Groundwater Exports
(Acre-Feet per Year)

Exporting County	Receiving County	Received By	Source	Amount in 2023	Remarks
Jeff Davis	Brewster	City of Alpine	Igneous Aquifer	511	Pumpage from four wells in Musquiz wellfield
	Reeves	City of Balmorhea	Pecos Valley	101	Pumpage from one well
		Madera Valley WSC	Pecos Valley	183	Pumpage from two wells

Source: Jeff Davis County Underground Water Conservation District
Note: See Region F Water Plan for future water use projections for the Reeves County water user entities.

Also, the U.S. Bureau of Reclamation has water rights for diversions of up to 18,936 acre-feet per year of surface water from Phantom Creek for irrigation use in Reeves County.

3.3 LOCAL SUPPLY

“Local Supplies” refers to limited water supplies that occur 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 and irrigation. For planning purposes, the volume of runoff water in these catchment basins is 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 Far West Texas 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, which provides an additional 216 acre-feet per decade of existing surface water supply to the Region throughout the planning horizon.

3.4 REUSE

Reuse refers to the utilization of return flows from municipal wastewater treatment plants and other water users. Reuse water can be broadly characterized as one of two types: (1) direct reuse, or wastewater that is reused without first being discharged into a stream or watercourse, and (2) indirect reuse, in which wastewater is discharged to a stream or other watercourse prior to being diverted for use.

Direct Reuse

El Paso Water's direct reuse project involves wastewater treatment from four facilities with a combined treatment capacity of 107,758 acre-feet per year and has nearly 40 miles of reclaimed water lines (purple pipeline) in place in all areas of the City. Reclaimed water serves the landscape irrigation demand of golf courses, parks, schools, and cemeteries, and provides water supplies for steam electric plants and industries within the City. EPWater does not plan on extending or growing the purple pipe infrastructure but will focus on maintaining existing purple pipe customers and work towards increasing the use of reclaimed water through additional purified water projects (see EPWater strategies in Chapter 5). For planning purposes, the current use of treated wastewater as reported by the Texas Water Development Board, available to EPWater is about 6,000 acre-feet per year (Table 3-2). It is expected that the Advanced Water Purification Project will come online by 2030, increasing the direct reuse supply amount by 11,210 acre-feet per year, bringing the total volume to approximately 17,210 acre-feet per year.

The City of Alpine in Brewster County is also reusing treated wastewater to irrigate City public spaces. Direct reuse supply available to the City utility (Table 3-1) is 193 acre-feet per year. The City reports that it treats an average of 448 acre-feet of wastewater per year and discharges approximately 109 acre-feet per year (Table 3-2).

Indirect Reuse

Indirect reuse in the form of municipal return flow is an important source of supply for irrigators in El Paso and Hudspeth Counties during the irrigation season from March through September. Supplies currently available in El Paso County are estimated to be 34,169 acre-feet per year. Irrigators in Hudspeth County utilize irrigation return flows from Rio Grande Project water, which is estimated to total 334 acre-feet per year.

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	Application Number	Type	Owners	Diversion Amount (ac-ft/yr.)	Use Type	Priority Date	Storage Amount (ac-ft/yr.)	Basin	County
121	121	Permit	Clajon Production Corporation Williams, Clayton W Jr	124	Domestic and Livestock	09/13/1915	16	Rio Grande	Jeff Davis
375	375	Cert Filing	Us Department of The Interior Bureau of Reclamation	900	Agriculture - Irrigation	06/25/1914		Rio Grande	Jeff Davis
899	899	Cert of Adj	C. and L. Company, Inc.	60	Agriculture - Irrigation	02/12/1925		Rio Grande	Presidio
900	900	Cert of Adj	Darwin Ray Nilsson Regina Marie Nilsson	700	Agriculture - Irrigation	01/01/1909		Rio Grande	Hudspeth
900	900	Cert of Adj	Darwin Ray Nilsson Regina Marie Nilsson	800	Agriculture - Irrigation	01/28/1924	395	Rio Grande	Hudspeth
901	901	Cert of Adj	Roth, Allen L Roth, Anita L Roth, Sheila J Roth, William N	507	Agriculture - Irrigation	01/01/1932		Rio Grande	Hudspeth
902	902	Cert of Adj	Gilberto Morales Patricia Rosales	287.5	Agriculture - Irrigation	12/31/1925		Rio Grande	Hudspeth
902	902	Cert of Adj	Estate of Sidney W. Cowan	42.5	Agriculture - Irrigation	12/31/1925		Rio Grande	Hudspeth
903	903	Cert of Adj	Johnston, Douglas A	63	Agriculture - Irrigation	01/01/1925		Rio Grande	Hudspeth
904	904	Cert of Adj	Bean, J B Bean, Jim B Engle, Vivian Stubbs, Judy	831	Agriculture - Irrigation	01/01/1925		Rio Grande	Hudspeth
905	905	Cert of Adj	Lopez, Kathryne Alice G Villarreal, Marisela	330	Agriculture - Irrigation	01/01/1925		Rio Grande	Hudspeth
906	906	Cert of Adj	Tom H. Neely Trust	164	Agriculture - Irrigation	01/01/1925		Rio Grande	Hudspeth
906	906	Cert of Adj	Betsy W. Whetstone Raymond R. Whetstone	82	Agriculture - Irrigation	01/01/1925		Rio Grande	Hudspeth
907	907	Cert of Adj	Foix, Louis M Sr	150	Agriculture - Irrigation	01/01/1925		Rio Grande	Hudspeth
908	908	Cert of Adj	Talley, Lester Ray Jr	138	Agriculture - Irrigation	01/01/1919		Rio Grande	Hudspeth
909	909	Cert of Adj	Talley, Lester Ray Jr	144	Agriculture - Irrigation	01/01/1947		Rio Grande	Hudspeth
910	910	Cert of Adj	Talley, Lester Ray Jr	126	Agriculture - Irrigation	01/01/1948		Rio Grande	Hudspeth
911	911	Cert of Adj	Talley, Lester Ray	216	Agriculture - Irrigation	01/01/1952		Rio Grande	Hudspeth

Water Right Number	Application Number	Type	Owners	Diversion Amount (ac-ft/yr.)	Use Type	Priority Date	Storage Amount (ac-ft/yr.)	Basin	County
912	912	Cert of Adj	Autry C. Stephens	15	Agriculture - Irrigation	1920		Rio Grande	Hudspeth
912	912	Cert of Adj	Autry C. Stephens	162	Agriculture - Irrigation	1948		Rio Grande	Hudspeth
913	913	Cert of Adj	Addington, Gloria Guerra	582	Agriculture - Irrigation	01/01/1912		Rio Grande	Hudspeth
914	914	Cert of Adj	Texas Parks and Wildlife Department	219	Agriculture - Irrigation Instream	01/01/1939		Rio Grande	Hudspeth
915	915	Cert of Adj	Rancho Pensado Properties, LLC	291.6	Agriculture - Irrigation	01/01/1902		Rio Grande	Presidio
915	915	Cert of Adj	Oscar B. Jackson	291.6	Agriculture - Irrigation	01/01/1902		Rio Grande	Presidio
915	915	Cert of Adj	Rancho Pensado Properties, LLC	291.6	Agriculture - Irrigation	01/01/1902		Rio Grande	Presidio
915	915	Cert of Adj	Kenneth R. Matthews	291.6	Agriculture - Irrigation	01/01/1902		Rio Grande	Presidio
915	915	Cert of Adj	Harry Miller	291.6	Agriculture - Irrigation	01/01/1902		Rio Grande	Presidio
915	915	Cert of Adj	Andrew H. Jackson	194.4	Agriculture - Irrigation	01/01/1902		Rio Grande	Presidio
915	915	Cert of Adj	C. B. Fields	291.6	Agriculture - Irrigation	01/01/1902		Rio Grande	Presidio
916	916	Cert of Adj	Texas Parks and Wildlife Department	714	Agriculture - Irrigation	01/01/1932		Rio Grande	Presidio
917	917	Cert of Adj	Carlye Pavlas Pavlas, Leo J	405	Agriculture - Irrigation	11/11/1924		Rio Grande	Presidio
918	918	Cert of Adj	Walker, Billy O Walker, Darline L	29.19	Agriculture - Irrigation	01/01/1932		Rio Grande	Presidio
918	918	Cert of Adj	Bishop, B J	18.81	Agriculture - Irrigation	01/01/1932		Rio Grande	Presidio
919	919	Cert of Adj	Joel Terry	243	Agriculture - Irrigation	01/01/1949		Rio Grande	Presidio
920	920	Cert of Adj	United Farms of Oasis, LLC	495	Agriculture - Irrigation	03/20/1917		Rio Grande	Presidio
921	921	Cert of Adj	AC&L Armendariz Partnership	270	Agriculture - Irrigation	01/01/1917		Rio Grande	Presidio
922	922	Cert of Adj	Garcia, Margarita O Garcia, Merced O Garcia, Ricardo Garcia, Viola O Garcia, Ysidro Jr	90	Agriculture - Irrigation	01/01/1924		Rio Grande	Presidio Terrell
924	924	Cert of Adj	La Haciendita Pecan Company, LLC	174	Agriculture - Irrigation	03/20/1917		Rio Grande	Presidio

Water Right Number	Application Number	Type	Owners	Diversion Amount (ac-ft/yr.)	Use Type	Priority Date	Storage Amount (ac-ft/yr.)	Basin	County
925	925	Cert of Adj	Bauernfeind, Victorina S Chavez, Ernestina Lof, Valentina Rodriguez, Rudolfo Saldivar, Aida Soza, Carlos Soza, Evangelina Soza, Francisco Soza, Jesusita Soza, Jose Jr Soza, Lupe Soza, Wilfredo Urias, Maria Dolores Zavala, Natalia S	42	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
926	926	Cert of Adj	Soza, Robert L	66	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
927	927	Cert of Adj	Lajitas Capital Partners LLC	72	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
928	928	Cert of Adj	Lajitas Capital Partners LLC	57	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
929	929	Cert of Adj	Baeza, Alfredo S	48	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
930	930	Cert of Adj	Soza & Company, Ltd.	114	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
931	931	Cert of Adj	Jose A. Spencer Dr. Roberto R. Spencer	111	Agriculture - Irrigation Instream	03/26/1917		Rio Grande	Presidio
932	932	Cert of Adj	Armendariz, Frank Armendariz, Martha R	606	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
933	933	Cert of Adj	Armendariz, Luz S	321	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
936	936	Cert of Adj	Rodriguez, Jose Natividad	33.994	Agriculture - Irrigation	01/01/1914		Rio Grande	Presidio
936	936	Cert of Adj	Rodriguez, Salvador S	33.166	Agriculture - Irrigation	01/01/1914		Rio Grande	Presidio
936	936	Cert of Adj	Rodriguez, Jose Natividad	113.806	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
936	936	Cert of Adj	Rodriguez, Salvador S	111.034	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
937	937	Cert of Adj	Rodriguez, Jose A	114	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
938	938	Cert of Adj	Rodriguez, Jose A	120	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
939	939	Cert of Adj	Hernandez, Lorenzo	45	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
939	939	Cert of Adj	Hernandez, Lorenzo	45	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio

Water Right Number	Application Number	Type	Owners	Diversion Amount (ac-ft/yr.)	Use Type	Priority Date	Storage Amount (ac-ft/yr.)	Basin	County
940	940	Cert of Adj	Rodriguez, Jesus M Jr	180	Agriculture - Irrigation Instream	01/01/1914		Rio Grande	Presidio
941	941	Cert of Adj	RCS, Inc.	164	Agriculture - Irrigation	03/26/1917		Rio Grande	Presidio
942	942	Cert of Adj	Crosson, Pauline Juarez	25.98	Agriculture - Irrigation	01/01/1914		Rio Grande	Presidio
942	942	Cert of Adj	Rcs, Inc.	145.32	Agriculture - Irrigation	01/01/1914		Rio Grande	Presidio
942	942	Cert of Adj	Sanchez, Edmundo	28.7	Agriculture - Irrigation	01/01/1914		Rio Grande	Presidio
943	943	Cert of Adj	RCS, Inc.	420	Agriculture - Irrigation	01/01/1927		Rio Grande	Presidio
944	944	Cert of Adj	Santa Cruz Land & Cattle, Inc.	743	Agriculture - Irrigation	02/12/1925		Rio Grande	Presidio
946	946	Cert of Adj	RCS, Inc.	61	Agriculture - Irrigation	02/12/1925		Rio Grande	Presidio
947	947	Cert of Adj	RCS, Inc.	800	Agriculture - Irrigation	02/12/1925		Rio Grande	Presidio
948	948	Cert of Adj	C. and L. Company, Inc.	880	Agriculture - Irrigation	02/12/1925		Rio Grande	Presidio
949	949	Cert of Adj	C. and L. Company, Inc.	267	Agriculture - Irrigation	12/12/1924		Rio Grande	Presidio
950	950	Cert of Adj	Spencer, Oscar Miguel	39	Agriculture - Irrigation	02/12/1925		Rio Grande	Presidio
952	952	Cert of Adj	City of Eagle Pass Water Works System	4,600	Municipal/Domestic	02/12/1925		Rio Grande	Presidio
952	952	Cert of Adj	City of Laredo	2,818	Municipal/Domestic	02/12/1925		Rio Grande	Presidio
952	952	Cert of Adj	Maverick County	641	Municipal/Domestic	02/12/1925		Rio Grande	Presidio
953	953	Cert of Adj	C F and L Enterprises Rcs, Inc.	407	Agriculture - Irrigation	02/12/1925		Rio Grande	Presidio
954	954	Cert of Adj	C F and L Enterprises Rcs, Inc.	684	Agriculture - Irrigation	02/12/1925		Rio Grande	Presidio
955	955	Cert of Adj	C F and L Enterprises Rcs, Inc.	172	Agriculture - Irrigation	02/12/1925		Rio Grande	Presidio
956	956	Cert of Adj	Rubio, Manuel M Rubio, Roberto M	84	Agriculture - Irrigation	01/01/1925		Rio Grande	Presidio
957	957	Cert of Adj	Nieto, Edmundo M Nieto, Eva Maria Nieto, Lucy Spencer, Delpha Nieto	536	Agriculture - Irrigation	01/01/1932		Rio Grande	Presidio
958	958	Cert of Adj	Oscar Carnero	48.28	Agriculture - Irrigation	01/01/1932		Rio Grande	Presidio
958	958	Cert of Adj	Covos, Manuel Covos, Olivia R	43.72	Agriculture - Irrigation	01/01/1932		Rio Grande	Presidio

Water Right Number	Application Number	Type	Owners	Diversion Amount (ac-ft/yr.)	Use Type	Priority Date	Storage Amount (ac-ft/yr.)	Basin	County
960	960	Cert of Adj	Alfonso C. Brito Laurencio C. Brito	140	Agriculture - Irrigation	12/31/1932		Rio Grande	Presidio
961	961	Cert of Adj	Brito, Laurencio	24.415	Agriculture - Irrigation	12/31/1925		Rio Grande	Presidio
961	961	Cert of Adj	Alfonso C. Brito Laurencio C. Brito	47.585	Agriculture - Irrigation	12/31/1925		Rio Grande	Presidio
962	962	Cert of Adj	Hernandez, Reynaldo	96	Agriculture - Irrigation	01/01/1925		Rio Grande	Presidio
963	963	Cert of Adj	Rcs, Inc.	160	Agriculture - Irrigation	01/01/1900		Rio Grande	Presidio
964	964	Cert of Adj	Rcs, Inc.	376	Agriculture - Irrigation	01/01/1927		Rio Grande	Presidio
965	965	Cert of Adj	Hernandez, Consuelo Hernandez, George	60	Agriculture - Irrigation	01/01/1900		Rio Grande	Presidio
966	966	Cert of Adj	Hernandez, Hector A	80	Agriculture - Irrigation	01/01/1918		Rio Grande	Presidio
967	967	Cert of Adj	Mccall, Herminia M	80	Agriculture - Irrigation	01/01/1932		Rio Grande	Presidio
967	967	Cert of Adj	Geral Mead McCall Mccall, Herminia M	180	Agriculture - Irrigation	01/01/1932		Rio Grande	Presidio
969	969	Cert of Adj	Texas Mountain Cattle Company, LLC		Recreation	10/13/1910	18,700	Rio Grande	Presidio
971	971	Cert of Adj	Patrick W Daly Mark C Morrison	35	Agriculture - Irrigation	01/01/1918		Rio Grande	Presidio
972	972	Cert of Adj	Lucia H Russell Estate	80	Agriculture - Irrigation	10/13/1927		Rio Grande	Presidio
973	973	Cert of Adj	Hernandez, Jose A	96	Agriculture - Irrigation	01/01/1948		Rio Grande	Presidio
974	974	Cert of Adj	Presidio County Water Improvement District 1	2,780	Agriculture - Irrigation Instream	01/01/1978		Rio Grande	Presidio
975	975	Cert of Adj	Lajitas Capital Partners LLC	380	Agriculture - Irrigation	01/01/1908		Rio Grande	Presidio
976	976	Cert of Adj	Madrid, Ruben H	56	Agriculture - Irrigation	01/01/1952		Rio Grande	Presidio
977	977	Cert of Adj	Madrid, Lydia	40	Agriculture - Irrigation	01/01/1945		Rio Grande	Presidio
978	978	Cert of Adj	Margarita C. Madrid	32	Agriculture - Irrigation	01/01/1953		Rio Grande	Presidio
978	978	Cert of Adj	Margarita C. Madrid	304	Agriculture - Irrigation	08/12/1974		Rio Grande	Presidio
979	979	Cert of Adj	Travis Tucker	52	Agriculture - Irrigation	01/01/1953		Rio Grande	Presidio
980	980	Cert of Adj	Travis Tucker	52	Agriculture - Irrigation	01/01/1953		Rio Grande	Presidio
981	981	Cert of Adj	Nadine Pineda Mata	84	Agriculture - Irrigation	01/01/1921		Rio Grande	Presidio
981	981	Cert of Adj	Leo N. Pineda	84	Agriculture - Irrigation	01/01/1921		Rio Grande	Presidio

Water Right Number	Application Number	Type	Owners	Diversion Amount (ac-ft/yr.)	Use Type	Priority Date	Storage Amount (ac-ft/yr.)	Basin	County
982	982	Cert of Adj	Madrid, Enrique Rede Madrid, Jaime Rede Madrid, Lydia	80	Agriculture - Irrigation	01/01/1947		Rio Grande	Presidio
983	983	Cert of Adj	Mallan, Thomas A	84	Agriculture - Irrigation	01/01/1947		Rio Grande	Presidio
985	985	Cert of Adj	Adan Madrid Ninfa Madrid	20	Agriculture - Irrigation	01/01/1921		Rio Grande	Presidio
986	986	Cert of Adj	Lajitas Capital Partners LLC	224.26	Agriculture - Irrigation	03/26/1917		Rio Grande	Brewster
986	986	Cert of Adj	Lajitas Municipal Services Company LLC	144	Municipal/Domestic	03/26/1917		Rio Grande	Brewster
986	986	Cert of Adj	Frank W. Howard	0.74	Agriculture - Irrigation	03/26/1917		Rio Grande	Brewster
987	987	Cert of Adj	US Department of The Interior National Park Service	530	Municipal/Domestic	11/17/1915		Rio Grande	Brewster
987	987	Cert of Adj	US Department of The Interior National Park Service	1,000	Agriculture - Irrigation	11/17/1915		Rio Grande	Brewster
988	988	Cert of Adj	El Carmen Land and Conservation Company, LLC	20	Agriculture - Irrigation	01/01/1932		Rio Grande	Brewster
989	989	Cert of Adj	El Carmen Land and Conservation Company, LLC	180	Agriculture - Irrigation	01/01/1932		Rio Grande	Brewster
990	990	Cert of Adj	Combs, Susan David K Combs Trust	1,520	Agriculture - Irrigation	07/02/1925		Rio Grande	Brewster
991	991	Cert of Adj	Jordan, W N Chris	3,800	Agriculture - Irrigation	07/02/1925		Rio Grande	Brewster
991	991	Cert of Adj	Basse, E A Iii	3,800	Agriculture - Irrigation	07/02/1925		Rio Grande	Brewster
992	992	Cert of Adj	Anale W Hodge Trustee Hodge, Byron W Hodge, Lauralee	152	Agriculture - Irrigation	01/01/1956		Rio Grande	Terrell
1172	1172	Cert of Adj	Scott Locke McIvor	15	Agriculture - Irrigation Recreation	04/01/1963	20	Rio Grande	Jeff Davis
1173	1173	Cert of Adj	Tanner Fulton Whitesell	13.8	Agriculture - Irrigation	01/01/1923		Rio Grande	Jeff Davis
1173	1173	Cert of Adj	Trent Mccann Whitesell	13.8	Agriculture - Irrigation	01/01/1923		Rio Grande	Jeff Davis
1173	1173	Cert of Adj	Stephanie Sproul Rentfro	13.8	Agriculture - Irrigation	01/01/1923		Rio Grande	Jeff Davis
1173	1173	Cert of Adj	Johnathan Mccann Rentfro	13.8	Agriculture - Irrigation	01/01/1923		Rio Grande	Jeff Davis
1173	1173	Cert of Adj	Zachary Everett Rentfro	13.8	Agriculture - Irrigation	01/01/1923		Rio Grande	Jeff Davis
1174	1174	Cert of Adj	Sproul, H E	224	Agriculture - Irrigation Recreation	01/01/1992	3	Rio Grande	Jeff Davis
1175	1175	Cert of Adj	Thompson, Isabel Cecilia	5	Agriculture - Irrigation	01/01/1916		Rio Grande	Jeff Davis

Water Right Number	Application Number	Type	Owners	Diversion Amount (ac-ft/yr.)	Use Type	Priority Date	Storage Amount (ac-ft/yr.)	Basin	County
1176	1176	Cert of Adj	Higgins, Bessie J Higgins, Jimmy G	4	Agriculture - Irrigation	01/01/1985		Rio Grande	Jeff Davis
1177	1177	Cert of Adj	Hoffman, George A MD Teague, Anna Maria Hoffman	50	Agriculture - Irrigation	11/04/1907		Rio Grande	Jeff Davis
1178	1178	Cert of Adj	Sharp, Estelle Langham	15	Agriculture - Irrigation	01/01/1896		Rio Grande	Jeff Davis
1392	1491	Permit	US Bureau of Reclamation	18,000	Agriculture - Irrigation	06/18/1946		Rio Grande	Jeff Davis
2926	2926	Claim	Leoncita Land Company		Agriculture - Irrigation	08/28/1969	900	Rio Grande	Brewster
3002	3245	Permit	Brown, Joe Russell	312	Agriculture - Irrigation	06/15/1974		Rio Grande	Hudspeth
3003	3246	Permit	Brown, Joe Russell	156	Agriculture - Irrigation	07/15/1974		Rio Grande	Hudspeth
3005	3255	Permit	Laura P Haefeli Thomas E Haefeli	108	Agriculture - Irrigation	08/12/1974		Rio Grande	Presidio
3006	3256	Permit	Lajitas Capital Partners LLC	132	Agriculture - Irrigation	08/12/1974		Rio Grande	Presidio
3032	3295	Permit	Pope Ranch	140.7	Agriculture - Irrigation	11/04/1974		Rio Grande	Brewster
3032	3295	Permit	Pope Ranches, Lp	1,119.3	Agriculture - Irrigation	11/04/1974		Rio Grande	Brewster
3033	3326	Permit	Combs, Susan David K Combs Trust	80	Agriculture - Irrigation	12/16/1974	10	Rio Grande	Brewster
3033	3326	Permit	Combs, Susan David K Combs Trust	20	Agriculture - Irrigation Recreation	12/16/1974		Rio Grande	Brewster
3034	3327	Permit	Combs, Susan David K Combs Trust	450	Agriculture - Irrigation	12/16/1974		Rio Grande	Brewster
3041	3314	Permit	Texas Parks and Wildlife Department	1,017	Agriculture - Irrigation Instream	12/09/1974		Rio Grande	Hudspeth
3092	3392	Permit	Lucia H Russell Estate	100	Agriculture - Irrigation	01/12/1970		Rio Grande	Presidio
3112	3393	Permit	Texas Parks and Wildlife Department	156	Agriculture - Irrigation	02/10/1975		Rio Grande	Presidio
3113	3402	Permit	Potter, Walter Travis	200	Agriculture - Irrigation	02/24/1975		Rio Grande	Brewster
3133	3369	Permit	Green, Elinor Frances	162	Agriculture - Irrigation	01/20/1975	9	Rio Grande	Brewster
3133	3369	Permit	Neville Ranch	18	Agriculture - Irrigation	06/24/1975		Rio Grande	Brewster
3144	3405	Permit	Love, Ben Love, Jackson B Love, Jackson B Jr Orr, Kathleen Love	400	Agriculture - Irrigation	03/03/1975		Rio Grande	Brewster
3153	3404	Permit	Woodward, J Frank Jr	12.5	Agriculture - Irrigation	03/03/1975		Rio Grande	Brewster

Water Right Number	Application Number	Type	Owners	Diversion Amount (ac-ft/yr.)	Use Type	Priority Date	Storage Amount (ac-ft/yr.)	Basin	County
5375	5375	Permit	Brewster County		Recreation	08/16/1991	7	Rio Grande	Brewster
5439	5439	Cert of Adj	City of Balmorhea	644	Municipal/Domestic	01/29/1930	109	Rio Grande	Jeff Davis
5440	5440	Cert of Adj	James P. Espy Mandy Lynn Espy Sally Hardy Espy Josiah Winchester	45	Agriculture - Irrigation	12/31/1939	2	Rio Grande	Jeff Davis
5451	5451	Cert of Adj	Union Pacific Railroad Company		Agriculture - Irrigation	06/16/1914	597	Rio Grande	Jeff Davis
5451	5451	Cert of Adj	Union Pacific Railroad Company		Agriculture - Irrigation	07/25/1960	327	Rio Grande	Jeff Davis
5451	5451	Cert of Adj	Davis, J L	223	Agriculture - Irrigation	07/25/1960		Rio Grande	Jeff Davis
5452	5452	Cert of Adj	Beal, Barry A	50	Agriculture - Irrigation	11/13/1915	2	Rio Grande	Jeff Davis
5462	5462	Cert of Adj	Chandler, Charlena J Estate of Joe B. Chandler	125.09	Agriculture - Irrigation	02/17/1920	14	Rio Grande	Terrell
5462	5462	Cert of Adj	Chandler, Charlena J Jobeth Elrod	10.72	Agriculture - Irrigation	02/17/1920		Rio Grande	Terrell
5462	5462	Cert of Adj	The Nature Conservancy	4.19	Agriculture - Irrigation	02/17/1920		Rio Grande	Terrell
5463	5463	Cert of Adj	The Nature Conservancy	530	Agriculture - Irrigation Instream	12/31/1900	192	Rio Grande	Terrell
5464	5464	Cert of Adj	Banner Residual Trust Sandra K Banner	150	Agriculture - Irrigation	12/31/1919		Rio Grande	Terrell
5465	5465	Cert of Adj	Clark, John Robbins, John Edward	8.25	Agriculture - Irrigation	07/12/1919		Rio Grande	Terrell
5466	5466	Cert of Adj	Banner Residual Trust Sandra K Banner	44.4	Agriculture - Irrigation	12/31/1917	15	Rio Grande	Terrell
5466	5466	Cert of Adj	Bell, Mattie Banner	0.6	Agriculture - Irrigation	12/31/1917		Rio Grande	Terrell
5467	5467	Cert of Adj	C L Ranch A Partnership Connecticut Mutual Life Insurance Company Lynch, James Jr Lynch, Mary	2,200	Agriculture - Irrigation	09/15/1980	775	Rio Grande	Hudspeth
5468	5468	Cert of Adj	C L Machinery Company Connecticut Mutual Life Insurance Company	2,400	Agriculture - Irrigation	09/15/1980	458	Rio Grande	Hudspeth
5469	5469	Cert of Adj	C L Ranch A Partnership	2,100	Agriculture - Irrigation	09/15/1980	588	Rio Grande	Hudspeth

Water Right Number	Application Number	Type	Owners	Diversion Amount (ac-ft/yr.)	Use Type	Priority Date	Storage Amount (ac-ft/yr.)	Basin	County
5940	5940	Cert of Adj	El Paso County Water Improvement District 1 United States of America	376,000	Agriculture - Irrigation Industrial Mining Municipal/Domestic Recreation	07/06/1889	2,638,860	Rio Grande	El Paso
5941	5941	Cert of Adj	Cemex El Paso, Inc	178	Industrial	01/01/1910	178	Rio Grande	El Paso
5942	5942	Cert of Adj	City of El Paso	11,000	Flood Control Municipal/Domestic	11/01/1948		Rio Grande	El Paso
5943	5943	Cert of Adj	Indian Cliffs Ranch, Inc.		Recreation	10/11/1977	52	Rio Grande	El Paso
5944	5944	Cert of Adj	United States of America	26,600	Agriculture - Irrigation	11/22/1917		Rio Grande	El Paso
5944	5944	Cert of Adj	Hudspeth County Conservation & Reclamation District 1	26,600	Agriculture - Irrigation Industrial Mining Recreation	11/22/1917		Rio Grande	El Paso
13727	13727	Permit	El Paso Water Utilities Public Service Board		Flood Control	09/28/2020	122	Rio Grande	El Paso

Cert of Adj – Certificate of Adjudication
Cert Filing – Certified Filing