

REGION F WATER PLANNING AREA TECHNICAL MEMORANDUM

Prepared for:

Texas Water Development Board
On behalf of the Region F Water Planning Group

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EXECUTIVE SUMMARY

This Technical Memorandum discusses population and water demand projections, water availability, existing water supplies, and identified potentially feasible water management strategies in Region F for the fifth cycle of regional water plan development. Included in this report are the required Texas Water Development Board (TWDB) Database 2022 (DB22) reports (nine) along with the additional information required for the Technical Memorandum submittal as set forth in Section 13.1.1 of TWDB's *Second Amended Exhibit C (General Guidelines for Fifth Cycle of the Regional Water Plan Development)* dated April 2018. A public meeting was held on November 15, 2018 to discuss the contents of this memorandum. Notice of the meeting was posted on November 1, 2018. Public comments were solicited at the public meeting and for two weeks following the meeting, closing on November 29, 2018.

1.0 TWDB DB22 REPORTS

All DB22 reports are located in Appendix A of this document. The nine required DB22 reports for this Technical Memorandum are summarized below. These include DB22 reports numbered 1 through 6, 9, and 10 (10a and 10b). DB22 reports 7 and 8 (concerning needs after implementation of conservation and direct reuse strategies) are not required for the Technical Memorandum but are required for the Initially Prepared Plan and Final Plan.

1.1 POPULATION AND WATER DEMAND PROJECTIONS

In early 2017, TWDB released their draft population and demand projections for all regions. Each Regional Planning Group was given the ability to make limited adjustments to the projections. The Region F Water Planning Group (RFWPG) recommended adjustments to the projections which were reviewed by TWDB staff prior to approval by the RFWPG. At the November 16, 2017 RFWPG Meeting, the RFWPG approved these updated population and demand projections. TWDB approved the projections in April 2018.

Appendix A contains three database reports related to population and demand. The reports are:

- **TWDB DB22 Report #1 - WUG Population Projections**
- **TWDB DB22 Report #2 - WUG Water Demand Projections**
- **TWDB DB22 Report #3 - WUG Category Summary**

TWDB DB22 Report #1 presents the projected populations for each municipal water user group. This includes water utilities or water systems that provide an average of more than 100 acre-feet per year to retail municipal customers, and rural/unincorporated areas of municipal water use, known as County Other. **TWDB DB22 Report #2** provides the projected water demands for each water user group. This includes both municipal and non-municipal demands. The data in Reports #1 and #2 are reported by entity, county, and river basin. **TWDB DB22 Report #3** summarizes the population, demands, supplies, and water needs by each water use type (municipal, manufacturing, mining, livestock, irrigation, and steam electric power).

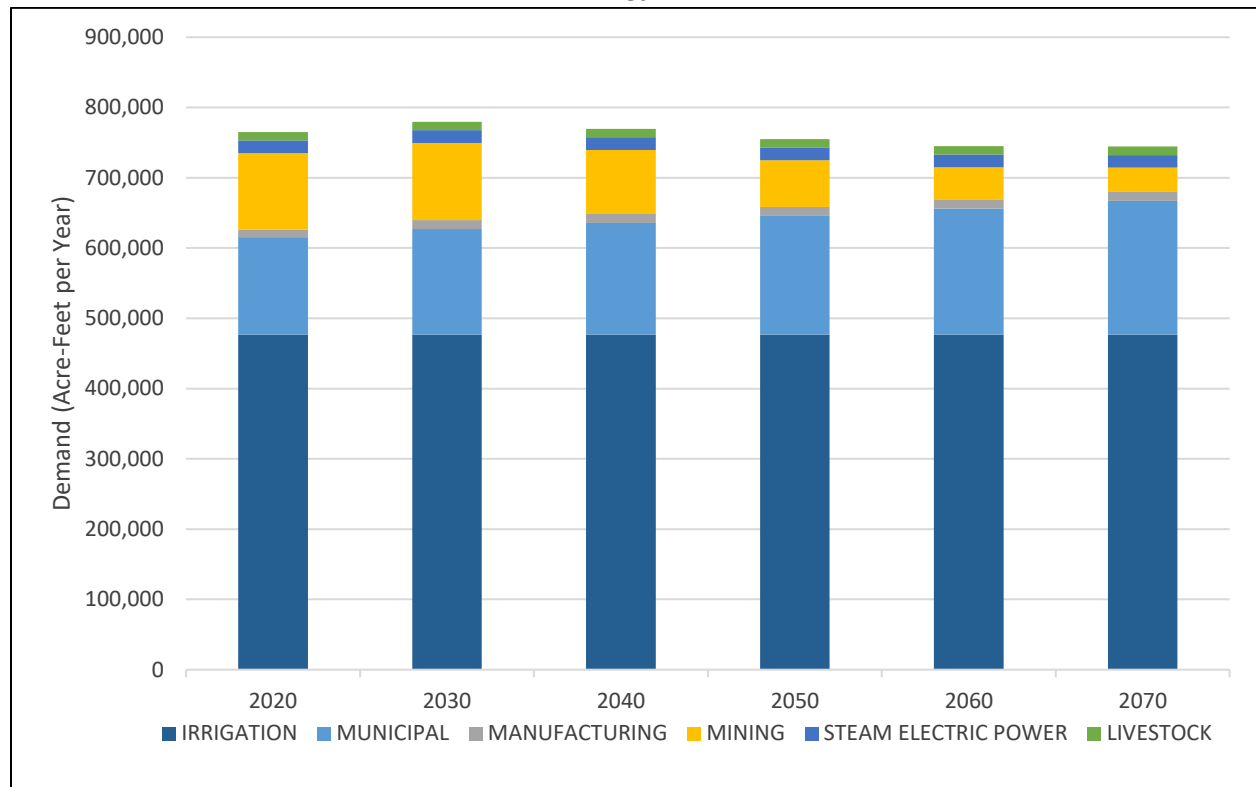
In addition to these summary tables, **Table 1-1** shows the population projections by county. The population for Region F is expected to increase from 715,773 to 1,039,502 over the planning horizon. Most of the increase in population and municipal demands occur in Ector, Midland, and Tom Green Counties.

Table 1-1: Adopted Population Projections for Region F by County

County	2020	2030	2040	2050	2060	2070
ANDREWS	19,089	22,847	26,246	30,111	34,526	39,574
BORDEN	659	671	671	671	671	671
BROWN	39,761	40,717	40,717	40,717	40,717	40,717
COKE	3,320	3,320	3,320	3,320	3,320	3,320
COLEMAN	9,103	9,307	9,307	9,307	9,307	9,307
CONCHO	2,781	2,852	2,852	2,852	2,852	2,852
CRANE	5,056	5,713	6,241	6,737	7,151	7,501
CROCKETT	4,111	4,386	4,446	4,486	4,500	4,506
ECTOR	164,289	187,604	210,926	233,048	255,083	278,740
GLASSCOCK	1,341	1,429	1,429	1,429	1,429	1,429
HOWARD	37,310	38,936	39,603	39,603	39,603	39,603
IRION	1,684	1,702	1,702	1,702	1,702	1,702
KIMBLE	4,710	4,754	4,754	4,754	4,754	4,754
LOVING	82	82	82	82	82	82
MARTIN	5,433	5,986	6,382	6,735	7,000	7,205
MASON	4,012	4,012	4,012	4,012	4,012	4,012
MCCULLOCH	8,635	9,000	9,030	9,125	9,152	9,165
MENARD	2,242	2,242	2,242	2,242	2,242	2,242
MIDLAND	169,062	195,286	213,581	232,357	250,264	269,070
MITCHELL	10,531	11,329	11,566	11,706	11,826	11,930
PECOS	17,718	19,224	20,802	22,021	23,109	24,090
REAGAN	3,853	4,303	4,571	4,812	4,980	5,102
REEVES	15,125	16,193	17,057	17,650	18,106	18,443
RUNNELS	10,883	11,300	11,300	11,300	11,300	11,300
SCHLEICHER	3,811	4,106	4,259	4,350	4,406	4,440
SCURRY	19,911	22,497	24,249	26,236	28,246	30,322
STERLING	1,215	1,260	1,275	1,275	1,275	1,275
SUTTON	3,817	4,094	4,198	4,279	4,322	4,347
TOM GREEN	123,052	137,486	145,685	154,230	163,215	172,642
UPTON	3,690	3,990	4,128	4,272	4,360	4,421
WARD	11,454	12,144	12,634	13,029	13,329	13,557
WINKLER	8,033	8,817	9,459	10,147	10,702	11,181
Region F Total	715,773	797,589	858,726	918,597	977,543	1,039,502

Figure 1-1 is a graph of demands by use type and decade for Region F. Irrigation use accounts for over half of the demand in Region F. While population and municipal water demands are expected to increase over time, total water demands in Region F are expected to decrease slightly over time due to projected decreases in mining water use.

Figure 1-1: Total Water Demand Projections for Region F by Use Type and Decade in Acre-Feet per Year



1.2 SOURCE WATER AVAILABILITY

TWDB Report #4 – Source Water Availability presents the available water by source. Under the TWDB regional water planning guidelines, each region is to identify available water supplies within the region. The supplies available by source are based on the supply available during drought of record conditions. For surface water reservoirs, this is generally the equivalent of firm yield supply or the permitted amount, whichever is lower. Region F has chosen to use safe yields, as opposed to firm yields, as the available supply. The safe yield is less than the firm yield and leaves a one-year supply reserve in storage at the end of the drought of record. For run-of-river supplies, the reliable supply is the minimum modeled annual diversion over the historical record. Available groundwater supplies are defined by county and aquifer. Through the Joint Planning Process, Modeled Available Groundwater (MAG) values were developed by

the TWDB to define the long-term available groundwater supply for the major and minor aquifers within Region F. MAG values were not developed for aquifers or portions of aquifers that were declared “non-relevant” and other formations that are not modeled (such as “other aquifer” and Cross Timbers Aquifer).

The Region F has 1.3 million acre-feet per year of available water in 2020. This includes both developed and undeveloped supplies. Most of this supply is associated with groundwater sources. **Table 1-2** shows the overall water supply source availability in Region F. It should be noted that these supplies have not been limited by the current infrastructure that treats and delivers the water. The amount of supply available when considering infrastructure limitations is referred to as “Existing Water Supplies” and is discussed in Section 1.3 of this Technical Memorandum.

Table 1-2: Overall Water Supply Source Availability in the Region F (Acre-Feet per Year)

	2020	2030	2040	2050	2060	2070
RESERVOIRS	103,860	102,620	101,380	100,140	98,900	97,660
RUN-OF-RIVER	26,457	26,457	26,457	26,457	26,457	26,457
LOCAL SUPPLY ¹	5,272	5,272	5,272	5,272	5,272	5,272
GROUNDWATER	1,135,369	1,113,627	1,100,027	1,091,697	1,085,680	1,082,668
REUSE	32,773	32,773	32,773	32,773	32,773	32,773
REGION F TOTAL	1,303,731	1,280,749	1,265,909	1,256,339	1,249,082	1,244,830

1. Local supplies are surface water supplies that do not require a State water right permit. These supplies generally consist of stock tanks for livestock use.

1.2.2 Surface Water

In regional planning, surface water supplies from reservoirs and run-of-river rights are derived from the Water Availability Models (WAMs) developed by the Texas Commission on Environmental Quality (TCEQ). The TWDB requires the use of Full Authorization Run (Run 3) of the approved TCEQ WAM for regional water planning. Full Authorization assumes that all water rights will be fully met in priority order. Under this analysis, many water rights in Region F show no availability (due to senior water rights in the lower basin). Because this does not give an accurate assessment of water supplies based on the way the basin has historically been operation, Region F considers subordination of the Lower Colorado basin (Region K) to the Upper Colorado basin (Region F) a water management strategy. Water management strategies will be discussed as the next phase of regional planning and are not considered a current supply. Current surface water supplies (not constrained by infrastructure) in Region F are 135,696 acre-feet in 2020 and 129,496 acre-feet in 2070. The small decrease in these supplies over time is due to sedimentation in the region’s reservoirs.

Local supplies are surface water supplies that do not require a State water permit. These supplies are mainly stock tanks for livestock use and estimated based on historical use information from the TWDB.

1.2.3 Groundwater

Groundwater supplies in the RFWPA are primarily obtained from the following major and minor aquifers:

- Ogallala Aquifer
- Edwards-Trinity (Plateau) Aquifer
- Pecos Valley Aquifer
- Trinity Aquifer
- Capitan Reef Complex Aquifer
- Dockum Aquifer
- Edwards-Trinity (High Plains) Aquifer
- Ellenburger – San Saba Aquifer
- Hickory Aquifer
- Marble Falls Aquifer
- Rustler Aquifer
- Additional supplies in Region F are available from non-relevant portions of the major and minor aquifers, which also includes the Lipan, Igneous and Seymour Aquifers, and
- Locally undifferentiated formations, referred to as “Other Aquifer” including the newly designated Cross Timbers Aquifer.

As required by regional planning rules, MAG estimates provided by the TWDB were used to determine groundwater availability. For Region F, TWDB provided MAG estimates for the named aquifers listed above and some of the non-MAG availability estimates for non-relevant portions of the listed aquifers. A comparison of MAG totals from the previous and current planning cycles indicate a decrease of groundwater availability in all aquifers except Other Aquifer, due to the addition of the groundwater volume discharging to the surface from the San Andres Formation in Pecos County. In GMA-7, the three major aquifers have been combined since the last planning cycle. The Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers are lumped into one volume in the MAG estimate. The Ogallala and Edwards-Trinity (High Plains) are also combined (as they were in the previous planning cycle).

Region F includes parts of Groundwater Management Areas (GMAs) 2, 3, 7 and 8. The groundwater supplies available to Region F are summarized in **Table 1-3**. The total availability volume for Region F

represents estimates of existing supplies plus potentially recoverable groundwater supply volumes from areas that have not been developed. **Table 1-3** totals the groundwater supply availability estimates for MAGs, non-relevant aquifers and other aquifers.

Table 1-3. Overall Groundwater Supplies Available to Region F in Acre-Feet per Year

Source	2020	2030	2040	2050	2060	2070
OGALLALA AND EDWARDS-TRINITY (HIGH PLAINS) AQUIFER	168,536	146,798	133,194	124,868	118,847	115,839
EDWARDS-TRINITY (PLATEAU), PECOS VALLEY, AND TRINITY AQUIFERS (GMA-7)	758,749	758,749	758,749	758,749	758,749	758,749
TRINITY AQUIFER (GMA-8)	1,450	1,446	1,450	1,446	1,450	1,446
CAPITAN REEF COMPLEX AQUIFER	27,552	27,552	27,552	27,552	27,552	27,552
DOCKUM AQUIFER	42,038	42,038	42,038	42,038	42,038	42,038
ELLENBURGER – SAN SABA AQUIFER	8,562	8,562	8,562	8,562	8,562	8,562
HICKORY AQUIFER	41,018	41,018	41,018	41,018	41,018	41,018
MARBLE FALLS AQUIFER	275	275	275	275	275	275
RUSTLER AQUIFER	11,130	11,130	11,130	11,130	11,130	11,130
IGNEOUS AQUIFER	380	380	380	380	380	380
LIPAN AQUIFER	46,539	46,539	46,539	46,539	46,539	46,539
SEYMOUR AQUIFER	10	10	10	10	10	10
OTHER AQUIFER	29,130	29,130	29,130	29,130	29,130	29,130
RFWPA TOTAL	1,135,369	1,113,627	1,100,027	1,091,697	1,085,680	1,082,668

1.3 EXISTING WATER SUPPLIES

Existing Water Supplies (sometimes referred to as “currently available supplies” or “connected supplies”) are supplies that are limited by water rights, groundwater permits, contracts, and facilities that are currently in place. The Existing Water Supplies are less than the overall supplies available to the region (Source Water Availability from Section 1.2) because the facilities needed to use some of the source water have not yet been developed. Common constraints limiting supplies include the hydrogeologic properties of the source aquifers, capacity of transmission systems, treatment plants, wells, and permit limits.

Table 1-5 shows the Existing Water Supplies in Region F by different source types.

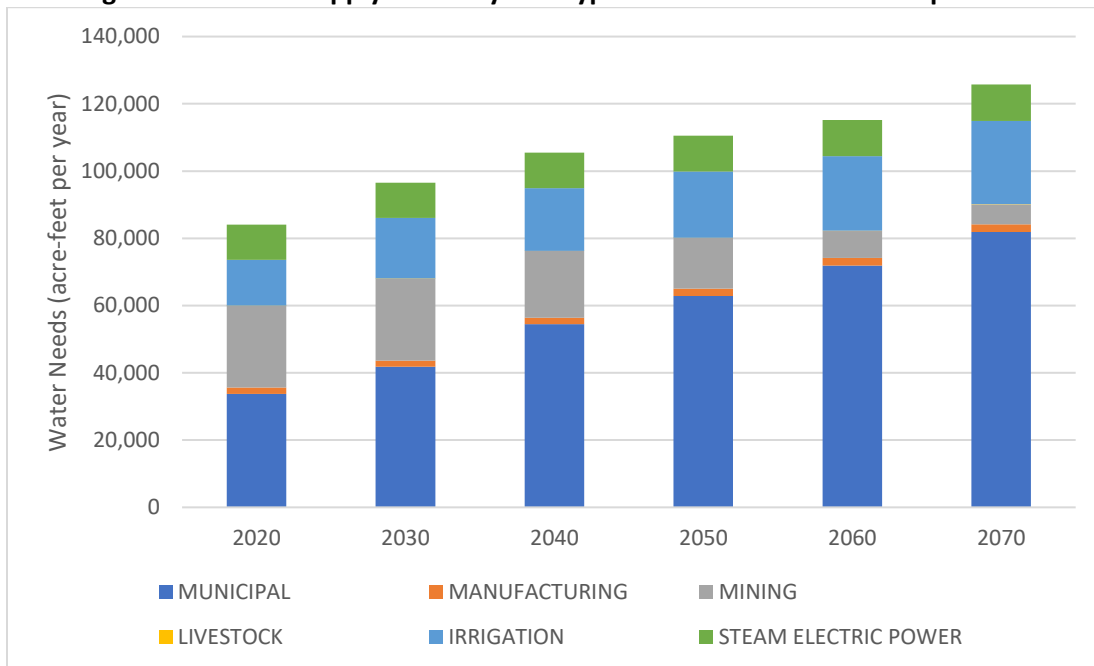
Table 1-4: Existing Water Supplies Available to Region F by Source in Acre-Feet per Year

Source	2020	2030	2040	2050	2060	2070
RESERVOIRS	63,447	62,622	61,621	60,681	59,799	58,931
RUN-OF-RIVER	26,387	26,387	26,387	26,387	26,387	26,387
LOCAL SUPPLY	5,272	5,272	5,272	5,272	5,272	5,272
GROUNDWATER	569,828	570,848	553,409	536,883	528,676	521,929
REUSE	23,916	23,914	23,915	23,915	23,916	23,916
REGION F TOTAL	688,850	689,043	670,604	653,138	644,050	636,435

1.4 IDENTIFIED WATER NEEDS/SURPLUSES

For each Water User Group, the Existing Water Supply was compared to the projected demand, resulting in either a need or a surplus for the WUG. The total water needs for Region F increase from about 84,000 acre-feet in 2020 to over 125,000 acre-feet in 2070. This is largely driven by anticipated population growth and the resulting municipal water demand. Mining needs shrink considerably over the planning cycle as demands are anticipated to decrease in later decades. Needs for other use types are relatively constant over the planning horizon. The water supply needs (no surpluses) that are unmet by existing water supplies are outlined below in Figure 1-2 by category of use. **TWDB DB22 Report #6 – WUG Identified Water Needs/Surpluses** is a compilation of this information for all WUGs. As previously discussed, a summary of the water needs by water use category is presented in **TWDB Report #3**.

Figure 1-2: Water Supply Needs by Use Type and Decade in Acre-Feet per Year



1.5 SOURCE WATER BALANCE

TWDB DB22 Report #9 – Source Water Balance shows the remaining balance of supply after all allocations to WUGs have been made. Table 1-5 shows sources available for new development in Region F, the majority (95%) of which is from groundwater. Some of this supply is quality impaired and may require blending, desalination, or other types of advanced treatment before use. Supplies from other sources could be sold or transferred from current users.

Table 1-5: Source Water Balance in Region F by Source in Acre-Feet per Year

Source	2020	2030	2040	2050	2060	2070
RESERVOIRS	31,148	30,955	30,763	30,570	30,378	30,185
RUN-OF-RIVER	70	70	70	70	70	70
LOCAL SUPPLY	0	0	0	0	0	0
GROUNDWATER	569,470	546,782	550,766	558,976	561,170	564,911
REUSE	552	552	552	552	552	552
REGION F TOTAL	601,240	578,359	582,151	590,168	592,170	595,718

1.6 COMPARISON TO 2016 REGIONAL WATER PLAN

Using its online database (DB22), TWDB has developed comparisons of information from this 2021 Regional Water Plan to information from the 2016 Regional Water Plan. The comparisons have been done for each Water User Group and for each supply source type by county, which are contained in **TWDB DB22 Report #10a – Comparison of Supply, Demands, and Needs to 2016 RWP** and **TWDB DB22 Report #10b – Comparison of Availability to 2016 RWP**. Both reports are included in **Appendix A**.

In Region F, total source availability (before allocation to users) increased from the 2016 to 2021 plan slightly. Groundwater availability went up about 7.5 percent due to changes in MAGs. Reuse availability increased as more users implemented reuse strategies (about 31 percent). Total surface water availability decreased very slightly (less than one percent) due to updates to the TCEQ WAM.

Projected demands in Region F decreased between 7 and 13 percent over the planning horizon from the 2016 to 2021 plan. This is mostly due to changes in demand projection methodology for non-municipal water use types. Existing supplies to water user groups increased slightly and overall water needs decreased significantly. This is largely due to updated MAG availabilities in Andrews, Martin, and McCulloch counties that reduced artificial MAG related shortages in the 2016 plan.

The availability from the Hickory Aquifer in McCulloch County increased by nearly 130 percent. The Ogallala Aquifer MAG volumes for Andrews, Borden, Howard, and Martin Counties all increased significantly because the DFCs in the Southern portion of GMA-2 are much less restrictive than what were initially adopted in 2010. However, in Glasscock County, the MAG decreased by about 15 percent (13,424 afy). Also, Ward County MAG volumes decreased ten percent primarily in the Dockum, Capitan Reef Complex and Rustler Aquifers.

2.0 DETERMINING SOURCE AVAILABILITY

2.1 SURFACE WATER

2.1.1 Hydrologic Models

Surface water supplies in Region F are obtained from mostly from the Colorado River Basin and the Pecos River Basin, which is a tributary of the Rio Grande River Basin. A small amount of Region lies in the Brazos River Basin but there is little to no surface water supplied to Region F from this basin. In accordance with TWDB rules, Region F used the Full Authorization (Run 3) of the TCEQ-approved WAMS to determine

surface water availability. In Region F, many reservoirs and run-of-river water rights show no availability under a strict priority analysis like TCEQ WAM Run 3. Subordination of downstream water rights in Region K is major a source of supply for Region F but is considered a strategy and is not included in existing supplies in Technical Memorandum. Region F requested hydrologic variances, mainly the use of safe (instead of firm) yield, to more accurately reflect some of the other current conditions and operations in the region. This request is detailed in **Appendix B**.

2.1.2 Versions and Dates of Hydrologic Models

The following information is required for the hydrologic models used to determine Source Water Availability. More discussion on Source Water Availability is included in **Section 1.2** of this report.

TCEQ-approved Water Availability Models (WAM) were used to determine the surface water availability for Region F. The version date and run type for each model is reported in **Table 2-1**. The respective input and output files are provided electronically with this Technical Memorandum.

Table 2-1: Hydrologic Models Used in Determining Surface Water Availability

Hydrologic Model	Date Used	Run Used	Comments
Colorado WAM	August 2018	Run 3	Current and 2070 Firm and Safe Yield
Rio Grande WAM	February 2018	Run 3	Current and 2070 Firm and Safe Yield
Brazos WAM	See Region G Tech Memo	Run 3	Used to determine run-of-river supplies

Modifications to the surface water availability analysis are described in **Appendix B**, which contains the letter of request dated December 1, 2017 for hydrologic variances including modifications to the WAM. TWDB's response letter dated February 9, 2018 approving the requested modifications is also included in **Appendix B**. The analyses of surface water availability were carried out by Freese and Nichols, Inc. for the Colorado and Rio Grande River Basins, and by HDR, Inc. for the Brazos River Basin.

Table 2-2 presents the firm and safe yields for major reservoirs in Region F.

Table 2-2: Estimated Firm and Safe Yields for Major Reservoirs in Region F

Scenario	2020	2030	2040	2050	2060	2070
Lake Ivie						
Firm Yield (ac-ft/yr)	35,700	34,580	33,460	32,340	31,220	30,100
Safe Yield (ac-ft/yr)	30,350	29,320	28,290	27,260	26,230	25,200
Lake Brownwood						
Firm Yield (ac-ft/yr)	24,000	23,820	23,640	23,460	23,280	23,100
Safe Yield (ac-ft/yr)	18,900	18,760	18,620	18,480	18,340	18,200
Lake Balmorhea						
Firm Yield (ac-ft/yr)	18,800	18,800	18,800	18,800	18,800	18,800
Red Bluff Reservoir						
Firm Yield (ac-ft/yr)	38,630	38,548	38,466	38,384	38,302	38,220
Safe Yield (ac-ft/yr)	30,050	29,980	29,910	29,840	29,770	29,700

2.2 GROUNDWATER

2.2.1 Written Summary of Modeled Available Groundwater (MAGs)

The MAGs for this planning cycle came from four GAM run documents as follows (see **Table 2-3**):

- GAM RUN 16-028, which summarizes the MAG volumes for all aquifers within GMA-2,
- GAM RUN 16-027, which summarizes the MAG volumes for all aquifers in GMA-3,
- GAM RUN 16-026 Version 2, which summarizes the MAG volumes for all aquifers in GMA-7, and
- GAM RUN 16-029, which summarizes the MAG volumes for all aquifers in GMA-8.

Table 2-3: GAM Models Used in Determining Ground Water Availability

GAM Version	Date Results Published	Model Inputs/ Outputs Files Used	GMA
GR 16-028	May 12, 2017	High Plains Aquifer System GAM; adopted DFCs	GMA-2 ¹
GR 16-027	March 14, 2018	Eastern Arm of the Capitan Reef Complex Aquifer GAM, Alternative one-layer Edwards-Trinity (Plateau) and Pecos Valley model, High Plains Aquifer System GAM, Rustler Aquifer GAM; adopted DFCs	GMA-3
GR 16-026 Version 2	September 21, 2018	Capitan Reef Complex Aquifer GAM, High Plains Aquifer System GAM, Llano Uplift Aquifer System GAM, Rustler Aquifer GAM, Alternative one-layer Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifer model; adopted DFCs	GMA-7
GR 16-029	January 19, 2018	North Trinity Woodbine GAM; adopted DFCs	GMA-8 ²

1. Only Andrews, Borden, Howard, and Martin Counties within Region F are in GMA 2.
2. Brown is the only county within Region F in GMA 8.

GR 16-028 summarizes MAGs for the Ogallala, Edwards-Trinity (High Plains), and the Dockum Aquifers using the High Plains Aquifer System (HPAS) GAM. In GMA-2, the Ogallala and Edwards-Trinity (High Plains) availability volumes were lumped together and range from 114,157 acre-feet per year in 2020 to 71,177 acre-feet per year in 2070 for Andrews, Borden, Howard and Martin Counties only. The MAG estimate for the Dockum Aquifer for Andrews, Borden, Howard and Martin Counties is 3,817 acre-feet a year for the 50-year planning cycle.

GR 16-027 summarizes MAGs for the Capitan Reef Complex, Dockum, Edwards-Trinity (Plateau), Pecos Valley and Rustler Aquifers. The Edwards-Trinity (Plateau) and the Pecos Valley Aquifers MAGs total 420,541 acre-feet per year in GMA-3 for the 50-year planning cycle. The Capitan, Dockum, and Rustler Aquifer MAG estimates are 381, 17,378, and 2,590 acre-feet per year, respectively.

GR 16-026 Version 2 estimates MAGs for the portions of the Capitan Reef Complex, Dockum, Edwards-Trinity (Plateau), Ellenburger-San Saba, Hickory, Ogallala, Pecos Valley, Rustler and Trinity Aquifers that are located within GMA-7 and determined to be relevant for planning. Total MAG estimates for GMA-7 range between 590,469 in 202 and 589,114 acre-feet per year in 2070.

GR116-029 summarizes MAG volumes for all aquifers within GMA-8. However, the only availability volumes that apply to Region F are the Trinity Aquifer MAG estimates for Brown County, which range between 1,450 and 1,446 acre-feet per year. The units of the Trinity Aquifer that have DFCs in Brown County are the Antlers, Travis Peak, Hensell and Hosston Formations. However, only the MAG volumes for the Antlers and the Travis Peak are applicable.

Table 2-4 summarizes the MAG volumes from these GAM runs for each aquifer.

Table 2-4. Modeled Available Groundwater Supplies for Region F in Acre-Feet per Year

Source	2020	2030	2040	2050	2060	2070
OGALLALA AND EDWARDS-TRINITY (HIGH PLAINS) AQUIFER	122,082	102,204	91,361	85,000	80,755	77,747
EDWARDS-TRINITY (PLATEAU), PECOS VALLEY, AND TRINITY AQUIFERS (GMA-7)	752,584	752,584	752,584	752,584	752,584	752,584
TRINITY AQUIFER (GMA-8)	1,450	1,446	1,450	1,446	1,450	1,446
CAPITAN REEF COMPLEX AQUIFER	26,545	26,545	26,545	26,545	26,545	26,545
DOCKUM AQUIFER	23,519	23,519	23,519	23,519	23,519	23,519
ELLENBURGER – SAN SABA AQUIFER	8,562	8,562	8,562	8,562	8,562	8,562
HICKORY AQUIFER	40,518	40,518	40,518	40,518	40,518	40,518
MARBLE FALLS AQUIFER	25	25	25	25	25	25
RUSTLER AQUIFER	9,630	9,630	9,630	9,630	9,630	9,630
RFWPA TOTAL	984,915	965,033	954,194	947,829	943,588	940,576

2.2.2 Documented Methodologies Utilized for Non-MAGs Availabilities

The total estimated groundwater availability for non-MAG aquifers or portions of aquifers is 149,298 acre-feet per year. The availability volumes and methodologies used to derive these estimates are tabulated in Appendix C.

2.2.3 Declaration that No GAM Models were Used

Non-MAG and partial-MAG estimates determined by the TWDB were adopted where they were available. For the county/ aquifer/ basin areas that did not already have TWDB-estimated volumes available, no GAM models were used to determine availability volumes. These estimates are detailed in Appendix C.

3.0 POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES

3.1 PROCESS FOR IDENTIFYING POTENTIALLY FEASIBLE WMS

The process for identifying potentially feasible water management strategies was presented at the March 15, 2018 RFWPG meeting in Big Spring. There were no public comments and the RFWPG approved the methodology. A description of the methodology is presented in **Appendix D**.

3.2 LIST OF POTENTIALLY FEASIBLE WMS

A list of potentially feasible water management strategies is included in **Appendix E**. These strategies are based on preliminary discussions with wholesale water providers, water user survey responses, and recommendations from the 2016 regional water plan. During analysis and development of the regional water plan, other strategies may be identified and included in this list. The types of strategies considered include:

- Conservation (municipal and irrigation)
- Purchase water from a provider (Voluntary Transfer)
- Develop additional groundwater
- Water treatment
- Direct potable reuse
- Indirect potable reuse
- Direct non-potable reuse
- Brush control
- Conjunctive Use (may be combined with other strategy types)
- Aquifer, storage and recovery (may be combined with other strategy types)

4.0 SIMPLIFIED PLANNING OPTION

The RFWPG will not pursue the simplified planning option offered by TWDB for the fifth cycle of regional water planning.

5.0 PUBLIC COMMENT

Per the TWDB Regional Planning Rules [31 TAC Section 357.21(c)(7)(C)], written comments from the public were accepted for the period of 14 days after the public meeting on November 15, 2018 when this



Technical Memorandum was presented and considered for approval by the RFWPG. Public comments were also accepted at this meeting. Public comments received are included in Appendix F.