Region F Groundwater Availability Analysis

Prepared for

Region F Regional Water Planning Group

October 19, 2023

Advanced Groundwater Solutions, LLC

Outline

- Review and compare current groundwater availability to previous round
- Modeled Available Groundwater (MAGs) and Non-Relevant availability
- Consider recommendations for changes to Non-Relevant Availability in some counties

Groundwater Availability

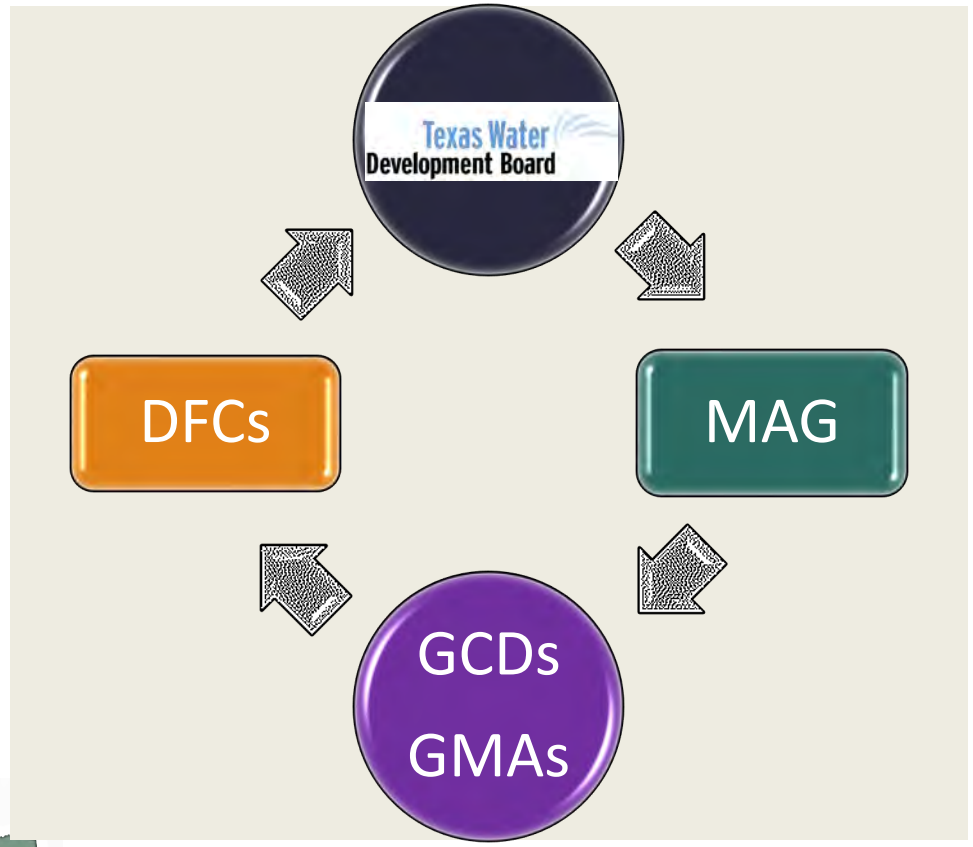
- Groundwater produced from 4 major and 9 minor aquifers, plus several “other” aquifers

- Comprised of “MAG” and “Non-MAG or Non-Relevant” availability
  - MAG = Modeled Available Groundwater
  - MAGs are determined by the TWDB based on desired future conditions (DFCs) adopted in the joint groundwater planning process (GMAs)
  - Non-MAG availability are estimated by the TWDB
  - Non-MAG availability can be adjusted at the request of the RWPG

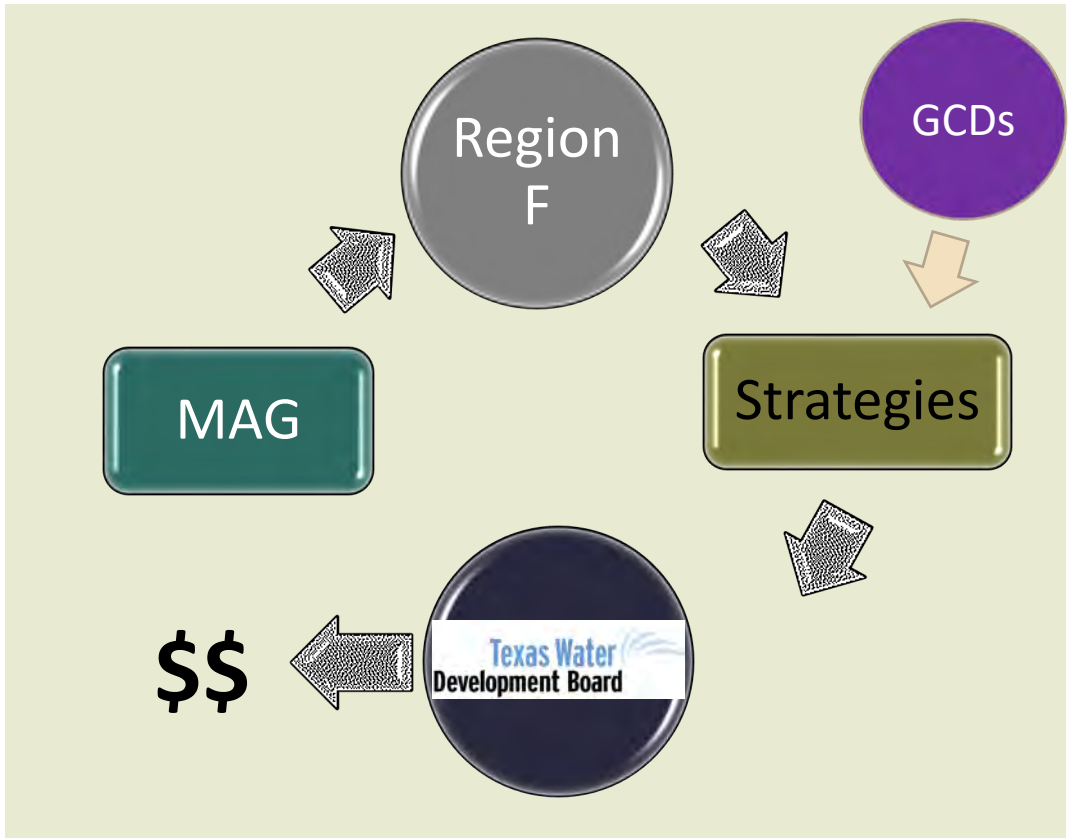
- Groundwater availability in Region F is ~1.1 million ac-ft/yr

The Groundwater Planning Cycle

Joint Groundwater Planning

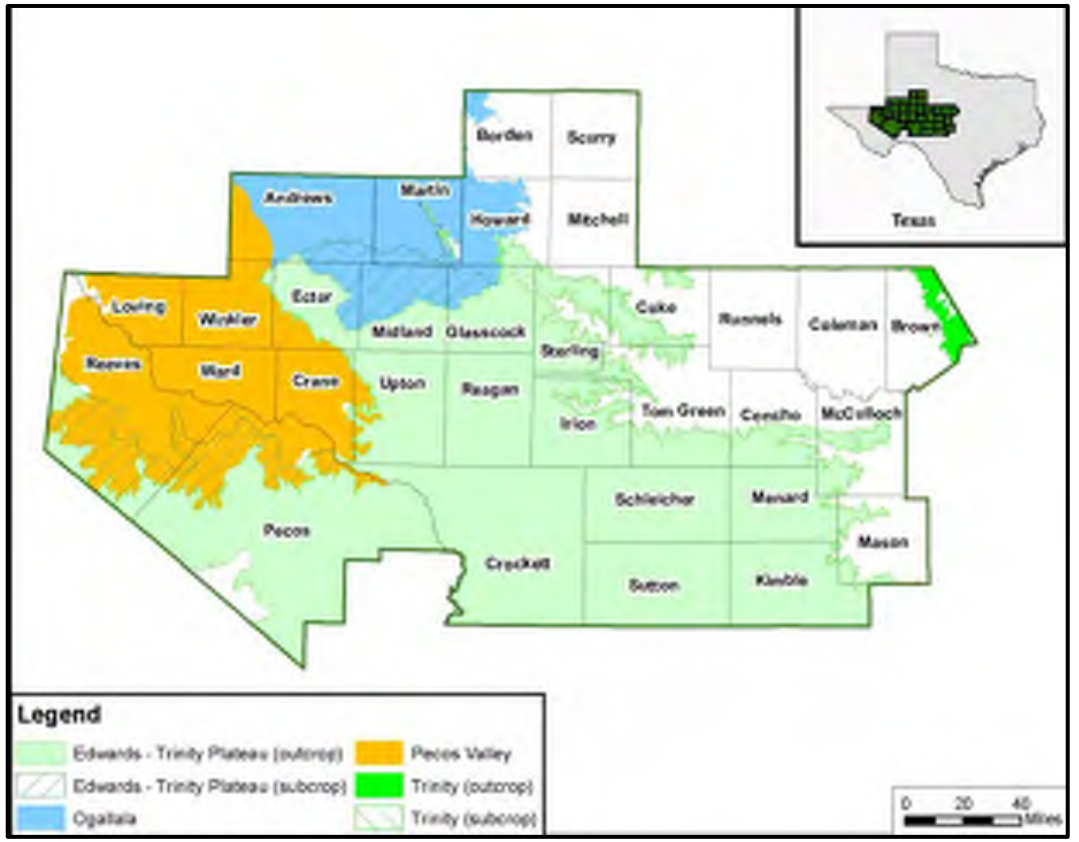


Regional Water Planning



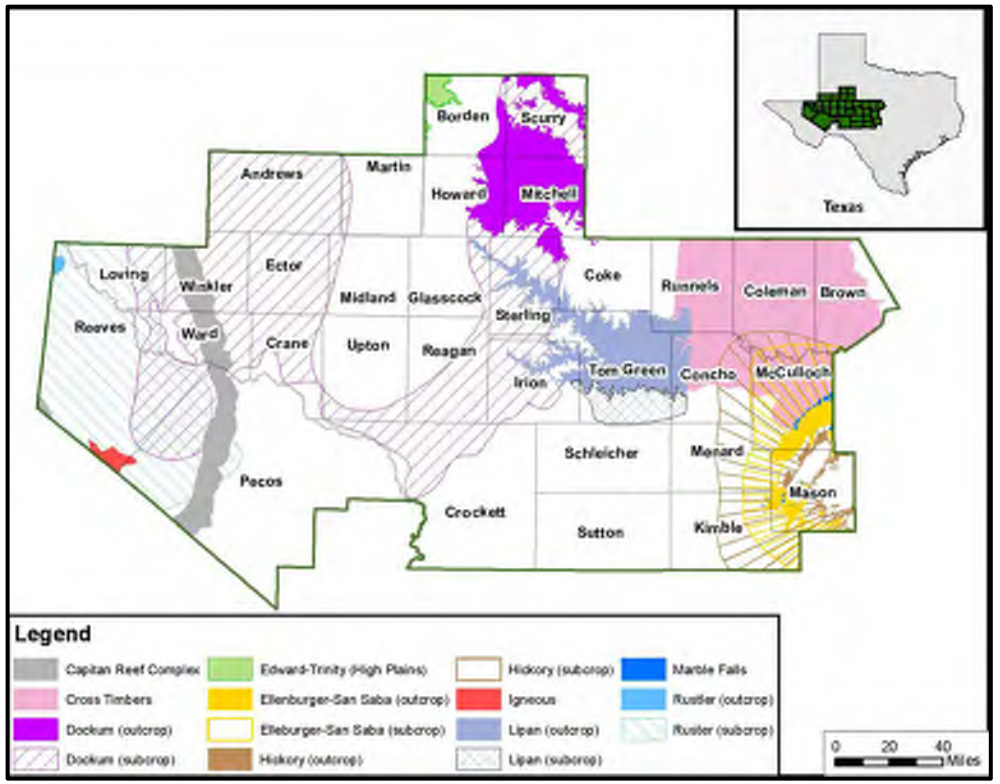
Major Aquifers

- *Edwards-Trinity (Plateau)*
  - Main aquifer in most of Region F
  - Significant availability
- *Ogallala*
  - Present in northwestern portion of Region F
  - Declining availability
- *Pecos Valley*
  - Main aquifer in western portion of Region F
  - Significant availability
- *Seymour*
  - Scurry County only; minimal extent and availability
- *Trinity*
  - Brown County only; moderate availability



Minor Aquifers

- *Capitan Reef*- Present in western Region F; variable availability
- *Cross Timbers*- Newly designated as a minor aquifer; present in the northeastern portion of Region F; low availability
- *Dockum*- Present in much of the central and western portions of Region F; low availability except in a few counties
- *Ellenburger-San Saba*- Present in a few counties in the southeastern portion of Region F; variable availability
- *Hickory*- Present in a few counties in the southeastern portion of Region F; variable availability
- *Igneous*- Present only in Pecos and Reeves counties; low availability
- *Lipan*- Present in the central part of Region F; variable availability
- *Marble Falls*- Present in a few counties in the southeastern portion of Region F; low availability
- *Rustler*- Present in the western portion of Region F; variable availability
- *"Other" Aquifers*- Aquifers not designated as a major or minor aquifer but with enough use to include in regional water planning; variable availability

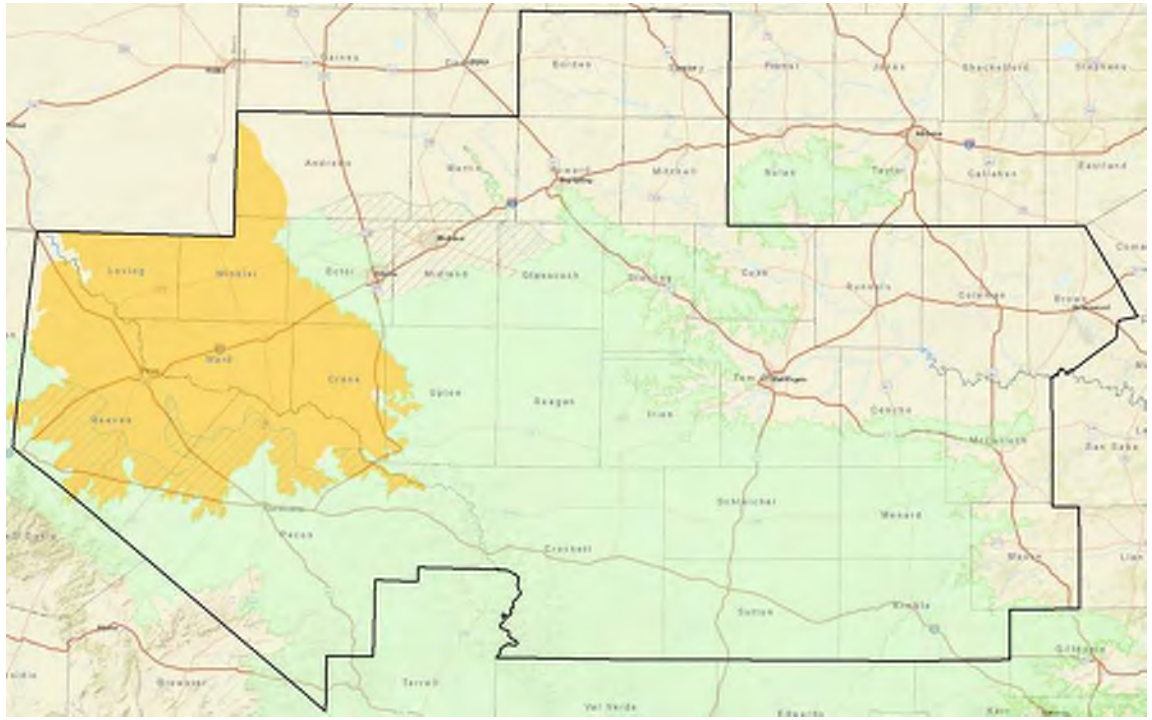


Notes on Groundwater Availability

- Groundwater availability has been combined by county
- Aquifer availability is mostly consistent through the planning period
- If availability varies over the planning period, typically shown like "5,000 to 4,000", reflecting that the variability decreases over time
- Total availability is comprised of "MAG" plus "Non-MAG" availability
  - MAG = Modeled Available Groundwater
  - MAGs are determined by the TWDB based on desired future conditions (DFCs) adopted in the joint groundwater planning process (GMAs)
  - Non-MAG availability are estimated by the TWDB
  - Non-MAG availability can be adjusted at the request of the RWPG

Edwards-Trinity (Plateau) and Pecos Valley Aquifers

- Main aquifers in most of Region F
- About 75% of the groundwater availability in Region F
- Due to GAM construction, the availability in these two aquifers is lumped together

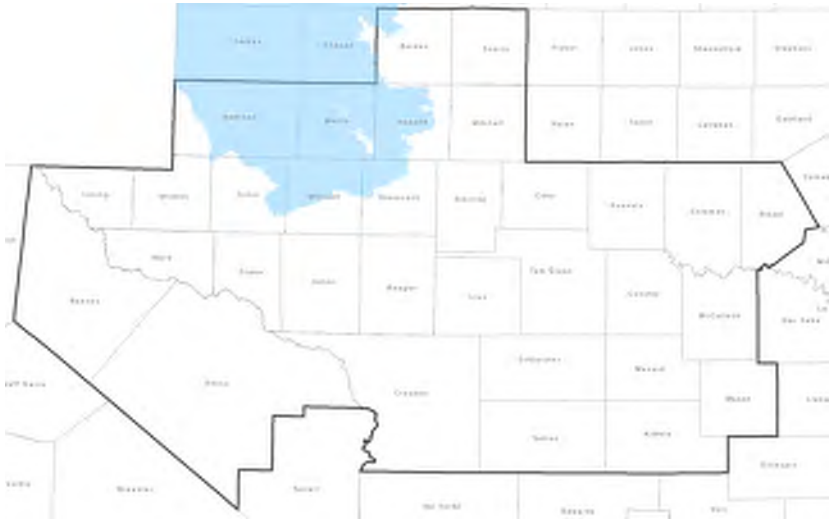


Edwards-Trinity (Plateau) and Pecos Valley Aquifers

Aquifer	County	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Pecos Valley	Andrews	Non-MAG	150	0	-150
Edwards-Trinity (Plateau)	Andrews	Non-MAG	1,198	1,198	0
Edwards-Trinity (Plateau)	Coke	MAG	997	997	0
Edwards-Trinity (Plateau)	Concho	Non-MAG	459	459	0
Edwards-Trinity (Plateau) and Pecos Valley	Crane	MAG	4,991	4,991	0
Edwards-Trinity (Plateau)	Crockett	MAG	5,447	5,447	0
Edwards-Trinity (Plateau) and Pecos Valley	Ector	MAG	5,542	5,542	0
Edwards-Trinity (Plateau)	Glasscock	MAG	65,186	65,186	0
Edwards-Trinity (Plateau)	Howard	Non-MAG	672	672	0
Edwards-Trinity (Plateau)	Irion	MAG	3,289	3,289	0
Edwards-Trinity (Plateau)	Kimble	MAG	1,386	1,386	0
Pecos Valley	Loving	MAG	2,982	2,982	0
Edwards-Trinity (Plateau)	Martin	Non-MAG	242	242	0
Edwards-Trinity (Plateau)	Mason	Non-MAG	18	18	0
Edwards-Trinity (Plateau)	McCulloch	Non-MAG	148	148	0
Edwards-Trinity (Plateau)	Menard	MAG	2,594	2,597	3
Edwards-Trinity (Plateau)	Midland	MAG	23,233	23,233	0
Edwards-Trinity (Plateau)	Mitchell	Non-MAG	NA	0	0
Edwards-Trinity (Plateau) and Pecos Valley	Pecos	MAG	240,208	240,208	0
Edwards-Trinity (Plateau)	Reagan	MAG	68,233	68,233	0
Edwards-Trinity (Plateau) and Pecos Valley	Reeves	MAG	189,744	189,744	0
Edwards-Trinity (Plateau)	Schleicher	MAG	8,034	8,034	0
Edwards-Trinity (Plateau)	Sterling	MAG	2,495	2,495	0
Edwards-Trinity (Plateau)	Sutton	MAG	6,410	6,410	0
Edwards-Trinity (Plateau)	Tom Green	Non-MAG	2,797	2,797	0
Edwards-Trinity (Plateau) and Pecos Valley	Upton	MAG	22,369	22,369	0
Pecos Valley	Ward	MAG	49,976	49,976	0
Edwards-Trinity (Plateau) and Pecos Valley	Winkler	MAG	49,949	49,949	0
TOTAL			**758,749**	**758,602**	**-147**

Ogallala Aquifer

- Present in eight counties in northwestern portion of Region F
- Moderate to high availability (up to ~48,000 ac-ft/yr)

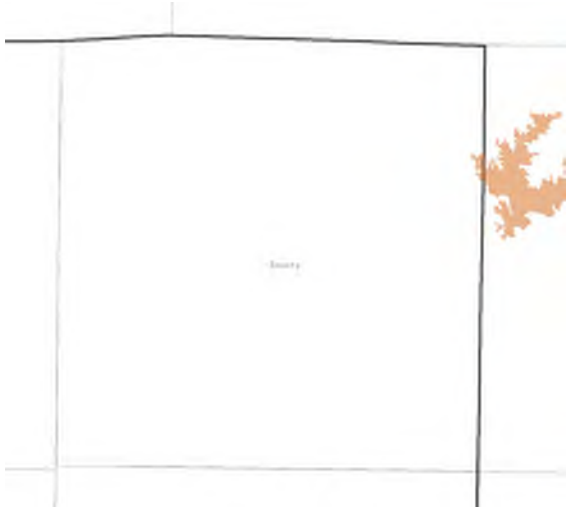


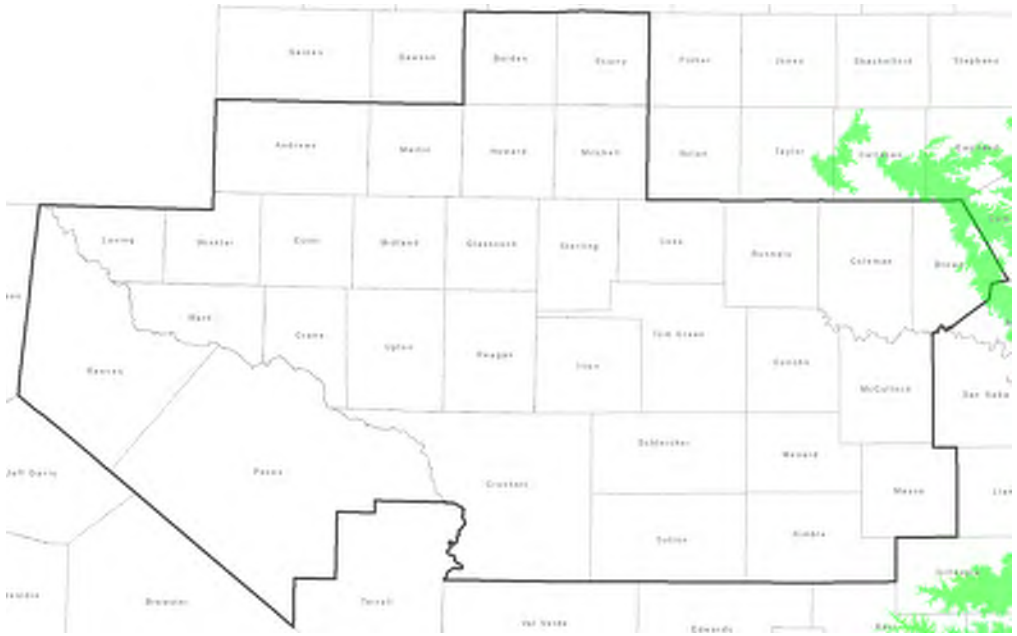
Aquifer	County	Type	2022 Total Availability (ac-ft/yr)				
			2030	2040	2050	2060	2070
Ogallala	Andrews	MAG	21,375	19,795	18,774	18,040	17,474
Ogallala and Edwards-Trinity (High Plains)	Borden	MAG	4,639	4,068	3,737	3,421	3,212
Ogallala	Howard	MAG	17,391	16,264	15,638	15,281	15,066
Ogallala	Martin	MAG	51,126	43,861	39,793	37,210	35,425
Ogallala	Ector	Non-MAG	7,730	7,171	7,135	6,727	6,727
Ogallala	Glasscock	MAG	7,673	7,372	7,058	6,803	6,570
Ogallala	Midland	Non-MAG	36,824	34,623	32,693	31,325	31,325
Ogallala	Winkler	Non-MAG	40	40	40	40	40
TOTAL			**146,798**	**133,194**	**124,868**	**118,847**	**115,839**

Aquifer	County	Type	2027 Total Availability (ac-ft/yr)					
			2030	2040	2050	2060	2070	2080
Ogallala	Andrews	MAG	19,391	17,897	16,937	16,260	15,764	15,378
Ogallala and Edwards-Trinity (High Plains)	Borden	MAG	4,432	3,893	3,591	3,393	3,227	3,072
Ogallala	Howard	MAG	15,631	14,818	14,365	14,090	13,915	13,800
Ogallala	Martin	MAG	48,293	43,032	39,019	36,358	34,521	33,171
Ogallala	Ector	Non-MAG	206	213	218	222	226	226
Ogallala	Glasscock	MAG	7,673	7,372	7,058	6,803	6,570	6,570
Ogallala	Midland	Non-MAG	15,442	14,369	13,732	13,258	12,745	12,745
Ogallala	Winkler	Non-MAG	40	40	40	40	40	40
TOTAL			**111,108**	**101,634**	**94,960**	**90,424**	**87,008**	**85,002**

Aquifer	County	Type	Difference in Availability (ac-ft/yr)				
			2030	2040	2050	2060	2070
Ogallala	Andrews	MAG	-1,984	-1,898	-1,837	-1,780	-1,710
Ogallala and Edwards-Trinity (High Plains)	Borden	MAG	-207	-175	-146	-28	15
Ogallala	Howard	MAG	-1,760	-1,446	-1,273	-1,191	-1,151
Ogallala	Martin	MAG	-2,833	-829	-774	-852	-904
Ogallala	Ector	Non-MAG	-7,524	-6,958	-6,917	-6,505	-6,501
Ogallala	Glasscock	MAG	0	0	0	0	0
Ogallala	Midland	Non-MAG	-21,382	-20,254	-18,961	-18,067	-18,580
Ogallala	Winkler	Non-MAG	0	0	0	0	0
TOTAL			**-35,690**	**-31,560**	**-29,908**	**-28,423**	**-28,831**

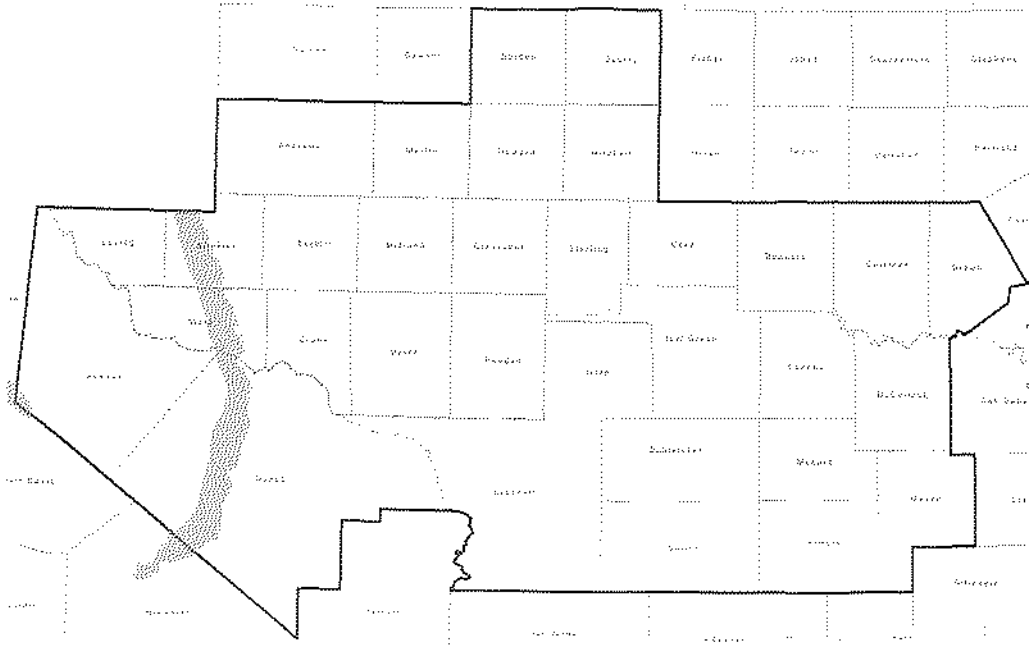
Seymour and Trinity Aquifers





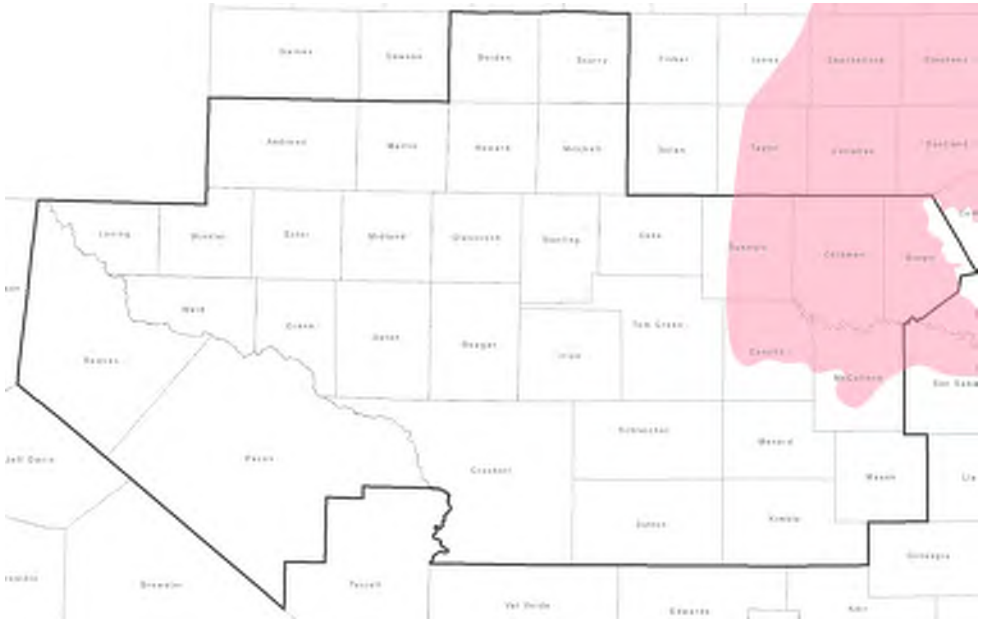
Aquifer	County	Basin	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Trinity	Brown	Brazos	MAG	~1,450	1,427	-23
Seymour	Scurry	Brazos	Non-MAG	10	10	0

Capitan Reef Aquifer



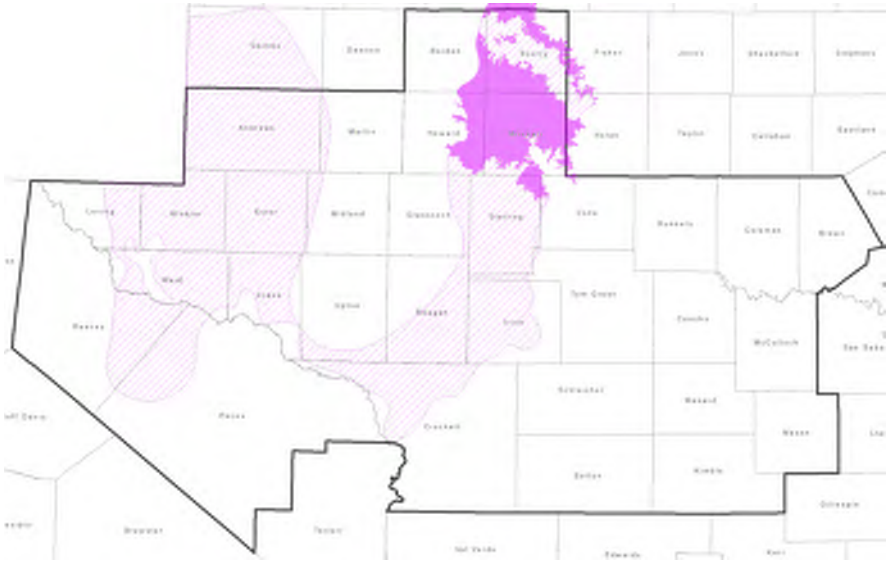
Aquifer	County	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Capitan Reef	Pecos	MAG	26,168	26,168	0
Capitan Reef	Reeves	Non-MAG	1,007	0	-1,007
Capitan Reef	Ward	MAG	103	103	0
Capitan Reef	Winkler	MAG	274	274	0
TOTAL			**27,552**	**26,545**	**-1,007**

Cross Timbers Aquifer



Aquifer	County	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Cross Timbers Aquifer	Brown	Non-MAG	993	993	0
Cross Timbers Aquifer	Coleman	Non-MAG	108	108	0
Cross Timbers Aquifer	Concho	Non-MAG	NA	0	0
Cross Timbers Aquifer	McCulloch	Non-MAG	103	103	0
Cross Timbers Aquifer	Runnels	Non-MAG	NA	0	0
TOTAL			**1,204**	**1,204**	**0**

Dockum Aquifer



Aquifer	County	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Dockum	Andrews	MAG	1,319	1,503	184
Dockum	Borden	MAG	901	1,026	125
Dockum	Coke	Non-MAG	100	0	-100
Dockum	Crane	MAG	94	94	0
Dockum	Crockett	Non-MAG	4	6	2
Dockum	Ector	Non-MAG	528	749	221
Dockum	Glasscock	Non-MAG	900	0	-900
Dockum	Howard	MAG	1,589	6,770	5,181
Dockum	Irion	Non-MAG	150	0	-150
Dockum	Loving	MAG	453	453	0
Dockum	Martin	MAG	8	11,449	11,441
Dockum	Midland	Non-MAG	400	0	-400
Dockum	Mitchell	Non-MAG	14,018	13,987 to 10,540	-31 to -3,478
Dockum	Pecos	MAG	8,164	8,164	0
Dockum	Reagan	MAG	302	962	660
Dockum	Reeves	MAG	2,539	2,539	NA
Dockum	Scurry	Non-MAG	1,209	11,697 to 11,326	10,117 to 10,488
Dockum	Sterling	Non-MAG	10	27	17
Dockum	Tom Green	Non-MAG	200	0	-200
Dockum	Upton	Non-MAG	1,000	67	-933
Dockum	Ward	MAG	2,150	2,150	0
Dockum	Winkler	MAG	6,000	6,000	0
TOTAL			**42,038**	**67,643 to 63,825**	**21,787 to 25,605**

Ellenburger-San Saba Aquifer

Aquifer	County	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Ellenburger-San Saba	Brown	MAG	131	131	0
Ellenburger-San Saba	Coleman	Non-MAG	NA	0	0
Ellenburger-San Saba	Kimble	MAG	521	521	0
Ellenburger-San Saba	Mason	MAG	3,237	3,237	0
Ellenburger-San Saba	McCulloch	MAG	4,364	4,364	0
Ellenburger-San Saba	Menard	MAG	309	309	0
TOTAL			**8,562**	**8,562**	**0**

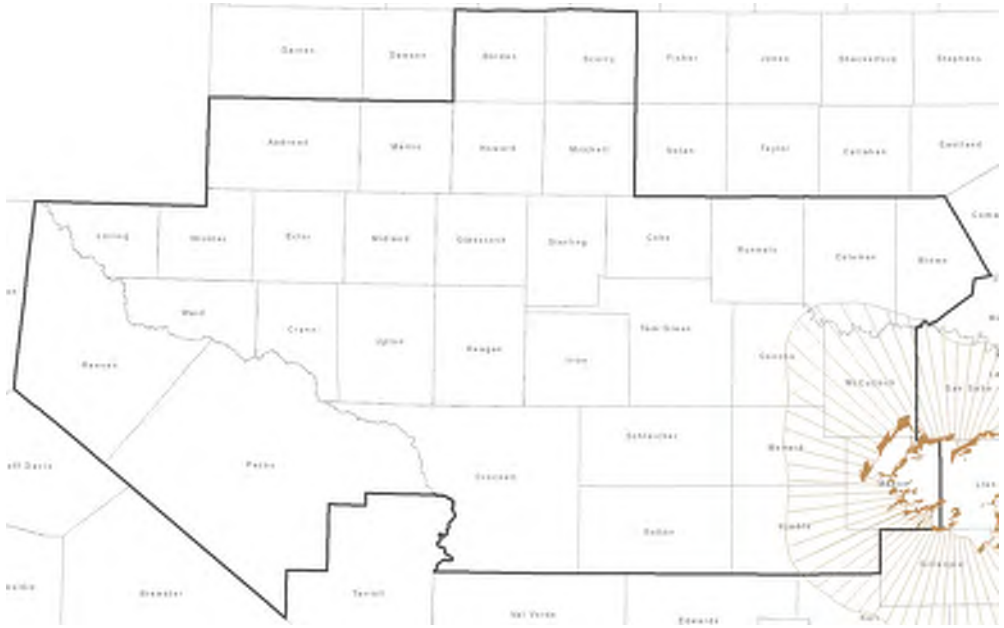
Edwards-Trinity (High Plains) Aquifer

Aquifer	County	Type	2022 Total Availability (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Ogallala and Edwards-Trinity (High Plains)	Borden	MAG	5,922	4,639	4,068	3,737	3,421	3,212

Aquifer	County	Type	2027 Total Availability (ac-ft/yr)					
			2030	2040	2050	2060	2070	2080
Ogallala and Edwards-Trinity (High Plains)	Borden	MAG	4,432	3,893	3,591	3,393	3,227	3,072

Aquifer	County	Type	Difference in Availability (ac-ft/yr)				
			2030	2040	2050	2060	2070
Ogallala and Edwards-Trinity (High Plains)	Borden	MAG	-207	-175	-146	-28	15

Hickory Aquifer

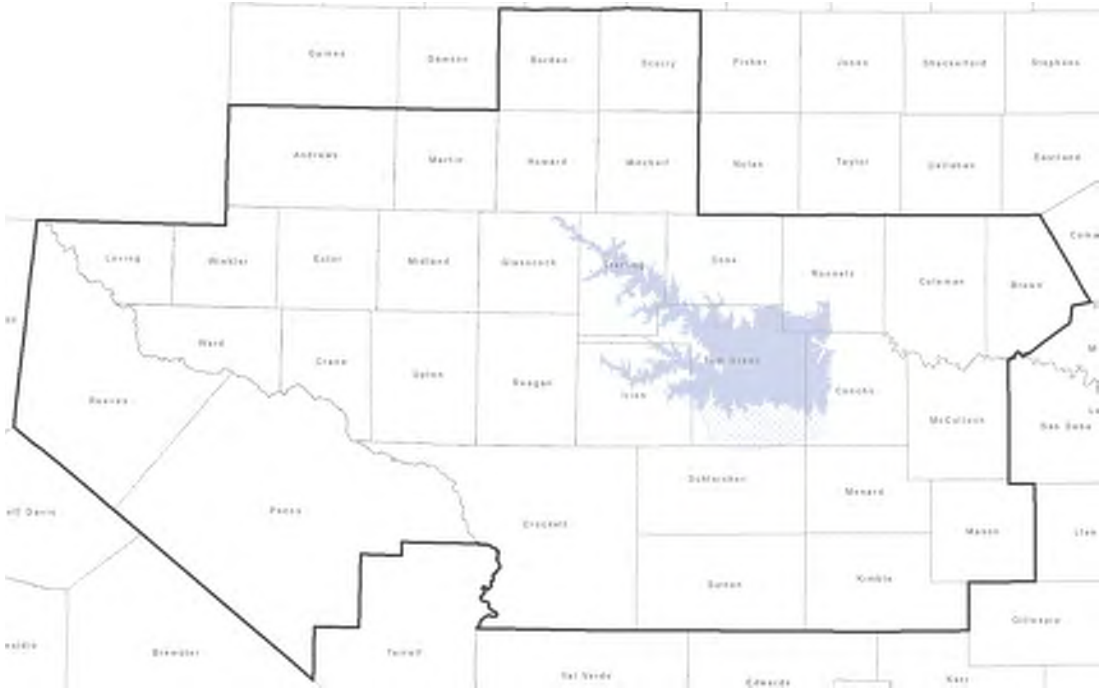


Aquifer	County	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Hickory	Brown	MAG	12	12	0
Hickory	Coleman	Non-MAG	500	0	-500
Hickory	Concho	MAG	27	27	0
Hickory	Kimble	MAG	165	165	0
Hickory	Mason	MAG	13,212	13,212	0
Hickory	McCulloch	MAG	24,377	24,377	0
Hickory	Menard	MAG	2,725	2,725	0
TOTAL			**41,018**	**40,518**	**-500**

Igneous Aquifer

Aquifer	County	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Igneous	Pecos	Non-MAG	80	80	0
Igneous	Reeves	Non-MAG	300	300	0
TOTAL			**380**	**380**	**0**

Lipan Aquifer

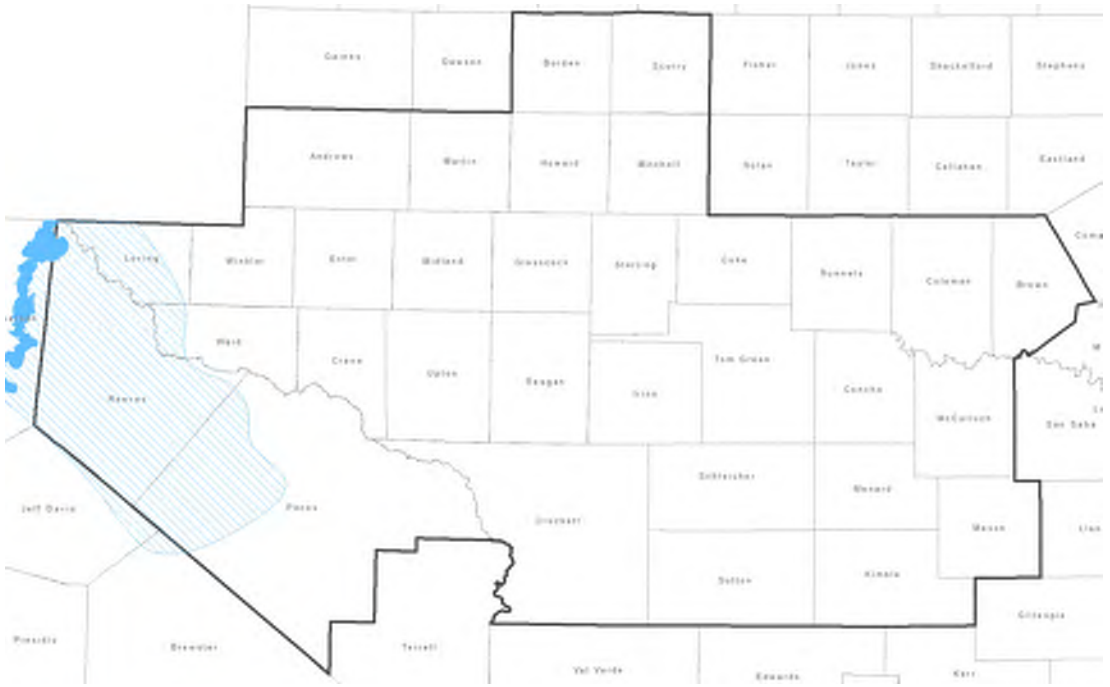


Aquifer	County	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Lipan	Coke	Non-MAG	160	160	0
Lipan	Concho	Non-MAG	1,893	1,893	0
Lipan	Glasscock	Non-MAG	10	10	0
Lipan	Irion	Non-MAG	13	13	0
Lipan	Runnels	Non-MAG	45	45	0
Lipan	Schleicher	Non-MAG	0	0	0
Lipan	Sterling	Non-MAG	850	850	0
Lipan	Tom Green	Non-MAG	43,568	43,568	0
TOTAL			**46,539**	**46,539**	**0**

Marble Falls Aquifer

Aquifer	County	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Marble Falls	Brown	MAG	25	25	0
Marble Falls	Kimble	Non-MAG	100	100	0
Marble Falls	Mason	Non-MAG	100	100	0
Marble Falls	McCulloch	Non-MAG	50	50	0
TOTAL			**275**	**275**	**0**

Rustler Aquifer

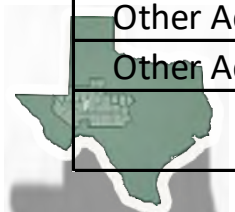


Aquifer	County	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Rustler	Crane	Non-MAG	1,000	1,000	0
Rustler	Loving	MAG	200	200	0
Rustler	Pecos	MAG	7,043	7,043	0
Rustler	Reeves	MAG	2,387	2,387	0
Rustler	Ward	MAG	0	0	0
Rustler	Winkler	Non-MAG	500	0	-500
TOTAL			**11,130**	**10,630**	**-500**

Other Aquifers

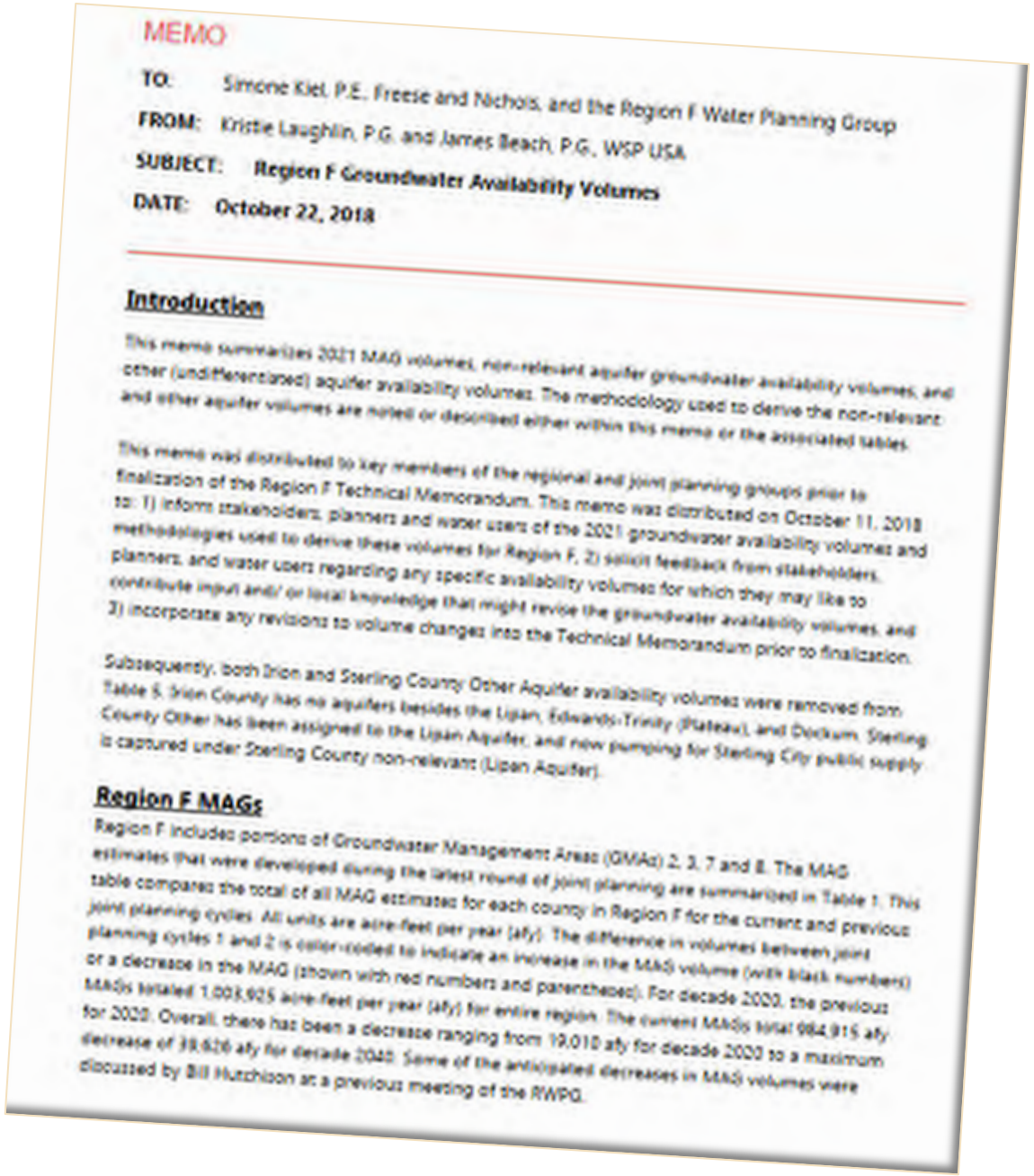
- Not official aquifers per the TWDB
- Includes:
  - Cambrian deposits
  - Permian deposits
  - Quartermaster Formation
  - Edwards Aquifer and Antlers Sand
  - Undefined

Aquifer	Detail	County	Type	2022 Total Availability (ac-ft/yr)	2027 Total Availability (ac-ft/yr)	Difference in Availability (ac-ft/yr)
Other Aquifer		Borden	Non-MAG	2,598	2,598	0
Other Aquifer		Coke	Non-MAG	2,100	2,100	0
Other Aquifer	Edwards Aquifer and Antlers Sand	Coleman	Non-MAG	109	109	0
Other Aquifer	Cambrian Deposits	Concho	Non-MAG	5,964	5,964	0
Other Aquifer		Mason	Non-MAG	873	873	0
Other Aquifer		McCulloch	Non-MAG	103	103	0
Other Aquifer	Permian Deposits	Mitchell	Non-MAG	789	789	0
Other Aquifer		Pecos	Non-MAG	10,000	10,000	0
Other Aquifer		Runnels	Non-MAG	5,001	5,001	0
Other Aquifer	Quartermaster Formation	Scurry	Non-MAG	74	74	0
Other Aquifer		Scurry	Non-MAG	315	315	0
TOTAL				**27,926**	**27,926**	**0**



History of Non-Relevant Availability in Region F

- 2018 Review
- Region F and TWDB agreed to recommended changes
- Most Non-Relevant availability went back to pre-2018 estimates
- Recommendation: Re-adopt the same non-relevant availability as last round



MEMO

TO: Simone Kiel, P.E., Freese and Nichols, and the Region F Water Planning Group

FROM: Kristie Laughlin, P.G. and James Beach, P.G., WSP USA

SUBJECT: **Region F Groundwater Availability Volumes**

DATE: **October 22, 2018**

Introduction

This memo summarizes 2021 MAG volumes, non-relevant aquifer groundwater availability volumes, and other (undifferentiated) aquifer availability volumes. The methodology used to derive the non-relevant and other aquifer volumes are noted or described either within this memo or the associated tables.

This memo was distributed to key members of the regional and joint planning groups prior to finalization of the Region F Technical Memorandum. This memo was distributed on October 11, 2018 to: 1) inform stakeholders, planners and water users of the 2021 groundwater availability volumes and methodologies used to derive these volumes for Region F, 2) solicit feedback from stakeholders, planners, and water users regarding any specific availability volumes for which they may like to contribute input and/ or local knowledge that might revise the groundwater availability volumes, and 3) incorporate any revisions to volume changes into the Technical Memorandum prior to finalization.

Subsequently, both Irion and Sterling County Other Aquifer availability volumes were removed from Table 8. Irion County has no aquifers besides the Lipan, Edwards-Trinity (Plateau), and Dockum. Sterling County Other has been assigned to the Lipan Aquifer, and now pumping for Sterling City public supply is captured under Sterling County non-relevant (Lipan Aquifer).

Region F MAGs

Region F includes portions of Groundwater Management Areas (GMAs) 2, 3, 7 and 8. The MAG estimates that were developed during the latest round of joint planning are summarized in Table 1. This table compares the total of all MAG estimates for each county in Region F for the current and previous joint planning cycles. All units are acre-feet per year (afy). The difference in volumes between joint planning cycles 1 and 2 is color-coded to indicate an increase in the MAG volume (with black numbers) or a decrease in the MAG (shown with red numbers and parentheses). For decade 2020, the previous MAGs totaled 1,003,925 acre-feet per year (afy) for entire region. The current MAGs total 984,915 afy for 2020. Overall, there has been a decrease ranging from 19,010 afy for decade 2020 to a maximum decrease of 39,626 afy for decade 2040. Some of the anticipated decreases in MAG volumes were discussed by Bill Hutchison at a previous meeting of the RWPG.

Recommended Changes to Non-MAG Availability

Aquifer	County	2022 Availability	2027 Availability	Recommendation	Comments/Notes
Capitan Reef	Reeves	1,007	0	1,007	Previous availability
Dockum	Coke	100	0	100	Estimated rig supply well use
Dockum	Glasscock	900	0	900	Previous availability
Dockum	Irion	150	0	150	Previous availability
Dockum	Midland	400	0	400	Estimated fracking pumping
Dockum	Mitchell	14,018	10,540	14,018	Based on recent historic pumping
Dockum	Sterling	10	27	300	Based on recent historic pumping
Dockum	Tom Green	200	0	200	Estimated rig supply well use
Dockum	Upton	1,000	67	67	Estimated fracking pumping
Edwards-Trinity (Plateau)	Howard	672	672	2,100	Based on recent historic pumping
Edwards-Trinity (Plateau)	McCulloch	148	148	600	Based on recent historic pumping
Hickory	Coleman	500	0	0	Estimated equivalent to Concho Co.
Lipan	Concho	1,893	1,893	4,000	Based on recent historic pumping
Ogallala	Ector	6,727	226	226	No change recommended
Ogallala	Midland	31,325	12,745	12,745	No change recommended
Pecos Valley	Andrews	150	0	150	Well reports and historic pumping
Rustler	Winkler	500	0	500	Previous availability