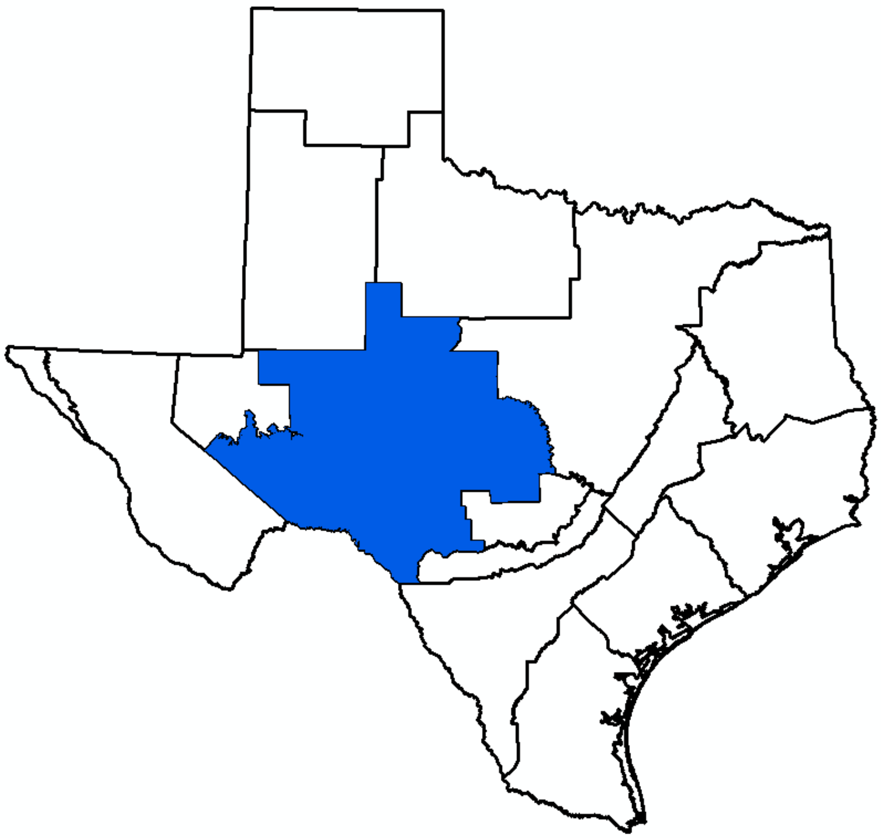
Documentation for Aquifers Not Relevant for Purposes of Joint Planning
GMA 7

Blaine, Cross Timbers, Igneous, Lipan, and Seymour Aquifers



Prepared for:
Groundwater Management Area 7

Prepared by:
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August 27, 2021

Contents

Please note that the Marble Falls documentation is contained within GMA 7 Explanatory Report for the Llano Uplift Aquifers

STATE OF TEXAS § **RESOLUTION # 08-19-2021-1**
§
GROUNDWATER §
MANAGEMENT AREA 7 §

Declaration that the Blaine, Igneous, Lipan, Marble Falls, Cross Timbers, and Seymour Aquifers are Not Relevant for Joint Planning Purposes

Groundwater Management Area 7

WHEREAS, Groundwater Conservation Districts (GCDs) located within or partially within Groundwater Management Area 7 (GMA 7) are required under Chapter §36.108, Texas Water Code to conduct joint planning and designate the Desired Future Conditions of aquifers within GMA 7 and;

WHEREAS, the Board Presidents or their Designated Representatives of GCDs in GMA 7 have met in various meetings and conducted joint planning in accordance with Chapter §36.108, Texas Water Code since October 2019 and;

WHEREAS, the GMA 7 Districts have received and considered Groundwater Availability Model runs and other technical advice regarding local aquifers, hydrology, geology, recharge characteristics, local groundwater demands and usage, population projections, other factors set forth in §36.108(d) of the Texas Water Code, from all aquifers within the respective GCDs, ground and surface water inter-relationships, that affect groundwater conditions through the year 2070; and

WHEREAS, the member GCDs of GMA 7, having given proper and timely notice, held an open meeting on March 18, 2021, at the Sutton County Civic Center, 1700 N Crockett, Sonora, Texas, and voted to adopt proposed Desired Future Conditions for the aquifers of GMA; and

WHEREAS, at a meeting held on August 19, 2021, the GCDs within GMA 7 voted, upon motion made and seconded, 14 districts in favor, 0 districts opposed, to declare the Blaine, Igneous, Lipan, Marble Falls, Cross Timbers, and Seymour Aquifers not relevant for joint planning purposes pursuant to Section 36.108 of the Texas Water Code and therefore not requiring establishment of DFCs by GMA 7 nor determination by the Texas Water Development Board (TWDB) of Modeled Available Groundwater (MAGs) for those aquifers within GMA 7,

NOW THEREFORE BE IT RESOLVED, that Groundwater Management Area 7 does hereby record, and confirm the above declaration that the **Blaine, Igneous, Lipan, Marble Falls, Cross Timbers, and Seymour Aquifers are not relevant for Section 36.108 joint planning purposes within the boundaries of Groundwater Management Area 7**, therefore not requiring establishment of Desired Future Conditions by GMA 7 Districts nor determination of Managed Available Groundwater by the Texas Water Development Board for said aquifers within GMA 7, approved by the following votes of the Designated Representatives of Groundwater Conservation Districts present and voting on August 19, 2021:

AYES:

DESIGNATED REPRESENTATIVE – Coke County Underground Water Conservation District

DESIGNATED REPRESENTATIVE – Crockett County Groundwater Conservation District

DESIGNATED REPRESENTATIVE – Glasscock Groundwater Conservation District

DESIGNATED REPRESENTATIVE – Hickory Underground Water Conservation District No. 1

DESIGNATED REPRESENTATIVE – Hill Country Underground Water Conservation District

DESIGNATED REPRESENTATIVE - Irion County Water Conservation District

DESIGNATED REPRESENTATIVE – Kimble County Groundwater Conservation District

DESIGNATED REPRESENTATIVE - Kinney County Groundwater Conservation District

DESIGNATED REPRESENTATIVE - Lipan-Kickapoo Water Conservation District

DESIGNATED REPRESENTATIVE - Lone Wolf Groundwater Conservation District

DESIGNATED REPRESENTATIVE – Menard County Underground Water District

DESIGNATED REPRESENTATIVE – Middle Pecos Groundwater Conservation District

DESIGNATED REPRESENTATIVE - Plateau Underground Water Conservation and Supply District

DESIGNATED REPRESENTATIVE - Real-Edwards Conservation and Reclamation District

DESIGNATED REPRESENTATIVE - Santa Rita Underground Water Conservation District

DESIGNATED REPRESENTATIVE - Sterling County Underground Water Conservation District

DESIGNATED REPRESENTATIVE – Sutton County Underground Water Conservation District

DESIGNATED REPRESENTATIVE - Terrell County Groundwater Conservation District

DESIGNATED REPRESENTATIVE - Uvalde County Underground Water Conservation District

DESIGNATED REPRESENTATIVE - Wes-Tex Groundwater Conservation District

NAYES:

____
DESIGNATED REPRESENTATIVE – Coke County Underground Water Conservation District

____
DESIGNATED REPRESENTATIVE – Crockett County Groundwater Conservation District

____
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DESIGNATED REPRESENTATIVE - Wes-Tex Groundwater Conservation District

Blaine Aquifer: Not Relevant for Purposes of Joint Planning – GMA 7 Technical Memorandum 15-01

Cross Timbers Aquifer: Not Relevant for Purposes of Joint Planning – GMA 7 Technical Memorandum 20-01

Igneous Aquifer: Not Relevant for Purposes of Joint Planning – GMA 7 Technical Memorandum 15-02

Lipan Aquifer: Not Relevant for Purposes of Joint Planning – GMA 7 Technical Memorandum 15-03

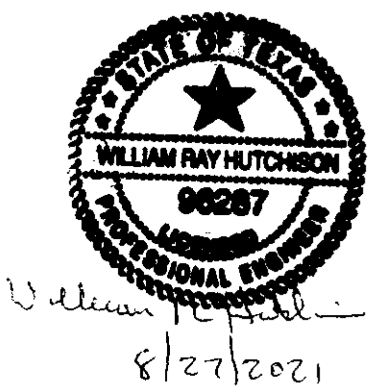
Seymour Aquifer: Not Relevant for Purposes of Joint Planning – GMA 7 Technical Memorandum 15-04

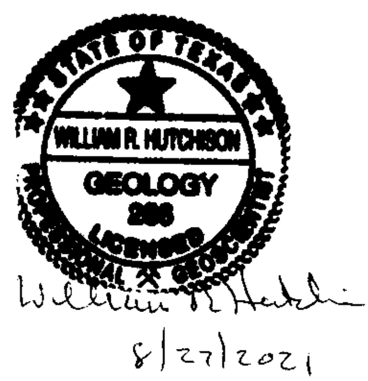
Geoscientist and Engineering Seal

This report documents the work and supervision of work of the following licensed Texas Professional Geoscientist and licensed Texas Professional Engineers:

William R. Hutchison, Ph.D., P.E. (96287), P.G. (286)

Dr. Hutchison completed the analyses and model simulations described in this report, and was the principal author of the final report.





Blaine Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 15-01, Final

William R. Hutchison, Ph.D., P.E., P.G.
November 18, 2016

Introduction

The Texas Water Development Board, in its July 2013 document, Explanatory Report for Submittal of Desired Future Conditions to the Texas Water Development Board, offers the following guidance regarding documentation for aquifers that are to be classified not relevant for purposes of joint planning:

> *Districts in a groundwater management area may, as part of the process for adopting and submitting desired future conditions, propose classification of a portion or portions of a relevant aquifer as non-relevant (31 Texas Administrative Code 356.31 (b)). This proposed classification of an aquifer may be made if the districts determine that aquifer characteristics, groundwater demands, and current groundwater uses do not warrant adoption of a desired future condition.*
>
> *The districts must submit to the TWDB the following documentation for the portion of the aquifer proposed to be classified as non-relevant:*
>
> 1. *A description, location, and/or map of the aquifer or portion of the aquifer;*
> 2. *A summary of aquifer characteristics, groundwater demands, and current groundwater uses, including the total estimated recoverable storage as provided by the TWDB, that support the conclusion that desired future conditions in adjacent or hydraulically connected relevant aquifer(s) will not be affected; and*
> 3. *An explanation of why the aquifer or portion of the aquifer is non-relevant for joint planning purposes.*

This technical memorandum provides the required documentation to classify the Blaine Aquifer as not relevant for purposes of joint planning.

Aquifer Description and Location

As described in George and others (2011):

> *The Blaine Aquifer is a minor aquifer located at the east end of the High Plains in North Texas. The aquifer is part of the Permian Blaine Formation, which is composed of red silty shale, gypsum, anhydrite, salt, and dolomite. The formation consists of cycles of marine and nonmarine sediments deposited in a broad, shallow sea that once covered the southwestern United States. Saturated thickness reaches 300 feet in the aquifer, but freshwater saturated thickness averages 137 feet. Groundwater occurs primarily in solution channels and caverns within the beds of anhydrite and gypsum that contribute to the overall poor quality of the water.*

Blaine Aquifer: Not Relevant for Purposes of Joint Planning
GMA 7 Technical Memorandum 15-01, Final

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November 18, 2016

> *Although some wells contain slightly saline water, with total dissolved solids between 1,000 and 3,000 milligrams per liter, most contain moderately saline water, with total dissolved solids between 3,000 and 10,000 milligrams per liter, exceeding secondary drinking water standards for Texas. Sulfate values are also well in excess of the secondary drinking water standard of 300 milligrams per liter. Water from the Blaine Aquifer is used for livestock and for irrigation of crops that are highly tolerant of salt. In areas where the groundwater is used for irrigation, water levels fluctuate seasonally.*

Figure 1 (taken from Jones and others, 2013) shows the limited extent of the Blaine Aquifer in GMA 7. Note that it occurs only in a small portion of Nolan County.

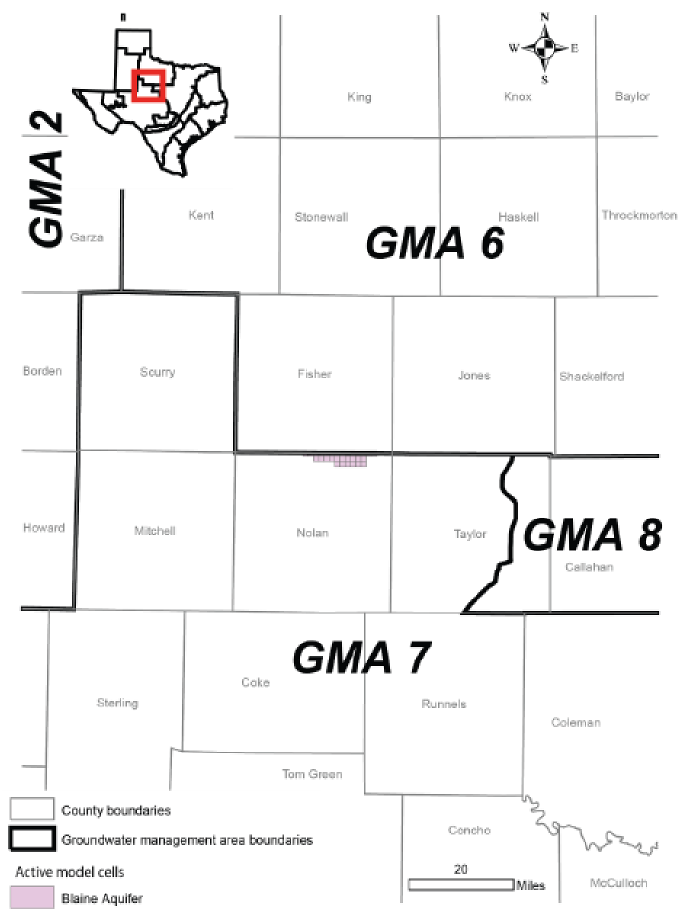

Figure 1. Location of Blaine Aquifer in GMA 7

Aquifer Characteristics

Blaine Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 15-01, Final

William R. Hutchison, Ph.D., P.E., P.G.
November 18, 2016

Ewing and others (2004) developed a groundwater availability model of the Seymour Aquifer and the underlying Permian formations for the Texas Water Development Board. The model extends further south into Nolan County than the official aquifer boundary of George and others (2011). Calibrated hydraulic conductivity in Nolan County in the area of the official aquifer boundary ranges from 1.6 ft/day to 2.9 ft/day, and appears to include the Whitehorse formation and the Pease Rover formation (Ewing and others, 2004, pg. 8-10, Figure 8.1-4).

Groundwater Demands and Current Groundwater Uses

The Texas Water Development Board pumping database shows no uses from the Blaine Aquifer in Nolan County. Ewing and others (2004) appeared to have limited estimates of pumping in the Permian formations to the Blaine formation, and did not document any historic or simulated pumping in any of the other Permian formations.

Total Estimated Recoverable Storage

Jones and others (2013) documented the total estimated recoverable storage for the Blaine Aquifer in Nolan County. Total storage was estimated to be 260,000 acre-feet. Total estimated recoverable storage was assumed to be between 25 percent and 75 percent of the total storage (between 65,000 and 195,000 acre-feet).

Explanation of Non-Relevance

Due to its limited areal extent and lack of groundwater use, the Blaine Aquifer is not relevant for purposes of joint planning in Groundwater Management Area 7.

References

Ewing, J.E., Jones, T.L., Pickens, J.F., Chastain-Howley, A., Dean, K.E., and Spear, A.A., 2004. Groundwater Availability Model for the Seymour Aquifer. Final Report prepared for the Texas Water Development Board, July 2004, 533p.

George, P.G., Mace, R.E., and Petrossian, R., 2011. Aquifers of Texas. Texas Water Development Board Report 380, July 2011, 182p.

Jones, I.C., Bradley, R., Boghici, R., Kohlrenken, W., and Shi, J., GAM Task 13-030: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 7, October 2, 2013, 53p.

Cross Timbers Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 20-01, Final

William R. Hutchison, Ph.D., P.E., P.G.
August 27, 2021

Introduction

The Texas Water Development Board administrative rules (31 TAC §356.31(b)) requires documentation for aquifers that are classified as not relevant for the purposes of joint planning. Part 6 of the TWDB's checklist to verify administrative completeness of a submitted desired future condition package lists these three items:

1. Description, location, and/or map of aquifer or portion of the aquifer
2. Summary of aquifer characteristics, groundwater demands, and current groundwater uses, including the total estimated recoverable storage as provided by the executive administrator, that support the conclusion that desired future conditions in adjacent or hydraulically connected relevant aquifer(s) will not be affected.
3. Why the aquifer or portion of the aquifer is non-relevant for joint planning.

This technical memorandum provides the required documentation to classify the Cross Timbers Aquifer as not relevant for purposes of joint planning.

Aquifer Location and Management

The map below (taken from Ballew and French, 2019) shows the general location of the Cross Timbers Aquifer.

Cross Timbers Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 20-01, Final

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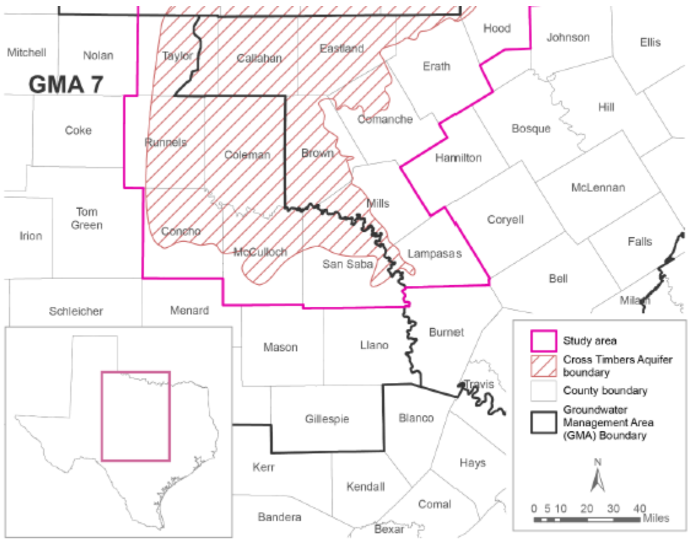
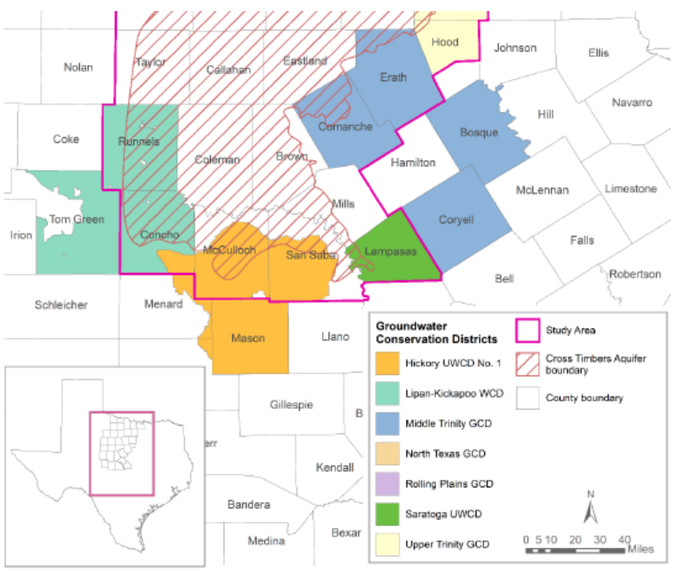
The map below (taken from Ballew and French, 2019) shows the location of the Cross Timbers Aquifer in relation to GMA 7.



The figure below (taken from Ballew and French, 2019) shows the location of the southern portion of the Cross Timbers Aquifer and the coverage in groundwater conservation districts.



Please note that within GMA 7, the only groundwater conservation districts that cover are the Lipan Kickapoo WCD and the Hickory UWCD No. 1. There is a small portion of the Cross Timbers Aquifer in Coleman and Taylor counties where there is no groundwater conservation district.

Cross Timbers Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 20-01, Final

William R. Hutchison, Ph.D., P.E., P.G.
August 27, 2021

Aquifer Description and Characteristics

Ballew and French (2019) provided the following summary of geology and aquifer properties:

- The geologic formations of the Cross Timbers Aquifer primarily consist of limestone, shale, and sandstone. These rocks occur in layers and lenses, reflecting riverine and deltaic depositional environments.
- Formations in most of the study area are exposed at the land surface (outcrop areas) and generally dip to the west. The formations in the northern portion of the study area dip to the north and east, particularly where these formations are covered by the younger Trinity Aquifer formations.
- Groundwater in the Cross Timbers Aquifer occurs under mostly water-table (or unconfined) conditions and is typically discontinuous within isolated sandstone layers. Overall, groundwater resides in a shallow flow system that is susceptible to water level changes due to variable recharge and discharge.
- The geometry and aquifer properties of water-bearing strata vary widely and contribute to variability in well yields.
- Groundwater quality ranges from fresh to brackish.

Ballew and French (2019) identified four units within the Cross Timers Aquifer: Wichita Group, Cisco Group, Canyon Group, and Strawn Group. Within GMA 7, Ballew and French (2019) provided depth to water data for one well in Coleman County in the Cisco Group, and for three wells in the Wichita Group (one well in Concho County, one well in Coleman County, and one well in Runnels County.

Ballew and French (2019) also provided data on groundwater quality which shows the moderately saline character of the groundwater in the GMA 7 portion of the Cross Timbers Aquifer.

Groundwater use appears to be low, and Ballew and French (2019) reported that the Region F recommended water management strategies include "other aquifer" groundwater supplies for mining use. Ballew and French (2019) noted that prior to its official designation as a minor aquifer, groundwater in the Cross Timbers Aquifer would have been lumped in with "Other Aquifers" in regional water planning.

The Texas Water Development Board has not yet developed an estimate for Total Estimated Recoverable Storage for the Cross Timbers Aquifer.

Cross Timbers Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 20-01, Final

William R. Hutchison, Ph.D., P.E., P.G.
August 27, 2021

Explanation of Non-Relevance

Due to its limited areal extent and limited groundwater use, the Cross Timbers Aquifer is not relevant for purposes of joint planning in Groundwater Management Area 7.

References

Ballew, N., and French, L.N., 2019. Groundwater Conditions in the Cross Timbers Aquifer. Texas Water Development Board Groundwater Management Report 19-01. September 2019.

Igneous Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 15-02, Final

William R. Hutchison, Ph.D., P.E., P.G.
November 18, 2016

Introduction

The Texas Water Development Board, in its July 2013 document, Explanatory Report for Submittal of Desired Future Conditions to the Texas Water Development Board, offers the following guidance regarding documentation for aquifers that are to be classified not relevant for purposes of joint planning:

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> 3. *An explanation of why the aquifer or portion of the aquifer is non-relevant for joint planning purposes.*

This technical memorandum provides the required documentation to classify the Igneous Aquifer as not relevant for purposes of joint planning.

Aquifer Description and Location

As described in George and others (2011):

> *The Igneous Aquifer, located in Far West Texas, is designated as a minor aquifer. The aquifer consists of volcanic rocks made up of a complex series of welded pyroclastic rock, lava, and volcaniclastic sediments and includes more than 40 different named units as much as 6,000 feet thick. Freshwater saturated thickness averages about 1,800 feet. The best water-bearing zones are found in igneous rocks with primary porosity and permeability, such as vesicular basalts, interflow zones in lava successions, sandstone, conglomerate, and breccia.*

Igneous Aquifer: Not Relevant for Purposes of Joint Planning
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> *Faulting and fracturing enhance aquifer productivity in less permeable rock units. Although water in the aquifer is fresh and contains less than 1,000 milligrams per liter of total dissolved solids, elevated levels of silica and fluoride have been found in water from some wells, reflecting the igneous origin of the rock. Water is primarily used to meet municipal needs for the cities of Alpine, Fort Davis, and Marfa, as well as some agricultural needs. There have been no significant water level declines in wells measured by the TWDB throughout the aquifer.*

Figure 1 (taken from Jones and others, 2013) shows the limited extent of the Igneous Aquifer in GMA 7. Note that it occurs only in a small portion of Pecos County.

Igneous Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 15-02, Final

William R. Hutchison, Ph.D., P.E., P.G.
November 18, 2016

Figure 1. Location of Igneous Aquifer in GMA 7

Aquifer Characteristics

Beach and others (2004) developed a groundwater availability model of the Igneous Aquifer and parts of the West Texas Bolsons for the Texas Water Development Board. The model domain did not extend into the small area of Pecos County that is included in the official aquifer boundary as shown in Jones and others (2013). Aquifer hydraulic conductivity from the calibrated model in the eastern portion of adjoining Jeff Davis County is 0.1 ft/day (Beach and others, 2004, pg. 8-7), and storativity from the calibrated model in the eastern portion of adjoining Jeff Davis County is 3.0E-05 (dimensionless) (Beach and others, 2004, pg. 9-6).

Groundwater Demands and Current Groundwater Uses

The Texas Water Development Board pumping database shows no uses from the Igneous Aquifer in Pecos County. Since the model domain of Beach and others (2004) did not include Pecos County, there are no estimates of pumping from the model in Pecos County.

Total Estimated Recoverable Storage

Jones and others (2013) documented the total estimated recoverable storage for the Igneous Aquifer in Pecos County. Total storage was estimated to be 350 acre-feet. Total estimated recoverable storage was assumed to be between 25 percent and 75 percent of the total storage (between 88 and 263 acre-feet).

Explanation of Non-Relevance

Due to its limited areal extent and lack of groundwater use, the Igneous Aquifer is not relevant for purposes of joint planning in Groundwater Management Area 7.

References

Beach, J.A., Ashworth, J.B., Finch, S.T., Chastain-Howley, A., Calhoun, K., Urbanczyk, K.M., Sharp, J.M., and Olson, J., 2004. Groundwater Availability Model for the Igneous and parts of the West Texas Bolsons (Wild Horse Flat, Michigan Flat, Ryan Flat and Lobo Flat) Aquifers, Report prepared for the Texas Water Development Board, June 2004, 407p.

George, P.G., Mace, R.E., and Petrossian, R., 2011. Aquifers of Texas. Texas Water Development Board Report 380, July 2011, 182p.

Jones, I.C., Bradley, R., Boghici, R., Kohlrenken, W., and Shi, J., GAM Task 13-030: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 7, October 2, 2013, 53p.

Lipan Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 15-03, Final

William R. Hutchison, Ph.D., P.E., P.G.
November 18, 2016

Introduction

The Texas Water Development Board, in its July 2013 document, Explanatory Report for Submittal of Desired Future Conditions to the Texas Water Development Board, offers the following guidance regarding documentation for aquifers that are to be classified not relevant for purposes of joint planning:

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> *The districts must submit to the TWDB the following documentation for the portion of the aquifer proposed to be classified as non-relevant:*
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> 1. *A description, location, and/or map of the aquifer or portion of the aquifer;*
> 2. *A summary of aquifer characteristics, groundwater demands, and current groundwater uses, including the total estimated recoverable storage as provided by the TWDB, that support the conclusion that desired future conditions in adjacent or hydraulically connected relevant aquifer(s) will not be affected; and*
> 3. *An explanation of why the aquifer or portion of the aquifer is non-relevant for joint planning purposes.*

This technical memorandum provides the required documentation to classify the Lipan Aquifer as not relevant for purposes of joint planning.

Aquifer Description, Management, and Location

As described in George and others (2011):

> *The Lipan Aquifer is a minor aquifer found in parts of Coke, Concho, Glasscock, Irion, Runnels, Schleicher, Sterling, and Tom Green counties in west-central Texas. The aquifer includes water-bearing alluvium and the updip portions of older, underlying strata. The alluvium includes as much as 125 feet of saturated sediments of the Quaternary Leona Formation. These deposits consist mostly of gravels and conglomerates cemented with sandy lime and layers of clay. The formation generally fines upward with conglomerates existing mainly in locations of thicker alluvium. The underlying strata include the San Angelo Sandstone of the Pease River Group and the Choza Formation, Bullwagon Dolomite, Vale Formation,*

> *Standpipe Limestone, and Arroyo Formation of the Clear Fork Group. These units are predominantly limestones and shales. Groundwater in the alluvial deposits and the upper parts of the older rocks is hydraulically connected, and most wells in the area are completed in both units. Groundwater flow in the Lipan Aquifer does not appear to be structurally controlled. Higher production wells appear to correspond to alluvial deposits overlying the Choza, Bullwagon, and Vale formations. In these areas, thick alluvial deposits with conglomerates lie near the contact with the Permian. Groundwater in the alluvium ranges from fresh to slightly saline, containing between 350 and 3,000 milligrams per liter of total dissolved solids, and is very hard. Water in the underlying parts of the Choza Formation and Bullwagon Dolomite tends to be moderately saline with total dissolved solids in excess of 3,000 milligrams per liter. The aquifer is primarily used for irrigation but also supports livestock and municipal, domestic, and manufacturing uses.*

Figure 1 (taken from Jones and others, 2013) shows the extent of the Lipan Aquifer in GMA 7.

Groundwater management in the Lipan is unique as described in Hutchison (2010):

> *Groundwater pumping in the Lipan Aquifer is variable, and the variation is based largely on the groundwater levels in the aquifer at the beginning of the irrigation season. When groundwater levels are high at the beginning of the irrigation season, groundwater pumping is relatively high. When groundwater levels are low, groundwater pumping is relatively low. Groundwater pumping generally reduces storage each year to the point that pumping is no longer economically feasible. Once the irrigation season ends, winter precipitation recharges the aquifer and causes groundwater levels to recover. Thus, the amount of pumping in a particular irrigation season is largely controlled by the amount of recharge during the preceding winter. Over the long term, there is no drawdown in the aquifer due to the relatively small storage and high pumping.*

On July 29, 2010, Groundwater Management Area 7 adopted a desired future condition for the Lipan Aquifer within the boundaries of the Lipan-Kickapoo WCD in Concho, Runnels, and Tom Green counties that recognized that 100 percent of all available groundwater would be used annually that would result in annual fluctuations in groundwater levels, and zero net drawdown over the next 50 years. Modeled available groundwater for Concho County, Runnels County, and Tom Green County was calculated to be 1,834 AF/yr, 15 AF/yr, and 39,361 AF/yr, respectively (Oliver, 2012). The aquifer was considered not relevant for joint planning purposes outside the boundaries of the Lipan-Kickapoo WCD.

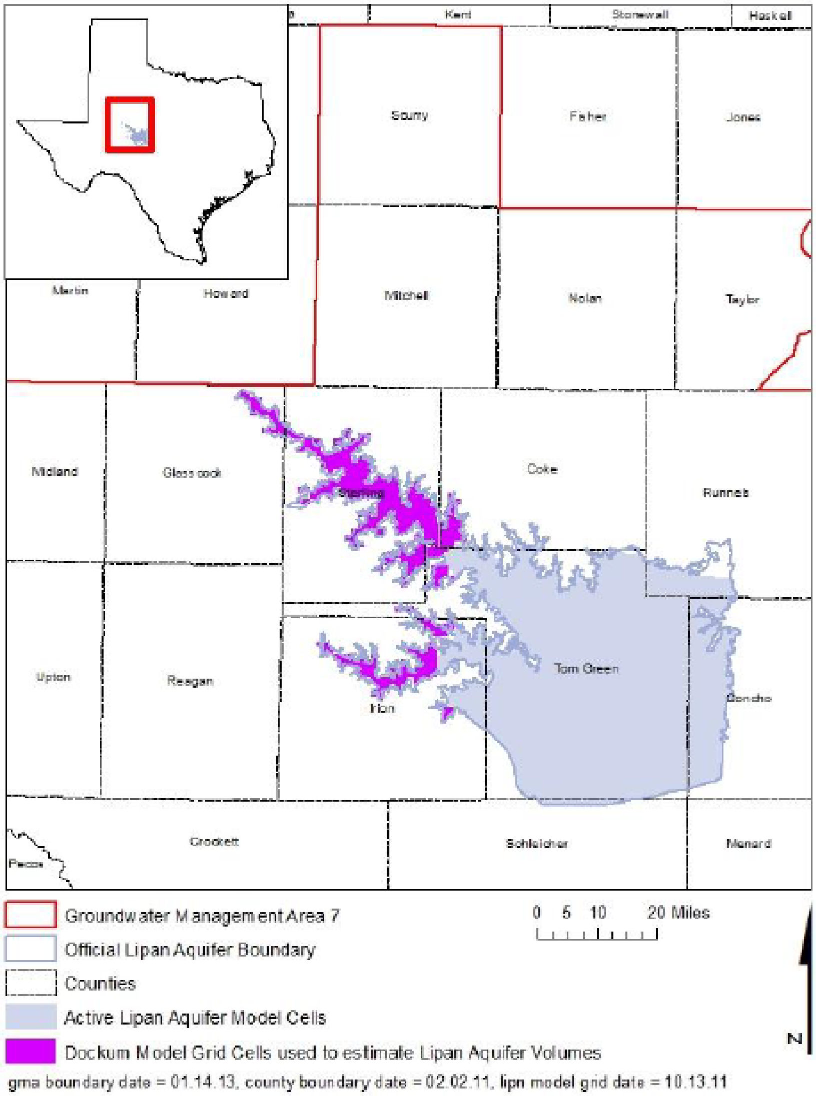


Figure 1. Location of Lipan Aquifer in GMA 7

Aquifer Characteristics

Beach and others (2004) developed a groundwater availability model of the Lipan Aquifer, the underlying Permian formations and the Edwards-Trinity (Plateau) Aquifer for the Texas Water Development Board. The model pre-dates the updated footprint of the Lipan Aquifer, and does not include all of the aquifer as it is currently delineated. Calibrated values of hydraulic conductivity (Beach and others, 2004, pg. 8-4) and specific yield (Beach and others, 2004, pg. 9-4) are presented in Figures 2 and 3, respectively

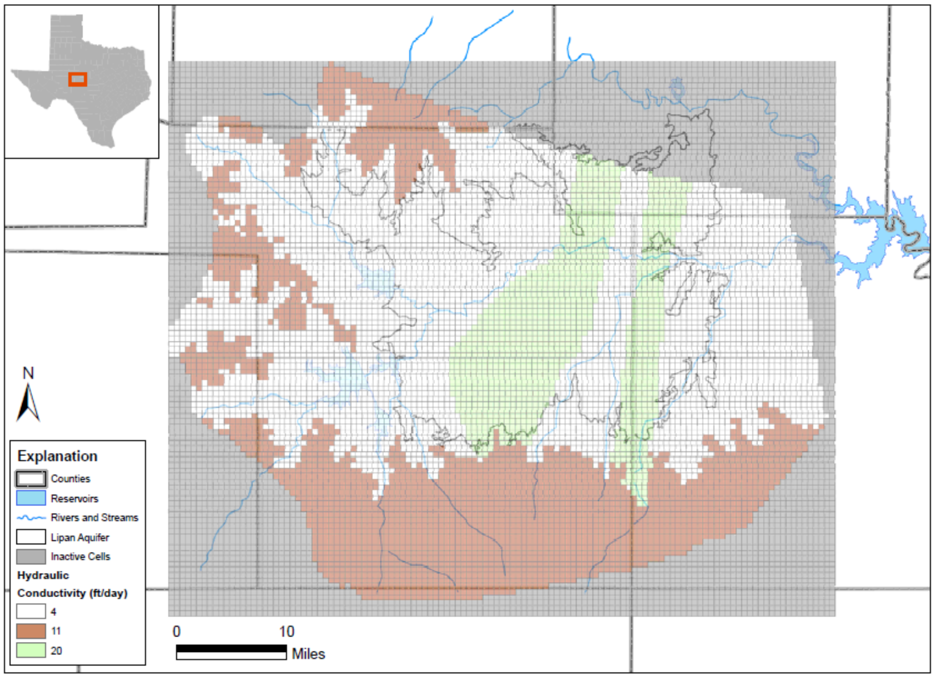


Figure 2. Estimated Hydraulic Conductivity from Beach and others (2004)

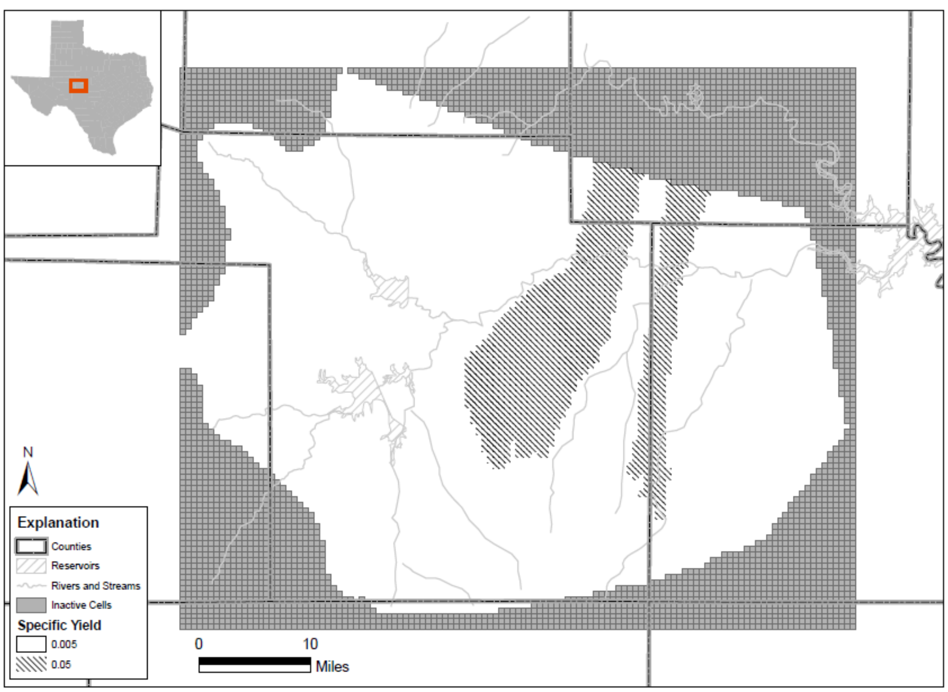


Figure 2. Estimated Specific Yield from Beach and others (2004)

Groundwater Demands and Current Groundwater Uses

Lipan Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 15-03, Final

William R. Hutchison, Ph.D., P.E., P.G.
November 18, 2016

The Texas Water Development Board pumping database summarizes historic groundwater uses from the Lipan Aquifer from Concho, Runnels, and Tom Green counties, and is shown in Table 1. No pumping from the Lipan in other counties is reported.

Table 1. Summary of Historic Groundwater Pumping (all values in AF/yr)

Year	County	Aquifer	Municipal	Manufacturing	Irrigation	Livestock
2000	CONCHO	LIPAN AQUIFER	0	0	1,445	0
2001	CONCHO	LIPAN AQUIFER	0	0	1,180	0
2002	CONCHO	LIPAN AQUIFER	0	0	2,081	0
2003	CONCHO	LIPAN AQUIFER	0	0	897	0
2004	CONCHO	LIPAN AQUIFER	0	0	1,090	0
2005	CONCHO	LIPAN AQUIFER	0	0	1,768	0
2006	CONCHO	LIPAN AQUIFER	1	0	4,579	0
2007	CONCHO	LIPAN AQUIFER	1	0	3,070	0
2008	CONCHO	LIPAN AQUIFER	1	0	5,798	0
2009	CONCHO	LIPAN AQUIFER	1	0	722	0
2010	CONCHO	LIPAN AQUIFER	1	0	3,869	0
2011	CONCHO	LIPAN AQUIFER	1	0	1,387	0
2012	CONCHO	LIPAN AQUIFER	1	0	2,825	0
2000	RUNNELS	LIPAN AQUIFER	140	0	0	7
2001	RUNNELS	LIPAN AQUIFER	233	0	0	7
2002	RUNNELS	LIPAN AQUIFER	91	1	0	8
2003	RUNNELS	LIPAN AQUIFER	91	1	0	6
2004	RUNNELS	LIPAN AQUIFER	0	1	0	6
2005	RUNNELS	LIPAN AQUIFER	0	0	0	30
2006	RUNNELS	LIPAN AQUIFER	3	0	0	31
2007	RUNNELS	LIPAN AQUIFER	2	0	0	30
2008	RUNNELS	LIPAN AQUIFER	3	0	0	34
2009	RUNNELS	LIPAN AQUIFER	3	0	0	33
2010	RUNNELS	LIPAN AQUIFER	4	0	0	35
2011	RUNNELS	LIPAN AQUIFER	4	0	0	37
2012	RUNNELS	LIPAN AQUIFER	4	0	0	23
2000	TOM GREEN	LIPAN AQUIFER	1,100	0	17,879	25
2001	TOM GREEN	LIPAN AQUIFER	1,076	195	23,310	23
2002	TOM GREEN	LIPAN AQUIFER	1,014	206	24,847	26
2003	TOM GREEN	LIPAN AQUIFER	989	324	22,557	23
2004	TOM GREEN	LIPAN AQUIFER	1,047	338	14,263	19
2005	TOM GREEN	LIPAN AQUIFER	1,074	336	16,285	162
2006	TOM GREEN	LIPAN AQUIFER	965	332	19,375	178
2007	TOM GREEN	LIPAN AQUIFER	1,004	382	40,282	119
2008	TOM GREEN	LIPAN AQUIFER	1,061	443	50,251	163
2009	TOM GREEN	LIPAN AQUIFER	1,464	364	39,051	147
2010	TOM GREEN	LIPAN AQUIFER	1,662	360	22,159	152
2011	TOM GREEN	LIPAN AQUIFER	2,014	441	4,607	167
2012	TOM GREEN	LIPAN AQUIFER	1,714	382	30,902	144

It is important to note that the historic pumping estimates often exceed the modeled available groundwater numbers presented in Oliver (2012). As explained in Hutchison (2010) and Oliver (2012), annual pumping is variable due to variations in annual recharge. The modeled available groundwater values are averages, but Hutchison (2010) and Oliver (2012) also show the expected minimum and maximum pumping values based on simulations.

Total Estimated Recoverable Storage

Jones and others (2013) documented the total estimated recoverable storage for the Lipan Aquifer in Groundwater Management Area 7 as shown in Table 2 (by county) and Table 3 (by groundwater conservation district). As noted in Jones and others (2013, pg. 47) the total estimated recoverable storage values by county and groundwater conservation district yield different totals for the entire groundwater management area because the numbers have been rounded to within two significant figures.

Table 2. Total Estimated Recoverable Storage for the Lipan Aquifer by County

County	*Total Storage (acre-feet)*	*25 percent of Total Storage (acre-feet)*	*75 percent of Total Storage (acre-feet)*
Coke	13,000	3,250	9,750
Concho	720,000	180,000	540,000
Glasscock	6,000	1,500	4,500
Irion	100,000	25,000	75,000
Runnels	400,000	100,000	300,000
Sterling	41,000	10,250	30,750
Schleicher	7,500	1,875	5,625
Tom Green	2,900,000	725,000	2,175,000
Total	4,200,000	1,046,875	3,140,625

Table 3. Total Estimated Recoverable Storage for the Lipan Aquifer by Groundwater Conservation District

Groundwater Conservation District (GCD)	*Total Storage (acre-feet)*	*25 percent of Total Storage (acre-feet)*	*75 percent of Total Storage (acre-feet)*
No District	330,000	82,500	247,500
Coke County UWCD[32]	13,000	3,250	9,750
Glasscock GCD	6,000	1,500	4,500
Irion County WCD[33]	110,000	27,500	82,500
Lipan-Kickapoo WCD	3,600,000	900,000	2,700,000
Plateau UWC[34] and Supply District	7,500	1,875	5,625
Sterling County UWCD	45,000	11,250	33,750
Total	4,100,000	1,027,875	3,083,625

Explanation of Non-Relevance

The Lipan-Kickapoo WCD manages the significant portion of the Lipan Aquifer. Within the Lipan-Kickapoo WCD, annual pumping is significant, but variable depending on winter rainfall. The modeling analysis completed by Hutchison (2010) is attached as Appendix A, and demonstrated that the management approach results in no long term drawdown and does not affect surrounding areas. The Lipan Aquifer within the boundaries of the Lipan-Kickapoo WCD is managed on an annual basis, and the amount of pumping varies mainly on recharge and the economics of pumping.

The Joint Planning process focuses on long-term management of groundwater and the potential for the management practices in a groundwater conservation district to affect a neighboring district. One result of the process is that the Texas Water Development Board calculates modeled available groundwater numbers that are delivered to the groundwater conservation districts and the regional planning groups. The modeled available groundwater is the amount of pumping that will achieve the desired future condition.

Due to the nature of the annual management of the Lipan Aquifer in the Lipan-Kickapoo WCD, concepts like desired future conditions and managed available groundwater that are based on long-term management are not applicable. Also, there are no other areas of the Lipan Aquifer that are affected by pumping in the Lipan-Kickapoo WCD. Thus, the portion of the Lipan Aquifer within the boundaries of the Lipan- Kickapoo WCD is not relevant for purposes of joint planning in Groundwater Management Area 7.

Outside the Lipan-Kickapoo WCD, the aquifer is of limited extent and there are no reported uses. Due to its limited areal extent and lack of groundwater use, this portion of the Lipan Aquifer is not relevant for purposes of joint planning in Groundwater Management Area 7.

References

Beach, J.A., Burton, S., and Kolarik, B., 2004. Groundwater Availability Model for the Lipan Aquifer in Texas. Report prepared for the Texas Water Development Board, June 2004, 246p.

George, P.G., Mace, R.E., and Petrossian, R., 2011. Aquifers of Texas. Texas Water Development Board Report 380, July 2011, 182p.

Hutchison, W.R., 2010. GAM Run 10-002. Texas Water Development Board, Groundwater Resources Division, September 3, 2010, 8p.

Jones, I.C., Bradley, R., Boghici, R., Kohlrenken, W., and Shi, J., GAM Task 13-030: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 7, October 2, 2013, 53p.

Oliver, W., 2012. GAM Run 10-062 MAG Version 2 (Updated by Shirley Wade). Texas Water Development Board, Groundwater Availability Modeling Section, June 29, 2012, 9p.

Seymour Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 15-04, Final

William R. Hutchison, Ph.D., P.E., P.G.
November 18, 2016

Introduction

The Texas Water Development Board, in its July 2013 document, Explanatory Report for Submittal of Desired Future Conditions to the Texas Water Development Board, offers the following guidance regarding documentation for aquifers that are to be classified not relevant for purposes of joint planning:

> *Districts in a groundwater management area may, as part of the process for adopting and submitting desired future conditions, propose classification of a portion or portions of a relevant aquifer as non-relevant (31 Texas Administrative Code 356.31 (b)). This proposed classification of an aquifer may be made if the districts determine that aquifer characteristics, groundwater demands, and current groundwater uses do not warrant adoption of a desired future condition.*
>
> *The districts must submit to the TWDB the following documentation for the portion of the aquifer proposed to be classified as non-relevant:*
>
> 1. *A description, location, and/or map of the aquifer or portion of the aquifer;*
> 2. *A summary of aquifer characteristics, groundwater demands, and current groundwater uses, including the total estimated recoverable storage as provided by the TWDB, that support the conclusion that desired future conditions in adjacent or hydraulically connected relevant aquifer(s) will not be affected; and*
> 3. *An explanation of why the aquifer or portion of the aquifer is non-relevant for joint planning purposes.*

This technical memorandum provides the required documentation to classify the Seymour Aquifer as not relevant for purposes of joint planning.

Aquifer Description and Location

As described in George and others (2011):

> *The Seymour Aquifer is a major aquifer extending across north-central Texas. The aquifer consists of Quaternary-age, alluvial sediments unconformably overlying Permian-age rocks. Water is contained in isolated patches of alluvium as much as 360 feet thick composed of discontinuous beds of poorly sorted gravel, conglomerate, sand, and silty clay. Water ranges from fresh to slightly saline, containing from approximately 100 to 3,000 milligrams per liter of total dissolved solids; however, moderately to very saline water, containing 3,000 to more than 10,000 milligrams per liter of total dissolved solids, exists in localized areas.*

Seymour Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 15-04, Final

William R. Hutchison, Ph.D., P.E., P.G.
November 18, 2016

> *Throughout its extent, the aquifer is affected by nitrate in excess of primary drinking water standards. Excess chloride also occurs throughout the aquifer. Almost all of the groundwater pumped from the aquifer—90 percent—is used for irrigation, with the remainder used primarily for municipal supply.*

Figure 1 (taken from Jones and others, 2013) shows the limited extent of the Seymour Aquifer in GMA 7. Note that it occurs only in a small portion of Taylor County.

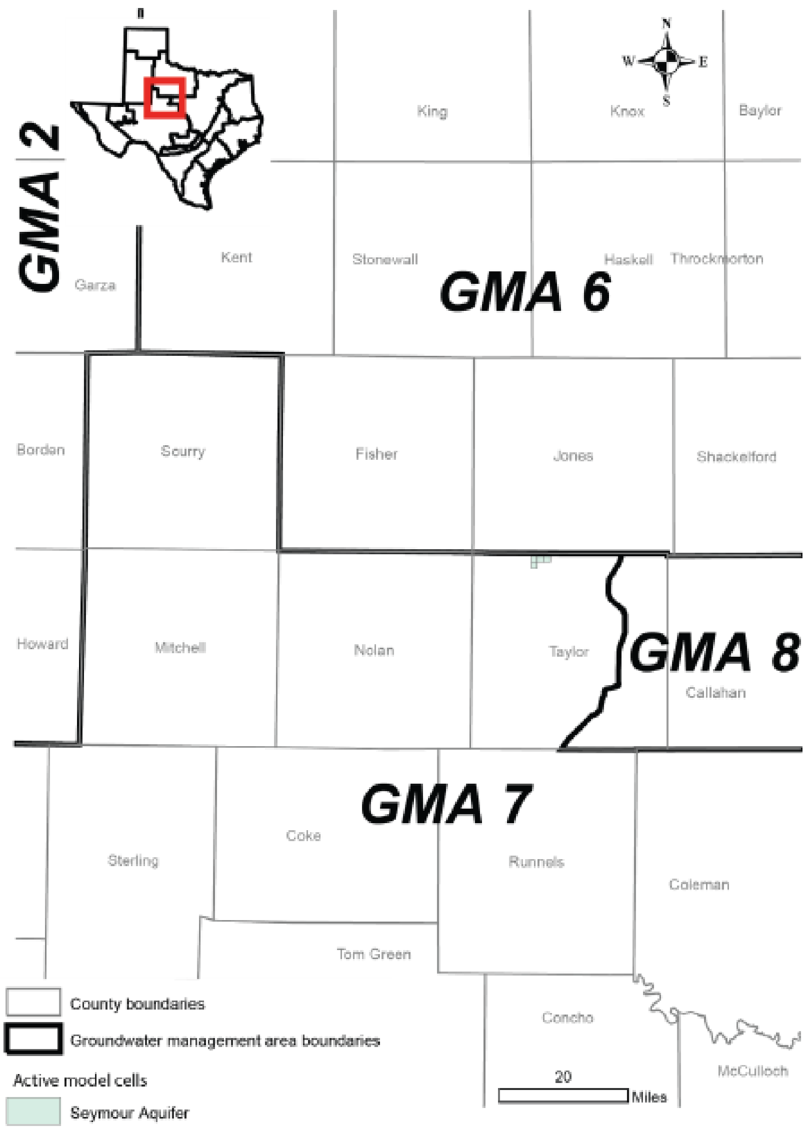


Figure 1. Location of Seymour Aquifer in GMA 7

Seymour Aquifer: Not Relevant for Purposes of Joint Planning

GMA 7 Technical Memorandum 15-04, Final

William R. Hutchison, Ph.D., P.E., P.G.
November 18, 2016

Aquifer Characteristics

Ewing and others (2004) developed a groundwater availability model of the Seymour Aquifer and the underlying Permian formations for the Texas Water Development Board. The model extends into Taylor County. From the map of calibrated hydraulic conductivity in Ewing and others (2004, pg. 8-9), the range of hydraulic conductivity is between 30 and 100 ft/day.

Groundwater Demands and Current Groundwater Uses

The Texas Water Development Board pumping database shows use from the Seymour Aquifer in Taylor County as summarized below in Table 1. Ewing and others (2004) reported estimated historic pumping for 1980, 1985, 1990, 1995, and 1999 from the Seymour Aquifer in Taylor County. These are summarized below in Table 2.

Table 1 – Summary of Pumping Estimates (AF/yr) from Texas Water Development Board Pumping Database

Year	County	Aquifer	Municipal	Irrigation	Livestock	Total
2000	TAYLOR	SEYMOUR AQUIFER	0	3	6	9
2001	TAYLOR	SEYMOUR AQUIFER	0	7	4	11
2002	TAYLOR	SEYMOUR AQUIFER	0	5	3	8
2003	TAYLOR	SEYMOUR AQUIFER	0	1	2	3
2004	TAYLOR	SEYMOUR AQUIFER	0	1	2	3
2005	TAYLOR	SEYMOUR AQUIFER	0	25	7	32
2006	TAYLOR	SEYMOUR AQUIFER	10	24	9	43
2007	TAYLOR	SEYMOUR AQUIFER	9	13	8	30
2008	TAYLOR	SEYMOUR AQUIFER	10	0	2	12
2009	TAYLOR	SEYMOUR AQUIFER	19	7	1	27
2010	TAYLOR	SEYMOUR AQUIFER	28	21	8	57
2011	TAYLOR	SEYMOUR AQUIFER	24	53	8	85
2012	TAYLOR	SEYMOUR AQUIFER	25	20	7	52

Table 2 – Summary of Pumping Estimates (AF/yr) from Ewing and others (2004)

Year	County	Aquifer	County-Other	Total
1980	TAYLOR	SEYMOUR AQUIFER	17	17
1985	TAYLOR	SEYMOUR AQUIFER	16	16
1990	TAYLOR	SEYMOUR AQUIFER	12	12
1995	TAYLOR	SEYMOUR AQUIFER	14	14
1999	TAYLOR	SEYMOUR AQUIFER	13	13

Total Estimated Recoverable Storage

Jones and others (2013) documented the total estimated recoverable storage for the Seymour Aquifer in Taylor County. Total storage was estimated to be 610 acre-feet. Total estimated recoverable storage was assumed to be between 25 percent and 75 percent of the total storage (between 153 and 458 acre-feet).

Explanation of Non-Relevance

Due to its limited areal extent and limited groundwater use, the Seymour Aquifer is not relevant for purposes of joint planning in Groundwater Management Area 7.

References

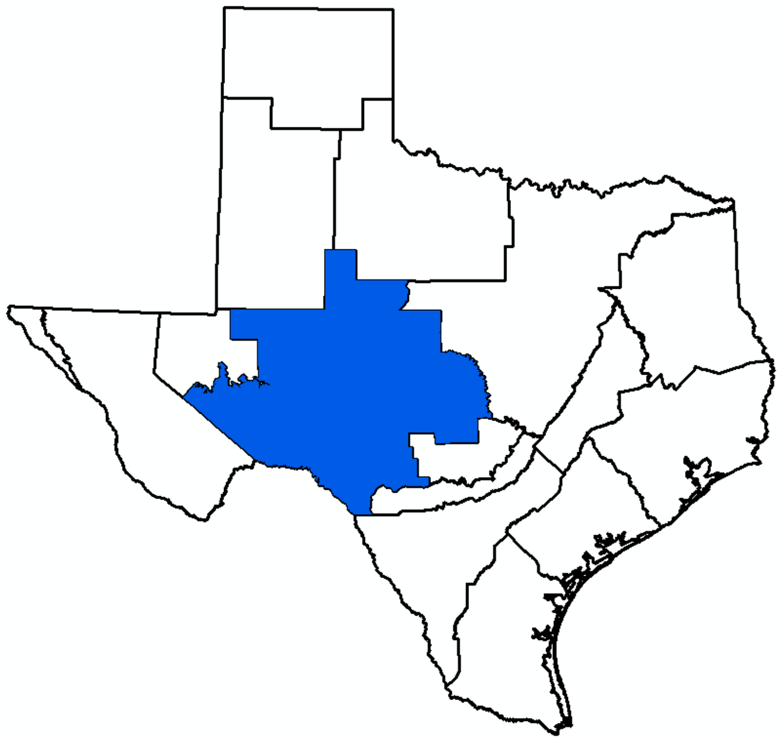
Ewing, J.E., Jones, T.L., Pickens, J.F., Chastain-Howley, A., Dean, K.E., and Spear, A.A., 2004. Groundwater Availability Model for the Seymour Aquifer. Final Report prepared for the Texas Water Development Board, July 2004, 533p.

George, P.G., Mace, R.E., and Petrossian, R., 2011. Aquifers of Texas. Texas Water Development Board Report 380, July 2011, 182p.

Jones, I.C., Bradley, R., Boghici, R., Kohlrenken, W., and Shi, J., GAM Task 13-030: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 7, October 2, 2013, 53p.

Supplemental Documentation for
Aquifers Not Relevant for Purposes of Joint Planning
GMA 7

Portions of Dockum, Edwards-Trinity (Plateau), Ellenburger-San Saba, Hickory, Marble Falls, and Ogallala Aquifers



Prepared for:
Groundwater Management Area 7

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January 20, 2022

Supplemental Documentation for Aquifers Not Relevant for Purposes of Joint Planning GMA 7

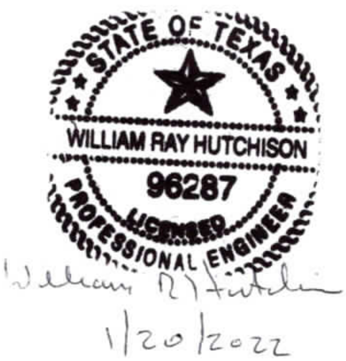
Portions of Dockum, Edwards-Trinity (Plateau), Ellenburger-San Saba, Hickory, Marble Falls, and Ogallala Aquifers

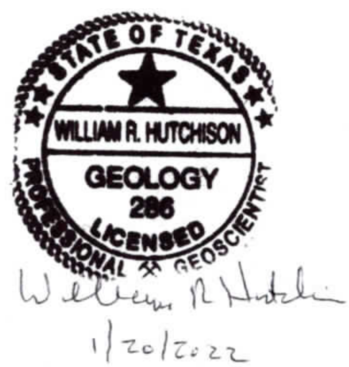
Geoscientist and Engineering Seal

This report documents the work of the following licensed Texas Professional Geoscientist and licensed Texas Professional Engineers:

William R. Hutchison, Ph.D., P.E. (96287), P.G. (286)

Dr. Hutchison completed the data gathering and analyses described in this report and was the principal author of the final report.





Supplemental Documentation for
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Supplemental Documentation for
Aquifers Not Relevant for Purposes of Joint Planning
GMA 7

1.0 Introduction

The Texas Water Development Board administrative rules (31 TAC §356.31(b)) requires documentation for aquifers that are classified as not relevant for the purposes of joint planning. Part 6 of the TWDB's checklist to verify administrative completeness for documentation of the joint planning process lists these three items related to non-relevant portions of aquifers:

1. Description, location, and/or map of aquifer or portion of the aquifer.
2. Summary of aquifer characteristics, groundwater demands, and current groundwater uses, including the total estimated recoverable storage as provided by the executive administrator, that support the conclusion that desired future conditions in adjacent or hydraulically connected relevant aquifer(s) will not be affected.
3. Why the aquifer or portion of the aquifer is non-relevant for joint planning.

The groundwater conservation districts in Groundwater Management Area 7 had previously submitted documentation for entire aquifers that were considered not relevant for purposes of joint planning. These aquifers were the Blaine, Cross Timbers, Igneous, Lipan, and Seymour aquifers (Hutchison, 2021).

In a November 10, 2021 email from Robert Bradley of TWDB to Meredith Allen, Groundwater Management Area 7 coordinator, Mr. Bradley noted that TWDB Rules (Texas Administrative Code § 356.31) require additional documentation for the portions of these other aquifers that have been designated as not relevant for purposes of joint planning:

- Dockum Aquifer
- Edwards-Trinity (Plateau) Aquifer
- Ellenburger-San Saba Aquifer
- Hickory Aquifer
- Marble Falls Aquifer
- Ogallala Aquifer

Desired future conditions for these six aquifers were adopted for specific counties, but certain areas of these aquifers were designated as not relevant for purposes of joint planning. The purpose of this report is to document the non-relevant portions of these aquifers as required by Texas Administrative Code § 356.31. The TWDB report on Total Estimated Recoverable Storage (Jones and others, 2013) was used to identify which aquifers are in each county in Groundwater Management Area 7.

The presence of a groundwater conservation district is not listed in the Texas Administrative Code as one of the documented factors in evaluating relevance or non-relevance for desired future conditions. However, discussions by the groundwater conservation districts in Groundwater Management Area 7 included whether an area was part of a groundwater conservation district. Figure 1 shows the coverage of groundwater conservation districts in Groundwater Management Area 7.

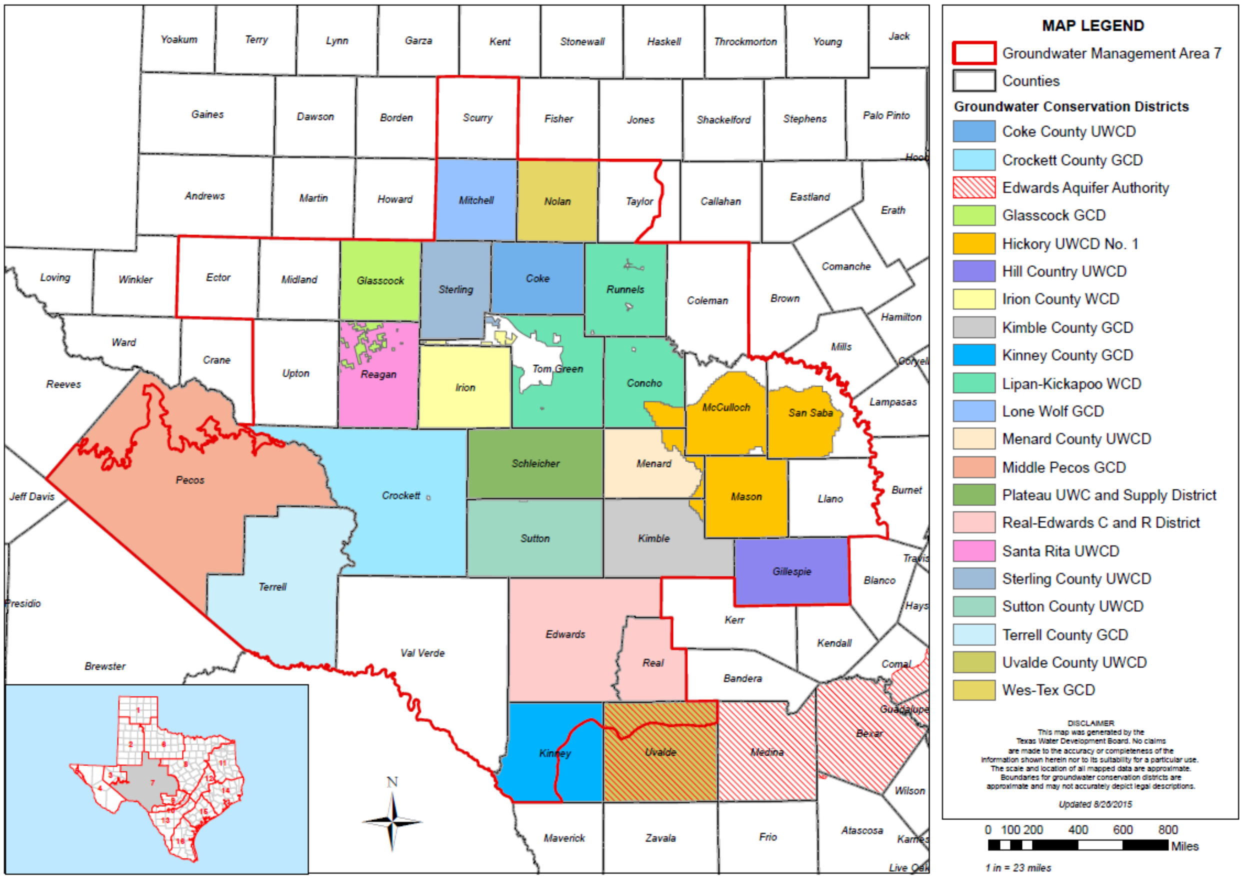

Figure 1. Groundwater Conservation Districts in Groundwater Management Area 7

The draft of this report is for circulation to the groundwater conservation districts in Groundwater Management Area 7 and to TWDB staff for review and comment. Once the review has been completed, the report will be formally approved at a Groundwater Management Area 7 meeting in early 2022 for final submittal to TWDB.

2.0 Dockum Aquifer

In Groundwater Management Area 7, desired future conditions were established for the Dockum Aquifer in Pecos and Reagan counties. The Dockum Aquifer was classified as not relevant for purposes of joint planning in Coke, Crockett, Ector, Glasscock, Irion, Midland, Mitchell, Nolan, Scurry, Sterling, Tom Green, and Upton counties.

2.1 Aquifer Description

As described in George and others (2011):

> ***The Dockum Aquifer*** *is a minor aquifer found in the northwest part of the state. It is defined stratigraphically by the Dockum Group and includes, from oldest to youngest, the Santa Rosa Formation, the Tecovas Formation, the Trujillo Sandstone, and the Cooper Canyon Formation. The Dockum Group consists of gravel, sandstone, siltstone, mudstone, shale, and conglomerate. Groundwater located in the sandstone and conglomerate units is recoverable, the highest yields coming from the coarsest grained deposits located at the middle and base of the group. Typically, the water-bearing sandstones are locally referred to as the Santa Rosa Aquifer. The water quality in the aquifer is generally poor—with freshwater in outcrop areas in the east and brine in the western subsurface portions of the aquifer—and the water is very hard. Naturally occurring radioactivity from uranium present within the aquifer has resulted in gross alpha radiation in excess of the state's primary drinking water standard. Radium-226 and -228 also occur in amounts above acceptable standards. Groundwater from the aquifer is used for irrigation, municipal water supply, and oil field waterflooding operations, particularly in the southern High Plains. Water level declines and rises have occurred in different areas of the aquifer. The regional water planning groups, in their 2006 Regional Water Plans, recommended several water management strategies that use the Dockum Aquifer, including new wells, desalination, and reallocation.*

2.2 Location Map of Aquifer

Figure 2 (from TWDB, 2016) shows the location and extent of the Dockum Aquifer.

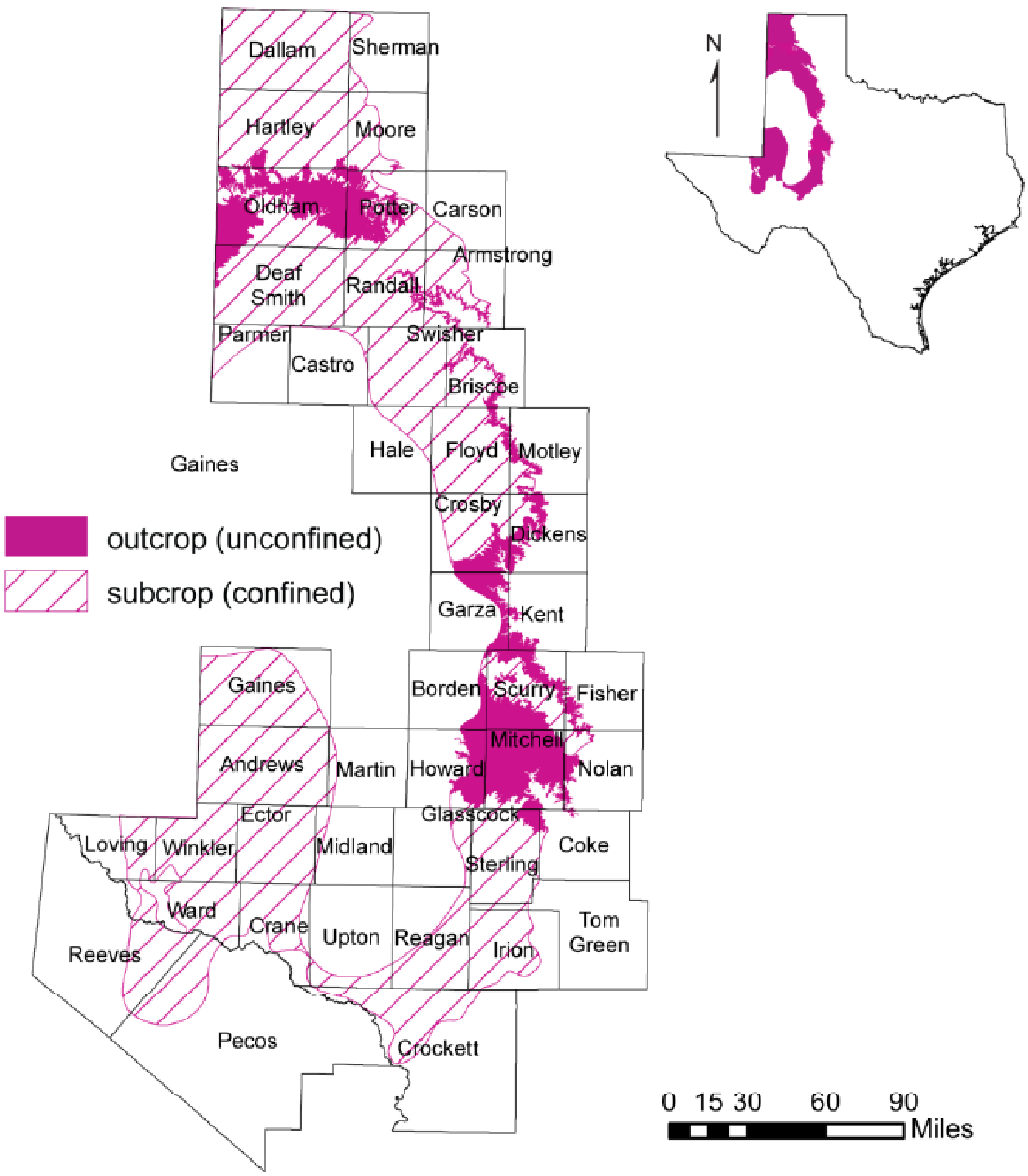

Figure 2. Extent of Dockum Aquifer (from TWDB, 2016)

2.3 Aquifer Characteristics

As reported in TWDB (2016):

> *Groundwater in sandstone and conglomerate units is recoverable, with the highest yields typically coming from the coarsest grained deposits located at the base of the Dockum Group; these water-bearing sandstones are locally referred to as the Santa Rosa Aquifer. The mean hydraulic conductivity is 0.2 feet per day for the upper Dockum Aquifer and 0.4 feet per day for the lower Dockum Aquifer (Ewing and others, 2008) but can range as high as 22 feet per day in some areas (Deeds and others, 2015).*

2.4 Groundwater Demands

Pumping estimates for 2019 were obtained from the TWDB website:

https://www3.twdb.texas.gov/apps/reports/WU/SumFinal_Groundwater_Pumpage

Table 1 presents the 2019 pumping data for the Dockum Aquifer for Groundwater Management Area 7 counties that were designated as not relevant for purposes of joint planning. Please note that Coke, Glasscock, and Tom Green counties were not listed in the source data.

Table 1. Groundwater Pumping Estimates for 2019 - Dockum Aquifer

County	2019 Pumping (AF/yr)
Coke	Not listed
Crockett	1
Ector	37
Glasscock	Not listed
Irion	1
Midland	0
Mitchell	16,017
Nolan	14,836
Scurry	8,027
Sterling	224
Tom Green	Not listed
Upton	110

2.5 Total Estimated Recoverable Storage

Total estimated recoverable storage was reported by Jones and others (2013). Estimates for the counties designated as not relevant for purposes of joint planning are presented in Table 2.

Table 2. Total Estimated Recoverable Storage - Dockum Aquifer

County	Total Storage (Million AF)	25 Percent of Total Storage (Million AF)	75 Percent of Total Storage (Million AF)
Coke	0.52	0.13	0.39
Crockett	14.00	3.50	10.50
Ector	100.00	25.00	75.00
Glasscock	11.00	2.75	8.25
Irion	9.10	2.28	6.83
Midland	10.00	2.50	7.50
Mitchell	27.00	6.75	20.25
Nolan	2.10	0.53	1.58
Scurry	32.00	8.00	24.00
Sterling	33.00	8.25	24.75
Tom Green	1.10	0.28	0.83
Upton	9.30	2.33	6.98

2.6 Explanation of Non-Relevance

The reasons for designating portions of the Dockum Aquifer not relevant for purposes of joint planning include limited areal extent, limited groundwater use, limited impacts across county lines due to generally low hydraulic conductivity, and no groundwater conservation district. Table 3 summarizes the reasons for each county.

Table 3. Explanation of Non-Relevance - Dockum Aquifer

County	Limited Areal Extent	Limited Groundwater Use	Limited Impacts Across County Lines	No GCD
Coke	x	x		
Crockett		x		
Ector		x		x
Glasscock	x	x		
Irion		x		
Midland	x	x		x
Mitchell			x	
Nolan			x	
Scurry			x	x
Sterling		x		
Tom Green	x	x		
Upton	x	x		x

3.0 Edwards-Trinity (Plateau) Aquifer

In Groundwater Management Area 7, desired future conditions were established for the Edwards-Trinity (Plateau) Aquifer in Coke, Crockett, Ector, Edwards, Gillespie, Glasscock, Irion, Kimble, Kinney, Menard, Midland, Pecos, Reagan, Real, Schleicher, Sterling, Sutton, Taylor, Terrell, Upton, Uvalde, and Val Verde counties. The Edwards-Trinity (Plateau) Aquifer was classified as not relevant for purposes of joint planning in Concho, Mason, McCulloch, Nolan, and Tom Green counties.

3.1 Aquifer Description

As described in George and others (2011):

> ***The Edwards-Trinity (Plateau) Aquifer*** *is a major aquifer extending across much of the southwestern part of the state. The water-bearing units are composed predominantly of limestone and dolomite of the Edwards Group and sands of the Trinity Group. Although maximum saturated thickness of the aquifer is greater than 800 feet, freshwater saturated thickness averages 433 feet. Water quality ranges from fresh to slightly saline, with total dissolved solids ranging from 100 to 3,000 milligrams per liter, and water is characterized as hard within the Edwards Group. Water typically increases in salinity to the west within the Trinity Group. Elevated levels of fluoride in excess of primary drinking water standards occur within Glasscock and Irion counties. Springs occur along the northern, eastern, and southern margins of the aquifer primarily near the bases of the Edwards and Trinity groups where exposed at the surface. San Felipe Springs is the largest exposed spring along the southern margin. Of groundwater pumped from this aquifer, more than two-thirds is used for irrigation, with the remainder used for municipal and livestock supplies. Water levels have remained relatively stable because recharge has generally kept pace with the relatively low amounts of pumping over the extent of the aquifer. The regional water planning groups, in their 2006 Regional Water Plans, recommended water management strategies that use the Edwards Trinity (Plateau) Aquifer, including the construction of a well field in Kerr County and public supply wells in Real County.*

3.2 Location Map of Aquifer

Figure 3 (from TWDB, 2016) shows the location and extent of the Edwards-Trinity (Plateau) Aquifer.

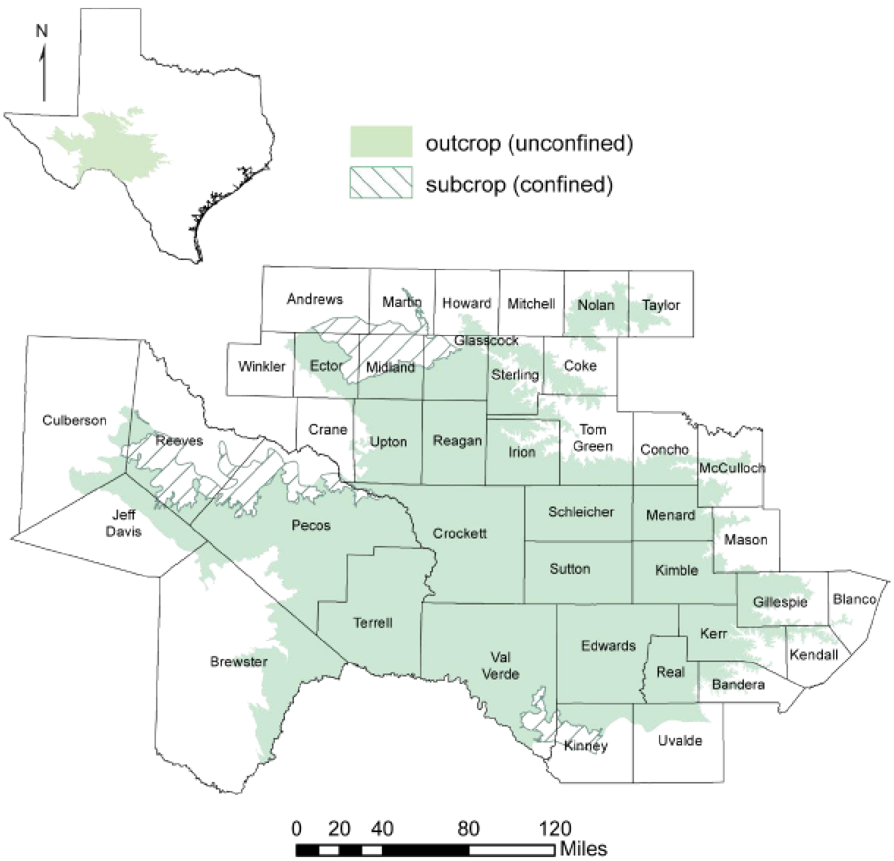

Figure 3. Extent of Edwards-Trinity (Plateau) Aquifer (from TWDB, 2016)

3.3 Aquifer Characteristics

As reported in TWDB (2016):

> *The aquifer is mostly under water table or unconfined conditions, although the Trinity unit of the aquifer may be semi-confined locally where relatively impermeable sediments of the overlying basal member of the Edwards Group exists (Ashworth and Hopkins, 1995). The base of the aquifer slopes generally to the south and southeast. Most of the rocks that underlie the Edwards-Trinity (Plateau) Aquifer are much less permeable than the aquifer and function as a barrier to groundwater flow. Locally, the underlying rocks are permeable and are hydraulically connected to the Edwards-Trinity (Plateau) Aquifer, thus extending the thickness of the flow system.*

Except for areas of significant karst-induced permeability, the average hydraulic conductivity of the Edwards-Trinity (Plateau) Aquifer sediments is about 10 feet per day (Barker and Ardis, 1996). Wells commonly yield from 50 to 200 gallons per minute. Well yields can vary greatly depending on the amount of development of secondary permeability in the limestone; yields from jointed and cavernous limestone can be as much as 3,000 gallons per minute.

3.4 Groundwater Demands

Pumping estimates for 2019 were obtained from the TWDB website:

https://www3.twdb.texas.gov/apps/reports/WU/SumFinal_Groundwater_Pumpage

Table 4 presents the 2019 pumping data for the Edwards-Trinity (Plateau) Aquifer for Groundwater Management Area 7 counties that were designated as not relevant for purposes of joint planning.

Table 4. Groundwater Pumping Estimates for 2019 - Edwards-Trinity (Plateau) Aquifer

County	2019 Pumping (AF/yr)
Concho	321
Mason	11
McCulloch	6
Nolan	216
Tom Green	2,115

3.5 Total Estimated Recoverable Storage

Total estimated recoverable storage was reported by Jones and others (2013). Estimates for the counties designated as not relevant for purposes of joint planning are presented in Table 5.

Table 5. Total Estimated Recoverable Storage - Edwards-Trinity (Plateau) Aquifer

County	Total Storage (Million AF)	25 Percent of Total Storage (Million AF)	75 Percent of Total Storage (Million AF)
Concho	0.08	0.02	0.59
Mason	0.05	0.01	0.04
McCulloch	0.09	0.02	0.07
Nolan	0.17	0.04	0.13
Tom Green	0.25	0.06	0.19

3.6 Explanation of Non-Relevance

The reasons for designating portions of the Edwards-Trinity (Plateau) Aquifer not relevant for purposes of joint planning include limited areal extent and limited groundwater use. There were no instances of limited impacts across county lines due to generally low hydraulic conductivity or no groundwater conservation district. Table 6 summarizes the reasons for each county.

Table 6. Explanation of Non-Relevance - Edwards-Trinity (Plateau) Aquifer

County	Limited Areal Extent	Limited Groundwater Use	Limited Impacts Across County Lines	No GCD
Concho	x	x		
Mason	x	x		
McCulloch	x	x		
Nolan	x	x		
Tom Green	x	x		

4.0 Ellenburger-San Saba Aquifer

In Groundwater Management Area 7, desired future conditions were established for the Ellenburger-San Saba Aquifer in Gillespie, Kimble, Llano, McCulloch, Menard, and San Saba counties. The Ellenburger-San Saba Aquifer was classified as not relevant for purposes of joint planning in Coleman, Concho, and Mason counties.

4.1 Aquifer Description

As described in George and others (2011):

> ***The Ellenburger–San Saba Aquifer*** *is a minor aquifer that is found in parts of 15 counties in the Llano Uplift area of Central Texas. The aquifer consists of the Tanyard, Gorman, and Honeycut formations of the Ellenburger Group and the San Saba Limestone Member of the Wilberns Formation. The aquifer consists of a sequence of limestone and dolomite that crop out in a circular pattern around the Llano Uplift and dip radially into the subsurface away from the center of the uplift to depths of approximately 3,000 feet. Regional block faulting has significantly compartmentalized the aquifer. The maximum thickness of the aquifer is about 2,700 feet. Water is held in fractures, cavities, and solution channels and is commonly under confined conditions. The aquifer is highly permeable in places, as indicated by wells that yield as much as 1,000 gallons per minute and springs that issue from the aquifer, maintaining the base flow of streams in the area. Water produced from the aquifer is inherently hard and usually has less than 1,000 milligrams per liter of total dissolved solids. Fresh to slightly saline water extends downdip to depths*

of approximately 3,000 feet. Elevated concentrations of radium and radon also occur in the aquifer. Most of the groundwater is used for municipal purposes, and the remainder for irrigation and livestock. A large portion of water flowing from San Saba Springs, which is the water supply for the city of San Saba, is thought to be from the Ellenburger–San Saba and Marble Falls aquifers. The regional water planning groups, in their 2006 Regional Water Plans, recommended several water management strategies that use the Ellenburger–San Saba Aquifer, including the development of a new well field in Llano County to supply the city of Llano, additional pumping from existing wells, temporary overdrafts, and the reallocation of supplies from users with surpluses to users with needs.

4.2 Location Map of Aquifer

Figure 4 (from TWDB, 2016) shows the location and extent of the Ellenburger-San Saba Aquifer.

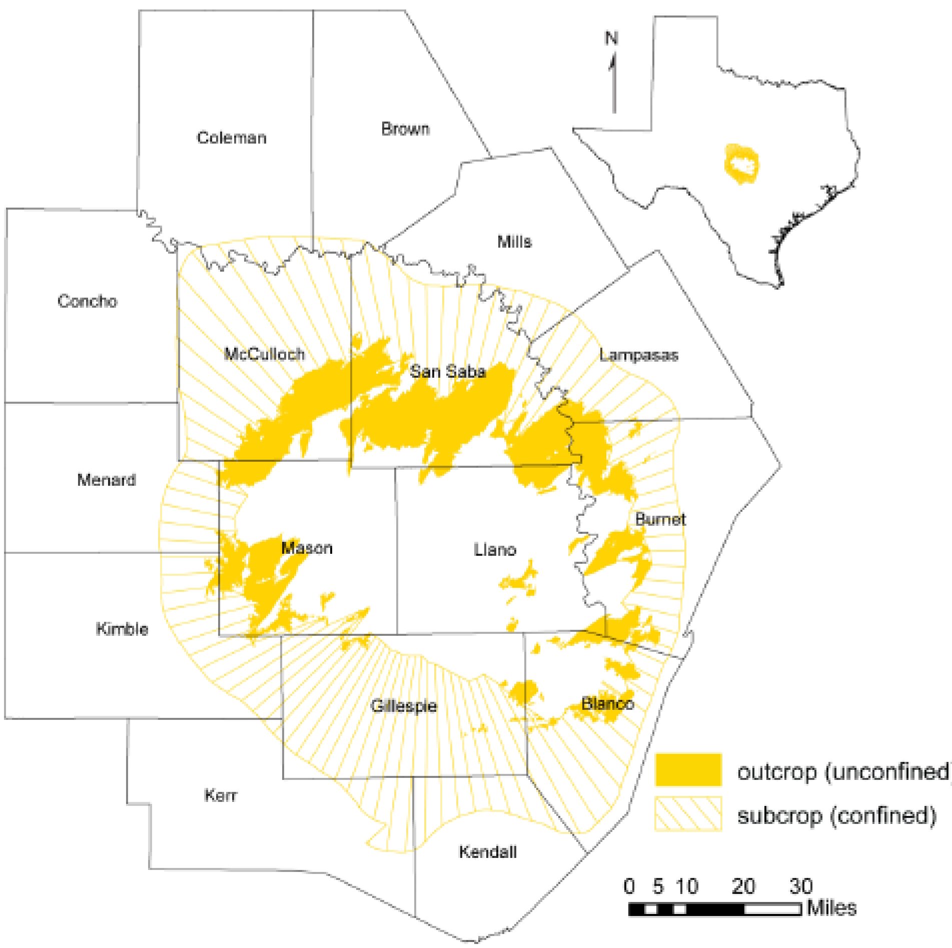

Figure 4. Extent of Ellenburger-San Saba Aquifer (from TWDB, 2016)

4.3 Aquifer Characteristics

As reported in TWDB (2016):

> *Water occurs in fractures, cavities, and solution channels and is commonly under confined conditions. The aquifer is highly permeable in places, as indicated by wells that yield as much as 1,000 gallons per minute. Numerous springs issue from the aquifer, maintaining the baseflow of streams in the area.*

4.4 Groundwater Demands

Pumping estimates for 2019 were obtained from the TWDB website:

https://www3.twdb.texas.gov/apps/reports/WU/SumFinal_Groundwater_Pumpage

Table 7 presents the 2019 pumping data for the Ellenburger-San Saba Aquifer for Groundwater Management Area 7 counties that were designated as not relevant for purposes of joint planning. Please note that Concho County was not listed in the source data.

Table 7. Groundwater Pumping Estimates for 2019 - Ellenburger-San Saba Aquifer

County	2019 Pumping (AF/yr)
Coleman	0
Concho	Not Listed
Mason	73

4.5 Total Estimated Recoverable Storage

Total estimated recoverable storage was reported by Jones and others (2013). Estimates for the counties designated as not relevant for purposes of joint planning are presented in Table 8.

Table 8. Total Estimated Recoverable Storage - Ellenburger-San Saba Aquifer

County	Total Storage (Million AF)	25 Percent of Total Storage (Million AF)	75 Percent of Total Storage (Million AF)
Coleman	1.40	0.35	1.05
Concho	0.06	0.02	0.05
Mason	1.90	0.48	1.43

4.6 Explanation of Non-Relevance

The reasons for designating portions of the Ellenburger-San Saba Aquifer not relevant for purposes of joint planning include limited areal extent and limited groundwater use, and no groundwater conservation district. There were no instances of limited impacts across county lines due to generally low hydraulic conductivity. Table 9 summarizes the reasons for each county.

Table 9. Explanation of Non-Relevance - Ellenburger-San Saba Aquifer

County	Limited Areal Extent	Limited Groundwater Use	Limited Impacts Across County Lines	No GCD
Coleman		x		x
Concho	x	x		
Mason		x		

5.0 Hickory Aquifer

In Groundwater Management Area 7, desired future conditions were established for the Hickory Aquifer in Concho, Gillespie, Kimble, Mason, McCulloch, Menard, and San Saba counties. The Hickory Aquifer was classified as not relevant for purposes of joint planning in Coleman and Llano counties.

5.1 Aquifer Description

As described in George and others (2011):

> **The Hickory Aquifer**, *a minor aquifer found in the central part of the state, consists of the water-bearing parts of the Hickory Sandstone Member of the Riley Formation. The Hickory Aquifer reaches a maximum thickness of 480 feet, and freshwater saturated thickness averages about 350 feet. Although the groundwater is generally fresh, with total dissolved solids concentrations of less than 1,000 milligrams per liter, the upper portion of the aquifer typically contains iron in excess of the state's secondary drinking water standards. Of greater concern is naturally occurring radioactivity: gross alpha radiation, radium, and radon are commonly found in excess of the state's primary drinking water standards. The groundwater is used for irrigation throughout its extent and for municipal supply in the cities of Brady, Mason, and Fredericksburg. Slight water level fluctuations occur seasonally in irrigated areas. The regional water planning groups, in their 2006 Regional Water Plans, recommended several water management strategies that use the Hickory Aquifer, including constructing new wells, pumping additional water*

from existing wells, and maintaining existing supplies through supplemental or replacement wells. In addition, the Region F Regional Water Planning Group recommended treating water from the aquifer and distributing it as drinking water through a bottled water program in Concho and McCulloch counties.

5.2 Location Map of Aquifer

Figure 5 (from TWDB, 2016) shows the location and extent of the Hickory Aquifer.

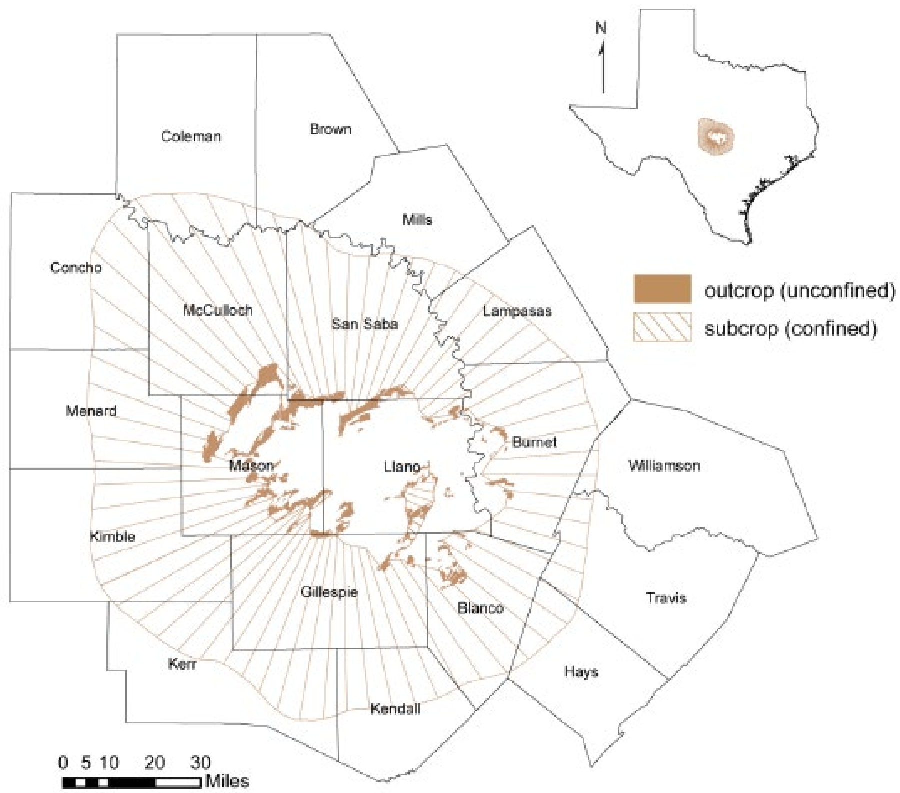

Figure 5. Extent of Hickory Aquifer (from TWDB, 2016)

5.3 Aquifer Characteristics

As reported in TWDB (2016) with references to figure numbers in the source report omitted:

The Hickory Aquifer is a minor aquifer in the central part of the state that consists of the water-bearing parts of the Hickory Sandstone Member. The Hickory Member is a mixture of terrestrial and marine sandstones, siltstones, and mudstones. It is divided into three units with quartz sand in the lower unit, silty or argillaceous sand in the middle unit, and hematite-cemented sand in the upper unit (Shi and others, *2016b). In general, the Hickory Member thickens from north to south, with zero thickness at the Precambrian granite knobs of the Llano Uplift to about 1,000 feet in Kerr County to the south.. The top and base of the Hickory Member are strong geophysical log correlation surfaces (Standen and Ruggiero, 2007) with relatively high gamma readings. The freshwater saturated thickness of the Hickory Aquifer averages about 350 feet.*

5.4 Groundwater Demands

Pumping estimates for 2019 were obtained from the TWDB website:

https://www3.twdb.texas.gov/apps/reports/WU/SumFinal_Groundwater_Pumpage

Table 10 presents the 2019 pumping data for the Hickory Aquifer for Groundwater Management Area 7 counties that were designated as not relevant for purposes of joint planning. Please note that Coleman County was not listed in the source data.

Table 10. Groundwater Pumping Estimates for 2019 - Hickory Aquifer

County	2019 Pumping (AF/yr)
Coleman	Not Listed
Llano	688

5.5 Total Estimated Recoverable Storage

Total estimated recoverable storage was reported by Jones and others (2013). Estimates for the counties designated as not relevant for purposes of joint planning are presented in Table 11.

Table 11. Total Estimated Recoverable Storage - Hickory Aquifer

County	Total Storage (Million AF)	25 Percent of Total Storage (Million AF)	75 Percent of Total Storage (Million AF)
Coleman	1.40	0.35	1.05
Llano	0.35	0.09	0.26

5.6 Explanation of Non-Relevance

The reasons for designating portions of the Hickory Aquifer not relevant for purposes of joint planning include limited areal extent and limited groundwater use, and no groundwater conservation district. There were no instances of limited impacts across county lines due to generally low hydraulic conductivity. Table 12 summarizes the reasons for each county.

Table 12. Explanation of Non-Relevance - Hickory Aquifer

County	Limited Areal Extent	Limited Groundwater Use	Limited Impacts Across County Lines	No GCD
Coleman	x	x		x
Llano	x	x		x

6.0 Marble Falls Aquifer

In Groundwater Management Area 7, all portions of the Marble Falls Aquifer were classified as not relevant for purposes of joint planning. The counties include Kimble, Llano, Mason, McCulloch, and San Saba.

6.1 Aquifer Description

As described in George and others (2011):

> **The Marble Falls Aquifer**, *a minor aquifer, occurs in several separated outcrops along the northern and eastern flanks of the Llano Uplift region of Central Texas. The subsurface extent of the aquifer is unknown. Groundwater occurs in fractures, solution cavities, and channels in the limestone of the Marble Falls Formation of the Bend Group. The aquifer is highly permeable in places, as indicated by wells that yield as much as 2,000 gallons per minute. Maximum thickness of the formation is 600 feet. Where underlying beds are thin or absent, the Marble Falls Aquifer may be hydraulically connected to the Ellenburger–San Saba Aquifer. Numerous large springs issue from the aquifer and provide a significant part of the base flow to the San Saba River in McCulloch and San Saba counties and to the Colorado River in San Saba and Lampasas counties. Because the limestone beds composing this aquifer are relatively shallow, the aquifer is susceptible to pollution by surface uses and activities. For example, some wells in Blanco County have produced water with high nitrate concentrations. In the subsurface, groundwater becomes highly mineralized; however, the water produced from this aquifer is suitable for most purposes and generally contains less than 1,000 milligrams per liter of total dissolved solids. Water from the aquifer is used for municipal, agricultural, and industrial uses, and no significant water level declines have occurred in wells measured by the TWDB. The regional water planning groups, in their 2006 Regional Water Plans, recommended drilling new wells in Burnet County as a water management strategy using the Marble Falls Aquifer.*

6.2 Location Map of Aquifer

Figure 6 (from TWDB, 2016) shows the location and extent of the Marble Falls Aquifer.

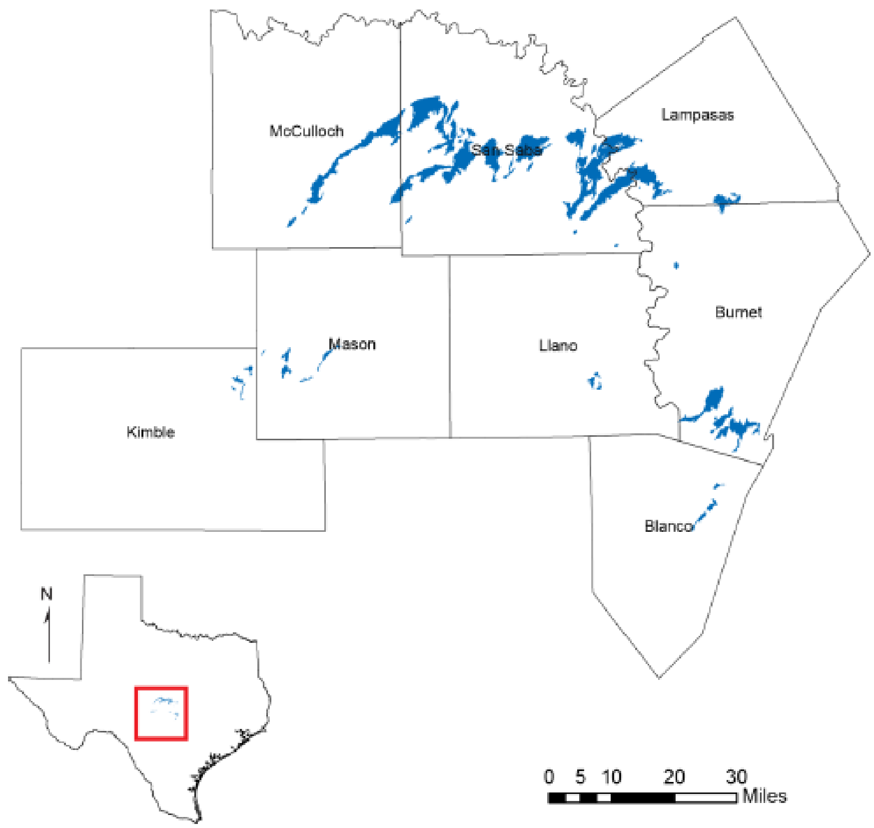

Figure 6. Extent of Marble Falls Aquifer (from TWDB, 2016)

6.3 Aquifer Characteristics

As reported in TWDB (2016) with references to figure numbers in the source report omitted:

> *The Marble Falls Aquifer is a minor aquifer that occurs in several separated outcrops along the northern and eastern edges of the Llano Uplift in Central Texas. The subsurface extent of the aquifer is largely unknown. Water occurs in the Marble Falls Limestone in voids and fractures, and the formation is very permeable in some areas. Wells may produce up to 2,000 gallons per minute and the formation measures up to 600 feet thick with an average estimated thickness of 160 feet. Specific yield estimates range from 1.5 percent to as much as 3 percent.*

6.4 Groundwater Demands

Pumping estimates for 2019 were obtained from the TWDB website:

https://www3.twdb.texas.gov/apps/reports/WU/SumFinal_Groundwater_Pumpage

Table 13 presents the 2019 pumping data for the Marble Falls Aquifer for Groundwater Management Area 7 counties that were designated as not relevant for purposes of joint planning. Please note that Kimble, Llano, and Mason counties were not listed in the source data.

Table 13. Groundwater Pumping Estimates for 2019 – Marble Falls Aquifer

County	2019 Pumping (AF/yr)
Kimble	Not Listed
Llano	Not Listed
Mason	Not Listed
McCulloch	26
San Saba	34

6.5 Total Estimated Recoverable Storage

Total estimated recoverable storage was reported by Jones and others (2013). Estimates for the counties designated as not relevant for purposes of joint planning are presented in Table 14.

Table 14. Total Estimated Recoverable Storage – Marble Falls Aquifer

County	Total Storage (Million AF)	25 Percent of Total Storage (Million AF)	75 Percent of Total Storage (Million AF)
Kimble	0.0024	0.0006	0.0018
Llano	0.021	0.000525	0.001575
Mason	0.0053	0.001325	0.003975
McCulloch	0.033	0.00825	0.02475
San Saba	0.144	0.036	0.108

6.6 Explanation of Non-Relevance

The reasons for designating portions of the Marble Falls Aquifer not relevant for purposes of joint planning include limited areal extent and limited groundwater use, and no groundwater conservation district. There were no instances of limited impacts across county lines due to generally low hydraulic conductivity. Table 15 summarizes the reasons for each county.

Table 15. Explanation of Non-Relevance – Marble Falls Aquifer

County	Limited Areal Extent	Limited Groundwater Use	Limited Impacts Across County Lines	No GCD
Kimble	x	x		
Llano	x	x		x
Mason	x	x		
McCulloch	x	x		
San Saba	x	x		

7.0 Ogallala Aquifer

In Groundwater Management Area 7, desired future conditions were established for the Ogallala Aquifer in Glasscock County. The Ogallala Aquifer was classified as not relevant for purposes of joint planning in Ector and Midland counties.

7.1 Aquifer Description

As described in George and others (2011):

> ***The Ogallala Aquifer*** *is the largest aquifer in the United States and is a major aquifer of Texas underlying much of the High Plains region. The aquifer consists of sand, gravel, clay, and silt and has a maximum thickness of 800 feet. Freshwater saturated thickness averages 95 feet. Water to the north of the Canadian River is generally fresh, with total dissolved solids typically less than 400 milligrams per liter; however, water quality diminishes to the south, where large areas contain total dissolved solids in excess of 1,000 milligrams per liter. High levels of naturally occurring arsenic, radionuclides, and fluoride in excess of the primary drinking water standards are also present. The Ogallala Aquifer provides significantly more water for users than any other aquifer in the state. The availability of this water is critical to the economy of the region, as approximately 95 percent of groundwater pumped is used for irrigated agriculture. Throughout much of the aquifer, groundwater withdrawals exceed the amount of recharge, and water levels have declined fairly consistently through time. Although water level declines in excess of 300 feet have occurred in several areas over the last 50 to 60 years, the rate of*

decline has slowed, and water levels have risen in a few areas. The regional water planning groups for the Panhandle and Llano Estacado regions, in their 2006 Regional Water Plans, recommended numerous water management strategies using the Ogallala Aquifer, including drilling new wells, developing well fields, overdrafting, and reallocating supplies.

7.2 Location Map of Aquifer

Figure 7 (from TWDB, 2016) shows the location and extent of the Ogallala Aquifer.

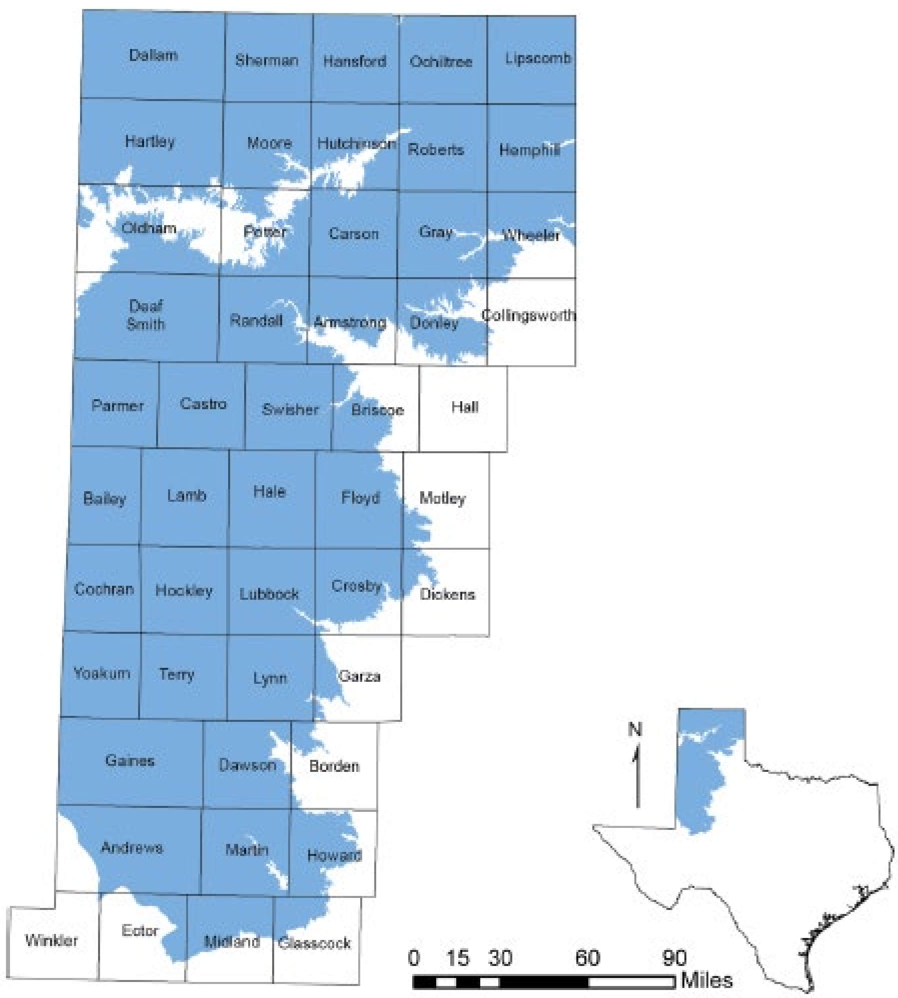

Figure 7. Extent of Ogallala Aquifer (from TWDB, 2016)

7.3 Aquifer Characteristics

As reported in TWDB (2016):

> *The hydraulic conductivity of the Southern Ogallala Aquifer ranges from 0.01 to 2,600 feet per day with a mean of about 6.8 feet per day (Blandford, 2003). The geometric mean of hydraulic conductivity in the Northern Ogallala Aquifer is about 14.8 feet per day with a standard deviation of 5 to 44 feet per day (Dutton, 2001). The specific yield of the Ogallala Aquifer ranges from 15 to 22 percent, with an average of 16 percent (Blandford, 2003).*

7.4 Groundwater Demands

Pumping estimates for 2019 were obtained from the TWDB website:

https://www3.twdb.texas.gov/apps/reports/WU/SumFinal_Groundwater_Pumpage

Table 16 presents the 2019 pumping data for the Ogallala Aquifer for Groundwater Management Area 7 counties that were designated as not relevant for purposes of joint planning.

Table 16. Groundwater Pumping Estimates for 2019 – Ogallala Aquifer

County	2019 Pumping (AF/yr)
Ector	209
Midland	5,231

6.5 Total Estimated Recoverable Storage

Total estimated recoverable storage was reported by Jones and others (2013). Estimates for the counties designated as not relevant for purposes of joint planning are presented in Table 17.

Table 17. Total Estimated Recoverable Storage – Ogallala Aquifer

County	Total Storage (Million AF)	25 Percent of Total Storage (Million AF)	75 Percent of Total Storage (Million AF)
Ector	0.84	0.21	0.63
Midland	3.50	0.88	2.63

6.6 Explanation of Non-Relevance

The reasons for designating portions of the Ogallala Aquifer not relevant for purposes of joint planning include limited areal extent and limited groundwater use, and no groundwater conservation district. There were no instances of limited impacts across county lines due to generally low hydraulic conductivity. Table 18 summarizes the reasons for each county.

Table 18. Explanation of Non-Relevance – Ogallala Aquifer

County	Limited Areal Extent	Limited Groundwater Use	Limited Impacts Across County Lines	No GCD
Ector	x	x		x
Midland		x		x

8.0 References

George, P.G., Mace, R.E., and Petrossian, R., 2011. Aquifers of Texas. Texas Water Development Board Report 380, July 2011, 182p.

Hutchison, W.R., 2021. Documentation for Aquifers Not Relevant for Purposes of Joint Planning, GMA 7 – Blaine, Cross Timbers, Igneous, Lipan, and Seymour Aquifers. Report prepared for Groundwater Management Area 7, August 27, 2021, 28p.

Jones, I.C., Bradley, R., Bohici, R., Kohlrenken, W., Shi, J., 2013. GAM Task 13-030: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 7. Texas Water Development Board, Groundwater Resources Division, October 2, 2013, 53p.

Texas Water Development Board, 2016. Texas Aquifer Study, Groundwater Quantity, Quality, Flow, and Contributions to Surface Flow. Unnumbered Report. December 31, 2016, 336p.

STATE OF TEXAS	§	
	§	**RESOLUTION # 08-19-2021-1**
GROUNDWATER	§	
MANAGEMENT AREA 7	§	

Declaration that the Blaine, Igneous, Lipan, Marble Falls, Cross Timbers, and Seymour Aquifers are Not Relevant for Joint Planning Purposes

Groundwater Management Area 7

WHEREAS, Groundwater Conservation Districts (GCDs) located within or partially within Groundwater Management Area 7 (GMA 7) are required under Chapter §36.108, Texas Water Code to conduct joint planning and designate the Desired Future Conditions of aquifers within GMA 7 and;

WHEREAS, the Board Presidents or their Designated Representatives of GCDs in GMA 7 have met in various meetings and conducted joint planning in accordance with Chapter §36.108, Texas Water Code since October 2019 and;

WHEREAS, the GMA 7 Districts have received and considered Groundwater Availability Model runs and other technical advice regarding local aquifers, hydrology, geology, recharge characteristics, local groundwater demands and usage, population projections, other factors set forth in §36.108(d) of the Texas Water Code, from all aquifers within the respective GCDs, ground and surface water inter-relationships, that affect groundwater conditions through the year 2070; and

WHEREAS, the member GCDs of GMA 7, having given proper and timely notice, held an open meeting on March 18, 2021, at the Sutton County Civic Center, 1700 N Crockett, Sonora, Texas, and voted to adopt proposed Desired Future Conditions for the aquifers of GMA; and

WHEREAS, at a meeting held on August 19, 2021, the GCDs within GMA 7 voted, upon motion made and seconded, 14 districts in favor, 0 districts opposed, to declare the Blaine, Igneous, Lipan, Marble Falls, Cross Timbers, and Seymour Aquifers not relevant for joint planning purposes pursuant to Section 36.108 of the Texas Water Code and therefore not requiring establishment of DFCs by GMA 7 nor determination by the Texas Water Development Board (TWDB) of Modeled Available Groundwater (MAGs) for those aquifers within GMA 7,

NOW THEREFORE BE IT RESOLVED, that Groundwater Management Area 7 does hereby record, and confirm the above declaration that the **Blaine, Igneous, Lipan, Marble Falls, Cross Timbers, and Seymour Aquifers are not relevant for Section 36.108 joint planning purposes within the boundaries of Groundwater Management Area 7**, therefore not requiring establishment of Desired Future Conditions by GMA 7 Districts nor determination of Managed Available Groundwater by the Texas Water Development Board for said aquifers within GMA 7, approved by the following votes of the Designated Representatives of Groundwater Conservation Districts present and voting on August 19, 2021:

AYES:

____
DESIGNATED REPRESENTATIVE – Coke County Underground Water Conservation District

____
DESIGNATED REPRESENTATIVE – Crockett County Groundwater Conservation District

____
DESIGNATED REPRESENTATIVE – Glasscock Groundwater Conservation District

____
DESIGNATED REPRESENTATIVE – Hickory Underground Water Conservation District No. 1

____
DESIGNATED REPRESENTATIVE – Hill Country Underground Water Conservation District

____
DESIGNATED REPRESENTATIVE - Irion County Water Conservation District

____
DESIGNATED REPRESENTATIVE – Kimble County Groundwater Conservation District

____
DESIGNATED REPRESENTATIVE - Kinney County Groundwater Conservation District

____
DESIGNATED REPRESENTATIVE - Lipan-Kickapoo Water Conservation District

____
DESIGNATED REPRESENTATIVE - Lone Wolf Groundwater Conservation District

____
DESIGNATED REPRESENTATIVE – Menard County Underground Water District

____
DESIGNATED REPRESENTATIVE – Middle Pecos Groundwater Conservation District

____
DESIGNATED REPRESENTATIVE - Plateau Underground Water Conservation and Supply District

____
DESIGNATED REPRESENTATIVE - Real-Edwards Conservation and Reclamation District

____
DESIGNATED REPRESENTATIVE - Santa Rita Underground Water Conservation District

____
DESIGNATED REPRESENTATIVE - Sterling County Underground Water Conservation District

____
DESIGNATED REPRESENTATIVE – Sutton County Underground Water Conservation District

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DESIGNATED REPRESENTATIVE - Terrell County Groundwater Conservation District

____
DESIGNATED REPRESENTATIVE - Uvalde County Underground Water Conservation District

____
DESIGNATED REPRESENTATIVE - Wes-Tex Groundwater Conservation District

NAYES:

____

DESIGNATED REPRESENTATIVE – Coke County Underground Water Conservation District

DESIGNATED REPRESENTATIVE – Crockett County Groundwater Conservation District

DESIGNATED REPRESENTATIVE – Glasscock Groundwater Conservation District

DESIGNATED REPRESENTATIVE – Hickory Underground Water Conservation District No. 1

DESIGNATED REPRESENTATIVE – Hill Country Underground Water Conservation District

DESIGNATED REPRESENTATIVE - Irion County Water Conservation District

DESIGNATED REPRESENTATIVE – Kimble County Groundwater Conservation District

DESIGNATED REPRESENTATIVE - Kinney County Groundwater Conservation District

DESIGNATED REPRESENTATIVE - Lipan-Kickapoo Water Conservation District

DESIGNATED REPRESENTATIVE - Lone Wolf Groundwater Conservation District

DESIGNATED REPRESENTATIVE – Menard County Underground Water District

DESIGNATED REPRESENTATIVE – Middle Pecos Groundwater Conservation District

DESIGNATED REPRESENTATIVE - Plateau Underground Water Conservation and Supply District

DESIGNATED REPRESENTATIVE - Real-Edwards Conservation and Reclamation District

DESIGNATED REPRESENTATIVE - Santa Rita Underground Water Conservation District

DESIGNATED REPRESENTATIVE - Sterling County Underground Water Conservation District

DESIGNATED REPRESENTATIVE – Sutton County Underground Water Conservation District

DESIGNATED REPRESENTATIVE - Terrell County Groundwater Conservation District

DESIGNATED REPRESENTATIVE - Uvalde County Underground Water Conservation District

DESIGNATED REPRESENTATIVE - Wes-Tex Groundwater Conservation District