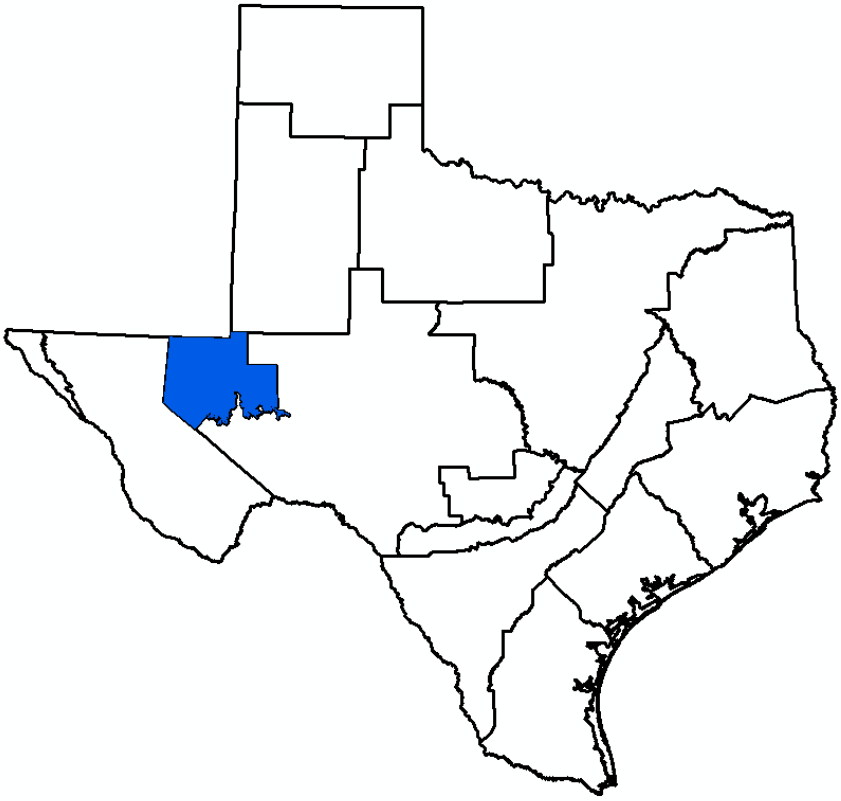
Documentation for Aquifers Not Relevant for Purposes of Joint Planning
GMA 3

Igneous and Ogallala Aquifers



Prepared for:
Groundwater Management Area 3

Prepared by:
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WHEREAS, Groundwater Conservation Districts (GCDs) located within or partially within Groundwater Management Area 3 (GMA 3) are required under Chapter 36.108, Texas Water Code to conduct joint planning and designate the Desired Future Conditions of aquifers within GMA 3 and;

WHEREAS, the Board Presidents or their Designated Representatives of GCDs in GMA 3 have met in various meetings and conducted joint planning in accordance with §36.108, Texas Water Code since 2016; and

WHEREAS, the GMA 3 committee has received and considered Groundwater Availability Model runs and other technical advice regarding local aquifers, hydrology, geology, recharge characteristics, the nine factors set forth in§36.108(d) of the Texas Water Code, local groundwater demands and usage, population projections, total water supply and quality of water supply available from all aquifers within the respective GCDs, regional water plan water management strategies, ground and surface water interactions, that affect groundwater conditions through the year 2070; and

WHEREAS, the member GCDs of GMA 3, having given proper and timely notice, held an open meeting on October 21, 2020 at the Middle Pecos Groundwater Conservation District office, 405 North Spring Drive, Fort Stockton, Texas to vote to adopt proposed Desired Future Conditions within the boundaries of GMA 3; and

WHEREAS on this day of February 17, 2021, at an open meeting duly noticed and held in accordance with law at the Middle Pecos Groundwater Conservation District office, 405 North Spring Drive, Fort Stockton, Texas, the GCDs within GMA 3, having considered at this meeting comments submitted to the individual districts during the comment period and at this meeting, have voted, 2 districts in favor, 0 districts opposed, to declare the Igneous and Ogallala not relevant for purposes of joint planning pursuant to Section 36.108 of the Texas Water Code and therefore not requiring the establishment of DFCs by GMA 3, nor the determination by the Texas Water Development Board (TWDB) of Modeled Available Groundwater (MAGs) for those aquifers in GMA 3,

Middle Pecos Groundwater Conservation District
Ty Edwards, General Manager

Reeves County Groundwater Conservation District
Larry Turnbough, Board President

Igneous Aquifer: Not Relevant for Purposes of Joint Planning

GMA 3 Technical Memorandum 16-03, Final

William R. Hutchison, Ph.D., P.E., P.G.
February 13, 2017

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 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.

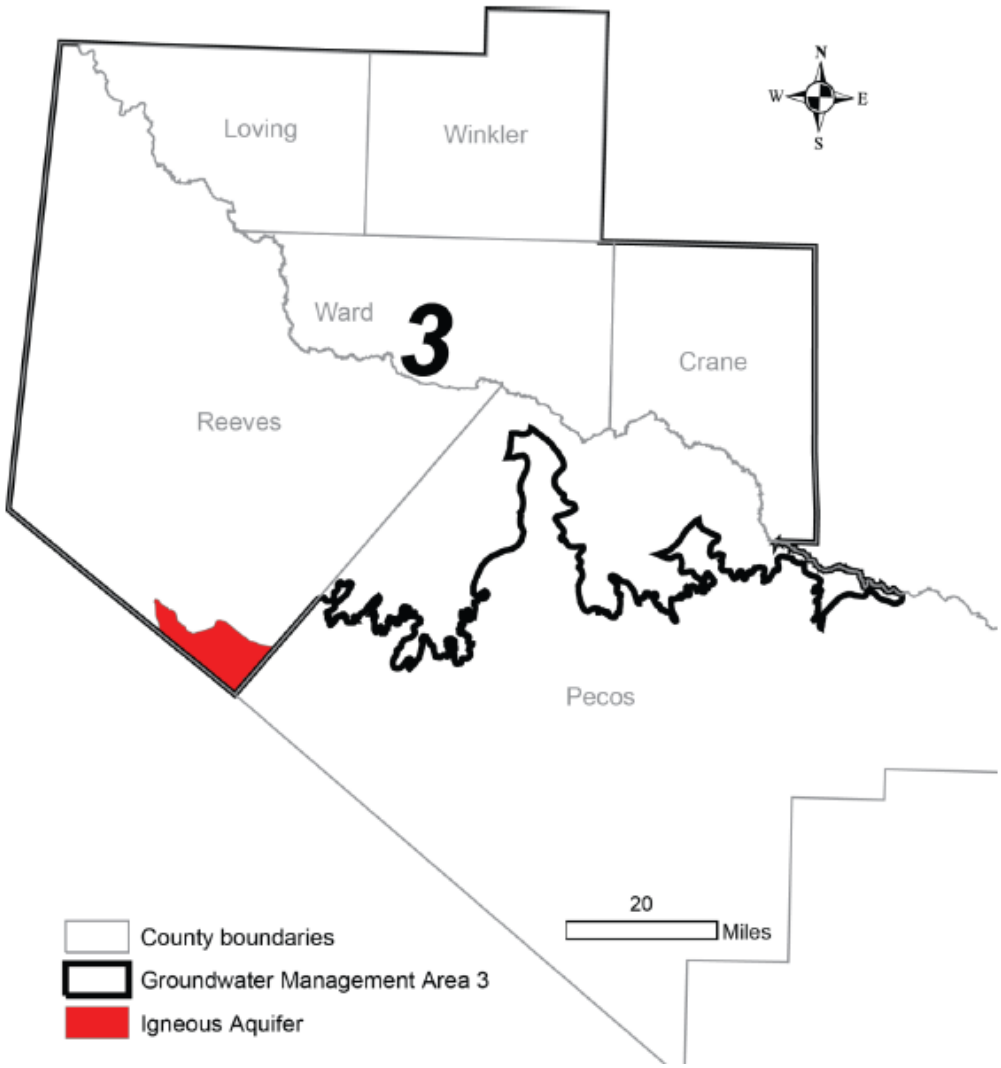

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Figure 1. Location of Igneous Aquifer in GMA 3

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 Reeves 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 use in Reeves County of 284 AF/yr from the Igneous Aquifer in 2012. This amount of pumping since 2000 ranged from 18 AF/yr (in 2008) to 415 AF/yr (in 2000).

Total Estimated Recoverable Storage

Jones and others (2013) documented the total estimated recoverable storage for the Igneous Aquifer in Reeves County. Total storage was estimated to be 54,000 acre-feet. Total estimated recoverable storage was assumed to be between 25 percent and 75 percent of the total storage (between 13,500 and 40,500 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 3.

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., Boghici, R., Kohlrenken, W., and Shi, J., GAM Task 13-027: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 3, September 19, 2013, 28p.

Ogallala Aquifer: Not Relevant for Purposes of Joint Planning

GMA 3 Technical Memorandum 16-04, Final

William R. Hutchison, Ph.D., P.E., P.G.
February 13, 2017

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.*
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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 Igneous Aquifer as not relevant for purposes of joint planning.

Aquifer Description and Location

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.*

Figure 1 (taken from Jones and others, 2013) shows the limited extent of the Ogallala Aquifer in GMA 3. Note that it occurs only in a small portion of Winkler County.

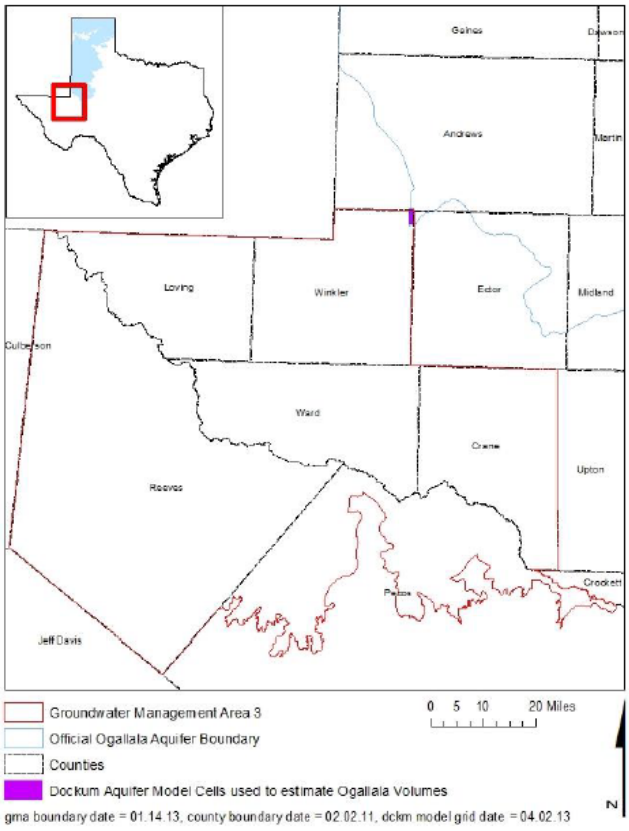

Figure 1. Location of Ogallala Aquifer in GMA 3

Ogallala Aquifer: Not Relevant for Purposes of Joint Planning

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Aquifer Characteristics

Deeds and others (2015) described the aquifer characteristics for the groundwater availability model of the High Plains Aquifer System, which includes the Ogallala Aquifer. Hydraulic conductivity in the area of Winkler County is less than 5 feet per day. Specific yield is in the range of 0.16 and 0.20.

Groundwater Demands and Current Groundwater Uses

The Texas Water Development Board pumping database shows use in Crane County from the Ogallala Aquifer was 7 AF/yr in 2010, 2011 and 2012. No pumping is reported from within the official boundary of Winkler County.

Total Estimated Recoverable Storage

Jones and others (2013) documented the total estimated recoverable storage for the Ogallala Aquifer in Winkler County. Total storage was estimated to be 9,600 acre-feet. Total estimated recoverable storage was assumed to be between 25 percent and 75 percent of the total storage (between 2,400 and 7,200 acre-feet).

Explanation of Non-Relevance

Due to its limited areal extent and lack of groundwater use, the Ogallala Aquifer is not relevant for purposes of joint planning in Groundwater Management Area 3.

References

Deeds, N.E., Harding, J.J., Jones, T.L., Singh, A., Hamlin, S., Reedy, R.C., Yan, T., Jigmond, M., Lupton, D., Scanlon, B.R., Seni, S., Dutton, A., Final Conceptual Model Report for the High Plains Aquifer System Groundwater Availability Model. Prepared for the Texas Water Development Board, August 2015. 590p.

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., Boghici, R., Kohlrenken, W., and Shi, J., GAM Task 13-027: Total Estimated Recoverable Storage for Aquifers in Groundwater Management Area 3, September 19, 2013, 28p.