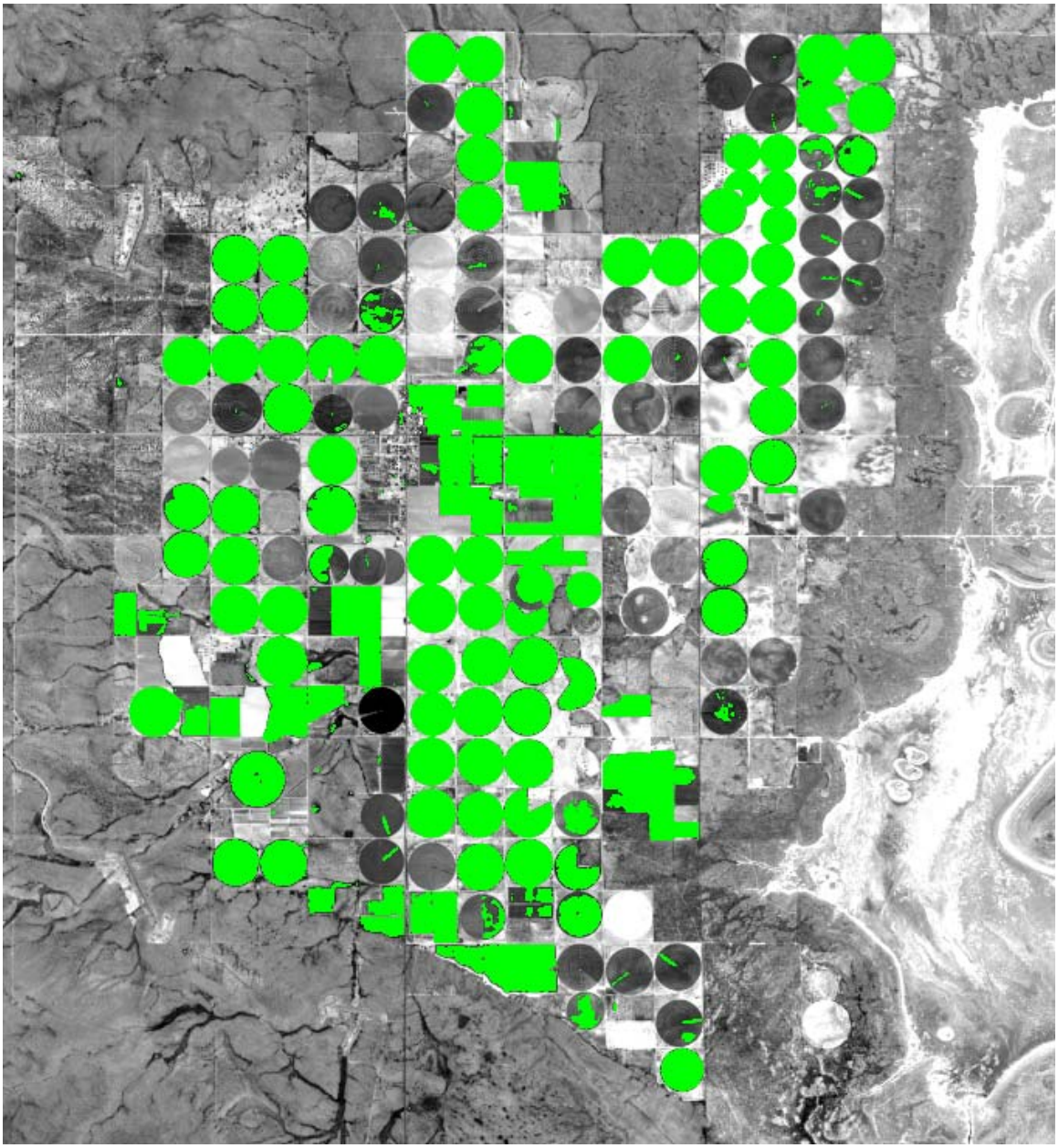
Hudspeth County Underground Water Conservation District No. 1



Groundwater Management Plan

Approved on October 23, 2018

Hudspeth County Underground Water Conservation District No. 1

DRAFT Management Plan for TWDB Review July 2018

This Management Plan was prepared in accordance with the requirements of Chapter 36 of the Texas Water Code and Title 31, Chapter 356, of the Texas Administrative Code and was made available for public comment prior to adoption by the Board of Directors of the Hudspeth County Underground Water Conservation District No. 1 (the District).

1. Estimate of Modeled Available Groundwater - 31 TAC § 356.52(a)(5)(A)

TWDB GAM Run 16-03 0 MAG (Appendix A) summarized the Modeled Available Groundwater based on the GMA 4 Adopted Desired Future Conditions as 101,040 acre-feet per year.

2. Amount of Groundwater Being Used through 2017 – 31 TAC §§ 356.52(a)(5)(B);356.10(2)

Irrigation water use makes up over 99% of the water use in Hudspeth County and in the District. The District requires by rule that all groundwater pumped under validation or operating permits must be metered. (Validation permits are basically those that recognize—"validate"—existing and historic use.) The District has issued approximately 55 validation permits which identify approximately 260 irrigation wells from which groundwater can be pumped. Approximately 120 of the irrigation wells identified in the validation permits are not equipped with a pump and thus are not required to have flow meters. Of the remaining 140 irrigation wells that are equipped with a pump, the District has received meter reading reports for 132 wells.

Domestic, livestock, and municipal use is estimated to be less than 500 acre-feet a year and relatively constant during from 2013 through 2017.

The table on the next page shows the estimated annual amount of groundwater pumping for the Dell City area uses a combination of estimates from crop water use estimates and crop acreage from LANDSAT 8 images and meter reading records. In 2015 the District made a sustained effort to make sure all wells were metered and the meters where working properly. The estimate of unmetered water in 2015 was only 3%.

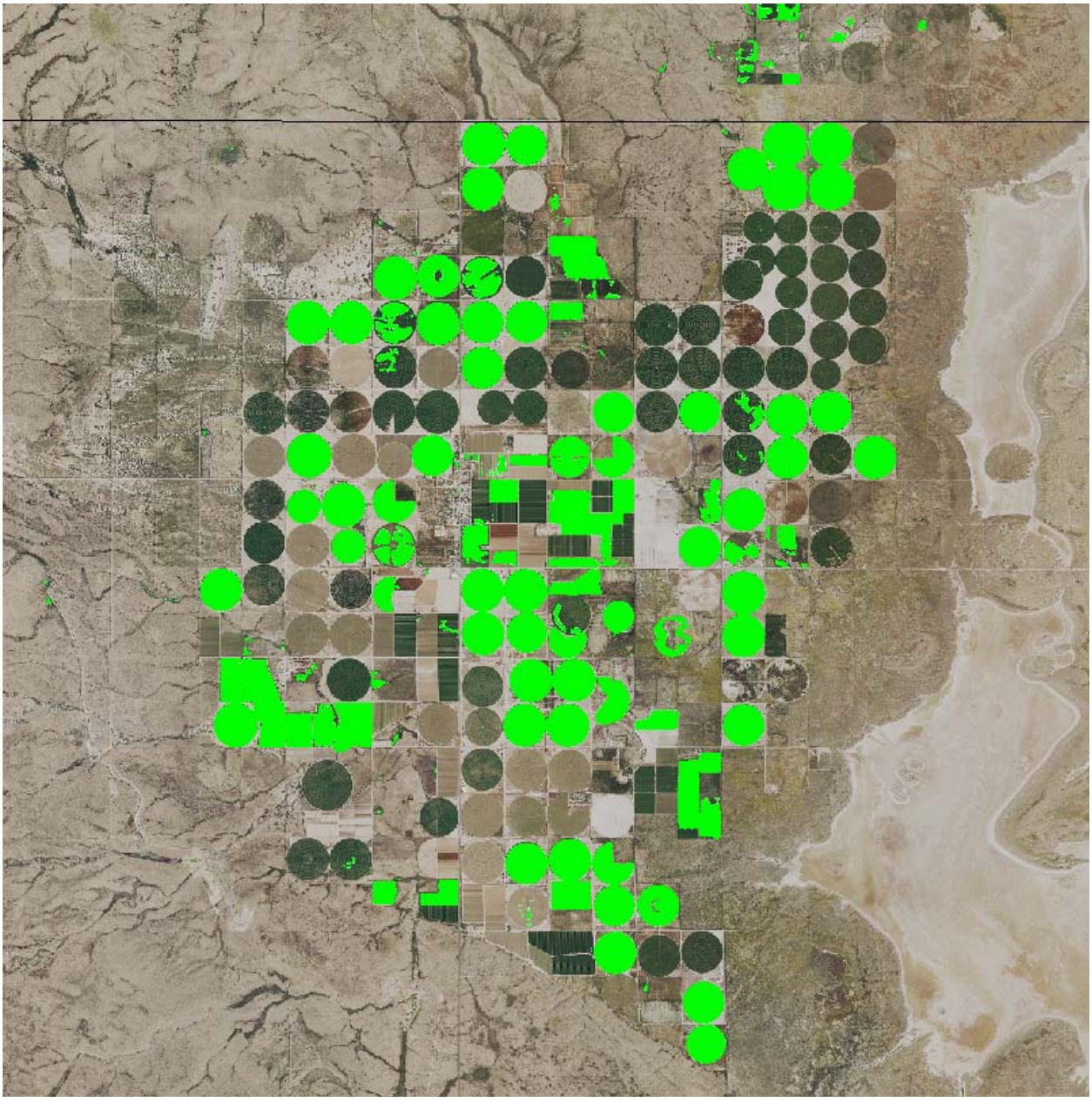


Figure 1: Cultivated Acreage in Dell City, Texas, Area in 2015 (Actively growing area shown in green)

Appendix F contains the "Estimated Historical Groundwater Use and 2017 State Water Plan Datasets" provided by the TWDB. The estimates of Historical Groundwater Use (acre-feet per year) in Appendix F significantly under-estimate the actual historical pumping in the District and other locations within Hudspeth County (see section 2).

3. Amount of Recharge from Precipitation – 31 TAC § 356.52(a)(5)(C)

TWDB GAM Run 11-020 estimated the recharge from precipitation over the District is 256 acre-feet per year. The primary recharge zone for the Bone Spring – Victorio Peak Aquifer is outside and north of the District in the Sacramento Mountains drainage area.

4. Amount of Water that Discharges to Springs – 31 TAC § 356.52(a)(5)(D)

Historically, water from the Bone Spring -Victorio Peak Aquifer discharged to the Alkali Lakes in the Crow Flat portions of the Salt Basin. The exact date that such discharge stopped is not known but was assumed to have occurred prior to 1970. Currently, there is no known spring flow from the aquifer.

5. Estimate of Annual Volumes of Flow – 31 TAC § 356.52(a)(5)(E)

There is only one aquifer in the district and it is in a closed basin. Table 1 below was prepared by the Texas Water Development Board in the document GAM Run 11-030: Hudspeth County Underground Water Conservation District Management Plan.

Table 1: TWDB GAM Run 11-020 Recharge, Inflows and Outflows

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Bone Spring-Victorio Peak Aquifer	256
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Bone Spring-Victorio Peak Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Bone Spring-Victorio Peak Aquifer	110,805
Estimated annual volume of flow out of the district within each aquifer in the district	Bone Spring-Victorio Peak Aquifer	39,825
Estimated net annual volume of flow between each aquifer in the district	Bone Spring-Victorio Peak Aquifer	0

6. Projected Surface Water Supply – 31 TAC § 356.52(a)(5)(F)

The 2017 State Water Plan (see Appendix F) shows 160 acres-feet of surface water being available from the Rio Grande in Hudspeth County during the drought of record. No water from the Rio Grande is available to water users within the District. There are four recharge and flood control dams located within the District that do capture storm runoff, but during the drought-of-record the estimated amount of runoff is zero.

7. Projected Total Demand for Water –31 TAC § 356.52(a)(5)(G)

Appendix F contains the "Estimated Historical Groundwater Use And 2017 State Water Plan Datasets" provided by the TWDB. The project Total Demand for Hudspeth County shown in Appendix F for 2020 for Hudspeth County is 35,142 acre feet. Hudspeth County contains three primary areas of irrigated agriculture: 1) the Hudspeth County Conservation and Reclamation District No. 1 near Ft. Hancock, Texas (approximately 18,000 acres of irrigated land); 2) the Hudspeth County Underground Water Conservation District No. 1 (approximately 34,000 acres of permitted historical irrigated land); and the Salt Flat – Diablo Farms area (approximately 5,000 acres of irrigated land). The approximate total amount of irrigated land in Hudspeth County is 57,000 acres of which it is typical to apply between 3 to 4 feet or water per year to produce and agricultural crop. During drought, the amount of irrigation land near Ft. Hancock is significantly less than 18,000 acres.

Since the District does not cover all of Hudspeth County, county-wide data are not representative data for the District. The area within the District is approximately 19.62 percent of the total area of Hudspeth County.

8. Water Supply Needs – TWC § 36.1071(e)(4)

Appendix F contains the "Estimated Historical Groundwater Use And 2017 State Water Plan Datasets" provided by the TWDB. The Water Supply Needs for Hudspeth County shown in Appendix F for 2020 for Hudspeth County for irrigation is -98,847 acre feet.

9. Water Management Strategies –TWC § 36.1071(e)(4)

The water management strategies for the District include the following strategies obtained from the 2017 State Water Plan:

- Irrigation Scheduling
- Reuse of Irrigation Tailwater

The large majority of irrigated land in the District is planted with alfalfa for hay. Hay production requires repetitive field operations of irrigation, cutting or windrowing, raking, and bailing. The harvest operations are dependent on the alfalfa leaf area being relatively dry and the moisture of the cut hay must be optimal for bailing (neither too dry nor too wet). This sequence of irrigation, cutting, raking, and bailing is typically repeated 5 to 8 times per year. Because the scheduling of these harvest operations takes priority over crop water requirements, irrigation scheduling is seldom used in alfalfa hay

production, and thus is not a useful conservation strategy for the District. Similarly, because alfalfa is a multi-year crop (3 to 6 years) between replanting, conservation tillage is of limited value for alfalfa production.

The majority of the irrigated land within the District is irrigated using low pressure center pivots. Currently, only high value crops in the District, such as grapes, are irrigated using drip irrigation. Several farms in the far south west area of New Mexico and eastern area of Arizona are using subsurface drip irrigation for alfalfa production. The irrigation water quality at these locations is typically much higher (less salt) than the quality of the groundwater in the District. Nonetheless, some potential exists within the District for increasing the amount of drip irrigation.

10. Management of Groundwater Supplies - 31 TAC § 356.52(a)(4)

The District will manage the production of groundwater from the Bone Spring-Victorio Peak aquifer within the District in a sustainable manner. The District will identify and engage in such practices that, if implemented, would result in more efficient use of groundwater.

The District shall prepare an annual report summarizing District activities to be approved by the Board of Directors during the first quarter of each year. A newsletter will be mailed to all validation and operational permit holders. The newsletter will contain a summary of the annual report and information regarding water conservation.

11. Actions, procedures, performance, and avoidance that are or may be necessary to effect the plan, including specifications and proposed rules - TWC §36.1071(e)(2)

The District has, as specified in the District's rules, including the District's groundwater production permitting process, actions, procedures, performance, avoidance, and specifications necessary to effect this Management Plan. Section 16 of this plan specifies management goals, objectives, and performance standards for District activities. Operations of the District, all agreements entered into by the District, and any additional planning activities in which the District participates will be consistent with this plan and with the District's rules.

12. District Rules – TWC § 36.1071(f)

A copy of the District's can be download from https://www.twdb.texas.gov/groundwater/docs/.../hcuwcd1/hcuwcd1_rules2016.pdf

13. Resolution Adopting 2018 Management Plan – 31 TAC § 356.53(a)(3)

A certified copy of the District Resolution adopting this Management Plan is attached as Appendix B.

14. Notice of Hearing on 2018 Management Plan – 31 TAC § 356.53(a)(3)

A hearing notice was published in the *Hudspeth County Herald*, a newspaper of general circulation in Hudspeth County, Texas, 20th day of July 2018, and a copy of the published notice is attached as Appendix C. Also enclosed, as Appendices D and E, respectively, are copies of the posted agenda for the hearing and the minutes of the hearing.

15. Site Specific Information – 31 TAC § 356.52(c)

Section 19 list references for technical publication describing the characteristics of the groundwater resources with the District.

16. Management Goals, Objectives, and Performance Standards – 31 TAC § 356.51

16.1. Addressing Efficient Use of Groundwater

Management Objective: Each year the District will provide information to the general public about the status of the groundwater in the District.

Performance Standard: The District's annual newsletter that will be mailed to each of the existing validation and operating permit holders will include information on the status of groundwater in the District.

16.2. Addressing Controlling and Preventing Waste of Groundwater

Management Objective: The District will inform District water users about efficient use of water and methods to prevent waste.

Performance Standard: The District's annual newsletter that will be mailed to all validation and operating permit holders will include an article on irrigation water management.

16.3. Addressing Controlling and Preventing Subsidence

There is no known subsidence (as defined in Chapter 36 of the Texas Water Code) within the District caused by groundwater withdrawals, and this management item is not applicable to the District's Management Plan.

16.4. Addressing Conjunctive Surface Water Management Issues

There are no known conjunctive surface water management issues within the District, and this management item is not applicable to the District's Management Plan.

16.5. Addressing Natural Resource Issues

Management Objective: The amount of groundwater withdrawals permitted by the District shall be tied to the long-term sustainable amount of recharge to the portion of the aquifer within the District and the groundwater elevation measured in the District's monitoring well(s) in accordance with the District's rules, in such a way as to protect the historical and existing uses of groundwater withdrawn from the portion of the Bone Spring-Victorio Peak aquifer located within the District.

Performance Standard: The District shall report annually to the Board on the amount of groundwater being withdrawn through non-exempt wells located within the District, measured through the District's flow metering program, for the quantification of existing and historical use of groundwater within the District's boundaries, and for the issuing of validation and operational permits for all nonexempt wells in operation.

16.6. Addressing Drought Conditions

Management Objective: The annual amount of groundwater permitted by the District for withdrawal from the portion of the Bone Spring-Victorio Peak aquifer located within the District may be curtailed during periods of extreme drought in the recharge zone of the aquifer or because of other conditions that cause significant declines in groundwater surface elevations. Such curtailment may be triggered by the District's Board based on the groundwater elevation measured in the District's monitoring well(s).

Performance Standard: The District's annual report will include a report on the District's monitoring well groundwater elevation at least one measurement per year and a report on whether the permitted withdrawals were curtailed at any time during the year because of drought conditions.

16.7. Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, and Brush Control

Management Objective: The District shall promote the efficient application of irrigation water to field crops.

Performance Standard: The District shall assist in organizing the field demonstration of irrigation water conservation technology during one day every other year.

Management Objective: The District shall coordinate each year with Hudspeth County on the maintenance of the three existing recharge and flood control facilities located in the district.

Performance Standard: The District Manager shall report to the District's board of directors annually regarding the activities of Hudspeth County regarding the maintenance of the recharge and flood control facilities, and such report shall be reflected in the minutes of such board meeting.

Management Objective: The District shall promote rainwater harvesting, precipitation enhancement, and brush control.

Performance Standard: The District shall include articles on rainwater harvesting, precipitation enhancement, and brush control in its annual newsletter mailed to all of its validation and operating permit holders.

16.8. Addressing Modeled Available Groundwater and Desired Future Conditions

Management Objective: The District shall adopt a Modeled Available Groundwater and Desired Future Conditions value in accordance with the requirements of Chapter 36 of the Texas Water Code and Title 31, Chapter 356, of the Texas Administrative Code.

Performance Standard: The District has participated in the GMA 4 meetings with a minimum of one meeting per year, and will continue to work with GMA 4 and the Texas Water Development Board in determine the amount of Modeled Available Groundwater and the Desired Future Conditions within the District.

17. Addressing Desired Future Conditions

The GMA 4 Resolution 2010-01 set a Desired Future Condition for the Bone Spring – Victorio Peak Aquifer of 0 feet of change in the average groundwater elevation at the end of 50 year planning period in 2060. The following objectives and performance standards will be used to address the District's Desired Future Conditions.

Objective: The District will review and calculate its total amount of groundwater pumped within the District and assess whether the District is on target to meet the DFC estimates submitted to the TWDB.

Performance Standard: The District's Annual Report will include a discussion of the measured groundwater levels and the amount of water pumped each year within the District and will evaluate the District's progress in achieving the DFCs of the groundwater resources within the boundaries of the District and whether the District is on track to maintain the DFC estimates over the fifty year planning period.

Objective: The District will continuously measure the water levels in at least one monitoring well and manually measure water levels each year in at least five monitoring wells within the District and will determine the average groundwater levels every two years. The District will compare the two-year water level averages to the corresponding two-year increment of its DFCs in order to track its progress in achieving the DFCs.

Performance Standard: The District's Annual Report will include the water level measurements taken each year for the purpose of measuring water levels to assess the District's progress towards achieving its DFCs. The District will include a discussion of its comparison of water level averages to the corresponding two-year increment of its DFCs in order to track its progress in achieving its DFCs.

18. Evidence of Coordination with Surface Water Entity

There are no surface water entities identified in the 2017 State Water Plan that are located within the District's boundaries.

19. Sharing with Regional Water Planning Group

Below is a copy of the transmittal letter for the copy of the plan that was sent by certified mail to the Chair of the Far West Regional Water Planning Group requesting the group's comments regarding this Management Plan.

20. References

Ashworth, John, (1995), Ground-water resources of the Bone Spring-Victorio Peak Aquifer in the Dell Valley Area, Texas, Texas Water Development Board Report No. 344, Austin, Texas, 43 pg.

Mace, Robert, et al (2001), Aquifers of West Texas, Texas Water Development Board Report No. 356, Austin, Texas, pg.135-152.

Blair, A.W., (2003), April 28, 2003 as revised on May 5, 2003. Report to the Far West Texas Regional Water Planning Group and the Texas Water Development Board.

“Determination of Acres of Irrigated Land and Irrigation Water Use for the Year 2000 in Hudspeth County Texas.

Far West Texas Regional Water Plan, 2011, Rio Grande Council of Governments, http://www.riocog.org/EnvSvcs/FWTWPG/publishe.htm

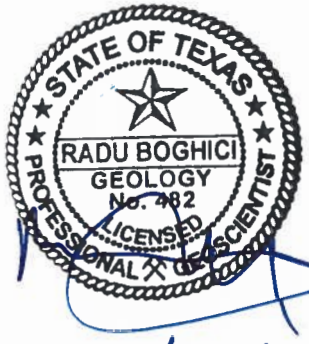
Mayer, J.R., (1995), The role of fractures in regional groundwater flow: Field evidence and model results from the basin-and-range of Texas and New Mexico, M.S. Thesis from University of Texas, Austin.

Logan, H.H., (1984), A groundwater recharge project associated with a flood protection plan in Hudspeth County, Texas, Master Thesis – Texas Christian University, 110 pg. (as cited in Ashworth, 1995).

Appendix A – TWDB GAM Run 16-030 MAG

GAM RUN 16-030 MAG: MODELED AVAILABLE GROUNDWATER FOR THE AQUIFERS IN GROUNDWATER MANAGEMENT AREA 4

Radu Boghici, P.G. and Robert G. Bradley, P.G.
Texas Water Development Board
Groundwater Division
(512) 463-5808
February 28, 2018



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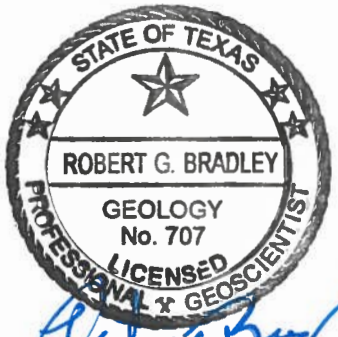

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GAM RUN 16-030 MAG: MODELED AVAILABLE GROUNDWATER FOR THE AQUIFERS IN GROUNDWATER MANAGEMENT AREA 4

Radu Boghici, P.G. and Robert G. Bradley, P.G.
Texas Water Development Board
Groundwater Division
(512) 463-5808
February 28, 2018

EXECUTIVE SUMMARY:

The modeled available groundwater for the relevant aquifers of Groundwater Management Area 4—the Bone Spring-Victorio Peak, Capitan Reef Complex, Edwards-Trinity (Plateau), Igneous, Marathon, and West Texas Bolsons aquifers—are summarized by decade for use in the regional water planning process (Tables 2, 4, 6, 8, 10, and 12) and for the groundwater conservation districts (Tables 1, 3, 5, 7, 9, and 11). The modeled available groundwater estimates are 101,400 acre-feet per year in the Bone Spring-Victorio Peak Aquifer, 8,163 acre-feet per year in the Capitan Reef Complex Aquifer, 1,394 acre-feet per year in the Edwards-Trinity (Plateau) Aquifer, range from 11,333 to 11,329 acre-feet per year in the Igneous Aquifer, 7,327 acre-feet per year in the Marathon Aquifer, and range from 58,577 to 57,881 acre-feet per year in the West Texas Bolsons Aquifer (Salt Basin and Presidio and Redford Bolsons combined). The modeled available groundwater estimates were extracted from results of model runs using the following groundwater availability models and alternative models: Bone Spring-Victorio Peak, Eastern Arm of the Capitan Reef Complex, Edwards-Trinity (Plateau), Igneous and West Texas Bolsons (Wild Horse Flat, Michigan Flat, Ryan Flat, and Lobo Flat), and West Texas Bolsons (Presidio and Redford) aquifers. Analytical methods were used to calculate the modeled available groundwater for the Capitan Reef Complex Aquifer in Culberson County and for the Marathon Aquifer. The explanatory report and other materials submitted to the Texas Water Development Board (TWDB) were determined to be administratively complete on October 9, 2017.

Groundwater Management Area 4 responded to a request for clarifications by the TWDB in December 2017 (see the "Description of Request" section below for details).

REQUESTOR:

Ms. Janet Adams, Chair of Groundwater Management Area 4.

DESCRIPTION OF REQUEST:

In a letter dated September 26, 2017, Ms. Janet Adams provided the TWDB with the desired future conditions of the relevant aquifers in Groundwater Management Area 4. The desired future conditions, adopted September 20, 2017 by the groundwater conservation districts within Groundwater Management Area 4, are reproduced below:

Brewster County GCD [Groundwater Conservation District]: for the period from 2010-2060

- 3 feet drawdown for the Edwards-Trinity (Plateau) Aquifer.
- 10 feet drawdown for the Igneous Aquifer.
- 0-foot drawdown for the Marathon Aquifer.
- 0-foot drawdown for the Capitan Reef Complex Aquifer.

Culberson County GCD [Groundwater Conservation District]: for the period from 2010-2060

- 50 feet drawdown for the Capitan Reef Complex Aquifer.
- 78 feet drawdown for the [Salt Basin portion of the] West Texas Bolsons Aquifer.
- 66 feet drawdown for the Igneous Aquifer.

Hudspeth County UWCD [Underground Water Conservation District] No.1

- 0-foot drawdown for the period from 2010 until 2060 for the Bone Spring-Victorio Peak Aquifer, averaged across the portion of the aquifer within the boundaries of the District.

Jeff Davis County UWCD [Underground Water Conservation District]: for the period from 2010-2060

- 20 feet drawdown for the Igneous Aquifer.
- 72 feet drawdown for the [Salt Basin portion of the] West Texas Bolsons Aquifer.

Presidio County UWCD [Underground Water Conservation District]: for the period from 2010-2060

- 14 feet drawdown for the Igneous Aquifer.
- 72 feet drawdown for the [Salt Basin portion of the] West Texas Bolsons Aquifer.
- 72 feet drawdown for the Presidio-Redford Bolson [portion of the West Texas Bolsons].

In response to requests for clarifications from the TWDB on December 5, 2017, December 8, 2017, and February 5, 2018 the Groundwater Management Area 4 Chair, Ms. Janet Adams, indicated the following preferences for calculating modeled available groundwater volumes in Groundwater Management Area 4:

- For the Bone Spring-Victorio Peak Aquifer (Hudspeth County), the TWDB will use the results reported in GAM Run 10-061 and the assumptions described in GAM Task 10-006;
- For the Capitan Reef Complex Aquifer (Brewster and Culberson counties), the TWDB will use the Capitan Reef Complex Aquifer (Eastern Arm) groundwater availability model for Brewster County and the analytical approach (AA 09-08) for Culberson County. For Brewster County we will use 2005 as the baseline year and for Culberson County we will use the assumptions described in AA 09-08. The TWDB will assume the desired future condition in Brewster County is met if the average simulated drawdown value is within 3 feet.
- For the Edwards-Trinity (Plateau) Aquifer (Brewster County), the TWDB will use the single layer groundwater flow model for the Edwards-Trinity (Plateau) and Pecos Valley aquifers, with 2005 as the baseline year and the assumptions described in GR 10-048.
- For the Igneous Aquifer and Salt Basin Portion of the West Texas Bolsons Aquifer (Brewster, Culberson, Jeff Davis, and Presidio counties), the TWDB will use the Igneous and West Texas Bolsons aquifers groundwater availability model, with 2000 as the baseline year and the assumptions described in report GR 10-037 MAG.
- For Presidio and Redford Bolsons portion of the West Texas Bolsons Aquifer, the TWDB will use the West Texas Bolsons Aquifer (Presidio and Redford Bolsons) groundwater availability model, with 2007 as the baseline year.
- The Red Light Draw, Green River Valley, and Eagle Flat portions of the West Texas Bolsons Aquifer are considered non-relevant for the purposes of joint planning because there are no groundwater conservation districts with jurisdiction over this portion of the minor aquifer.

METHODS:

The desired future conditions for the Bone Spring-Victorio Peak, Capitan Reef Complex (Culberson County only), Marathon, Igneous, Edwards-Trinity (Plateau), and West Texas Bolsons (Wild Horse Flat, Michigan Flat, Ryan Flat, and Lobo Flat) aquifers are identical to the ones adopted in 2011, and the applicable groundwater availability models and

analytical methodology to calculate modeled available groundwater are unchanged. Therefore, the modeled available groundwater volumes presented for those aquifers are the same as those shown in the previous analytical assessments and model runs—GAM Task 10-061 (Oliver, 2011c), AA 09-08 (Wuerch and Davidson, 2010), AA 09-09 (Thorkildsen and Backhouse, 2010), GAM Run 10-048 (Oliver, 2012), and GAM Run 10-037 (Oliver, 2011a), and GAM Run 10-036 (Oliver, 2011b). The TWDB ran two new groundwater availability models, not previously available, for the Capitan Reef Complex (Eastern Arm) and West Texas Bolsons (Presidio and Redford Bolsons) aquifers. The modeled available groundwater volumes for these aquifers differ from the modeled available groundwater volumes previously calculated using analytical assessments.

Where analytical aquifer assessments were used, modeled available groundwater volumes were determined by summing estimates of effective recharge and the change in aquifer storage. See Freeze and Cherry (1979, p.365) for details regarding this analytical method.

Where groundwater availability models were used, the TWDB identified groundwater pumping scenarios that could achieve the adopted desired future conditions in Groundwater Management Area 4. The TWDB extracted simulated water levels for baseline years (see Parameters and Assumptions section for more information) and subsequent decades. The simulated drawdowns in all active model cells were averaged by aquifer for each county and groundwater conservation district. If water levels dropped below the base of the model cells during the predictive simulations, these cells became “dry cells”. In some instances, dry cells were included in drawdown averages; in other instances they were not. See the “Parameters and Assumptions” section for more details on the treatment of dry cells in each of the model runs.

The calculated drawdown averages compared well with the desired future conditions and verified that the desired future conditions adopted by the districts can be achieved—within the assumptions and limitations associated with each groundwater availability model. Modeled available groundwater volumes were determined by extracting pumping rates by decade from the model results using ZONEBUDGET Version 3.01 (Harbaugh, 2009). Annual pumping rates were divided by county, river basin, regional water planning area, and groundwater conservation district within Groundwater Management Area 4 (Figures 1 through 13 and Tables 1 through 12).

Modeled Available Groundwater and Permitting

As defined in Chapter 36 of the Texas Water Code, “modeled available groundwater” is the estimated average amount of water that may be produced annually to achieve a desired future condition. Groundwater conservation districts are required to consider modeled available groundwater, along with several other factors, when issuing permits in order to manage groundwater production to achieve the desired future condition(s). The other

factors districts must consider include annual precipitation and production patterns, the estimated amount of pumping exempt from permitting, existing permits, and a reasonable estimate of actual groundwater production under existing permits.

PARAMETERS AND ASSUMPTIONS:

Bone Spring-Victorio Peak Aquifer

- The previous modeled available groundwater (Oliver, 2011c) was calculated using three separate flow models run under a variety of climatic and pumping scenarios. See Hutchison (2008) for assumptions and limitations of the three groundwater flow models.
- The models have one layer representing the Bone Spring-Victorio Peak Aquifer, a portion of the Capitan Reef Complex Aquifer, and the Diablo Plateau.
- Hutchison (2008) ran all three models using pumping ranging from 0 to 125,000 acre-feet per year and climatic information from tree ring data ranging from 1000 to 1988.
- The results of the 144 simulations were plotted to establish a relationship between pumping and drawdown (Hutchison, 2010). Modeled available groundwater was the sum of net pumping and the estimated irrigation return flow (approximately 30 percent of the net pumping, according to the Hudspeth County Underground Water Conservation District No. 1) for each desired future condition. Additional information on the application of irrigation return flow is described in GAM Run 10-061 MAG (Oliver, 2011c).
- Because the analysis used was statistically based, the starting and ending period can apply for any 50-year planning horizon. Therefore, we applied the values to 2020 to 2070.

Capitan Reef Complex Aquifer (Brewster County only)

- Version 1.01 of the groundwater availability model of the Eastern Arm of the Capitan Reef Complex Aquifer was used, with a baseline year of 2005. See Jones (2016) for assumptions and limitations of the groundwater availability model. A new model run simulation was completed to determine modeled available groundwater that achieved the desired future condition.
- The model has five layers: Layer 1, the Edwards-Trinity (Plateau) and Pecos Valley aquifers; Layer 2, the Dockum Aquifer and the Dewey Lake Formation; Layer 3, the Rustler Aquifer; Layer 4, a confining unit made up of the Salado and Castile formations, and the overlying portion of the Artesia Group; and Layer 5,

the Capitan Reef Complex Aquifer, part of the Artesia Group, and the Delaware Mountain Group. Layers 1 through 4 are intended to act solely as boundary conditions facilitating groundwater inflow and outflow relative to the Capitan Reef Complex Aquifer (Layer 5).

- The recharge used for the model simulation represents average recharge from 1931 through 2005 (last year of model calibration).
- Available water-level data from 2005 to 2010 for the Capitan Reef Complex Aquifer indicates that water level changes have been minimal. Therefore, applying the clarifications received from the Groundwater Management Area 4 on December 7, 2017, we concluded that a 2005-to-2055 predictive simulation is equivalent to a 2010-to-2060 predictive simulation.
- Drawdowns were then averaged in Groundwater Management Area 4 based on the official aquifer boundaries. We assumed the desired future condition was met if the average drawdown value was within 3 feet.

Capitan Reef Complex Aquifer (Culberson County only)

- There is no groundwater availability model for the Capitan Reef Complex Aquifer in Culberson County.
- The annual total pumping estimates were calculated as the sum of the annual effective recharge amount and the annual volume of water depleted from the aquifer based on the desired future condition.
- Recharge was assumed to be evenly distributed across the outcrop of the aquifer.
- Effective recharge estimates were based on springflow and surface hydrology, groundwater pumpage and water-level changes, and precipitation estimates.
- Annual volumes of water taken from storage were calculated by dividing the total volume of depletion, based on the draft desired future condition, by 50 years. For this report, we assumed the 50 years was 2010 to 2060.
- Calculated water-level declines were assumed to be uniform across the aquifer within its footprint area, and these calculated water-level declines did not exceed aquifer thickness.
- A detailed description of all parameters and assumptions is available in AA 09-08 (Wuerch and others, 2011).

Edwards-Trinity (Plateau) Aquifer (Brewster County)

- The alternate groundwater flow model for the Edwards-Trinity (Plateau) and Pecos Valley aquifers was used with a baseline year of 2005. This model is an update to the previously developed groundwater availability model documented in Anaya and Jones (2009). See Hutchison and others (2011) and Anaya and Jones (2009) for assumptions and limitations of the model.
- The groundwater model has one layer representing the Pecos Valley Aquifer and the Edwards-Trinity (Plateau) Aquifer. In the relatively narrow area where both aquifers are present, the model is a lumped representation of both aquifers.
- The recharge used for the model simulation represents average recharge as described in Hutchison and others (2011).
- Drawdowns were calculated by subtracting 2005 simulated water levels from 2060 simulated water levels, which were then averaged based on the official aquifer boundaries in Groundwater Management Area 4. Drawdowns for cells with water levels below the base elevation of the cell (dry cells) were excluded from the averaging.
- A detailed description of all parameters and assumptions is available in GAM Run 10-048 (Oliver, 2012).

Igneous Aquifer

- Version 1.01 of the groundwater availability flow model for the Igneous and parts of the West Texas Bolson aquifers was used for this analysis with year 2000 as baseline. See Beach and others (2004) for assumptions and limitations of the model.
- The model includes three layers representing the Wild Horse Flat, Michigan Flat, Ryan Flat, and Lobo Flat portions of the West Texas Bolsons Aquifer (Layer 1), the Igneous Aquifer (Layer 2), and the underlying Cretaceous and Permian units (Layer3). Some areas of Layer 2 outside the boundary of the Igneous Aquifer are active in order to allow flow between Layer 1 and Layer 3.
- The averaging of drawdowns and modeled available groundwater calculations were based on model extent as opposed to the official aquifer footprint. The Igneous Aquifer model extent is a smoothed and somewhat smaller version of the official footprint of the Igneous Aquifer. A comparison of these two areas is shown in Figure 8.
- The predictive run was set up using average recharge as described in Beach and others (2004) and was run from 2000 to 2050.

- Cells were assigned to individual counties, river basins, regional water planning areas, and groundwater conservation districts as shown in the August 3, 2010, version of the file that associates the model grid to political and natural boundaries for the Igneous Aquifer. Note that some minor adjustments were made to the file to better reflect the relationship of model cells to political boundaries.
- See GAM Task 10-028 (Oliver, 2010) for a full description of the methods and assumptions used in the groundwater availability model simulations. The predictive model run for this analysis resulted in water levels in some model cells dropping below the base elevation of the cell during the simulation. These cells were excluded from the averaging of drawdowns, which in turn resulted in progressively lower pumping values through time. This is illustrated by the decline in modeled available groundwater (see Tables 7 and 8).

Marathon Aquifer

- The annual total pumping estimates was calculated as the sum of the annual effective recharge amount and the annual volume of water depleted from the aquifer based on the desired future condition.
- Recharge was assumed to occur evenly across the aerial extent of the aquifer.
- Average annual precipitation (1971 through 2000) from the Climatic Atlas of Texas (Larkin and Bomar, 1983) was used to calculate annual effective recharge volumes.
- The draft annual total pumping estimates are the sum of the annual effective recharge amount and the annual volume of water depleted from the aquifer based on the draft desired future condition. Annual volumes were calculated by dividing the total volume by 50 years. For this report, we assumed the 50 years was 2010 to 2060.
- Calculated water level declines were estimated uniformly across the aquifer.
- A detailed description of all parameters and assumptions is available in AA 09-09 (Thorkildsen and Backhouse, 2010).

[Salt Basin portion of the] West Texas Bolsons (Wild Horse Flat, Michigan Flat, Ryan Flat, and Lobo Flat) Aquifer

- Version 1.01 of the groundwater availability flow model for the Igneous and parts of the West Texas Bolson aquifers was used for this analysis with year 2000 as baseline. See Beach and others (2004) for assumptions and limitations of the model.

- The model includes three layers representing the Wild Horse Flat, Michigan Flat, Ryan Flat and Lobo Flat portions of the West Texas Bolsons Aquifer (Layer 1), the Igneous Aquifer (Layer 2), and the underlying Cretaceous and Permian units (Layer 3).
- The simulation was set up using average recharge as described in Beach and others (2004) and was run from 2000 to 2050.
- Cells were assigned to individual counties, river basins, regional water planning areas, and groundwater conservation districts as shown in the August 3, 2010, version of the file that associates the model grid to political and natural boundaries for the Igneous and West Texas Bolson Aquifers. Note that some minor adjustments were made to the file to better reflect the relationship of model cells to political boundaries.
- See GAM Task 10-028 (Oliver, 2010) for a full description of the methods and assumptions used in the groundwater availability model simulations. The predictive model run for this analysis resulted in water levels in some model cells dropping below the base elevation of the cell during the simulation. These cells have been excluded from the averaging of drawdowns, which in turn resulted in progressively lower pumping values through time. This is illustrated by the decline in modeled available groundwater (see Tables 11 and 12).

West Texas Bolsons (Presidio and Redford) Aquifer

- Version 1.01 of the groundwater availability model of the Presidio and Redford bolsons of the West Texas Bolsons Aquifer was used with a baseline year of 2007. A new model run simulation was completed to determine the modeled available groundwater that achieved the desired future condition.
- See Wade and Jigmond (2013) for assumptions and limitations of the groundwater availability model.
- The model includes three layers representing the Rio Grande Alluvium (Layer 1), West Texas Bolsons (Presidio and Redford) Aquifer (Layer 2), and Tertiary and Cretaceous units (Layer 3).
- The recharge used for the simulation represents average recharge from 1948 through 2007 (end year of model calibration). Pumping was scaled by an equal factor and simultaneously on both the United States and the Mexico sides of the aquifer during the predictive run simulations.
- An analysis of the Presidio and Redford bolsons indicate that the changes in water levels in the few wells with available data from 2007 through 2010 have

been minimal. Therefore, in observance of the clarifications received from the Groundwater Management Area 4 on December 7, 2017, we assumed that a 2007-to-2057 predictive simulation is equivalent to a 2010-to-2060 predictive simulation.

- Drawdowns were calculated by subtracting 2007 simulated water levels from 2057 simulated water levels which were then averaged for all active model cells within the official aquifer boundary in Presidio County. Drawdowns in model cells located in Mexico were excluded from averaging. We assumed the desired future condition was met if the average drawdown value was within 1 foot.

RESULTS:

The results for the groundwater conservation districts (Tables 1, 3, 5, 7, 9, and 11), reflects the ending year discussed in the Parameters and Assumption Section of this report. For planning purposes (Tables 2, 4, 6, 8, 10, and 12), the values may have been populated past the dates noted in Parameters and Assumption Section using the trend of results. Tables 1 through 12 show the combination of modeled available groundwater summarized (1) by groundwater conservation district and county; and (2) by county, river basin, and regional water planning area for use in the regional water planning process.

The modeled available groundwater for the Bone Spring-Victorio Peak Aquifer that achieves the desired future conditions adopted by Groundwater Management Area 4 is 101,400 acre-feet per year from 2020 to 2070 (Tables 1 and 2). These volumes represent total pumping, defined as the sum of net pumping and the irrigation return flow. Hudspeth County Underground Water Conservation District No. 1 estimates that irrigation return flow is about 30 percent of net pumping.

The modeled available groundwater for the Capitan Reef Complex Aquifer that achieves the desired future conditions adopted by Groundwater Management Area 4 is 8,163 acre-feet per year from 2020 to 2060/2070 (Tables 3 and 4). This value includes 583 acre-feet per year in Brewster County; 7,580 acre-feet per year in Culberson County.

The modeled available groundwater for the Edwards-Trinity (Plateau) Aquifer that achieves the desired future conditions adopted by Groundwater Management Area 4 is 1,394 acre-feet per year from 2020 to 2060/2070 (Tables 5 and 6).

The modeled available groundwater for the Igneous Aquifer that achieves the desired future conditions adopted by Groundwater Management Area 4 decreases from 11,333 to 11,329 acre-feet per year between 2020 and 2050 (Tables 7 and 8). In the counties comprising Groundwater Management Area 4, the modeled available groundwater from 2020 to 2060 is as follows: a decline from 2,586 to 2,583 acre-feet per year in Brewster

County; 99 acre-feet per year in Culberson County; 4,584 acre-feet per year in Jeff Davis County; 4,063 acre-feet per year in Presidio County.

The modeled available groundwater for the Marathon Aquifer that achieves the desired future conditions adopted by Groundwater Management Area 4 is 7,327 acre-feet per year from 2020 to 2060/2070 (Tables 9 and 10).

The modeled available groundwater for the West Texas Bolsons (including the Salt Bolson and Presidio and Redford Bolsons) that achieves the desired future conditions adopted by Groundwater Management Area 4 decreases from 58,577 acre-feet per year to 57,881 acre-feet per year between 2020 and 2050 (Tables 11 and 12).

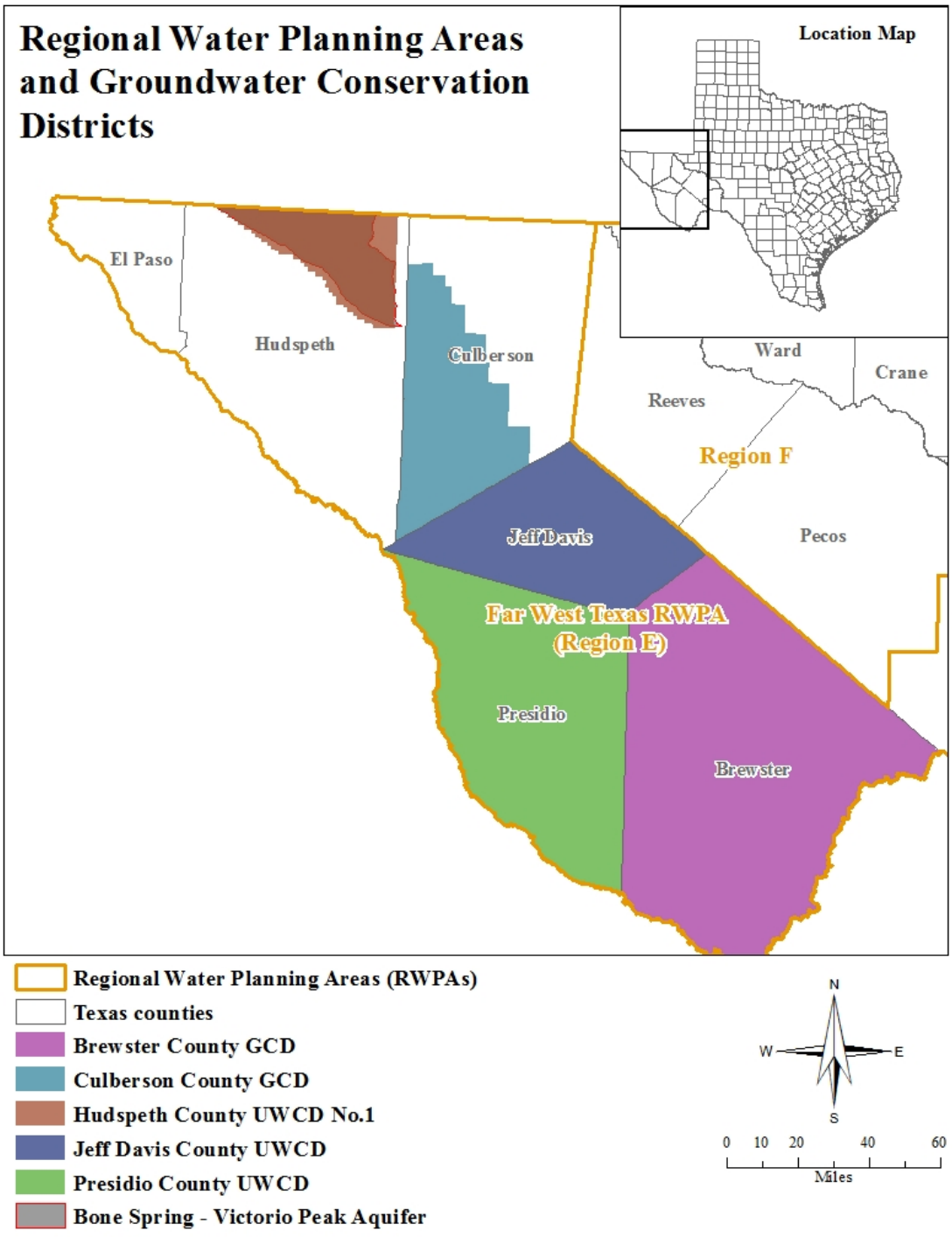

FIGURE 1. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAS), GROUNDWATER CONSERVATION DISTRICTS (GCDS), AND COUNTIES IN THE VICINITY OF THE BONE SPRING–VICTORIO PEAK AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

FIGURE 2. MAP SHOWING THE AREAS COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE BONE SPRING-VICTORIO PEAK AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

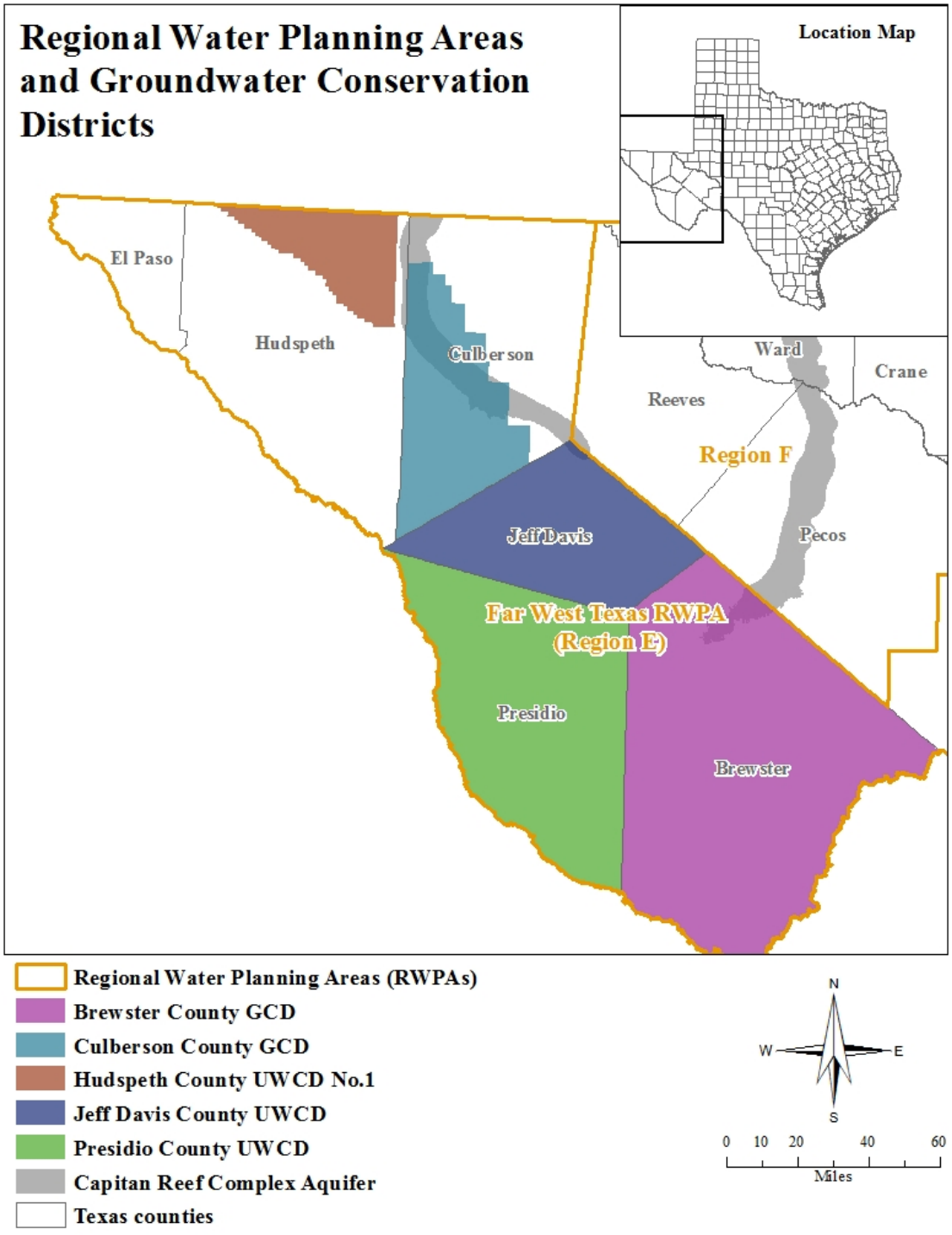

FIGURE 3. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAS), GROUNDWATER CONSERVATIONDISTRICTS (GCDS), AND COUNTIES IN THE VICINITY OF THE CAPITAN REEF COMPLEX AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

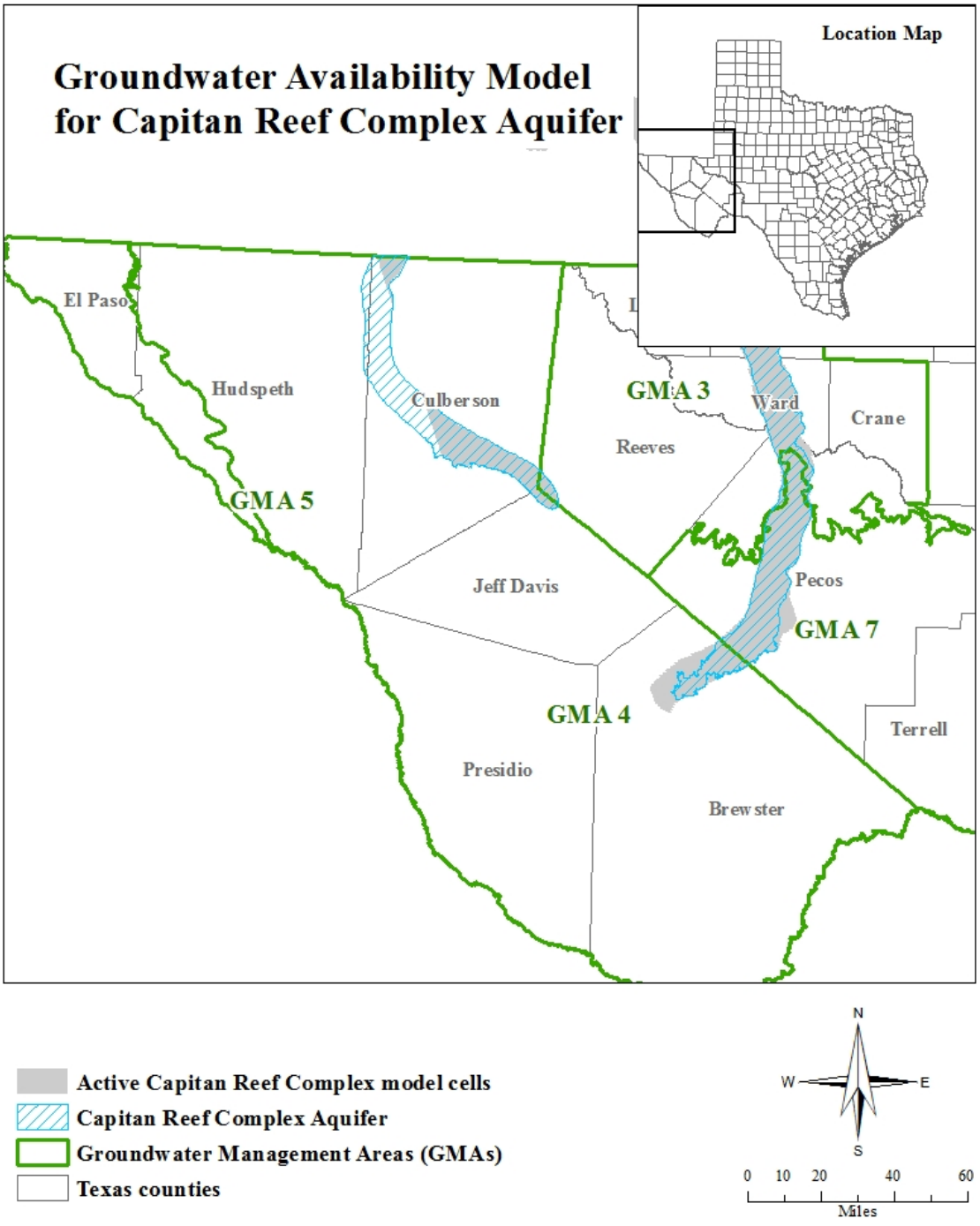

FIGURE 4. MAP SHOWING THE AREAS COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE CAPITAN REEF COMPLEX AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

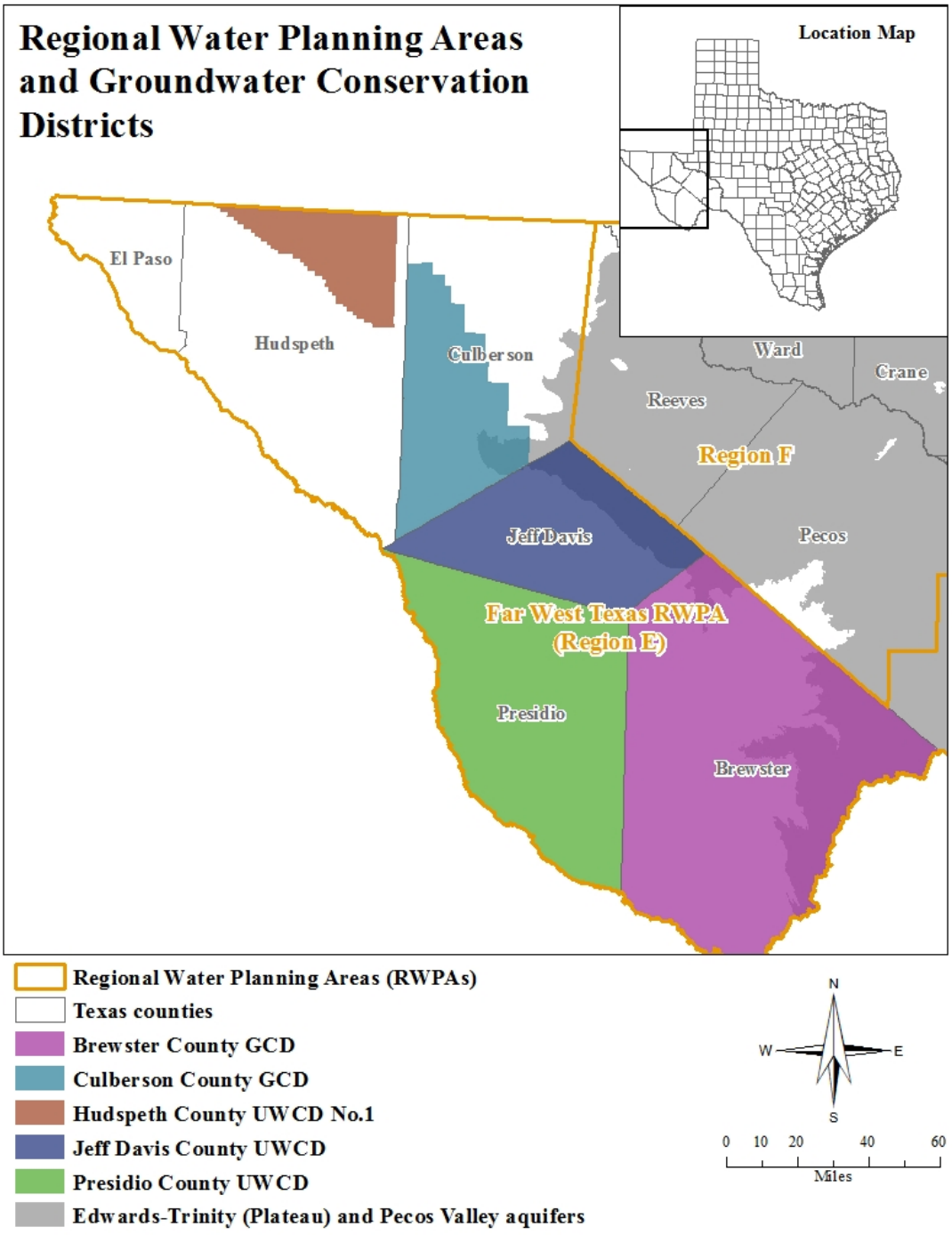

FIGURE 5. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAS), GROUNDWATER CONSERVATIONDISTRICTS (GCDS), AND COUNTIES IN THE VICINITY OF THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

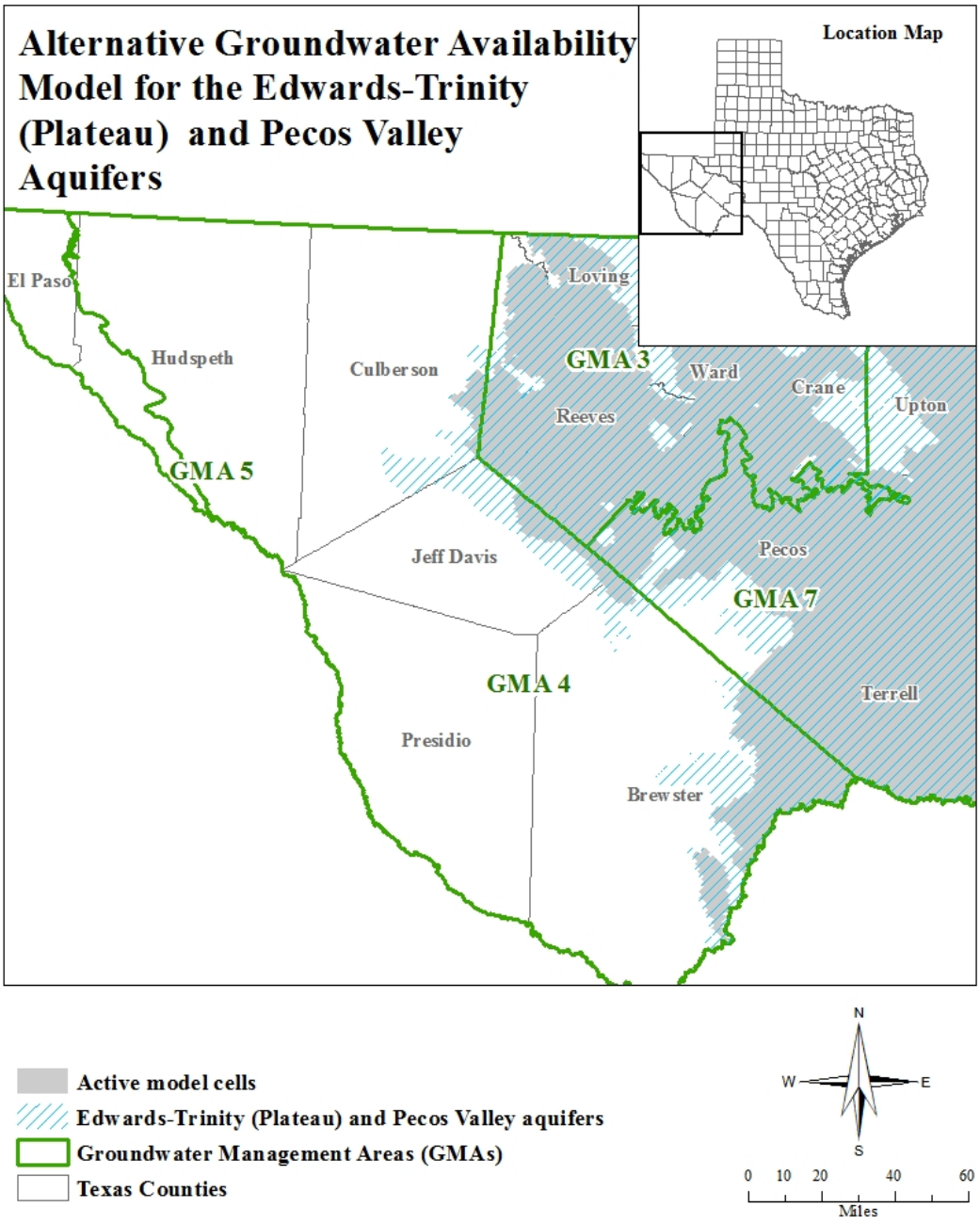

FIGURE 6. MAP SHOWING THE AREAS COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

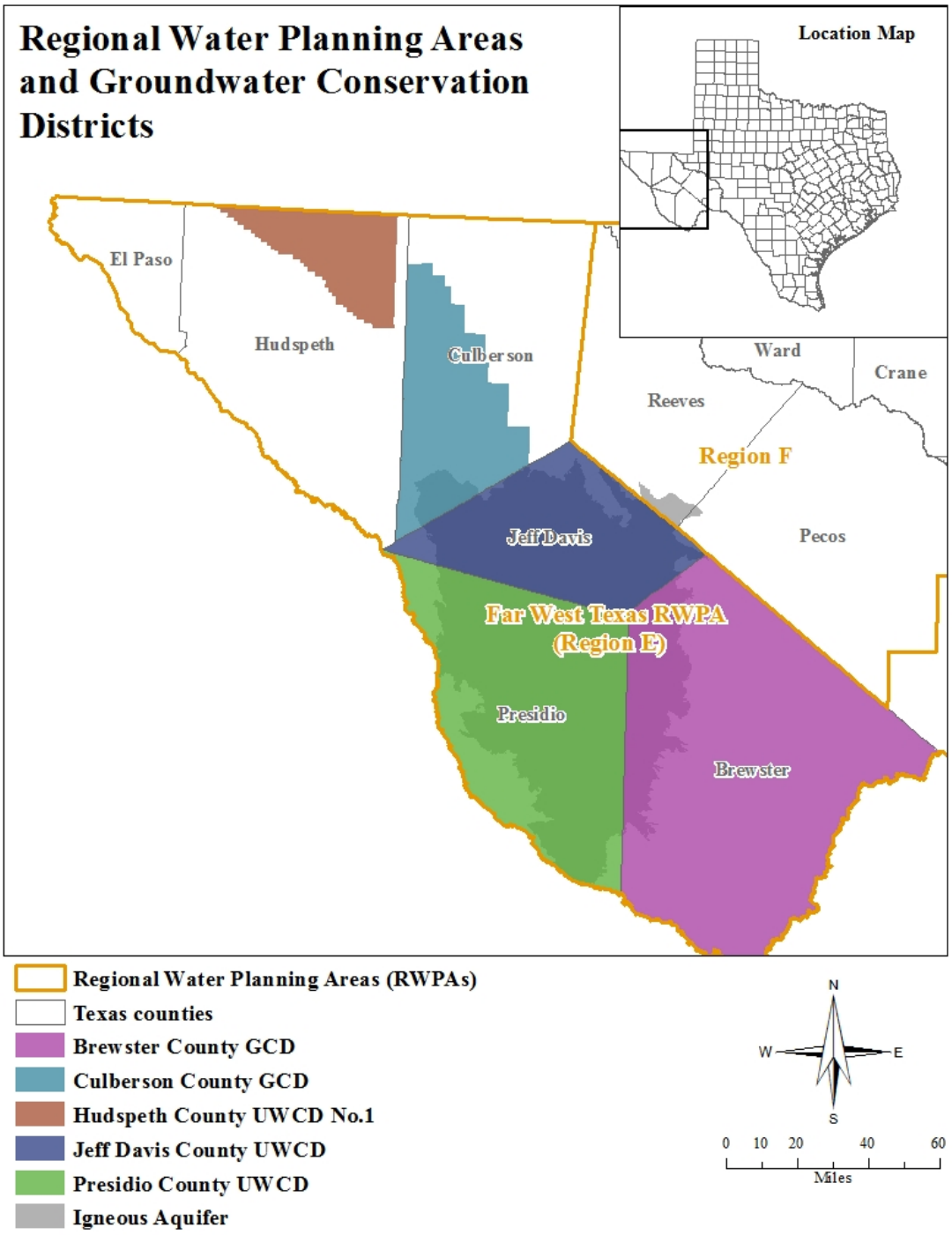

FIGURE 7. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAS), GROUNDWATER CONSERVATION DISTRICTS (GCDS), AND COUNTIES IN THE VICINITY OF THE IGNEOUS AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

FIGURE 8. MAP SHOWING THE AREAS COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE IGNEOUS AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

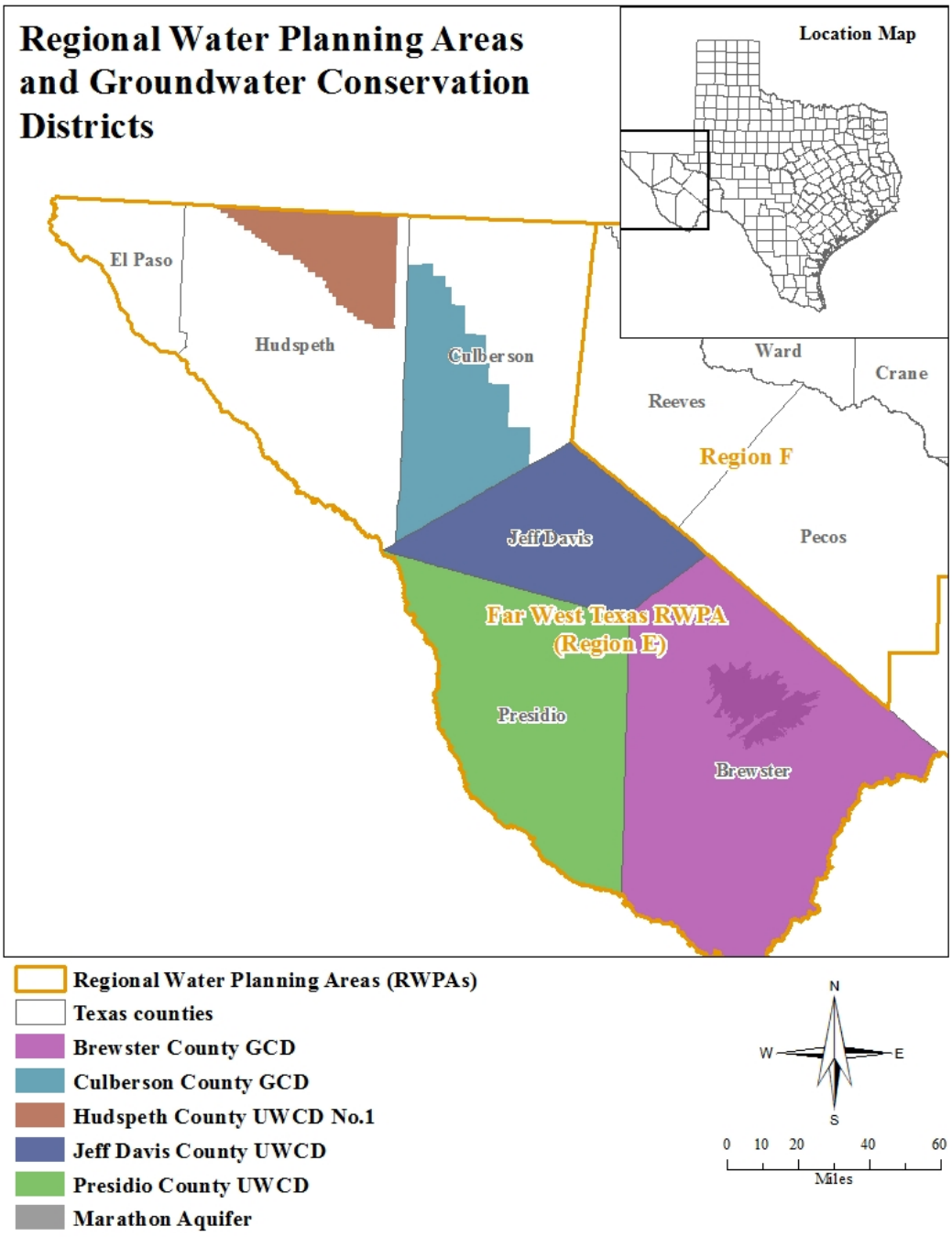

FIGURE 9. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAS), GROUNDWATER CONSERVATION DISTRICTS (GCDS), AND COUNTIES IN THE VICINITY OF THE MARATHON AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

FIGURE 10. MAP SHOWING GROUNDWATER MANAGEMENT AREAS (GMAS) AND COUNTIES IN THE VICINITY OF THE MARATHON AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

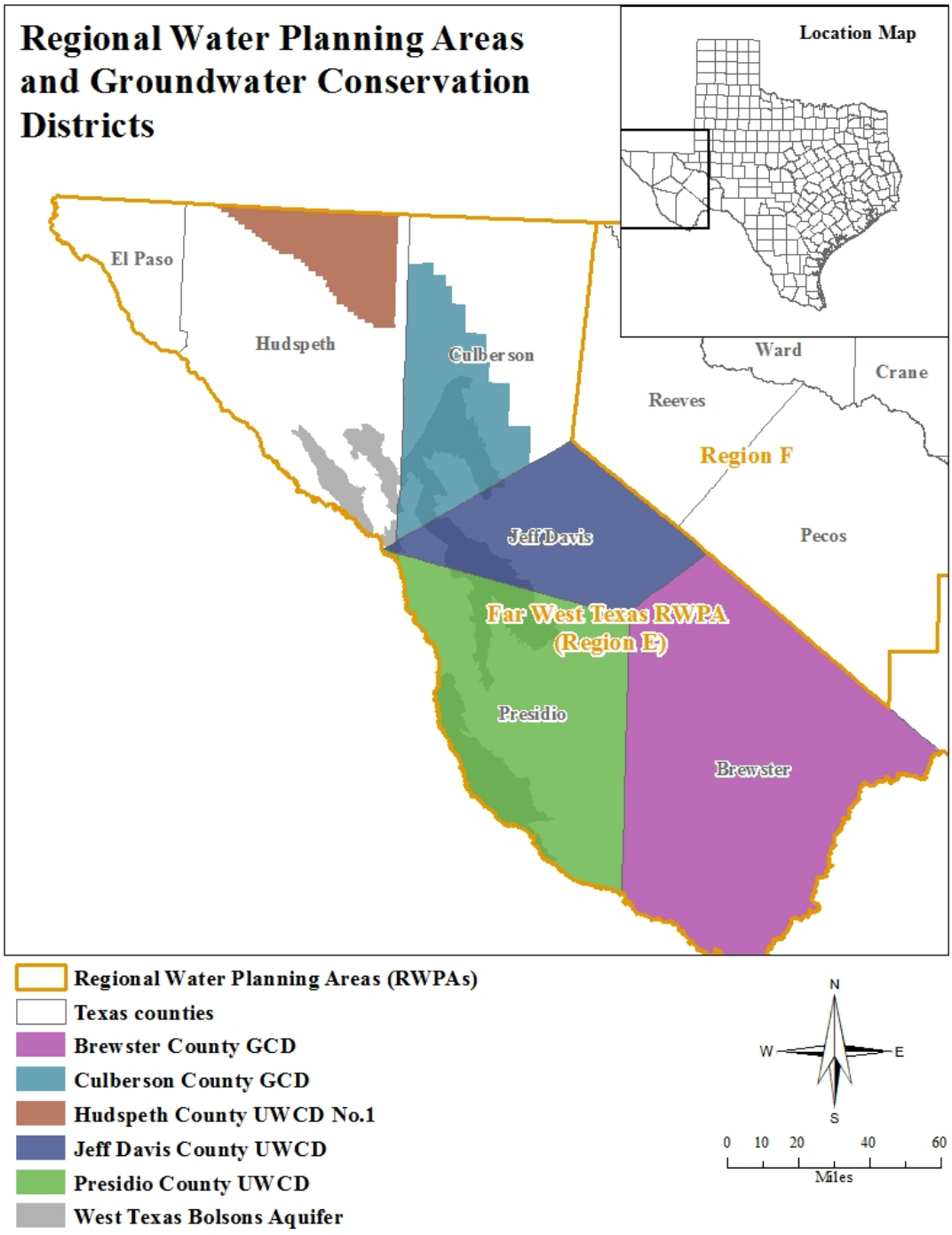

FIGURE 11. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAS), GROUNDWATER CONSERVATIONDISTRICTS (GCDS), AND COUNTIES IN THE VICINITY OF THE WEST TEXAS BOLSONS AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

FIGURE 12. MAP SHOWING THE AREAS COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR PORTIONS OF THE WEST TEXAS BOLSONS AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

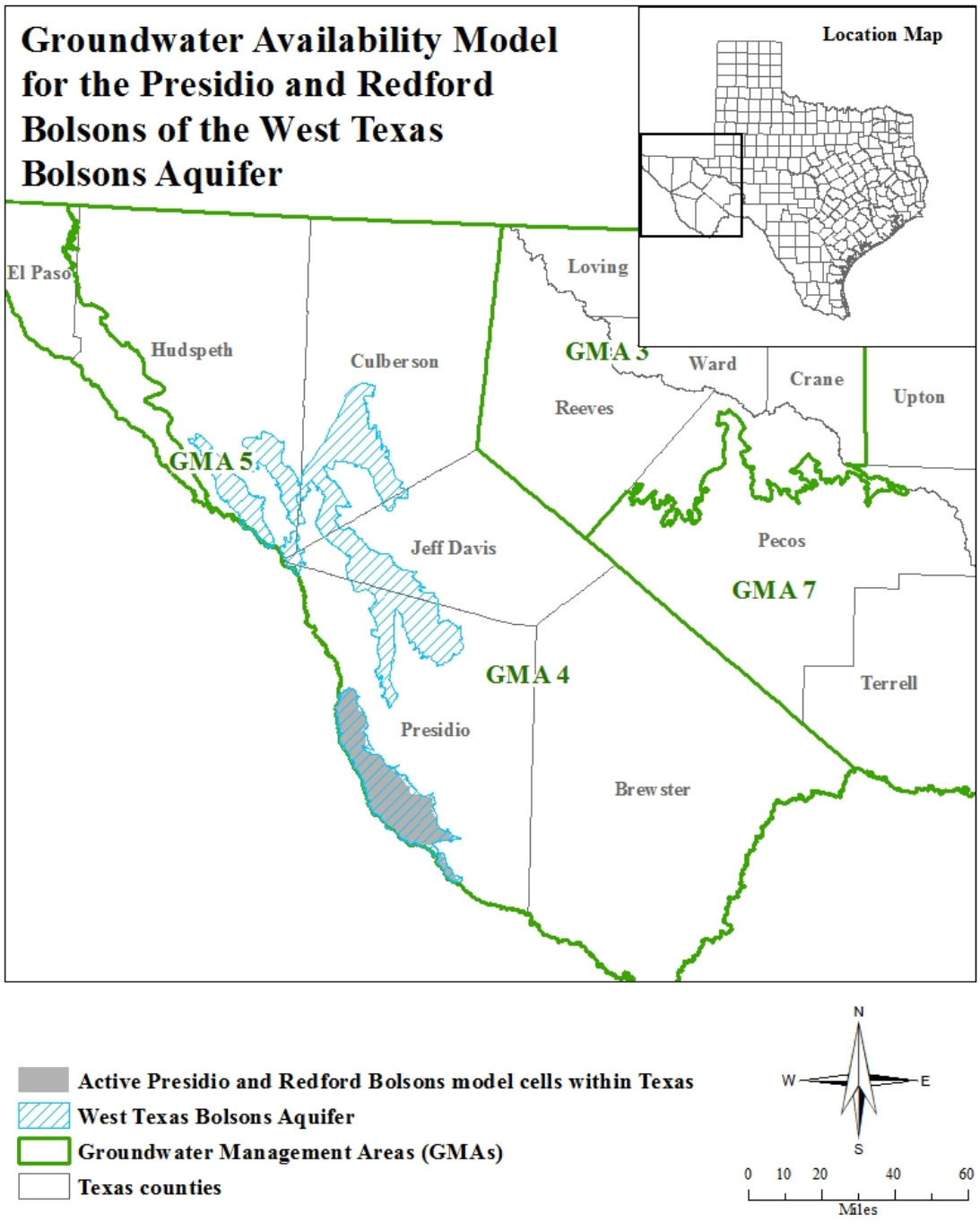

FIGURE 13. MAP SHOWING THE AREAS COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE PRESIDIO AND REDFORD PORTIONS OF THE WEST TEXAS BOLSON AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE BONE SPRING-VICTORIO PEAK AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (UWCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	2020	2030	2040	2050	2060	2070
Hudspeth County UWCD	Hudspeth	101,400	101,400	101,400	101,400	101,400	101,400
No district-County	Hudspeth	0	0	0	0	0	0
Total		**101,400**	**101,400**	**101,400**	**101,400**	**101,400**	**101,400**

TABLE 2. MODELED AVAILABLE GROUNDWATER FOR THE BONE SPRING-VICTORIO PEAK AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2020 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	2020	2030	2040	2050	2060	2070
Hudspeth	E	Rio Grande	101,400	101,400	101,400	101,400	101,400	**101,400**
Total			**101,400**	**101,400**	**101,400**	**101,400**	**101,400**	**101,400**

TABLE 3. MODELED AVAILABLE GROUNDWATER FOR THE CAPITAN REEF COMPLEX AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2060. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	2020	2030	2040	2050	2060
Brewster County GCD	Brewster	583	583	583	583	583
Culberson County GCD	Culberson	7,580	7,580	7,580	7,580	7,580
Total		**8,163**	**8,163**	**8,163**	**8,163**	**8,163**

TABLE 4. MODELED AVAILABLE GROUNDWATER FOR THE CAPITAN REEF COMPLEX AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2020 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR. NOTE: THE VALUES LISTED IN THIS TABLE HAVE BEEN POPULATED PAST THE DATES NOTED IN PARAMETERS AND ASSUMPTIONS SECTION (SEE TABLE 3) USING THE TREND OF RESULTS.

County	RWPA	River Basin	2020	2030	2040	2050	2060	2070
Brewster	E	Rio Grande	583	583	583	583	583	583
Culberson	E	Rio Grande	7,580	7,580	7,580	7,580	7,580	7,580
Total			**8,163**	**8,163**	**8,163**	**8,163**	**8,163**	**8,163**

TABLE 5. MODELED AVAILABLE GROUNDWATER FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2060. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	2020	2030	2040	2050	2060
Brewster County GCD	Brewster	1,394	1,394	1,394	1,394	1,394
Total		**1,394**	**1,394**	**1,394**	**1,394**	**1,394**

TABLE 6. MODELED AVAILABLE GROUNDWATER FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2020 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR. NOTE: THE VALUES LISTED IN THIS TABLE HAVE BEEN POPULATED PAST THE DATES NOTED IN PARAMETERS AND ASSUMPTIONS SECTION (SEE TABLE 5) USING THE TREND OF RESULTS.

County	RWPA	River Basin	2020	2030	2040	2050	2060	2070
Brewster	E	Rio Grande	1,394	1,394	1,394	1,394	1,394	1,394
Total			**1,394**	**1,394**	**1,394**	**1,394**	**1,394**	**1,394**

TABLE 7. MODELED AVAILABLE GROUNDWATER FOR THE IGNEOUS AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD, UWCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2050. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	2020	2030	2040	2050
Brewster County GCD	Brewster	2,586	2,586	2,585	2,583
Culberson County GCD	Culberson	99	99	99	99
Jeff Davis County UWCD	Jeff Davis	4,584	4,584	4,584	4,584
Presidio County UWCD	Presidio	4,064	4,064	4,064	4,063
Total		**11,333**	**11,333**	**11,332**	**11,329**

TABLE 8. MODELED AVAILABLE GROUNDWATER FOR THE IGNEOUS AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2020 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR. NOTE: THE VALUES LISTED IN THIS TABLE HAVE BEEN POPULATED PAST THE DATES NOTED IN PARAMETERS AND ASSUMPTIONS SECTION (SEE TABLE 7) USING THE TREND OF RESULTS.

County	RWPA	River Basin	2020	2030	2040	2050	2060	2070
Brewster	E	Rio Grande	2,586	2,586	2,585	2,583	2,583	2,582
Culberson	E	Rio Grande	99	99	99	99	99	99
Jeff Davis	E	Rio Grande	4,584	4,584	4,584	4,584	4,584	4,584
Presidio	E	Rio Grande	4,064	4,064	4,064	4,063	4,063	4,063
Total			**11,333**	**11,333**	**11,332**	**11,329**	**11,329**	**11,327**

TABLE 9. MODELED AVAILABLE GROUNDWATER FOR THE MARATHON AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2020 AND 2060. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	2020	2030	2040	2050	2060
Brewster County GCD	Brewster	7,327	7,327	7,327	7,327	7,327
Total		**7,327**	**7,327**	**7,327**	**7,327**	**7,327**

TABLE 10. MODELED AVAILABLE GROUNDWATER FOR THE MARATHON AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), AND RIVER BASIN FOR EACH DECADE BETWEEN 2020 AND 2070. VALUES ARE IN ACRE-FEET PER YEAR. NOTE: THE VALUES LISTED IN THIS TABLE HAVE BEEN POPULATED PAST THE DATES NOTED IN PARAMETERS AND ASSUMPTIONS SECTION (SEE TABLE 9) USING THE TREND OF RESULTS.

County	RWPA	River Basin	2020	2030	2040	2050	2060	2070
Brewster	E	Rio Grande	7,327	7,327	7,327	7,327	7,327	7,327
Total			**7,327**	**7,327**	**7,327**	**7,327**	**7,327**	**7,327**

TABLE 11. MODELED AVAILABLE GROUNDWATER FOR THE WEST TEXAS BOLSONS AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD, UWCD), COUNTY, AND AQUIFER SEGMENT FOR EACH DECADE BETWEEN 2020 AND 2050. VALUES ARE IN ACRE-FEET PER YEAR. THE SALT BASIN PORTION OF THE WEST TEXAS BOLSONS AQUIFER INCLUDES WILD HORSE, MICHIGAN, LOBO FLATS, AND RYAN FLAT.

Groundwater Conservation District	County	Aquifer Segment	2020	2030	2040	2050
Culberson County GCD	Culberson	Wild Horse, Michigan, and Lobo Flats	35,749	35,678	35,601	35,550
Jeff Davis County UWCD	Jeff Davis	Ryan Flat	6,055	6,055	5,989	5,960
Presidio County UWCD	Presidio	Ryan Flat	9,112	8,982	8,834	8,710
Presidio County UWCD	Presidio	Presidio and Redford Bolsons	7,661	7,661	7,661	7,661
Total			**58,577**	**58,376**	**58,085**	**57,881**

TABLE 12. MODELED AVAILABLE GROUNDWATER FOR THE WEST TEXAS BOLSONS AQUIFER IN GROUNDWATER MANAGEMENT AREA 4 SUMMARIZED BY COUNTY, REGIONAL WATER PLANNING AREA (RWPA), RIVER BASIN, AND AQUIFER SEGMENT FOR EACH DECADE BETWEEN 2020 AND 2070. NOTE: THE VALUES LISTED IN THIS TABLE HAVE BEEN POPULATED PAST THE DATES NOTED IN PARAMETERS AND ASSUMPTIONS SECTION (SEE TABLE 11) USING THE TREND OF RESULTS. VALUES ARE IN ACRE-FEET PER YEAR.

County	RWPA	River Basin	Aquifer Segment	2020	2030	2040	2050	2060	2070
Culberson	E	Rio Grande	Wild Horse, Michigan, and Lobo Flats	35,749	35,678	35,601	35,550	35,476	35,409
Jeff Davis	E	Rio Grande	Ryan Flat	6,055	6,055	5,989	5,960	5,927	5,892
Presidio	E	Rio Grande	Ryan Flat	9,112	8,982	8,834	8,710	8,571	8,436
Presidio	E	Rio Grande	Presidio and Redford Bolsons	7,661	7,661	7,661	7,661	7,661	7,661
Total				**58,577**	**58,376**	**58,085**	**57,881**	**57,635**	**57,397**

LIMITATIONS:

The groundwater model used in completing this analysis is the best available scientific tool that can be used to meet the stated objectives. To the extent that this analysis will be used for planning purposes and/or regulatory purposes related to pumping in the past and into the future, it is important to recognize the assumptions and limitations associated with the use of the results. In reviewing the use of models in environmental regulatory decision making, the National Research Council (2007) noted:

> *"Models will always be constrained by computational limitations, assumptions, and knowledge gaps. They can best be viewed as tools to help inform decisions rather than as machines to generate truth or make decisions. Scientific advances will never make it possible to build a perfect model that accounts for every aspect of reality or to prove that a given model is correct in all respects for a particular regulatory application. These characteristics make evaluation of a regulatory model more complex than solely a comparison of measurement data with model results."*

A key aspect of using the groundwater model to evaluate historic groundwater flow conditions includes the assumptions about the location in the aquifer where historic pumping was placed. Understanding the amount and location of historic pumping is as important as evaluating the volume of groundwater flow into and out of the district, between aquifers within the district (as applicable), interactions with surface water (as applicable), recharge to the aquifer system (as applicable), and other metrics that describe the impacts of that pumping. In addition, assumptions regarding precipitation, recharge, and streamflow are specific to a particular historic time period.

Because the application of the groundwater model was designed to address regional scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations relating to the actual conditions of any aquifer at a particular location or at a particular time.

It is important for groundwater conservation districts to monitor groundwater pumping and groundwater levels in the aquifer. Because of the limitations of the groundwater model and the assumptions in this analysis, it is important that the groundwater conservation districts work with the TWDB to refine this analysis in the future given the reality of how the aquifer responds to the actual amount and location of pumping now and in the future. Historic precipitation patterns also need to be placed in context as future climatic conditions, such as dry and wet year precipitation patterns, may differ and affect groundwater flow conditions.

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Appendix B – Copy of Resolution Adopting Management Plan

HUDSPETH COUNTY UNDERGROUND
WATER CONSERVATION DISTRICT #1
Special Session – August 14, 2018 @ 1:00 pm
District Office 105 Dodson
Dell City, Texas 79837

Directors Present	Directors Absent	Visitors	
Talley Davis - President	None	James Rascoe	Val Call
Robert Carpenter-Vice President		Casey Peters	Steve Carpenter
Grant Gardiner-Sec/Treas.		Kevin Lynch	Brian Archuleta
Lindsay Snodgrass		Jim Lynch	Melanie Gentry
Phyllis Gentry		Anne Lynch	Keith Newbill
		Eric Brunnermann	Jay Hill

Staff Present
Randy L. Barker – GM
Al Blair – District Engineer
Della Tavarez – Administrative Assistant

President Davis called the special session to order at 1:00 P.M., on August 14, 2018. Davis declared a quorum and welcomed guests.

1. **Discuss and take action on revisions, if any, to District Groundwater Management Plan:**
Groundwater Management Plan was discussed with no guest inputs by mail or in person. The Draft Plan will be presented to the Texas Water Development Board for approval. James Rascoe commented about the water usage and the drawdown of the Aquifer.

2. **Adjourn**
Phyllis Gentry made motion to adjourn at 1:04 P.M., Grant Gardiner seconded and the motion passed.

PASSED AND APPROVED THIS 23rd ***DAY OF*** Oct. ***, 2018***

Attest:

Grant Gardiner, Secretary-Treasurer

Talley Davis, President

Appendix C – Notice of Hearing

PUBLIC NOTICE OF GROUNDWATER

MANAGEMENT PLAN FOR ADOPTION BY THE

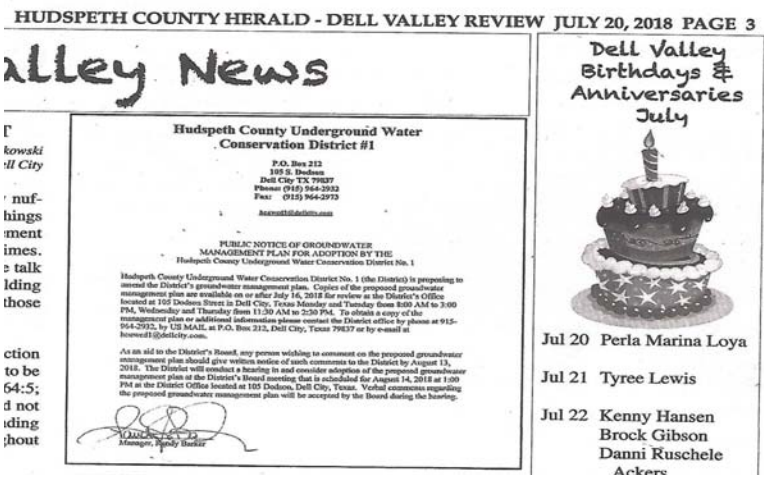
Hudspeth County Underground Water Conservation District No. 1

Hudspeth County Underground Water Conservation District No. 1 (the District) is proposing to amend the District's groundwater management plan. Copies of the proposed groundwater management plan are available for review at the District's Office located at 107 S. Dodson Street in Dell City, Texas Monday through Thursday from 9:00 AM to 2:00 PM. To obtain a copy of the management plan or additional information please contact the District office by phone at 915-964-2932, by US MAIL at P.O. Box 212, Dell City, Texas 79837 or by e-mail at hcuwcd1@dellcity.com.

As an aid to the District's Board, any person wishing to comment on the proposed groundwater management plan should give written notice of such comments to the District by August 13, 2018. The District will conduct a hearing in and consider adoption of the proposed groundwater management plan at the District's Board meeting that is scheduled for August 14, 2018 at 1:00 PM at the District Office located at 107 S. Dodson, Dell City, Texas. Verbal comments regarding the proposed groundwater management plan will be accepted by the Board during the hearing.

_____

Manager, Randy Barker



HUDSPETH COUNTY HERALD - DELL VALLEY REVIEW JULY 20, 2018 PAGE 3

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Hudspeth County Underground Water Conservation District #1

P.O. Box 212
105 S. Dodson
Dell City TX 79837
Phone (915) 964-2932
Fax (915) 964-2973

PUBLIC NOTICE OF GROUNDWATER MANAGEMENT PLAN FOR ADOPTION BY THE Hudspeth County Underground Water Conservation District No. 1

Hudspeth County Underground Water Conservation District No. 1 (the District) is proposing to amend the District's groundwater management plan. Copies of the proposed groundwater management plan are available on or after July 16, 2018 for review at the District's Office located at 105 Dodson Street in Dell City, Texas Monday and Tuesday from 8:00 AM to 3:00 PM, Wednesday and Thursday from 11:30 AM to 2:30 PM. To obtain a copy of the management plan or additional information please contact the District office by phone at 915-964-2932, by US MAIL at P.O. Box 212, Dell City, Texas 79837 or by e-mail at hcuwcd1@dellcity.com.

As an aid to the District's Board, any person wishing to comment on the proposed groundwater management plan should give written notice of such comments to the District by August 13, 2018. The District will conduct a hearing in and consider adoption of the proposed groundwater management plan at the District's Board meeting that is scheduled for August 14, 2018 at 1:00 PM at the District Office located at 105 Dodson, Dell City, Texas. Verbal comments regarding the proposed groundwater management plan will be accepted by the Board during the hearing.

Manager, Randy Barker

Dell Valley Birthdays & Anniversaries July

Jul 20 Perla Marina Loya

Jul 21 Tyree Lewis

Jul 22 Kenny Hansen
Brock Gibson
Danni Ruschele

APPENDIX C – Agenda for August 13, 2018 Board Meeting and Hearing on Groundwater Management Plan

NOTICE OF MEETING
OF THE GOVERNING BODY OF THE HUDSPETH COUNTY
UNDERGROUND WATER CONSERVATION DISTRICT #1

Notice is hereby given that the Board of Directors of the Hudspeth County Underground Water Conservation District #1 will meet in a Special Session at the following location and time;

Location: **HCUWCD #1**
105 S. Dodson
Dell City, Texas 79837

Time: **August 14, 2018 @ 1:00 P.M.**

MEETING AGENDA

At the above time and location the District's Board of Directors will discuss and may take action on any items on this agenda it may determine would be appropriate to-wit:

Call to order and welcome all guests

1. Discuss and take action on revisions, if any, to District Groundwater Management Plan.

2. Adjourn.

I, the undersigned authority of the District, do hereby certify that the above notice is a true and correct copy of said notice and that such notice was posted on the main entrance of the District's office located at 105 S. Dodson, Dell City, Texas at least 72 hours prior to the time of said meeting, and that copy of said notice was furnished via facsimile to the Clerk of Hudspeth County, Texas at least 72 hours prior to the time of said meeting.

08-01-18 Date: 9:35 A.M. Time:

Talley Davis, President

I, the Clerk of Hudspeth County, Texas do hereby certify that the above notice of meeting is a true and correct copy of said notice and that such notice has been posted on the bulletin board at the Hudspeth County Court House in Sierra Blanca, Texas at least 72 hours prior to the time of said meeting.

8/10/18 Date: 2:00 PM Time:

Virginia Doyal, County Clerk
Hudspeth County, Texas

Appendix E - Minutes from October 23, 2018 Hearing

HUDSPETH COUNTY UNDERGROUND
WATER CONSERVATION DISTRICT #1
Special Meeting – October 23, 2018 @ 1:00 pm
District Office 105 Dodson
Dell City, Texas 79837

Directors Present	Directors Absent	Visitors
Talley Davis - President	None	Melanie Gentry
Robert Carpenter-Vice President		Steve Carpenter
Grant Gardiner-Sec/Treas.		Jonena Hearst
Lindsay Snodgrass		Jay Hill
Phyllis Gentry		Keith Newbill

Staff Present
Randy L. Barker – General Manager
Della Tavarez – Administrative Assistant
Renea Hicks – Attorney (District)
Al Blair – District Engineer via Teleconference

President Davis called the special meeting to order at 1:00 P.M., on October 23, 2018. Davis declared a quorum and welcomed guests.

1. Discuss and take action for approval of minutes:
Lindsay Snodgrass made the motion to approve the minutes of the special meeting on August 14, 2018, and regular meeting on September 11, 2018. Grant Gardiner seconded and the motion passed.

2. Discuss and take action for approval of bills.
Robert Carpenter made the motion to approve the bills, Phyllis Gentry seconded and the motion passed.

3. Discuss and take action for approval of financial report:
Lindsay Snodgrass made the motion to approve the financial report, Grant Gardiner seconded and the motion passed.

4. Discuss and take action for approval of 2018 Management Plan.
Phyllis Gentry made the motion to approve the Management Plan with the changes recommended by TWDB, update on State Water Plan in appendices. Robert Carpenter seconded and the motion passed.

5. Discuss and take action on El Paso Water Utility's application to amend Validation Permit No., VP-062 to reflect change in ownership of estate.
Phyllis Gentry made the motion to amend El Paso Water Utility's Validation Permit No. VP-062 to reflect change in ownership of estate. Robert Carpenter seconded and the motion passed.

6. Discuss and take action on El Paso Water Utility's application to amend Validation Permit No., VP-063 to reflect change in ownership of estate.
Phyllis Gentry made the motion to amend El Paso Water Utility's Validation Permit No. VP-063 to reflect change in ownership of estate. Robert Carpenter seconded and the motion passed.

7. Discuss and take action on El Paso Water Utility's application to amend Validation Permit No., VP-064 to reflect change in ownership of estate.
Phyllis Gentry made the motion to amend El Paso Water Utility's Validation Permit No. VP-064 to reflect change in ownership of estate. Robert Carpenter seconded and the motion passed.

8. Discuss and take action on El Paso Water Utility's application to amend Validation Permit No., VP-065 to reflect change in ownership of estate.
Phyllis Gentry made the motion to amend El Paso Water Utility's Validation Permit No. VP-065 to reflect change in ownership of estate. Robert Carpenter seconded and the motion passed.

9. Discuss and take action on El Paso Water Utility's application to amend Validation Permit No., VP-066 to reflect change in ownership of estate.
Phyllis Gentry made the motion to amend El Paso Water Utility's Validation Permit No. VP-066 to reflect change in ownership of estate. Robert Carpenter seconded and the motion passed.

10. Discuss and take action on El Paso Water Utility's application to amend Validation Permit No., VP-067 to reflect change in ownership of estate.
Phyllis Gentry made the motion to amend El Paso Water Utility's Validation Permit No. VP-067to reflect change in ownership of estate. Robert Carpenter seconded and the motion passed.

11. Discuss and take action on El Paso Water Utility's application to amend Validation Permit No., VP-072-1 to reflect change in ownership of estate.
Phyllis Gentry made the motion to amend El Paso Water Utility's Validation Permit No. VP-072-1 to reflect change in ownership of estate. Robert Carpenter seconded and the motion passed.

12. Discuss and take action on El Paso Water Utility's application to amend Validation Permit No., VP-074 to reflect change in ownership of estate.
Phyllis Gentry made the motion to amend El Paso Water Utility's Validation Permit No. VP-074 to reflect change in ownership of estate. Robert Carpenter seconded and the motion passed.

13. Discuss and take action on El Paso Water Utility's application to amend Validation Permit No., VP-077 to reflect change in ownership of estate.
Phyllis Gentry made the motion to amend El Paso Water Utility's Validation Permit No. VP-077 to reflect change in ownership of estate. Robert Carpenter seconded and the motion passed.

14. Discuss and take action on El Paso Water Utility's application to amend Validation Permit No., VP-078 to reflect change in ownership of estate.
Phyllis Gentry made the motion to amend El Paso Water Utility's Validation Permit No. VP-078 to reflect change in ownership of estate. Robert Carpenter seconded and the motion passed.

15. Report from District Engineer.
No action.

16. Open Forum.
No comments.

18. Adjourn.
President Talley Davis adjourned the meeting at 1:10 P.M.

PASSED AND APPROVED THIS 13th ***DAY OF*** NOV. , ***2018***

Attest:

Grant Gardiner, Secretary-Treasurer

Talley Davis, President

Appendix F - Estimated Historical Groundwater Use and 2017 State Water Plan Datasets

2017 State Water Plan: Amendment #1

The following changes were made to the 2017 State Water Plan as a result of a minor amendment to the Region G 2016 Regional Water Plan. This amendment was approved by the Texas Water Development Board on July 7, 2016.

REVISIONS AND ADDITIONS TO THE LIST OF RECOMMENDED WATER MANAGEMENT STRATEGIES

				Strategy supply volume by planning decade (acre-feet per year)					
Water user group region	**Water user group**	**Water management strategy sponsor region**	**Recommended water management strategy**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
G	WACO	G	MUNICIPAL WATER CONSERVATION (URBAN) - WACO	764	1,796	4,435	7,312	9,336	9,814
G	WACO	G	CONSERVATION - METER ENHANCEMENT PROGRAM - WACO	698	2,237	2,346	2,469	2,604	2,740

Texas Water Development Board

2017 State Water Plan: Amendment #1

The following changes were made to the 2017 State Water Plan as a result of a minor amendment to the Region G 2016 Regional Water Plan.
This amendment was approved by the Texas Water Development Board on July 7, 2016.

ADDITIONS TO THE LIST OF RECOMMENDED WATER MANAGEMENT STRATEGY PROJECTS

Project sponsor region	Project	Online decade	Project sponsors	Capital cost
G	MUNICIPAL WATER CONSERVATION (URBAN) - ABILENE	2020	ABILENE	$9,243,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - ALBANY	2020	ALBANY	$1,059,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - ARMSTRONG WSC	2020	ARMSTRONG WSC	$153,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - ASPERMONT	2020	ASPERMONT	$377,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - BAIRD	2020	BAIRD	$25,000
G	ADDITIONAL ADVANCED CONSERVATION - BARTLETT	2050	BARTLETT	$267,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - BARTLETT	2020	BARTLETT	$287,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - BELTON	2020	BELTON	$1,490,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - BETHESDA WSC	2020	BETHESDA WSC	$4,997,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - BRECKENRIDGE	2020	BRECKENRIDGE	$212,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - BREMOND	2020	BREMOND	$98,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - BRENHAM	2020	BRENHAM	$6,444,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - BRUCEVILLE-EDDY	2020	BRUCEVILLE-EDDY	$157,000
G	ADDITIONAL ADVANCED CONSERVATION - BRUSHY CREEK MUD	2020	BRUSHY CREEK MUD	$1,691,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - BRUSHY CREEK MUD	2020	BRUSHY CREEK MUD	$6,381,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - BRYAN	2020	BRYAN	$8,497,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - CALDWELL	2020	CALDWELL	$967,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - CALVERT	2020	CALVERT	$12,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - CAMERON	2020	CAMERON	$1,925,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - CEDAR PARK	2020	CEDAR PARK	$14,602,000
G	ADDITIONAL ADVANCED CONSERVATION - CHISHOLM TRAIL SUD	2040	CHISHOLM TRAIL SUD	$7,734,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - CHISHOLM TRAIL SUD	2020	CHISHOLM TRAIL SUD	$6,762,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - CISCO	2020	CISCO	$278,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - CLEBURNE	2020	CLEBURNE	$3,472,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - CLIFTON	2020	CLIFTON	$305,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - COLLEGE STATION	2020	COLLEGE STATION	$19,532,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - COOLIDGE	2020	COOLIDGE	$21,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - CORYELL CITY WATER SUPPLY DISTRICT	2020	CORYELL CITY WATER SUPPLY DISTRICT	$134,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - COUNTY-OTHER, BELL	2020	COUNTY-OTHER, BELL	$573,000
G	ADDITIONAL ADVANCED CONSERVATION - COUNTY-OTHER, WILLIAMSON	2040	COUNTY-OTHER, WILLIAMSON	$10,199,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - CRAWFORD	2020	CRAWFORD	$114,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - CROSS COUNTRY WSC	2020	CROSS COUNTRY WSC	$94,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - CROSS PLAINS	2020	CROSS PLAINS	$41,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - EASTLAND	2020	EASTLAND	$12,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - FERN BLUFF MUD	2020	FERN BLUFF MUD	$1,026,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - FORT HOOD	2020	FORT HOOD	$8,390,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - GATESVILLE	2020	GATESVILLE	$9,680,000
G	ADDITIONAL ADVANCED CONSERVATION - GEORGETOWN	2060	GEORGETOWN	$17,315,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - GEORGETOWN	2020	GEORGETOWN	$44,986,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - GIDDINGS	2020	GIDDINGS	$967,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - GLEN ROSE	2020	GLEN ROSE	$706,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - GRAHAM	2020	GRAHAM	$4,996,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - GROESBECK	2020	GROESBECK	$8,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - HAMILTON	2020	HAMILTON	$127,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - HAMLIN	2020	HAMLIN	$228,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - HARKER HEIGHTS	2020	HARKER HEIGHTS	$7,152,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - HEARNE	2020	HEARNE	$138,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - HEWITT	2020	HEWITT	$138,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - HILLSBORO	2020	HILLSBORO	$2,050,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - JAYTON	2020	JAYTON	$24,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - KEMPNER	2020	KEMPNER	$39,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - KEMPNER WSC	2020	KEMPNER WSC	$975,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - KNOX CITY	2020	KNOX CITY	$228,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - LAMPASAS	2020	LAMPASAS	$106,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - LEXINGTON	2020	LEXINGTON	$108,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - LITTLE RIVER-ACADEMY	2020	LITTLE RIVER-ACADEMY	$75,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - LOMETA	2020	LOMETA	$114,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - LORENA	2020	LORENA	$39,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - MARLIN	2020	MARLIN	$2,998,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - MART	2030	MART	$4,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - MINERAL WELLS	2020	MINERAL WELLS	$290,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - MUNDAY	2020	MUNDAY	$154,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - NAVASOTA	2020	NAVASOTA	$936,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - NOLANVILLE	2020	NOLANVILLE	$3,943,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - NORTH BOSQUE WSC	2020	NORTH BOSQUE WSC	$1,777,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - POSSUM KINGDOM WSC	2020	POSSUM KINGDOM WSC	$1,701,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - RANGER	2020	RANGER	$191,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - ROBINSON	2020	ROBINSON	$2,607,000

Project sponsor region	Project	Online decade	Project sponsors	Capital cost
G	MUNICIPAL WATER CONSERVATION (RURAL) - ROBY	2020	ROBY	$58,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - ROCKDALE	2020	ROCKDALE	$859,000
G	ADDITIONAL ADVANCED CONSERVATION - ROUND ROCK	2040	ROUND ROCK	$33,490,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - ROUND ROCK	2020	ROUND ROCK	$2,044,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - SALADO WSC	2020	SALADO WSC	$4,105,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - SNOOK	2020	SNOOK	$378,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - SOMERVILLE	2020	SOMERVILLE	$102,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - SOUTHWEST MILAM WSC	2020	SOUTHWEST MILAM WSC	$137,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - STAMFORD	2020	STAMFORD	$1,352,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - STRAWN	2020	STRAWN	$91,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - SWEETWATER	2020	SWEETWATER	$162,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - TAYLOR	2020	TAYLOR	$295,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - TEMPLE	2020	TEMPLE	$46,987,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - TEXAS A & M UNIVERSITY	2020	TEXAS A & M UNIVERSITY	$10,498,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - THROCKMORTON	2020	THROCKMORTON	$178,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - VALLEY MILLS	2020	VALLEY MILLS	$190,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - VENUS	2020	VENUS	$613,000
G	CONSERVATION - METER ENHANCEMENT PROGRAM - WACO	2020	WACO	$15,282,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - WACO	2020	WACO	$38,913,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - WELLBORN SUD	2020	WELLBORN SUD	$2,827,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - WEST	2020	WEST	$90,000
G	MUNICIPAL WATER CONSERVATION (RURAL) - WHITE BLUFF COMMUNITY WS	2020	WHITE BLUFF COMMUNITY WS	$523,000
G	MUNICIPAL WATER CONSERVATION (URBAN) - WHITNEY	2020	WHITNEY	$282,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - WILLIAMSON COUNTY MUD #10	2020	WILLIAMSON COUNTY MUD #10	$2,705,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - WILLIAMSON COUNTY MUD #11	2020	WILLIAMSON COUNTY MUD #11	$1,282,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - WILLIAMSON COUNTY MUD #9	2020	WILLIAMSON COUNTY MUD #9	$1,761,000
G	MUNICIPAL WATER CONSERVATION (SUBURBAN) - WOODWAY	2020	WOODWAY	$7,494,000