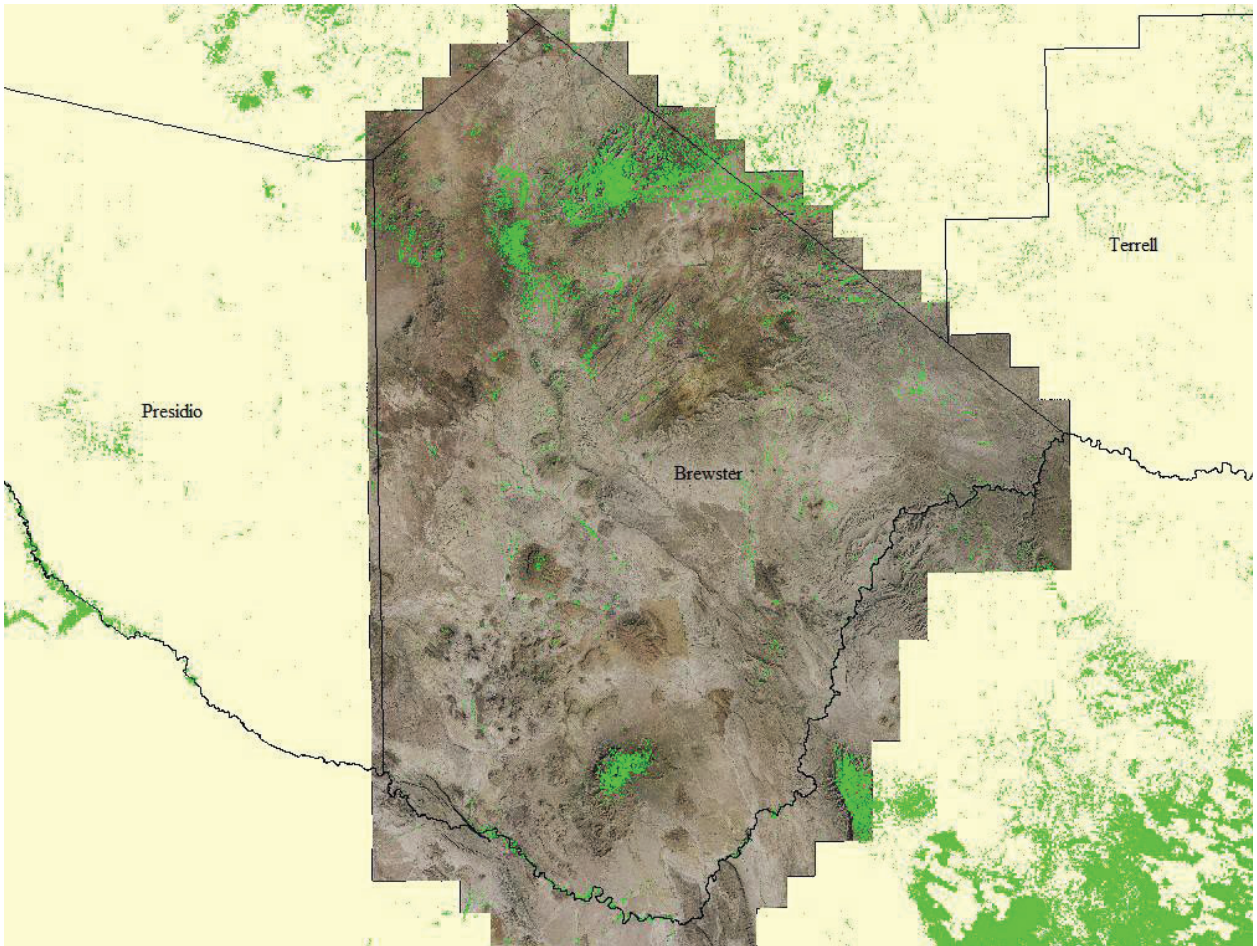


Conservation District Groundwater Management Plan



Adopted November 18, 2021

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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 Brewster County Groundwater Conservation District (the District).

District Purpose and Mission

The purpose of the District is to provide a locally controlled groundwater district to conserve and preserve groundwater, protect groundwater users, protect groundwater, prevent pollution or waste of groundwater within the boundaries of the District, and regulate the transport of water out of the boundaries of the District. The District has adopted rules to regulate groundwater withdrawals based on principals of reasonable use, correlative rights, and public good to achieve the desired future conditions (DFCs) for the groundwater resources within the District, as those DFCs are agreed upon by Groundwater Management Area 4 (GMA 4).

The mission of the Brewster County Groundwater Conservation District is to manage, protect, and conserve the groundwater resources of Brewster County, Texas while protecting the property right and promoting constructive and sustainable development in Brewster County. The primary goal of the Brewster Groundwater Conservation District in pursuing its mission is the sustainability of the groundwater resources of Brewster County.

Statement of Guiding Principles

The groundwater resources of Brewster County (“the County”) are of vital importance to all citizens, and as the population of the County continues to increase, additional pressure will be placed on the groundwater resources of the County. The Brewster County Groundwater Conservation District (“the District”), managed and controlled locally, is the most practical means of directing development and preventing over-development of the natural resources of the County.

The District can achieve its mission and goals by increasing the quantity and quality of knowledge regarding the groundwater resources of the County, encouraging the most efficient use of groundwater, preserving and improving groundwater quality, and increasing public awareness and education of groundwater issues. Believing that local control of local resources is critical to the District’s mission and goal, the District will monitor the activities of the Texas Legislature and of the Far West Texas Water Planning

Group, along with the rules and orders of state agencies which may affect the private ownership, use, and management of groundwater.

The District will work in cooperation with the Jeff Davis County Underground Water Conservation District, the Presidio County Groundwater Conservation District, and the Culberson County Groundwater Conservation District to manage and protect those groundwater resources that are shared by any or all of the five counties.

A major threat to the mission of the District is management of the groundwater resources of Brewster County without a thorough understanding of the aquifers and their hydrogeologic properties. This Management Plan will be a tool for the directors of the District and for the managers of the District's water resources, the landowners of Brewster County. The District's directors regard all landowners as the District's partners in managing our groundwater resources.

General Description of The District

The District was created by the citizens of Brewster County through a confirmation election on November 6, 2001. The current Board of Directors ("the Board") are Joan Johnson (Chairman), Tim Leary (Vice Chairman), Homer Mills (Secretary), Ike Roberts, Tom Mangrem, Dr. Kevin Urbanczyk and Ambrosio Valles.

The boundaries of the District are coterminous with those of Brewster County, Texas. The economy of the County and the District is dominated by agriculture, tourism, and Sul Ross State University. Agricultural income is derived primarily from beef cattle production, hunting, and outdoor recreation.

Brewster County, containing 6,193 square miles or almost 4 million acres, is the largest county in Texas. The County is located on the Big Bend of the Rio Grande. It is bounded on the northeast by Terrell and Pecos Counties, on the northwest by Jeff Davis County, on the west by Presidio County, and on the south and southeast by the Republic of Mexico. Alpine, which is in the northwest part of the County, is the county seat. Other population centers are Marathon, in the northeast part of the County, and Lajitas, Terlingua, and Study Butte, in the south part of the County. Because Brewster County contains Big Bend National Park, Black Gap Wildlife Management Area, and Elephant Mountain Wildlife Management Area, as well as a portion of Big Bend Ranch State Natural Area, almost 25% of the County is publicly owned. The County consists of mountains, canyons, plateaus, valleys, and rolling plains. The altitude of the land surface ranges from 1,355 to 7,825 feet above mean sea level. Brewster County lies within the drainage systems of the Rio Grande and the Pecos River, which is also a tributary of the

Rio Grande. On page 35 of the 1975 TWDB Report 189 “Major Springs of Texas” list five springs in Brewster County (San Lorenzo, Pena Colorada, Chilicotol, Glen, Boquillas). Chilicotol, Glen, Boquillas springs are located with Big Bend National Park. San Lorenzo Spring is located northeast of the City of Alpine and is supplied by water from the Igneous Aquifer. Pena Colorada Spring is located approximately 4 miles southwest of the town of Marathon and is likely supplied by the Marathon Aquifer.”

The list of springs in Brewster County also includes the springs that flow from the Edwards-Trinity Plateau Aquifer that are located along the Rio Grande downriver from Big Bend National Park in the reach referred to as the Rio Grande Wild and Scenic River. These include significant springs in the Black Gap Wildlife Management Area, and near Big Canyon, Silber Canyon and Panther Gulch. These are the springs that are responsible for the bulk of the 31,261 AF reported in section 2.4.

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

Listed below in Table 1 are the summarized values from TWDB GAM Run 16-030 MAG (Appendix A) Modeled Available Groundwater for the year 2020 based on the GMA 4 Adopted Desired Future Conditions for the time period from 2010 through 2060.

Table 1: Modeled Available Groundwater and Desired Future Conditions Drawdown

Aquifer	MAG (af/yr)	DFC Drawdown (ft)
Edwards-Trinity	1,394	3
Capitan Reef Complex Aquifer	583	0
Igneous	2,586	10
Marathon	7,327	0

2. Amount of Groundwater Being Used 2013 through 2017 – 31 TAC §§ 356.52(a)(5)(B);356.10(2)

Municipal water use makes up over 99% of the water use in Brewster County and in the District. The District requires by rule that all groundwater pumped under Operating Production permits must be metered. The District has issued four (4) Operating Production Permits, for Irrigation, Industrial and Municipal purposes. All non-exempt pumping wells must be equipped with meters approved by the district and pumping data

reported to the district annually. For the year 2018 the total amount of permitted non-exempt groundwater pumping reported to the District was 157 acre-feet.

The estimate of the amount of groundwater production in Brewster County for irrigation in 2017 was 403 acre-feet (138 acres or irrigated land), and the estimate of total production from the Igneous Aquifer in Brewster County in 2017 was 2,066 acre-feet (see Table 2).

Table 2: Estimate of 2018 Igneous Aquifer Groundwater Production

Estimate of 2017 Igneous Aquifer Groundwater Production in Brewster County	
Description of Source and Use	af/yr
2016 MAG (TWDB Report GR15-030 MAG)	2,586
Estimate of Permit Use (2017)	110
City of Alpine GW Use Igneous Brewster*	1,428
Estimate of Domestic and Livestock (Exempt)**	128
Estimate of Unpermitted Non-Exempt Use	400
Estimate of Total Use in 2017	2,066
Difference (MAG - 2017 Use)	520
*Farwest Texas 2016 Water Plan Sec. 11.2.4. This amount is equal to the amount of water available (capacity) and not the actual production in 2017	
** TWDB 2015 Report Projected Exempt Groundwater Use Estimates	

The TWDB estimates of the total amount of groundwater use in 2015 (see Table 3) for Brewster County are 2,815 acre-feet. The estimate for 2016 of 4,703 acres feet appears to be too large by approximately 1,700 acre-feet.

Table 3: TWDB Estimate of Groundwater and Surface Water Production in Brewster Co.

BREWSTER COUNTY								All values are in acre-feet
Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2018	GW	2,112	0	0	0	975	470	3,557
	SW	0	0	0	0	684	25	709
2017	GW	1,901	0	0	0	695	453	3,049
	SW	0	0	0	0	388	24	412
2016	GW	3,491	0	0	0	915	297	4,703
	SW	0	0	0	0	659	16	675
2015	GW	1,940	0	0	0	583	292	2,815
	SW	0	0	0	0	1,391	15	1,406
2014	GW	1,832	0	0	0	1,527	286	3,645
	SW	0	0	0	0	377	15	392
2013	GW	2,187	0	0	0	329	357	2,873
	SW	0	0	0	0	1,551	19	1,570

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

The 2019 TWDB report titled “GAM Run 19-0 08: Brewster County Groundwater Conservation District Groundwater Management Plan”(see Appendix H) contains estimates of recharge from all aquifers within the District. Table 3 below shows the estimates for the Igneous aquifer.

During times of drought and reduced rainfall the amount of recharge decreases significantly.

The estimated amount of water that Recharges from Precipitation is:

Igneous Aquifer	6,584 af
Edwards-Trinity Aquifer	29,759 af
Capitan Reef Complex Aquifer	16,171 af
Rustler Aquifer	0 af

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

The estimated amount of water that Discharges to Springs is:

Igneous Aquifer	136 af
Edwards-Trinity Aquifer	31,261 af
Capitan Reef Complex Aquifer	0 af
Rustler Aquifer	0 af

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

The Estimated annual flow into the District are:

Igneous Aquifer	1,118 af
Edwards-Trinity Aquifer	15,172 af
Capitan Reef Complex Aquifer	0 af
Rustler Aquifer	15 af

(Includes flows from Jeff Davis County to the west and Davis Mountains to the south)

The Estimated annual flow out of the District are:

Igneous Aquifer	1,364 af
Edwards-Trinity Aquifer	15,739 af
Capitan Reef Complex Aquifer	29,390 af

Rustler Aquifer 15 af

The Estimated annual flow between aquifers:

Igneous Aquifer 3,472 af

Edwards-Trinity Aquifer not applicable

Capitan Reef Complex Aquifer 16,940 af

Rustler Aquifer 0 af

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

Table 4 list the Projected Surface Water Supply from the TWDB 2017 State Water Plan Data for Brewster County.

Table 4: TWDB Project Surface Water Supply Brewster County

BREWSTER COUNTY				All values are in acre-feet					
RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
E	IRRIGATION, BREWSTER	RIO GRANDE	RIO GRANDE RUN-OF-RIVER	600	600	600	600	600	600
E	LIVESTOCK, BREWSTER	RIO GRANDE	RIO GRANDE LIVESTOCK LOCAL SUPPLY	19	19	19	19	19	19
Sum of Projected Surface Water Supplies (acre-feet)				619	619	619	619	619	619

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

Table 5 list the Projected Water Demands from the TWDB 2017 State Water Plan Data for Brewster County.

Table 5: TWDB Projected Total Demand for Water for Brewster County

BREWSTER COUNTY				All values are in acre-feet					
RWPG	WUG	WUG Basin		2020	2030	2040	2050	2060	2070
E	ALPINE	RIO GRANDE		1,935	1,944	1,936	1,934	1,937	1,940
E	COUNTY-OTHER, BREWSTER	RIO GRANDE		563	583	584	588	591	594
E	IRRIGATION, BREWSTER	RIO GRANDE		2,304	2,293	2,280	2,269	2,258	2,247
E	LIVESTOCK, BREWSTER	RIO GRANDE		386	386	386	386	386	386
E	MANUFACTURING, BREWSTER	RIO GRANDE		4	4	4	4	4	4
Sum of Projected Water Demands (acre-feet)				5,192	5,210	5,190	5,181	5,176	5,171

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

Table 6 list the Water Supply Needs from the TWDB 2017 State Water Plan Data for Brewster County.

Table 6: TWDB Water Supply Needs for Brewster County

BREWSTER COUNTY			All values are in acre-feet					
RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
E	ALPINE	RIO GRANDE	231	222	230	232	229	226
E	COUNTY-OTHER, BREWSTER	RIO GRANDE	503	483	482	478	475	472
E	IRRIGATION, BREWSTER	RIO GRANDE	968	979	992	1,003	1,014	1,025
E	LIVESTOCK, BREWSTER	RIO GRANDE	0	0	0	0	0	0
E	MANUFACTURING, BREWSTER	RIO GRANDE	0	0	0	0	0	0
Sum of Projected Water Supply Needs (acre-feet)			0	0	0	0	0	0

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:

- Marathon Water Loss Audit and Line Repairs
- Panther Junction BBNP Water Loss Audit and Line Repairs
- Rio Grande Village BBNP Water Loss Audit and Line Repairs

Table 7 list the amount annual amount of demand reduction from these three strategies. All three strategies are for reduction in groundwater use.

Table 7: TWDB Water Management Strategies for Brewster County

BREWSTER COUNTY		All values are in acre-feet					
WUG, Basin (RWPG)		2020	2030	2040	2050	2060	2070
Water Management Strategy	Source Name [Origin]						
COUNTY-OTHER, BREWSTER, RIO GRANDE (E)							
MARATHON WSSSERVICE - WATER LOSS AUDIT AND MAIN-LINE REPAIR	DEMAND REDUCTION [BREWSTER]	65	65	65	65	65	65
PANTHER JUNCTION BBNP PLT - WATER LOSS AUDIT AND MAIN-LINE REPAIR	DEMAND REDUCTION [BREWSTER]	2	2	2	2	2	2
RIO GRANDE VILLAGE BBNP - WATER LOSS AUDIT AND MAIN-LINE REPAIR	DEMAND REDUCTION [BREWSTER]	6	6	6	6	6	6
Sum of Projected Water Management Strategies (acre-feet)		73	73	73	73	73	73

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

The District will manage the production of groundwater from the Marathon, Igneous, Capitan Reef Complex, Edwards-Trinity, and Santa Elena Aquifers 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. The District website will be available to all public. The website will contain a summary of the annual report and information regarding water conservation.

The District will manage the supply of groundwater within the District in order to conserve the resource while seeking to maintain the economic viability of all resource user groups, public and private. In consideration of the economic and cultural activities occurring within the District, the District will identify and engage in such activities and practices that, if implemented, would result in a reduction of groundwater use. An observation network shall be established and maintained in order to monitor changing storage conditions of groundwater supplies within the District. The District will make a regular assessment of water supply and groundwater storage conditions and will report those conditions to the Board and to the public. The District will undertake, as necessary, and cooperate with investigations of the groundwater resources within the District and will make the results of investigations available to the public upon adoption by the Board.

The District will adopt rules to regulate groundwater withdrawals by means of spacing and production limits. The District may deny a well construction permit or limit groundwater withdrawals in accordance with the guidelines stated in the rules of the District. In deciding to deny a permit or limit groundwater withdrawals, the District will consider the public benefit against individual hardship after considering all appropriate testimony. The District shall pass rules specifying under what conditions the annual amount of groundwater permitted by the District for withdrawal from the aquifers located within the District may be curtailed.

The relevant factors to be considered in deciding to deny a permit or limit groundwater withdrawals will include:

The purpose of the rules of the District;

The equitable distribution of the resource;

The economic hardship resulting from grant or denial of a permit or the terms prescribed by the permit;

In pursuit of the District's mission of protecting and managing the resource, the District may require reduction of groundwater withdrawals to amounts which will not cause harm

to the aquifer. To achieve this purpose, the District may, at the Board's discretion, amend or revoke any permits after notice and hearing. The determination to seek the amendment or revocation of a permit by the District will be based on aquifer conditions observed by the District. The District will enforce the terms and conditions of permits and the rules of the District by enjoining the permit holder in a court of competent jurisdiction as provided for in Section 36.102, Texas Water Code.

A contingency plan to cope with the effects of water supply deficits due to climatic or other conditions will be developed by the District and will be adopted by the Board after notice and hearing. In developing the contingency plan, the District will consider the economic effect of conservation measures upon all water resource user groups, the local implications of the degree and effect of changes in water storage conditions, the unique hydrogeologic conditions of the aquifers within the District and the appropriate conditions under which to implement the contingency plan.

The District will employ all technical resources at its disposal to evaluate the resources available within the District and to determine the effectiveness of regulatory or conservation measures. A public or private user may appeal to the Board for discretion in enforcement of the provisions of the water supply deficit contingency plan on grounds of adverse economic hardship or unique local conditions. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

11. Actions, Procedures, Performance and Avoidance Necessary to Effectuate the Management Plan – TWC § 36.1071(e) (4)

The District will use the provisions of this plan as guidelines 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.

The District will implement the provisions of this management plan and will utilize the objectives of the plan as a guide for District actions, operations, and decision-making. The District will ensure that planning efforts, activities and operations are consistent with the provisions of this plan. The District has adopted rules in accordance with Chapter 36 of the Texas Water Code. The development of rules is based on the scientific information and technical evidence available to the District. Current rules are available at: [Brewster County Groundwater Conservation District \(westtexasgroundwater.com\)](http://www.westtexasgroundwater.com). The District will encourage cooperation and coordination in the implementation of this plan. All operations and activities will be performed in a manner that encourages the cooperation of the citizens of the District and with appropriate water management entities at the local,

regional, and state level. The District shall treat all citizens with equality. Citizens may apply to the District for discretion in enforcement of the rules on grounds of adverse economic effect or unique local conditions. In granting of discretion to any rule, the Board shall consider the potential for adverse effect on adjacent landowners. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

12. Resolution Adopting 2021 Management Plan – 31 TAC § 356.53(a)(3)

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

13. Notice of Hearing on 2021 Management Plan – 31 TAC § 356.53(a)(3)

A hearing notice was published in the *Alpine Avalanche*, a newspaper of general circulation in Brewster County, Texas, on November 18, 2021, and a copy of the published notice is attached as Appendix C. Also enclosed, as Appendices D, E and F, respectively, are copies of the posted agenda for the hearing and the minutes of the hearing and a discussion meeting.

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

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

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

Methodology for Tracking District Progress in Achieving Management Goals

In order to achieve the goals, management objectives, and performance standards adopted in this plan, the District shall continually work to develop, maintain, review, and update rules, policies, and procedures for the various programs and activities contained in the plan. As a means to monitor performance, the General Manager will provide direction on activities throughout the year and routinely meet with staff to track interim progress on the various goals, management objectives, and performance standards adopted in this plan. On an annual basis, the General Manager will prepare an annual report documenting progress made towards implementation of the management plan and achievement of the goals and objectives. The General Manager will present the annual report to the Board to assist the Board's evaluation of the progress made, and to consider approval. Once approved by the Board, a copy of the annual report will remain on file at

the District's office for members of the public to access as well as made available on the website, and then submitted to the relevant entities pursuant to District Rules and Bylaws.

15.1. Efficient Use of Groundwater

Management Objective: Each year, the District will require all new exempt or non-exempt wells that are constructed within the boundaries of the District to be registered with the District in accordance with the District Rules.

Performance Standard: Each year the number of exempt and non-exempt wells registered by the District for the year will be incorporated into the Annual Report submitted to the Board of Directors of the District. The District will educate the public on the most efficient uses of groundwater. A District education, outreach, and information-sharing program, covering local groundwater issues, will be continued and strengthened. It will be designed to inform the public and public officials in the county and to add to the geotechnical database of the local water well drilling industry.

Management Objective: Each year, the District will hold at least one educational event.

Performance Standard: Each year, a summary of the District educational event will be included in the Annual Report. The District's website will be updated to include information on the status of groundwater in the District.

15.2. Controlling and Preventing Waste of Groundwater

Management Objective: Each year, the district will review and evaluate the district rules to determine whether any amendments are needed to decrease the amount of waste of groundwater within the district. The district's review of its rules will take place during a properly noticed meeting, and any decisions regarding amendments to the district rules will be via formal district board action and will be documented in the minutes of the board.

Performance Standard: The district will, in each annual report, include a summary discussion of the district board's review and decisions regarding amendments to the district rules. Documentation in the annual report will include at minimum, the date, time, and location of the district board meeting, and documentation (in the form of approved meeting minutes) of the board's review and actions (if any) taken regarding rule amendments.

Management Objective: The district will annually provide information to the public on eliminating and reducing wasteful practices in the use of groundwater by publishing

information on groundwater waste reduction on the district’s website at least once a year and by giving public presentations.

Performance Standard: Record the number of shows, demonstrations, events, or educational talks presented and report this to the district board of directors in an annual report.

Management Objective: The District will monitor and communicate to well owners any indications of inefficiency in well operations that might cause waste of groundwater. The BCGCD staff will report to the Board at least annually, the number of site visits to check equipment and the number of notices and violations of District rules regarding waste.

Performance Standard: The following will be the expected key metrics used to measure progress of management objectives: The annual number of site visits to inspect wells; and the annual number of notices and violations of District rules regarding well maintenance and/or groundwater waste.

15.3. 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, the geologic formation of the aquifer within the District precludes significant subsidence from occurring due to groundwater pumping, and this management item is not applicable to the District’s current Management Plan. The District has reviewed the TWDB subsidence risk report “Identification of the Vulnerability of the Major and Minor Aquifers of Texas to Subsidence with Regard to Groundwater Pumping.”

(<http://www.twdb.texas.gov/groundwater/models/research/subsidence/subsidence.asp>).

This report only found four locations within Texas with observed subsidence and none of these areas were within the District. The District will continue to watch for subsidence risk and review reports to monitor if it could be a problem in the future.

15.4. Conjunctive Surface Water Management Issues

Management Objective: Each year, the District will participate in the regional planning process by attending the Region E regional water planning group meetings to encourage the development of surface water supplies to meet the needs of water user groups in the District. A representative of the District will attend a minimum of 50 percent of the Region E regional water planning group meetings.

Performance Standard: The District will, in each annual report, document the participation of District representatives in Region E meetings and the number of meetings

attended in the preceding calendar year. Documentation will consist of a table listing all Region E meetings scheduled during the preceding 12 months, and the name(s) of District representative attending.

Management Objective: Promote measures and policies that foster large-scale substitution of surface and other alternative water supplies for existing groundwater users. Identify available surface water resources. Encourage District permittees to diversify their water supplies and implement conjunctive use by fostering arrangements with available water suppliers.

Performance Standard: Record progress made for this goal and present annually to the District Board of Directors.

15.5. 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 Capitan Reef Complex, Edwards-Trinity, Igneous, Marathon, and Santa Elena Aquifers 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 operating production permits for all nonexempt wells in operation.

Management Objective: The District will encourage the collection and testing of groundwater quality samples by well owner from newly-drilled wells and existing wells.

Performance Standard: The District will work with the Brewster County Extension Agent to bring in outside testing facilitators and water quality programs.

Management Objective: The District will review the need to prepare and update at least once every two years a habitat conservation plan (HCP) that protects, to the maximum extent practicable, the population of endangered species affected by district groundwater management activities, including implementation of the approved HCP under the rules.

Performance Standard: The District, if needed, will report to the board of directors revisions made to the HCP every two years and post the revised HCP to the district web site.

Management Objective: The District may inspect suspended and abandoned wells to ensure proper closing of wells in accordance to rules set forth by the District. Notices will be sent and fines may be assessed against well owners whose wells do not adhere to District rules.

Performance Standard: The following will be the expected key metrics used to measure progress of management objectives: The number of notices sent out and possible fines assessed to well owners or operators concerning violations of District rules and the number of wells plugged each year.

15.6. Drought Conditions

Management Objective: The annual amount of groundwater permitted by the District for withdrawal from the portion of the Capitan Reef Complex, Edwards-Trinity, Igneous, Marathon, and Santa Elena Aquifers 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.

15.7. Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, and Brush Control

Management Objective: The General Manager will be available to present water conservation programs to schools, 4-H clubs, and community groups on a request basis. These programs will be scheduled through the District office and will be appropriate for the various audiences. Depending on availability, the District will make every effort to distribute, on an annual basis, conservation education materials to schools that serve students from the District.

Performance Standard: A summary of programs presented, content and audience group will be included in the annual report.

Recharge Enhancement is not applicable for the District; as it cost prohibitive and rainfall in the District is not adequate to accomplish this goal.

Management Objective: The District shall promote rainwater harvesting and brush control. Precipitation enhancement is not applicable.

Performance Standard: The District shall include articles on rainwater harvesting and brush control on its website annually, as well as work with the local Agri-Life Extension on promoting programs. Precipitation enhancement is not appropriate nor cost effective.

15.8. Modeled Available Groundwater and Desired Future Conditions

Management Objective: Each year, the District will measure water levels of at least three wells within the District. These measurements and others in the area are taken by the TWDB, will be used over five years (or available) to calculate an average.

Performance Standard: The District will, in each annual report, include the monitoring results of the sample wells. After five years (or available) the average will be used to determine if the District is on track to meet the DFC.

Management Objective: Once the district's monitoring program has been approved, conduct water level measurements at least annually on wells within the district.

Performance Standard: Annual evaluation of water-level trends and the adequacy of the monitoring network to monitor aquifer conditions within the district and comply with the aquifer resources desired future conditions. The evaluation will be included in the district's annual report to be given to the district's board of directors.

16. Desired Future Conditions

The GMA 4 Resolution 2010-01 set a Desired Future Condition for the Capitan Reef Complex Aquifer of 0 ft, Edwards-Trinity Aquifer of 3 ft, Marathon Aquifer of 0 ft, and Igneous Aquifer of 10 ft 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 submitted to the TWDB based on limiting annual groundwater pumped to the MAG values provided to the District by the TWDB.

Performance Standard: The District's Annual Report will include a discussion of 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 install a water level recorder in at least one monitoring well and manually measure water levels each year in at least one monitoring well within the District and will determine the average groundwater levels annually.

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.

17. 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.

18. Sharing with Regional Water Planning Group

An adopted copy of the Management Plan will be sent via electronic copy to the RioCog for dissemination to the Far West Regional Water Planning Group for review.

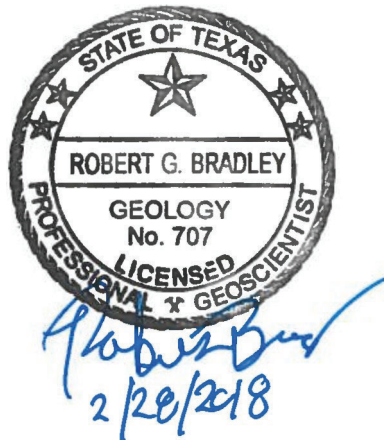
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Appendix A – TWDB GAM Run 16-030 MAG

**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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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).

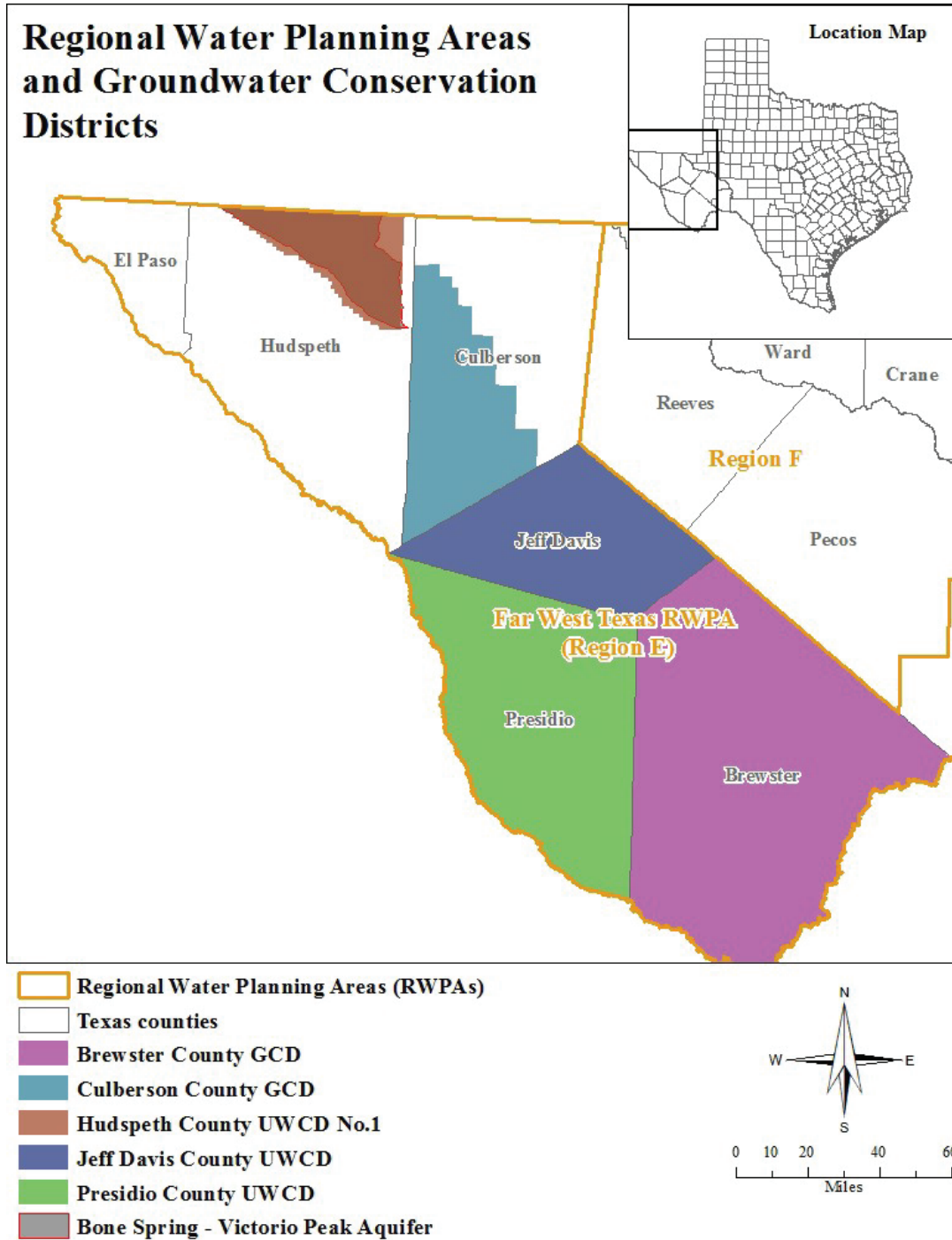


FIGURE 1. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAS), GROUNDWATER CONSERVATION DISTRICTS (GCDs), AND COUNTIES IN THE VICINITY OF THE BONE SPRING-VICTORIO PEAK AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.



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

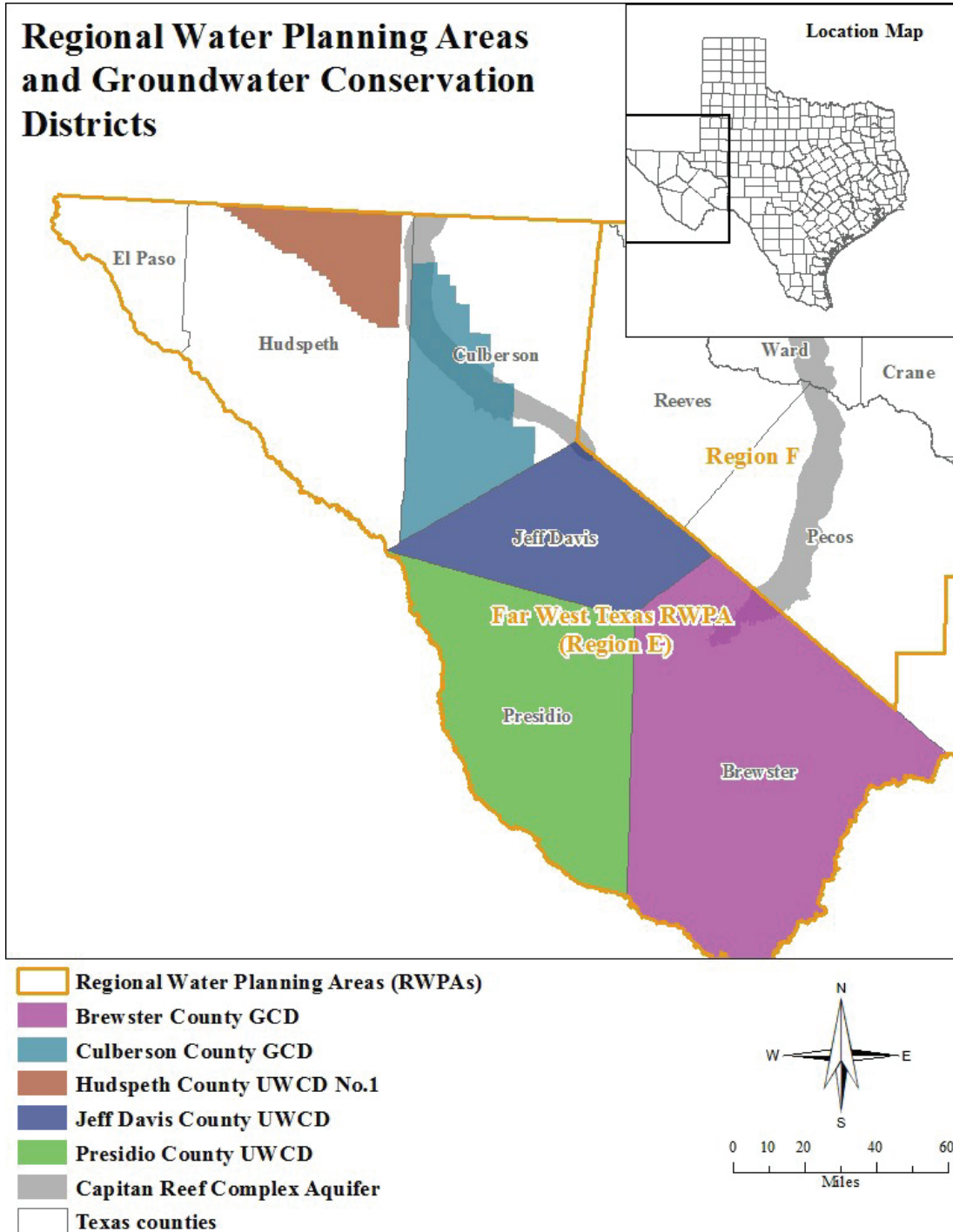


FIGURE 3. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAS), GROUNDWATER CONSERVATION DISTRICTS (GCDs), AND COUNTIES IN THE VICINITY OF THE CAPITAN REEF COMPLEX AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

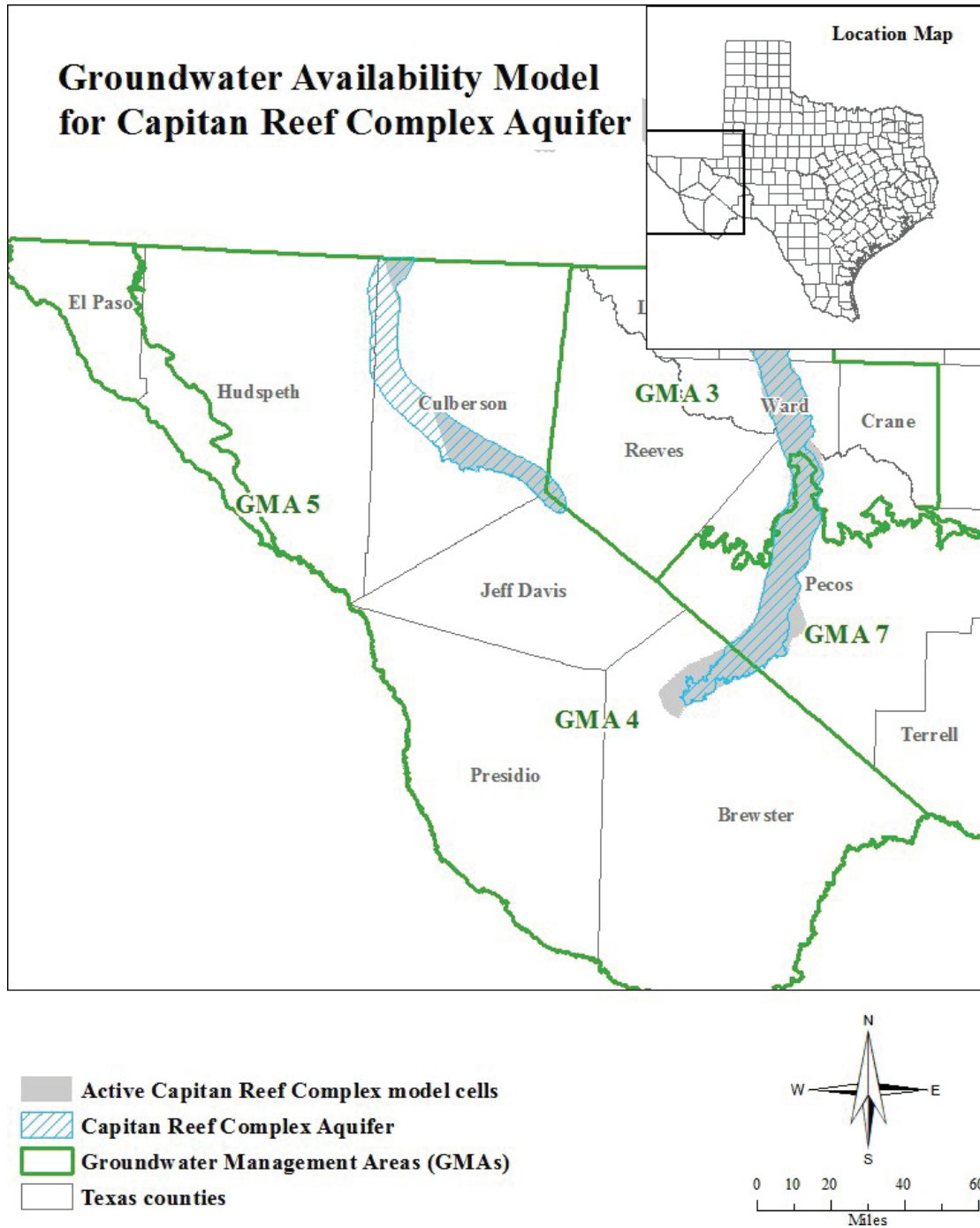


FIGURE 4. MAP SHOWING THE AREAS COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE CAPITAN REEF COMPLEX AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

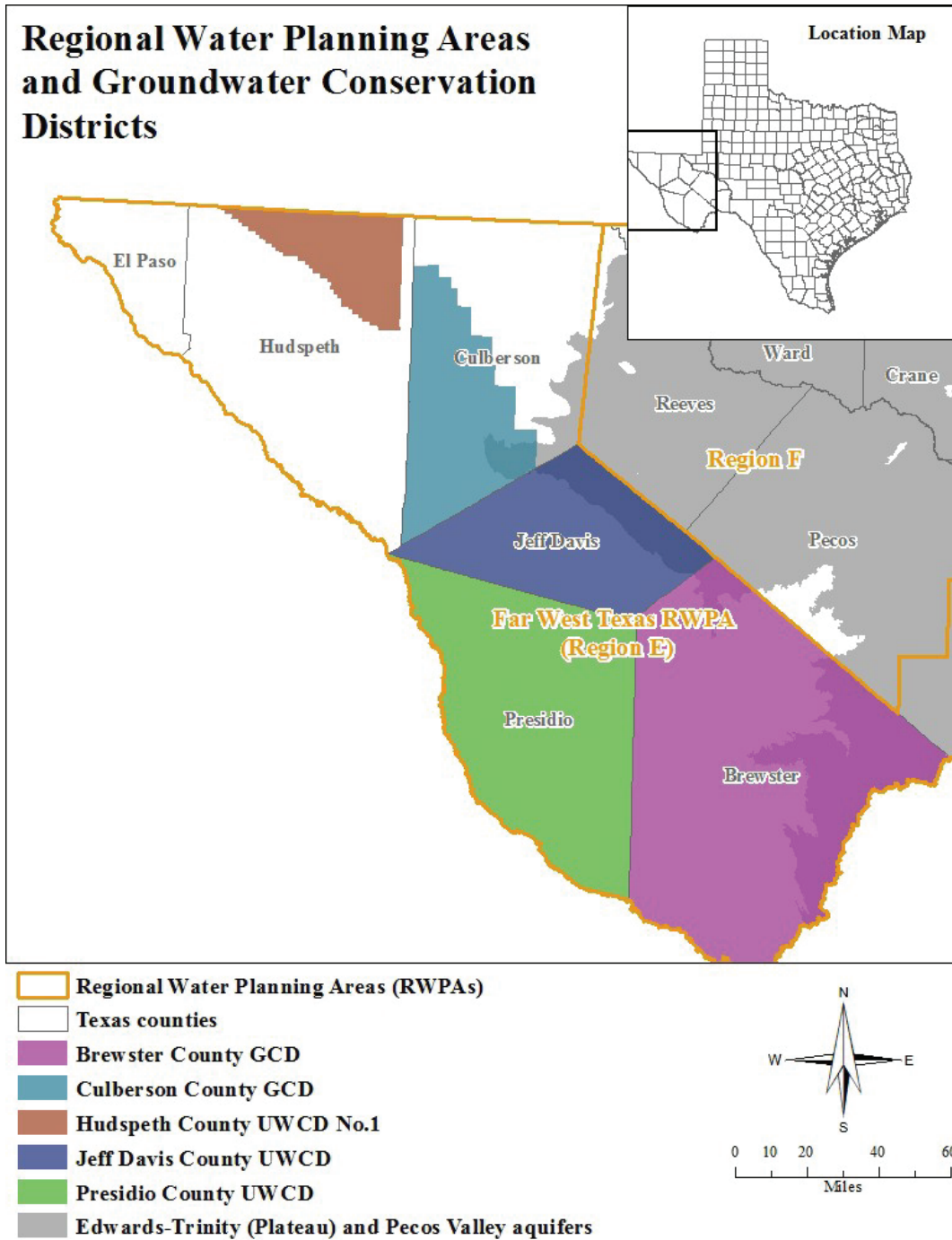


FIGURE 5. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAS), GROUNDWATER CONSERVATION DISTRICTS (GCDs), AND COUNTIES IN THE VICINITY OF THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

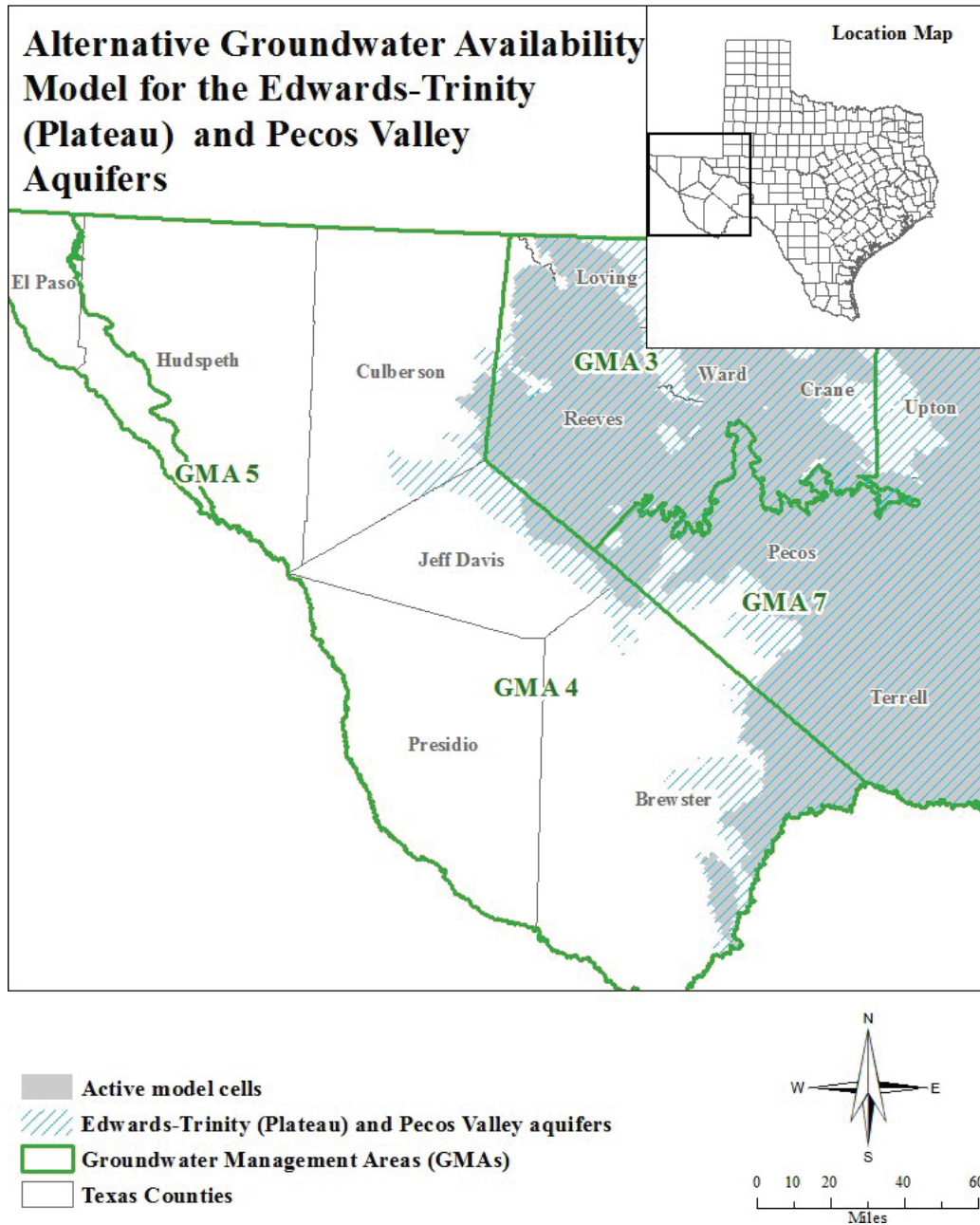


FIGURE 6. MAP SHOWING THE AREAS COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

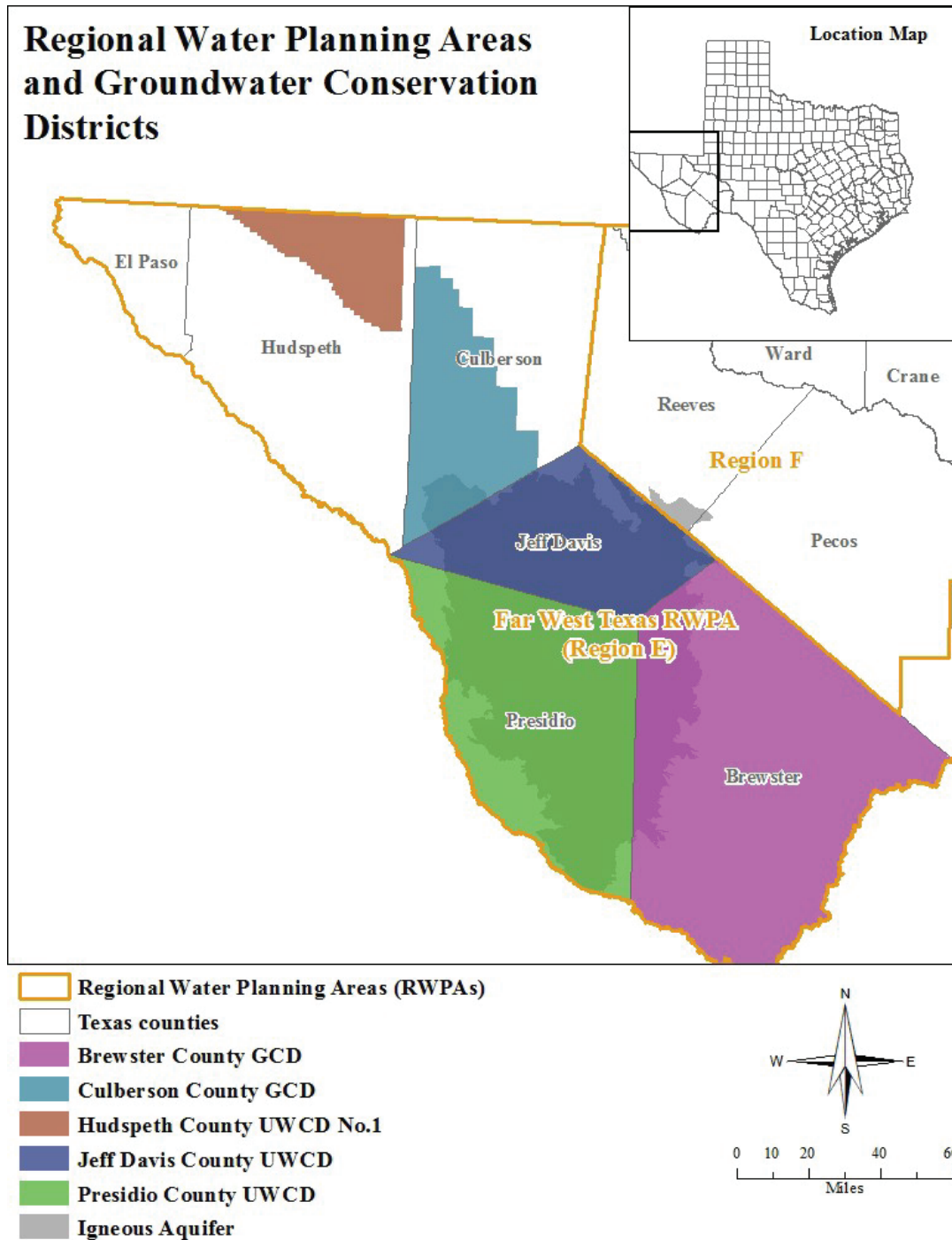


FIGURE 7. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAS), GROUNDWATER CONSERVATION DISTRICTS (GCDs), AND COUNTIES IN THE VICINITY OF THE IGNEOUS AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.



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

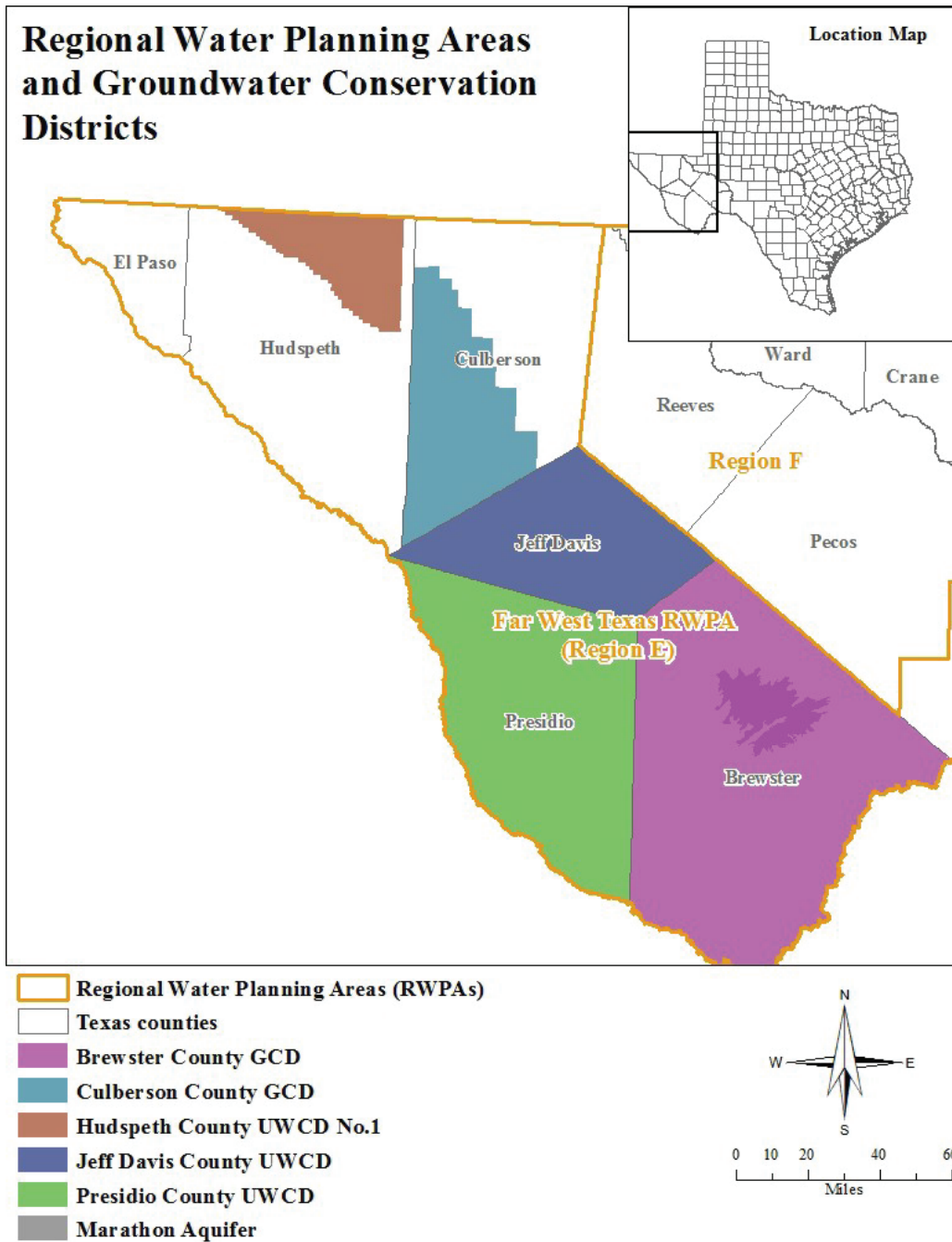


FIGURE 9. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAs), GROUNDWATER CONSERVATION DISTRICTS (GCDs), AND COUNTIES IN THE VICINITY OF THE MARATHON AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.



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

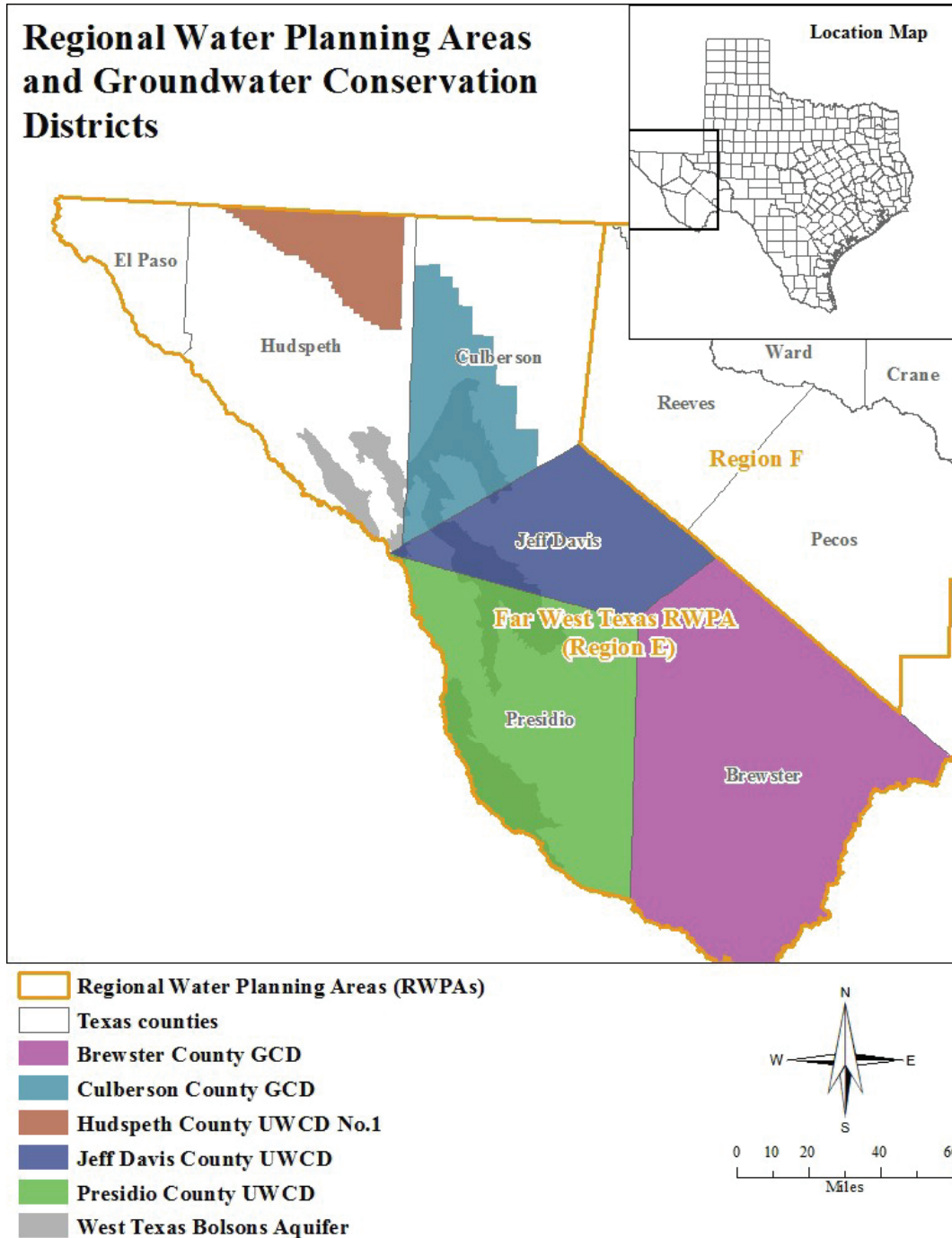


FIGURE 11. MAP SHOWING REGIONAL WATER PLANNING AREAS (RWPAS), GROUNDWATER CONSERVATION DISTRICTS (GCDs), AND COUNTIES IN THE VICINITY OF THE WEST TEXAS BOLSONS AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.



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.

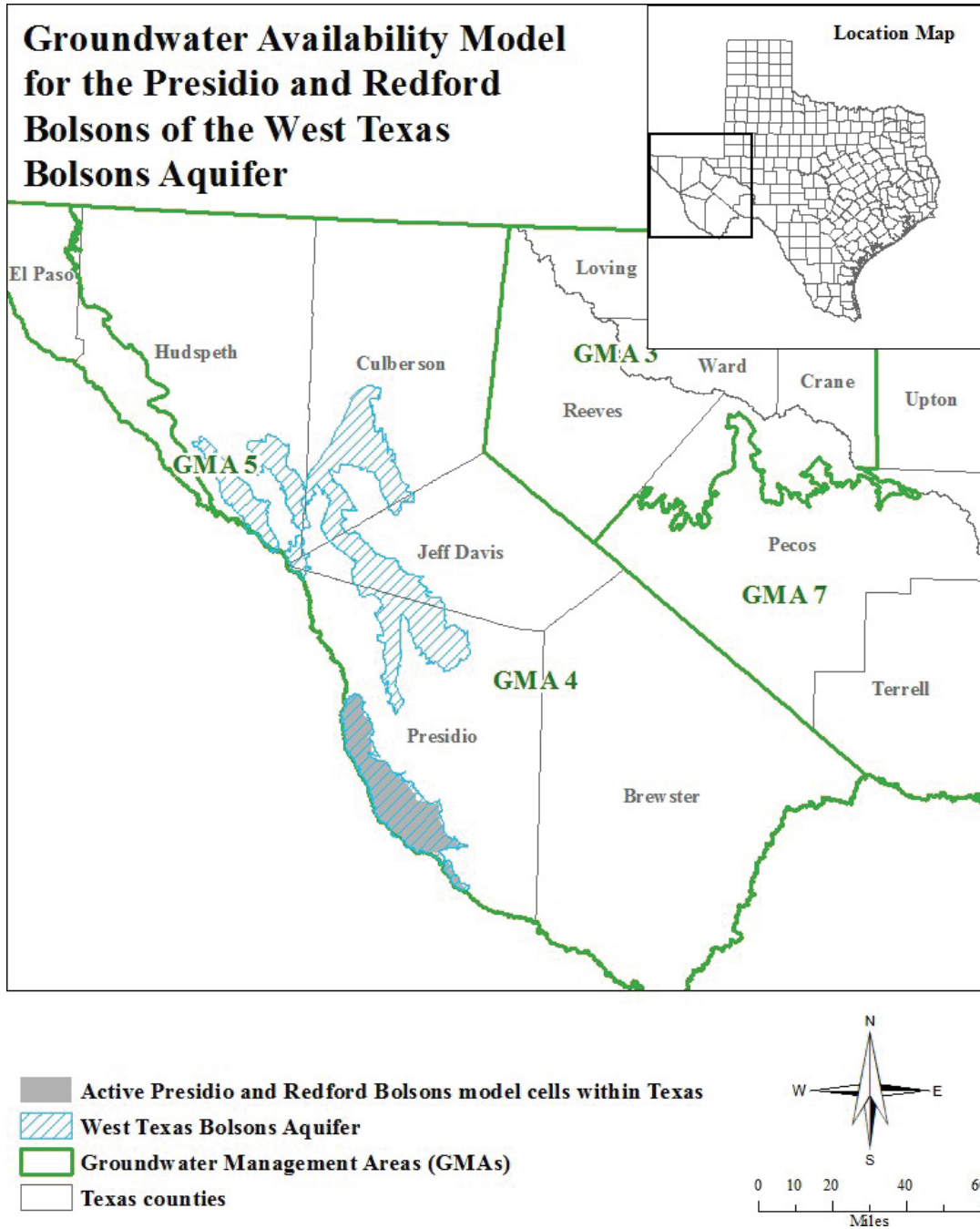


FIGURE 13. MAP SHOWING THE AREAS COVERED BY THE GROUNDWATER AVAILABILITY MODEL FOR THE PRESIDIO AND REDFORD PORTIONS OF THE WEST TEXAS BOLSON AQUIFER IN GROUNDWATER MANAGEMENT AREA 4.

TABLE 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 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


**Resolution of the
Brewster County Groundwater Conservation District
(the District)**

Whereas, the District in accordance with Chapter 36 of the Texas Water Code has provided public notice of hearing regarding amendment and adoption of the District's Groundwater Management Plan;


Whereas, the District has held three public meetings soliciting public comments regarding the proposed draft amended management plan and a quorum of the board was present for all meetings;

Whereas, copies of all written comments regarding the proposed management plan have been provided to each of the District's Board Members;

Therefore, the Board of Directors adopted the proposed management plan, as amended, and shall send a copy of the plan to the Texas Water Development Board for certification, to the Chair of the Far West Texas Water Planning Group, and to the general managers of each of the groundwater districts within Groundwater Management Area 4 of Texas.



, Chairman



, Secretary

Appendix C – Notice of Hearing

ALPINE AVALANCHE
Heard on the STREET

Our Avalanche reporter asked, "Do you believe in ghosts?"



Elizabeth Wood, Alpine: Yes, I think there is too much empirical evidence about near-death experiences and past lives for there not to be anything else other than this existence.



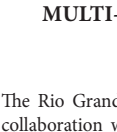
Jennifer Shelton, Alpine: Yes, I do believe in ghosts because I have seen one. We had one at the house I used to live in, and the first time I ever met it, I was at my front door standing. I looked to see what was behind the door, I thought it was one of my brothers, but it was a young boy, and I could see Converse, his blue jeans, and white t-shirt. I couldn't see his face, though. We had heard all kinds of noises while we were there.



Isabella Shelton, Alpine: Yes and no. I believe in ghosts, but I also believe in spirits. I believe they're here, but I also believe in heaven and the other side.



Erik Llanez, Alpine: A little bit, because there's been a couple of them at the Holland Hotel, and people say it's haunted. I'm from here, and I think that's real because I've been at the Holland, and I've heard some weird stuff about it.



James Bell, Alpine: Yes! Because they're at my house and one is my friend.



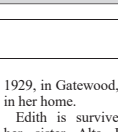
Elizabeth Wood, Alpine: Yes, I think there is too much empirical evidence about near-death experiences and past lives for there not to be anything else other than this existence.



Jennifer Shelton, Alpine: Yes, I do believe in ghosts because I have seen one. We had one at the house I used to live in, and the first time I ever met it, I was at my front door standing. I looked to see what was behind the door, I thought it was one of my brothers, but it was a young boy, and I could see Converse, his blue jeans, and white t-shirt. I couldn't see his face, though. We had heard all kinds of noises while we were there.



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James Bell, Alpine: Yes! Because they're at my house and one is my friend.



Send your roadslides to editor@alpineavalanche.com.

UPCOMING EVENTS

October 28
Poet Laureates Presentation, 5-7 p.m. at Museum of the Big Bend on the Sul Ross State University campus. Alan Birkenbach and Lisa Carver will present a program about "The National Parks: A Century of Grace." Free and open to the public.
October 30
Day of the Dead Celebration, 3-7 p.m. at Holy Angels Cemetery on Old Cemetery Road in Alpine. Menudo, Frito pie, hot dogs, popom balls, and more. Proceeds from food sales will go toward improvements at the cemetery.

November 4
NASA@MyLibrary Program, 7 p.m. at Alpine Public Library, 805 W. Ave. E. An outdoor event free and open to the public. Watch a presentation of the James Webb space telescope, and view the night sky. Free tamale dinner included.
Citizenship Classes, at Alpine Public Library by appointment only, 805 W. Ave. E. 432-837-2621
ESL Tutoring, at Alpine Public Library, 805 W. Ave. E. Call 432-837-2621 to make an appointment.

PET OF THE WEEK



Alpine Humane Society Pet of the Week is Herbert, a domestic medium hair gray tabby. He is about six months old, and would love to curl up this fall on your sofa.
Like many tabbies, Herbert has a distinctive "M" on his forehead, and several legends describe the mark's origin. The first legend comes from the ancient Egyptians. Cats were called mau, most likely because of the sound they make. The word mau also translated to seeing or light.
Individual monetary donations are one of the significant sources of support for the Al-

November 13
Horseshoe and Cribbage Tournament, starts 9:30 a.m. at the Ghost Town horseshoe pits in Terlingua. Batches served at noon, with action to follow. All proceeds benefit Big Bend Education Corporation for Terlingua school graduates.

ONGOING EVENTS

Alcoholics Anonymous, 502 E. Lockhart Ave. Schedules available on front door. For more information, call 915-562-4081 or aa-intergroup.org.
Alpine Lions Club meeting, noon Tuesdays at the Sul Ross University Center, Room 210.

American Legion Post 79 meeting, 6:30 p.m., second Monday each month, Legion Hall, 306 W. Sul Ross Ave. Dinner provided.

American Legion Auxiliary meeting, 6:30 p.m., third Monday each month, Legion Hall, 306 W. Sul Ross Ave.
Big Bend Community Choral rehearsals on Monday evenings at 6 p.m. in the First United Methodist Church sanctuary in Alpine. All are welcome, but first contact Andrew Alegria at Andrew.alegria@sulross.edu, call 432-837-8216, or visit bbccorale.wixsite.com/bbcc.

Citizenship Classes, at Alpine Public Library by appointment only, 805 W. Ave. E. 432-837-2621

ESL Tutoring, at Alpine Public Library, 805 W. Ave. E. Call 432-837-2621 to make an appointment.

GED tutoring, at Alpine Public Library, 805 W. Ave. E. Call 432-837-2621 to make an appointment.

Kiwanis Club of Alpine, noon, Wednesdays at the Sul Ross University Center, room 210.
805 W. Ave. E. After school club for grades one to three.

Senior Coffee, 9:30 a.m.-noon on Fridays at Alpine Public Library, 805 W. Ave. E. 432-837-2621.

Sons of the Legion, 6:30 p.m., fourth Monday each month, Legion Hall, 306 W. Sul Ross Ave.

Voter registration assistance, Tuesdays-Thursdays, 9 a.m.-1 p.m., Alpine Public Library, 805 W. Ave. E. 432-837-2621.

Walk for Life, 9-10 a.m. Tuesdays beginning March 30. Locations will vary so call or email to register at Cathy@cathywright.com or 832-314-8103. A movement intelligence program by Cathy Wright, Learning for Life LLC.

Zumba, 6-7 p.m. every Monday, Wednesday, and Thursday at Alpine Public Library, 805 W. Ave. E, with instructor Eva Lambert.

See more at alpineavalanche.com.

WEST TEXAS EYECARE
Dr. Hulon Pass - Optometrist
Dr. Joshua Pass - Optometrist
Dr. Brian Cherry - Optometrist
605 N. Main P.O. Box 1568
Ft. Stockton, TX 79735
432-336-3662 • 432-336-6711
Mon - Fri 8:30 am-5:30 pm

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432.837.0094 | 102 W. AVE. E | ALPINE
1600-1700 head of cattle tomorrow. 325-350 weigh cows & bulls, 100-125 Pairs & Breds, 1150-1200 calves & yearlings.
Here are a few consignments:
190 Cows-(Animas Foundation) Blk, Bwf Angus & Brangus X, Pregged Open @ Ranch, good frame, medium flesh 5-10 yrs old.
200-excellent quality (Triple R) 85% blk, bwf Angus & Brangus X calves. BSGold/ 7way@ branding, medium condition 450-650#.
85-reputation quality (McDaniel) blk angus X calves, BSGold/ 7way@ branding 500-600#.
60-reputation quality (Waggoner) 90% blk, bwf angus & brangus X calves, BSGold/7way@ branding, medium condition 450-600#.
36-excellent quality char X calves, medium condition 350-450#.
20-excellent quality blk angus X calves, CM5/ 7way@ branding 375-500#.
36-excellent quality blk angus & brangus X calves, WEANED 45 days, Rounds of shots off grass, 400-500#.

BREWSTER COUNTY GROUNDWATER CONSERVATION DISTRICT NOTICE OF PUBLIC HEARING ON PROPOSED CHANGES TO MANAGEMENT PLAN

Notice is hereby given that the Brewster County Groundwater Conservation District ("District") proposes action on ADOPTION OF 2021 GROUNDWATER MANAGEMENT PLAN. Copies of the District General Manager's proposed action and DRAFT 2021 MANAGEMENT PLAN are available for public inspection on the District website at westtexasgroundwater.com and by email request at bcgwcd@gmail.com. For inspection of the proposed DRAFT MANAGEMENT PLAN in person, please contact Summer Webb the General Manager at (432) 386-3437.

The District will conduct a **PUBLIC HEARING** pursuant to its authority under Chapter 8816 of the Texas Special District Local Laws Code, Chapter 36 of the Texas Water Code, and the District's Rules to consider ADOPTION OF THE DRAFT 2021 GROUNDWATER MANAGEMENT PLAN and to provide interested members of the public an opportunity to appear and provide oral or written comments to the District regarding the proposed Management Plan. WRITTEN COMMENTS OR PROPOSALS ARE TO BE TO THE GENERAL MANAGER BY November 16, 2021, at 5 PM. The public hearing will be at the following location at the indicated date and time:

In Person: Val Clark Beard Conference Room, 203 N 7th St., Alpine, TX 79830
Virtual: <https://global.gotomeeting.com/join/593196125> or tel:+1(571)317-3116 access code: 593-196-125#

Date and Time: November 18, 2021, at 8:00 AM

The District General Manager will propose that the District Board grant adoption as follows:

- ADOPTION OF 2021 GROUNDWATER MANAGEMENT PLAN FOR FINAL SUBMISSION TO THE TEXAS WATER DEVELOPMENT BOARD.

Affected persons may request a contested case hearing on the proposed MANAGEMENT PLAN by submitting such a request in writing to the District no later than 5:00 pm on November 12, 2021. If no timely written request for a contested case hearing is filed, such ADOPTION OF 2021 MANAGEMENT PLAN, will be presented to the District Board on the date of the hearing for final action.

PERSONS WITH DISABILITIES WHO PLAN TO ATTEND THE DISTRICT HEARING AND WHO MAY NEED AUXILIARY AIDS OR SERVICES SUCH AS INTERPRETERS FOR PERSONS WHO ARE DEAF OR HEARING IMPAIRED, READERS, LARGE PRINT, OR BRAILLE, ARE REQUESTED TO CONTACT SUMMER WEBB, GENERAL MANAGER, AT (432) 386-3437. AT LEAST FIVE (5) WORK DAYS PRIOR TO THE MEETING SO THAT APPROPRIATE ARRANGEMENTS CAN BE MADE. PERSONS WHO DESIRE THE ASSISTANCE OF AN INTERPRETER IN CONJUNCTION WITH THEIR ORAL PRESENTATION AT THIS MEETING ARE ALSO REQUESTED TO CONTACT SUMMER WEBB AT LEAST FIVE (5) DAYS PRIOR TO THE MEETING SO THAT APPROPRIATE ARRANGEMENTS CAN BE MADE.

OBITUARIES • FROM 2

L. Edith Heidebrecht

L. Edith Heidebrecht passed away early Oct. 9, 2021, at Big Bend Regional Medical Center.

She was born Lois Edith Brown on Jan. 14,

1929, in Gatewood, Mo., in her home.

Edith is survived by her sister Alta Brock of Boulder, Colo., five daughters, 12 grandchildren, and many great-

grandchildren. She was preceded in death by one son and one grandson.

Her body is laid to rest at Terlingua Ranch Community Church Cemetery.

RIO GRANDE COUNCIL OF GOVERNMENTS
PUBLIC MEETING: UPDATE OF BREWSTER COUNTY AND THE CITY OF ALPINE MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

The Rio Grande Council of Governments (RGCOC) in collaboration with Brewster County and City of Alpine Hazard Mitigation Planning team will hold a public meeting on Wednesday, November 3, 2021 at 1p.m. (CDT) at Alpine Civic Center, 801 W. Holland Ave., Alpine, Texas 79830. The intent of the public meeting is to discuss and gather input on the potential impact of natural hazards and determine mitigation action strategies that may reduce potential for loss, injury, damage and interruption of businesses when hazards occur in the future.

For additional information, please contact Hazard Mitigation Coordinator, Ray Resendez at (915) 533-0998 x 153 or at rayr@riocog.org, or Marci Tuck, Grant Writer City of Alpine at (432) 837-3301 or at grant.writer@ci.alpine.tx.us.

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**APPENDIX D – Agenda for November 18, 2021 Board Meeting and Hearing
on Groundwater Management Plan**

AGENDA
BREWSTER COUNTY GROUNDWATER CONSERVATION DISTRICT
REGULAR MEETING

Thursday, November 18, 2021, 8:00 a.m.

In Person: Val Clark Beard County Office Building,
Conference Room, 203 N. 7th Street, Alpine, TX

via GoTo Meeting: <https://global.gotomeeting.com/join/593196125>

You can also dial in using your phone: [tel:1\(571\)317-3116](tel:1(571)317-3116) Access Code: 593-196-125#

MANAGEMENT PLAN HEARING

1. Presentation of Management Plan v.5
2. Public Comment

REGULAR MEETING

1. Call to Order
2. Determination of a Quorum
3. Proof of Notice of Meeting
4. Public Comment
5. Discuss/Act On: Brewster County GCD Management Plan v.5
6. Discuss: Update on Marathon Aquifer Study
7. Discuss/Act On: Exempt Well Requirements, specifically under 10 acres
8. Discuss/Act On: Drilling Applications
9. Discuss/Act On: Hire Assistant General Manager
10. Discuss/Act On: Recommendation for Director Appointees
11. Discuss/Act On: Approval of Minutes
 - a. Regular Meeting- August 26, 2021
12. Discuss/Act On: Report
 - a. Chairman
 - b. General Manager
13. Discuss/Act On: Payment of Bills, Budget Line Items, and Bank Reconciliations
14. Closed Session:

The Board of Directors of the Brewster County Groundwater Conservation District may go into closed session under the authority of the Government Code, Chapter 551, and Texas Open Meetings Act, for the purpose of consultation with attorney - pending litigation (§ 551.071), consultation with attorney – attorney/client privileged consultations (§ 551.071), deliberations regarding real property (§ 551.072), deliberations regarding personnel matters (§ 551.074).
15. Discuss recommendation(s) regarding matters discussed in closed session
16. Discuss/Act On: December 16, 2021
17. Adjournment

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 District Website, westtexasgroundwater.com, at least 72 hours prior to the time of said public hearing.

Date: 11/11/2021

Summer Webb
Summer Webb, General Manager

At 11:53 FILED o'clock A M
Date November 12, 2021

Sarah Vasquez

SARAH VASQUEZ
County Clerk, Brewster County, TX
By _____ Deputy

Appendix E - Minutes from November 18, 2021 Hearing

Brewster County Groundwater Conservation District
Minutes of Hearing & Regular Meeting
Thursday, November 18, 2021 – 8:00 AM CDT
Alpine, Texas

Management Plan Hearing

1. Presentation of Management Plan v.5
2. Public Comment- None

Regular Meeting

1. Call to Order – Meeting was called to order at 8:04 a.m. by Chairman Joan Johnson and immediately entered into the Hearing. The Regular meeting was started again at 8:13 a.m.
2. Determination of Quorum – Members present were Chairman Joan Johnson, Vice Chairman Tim Leary, Member Dr. Kevin Urbanczyk, Member Ike Roberts, Member Ambrosio Valles, Member Homer Mills and Member Tom Mangrem.. A quorum was determined. Also present was General Manager Summer Webb. Members of the public and interested parties are listed on an attached sign-in sheet.
3. Proof of Notice of Meeting- Posted Timely
4. Public comment: Janet Groth discussed upcoming agenda items.
5. Discuss/Act On: Brewster County GCD Management Plan v.5- Director Leary made a motion to approve the MP as presented; with a second by Director Mills. All members were in favor and the motion passed.
6. Discuss: Update on Marathon Aquifer Study- Danielle Gallo presented an update on the progress of the study; the Directors met with approval.
7. Discuss/Act On: Exempt Well Requirements- after consideration and discussion with Attorney Trejo, the decision was as long as a well was for domestic use, at least 50’ from the property line, and prorated according to deeded acres; it would be considered exempt and approved by GM. This was not the intention of the Board and will continue to be discussed.
8. Discuss/Act On: Drilling Application- None
9. Discuss/Act On: Hire Assistant General Manager- discussion only; no decisions were made.
10. Discuss/Act On: Recommendation for General Manager- discussion was had regarding the next years board and who would like to continue as Director. No decisions were made.
11. Discuss/ Act On: Approval of Minutes-
 - a. Regular Meeting- August 26, 2021 – Director Mangrem made a motion to approve; with a second by Director Mills. All members were in favor and the motion passed.
12. Discuss/Act On: Report
 - a. Chairman- Nothing new at this time.
 - b. General Manager’s Report- The district has received a permit application which is being reviewed.

13. Discuss/ Act On: Payment of Bills, Budget Line items, and Bank Reconciliations – Director Leary made a motion to approve the bills and reconciliations as presented; with a second by Director Roberts. All members were in favor and the motion passed.
14. Closed Session: 9:26-10:11. No action was taken.
15. Discuss recommendation(s) regarding matters discussed in closed session- GM was asked to run the job posting another week.
16. Discuss/ Take Action On: Agenda Items for Meeting- December 16, 2021 regarding exempt wells under 10 acres.
17. Adjournment- Chairman Johnson closed the meeting at 10:11 am.

Chairman, Joan Johnson

Vice Chairman, Tim Leary

Secretary, Homer Mills

Member, Ike Roberts

Member, Kevin Urbanczyk

Member, Tom Mangrem

Member, Ambrosio Valles

Appendix F - Minutes from June 28, 2021 Board Meeting

Brewster County Groundwater Conservation District
Minutes of Special Meeting
Monday, June 28, 2021 – 8:00 AM CDT
Virtually

1. Call to Order – Meeting was called to order at 8:00 a.m. by Chairman Joan Johnson.
2. Determination of Quorum – Members in attendance were Chairman Joan Johnson, Vice Chairman Tim Leary, Secretary Homer Mills, Member Dr. Kevin Urbanczyk, Member Ambrosio Valles and Member Tom Mangrem.. A quorum was determined. Also present was General Manager Summer Webb. Members of the public and interested parties are listed on an attached sign-in sheet.
3. Proof of Notice of Meeting- Posted Timely
4. Public comment: None
5. Discuss/ Act On: Permit Applications, Hearing Date- none.
6. Discuss/Act On: Management Plan- Discussion was had regarding the data presented and required by TWDB. The Board has doubts regarding the validity of these numbers, but understands it is required for this cycle planning. There is hope that at the next planning cycle the district will have published data that better reflects correct spring flows and exempt use. Director Leary made a motion to approve and submit as Final Management Plan to the TWDB and TCEQ as presented; with a second by Director Valles. All members were in favor and the motion passed.
7. Closed Session: None.
8. Discuss recommendation(s) regarding matters discussed in closed session- None.
9. Adjournment- Chairman Johnson closed the meeting at 8:22am.

Chairman, Joan Johnson

Secretary, Homer Mills

Member, Kevin Urbanczyk

Member, Ambrosio Valles

Vice Chairman, Tim Leary

Member, Ike Roberts

Member, Tom Mangrem

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

Estimated Historical Water Use And 2017 State Water Plan Datasets:

Brewster County Groundwater Conservation District

by Stephen Allen

Texas Water Development Board

Groundwater Division

Groundwater Technical Assistance Section

stephen.allen@twdb.texas.gov

(512) 463-7317

July 22, 2020

GROUNDWATERMANAGEMENTPLANDATA:

This package of water data reports (part 1 of a 2-part package of information) is being provided to groundwater conservation districts to help them meet the requirements for approval of their five-year groundwater management plan. Each report in the package addresses a specific numbered requirement in the Texas Water Development Board's groundwater management plan checklist. The checklist can be viewed and downloaded from this web address:

<http://www.twdb.texas.gov/groundwater/docs/GCD/GMPChecklist0113.pdf>

The five reports included in this part are:

1. Estimated Historical Water Use (checklist item 2)

from the TWDB Historical Water Use Survey (WUS)

2. Projected Surface Water Supplies (checklist item 6)

3. Projected Water Demands (checklist item 7)

4. Projected Water Supply Needs (checklist item 8)

5. Projected Water Management Strategies (checklist item 9)

from the 2017 Texas State Water Plan (SWP)

Part 2 of the 2-part package is the groundwater availability model (GAM) report for the District (checklist items 3 through 5). The District should have received, or will receive, this report from the Groundwater Availability Modeling Section. Questions about the GAM can be directed to Dr. Shirley Wade, shirley.wade@twdb.texas.gov, (512) 936-0883.

Estimated Historical Water Use and 2017 State Water Plan Dataset:

Brewster County Groundwater Conservation District

July 22, 2020

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DISCLAIMER:

The data presented in this report represents the most up-to-date WUS and 2017 SWP data available as of 7/22/2020. Although it does not happen frequently, either of these datasets are subject to change pending the availability of more accurate WUS data or an amendment to the 2017 SWP. District personnel must review these datasets and correct any discrepancies in order to ensure approval of their groundwater management plan.

The WUS dataset can be verified at this web address:

<http://www.twdb.texas.gov/waterplanning/waterusesurvey/estimates/>

The 2017 SWP dataset can be verified by contacting Sabrina Anderson (sabrina.anderson@twdb.texas.gov or 512-936-0886).

For additional questions regarding this data, please contact Stephen Allen (stephen.allen@twdb.texas.gov or 512-463-7317).

Estimated Historical Water Use

TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar year 2018. TWDB staff anticipates the calculation and posting of these estimates at a later date.

BREWSTER COUNTY

All values are in acre-feet

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2018	GW	2,112	0	0	0	975	470	3,557
	SW	0	0	0	0	684	25	709
2017	GW	1,901	0	0	0	695	452	3,049
	SW	0	0	0	0	388	24	412
2016	GW	3,491	0	0	0	915	296	4,703
	SW	0	0	0	0	659	16	675
2015	GW	1,940	0	0	0	583	291	2,815
	SW	0	0	0	0	1,391	15	1,406
2014	GW	1,832	0	0	0	1,527	286	3,645
	SW	0	0	0	0	377	15	392
2013	GW	2,187	0	0	0	329	357	2,873
	SW	0	0	0	0	1,551	19	1,570
2012	GW	2,298	0	0	0	308	303	2,909
	SW	0	0	0	0	1,466	16	1,482
2011	GW	2,761	0	0	0	940	348	4,049
	SW	0	0	0	0	600	18	618
2010	GW	1,840	0	0	0	2,781	355	4,976
	SW	0	0	0	0	150	19	169
2009	GW	1,663	0	0	0	1,479	333	3,475
	SW	0	0	0	0	171	18	189
2008	GW	2,028	0	0	0	1,950	367	4,345
	SW	0	0	0	0	180	19	199

Estimated Historical Water Use and 2017 State Water Plan Dataset:

Brewster County Groundwater Conservation District

July 22, 2020

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2007

GW

1,151

0

0

0

1,964

335

3,450

Estimated Historical Water Use and 2017 State Water Plan Dataset:

Brewster County Groundwater Conservation District

July 22, 2020

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	SW	92	0	0	0	0	17	109
2006	GW	2,058	0	0	0	1,345	303	3,706
	SW	75	0	0	0	1,500	16	1,591
2005	GW	2,045	0	0	0	763	336	3,144
	SW	75	0	0	0	2,232	18	2,325
2004	GW	2,032	0	0	0	418	257	2,707
	SW	75	0	0	0	6,747	14	6,836
2003	GW	2,216	0	0	0	399	257	2,872
	SW	75	0	0	0	3,624	14	3,713
2002	GW	2,219	0	0	0	308	497	3,024
	SW	75	0	0	0	138	26	239

Estimated Historical Water Use and 2017 State Water Plan Dataset:

Brewster County Groundwater Conservation District

July 22, 2020

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Projected Surface Water Supplies TWDB 2017 State Water Plan Data

BREWSTER COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	Source Name	2020	2030	2040	2050	2060	2070
E	IRRIGATION, BREWSTER	RIO GRANDE	RIO GRANDE RUN- OF-RIVER	600	600	600	600	600	600
E	LIVESTOCK, BREWSTER	RIO GRANDE	RIO GRANDE LIVESTOCK LOCAL SUPPLY	19	19	19	19	19	19
Sum of Projected Surface Water Supplies (acre-feet)				619	619	619	619	619	619

Estimated Historical Water Use and 2017 State Water Plan Dataset:

Brewster County Groundwater Conservation District

July 22, 2020

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Projected Water Demands

TWDB 2017 State Water Plan Data

Please note that the demand numbers presented here include the plumbing code savings found in the Regional and State Water Plans.

BREWSTER COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
E	ALPINE	RIO GRANDE	1,935	1,944	1,936	1,934	1,937	1,940
E	COUNTY-OTHER, BREWSTER	RIO GRANDE	563	583	584	588	591	594
E	IRRIGATION, BREWSTER	RIO GRANDE	2,304	2,293	2,280	2,269	2,258	2,247
E	LIVESTOCK, BREWSTER	RIO GRANDE	386	386	386	386	386	386
E	MANUFACTURING, BREWSTER	RIO GRANDE	4	4	4	4	4	4
Sum of Projected Water Demands (acre-feet)			5,192	5,210	5,190	5,181	5,176	5,171

Estimated Historical Water Use and 2017 State Water Plan Dataset:

Brewster County Groundwater Conservation District

July 22, 2020

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Projected Water Supply Needs

TWDB 2017 State Water Plan Data

Negative values (in red) reflect a projected water supply need, positive values a surplus.

BREWSTER COUNTY

All values are in acre-feet

RWPG	WUG	WUG Basin	2020	2030	2040	2050	2060	2070
E	ALPINE	RIO GRANDE	231	222	230	232	229	226
E	COUNTY-OTHER, BREWSTER	RIO GRANDE	503	483	482	478	475	472
E	IRRIGATION, BREWSTER	RIO GRANDE	968	979	992	1,003	1,014	1,025
E	LIVESTOCK, BREWSTER	RIO GRANDE	0	0	0	0	0	0
E	MANUFACTURING, BREWSTER	RIO GRANDE	0	0	0	0	0	0
Sum of Projected Water Supply Needs (acre-feet)			0	0	0	0	0	0

Estimated Historical Water Use and 2017 State Water Plan Dataset:

Brewster County Groundwater Conservation District

July 22, 2020

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Projected Water Management Strategies

TWDB 2017 State Water Plan Data

BREWSTER COUNTY

WUG, Basin (RWPG)

All values are in acre-feet

Water Management Strategy	Source Name [Origin]	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, BREWSTER, RIO GRANDE (E)							
MARATHON WSSSERVICE - WATER LOSS AUDIT AND MAIN-LINE REPAIR	DEMAND REDUCTION [BREWSTER]	65	65	65	65	65	65
PANTHER JUNCTION BBNP PLT - WATER LOSS AUDIT AND MAIN-LINE REPAIR	DEMAND REDUCTION [BREWSTER]	2	2	2	2	2	2
RIO GRANDE VILLAGE BBNP - WATER LOSS AUDIT AND MAIN-LINE REPAIR	DEMAND REDUCTION [BREWSTER]	6	6	6	6	6	6
Sum of Projected Water Management Strategies (acre-feet)		73	73	73	73	73	73

Estimated Historical Water Use and 2017 State Water Plan Dataset:

Brewster County Groundwater Conservation District

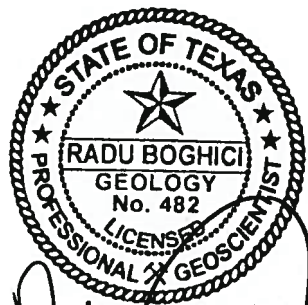
July 22, 2020

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Appendix H – TWDB GAM Run 19-008

GAM RUN 19-008: BREWSTER COUNTY GROUNDWATER CONSERVATION DISTRICT GROUNDWATER MANAGEMENT PLAN

Radu Boghici, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-463-5808
February 28, 2019



Radu Boghici
2/28/19

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GAM RUN 19-008: BREWSTER COUNTY GROUNDWATER CONSERVATION DISTRICT GROUNDWATER MANAGEMENT PLAN

Radu Boghici, P.G.
Texas Water Development Board
Groundwater Division
Groundwater Availability Modeling Department
512-463-5808
February 28, 2019

EXECUTIVE SUMMARY:

Texas Water Code, Section 36.1071(h) (Texas Water Code, 2011), states that, in developing its groundwater management plan, a groundwater conservation district shall use groundwater availability modeling information provided by the Executive Administrator of the Texas Water Development Board (TWDB) in conjunction with any available site-specific information provided by the district for review and comment to the Executive Administrator.

The TWDB provides data and information to the Brewster County Groundwater Conservation District in two parts. Part 1 is the Estimated Historical Water Use/State Water Plan dataset report, which will be provided to you separately by the TWDB Groundwater Technical Assistance Department. Please direct questions about the water data report to Mr. Stephen Allen at 512-463-7317 or stephen.allen@twdb.texas.gov. Part 2 is the required groundwater availability modeling information and this information includes:

1. the annual amount of recharge from precipitation, if any, to the groundwater resources within the district;
2. for each aquifer within the district, the annual volume of water that discharges from the aquifer to springs and any surface-water bodies, including lakes, streams, and rivers; and
3. the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

The groundwater management plan for the Brewster County Groundwater Conservation District should be adopted by the district on or before October 7, 2019 and submitted to the Executive Administrator of the TWDB on or before November 6, 2019. The current

management plan for the Brewster County Groundwater Conservation District expires on January 5, 2020.

This report replaces GAM Run 13-020 (Shi, 2013). GAM Run 19-008 includes results from the following groundwater availability models: Eastern Arm of the Capitan Reef Complex Aquifer, Edwards-Trinity (Plateau) and Pecos Valley Aquifers, West Texas Bolsons (Wild Horse Flat, Michigan Flat, Ryan Flat and Lobo Flat) and Igneous Aquifers, and Rustler Aquifer. Tables 1 through 4 summarize the groundwater availability model data required by statute, and Figures 1 through 4 show the area of the models from which the values in the tables were extracted. If, after review of the figures, Brewster County Groundwater Conservation District determines that the district boundaries used in this assessment do not reflect current conditions, please notify the TWDB at your earliest convenience.

METHODS:

In accordance with the provisions of the Texas Water Code, Section 36.1071(h), the groundwater availability models for the Eastern Arm of the Capitan Reef Complex Aquifer (Jones, 2016), Edwards-Trinity (Plateau) and Pecos Valley Aquifers (Anaya and Jones, 2009), West Texas Bolsons (Wild Horse Flat, Michigan Flat, Ryan Flat and Lobo Flat) and Igneous Aquifers (Beach and others, 2004), and Rustler Aquifer (Ewing and others, 2012) were used to estimate information for the Brewster County Groundwater Conservation District groundwater management plan. Water budgets were extracted for the historical model periods using ZONEBUDGET Version 3.01 (Harbaugh, 2009). The historical model periods were selected as follows: years 1980 through 2005 for the Eastern Arm of the Capitan Reef Complex Aquifer; years 1980 through 2000 for the Edwards-Trinity (Plateau), Pecos Valley Aquifers, the West Texas Bolsons (Wild Horse Flat, Michigan Flat, Ryan Flat and Lobo Flat) and Igneous Aquifers; and years 1980 through 2008 for the Rustler Aquifer Groundwater Availability Models. The average annual water budget values for recharge, surface-water outflow, inflow to the district, and outflow from the district for the aquifers within the district are summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Eastern Arm of the Capitan Reef Complex Aquifer

- We used version 1.01 of the groundwater availability model for the Eastern Arm of the Capitan Reef Complex Aquifer for this analysis. See Jones (2016) for assumptions and limitations of the model.

- The model has five layers which, in the area under the Brewster County Groundwater Conservation District, represent the Edwards-Trinity (Plateau) Aquifer (Layer 1), the Dewey Lake Formation (Layer 2), the Rustler Aquifer (Layers 3), the Confining Unit Above the Capitan Reef Complex Aquifer (Layer 4), and Capitan Reef Complex Aquifer (Layer 5).
- Water budgets for the district were determined for the Capitan Reef Complex Aquifer (Layer 5).
- The model was run with MODFLOW-2005 (Harbaugh, 2005).

Edwards-Trinity (Plateau) Aquifer

- We used version 1.01 of the groundwater availability model for the Edwards-Trinity (Plateau) and Pecos Valley aquifers for this analysis. See Anaya and Jones (2009) for assumptions and limitations of the model.
- The model has two active layers and one inactive layer. In the area under the Brewster County Groundwater Conservation District, the two active model layers represent the Edwards (Layer 1), and the Trinity (Layer 2) hydrogeologic units.
- Water budgets were calculated for layers 1 and 2 lumped together as the Edwards-Trinity (Plateau) Aquifer for this management plan analysis.
- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).

Igneous Aquifer

- We used version 1.01 of the groundwater availability model for the West Texas Bolsons (Wild Horse Flat, Michigan Flat, Ryan Flat, and Lobo Flat) and Igneous Aquifers for this analysis. See Beach and others (2004) for assumptions and limitations of the model.
- The model has three layers which, in the area under the Brewster County Groundwater Conservation District, represent the Salt Basin Bolson Aquifer (Layer 1), the Igneous Aquifer (Layer 2), and the underlying Cretaceous and Permian units (Layer 3). Layer 1 is not present within Brewster County Groundwater Conservation District.
- Water budgets for the district were determined for the Igneous Aquifer (Layer 2).

- The model was run with MODFLOW-96 (Harbaugh and McDonald, 1996).

Rustler Aquifer

- We used version 1.01 of the groundwater availability model for the Rustler Aquifer for this analysis. See Ewing and others (2012) for assumptions and limitations of the model.
- The model has two layers which, in the area under the Brewster County Groundwater Conservation District, represent the Dewey Lake Formation (Layer 1), and the Rustler Aquifer (Layer 2).
- Water budgets for the district were determined for the Rustler Aquifer (Layer 2).
- The model was run with MODFLOW-2000 (Harbaugh and others, 2000).

RESULTS:

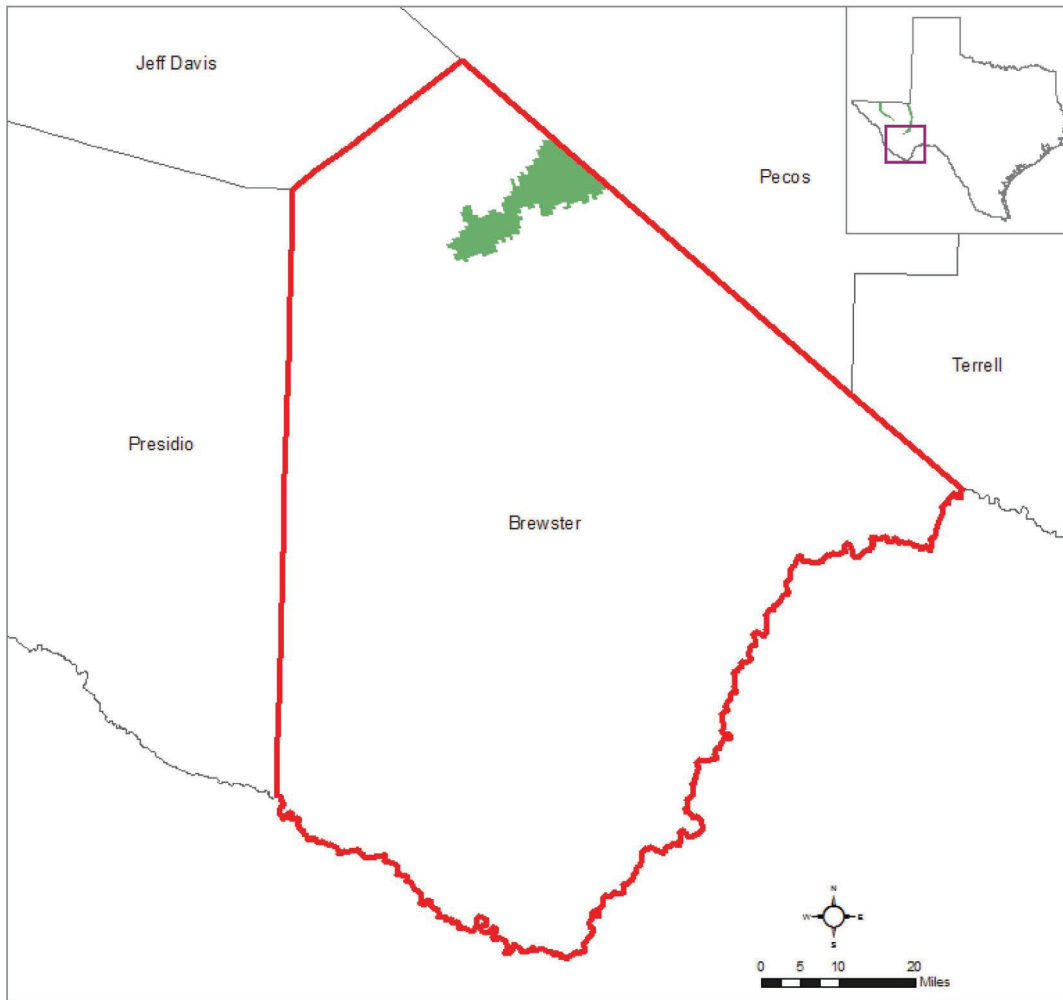
A groundwater budget summarizes the amount of water entering and leaving the aquifers according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the groundwater availability model results for the Capitan Reef Complex, Edwards-Trinity (Plateau), Igneous, and Rustler aquifers located within Brewster County Groundwater Conservation District and averaged over the historical calibration periods, as shown in Tables 1 through 4 .




1. Precipitation recharge—the areally distributed recharge sourced from precipitation falling on the outcrop areas of the aquifers (where the aquifer is exposed at land surface) within the district.
2. Surface-water outflow—the total water discharging from the aquifer (outflow) to surface-water features such as streams, reservoirs, and springs.
3. Flow into and out of district—the lateral flow within the aquifer between the district and adjacent counties.
4. Flow between aquifers—the net vertical flow between the aquifer and adjacent aquifers or confining units. This flow is controlled by the relative water levels in each aquifer and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs.

The information needed for the district’s management plan is summarized in Tables 1 through 4. It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as a district or county boundary, is assigned to one side of the boundary based on the location of the centroid of the model cell. For example, if a cell contains two counties, the cell is assigned to the county where the centroid of the cell is located.

TABLE 1. SUMMARIZED INFORMATION FOR THE EASTERN ARM OF THE CAPITAN REEF COMPLEX AQUIFER FOR BREWSTER COUNTY GROUNDWATER CONSERVATION DISTRICT’S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Capitan Reef Complex Aquifer	16,171
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Capitan Reef Complex Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Capitan Reef Complex Aquifer	0
Estimated annual volume of flow out of the district within each aquifer in the district	Capitan Reef Complex Aquifer	29,390
Estimated net annual volume of flow between each aquifer in the district	Net flow from adjacent units into Capitan Reef Complex Aquifer	16,940



-  Brewster County Groundwater Conservation District boundary
-  County boundaries
-  Active model grid cells, Capitan Reef Complex Aquifer

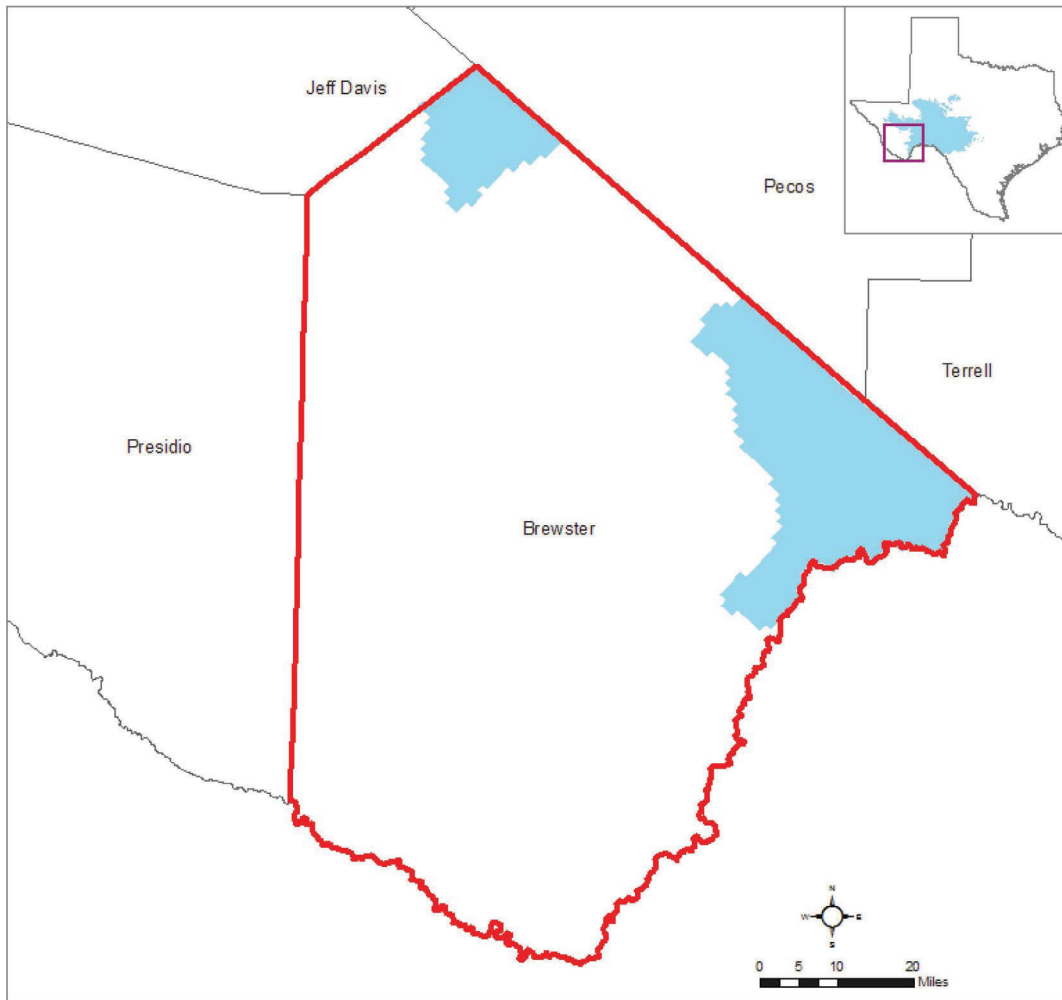
Data vintages:
County boundaries 02.20.2011
GCD boundary 01.22.2018
crx 12.20.2016




FIGURE 1. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE CAPITAN REEF COMPLEX AQUIFER FOR WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE CAPITAN REEF COMPLEX AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 2. SUMMARIZED INFORMATION FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER FOR BREWSTER COUNTY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Edwards-Trinity (Plateau) Aquifer	29,759
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Edwards-Trinity (Plateau) Aquifer	31,261
Estimated annual volume of flow into the district within each aquifer in the district	Edwards-Trinity (Plateau) Aquifer	15,172
Estimated annual volume of flow out of the district within each aquifer in the district	Edwards-Trinity (Plateau) Aquifer	15,739
Estimated net annual volume of flow between each aquifer in the district	Not applicable	Not applicable

Due to changes to the model grid since the previous management plan report (2013), the groundwater flow volumes have also changed.



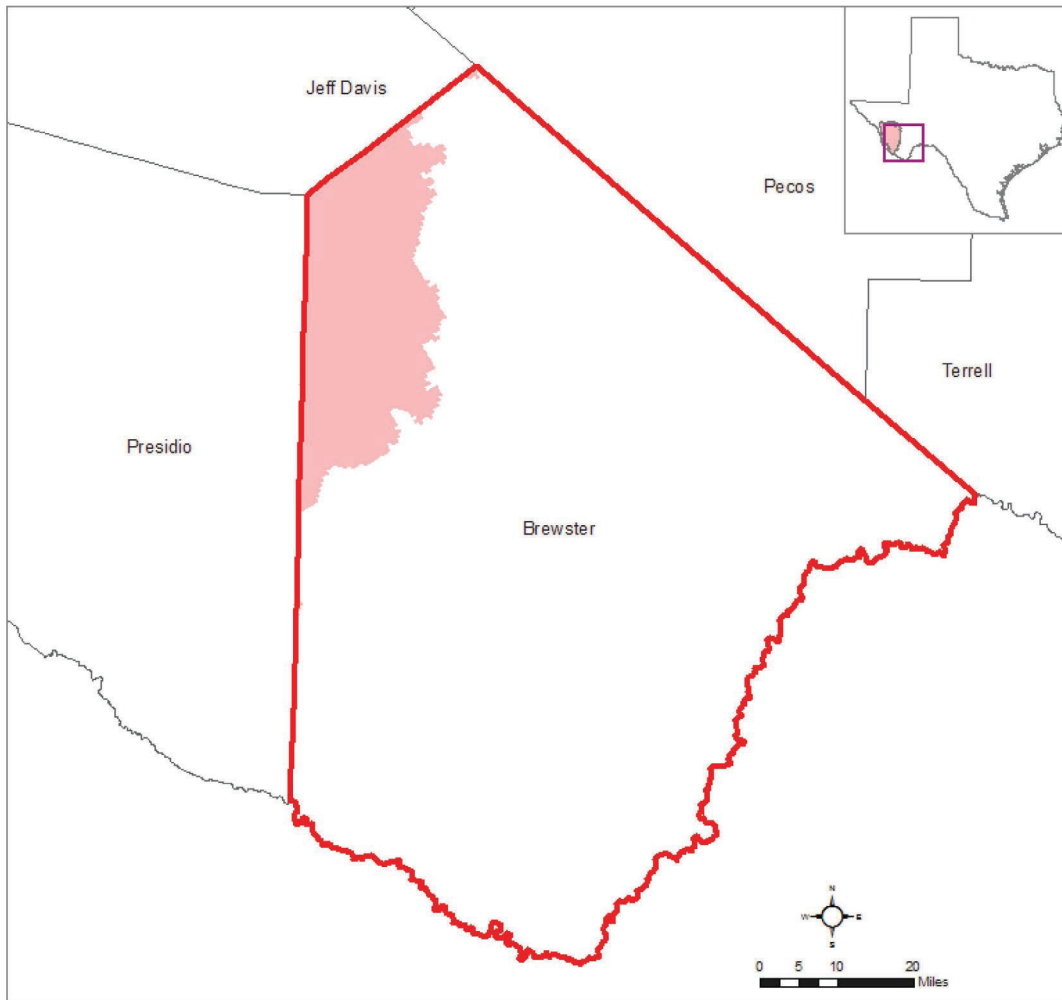
-  Brewster County Groundwater Conservation District boundary
-  County boundaries
-  Active model grid cells, Edwards-Trinity (Plateau) GAM




Data vintages:
County boundaries 02.20.2011
GCD boundary 01.22.2018
eddt_p model grid 02.08.2014

FIGURE 2. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER FOR WHICH THE INFORMATION IN TABLE 2 WAS EXTRACTED (THE EDWARDS-TRINITY (PLATEAU) AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

**TABLE 3. SUMMARIZED INFORMATION FOR THE IGNEOUS AQUIFER FOR BREWSTER COUNTY
 GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL
 VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-
 FOOT.**

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Igneous Aquifer	6,584
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Igneous Aquifer	136
Estimated annual volume of flow into the district within each aquifer in the district	Igneous Aquifer	1,118
Estimated annual volume of flow out of the district within each aquifer in the district	Igneous Aquifer	1,364
Estimated net annual volume of flow between each aquifer in the district	Net flow from Igneous Aquifer to underlying Cretaceous and Permian Units	3,472



-  Brewster County Groundwater Conservation District boundary
-  County boundaries
-  Active model grid cells, Igneous Aquifer GAM

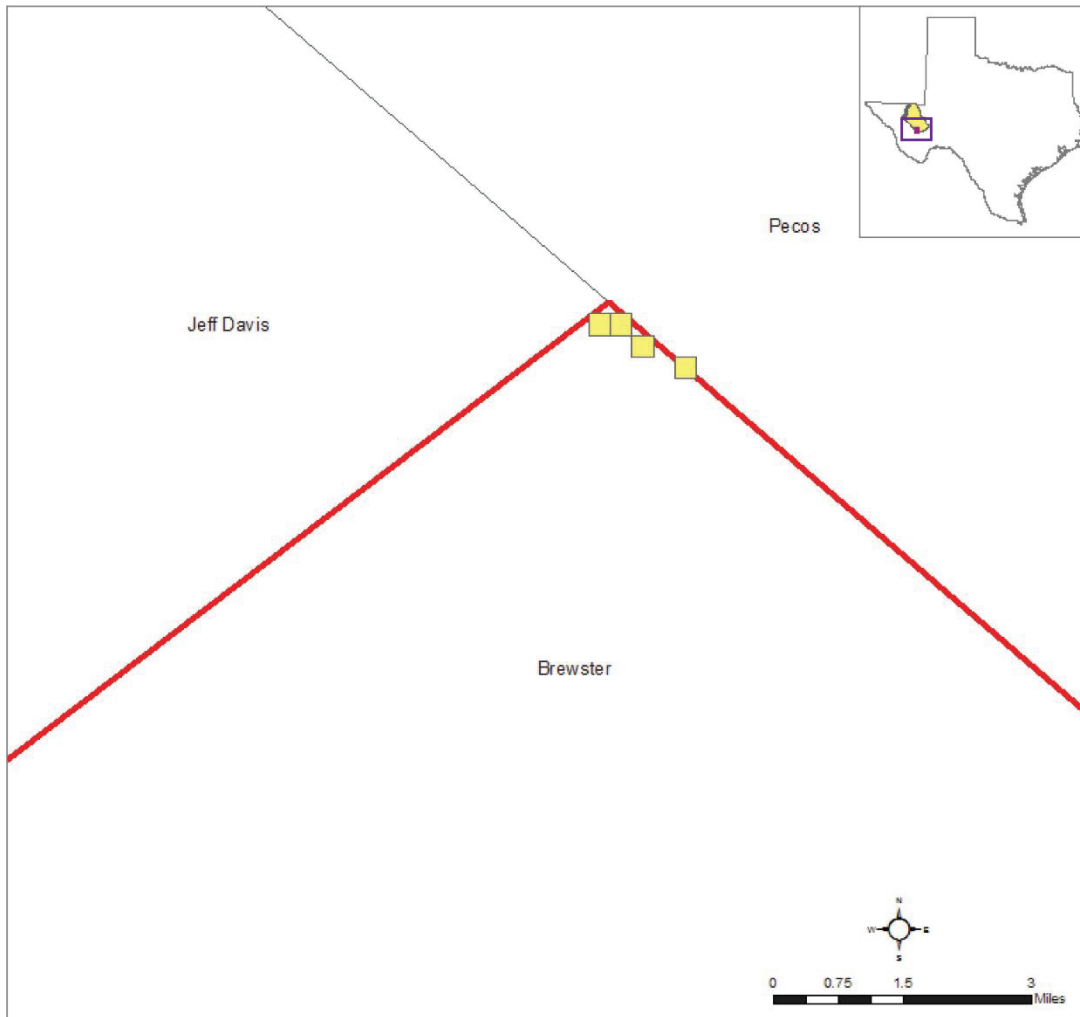
Data vintages:
County boundaries 02.20.2011
GCD boundary 01.22.2018
igbl model grid 11.19.2015




FIGURE 3. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE IGNEOUS AQUIFER FOR WHICH THE INFORMATION IN TABLE 3 WAS EXTRACTED (THE IGNEOUS AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 4. SUMMARIZED INFORMATION FOR THE RUSTLER AQUIFER FOR BREWSTER COUNTY GROUNDWATER CONSERVATION DISTRICT'S GROUNDWATER MANAGEMENT PLAN. ALL VALUES ARE REPORTED IN ACRE-FEET PER YEAR AND ROUNDED TO THE NEAREST 1 ACRE-FOOT.

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Rustler Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Rustler Aquifer	0
Estimated annual volume of flow into the district within each aquifer in the district	Rustler Aquifer	15*
Estimated annual volume of flow out of the district within each aquifer in the district	Rustler Aquifer	15
Estimated net annual volume of flow between each aquifer in the district	Flow between Rustler Aquifer and overlying units	0

*Includes flows from Jeff Davis County to the west and Davis Mountains to the south.



-  Brewster County Groundwater Conservation District boundary
-  County boundaries
-  Active model grid cells, Rustler Aquifer GAM

Data vintages:
County boundaries 02.20.2011
GCD boundary 01.22.2018
rslr model grid 02.03.2014

FIGURE 4. AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE RUSTLER AQUIFER FOR WHICH THE INFORMATION IN TABLE 4 WAS EXTRACTED (THE RUSTLER AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

LIMITATIONS:

The groundwater models used in completing this analysis are the best available scientific tools 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 interaction with streams are specific to particular historic time periods.

Because the application of the groundwater models was designed to address regional-scale questions, the results are most effective on a regional scale. The TWDB makes no warranties or representations related 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 overall conditions of 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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BREWSTER COUNTY GROUNDWATER CONSERVATION DISTRICT
NOTICE OF PUBLIC HEARING
ON PROPOSED CHANGES TO MANAGEMENT PLAN

Notice is hereby given that the Brewster County Groundwater Conservation District (“District”) proposes action on CHANGING OF BCGCD ADOPTED 2020 GROUNDWATER MANAGEMENT PLAN. Copies of the District General Manager’s proposed action and DRAFT 2020 MANAGEMENT PLAN are available for public inspection on the District website at westtexasgroundwater.com and by email request at bcgwcd@gmail.com. For inspection of the proposed DRAFT MANAGEMENT PLAN in person, please contact Summer Webb the General Manager at (432) 386-3437.

The District will conduct a **PUBLIC HEARING** pursuant to its authority under Chapter 8816 of the Texas Special District Local Laws Code, Chapter 36 of the Texas Water Code, and the District’s Rules to consider ADOPTING THE AMENDED 2020 GROUNDWATER MANAGEMENT PLAN and to provide interested members of the public an opportunity to appear and provide oral or written comments to the District regarding the proposed amended Management Plan. WRITTEN COMMENTS OR PROPOSALS ARE TO BE TO THE GENERAL MANAGER BY January 14, 2021, at 5 PM. The public hearing will be at the following location at the indicated date and time:

Virtual: <https://global.gotomeeting.com/join/785655309> or
[tel:+1\(872\)240-3311](tel:+1(872)240-3311) access code: 785-655-309#

Date and Time: **January 21, 2021, at 8:00 AM**

The District General Manager will propose that the District Board grant adoption as follows:

- 1) ADOPTION OF PROPOSED CHANGES TO 2020 GROUNDWATER MANAGEMENT PLAN FOR FINAL SUBMISSION TO THE TEXAS WATER DEVELOPMENT BOARD.

Affected persons may request a contested case hearing on the proposed MANAGEMENT PLAN by submitting such a request in writing to the District no later than 2:00 pm on January 14, 2021. If no timely written request for a contested case hearing is filed, such ADOPTION OF 2020 MANAGEMENT PLAN, will be presented to the District Board on the date of the hearing for final action.

PERSONS WITH DISABILITIES WHO PLAN TO ATTEND THE DISTRICT HEARING AND WHO MAY NEED AUXILIARY AIDS OR SERVICES SUCH AS INTERPRETERS FOR PERSONS WHO ARE DEAF OR HEARING IMPAIRED, READERS, LARGE PRINT, OR BRAILLE, ARE REQUESTED TO CONTACT SUMMER WEBB, GENERAL MANAGER, AT (432) 386-3437, AT LEAST FIVE (5) WORK DAYS PRIOR TO THE MEETING SO THAT APPROPRIATE ARRANGEMENTS CAN BE MADE. PERSONS WHO DESIRE THE ASSISTANCE OF AN INTERPRETER IN CONJUNCTION WITH THEIR ORAL PRESENTATION AT THIS MEETING ARE ALSO REQUESTED TO CONTACT SUMMER WEBB AT LEAST FIVE (5) DAYS PRIOR TO THE MEETING SO THAT APPROPRIATE ARRANGEMENTS CAN BE MADE.

AGENDA
BREWSTER COUNTY GROUNDWATER CONSERVATION DISTRICT
REGULAR MEETING
Thursday, January 21, 2021, 8:00 a.m.

via Go To Meeting:
<https://global.gotomeeting.com/join/785655309>
You can also dial in using your phone.
United States: 1-872-240-3311,,785655309#
Access Code: 785-655-309

HEARING ON MANAGEMENT PLAN

1. District presentation
2. Public Comment

REGULAR MEETING

1. Call to Order
2. Determination of a Quorum
3. Proof of Notice of Meeting
4. Public Comment
5. Discuss/Act On: Adoption of Management Plan
6. Discuss/Act On: Officer Elections
7. Discuss/Act On: Approval of Minutes
 - a. Regular Meeting- December 17, 2020
8. Discuss/Act On: Purchasing Tablets and Headphones for Directors
9. Discuss/Act On: Approval of Exempt Use Drilling Application
10. Discuss/Act On: Report
 - a. Chairman
 - b. General Manager
11. Discuss/Act On: Payment of Bills, Budget Line Items, and Bank Reconciliations
12. Closed Session:

The Board of Directors of the Brewster County Groundwater Conservation District may go into closed session under the authority of the Government Code, Chapter 551, and Texas Open Meetings Act, for the purpose of consultation with attorney - pending litigation (§ 551.071), consultation with attorney – attorney/client privileged consultations (§ 551.071), deliberations regarding real property (§ 551.072), deliberations regarding personnel matters (§ 551.074).

13. Discuss recommendation(s) regarding matters discussed in closed session
14. Discuss/Act On: Agenda Items for February 18, 2021 Meeting
15. Adjournment

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 District Website, westtexasgroundwater.com, at least 72 hours prior to the time of said public hearing.

Date: 1/16/2021

Summer Webb
Summer Webb, General Manager

Brewster County Groundwater Conservation District
Minutes of Regular Meeting
Thursday, January 21, 2021 – 8:00 AM CDT
Alpine, Texas

HEARING ON MANAGEMENT PLAN

1. District Presentation- Discussion on MP
2. Public Comment-
 - a. Dr. Daugherty- skeptical on numbers
 - b. Dr. Urbanczyk- wants to expound on springs

REGULAR MEETING

1. Call to Order – Meeting was called to order at 8:17 a.m. by Chairman Joan Johnson via GoToMeeting. All Directors and visitors joined via teleconference or phone call.
2. Determination of Quorum – Members present were Chairman Joan Johnson, Vice Chairman Tim Leary, Member Ambrosio Valles, and Member Ike Roberts. A quorum was determined. Also present was General Manager Summer Webb. Members of the public and interested parties are listed on an attached sign-in sheet.
3. Proof of Notice of Meeting- Posted Timely
4. Public comment: none
5. Consider/ Take Action: Adoption of Management Plan- Director Roberts made a motion to table until next meeting, with a second by Director Leary. Dr. Urbanczyk will send in verbiage regarding springs.
6. Consider/ Take Action: Officer Elections- Director Roberts made a motion to leave everything the same, with a second by Director Valles. All members were in favor and the motion passed.
7. Consider/ Take Action On: Approval of Minutes:
 - a. December 17, 2020 – Director Roberts made a motion to approve as presented; with a second by Director Leary. All members were in favor and the motion passed.
8. Consider/ Take Action On: Purchasing Tablets and Headphones for Directors- Purchased
9. Consider/ Take Action On: Approval of Exempt Use Drilling Applications- Director Leary made a motion to approve, with a second by Director Roberts. All members were in favor and the motion passed.
10. Consider/ Take Action On: General Manager’s Report- Chairman Johnson made a motion to donate \$50 to the Marathon Cemetery Association in memory of Tom Leary, with a second by Director Roberts. All members were in favor and the motion passed.
11. Consider/ Take Action On: Payment of Bills, Budget Line items, and Bank Reconciliations – Director Roberts made a motion to approve the bills and reconciliations as presented; with a second by Director Valles. All members were in favor and the motion passed.
12. Closed Session: Directors went into closed session to discuss personnel matters.
13. Consider recommendation(s) regarding matters discussed in closed session- None.
14. Consider/ Take Action On: Agenda Items for Meeting- February 18, 2021, Management Plan.
15. Adjournment- Chairman Johnson closed the meeting at 8:46am.

Approved via virtual meeting

Chairman, Joan Johnson

Secretary, Homer Mills

Member, Kevin Urbanczyk

Approved via virtual meeting

Member, Ambrosio Valles

Approved via virtual meeting

Vice Chairman, Tim Leary

Approved via virtual meeting

Member, Ike Roberts

Member, Tom Mangrem

Brewster County Groundwater Conservation District
Minutes of Special Meeting
Monday, June 28, 2021 – 8:00 AM CDT
Virtually

1. Call to Order – Meeting was called to order at 8:00 a.m. by Chairman Joan Johnson.
2. Determination of Quorum – Members in attendance were Chairman Joan Johnson, Vice Chairman Tim Leary, Secretary Homer Mills, Member Dr. Kevin Urbanczyk, Member Ambrosio Valles and Member Tom Mangrem.. A quorum was determined. Also present was General Manager Summer Webb. Members of the public and interested parties are listed on an attached sign-in sheet.
3. Proof of Notice of Meeting- Posted Timely
4. Public comment: None
5. Discuss/ Act On: Permit Applications, Hearing Date- none.
6. Discuss/Act On: Management Plan- Discussion was had regarding the data presented and required by TWDB. The Board has doubts regarding the validity of these numbers, but understands it is required for this cycle planning. There is hope that at the next planning cycle the district will have published data that better reflects correct spring flows and exempt use. Director Leary made a motion to approve and submit as Final Management Plan to the TWDB and TCEQ as presented; with a second by Director Valles. All members were in favor and the motion passed.
7. Closed Session: None.
8. Discuss recommendation(s) regarding matters discussed in closed session- None.
9. Adjournment- Chairman Johnson closed the meeting at 8:22am.

Chairman, Joan Johnson

Secretary, Homer Mills

Member, Kevin Urbanczyk

Member, Ambrosio Valles

Vice Chairman, Tim Leary

Member, Ike Roberts

Member, Tom Mangrem

2020 • FROM I

coronavirus with them as they escaped urban areas, the commissioners ordered everyone out by noon on March 23.

In defining his first-class Marathon establishment, Bryan names as defendants County Judge Eleazar Cano, and Commissioners Betse Esparza, Sara Allen Collando, and Mike Pallanez.

Cited as factual background was Texas Governor Greg Abbott's March 13 proclamation declaring a state of disaster for all counties, and it did not require or recommend Texas counties to close short-term rentals.

Cano shuts down county

On March 31, Brewster County Judge Eleazar Cano ordered all individuals living in the county to stay at home in their place

of residence, prohibited all public or private gatherings of any size, shut down all but essential businesses, and banned all travel except for essential activities.

In addition, he imposed a countywide curfew that ordered the public to remain at their residences between 10 p.m. and 5 a.m.

As of press time, no cases of the coronavirus had yet been identified in the Tri-County.

Also on Tuesday, Governor Greg Abbott told Texans to stay at home except for essential services and activities.

Abbott loosens some restrictions, promises more

At an April 17 press conference, Gov. Greg Abbott said reopening the Texas economy during the coronavirus outbreak would come in phases. The initial steps included loosening

surgery restrictions at medical facilities, allowing all retail stores to provide product pickups, and reopening state parks.

Abbott pointed out that economic damage had hit even more Americans than the coronavirus itself, with more than 22 million filing for unemployment since restrictions started, and more than a million in Texas.

Abbott outlines Phase I, ends stay-at-home directive

At an April 27 press conference, Texas Gov. Greg Abbott said his stay-at-home order would expire April 30, and introduced Phase I for reopening the Texas economy.

First to open were restaurants, retail businesses, movie theaters, and malls, limited to 25% capacity. Abbott added that counties with five or fewer COVID-19 cases could increase their capacity to 50% after submitting a form to the state for approval.

Hair and nail salons, barber shops, gyms, and bars must remain closed until at least mid-May.

He stressed that his order "supersedes all local orders."

About the controversial face mask issue, Abbott

strongly recommended that people wear masks, but said "it's not a mandate, and we made clear that no jurisdiction can impose a penalty for not wearing one."

Abbott concluded by saying if anyone didn't feel safe venturing out, there was no requirement that those people leave their homes.

Trustees discuss budget overrun

Alpine ISD Board of Trustees held a special meeting on May 14 to discuss the new high school construction budget with Parkhill, Smith, and Cooper architect Allan Wolf, along with Lee Lewis Construction Project Director Neil Easter.

The main topic was the unforeseen announcement from Wolf and Easter that bids received from subcontractors were over budget by several million dollars.

The design exceeded the original bond scope by 10,000 square feet, going to 76,000 square feet instead of 66,000 square feet, which necessitated exceeding the original bond amount by \$1.5-2 million.

In November 2018, voters approved a \$22.588 million bond for the new high school construction.

Protest march coming to Alpine

The City of Alpine held its regularly scheduled council meeting on June 2, and City Manager Erik Zimmer announced that Big Bend Black Lives Matter would hold a protest march on June 6 in Alpine. The group marched from City Hall to the Brewster County Courthouse, and held a rally there.

Zimmer said the potential for civil unrest was of concern, particularly since some of the group was from outside the area.

Mayor Andy Ramos noted that although everyone was entitled to hold public gatherings, those gatherings must be done in a safe manner. He said he would not tolerate any kind of civil disobedience in Alpine. The march was peaceful.

Trustees vote to terminate contractor

Alpine ISD Board of Trustees held its regular meeting on June 30, and announced termination of Lubbock contractor Lee Lewis Construction for construction of the new high school.

Trustees delegated authority to Alpine ISD Superintendent Becky Mc-

Cutchen and CFO Tucker Durham to prepare and issue procurement documents, receive and open bids, and propose a ranking for the board's consideration.

Trustees also approved the final change order for close out of the bus barn project. McCutchen announced that based on input from legal counsel, there was \$31,000 in liquidated damages to which Alpine ISD was entitled from Lee Lewis Construction for the bus barn delay.

Abbott issues statewide mask mandate

On July 2, Gov. Greg Abbott issued a statewide mask mandate ordering Texans living in counties with 20 or more positive COVID-19 cases to wear a face covering while inside a business or other building open to the public, as well as outdoor public spaces when social distancing isn't possible.

The order provided several exceptions, including children younger than 10 years old, those with a medical condition that prevents them from wearing a mask, people who are

See 2020 • 3

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 Richard Hochwald in memory of the Hochwald and Sanchez Families
 Judy Probst in memory of Nedad (Mami)
 M. Robe in honor of Dot Mainz
 Pam Cook in memory of Jennifer Jordan
 Our Vision: A hunger-free, healthy community.
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 Join us for lunch Monday through Friday: 11:30 - 12:30 • Cost is \$6.00 per person.
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NOTICE
To All Customers of Big Bend Telephone Company Telecommunications Services
 The Public Service Commission of Texas designated Big Bend Telephone Company (BBT) as an "Eligible Telecommunications Carrier" and an "Eligible Telecommunications Provider" for its service area for universal service purposes. The goal of universal service is to provide all citizens access to essential telecommunications services.
 BBT provides the supported services -- voice telephony service and broadband Internet access service -- throughout its designated service area. These supported services include:
 • Voice grade access to the public switched network;
 • Minutes of use for local service provided at no additional charge;
 • Access to emergency services such as 911 and enhanced 911; and
 • Broadband Internet access service which includes the capability to send data to and receive data from the Internet but excludes dial-up service.
 Voice telephony service is provided at rates of \$22.27 per month for residential customers and \$30.00 per month for business customers. Broadband Internet access service is provided at rates which start at \$84.98 per month for residential customers and \$93.98 per month for business customers. BBT would be pleased to provide you with specific rates for broadband for your area upon request. Use of these services may result in added charges including taxes, surcharges, and fees.
 BBT also offers qualified customers Lifeline service. Lifeline is a non-transferable, federal benefit that makes monthly voice or broadband service more affordable. The program is limited to one discount per household. Eligible households may apply the monthly Lifeline discount to either broadband service (home or wireless) or voice service (home or wireless) but not both. Lifeline customers also have the option to apply the discount to a service bundle, such as home phone and home internet. In addition, the phone or internet service you order from BBT must meet certain minimum service standards. The Lifeline voice service also includes toll blocking to qualifying customers without charge. The current discount provided under the Company's Lifeline service is a federal discount of \$5.25 for qualifying internet or voice service and a state discount of \$3.50 per month for each month that the customer qualifies (plus an additional Lifeline Area Discount may be available based upon the service location).
 For Texas customers, a household is eligible for the Lifeline discount if the customer's annual household income is at or below 135% of the federal poverty guidelines for the federal discount, or at or below 150% of the federal poverty guidelines for the state discount. You may also qualify for the Lifeline program if a customer, a dependent, or the customer's household participates in one or more of the following programs:
 • Medicaid
 • Supplemental Nutrition Assistance Program (SNAP)
 • Supplemental Security Income (SSI)
 • Federal Public Housing Assistance (FPHA)
 • Veterans or Survivors Pension Benefit
 • Low-Income Home Energy Assistance (LIHEAP) (State only discount)
 • Health benefits coverage under the state Children's Health Insurance Program (CHIP) (State only discount)
 • Temporary Assistance to Needy Families (TANF) (State only discount)
 • The National School Lunch Program's Free Lunch Program (State only discount)
 To apply for Lifeline Service, please contact our office at (432) 364-1000 or Lite-Up Texas at 866-454-8387.

BREWSTER COUNTY GROUNDWATER CONSERVATION DISTRICT
NOTICE OF PUBLIC HEARING
ON PROPOSED CHANGES TO MANAGEMENT PLAN
 Notice is hereby given that the Brewster County Groundwater Conservation District ("District") proposes action on CHANGING OF BCGGD ADOPTED 2020 GROUNDWATER MANAGEMENT PLAN. Copies of the District General Manager's proposed action and DRAFT 2020 MANAGEMENT PLAN are available for public inspection on the District website at westexasgroundwater.com and by email request at bgwgd@gmail.com. For inspection of the proposed DRAFT MANAGEMENT PLAN in person, please contact Summer Webb the General Manager at (432) 386-3437.
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 PERSONS WITH DISABILITIES WHO PLAN TO ATTEND THE DISTRICT HEARING AND WHO MAY NEED AUXILIARY AIDS OR SERVICES SUCH AS INTERPRETERS FOR PERSONS WHO ARE DEAF OR HEARING IMPAIRED, READERS, LARGE PRINT, OR BRAILLE, ARE REQUESTED TO CONTACT SUMMER WEBB, GENERAL MANAGER, AT (432) 386-3437, AT LEAST FIVE (5) WORK DAYS PRIOR TO THE MEETING SO THAT APPROPRIATE ARRANGEMENTS CAN BE MADE. PERSONS WHO DESIRE THE ASSISTANCE OF AN INTERPRETER IN CONJUNCTION WITH THEIR ORAL PRESENTATION AT THIS MEETING ARE ALSO REQUESTED TO CONTACT SUMMER WEBB AT LEAST FIVE (5) DAYS PRIOR TO THE MEETING SO THAT APPROPRIATE ARRANGEMENTS CAN BE MADE.