Texas Water Development Board

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TO: Board Members

THROUGH: Melanie Callahan, Executive Administrator
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Kenneth L. Petersen, General Counsel

FROM: Larry French, Director, Groundwater Resources
Joe Reynolds, Attorney
Jerry Shi, Groundwater Availability Modeling

DATE: April 11, 2012

SUBJECT: **Briefing, discussion, and possible action** on appeal of the reasonableness of the Desired Future Conditions adopted by the groundwater conservation districts in Groundwater Management Area 7 for the Edwards-Trinity (Plateau) Aquifer

ACTION REQUESTED

Staff recommends that the Board find that the desired future conditions (DFCs) adopted by the groundwater conservation districts (Districts) in Groundwater Management Area 7 (GMA 7) for the Edwards-Trinity (Plateau) Aquifer are reasonable based on the analysis set out in this report.

BACKGROUND

This report and the attached technical report constitute the staff analysis of a petition filed by legally defined interests in groundwater in Groundwater Management Area 7. This petition appeals the adoption of the DFCs for the Edwards-Trinity (Plateau) Aquifer in GMA 7. This analysis discusses whether the DFCs are unreasonable based on the evidence in the record.

Legislative History

The 79th Legislature provided that a person with a legally defined interest in the groundwater in a GMA could file a petition with the Texas Water Development Board (TWDB) appealing the approval of a DFC by the Districts in that GMA. The Legislature placed the burden on the petitioner to provide evidence that the Districts did not establish a reasonable DFC. But the Legislature did not define "reasonable," nor did it provide any guidelines for the TWDB to use in determining whether a DFC is reasonable.[1] The final determination of a DFC is, in fact, the responsibility of the Districts in the GMA.[2]

[1] *See* Tex. Water Code § 36.108(l)-(n).
[2] *See* Tex. Water Code § 36.108(n).

The 82nd Legislature amended the statute to provide a more detailed process for groundwater conservation districts to follow in approving a DFC.[3] Districts are now required to prepare a detailed report on the DFC approval process that documents the consideration of certain criteria and the application of a balancing test, and to develop a record of public participation and responses to any public comments. The 82nd Legislature, however, did not change the basic process for an appeal of a DFC to the TWDB.[4] Notwithstanding any findings that may be made by the TWDB that a DFC is unreasonable, the final determination of a DFC remains the responsibility of the Districts in the GMA.[5]

These revised statutory requirements for adoption of a DFC do not apply, however, to the GMA 7 DFC review under consideration, as the DFC was adopted before the changes made by the 82nd Legislature became effective. The determination to review appeals of DFCs under the statute in place at the time of adoption was discussed by the Board on October 19, 2011.

Procedural History
On July 29, 2010, the Districts in GMA 7[6] adopted the following DFCs for the Edwards-Trinity (Plateau) Aquifer, pursuant to Texas Water Code § 36.108:

> An average drawdown of 7 feet for the Edwards-Trinity (Plateau) based on Scenario 10 of GAM Run 09-35, except for the Kinney County GCD; and
>
> In Kinney County, that drawdown which is consistent with maintaining, at Las Moras Springs, an annual average flow of 23.9 cfs and a median flow of 24.4 cfs based on Scenario 3 of the TWDB flow model presented on July 27, 2010.

An administratively complete petition was submitted by Grass Valley Water, L.P. (Grass Valley) on July 29, 2011. Grass Valley filed its petition to appeal the DFCs adopted by GMA 7 for the Edwards-Trinity (Plateau) Aquifer in Kinney County and Val Verde County.

TWDB staff held hearings on the petition relating to the DFCs for Kinney County on January 18, 2012, in Sonora, Texas, and on the petition relating to the DFC for Val Verde County on January 19, 2012, in Sonora, Texas, to take testimony and evidence from the petitioner and the Districts. The record for both petitions remained open until February 2, 2012, to receive additional evidence from other interested persons, as required by 31 Tex. Admin. Code § 356.44(f). The TWDB

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[3] Acts 2011, S.B. 727 and S.B. 660, 82nd Leg., R.S.
[4] *See* new Tex. Water Code § 36.1083, eff. 9/1/2011.
[5] *See* new Tex. Water Code § 36.1083(d), eff. 9/1/2011 comp. to former Tex Water Code § 36.108(n).
[6] Coke County Underground Water Conservation District, Crockett County Groundwater Conservation District, Edwards Aquifer Authority, Glasscock Groundwater Conservation District, Hickory Underground Water Conservation District No. 1, Hill Country Underground Water Conservation District, Irion County Water Conservation District, Kimble County Groundwater Conservation District, Kinney County Groundwater Conservation District, Lipan-Kickapoo Water Conservation District, Lone Wolf Groundwater Conservation District, Menard County Underground Water District, Middle Pecos Groundwater Conservation District, Plateau Underground Water Conservation and Supply District, Real-Edwards Conservation and Reclamation District, Santa Rita Underground Water Conservation District, Sterling County Underground Water Conservation District, Sutton County Underground Water Conservation District, Uvalde County Underground Water Conservation District, and Wes-Tex Groundwater Conservation District.

received additional evidence from one person related specifically to the appeal for Val Verde County and seven comments related to the appeals in Kinney County.[7]

The Arguments

Grass Valley Water

Petitioner Grass Valley is a limited partnership holding approximately 30,000 acres for groundwater lease in Kinney County and about 12,500 acres under groundwater lease in Val Verde County.[8]

Currently, there is no groundwater conservation district in Val Verde County. Grass Valley expressed concern, however, about the possibility of a district being formed, which would then be tasked with enforcing the established DFC. Grass Valley, therefore, decided to file a petition appealing the DFC adopted by GMA 7 for Val Verde County.

Grass Valley challenges the reasonableness of the DFC adopted for Val Verde County by GMA 7 on the grounds that it did not meet the statutory requirements for consideration of the uses and conditions of the aquifer throughout the GMA when it set a uniform DFC for the whole GMA.[9] Grass Valley also claims that the DFC gives no consideration to the impact on private property rights or future groundwater uses in Val Verde County. Finally, Grass Valley claims the DFC is insufficient to satisfy future pumping in the county, let alone needs identified in the state water plan that could be addressed by the water available in Val Verde County.[10]

Grass Valley challenges the reasonableness of the DFC adopted for Kinney County by GMA 7 because it is inappropriately keyed to the flows at Las Moras Springs. Grass Valley contends that continuous spring flow measurements for the springs used in developing the groundwater flow model for Kinney County do not include sufficient data that coincide with the periods of highest groundwater production or critical drought.[11] Grass Valley argues that the DFC is biased towards continuous flow measurements available after 2003 without considering the low flow or no-flow conditions during dry years at Las Moras Springs. Grass Valley concludes that the DFC for Kinney County is arbitrary, does not provide reasonable and prudent development of the state's groundwater resources and has a negative impact on private property rights.[12]

The Districts

The Districts testified that there is no limit on pumping for regions outside GCDs, and there presently is no district in Val Verde County. Consequently, at this time, concern about a district enforcing the DFC in Val Verde County is conjectural.

District testimony regarding the use of spring flows in setting the DFC for Kinney County is set out in Section 3, below. The Districts in GMA 7 did not directly address the model used for determining the DFC in Kinney County.

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[7] The petition challenging the DFC in GMA 10 is being considered by the Board separately.
[8] Hearing Transcript 1/18/12, pg. 10; Hearing Transcript 1/19/12, pg. 8.
[9] Hearing Trans., 1/19/12, pg. 12-20.
[10] Hearing Trans. 1/19/12, pg. 23-24.
[11] Petition., pg. 7-8; Hearing Trans. 1/18/12, pg. 20-25.
[12] Pet., pg. 9-10; Hearing Trans. 1/18/12, pg. 25-28.

Staff

At this time, there is no indication that Val Verde County contemplates the formation of a groundwater conservation district. Grass Valley's concern is, therefore, speculative as to the impact of the DFC on its ability to exercise its lease, as the Rule of Capture prevails in the absence of a groundwater conservation district.[13] Nevertheless, Grass Valley's petition with respect to the DFC in Val Verde County warrants being heard because the modeled available groundwater (MAG) value that results from the DFC is important for state water planning purposes. Any project to develop a new well field that applies to the TWDB for funding is evaluated to see if it is consistent with the available groundwater in the regional water plan based on the MAG.[14]

The DFC for Kinney County adopted by the Districts in GMA 7 focused on maintaining a level of spring flow at Las Moras Springs rather than an average drawdown level for the aquifer.[15] The DFC for GMA 7 in Kinney County was based on a calibrated model that considered average annual spring flow and water level when pumping was greater in dry years. Thus, the DFC is not biased towards measurements collected after 2003, as Grass Valley claimed.

Analysis of Issues Raised

Attachment A is staff's technical analysis of certain issues raised by the petition. Reference to that analysis will be made as appropriate throughout this discussion.

TWDB rules provide that the Board shall base any recommended revisions to the desired future conditions only on evidence in the hearing record.[16] In addition, the Board is to consider the following criteria when determining whether a desired future condition is reasonable:

> (1) the adopted desired future conditions are physically possible and the consideration given groundwater use;
>
> (2) the socio-economic impacts reasonably expected to occur;
>
> (3) the environmental impacts including, but not limited to, impacts to spring flow or other interaction between groundwater and surface water;
>
> (4) the state's policy and legislative directives;
>
> (5) the impact on private property rights;
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> (6) the reasonable and prudent development of the state's groundwater resources; and
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> (7) any other information relevant to the specific desired future condition.[17]

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[13] Tex. Water Code § 36.002(b)-(d) as amended by Acts 2011, 82nd Leg., ch. 1207 (S.B. 332); *The Edwards Aquifer Authority and the State of Texas v. Burrell Day and Joel McDaniel*, No. 08-0964, 2012 WL 592729 at *11 (Tex. Feb. 24, 2012).
[14] Tex. Water Code § 16.053(e)(2-a) and (3)(A).
[15] *See* Hearing Trans. 1/19/12, pg. 56.
[16] 31 TAC § 356.45(c).
[17] *Id.*

Consequently, this report will be organized around the criteria listed above. Arguments from the Petitioners and from the Districts will be presented, followed by staff's analysis.

1. The DFC is physically possible.

Grass Valley Water

Grass Valley did not address whether the DFCs are physically possible.

The Districts

The Districts testified that the GAM runs demonstrated that the DFCs were physically possible.[18]

Staff

Staff has consistently taken the approach that when assessing whether a DFC is physically possible, staff considers whether there is any possible pumping scenario that would allow the DFC to be achieved. If a scenario would allow the DFC to be achieved, then the DFC is considered physically possible.[19] The models used for the assessment of the MAGs in Val Verde County and Kinney County in GMA 7 demonstrate that the DFCs as adopted by GMA 7 are physically possible

The DFC for Val Verde County of 1 foot average drawdown over the 50-year planning cycle produced a MAG value of 25,000 acre-feet per year. This MAG value is approximately 6,500 acre-feet per year greater than the projected total current supplies and strategies to meet future needs estimated for Val Verde County of 18,471 acre-feet per year.[20] The MAG, however, is less than the total available groundwater estimate identified in the 2012 State Water Plan of nearly 50,000 acre-feet per year.

The MAG based on the DFC of maintaining an annual average flow of 23.9 cubic feet per second and a median flow of 24.4 cubic feet per second at Las Moras Springs yields 70,340 acre-feet per year in the GMA 7 portion of Kinney County. Available groundwater based on the 2012 State Water Plan is an estimated 22,432 acre-feet per year, and supplies and strategies in Kinney County are approximately 21,000 acre-feet per year. This leaves a margin between the MAG value and existing water supplies and recommended water management strategies value of around 49,000 acre-feet per year.[21]

2. Consider socio-economic impacts that are reasonably expected to occur.

Grass Valley Water

Grass Valley raised as a socio-economic impact the number of people in the state who could benefit from water that Grass Valley could pump and market—water that is available and can be withdrawn

[18] Hearing Trans. 1/18/12, pg. 58; Hearing Trans. 1/19/12, pg. 51.
[19] Report on Appeal of the Reasonableness of the Desired Future Conditions Adopted by the Groundwater Conservation Districts in Groundwater Management Area 1 for the Ogallala and Rita Blanca Aquifers, pg. 8, February 10, 2010.
[20] Attachment 1, Table 3 and Figure 6.
[21] Attachment 1, Table 2 and Figure 5.

with no harm to other, local uses.[22] The Aquifer in this region is prolific but does not experience a high level of pumping.[23]

The Districts

The Districts testified that socio-economic impacts were considered in both Val Verde and Kinney counties.[24] The Districts stated that they wanted to ensure that all the industries in GMA 7 received what they needed. In particular, they pointed to the oil and gas industry, where need is difficult to quantify because, as an exempt use, it is not clear how much the industry uses during any given period.[25]

Staff

Water in an aquifer may be withdrawn for any number of beneficial uses. The regional and state water plans list certain uses that warrant particular attention based on statute and on TWDB rules when planning for drought of record conditions. The question here is whether the DFC has an unreasonable impact on any of the planned or permitted uses. Grass Valley did not present any evidence that such is the case. Staff did not find any evidence to suggest that such is the case.

3. Consider environmental impacts including but, not limited to, impacts to spring flow or other interaction between groundwater and surface water.

Grass Valley Water

Regarding the DFC adopted by GMA 7 for Kinney County, Grass Valley asserts that the DFC based upon spring flow at Las Moras Springs does not sufficiently take into account measured spring flow during times when groundwater production was highest and during times of critical drought. The average spring flow used as the DFC is skewed toward conditions based on continuous data measured only since 2003.[26] The DFC thus unreasonably links groundwater production to spring flow measurements that have only been continuously recorded for the past 8 years, excluding the historical period when the highest levels of production occurred in the county.

Grass Valley did not raise environmental issues in relation to the DFC adopted by the Districts in GMA 7, except to note that there are no endangered species in Las Moras Creek.[27]

Districts

The Districts testified that environmental impacts were considered when the DFCs were adopted, both in Kinney County[28] and in Val Verde County.[29] Consideration in GMA 7 included concern for federally listed endangered species.[30] The Districts presented studies on San Felipe Springs done for the Rio Grande Regional Water Authority and the San Felipe Creek Commissioners to support their contentions regarding the importance of protecting spring flow, although the Districts

[22] Hearing Trans., 1/18/12, pg. 118.
[23] Hearing Trans., 1/18/12, pg 26-27.
[24] Hearing Trans., 1/18/12, pg. 58.
[25] Hearing Trans., 1/19/12, pg. 52.
[26] Pet. of GMA 7 DFC, pg.8; Hearing Trans., 1/18/12, pg. 23-24.
[27] Hearing Trans., 1/18/12, pg. 24.
[28] Hearing Trans., 1/18/12, pg. 58.
[29] Hearing Trans., 1/19/12, pg. 53-54.
[30] *Id.*

acknowledged that the studies are illustrative and did not contribute to the deliberations concerning the springs.[31]

Staff

Testimony was conflicting and inconclusive concerning the connection between groundwater flow in specific areas and the volume of flow at certain springs. Historically, dry periods in the various springs have occurred during times of drought and when pumping for irrigation in the area was highest. In any case, a direct connection between groundwater and spring flow was not required to find: (1) the use of spring flows to be a reasonable metric for a DFC; and (2) acknowledging that the springs may, and probably will, experience dry periods, the DFCs adopted by the Districts in GMA 7 will not have an unreasonable impact on spring flows in the area.

4. Consider the state's policy and legislative directives.

Grass Valley Water

First, Grass Valley states that it does not question that the way the DFCs were adopted was reasonable. Rather, it finds the overall DFC itself unreasonable, in part because, by using an average DFC for the whole of GMA 7, Grass Valley asserts the DFC violates the statute.[32] Grass Valley claims that an average drawdown of 7 feet for the Edwards-Trinity Plateau Aquifer in GMA 7 does not "consider uses or conditions of the aquifer within the management area that differ substantially from one geographic area to another."[33]

Grass Valley also asserts that, under the DFC as applied to Val Verde County, with the majority of pumping going to the City of Del Rio, essentially no water is left in Val Verde for irrigators and other users.[34]

Second, Grass Valley claims the DFC in Val Verde County is insufficient to satisfy future pumping in the county, let alone needs identified in the state water plan that could be addressed by the water available in Val Verde County.[35] Grass Valley pointed out that Water Planning Regions J and L both have water shortages in their long-term regional water plans. These shortages could be met by exporting water from Kinney and Val Verde counties.[36]

Districts

The Districts testified that the overall DFC of 7 feet of drawdown is an average of 9 DFCs set by the Districts for the Edwards-Trinity (Plateau) Aquifer in GMA 7.[37] In addition, the Districts adopted DFCs for the minor aquifers.[38] The Districts testified at length regarding the different characteristics of the aquifer in different districts, including variations even within a single district.[39] Acknowledging that DFCs can be based on a number of possible goals, such as

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[31] Hearing Trans. Resp. Exh. 2 and 8, 1/19/12.
[32] Hearing Trans., 1/19/12, pg. 8-9.
[33] Tex. Water Code § 36.108(d).
[34] Hearing Trans., 1/19/12, pg. 22.
[35] Hearing Trans. 1/19/12, pg. 23-24.
[36] Hearing Trans., 1/18/12, pg 37.
[37] Hearing Trans., 1/19/12, pg. 25.
[38] Hearing Trans., 1/19/12, pg. 38.
[39] Hearing Trans., 1/19/12, pg. 43-50.

percentage of depletion over 50 years, desired water quality, specific maintenance of spring and surface water flows, or other relevant objective standards, the Districts testified that all the Edwards-Trinity (Plateau) Aquifer Districts chose to base their DFCs on desired declines in aquifer levels, with the exception of Kinney County, which based its DFC on specific spring flows.

Based on the variables described in the Districts' testimony, the following districts adopted drawdowns of:

(a) 0 to 2 feet: Coke County UWCD, Lipan-Kickapoo WCD (Concho and Tom Green), Real-Edwards C and RD (Edwards), Kimble Co. GCD, Menard County UWD, Terrell Co. GCD, Uvalde Co. UWCD, and Val Verde (no district);

(b) three to seven feet: Ector (no district), Hill County UWCD (Gillespie), Real-Edwards C and RD (Real), Sterling Co. UWCD, and Sutton Co. UWCD;

(c) eight to 13 feet: Crockett Co. GCD, Irion Co. WCD, Midland (no district), Middle Pecos GCD, Plateau UWC and SD (Schleicher), and Upton (no district); and

(d) 34 to 37 feet: Glasscock GCD and Santa Rita UWCD.[40]

Kinney County based its DFC on maintaining a specific flow in a major spring.

Kinney County GCD set as a management plan goal the sustainability of the Aquifer and maintaining a certain level of spring flow.[41] The Districts argued that, without the spring flow, a number of surface water rights would be impaired. The Districts' witness testified that pumping of groundwater affects spring flow, which affects surface water, and GMA 7 considered these factors. In particular, concerns were raised regarding the impact of reduced spring flows on waters that are tributaries to the Rio Grande and thus possibly covered by the 1944 Water Treaty between the United States and Mexico.[42]

District witnesses testified that the Districts considered whether the DFCs adopted in GMA 7 adequately covered all the needs in the water plan while balancing those different needs.[43]

Staff

Staff has stated before that under the relevant statute and regulations, a *regional* DFC is not inherently unreasonable.[44] Adopting a GMA-wide drawdown to be averaged across several hydrogeologic zones is not inherently unreasonable.[45] Here, the Districts testified that they looked at varying aquifer conditions, including recharge rates, production capability, aquifer thickness and conductivity, along with uses, such as irrigation, municipal, and oil production in some 27 counties. The final DFCs reflected this diversity in the different levels of drawdown accepted for the various

[40] Resp. Exh. 9, 1/19/12.
[41] Hearing Trans., 1/18/12, pg. 35.
[42] Hearing. Trans. 1/18/12, pg. 98-99.
[43] Hearing Trans., 1/18/12, pg. 58-59.
[44] TWDB Board Report on GMA 9, pg. 7, 1/25/2012.
[45] TWDB Board Report on GMA 13, pg. 6, 2/22/2012.

counties.[46] These different levels of drawdown were then averaged to determine an overall DFC. At the same time, the scenario upon which the different DFCs was based was also included in the DFC statement for reference in planning. Contrary to Grass Valley's assertion, the average drawdown of seven feet adopted by the Districts appears to reflect reasonable consideration of "uses or conditions of the aquifer within the management area that differ substantially from one geographic area to another."

During the hearing on January 18, a witness for the Districts representing the Maverick County Water District testified regarding the tributaries of the Rio Grande that are fed by San Filipe, Sycamore, Pinto , and Las Moras Creeks. The Rio Grande in turn provides surface water to all the cities in 27 water districts in the lower valley, downstream of Kinney County. The witness testified that these tributaries are therefore covered by the 1944 Water Treaty between the United States and Mexico and any attempt to reroute water from those streams would violate that treaty.[47]

The treaty to which the Districts refer is the Treaty between the United States of America and Mexico Respecting Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, U.S.-Mex., Feb. 3, 1944, 59 Stat. 1219 (Treaty). The purpose of the Treaty was to resolve boundary and water allocation issues and to establish water entitlements for both Mexico and the United States. Under Article 4 of the Treaty, the waters of the Rio Grande between Fort Quitman and the Gulf were allotted to the two countries in the manner specified in the Treaty. Included in the allotment to the United States were "all the waters reaching the main channel of the Rio Grande from the Pecos and Devils Rivers, Goodenough Spring, and Alamito, Terlingua, San Felipe and Pinto Creeks." Thus, all the waters of concern in this proceeding were allocated to use by the United States. Periods of low-flow and no-flow from the creeks are expected and are recognized in the Treaty. As all of the flow is allocated to the United States, reductions in flow from the creeks would not jeopardize our commitment to Mexico under the Treaty.

The DFC appears designed to maintain sufficient flow to serve downstream surface water users when the streams are flowing naturally. Additional pumping of groundwater could affect stream flows and flows downstream. But, as discussed under Section 3 above, data is inconclusive about the connection between groundwater flow in specific areas and the volume of flow at certain springs. Therefore, any impact the DFC may have on water flowing to downstream surface water users is a question of fact to be resolved through a judicial review of those facts.

Grass Valley refers to the shortages projected in Regions J and L as an indication that the DFCs in Kinney and Val Verde Counties are unreasonable in light of state policy and legislative directives. Presently, however, neither regional plan has a recommended strategy or alternative strategy that calls for development of groundwater in either Kinney County or Val Verde County to serve outside the region. This is not to say that such a strategy could not be developed in future planning efforts that would need to be compared to future DFCs; only that the current DFCs are reasonable in light of the regional plans and any known specific state directives affecting the GMA.

5. Consider the impact on private property rights.

[46] Resp. Exh. 9, 1/19/12.
[47] Hearing Trans., 1/18/12, pg. 99, 100.

Grass Valley Water

Grass Valley asserts that the DFC adopted by the Districts in GMA 7 for Val Verde County leaves no water available for landowners to exercise their private property rights.[48] Grass Valley also claims that the DFC adopted for Kinney County by GMA 7 keeps Grass Valley from exercising its private property rights because the DFC allows very little additional pumping.[49] The restrictions, Grass Valley concludes, are not based on reasonable standards or purposes.[50]

Districts

The witness for the Districts testified that the Districts in GMA 7 considered the impact of the DFC on private property rights—for example, the rights of the ranchers, irrigators, and surface water holders.[51] The Districts acknowledged that landowners have a right to sell and export their water; but they also have a right to keep their water under their land for future use.[52]

Staff

Grass Valley did not state how much water it intended to permit. In Kinney County, Grass Valley's proposed wells all appear to be in GMA 10, and, consequently, will be discussed in the report on the appeal of the GMA 10 DFC. With approximately 6,529 acre-feet per year over and above current supplies and strategies in Val Verde County, Grass Valley presumably could begin to exercise at least some of its leasehold interests in eastern Val Verde County even if a district were in place. But presently, with no district in Val Verde County to enforce the DFC, Grass Valley's concerns are speculative regarding any impact on its property rights.

6. Consider the reasonable and prudent development of the state's groundwater resources.

Grass Valley Water

The witness for Grass Valley testified that "there is a large amount of water flowing through the aquifer" in an area with fairly low population and little usage.[53] In addition, Grass Valley claims that, "if we're trying to develop the state's groundwater resources" to move water from areas of high availability to areas that need water, then moving it from Kinney and Val Verde Counties to other areas of the state constitutes reasonable and prudent development of the state's groundwater resources.[54]

Districts

The witness for GMA 7 testified that the Districts thought the DFCs provided a reasonable and prudent development of the state's groundwater resources.[55] The Districts' primary objective in Val Verde County was protection of current use and the San Felipe Springs. The Districts claimed a similar objective in Kinney County by protecting Las Moras Springs.

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[48] Hearing Trans., 1/19/12, pg. 21.
[49] Hearing Trans., 1/18/12, pg. 10.
[50] *Id.* at 28.
[51] *Id.*, at 55.
[52] *Id.* at 59.
[53] Hearing Trans., 1/19/12, pg 22.
[54] *Id.*, at 22-23.
[55] Hearing Trans. 1/18/12, pg. 60; Hearing Trans., 1/19/12, pg. 55.

Staff

The DFC results in a MAG of 25,000 acre-feet per year.[56] The 2011 Plateau Regional Water Plan projects a total demand in Val Verde County of 26,000 acre-feet per year, as Grass Valley testified.[57] But Grass Valley fails to acknowledge that the demand projections include both groundwater and surface water. In fact, water use for both Val Verde County and Del Rio is about equally divided between surface water and groundwater. Therefore, comparing the demand figures with the MAG is not appropriate. The MAG exceeds regional water plan supplies and strategies that are tied to groundwater, by 6,500 acre-feet per year.[58]

The DFC results in a MAG of 70,340 acre-feet per year for Kinney County in GMA 7.[59] The MAG exceeds regional water plan supplies and strategies in Kinney County by almost 50,000 acre-feet per year.[60] Providing for existing supplies and recommended strategies with a not insignificant allowance for additional uses, while also protecting spring flow, is both reasonable and prudent.

RECOMMENDATION

Staff recommends that the Board find that the DFCs adopted by the Districts in GMA 7 for the Edwards-Trinity (Plateau) Aquifer in Kinney and Val Verde Counties are reasonable based on the petitions, the testimony and evidence presented at the hearings, and staff's summary and analysis of that evidence. The reasonableness of the DFC with respect to the exercise of personal property rights in Kinney County will depend on the way in which the Districts incorporate the MAG in their management plans and rules and make related decisions regarding permit authorizations and administration. With respect to Val Verde County, the reasonableness of the DFC with respect to the exercise of personal property rights will depend upon the future formation and actions of a groundwater conservation district in Val Verde County, if one is formed.

Attachment(s): Technical Analysis of Petitions

[56] Attachment 1, Table 3
[57] Region J 2011 Regional Water Plan, pg. 2-9; Hearing Trans., 1/19/12, pg. 20
[58] Attachment 1, Figure 6 and Table 3
[59] Attachment 1, Table 2
[60] Attachment 1, Figure 5 and Table 2

TECHNICAL ANALYSIS OF PETITION

CHALLENGING THE REASONABLENESS OF THE DESIRED FUTURE CONDITIONS FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN GROUNDWATER MANAGEMENT AREA 7 IN KINNEY AND VAL VERDE COUNTIES

Petitioner:
Grass Valley Water, L.P.

Prepared by:
Jerry Shi, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division

Prepared for:
Texas Water Development Board
April 19, 2012 Board Meeting

April 11, 2012

The seal appearing on this technical analysis was authorized by Jianyou (Jerry) Shi, P.G. 11113 on April 11, 2012.

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EXECUTIVE SUMMARY

Technical information from groundwater availability model (GAM) runs and other sources have been summarized to provide context to issues raised in a petition appealing the reasonableness of the desired future conditions for the Edwards-Trinity (Plateau) Aquifer in Groundwater Management Area 7 (GMA 7) in Kinney and Val Verde counties.

The desired future conditions of the Edwards-Trinity (Plateau) Aquifer for GMA 7 in Kinney County are to maintain an average flow of approximately 23.9 cubic feet per second (cfs) and a median flow of approximately 24.4 cfs at the Las Moras Springs. The desired future condition in the Edwards-Trinity (Plateau) Aquifer for the rest of GMA 7 (including Val Verde County) is to maintain an average drawdown of seven feet. For GMA 7 in Kinney County, the modeled available groundwater value (approximately 70,300 acre-feet per year) exceeds the 2012 State Water Plan groundwater availability, existing water supplies and recommended water management strategies, and historical use in Kinney County (historical groundwater use is not estimated for GMA 7 and GMA 10 separately in Kinney County) (Table 2; Figure 5). The modeled available groundwater is less than the maximum sustainable pumping rate. For Val Verde County, the modeled available groundwater value (approximately 25,000 acre-feet per year) is more than the existing water supplies and recommended water management strategies and historical use. Modeled available groundwater is less than the 2012 State Water Plan groundwater availability and potentially below the maximum sustainable pumping rate.

SECTION 1: INTRODUCTION

This document summarizes the technical information to provide context to the issues raised in a petition appealing the reasonableness of the desired future conditions for the Edwards-Trinity (Plateau) Aquifer (Figure 1) adopted by groundwater conservation districts in GMA 7 (Figure 2). This report accompanies the Texas Water Development Board (TWDB) staff evaluation of the issues raised in the petition filed by Grass Valley Water, L.P. In this technical report, no conclusions are drawn about the merits of the issues raised in the petition.

Section 2 presents background information regarding different model simulations that were developed in support of the desired future conditions process. Section 3 summarizes the approach by the TWDB to estimate the modeled available groundwater in the Edwards-Trinity (Plateau) Aquifer related to the desired future conditions in Kinney County. Section 4 compares the modeled available groundwater with historical groundwater pumping, exempt use, groundwater availability from 2012 state water plan, existing water supplies and recommended water management strategies, recharge, estimated maximum sustainable pumping, and total storage volume. Section 5 discusses the limitations of regional scale numerical groundwater flow models.

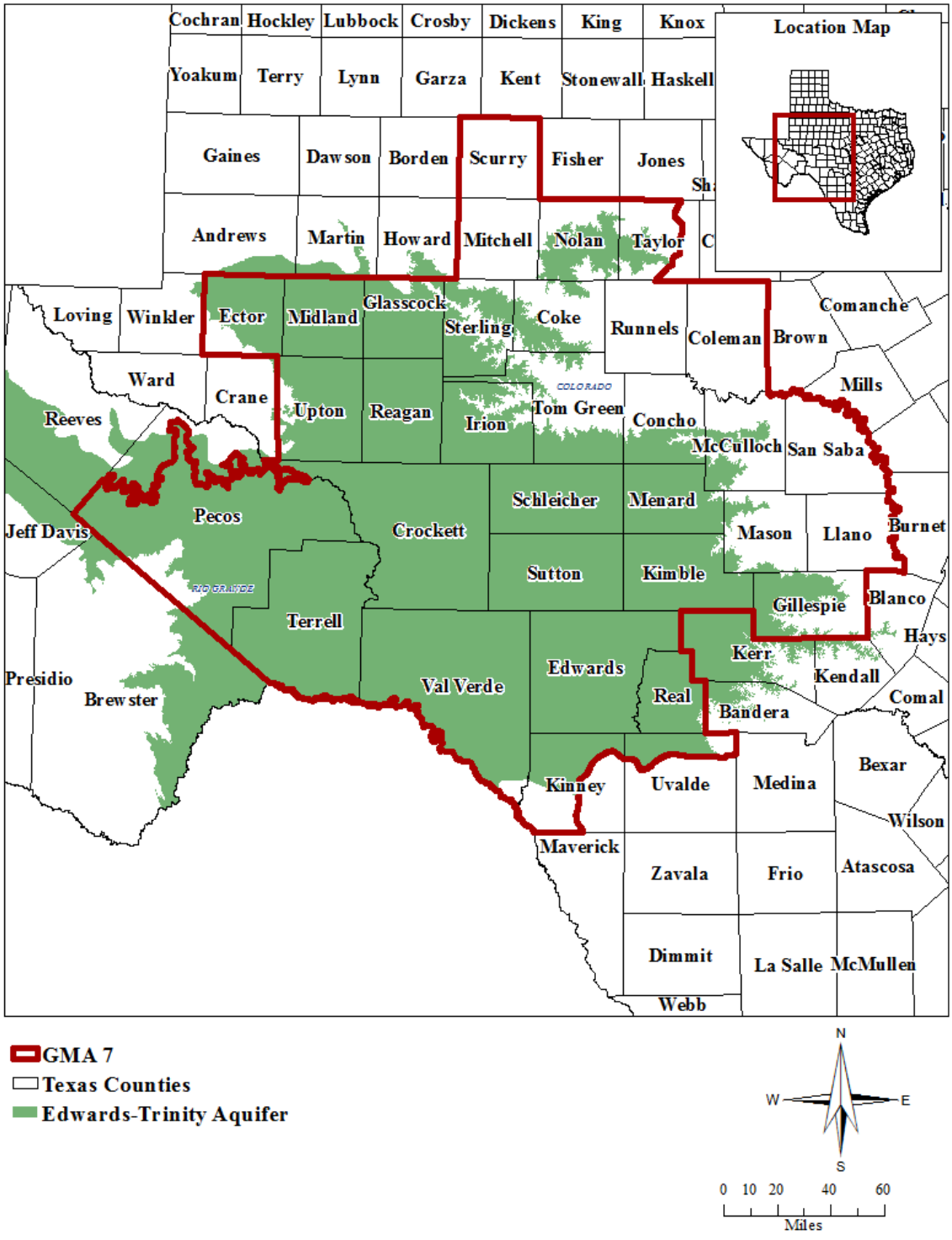

FIGURE 1. LOCATION OF THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN GROUNDWATER MANAGEMENT AREA 7.

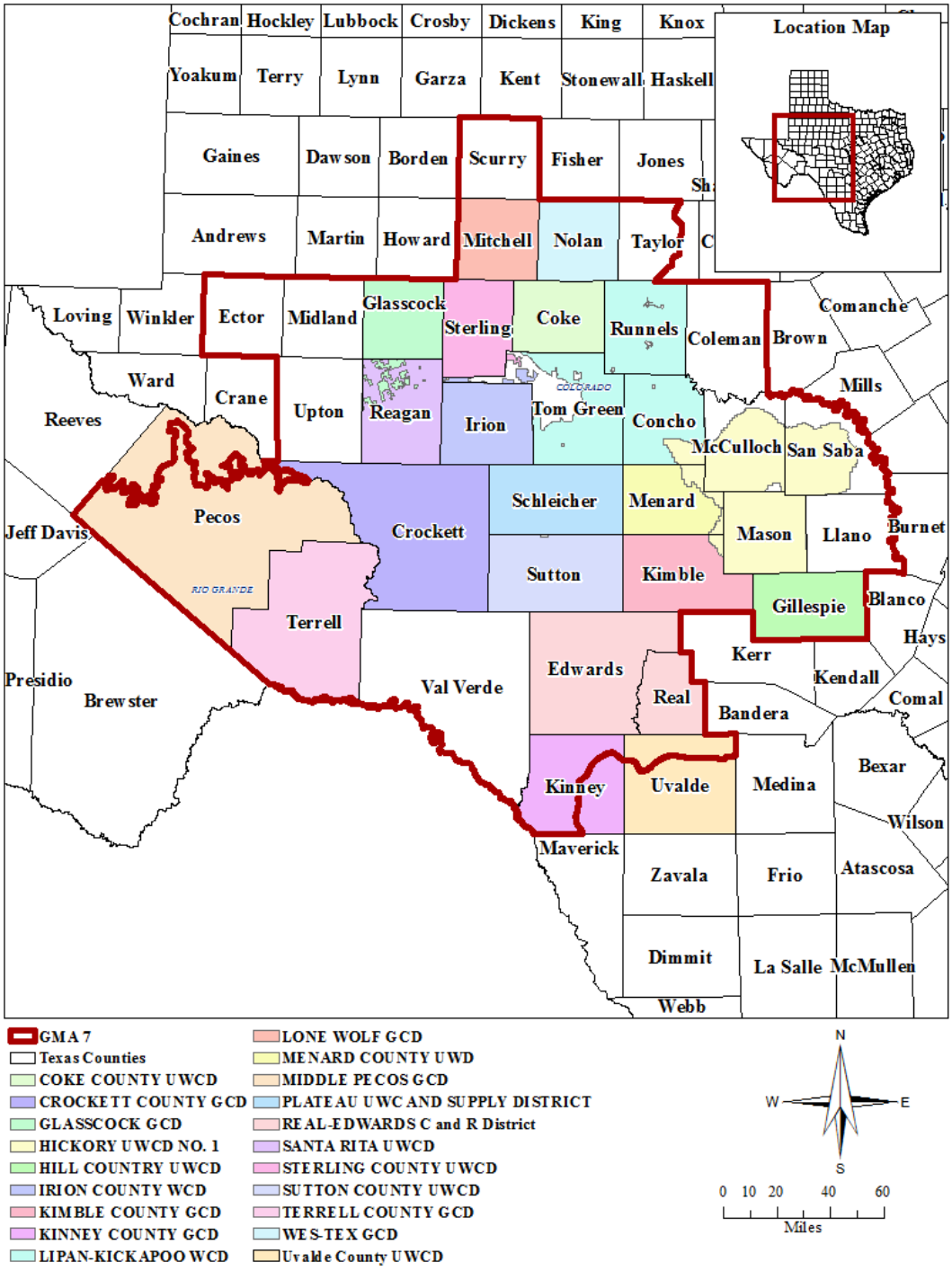

FIGURE 2. GROUNDWATER CONSERVATION DISTRICTS IN GROUNDWATER MANAGEMENT AREA 7. (GCD = GROUNDWATER CONSERVATION DISTRICT; UWCD = UNDERGROUND WATER CONSERVATION DISTRICT; UWD = UNDERGROUND WATER DISTRICT; WCD = WATER CONSERVATION DISTRICT).

SECTION 2: GROUNDWATER AVAILABILITY MODEL RUNS

TWDB staff completed two aquifer assessments and five groundwater availability modeling analyses to assist the groundwater conservation districts with developing their desired future conditions for the Edwards-Trinity (Plateau) Aquifer in GMA 7. The desired future conditions, adopted by groundwater conservation districts in GMA 7 on July 29, 2010, are to maintain an average drawdown of seven feet for the Edwards-Trinity (Plateau) Aquifer, except for Kinney County, based on Scenario 10 of TWDB GAM Run 09-035 (Hutchison, 2010). In Kinney County the desired future condition was to maintain an annual average flow of 23.9 cfs and a median flow of 24.4 cfs at Las Moras Springs, based on Scenario 3 of GAM Task 10-027 (revised) (Hutchison, 2011). Figure 3 illustrates the features of Kinney County that are referenced in this technical report.

The reports of these analyses are summarized as follows.

GTA Aquifer Assessment 08-06
Thorkildsen and Backhouse (June 17, 2009)

TWDB staff calculated managed available groundwater for the Edwards-Trinity (Plateau) Aquifer to achieve the draft desired future conditions for Glasscock County, Reagan County, Upton County, and the southeast corner of Midland County. The assessment was based on precipitation, effective groundwater recharge rate, and aquifer storage change over a 50-year period after the aquifer-saturated thickness was assumed to be reduced by approximately 50 percent.

A second area was assessed separately and summarized in GTA Aquifer Assessment 08-05 (see below).

GTA Aquifer Assessment 08-05
Thorkildsen and Backhouse (August 11, 2009)

TWDB staff calculated managed available groundwater for the Edwards-Trinity (Plateau) Aquifer to achieve the draft desired future conditions for Crockett County, Kimble County, Kinney County, Middle Pecos and Wes-Tex Groundwater Conservation Districts; the Coke County, Hill Country, Sterling County, Sutton County, and Uvalde County Underground Water Conservation Districts; the Hickory Underground Water Conservation District No. 1; the Irion County and Lipan-Kickapoo Water Conservation Districts; the Menard County Underground Water District; the Plateau Underground Water Conservation and Supply District; and the Real-Edwards Conservation and Reclamation District. The assessment was based on precipitation, effective groundwater recharge rate, and aquifer storage change over a 50-year period after the water level in the aquifer was assumed to decline by 5, 10, 15, and 20 feet, respectively.

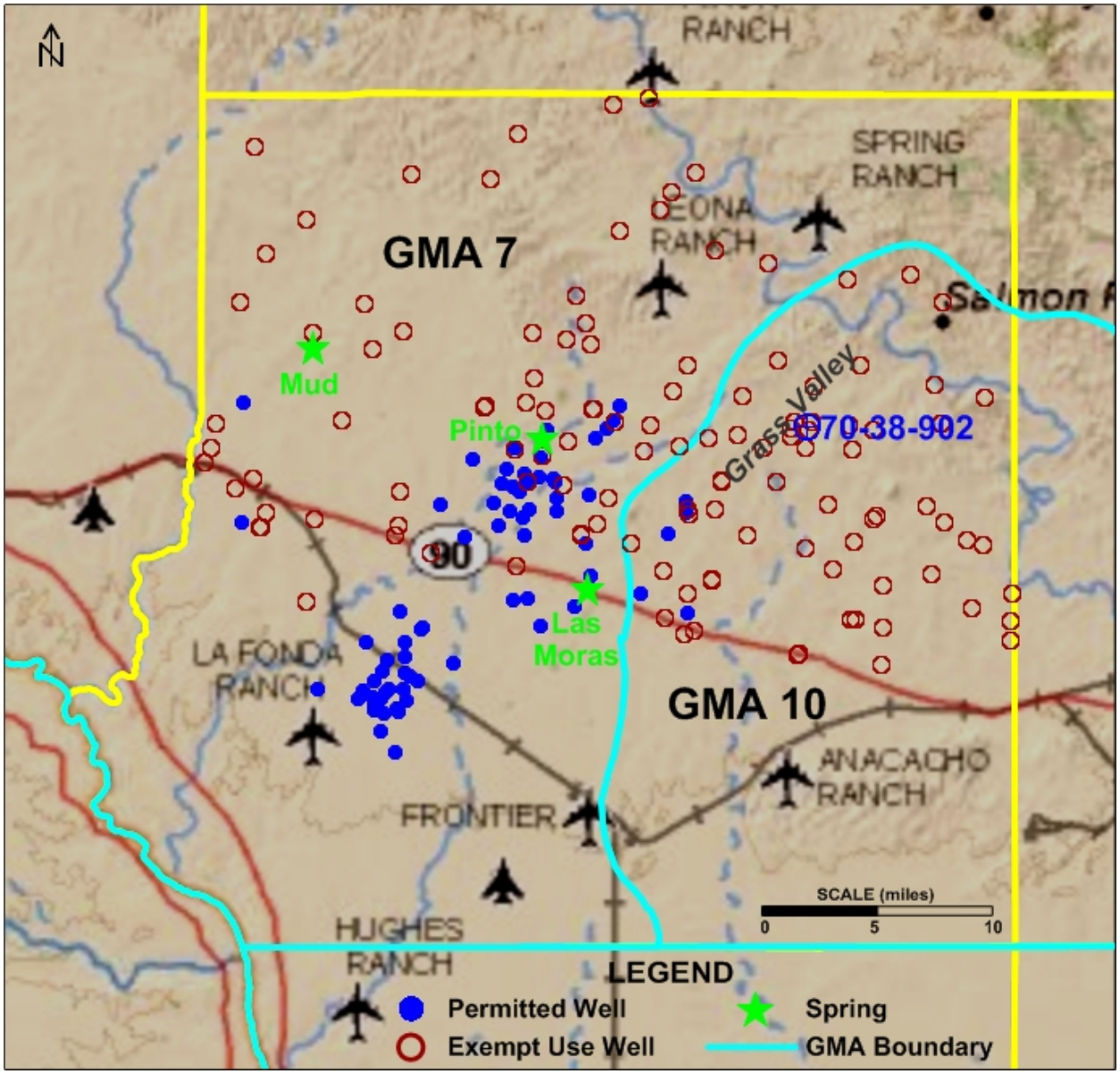

FIGURE 3. LOCATIONS OF GROUNDWATER MANAGEMENT AREAS (GMAS), MAJOR SPRINGS, PERMITTED WELLS, AND EXEMPT WELLS IN KINNEY COUNTY.

GAM Run 07-003
Donnelly (June 13, 2007)

Using version 1.0 of the Edwards-Trinity (Plateau) Aquifer numerical groundwater flow model (Anaya and Jones, 2004), TWDB staff simulated the groundwater drawdown (relative to the water level at the end of 2000) over a 50-year predictive period assuming average recharge and baseline pumpage provided by the groundwater conservation district located in GMA 7. This assessment indicated that water levels after 50 years of baseline pumpage stayed within 25 feet of water levels at the end of 2000 for most areas.

Significant drawdowns of up to 500 feet were predicted in Glasscock and Reagan counties because the model was not appropriately simulating the response of the Edwards-Trinity (Plateau) Aquifer to pumping in this area.

GAM Run 07-032
Donnelly (December 11, 2007)

This model run was exactly the same as GAM Run 07-03 except that recharge related to drought-of-record was used for the last six years of the 50-year predictive period. This assessment indicated that water levels after 50 years of baseline pumpage stayed within 25 feet of water levels at the end of 2000 except in the area centered in Glasscock and Reagan counties where significant drawdowns of up to 500 feet were predicted—similar to GAM Run 07-03.

GAM Run 07-037
Tu (April 9, 2008)

Using version 1.0 of the Edwards-Trinity (Plateau) Aquifer numerical groundwater flow model (Anaya and Jones, 2004), TWDB staff modeled the groundwater drawdown (relative to the water level at the end of 1999) over a 51-year predictive period assuming average recharge and new baseline pumpage provided by the groundwater conservation districts located in GMA 7. The new pumpage for each county was the higher value between the old baseline value (as described in GAM Runs 07-03 and 07-32) and the 2007 State Water Plan. This assessment indicated that water levels after 51 years decreased between 50 and 100 feet with the exception of an area centered in Pecos, Glasscock, and Reagan counties where significant drawdowns of up to 600 feet were predicted—similar to GAM Runs 07-03 and 07-32.

GAM Run 09-035
Hutchison (August 7, 2010)

Using the one-layer Edwards-Trinity (Plateau) and Pecos Valley aquifers alternative numerical groundwater flow model (Hutchison and others, 2011[b]), TWDB staff simulated ten pumping scenarios to evaluate the groundwater drawdowns (relative to the water level at the end of 2010) in GMA 7 over a 50-year predictive period assuming average recharge conditions.

Table 1 shows drawdowns for the GMA 7 counties as well as the overall average drawdown of seven feet (the desired future condition) adopted by the groundwater conservation districts based on Scenario 10.

TABLE 1. AVERAGE SIMULATED DRAWDOWN IN FEET RELATIVE TO 2000 IN GROUNDWATER MANAGEMENT AREA 7 FROM TEN SCENARIOS.

County	Simulated Drawdown (feet)
Coke	0
Concho	0
Crockett	9
Ector	7
Edwards	2
Gillespie	5
Glasscock	34
Irion	10
Kimble	1
Kinney	not applicable
McCulloch	0
Mason	0
Menard	1
Midland	10
Nolan	0
Pecos (GMA 7 portion)	11
Reagan	37
Real	4
Schelicher	8
Sterling	6
Sutton	6
Taylor	0
Terrell	2
TomGreen	2
Upton	13
Uvalde	2
ValVerde	1
GMA 7 Average	7

GAM Task 10-027
Hutchison (February 9, 2011)

TWDB staff simulated seven pumping scenarios in GMAs 7 and 10 in Kinney County using the Kinney County area groundwater flow model (Hutchison and others, 2011[a]). The total pumping rates in these scenarios ranged from approximately 38,000 acre-feet per year to 153,000 acre-feet per year in Kinney County. Figure 4 illustrates the results of these simulations. For each scenario, the simulated flow at Las Moras Springs was evaluated to assist the Kinney County Groundwater Conservation District with the development of their desired future conditions for the Edwards-Trinity (Plateau) Aquifer. The desired future conditions adopted by the Kinney County Groundwater Conservation District are based on Scenario 3 (Figure 4).

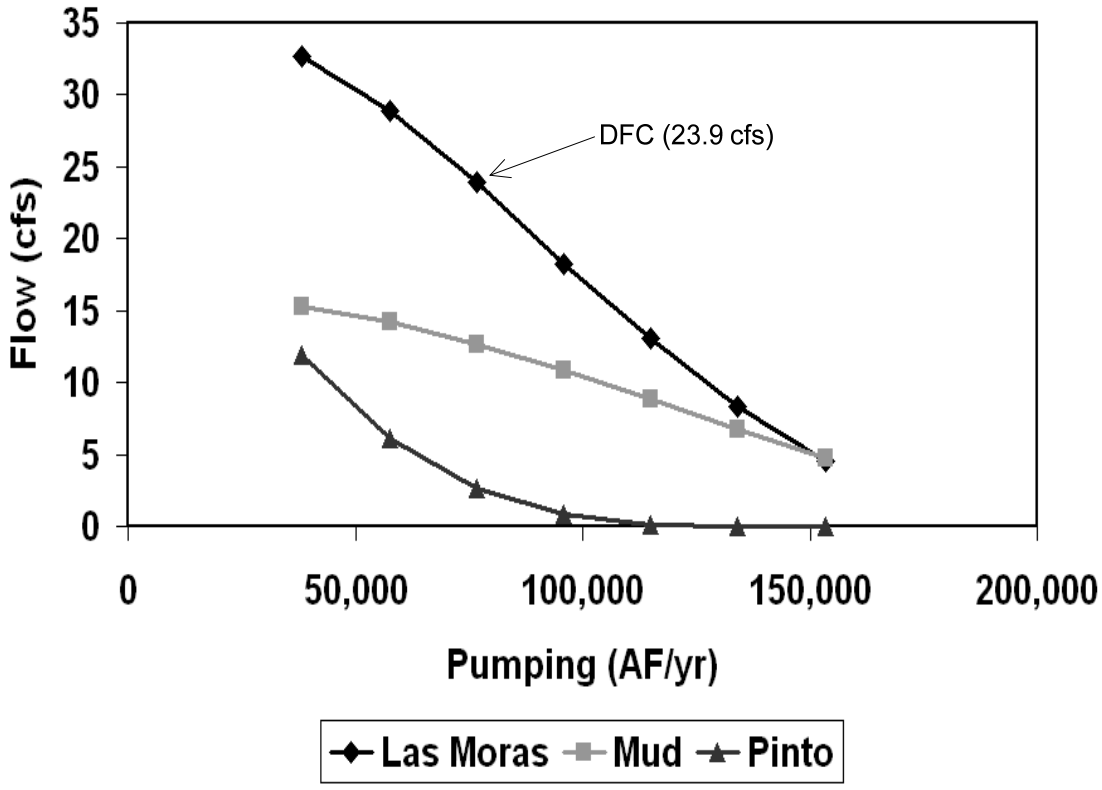

FIGURE 4. KINNEY COUNTY PUMPING VERSUS SPRING FLOW FOR SEVEN PUMPING SCENARIOS.(SEE FIGURE 3 FOR LOCATION OF SPRINGS.)

SECTION 3: EVALUATION OF ESTIMATES OF MODELED AVAILABLE GROUNDWATER IN KINNEY COUNTY

TWDB staff updated the predictive analysis from GAM Task 10-027 by re-distributing pumping to well locations representing both exempt groundwater use as well as permitted well locations in Kinney County. The modeled available groundwater projected by the updated predictive simulation run resulted in approximately 70,300-acre-feet per year for Groundwater Management Area 7 from the Edwards-Trinity (Plateau) Aquifer and approximately 6,300 acre-feet per year for Groundwater Management Area 10 from the Edwards (Balcones Fault Zone) Aquifer (Shi, and others, 2012).

SECTION 4: COMPARISON OF DRAFT MODELED AVAILABLE GROUNDWATER WITH OTHER DATA

This section compares the modeled available groundwater (described in Sections 2 and 3) with several indicators of groundwater availability and supply including estimates of historical groundwater pumping, exempt use, groundwater availability from the 2012 state water plan, existing water supplies and recommended water management strategies, recharge, estimated maximum sustainable pumping, and total storage.

Estimated Historical Groundwater Pumping

The estimated historical groundwater pumping is from the TWDB Water Use Survey (TWDB, 2011). The total historical use in Kinney County shows a downward trend from 1974 through 2004 (Figure 5), while the total historical use in Val Verde County shows an upward trend for the same period (Figure 6).

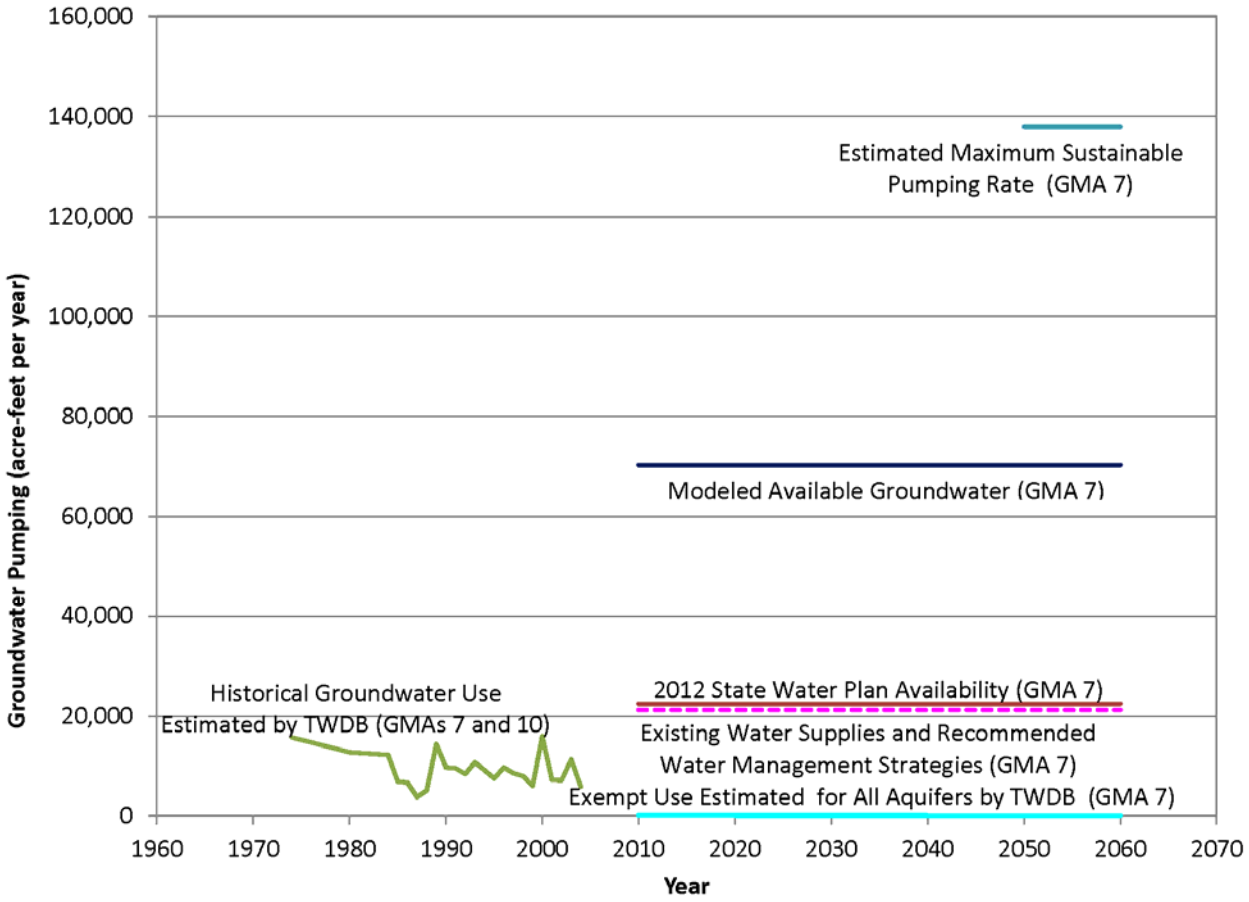

FIGURE 5. COMPARISON OF VARIOUS GROUNDWATER PLANNING AMOUNTS FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN GMA 7 IN KINNEY COUNTY.

TABLE 2. GROUNDWATER MANAGEMENT AREA 7 IN KINNEY COUNTY – EDWARDS-TRINITY (PLATEAU) AQUIFER (ALL VALUES IN ACRE-FEET PER YEAR EXCEPT WHERE NOTED).

	2010	2020	2030	2040	2050	2060
Modeled Available Groundwater (GAM Run 12-002)	70,340	70,340	70,340	70,340	70,340	70,340
Available Groundwater Based on 2012 State Water Plan	22,432	22,432	22,432	22,432	22,432	22,432
Exempt Use	125	99	83	72	68	63
Existing Water Supplies and Recommended Water Management Strategies	21,162	21,162	21,162	21,162	21,162	21,162
Estimated Recharge	111,000					
Estimated Storage Volume (SV) (acre-feet)	16,715,000					
Estimated Drainable Water (= 25% of SV) (acre-feet)	4,179,000					
Estimated Drainable Water (= 75% of SV) (acre-feet)	12,537,000					
Estimated Maximum Sustainable Pumping	138,000					

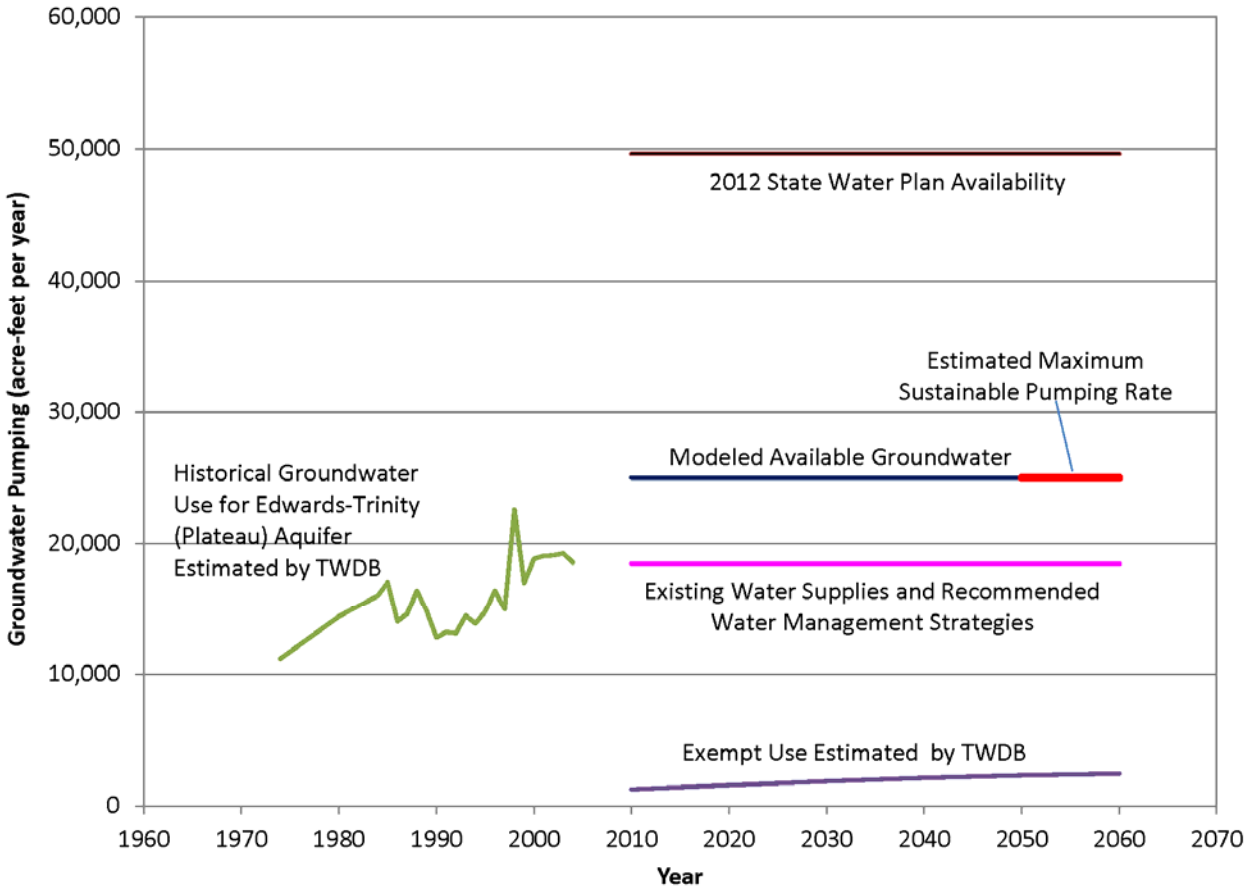

FIGURE 6. COMPARISON OF VARIOUS GROUNDWATER PLANNING AMOUNTS FOR THE EDWARDS-TRINITY (PLATEAU) AQUIFER IN VAL VERDE COUNTY.

TABLE 3. GROUNDWATER MANAGEMENT IN VAL VERDE COUNTY – EDWARDS-TRINITY (PLATEAU) AQUIFER (ALL VALUES IN ACRE-FEET PER YEAR EXCEPT WHERE NOTED).

	2010	2020	2030	2040	2050	2060
Modeled Available Groundwater	25,000	25,000	25,000	25,000	25,000	25,000
Available Groundwater Based on 2012 State Water Plan	49,607	49,607	49,607	49,607	49,607	49,607
Exempt Use	1,251	1,579	1,884	2,145	2,335	2,472
Existing Water Supplies and Recommended Water Management Strategies	18,471	18,471	18,471	18,471	18,471	18,471
Estimated Recharge	67,000					
Estimated Storage Volume (SV) (acre-feet)	25,409,000					
Estimated Drainable Water (= 25% of SV) (acre-feet)	6,352,000					
Estimated Drainable Water (= 75% of SV) (acre-feet)	19,057,000					
Estimated Maximum Sustainable Pumping	25,000					

Estimated Exempt Use

Exempt use is the projected amount of pumping from the aquifer that is exempt from permitting by a groundwater conservation district. Examples of exempt uses include certain domestic and livestock use. Each district may also have additional exempt uses as defined by its rules or enabling legislation. TWDB staff developed a standardized method for estimating exempt use for domestic and livestock purposes based on projected

changes in population and the distribution of domestic and livestock wells. Because other exempt uses can vary significantly from district to district, estimates of exempt pumping outside domestic and livestock uses were not included in the TWDB estimate.

The exempt use in GMA 7 in Kinney County is estimated as less than 130 acre-feet per year in 2010 and decreases to approximately 60 acre-feet per year in 2060 (Table 2; Figure 5).The exempt use in Val Verde County is estimated to increase from approximately 1,250 acre-feet per year in 2010 to 2,500 acre-feet per year in 2060 (Table 3; Figure 6).

2012 State Water Plan Groundwater Availability

Groundwater availability is the amount of water from an aquifer that is available for use regardless of legal or physical availability. The 2012 State Water Plan shows 22,432-acre-feet per year available in GMA 7 in Kinney County (Table 2; Figure 5) and 49,607 acre-feet per year available in Val Verde County (Table 3; Figure 6) from 2010 through 2060 from the Edwards-Trinity (Plateau) Aquifer.

2012 State Water Plan Existing Water Supplies and Recommended Water Management Strategies

Existing water supplies are those supplies that are physically and legally available now. They include water that providers have permits or contracts for now and are able to provide to water users with existing infrastructure. Water management strategies include projects for new groundwater development or projects for new conveyance facilities to move available water supplies to areas of need.

The 2012 State Water Plan projects 21,162-acre-feet per year for existing water supplies and recommended water management strategies in Kinney County (Table 2; Figure 5) and 18,471 acre-feet per year in Val Verde County (Table 3; Figure 6) from 1020 through 2060.

Estimated Recharge

The aquifer recharge in GMA 7 in Kinney County is estimated to be approximately 111,000 acre-feet per year (Table 2; Figure 5) using the groundwater flow model for Kinney County (Hutchison and others, 2011 [a]).

The groundwater recharge in Val Verde County is estimated to be approximately 67,000 acre-feet per year (Table 3; Figure 6) using the alternative one-layer groundwater flow model for the Edwards-Trinity (Plateau) Aquifer (Hutchison and others, 2011 [b]).

Estimated Maximum Sustainable Pumping

The maximum sustainable pumping is determined by TWDB as the pumping rate when water levels in the aquifer are relatively stable after 500-year pumping. Groundwater flow models are used to estimate this pumping rate.

For GMA 7 in Kinney County, the maximum sustainable pumping rate is estimated as approximately 138,000 acre-feet per year (Table 2; Figure 5) using the groundwater flow model by Hutchison and others (2011 [a]).

For Val Verde County, the maximum sustainable pumping rate is estimated as approximately 25,000 acre-feet per year (Table 3; Figure 6) using the groundwater flow model by Hutchison and others (2011 [b]).

Comparison Summary

For GMA 7 in Kinney County, modeled available groundwater exceeds the 2012 State Water Plan groundwater availability, existing water supplies and recommended water management strategies, and historical use in Kinney County (Table 2; Figure 5; note that the historical use in Kinney County includes Groundwater Management Areas 7 and 10) Modeled available groundwater is less than the maximum sustainable pumping rate.

For Val Verde County, modeled available groundwater is more than the existing water supplies and recommended water management strategies and historical use. Modeled available groundwater is less than the 2012 State Water Plan groundwater availability and potentially below the maximum sustainable pumping rate (Table 3; Figure 6).

SECTION 5: 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 may be used for planning purposes and/or regulatory purposes related to future pumping, 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.

Given these limitations, users of this information are cautioned that the results should not be considered a definitive, permanent prediction of the changes in groundwater storage, stream flow and spring flow. 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.

SECTION 6: REFERENCES

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