

TO: Board Members

THROUGH: Melanie Callahan, Executive Administrator
Robert E. Mace, Deputy Executive Administrator, Water Science and Conservation
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 Condition adopted by the groundwater conservation districts in Groundwater Management Area 10 for the western subdivision of the Edwards (Balcones Fault Zone) Aquifer in Kinney County.

ACTION REQUESTED

Staff recommends that the Board find that the desired future condition (DFC) adopted by the groundwater conservation districts (Districts) in Groundwater Management Area 10 (GMA 10) for the western subdivision of the Edwards (Balcones Fault Zone) Aquifer in Kinney County is reasonable based on the analysis set out in this report.

BACKGROUND

This report and the attached technical analysis constitute the staff analysis of a petition filed by legally defined interests in groundwater in Groundwater Management Area 10. This petition appeals the adoption of the DFC for the western subdivision of the Edwards (Balcones Fault Zone) Aquifer in Kinney County. This analysis discusses whether the DFC is 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

<p>Our Mission</p> <p>To provide leadership, planning, financial assistance, information, and education for the conservation and responsible development of water for Texas</p>	<p>Board Members</p> <p>Edward G. Vaughan, Chairman Joe M. Crutcher, Vice Chairman Melanie Callahan, Executive Administrator</p>	<p>Thomas Weir Labatt III, Member Lewis H. McMahan, Member</p>	<p>Billy R. Bradford Jr., Member Monte Cluck, Member</p>
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a DFC is reasonable.¹ The final determination of a DFC is, in fact, the responsibility of the Districts in the GMA.²

The 82nd Legislature amended the statute to provide a more detailed process for groundwater conservation district 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 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 10 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 August 4, 2010, the Districts in GMA 10⁶ adopted the following DFC for the western subdivision of the Edwards (Balcones Fault Zone) Aquifer in Kinney County, pursuant to Texas Water Code § 36.108:

maintaining a water level in Index Well No. 70-38-902 at or above an elevation of 1,184 feet above mean sea level.

An administratively complete petition was submitted by Grass Valley Water, L.P. (Grass Valley) on August 4, 2011 to appeal the DFC adopted by GMA 10 for the Edwards (Balcones Fault Zone) Aquifer in Kinney County. Kinney County is divided between GMA 7 to the west and north, and GMA 10 to the southeast, with Kinney County Groundwater Conservation District participating in both GMAs. Consequently, the petition, hearing, and consideration focused on the county at issue.

TWDB staff held a hearing on the petition relating to the GMA 10 DFC for Kinney County on January 18, 2012, in Sonora, Texas, to take testimony and evidence from the petitioner and the Districts. The record for the petition 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 received additional evidence from three people related specifically to the GMA 10 appeal and seven comments related to both the GMA 7 and GMA 10 DFCs in Kinney County.⁷

¹ See Tex. Water Code § 36.108(l)-(n).

² See Tex. Water Code § 36.108(n).

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 Barton Springs/Edwards Aquifer Conservation District, Edwards Aquifer Authority, Guadalupe County Groundwater Conservation District, Hays Trinity Groundwater Conservation District, Kinney County Groundwater Conservation District, Medina County Groundwater Conservation District, Plum Creek Conservation District, Trinity-Glen Rose Groundwater Conservation District, and Uvalde County Underground Water Conservation District.

⁷ The petition challenging the DFCs in GMA 7 is being considered by the Board separately.

The Arguments

Grass Valley Water, L.P.

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

Grass Valley argues that the DFC adopted by the Districts in for the Kinney County portion of GMA 10 is unreasonable because it is inappropriately based on a single index well. Grass Valley asserts that the index well is not properly calibrated to indicate water levels in the region and is too close to Grass Valley's proposed wellfields. Based on these underlying assertions, Grass Valley concludes that the DFC adopted by the Districts in GMA 10 for Kinney County does not provide reasonable and prudent development of the state's groundwater resources and has a negative impact on private property rights.

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.⁹ 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;
- (6) the reasonable and prudent development of the state's groundwater resources; and
- (7) any other information relevant to the specific desired future condition.¹⁰

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.

⁸ Hearing Transcript 1/18/12, pg. 10; Hearing Transcript 1/19/12, pg. 8.

⁹ 31 TAC § 356.45(c).

¹⁰ *Id.*

1. The DFC is physically possible.

Grass Valley Water

Grass Valley appeals the DFC for the western subdivision of the Edwards (Balcones Fault Zone) Aquifer in Kinney County because the well data for Well No. 70-38-902, the Index Well for the DFC, does not take into account historical data when groundwater production was higher. Thus, the value used as the DFC would lead to an underestimation of the production capabilities of the aquifer.¹¹ Grass Valley also asserts that the DFC unreasonably links groundwater production to water-level measurements from only one index well.¹² Finally, Grass Valley states that the single index well is within the anticipated cone of depression of Grass Valley's proposed well field and is thus incapable of producing fair, impartial, and accurate data for the impact to the DFC because of Grass Valley's anticipated production from its groundwater leases.¹³

The Districts

Testimony from the Districts focused on the priority of protecting spring flow at Las Moras Springs and the correlation of water levels at the Index Well with spring flow at Las Moras Springs. The latter issue is discussed below in Section 3.

The Districts further testified that GMA 10 was partitioned into three areas along certain naturally occurring divides in the aquifer—one north of Kyle that created the Barton Springs area, and one along the divide between Kinney County and Uvalde County, with the Uvalde pool and the San Antonio pool in the center.¹⁴ The Districts stated that the San Marcos Springs, Comal Springs, J-17 index well in San Antonio, and the J-27 index well in Uvalde are the other indices for GMA 10 along with the Index Well (also known as the "Tularosa Well," or Well No. 70-38-902).¹⁵

Staff

The DFCs for Kinney County (one for the GMA 10 portion and one for the GMA 7 portion) produced a draft MAG value of a little more than 76,000 acre-feet per year for the entire county. When viewed in terms of the Edwards (Balcones Fault Zone) Aquifer segments and GMA 7 and 10 boundaries in Kinney County, the draft MAG value is 70,340 acre-feet per year in the GMA 7 portion of Kinney County, and 6,320 acre-feet per year in the GMA 10 portion of Kinney County. This latter number is slightly higher than the projected total of 6,318 acre-feet per year for current uses and future strategies estimated for GMA 10 in Kinney County in the 2012 State Water Plan.¹⁶

Very little pumping occurs in the GMA 10 part of Kinney County, and most of that is exempt pumping. Growth and development are not anticipated in this area. Thus, information on groundwater withdrawals based on historic records is limited. Contrary to Grass Valley's assertion, however, early data were available and were incorporated into the groundwater flow model, though the data were not a continuous record. Thus, it was possible to calibrate the model for the period before 1973, the year that the index well was installed. While it is periodic, there are adequate data

¹¹ Pet. of GMA 10 DFC, pg. 4.

¹² Pet. of GMA 10 DFC, pg. 5.

¹³ *Id.*

¹⁴ Hearing Trans. pg. 49, 1/18/12.

¹⁵ *Id.* at 50.

¹⁶ Tech. Report, Table 1 and Figure 3.

that cover the period of highest groundwater production in Kinney County to provide a pumping scenario that allows the DFC to be achieved.

Grass Valley acknowledged that individual wells are used in other parts of GMA 10 for monitoring. But Grass Valley argued that the other wells used in GMA 10 are “legislatively mandated trigger” wells that have extensive history and are used for a different purpose than defining a DFC.¹⁷ Grass Valley alleged that no other GMA uses a single index well for its DFC.¹⁸ The fact that no other GMA uses a single index well to define its DFC does not, however, make GMA 10’s use of the index well for this purpose unreasonable. Using the index well for a DFC may not equate to using the J-17 and J-27 wells in the San Antonio pool and the Uvalde pool as triggers for critical period withdrawal reduction stages. But throughout GMA 10 spring flows and well levels at specifically identified wells are standard tools for aquifer management in conjunction with the use of historic pumping data.

Grass Valley also testified that the index well would be within the anticipated cone of depression of Grass Valley’s proposed wellfields, which means that the index well will be directly impacted by pumping from Grass Valley’s wells.¹⁹ Grass Valley further states that very little pumping is going on in the Edwards (Balcones Fault Zone) Aquifer in Kinney County.²⁰ The well was constructed in 1973 and has been used for measurement since then, including measurements taken over the years by the Edwards Aquifer Authority. Staff concludes that this well has the best available baseline water-level data for this area of the Edwards (Balcones Fault Zone) Aquifer. It therefore seems reasonable that the Districts in GMA 10 would identify the index well as the monitoring point for GMA 10’s DFC in Kinney County.

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 it claims is available and can be withdrawn with no harm to other, local uses.²¹ The Edwards (Balcones Fault Zone) Aquifer, in this region is prolific but does not have a high level of pumping, according to Grass Valley.²²

The Districts

The Districts testified that socio-economic impacts were considered in both Val Verde and Kinney counties.²³

Staff

The water in an aquifer may be withdrawn for any number of beneficial uses. Grass Valley focuses on one—marketing to areas lacking sufficient supply. The Districts emphasized others—existing

¹⁷ Hearing Trans., pg. 112-113, 1/18/12.

¹⁸ Hearing Trans., pg. 18-19, 1/18/12.

¹⁹ Hearing Trans., pg. 18, 1/18/12.

²⁰ *Id.* at 19.

²¹ Hearing Trans., pg. 118, 1/18/12.

²² Hearing Trans., pg 26-27, 1/18/12.

²³ Hearing Trans., pg. 58, 1/18/12.

uses within GMA 10 identified in the 2012 State Water Plan. The regional and state water plans list certain uses that are enumerated in statute and in TWDB rules for particular consideration when planning for drought of record conditions. The question here is whether the DFC has an unreasonable impact on any of those 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

A Grass Valley witness testified that there are no endangered species in Las Moras Creek.²⁴ In addition, Grass Valley asserted that there is no connection between the index well and Las Moras Springs, arguing that water levels in the Index Well are not a good method for determining impacts to spring flow.²⁵

Grass Valley's petition appealing the DFC in GMA 10 includes an analysis that attributes increases or declines in water level and spring discharge in Kinney County to precipitation.²⁶ The hydrographic data on eight wells located along either side of the divide between the Edwards-Trinity (Plateau) Aquifer and the Edwards (Balcones Fault Zone) Aquifer appeared to indicate that Las Moras Springs is hydraulically connected to the west side of the groundwater divide—that is, to the GMA 7 portion of Kinney County.²⁷ This would further support the claim that groundwater flow in the vicinity of the index well does not contribute to flow to Las Moras Springs.

Districts

The Districts testified that environmental impacts were considered when the DFC was adopted, both in GMA 10²⁸ and in GMA 7.²⁹ The Districts also assert that maintaining spring flow is important in and of itself, not just to protect endangered species.³⁰

Staff

Testimony was inconclusive and conflicting concerning the connection between groundwater flow in specific areas and the volume of flow at certain springs. In any case, a direct connection between groundwater and spring flow is not required to find that the DFCs adopted by the Districts in GMA 10 will not have an unreasonable impact on spring flows in the area.

²⁴ Hearing Trans., pg. 24, 1/18/12.

²⁵ Hearing Trans., pg. 27-28, 1/18/12.

²⁶ Pet. of GMA 10 DFC, Exh. 8, pg. 22.

²⁷ *Id.* at 23.

²⁸ Hearing Trans., pg. 47 and 58, 1/18/12.

²⁹ Hearing Trans., pg. 53-54, 1/19/12.

³⁰ Hearing Trans., pg 103, 1/18/12.

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

Grass Valley Water

Grass Valley pointed out that the Plateau (Region J) and South Central (Region L) Regional Planning Groups both have identified water shortages in their long-term regional water plans, needs that could be met by exporting water from Kinney and Val Verde counties.³¹

Districts

District witnesses testified that the Districts considered whether the DFCs adopted by the Districts in GMA 7 and 10 adequately covered all the needs in the water plan while balancing those different needs.³²

Staff

Grass Valley refers to the future water needs projected in the regional water plans as an indication that the DFC in Kinney County is unreasonable in light of state policy and legislative directives. Presently, however, neither regional water plan has a recommended strategy or alternative strategy that calls for development of groundwater in Kinney County. This is not to say that such a strategy could not be developed in future planning that would need to be compared to future DFCs. Any project to develop a new well field would need to be consistent with the available groundwater in the regional water plan based on the MAG.³³ Staff finds that the current DFC is reasonable in light of current policy and any known specific state directives affecting GMA 10.

5. Consider the impact on private property rights.

Grass Valley Water

Grass Valley claims that the DFC adopted for Kinney County keeps Grass Valley from exercising its private property rights because the DFC allows very little additional pumping.³⁴ The restrictions, it concludes, are not based on reasonable standards or purposes.³⁵

Districts

A witness for the Districts testified that landowners do have a right to sell and export their water; they also have a right to keep their water under their land for future use.³⁶

Staff

In the GMA 10 portion of Kinney County, the DFC results in a MAG value that is essentially the same as current supplies and strategies from the 2011 Regional Water Plan. Insofar as Grass Valley's intent to export water from Kinney County is not a strategy in any of the 2011 regional water plans, if all the current supplies and recommended water management strategies are implemented and used, the available groundwater remaining for Grass Valley to market from that area would be limited. But that assumes that all supplies and strategies are implemented and used.

³¹ Hearing Trans., pg 37, 1/18/12.

³² Hearing Trans., 58-59, 1/18/12.

³³ Tex. Water Code § 16.053(e)(2-A) and (3)(A).

³⁴ Hearing Trans., pg. 10, 1/18/12.

³⁵ *Id.* at 28.

³⁶ *Id.* at 59.

Staff found no evidence to support that assumption. Therefore, there well may be water available to Grass Valley should it seek a permit.

Staff has noted before that, to one degree or another, all DFCs potentially impact the exercise of private property rights.³⁷ Beyond outright prohibition, the impact on private property rights involves the balancing of competing interests.³⁸ Kinney County GCD's General Manager testified that Kinney County GCD has no such prohibition on permits to export water from the district.³⁹ But the DFC based on a specific water level in the index well does impose a limit on the amount of water that may be withdrawn.

The Districts in GMA 10 selected an index well that has been in place and used for monitoring for more than 30 years. It was in place before Grass Valley acquired the groundwater leases in that area. The DFC is based on historic pumping and is consistent with other indices used in GMA 10. Modeling shows that the DFC is possible. In the final analysis, the measure of the impact of the DFC on Grass Valley's property rights will be determined by a number of factors that have yet to be decided, including the permitting decisions made by the District. Staff is persuaded by the testimony and evidence that the Districts have considered the potential impact of the DFC on all users and uses of groundwater in the GMA 10 portion of Kinney County.

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.⁴⁰ 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 constitutes reasonable and prudent development of the state's groundwater resources.⁴¹

Districts

Kinney County GCD testified that the goal of the District is to maintain sustainability of the aquifer, maintain an average spring flow at Las Moras Springs, and maintain water levels in the District such that current lifestyles can continue.⁴²

Staff

As indicated under Section 5 above, none of the 2011 regional water plans has a recommended strategy or alternative strategy that calls for development of groundwater in Kinney County. The draft MAG value for the GMA 10 portion of Kinney County is 6,320 acre-feet per year.⁴³ Current supplies and future strategies are 6, 318 acre-feet per year. The Region J 2011 Regional Water Plan

³⁷ See Tex. Water Code § 36.002(d).

³⁸ TWDB Board Report on GMA 1, pg. 4, 2/10/10.

³⁹ Hearing Trans., pg 42-43, 1/18/12.

⁴⁰ Hearing Trans., pg 22, 1/19/12.

⁴¹ *Id.*, at 22-23.

⁴² Hearing Trans., pg. 41, 1/18/12.

⁴³ Attachment 1, Table 1.

shows a decrease in total demand for groundwater and surface water in Kinney County from 15,228 acre-feet per year in 2010 to 12,641 acre-feet per year in 2060.⁴⁴ This value covers all of Kinney County; most of the pumping is known to be in the GMA 7 portion of the county. As stated earlier, the testimony presented conflicting studies regarding aquifer properties and the impact of those properties on managing the aquifer, suggesting that additional studies are appropriate. This DFC will also form the basis for future planning efforts. Therefore, providing for existing supplies and recommended strategies while also protecting spring flow is both reasonable and prudent.

Closing

According to the 2012 State Water Plan, aside from municipal use, other water uses in Kinney County are expected to remain essentially the same, if not decline slightly, over the next 50 years. Nevertheless, the Districts have set a DFC that reflects historic use, consistent with the approach taken by the Districts and the legislature in establishing the DFCs for the rest of GMA 10 and the Edwards Aquifer Authority.

RECOMMENDATION

Staff recommends that the Board find that the DFC adopted by the Districts in GMA 10 for the western subdivision of the Edwards (Balcones Fault Zone) Aquifer in Kinney County is 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 Kinney County Groundwater Conservation District incorporates the MAG value in its management plan and rules and makes future decisions regarding permit authorizations and administration.

Attachment(s): Technical Analysis of Petitions

⁴⁴ Region J 2011 Regional Water Plan, pg. 2-9.

TECHNICAL ANALYSIS OF PETITION

CHALLENGING THE REASONABLENESS OF THE DESIRED FUTURE CONDITION FOR THE EDWARDS (BALCONES FAULT ZONE) AQUIFER IN GROUNDWATER MANAGEMENT AREA 10 IN KINNEY COUNTY

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 have been summarized to provide context to issues raised in a petition appealing the reasonableness of the desired future condition for the Edwards (Balcones Fault Zone) Aquifer in Groundwater Management Area 10 (GMA 10) in Kinney County.

The desired future condition, adopted by groundwater districts in GMA 10 on August 4, 2010, is to maintain a water level in Index Well No. 70-38-902 at or above an elevation of 1,184 feet above mean sea level. The modeled available groundwater projected by an updated predictive simulation run by staff resulted in approximately 6,300 acre-feet per year for Groundwater Management Area 10 from the Edwards (Balcones Fault Zone) Aquifer and approximately 70,300-acre-feet per year for Groundwater Management Area 7 from the Edwards-Trinity (Plateau) Aquifer. Additional model simulations suggest that pumping more than 2,000 acre-feet per year at the Grass Valley Water, L. P. well field in central Kinney County will decrease the water level at Index Well No. 70-38 to below the desired future condition of 1,184 feet above mean sea level (Figure 4).

For GMA 10 in Kinney County, the modeled available groundwater is less than the 2012 State Water Plan groundwater availability but almost the same as existing water supplies and recommended water management strategies (Table 1; Figure 5). In general, the modeled available groundwater is less than the historical use in Kinney County (historical groundwater use is not estimated for GMA 7 and GMA 10 separately in Kinney County). The modeled available groundwater is also expected to be less than 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 condition for the Edwards (Balcones Fault Zone) Aquifer (Figure 1) adopted by groundwater conservation districts in GMA 10 (Figure 2). This report accompanies the TWDB staff evaluation of the issues raised in the petitions 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 some background information regarding different model simulations that were developed in support of the desired future conditions process. Section 3 summarizes the approach by Texas Water Development Board (TWDB) to estimate the modeled available groundwater in the Edwards-(Balcones Fault Zone) 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.

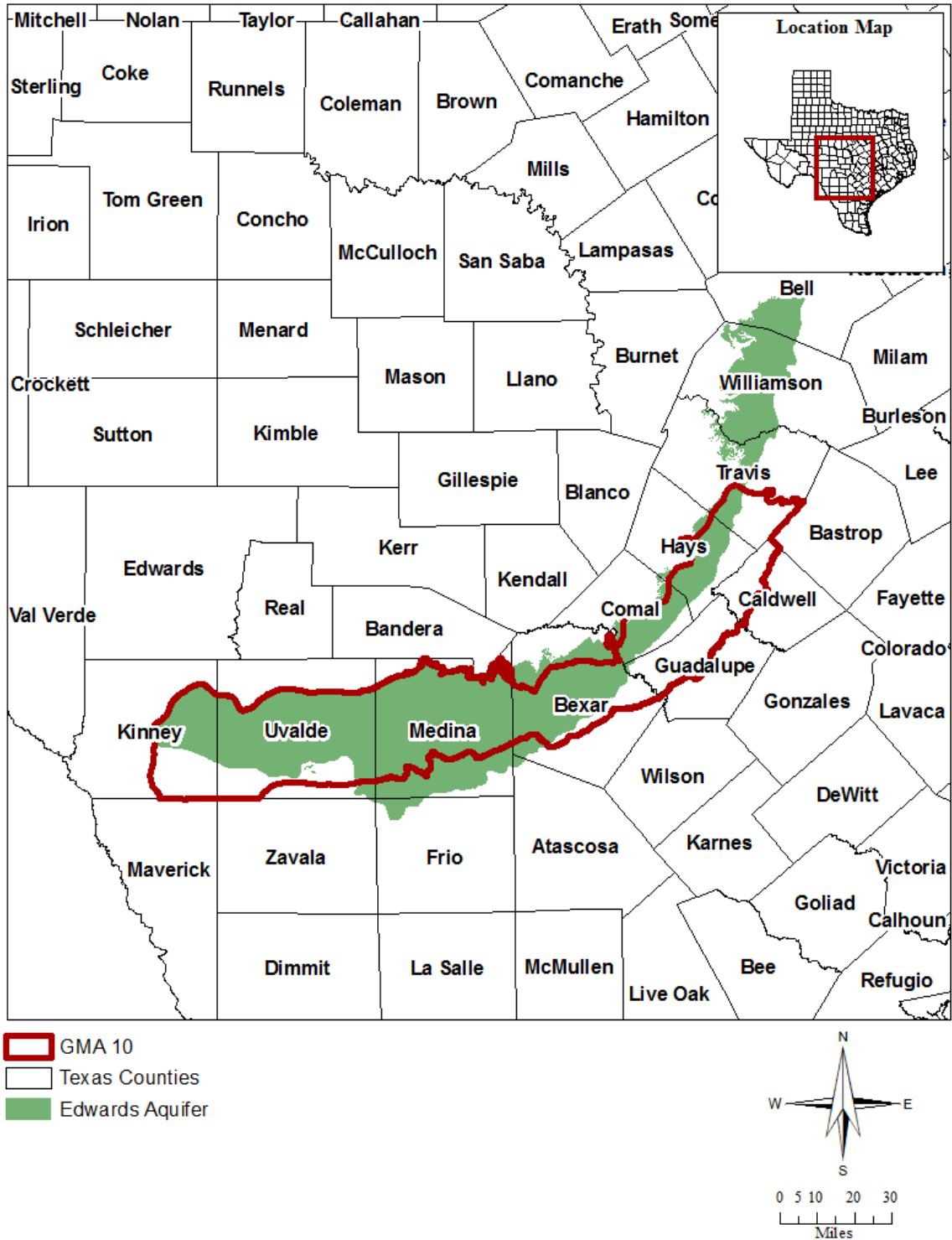


FIGURE 1. LOCATION OF THE EDWARDS (BALCONES FAULT ZONE) AQUIFER IN GROUNDWATER MANAGEMENT AREA 10.

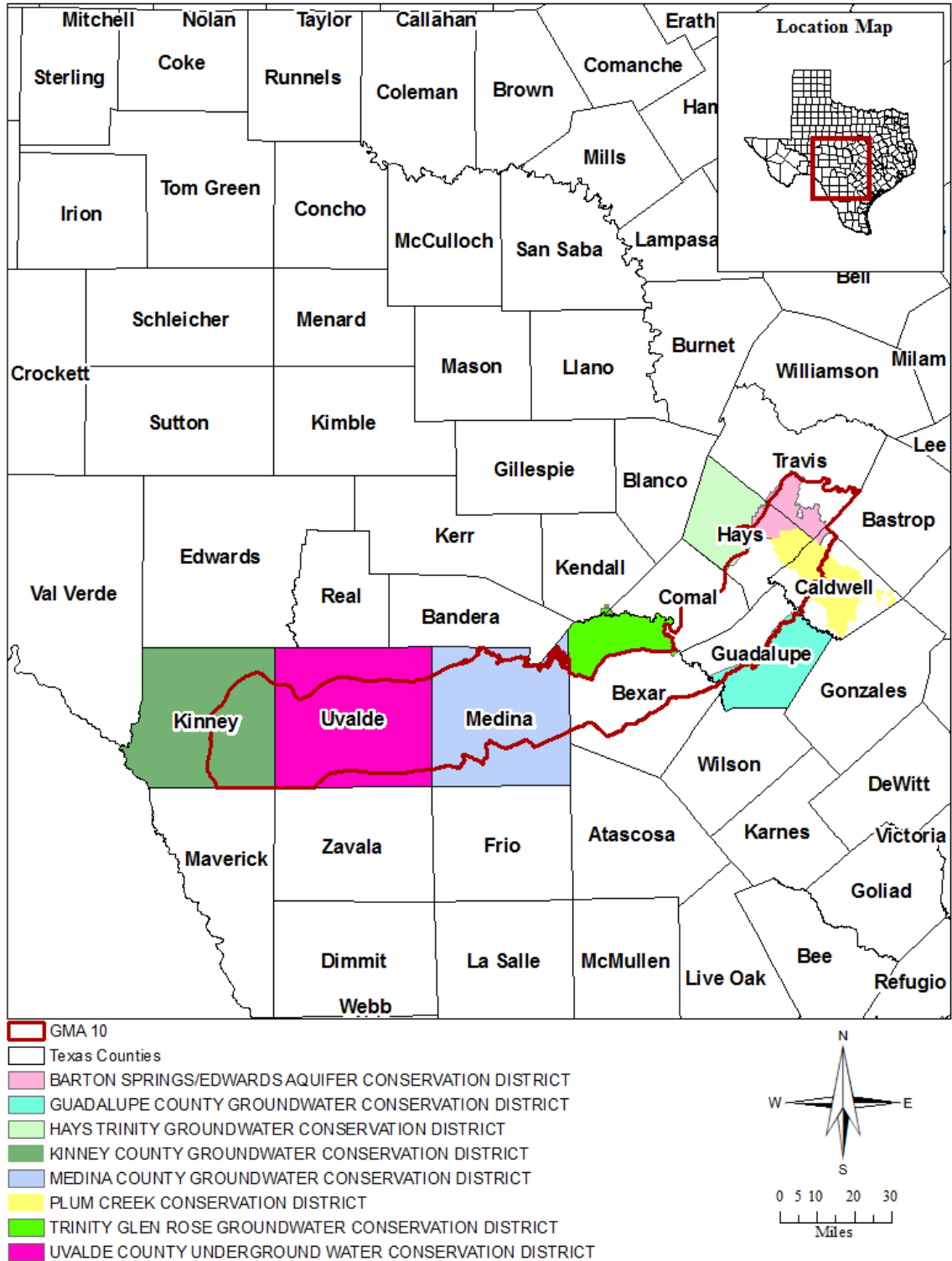


FIGURE 2. GROUNDWATER CONSERVATION DISTRICTS IN GROUNDWATER MANAGEMENT AREA 10.

SECTION 2: GROUNDWATER AVAILABILITY MODEL RUN

TWDB staff performed one groundwater availability modeling analysis for GMA 10 to help the groundwater conservation districts develop their desired future condition for the Edwards (Balcones Fault Zone) Aquifer in Kinney County. The desired future condition, adopted by groundwater districts in GMA 10 on August 4, 2010, is to maintain a water level in Index Well No. 70-38-902 (Figure 3) at or above an elevation of 1,184 feet above mean sea level based on GAM Task 10-027 (Hutchison, 2011). This model run is summarized as follows:

GAM Task 10-027

Hutchison (February 9, 2011)

Using the Kinney County area groundwater flow model (Hutchison and others, 2011), TWDB simulated seven pumping scenarios in GMAs 7 and 10 in Kinney County. 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. Scenario 3 was selected to define the desired future condition for GMA 10 as well as the desired future conditions for GMA 7 in Kinney County. The total pumping with this scenario is approximately 77,000 acre-feet per year in Kinney County.

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).

The model for Kinney County was also used to evaluate the model's prediction of the water level at Index Well No. 70-38-902 using different pumping scenarios for the Grass Valley Water, L.P. well field located in central Kinney County. Figure 3 shows the groundwater management areas, the springs, the Grass Valley Water, L.P. well field, and the Index Well No. 70-38-902 in Kinney County. The model indicates that pumping more than 2,000 acre-feet per year at the Grass Valley Water, L. P. well field will decrease the water level at Index Well No. 70-38 to below the desired future condition of 1,184 feet above mean sea level (Figure 4).

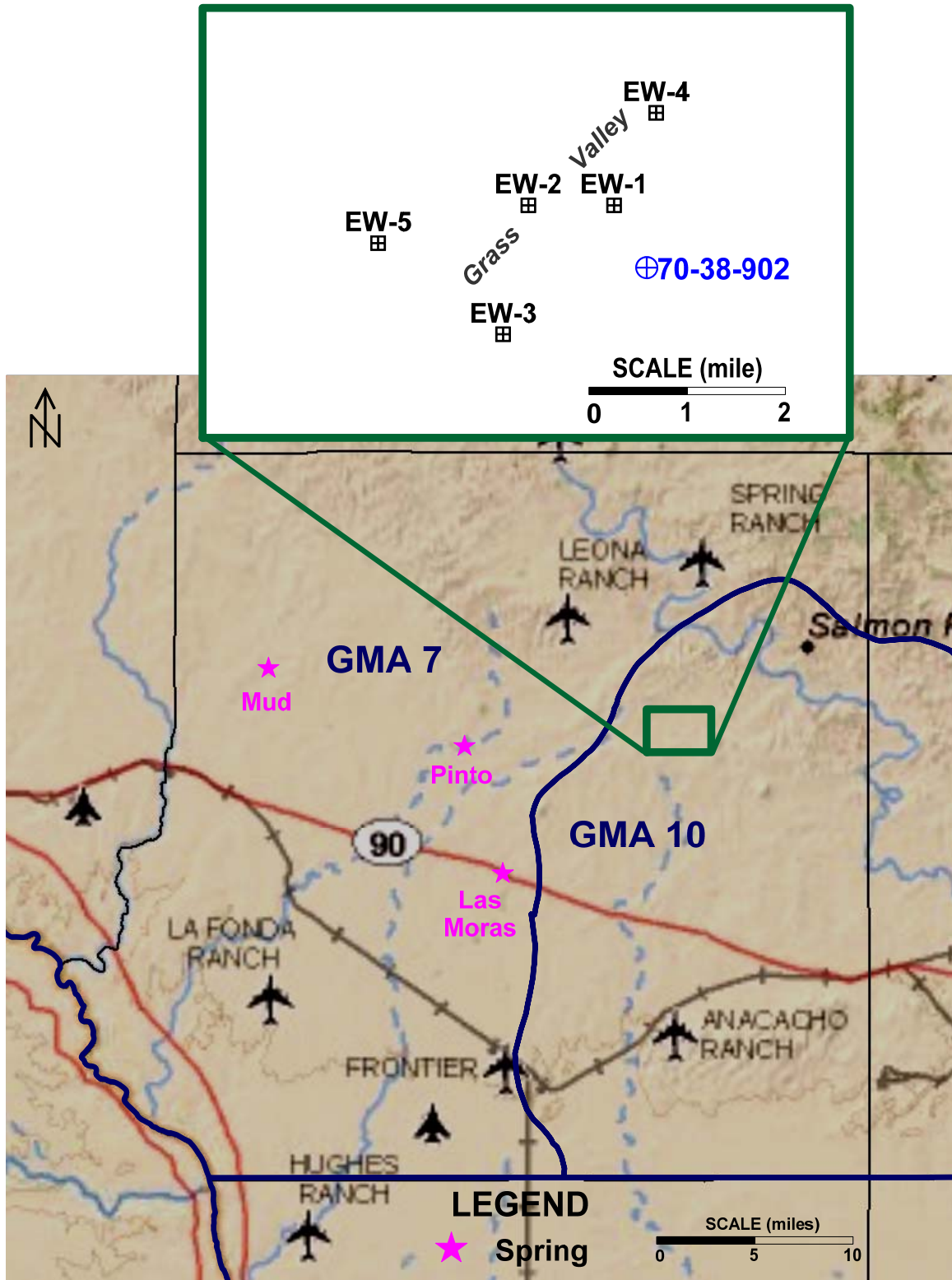


FIGURE 3. LOCATIONS OF GROUNDWATER MANAGEMENT AREAS, SPRINGS, GRASS VALLEY WATER, L.P. WELL FIELD, AND INDEX WELL NO. 70-38-902.

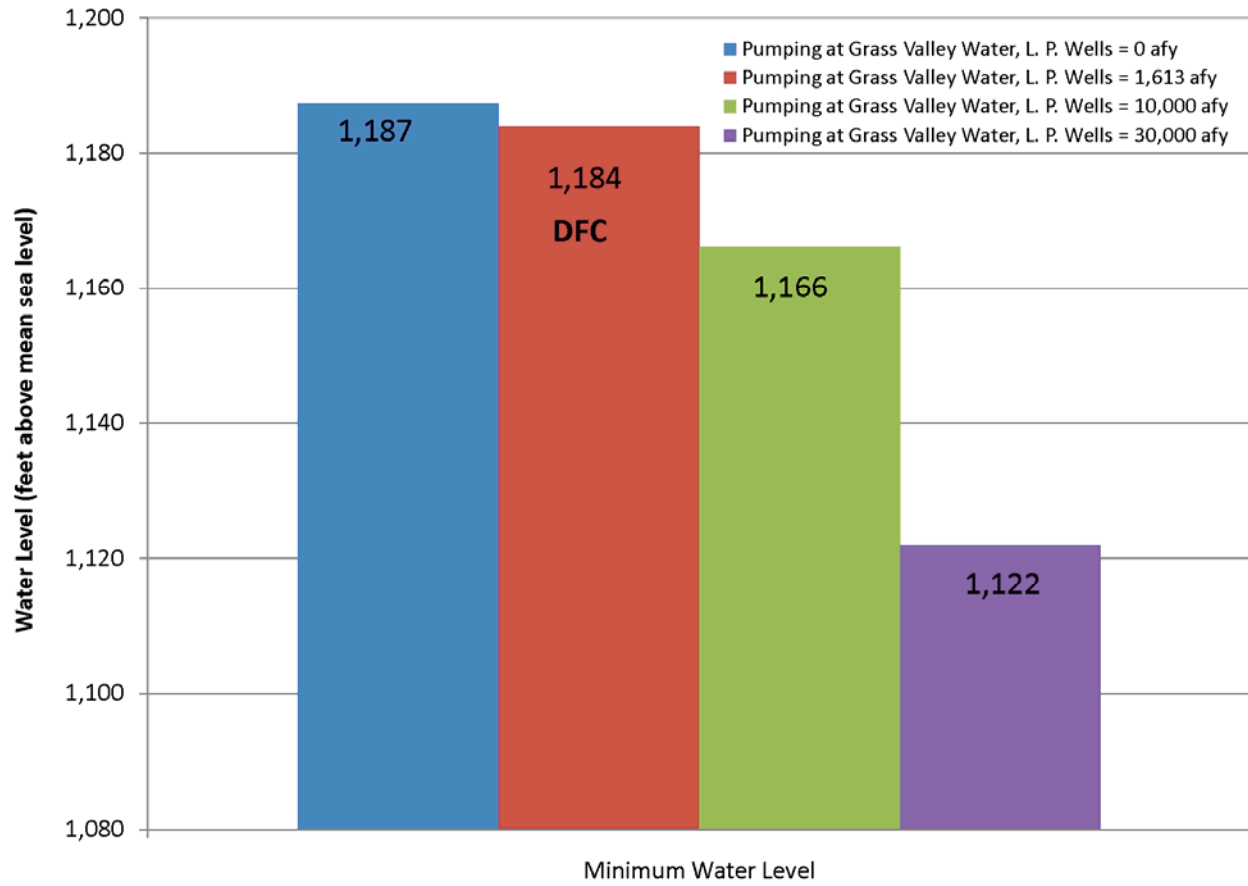


FIGURE 4. SIMULATED IMPACTS OF GROUNDWATER PUMPING IN GRASS VALLEY WATER, L. P. WELL FIELD ON WATER LEVEL AT INDEX WELL NO. 70-38-902.

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

This section compares the modeled available groundwater (described in Section 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, precipitation recharge, estimated maximum sustainable pumping, and total storage volume.

Estimated Historical Groundwater Pumping

The estimated historical groundwater pumping is from the TWDB Water Use Survey (TWDB, 2011). The estimated historical groundwater pumping in Kinney County in general, shows a downward trend from 1974 through 2004 (Figure 5).

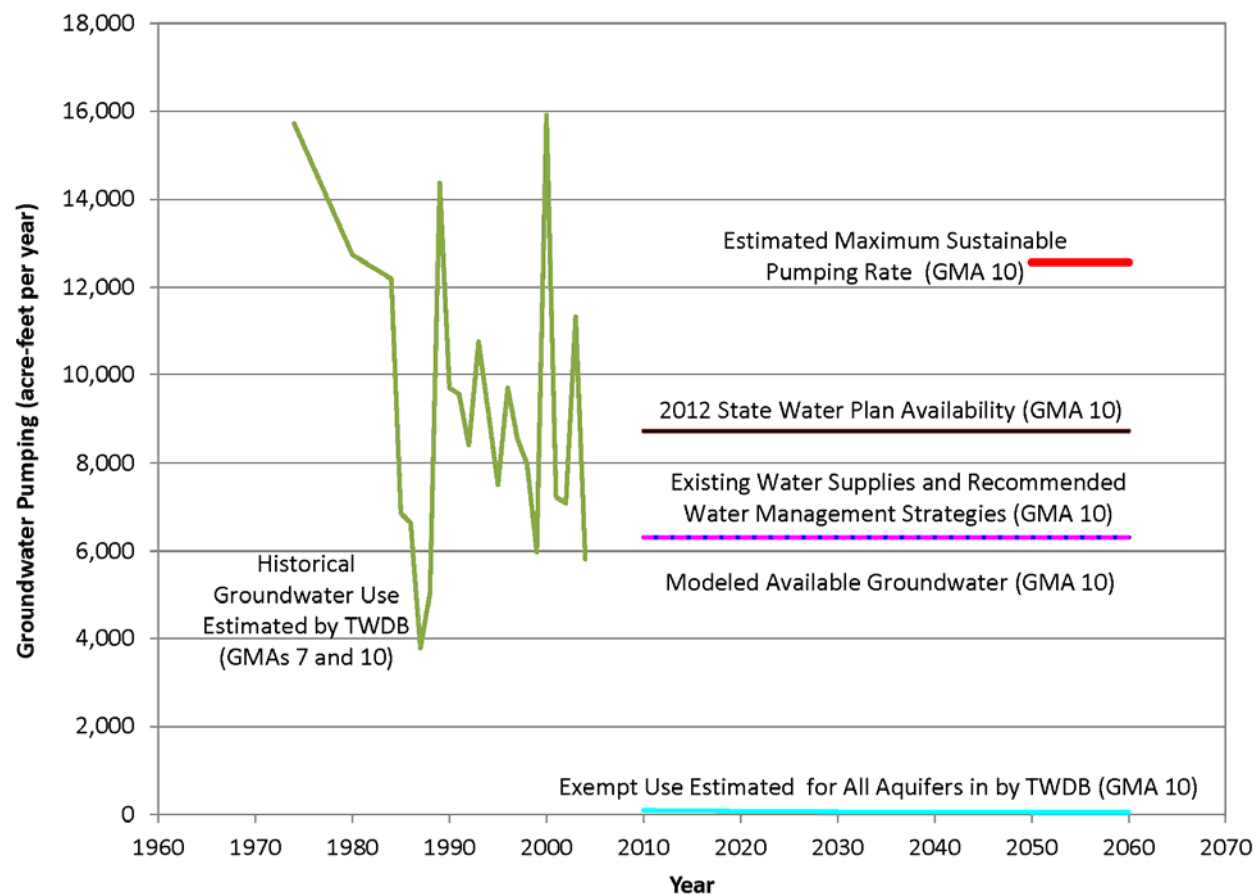


FIGURE 5. COMPARISON OF VARIOUS GROUNDWATER PLANNING AMOUNTS FOR THE EDWARDS (BALCONES FAULT ZONE) AQUIFER IN GMA 10 IN KINNEY COUNTY

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 exempt additional 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 10 in Kinney County is estimated to be less than 100 acre-feet per year in 2010 and decreases to approximately 50 acre-feet per year in 2060 (Table 1; Figure 5).

TABLE 1. GROUNDWATER MANAGEMENT AREA 10 IN KINNEY COUNTY - EDWARDS (BALCONES FAULT ZONE) AQUIFER (ALL VALUES IN ACRE-FEET PER YEAR EXCEPT WHERE NOTED).

	2010	2020	2030	2040	2050	2060
Modeled Available Groundwater (GAM Run 12-002)	6,320	6,320	6,320	6,320	6,320	6,320
Available Groundwater Based on 2012 State Water Plan	8,725	8,725	8,725	8,725	8,725	8,725
Exempt Use	99	78	67	58	53	51
Current Supply and Future Strategies	6,318	6,318	6,318	6,318	6,318	6,318
Estimated Recharge	62,445					
Estimated Storage Volume (SV10) (acre-feet)	11,764,000					
Estimated Drainable Water (= 25% of SV10) (acre-feet)	2,941,000					
Estimated Drainable Water (= 75% of SV10) (acre-feet)	8,823,000					
Estimated Maximum Sustainable Pumping	12,600					

2012 State Water Plan Groundwater Availability

The 2012 State Water Plan shows 8,725 acre-feet per year in GMA 10 for Kinney County from 2010 through 2060 (Table 1; Figure 5).

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 6,318 acre-feet per year for existing water supplies and recommended water management strategies in GMA 10 in Kinney County from 2010 through 2060 (Table 1; Figure 5).

Estimated Recharge

The aquifer recharge in GMA 10 in Kinney County is estimated at approximately 62,500 acre-feet per year (Table 1; Figure 5) using the groundwater flow model for Kinney County (Hutchison and others, 2011).

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 years of pumping. For GMA 10 in Kinney County, the maximum sustainable pumping rate is estimated as approximately 12,600 acre-feet per year (Table 1; Figure 5) using the groundwater flow model by Hutchison and others (2011).

Comparison Summary

For GMA 10 in Kinney County, the modeled available groundwater is less than the 2012 State Water Plan groundwater availability but almost the same as existing water supplies and recommended water management strategies (Table 1; Figure 5). In general, the modeled available groundwater is less than the historical use in Kinney County (note that the historical groundwater use includes all of Kinney County). The modeled available groundwater is also expected to be less than the maximum sustainable pumping rate.

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 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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