Trinity Glen Rose
Groundwater Conservation District

6335 Camp Bullis Road, Suite 25
San Antonio, TX 78257
Fax: (210) 698-1159
Phone: (210) 698-1155
www.trinityglenrose.com

Trinity Glen Rose Groundwater Conservation District Management Plan

Revision Record

Date Adopted	Effective Date	Version/Resolution
October 14, 2004	October 14, 2004	Original Adoption, Board Resolution
October 14, 2010	October 14, 2010	Revision/Re-Adoption, Board Resolution

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TIME PERIOD FOR THIS PLAN

This plan becomes effective upon adoption by the Trinity Glen Rose Groundwater Conservation District Board of Directors and subsequent approval by the Texas Water Development Board (TWDB). This plan incorporates a planning period of 50 years. After five years, the plan will be reviewed for consistency with the applicable Regional Water Plans, the State Water Plan, and Groundwater Management Area 9's (GMA-9) Desire Future Conditions (DFC) and shall be readopted with or without amendments. The plan may be revised at anytime in order to maintain such consistency or as necessary to address any new or revised data, Groundwater Availability Models, Desired Future Conditions in GMA-9, or District management strategies.

DISTRICT MISSION

The Trinity Glen Rose Groundwater Conservation District (TGRGCD or District) was created in 2001 during the 77th Texas Legislature and confirmed by voters in 2002. The District was created in response to the Texas Natural Resources Conservation Commission designating a portion of the Trinity Aquifer within Bexar Country as a Priority Groundwater Management Area (PGMA). The District was created for the purpose of conserving, preserving, recharging, protecting and preventing waste of groundwater from the Trinity Aquifer in Northern Bexar County. Additionally, the District is charged with developing and implementing regulatory programs for the resources within District boundaries. With continued growth in Northern Bexar County, the District is challenged with balancing the needs of families and business with the need to maintain the water resources in this area. To effectively meet these needs, the District's mission and activities include conducting research, regulating water well drilling and production from permitted, non-exempt wells, collecting and analyzing well water and aquifer data, issuing permits for well drilling, modification, and plugging, promote the capping or plugging of abandoned wells, developing education and conservation programming, providing information and educational material to local property owners, interacting with other governmental or organizational entities, working with stakeholders to ensure a comprehensive management strategy, and undertaking other groundwater-related activities that may help meet the purposes of the District.
The Texas Hill Country Area, which includes the Trinity Glen Rose GCD, was declared a Critical Groundwater Area by the then Texas Water Commission in 1990. This declaration, now known as the Hill Country Priority Groundwater Management Area (PGMA), gave notice to the residents of the area that water availability and quality will be at risk within the next 25 years.

STATEMENT OF GUIDING PRINCIPLES

The TGRGCD was created in order that appropriate groundwater management techniques and strategies could be implemented at the local level to address groundwater issues or problems within the District. The District will continue to incorporate the best and most current site-specific data available in the development of this plan to ensure the sustainability of the aquifers and achievement of the DFC's. This plan serves as a guideline for the District to ensure greater understanding of local aquifer conditions, development of groundwater management concepts and strategies, and subsequent implementation of appropriate groundwater management policies.

COMMITMENT TO IMPLEMENT GROUNDWATER MANAGEMENT PLAN

To address potential groundwater quantity and quality issues, the District is committed to, and will actively pursue, the groundwater management strategies identified in this management plan. These management strategies will be implemented in conjunction with District Rules, policies, and activities in order to effectively manage and regulate the drilling of wells, production of groundwater within the District, protection of recharge features, pollution and waste prevention, and the possible transfer of water out of the District. This includes the evaluation of the impact(s) of conjunctive use of surface and groundwater. The term "conjunctive use" means the combined use of groundwater and surface water sources that optimizes the beneficial characteristics of each source (Texas Water Code, Chapter 36).

Additionally, the District will encourage conservation practices and efficient use of water resources, ensure compliance with the District Drought Contingency Plan, and provide for the identification of any critical groundwater depletion areas within the District.

To the greatest extent practicable, the District will cooperate with and coordinate its management plan and regulatory policies with adjacent groundwater districts, Groundwater Management Area 9, Regional Water Planning Groups, local water purveyors and stakeholders, and adjacent counties with similar aquifers and/or groundwater usage.

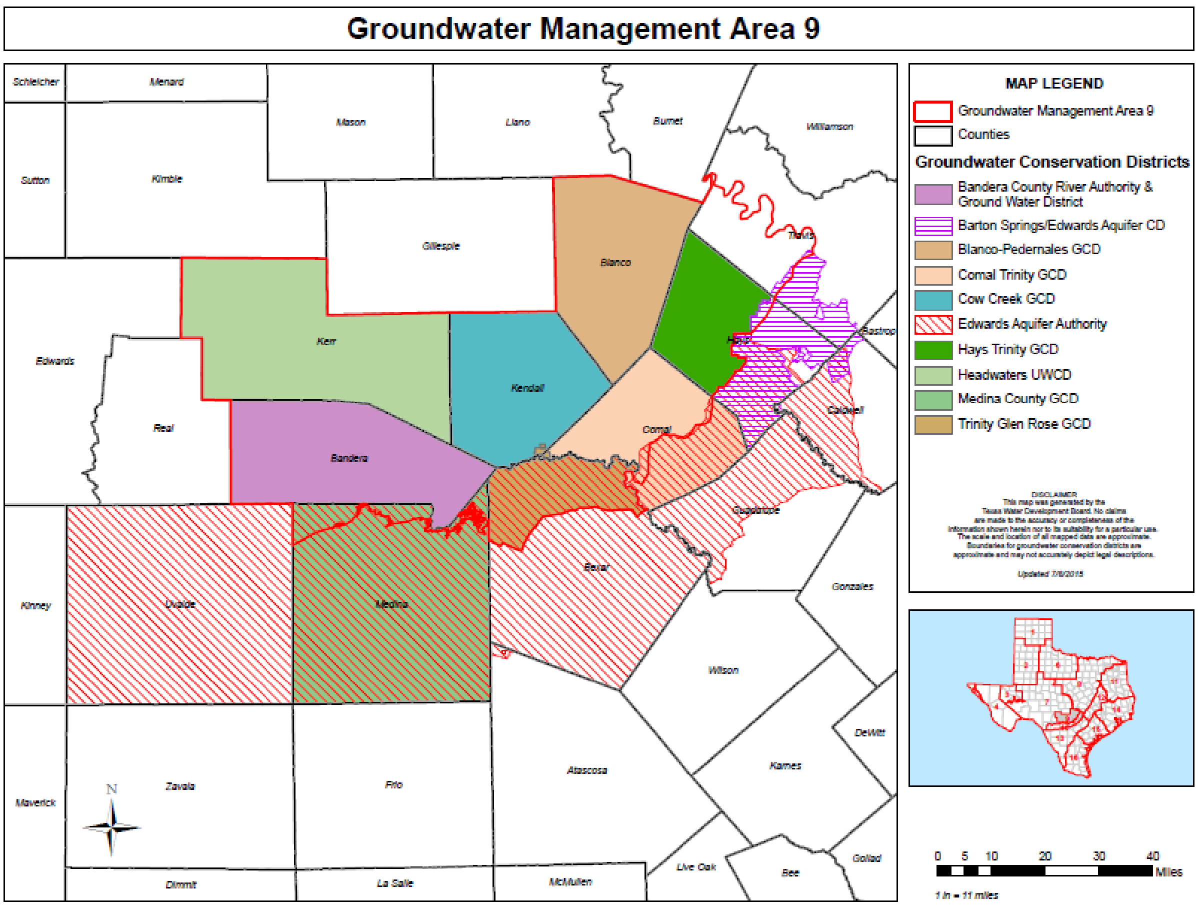
An electronic copy of the management plan is available online at www.trinityglenrose.com. A paper copy may be requested at the TGRGCD office, located at 6335 Camp Bullis Rd. Ste. 25, San Antonio, Texas 78257.

JOINT PLANNING IN MANAGEMENT AREA

Every five years, the groundwater conservation districts in GMA 9 shall consider groundwater availability models and other data or information for the management area and shall establish desired future conditions for the relevant aquifers within the management area. In establishing the desired future conditions of the aquifers under this section, the districts shall consider uses or conditions of an aquifer within the management area that differ substantially from one geographic area to another.

The GMA may establish different desired future conditions for each aquifer, subdivision of an aquifer, or geologic strata located in whole or in part within the boundaries of the management area; or each geographic area overlying an aquifer in whole or in part or subdivision of an aquifer within the boundaries of the management area. The Texas Water Development Board will calculate the Modeled Available Groundwater (MAG) from the adopted Desired Future Conditions (DFC) of the management area.

Map 1: GROUNDWATER MANAGEMENT AREA (GMA) 9:



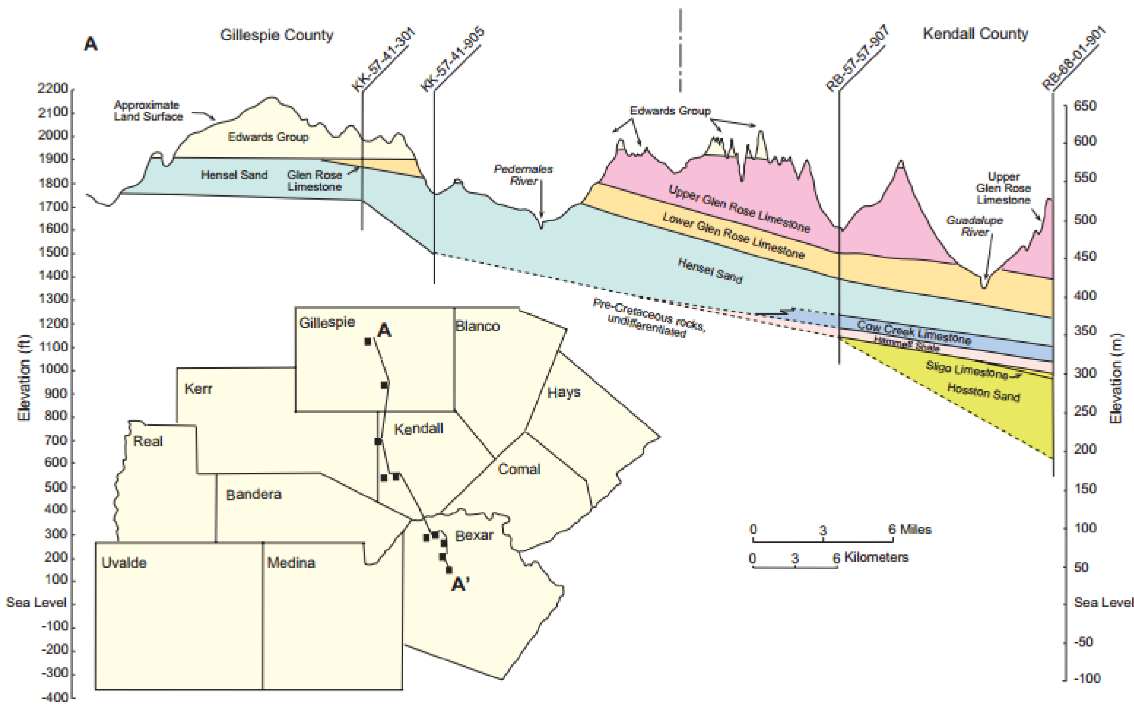
Source:TWDB; http://www.twdb.texas.gov/groundwater/management_areas/maps/GMA9_GCD.pdf

MODELED AVAILABLE GROUNDWATER (BASED ON DESIRED FUTURE CONDITIONS)

Groundwater Management Area 9 has adopted Desired Future Conditions for the Aquifers located within its planning area. The total Modeled Available Groundwater (MAG) for the Trinity Group of Aquifers underlying TGRGCD is 25,511 ac-ft/yr (2010-2060). (GR10-050 MAG v. 2)

The Desired Future Conditions for the aquifers located within the District boundaries and within Groundwater Management Area 9 have been established by Resolution #072610-01 (see appendix A).

Map 2: STRATIGRAPHIC CROSS SECTION OF THE HILL COUNTRY AREA:



Source: Modified from Ashworth, 1983 and Mace, et al, 2000.

Map 3: DISTRICT BOUNDARY MAP:

GENERAL DESCRIPTION OF THE DISTRICT

The Trinity Glen Rose Groundwater Conservation District is located in Northern Bexar County and portions of Kendall and Comal Counties. The District covers approximately 311 square miles (199,574 acres). In 2001, the Texas Legislature passed House Bill (HB) 2005 creating the TGRGCD, in part due to a response to the State of Texas (TCEQ) designating the portion of the Trinity Group of Aquifers lying within Bexar County as a Priority Groundwater Management Area (PGMA). HB2005 outlined the District's creation, authority, structure, and funding. In 2004, the City of Fair Oaks Ranch held an election and voted to become a part of the TGRGCD, expanding the District to include those portions of Kendall and Comal Counties within the boundaries of Fair Oaks Ranch. In 2009, the Texas Legislature passed HB1518 allowing an increase of production fees and allowing municipalities to request inclusion of annexed areas into the District as provided by Chapter 36 Texas Water Code, expanding the District boundaries. The District operates under the authority of these house bills, as well as the authority and duties set forth in Chapter 36 of the Texas Water Code.

The District is comprised of a 5-member Board of Directors elected to serve 4 year rotating terms. The District also employs one part-time general manager and 1 part-time administrative staff. The District finalized and approved well registration rules in 2002 and general district rules in 2003. Rules governing well construction standards were finalized and approved in 2005 and Drought Contingency Plan rules were finalized and approved in 2007. Rules governing well spacing, exportation, drought and conservation plans, contested case hearings, and variances were developed and/or amended, finalized, and approved in 2013. Rules governing fees were amended, finalized, and approved in 2014.

Northern Bexar County's economy is primarily residential. There are also large ranch holdings and military reservations in the area. The past 15 years has seen a dramatic increase in suburban development and increased residential population density. There is limited agricultural activity in the area that consists of small pastures, grazing, and native grassland open areas.

The largest city within the District is San Antonio with a population of approximately 1.3 million.[1] According to the Texas State Data Center and the State Demographer, the 2010 population for San Antonio was 1,327,407, an increase of over 15.96% since the national census in 2000. Approximately 185,000[2] of the 1.3 million residents live within the District's boundaries. The remainder of the District is made up of smaller cities including Fair Oaks Ranch and Grey Forest, as well as smaller subdivisions and rural residential population. The District encompasses a high-growth area with on-going plans for future development.

Northern Bexar County lies within the San Antonio River basin and for statewide water planning purposes it is part of the South Central Texas Regional Water Planning Group (Region L). The District is also the southernmost portion of the Groundwater Management Area (GMA) 9. The region is unique in comparison to other areas within GMA9 due to the population density, impact of increasing development, and recharge impact from Cibolo Creek Watershed.

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[1] 2010 US Census
[2] Bickerstaff, Health, Delgado, and Acosta 2010 Redistricting Report

TOPOGRAPHY AND DRAINAGE

The primary watershed in Northern Bexar County is the San Antonio River which is a tributary to the Guadalupe River. Surface drainage within the District is generally from northwest to southeast. Cibolo Creek is a tributary of the San Antonio River and drains from northwest to southeast across the Trinity Group of Aquifers and forms a large portion of the boundary between Northern Bexar County and adjacent counties. Cibolo Creek is a major recharge feature of the Trinity Group of Aquifers in Northern Bexar County and eventually confluences with the San Antonio River.

The major geologic feature located within the District's boundaries is the Edwards Plateau. This broad, topographically high area is composed of Cretaceous age limestone, dolomite and marl. Deep erosion and down cutting by streams and rivers in the area have resulted in the Edwards Plateau being perceptibly higher than adjacent areas. The plateau is the southernmost extension of the Great Plains, extending westward from the Colorado River to the Pecos, and covers many Central and West Texas counties. It is bordered on the northeast by the pre-Cambrian rocks of the Llano Uplift. Northern Bexar County lies near the southeastern edge of the Plateau.

Elevation within the District ranges from a low of approximately 730 feet above sea level where the Cibolo Creek leaves Northern Bexar County to the southeast to approximately 1,892 feet above sea level at Mount Smith in the northwestern portion of the district.

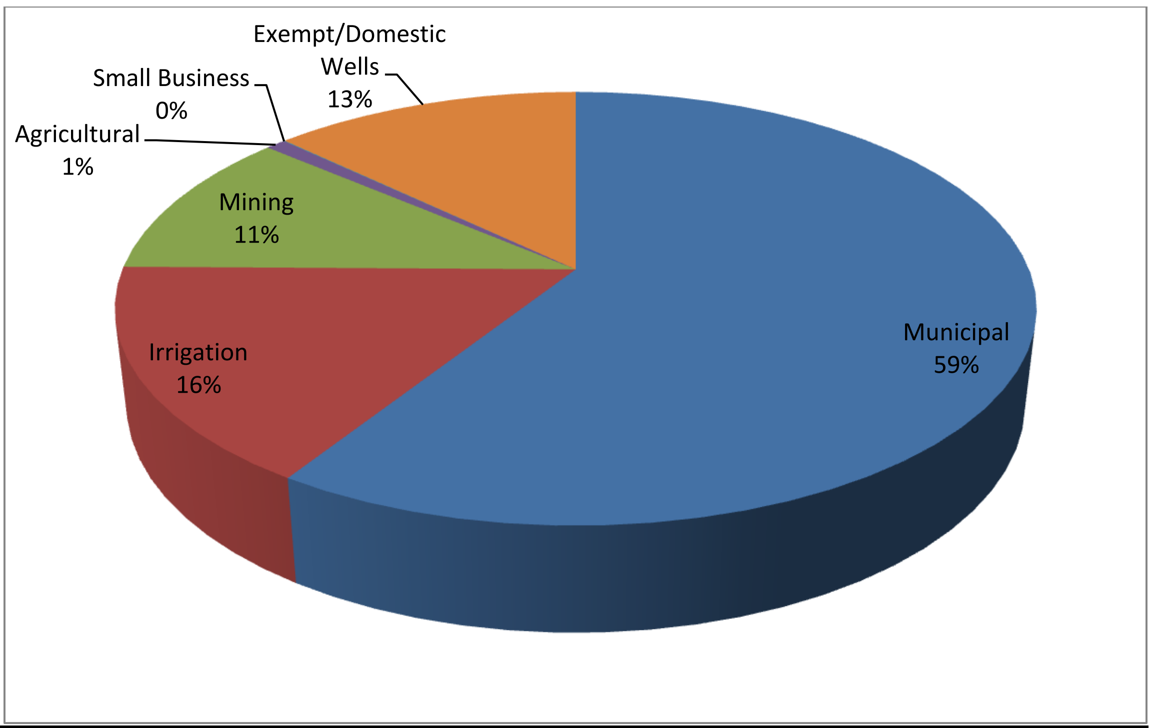
WATER RESOURCES WITHIN THE TRINITY GLEN ROSE GROUNDWATER CONSERVATION DISTRICT

Groundwater Resources and Usage in Northern Bexar County

Within the TGRGCD boundaries, the only major aquifer managed by the TGRGCD that provides groundwater to county residents is the Trinity Group of Aquifers consisting of the Upper Glen Rose Limestone, Lower Glen Rose Limestone, Cow Creek Limestone, Sligo Limestone and Hosston Sand. In isolated areas, the Edwards Aquifer overlies portions of the Trinity Group of Aquifers and is utilized, but not overseen by TGRGCD. Residents drilling wells to be completed into the Edwards Aquifer must obtain a permit through the Edwards Aquifer Authority. In areas where a well is to be completed into the Trinity Group of Aquifers, but must pass through a portion of the Edwards Aquifer on the surface, the driller must obtain a “pass through” permit from the Edwards Aquifer Authority. Trinity well depths vary from shallow, hand-dug wells to drilled wells from 100 feet deep to over 1,600 feet deep based on TWDB records for Bexar County. Depths are highly variable even within the same aquifer and depend entirely on site-specific topography and geology, especially faulting. Water quality and water quantity also vary greatly throughout the District. Water quality within a specific aquifer can be defined or characterized in a general sense, but can still be affected by local geology, hydrology and structure.

Table 1: TGRGCD Historical Groundwater Usage (in ac-ft) – 2004 - 2014[3]

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Municipal PWS	6442	7779	7687	6427	8405	6245	7010	7969	6799	6584	5878
Irrigation	1327	1696	2204	1458	2360	2069	1874	2533	1745	1969	1901
Mining	867	1712	1775	1698	1229	1230	1458	1155	1032	1480	822
Agriculture	100	100	100	100	100	100	100	100	100	100	100
Sm. Business											55
Exempt	1500	1500	1500	1500	1500	1500	1500	1500	1500	1714	1615
Total	**10236**	**12787**	**13266**	**11183**	**13594**	**11144**	**11942**	**13257**	**11176**	**11847**	**10370**



It is important to note that the water available from other sources will increase or decrease depending on demand and the service plans managed by the major water utilities operating within the District, San Antonio Water System.

[3] Trinity Glen Rose Groundwater Conservation District Pumpage Database. Values collected through non-exempt user pumpage reports and estimated exempt use.

TRINITY GROUP OF AQUIFERS

The Trinity Group of Aquifers in Northern Bexar County is comprised of the Upper and Lower Glen Rose Limestone, Cow Creek Limestone, Sligo Limestone and the Hosston Sand and is recharged from local precipitation on its outcrop; flow through Cibolo Creek and through the overlying units where it is in the subsurface. Yields vary greatly and are highly dependent on local subsurface physical characteristics. Yields are generally low, less than 20 gpm, but can occasionally be significantly higher, with yields of 600-800 gpm being reported in site-specific areas. Production from Trinity wells is primarily used for municipal, rural domestic, irrigation, and mining demands.

SURFACE WATER RESOURCES AND USAGE IN NORTHERN BEXAR COUNTY

Canyon Lake is the only major surface water supplier within the District. Fair Oaks Ranch has up to 1,850 ac-ft of surface water rights from Canyon Lake (Guadalupe- Blanco River Authority, GBRA), and also claims 39 ac-ft of groundwater from the Trinity Aquifer in Comal County and up to 75 ac-ft of groundwater from Kendall County. San Antonio Water System (SAWS) has up to 4,000 ac-ft of confirmed surface water rights water and up to an additional 5,000 ac-ft of variable term water available from Canyon Lake (GBRA) that declines 2% - 3% per year through 2037.

PROJECTED TOTAL WATER DEMAND IN BEXAR COUNTY

The projected total annual water demand in Bexar County is summarized in Appendix B. As future demands increase, changes in the infrastructure will be necessary. It is projected that the greatest demand on water resources will be from municipal suburban users who will rely on groundwater and other supplies provided by municipal providers. The majority of infrastructure improvements necessary to service these new groundwater users will be provided by either developers or municipal water supply companies. Therefore, it is anticipated that the amount of water supplied at any given time will be primarily related to suburban growth patterns.

RECHARGE OF GROUNDWATER IN BEXAR COUNTY

The annual natural recharge occurring in Bexar County is thought to be through percolation of rainfall countywide and more localized recharge, along with potentially higher rates of recharge, occurring in the bed of Cibolo Creek and its tributaries. The District is currently unaware of any significant recharge feature in Northern Bexar County that may be providing a major avenue for recharge other than unnamed sinkholes within Cibolo Creek and some cave/sinkhole structures within the district.

The Draft Cibolo Creek Study prepared by the Army Corp of Engineers in 2005 helps define recharge through the Cibolo Creek area. Additionally, a calculated annual recharge coefficient of approximately 4% of annual rainfall was developed in the September 2000 TWDB Mace et al. report on *Groundwater Availability of the Trinity Group of Aquifers, Hill Country Area, Texas: Numerical Simulations through 2050*. It seems reasonable for the District to assume a 4% average for Northern Bexar County Trinity Group of Aquifers recharge, (Mace, et. al. has done this for the Trinity Group of Aquifers as a whole). John Ashworth also developed a similar annual effective recharge coefficient (also 4% of average annual rainfall of about 29.5 inches) for the Trinity Group of Aquifers in the Texas Department of Water Resources Report 273, *Ground-Water Availability of the Lower Cretaceous Formations in the Hill Country of South-Central Texas*, January 1983.

These recharge potentials are not to be confused with “recoverable” groundwater. Not all groundwater is recoverable. Some is lost to spring flow and seeps, some is used by plant life while the water is still near the surface, while some is almost permanently retained within the rock itself. However, water retained within the rock itself is a one-time recharge and should not affect available water from further recharge events. For instance, some areas of the Trinity Group of Aquifers may be a rather “tight” formation, particularly in the vertical direction. The Trinity Group of Aquifers in some areas is known to have low porosity and permeability, limited fracturing and faulting, and a complicated stratigraphy that includes layers of rock that reduce transmissivity and retard downward-moving recharge water. In other areas, dissolution of the limestone, cave/sinkhole formation, faulting, fracturing, higher porosity and permeability increase water movement and transmissivities as well as vertical movement. As a result, individual well yields can be very low to very high.   Though large quantities of water may be present in the subsurface, much of the groundwater may be unrecoverable in some areas due to these hydrogeologic conditions while in other areas a large portion of the water is recoverable.

As previously mentioned, some water recharging the Trinity Group of Aquifers will be lost, some through biologic uptake and some through discharge at springs and seeps that provide some base flow to local creeks and tributaries.   This is water that the aquifer rejects on an average annual basis and is potentially available and can theoretically be retrieved (at least on a short-term basis) without diminishing the average volume of groundwater being recharged to storage or, in other words, without creating a water losing situation within the aquifer.   Extensive pumping will also reduce the pressure head and may result in a significantly larger quantity of recharge water actually percolating downward into the aquifer providing recharge that would not be normally available thus providing more reliable, long-term well production. Once pumping exceeds average annual recharge, then the aquifer(s) will be providing water from storage (thought to be a relative large amount) and the groundwater level will decline over time.

Table 2: District Flow Budget and Recharge Variable[4]

Management Plan Requirement	Aquifer	Results (ac-ft/yr)
Estimated annual amount of recharge from precipitation to the District	Trinity Aquifer	42,171
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body, including lakes, streams, and rivers	Trinity Aquifer	9,892
Estimated annual volume of flow into the District within each aquifer in the District	Trinity Aquifer	35,193
Estimated annual volume of flow out of the District within each aquifer in the District	Trinity Aquifer	26,170
Estimated net annual volume of flow between each aquifer in the District	From the Trinity Aquifer to the Edwards (Balcones Fault Zone) Aquifer	37,272

[4] TWDB, Groundwater Availability Model (GAM) 15-001

RECHARGE ENHANCEMENT POTENTIAL

The District has yet to assess potential recharge projects in the area. The District may solicit ideas and information and may investigate any potential recharge enhancement opportunities, natural or artificial, that are brought to the District's attention. Such projects may include, but are not limited to: cleanup or site protection projects at any identified significant recharge feature, encouragement of prudent brush control/water enhancement projects, non-point source pollution mitigation projects, aquifer storage and recovery projects, development of recharge ponds or small reservoirs, and the encouragement of appropriate and practical erosion and sedimentation control at construction projects located near surface streams.

PROJECTED POPULATION IN BEXAR COUNTY

Population and water demand projections are given for Bexar County in the Region L Plan. The following table incorporates those revisions and provides updated Bexar County populations and Trinity Group of Aquifers annual water demand projections for every ten years beginning in 2010 and ending with 2070.

Table 3: Population Projections

Total Bexar County Population[5]

2010	1,631,935
2020	1,974,041
2030	2,231,550
2040	2,468,254
2050	2,695,668
2060	2,904,319
2070	3,094,726

Much of the growth now occurring in Northern Bexar County is focused on the major thoroughfares north of Loop 1604, including Highway 281 North, Interstate 10 West, and Highway 16 to Bandera as well as along the 1604 North corridor. These areas are generally served by municipal suppliers and private water wells producing from the Upper Glen Rose and Lower Glen Rose stratigraphic units of the Trinity Group of Aquifers and the Cow Creek geologic unit. Municipal water systems and the influx of non-Trinity based water will reduce the dependence on the Trinity Group of Aquifers. Continued growth in the region will have an impact on the Trinity Group of Aquifers and may lead to overextension of the resources available. Water availability will require careful monitoring to assure that impact is managed and minimized to the extent possible.

[5] South Central Texas Regional Water Planning Area 2016 IPP May 2015

ACTIONS, PROCEDURES, PERFORMANCE AND AVOIDANCE NECESSARY TO EFFECTUATE THE MANAGEMENT PLAN

The District will manage the supply of groundwater within the District based on the District's best available data and its assessment of water availability and groundwater storage conditions. The most current Groundwater Availability Model and Managed Available Groundwater developed by the TWDB for the Trinity Group of Aquifers or other groundwater models, as well as other studies performed by other entities, will also aid in the decision making process by the District.

The District has adopted Rules that require the permitting of non-exempt wells within the District consistent with the District Management Plan, the provisions of Chapter 36.113, and other pertinent sections of Chapter 36. District Rules can be found at http://www.trinityglenrose.com/#!district-rules/cg6n.

The District is in agreement with the commonly accepted groundwater management principle that opposes the mining of groundwater. Therefore, it shall be the policy of the District to limit withdrawal of groundwater from permitted wells producing from Northern Bexar County aquifers to no more than the current groundwater availability volumes indicated for the Trinity Group of Aquifers in this Management Plan unless sufficient data is provided to indicate that water can be removed without causing regional reductions to the aquifer. Development or analysis of new or existing groundwater or aquifer data (MAG revisions) may result in changes to the groundwater availability volumes, with a corresponding change in production limits from the affected aquifers.

The District has adopted rules that regulate the production of groundwater consistent with the provisions Chapter 36.116. The District wishes to emphasize that in regulating or limiting groundwater production, it shall be the policy of the District to recognize good scientific data in the development of groundwater usage.

The District will implement and utilize the provisions of this groundwater management plan for all District activities. The District's current and future Rules have and will be promulgated pursuant to the provisions of Texas Water Code Chapter 36 and shall address, implement, and be consistent with the provisions and policies of this plan.

The District shall review and re-adopt this plan, with or without revisions, at least once every five years in accordance with Chapter 36.1072(e). Any amendment to this plan shall be in accordance with Chapter 36.1073.

The District will seek cooperation and coordination in the development and implementation of this plan with the appropriate state, regional or local water management or planning entities.

The District will monitor groundwater conditions through its water level and water quality monitoring programs. If necessary, the District may, through the rule-making process, identify areas within the District which, based on results from District aquifer monitoring, are identified as Critical Groundwater Depletion Areas (CGDA). These areas, when identified by the District in accordance with District Rules, may require specific pumping limits or reduction measures to ensure that groundwater supply is maintained and protected.

The District will encourage cooperative and voluntary rule compliance, but if rule enforcement becomes necessary, the enforcement will be legal, fair, and impartial.

METHODOLOGY FOR TRACKING PROGRESS IN ACHIEVING MANAGEMENT GOALS

The District will present an Annual Report to the Board of Directors on District performance and progress in achieving management goals and objectives at the last regular Board meeting of each fiscal year.

GROUNDWATER MANAGEMENT GOALS

1.0 Implement management strategies that will provide for the most efficient use of groundwater.

1.1 **Management Objective**

Implement and maintain a program of issuing well operating permits for non-exempt wells within the District.

Performance Standard

Once the operating permit issuance program is developed, the number of well operating permit applications and the number of permits issued for the year will be included in the Annual Report submitted to the Board of Directors of the District.

1.2 **Management Objective**

Maintain and regulate well construction and spacing standards through the issuance of well construction permits.

Performance Standard

Require permits for all wells drilled or plugged within the District and maintain a well database. Provide an annual report to the District Board which includes the number of wells drilled and plugged within the District during the past year. Through an interlocal agreement with San Antonio Water System (SAWS) well site inspections are performed before, during, and after the drilling of each new well in the District. Require state well logs and geophysical logs for each well drilled or plugged.

1.3 **Management Objective**

Collect meter readings and maintain database of monthly well pumping for non-exempt wells within the District. These reports are completed in accordance with the District Rules.

Performance Standard

Minimum of 75% of registered non-exempt well users monthly groundwater pumpage entered into District well production database.

2.0 Implement strategies that will control and prevent waste of groundwater.

2.1 **Management Objective**

Each year the District will provide to local newspapers or other local media, at least one article describing groundwater waste prevention practices available for implementation by groundwater users.

Performance Standard

Number of articles describing groundwater waste prevention submitted to local newspapers and/or local media each year to be included in the annual report submitted to the District Board of Directors.

2.2 **Management Objective**

Each year, the District will provide information to the public on eliminating or reducing wasteful practices in the use of groundwater by including information on groundwater waste reduction on the District's website.

Performance Standard

Online resources available on District website addressing groundwater waste reduction practices.

2.3 **Management Objective**

Make a speaker available to local clubs and organizations or a display booth at public events.

Performance Standard

Number of speaking engagements or booth displays offered each year recorded in the annual report submitted to the District Board of Directors.

2.4 **Management Objective**

The District will make an annual evaluation of the District Rules and determine if amendments to the District Rules are recommended to prevent or reduce the waste of groundwater in the District.

Performance Standard

Agenda item during at least one meeting of the District Board of Directors to assess the need to amend District Rules to prevent or reduce the waste of groundwater within the District.

3.0 Implement strategies that will control and prevent subsidence.

The rigid geologic framework of the region precludes subsidence from occurring. Therefore, this goal is not applicable to the operations of this District.

4.0 Implement management strategies that will address conjunctive surface water management issues.

4.1 **Management Objective**

Collaborate with USGS and other agencies through spring surveys and other research projects regarding correlations between spring flow, surface stream elevations/flows, rainfall, and groundwater levels.

Performance Standard

Evaluate need throughout the year to conduct research and/or partner with other agencies to gather conjunctive surface water data and submit research recommendations to District Board of Directors annually.

5.0 Implement strategies that will address natural resource issues which impact the use and availability of groundwater, or which are impacted by the use of groundwater.

5.1 **Management Objective**

Partner with the Texas Stream Team at The Meadows Center for Water and the Environment to monitor water quality values for the Upper Cibolo Creek Watershed which provides local recharge to the Trinity Aquifers in Northern Bexar County.

Performance Standard

Continue to provide annual monetary contributions for the purchase of water quality testing supplies. Inform Board of Directors of any areas of concern related to water quality that may arise through testing during regular monthly board meetings. Continue to encourage public involvement during the public comment period at each District meeting of the Board of Directors to bring forward any additional natural resource issues.

6.0 Implement strategies that will address drought conditions.

6.1 **Management Objective**

Review Palmer Drought Severity Index (PDSI) posted on the National Weather Service - Climate Prediction Center website on a monthly basis.

Performance Standard

Report drought conditions to the District Board of Directors at least quarterly.

6.2 **Management Objective**

Provide and post drought-orientated literature on the District's website.

Performance Standard

Drought-orientated literature posted on the District's website. Place a link to the Texas Water Development Board drought information page (http://waterdatafortexas.org/drought/) on District website.

6.3 **Management Objective**

The District will collect water levels on selected monitor wells representative of the major aquifer within the District.

Performance Standard

Report monitor well network levels to the District Board of Directors at least quarterly to determine the need to implement drought contingency plan.

6.4 **Management Objective**

Monitor compliance of non-exempt wells with District's Drought Contingency Plan once trigger conditions are reached.

Performance Standard

Preparation and distribution of Press Releases and District water restriction requirements to District water users.

7.0 Implement strategies that will address:

Conservation

7.1 **Management Objective**

Each year the District will provide local newspaper or media with at least one article identifying the importance of water conservation and water conservation methods.

Performance Standard

A copy of the article(s) regarding water conservation submitted each year will be included in the Annual Report to the District Board of Directors.

7.2 **Management Objective**

Provide water conservation guideline and resource links on the District's website.

Performance Standard

Conservation guidelines and links posted on the District's website.

7.3 **Management Objective**

Provide to the public, upon request, or during public outreach events, conservation literature handouts.

Performance Standard

Number of conservation handouts requested per year included in the Annual Report to the District Board of Directors.

Recharge Enhancement

7.4 **Management Objective**

Investigate potential natural or artificial recharge enhancement projects.

Performance Standard

Annually report to Board of Directors any potential recharge enhancement projects District is made aware of.

Rainwater Harvesting

7.5 **Management Objective**

Support efforts by encouraging rainwater harvesting and providing rainwater harvesting information to the public.

Performance Standard

Maintain brochures that are available to the public at the District office and have brochures available at public events.

Precipitation Enhancement

Not applicable to include since this objective is not cost effective at this time.

Brush Control

7.6 **Management Objective**

The District will encourage brush control and Best Management Practices related to the same where appropriate.

Performance Standard

Annually, the District will conduct a review of the policies adopted by the District related to brush control practices and/or the progression of brush control within the District. A copy of the review will be included in the annual report to the District Board of Directors. If it is found from review that no policies that relate to brush control practices were adopted by the District during the previous year, then a statement of such will be included in the annual report.

8.0 Addressing Desired Future Conditions in a quantitative manner

Management Objective

The District will monitor the static water level in the Trinity Aquifer to ensure the achievement of the adopted DFC.

Performance Standard

The District will monitor the static water level in the Trinity Aquifer on a bimonthly basis. The data will be presented to the District Board of Directors in an annual report.

REFERENCES

Allen, S. 2015, Estimated Historical Use and 2012 State Water Plan Datasets: Trinity Glen Rose Groundwater Conservation District. Texas Water Development Board**,** January 29, 2015

Ashworth, J. B., 1983, Ground-water availability of the lower Cretaceous formations in the Hill Country of south-central Texas. Texas Department of Water Resources Report 273, 65 p.

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South Central Texas Regional Water Planning Area 2016 IPP, May 2015

Texas Water Development Board,
http://www.twdb.texas.gov/groundwater/management_areas/maps/GMA9_GCD. pdf

Texas Water Development Board, Groundwater Availability Model (GAM) 15-001

Trinity Glen Rose Groundwater Conservation District, Pumpage Database.

U.S. Census Bureau, United States Census (2010).

APPENDIX A

STATE OF TEXAS	**§**	
	§	**RESOLUTION # 072610-01**
GROUNDWATER	**§**	
MANAGEMENT AREA 9	**§**	

Designation of Desired Future Conditions For Groundwater Management Area 9 Aquifers

WHEREAS, Groundwater Conservation Districts (GCDs) located within or partially within Groundwater Management Area 9 (GMA 9) are required under Chapter 36.l08, Texas Water Code to conduct joint planning and designate the Desired Future Conditions of aquifers within GMA 9 and;

WHEREAS, the Board Presidents or their Designated Representatives of GCDs in GMA 9 have met as a Committee in various meetings and conducted joint planning in accordance with Chapter 36.l08, Texas Water Code since September 2005 and;

WHEREAS, GMA 9, having given proper and timely notice, held an open meeting of the GMA 9 Committee on July 26, 2010 at the Boerne High School Auditorium, 1 Greyhound Lane, Boerne, Texas and;

WHEREAS, since September 20, 2005, GMA 9 has solicited and considered public comment at various GMA 9 Committee meetings, at nine special Public Meetings, one Public Hearing on the Edwards Group of the Edwards Trinity (Plateau), and from a stakeholders section in the University of Texas at Austin LBJ School of Public Affairs Policy Research Project Report 161, and;

WHEREAS, the GMA 9 Committee received and considered technical advice regarding local aquifers, hydrology, geology, recharge characteristics, local groundwater demands and usage, population projections, ground and surface water inter-relationships, and other considerations that affect groundwater conditions from the Texas Water Development Board (TWDB), Regional Water Planning Groups J, K, and L, consultants, hydrologists, geologists, and other groundwater professionals, and;

WHEREAS, following public discussion and due consideration of the current and future needs and conditions of the aquifers in question, the current and projected groundwater demand estimates from local GCDs, the TWDB, and Regional Water Planning Groups J, K, and L, and the potential effects on springs, surface water, habitat, and water-dependent species for DFCs set through the year 2060, the following motions were made:

Motion #1:
Moved by Tommy Boehme and seconded by Gene Williams to designate the following Desired Future Condition through the year 2060 for the Trinity aquifer located in GMA 9:

- Hill Country Trinity Aquifer -
  allow for an increase in average drawdown of approximately 30 feet through 2060 consistent with "Scenario 6" in TWDB Draft GAM Task 10-005

the vote on the motion was 8 ayes, 1 nays, and 0 abstentions, and the Motion Passed.

Motion #2
Moved by Gene Williams and seconded by Luana Buckner to declare the Edwards Group of the Hill Country Aquifer located in Kerr County as a not-relevant aquifer:

the vote on the motion was 7 ayes, 2 nays, and 0 abstentions, and the Motion Passed.

Motion #3
Moved by Micah Voulgaris and seconded by Luana Buckner to declare the Edwards Group of the Hill Country Aquifer located in Kendall County as a relevant aquifer:

the vote on the motion was 9 ayes, 0 nays, and 0 abstentions, and the Motion Passed.

Motion #4
Moved by Jim Chastain and seconded by Luana Buckner to declare the Edwards Group of the Hill Country Aquifer located in Bandera County as a relevant aquifer:

the vote on the motion was 9 ayes, 0 nays, and 0 abstentions, and the Motion Passed.

Motion #5
Moved by Micah Voulgaris and seconded by Jim Chastain to designate the following Desired Future Condition through the year 2060 for the Edwards Group of the Hill Country Aquifer located in Kendall and Bandera County:

- Edward Group of the Edwards Trinity (Plateau) – no net increase in average drawdown for those portions located in Kendall and Bandera County

the vote on the motion was 9 ayes, 0 nays, and 0 abstentions, and the Motion Passed.

Motion #6
Moved by Neill Binford and seconded by Luana Buckner to declare the Edwards Group of the Hill Country Aquifer located in Blanco County as a not-relevant aquifer:

the vote on the motion was 9 ayes, 0 nays, and 0 abstentions, and the Motion Passed, and, Whereas, the above Motions and votes of each Committee Member have been recorded in the Minutes of the July 26, 2010 GMA 9 Committee Meeting,

NOW THEREFORE BE IT RESOLVED, Groundwater Management Area 9 Committee Members present and voting on July 26, 2010 do hereby document, record, and confirm the above described Motions and votes.

Approved by consensus and signed on July 26, 2010 by the following Voting GMA 9 Committee Members,

____

Neill Binford - President of the Blanco Pedernales GCD

____

Jim Chastain - President of the Bandera County River Authority and Groundwater Conservation District

____

Tommy Boehme - President of the Medina County GCD

____

Jimmy Skipton - President of the Hays Trinity GCD

____

Brian Hunt - Designated Representative for the Barton Springs/Edwards Aquifer Conservation District

____

Micah Voulgaris – General Manager and Designated Representative for the Cow Creek GCD

____

Jorge Gonzales – Vice President and Designated Representative for the Trinity Glen Rose GCD

____

Luana Buckner - Chairman of the Edwards Aquifer Authority

____

Gene Williams - Designated Representative for the Headwaters GCD

Appendix B – Estimated Historical Groundwater Use and 2012 State Water Plan Datasets: Trinity Glen Rose Groundwater Conservation District[6]

[6] Data compiled and distributed to TGRGCD by TWDB, Stephen Allen, 09/21/15

Estimated Historical Water Use

TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water historical use estimates are currently unavailable for calendar year 2014. TWDB staff anticipates the calculation and posting of these estimates at a later date.

BEXAR COUNTY[10] *24.36 % (multiplier)* All values are in acre-fee/year

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2013	GW	59,290	1,124	1,735	261	2,330	223	64,963
	SW	3,223	212	0	8,631	195	140	12,401
2012	GW	59,312	1,156	2,245	256	3,265	217	66,451
	SW	4,544	191	0	9,454	260	127	14,576
2011	GW	63,839	1,165	1,990	280	2,687	299	70,260
	SW	5,491	192	68	12,459	859	318	19,387
2010	GW	55,630	1,040	2,913	279	2,122	299	62,283
	SW	5,175	149	898	6,744	828	317	14,111
2009	GW	58,505	1,362	2,449	376	4,448	70	67,210
	SW	6,662	148	1,050	8,535	1,052	165	17,612
2008	GW	63,531	1,535	3,934	348	1,683	209	71,240
	SW	4,317	218	1,068	10,023	1,097	159	16,882
2007	GW	53,292	1,557	2,234	310	901	84	58,378
	SW	3,444	238	315	2,854	538	197	7,586
2006	GW	62,674	1,570	2,110	271	2,369	99	69,093
	SW	3,562	259	602	10,125	244	230	15,022
2005	GW	60,657	2,366	2,246	303	2,212	101	67,885
	SW	2,973	218	599	8,177	244	237	12,448
2004	GW	51,357	2,530	2,465	249	2,167	24	58,792
	SW	2,574	241	599	5,537	215	226	9,392
2003	GW	53,111	2,483	2,119	233	1,730	24	59,700
	SW	2,549	64	559	4,397	1,202	227	8,998
2002	GW	51,959	2,691	2,218	254	3,781	29	60,932
	SW	2,297	55	559	3,671	2,521	269	9,372
2001	GW	56,124	2,772	2,195	318	2,568	29	64,006
	SW	2,410	46	353	4,765	1,903	268	9,745
2000	GW	57,564	3,121	1,945	564	2,326	29	65,549
	SW	960	72	328	5,860	1,539	261	9,020

[10] ***** The values presented in the data tables of this report are county-based. In cases where groundwater conservation districts cover only a portion of one or more counties, the data values are modified with an apportioning multiplier to create new values that more accurately represent district conditions. The multiplier used in the following formula is a land area ratio: (data value *(land area of district in county/land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining, and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask each district to identify these locations).
The other two SWP tables (Projected Water Supply Needs and Projected Water Management Strategies) are not modified because district-specific values are not statutorily required. Each district needs only "consider" the county values in those tables.
In the WUS table every category of water use (including municipal) is apportioned. Staff determined that breaking down the annual municipal values into individual WUGs was too complex.
TWDB recognizes that the apportioning formula used is not perfect but it is the best data available process with respect to time and staffing constraints. If a district believes it has data that is more accurate it can add those data to the plan with an explanation of how the data were derived. Apportioning percentages that the TWDB used are listed above each applicable table.
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COMAL COUNTY[11]

0.34 % (multiplier)

All values are in acre-fee/year

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2013	GW	36	1	23	0	1	0	61
	SW	28	0	0	0	0	1	29
2012	GW	42	10	11	0	1	0	64
	SW	30	0	0	0	1	0	31
2011	GW	50	1	22	0	1	0	74
	SW	30	0	1	0	1	1	33
2010	GW	36	1	30	0	1	0	68
	SW	42	0	12	0	1	1	56
2009	GW	41	1	33	0	2	0	77
	SW	28	2	12	0	0	1	43
2008	GW	43	1	35	0	0	0	79
	SW	30	2	13	0	1	1	47
2007	GW	26	2	23	0	1	0	52
	SW	26	2	2	0	1	0	31
2006	GW	30	2	23	0	3	0	58
	SW	27	3	2	0	0	0	32
2005	GW	30	2	23	0	0	0	55
	SW	27	2	2	0	1	0	32
2004	GW	22	1	26	0	0	1	50
	SW	26	2	2	0	1	0	31
2003	GW	22	1	27	0	0	1	51
	SW	26	2	2	0	2	0	32
2002	GW	24	2	28	0	0	1	55
	SW	21	1	2	0	0	0	24
2001	GW	23	2	22	0	0	1	48
	SW	26	1	0	0	0	0	27
2000	GW	25	3	40	0	0	1	69
	SW	26	1	0	0	0	0	27

[11] * The values presented in the data tables of this report are county-based. In cases where groundwater conservation districts cover only a portion of one or more counties, the data values are modified with an apportioning multiplier to create new values that more accurately represent district conditions. The multiplier used in the following formula is a land area ratio: (data value *(land area of district in county/land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining, and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask each district to identify these locations).
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KENDALL COUNTY[12] *0.48 % (multiplier)* All values are in acre-fee/year

Year	Source	Municipal	Manufacturing	Mining	Steam Electric	Irrigation	Livestock	Total
2013	GW	16	0	0	0	2	1	19
	SW	11	0	0	0	0	0	11
2012	GW	17	0	0	0	3	1	21
	SW	10	0	0	0	0	0	10
2011	GW	20	0	0	0	4	2	26
	SW	10	0	0	0	0	0	10
2010	GW	16	0	0	0	3	1	20
	SW	8	0	0	0	1	0	9
2009	GW	14	0	0	0	4	1	19
	SW	8	0	0	0	1	0	9
2008	GW	15	0	0	0	0	1	16
	SW	8	0	0	0	1	0	9
2007	GW	13	0	0	0	0	2	15
	SW	7	0	0	0	0	0	7
2006	GW	16	0	0	0	1	2	19
	SW	6	0	0	0	0	0	6
2005	GW	19	0	0	0	1	2	22
	SW	4	0	0	0	0	0	4
2004	GW	15	0	0	0	0	1	16
	SW	3	0	0	0	1	0	4
2003	GW	15	0	0	0	1	1	17
	SW	3	0	0	0	2	0	5
2002	GW	15	0	0	0	4	1	20
	SW	2	0	0	0	1	1	4
2001	GW	16	0	0	0	4	1	21
	SW	0	0	0	0	1	1	2
2000	GW	13	0	0	0	1	1	15
	SW	4	0	0	0	1	0	5

[12] ***** The values presented in the data tables of this report are county-based. In cases where groundwater conservation districts cover only a portion of one or more counties, the data values are modified with an apportioning multiplier to create new values that more accurately represent district conditions. The multiplier used in the following formula is a land area ratio: (data value *(land area of district in county/land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining, and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask each district to identify these locations).
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<u>Projected Surface Water Supplies</u>
TWDB 2012 State Water Plan Data

BEXAR COUNTY [13] *24.36 % (multiplier)* All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
L	BEXAR MET WATER DISTRICT	NUECES	SAN ANTONIO RIVER RUN-OF-RIVER	76	76	76	76	76	76
L	BEXAR MET WATER DISTRICT	SAN ANTONIO	SAN ANTONIO RIVER RUN-OF-RIVER	3,130	3,051	2,983	2,926	2,875	2,826
L	EAST CENTRAL WSC	SAN ANTONIO	CANYON LAKE/RESERVOIR	1,170	251	251	251	251	251
L	FAIROAKS RANCH	SAN ANTONIO	CANYON LAKE/RESERVOIR	1,388	1,388	1,388	1,388	1,388	1,388
L	GREEN VALLEY SUD	SAN ANTONIO	CANYON LAKE/RESERVOIR	444	768	768	768	768	768
L	IRRIGATION	SAN ANTONIO	SAN ANTONIO RIVER COMBINED RUN-OF-RIVER IRRIGATION	246	246	246	246	246	246
L	LIVESTOCK	NUECES	LIVESTOCK LOCAL SUPPLY	3	3	3	3	3	3
L	LIVESTOCK	SAN ANTONIO	LIVESTOCK LOCAL SUPPLY	158	158	158	158	158	158
L	SAN ANTONIO	SAN ANTONIO	CANYON LAKE/RESERVOIR	7,500	5,500	4,000	0	0	0
L	SAN ANTONIO	SAN ANTONIO	CANYON LAKE/RESERVOIR	4,000	0	0	0	0	0
L	SOMERSET	SAN ANTONIO	SAN ANTONIO RIVER RUN-OF-RIVER	405	484	552	609	660	709
L	STEAM ELECTRIC POWER	SAN ANTONIO	CALAVERAS LAKE/RESERVOIR	8,989	8,989	8,989	8,989	8,989	8,989
L	STEAM ELECTRIC POWER	SAN ANTONIO	VICTOR BRAUNIG LAKE/RESERVOIR	2,923	2,923	2,923	2,923	2,923	2,923
	Sum of Projected Surface Water Supplies (acre-feet/year)			**30,432**	**23,837**	**22,337**	**18,337**	**18,337**	**18,337**

[13] ***** The values presented in the data tables of this report are county-based. In cases where groundwater conservation districts cover only a portion of one or more counties, the data values are modified with an apportioning multiplier to create new values that more accurately represent district conditions. The multiplier used in the following formula is a land area ratio: (data value *(land area of district in county/land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining, and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask each district to identify these locations).
The other two SWP tables (Projected Water Supply Needs and Projected Water Management Strategies) are not modified because district-specific values are not statutorily required. Each district needs only "consider" the county values in those tables.
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COMAL COUNTY[14]

0.34 % (multiplier) All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
L	BULVERDE CITY	GUADALUPE	CANYON LAKE/RESERVOIR	4	4	4	4	4	4
L	BULVERDE CITY	SAN ANTONIO	CANYON LAKE/RESERVOIR	396	396	396	396	396	396
L	CANYON LAKE WSC	GUADALUPE	CANYON LAKE/RESERVOIR	6,000	6,000	6,000	6,000	6,000	6,000
L	COUNTY-OTHER	GUADALUPE	CANYON LAKE/RESERVOIR	1	1	1	1	1	1
L	COUNTY-OTHER	SAN ANTONIO	CANYON LAKE/RESERVOIR	2	2	2	2	2	2
L	CRYSTAL CLEAR WSC	GUADALUPE	CANYON LAKE/RESERVOIR	269	269	269	269	269	269
L	CRYSTAL CLEAR WSC	GUADALUPE	GUADALUPE RIVER RUN-OF-RIVER	16	16	16	16	16	16
L	FAIROAKS RANCH	SAN ANTONIO	CANYON LAKE/RESERVOIR	74	74	74	74	74	74
L	GREEN VALLEY SUD	GUADALUPE	CANYON LAKE/RESERVOIR	360	360	360	360	360	360
L	IRRIGATION	GUADALUPE	CANYON LAKE/RESERVOIR	1	1	1	1	1	1
L	LIVESTOCK	GUADALUPE	LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
L	LIVESTOCK	SAN ANTONIO	LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
L	MANUFACTURING	GUADALUPE	CANYON LAKE/RESERVOIR	0	0	0	0	0	0
L	NEW BRAUNFELS	GUADALUPE	CANYON LAKE/RESERVOIR	5,634	5,634	5,634	5,634	5,634	5,634
L	NEW BRAUNFELS	GUADALUPE	GUADALUPE RIVER RUN-OF-RIVER	1,036	1,036	1,036	1,036	1,036	1,036
	Sum of Projected Surface Water Supplies (acre-feet/year)			**13,793**	**13,793**	**13,793**	**13,793**	**13,793**	**13,793**

[14] ***** The values presented in the data tables of this report are county-based. In cases where groundwater conservation districts cover only a portion of one or more counties, the data values are modified with an apportioning multiplier to create new values that more accurately represent district conditions. The multiplier used in the following formula is a land area ratio: (data value *(land area of district in county/land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining, and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask each district to identify these locations).
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KENDALL COUNTY [15]

0.48 % (multiplier)

All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
L	BOERNE	SAN ANTONIO	BOERNE LAKE/RESERVOIR	0	0	0	0	0	0
L	BOERNE	SAN ANTONIO	CANYON LAKE/RESERVOIR	3,611	3,611	3,611	3,611	3,611	3,611
L	COUNTY-OTHER	SAN ANTONIO	CANYON LAKE/RESERVOIR	10	10	10	10	10	10
L	FAIROAKS RANCH	SAN ANTONIO	CANYON LAKE/RESERVOIR	389	389	389	389	389	389
L	IRRIGATION	GUADALUPE	GUADALUPE RIVER COMBINED RUN-OF-RIVER IRRIGATION	0	0	0	0	0	0
L	LIVESTOCK	COLORADO	LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
L	LIVESTOCK	GUADALUPE	LIVESTOCK LOCAL SUPPLY	1	1	1	1	1	1
L	LIVESTOCK	SAN ANTONIO	LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
	Sum of Projected Surface Water Supplies (acre-feet/year)			**4,011**	**4,011**	**4,011**	**4,011**	**4,011**	**4,011**

[15] ***** The values presented in the data tables of this report are county-based. In cases where groundwater conservation districts cover only a portion of one or more counties, the data values are modified with an apportioning multiplier to create new values that more accurately represent district conditions. The multiplier used in the following formula is a land area ratio: (data value *(land area of district in county/land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining, and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask each district to identify these locations).
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Projected Water Demands
TWDB 2012 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.

BEXAR COUNTY[16] *24.36 % (multiplier)* All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
L	BEXAR MET WATER DISTRICT	NUECES	161	163	165	165	167	171
L	LYTLE	NUECES	5	7	8	10	11	12
L	COUNTY-OTHER	NUECES	63	64	65	66	67	68
L	LIVESTOCK	NUECES	6	6	6	6	6	6
L	IRRIGATION	NUECES	313	299	287	275	263	252
L	MINING	NUECES	32	35	37	39	41	42
L	ATASCOSA RURAL WSC	NUECES	38	44	51	56	60	65
L	SAN ANTONIO	SAN ANTONIO	192,008	213,942	234,864	250,671	265,957	281,204
L	SAN ANTONIO	SAN ANTONIO	24,654	27,471	30,157	32,187	34,150	36,107
L	BEXAR MET WATER DISTRICT	SAN ANTONIO	8,736	8,869	8,944	8,945	9,081	9,278
L	EAST CENTRAL WSC	SAN ANTONIO	1,325	1,572	1,790	1,974	2,133	2,289
L	SELMA	SAN ANTONIO	1,531	1,927	2,309	2,260	2,204	2,155
L	GREEN VALLEY SUD	SAN ANTONIO	458	646	818	939	1,068	1,182
L	WATER SERVICES INC	SAN ANTONIO	570	697	809	902	982	1,061
L	LIVESTOCK	SAN ANTONIO	315	315	315	315	315	315
L	STEAM ELECTRIC POWER	SAN ANTONIO	4,968	6,275	7,342	8,032	8,799	9,650
L	MINING	SAN ANTONIO	841	923	974	1,024	1,074	1,119
L	MANUFACTURING	SAN ANTONIO	6,322	7,185	7,984	8,786	9,492	10,258
L	FAIROAKS RANCH	SAN ANTONIO	1,090	1,094	1,097	1,101	1,099	1,104
L	IRRIGATION	SAN ANTONIO	3,408	3,264	3,126	2,994	2,867	2,746
L	TERRELL HILLS	SAN ANTONIO	863	914	956	983	1,018	1,057
L	WINDCREST	SAN ANTONIO	1,204	1,196	1,187	1,177	1,174	1,182
L	COUNTY-OTHER	SAN ANTONIO	172	136	115	181	240	294
L	HELOTES	SAN ANTONIO	1,537	2,249	2,820	3,264	3,679	4,047
L	HOLLYWOOD PARK	SAN ANTONIO	2,314	2,389	2,458	2,511	2,565	2,616
L	BALCONES HEIGHTS	SAN ANTONIO	514	555	578	600	633	670
L	LACKLAND AFB	SAN ANTONIO	3,104	3,080	3,056	3,032	3,016	3,016
L	LEON VALLEY	SAN ANTONIO	695	678	667	655	650	659
L	LIVE OAK	SAN ANTONIO	1,145	1,157	1,177	1,193	1,232	1,284
L	SCHERTZ	SAN ANTONIO	272	371	456	525	591	649
L	SHAVANO PARK	SAN ANTONIO	819	835	847	856	868	880
L	SOMERSET	SAN ANTONIO	405	484	552	609	660	709

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Bexar County cont.

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
L	CASTLE HILLS	SAN ANTONIO	820	807	793	780	771	771
L	CHINA GROVE	SAN ANTONIO	376	457	531	591	645	695
L	CONVERSE	SAN ANTONIO	1,907	2,331	2,729	3,044	3,311	3,564
L	HILL COUNTRY VILLAGE	SAN ANTONIO	838	835	831	828	826	826
L	LEON VALLEY	SAN ANTONIO	397	388	382	375	372	377
L	ATASCOSA RURAL WSC	SAN ANTONIO	903	1,068	1,213	1,335	1,441	1,548
L	ALAMO HEIGHTS	SAN ANTONIO	2,071	2,134	2,136	2,132	2,146	2,170
L	ELMENDORF	SAN ANTONIO	112	123	132	140	148	156
L	KIRBY	SAN ANTONIO	1,005	1,004	1,007	1,001	1,013	1,034
L	OLMOS PARK	SAN ANTONIO	403	424	441	452	468	484
L	ST. HEDWIG	SAN ANTONIO	310	358	403	436	469	501
L	UNIVERSAL CITY	SAN ANTONIO	2,608	2,916	3,175	3,125	3,101	3,101
L	COUNTY-OTHER	SAN ANTONIO	1,379	1,400	1,412	1,412	1,433	1,465
L	SAN ANTONIO	SAN ANTONIO	284	317	348	371	394	416
		Sum of Projected Water Demands (acre-feet/year)	**273,301**	**303,404**	**331,550**	**352,355**	**372,700**	**393,255**

COMAL COUNTY[17]

0.34 % (multiplier)

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
L	NEW BRAUNFELS	GUADALUPE	10,042	12,510	15,390	18,241	21,168	24,416
L	CANYON LAKE WSC	GUADALUPE	2,928	4,769	6,838	8,898	11,034	13,331
L	LIVESTOCK	GUADALUPE	1	1	1	1	1	1
L	SCHERTZ	GUADALUPE	71	107	146	185	226	270
L	BULVERDE CITY	GUADALUPE	9	14	21	27	34	41
L	MINING	GUADALUPE	9	10	10	11	11	12
L	IRRIGATION	GUADALUPE	1	1	0	0	0	0
L	MANUFACTURING	GUADALUPE	26	29	32	34	36	39
L	COUNTY-OTHER	GUADALUPE	9	9	10	11	12	13
L	GARDEN RIDGE	GUADALUPE	337	419	513	607	704	811
L	GREEN VALLEY SUD	GUADALUPE	235	314	409	493	591	696
L	CRYSTAL CLEAR WSC	GUADALUPE	240	325	426	516	619	731
L	BEXAR MET WATER DISTRICT	GUADALUPE	33	53	75	95	117	141
L	FAIROAKS RANCH	SAN ANTONIO	58	58	58	58	58	59
L	COUNTY-OTHER	SAN ANTONIO	0	0	1	1	1	1
L	IRRIGATION	SAN ANTONIO	0	0	0	0	0	0
L	MANUFACTURING	SAN ANTONIO	0	0	0	0	0	0
L	GARDEN RIDGE	SAN ANTONIO	228	284	347	411	477	549
L	LIVESTOCK	SAN ANTONIO	0	0	0	0	0	0
L	WATER SERVICES INC	SAN ANTONIO	308	402	509	615	723	845
L	SELMA	SAN ANTONIO	77	129	193	222	248	274
L	SCHERTZ	SAN ANTONIO	11	16	23	28	35	42
L	BULVERDE CITY	SAN ANTONIO	1,044	1,728	2,507	3,283	4,089	4,954
L	BEXAR MET WATER DISTRICT	SAN ANTONIO	429	695	984	1,249	1,537	1,860
	Sum of Projected Water Demands (acre-feet/year)		**16,096**	**21,873**	**28,493**	**34,986**	**41,721**	**49,086**

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KENDALL COUNTY[18]

0.48 % (multiplier) All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
L	LIVESTOCK	COLORADO	0	0	0	0	0	0
L	MINING	COLORADO	0	0	0	0	0	0
L	COUNTY-OTHER	COLORADO	0	0	0	0	0	0
L	COUNTY-OTHER	GUADALUPE	8	11	14	17	19	21
L	IRRIGATION	GUADALUPE	3	2	2	2	2	2
L	LIVESTOCK	GUADALUPE	2	2	2	2	2	2
L	IRRIGATION	SAN ANTONIO	1	1	1	1	1	1
L	LIVESTOCK	SAN ANTONIO	0	0	0	0	0	0
L	WATER SERVICES INC	SAN ANTONIO	43	52	61	69	75	81
L	COUNTY-OTHER	SAN ANTONIO	5	7	9	11	13	14
L	BOERNE	SAN ANTONIO	1,570	2,188	2,843	3,370	3,831	4,282
L	FAIROAKS RANCH	SAN ANTONIO	286	296	300	305	310	316
		Sum of Projected Water Demands (acre-feet/year)	**1,918**	**2,559**	**3,232**	**3,777**	**4,253**	**4,719**

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Projected Water Supply Needs
TWDB 2012 State Water Plan Data

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

BEXAR COUNTY[19]

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
L	ALAMO HEIGHTS	SAN ANTONIO	-592	-655	-657	-653	-667	-691
L	ATASCOSA RURAL WSC	NUECES	-22	-28	-35	-40	-44	-49
L	ATASCOSA RURAL WSC	SAN ANTONIO	-524	-689	-834	-956	-1,062	-1,169
L	BALCONES HEIGHTS	SAN ANTONIO	0	0	0	0	0	0
L	BEXAR MET WATER DISTRICT	NUECES	-85	-87	-89	-89	-91	-95
L	BEXAR MET WATER DISTRICT	SAN ANTONIO	-3,106	-3,318	-3,691	-3,762	-3,961	-4,217
L	CASTLE HILLS	SAN ANTONIO	-96	-83	-69	-56	-47	-47
L	CHINA GROVE	SAN ANTONIO	0	0	0	0	0	0
L	CONVERSE	SAN ANTONIO	688	264	-134	-449	-716	-969
L	COUNTY-OTHER	NUECES	56	51	46	44	41	35
L	COUNTY-OTHER	SAN ANTONIO	0	0	0	0	0	0
L	COUNTY-OTHER	SAN ANTONIO	1,156	1,254	176	-127	-403	-655
L	EAST CENTRAL WSC	SAN ANTONIO	1,170	4	-214	-398	-557	-713
L	ELMENDORF	SAN ANTONIO	0	0	0	0	0	0
L	FAIROAKS RANCH	SAN ANTONIO	495	491	488	484	450	445
L	GREEN VALLEY SUD	SAN ANTONIO	324	460	288	167	38	-76
L	HELOTES	SAN ANTONIO	0	0	0	0	0	0
L	HILL COUNTRY VILLAGE	SAN ANTONIO	-730	-727	-723	-720	-718	-718
L	HOLLYWOOD PARK	SAN ANTONIO	-1,969	-2,044	-2,113	-2,166	-2,220	-2,271
L	IRRIGATION	NUECES	500	541	5	47	86	125
L	IRRIGATION	SAN ANTONIO	9,237	9,828	10,210	10,743	11,254	11,743
L	KIRBY	SAN ANTONIO	-335	-334	-337	-331	-343	-364
L	LACKLAND AFB	SAN ANTONIO	0	0	0	0	0	0
L	LEON VALLEY	SAN ANTONIO	90	107	118	130	135	126
L	LEON VALLEY	SAN ANTONIO	0	0	0	0	0	0
L	LIVE OAK	SAN ANTONIO	1,183	1,174	1,160	1,149	1,122	1,085
L	LIVESTOCK	NUECES	0	0	0	0	0	0
L	LIVESTOCK	SAN ANTONIO	55	56	54	53	51	50
L	LYTLE	NUECES	-3	-5	-6	-8	-9	-10
L	MANUFACTURING	SAN ANTONIO	-1,340	-4,886	-8,241	-11,537	-14,438	-17,588
L	MINING	NUECES	0	0	0	1	1	1
L	MINING	SAN ANTONIO	0	0	-921	-1,021	-1,123	-1,217
L	OLMOS PARK	SAN ANTONIO	0	0	0	0	0	0

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Bexar County cont.

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
L	SAN ANTONIO	SAN ANTONIO	-284	-317	-348	-371	-394	-416
L	SAN ANTONIO	SAN ANTONIO	-68,477	-93,384	-116,921	-137,353	-153,357	-169,336
L	SAN ANTONIO	SAN ANTONIO	-9,023	-15,840	-18,526	-20,556	-22,519	-24,476
L	SCHERTZ	SAN ANTONIO	331	232	147	78	12	-46
L	SELMA	SAN ANTONIO	39	-357	-739	-690	-634	-585
L	SHAVANO PARK	SAN ANTONIO	-320	-336	-348	-357	-369	-381
L	SOMERSET	SAN ANTONIO	0	0	0	0	0	0
L	ST. HEDWIG	SAN ANTONIO	0	0	0	0	0	0
L	STEAM ELECTRIC POWER	SAN ANTONIO	28,505	23,139	18,761	15,927	12,780	9,286
L	TERRELL HILLS	SAN ANTONIO	0	0	0	0	0	0
L	UNIVERSAL CITY	SAN ANTONIO	-113	-421	-680	-630	-606	-606
L	WATER SERVICES INC	SAN ANTONIO	-546	-673	-785	-878	-958	-1,037
L	WINDCREST	SAN ANTONIO	-235	-227	-219	-209	-206	-214
	Sum of Projected Water Supply Needs (acre-feet/year)		**-87,800**	**-124,411**	**-156,630**	**-183,357**	**-205,442**	**-227,946**

COMAL COUNTY [20]

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
L	BEXAR MET WATER DISTRICT	GUADALUPE	-33	-53	-75	-95	-117	-141
L	BEXAR MET WATER DISTRICT	SAN ANTONIO	-386	-652	-941	-1,206	-1,502	-1,825
L	BULVERDE CITY	GUADALUPE	-5	-10	-17	-23	-30	-37
L	BULVERDE CITY	SAN ANTONIO	-648	-1,332	-2,111	-2,887	-3,693	-4,558
L	CANYON LAKE WSC	GUADALUPE	3,805	1,949	-129	-2,198	-4,467	-6,769
L	COUNTY-OTHER	GUADALUPE	-1,782	-1,972	-2,178	-2,362	-2,665	-2,960
L	COUNTY-OTHER	SAN ANTONIO	401	374	347	310	266	218
L	CRYSTAL CLEAR WSC	GUADALUPE	101	16	-85	-175	-278	-390
L	FAIROAKS RANCH	SAN ANTONIO	29	29	29	29	27	26
L	GARDEN RIDGE	GUADALUPE	-135	-217	-311	-405	-502	-609
L	GARDEN RIDGE	SAN ANTONIO	-122	-178	-241	-305	-371	-443
L	GREEN VALLEY SUD	GUADALUPE	356	277	182	98	0	-105
L	IRRIGATION	GUADALUPE	804	819	834	848	863	877
L	IRRIGATION	SAN ANTONIO	3	6	8	11	13	15
L	LIVESTOCK	GUADALUPE	0	0	0	0	0	0
L	LIVESTOCK	SAN ANTONIO	0	0	0	0	0	0
L	MANUFACTURING	GUADALUPE	-5,199	-6,033	-6,784	-7,514	-8,141	-9,022
L	MANUFACTURING	SAN ANTONIO	351	351	351	350	350	350
L	MINING	GUADALUPE	-439	-635	-753	-870	-1,068	-1,173
L	NEW BRAUNFELS	GUADALUPE	1,688	-780	-3,660	-6,511	-9,438	-12,686
L	SCHERTZ	GUADALUPE	137	101	62	23	-18	-62
L	SCHERTZ	SAN ANTONIO	47	42	35	30	23	16
L	SELMA	SAN ANTONIO	92	40	-24	-53	-79	-105
L	WATER SERVICES INC	SAN ANTONIO	-295	-389	-496	-602	-710	-832
	Sum of Projected Water Supply Needs (acre-feet/year)		**-9,044**	**-12,251**	**-17,805**	**-25,206**	**-33,079**	**-41,717**

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KENDALL COUNTY [21]

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
L	BOERNE	SAN ANTONIO	2,435	1,817	1,162	635	175	-276
L	COUNTY-OTHER	COLORADO	50	36	22	10	-1	-11
L	COUNTY-OTHER	GUADALUPE	-221	-865	-1,522	-2,073	-2,725	-3,503
L	COUNTY-OTHER	SAN ANTONIO	1,365	939	506	141	0	0
L	FAIROAKS RANCH	SAN ANTONIO	137	127	123	118	107	101
L	IRRIGATION	GUADALUPE	27	38	48	58	68	77
L	IRRIGATION	SAN ANTONIO	1	5	9	13	4	7
L	LIVESTOCK	COLORADO	0	0	0	0	0	0
L	LIVESTOCK	GUADALUPE	0	0	0	0	0	0
L	LIVESTOCK	SAN ANTONIO	0	0	0	0	9	9
L	MINING	COLORADO	0	0	0	0	0	0
L	WATER SERVICES INC	SAN ANTONIO	-41	-50	-59	-67	-73	-79
	Sum of Projected Water Supply Needs (acre-feet/year)		**-262**	**-915**	**-1,581**	**-2,140**	**-2,799**	**-3,869**

[21] ***** The values presented in the data tables of this report are county-based. In cases where groundwater conservation districts cover only a portion of one or more counties, the data values are modified with an apportioning multiplier to create new values that more accurately represent district conditions. The multiplier used in the following formula is a land area ratio: (data value *(land area of district in county/land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining, and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask each district to identify these locations).
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Projected Water Management Strategies
TWDB 2012 State Water Plan Data

BEXAR COUNTY [22]

WUG, Basin (RWPG)

All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
ALAMO HEIGHTS, SAN ANTONIO (L)							
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [BEXAR]	104	0	0	0	0	0
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [UVALDE]	592	655	657	653	667	691
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	175	337	488	625	769	865
ATASCOSA RURAL WSC, NUECES (L)							
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [UVALDE]	22	28	35	40	44	49
FACILITIES EXPANSION	EDWARDS-BFZ AQUIFER [BEXAR]	0	0	0	0	0	0
LOCAL GROUNDWATER CARRIZO-WILCOX AQUIFER (INCLUDES OVERDRAFTS)	CARRIZO-WILCOX AQUIFER [BEXAR]	10	10	10	10	10	10
ATASCOSA RURAL WSC, SAN ANTONIO (L)							
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [BEXAR]	47	0	0	0	0	0
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [UVALDE]	524	689	834	956	1,062	1,169
FACILITIES EXPANSION	EDWARDS-BFZ AQUIFER [BEXAR]	0	0	0	0	0	0
LOCAL GROUNDWATER CARRIZO-WILCOX AQUIFER (INCLUDES OVERDRAFTS)	CARRIZO-WILCOX AQUIFER [BEXAR]	110	110	110	110	110	110
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	0	0	0	0	0	22
BALCONES HEIGHTS, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	4	6	7	9	20	37
BEXAR MET WATER DISTRICT, NUECES (L)							
LOCAL GROUNDWATER CARRIZO-WILCOX AQUIFER (INCLUDES OVERDRAFTS)	CARRIZO-WILCOX AQUIFER [BEXAR]	85	87	89	89	91	95
BEXAR MET WATER DISTRICT, SAN ANTONIO (L)							
LOCAL GROUNDWATER CARRIZO-WILCOX AQUIFER (INCLUDES OVERDRAFTS)	CARRIZO-WILCOX AQUIFER [BEXAR]	3,106	3,318	3,691	3,762	3,961	4,217
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	0	0	0	0	0	293

[22] * The values presented in the data tables of this report are county-based. In cases where groundwater conservation districts cover only a portion of one or more counties, the data values are modified with an apportioning multiplier to create new values that more accurately represent district conditions. The multiplier used in the following formula is a land area ratio: (data value *(land area of district in county/land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining, and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask each district to identify these locations).
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Bexar County cont.

WUG, Basin (RWPG)							All values are in acre-feet/year
	Water Management Strategy	**Source Name [Origin]**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
CASTLE HILLS, SAN ANTONIO (L)								
	DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [BEXAR]	41	0	0	0	0	0
	LOCAL GROUNDWATER (TRINITY AQUIFER)	TRINITY AQUIFER [BEXAR]	96	83	69	56	47	47
	MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	61	120	142	144	151	166
CHINA GROVE, SAN ANTONIO (L)								
	MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	28	66	116	166	190	217
CONVERSE, SAN ANTONIO (L)								
	LOCAL GROUNDWATER (TRINITY AQUIFER)	TRINITY AQUIFER [BEXAR]	0	0	134	449	716	969
	MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	0	0	0	0	21	110
COUNTY-OTHER, SAN ANTONIO (L)								
	EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [UVALDE]	0	0	0	127	403	655
	MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	49	96	140	191	310	505
EAST CENTRAL WSC, SAN ANTONIO (L)								
	EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [UVALDE]	1,837	1,837	1,837	1,837	1,837	1,837
	HAYS/CALDWELL PUA PROJECT (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [CALDWELL]	0	0	214	398	557	713
	LOCAL GROUNDWATER (TRINITY AQUIFER)	TRINITY AQUIFER [BEXAR]	180	180	180	180	180	180
	MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	0	0	0	0	32	104
ELMENDORF, SAN ANTONIO (L)								
	MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	0	0	0	0	2	6
FAIROAKS RANCH, SAN ANTONIO (L)								
	MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	94	185	269	345	361	382
GREEN VALLEY SUD, SAN ANTONIO (L)								
	BRACKISH GROUNDWATER DESALINATION (WILCOX AQUIFER)	CARRIZO-WILCOX AQUIFER- BRACKISH [GUADALUPE]	0	0	112	112	225	225
	BRACKISH GROUNDWATER DESALINATION (WILCOX AQUIFER)	CARRIZO-WILCOX AQUIFER- BRACKISH [WILSON]	0	0	638	638	1,278	1,278
	CRWA WELLS RANCH PROJECT PHASE II (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GUADALUPE]	175	0	0	0	0	0

Bexar County cont.

WUG, Basin (RWPG)							All values are in acre-feet/year
Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
GBRA MID BASIN (SURFACE WATER)	GBRA MID BASIN OFF-CHANNEL LAKE/RESERVOIR [RESERVOIR]	0	450	0	0	0	0
PURCHASE FROM NBU/REDISTRIBUTION OF SUPPLIES	CANYON LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	8
HELOTES, SAN ANTONIO (L)							
FACILITIES EXPANSION	EDWARDS-BFZ AQUIFER [BEXAR]	0	0	0	0	0	0
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	115	345	539	674	832	993
HILL COUNTRY VILLAGE, SAN ANTONIO (L)							
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [BEXAR]	42	0	0	0	0	0
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [BEXAR]	730	727	723	720	718	718
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	77	146	209	265	316	365
HOLLYWOOD PARK, SAN ANTONIO (L)							
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [BEXAR]	116	0	0	0	0	0
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [BEXAR]	1,969	2,044	2,113	2,166	2,220	2,271
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	212	414	612	798	980	1,154
KIRBY, SAN ANTONIO (L)							
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [BEXAR]	50	0	0	0	0	0
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [BEXAR]	335	334	337	331	343	364
LACKLAND AFB, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	268	515	736	934	1,119	1,300
LEON VALLEY, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	0	0	0	0	0	12
LYTLE, NUECES (L)							
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [ATASCOSA]	3	5	6	8	9	10
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	2	4	4	4	5	5
MANUFACTURING, SAN ANTONIO (L)							
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [MEDINA]	0	0	0	0	379	643

Bexar County cont.

WUG, Basin (RWPG)							All values are in acre-feet/year
Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [UVALDE]	0	873	2,873	6,873	14,494	14,230
RECYCLED WATER PROGRAMS	DIRECT REUSE [BEXAR]	4,240	7,367	15,127	15,127	15,127	15,127
RECYCLED WATER PROGRAMS	DIRECT REUSE [BEXAR]	1,340	4,886	8,240	11,537	14,438	17,588
MINING, SAN ANTONIO (L)							
INDUSTRIAL, STEAM-ELECTRIC POWER GENERATION, AND MINING WATER CONSERVATION	CONSERVATION [BEXAR]	0	0	921	1,021	1,123	1,217
OLMOS PARK, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	9	11	13	14	21	33
SAN ANTONIO, SAN ANTONIO (L)							
ASR PROJECT AND PHASED EXPANSION	EDWARDS-BFZ AQUIFER [BEXAR]	3,800	16,000	0	0	0	0
BRACKISH GROUNDWATER DESALINATION (WILCOX AQUIFER)	CARRIZO-WILCOX AQUIFER- BRACKISH [BEXAR]	0	12,000	21,000	26,400	26,400	26,400
CRWA WELLS RANCH PROJECT PHASE I	CARRIZO-WILCOX AQUIFER [GONZALES]	2,800	5,200	5,200	5,200	5,200	5,200
CRWA WELLS RANCH PROJECT PHASE II (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GUADALUPE]	0	3,050	3,050	3,050	3,050	3,050
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [BEXAR]	1,233	0	0	0	0	0
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [BEXAR]	37,622	0	0	0	0	0
EDWARDS AQUIFER RECHARGE - TYPE 2 PROJECTS	SAN ANTONIO RIVER RUN-OF-RIVER RECHARGE [BEXAR]	0	13,451	0	0	7,220	0
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [BEXAR]	639	639	0	0	639	639
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [BEXAR]	301	229	164	114	62	11
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [MEDINA]	9,453	9,453	0	1,357	9,074	8,810
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [MEDINA]	8,337	8,337	0	0	8,337	8,337
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [UVALDE]	14,946	14,057	0	7,909	0	0
FIRM-UP RUN-OF-RIVER WITH OFF-CHANNEL RESERVOIR - LCRA/SAWS PROJECT (REGION L COMPONENT)	COLORADO RIVER RUN-OF-RIVER [MATAGORDA]	0	0	84,234	90,000	90,000	90,000
LOCAL GROUNDWATER (TRINITY AQUIFER)	TRINITY AQUIFER [BEXAR]	1,686	1,733	1,613	1,311	1,053	800
LOCAL GROUNDWATER CARRIZO-WILCOX AQUIFER (INCLUDES OVERDRAFTS)	CARRIZO-WILCOX AQUIFER [BEXAR]	0	1,759	2,583	2,156	5,597	8,971

Bexar County cont.

WUG, Basin (RWPG) — All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
MEDINA LAKE FIRM-UP (ASR)	MEDINA LAKE/RESERVOIR [RESERVOIR]	4,236	3,869	5,916	8,725	7,557	6,444
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	4,956	6,320	7,607	9,095	13,710	20,822
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	284	317	348	371	394	416
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	512	681	840	1,024	1,594	2,473
RECYCLED WATER PROGRAMS	DIRECT REUSE [BEXAR]	0	7,760	0	0	0	0
REGIONAL CARRIZO FOR SAWS (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GONZALES]	0	11,687	11,687	11,687	11,687	11,687
SEAWATER DESALINATION	GULF OF MEXICO SEA WATER [RESERVOIR]	0	0	0	0	0	23,463
SCHERTZ, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [GUADALUPE]	0	0	0	0	0	46
REGIONAL CARRIZO FOR SSLGC PROJECT EXPANSION (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GONZALES]	0	0	0	0	0	45
SELMA, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	135	254	609	603	721	827
REGIONAL CARRIZO FOR SSLGC PROJECT EXPANSION (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GONZALES]	0	292	699	695	686	687
SHAVANO PARK, SAN ANTONIO (L)							
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [BEXAR]	41	0	0	0	0	0
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [UVALDE]	320	336	348	357	369	381
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	73	142	205	265	324	382
SOMERSET, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	29	70	110	131	152	177
ST. HEDWIG, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	0	0	0	0	0	14
TERRELL HILLS, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	14	18	21	24	39	65
UNIVERSAL CITY, SAN ANTONIO (L)							
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [BEXAR]	130	0	0	0	0	0
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [BEXAR]	113	421	680	630	606	606
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	0	0	0	0	49	148

Bexar County cont.

WUG, Basin (RWPG) — All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
WATER SERVICES INC, SAN ANTONIO (L)							
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [BEXAR]	48	0	0	0	0	0
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [MEDINA]	222	248	245	224	188	135
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	0	0	0	18	50	105
PURCHASE FROM WWP (SSLGC)/REDISTRIBUTION OF SUPPLIES	CARRIZO-WILCOX AQUIFER [GONZALES]	324	324	324	324	324	324
TWA REGIONAL CARRIZO (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GONZALES]	0	1,000	1,000	1,000	1,000	1,000
WINDCREST, SAN ANTONIO (L)							
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [BEXAR]	235	235	235	235	235	235
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	99	189	270	343	362	385
Sum of Projected Water Management Strategies (acre-feet/year)		**109,436**	**145,999**	**191,213**	**224,617**	**261,847**	**294,075**

COMAL COUNTY[23]

WUG, Basin (RWPG) — All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
BEXAR MET WATER DISTRICT, GUADALUPE (L)							
LOCAL GROUNDWATER CARRIZO-WILCOX AQUIFER (INCLUDES OVERDRAFTS)	CARRIZO-WILCOX AQUIFER [BEXAR]	33	53	75	95	117	141
BEXAR MET WATER DISTRICT, SAN ANTONIO (L)							
LOCAL GROUNDWATER CARRIZO-WILCOX AQUIFER (INCLUDES OVERDRAFTS)	CARRIZO-WILCOX AQUIFER [BEXAR]	386	652	941	1,206	1,502	1,825
BULVERDE CITY, GUADALUPE (L)							
GBRA SIMSBORO PROJECT (OVERDRAFT)	CARRIZO-WILCOX AQUIFER [BASTROP]	0	10	17	23	30	37
PURCHASE FROM WWP (GUADALUPE-BLANCO RIVER AUTHORITY)	CANYON LAKE/RESERVOIR [RESERVOIR]	5	0	0	0	0	0
BULVERDE CITY, SAN ANTONIO (L)							
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [COMAL]	53	0	0	0	0	0
GBRA SIMSBORO PROJECT (OVERDRAFT)	CARRIZO-WILCOX AQUIFER [BASTROP]	0	1,332	2,111	2,887	3,693	4,558
MUNICIPAL WATER CONSERVATION	CONSERVATION [COMAL]	0	0	38	130	260	430

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Comal County cont.

PURCHASE FROM WWP (GUADALUPE-BLANCO RIVER AUTHORITY)	CANYON LAKE/RESERVOIR [RESERVOIR]	648	0	0	0	0	0
TWA REGIONAL CARRIZO (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GONZALES]	0	1,342	2,128	2,910	3,723	4,595
CANYON LAKE WSC, GUADALUPE (L)							
GBRA SIMSBORO PROJECT (OVERDRAFT)	CARRIZO-WILCOX AQUIFER [BASTROP]	0	0	129	2,198	4,466	6,769
MUNICIPAL WATER CONSERVATION	CONSERVATION [COMAL]	0	96	254	543	929	1,414
TWA REGIONAL CARRIZO (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GONZALES]	0	0	3,000	6,000	9,000	12,000
COUNTY-OTHER, GUADALUPE (L)							
GBRA SIMSBORO PROJECT (OVERDRAFT)	CARRIZO-WILCOX AQUIFER [LEE]	0	0	0	0	152	299
GBRA SIMSBORO PROJECT (OVERDRAFT)	CARRIZO-WILCOX AQUIFER [BASTROP]	0	986	1,089	1,181	1,181	1,181
MUNICIPAL WATER CONSERVATION	CONSERVATION [COMAL]	0	0	0	0	0	85
PURCHASE FROM NBU/REDISTRIBUTION OF SUPPLIES	CANYON LAKE/RESERVOIR [RESERVOIR]	891	0	0	0	0	0
PURCHASE FROM WWP (GUADALUPE-BLANCO RIVER AUTHORITY)	CANYON LAKE/RESERVOIR [RESERVOIR]	891	0	0	0	0	0
TWA REGIONAL CARRIZO (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GONZALES]	0	986	1,089	1,181	1,333	1,480
CRYSTAL CLEAR WSC, GUADALUPE (L)							
BRACKISH GROUNDWATER DESALINATION (WILCOX AQUIFER)	CARRIZO-WILCOX AQUIFER- BRACKISH [GUADALUPE]	0	0	130	130	259	259
CRWA WELLS RANCH PROJECT PHASE I	CARRIZO-WILCOX AQUIFER [GONZALES]	433	0	0	0	0	0
GBRA MID BASIN (SURFACE WATER)	GBRA MID BASIN OFF-CHANNEL LAKE/RESERVOIR [RESERVOIR]	0	865	0	0	0	0
HAYS/CALDWELL PUA PROJECT (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [CALDWELL]	0	0	735	735	1,469	1,469
LOCAL GROUNDWATER CARRIZO-WILCOX AQUIFER (INCLUDES OVERDRAFTS)	CARRIZO-WILCOX AQUIFER [GUADALUPE]	0	0	455	907	1,507	2,152
FAIROAKS RANCH, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	5	10	14	18	19	20
GARDEN RIDGE, GUADALUPE (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [COMAL]	21	52	94	147	190	230
PURCHASE FROM WWP (SSLGC)/REDISTRIBUTION OF SUPPLIES	CARRIZO-WILCOX AQUIFER [GONZALES]	135	217	311	405	502	609
GARDEN RIDGE, SAN ANTONIO (L)							
DROUGHT MANAGEMENT	DROUGHT MANAGEMENT [COMAL]	28	0	0	0	0	0
MUNICIPAL WATER CONSERVATION	CONSERVATION [COMAL]	21	52	94	147	190	230

Comal County cont.

WUG, Basin (RWPG) All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
PURCHASE FROM WWP (SSLGC)/REDISTRIBUTION OF SUPPLIES	CARRIZO-WILCOX AQUIFER [GONZALES]	122	178	241	305	371	443
GREEN VALLEY SUD, GUADALUPE (L)							
BRACKISH GROUNDWATER DESALINATION (WILCOX AQUIFER)	CARRIZO-WILCOX AQUIFER- BRACKISH [GUADALUPE]	0	0	112	112	225	225
BRACKISH GROUNDWATER DESALINATION (WILCOX AQUIFER)	CARRIZO-WILCOX AQUIFER- BRACKISH [WILSON]	0	0	638	638	1,278	1,278
CRWA WELLS RANCH PROJECT PHASE II (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GUADALUPE]	175	0	0	0	0	0
GBRA MID BASIN (SURFACE WATER)	GBRA MID BASIN OFF-CHANNEL LAKE/RESERVOIR [RESERVOIR]	0	450	0	0	0	0
PURCHASE FROM NBU/REDISTRIBUTION OF SUPPLIES	CANYON LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	105
MANUFACTURING, GUADALUPE (L)							
GBRA SIMSBORO PROJECT (OVERDRAFT)	CARRIZO-WILCOX AQUIFER [BASTROP]	0	6,033	6,784	7,514	8,141	9,022
PURCHASE FROM WWP (GUADALUPE-BLANCO RIVER AUTHORITY)	CANYON LAKE/RESERVOIR [RESERVOIR]	5,199	0	0	0	0	0
RECYCLED WATER PROGRAMS	DIRECT REUSE [COMAL]	5,199	6,033	6,784	7,514	8,141	9,022
MINING, GUADALUPE (L)							
INDUSTRIAL, STEAM-ELECTRIC POWER GENERATION, AND MINING WATER CONSERVATION	CONSERVATION [COMAL]	439	635	753	870	1,068	1,173
NEW BRAUNFELS, GUADALUPE (L)							
GBRA SIMSBORO PROJECT (OVERDRAFT)	CARRIZO-WILCOX AQUIFER [LEE]	0	0	0	0	2,927	6,175
GBRA SIMSBORO PROJECT (OVERDRAFT)	CARRIZO-WILCOX AQUIFER [BASTROP]	0	780	3,660	6,511	6,511	6,511
MUNICIPAL WATER CONSERVATION	CONSERVATION [COMAL]	815	1,965	3,632	5,433	6,650	8,152
SCHERTZ, GUADALUPE (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [GUADALUPE]	0	0	0	0	18	62
REGIONAL CARRIZO FOR SSLGC PROJECT EXPANSION (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GONZALES]	0	0	0	0	19	63

WUG, Basin (RWPG) All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
SELMA, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	0	90	8	183	209	235
REGIONAL CARRIZO FOR SSLGC PROJECT EXPANSION (INCL. GONZALES CO.)	CARRIZO-WILCOX AQUIFER [GONZALES]	0	6	16	16	16	16
WATER SERVICES INC, SAN ANTONIO (L)							
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [MEDINA]	295	389	496	602	710	832
Sum of Projected Water Management Strategies (acre-feet/year)		**15,794**	**23,212**	**35,828**	**50,541**	**66,806**	**83,097**

KENDALL COUNTY [24]

WUG, Basin (RWPG) — All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
BOERNE, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [KENDALL]	98	280	394	502	652	816
WESTERN CANYON WTP EXPANSION	CANYON LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	276
COUNTY-OTHER, COLORADO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [KENDALL]	0	0	0	0	1	11
COUNTY-OTHER, GUADALUPE (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [KENDALL]	0	0	0	0	72	253
PURCHASE FROM WWP (GUADALUPE-BLANCO RIVER AUTHORITY)	CANYON LAKE/RESERVOIR [RESERVOIR]	221	0	0	0	0	0
STORAGE ABOVE CANYON RESERVOIR (ASR)	GUADALUPE RIVER RUN-OF-RIVER [KENDALL]	0	3,140	3,140	3,140	3,140	3,140
WESTERN CANYON WTP EXPANSION	CANYON LAKE/RESERVOIR [RESERVOIR]	0	0	0	0	0	374
FAIROAKS RANCH, SAN ANTONIO (L)							
MUNICIPAL WATER CONSERVATION	CONSERVATION [BEXAR]	26	51	75	97	101	107
WATER SERVICES INC, SAN ANTONIO (L)							
EDWARDS TRANSFERS	EDWARDS-BFZ AQUIFER [MEDINA]	41	50	59	67	73	79
Sum of Projected Water Management Strategies (acre-feet/year)		**386**	**3,521**	**3,668**	**3,806**	**4,039**	**5,056**

[24] * The values presented in the data tables of this report are county-based. In cases where groundwater conservation districts cover only a portion of one or more counties, the data values are modified with an apportioning multiplier to create new values that more accurately represent district conditions. The multiplier used in the following formula is a land area ratio: (data value *(land area of district in county/land area of county)). For two of the four SWP tables (Projected Surface Water Supplies and Projected Water Demands) only the county-wide user group (WUG) data values (county other, manufacturing, steam electric power, irrigation, mining, and livestock) are modified using the multiplier. WUG values for municipalities, water supply corporations, and utility districts are not apportioned; instead, their full values are retained when they are located within the district, and eliminated when they are located outside (we ask each district to identify these locations).
The other two SWP tables (Projected Water Supply Needs and Projected Water Management Strategies) are not modified because district-specific values are not statutorily required. Each district needs only "consider" the county values in those tables.
In the WUS table every category of water use (including municipal) is apportioned. Staff determined that breaking down the annual municipal values into individual WUGs was too complex.
TWDB recognizes that the apportioning formula used is not perfect but it is the best data available process with respect to time and staffing constraints. If a district believes it has data that is more accurate it can add those data to the plan with an explanation of how the data were derived. Apportioning percentages that the TWDB used are listed above each applicable table.
For additional questions regarding this data, please contact Stephen Allen (stephen.allen@twdb.texas.gov or 512.463.7317) or Rima Petrossian (rima.petrossian@twdb.texas.gov or 512.936.2420).

Appendix C – GAM Run 10-050 MAG version 2

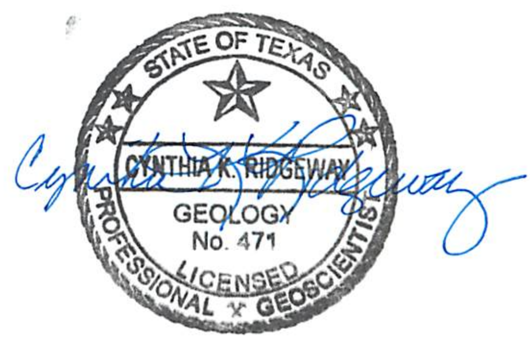
(attached)

GAM Run 10-050 MAG version 2

By Mohammad Masud Hassan, P.E.

Edited and finalized by Radu Boghici to reflect statutory changes effective September 1, 2011

Texas Water Development Board
Groundwater Availability Modeling Section
(512) 463-5808
March 30, 2012



Cynthia K. Ridgeway, the Manager of the Groundwater Availability Modeling Section is responsible for oversight of work performed by employees under her direct supervision. The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.G. 471 on March 30, 2012

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EXECUTIVE SUMMARY:

The modeled available groundwater for the Trinity Aquifer as a result of the desired future condition adopted by the members of Groundwater Management Area 9 declines from approximately 93,000 acre-feet per year to approximately 90,500 acre-feet per year between 2010 and 2060. This is shown divided by county, regional water planning area, and river basin in Table 1 for use in the regional water planning process. Modeled available groundwater is summarized by county, regional water planning area, river basin, and groundwater conservation district in tables 2 though 5. The estimates were extracted from Scenario 6 of Groundwater Availability Modeling Task 10-005 (Hutchison, 2010), which meets the desired future condition adopted by the members of Groundwater Management Area 9.

REQUESTOR:

Mr. Ronald G. Fieseler of the Blanco Pedernales Groundwater Conservation District on behalf of Groundwater Management Area 9

DESCRIPTION OF REQUEST:

In a letter dated August 26, 2010 and received August 30, 2010, Mr. Ronald G. Fieseler provided the Texas Water Development Board (TWDB) with the desired future condition of the Trinity Aquifer adopted by the members of Groundwater Management Area 9. The desired future condition for the Trinity Aquifer in Groundwater Management Area 9, as described in Resolution No. 07-26-10-1, is:

"Hill Country Trinity Aquifer - allow for an increase in average drawdown of approximately 30 feet through 2060 consistent with "Scenario 6" in TWDB Draft GAM Task 10-005"

The TWDB has used this adopted desired future condition to estimate the modeled available groundwater for the Trinity Aquifer for each groundwater conservation district within Groundwater Management Area 9.

METHODS:

The TWDB previously completed several predictive groundwater availability model simulations of the Trinity Aquifer to assist the members of Groundwater Management Area 9 in developing a desired future condition. The location of Groundwater Management Area 9, the Trinity Aquifer, and the groundwater availability model cells that represent the aquifer are shown in Figure 1. As stated in Resolution No. 07-26-10-1, the management area considered Groundwater Availability Modeling (GAM) Task 10-005 (Hutchison, 2010) when developing a desired future condition for the Trinity Aquifer. Since the desired future condition above is met in Scenario 6 of GAM Task 10-005, the modeled available groundwater for Groundwater Management Area 9 presented here was taken directly from that simulation. Please note that in GAM Task 10-005 the pumping was presented as an average of all years (2010 to 2060). We have reported this pumping by decade in the results shown in tables 1-5. The modeled available groundwater was then divided by county, regional water planning area, river basin, and groundwater conservation district (Figure 2).

PARAMETERS AND ASSUMPTIONS:

The parameters and assumptions for the model run using the groundwater availability model for the Trinity Aquifer are described below:

- The results presented in this report are based on Scenario 6 of GAM Task 10-005 (Hutchison, 2010). See Hutchison (2010) for a full description of the methods, assumptions, and results of the model simulations.
- The recently updated groundwater availability model (version 2.01) for the Hill Country portion of the Trinity Aquifer developed by Jones and others (2009) was used for the simulations in GAM Task 10-005. See Mace and others (2000) and Jones and others (2009) for details on model construction, recharge, discharge, assumptions, and limitations.
- The model has four layers: Layer 1 represents the Edwards Group of the Edwards-Trinity (Plateau) Aquifer, Layer 2 represents the Upper Trinity Aquifer, Layer 3 represents the Middle Trinity Aquifer, and Layer 4 represents the Lower Trinity Aquifer. Each scenario in GAM Task 10-005 consisted of a series of 387 separate 50-year model simulations, each with a different recharge configuration. Though the pumping input to the model was the same for each of the 387 simulations, the pumping output differed depending on the occurrence of inactive (or dry) cells. The results below represent the average pumping for the year shown among the simulations comprising Scenario 6 in Hutchison (2010).

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. This is distinct from “managed available groundwater”, shown in the draft version of this report dated December 1, 2010, which was a permitting value, and accounted for the estimated use of the aquifer exempt from permitting.

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 the 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. The estimated amount of pumping exempt from permitting, which the Texas Water Development Board is now required to develop after soliciting input from applicable groundwater conservation districts, will be provided in a separate report.

RESULTS:

The modeled available groundwater for the Trinity Aquifer in Groundwater Management Area 9 consistent with the desired future condition decreases from 93,052 acre-feet per year in 2010 to 90,503 acre-feet per year in 2060. The modeled available groundwater has been divided by county, regional water planning area, and river basin for each decade between 2010 and 2060 for use in the regional water planning process (Table 1).

The modeled available groundwater is also summarized by county, regional water planning area, river basin, and groundwater conservation district as shown in tables 2, 3, 4, and 5, respectively. In Table 5, note that modeled available groundwater is totaled for both groundwater conservation district areas and areas without groundwater conservation districts.

REFERENCES:

Hutchison, William R., 2010, GAM Task 10-005, Texas Water Development Board GAM Task 10-005 Report, 13 p.

Jones, I.C., Anaya, R. and Wade, S., 2009, Groundwater Availability Model for the Hill Country portion of the Trinity Aquifer System, Texas, Texas Water Development Board unpublished report,193 p.

Mace, R.E., Chowdhury, A.H., Anaya, R., and Way, S-C., 2000, Groundwater availability of the Trinity Aquifer, Hill Country Area, Texas—Numerical simulations through 2050: Texas Water Development Board Report 353, 119 p.

TABLE 1. MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER IN GROUNDWATER MANAGEMENT AREA 9 DIVIDED BY COUNTY, REGIONAL WATER PLANNING AREA, AND RIVER BASIN. RESULTS ARE IN ACRE-FEET PER YEAR.

County	Regional Water Planning Area	River Basin	Year					
			2010	2020	2030	2040	2050	2060
Bandera	J	Guadalupe	76	76	76	76	76	76
		Nueces	903	903	903	903	903	903
		San Antonio	6,305	6,305	6,305	6,305	6,305	6,305
Bexar	L	San Antonio	24,856	24,856	24,856	24,856	24,856	24,856
Blanco	K	Colorado	1,322	1,322	1,322	1,322	1,322	1,322
		Guadalupe	1,251	1,251	1,251	1,251	1,251	1,251
Comal	L	Guadalupe	6,906	6,906	6,906	6,906	6,906	6,906
		San Antonio	3,308	3,308	3,308	3,308	3,308	3,308
Hays	K	Colorado	4,721	4,710	4,707	4,706	4,706	4,706
	L	Guadalupe	4,410	4,410	4,410	4,410	4,410	4,410
Kendall	L	Colorado	135	135	135	135	135	135
		Guadalupe	6,028	6,028	6,028	6,028	6,028	6,028
		San Antonio	4,976	4,976	4,976	4,976	4,976	4,976
Kerr	J	Colorado	318	318	318	318	318	318
		Guadalupe	15,646	14,129	14,056	13,767	13,450	13,434
		Nueces	0	0	0	0	0	0
		San Antonio	471	471	471	471	471	471
Medina	L	Nueces	1,575	1,575	1,575	1,575	1,575	1,575
		San Antonio	925	925	925	925	925	925
Travis	K	Colorado	8,920	8,672	8,655	8,643	8,627	8,598
Total			**93,052**	**91,276**	**91,183**	**90,881**	**90,548**	**90,503**

TABLE 2: MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER SUMMARIZED BY COUNTY IN GROUNDWATER MANAGEMENT AREA 9 FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR.

County	Year					
	2010	2020	2030	2040	2050	2060
Bandera	7,284	7,284	7,284	7,284	7,284	7,284
Bexar	24,856	24,856	24,856	24,856	24,856	24,856
Blanco	2,573	2,573	2,573	2,573	2,573	2,573
Comal	10,214	10,214	10,214	10,214	10,214	10,214
Hays	9,131	9,120	9,117	9,116	9,116	9,116
Kendall	11,139	11,139	11,139	11,139	11,139	11,139
Kerr	16,435	14,918	14,845	14,556	14,239	14,223
Medina	2,500	2,500	2,500	2,500	2,500	2,500
Travis	8,920	8,672	8,655	8,643	8,627	8,598
Total	**93,052**	**91,276**	**91,183**	**90,881**	**90,548**	**90,503**

TABLE 3: MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER SUMMARIZED BY REGIONAL WATER PLANNING AREA IN GROUNDWATER MANAGEMENT AREA 9 FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR.

Regional Water Planning Area	Year					
	2010	2020	2030	2040	2050	2060
J	23,719	22,202	22,129	21,840	21,523	21,507
K	16,214	15,955	15,935	15,922	15,906	15,877
L	53,119	53,119	53,119	53,119	53,119	53,119
Total	**93,052**	**91,276**	**91,183**	**90,881**	**90,548**	**90,503**

TABLE 4: MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER SUMMARIZED BY RIVER BASIN IN GROUNDWATER MANAGEMENT AREA 9 FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR.

River Basin	Year					
	2010	2020	2030	2040	2050	2060
Colorado	15,416	15,157	15,137	15,124	15,108	15,079
Guadalupe	34,317	32,800	32,727	32,438	32,121	32,105
Nueces	2,478	2,478	2,478	2,478	2,478	2,478
San Antonio	40,841	40,841	40,841	40,841	40,841	40,841
Total	**93,052**	**91,276**	**91,183**	**90,881**	**90,548**	**90,503**

TABLE 5: MODELED AVAILABLE GROUNDWATER FOR THE TRINITY AQUIFER SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) IN GROUNDWATER MANAGEMENT AREA 9 FOR EACH DECADE BETWEEN 2010 AND 2060. RESULTS ARE IN ACRE-FEET PER YEAR. RA REFERS TO RIVER AUTHORITY. GWD REFERS TO GROUNDWATER DISTRICT.

Groundwater Conservation District	Year					
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Bandera County RA & GWD	7,284	7,284	7,284	7,284	7,284	7,284
Blanco-Pedernales GCD	2,573	2,573	2,573	2,573	2,573	2,573
Cow Creek GCD	10,622	10,622	10,622	10,622	10,622	10,622
Hays Trinity GCD	9,109	9,098	9,095	9,094	9,094	9,094
Headwaters GCD	16,435	14,918	14,845	14,556	14,239	14,223
Medina County GCD	2,500	2,500	2,500	2,500	2,500	2,500
Trinity Glen Rose GCD	25,511	25,511	25,511	25,511	25,511	25,511
Total (district areas)	**74,034**	**72,506**	**72,430**	**72,140**	**71,823**	**71,807**
No District	19,018	18,770	18,753	18,741	18,725	18,696
Total (including non-district areas)	**93,052**	**91,276**	**91,183**	**90,881**	**90,548**	**90,503**

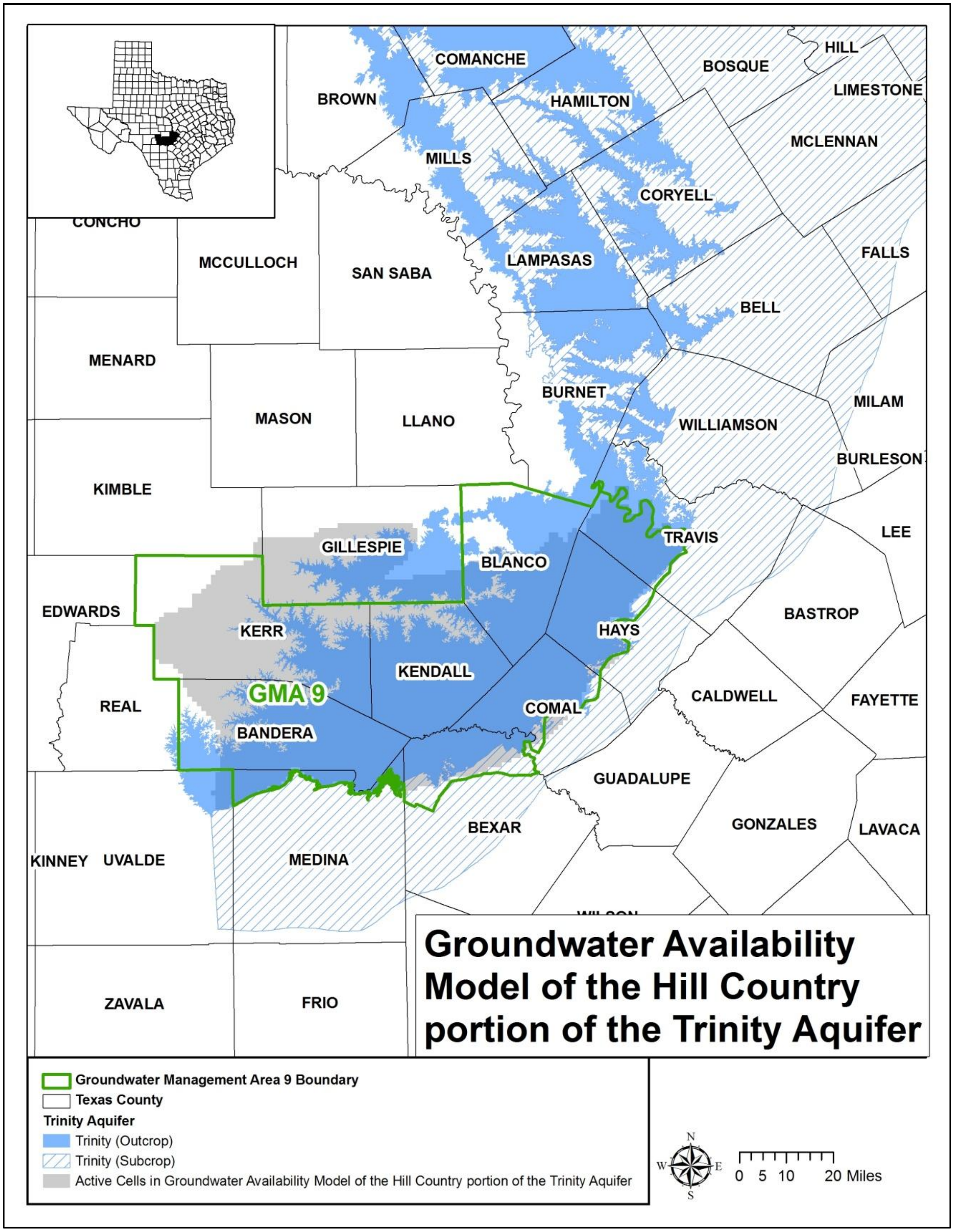

Figure 1: Map showing the areas covered by the groundwater availability model for the Trinity Aquifer.

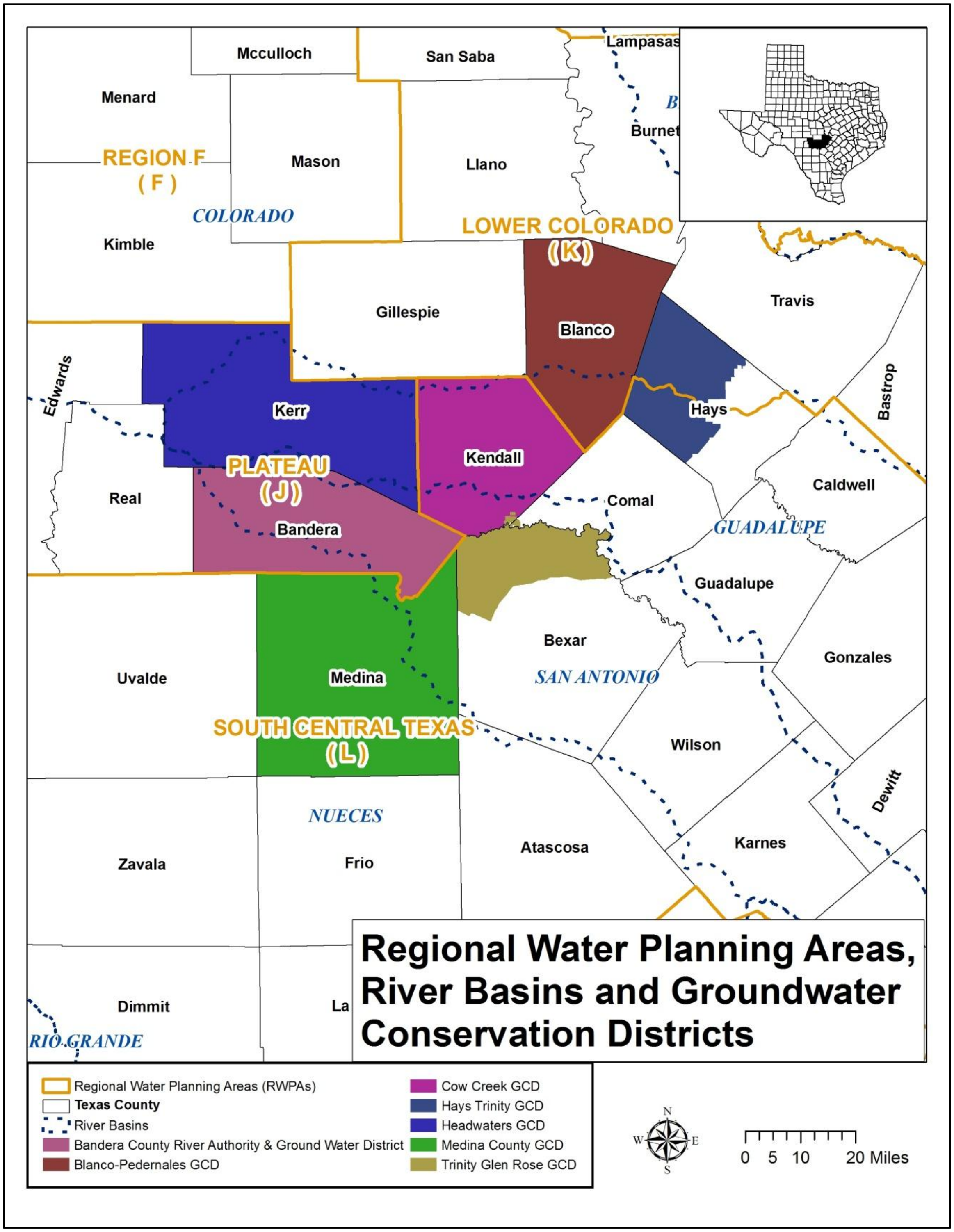

Figure 2: Map showing regional water planning areas (RWPAs), groundwater conservation districts (GCDs), counties, and river basins in Groundwater Management Area 9.

Appendix D – GAM Run 15-001

(attached)

GAM Run 15-001: Trinity Glen Rose Groundwater Conservation District Management Plan

by Shirley C. Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 936-0883
February 17, 2015

STATE OF TEXAS
SHIRLEY C. WADE
GEOLOGY
No. 525
LICENSED
PROFESSIONAL GEOSCIENTIST

Shirley C. Wade 2/17/15

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GAM RUN 15-001: TRINITY GLEN ROSE GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN

by Shirley C. Wade, Ph.D., P.G.
Texas Water Development Board
Groundwater Resources Division
Groundwater Availability Modeling Section
(512) 936-0883
February 17, 2015

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (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. Information derived from groundwater availability models that shall be included in the groundwater management plan includes:

- the annual amount of recharge from precipitation to the groundwater resources within the district, if any;
- 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
- the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

This report—Part 2 of a two-part package of information from the TWDB to the Trinity Glen Rose Groundwater Conservation District—fulfills the requirements noted above. Part 1 of the two-part package is the Estimated Historical Water Use/State Water Plan data report. The District will receive this data report from the TWDB Groundwater Technical Assistance Section. Questions about the data report can be directed to Mr. Stephen Allen, stephen.allen@twdb.texas.gov, (512) 463-7317.

The groundwater management plan for the Trinity Glen Rose Groundwater Conservation District should be adopted by the district on or before September 15, 2015 and submitted to the executive administrator of the TWDB on or before October 15, 2015. The current management plan for the Trinity Glen Rose Groundwater Conservation District expires on December 14, 2015.

This report discusses the methods, assumptions, and results from a model run using the groundwater availability model for the Hill Country portion of the Trinity Aquifer System (Jones and others, 2009). Please note that the Edwards (Balcones Fault Zone) Aquifer occurs within the boundaries of the Trinity Glen Rose Groundwater Conservation District but is excluded from this report because the Trinity Glen Rose Groundwater Conservation District does not have jurisdiction over that aquifer. This model run replaces the results of GAM Run 09-032 (Aschenbach, 2010). The groundwater district boundaries have changed since 2010 and GAM Run 15-001 meets current standards set after the release of GAM Run 09-032. In addition, groundwater flow between the Trinity Aquifer System and the Edwards (Balcones Fault Zone) Aquifer was not reported in GAM Run 09-032.

Table 1 summarizes the groundwater availability model data required by statute, and Figure 1 shows the area of the model from which the values in Table 1 were extracted. If after review of the figure, the Trinity Glen Rose Groundwater Conservation District determines that the district boundaries used in the assessment do not reflect current conditions, please notify the TWDB at your earliest convenience.

The Trinity Aquifer underlies the Edwards (Balcones Fault Zone) Aquifer in the southeast parts of the Trinity Glen Rose Groundwater Conservation District (Figure 1). However, that part of the Trinity Aquifer is not included in the groundwater availability model for the Hill Country portion of the Trinity Aquifer System. Information for the Trinity Aquifer underlying the Edwards (Balcones Fault Zone) Aquifer is being provided separately from the Groundwater Technical Assistance Section of the TWDB.

METHODS:

In accordance with the provisions of the Texas State Water Code, Section 36.1071, Subsection (h), the groundwater availability model for the Hill Country portion of the Trinity Aquifer System (Jones and others, 2009) was run for this analysis. Trinity Glen Rose Groundwater Conservation District water budgets were extracted for the historical model period (1980 through 1997) using ZONEBUDGET Version 3.01 (Harbaugh, 2009). The average annual water budget values for recharge, discharge to surface waterbodies, inflow to the district, outflow from the district, net inter-aquifer flow (upper), and net inter-aquifer flow (lower) for the portion of the aquifer located within the district is summarized in this report.

PARAMETERS AND ASSUMPTIONS:

Hill Country portion of the Trinity Aquifer System

- Version 2.01 of the groundwater availability model for the Hill Country portion of the Trinity Aquifer System was used for this analysis. See Jones and others (2009) for assumptions and limitations of the groundwater availability model.

- This groundwater availability model includes four layers, which represent the Edwards Group of the Edwards-Trinity (Plateau) Aquifer (Layer 1), the Upper Trinity Aquifer (Layer 2), the Middle Trinity Aquifer (Layer 3), and the Lower Trinity Aquifer (Layer 4).

- An overall water budget for the Trinity Glen Rose Groundwater Conservation District was determined for the Hill Country portion of the Trinity Aquifer System (Layers 2 through 4 collectively for the portions of the model that represent the Trinity Aquifer System).

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

RESULTS:

A groundwater budget summarizes the amount of water entering and leaving the aquifer according to the groundwater availability model. Selected groundwater budget components listed below were extracted from the model results for the aquifers located within the district and averaged over the duration of the calibration and verification portion of the model run in the district, as shown in Table 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.

- Surface water outflow—The total water discharging from the aquifer (outflow) to surface water features such as streams, reservoirs, and springs.

- Flow into and out of district—The lateral flow within the aquifer between the district and adjacent counties.

- 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 or confining unit and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs.

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.

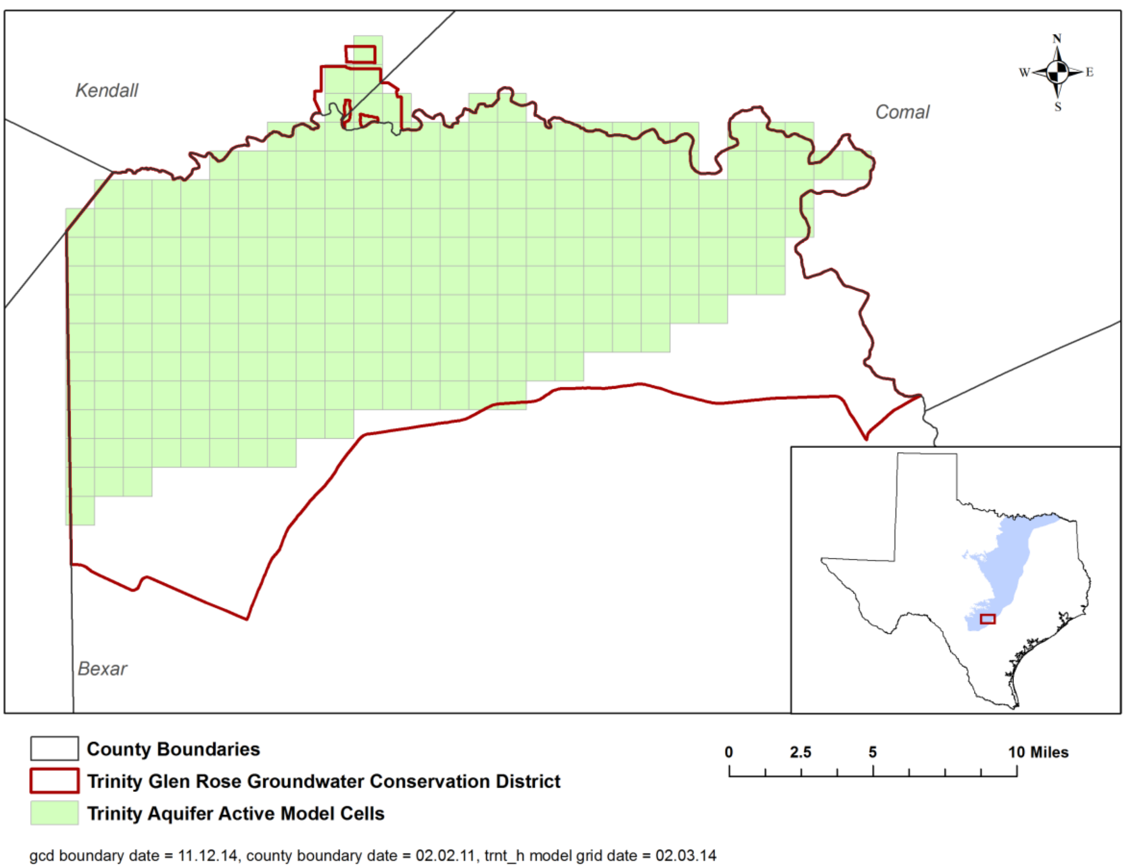

FIGURE 1: AREA OF THE GROUNDWATER AVAILABILITY MODEL FOR THE HILL COUNTRY PORTION OF THE TRINITY AQUIFER SYSTEM FROM WHICH THE INFORMATION IN TABLE 1 WAS EXTRACTED (THE TRINITY AQUIFER EXTENT WITHIN THE DISTRICT BOUNDARY).

TABLE 1: SUMMARIZED INFORMATION FOR THE HILL COUNTRY PORTION OF THE TRINITY AQUIFER SYSTEM THAT IS NEEDED FOR THE TRINITY GLEN ROSE 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	Trinity Aquifer	42,171
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Trinity Aquifer	9,892
Estimated annual volume of flow into the district within each aquifer in the district	Trinity Aquifer	35,193
Estimated annual volume of flow out of the district within each aquifer in the district	Trinity Aquifer	26,170
Estimated net annual volume of flow between each aquifer in the district	From the Trinity Aquifer to the Edwards (Balcones Fault Zone) Aquifer.	37,272

LIMITATIONS:

The groundwater model(s) used in completing this analysis is the best available scientific tool that can be used to meet the stated objective(s). 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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