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APPENDICES

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CHAPTER 3.0: IDENTIFICATION OF CURRENTLY AVAILABLE WATER SUPPLIES

A key task in the preparation of the Lower Colorado Regional Water Plan (Region K Plan) is to determine the current available water supplies within the region. This information, when compared to the population and water demand projections, is critical in projecting water supply shortfalls and surpluses for the region, including the amount of shortfall, when a shortfall is expected to occur, and the county in which the shortfall is expected.

As presented in Chapter 2, the expected water demand in the Lower Colorado Regional Water Planning Area (LCRWPA) is projected to increase by approximately 24 percent while the population is projected to nearly double over the next 50 years. Therefore, the need to accurately identify available water supplies is a critical component of developing the regional plan.

The following sections of the chapter describe the methodologies utilized in developing estimates of currently available water supplies for the LCRWPA. This chapter also presents regional water supplies by county, wholesale water providers of municipal water, and the six Texas Water Development Board (TWDB) specified water-use categories.

3.1 TWDB GUIDELINES FOR REVISIONS TO WATER SUPPLIES

The Texas Water Development Board (TWDB) has promulgated rules for regional planning and has provided specific guidance to Regional Water Planning Groups (RWPGs) concerning the development of estimates of currently available water supplies. The guidance clearly indicates that the estimates of currently available water supplies shall reflect water that is reliably available to the area during a repeat of the “drought-of-record” (DOR) conditions. The specific methods used in determining the amount of currently available water vary depending upon whether it is a groundwater or surface water resource. A summary of TWDB guidelines and methods for estimating currently available water supply is presented below.

3.2 AVAILABLE WATER SOURCES TO THE LCRWPA

In accordance with the TWDB guidelines, five basic types of water supply exist within the LCRWPA. The types are as follows:

- Surface water supplies
- Groundwater supplies
- Supplies available through contractual arrangements
- Supplies available through the operation of a system of reservoirs or other supplies
- Reclaimed water

Since supplies available through the last three categories originated from either surface or groundwater sources, all available water supplies will be discussed in terms of being either of surface water origin or groundwater origin. The following sections present information concerning the available supply of water within the LCRWPA. That is to say, water that is physically present within the LCRWPA, whether it is present due to natural circumstances or it is present as a result of facilities constructed by one or more water users within the LCRWPA.

3.2.1 Surface Water Availability

Surface water sources include any water resource where water is obtained directly from a surface water body. This would include rivers, streams, creeks, lakes, ponds, and tanks. In the State of Texas, all waters contained in a watercourse (rivers, natural streams, and lakes, and the storm water, flood water, and rainwater of every river, natural stream, canyon, ravine, depression, and watershed) are waters of the State and thus belong to the State. The State grants individuals, municipalities, water suppliers, industries, and others the right to divert and use this water through water rights permits. Water rights are considered property rights and can be bought, sold, or transferred with state approval. All of these permits are issued based on the concept of prior appropriation, or "first-in-time, first-in-right." Water rights issued by the State generally fall into two major categories:

- Run-of-River (ROR) Rights – Allow diversions of water directly from a water body as long as there is water in the stream and that water is not needed to meet a senior downstream water right. ROR rights are greatly impacted by drought conditions, particularly in the upper portions of a river basin.

- Stored Water Rights – Allow the impoundment of water by a permittee in a reservoir. Water can be held for storage as long as the inflow is not needed to meet a senior downstream water right. Water stored in the reservoir can be withdrawn by the permittee at a later date to meet its or its customers' water demands. The storage of water in a reservoir gives the permittee a buffer against drought conditions.

A list of active water rights within the LCRWPA is contained in *Appendix 3A.*

In addition to the water rights permits issued by the State, individual landowners may use state waters without a specific permit for certain types of use. The most common of these uses is domestic and livestock use. Landowners are also allowed to construct impoundments on their own property with up to 200 acre-feet (ac-ft) of storage for domestic and livestock or certain wildlife management purposes (see Section 11.142, Texas Water Code). These types of water sources are generally referred to in this plan as "Local Supply Sources." Many individuals with land along a river or stream that have a riparian right can also divert a reasonable amount of water for domestic and livestock uses without a permit.

Water availability in Region K will be determined for the purposes of regional planning as prescribed by the TWDB water planning guidelines. The TWDB guidance requires that the amount of surface water available from each source be determined with the following assumptions:

- Water availability will be estimated based on a "firm yield" analysis. For a reservoir system, this detailed analysis would produce the average annual withdrawals available through a simulated repeat of drought of record conditions considering the reservoir's long-term storage capabilities and drought period inflows, and evaporation. During the on-going drought, drought period inflows into reservoir systems have been lower than the drought-of-record and significantly lower than historical average inflows. For water rights based solely on run-of-river, the drought of record corresponds to the amount of water available in the worst single hydrologic year on record. Without available storage, water is no longer available if the river goes dry. In addition, a run-of-river right may not be able to divert even if there is water in the river or stream due to the constraints of the prior appropriation system or environmental flow limitations under such water right.

- Water availability will be based on the assumption that all senior water rights in the basin are being fully utilized. That is, water user groups cannot depend on "borrowing" water from unused water rights.

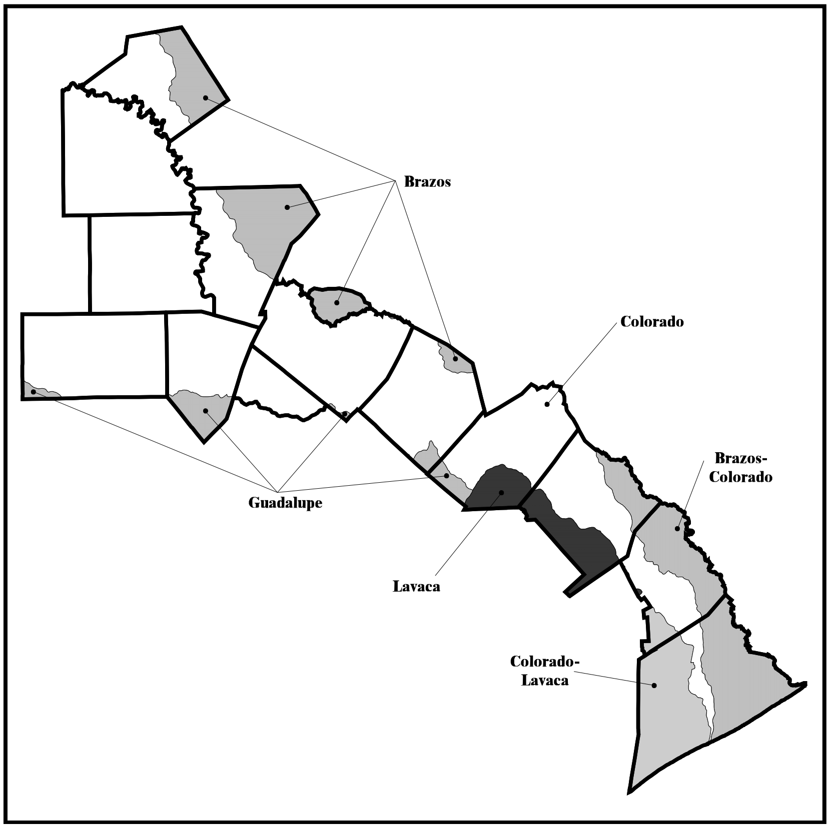
- Water supply is based on the infrastructure that is in place. For example, water would not be considered to be a supply from a reservoir if a user still needed to construct the water intake and pipeline to convey the water from the reservoir to the area of need.

It should be noted that state directives (summarized above) to regional water planners on how they are to determine water availability in meeting future water supply needs may impose unrealistic assumptions on how water is actually used or will be used over the planning period. This methodology requires local water planners to assume that every water right holder will simultaneously divert and totally consume the water up to their full authorizations. These directives have the potential to overestimate water shortages.

Although "worst case" conservative assumptions may be appropriate to avoid the theoretical "over permitting" of water, it may be unrealistic to use this methodology alone for planning purposes. Rather, local and regional planners should be allowed, and are to some extent by the existing process, to bring their knowledge, experience, and common sense to the "planning effort" to determine realistic water availability assumptions, something Senate Bill 1 was intended to provide by establishing a "bottom-up" approach to replace the previous "top-down" state planning approach.

The LCRWPA traverses six different river basins, including the Brazos, Brazos-Colorado Coastal, Colorado, Colorado-Lavaca Coastal, Lavaca, and Guadalupe River Basins. *Figure 3.1* illustrates the location of each of these basins. The following sections discuss the available water sources in each river basin within the LCRWPA.

Figure 3.1: River Basins Within the LCRWPA (Region K)



3.2.1.1 Colorado River Basin

The majority of the LCRWPA is contained in the Colorado River Basin. The primary sources of water within this basin are the Highland Lakes and run-of-river water from the Colorado River. However, several water user groups obtain water from tributaries or off-channel ponds.

3.2.1.1.1 Water Availability Modeling for the 2016 Region K Water Plan

This is the third planning cycle in which the TWDB has approved Region K to use a model other than the TCEQ Colorado River Water Availability Model (WAM) Run 3 to determine surface water availability in the region. Termed the Region K Cutoff Model, this model was developed during the 2011 planning cycle and has been updated for use in the 2016 planning cycle. A description of the Region K Cutoff Model can be found in *Appendix 3B*, along with the request and approval letters for allowing the use of the Region K Cutoff Model by TWDB. The model used prior to the 2011 planning cycle is discussed in detail in the 2006 and 2011 Region K plans.

The model is a modified version of the TCEQ WAM Run 3, where the basin is divided into two parts, an upper basin and a lower basin. The dividing points are the dams for Ivie Reservoir and Lake Brownwood. Most of the area in the upper basin part of the Region K Cutoff Model is included in Region F. Within the Region K Cutoff Model, the water rights below Ivie Reservoir and Lake Brownwood are modeled based on prior appropriation (i.e. each water right has a priority date), however, no water rights downstream of the dividing points make prior appropriation calls on water rights upstream of the dividing points. All of the water rights are represented with their full authorization amounts. This model reflects the actual and historical water management operating conditions and existing contractual agreements between LCRA and certain upper basin water right holders.[1]

3.2.1.1.2.1 Highland Lakes System

The Highland Lakes System is composed of two major water supply reservoirs – Lakes Buchanan and Travis. These lakes are owned and operated by the LCRA. In addition, the system contains three intermediate pass-through lakes owned and operated by the LCRA – Inks Lake, Lake LBJ, and Lake Marble Falls. Lake Austin, the last in the Highland Lakes System, is owned by the City of Austin and is operated by the LCRA through an agreement.

The LCRA operates the Highland Lakes as a system to provide a reliable source of water to its customers. The LCRA developed a "Water Management Plan for the Lower Colorado River Basin" in response to requirements contained in a final order of adjudication of water rights for the Highland Lakes. The Water Management Plan (WMP) was originally adopted in 1989 and has been amended several times, most recently in January 2010, and proposed amendments to the WMP were submitted to the TCEQ by the LCRA in March 2012 and are still pending as of the May, 2015. In each WMP update, LCRA determines the current combined firm yield of Lakes Buchanan and Travis based on a detailed analysis of the water availability for Lakes Buchanan and Travis through a simulated repeat of drought of record conditions. The WMP also contains a management strategy for meeting near-term projected demands of its firm water supply (i.e. municipal, industrial, and other use categories) customers, while continuing to provide water for environmental needs and downstream agricultural purposes, largely on an interruptible basis. The LCRA's current approved WMP determines the annual amount of interruptible water supply that can be made available while continuing to ensure the availability of water for firm demands in a simulated repeat of drought of record conditions using a system of curtailment triggers that are linked to actual water in storage on January 1 of each year. In the current pending update to the WMP, LCRA is proposing significant changes to the WMP, including the utilization of additional trigger dates and storage levels and other mechanisms to better manage the availability and use of interruptible supplies while protecting firm water use through severe drought periods. The interruptible supply is generally comprised of uncommitted firm supply, committed firm supply that is not projected to be used in the ten year planning period covered by the plan, and flood flows. As firm commitments and demands for water under those commitments increase over time, interruptible supplies must be reduced more often even at higher storage levels to ensure the availability of water to firm customers in DOR conditions. For this plan, the Region K Cutoff Model was developed using the LCRA 2010 WMP, and therefore that is the version of the WMP that was used for the development and evaluation of some of the water management strategies in this regional water plan.

The firm yield of the Highland Lakes System was determined using the Region K Cutoff Model and adding up the various components of the Highland Lakes System. Some of the assumptions in the model for determining the firm yield of the system are described below:

- Water rights are protected based on prior appropriation doctrine;

[1] The City of Junction (Lake Junction) and City of Brady, (Brady Creek Lake) water rights are not included in the Region K Cutoff Model under the cutoff assumption, due to the fact that these entities do not have existing formal agreements in place regarding prior appropriation calls on water impoundments.

- The hydrologic conditions in the 1940-2013 period are repeated. Late in the planning cycle, the planning group decided to re-evaluate the surface water availability using hydrology through 2013. Hydrology previously had been through 2009. Doing so did not change the drought-of-record period, but did impact the run-of-river rights by changing the driest year (i.e. "critical year") in the period from 1956 to 2011;
- Downstream, senior water rights are being fully utilized during this period. The water rights in the Lower Colorado Region are included in *Appendix 3A;*
- The 2010 WMP component of the Region K Cutoff Model and the return flows component are disengaged in determining the firm yield of the Highland Lakes System
- The LCRA cannot impose its priority rights for Lakes Buchanan and Travis against any upstream, junior water right with a priority date senior to November 1, 1987, so long as interruptible supplies are not curtailed;
- Historical net evaporation rates for the period of 1940 through 2013 were used;
- Downstream water demands are assumed to be met with inflows to the river below the Highland Lakes, to the extent possible; and
- The total system yield decreases over time due to sedimentation of the reservoirs.

Table 3.1 Components of the Highland Lakes Firm Yield

Entity or Use	Region K Cutoff Model Results (Ac-Ft/Yr)					
	2020	2030	2040	2050	2060	2070
Water Available for LCRA Firm Contracts and Env Commitments*	296,243	290,743	285,243	279,243	272,743	266,743
LCRA Backup of STPNOC Run-of-River Water Right	32,240	32,226	32,202	32,172	32,142	32,120
LCRA Backup of City of Austin Municipal Run-of-River Water Rights**	90,329	90,329	90,329	90,329	90,316	90,262
LCRA Backup to Interruptible Run-of-River Water Rights	0	0	0	0	0	0
Total Highland Lakes Firm Yield	**418,812**	**413,298**	**407,774**	**401,744**	**395,201**	**389,125**

Notes:

Colorado WAM provided by TCEQ, February 2012, Run 3. Hydrology extended through 2013. WRAP program by Dr. Ralph Wurbs, Texas A&M University, August 2012

Drought-of-Record (DOR) is May 1947 to April 1957 (10 years) for all decades

* Includes firm water supplies for municipal, industrial, irrigation, and other water contracts. The LCRA 2010 WMP states that the amount of firm water allocated for environmental purposes is 33,440 AFY (10-year average). This amount is included in this line item.

** Amount shown does not include 33,297 AFY of firm water needed to meet LCRA's full contractual municipal commitment to City of Austin.

Table 3.1 above shows the components that make up the firm yield of the Highland Lakes System. The Region K Cutoff Model was used to determine the values in the table. The results were viewed using the August 2012 version of the WRAP modeling program. The firm yields were calculated for the 10-year

DOR period (May 1947 to April 1957) for the 2020 through 2070 analyses, which is currently identified as the most severe historical drought period since 1898. At the time this plan was being initially drafted this region was experiencing hydrologic drought conditions that were approaching, if not exceeding, those of the above DOR period, thereby giving this regional planning group the expectation of a potential new drought of record period prior to the end of this planning cycle. The firm yield commitments are releases from system storage; they do not consist of run-of-river water.

As shown in *Table 3.1* the Highland Lakes yield will decrease over time and this is due to sedimentation of the two supply reservoirs.

It should be noted that the current drought in the Colorado River Basin is on-going and historical in proportion. At the time of the development of this plan's information, preliminary analysis indicates that firm yields have been reduced below the values shown. The LCRA is working to develop drought response strategies to assure that the water supply remains reliable taking into consideration the on-going drought. LCRA's water management strategies and drought response strategies are referenced in Chapter 5.

3.2.1.1.2.2 Reservoirs

The estimated firm yields for all existing reservoirs within the Colorado River Basin are presented in *Table 3.2*.

Table 3.2 Reservoir Yields in the Colorado Basin (ac-ft/yr)

Entity or Use	Region K Cutoff Model Results (Ac-Ft/Yr)					
	2020	2030	2040	2050	2060	2070
Highland Lakes	**418,812**	**413,298**	**407,774**	**401,744**	**395,201**	**389,125**
City of Goldthwaite	0	0	0	0	0	0
City of Llano	417	417	417	417	417	417
Walter E. Long (Decker Lake)	0	0	0	0	0	0
Lake Bastrop	0	0	0	0	0	0
Lake Fayette	0	0	0	0	0	0
City of Lometa	0	0	0	0	0	0
STP Reservoir	0	0	0	0	0	0
Minor Reservoir Subtotal	**417**	**417**	**417**	**417**	**417**	**417**
TOTAL	**419,229**	**413,715**	**408,191**	**402,161**	**395,618**	**389,542**

Notes:

Colorado WAM provided by TCEQ, February 2012, Run 3. WRAP program by Dr. Ralph Wurbs, Texas A&M University, August 2012

Drought-of-Record (DOR) is May 1947 to April 1957 (10 years) for all decades

The Highland Lakes firm yield is discussed in detail in *Section 3.2.1.1.1*. Several smaller reservoirs in the LCRWPA are also located within the Colorado River Basin. Estimates for the firm yield of these reservoirs are based on the Region K Cutoff Model runs and a detailed discussion is provided below.

- The **City of Goldthwaite** owns and operates a two-reservoir system as part of its water supply facilities. The reservoirs include a small reservoir with a capacity of 40 ac-ft adjacent to the river and a larger reservoir with a capacity of 200 ac-ft, both of which are located off-channel. The city pumps water from the Colorado River into the smaller reservoir and then pumps it into the larger reservoir, from which water is drawn for treatment. The size of the reservoirs are relatively small in comparison to the city's water demand, which is projected to increase from approximately 361 ac-ft in the year 2020 scenario to 407 ac-ft in the year 2070. Based on the limited storage available, the firm yields of the reservoirs are dependent upon continued river flows throughout the year. It is estimated that the available storage would be depleted within four months once the river ceases flowing. Based on the Region K Cutoff Model, it was determined that the Goldthwaite reservoir system has a firm yield of 0 ac-ft/yr.

- The **City of Llano** owns and operates two reservoirs on the Llano River: City Lake and City Park Lake, both of which are small channel dams. The two reservoirs were estimated to have a combined capacity of 503 ac-ft in 1988. This is significantly less than the original design capacity of 700 ac-ft. The decreased capacity is due to sedimentation rates in the two reservoirs. The firm yield estimated by the Region K Cutoff Model was 417 ac-ft/yr.

- **Lake Walter E. Long (Decker Lake)** is owned and operated by the City of Austin. The lake is formed by a dam on Decker Creek, which is a tributary to the Colorado River in Travis County. The City of Austin uses Decker to supply cooling water for an electrical generating plant. The City of Austin supplements the water supply to Decker by pumping water from the Colorado River based on run-of-river rights and a water supply contract with LCRA for stored water from the Highland Lakes. Therefore, because the water from Decker Lake has already been accounted for in run-of-river and LCRA backup amounts, the firm yield of the lake itself due to the TCEQ WAM is considered 0 ac-ft/yr.

  Lake Bastrop is owned and operated by the LCRA. The lake is formed by a dam on Spicey Creek, which is a tributary to Piney Creek and the Colorado River in Bastrop County. The LCRA uses water from Lake Bastrop for cooling purposes at its Sim Gideon Power Generating Station. The LCRA supplements the water supply at this lake by pumping water into the lake from the Colorado River. The surface water pumped into the lake is stored water from the Highland Lakes. Therefore, because the water from Lake Bastrop has already been accounted for in run-of-river and LCRA backup amounts, the firm yield of the lake itself due to the TCEQ WAM is considered 0 ac-ft/yr. In addition to surface water sources, LCRA has obtained a groundwater production permit from the Lost Pines Groundwater Conservation District to use groundwater from the Simsboro formation at this site for industrial purposes and the lake is now supplied by both surface water and groundwater.

- **Lake Fayette** is owned and operated by the LCRA. The lake is formed by a dam on Cedar Creek, which is a tributary to the Colorado River in Fayette County. The LCRA uses water from Lake Fayette for cooling purposes at the Fayette Power Project. The LCRA supplements the water supply at this lake by pumping water into the reservoir from the Colorado River. A portion of the water pumped is run-of-river water rights held by the City of Austin, which is co-owner in certain facilities at the Fayette Power Project. The remainder of the water pumped into the reservoir is stored water from the Highland Lakes. Therefore, because the water from Lake Fayette has already been accounted for in run-of-river and LCRA backup amounts, the firm yield of the lake itself due to the TCEQ WAM is considered 0 ac-ft/yr.

- **Lometa Reservoir** is owned by LCRA and is being operated under a long term agreement with an operating company. The reservoir is formed by a dam on Salt Creek, which is a tributary to the Colorado River in Lampasas County. Water from Lometa Reservoir is being used for municipal purposes within the service area of the Lometa Water System. The reservoir was authorized to have a normal maximum operating capacity of 554.6 ac-ft. A maximum of 882 ac-ft of water is available for diversion from the Colorado River, including 476 ac-ft for municipal demands and 406 ac-ft to offset evaporative losses through an upstream firm water supply contract with LCRA. Because this amount is included as part of the Highland Lakes firm yield, the reported firm yield of the Lometa Reservoir is 0 ac-ft/yr.

- **South Texas Project Reservoir**: The Main Cooling Reservoir associated with the South Texas Project Electric Generating Station is a 7,000-acre (surface area) off-channel reservoir located in Matagorda County. At the authorized maximum design operating level, the reservoir has a capacity of 202,600 ac-ft, or 9.6 percent of the total capacity of Lakes Travis and Buchanan as stated in the LCRA Water Management Plan. The firm yield from the TCEQ WAM is considered to be 0 ac-ft/yr since the reservoir firm yield is supplied by the STP run-of-river right (STP Nuclear Operating Co. et al.) and LCRA stored water from Lakes Buchanan and Travis, and the amount of water from the run-of-river right and LCRA's Highland Lakes has already been included in the water availability analysis for Region K (refer to *Tables 3.1* and *3.3*). If both the run-of-river right and the reservoir firm yield were included, then the water would be double counted since the water available to the reservoir is based on the diversions from the river.

  Reservoir water is withdrawn from the Colorado River adjacent to the site. Pumping from the river is intermittent, and this diversion normally occurs during periods of higher river flow. The reservoir design incorporates storage to account for periods during which river water is unavailable for the reservoir in order to support operation through a repeat of the drought of record conditions.

- **Consideration of Lower Inflows on Reservoir Firm Yields.** During the ongoing drought, reservoir inflows have been unusually low in comparison to historical inflows, even during periodic significant rainfall events. Many factors can affect inflows including: changes in the frequency and intensity of rainfall events in the watershed, the transpiration of water and impeding of flows by invasive species, proliferation of impoundments such as stock tanks, and pumping from the alluvium of rivers and tributaries.

3.2.1.1.2.3 Run-of-River Water

Historically, the State of Texas has granted many of the run-of-river rights through an adjudication process that considered maximum historical uses. As a result, some run-of-river rights may have been granted for more water than is available in a river during drought conditions. The use of water during drought conditions is controlled by the priority system, with the oldest water rights having first call on the flows in the river. The TCEQ Colorado River Basin WAM was developed to simulate the amount of water available in the Colorado River under a strict run-of-river model scenario with no basin water management. Major factors used to calculate available water include:

- Senior downstream water rights are assumed to be fully utilized;

- No wastewater flows are returned to the river; and

- Inflows to the Highland Lakes are passed through the lakes to the extent that the water is needed to satisfy senior water rights downstream.

The results of this analysis for major run-of-river rights holders are presented in *Table 3.3*. The water availability presented in the table for most of the major run-of-river rights is based on the amount of run-of-river water that would be available during the driest year of the analysis period (2011 in the Region K Cutoff Model). Modeling output was reviewed to confirm that run-of-river availabilities were not over-estimated due to intra-year shortages. Region K has a very limited number of municipal water rights that are strictly run-of-river with no available storage or backup contract, and availabilities shown in this plan for those are based on the use-appropriate monthly percentages of the annual firm diversion being satisfied. The water availability for the City of Austin and STP Nuclear Operating Company water rights is based on the average annual water availability during the drought-of-record (DOR) period (1947-1957). This average availability was used since the City of Austin has contracted with LCRA to supply stored water to firm up its run-of-river water rights during drought conditions. Section 3.3.2 provides details of how the City of Austin is able to receive up to 325,000 AFY of firm water for municipal and other beneficial water uses, if needed. The STP Nuclear Operating Company has also contracted for backup supplies from LCRA, in addition to having a reservoir that allows for potential storage of water over the DOR period instead of having to use all of the water that is received in a particular year.

Table 3.3 below shows the water availability for the major run-of-river rights. The Region K Cutoff Model was used to determine the values in the table. The following describes the methods used to determine the values in *Table 3.3*.

LCRA (Garwood, Lakeside (#1 & 2), Gulf Coast, and Pierce Ranch)
The Garwood, Lakeside (#1 & 2), Gulf Coast, and Pierce Ranch operations each have several water supplies, both run-of-river and supplemental interruptible supplies from the Highland Lakes. The run-of-river rights are listed in *Table 3.3*. The run-of-river water rights were summed for each irrigation operation to determine which year in the model had the minimum total diversion.

City of Austin
The City of Austin has four municipal water rights shown in the table. Because these water rights are backed up by LCRA through contract each year, an average during the DOR was used.

The City of Austin has steam-electric water rights as shown in the table. The steam-electric water use portion of water right 5489 is backed up by LCRA, so an average during the DOR was used. The steam-electric water use portion of water right 5471 is not backed up by the LCRA, so the water availability for this right was determined by using the minimum amount of water available in any year during the analysis period.

Table 3.3 Major Run-of-River Rights in the Colorado Basin (ac-ft/yr)

Water Right Number	Water Rights Holder	Maximum Permitted Diversion (ac-ft/yr)	Priority Date	Region K Cutoff Model	
				2020	2070
5434	LCRA - Garwood	133,000	Nov 1, 1900	123,822	123,822
	Garwood	**Sub-Total**		**123,822**	**123,822**
5475	LCRA - Lakeside #1 Sr	52,500	Jan 4, 1901	2,780	2,780
5475	LCRA - Lakeside #1 Jr	78,750	Nov 1, 1987	0	0
5475	LCRA - Lakeside #2	55,000	Sep 2, 1907	2,912	2,912
	Lakeside #1 and #2	**Sub-Total**		**5,692**	**5,692**
5476	LCRA - Gulf Coast Sr	228,570	Dec 1, 1900	13,446	13,446
5476	LCRA - Gulf Coast Jr	33,930	Nov 1, 1987	78	78
	Gulf Coast	**Sub-Total**		**13,524**	**13,524**
5477	LCRA - Pierce Ranch	55,000	Sep 1, 1907	2,912	2,912
	Pierce Ranch	**Sub-Total**		**2,912**	**2,912**
5471	City of Austin - (mun.) [1, 2]	250,000	Jun 30, 1913	158,781	158,848
5471	City of Austin - (mun.) [1]		Jun 30, 1913	29,201	29,201
5471	City of Austin - (mun.) [1]	21,403	Jun 27, 1914	8,284	8,284
5471	City of Austin - (stm.)	24,000	Jun 27, 1914	4,970	4,970
5471	City of Austin - (stm.)		Jun 27, 1914	871	871
5489	City of Austin - (mun.) [1]	20,300	Aug 20, 1945	5,108	5,108
5489	City of Austin - (stm.)	16,156	Aug 20, 1945	0	0
5489	City of Austin - (stm.) [1]		Aug 20, 1945	5,097	5,097
5437	STP Nuclear Operating Co. [1]	102,000	Jun 10, 1974	44,397	44,397
5434	City of Corpus Christi [3]	35,000	Nov 2, 1900	22,105	22,105
	Totals	**1,433,200**		**424,764**	**424,831**

Data Source: WRAP modeling program provided by Dr. Ralph Wurbs, Texas A&M University, August 2012 version. Region K Cutoff Model updated for 2016 Plan.

Notes:

Water availability reflects driest year during period of record (1940-2013) unless otherwise noted and does not include return flows.

An explanation of the firm yield calculations is provided in Chapter 3 Section 3.2.1.1.2

The Drought-of-Record (DOR) is May 1947 - Apr 1957 for 2020-2070.

[1] The water availability was averaged over the drought-of-record period because of LCRA backup water.

[2] LCRA's water rights with a priority date junior to November 15, 1900, are subordinated in accordance with City of Austin Certificate of Adjudication #5471, Amendment A., Section 5.a.

[3] The water availability for this run-of-river water right was determined by using the minimum amount of water available in any year during the DOR. After discussions with Region N, the water availability entered into the TWDB database was not the one determined using the Region K Cutoff Model. Please see Section 3.2.1.1.2.3 for additional details.

STP Nuclear Operating Company
The run-of-river water right 5437, jointly owned by STPNOC and LCRA, was determined by taking the average over the DOR period. This was done because there is a contract for backup from LCRA, and there is a reservoir that allows for storage of water over the DOR period, rather than having to use the entire amount of water received in a particular year. One of the STPNOC diversion points is within the tidal reaches of the Gulf of Mexico.

Corpus Christi
The water availability for this run-of-river water right was determined by using the minimum amount of water available in any year during the DOR. After discussions with Region N, the water availability entered into the TWDB database was not the one determined using the Region K Cutoff Model. Region N has a local multi-basin system model with different drought-of-record periods. By working as a system, the sources can be optimized to provide a minimum amount of water each year. Therefore, using the minimum annual amount as the availability for each source in their system may not be accurate. At Region N's request, the availability entered into the TWDB database was the full authorized diversion of 35,000 ac-ft/yr.

3.2.1.1.2.4 Local Surface Water Sources

Another category of available surface water is local supply sources. This category includes small diversions from the river or tributaries to the river, as well as stock ponds that have captured diffuse surface water located on individual's property. Information concerning these sources is limited. As a result, the information available from the TWDB developed during the first planning cycle was used as an initial estimate of the water availability. However, in several instances the availability numbers were increased to match the projected demands with the assumption that the supply and demand for local water will be self-limiting. The results of this process are presented in *Table 3.4* and are organized by county. These numbers were developed for the 2001 Region K Plan and have been updated for the 2016 Plan.

Table 3.4 Other Surface Water Sources in the Colorado Basin (ac-ft/yr)

Local Supply Source Name	2020	2030	2040	2050	2060	2070
Livestock - basinwide	10,043	10,043	10,043	10,043	10,043	10,043
Other - basinwide	29,226	29,226	29,226	29,226	29,226	29,226
Irrig. - Bastrop Co.	786	786	786	786	786	786
Irrig. - Blanco Co.	67	67	67	67	67	67
Irrig. - Burnet Co.	276	276	276	276	276	276
Irrig. - Colorado Co.	3,000	3,000	3,000	3,000	3,000	3,000
Irrig. - Fayette Co.	534	534	534	534	534	534
Irrig. - Gillespie Co.	880	880	880	880	880	880
Irrig. - Hays Co.	41	41	41	41	41	41
Irrig. - Llano Co.	440	440	440	440	440	440
Irrig. - Matagorda Co.	900	900	900	900	900	900
Irrig. - Mills Co.	2,378	2,378	2,378	2,378	2,378	2,378
Irrig. - San Saba Co.	8,800	8,800	8,800	8,800	8,800	8,800
Irrig. - Travis Co.	880	880	880	880	880	880
Irrig. - Wharton Co.	7,650	7,650	7,650	7,650	7,650	7,650
Totals	**65,901**	**65,901**	**65,901**	**65,901**	**65,901**	**65,901**

Note: All of the sources listed in the table above are Local Supply Sources, which were updated for the 2016 Plan.

3.2.1.1.2.5 Current Available Reclaimed Water

Another category of surface water for use in the Colorado Basin is reclaimed water. Reclaimed water is wastewater effluent that has been treated to a level that is safe to be directly used to meet various water needs. At this time, reclaimed water in Region K is used for non-potable uses only, such as irrigation or industrial uses. Reclaimed water is currently used by the City of Austin, the City of Horseshoe Bay, the City of Buda, and entities around the Highland Lakes. *Table 3.5* contains a summary of available reclaimed water.

Table 3.5 Reclaimed Water Sources in the Colorado River Basin (ac-ft/yr)

Reclaimed Water Source Name	2020	2030	2040	2050	2060	2070
Direct Reuse – Burnet Co.	1,270	1,270	1,270	1,270	1,270	1,270
Direct Reuse – Hays Co.	2,240	2,240	2,240	2,240	2,240	2,240
Direct Reuse – Llano Co.	516	516	516	516	516	516
Direct Reuse – Travis Co.	19,500	33,457	45,648	55,598	60,848	60,848
Totals	**23,526**	**37,483**	**49,674**	**59,624**	**64,874**	**64,874**

3.2.1.2 Brazos River Basin

A portion of the LCRWPA is located within the Brazos River Basin. This area is limited to portions of Bastrop, Burnet, Fayette, Mills, Travis, and Williamson Counties. The portion of Williamson County in Region K is completely contained within the City of Austin service area. The remainder of Williamson County is located in Region G.

Surface water sources for these areas are limited to local sources. There are no major reservoirs within the LCRWPA portion of the Brazos River Basin. *Table 3.6* contains a summary of the surface water available to the LCRWPA from the Brazos River Basin.

Table 3.6 Surface Water Sources in the Brazos River Basin (ac-ft/yr)

Source Name	2020	2030	2040	2050	2060	2070
Livestock - basinwide	727	727	727	727	727	727
Totals	**727**	**727**	**727**	**727**	**727**	**727**

Note: All of the sources listed in the table above are Local Supply Sources, which were updated for the 2016 Plan.

3.2.1.3 Brazos-Colorado Coastal Basin

A portion of the LCRWPA is located within the Brazos-Colorado Coastal Basin. This area is limited to portions of Colorado, Matagorda, and Wharton Counties. Surface water sources for these areas are limited to local sources and a run-of-river water right from the San Bernard River. There are no major reservoirs within the LCRWPA portion of the Brazos-Colorado Coastal Basin. *Table 3.7* contains a summary of the surface water available to the LCRWPA from the Brazos-Colorado Coastal Basin.

Table 3.7 Surface Water Sources in the Brazos-Colorado Coastal Basin (ac-ft/yr)

Source Name	2020	2030	2040	2050	2060	2070
San Bernard ROR	597	597	597	597	597	597
Livestock - basinwide	1,238	1,238	1,238	1,238	1,238	1,238
Other - basinwide	1,900	1,900	1,900	1,900	1,900	1,900
Irrig. - Matagorda Co.	4,000	4,000	4,000	4,000	4,000	4,000
Irrig. - Wharton Co.	2,000	2,000	2,000	2,000	2,000	2,000
Totals	**9,735**	**9,735**	**9,735**	**9,735**	**9,735**	**9,735**

Note: All of the sources listed in the table above except for the San Bernard ROR are Local Supply Sources, which were updated for the 2016 Plan.

3.2.1.4 Colorado-Lavaca Coastal Basin

A portion of the LCRWPA is located within the Colorado-Lavaca Coastal Basin. This area is limited to portions of Matagorda and Wharton Counties. Surface water sources for these areas are limited to local sources. There are no major reservoirs (other than the South Texas Project Reservoir described in Section 3.2.1.1.2.2) within the LCRWPA portion of the Colorado-Lavaca Coastal Basin, and there are no WUGs with rights to water from reservoirs in the Colorado-Lavaca Coastal Basin. Return flows originating in the Colorado Basin from agriculture are sent to the Colorado-Lavaca Coastal Basin for use, but since the Region K Cutoff Model assumes full utilization of water rights and no return flows unless explicitly stated in the water right, these return flows were not taken into consideration for the Region K water availability analysis. *Table 3.8* contains a summary of the surface water available to the LCRWPA from the Colorado-Lavaca Coastal Basin.

Table 3.8 Surface Water Sources in the Colorado-Lavaca Coastal Basin (ac-ft/yr)

Source Name	2020	2030	2040	2050	2060	2070
Livestock - basinwide	788	788	788	788	788	788
Irrig. - Matagorda Co.	4,000	4,000	4,000	4,000	4,000	4,000
Totals	**4,788**	**4,788**	**4,788**	**4,788**	**4,788**	**4,788**

Note: All of the sources listed in the table above are Local Supply Sources, which were updated for the 2016 Plan.

3.2.1.5 Lavaca River Basin

A portion of the LCRWPA is located within the Lavaca River Basin. This area is limited to portions of Colorado and Fayette Counties. Surface water sources for these areas are limited to local sources. There are no major reservoirs within the LCRWPA portion of the Lavaca River Basin, and there are no WUGs with rights to water from reservoirs in the Lavaca River Basin. *Table 3.9* contains a summary of the surface water available to the LCRWPA from the Lavaca River Basin.

Table 3.9 Surface Water Sources in the Lavaca River Basin (ac-ft/yr)

Source Name	2020	2030	2040	2050	2060	2070
Livestock - basinwide	851	851	851	851	851	851
Irrig. - Colorado Co.	4,002	4,002	4,002	4,002	4,002	4,002
Irrig. - Fayette Co.	20	20	20	20	20	20
Totals	**4,873**	**4,873**	**4,873**	**4,873**	**4,873**	**4,873**

Note: All of the sources listed in the table above are Local Supply Sources, which were updated for the 2016 Plan.

3.2.1.6 Guadalupe River Basin

A portion of the LCRWPA is located within the Guadalupe River Basin. This area is limited to portions of Bastrop, Blanco, Fayette, Hays, and Travis Counties. Most of the surface water sources for these areas are limited to local sources. There are no major reservoirs within the LCRWPA portion of the Guadalupe River Basin. However, the City of Blanco owns and operates two, small, on-channel reservoirs on the Blanco River. The two reservoirs have a combined storage capacity of 168 ac-ft.

Anecdotal information provided by the City of Blanco indicates that the Blanco River has ceased flowing in the past, most notably during the summer of 1996. Information provided by the City of Blanco indicates that flow in the Blanco River ceased for a three-month period during that summer. The relatively small storage capacity of the two reservoirs will not sustain the projected demands from the City of Blanco for more than a four-month period when the river has ceased flowing.

Based on the Guadalupe River Basin WAM from TCEQ, dated October 2014, Run 3, the firm yield of the reservoir system is 596 ac-ft (water right C3877_1). *Table 3.10* contains a summary of the surface water available to the LCRWPA from the Guadalupe River Basin.

Table 3.10 Surface Water Sources in the Guadalupe River Basin (ac-ft/yr)

Source Name	2020	2030	2040	2050	2060	2070
Livestock - basinwide [1]	365	365	365	365	365	365
Irrig. - Blanco Co. [1]	9	9	9	9	9	9
Blanco Reservoirs [2]	596	596	596	596	596	596
Totals	**970**	**970**	**970**	**970**	**970**	**970**

[1] Local Supply Sources determined in the 2001 Plan, which were updated for the 2016 Plan.
[2] Firm Yield Data Source: Guadalupe River Basin WAM provided by TCEQ, October 2014, Run 3. WRAP modeling program provided by Dr. Ralph Wurbs, Texas A&M University, August 2012 version.

3.2.2 Groundwater Availability

Available groundwater is the volume of groundwater that can be withdrawn from an individual aquifer in accordance with the principle by which the aquifer is being managed or an assumed management approach. That managing principle, typically stated as a sustainability goal, can be stated in various ways, and the mechanism through which availabilities are being stated throughout Texas is evolving.

Before the advent of Groundwater Management Areas (GMAs), (HB 1763, 79th Legislature), an aquifer, or portion of an aquifer, may or may not have had a governmental entity managing the way that aquifer was being managed. If an aquifer, or portion of an aquifer, was managed, it was by a Groundwater Conservation District (GCD) whose jurisdiction can coincide with the boundary or boundaries of one or more counties or an aquifer. Most aquifers span multiple counties, and in that case the entire aquifer can be managed by one or more GCDs, with some portions not managed at all. There are also several Priority Groundwater Management Areas (PGMA) around the State, with portions of the Hill Country PGMA located within Region K. PGMAs are areas where critical groundwater problems exist. Region K has a GCD in every county located within the PGMA with the exception of Travis County. The Hill Country UWCD in Gillespie County was created prior to the designation of the PGMA. The Blanco-Pedernales GCD was created after the PGMA designation, as was the Hays-Trinity GCD. These GCDs give notice to the area residents that the declaration of the PGMA means that their water availability and quality will be at risk within the next 50 years. The Hays County Development Regulations have specific requirements listed for subdivisions served by individual water wells producing local groundwater within the PGMA. These requirements can be found in *Chapter 715, Sub-Chapter 3, Section 3.06* of the Hays County Development Regulations. GMAs are a different concept in that every county in the State is in one or more of sixteen GMAs, for the most part the major aquifers are not split across multiple GMAs, and the goal is to manage entire aquifer systems across political subdivisions in a consistent way. GCDs and GMAs are discussed in Chapter 1 of this plan and on the TWDB website at http://www.twdb.state.tx.us/groundwater/index.asp.

Early in the 2011-2016 regional water planning cycle, the GMAs in the LCRWPA adopted their Desired Future Condition (DFC) for their aquifers and the TWDB established the Modeled Available Groundwater (MAG) values for such aquifers. The GCDs within the PGMA had the same responsibility to adopt their DFC and establish a MAG for the aquifers in their district. If a MAG has been established for a particular aquifer, the TWDB requires that the MAG be considered the maximum amount of groundwater available for the regional water planning process. In cases where a MAG is not established for an aquifer, the local GCD or GMA representative was consulted regarding an appropriate availability volume.

The groundwater resources located in the region have been traditionally divided into those aquifers that yield large quantities of water over a relatively large area (major aquifers) and those aquifers yielding smaller quantities of water over smaller areas (minor aquifers). In the LCRWPA there are five major aquifers and six minor aquifers that provide usable groundwater supplies. The following discussion of the groundwater resources of the LCRWPA is divided into these two categories.

3.2.2.1 Major Aquifers

The major aquifers in the LCRWPA are the Edwards-Trinity (Plateau), Trinity Group, Edwards (Balcones Fault Zone), Carrizo-Wilcox, and the Gulf Coast. These five aquifers provide a significant component of the water supply used within the LCRWPA beyond that provided by the Colorado River. Most of the cities in the planning region draw their water supply from one of the five major aquifers. Descriptions and availability volumes of each major aquifer are provided in the following sections.

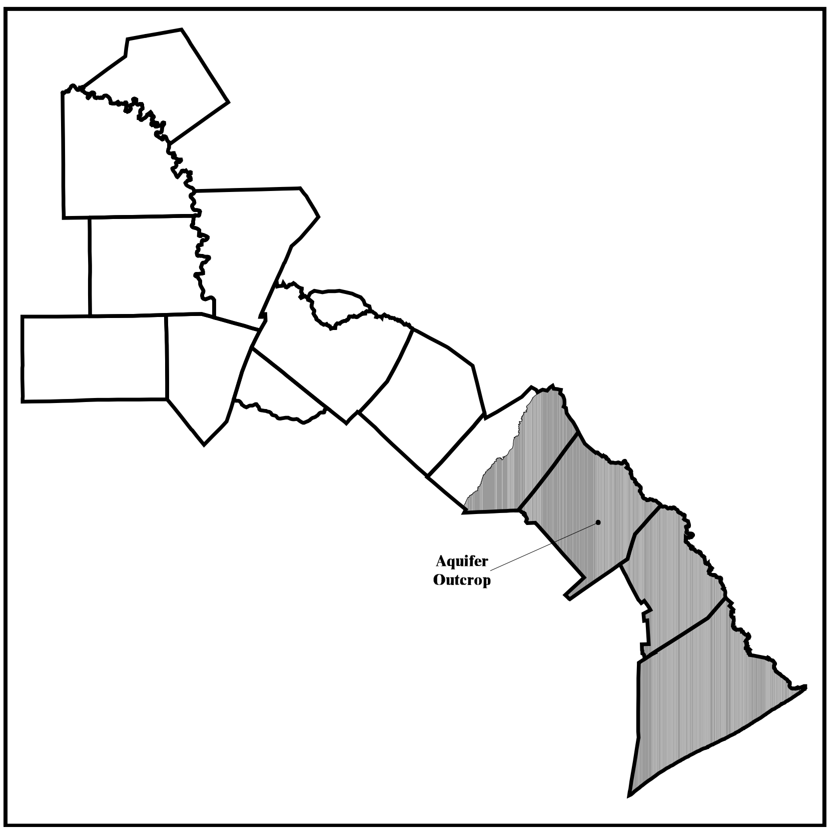
3.2.2.1.1 Gulf Coast Aquifer

Location and Use

The Gulf Coast aquifer forms an irregularly shaped belt along the Gulf of Mexico from Florida to Mexico. In Texas, the aquifer provides water to all or parts of 54 counties and extends from the Rio Grande northeastward to the Louisiana-Texas border.

Groundwater use from the Gulf Coast aquifer within the LCRWPA occurs in Colorado, Fayette, Matagorda, and Wharton Counties. TWDB records indicate that irrigation use accounts for the majority of groundwater pumpage from the aquifer. The location of the aquifer within the LCRWPA is illustrated in *Figure 3.2*.

Figure 3.2: Gulf Coast Aquifer Within the Lower Colorado Regional Water Planning Area



Hydrogeology

The Gulf Coast aquifer consists of complex interbedded clays, silts, sands, and gravels, which are hydrologically connected to form a large, leaky artesian aquifer system. The system has four major subdivisions in the LCRWPA. The Jasper aquifer is the lowermost or most landward component of the aquifer system. The Jasper aquifer is composed of the Oakville Sand and may also include upper portions of the Catahoula Sandstone. The Burkeville confining layer separates the top of the Jasper aquifer from the bottom of the Evangeline aquifer. The Evangeline aquifer is composed of the Fleming and Goliad Sands. The Chicot aquifer, or upper component of the Gulf Coast aquifer system, consists of the Lissie, Willis, and Beaumont Formations; and overlying alluvial deposits. Maximum total sand thickness ranges from about 700 feet in the south to 1,300 feet in the northern extent.

Water Quality

Water quality is generally good in the shallower portion of the aquifer. Groundwater containing less than 500 mg/l dissolved solids is usually encountered to a maximum depth of 3,200 feet in the aquifer from the San Antonio River Basin northeastward to Louisiana.

Availability

The Gulf Coast aquifer in Colorado, Fayette, Matagorda and Wharton Counties is within GMA 15. The Groundwater Conservation Districts (GCD) within GMA 15 worked together to determine the desired future condition (DFC) of the Central Gulf Coast Aquifer. Desired future conditions are essentially management goals for each aquifer. The DFC for the Central Gulf Coast Aquifer, adopted by GMA 15 on July 14, 2010, is summarized as follows:

- No more than 12 feet of average drawdown by 2060 relative to 1999 conditions.

The Texas Water Development Board (TWDB) took the DFC for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater or MAG. The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports, with the GMA 15 Central Gulf Coast aquifer MAG being documented in TWDB report GR 10-028_MAG, dated November 18, 2011. The report provides the MAG values for the Gulf Coast aquifer by county and basin, as shown in *Table 3.11* below.

Table 3.11 Water Availability in the Gulf Coast Aquifer (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Colorado	Brazos-Colorado	10,464	10,464	10,464	10,464	10,464	10,464
Colorado	Colorado	16,058	16,058	16,058	16,058	16,058	16,058
Colorado	Lavaca	22,431	22,431	22,431	22,431	22,431	22,431
	County Total	***48,953***	***48,953***	***48,953***	***48,953***	***48,953***	***48,953***
Fayette	Brazos	17	17	17	17	17	17
Fayette	Colorado	6,123	5,961	5,956	5,952	5,924	5,924
Fayette	Lavaca	2,933	2,927	2,922	2,917	2,915	2,915
	County Total	***9,073***	***8,905***	***8,895***	***8,886***	***8,856***	***8,856***
Matagorda	Brazos-Colorado	23,055	23,055	23,055	23,055	23,055	23,055
Matagorda	Colorado	4,179	4,179	4,179	4,179	4,179	4,179
Matagorda	Colorado-Lavaca	18,662	18,662	18,662	18,662	18,662	18,662
	County Total	***45,896***	***45,896***	***45,896***	***45,896***	***45,896***	***45,896***
Wharton	Brazos-Colorado	34,020	34,020	34,020	34,020	34,020	34,020
Wharton	Colorado	31,406	31,406	31,406	31,406	31,406	31,406
Wharton	Colorado-Lavaca	11,624	11,624	11,624	11,624	11,624	11,624
Wharton	Lavaca	1,690	1,690	1,690	1,690	1,690	1,690
	County Total	***78,740***	***78,740***	***78,740***	***78,740***	***78,740***	***78,740***
Region K	**Region Total**	**182,662**	**182,494**	**182,484**	**182,475**	**182,445**	**182,445**

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.1.1 *Availability*.

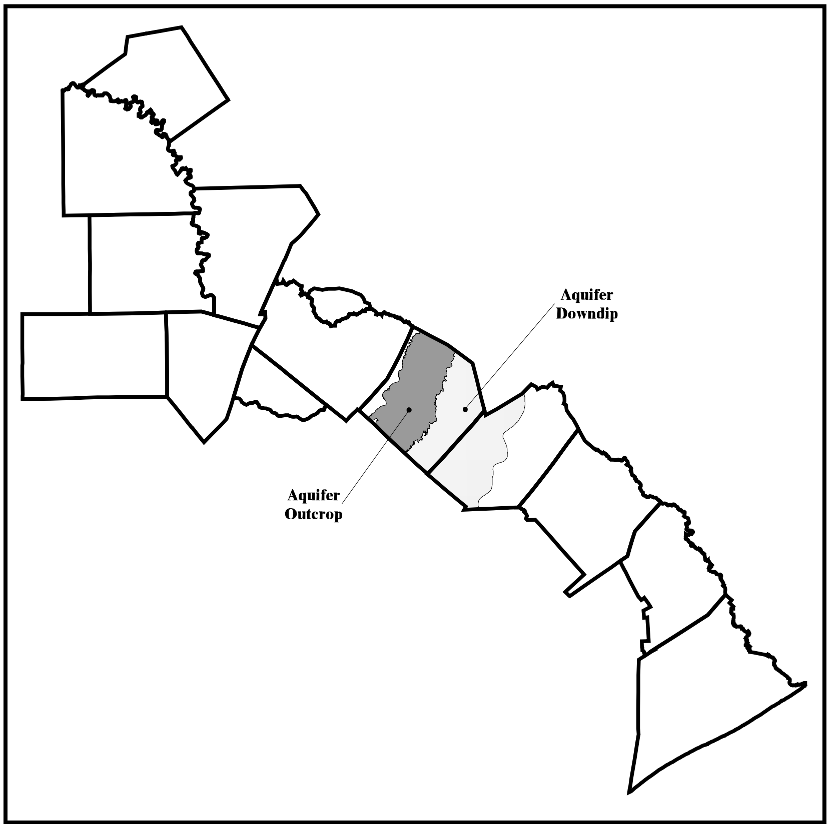
3.2.2.1.2 Carrizo-Wilcox Aquifer

Location and Use

The Wilcox Group and the overlying Carrizo Formation of the Claiborne Group form a hydrologically connected system known as the Carrizo-Wilcox aquifer. This aquifer extends from the Rio Grande in South Texas northeastward into Arkansas and Louisiana, providing water to all or parts of 60 counties in Texas. The Carrizo Sand and Wilcox Group occur at the surface along an outcrop band that parallels the Gulf Coast and dip beneath the land surface toward the coast except in the East Texas structural basin adjacent to the Sabine Uplift where the formations form a trough.

Use of water from the Carrizo-Wilcox aquifer in the LCRWPA occurs in Bastrop County and a portion of Fayette County. TWDB records indicate that municipal use accounts for the majority of groundwater pumpage from the aquifer. The location of the aquifer within the LCRWPA is illustrated in *Figure 3.3*.

Figure 3.3: Carrizo-Wilcox Aquifer Within the Colorado Regional Water Planning Area



Hydrogeology

The Carrizo-Wilcox aquifer is predominantly composed of sand, locally interbedded with gravel, silt, clay, and lignite deposited during the Tertiary Period. North of the Colorado River, the Wilcox Group is generally divided into three distinct subdivisions. From the oldest and deepest to youngest these are the Hooper, Simsboro, and Calvert Bluff Formations. Of the three, the Simsboro Formation typically contains the most massive and coarsest sands and produces the largest quantities of water. South of the Colorado River, the Simsboro is absent as a distinct unit. The Wilcox portion of the aquifer varies significantly in thickness in the downdip artesian portion from 400 feet in portions of Fayette County (south of the Colorado River) to as much as 1,600 feet in Bastrop County. The Carrizo portion of the aquifer also varies in thickness in the downdip artesian portion from 200 feet to 400 feet across the LCRWPA.

Water Quality

Water from the Carrizo-Wilcox is fresh to slightly saline with quality problems limited to localized areas. In the outcrop the water is hard yet usually low in dissolved solids. Downdip, the water is softer, has a higher temperature, and contains increasing amounts of dissolved solids down-gradient. Hydrogen sulfide and methane may occur locally.

Availability

The Carrizo-Wilcox aquifer in Bastrop and Fayette Counties is within GMA 12. The Groundwater Conservation Districts (GCD) within GMA 12 worked together to determine the desired future condition (DFC) of the Carrizo-Wilcox Aquifer. Desired future conditions are essentially management goals for each aquifer. The DFC for the Carrizo-Wilcox Aquifer, adopted by GMA 12 on August 11, 2010, is summarized as follows:

- Carrizo Aquifer: No more than 47 feet of average drawdown between January 2000 and December 2059.
- Simsboro (Middle Wilcox) Aquifer: No more than 237 feet of average drawdown between January 2000 and December 2059.

The Texas Water Development Board (TWDB) took the DFC for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater or MAG. The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports, with the GMA 12 Carrizo-Wilcox Aquifer MAG being documented in TWDB report GR 10-044_MAG, dated July 9, 2012. The report provides the MAG values for the Carrizo-Wilcox Aquifer by county and basin, as shown in *Table 3.12* below.

Table 3.12 Water Availability in the Carrizo-Wilcox Aquifer (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Bastrop	Brazos	4,864	4,013	4,497	4,293	4,372	4,372
Bastrop	Colorado	15,109	16,647	19,641	22,360	22,734	22,734
Bastrop	Guadalupe	6	6	695	1,365	1,392	1,392
	County Total	***19,979***	***20,666***	***24,833***	***28,018***	***28,498***	***28,498***
Fayette	Colorado	683	683	683	683	683	683
Fayette	Guadalupe	317	317	317	317	317	317
	County Total	***1,000***	***1,000***	***1,000***	***1,000***	***1,000***	***1,000***
Region K	**Region Total**	**20,979**	**21,666**	**25,833**	**29,018**	**29,498**	**29,498**

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.1.2 *Availability*.

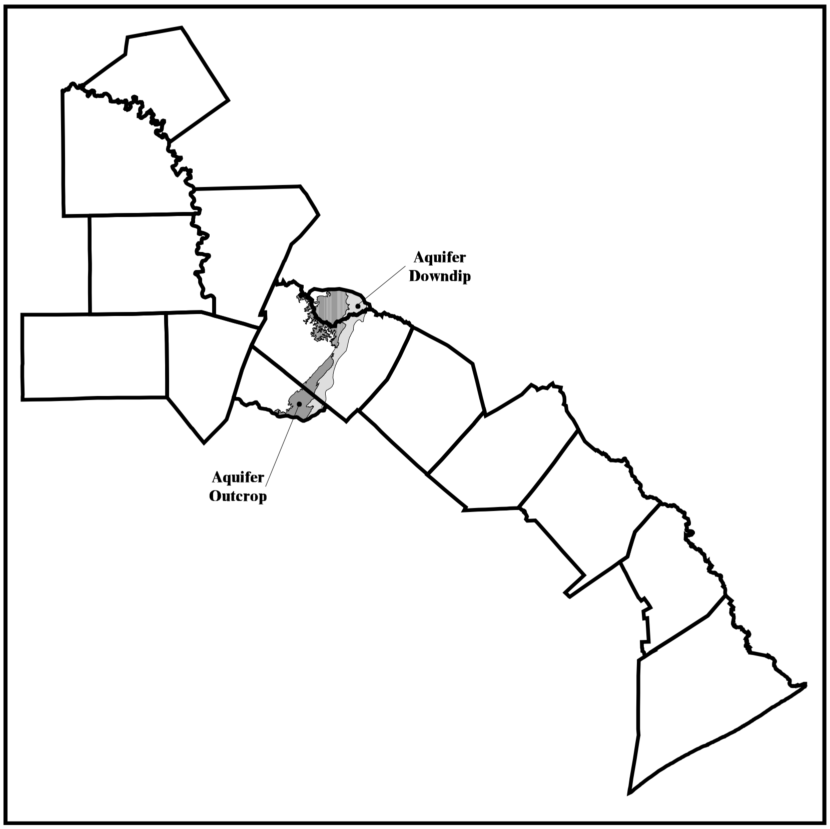
3.2.2.1.3 Edwards Aquifer (Balcones Fault Zone)

Location and Use

The Edwards aquifer (Balcones Fault Zone, or BFZ) covers approximately 4,350 square miles in parts of 11 counties. It forms a narrow belt extending along the base of the Balcones Escarpment from Kinney County through the San Antonio area northeastward to the Leon River in Bell County. A groundwater divide near Kyle in Hays County hydrologically separates the aquifer into the San Antonio and Barton Springs segments. The Colorado River divides the Barton Springs and Northern segments which are also considered hydrologically separate. The name Edwards aquifer (BFZ) distinguishes this aquifer from the Edwards-Trinity (Plateau) and Edwards-Trinity (High Plains) aquifers.

Groundwater use from the Edwards aquifer (BFZ) within the LCRWPA occurs in Hays, Travis, and Williamson Counties. TWDB records indicate that municipal use accounts for the majority of groundwater pumpage from the aquifer. Large springs feed several recreational areas and serve as habitat to several endangered species of plants and animals. Major river systems derive a significant amount of baseflow from Edwards aquifer (BFZ) spring flows that are utilized outside the Edwards region mainly for industrial and agricultural needs. The location of the aquifer within the LCRWPA is illustrated in *Figure 3.4.*

Figure 3.4: Edwards Aquifer (BFZ) Within the Lower Colorado Regional Water Planning Area



Hydrogeology

The Edwards aquifer (BFZ) is composed of limestone and dolomite deposited during the Cretaceous Period. The aquifer exists under water-table conditions in the outcrop and under artesian conditions where it dips into the subsurface and is confined below the overlying Del Rio Clay. The Edwards aquifer (BFZ) consists of the Georgetown Limestone and formations of the Edwards Group within the LCRWPA. Across the Edwards aquifer (BFZ) region, the aquifer thickness ranges from 200 to 600 feet.

Aquifer recharge occurs by the percolation of water on the aquifer outcrop (recharge zone). The recharge may occur by several methods: surface water percolating from streams and rivers draining the Edwards Plateau and which cross the outcrop; the percolation of rainfall runoff in ephemeral streams crossing the outcrop; and by direct infiltration of precipitation on the outcrop. This recharge reaches the aquifer through solution cavities, fracture crevices, faults, and sinkholes in the recharge zone. Unknown amounts of groundwater may enter the aquifer as lateral underflow from the Glen Rose Formation. Water in the aquifer generally moves from the recharge zone down-gradient and laterally toward natural discharge points such as Comal, San Marcos, Barton, and Salado springs.

A hydrologic divide occurs in the aquifer near Kyle in Hays County that separates the San Antonio segment of the aquifer from the Barton Springs and Northern segments of the aquifer. The Barton Springs segment is hydrologically bounded to the north by the Colorado River. The northern segment of the aquifer includes the area north of the Colorado River to Bell County. The area included in the LCRWPA is the area north of the Kyle groundwater divide and includes a portion of the Northern segment.

Groundwater moving through the aquifer system has dissolved large amounts of rock to create highly permeable zones in certain aquifer subdivisions and solution channels. Highly fractured areas near faults may be preferentially enhanced by solutioning to form conduits capable of transmitting large amounts of water. The solution features may facilitate rapid flow and augment the relatively high storage capacity of the aquifer. Due to the honeycombed and cavernous character of the aquifer, well yields are moderate to large. Several wells yield in excess of 16,000 gal/min and one well drilled in Bexar County flowed 37,000 gal/min from a 30-inch-diameter casing. The aquifer is significantly less permeable farther downdip where the concentration of dissolved solids in the water may abruptly exceed 1,000 mg/l.

Water Quality

The chemical quality of water in the aquifer is typically fresh, although hard, with dissolved solids concentrations averaging less than 500 mg/l. The downdip's relatively sharp interface between fresh and slightly saline water represents the extent of water containing less than 1,000 mg/l and is popularly known as the Bad Water Line (BWL). Within a relatively short distance down-gradient of the BWL, the groundwater becomes increasingly mineralized. The position of the bad water line generally coincides with the alignment of IH 35 in the LCRWPA.

Availability

Due to its highly permeable nature in the fresh water zone, the Edwards aquifer (BFZ) responds quickly to changes and extremes in stress placed upon the system. This is indicated by the rapid fluctuations in water levels over relatively short periods of time. During times of adequate rainfall and recharge, the Edwards aquifer (BFZ) is able to supply sufficient amounts of water for all demands as well as sustain springflows at many locations throughout its extent. However, when recharge is low, water withdrawn from wells and water discharged at the springs comes mainly from aquifer storage. If these conditions persist, water in storage within the aquifer continues to be depleted with corresponding water-level declines and reduced spring flows.

Availability for the northern segment of the Edwards aquifer (BFZ) was established by the TWDB based on DFCs adopted by GMA 8 on April 27, 2011. The DFCs for Travis and Williamson counties within GMA 8 are as follows:

- Maintain at least 42 acre-feet per month of aggregated stream/spring flow during a repeat of the Drought of Record in Travis County.
- Maintain at least 60 acre-feet per month of aggregated stream/spring flow during a repeat of the Drought of Record in Williamson County.

Availability for the southern portion of the Edwards aquifer (BFZ) was established by the TWDB based on DFCs adopted by GMA 10 on August 4, 2010. The DFCs for the Edwards (BFZ) Northern Subdivision and Edwards (BFZ) Northern Subdivision Saline Zone in Hays and Travis counties within GMA 10 are as follows:

Edwards (BFZ) Northern Subdivision

- Springflow at Barton Springs during average recharge conditions shall be no less than 49.7 cubic feet per second averaged over an 84 month (7-year) period;
- During extreme drought conditions, including those as severe as a recurrence of the 1950s drought of record, springflow of Barton Springs shall be no less than 6.5 cubic feet per second averaged on a monthly basis.

Edwards (BFZ) Northern Subdivision Saline Zone

- Well drawdown at the saline-freshwater interface (the so-called Edwards Bad Water Line) averages no more than 5 feet and does not exceed a maximum of 25 feet at any one point on the interface.

The Texas Water Development Board (TWDB) took the DFCs for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater or MAG. The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports. The GMA 8 Edwards (BFZ) Aquifer MAG is documented in TWDB report GR 10-065_MAG, dated December 14, 2011. The GMA 10 Edwards (BFZ) Aquifer MAG is documented in TWDB report GR 10-059_MAG Version 2, dated December 7, 2011. The GMA 10 Saline Edwards (BFZ) Aquifer MAG is documented in TWDB report AA 10-35 MAG, dated November 20, 2011. The reports provide the MAG values for the Edwards (BFZ) Aquifer by county and basin, and the Saline Edwards (BFZ) Aquifer by county and basin, as shown in *Table 3.13* and *Table 3.14* below.

Table 3.13 Water Availability in the Edwards Aquifer (BFZ) (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070	Source
Hays	Colorado	2,292	2,292	2,292	2,292	2,292	2,292	GMA 10
	County Total	***2,292***	***2,292***	***2,292***	***2,292***	***2,292***	***2,292***	
Travis	Brazos	275	275	275	275	275	275	GMA 8
Travis	Colorado	4,962	4,962	4,962	4,962	4,962	4,962	GMA 8
Travis	Colorado	1,166	1,166	1,166	1,166	1,166	1,166	GMA 10
	County Total	***6,403***	***6,403***	***6,403***	***6,403***	***6,403***	***6,403***	
Williamson	Brazos	6	6	6	6	6	6	GMA 8
Williamson	Colorado	4	4	4	4	4	4	GMA 8
	County Total	***10***	***10***	***10***	***10***	***10***	***10***	
Region K	**Region Total**	**8,705**	**8,705**	**8,705**	**8,705**	**8,705**	**8,705**	

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.1.3 *Availability*.

Table 3.14 Water Availability in the Saline Edwards Aquifer (BFZ) (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070	Source
Hays	Colorado	9	9	9	9	9	9	GMA 10
	County Total	***9***	***9***	***9***	***9***	***9***	***9***	
Travis	Colorado	699	699	699	699	699	699	GMA 10
Travis	Guadalupe	39	39	39	39	39	39	GMA 10
	County Total	***738***	***738***	***738***	***738***	***738***	***738***	
Region K	**Region Total**	**747**	**747**	**747**	**747**	**747**	**747**	

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.1.3 *Availability*.

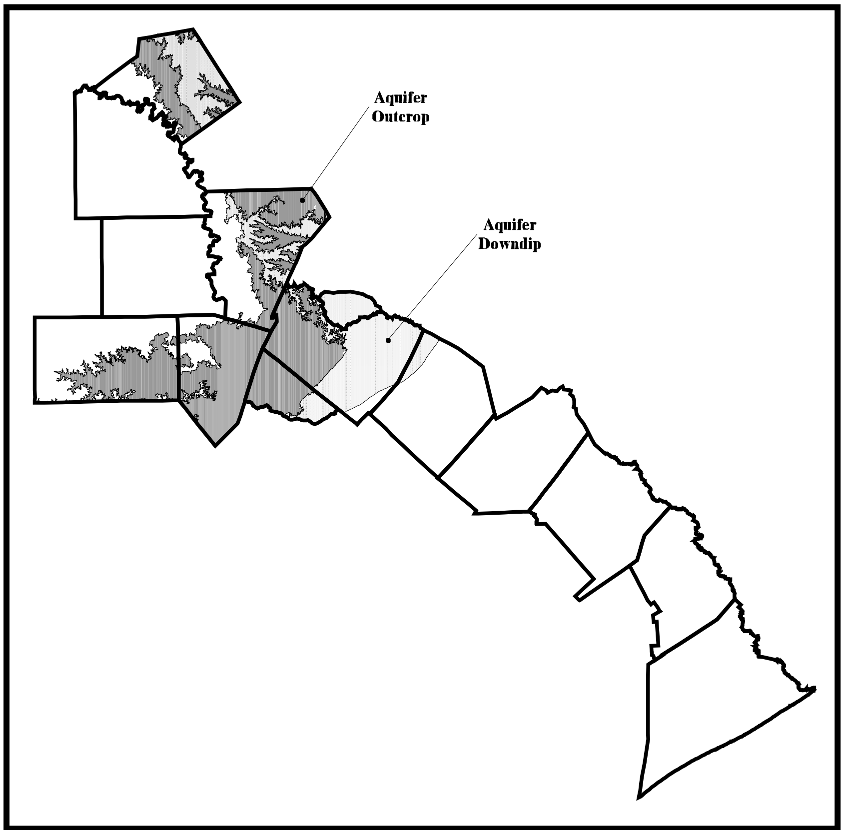
3.2.2.1.4 Trinity Aquifer

Location and Use

The Trinity aquifer consists of Cretaceous age rocks of the Trinity Group. The formations of the Trinity Group crop out in a band from the Red River in northern Texas to the Hill Country of South-Central Texas and provide water in all or parts of 55 counties. Trinity Group deposits also occur as far west as the Panhandle and Trans-Pecos regions where they are included as part of the Edwards-Trinity (High Plains) and Edwards-Trinity (Plateau) aquifers. Within much of the LCRWPA, the Trinity aquifer is exposed at the land surface as the erosion dissected margin of the Edwards Plateau.

Groundwater use from the Trinity aquifer in the LCRWPA occurs in Blanco, Burnet, Gillespie, Hays, Mills, and Travis Counties. TWDB records indicate that municipal use accounts for the majority of groundwater pumpage from the aquifer. The location of the aquifer within the LCRWPA is illustrated in *Figure 3.5.*

Figure 3.5: Trinity Aquifer Within the Lower Colorado Regional Water Planning Area



Hydrogeology

The Trinity aquifer is composed of sand, clay, and limestone deposited during the Cretaceous Period. The aquifer in the LCRWPA is subdivided into the Upper, Middle, and Lower Trinity aquifers. The Upper Trinity is composed of the Upper Glen Rose Formation. The Middle Trinity aquifer is composed of the Lower Glen Rose Formation and the Hensell Sand and Cow Creek Limestone of the Travis Peak Formation. The Hammett Shale of the Travis Peak Formation is a confining zone between the Middle and Lower Trinity aquifers. The Lower Trinity aquifer is composed of the Sligo Limestone and the Hosston Formation (sand and conglomerate). The Glen Rose Formation and the Cow Creek Limestone are karsted but not as heavily solutioned as the Edwards aquifer (BFZ). There are evaporite mineral beds (principally anhydrite) associated with the contact of the Upper and Lower Glen Rose Formation that contribute to water quality issues in the certain areas of the Trinity aquifer within the LCRWPA. The formations of the Trinity aquifer thin from down-dip areas toward the outcrop. In some areas of the LCRWPA this thinning is pronounced. At the Balcones Escarpment the Trinity may be significantly displaced by the throw of faults associated with the Balcones Fault Zone. Trinity aquifer well yields typically range from less than 20 to more than 300 gallons per minute. The yields of wells in the Upper and Middle Trinity aquifers may be closely associated with the degree of local karst or solutioning features. The yield of wells from the Lower Trinity aquifer may be generally greater than the average yields of Upper or Lower Trinity aquifer wells.

Water Quality

Water quality from the Trinity aquifer is acceptable for most municipal and industrial purposes; however, excess concentrations of certain constituents in many places exceed drinking water standards. Heavy pumpage and water level declines in this region have contributed to deteriorating water quality in the aquifer. Wells completed in the Middle Trinity (especially the Hensell Sand) may exhibit levels of sodium, sulfate, and chloride, which are believed to be the result of leakage from the overlying Glen Rose. This is less likely to be true for wells completed in the Lower Trinity. The Hammett Shale acts as an aquitard and effectively prevents leakage from the overlying formations. In some areas, poor quality water occurs in and near wells that have not been properly cased. These wells may have deteriorated casings, insufficient casing or cement, or the casing may have been perforated at multiple depths in an effort to maximize the well yield. These wells serve as a conduit for poor quality water originating in the evaporite beds near the contact of the Upper and Lower Glen Rose Formations. Water quality declines in the downdip direction of all of the Trinity water-bearing units.

Availability

The groundwater availability estimate values for the northern Trinity aquifer in Burnet, Mills, Travis, and Williamson Counties are based on DFCs submitted by GMA 8. The DFCs for the above mentioned counties are as follows:

Burnet County

- Average draw down of the Paluxy aquifer should not exceed approximately 1 foot after 50 years.
- Average draw down of the Glen Rose aquifer should not exceed approximately 1 foot after 50 years.
- Average draw down of the Hensell aquifer should not exceed approximately 11 feet after 50 years.
- Average draw down of the Hosston aquifer should not exceed approximately 29 feet after 50 years.

Mills County

- Average draw down of the Paluxy aquifer should not exceed approximately 0 feet after 50 years.
- Average draw down of the Glen Rose aquifer should not exceed approximately 0 feet after 50 years.
- Average draw down of the Hensell aquifer should not exceed approximately 3 feet after 50 years.
- Average draw down of the Hosston aquifer should not exceed approximately 12 feet after 50 years.

Travis County

- Average draw down of the Paluxy aquifer should not exceed approximately 124 feet after 50 years.
- Average draw down of the Glen Rose aquifer should not exceed approximately 61 feet after 50 years.
- Average draw down of the Hensell aquifer should not exceed approximately 98 feet after 50 years.
- Average draw down of the Hosston aquifer should not exceed approximately 116 feet after 50 years.

Williamson County

- Average draw down of the Paluxy aquifer should not exceed approximately 108 feet after 50 years.
- Average draw down of the Glen Rose aquifer should not exceed approximately 88 feet after 50 years.
- Average draw down of the Hensell aquifer should not exceed approximately 142 feet after 50 years.
- Average draw down of the Hosston aquifer should not exceed approximately 166 feet after 50 years.

The groundwater availability estimate values for the Trinity aquifer in Blanco, Hays, and Travis Counties are based on DFCs submitted by GMA 9. The DFCs for the Trinity aquifer is as follows:

- Average drawdown of approximately 30 feet through 2060.

The Texas Water Development Board (TWDB) took the DFCs for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater or MAG. The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports. The GMA 8 Trinity Aquifer MAG being documented in TWDB report GR 10-063_MAG, dated December 14, 2011. The GMA 9 Trinity Aquifer MAG being documented in TWDB report GR 10-050_MAG, dated March 30, 2012. The reports provide the MAG values for the Trinity Aquifer by county and basin, as shown in *Table 3.15* below.

Table 3.15 Water Availability for the Trinity Aquifer (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Blanco	Colorado	1,322	1,322	1,322	1,322	1,322	1,322
Blanco	Guadalupe	1,251	1,251	1,251	1,251	1,251	1,251
	County Total	***2,573***	***2,573***	***2,573***	***2,573***	***2,573***	***2,573***
Burnet	Brazos	2,723	2,723	2,723	2,723	2,723	2,723
Burnet	Colorado	823	823	823	823	823	823
	County Total	***3,546***	***3,546***	***3,546***	***3,546***	***3,546***	***3,546***
Gillespie	Colorado	2,482	2,482	2,482	2,482	2,482	2,482
Gillespie	Guadalupe	46	46	46	46	46	46
	County Total	***2,528***	***2,528***	***2,528***	***2,528***	***2,528***	***2,528***
Hays	Colorado	5,665	5,662	5,661	5,661	5,661	5,661
	County Total	***5,665***	***5,662***	***5,661***	***5,661***	***5,661***	***5,661***
Mills	Brazos	1,273	1,273	1,273	1,273	1,273	1,273
Mills	Colorado	1,128	1,128	1,128	1,128	1,128	1,128
	County Total	***2,401***	***2,401***	***2,401***	***2,401***	***2,401***	***2,401***
Travis	Brazos	8	8	8	8	8	8
Travis	Colorado	13,188	13,171	13,159	13,143	13,114	13,114
Travis	Guadalupe	7	7	7	7	7	7
	County Total	***13,203***	***13,186***	***13,174***	***13,158***	***13,129***	***13,129***
Williamson	Brazos	157	157	157	157	157	157
Williamson	Colorado	61	61	61	61	61	61
	County Total	***218***	***218***	***218***	***218***	***218***	***218***
Region K	**Region Total**	**30,134**	**30,114**	**30,101**	**30,085**	**30,056**	**30,056**

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.1.4 *Availability*.

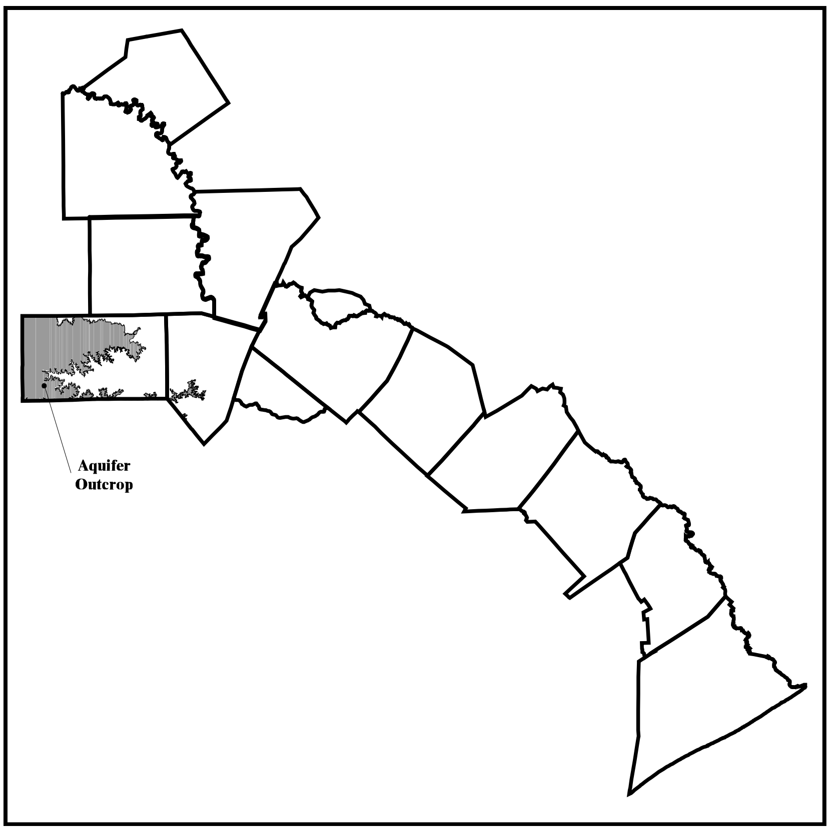
3.2.2.1.5 Edwards-Trinity (Plateau) Aquifer

Location and Use

The Edwards-Trinity (Plateau) aquifer underlies the Edwards Plateau east of the Pecos River and the Stockton Plateau west of the Pecos River, providing water to all or parts of 38 counties. The aquifer extends from the Hill Country of Central Texas to the Trans-Pecos region of West Texas.

Groundwater use from the Edwards-Trinity aquifer within the LCRWPA is limited to Gillespie County. TWDB records indicate that municipal use accounts for the majority of groundwater pumpage from the aquifer. The location of the aquifer within the LCRWPA is illustrated in *Figure 3.6.*

Figure 3.6: Edwards Trinity Aquifer Within the Lower Colorado Regional Water Planning Area



Hydrogeology

The aquifer consists of saturated sediments of lower Cretaceous age Trinity Group formations and overlying limestones and dolomites of the Comanche Peak, Edwards, and Georgetown Formations. Springs issuing from the aquifer form the headwaters for the Pedernales, Llano, and San Saba Rivers.

The aquifer generally exists under water table conditions, however, where the Trinity is fully saturated and a zone of low permeability occurs near the base of the overlying Edwards, artesian conditions may exist. Reported well yields commonly range from less than 50 gal/min, where saturated thickness is thin, to more than 1,000 gal/min, in areas outside of Region K where large capacity wells are completed in jointed and cavernous limestone.

Water Quality

Natural chemical quality of Edwards-Trinity (Plateau) water ranges from fresh to slightly saline. The water is typically hard and may vary widely in concentrations of dissolved solids, composed mostly of calcium and bicarbonate. The salinity of the groundwater tends to increase toward the west. Water quality of springs issuing from the aquifer in the southern and eastern border areas is typically excellent.

Availability

The Edwards-Trinity (Plateau) aquifer in Gillespie County is within GMA 7. The Groundwater Conservation Districts (GCD) within GMA 7 worked together to determine the desired future condition (DFC) of the Edwards-Trinity (Plateau) Aquifer. Desired future conditions are essentially management goals for each aquifer. The DFC for the Edwards-Trinity (Plateau) Aquifer, adopted by GMA 7 on July 29, 2010, is summarized as follows:

- No more than 7 feet of average drawdown.

The Texas Water Development Board (TWDB) took the DFC for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater or MAG. The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports, with the GMA 7 Edwards-Trinity (Plateau) aquifer MAG being documented in TWDB report GR 10-043_MAG, dated November 12, 2012. The report provides the MAG values for the Edwards-Trinity (Plateau) aquifer by county and basin, as shown in *Table 3.16* below.

Table 3.16 Water Availability from the Edwards-Trinity Aquifer (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Gillespie	Colorado	2,378	2,378	2,378	2,378	2,378	2,378
Gillespie	Guadalupe	136	136	136	136	136	136
	County Total	***2,514***	***2,514***	***2,514***	***2,514***	***2,514***	***2,514***
Region K	**Region Total**	**2,514**	**2,514**	**2,514**	**2,514**	**2,514**	**2,514**

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.1.5 *Availability*.

3.2.2.2 Minor Aquifers

The minor aquifers in the LCRWPA are the Hickory, Queen City, Sparta, Ellenburger-San Saba, Marble Falls, and Yegua-Jackson aquifers. These aquifers provide water supply to many of the cities and towns in the hill country of Central Texas, or in the case of the Sparta and Queen City aquifers, to farms, ranches, and small towns in Bastrop and Fayette Counties.

There are also WUGs in Region K that rely on alluvial aquifers for supply. These supplies are referred to as "Other Aquifer" since the actual aquifers have not been identified or named and the extent of the aquifer supply has not been determined.

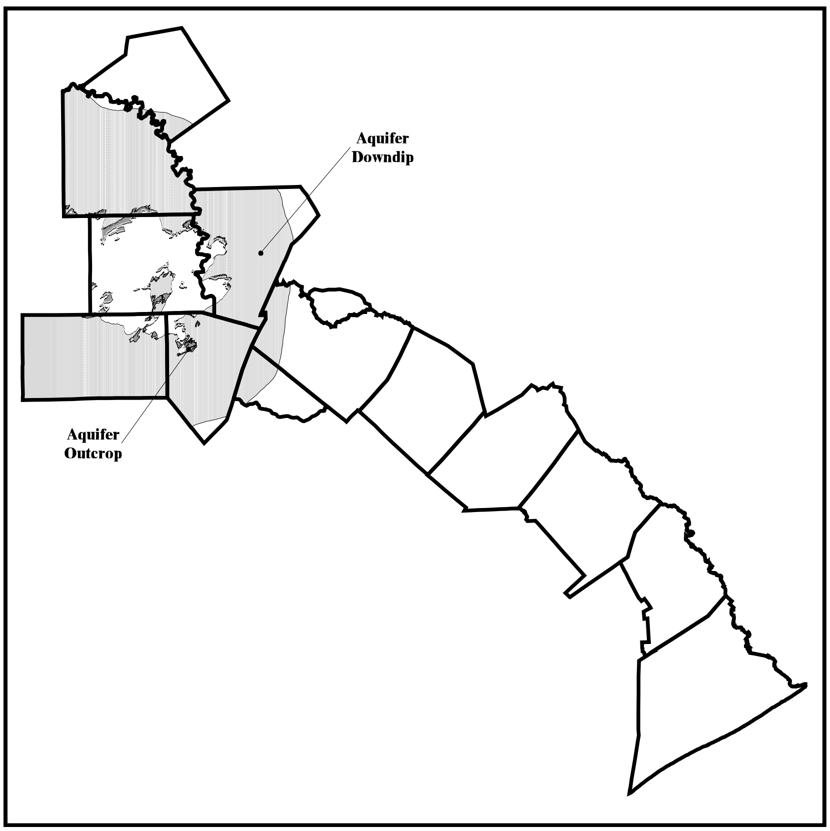
3.2.2.2.1 Hickory Aquifer

Location and Use

The Hickory aquifer underlies approximately 5,000 square miles in parts of 19 counties within the Llano Uplift region of Central Texas. Discontinuous outcrops of the Hickory sandstone overlie and flank the exposed Precambrian rocks that form the central core of the Uplift. The downdip artesian portion of the aquifer encircles the Uplift and extends to maximum depths approaching 4,500 feet.

Groundwater use from the Hickory aquifer within the LCRWPA occurs in Burnet, Gillespie, Llano, San Saba, and Blanco Counties. TWDB records indicate that irrigation use accounts for the majority of groundwater pumpage from the aquifer. The location of the aquifer within the LCRWPA is illustrated in *Figure 3.7.*

Figure 3.7: Hickory Aquifer Within the Lower Colorado Regional Water Planning Area



Hydrogeology

The Hickory aquifer, like the Marble Falls and Ellenburger-San Saba aquifers, was formed by the Llano Uplift, a distinct area of the state that includes portions of 19 counties. The Hickory Sandstone member of the Cambrian Riley Formation is composed of some of the oldest sedimentary rocks found in Texas. In most of the northern and western portions of the aquifer, the Hickory Sandstone Member can be differentiated into lower, middle, and upper units, which reach a maximum thickness of 480 feet in southwestern McCulloch County just northwest of the LCRWPA. In the southern and eastern extent of the aquifer, the Hickory Sandstone Member consists of only two units, which range in thickness from about 150 to 400 feet.

The Hickory aquifer has been compartmentalized by block faulting. The vertical displacement of faults ranges from a few feet to as much as 2,000 feet. Significant lateral displacement is also associated with these faults. Throughout its extent, the thickness of the aquifer is affected by the relief of the underlying Precambrian surface. Both of these elements have contributed to the significant variability that occurs in groundwater availability, movement, quality, and productivity.

Large wells used for irrigation and municipal supply may range from 200 to 500 gal/min. Some exceptional wells have been reported to have yields in excess of 1,000 gal/min. These would typically occur outside of the LCRWPA, northwest of the Llano Uplift.

Water Quality

In general, the quality of water from the Hickory aquifer could be described as moderate to low quality. The total dissolved solids concentrations vary from 300 to 500 mg/l. In some areas the groundwater may have dissolved solids concentrations as high as 3,000 mg/l. The water may contain alpha particle and total radium concentrations that may exceed safe drinking water levels soon to be issued by the EPA. Radon gas may also be entrained. Most of the radioactive groundwater is thought to be produced from the middle Hickory unit, while the upper Hickory unit produces water that exceeds safe drinking water concentrations for iron. High nitrate levels may be found in the shallower portions of the aquifer where there may be interaction with surface activities such as fertilizer applications and septic systems.

Availability

The Hickory aquifer spans several counties and several GMAs. The groundwater availability estimate values for the Hickory aquifer are based on desired future conditions (DFCs) submitted by the responsible GMAs. Desired future conditions are essentially management goals for each aquifer. The DFCs for the Hickory aquifer are as follows:

Blanco County (GMA 9) – DFC adopted on August 29, 2008

- Allow for an increase in average drawdown of no more than seven (7) feet.

Burnet County (GMA 8) – DFC adopted on May 19, 2008

- Burnet County should maintain approximately 100 percent of the saturated thickness after 50 years by using approximately 80 percent of the estimated recharge.

Gillespie County (GMA 7) – DFC adopted on July 29, 2010

- Total net decline in water levels shall not exceed seven (7) feet below 2010 water levels in the aquifer after 50 years.

Llano County (GMA 7) – DFC adopted on July 29, 2010

- Total net decline in water levels shall not exceed seven (7) feet below 2010 water levels in the aquifer after 50 years.

Mills County (GMA 8) – DFC adopted on May 19, 2008

- Mills County should maintain approximately 90 percent of the available drawdown after 50 years.

San Saba County (GMA 7) – DFC adopted on July 29, 2010

- Total net decline in water levels shall not exceed seven (7) feet below 2010 water levels in the aquifer after 50 years.

Travis County (GMA 8) – DFC adopted on May 19, 2008

- Travis County should maintain approximately 90 percent of the available drawdown after 50 years.

The Texas Water Development Board (TWDB) took the DFCs for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater or MAG. The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports.

- The GMA 7 Hickory aquifer MAG being documented in TWDB report AA 10-11_MAG, dated November 1, 2011.
- The GMA 8 Hickory aquifer MAG being documented in TWDB report AA 10-16_MAG, dated December 7, 2011.
- The GMA 9 Hickory aquifer MAG being documented in TWDB report AA 10-02_MAG, dated June 22, 2011.

The reports provide the MAG values for the Hickory Aquifer by county and basin, as shown in *Table 3.17* below.

Table 3.17 Water Availability from the Hickory Aquifer (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Blanco	Colorado	1,162	1,162	1,162	1,162	1,162	1,162
Blanco	Guadalupe	1	1	1	1	1	1
	County Total	***1,163***	***1,163***	***1,163***	***1,163***	***1,163***	***1,163***
Burnet	Brazos	0	0	0	0	0	0
Burnet	Colorado	2,148	2,148	2,148	2,148	2,148	2,148
	County Total	***2,148***	***2,148***	***2,148***	***2,148***	***2,148***	***2,148***
Gillespie	Colorado	1,659	1,659	1,659	1,659	1,659	1,659
Gillespie	Guadalupe	0	0	0	0	0	0
	County Total	***1,659***	***1,659***	***1,659***	***1,659***	***1,659***	***1,659***
Llano	Colorado	2,018	2,018	2,018	2,018	2,018	2,018
Mills	Brazos	1	1	1	1	1	1
Mills	Colorado	35	35	35	35	35	35
	County Total	***36***	***36***	***36***	***36***	***36***	***36***
San Saba	Colorado	1,479	1,479	1,479	1,479	1,479	1,479
Travis	Brazos	0	0	0	0	0	0
Travis	Colorado	22	22	22	22	22	22
	County Total	***22***	***22***	***22***	***22***	***22***	***22***
Region K	**Region Total**	**8,525**	**8,525**	**8,525**	**8,525**	**8,525**	**8,525**

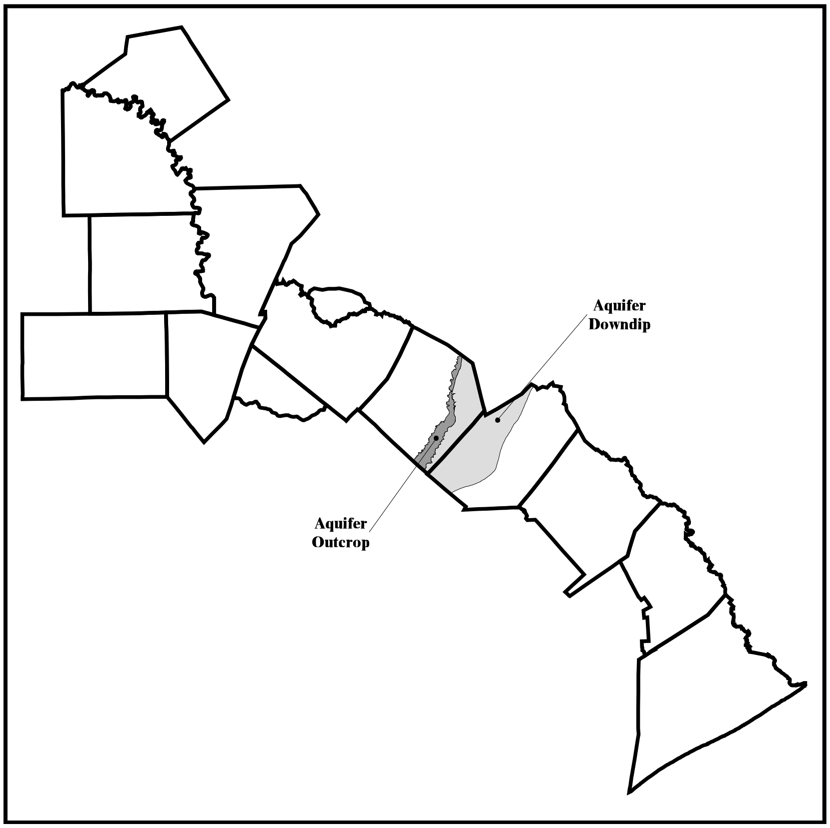
Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.2.1 *Availability*.

3.2.2.2.2 Queen City Aquifer

Location and Use

The Queen City aquifer extends in a band across most of the State from the Frio River in South Texas northeastward into Louisiana. The southwestern boundary is placed at the Frio River because of a facies change in the formation. This facies change results in reduced amounts of poorer quality water produced from this interval southwest of the Frio River. TWDB records indicate that irrigation and livestock use account for the majority of groundwater pumpage from the aquifer. The location of the aquifer within the LCRWPA is illustrated in *Figure 3.8*.

Figure 3.8: Queen City Aquifer Within the Lower Colorado Regional Water Planning Area



Hydrogeology

The Queen City aquifer is composed of sand, loosely cemented sandstone, and interbedded clay units of the Queen City Formation of the Tertiary Claiborne Group. These rocks slope downward or dip gently to the south and southeast toward the Gulf of Mexico. The total thickness of this aquifer is usually less than 500 feet in the LCRWPA. The Queen City aquifer generally parallels the Carrizo aquifer, and like the Carrizo, it has both a water table and artesian portion. Well yields are generally low with a few exceeding 400 gal/min.

Water Quality

Throughout most of the LCRWPA, the chemical quality of the Queen City aquifer water is excellent, but water quality may deteriorate fairly rapidly downdip. The water may be fairly acidic (low pH), have high iron concentrations, or contain hydrogen sulfide gas. All of these conditions are relatively easy to remedy with standard water treatment methods.

Availability

The Queen City aquifer in Bastrop and Fayette Counties is within GMA 12. The Groundwater Conservation Districts (GCD) within GMA 12 worked together to determine the desired future condition (DFC) of the Queen City aquifer. Desired future conditions are essentially management goals for each aquifer. The DFC for the Queen City aquifer, adopted by GMA 12 on August 11, 2010, is summarized as follows:

- No more than 13 feet of average drawdown between January 2000 and December 2059 within the Lost Pines Groundwater Conservation District (Bastrop County).
- No more than 60 feet of average drawdown between January 2000 and December 2059 within the Fayette County Groundwater Conservation District (Fayette County).

The Texas Water Development Board (TWDB) took the DFC for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater or MAG. The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports, with the GMA 12 Queen City aquifer MAG being documented in TWDB report GR 10-045_MAG, dated July 9, 2012. The report provides the MAG values for the Queen City aquifer by county and basin, as shown in *Table 3.18* below.

Table 3.18 Water Availability From the Queen City Aquifer (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Bastrop	Brazos	244	598	219	216	216	216
Bastrop	Colorado	659	1,626	599	591	590	590
Bastrop	Guadalupe	192	541	213	216	216	216
	County Total	***1,095***	***2,765***	***1,031***	***1,023***	***1,022***	***1,022***
Fayette	Colorado	436	478	513	565	570	570
Fayette	Guadalupe	0	0	0	0	0	0
	County Total	***436***	***478***	***513***	***565***	***570***	***570***
Region K	**Region Total**	**1,531**	**3,243**	**1,544**	**1,588**	**1,592**	**1,592**

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.2.2 *Availability*.

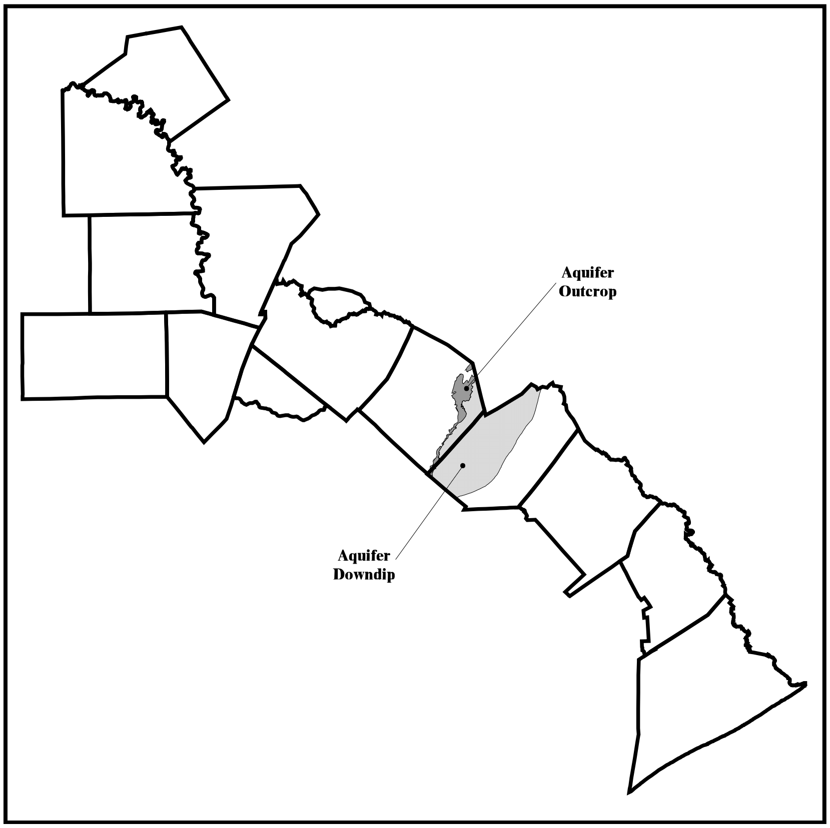
3.2.2.2.3 Sparta Aquifer

Location and Use

The Sparta aquifer extends in a narrow band across the state from the Frio River in South Texas northeastward to the Louisiana border in Sabine County. The southwestern boundary is placed at the Frio River because of a facies change in the formation, which makes it difficult to delineate the boundaries of the Sparta and contiguous formations southwestward. The facies change results in reduced amounts of water and poorer quality water produced from the interval.

Groundwater use from the Sparta aquifer within the LCRWPA occurs in Bastrop and Fayette Counties. TWDB records indicate that municipal, irrigation, and livestock use account for the groundwater pumpage from the aquifer. The location of the aquifer within the LCRWPA is illustrated in *Figure 3.9.*

Figure 3.9: Sparta Aquifer Within the Lower Colorado Regional Water Planning Area



Hydrogeology

The Sparta Formation, like the Queen City, is part of the Claiborne Group. The aquifer consists of sand and interbedded clay with more massive sand beds in the basal section. Rocks composing the Sparta Formation also dip gently to the south and southeast toward the Gulf Coast, with a total thickness that can reach up to 300 feet. Yields of individual wells are generally low to moderate, but high capacity wells, producing 400 to 500 gal/min, are possible. The water occurs under water table conditions near the outcrop but becomes confined and is under artesian conditions downdip. Usable quality water may be recovered from as much as 2,000 feet below the surface.

Water Quality

Usable quality water is commonly found within the outcrop and for a few miles downdip. The water quality in most of this aquifer is excellent, but the quality does decrease in the downdip direction. In some areas the water can contain iron concentrations exceeding the safe drinking water standards.

Availability

The Sparta aquifer in Bastrop and Fayette Counties is within GMA 12. The Groundwater Conservation Districts (GCD) within GMA 12 worked together to determine the desired future condition (DFC) of the

Sparta aquifer. Desired future conditions are essentially management goals for each aquifer. The DFC for the Sparta aquifer, adopted by GMA 12 on August 11, 2010, is summarized as follows:

- No more than 7 feet of average drawdown between January 2000 and December 2059 within the Lost Pines Groundwater Conservation District (Bastrop County).
- No more than 60 feet of average drawdown between January 2000 and December 2059 within the Fayette County Groundwater Conservation District (Fayette County).

The Texas Water Development Board (TWDB) took the DFC for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater or MAG. The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports, with the GMA 12 Sparta aquifer MAG being documented in TWDB report GR 10-046_MAG, dated July 9, 2012. The report provides the MAG values for the Sparta aquifer by county and basin, as shown in *Table 3.19* below.

Table 3.19 Water Availability from the Sparta Aquifer (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Bastrop	Brazos	65	170	58	55	55	55
Bastrop	Colorado	1,761	4,606	1,538	1,460	1,453	1,453
Bastrop	Guadalupe	87	228	79	76	75	75
	County Total	***1,913***	***5,004***	***1,675***	***1,591***	***1,583***	***1,583***
Fayette	Colorado	3,161	3,206	3,226	3,278	3,294	3,294
Fayette	Guadalupe	431	431	430	433	435	435
	County Total	***3,592***	***3,637***	***3,656***	***3,711***	***3,729***	***3,729***
Region K	**Region Total**	**5,505**	**8,641**	**5,331**	**5,302**	**5,312**	**5,312**

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.2.3, *Availability*.

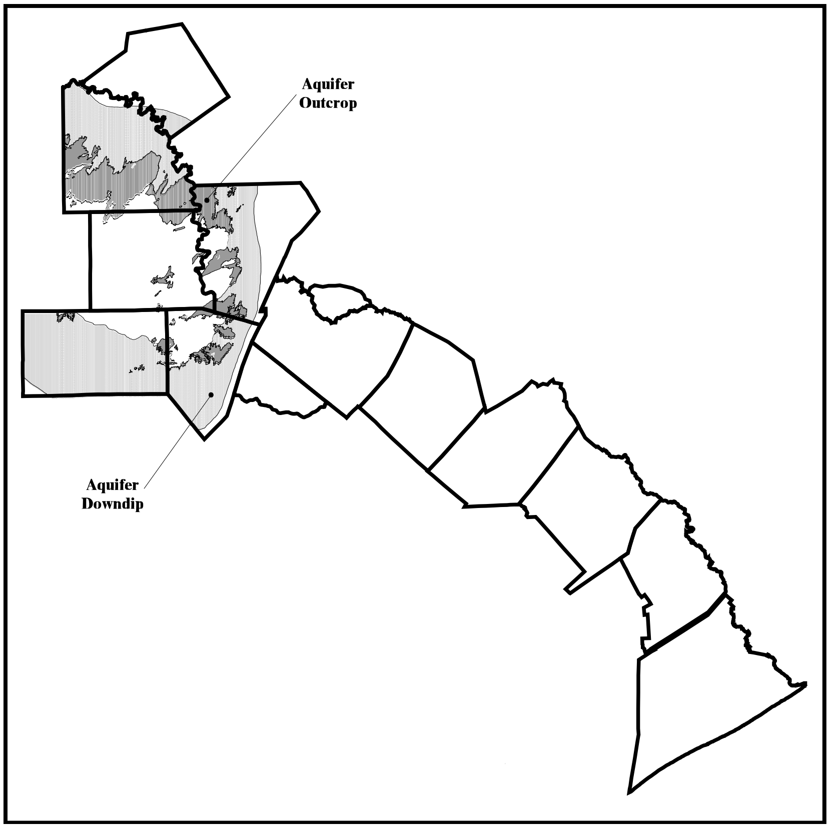
3.2.2.2.4 Ellenburger-San Saba Aquifer

Location and Use

The Ellenburger-San Saba aquifer underlies about 4,000 square miles in parts of 15 counties in the Llano Uplift area of Central Texas. Discontinuous outcrops of the aquifer generally encircle older rocks in the core of the uplift. The remaining downdip portion contains fresh to slightly saline water to depths of approximately 3,000 feet below land surface.

Groundwater use from the Ellenburger-San Saba aquifer within the LCRWPA occurs in Blanco, Burnet, Gillespie, Llano, and San Saba Counties. TWDB records indicate that municipal use accounts for the majority of groundwater pumpage from the aquifer. The location of the aquifer within the LCRWPA is illustrated in *Figure 3.10*.

Figure 3.10: Ellenburger-San Saba Aquifer Within the Lower Colorado Regional Water Planning Area



Hydrogeology

The Ellenburger-San Saba aquifer occurs in limestone and dolomite facies of the San Saba Member of the Wilbern Formation of the Late Cambrian Age; and in the Honeycut, Gorman, and Tanyard Formations of the Ellenburger Group. In the southeastern portion of the aquifer, these units have a combined maximum thickness of about 2,700 feet while in the northeastern portion of the aquifer and a maximum combined thickness is about 1,100 feet. In some areas where the overlying confining beds are thin or nonexistent the aquifer may be hydrologically connected to the Marble Falls aquifer.

Most of the water is under artesian conditions, even in the outcrop areas where impermeable carbonate rocks in the upper portion of the Ellenburger-San Saba function as confining layers. The aquifer is compartmentalized by block faulting with the fractures forming various sized cavities, which are the major water-bearing features.

The maximum capacity of wells used for municipal and irrigation purposes generally range from 200 to 600 gal/min. Most other wells produce less than 100 gal/min. The variable flow properties of the aquifer make it difficult to consistently obtain higher yield wells in some areas. Locations in the LCRWPA that have experienced this difficulty include the cities of Fredericksburg and Bertram.

Water Quality

Water produced from the aquifer may have dissolved concentrations that range from 200 mg/l to as high as 3,000 mg/l, but in most cases is usually less than 1,000 mg/l. The quality of water declines rapidly in the downdip direction.

Availability

The Ellenburger-San Saba aquifer spans several counties and several GMAs. The groundwater availability estimate values for the Ellenburger-San Saba aquifer are based on desired future conditions (DFCs) submitted by the responsible GMAs. Desired future conditions are essentially management goals for each aquifer. The DFCs for the Ellenburger-San Saba aquifer are as follows:

Blanco County (GMA 9) – DFC adopted on August 29, 2008

- Allow for an increase in average drawdown of no more than two (2) feet.

Burnet County (GMA 8) – DFC adopted on May 19, 2008

- Burnet County should maintain approximately 100 percent of the saturated thickness after 50 years by using approximately 80 percent of the estimated recharge.

Gillespie County (GMA 7) – DFC adopted on July 29, 2010

- Total net decline in water levels shall not exceed five (5) feet below 2010 water levels in the aquifer after 50 years.

Llano County (GMA 7) – DFC adopted on July 29, 2010

- Total net decline in water levels shall not exceed five (5) feet below 2010 water levels in the aquifer after 50 years.

Mills County (GMA 8) – DFC adopted on May 19, 2008

- Mills County should maintain approximately 90 percent of the available drawdown after 50 years.

San Saba County (GMA 7) – DFC adopted on July 29, 2010

- Total net decline in water levels shall not exceed five (5) feet below 2010 water levels in the aquifer after 50 years.

The Texas Water Development Board (TWDB) took the DFCs for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater or MAG. The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports.

- The GMA 7 Ellenburger-San Saba aquifer MAG being documented in TWDB report AA 10-10_MAG, dated November 1, 2011.
- The GMA 8 Ellenburger-San Saba aquifer MAG being documented in TWDB report AA 10-15_MAG, dated December 30, 2011.
- The GMA 9 Ellenburger-San Saba aquifer MAG being documented in TWDB report AA 10-01_MAG, dated June 22, 2011.

The reports provide the MAG values for the Ellenburger-San Saba aquifer by county and basin, as shown in *Table 3.20* below.

Table 3.20 Water Availability from the Ellenburger-San Saba Aquifer (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Blanco	Colorado	2,655	2,655	2,655	2,655	2,655	2,655
Blanco	Guadalupe	6	6	6	6	6	6
	County Total	***2,661***	***2,661***	***2,661***	***2,661***	***2,661***	***2,661***
Burnet	Brazos	123	123	123	123	123	123
Burnet	Colorado	5,403	5,403	5,403	5,403	5,403	5,403
	County Total	***5,526***	***5,526***	***5,526***	***5,526***	***5,526***	***5,526***
Gillespie	Colorado	6,270	6,270	6,270	6,270	6,270	6,270
Gillespie	Guadalupe	1	1	1	1	1	1
	County Total	***6,271***	***6,271***	***6,271***	***6,271***	***6,271***	***6,271***
Llano	Colorado	2,057	2,057	2,057	2,057	2,057	2,057
Mills	Brazos	5	5	5	5	5	5
Mills	Colorado	494	494	494	494	494	494
	County Total	***499***	***499***	***499***	***499***	***499***	***499***
San Saba	Colorado	10,893	10,893	10,893	10,893	10,893	10,893
Region K	**Region Total**	**27,907**	**27,907**	**27,907**	**27,907**	**27,907**	**27,907**

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.2.4 *Availability*.

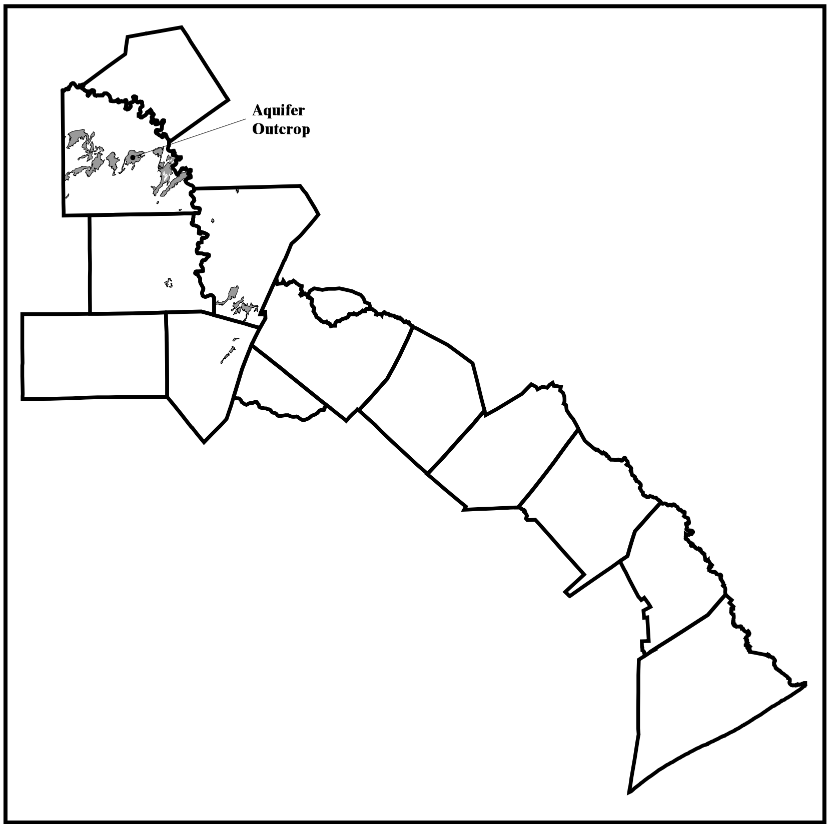
3.2.2.2.5 Marble Falls Aquifer

Location and Use

The Marble Falls aquifer occurs in several separated outcrops, primarily along the northern and eastern flanks of the Llano Uplift region of Central Texas. The downdip portion of the aquifer is of unknown extent.

Groundwater use from the Marble Falls aquifer within the LCRWPA occurs in Burnet and San Saba Counties. TWDB records indicate that municipal use accounts for the majority of groundwater pumpage from the aquifer. The location of the aquifer within the LCRWPA is illustrated in *Figure 3.11*.

Figure 3.11: Marble Falls Aquifer Within the Lower Colorado Regional Water Planning Area



Hydrogeology

This aquifer occurs in the fractures, solution cavities, and channels of the limestone rocks of the Marble Falls Formation of the Pennsylvanian Bend Group. The maximum thickness of the formation is 600 feet. Numerous large springs discharge from the aquifer and provide a significant portion of the baseflow of the San Saba River in McCulloch and San Saba Counties; and to the Colorado River in San Saba and Lampasas Counties. The aquifer contributes flow to the San Saba springs, which is the source of drinking water for the City of San Saba. In some areas where the confining layers are thin or nonexistent, the Marble Falls aquifer may be hydrologically connected to the San Saba-Ellenburger aquifer. Some wells have been known to produce as much as 2,000 gal/min; however, most wells produce at rates significantly less than this amount.

Water Quality

The water produced from this aquifer is suitable for most purposes, but some wells in Blanco County have produced water with high nitrate concentrations. The downdip portion of the aquifer is not extensive, but in these areas the water becomes highly mineralized. Because the limestone formation comprising this aquifer is relatively shallow, it is susceptible to pollution by surface uses and activities.

Availability

The Marble Falls aquifer spans several counties and several GMAs. The groundwater availability estimate values for the Marble Falls aquifer are based on desired future conditions (DFCs) submitted by the responsible GMAs. Desired future conditions are essentially management goals for each aquifer. The DFCs for the Marble Falls aquifer are as follows:

Blanco County (GMA 9) – DFC adopted on August 29, 2008

- Allow for no net increase in average drawdown.

Burnet County (GMA 8) – DFC adopted on May 19, 2008

- Burnet County should maintain approximately 100 percent of the saturated thickness after 50 years by using approximately 80 percent of the estimated recharge.

San Saba County (GMA 7) – DFC adopted on July 29, 2010

- Total net decline in water levels shall not exceed seven (7) feet below 2010 water levels in the aquifer after 50 years.

The Texas Water Development Board (TWDB) took the DFCs for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater or MAG. The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports.

- The GMA 7 Marble Falls aquifer MAG being documented in TWDB report AA 10-12_MAG, dated November 1, 2011.
- The GMA 8 Marble Falls aquifer MAG being documented in TWDB report AA 10-17_MAG, dated December 9, 2011.
- The GMA 9 Marble Falls aquifer MAG being documented in TWDB report AA 10-14_MAG, dated June 22, 2011.

The reports provide the MAG values for the Marble Falls aquifer by county and basin, as shown in *Table 3.21* below.

Table 3.21 Water Availability from the Marble Falls Aquifer (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Blanco	Colorado	261	261	261	261	261	261
Burnet	Brazos	93	93	93	93	93	93
Burnet	Colorado	1,885	1,885	1,885	1,885	1,885	1,885
	County Total	***1,978***	***1,978***	***1,978***	***1,978***	***1,978***	***1,978***
San Saba	Colorado	11,063	11,063	11,063	11,063	11,063	11,063
Region K	**Region Total**	**13,302**	**13,302**	**13,302**	**13,302**	**13,302**	**13,302**

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.2.5 *Availability*.

3.2.2.2.6 Yegua-Jackson Aquifer

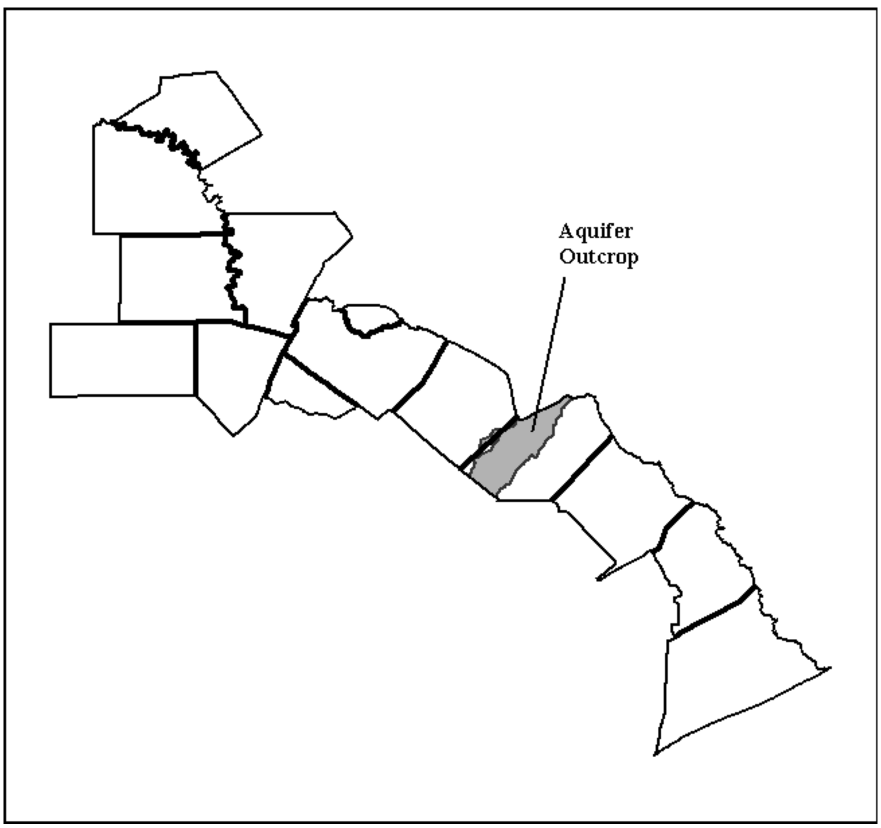
Location and Use

The Yequa-Jackson Aquifer extends in a narrow band from the Rio Grande Valley across the state to the Sabine River and Louisiana. It covers 10,904 square miles and exists within 34 counties.

The Yegua-Jackson Aquifer includes water bearing parts of the Yegua Formation and the Jackson Group. Within the LCRWPA, the Yegua Formation outcrops in Fayette County in a band approximately four to eight miles wide along the Bastrop-Fayette County line. The formation downdips at a rate of 150 feet per mile, and reaches its deepest depth of 2,800 feet below mean sea level along the Fayette-Lavaca County line. The yields of most wells in the Yegua-Jackson are generally small, ranging from less than 50 gallons per minute to over 300 gallons per minute. Groundwater use in Fayette County is primarily by rural landowners for domestic and livestock water supply.

The Jackson Group Formation outcrops in Fayette County within the LCRWPA in a band approximately three to eight miles wide along the northeasterly line from Flatonia to La Grange. The formation dips within Fayette County at a rate of approximately 150 feet per mile, and reaches its deepest depth of 2,200 feet below mean sea level near Fayetteville. Groundwater from the Jackson Group in Fayette County is used by the cities of Ledbetter, Flatonia, and Schulenburg as well as rural property owners.

Figure 3.12: Yegua-Jackson Aquifer Within the Lower Colorado Regional Water Planning Area



Hydrogeology

The Yegua-Jackson Aquifer's geologic units consist of complexly interbedded sand, silt, and clay layers originally deposited as fluvial and deltaic sediments. Most groundwater is produced from the sand units of the aquifer with the more significant productivity occurring in areas of more extensive fluvial channel sands and thick deltaic sands. Usable quality groundwater is generally limited to sands in the outcrop or slightly downdip. Net freshwater sands are generally less than 200 feet deep at any location within the aquifer.

Water Quality

Where the thicker, more extensive sand layers occur in the outcrop and slightly downdip, significant amounts of fresh to slightly saline water is available. Water quality varies greatly within the aquifer, and shallow occurrences of poor-quality water are not uncommon. The chemical quality of the groundwater is variable due to the variability of the composition of the sediments that make up the aquifer and the variability of how easily water moves through the aquifer. In all areas the aquifer becomes highly mineralized downdip.

Availability

The Yegua-Jackson aquifer in Fayette County is within GMA 12. The Groundwater Conservation Districts (GCD) within GMA 12 worked together to determine the desired future condition (DFC) of the Yegua-Jackson aquifer. Desired future conditions are essentially management goals for each aquifer. The DFC for the Yegua-Jackson aquifer, adopted by GMA 12 on June 30, 2011, is summarized as follows:

- No more than 75 feet of average drawdown between January 2010 and January 2060 within the Fayette County Groundwater Conservation District (Fayette County).

The Texas Water Development Board (TWDB) took the DFC for the aquifer and ran a groundwater availability model (GAM) that converted the DFC into a volume. This volume is considered the modeled available groundwater or MAG. The MAG, which is considered the maximum amount of groundwater available for the regional water planning process from a particular aquifer, is documented in TWDB reports, with the GMA 12 Yegua-Jackson aquifer MAG being documented in TWDB report GR 10-060_MAG, dated July 9, 2012. The report provides the MAG values for the Yegua-Jackson aquifer by county and basin, as shown in *Table 3.22* below.

Table 3.22 Water Availability from the Yegua-Jackson Aquifer (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Fayette	Colorado	5,065	5,065	5,065	5,065	5,065	5,065
Fayette	Guadalupe	650	650	650	650	650	650
Fayette	Lavaca	47	47	47	47	47	47
	County Total	***5,762***	***5,762***	***5,762***	***5,762***	***5,762***	***5,762***
Region K	**Region Total**	**5,762**	**5,762**	**5,762**	**5,762**	**5,762**	**5,762**

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.2.6 *Availability*.

3.2.2.2.7 Other Aquifer

Other Aquifer refers to alluvial aquifer water supplies that have not been identified, named, or studied. These alluvial aquifers are being used by a few WUGs in Region K as supply sources. The most likely source of these Other Aquifer supplies in Region K is the Colorado River Alluvium and related terrace deposits. Other Aquifer supplies were only considered for counties where WUGs specifically list alluvial aquifer type supplies as a source or where municipal or industrial WUGs could potentially utilize these alluvial supplies.

The availability of Other Aquifer supplies was determined based on current groundwater pumping reported in the TWDB historical groundwater use report for 2011, as well as permit data from Groundwater Conservation Districts, where applicable. *Table 3.23* contains a summary of the Other Aquifer sources available to the LCRWPA.

Table 3.23 Water Availability from Other Aquifer (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
Bastrop	Colorado	5,340	5,340	5,340	5,340	5,340	5,340
	County Total	***5,340***	***5,340***	***5,340***	***5,340***	***5,340***	***5,340***
Burnet	Brazos	783	783	783	783	783	783
Burnet	Colorado	3,672	3,672	3,672	3,672	3,672	3,672
	County Total	***4,455***	***4,455***	***4,455***	***4,455***	***4,455***	***4,455***
Fayette	Colorado	834	834	834	834	834	834
	County Total	***834***	***834***	***834***	***834***	***834***	***834***
Llano	Colorado	629	629	629	629	629	629
	County Total	***629***	***629***	***629***	***629***	***629***	***629***
Travis	Colorado	1,453	1,453	1,453	1,453	1,453	1,453
Travis	Guadalupe	112	112	112	112	112	112
	County Total	***1,565***	***1,565***	***1,565***	***1,565***	***1,565***	***1,565***
Region K	**Region Total**	**12,823**	**12,823**	**12,823**	**12,823**	**12,823**	**12,823**

Note: An explanation of the numbers presented in this table is provided in Section 3.2.2.2.6.

3.2.3 Regional Water Availability Summary

The TWDB guidelines for regional water planning process require that a summary of the water sources available to the region be presented. Detailed information concerning water source availability for the region is presented in *Appendix 3C* in the DB17 reports from TWDB. This information is presented graphically in *Figure 3.13* and is summarized in *Table 3.24*. As indicated, under current conditions, a total of approximately 1.25 million ac-ft of water is available annually to the LCRWPA under DOR conditions. Of this amount, approximately 74 percent is from surface water sources and 26 percent is from groundwater sources.

Figure 3.13: Total Water Available in Region K During a Drought of Record

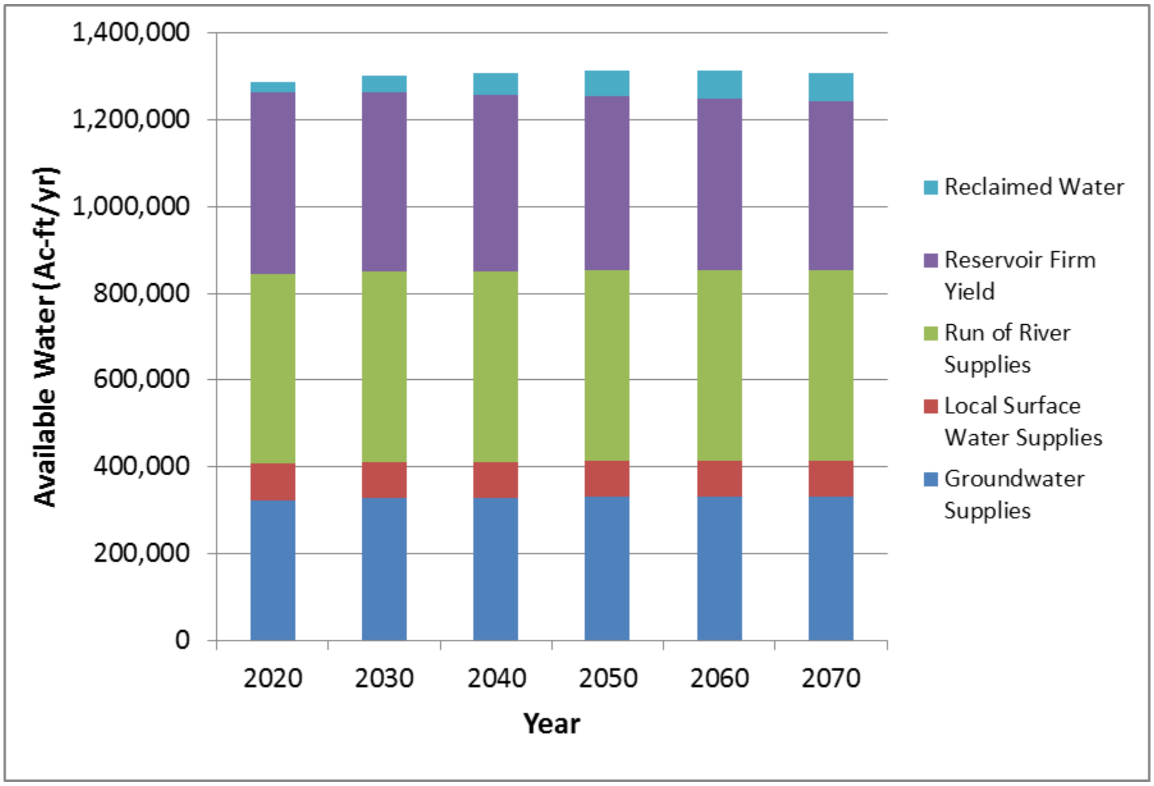


Table 3.24 Total Water Available in the Lower Colorado Regional Planning Area During a Drought of Record (ac-ft/yr)

Water Source	2020	2030	2040	2050	2060	2070
City of Austin - ROR Municipal [1]	201,374	201,374	201,374	201,374	201,387	201,441
City of Austin - ROR Steam Electric [1]	10,938	10,938	10,938	10,938	10,938	10,938
LCRA - Garwood ROR	123,822	123,822	123,822	123,822	123,822	123,822
LCRA - Gulf Coast ROR	13,524	13,524	13,524	13,524	13,524	13,524
LCRA - Lakeside ROR	5,692	5,692	5,692	5,692	5,692	5,692
LCRA - Pierce Ranch ROR	2,912	2,912	2,912	2,912	2,912	2,912
STP Nuclear Operating Co. ROR	44,397	44,397	44,397	44,397	44,397	44,397
San Bernard ROR	597	597	597	597	597	597
Highland Lakes [2]	418,812	413,298	407,774	401,744	395,201	389,125
Goldthwaite Reservoir	0	0	0	0	0	0
Llano Reservoir	417	417	417	417	417	417
Blanco Reservoir	596	596	596	596	596	596
Reclaimed Water (Reuse)	23,526	37,483	49,674	59,624	64,874	64,874
Irrigation Local Supply	38,687	38,687	38,687	38,687	38,687	38,687
Livestock Local Supply [3]	14,012	14,012	14,012	14,012	14,012	14,012
Other Local Supply	31,126	31,126	31,126	31,126	31,126	31,126
Carrizo-Wilcox Aquifer	20,979	21,666	25,833	29,018	29,498	29,498
Edwards (BFZ)Aquifer	9,452	9,452	9,452	9,452	9,452	9,452
Edwards-Trinity Aquifer (Plateau)	2,514	2,514	2,514	2,514	2,514	2,514
Ellenburger-San Saba Aquifer	27,907	27,907	27,907	27,907	27,907	27,907
Gulf Coast Aquifer	182,662	182,494	182,484	182,475	182,445	182,445
Hickory Aquifer	8,525	8,525	8,525	8,525	8,525	8,525
Marble Falls Aquifer	13,302	13,302	13,302	13,302	13,302	13,302
Queen City Aquifer	1,531	3,243	1,544	1,588	1,592	1,592
Sparta Aquifer	5,505	8,641	5,331	5,302	5,312	5,312
Trinity Aquifer	30,134	30,114	30,101	30,085	30,056	30,056
Yegua-Jackson Aquifer	5,762	5,762	5,762	5,762	5,762	5,762
Other Aquifer	14,093	14,093	14,093	14,093	14,093	14,093
Garwood (Corpus Christi) ROR	35,000	35,000	35,000	35,000	35,000	35,000
Region K Totals	**1,287,798**	**1,301,588**	**1,307,390**	**1,314,485**	**1,313,640**	**1,307,618**

Notes: Downstream water availability does not include return flows.
The water availability numbers in this table reflect water that is physically present in the region. This does not necessarily mean that this water is available to WUGs for immediate use as defined in *Table 3.31*.
Groundwater availabilities are discussed in Section 3.2.2.

[1] Refer to *Table 3.3* and *Table 3.27* for a breakdown of what is included in the COA ROR rights.
[2] Refer to *Table 3.1* for a breakdown of the Highland Lakes.
[3] Local Supply Sources are presented in *Tables 3.4, 3.5, 3.6, 3.7, 3.8,* and *3.9.*

3.3 WHOLESALE WATER PROVIDERS

The RWPGs are required to prepare estimates of the water available to the Wholesale Water Providers within each region. The LCRWPG has identified two Wholesale Water Providers, the LCRA, and the City of Austin. The water supplies available to these two entities are discussed in the following sections.

3.3.1 LCRA Water Availability

The LCRA has acquired the rights to significant quantities of water within the LCRWPA. The majority of water that is available to LCRA during a repeat of the drought of record is associated with the Highland Lakes System. However, the LCRA also has two additional smaller reservoirs that it operates in association with two power generating facilities (Fayette Power Project and Sim Gideon/Lost Pines Power Park). LCRA has developed groundwater supplies in Bastrop County. In addition, the LCRA has acquired many of the senior run-of-river water rights in the lower basin. *Table 3.25* contains a summary of the water that is available to the LCRA.

Table 3.25 Total Water Available to the Lower Colorado River Authority (ac-ft/yr)

Water Rights Holder/Source	Water Availability During Drought of Record [1]					
	2020	2030	2040	2050	2060	2070
LCRA - Garwood	123,822	123,822	123,822	123,822	123,822	123,822
LCRA - Gulf Coast	13,524	13,524	13,524	13,524	13,524	13,524
LCRA - Lakeside #1 and #2	5,692	5,692	5,692	5,692	5,692	5,692
LCRA - Pierce Ranch	2,912	2,912	2,912	2,912	2,912	2,912
LCRA - Highland Lakes	418,812	413,298	407,774	401,744	395,201	389,125
Carrizo-Wilcox Aquifer [2]	4,500	4,886	5,694	6,149	6,149	6,149
Totals	**569,262**	**564,134**	**559,418**	**553,843**	**547,300**	**541,224**

Data Source: Colorado WAM provided by TCEQ, Feb 2012, Run 3 – modified to Region K Cutoff Model with hydrology through 2013. WRAP program by Dr. Ralph Wurbs, Texas A&M University, August 2012

Note: Downstream water availability does not include return flows.

[1] The firm yield determinations for the LCRA ROR rights are discussed in *Section 3.2.1.1.3* and are presented in *Table 3.3*. The Highland Lakes firm yield determination is discussed in *Section 3.2.1.1.1* and is presented in *Table 3.1*.

[2] LCRA has a permit for Carrizo-Wilcox aquifer groundwater in Bastrop County. The amount shown is not the full permitted volume, but the amount available for planning purposes that meets TWDB requirements for regional water planning.

The LCRA makes the majority of this water available to its customers for various uses through water sales contracts. The majority of these water sales contracts are for stored water from the Highland Lakes System. These firm customer contracts are assumed to renew through the planning period. In addition, the LCRA operates three irrigation divisions (Lakeside, Garwood and Gulf Coast) in the lower basin and also provides water to Pierce Ranch. These divisions and Pierce Ranch are provided irrigation water, subject to interruption, for agricultural crop (rice and other crops) production in Colorado, Wharton, and Matagorda Counties. *Table 3.26* contains a summary of current LCRA water supply commitments and projected irrigation demands, by Water User Groups.

Table 3.26 LCRA Firm Water Commitment and Interruptible Demand Summary (ac-ft/yr)

County/WUG	2020	2030	2040	2050	2060	2070
Environmental Commitments*	33,440	33,440	33,440	33,440	33,440	33,440
Bastrop County						
County-Other	744	744	744	744	744	744
Irrigation	955	955	955	955	955	955
Steam Electric	16,720	16,720	16,720	16,720	16,720	16,720
Burnet County						
Burnet	4,100	4,100	4,100	4,100	4,100	4,100
Cottonwood Shores	495	495	495	495	495	495
Granite Shoals	830	830	830	830	830	830
Horseshoe Bay (also in Llano Co.)	2,225	2,225	2,225	2,225	2,225	2,225
Marble Falls	3,000	3,000	3,000	3,000	3,000	3,000
Meadowlakes	75	75	75	75	75	75
County-Other	2,205	2,205	2,205	2,205	2,205	2,205
Irrigation	416	416	416	416	416	416
Manufacturing	500	500	500	500	500	500
Colorado County						
Irrigation [1]	124,385	121,039	117,783	114,614	111,532	108,531
Fayette County						
County-Other	102	102	102	102	102	102
Steam Electric (LCRA)	38,101	38,101	38,101	38,101	38,101	38,101
Steam Electric (COA)	7,016	7,016	7,016	7,016	7,016	7,016
Gillespie County						
County-Other	56	56	56	56	56	56
Hays County						
Dripping Springs	506	506	506	506	506	506
Dripping Springs WSC	1,126	1,126	1,126	1,126	1,126	1,126
County-Other	1,401	1,401	1,401	1,401	1,401	1,401
Lampasas County (Region G)						
Lometa	665	665	665	665	665	665
Llano County						
Kingsland WSC (also in Burnet Co.)	1,150	1,150	1,150	1,150	1,150	1,150
Sunrise Beach Village	200	200	200	200	200	200
County-Other	3,586	3,586	3,586	3,586	3,586	3,586
Irrigation	1,514	1,514	1,514	1,514	1,514	1,514
Steam Electric	2,500	2,500	2,500	2,500	2,500	2,500
Mason County (Region F)						
Irrigation	59	59	59	59	59	59
Mining	2	2	2	2	2	2

County/WUG	2020	2030	2040	2050	2060	2070
Matagorda County						
Manufacturing	14,222	14,222	14,222	14,222	14,222	14,222
Irrigation [2]	181,906	176,942	172,112	167,412	162,839	158,388
Steam Electric [3]	32,240	32,226	32,202	32,172	32,142	32,120
San Saba County						
County-Other	20	20	20	20	20	20
Travis County						
Austin - Municipal [4]	123,626	123,626	123,626	123,626	123,613	123,559
Austin - Steam Electric [5]	16,156	16,156	16,156	16,156	16,156	16,156
Briar Cliff Village	400	400	400	400	400	400
Cedar Park [6]	2,767	2,767	2,767	2,767	2,767	2,767
The Hills	1,600	1,600	1,600	1,600	1,600	1,600
Lago Vista	6,500	6,500	6,500	6,500	6,500	6,500
Lakeway	3,069	3,069	3,069	3,069	3,069	3,069
Loop 360 WSC	1,250	1,250	1,250	1,250	1,250	1,250
Pflugerville	12,000	12,000	12,000	12,000	12,000	12,000
Point Venture	360	360	360	360	360	360
Travis County MUD #14	4,316	4,316	4,316	4,316	4,316	4,316
Travis County WCID #17	9,299	9,299	9,299	9,299	9,299	9,299
Travis County WCID #18	1,736	1,736	1,736	1,736	1,736	1,736
Travis County WCID #20	1,135	1,135	1,135	1,135	1,135	1,135
West Travis County PUA [7]	9,450	9,450	9,450	9,450	9,450	9,450
County-Other	14,617	14,617	14,617	14,617	14,617	14,617
Irrigation	2,596	2,596	2,596	2,596	2,596	2,596
Manufacturing	282	282	282	282	282	282
Williamson County (Region G)						
Cedar Park [6] (also in Travis County)	15,233	15,233	15,233	15,233	15,233	15,233
Leander [8] (also in Travis County)	24,000	24,000	24,000	24,000	24,000	24,000
Brazos River Authority	25,000	25,000	25,000	25,000	25,000	25,000
Wharton County						
Irrigation [9]	116,726	113,586	110,531	107,557	104,664	101,848
TOTAL	868,579	857,116	845,951	835,079	824,487	814,144

*Environmental demands are not one of the six water uses planned for in regional water planning.

[1] The Colorado Irrigation commitment represents 75 percent of the Colorado County Irrigation demand and includes both supplies from LCRA ROR water rights and supplemental interruptible stored water from the Highland Lakes on an annual contract basis.

[2] The Matagorda Irrigation commitment represents 87 percent of the Matagorda County Irrigation demand and includes both supplies from LCRA ROR water rights and supplemental interruptible stored water from the Highland Lakes on an annual contract basis.

[3] The Matagorda Steam Electric value is based on the Region K Cutoff Model results for the average annual amount of LCRA backup supplies needed to supplement the STPNOC/LCRA water right.

[4] The Austin-Municipal value is based on the Region K Cutoff Model results for the amount of LCRA backup supplies needed to supplement Austin's municipal water rights.

[5] The Austin-Steam Electric value is based on the Region K Cutoff Model results for the amount of LCRA backup supplies needed to supplement Austin's steam-electric water rights.

[6] Cedar Park is located in both Region K and Region G , and it serves Williamson-Travis Counties MUD #1 (WUG).

[7] West Travis County PUA serves multiple water user groups including the Village of Bee Cave, Barton Creek West WSC, and County-Other.

[8] Leander is located in both Region K and Region G.

[9] The Wharton Irrigation commitment represents 55 percent of the total Wharton County Irrigation demand and includes both supplies from LCRA ROR water rights and supplemental interruptible stored water from the Highland Lakes on an annual contract basis.

In general, the municipal and manufacturing commitments listed in the table above are considered firm commitments for water, while the water provided by LCRA to irrigation users in the three LCRA Irrigation Divisions and to Pierce Ranch is on an interruptible supply basis. Based on the current 2010 LCRA Water Management Plan, the LCRA will release water from storage on an interruptible basis when the levels in the Highland Lakes are above a prescribed level at the beginning of the year. During drought conditions, this water may not be available for users or is available in limited quantities. Therefore, in accordance with the TWDB guidance, interruptible water supplied by LCRA is not being considered as a "currently available water supply." The availability of interruptible water will be addressed in Chapter 5 discussing management strategies to meet identified water shortages.

3.3.2 City of Austin Water Availability

The City of Austin has run-of-river water rights to divert and use water from the Colorado River. Hydrologic conditions are such that Austin's full authorized diversion amount of water is not available to Austin under these water rights. As a result, the City of Austin has entered into a contract with LCRA to firm up these water rights with water stored in the Highland Lakes. *Table 3.27* contains a summary of the water available to the City of Austin.

Table 3.27 City of Austin Water Availability (ac-ft/yr)

Water Right / Agreement	Water Rights Holder	Water Supply Source	Water Availability During Drought of Record (Ac-Ft/Yr)					
			2020	**2030**	**2040**	**2050**	**2060**	**2070**
5471	COA [1]	ROR - Municipal	158,781	158,781	158,781	158,781	158,794	158,848
5471	COA [1]	ROR - Municipal	29,201	29,201	29,201	29,201	29,201	29,201
5471	COA [2]	ROR - Municipal	8,284	8,284	8,284	8,284	8,284	8,284
5489	COA [3]	ROR - Municipal	5,108	5,108	5,108	5,108	5,108	5,108
Mun and Mfg ROR Subtotal			201,374	201,374	201,374	201,374	201,387	201,441
5471	LCRA Backup [1]	Highland Lakes	62,018	62,018	62,018	62,018	62,005	61,951
5471	LCRA Backup [2]	Highland Lakes	13,119	13,119	13,119	13,119	13,119	13,119
5489	LCRA Backup [3]	Highland Lakes	15,192	15,192	15,192	15,192	15,192	15,192
Remaining Contract	LCRA Contract	Highland Lakes	33,297	33,297	33,297	33,297	33,297	33,297
LCRA Mun and Mfg Subtotal			123,626	123,626	123,626	123,626	123,613	123,559
Municipal & Manufacturing Total			**325,000**	**325,000**	**325,000**	**325,000**	**325,000**	**325,000**
5471 (Town Lake)	COA	ROR - Steam Electric	4,970	4,970	4,970	4,970	4,970	4,970
5471 (FPP)	COA	ROR - Steam Electric	871	871	871	871	871	871
5489 (Decker)	COA	ROR - Steam Electric	0	0	0	0	0	0
5489 (Decker) [4]	COA	ROR - Steam Electric	5,097	5,097	5,097	5,097	5,097	5,097
Steam Electric ROR Total			10,938	10,938	10,938	10,938	10,938	10,938
Town Lake Contract	LCRA Contract	Highland Lakes	0	0	0	0	0	0
Decker Contract [4]	LCRA Contract	Highland Lakes	11,059	11,059	11,059	11,059	11,059	11,059
FPP & Sandhill Contract	LCRA Contract	Highland Lakes	7,016	7,016	7,016	7,016	7,016	7,016
LCRA Steam Electric Total			18,075	18,075	18,075	18,075	18,075	18,075
Steam Electric Total			**29,013**	**29,013**	**29,013**	**29,013**	**29,013**	**29,013**
TOTAL (Municipal & Manufacturing + Stream Electric)			**354,013**	**354,013**	**354,013**	**354,013**	**354,013**	**354,013**

[1] These two City of Austin ROR Rights and the LCRA backup total 250,000 ac-ft/yr.
[2] The City of Austin ROR Right and the LCRA backup total 21,403 ac-ft/yr.
[3] The City of Austin ROR Right and the LCRA backup total 20,300 ac-ft/yr.
[4] The Decker ROR right and the LCRA contract total 16,156 ac-ft/yr.

The City of Austin provides treated water to customers within its service area. In addition, the City has contracts to provide treated water on a wholesale basis to cities, districts, and water supply corporations in surrounding areas. *Table 3.28* contains a summary of the City of Austin water commitments. Contracts which are expected to terminate, not be renewed, and may subsequently be supplied by LCRA during the planning period are identified as so in the table below by showing 0 ac-ft/yr of supply in the applicable decades. Details related to water management strategies for new LCRA contracts are provided in Chapter 5. The City of Austin will continue to treat and deliver the LCRA contracted water for these entities.

Table 3.28 City of Austin Water Commitment Summary (ac-ft/yr)

Water User Groups (WUGs)	County	Basin	2020	2030	2040	2050	2060	2070
Austin	Hays	Colorado	13	127	249	631	1,519	2,749
Austin	Travis	Colorado	157,445	182,933	209,973	229,887	246,590	266,411
County-Other [1] (COA Retail portion)	Travis	Colorado	4,520	4,108	3,740	3,138	2,298	1,555
Manufacturing	Travis	Colorado	35,430	48,350	63,498	72,631	81,421	91,270
Creedmoor-Maha WSC [1]	Travis	Colorado	241	0	0	0	0	0
Lost Creek MUD	Travis	Colorado	1,092	1,072	1,057	1,056	1,054	1,054
Manor [1]	Travis	Colorado	1,141	0	0	0	0	0
North Austin MUD#1	Travis	Colorado	82	79	77	75	75	75
Northtown MUD	Travis	Colorado	691	798	898	1,011	1,111	1,203
Rollingwood	Travis	Colorado	384	0	0	0	0	0
Shady Hollow MUD	Travis	Colorado	779	758	741	731	730	730
Sunset Valley	Travis	Colorado	386	0	0	0	0	0
Travis County WCID #10 [2]	Travis	Colorado	3,692	0	0	0	0	0
Wells Branch MUD	Travis	Colorado	1,638	1,602	1,577	1,563	1,559	1,558
Austin	Williamson	Brazos	7,697	9,541	11,841	14,317	17,126	20,208
County-Other (All COA Retail)	Williamson	Brazos	2,586	3,504	3,467	3,451	3,444	3,441
North Austin MUD#1	Williamson	Brazos	774	748	726	714	711	711
Wells Branch MUD	Williamson	Brazos	118	115	113	112	112	112
Total			**218,709**	**253,735**	**297,957**	**329,317**	**357,750**	**391,077**
Steam-Electric [3]	Fayette [4]	Colorado	14,702	14,702	14,702	14,702	20,702	22,702
Steam-Electric [3]	Travis	Colorado	18,500	22,500	22,500	23,500	24,500	26,500
Total			**33,202**	**37,202**	**37,202**	**38,202**	**45,202**	**49,202**

[1] These WUGs are also served by other entities.
[2] Travis County WCID #10 sells 1,564 AF of the Austin commitment to West Lake Hills.
[3] COA's portion of the STPNOC demand is included in the STPNOC total steam-electric demand in Matagorda County.
[4] COA portion - based on estimated current supply levels and approved projections.

3.4 WATER SUPPLIES AVAILABLE TO WATER USER GROUPS

Estimates of the total available supply of water within the LCRWPA during a repeat of the drought of record conditions are presented in Section 3.2. However, the availability of this water to each of the

water user groups is dependent upon the WUG's location and the infrastructure capacity or permits/contracts that are in place to move the water where it is needed. The following sections discuss the currently available water supplies for each of the water user groups within the LCRWPA. The water supply amounts presented in this section are a total of permitted/contracted amount and/or infrastructure capacity for each WUG in LCRWPA. Firm contacts are assumed to be renewed through the planning period, unless identified specifically in *Table 3.28*. The amount presented in *Section 3.2* (*Table 3.24*) is the total water available for LCRWPA established through modeling effort or regulatory limit.
The amount of total water supply available to the WUGs in Region K is less than the total available water to the region presented in *Table 3.24*, since the water supply for the WUGs is limited by current supplies owned or controlled by each WUG, location relative to the source, and infrastructure limitations. There is water available in Region K that is not currently being used by WUGs because they do not have the needs right now, or they do not have the means to utilize the source at this time. The following sections present the amount of water supply that is currently available to the WUGs (current permits/contracts and infrastructure capacities).

3.4.1 Surface Water Supplies Available to Water User Groups

As previously stated, there are four primary categories of surface water to be considered. The three categories include water stored in reservoirs, run-of-river water rights, local surface water supplies, and reclaimed water. The surface water supplies are available to the water user groups in a variety of methods. Many users of water throughout the basin have contracts with one of the two designated Wholesale Water Providers within the Region. Other users of surface water generally obtain water from small reservoirs or from other local sources such as stock ponds. Surface water information was also obtained from the TCEQ Water Utility Database (plant production capacities).

Information concerning the available surface water supply for each county within the LCRWPA is presented in *Table 3.29*. Detailed information concerning water supply availability for individual WUGs is presented in *Appendix 3C* in the DB17 reports from TWDB.

Table 3.29 Summary of Surface Water Supply to WUGs by County (ac-ft/yr)

County	2020 Supply	2030 Supply	2040 Supply	2050 Supply	2060 Supply	2070 Supply
Bastrop	14,734	14,237	13,336	12,799	12,726	12,677
Blanco	1,644	1,672	1,687	1,692	1,697	1,700
Burnet	15,422	15,462	15,505	15,546	15,576	15,603
Colorado	70,713	70,713	70,713	70,713	70,713	70,713
Fayette	48,330	48,330	48,330	48,330	48,330	48,330
Gillespie	742	742	742	742	742	742
Hays	8,447	8,619	8,811	9,283	10,274	11,496
Llano	12,057	12,055	12,046	12,036	12,035	12,033
Matagorda	108,927	108,913	108,889	108,859	108,829	108,807
Mills	3,066	3,066	3,066	3,066	3,066	3,066
San Saba	2,930	2,930	2,930	2,930	2,930	2,930
Travis	408,666	406,440	404,588	397,627	387,710	378,430
Wharton	37,422	37,422	37,422	37,422	37,422	37,422
Williamson	11,175	14,058	16,467	19,111	21,960	24,472
Regional Totals	**744,275**	**744,659**	**744,532**	**740,156**	**734,010**	**728,421**

Note: The supplies presented in this table are supplies currently available to the WUGs (current contracts and infrastructure capacities). Surface water availability excludes City of Austin return flows.

3.4.2 Groundwater Supplies Available to Water User Groups

Groundwater supplies were allocated to the various WUGs within the LCRWPA using data from various sources. Information provided by the water user group was entered when available. Permit information was entered for various groundwater conservation districts, and supplies were estimated based upon the TCEQ Water Utility Database information (well production capacities). In addition, in cases where total supplies exceeded the Modeled Available Groundwater (MAG), WUG supplies were cut back proportionally to prevent over allocation.

Information concerning the available groundwater supply for each county within the LCRWPA is presented in *Table 3.30*. Detailed information concerning water supply availability for individual WUGs is presented in *Appendix 3C* in the DB17 reports from TWDB.

Table 3.30 Summary of Groundwater Supply to WUGs by County (ac-ft/yr)

County	2020 Supply	2030 Supply	2040 Supply	2050 Supply	2060 Supply	2070 Supply
Bastrop	21,954	23,358	26,103	28,217	29,063	30,177
Blanco	2,575	2,575	2,575	2,575	2,575	2,575
Burnet	12,122	12,352	12,593	12,812	13,064	13,351
Colorado	48,727	48,727	48,727	48,727	48,727	48,727
Fayette	8,079	8,076	8,071	8,071	8,062	8,044
Gillespie	10,413	10,413	10,413	10,413	10,413	10,413
Hays	5,559	5,704	5,776	5,863	5,954	6,055
Llano	1,531	1,531	1,531	1,531	1,531	1,531
Matagorda	43,156	43,156	43,156	43,156	43,156	43,156
Mills	1,927	1,927	1,927	1,927	1,927	1,927
San Saba	7,715	7,717	7,716	7,712	7,715	7,718
Travis	14,630	14,561	14,434	14,325	14,170	13,630
Wharton	76,198	76,198	76,198	76,198	76,198	76,198
Williamson	6	6	6	6	6	6
Regional Totals	**254,592**	**256,301**	**259,226**	**261,533**	**262,561**	**263,508**

Note: The supplies presented in this table are supplies currently available to the WUGs (current permits and infrastructure capacities).

3.4.3 WUG Water Supply Summary

Information concerning the available water supply to WUGs in each county within the LCRWPA is presented in *Table 3.31.* There is water available in Region K that is not currently being used by WUGs because they do not have the needs right now, or they do not have the means to utilize the source at this time. *Table 3.31* shows the amount of water supply that is currently available to the WUGs (current permits/contracts and infrastructure capacities). As the contracts and permits expire, it is assumed they will be renewed at their currently contracted amount.

Detailed information concerning water supply available for every individual WUG in Region K is presented in *Appendix 3C* in the DB17 reports from TWDB.

Table 3.31 Total Water Supply to WUGs by County (ac-ft/yr)

County	2020 Supply	2030 Supply	2040 Supply	2050 Supply	2060 Supply	2070 Supply
Bastrop	36,688	37,595	39,439	41,016	41,789	42,854
Blanco	4,219	4,247	4,262	4,267	4,272	4,275
Burnet	27,544	27,814	28,098	28,358	28,640	28,954
Colorado	119,440	119,440	119,440	119,440	119,440	119,440
Fayette	56,409	56,406	56,401	56,401	56,392	56,374
Gillespie	11,155	11,155	11,155	11,155	11,155	11,155
Hays	14,006	14,323	14,587	15,146	16,228	17,551
Llano	13,588	13,586	13,577	13,567	13,566	13,564
Matagorda	152,083	152,069	152,045	152,015	151,985	151,963
Mills	4,993	4,993	4,993	4,993	4,993	4,993
San Saba	10,645	10,647	10,646	10,642	10,645	10,648
Travis	423,296	421,001	419,022	411,952	401,880	392,060
Wharton	113,620	113,620	113,620	113,620	113,620	113,620
Williamson	11,181	14,064	16,473	19,117	21,966	24,478
Regional Totals	**998,867**	**1,000,960**	**1,003,758**	**1,001,689**	**996,571**	**991,929**

Note: The supplies presented in this table are supplies currently available to the WUGs (current permits/contracts and infrastructure capacities).

APPENDIX 3A

WATER RIGHTS HELD IN THE LOWER COLORADO REGIONAL WATER PLANNING AREA

APPENDIX 3B

DESCRIPTION OF REGION K WAM RUN 3 CUTOFF MODEL

APPENDIX 3C

TWDB DB17 REPORTS FOR WATER AVAILABILITY AND WATER SUPPLIES