

Section 3 Water Supply Analyses [31 TAC §357.7(a)(3)]

3.1 Groundwater Supplies

There are five major and three minor aquifers supplying water to the South Central Texas Region. The five major aquifers are the Edwards-Balcones Fault Zone, Carrizo-Wilcox¹, Trinity, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers (Figure 3-1). The three minor aquifers are the Sparta, Queen City, and Yegua-Jackson Aquifers. Section 1.7.1 includes more detailed descriptions of the aquifers, including water quality characteristics.

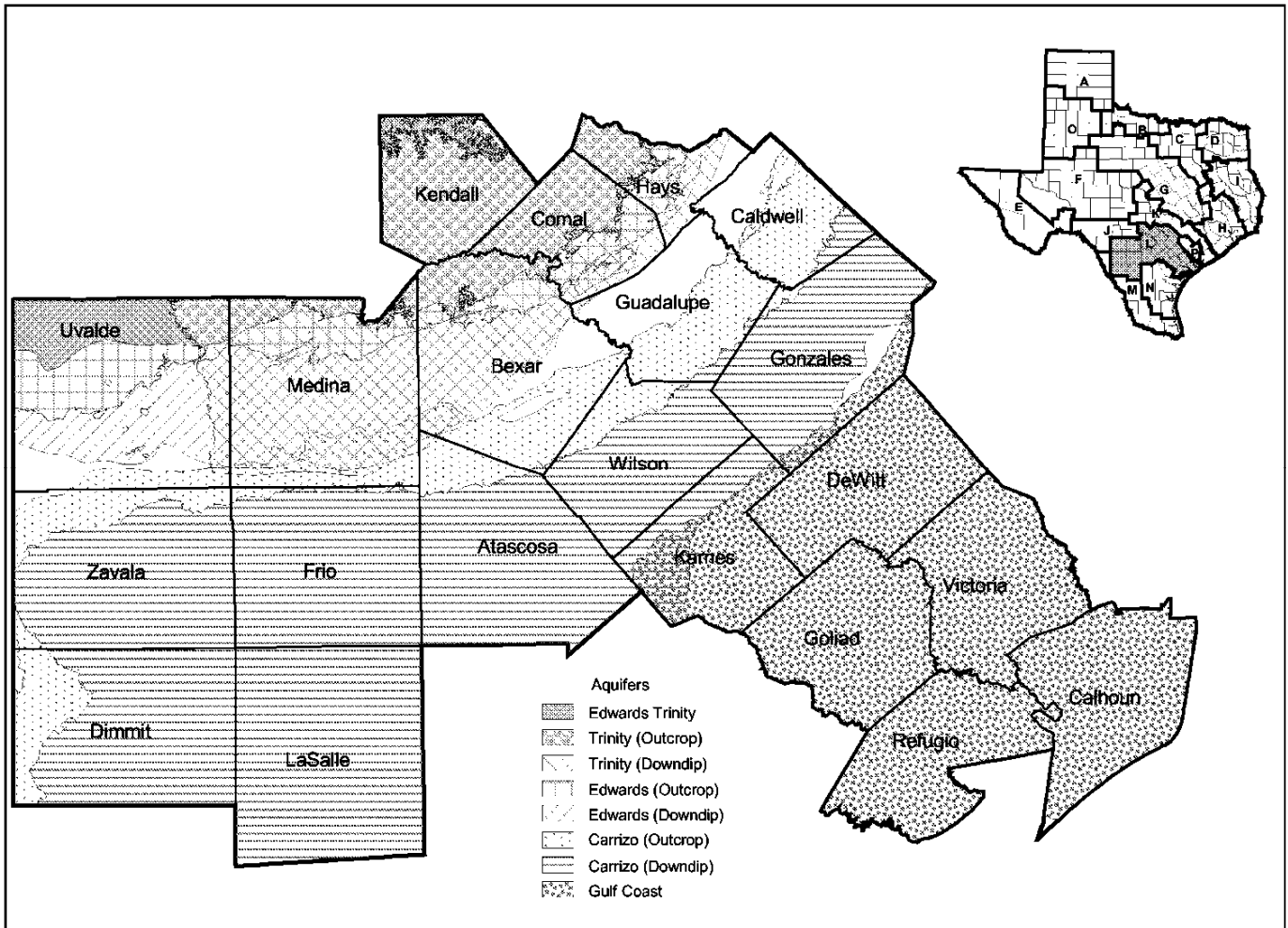


Figure 3-1. Major Aquifers — South Central Texas Region

¹ Although traditionally identified by the Texas Water Development Board as one major aquifer, the Carrizo and Wilcox formations are generally separated by an aquitard which serves to limit or preclude hydrologic connectivity between the two formations in some portions of the planning region.

There are 16 groundwater conservation districts (GCDs) in the South Central Texas Region (Figure 3-2). With the exceptions of Calhoun County, a GCD serves all or a portion of each county in the region. The responsibilities and authorities of these GCDs vary depending upon creating legislation and governing law, and some districts are not responsible for all aquifers within the geographic boundaries of the district. For example, the statutory district of the Edwards Aquifer Authority (EAA) includes (among others) Bexar, Medina, and Uvalde Counties, but the EAA exercises permitting authority only with respect to the Edwards Aquifer in those counties. Other aquifers within this three-county area are managed by the Trinity-Glen Rose GCD, Medina County GCD, and the Uvalde County Underground Water Conservation District. The Carrizo-Wilcox Aquifer in Bexar County, however, is not managed by a GCD.

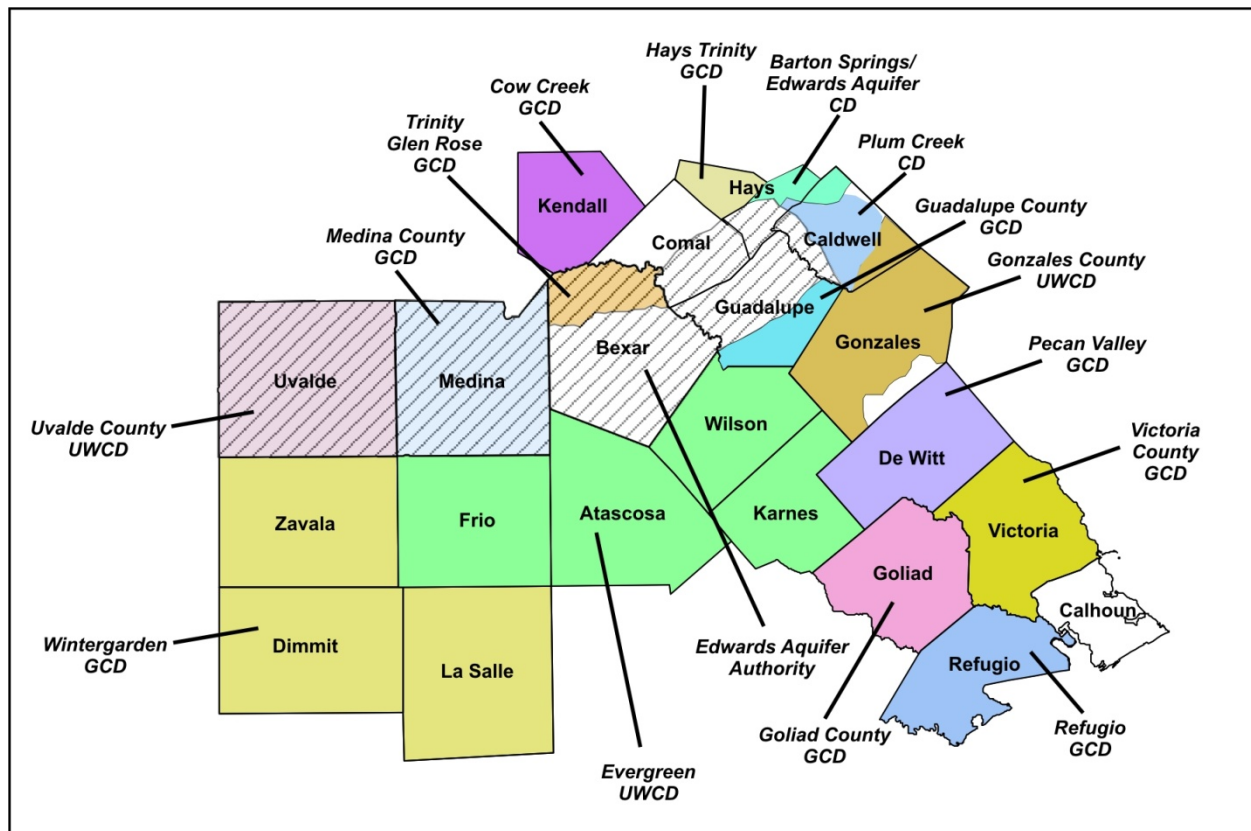


Figure 3-2. Groundwater Conservation Districts

3.1.1 Groundwater Availability

TWDB Guidelines for Regional Water Plan Development describe available groundwater supply as follows:

“The largest amount of water that can be pumped from a given aquifer without violating the most restrictive physical or regulatory or policy conditions limiting withdrawals under drought of record conditions. Regulatory conditions refer specifically to any limitations on pumping withdrawals imposed by groundwater conservation districts through their rules and permitting programs.”

HB1763 of the 79th Texas Legislature directs the GCDs within a Groundwater Management Area (GMA) to determine Desired Future Conditions (DFCs) for the groundwater resources within the boundaries of the GMA. These DFCs are used by the Texas Water Development Board (TWDB) to estimate Managed Available Groundwater (MAG) from each aquifer source within each county. The MAG estimates are then to be used by Region L as the official estimates of groundwater supplies available to meet current and future water demands within the region or wherever such supplies may be permitted for use.

The TWDB set a deadline of January 2008 for the GMAs to submit DFCs to the TWDB in order for such DFCs and the resulting MAG estimates to be included in the 2011 regional water plans. Despite significant efforts, none of the GMAs in Region L (GMAs 7, 9, 10, 13, and 15) met this deadline. The SCTRWPG recognized that the process for selection of DFCs is quite challenging and preferred to use MAG estimates in the 2011 South Central Texas Regional Water Plan. Hence, the SCTRWPG decided that final MAG estimates received on or before November 26, 2008 would be used in the 2011 South Central Texas Regional Water Plan. Region L received MAG estimates for the Edwards Group of the Edwards-Trinity (Plateau) Aquifer in GMA 9 in April 2009 and has included them in this plan. As of January 20, 2010, the SCTRWPG has not received MAG estimates from any of the other four GMAs in Region L.

Therefore, as a matter of policy, the SCTRWPG has chosen to accept estimates of available groundwater supply from the management plans of the GCDs for regional planning purposes². When a GCD management plan is not available or an area is not represented by a GCD, the SCTRWPG has chosen to retain the estimates of groundwater supply used in the 2006 South Central Texas Regional Water Plan. The SCTRWPG also acknowledges that county

² The SCTRWPG has assumed that estimates of groundwater availability reported in approved groundwater management plans were derived with due consideration of the results of groundwater availability model (GAM) applications in accordance with 31 TAC §356.5.

commissioners' courts have adopted water availability requirements for subdivision platting in Comal, Guadalupe, Hays, Kendall, and Medina Counties. Table 3-1 provides a summary of information pertinent to groundwater supply and availability by county, GCD, and aquifer for all major aquifers with the exception of the Edwards and the Edwards-Trinity (Plateau) Aquifers. In the rightmost column of Table 3-1, the existing groundwater supply "allocated" to meet local demands at year 2010 is shown for reference and comparison to estimates of overall supply. With respect to municipal utilities, it is important to note that this "allocated" supply is, after generally accounting for the ratio of peak to average day water demands, equal to the lesser of the tested well capacities as reported to the Texas Commission on Environmental Quality (TCEQ) or the available groundwater supply adopted by the SCTRWPG and is not necessarily representative of current or projected groundwater use.

In the case of the Edwards Aquifer, Senate Bill 3 of the 80th Texas Legislature established a maximum annual amount of permitted withdrawals from the aquifer of 572,000 acft/yr, specific critical period management plan provisions, interim minimum annualized rates for permitted withdrawals in critical period of 320,000 acft/yr, and a Recovery Implementation Program for protection of endangered species. Thus, for purposes of water supply analyses for the 2011 South Central Texas Regional Water Plan, the permitted supply from the Edwards Aquifer is assumed to be 320,000 acft/yr.³

Projected groundwater supplies available in the South Central Texas Region under drought of record conditions are 947,078 acft/yr in 2010, 939,680 acft/yr in 2030, and 939,356 acft/yr in 2060 (Table 3-2). Supplies available from the Edwards, Sparta, Queen City, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers are projected to hold steady on an annual basis throughout the 2010 through 2060 projection period, and represent about 49 percent of the total groundwater available to the region in 2060 (Table 3-2). The supply available from the Carrizo Aquifer is projected to decline from 438,539 acft/yr for the 2010 through 2020 period to 431,141 acft/yr for the period after 2020. The supply available from the Trinity Aquifer is projected to decline from 49,327 acft/yr for the 2010 through 2040 period to 49,003 acft/yr for the period after 2040.

³ For planning purposes, an estimate of 320,000 acft/yr of available supply during a drought of record from the Edwards Aquifer was agreed upon by the SCTRWPG and the staff of the TWDB. This quantity is adopted as a placeholder number until the EAA obtains approval of a Habitat Conservation Plan (HCP) from the U.S. Fish and Wildlife Service.

Table 3-1. Available Groundwater Supply for the Gulf Coast, Carrizo-Wilcox, and Trinity Aquifers

County	Groundwater Conservation District ¹	Major Aquifer(s) ²			Management Plan Status ³	Production Limits ⁴ (acft/ac/yr)	2010 Supply		2010 Supply Allocated (acft/yr)
		Gulf Coast	Carrizo-Wilcox	Trinity			2006 RWP ⁵ (acft/yr)	GCD Mgmt. Plan (acft/yr)	
Calhoun					No GCD		2,940		2,594
Gonzales					No GCD		2,083		101
Refugio	Refugio				Current			24,500	2,952
Goliad	Goliad Co.				Current	0.5		8,000	4,869
Victoria	Victoria Co.				Current	0.5		35,000	34,897
DeWitt	Pecan Valley				Current	1.0		15,000	10,334
Karnes	Evergreen				Current	2.0		15,200	5,069
Karnes					No GCD		699		699
Wilson	Evergreen				Current	2.0		21,804	19,656
Atascosa	Evergreen				Current	2.0		47,806	47,806
Frio	Evergreen				Current	2.0		130,765	123,320
Zavala	Wintergarden				Current	2.5		23,936	23,936
Dimmit	Wintergarden				Current	2.5		23,780	13,537
LaSalle	Wintergarden				Current	2.5		27,341	8,013
Gonzales	Gonzales Co.				Current	2.0		60,440	23,161
Guadalupe	Guadalupe Co.				Current	0.5		12,583	8,912
Caldwell	Plum Creek & Gonzales Co.				Current			24,460	7,172
Uvalde	Uvalde Co.				Current	2.5		33,276	2,486
	Uvalde Co.				Current	2.5		712	12
Medina	Medina Co.				Current	2.0		13,700	8,695
	Medina Co.				Current	2.0		8,900	209
Bexar	Trinity - Glen Rose				No GCD		17,950		13,498
					Current			32,767	14,827
Comal					No GCD		1,800		1,800
Hays	Hays Trinity				Current			1,213	1,213
Kendall	Cow Creek				Current			3,935	3,141

1 Edwards Aquifer Authority and Barton Springs/Edwards Aquifer Conservation District are not included in this table.

2 Edwards-Balcones Fault Zone Aquifer and various minor aquifers are not included in this table.

3 Management Plan status as of January 2010.

4 Production limits obtained from available GCD rules.

5 In the absence of a current GCD Management Plan, the estimated groundwater supply used in the 2006 South Central Texas Regional Water Plan was adopted.

3.1.2 Assumptions for Assessment of Groundwater Supply

1. Groundwater availability by county is subdivided into river basin parts of each county according to the ratios used in the 2006 Regional Water Plan. The ratios are the percent of land surface located in each river and coastal basin. Groundwater supplies for municipal utilities using water from the Carrizo, Gulf Coast, and Trinity Aquifers are based upon well capacities obtained from the TCEQ Water Utility Database.

**Table 3-2.
Available Groundwater Supply by Aquifer**

Aquifer Name and TWDB Aquifer No. ¹	Annual Quantity Available					
	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Edwards (11) ²	320,000	320,000	320,000	320,000	320,000	320,000
Carrizo (10)	438,539	438,539	431,141	431,141	431,141	431,141
Sparta (27)	8,990	8,990	8,990	8,990	8,990	8,990
Queen City (24)	23,269	23,269	23,269	23,269	23,269	23,269
Trinity (28)	49,327	49,327	49,327	49,327	49,003	49,003
Gulf Coast (15)	102,723	102,723	102,723	102,723	102,723	102,723
Edwards-Trinity (Plateau) (13)	4,230	4,230	4,230	4,230	4,230	4,230
Total	947,078	947,078	939,680	939,680	939,356	939,356
Percent of Total						
Edwards (11)	33.79%	33.79%	34.05%	34.05%	34.07%	34.07%
Carrizo (10)	46.30%	46.30%	45.88%	45.88%	45.89%	45.89%
Sparta (27)	0.95%	0.95%	0.96%	0.96%	0.96%	0.96%
Queen City (24)	2.46%	2.46%	2.48%	2.48%	2.48%	2.48%
Trinity (28)	5.21%	5.21%	5.25%	5.25%	5.22%	5.22%
Gulf Coast (15)	10.85%	10.85%	10.93%	10.93%	10.93%	10.93%
Edwards-Trinity (Plateau) (13)	0.44%	0.44%	0.45%	0.45%	0.45%	0.45%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
¹ TWDB aquifer identification number is shown in parentheses in column number 1.						
² Availability value does not include 1,537 acft/yr from the Edwards Aquifer – Barton Springs segment for use in Hays and Caldwell Counties. These values are however, shown in Tables C-3 and C-12 and are also included in the TWDB database.						

2. Groundwater availability during drought of record conditions from the Edwards Aquifer is set at a total of 320,000 acft/yr. Initial regular permit amounts from the EAA are prorated down to achieve a total value of 320,000 acft/yr as the sum of all permits. Permanent acquisitions of permits or portions of permits are accounted for prior to proration. Leases and dry year options are considered a water management strategy (Section 4C.3, Vol. II) rather than existing water supply.
3. Municipal supplies from the Carrizo, Sparta, Queen City, Trinity, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers are estimated as follows:

- a. For cities using water from the Carrizo, Gulf Coast, and Trinity Aquifers, supply is based on reported well capacities with adjustment to account for a peak to average day water demand ration of 2:1. In cases in which the total demand on that portion (i.e., county and river basin) of the aquifer exceeds the total availability, supply is prorated downwards for every entity using that particular source.
 - b. For rural areas, it is assumed that the rural household (municipal type) demand would be met from aquifers underlying that river basin portion of the county. The rural supply is generally calculated as 125 percent of the year 2000 use from each particular aquifer. In cases in which the total demand on that portion (i.e., county and river basin) of the aquifer exceeds the total availability, supply is prorated downwards for every entity using that particular source.
4. Industrial supply from the Carrizo, Sparta, Queen City, Trinity, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers is associated with aquifers underlying the river basin portion of the county. The industrial supply is generally calculated as 130 percent of the year 2000 use from each particular aquifer. In cases in which the total demand on that portion (i.e. county & river basin) of the aquifer exceeds the total availability, supply is prorated downwards for every entity using that particular source.
 5. Steam-electric supply from the Carrizo, Sparta, Queen City, Trinity, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers is associated with aquifers underlying the river basin portion of the county. The steam-electric supply is generally calculated as 130 percent of the year 2000 use from each particular aquifer. In cases in which the total demand on that portion (i.e., county and river basin) of the aquifer exceeds the total availability, supply is prorated downwards for every entity using that particular source.
 6. Irrigation supply from the Carrizo, Sparta, Queen City, Trinity, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers is associated with aquifers underlying the river basin portion of the county. The irrigation supply is calculated as being equal to the projected demand in each decade. In cases in which the total demand on that portion (i.e., county and river basin) of the aquifer exceeds the total availability, supply is prorated downwards for every entity using that particular source.
 7. Mining supply from the Carrizo, Sparta, Queen City, Trinity, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers is associated with aquifers underlying the river basin portion of the county. The mining supply is calculated as being equal to the projected demand in each decade. In cases in which the total demand on that portion (i.e., county and river basin) of the aquifer exceeds the total availability, supply is prorated downwards for every entity using that particular source.
 8. For all areas within the planning region, livestock water demand is assumed to be met 50 percent from quantified groundwater sources and 50 percent from local surface water and unquantified groundwater sources such as stock tanks, streams, and windmills. Livestock water supply is set equal to projected livestock demand.

3.2 Surface Water Supplies

The South Central Texas Region includes parts of the Rio Grande, Nueces, San Antonio, Guadalupe, Colorado, and Lavaca River Basins, and parts of the Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces Coastal Basins. As indicated in Figure 3-3, however, the Nueces, San Antonio, and Guadalupe are the major river basins of interest in considering surface water supplies. Although the Guadalupe and San Antonio River Basins have been delineated in Figure 3-3 as separate river basins, the two rivers join prior to discharge into San Antonio Bay. In part because of the large concentration of senior water rights below the confluence of the two rivers, the two watersheds are considered as one (the Guadalupe-San Antonio River Basin) when evaluating surface water supplies available under existing water rights. All of the major reservoirs within the South Central Texas Region are located in the Guadalupe-San Antonio River Basin and are identified in Figure 3-3. Owners and locations of major run-of-river rights having authorized annual consumptive use in excess of 10,000 acft/yr are also shown in Figure 3-3. Major reservoirs and run-of-river water rights are discussed in the following subsections.

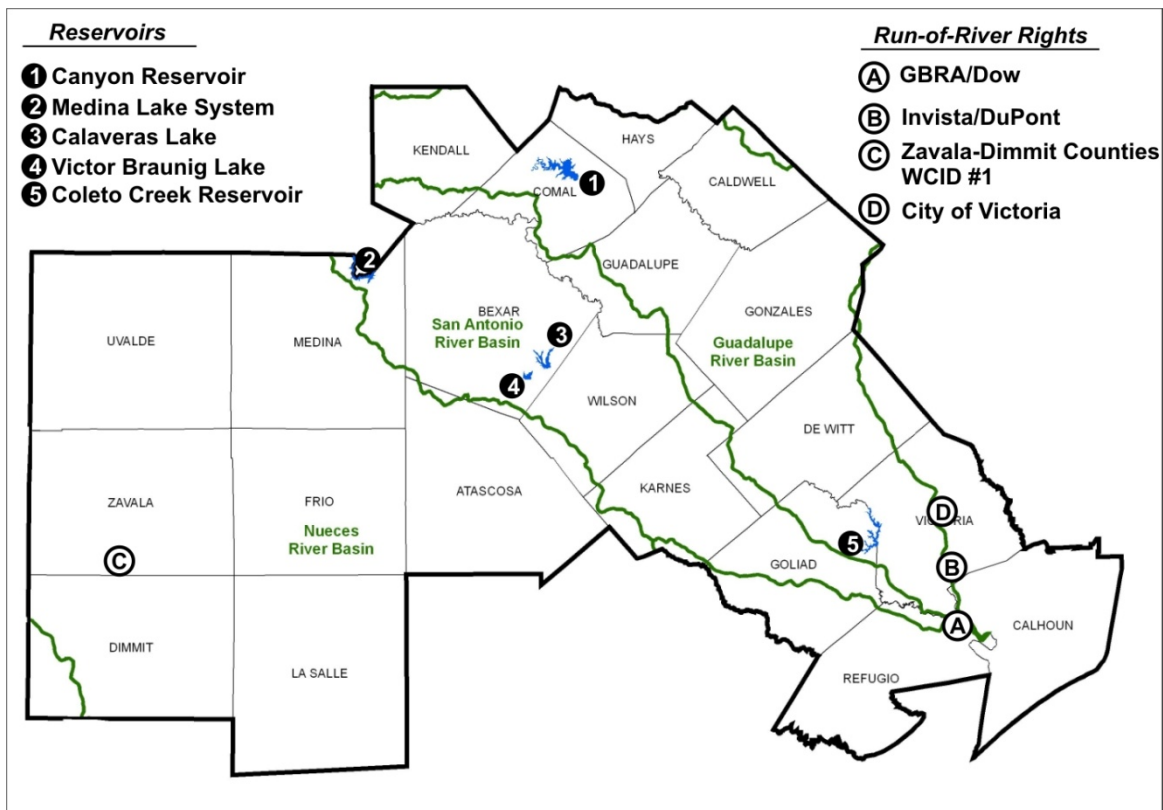


Figure 3-3. Major River Basins, Reservoirs, and Run-of-River Rights

3.2.1 Major Reservoirs and Associated Water Rights

Major reservoirs and associated water rights within the South Central Texas Region are summarized in Table 3-3. The firm yield, or dependable supply of water available during a repeat of the drought of record, for each of these reservoirs is also listed in Table 3-3. Additional information regarding each of the major reservoirs is provided in the following paragraphs.

The Medina Lake System is located on the Medina River, a tributary of the San Antonio River, in Medina and Bandera Counties. The Medina Lake System is owned by the Bexar-Medina-Atascosa Counties Water Control and Improvement District No. 1 (BMA) and has traditionally been used to supply irrigation water to farms in Bexar, Medina, and Atascosa Counties via the Medina Canal System. Bexar Metropolitan Water District (BMWD) has contracts with BMA to obtain municipal water supplies from the Medina Lake System which are delivered via the bed and banks of the Medina River to a point of diversion near Von Ormy in southwestern Bexar County. The Medina Lake System is unique among the major reservoirs in the South Central Texas Region because waters impounded therein contribute recharge, estimated to average over 42,000 acft/yr,⁴ to the Edwards Aquifer. Because of surface water “losses” to recharge and special conditions within Certificate of Adjudication #19-2130, as amended, it has been determined that the firm yield of the Medina Lake System in a repeat of the drought of record is essentially zero. Hence, the Medina Lake System has not been included as an existing source of surface water supply in the South Central Texas Region. Because of its location on the boundary of Regions L and J, the TWDB has designated the Medina Lake System as a special water resource. As the South Central Texas Region is not relying upon the Medina Lake System as a source of supply during drought, it is assumed that there are no conflicts with any water supply contracts or option agreements held by entities in the Plateau Region. It is further assumed that interests upstream of Medina Lake will obtain the necessary water rights permit(s) for diversion from the Medina River and/or its tributaries and will mitigate any associated impacts upon recharge of the Edwards Aquifer within Region L.

⁴ HDR Engineering, Inc. (HDR), “Edwards Aquifer Recharge Analyses,” Trans-Texas Water Program, West Central Study Area, Phase II, Texas Water Development Board, San Antonio River Authority, et al., March 1998.

**Table 3-3.
List of Major Reservoirs**

Reservoir	Water Right Owner	Certificate of Adjudication Number	Authorized Diversion (acft/yr)	Firm Yield (acft/yr)	Purposes
San Antonio River Basin					
Medina Lake System	Bexar-Medina-Atascosa Counties WCID #1	19-2130	66,750	0 ¹	Irrigation, municipal, domestic, livestock
Victor Braunig Lake	City Public Service Board of San Antonio	19-2161	12,000 ²	>12,000 ³	Steam-electric power generation
Calaveras Lake	City Public Service Board of San Antonio	19-2162	37,000 ⁴	>37,000 ³	Steam-electric power generation
Guadalupe River Basin					
Canyon Reservoir	Guadalupe-Blanco River Authority	18-2074	90,000 ⁵	~90,000 ⁵	Municipal, industrial, steam-electric, hydropower, irrigation, flood protection
Coletto Creek Reservoir	Coletto Creek Power	18-5486	12,500 ⁶	>12,500 ³	Steam-electric power generation
<p>¹ Based on operation of the Medina Lake System in accordance with CA #19-2130C.</p> <p>² Includes rights to divert up to 12,000 acft/yr from the San Antonio River to Braunig Lake and to consume up to 12,000 acft/yr at Braunig Lake.</p> <p>³ The reservoir and supplemental authorized diversions from the adjacent river could support a firm yield in excess of the authorized consumptive use, however, operations of steam-electric power generation facilities could be impaired.</p> <p>⁴ Includes rights to divert up to 60,000 acft/yr of reclaimed wastewater from the San Antonio River to Calaveras Lake and to consume up to 37,000 acft/yr.</p> <p>⁵ The firm yield of Canyon Reservoir is dependent upon a number of factors including points of diversion for contracted supplies, Edwards Aquifer springflow, term recreational flow agreements, and discharge of treated effluent throughout the Guadalupe – San Antonio River Basin. Subject to the hydrologic assumptions and operational procedures listed in Section 3.2.3.1, estimates of Canyon Reservoir firm yield range from 87,700 acft/yr to 87,275 acft/yr in years 2000 and 2060, respectively.</p> <p>⁶ Includes rights to divert up to 20,000 acft/yr from the Guadalupe River to Coletto Creek Reservoir and to consume up to 12,500 acft/yr.</p>					

Braunig and Calaveras Lakes, owned by the City Public Service Board of San Antonio, are located in the San Antonio River Basin in Bexar County to the southeast of San Antonio and are used for steam-electric power plant cooling water. Runoff from the watersheds above the reservoirs and diversions from the San Antonio River (including treated effluent discharged by the San Antonio Water System) are used to maintain necessary lake levels to facilitate efficient power plant operations.

Constructed by the U.S. Army Corps of Engineers, Canyon Reservoir in the Guadalupe River Basin is located in Comal County on the mainstem of the Guadalupe River. Uses of the reservoir include water supply for municipal, industrial, steam-electric power generation, irrigation, and hydroelectric power generation, as well as flood protection and recreation. Diversions from Canyon Reservoir are currently authorized up to an average of 90,000 acft/yr. Water supplies from Canyon Reservoir are managed by the Guadalupe-Blanco River Authority (GBRA) and made available to customers both within their ten-county district and in adjacent counties and/or river basins. Because a portion of its watershed is located in the Plateau Region (J), the TWDB has designated Canyon Reservoir as a special water resource. The South Central Texas Region (L) has included existing contracts between GBRA and entities in the Plateau Region in its assessments of surface water supplies using the Guadalupe-San Antonio River Basin Water Availability Model (GSA WAM). Pursuant to a Memorandum of Understanding (MOU) between GBRA and the Commissioners' Court of Kerr County, the SCTRWPG recognizes a potential commitment of approximately 2,000 acft/yr from the firm yield of Canyon Reservoir for the calendar years 2021 through 2060. GBRA's hydrology studies have indicated that a commitment of about 2,000 acft/yr would be necessary to allow permits for 6,000 acft/yr to be issued by TCEQ for diversion in Kerr County. No additional supplies from Canyon Reservoir are specifically reserved for entities within the Plateau Regional Water Planning Area (Region J) at this time. The SCTRWPG also recognizes commitments of about 600 acft/yr and 1120 acft/yr from Canyon Reservoir to meet projected needs for the Cities of Blanco and Buda, respectively, located in the Lower Colorado Regional Water Planning Area (Region K).

Coletto Creek Reservoir, owned by Coletto Creek Power (an International Power of America Company) and operated by GBRA, is located at the border of Victoria and Goliad Counties in the lower Guadalupe River Basin, and is a cooling reservoir for steam-electric power generation. Sources of water include runoff from the Coletto Creek watershed and diversions from the Guadalupe River, backed by storage in Canyon Reservoir, when needed. The reservoir

supplies water for steam-electric power generation at the Coletto Creek Power Station located in Goliad County.

Lakes Dunlap, McQueeney, Placid, Nolte, Gonzales, and Wood, on the Guadalupe River between New Braunfels and Gonzales, form pools for hydroelectric power generation and are the sites of hydroelectric power plants providing service to the Guadalupe Valley Electric Cooperative. These reservoirs and water rights are owned by GBRA. In addition to those owned by GBRA, there are other small reservoirs and associated priority and non-priority water rights for hydroelectric power generation located along the Guadalupe River at Seguin, Gonzales, and Cuero. Since hydroelectric power generation is a non-consumptive use of water, water available to these rights is not listed in Table 3-3. All water rights are, however, included on a priority basis in the assessment of surface water supply using the GSA WAM.

3.2.2 Run-of-River Water Rights

In addition to those associated with major reservoirs, surface water rights have been issued by the TCEQ and predecessor agencies to individuals, cities, industries, and water districts and authorities for diversion from flowing streams of the South Central Texas Region. Each right bears a priority date, diversion location, maximum diversion rate, and annual quantity of diversion. Some rights may include off-channel storage authorization, instream flow requirements, and various special conditions. The principle of prior appropriation or “first-in-time-first-in-right” is applied, which means that the most senior, or oldest, right has first call on flows, with the second, third, and more recent rights having second, third, and later priorities for diversions. This procedure gives senior right holders priority when streamflows are low, as in periods of drought, and renders junior rights less reliable during droughts. The most junior water right holders may not be able to divert any water during severe droughts if so directed by the TCEQ acting through the South Texas Watermaster.

It is important to note that many run-of-river rights are for irrigation purposes, where chances are taken at planting time upon whether or not water will be available for crop production during the growing season. In fact, when reviewing applications for irrigation rights, TCEQ staff has traditionally considered whether 75 percent of the proposed diversion would be available in 75 percent of the years. Municipal, industrial, and steam-electric power users, however, typically require more reliable supplies than are available from run-of-river flows.

Hence, these types of users will often develop storage and/or alternative supplies to increase the reliability of their run-of-river rights.

For the Nueces River Basin part of the South Central Texas Region, run-of-river water rights total more than 120,000 acft/yr and are primarily used for irrigation purposes. Consumptive run-of-river rights in the Guadalupe-San Antonio River Basin total over 446,000 acft/yr and are used primarily for irrigation, municipal, and industrial purposes.

3.2.3 Surface Water Availability

Surface water supplies for the vast majority of the South Central Texas Region have been quantified using the Nueces and Guadalupe-San Antonio River Basin Water Availability Models (WAMs).^{5,6} These WAMs were originally developed under a contract with the TCEQ and have been modified and improved for more accurate simulation of specific water rights and special conditions including those associated with operations of Canyon Reservoir and the Medina Lake System. Modifications to the basic Guadalupe-San Antonio River Basin WAM also include daily time-step computational procedures necessary to quantify water availability for new appropriations associated with potentially feasible water management strategies subject to Consensus Criteria for Environmental Flow Needs (CCEFN).

Surface water supply analyses for the South Central Texas Region have been completed using the WAMs to quantify the firm diversion associated with run-of-river water rights, calculate the firm yields associated with Canyon Reservoir and the Medina Lake System, and ensure the reliability of authorized consumptive uses associated with steam-electric power generation at major reservoirs. These analyses were performed subject to specific hydrologic assumptions and operational procedures adopted by the SCTRWPG (Section 3.2.3.1) and approved by the TWDB for the assessment of surface water supply. Reliability information, including firm (or minimum monthly) diversion, for water rights in the Nueces and Guadalupe–San Antonio River Basins is summarized in Appendix B. Firm diversion and firm yield amounts have been assigned to specific water users, county-aggregated water user groups, river basins, and sources as appropriate. This assignment of firm diversion and yield amounts is representative of existing surface water supplies and is detailed by county, river basin, and water user group in the Comprehensive Water Needs Assessment Data included as Appendix C.

⁵ HDR, “Water Availability in the Guadalupe-San Antonio River Basin,” Texas Natural Resource Conservation Commission (TNRCC), December 1999.

⁶ HDR, “Water Availability in the Nueces River Basin,” TNRCC, October 1999.

3.2.3.1 Hydrologic Assumptions and Operational Procedures for Assessment of Surface Water Supply

1. Full exercise of surface water rights.
2. Edwards Aquifer permitted pumpage consistent with Senate Bill 3 (80th Texas Legislature). Breakdown of use type and geographical distribution of pumpage is based on EAA permits (including permanent transfers). Minimum permitted Edwards Aquifer supply of 320,000 acft/yr during drought.
3. Operation of Canyon Reservoir at firm yield in accordance with Certificate of Adjudication No. 18-2074E, including subordination of all senior Guadalupe River hydropower permits to Canyon Reservoir.
4. Delivery of GBRA's present contractual obligations from Canyon Reservoir (about 86,000 acft/yr) to points of diversion. Uncommitted yield assumed to be diverted at Lake Dunlap.
5. Effluent discharge / return flow in the Guadalupe - San Antonio River Basin is assumed equal to that reported for 2006, adjusted for current SAWS direct recycled water commitments. Smaller reuse deliveries by San Marcos, New Braunfels, Seguin, Kyle, San Antonio River Authority, and Cibolo Creek Municipal Authority in 2006 are reflected in analyses of cumulative effects of plan implementation.
6. Operation of power plant reservoirs (Braunig, Calaveras, and Coletto Creek) subject to authorized consumptive uses at the reservoir, with makeup diversions as needed to maintain full conservation storage to the extent possible subject to senior water rights, instream flow constraints, and/or applicable contractual provisions.
7. Desired San Antonio River flows at Falls City gage of 55,000 acft/yr under current SAWS/SARA/CPS draft agreement (reporting purposes only).
8. Operation of Choke Canyon Reservoir/Lake Corpus Christi (CCR/LCC) System at firm yield subject to the Corpus Christi Phase 4 (maximum yield) policy and TCEQ Agreed Order regarding freshwater inflows to the Nueces Estuary.
9. Historical Edwards Aquifer recharge estimates developed by EUWD/HDR.
10. Period of record for simulations: Guadalupe-San Antonio River Basin (1934-89, Critical Drought = 1950s) and Nueces River Basin (1934-97, Critical Drought = 1990s).

3.3 Reuse Supplies

Current water supplies in the South Central Texas Region involving reuse of treated wastewater are associated with the Recycled Water Program of the San Antonio Water System (SAWS) and contractual commitments by the Guadalupe-Blanco River Authority (GBRA) and the City of San Marcos. SAWS has installed a distribution system capable of transmitting up to about 35,000 acft/yr of recycled water from its Leon and Dos Rios Water Recycling Centers to a number of customers in the San Antonio area. For regional planning purposes, current reuse supplies of 3,435 acft/yr for landscape irrigation (municipal) use, 4,616 acft/yr for irrigation

(non-municipal) use, and 1,716 acft/yr for industrial use from the SAWS Recycled Water Program have been included for water users of Bexar County. In addition to these amounts, 230 acft/yr of reuse water from the San Antonio River Authority (SARA) and 24 acft/yr of reuse water from the Cibolo Creek Municipal Authority (CCMA) have been included as a supply for Bexar County irrigation. A commitment of 92 acft/yr by the City of New Braunfels has been included as a reuse supply for irrigation in Comal County. A reuse supply of 2,240 acft/yr by the City of Seguin has been included as supply for steam-electric use in Guadalupe County. Similarly, a contractual commitment of 3,696 acft/yr by the City of San Marcos has been included as a reuse supply for steam-electric use in Hays County.

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