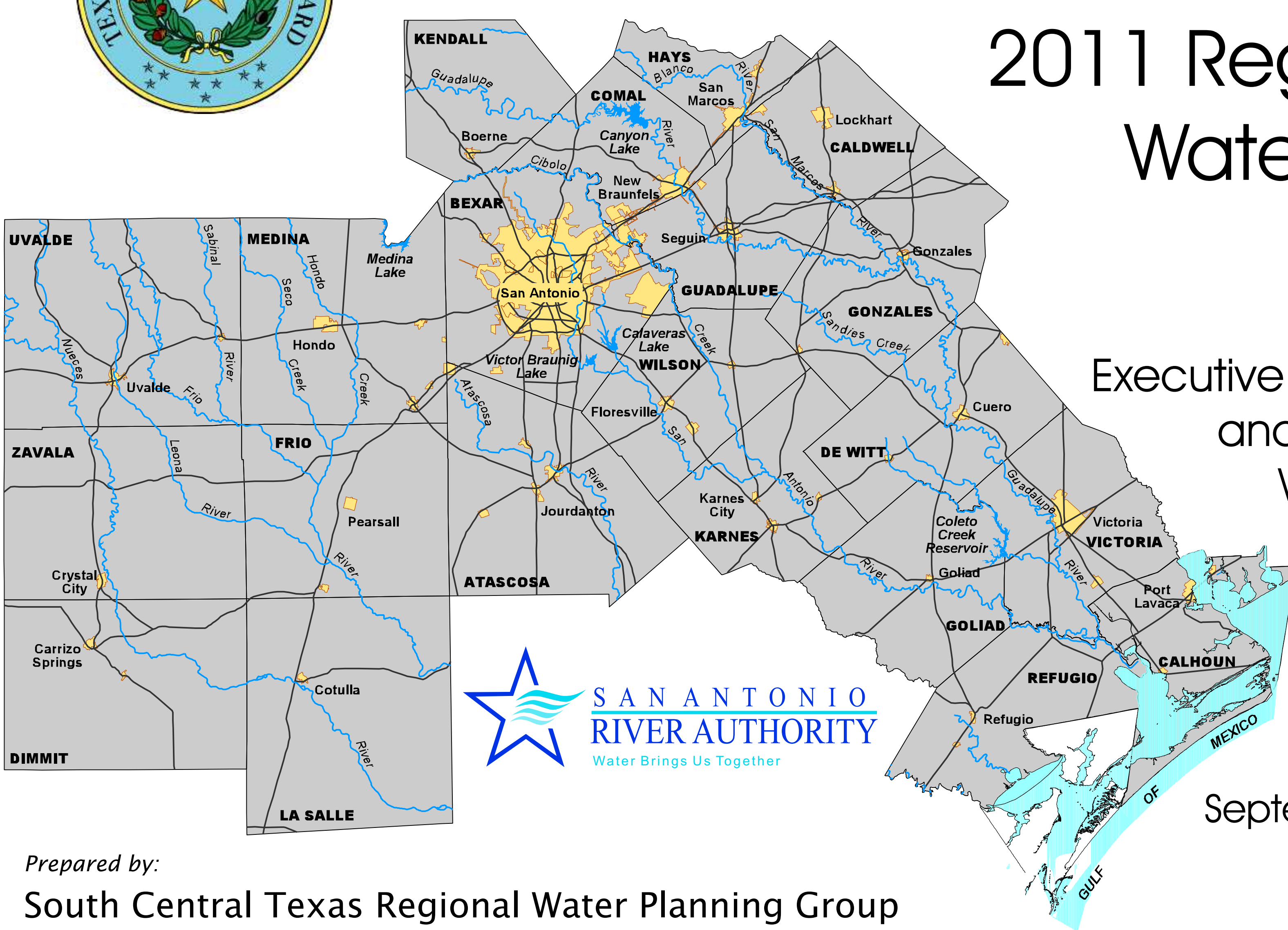
South Central Texas Regional Water Planning Area

2011 Regional Water Plan

Volume I
Executive Summary and Regional Water Plan



September 2010

Prepared by:

South Central Texas Regional Water Planning Group

http://www.regionltexas.org

With administration by:

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2011 South Central Texas Regional Water Plan

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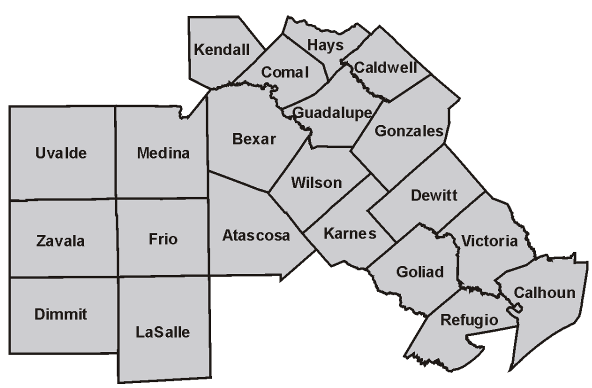

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Table of Contents

Section **Page**

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Section **Page**

Table of Contents (Concluded)

Section **Page**

Appendices

List of Figures

List of Figures (Continued)

List of Figures (Continued)

List of Figures (Concluded)

List of Tables

List of Tables (Continued)

List of Tables (Continued)

List of Tables (Continued)

List of Tables (Continued)

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COMMON ABBREVIATIONS

acft	acre-feet
acft/yr	acre-feet per year
ASR	Aquifer Storage and Recovery
BMWD	Bexar Metropolitan Water District
cfs	cubic feet per second
CRWA	Canyon Regional Water Authority
DFC	Desired Future Conditions
EAA	Edwards Aquifer Authority
IPP	Initially Prepared Plan
GBRA	Guadalupe-Blanco River Authority
GCD	Groundwater Conservation District
GAM	Groundwater Availability Model
GMA	Groundwater Management Area
GPM or gpm	gallons per minute
H/C PUA	Hays/Caldwell Public Utility Agency
kW-hr	kilowatt hours
LCRA	Lower Colorado River Authority
LNRA	Lavaca-Navidad River Authority
MAG	Managed Available Groundwater
MGD or mgd	million gallons per day
mg/L	milligrams per liter
NBU	New Braunfels Utilities
NRA	Nueces River Authority
NWF	National Wildlife Federation
OCR	Off-channel Reservoir
RWA	Regional Water Alliance
RWP	Regional Water Plan
SARA	San Antonio River Authority
SAWS	San Antonio Water System
SCTRWP	South Central Texas Regional Water Plan
SCTRWPG	South Central Texas Regional Water Planning Group
SHWSC	Springs Hill Water Supply Corporation
SSLGC	Schertz-Seguin Local Government Corporation
SWG	Staff Workgroup
SWP	State Water Plan
TAMU	Texas A&M University
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
TWA	Texas Water Alliance
TWDB	Texas Water Development Board
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey
UWCD	Underground Water Conservation District
WAM	Water Availability Model
WMS	Water Management Strategies
WSC*	Water Supply Corporation
WUG	Water User Group
WWP	Wholesale Water Provider

**In the case of Canyon Lake WSC, the "WSC" stands for "Water Service Company"*

2011 South Central Texas Regional Water Plan

Executive Summary

ES.1 Background

Since 1957, the Texas Water Development Board (TWDB) has been charged with preparing a comprehensive and flexible long-term plan for the development, conservation, and management of the state's water resources. The current state water plan, *Water for Texas, January 2007,* was produced by the TWDB and based on approved regional water plans pursuant to requirements of Senate Bill 1 (SB1), enacted in 1997 by the 75th Legislature. As stated in SB1, the purpose of the regional water planning effort is to:

> *"Provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of that particular region."*

SB1 also provides that future regulatory and financing decisions of the Texas Commission on Environmental Quality (TCEQ) and the TWDB be consistent with approved regional plans.

The TWDB divided the state into 16 planning regions and appointed members to the regional planning groups. As shown in Figure ES-1, the South Central Texas Region (Region L) includes all of 20 counties as well as the portion of Hays County located in the Guadalupe River Basin. The South Central Texas Regional Water Planning Group (SCTRWPG) has a total of 25 voting members. The members represent 11 interests or stakeholders (Public, Counties, Municipalities, Industry, Agriculture, Environmental, Small Business, Electric Generating Utilities, River Authorities, Water Districts, and Water Utilities), serve without pay, and are responsible for the development of the South Central Texas Regional Water Plan (Table ES-1).

The SCTRWPG adopted bylaws to govern its operations and, in accordance with its bylaws, selected the San Antonio River Authority (SARA) to serve as its administrative agency (Qualified Political Subdivision) to: (1) Develop scopes of work; (2) Apply for TWDB planning grants; (3) Contract with the TWDB for the grants; and (4) Manage the development of the Regional Water Plan, including supervision of technical, facilitation, and public participation consultants. Members of the SCTRWPG and key staff of several participants serve as an ad hoc Staff Workgroup to review and guide SARA and consultants' work.

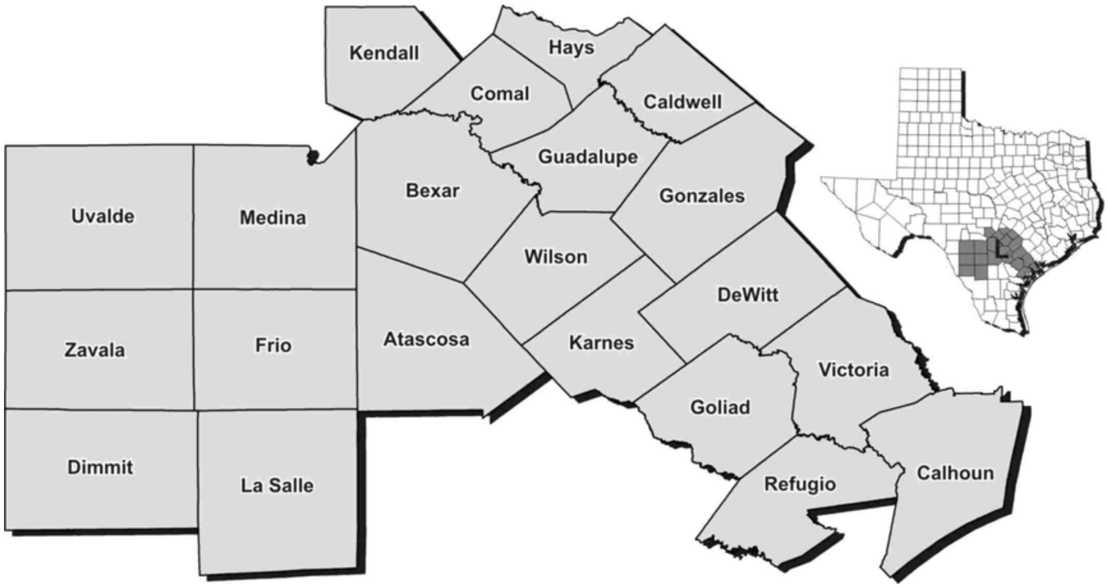

Figure ES-1. South Central Texas Planning Region (Region L)

Table ES-1.
South Central Texas Regional Water Planning Group Members

Name	*Interest*	*Membership*	*Affiliation*
Con Mims	River Authorities	Chair, Exec. Comm.	Nueces RA
Mike Mahoney	Water Districts	Vice-Chair, Exec. Comm.	Evergreen UWCD
Gary Middleton	Municipalities	Secretary, Exec. Comm.	City of Victoria
Evelyn Bonavita	Public	Member, Exec. Comm.	League of Women Voters
Ron Naumann	Water Utilities	Vice-Chair, Exec. Comm.	Springs Hill WSC
Jason Ammerman	Industry	Member	Union Carbide Corporation
Tim Andruss	Water Districts	Member	Victoria County GCD
Donna Balin	Environmental	Member	Geologist
Darrell Brownlow	Small Business	Member	Environmental Consultant
Velma Danielson	Water Districts	Member	Edwards Aquifer Authority
Garrett Engelking	Water Districts	Member	Refugio GCD
Mike Fields	Electricity Generating Utilities	Member	International Power
Vacant	Industry	Member	
Bill Jones	Agriculture	Member	D.M. O'Connor Ranches
Comm. John Kight	Counties	Member	Kendall County
David Langford	Agriculture	Member	Texas Wildlife Association
Comm. Jay Millikin	Counties	Member	Comal County
Iliana Peña	Environmental	Member	Mitchell Lake Audubon Center
Robert Puente	Municipalities	Member	San Antonio Water System
Steve Ramsey	Water Utilities	Member	New Braunfels Utilities
Suzanne Scott	River Authorities	Member	San Antonio River Authority
Milton Stolte	Agriculture	Member	Texas Farm Bureau
Thomas Taggart	Municipalities	Member	City of San Marcos
Bill West	River Authorities	Member	Guadalupe-Blanco RA
Tony Wood	Small Business	Member	National Spill Control School

Pursuant to Regional and State Water Planning Guidelines (Texas Administrative Code, Title 31, Part 10, Chapters 357 and 358), the SCTRWPG developed the 2001 and 2006 South Central Texas Regional Water Plans, which were then integrated into Water for Texas – 2002 and 2007, respectively, by the TWDB. The 2011 South Central Texas Regional Water Plan, of which this Executive Summary is a part, represents the second update of a regional water plan as presently required to occur on a five-year cycle. The TWDB will integrate this Regional Water Plan into a State Water Plan to be issued in 2012.

The structure of the 2011 Regional Water Plan is organized in accordance with TWDB guidelines and summarized by section title as follows.

- 1) Description of South Central Texas Region (Volume I)
- 2) Population and Water Demand Projections (Volume I)
- 3) Water Supply Analyses (Volume I)
- 4A) Comparison of Supply and Demand Projections to Determine Needs (Volume I)
- 4B) Water Supply Plans (Volume I)
- 4C) Technical Evaluations of Water Management Strategies (Volume II)
- 5) Impacts of Water Management Strategies on Key Parameters of Water Quality and Moving Water from Rural and Agricultural Areas (Volume I)
- 6) Water Conservation and Drought Management Recommendations (Volume I)
- 7) Consistency with Long-Term Protection of the State's Water, Agricultural, and Natural Resources (Volume I)
- 8) Policies and Recommendations (Volume I)
- 9) Water Infrastructure Funding Recommendations (Volume I)
- 10) Regional Water Plan Adoption (Volume I)

ES.2 Description of South Central Texas Region

The South Central Texas Region includes counties that are located in whole or in part in the Rio Grande, Nueces, San Antonio, Guadalupe, Lavaca, and Colorado River Basins and the San Antonio-Nueces, Lavaca-Guadalupe, and Colorado-Lavaca Coastal Basins. Major urban population centers include the cities of San Antonio, Victoria, Seguin, New Braunfels, and San Marcos which are located within Bexar, Victoria, Guadalupe, Comal, and Hays Counties, respectively. The regional economy is dominated by the trades & services and manufacturing sectors with much smaller, but significant, contributions from the agricultural and mining sectors. Physical terrain of the region ranges from the Hill Country of the Edwards Plateau to the Coastal Plains. Vegetational areas include the Edwards Plateau, South Texas Plains, Blackland Prairies, Post Oak Savannah, and Gulf Prairies and Marshes. Many species occur within the region that are listed by the U.S. Fish & Wildlife Service (USFWS) or Texas Parks & Wildlife Department (TPWD) as rare, threatened, or endangered. Several of the species listed as endangered occur in or near Comal and San Marcos Springs, the two largest springs in Texas. Average annual precipitation ranges from less than 22 inches in Dimmit County up to 40 inches in Calhoun County.

ES.3 Population and Water Demand Projections

In order to develop water plans to meet future water needs, it is necessary to make projections of future water demands for the region. Integrating information from the 2000 Census and reported water uses from the around the state, the TWDB provided draft population and water demand projections for cities, rural areas, and water user groups within each of the 21 counties of the region. **The population of the South Central Texas Region was estimated at about 2.0 million in 2000 and is projected to grow to about 4.3 million in 2060.** Of this 2060 total, 68 percent are projected to reside in the San Antonio River Basin. Demand projections were prepared by the TWDB for each water user category, including municipal, industrial, steam-electric power generation, irrigation, mining, and livestock. Municipal projections are at the level of detail of each city, individual utility providing more than 280 acft/yr, rural area, and county or part of county of each river basin. As the results of the 2010 Census will not be available until after the 2011 South Central Texas Regional Water Plan is approved, population and municipal water demand projections are identical to those used in the 2006 plan are used herein. Recent (2007) data from the Texas State Data Center indicates that current Region L population is only 0.15 percent greater than projected values and that only four (Bexar, Comal, DeWitt, and Guadalupe) of 21 counties are growing at rates faster than projected for the 2006 plan. Projections were also provided at the county and river basin area level of detail for industry, steam-electric power generation, irrigation, mining, and livestock. Only water demand projections for steam-electric power generation were updated for the 2011 plan. Final, approved water demand projections are summarized below.

Municipal water is fresh water used for drinking, sanitation, and other purposes in homes and commercial establishments of both cities and rural areas. Total municipal water use in the South Central Texas Region in 2000 was 340,030 acft/yr and is projected to increase to 637,235 acft/yr by 2060 (Figure ES-2). Industrial water is fresh water used in the manufacture of industrial products. All industries in the region used 100,195 acft of water in 2000 and are projected to have a demand of 179,715 acft/yr in 2060 (Figure ES-2).

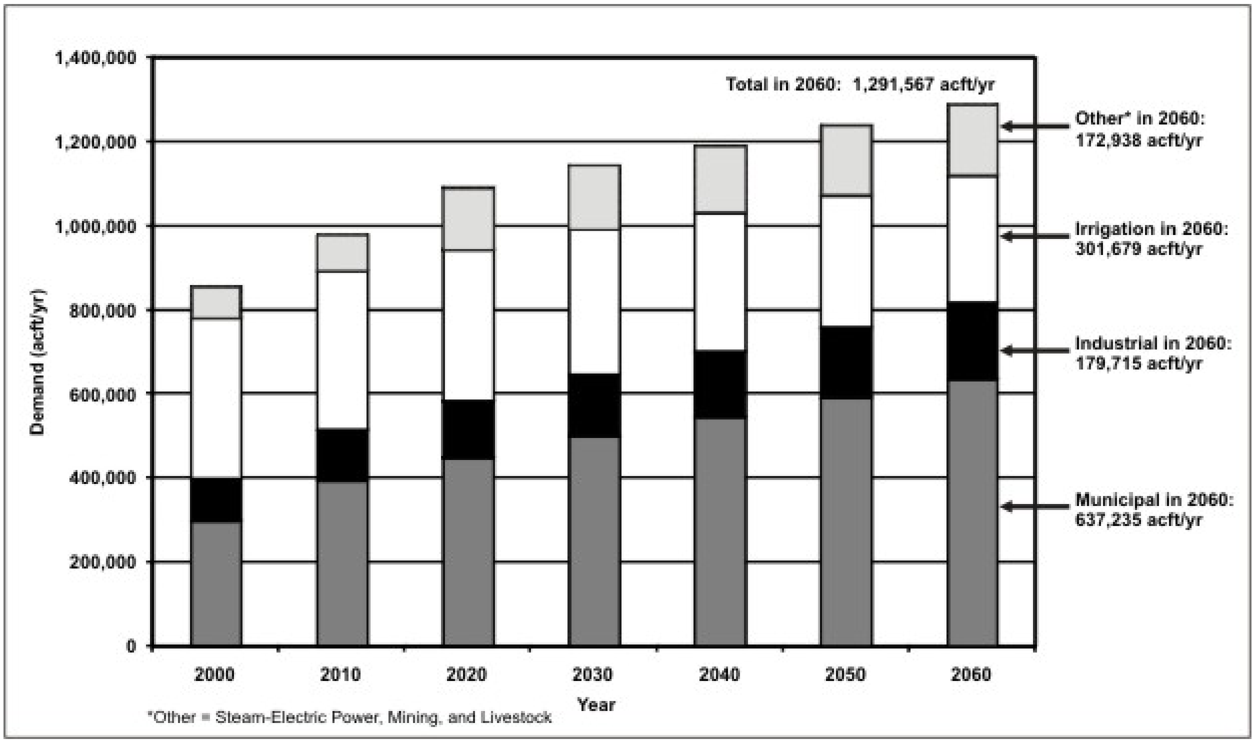

Figure ES-2. Projected Water Demands

Eight counties (Atascosa, Bexar, Calhoun, Frio, Goliad, Guadalupe, Hays, and Victoria) of the region use cooling and boiler feed water in steam-electric power production. In 2000, 35,379 acft of water were used, and it is estimated that by the year 2060, 128,340 acft/yr of water will be needed for the production of steam-electric power (Figure ES-2). Considerable uncertainty exists in what the regulatory requirements may be in the future for the control of atmospheric carbon emissions from fossil fuel fired steam-electric power plants. Carbon sequestration and geologic storage may prove to be a mandated or economically attractive option for controlling such emissions. This technology, if employed, would consume considerably more water than existing power plants and remove a significant amount of it from the hydrologic cycle. Since carbon control technologies and legal mandates are not yet established, and because such plants in Region L currently hold excess water capacity, these potential and unquantifiable future effects are not considered in this 2011 Regional Water Plan and will be addressed in the 2016 Regional Water Plan

In the South Central Texas Region, the principal uses of water for mining are for the extraction of stone, clay, and petroleum and for sand and gravel washing. In the region, total mining water use was 11,757 acft in 2000 and is projected to increase to 18,644 acft/yr in 2060, an increase of over 58 percent (Figure ES-2).

The TWDB *irrigation* water use data show annual use for irrigation to grow cotton, grain, vegetables, and tree crops in the South Central Texas Region in 2000 of 383,332 acft/yr, or 3.8 percent of the total irrigation water used in Texas in 2000. Projected irrigation water demands in 2060 are 301,679 acft/yr, or 21 percent less than in 2000 (Figure ES-2). The projected decline is based upon increased irrigation efficiency, economic factors, and reduced government programs affecting the profitability of irrigated agriculture. In 2000, water use in the region for *livestock* purposes was estimated at 25,660 acft/yr. The TWDB projections for livestock use in the region in the years 2010 through 2060 are 25,954 acft/yr.

Projected total water demand for the South Central Texas Region is the sum of water demand projections for municipal, industrial, steam-electric power generation, mining, irrigation, and livestock uses. Projected percentage changes in the composition of total water demand by use category from 2000 to 2060 are shown in Figure ES-3.

In accordance with TWDB guidelines, the SCTRWPG identified seven Wholesale Water Providers in the South Central Texas Region. These providers are listed in Table ES-2, along with a general description of their service areas. TWDB guidance defines a Wholesale Water Provider as a provider such as a river authority, water supply corporation, or city that has, or is expected to have, contracts to sell more than 1,000 acft wholesale in a year. The SCTRWPG has worked with each of the Wholesale Water Providers in an effort to quantify their projected demands, which typically include the demands of several cities, utilities, and other water user groups.

ES.4 Water Supply

There are five major and three minor aquifers supplying water to the region. The five major aquifers are the Edwards (Balcones Fault Zone), Carrizo-Wilcox[1], Trinity, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers. The three minor aquifers are the Sparta, Queen City, and Yegua-Jackson Aquifers. The Region is located in parts of the Rio Grande, Nueces, San Antonio,

[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.

Guadalupe, Colorado, and Lavaca River Basins and parts of the Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces Coastal Basins. The existing surface water supplies of the region include storage reservoirs and run-of-river water rights.

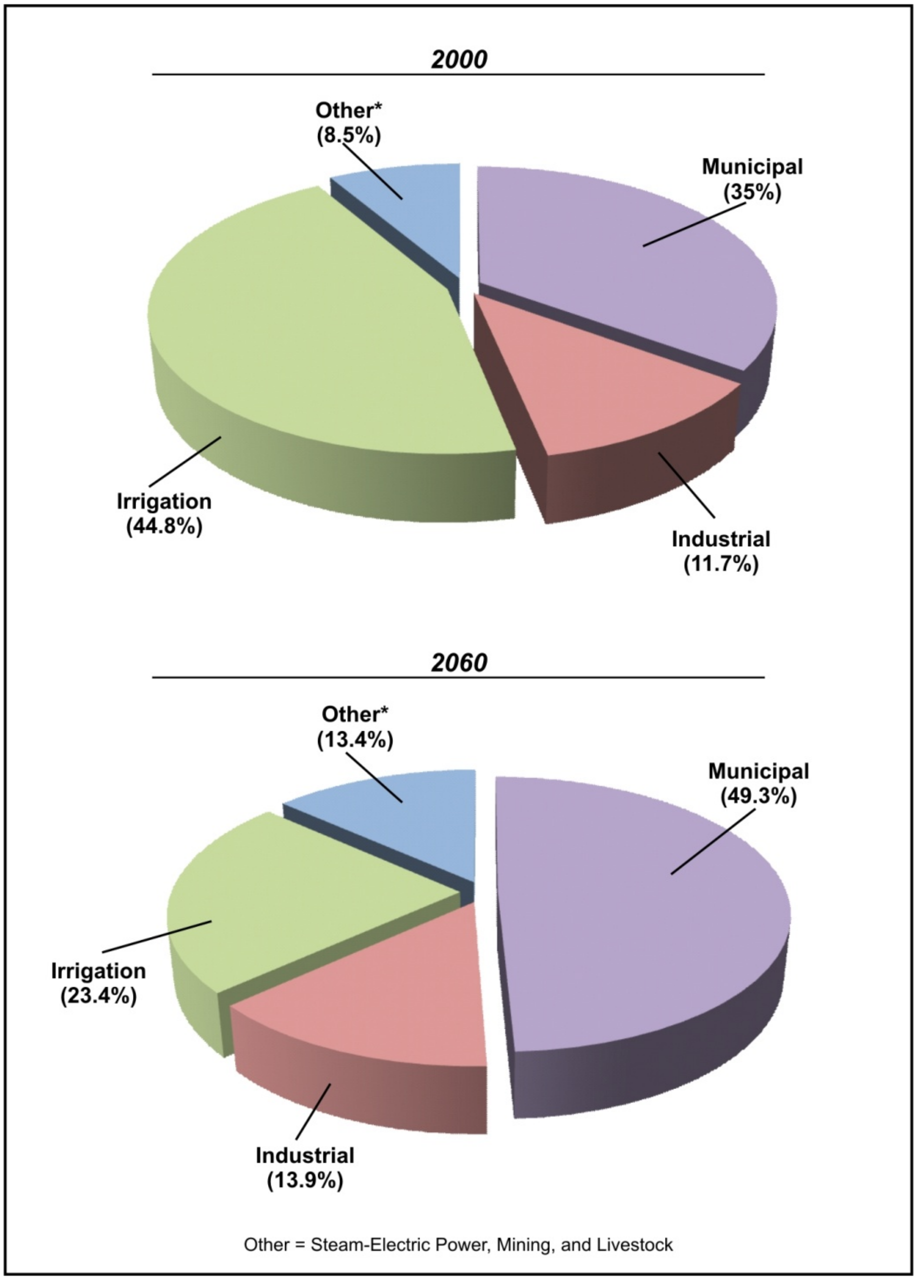

Figure ES-3. Distribution of Total Demand Among Uses

Table ES-2.
Wholesale Water Providers and Service Areas

Wholesale Water Provider	*Service Areas*
San Antonio Water System (SAWS)	Bexar County
Bexar Metropolitan Water District (BMWD)	Bexar, Atascosa, Comal, and Guadalupe Counties
Canyon Regional Water Authority (CRWA)	Bexar, Caldwell, Comal, Guadalupe, Hays, and Wilson Counties
Guadalupe-Blanco River Authority (GBRA)	Kendall, Comal, Hays, Caldwell, Guadalupe, Gonzales, DeWitt, Victoria, Refugio, and Calhoun Counties
Schertz-Seguin Local Government Corporation (SSLGC)	Schertz, Seguin, Selma, Universal City, Garden Ridge, and Springs Hill WSC
Springs Hill WSC	Springs Hills WSC, La Vernia, Crystal Clear WSC, and East Central WSC
Texas Water Alliance	Gonzales, Guadalupe, Comal, Hays, and Caldwell Counties

The total quantity of water obtained from aquifers of the region and used within the region in 2000 was 705,661 acft. Of this total, 55.6 percent was from the Edwards Aquifer, 36.1 percent was from the Carrizo, 5.6 percent was from the Gulf Coast, 2.1 percent was from the Trinity, and the remaining 0.6 percent was from the Queen City, Sparta, and Edwards-Trinity (Plateau) Aquifers.

Projected future groundwater supplies available in the South Central Texas Region during the drought of record are 947,078 acft/yr in 2010, 939,680 acft/yr in 2030, and 939,356 acft/yr in 2060. Such available supplies may be limited subject to the determinations of Managed Available Groundwater (MAG) based on Desired Future Conditions (DFC) established by Groundwater Management Area (GMA) pursuant to House Bill 1763 of the 79th Texas Legislature as well as the permitting authority of groundwater conservation districts. Supplies available from the Sparta, Queen City, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers are projected to hold steady on an annual basis throughout the 2010 through 2060 projections period. These aquifers are projected to supply only about 15 percent of the total groundwater available to the region in 2060. 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.

In the case of the Edwards Aquifer, Senate Bill 3 of the 80th Texas Legislature limits the permitted quantity of water that can be withdrawn from the Edwards Aquifer in each calendar year for the period beginning January 1, 2008 to no more than 572,000 acft. Senate Bill 3 specifies that the Edwards Aquifer Authority shall implement and enforce water management practices, procedures, and methods to ensure that not later than December 31, 2012, the continuous minimum spring flows of Comal and San Marcos Springs are maintained to protect endangered and threatened species to the extent required by federal law. Senate Bill 3 also specifies critical period management stages, triggers, and associated withdrawal reductions with the provision that, after January 1, 2013, the Authority may not require permitted withdrawals to be less than an annualized rate of 320,000 acft unless necessary for the protection of listed threatened or endangered species to the extent required by federal law.

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 South Central Texas Regional Water Planning Group and the staff of the Texas Water Development Board. This quantity was adopted as a placeholder number until the EAA obtains approval from the U.S. Fish and Wildlife Service of a Habitat Conservation Plan (HCP). Senate Bill 3 established the Edwards Aquifer Recovery Implementation Program which is in the midst of a facilitated, consensus-based process involving diverse stakeholders and federal, state, regional, and local technical resources supporting HCP development and long-term management of the Edwards Aquifer. Depending on the outcome of this process, the available supply from the Edwards Aquifer during drought may change from the assumed value of 320,000 acft/yr.

Development of surface water resources has been limited in the South Central Texas Region because of the presence of significant quantities of groundwater. The largest run-of-river water rights are concentrated below the confluence of the Guadalupe and San Antonio Rivers and are held by the Guadalupe-Blanco River Authority and Dow Chemical Company. These diversion rights total about 175,500 acft/yr. Significant water rights associated with existing reservoirs are held by the Guadalupe-Blanco River Authority (Canyon Reservoir), Bexar-Medina-Atascosa Counties WCID #1 (Medina Lake System), San Antonio City Public Service (Calaveras and Braunig Lakes), and Coleto Creek Power (Coleto Creek Reservoir). Authorizations for consumptive use associated with these reservoirs total about 218,000 acft/yr.

ES.5 Water Demand and Water Supply Comparisons

The South Central Texas Region water supply and demand data are shown graphically, by decade, for the years 2010 to 2060 in Figure ES-4. The amount by which drought demand exceeds current supply is defined, for regional water planning purposes, as the needs. In year 2010, needs (shortages) are about 174,234 acft/yr, in 2030, the projected need is about 308,443 acft/yr, and, in 2060, the projected need for drought of record conditions is about 436,750 acft/yr (Figure ES-4).

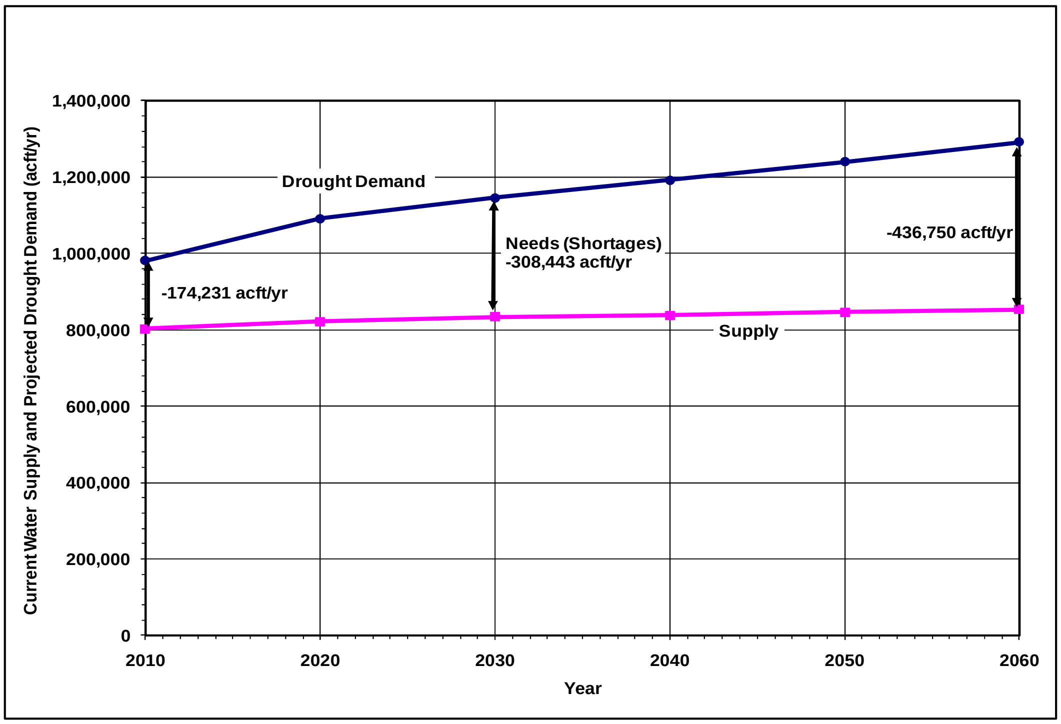

Figure ES-4. Supply, Demand, and Need (Shortage)

Figure ES-5 shows the projected water needs for the region at each decade. In 2010, the projected need (shortage) for municipal, industrial, steam-electric, and mining is approximately 105,766 acft/yr, and the need for irrigation and livestock is about 68,470 acft/yr. The projected needs in 2060 are about 394,967 acft/yr for municipal, industrial, steam-electric, and mining, and about 41,780 acft/yr for irrigation and livestock. Table ES-3 identifies the counties in which one or more water user groups have a projected water need (shortage) during the planning period. Twelve of the counties in the region have municipal water user groups for which there are projected shortages. There are four counties with projected manufacturing or industrial water needs (shortages), two counties with projected steam-electric power generation water needs, three counties with projected irrigation water needs, and three counties with projected mining water needs.

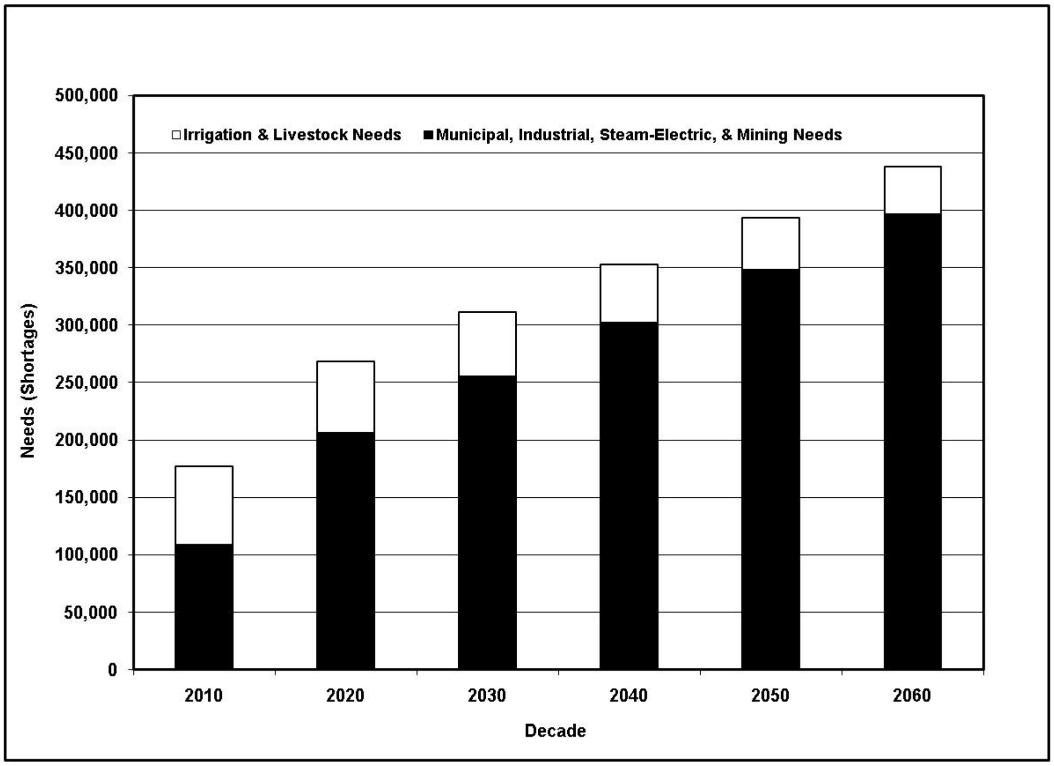

Figure ES-5. Projected Water Needs (Shortages)

ES.6 Social and Economic Impacts of Not Meeting Projected Water Needs[2]

The SCTRWPG identified 82 individual water user groups that showed an unmet need during drought-of-record supply conditions during the 2010 to 2060 planning period. Of the 21 counties of the South Central Texas Region, 14 have water user groups with projected water needs (shortages). The estimated value of lost income due to lost production resulting from projected water shortages is $5.28 billion per year in 2020 and $8.94 billion per year in 2060. If the water needs are left entirely unmet, the level of shortage in 2020 results in 19,948 fewer jobs than would be expected if the water needs of 2020 are fully met. The gap in job growth due to water shortages grows to 78,736 by 2060. Lost taxes paid to local and state governments due to unmet water needs are $563.75 million in 2020 and $964.71 million in 2060.

[2] Norvell, Stuart, and S. Doug Shaw, "Socioeconomic Impacts of Projected Water Needs for the South Central Texas Regional Water Planning Area (Region L)," Texas Water Development Board, Austin, Texas, June 2010.

Table ES-3.
Counties and Types of Water User Groups with Projected Water Needs (Shortages)

County	Municipal	Manufacturing	Steam-Electric Power	Mining	Irrigation	Livestock
Atascosa	✓		✓		✓	
Bexar	✓	✓		✓		
Caldwell	✓					
Calhoun	✓	✓				
Comal	✓	✓		✓		
DeWitt						
Dimmit						
Frio						
Goliad						
Gonzales						
Guadalupe	✓					
Hays (part)	✓			✓		
Karnes	✓					
Kendall	✓					
La Salle						
Medina	✓				✓	
Refugio						
Uvalde	✓					
Victoria		✓	✓			
Wilson	✓					
Zavala					✓	
Total	**12**	**4**	**2**	**3**	**3**	**0**

ES.7 Water Management Strategies to Meet Projected Water Needs

The regional water planning process includes making projections of the water needs of each water user group, identification of potentially feasible water management strategies (WMS) through public input, and evaluation of such strategies in accordance with TWDB rules. Technical evaluation of water management strategies includes calculation of potential quantity of water during drought conditions, reliability of supplies, cost of water delivered to the water users' distribution systems in a form ready to be distributed for end use, environmental and implementation issues, effects upon other water resources of the state, threats to agricultural and natural resources, consistency comparisons among strategies, recreational effects, third party social and economic impacts of voluntary transfers, efficient use of existing supplies, and water quality considerations. The planning process for the South Central Texas Region is summarized in Figure ES-6.

ES.8 South Central Texas Regional Water Plan

The South Central Texas Regional Water Plan includes recommended water management strategies that emphasize water conservation; maximize utilization of available resources, water rights, and reservoirs; engage the efficiency of conjunctive use of surface and groundwater; include new surface water appropriations while avoiding development of large mainstem reservoirs; and limit depletion of storage in aquifers. There are additional strategies that have significant support within the region, yet require further study regarding quantity of dependable water supply made available during severe drought, feasibility, and/or cost of implementation, that are also included in the Plan. **Water management strategies recommended to meet projected needs in the South Central Texas Region could produce new supplies in excess of 755,000 acft/yr in 2060 and may be categorized by source as shown in Figure ES-7.**

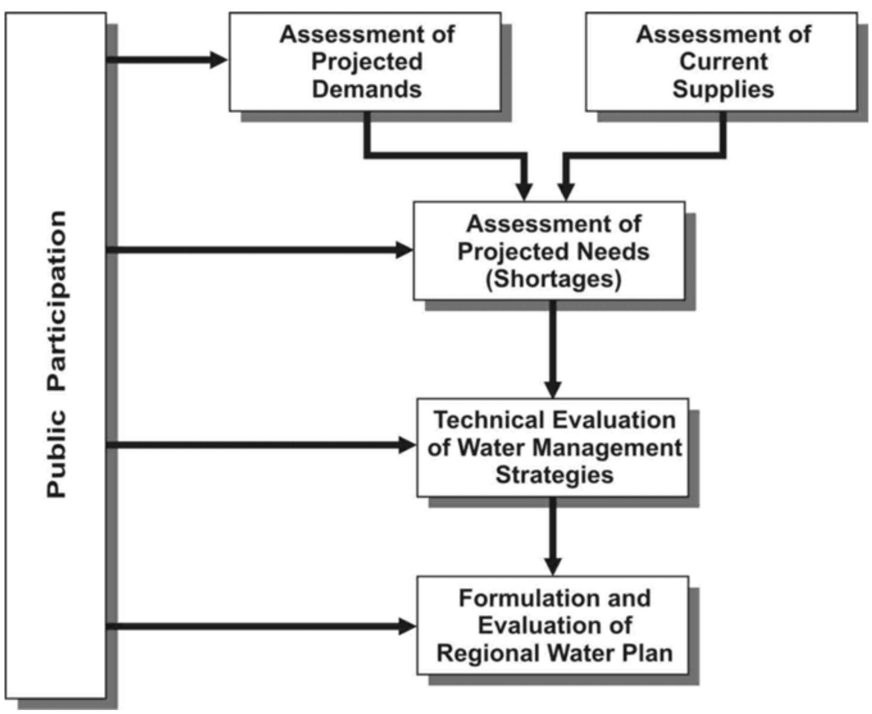

Figure ES-6. Regional Planning Process

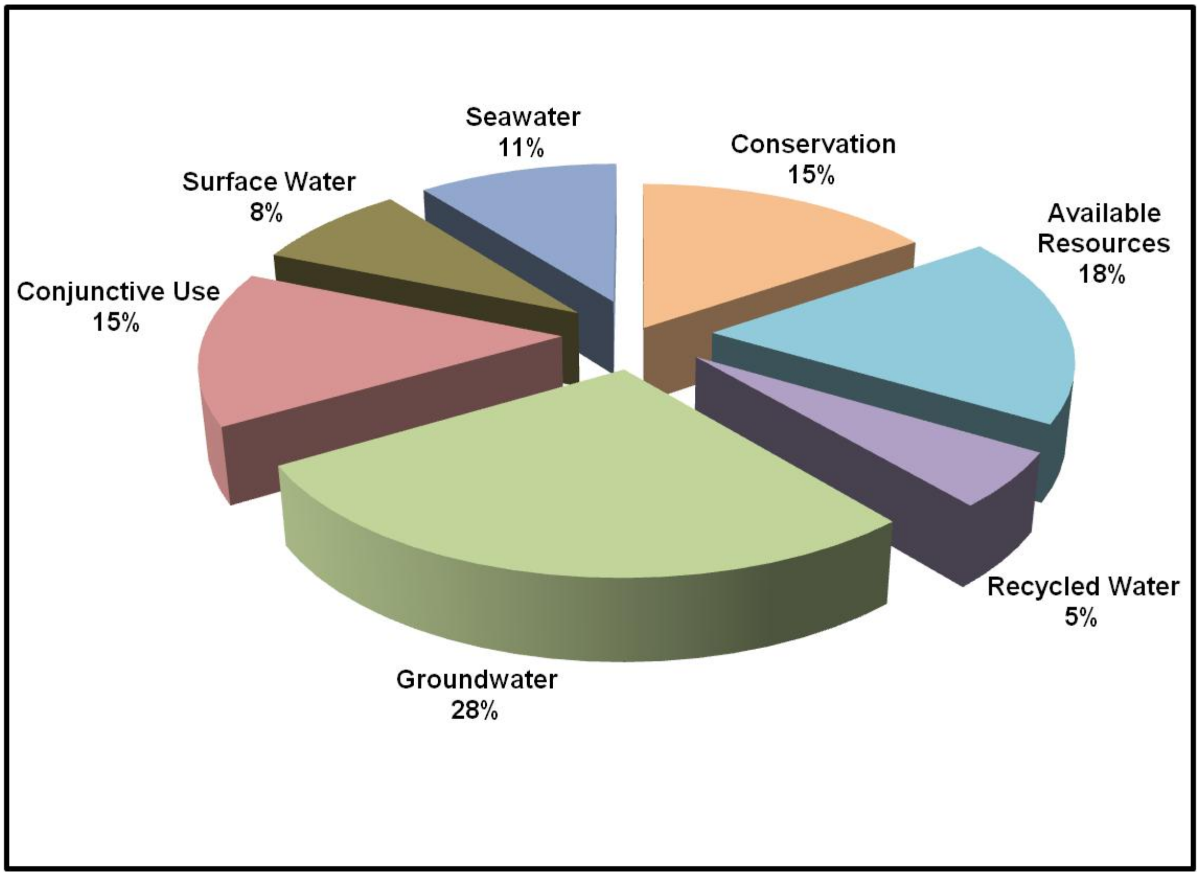

Figure ES-7. Sources of New Supply

Specific recommended water management strategies in the Plan are summarized by approximate timing of potential implementation in Figure ES-8. Water management strategies emphasizing conservation comprise about 15.5 percent of recommended new supplies and include:

- Municipal Water Conservation (72,666 acft/yr @ \$648/acft/yr[3]);
- Irrigation Water Conservation (7,238 acft/yr @ \$143/acft/yr);
- Drought Management (41,240 acft/yr); and
- Mining Water Conservation (2,493 acft/yr).

[3] \$648/acft/yr is an average cost of municipal water conservation. Actual unit costs vary from WUG to WUG and from decade to decade.

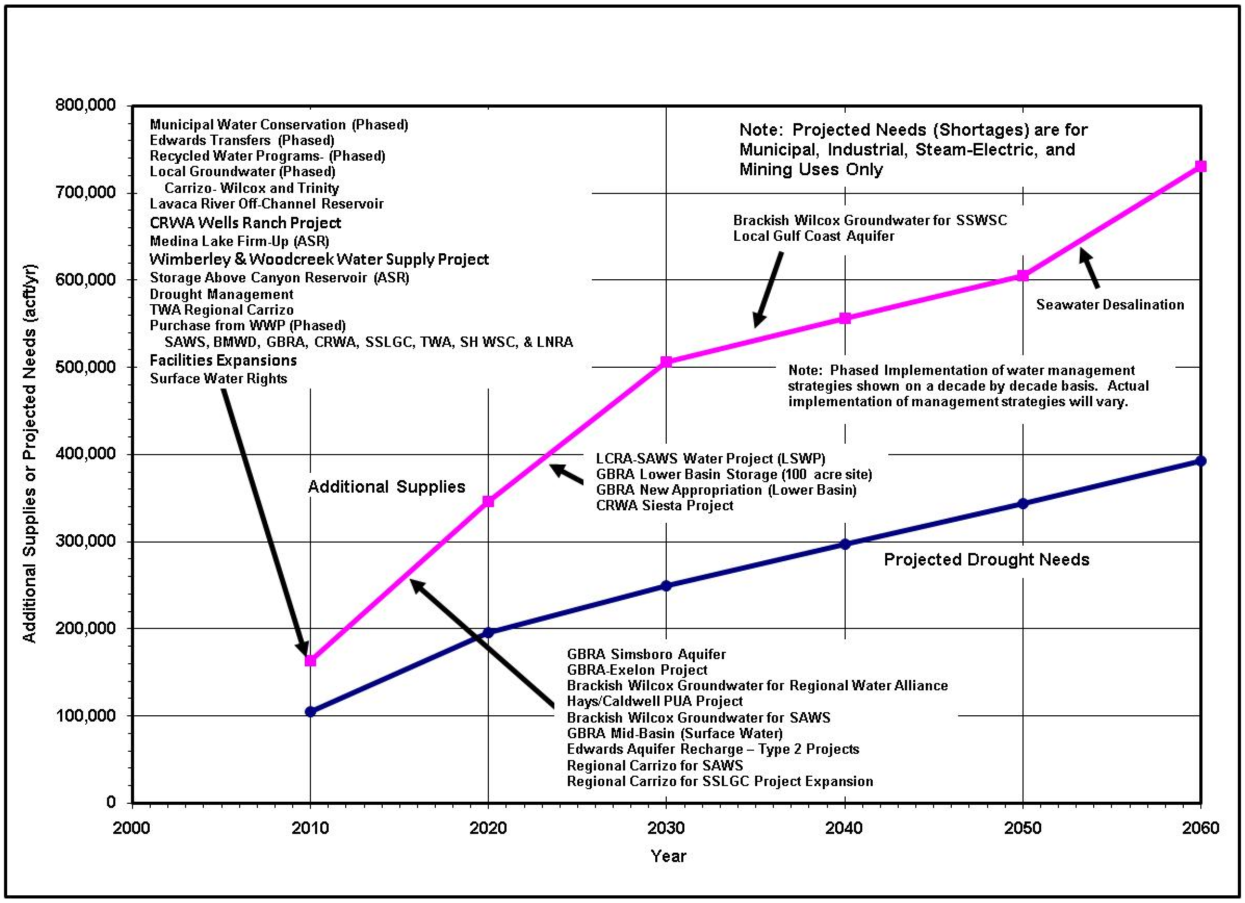

Figure ES-8. Phased Implementation of Water Management Strategies

Water management strategies maximizing use of available resources, water rights, and reservoirs comprise about 18.0 percent of recommended new supplies and include:

- Edwards Transfers (51,875 acft/yr @ $454/acft/yr);
- GBRA-Exelon Project (49,126 acft/yr @ $641/acft/yr);
- GBRA Lower Basin Storage (100 acre site) (28,369 acft/yr @ $104/acft/yr);
- Medina Lake Firm-Up (ASR) (9,933 acft/yr @ $1,696/acft/yr);
- Wimberley & Woodcreek Water Supply Project (4,480 acft/yr @ $2,453/acft/yr);
- Surface Water Rights[4]; and
- Facilities Expansions.

The Regional Water Plan includes the Recycled Water Programs water management strategy at 41,737 acft/yr which could represent approximately 5.2 percent of the recommended new supplies.

[4] As new supplies and associated costs have not been quantified, this strategy is more explicitly identified as an activity consistent with the 2011 Regional Water Plan.

Water management strategies that simultaneously develop groundwater supplies and limit depletion of storage in regional aquifers comprise about 27.9 percent of recommended new supplies and include:

- GBRA Simsboro Project (49,777 acft/yr @ $982/acft/yr)[5];
- Local Groundwater Supplies (Carrizo[6], Gulf Coast, and Trinity) (38,471 acft/yr @ $687/acft/yr - $1,823/acft/yr);
- Hays/Caldwell PUA Project (35,000 acft/yr @ $1,245/acft/yr);
- TWA Regional Carrizo (27,000 acft/yr @ $1,523/acft/yr);
- Brackish Wilcox Groundwater for SAWS (26,400 acft/yr @ $1,245/acft/yr);
- Regional Carrizo for SAWS (11,687 acft/yr @ $1,343/acft/yr);
- Brackish Wilcox Groundwater for Regional Water Alliance (14,700 acft/yr @ $1,293/acft/yr);
- CRWA Wells Ranch Project (11,000 acft/yr @ $725/acft/yr);
- Regional Carrizo for SSLGC Project Expansion (10,364 acft/yr @ $608/acft/yr); and
- Brackish Wilcox Groundwater for SSWSC (1,120 acft/yr @ $1,883/acft/yr).

Water management strategies that engage the efficiency of conjunctive use of surface and groundwater as well as maximize the use of available resources and water rights comprise approximately 14.6 percent of recommended new supplies and include:

- LCRA-SAWS Water Project (90,000 acft/yr @ $2,394/acft/yr);
- Edwards Aquifer Recharge – Type 2 Projects (21,577 acft/yr @ $1,728/acft/yr); and
- CRWA Siesta Project (5,042 acft/yr @ $1,421/acft/yr).

Water management strategies that involve new surface water appropriations while avoiding development of large mainstem reservoirs comprise approximately 8.2 percent of recommended new supplies and include:

- Lavaca River Off-Channel Reservoir (26,242 acft/yr @ $701/acft);
- GBRA Mid-Basin Project (Surface Water) (25,000 acft/yr @ $2,204/acft/yr);
- GBRA New Appropriation (Lower Basin) (11,300 acft/yr @ $1,953/acft/yr); and
- Storage Above Canyon Reservoir (ASR) (3,140 acft/yr @ $1,772/acft/yr).

[5] The new firm supply associated with this strategy was reduced from 50,000 acft/yr to 49,777 acft/yr to resolve a potential inter-regional conflict with Region G. This small change did not warrant revision of Section 4C.21. A portion of the new firm supply for this strategy to be obtained from the Carrizo-Wilcox Aquifer in Bastrop County is identified as an "overdraft" to resolve a potential inter-regional conflict with Region K. See the response to TWDB Level I Comment No. 52 in Section 10 for additional information.

[6] The portion of the new firm supply for this strategy to be obtained by Bexar Metropolitan Water District from the Carrizo-Wilcox Aquifer in Bexar County is identified as a "temportary overdraft." See the response to TWDB Level I Comment No. 52 in Section 10 for additional information.

Finally, the Regional Water Plan includes the development of a Seawater Desalination water management strategy at 84,012 acft/yr (75 mgd) ($2,284/acft/yr) which could represent approximately 10.5 percent of the recommended new supplies.

The South Central Texas Regional Water Planning Group identifies the following as alternative water management strategies that have been technically evaluated in accordance with TWDB rules and may, subject to an appropriate amendment process defined by TWDB rules, replace a recommended water management strategy in the 2011 Regional Water Plan:

- Lower Guadalupe Water Supply Project for Upstream GBRA Needs (60,000 acft/yr @ $1,506/acft/yr);
- GBRA Lower Basin Storage (500 acre site) (59,569 acft/yr @ $109/acft/yr);
- Lower Guadalupe Water Supply Project for Upstream GBRA Needs at Reduced Capacity (35,000 acft/yr @ $2,565/acft/yr);
- GBRA Mid-Basin Project (Conjunctive Use) (25,000 acft/yr @ $1,779/acft/yr);
- Regional Carrizo for Guadalupe Basin (GBRA) (25,000 acft/yr @ $1,280/acft/yr);
- Medina Lake Firm-Up (OCR) (9,078 acft/yr @ $1,197/acft/yr);
- Local Groundwater Supplies (Barton Springs Edwards) (1,358 acft/yr @ $203/acft/yr);
- Calhoun County Brackish Groundwater Project (1,344 acft/yr @ $2,679/acft/yr); and
- Local Groundwater Supplies (Carrizo) (Yancey WSC) (1,210 acft/yr @ $517/acft/yr).

The Regional Water Plan includes several water management strategies that require further study and funding prior to recommendation for implementation. Several of these strategies employ technologies that have been used previously, but further research is necessary to determine the cost of implementation, optimal scale and location, and quantity of dependable water supply that would be available in severe drought. These strategies are:

- Brush Management;
- Weather Modification;
- Rainwater Harvesting;
- Storage Above Canyon Reservoir (Off-Channel);
- Edwards Aquifer Recharge & Recirculation Systems;
- Palmetto Bend – Stage II (LNRA);
- Seawater Desalination for Guadalupe River Basin;
- Mesa Water Supply Project (SAWS);
- SAWS Other Water Supplies (Planned RFP);
- Regional Carrizo for BMWD;

- Regional Carrizo for SSLGC Project Expansion – Wilson County Option;
- CRWA Dunlap Project; and
- Balancing Storage (ASR and/or Surface)[7].

Although specific quantities of new supply dependable in drought have not been determined for these strategies, it is understood that their implementation will contribute positively to storage and system management of many diverse strategies in the Regional Water Plan. The SCTRWPG recommends that State funding be made available to cooperatively support the refinement and implementation of these strategies.

There are significant quantities of projected water supply needs or shortages in the region for municipal, industrial, steam-electric, and mining uses. As indicated in Figure ES-8, implementation of a number of water management strategies on an expedited basis will be necessary to avoid significant hardship, water rationing, and/or cessation of discharge from Comal Springs in the event of severe drought during the next decade. Substantial water supply needs or shortages are also projected for irrigation use in the South Central Texas Region. However, based upon present economic conditions for agriculture and the fact that there are no really low-cost water supplies to be developed, the SCTRWPG has determined that it is not economically feasible to meet projected irrigation needs at this time, since the net farm income to pay for water is less than the costs of water at the potential sources.

Implementation of the 2011 South Central Texas Regional Water Plan will result in the development of new water supplies that will be reliable in the event of a repeat of the most severe drought on record. It is evident in Figure ES-8 that implementation of all recommended water management strategies is not likely to be necessary in order to meet projected needs within the planning period. The SCTRWPG explicitly recognizes the difference between additional supplies and projected needs as System Management Supplies and has recommended water management strategies over and above those apparently needed to meet projected demands in the Regional Water Plan for the following reasons:

- To recognize both the long lead times and the uncertainty associated with risk factors that may prevent implementation of water management strategies and necessitate replacement strategies;

[7] As new supplies and associated costs have not been quantified, this strategy is more explicitly identified as an activity consistent with the 2011 Regional Water Plan.

- To preserve flexibility for water user groups or wholesale water suppliers to select the most feasible projects among several consistent with the Regional Plan and, therefore, ensure that such projects are potentially eligible for permitting and funding;
- To serve as additional supplies in the event that rules, regulations, or other restrictions limit use of any planned strategies; and/or
- To ensure adequate supplies in the event of a drought more severe than that which occurred historically.

Costs associated with the implementation and long-term operations and maintenance of water management strategies have been estimated in accordance with TWDB rules and general guidelines and reflect regional water treatment capacity and balancing storage facilities sufficient to meet peak daily and seasonal water demands in the larger urban areas. **Total estimated project cost (in 2008 dollars) for the recommended water management strategies for municipal supply that will likely require long-term financing for implementation is about $7.6 billion. Annual unit costs for recommended water management strategies for municipal supply in the 2011 South Central Texas Regional Water Plan (in 2008 dollars) are estimated to range from a low of about $104/acft/yr ($0.32 per 1,000 gallons) for GBRA Lower Basin Storage to a high of about $2,429/acft/yr ($7.45 per 1,000 gallons) for the Wimberley/Woodcreek Water Supply Project and average about $1,209/acft/yr ($3.71 per 1,000 gallons).** No costs have been included for projects that are presently under construction, alternative water management strategies, and potentially feasible water management strategies requiring further study.

The South Central Texas Regional Water Planning Group has identified the following environmental benefits and concerns associated with the implementation of the Regional Water Plan.

ES.9 Environmental Benefits

- Substantial commitment to water conservation through adoption of an aggressive water conservation water management strategy effectively reduces projected water shortages thereby delaying or eliminating the need for implementation of other water management strategies having greater associated environmental impacts. Implementation of economically appropriate drought management strategies, as determined at the water user group level, may provide similar benefits while projects delivering reliable water supplies to meet projected needs are permitted and constructed.
- Development of new water supply sources for Bexar, Comal, and Hays Counties reduces reliance on the Edwards Aquifer during drought thereby contributing to maintenance of springflow and protection of endangered species. The Regional Water

Plan recognizes the on-going efforts of the participants in the Edwards Aquifer Recovery Implementation Program (EARIP) to develop a Habitat Conservation Plan which will help to define the requirements for maintenance of springflow and protection of endangered species and meet with approval from the U.S. Fish & Wildlife Service.

- Implementation of the 2011 Regional Water Plan is likely to result in increased instream flows in the San Antonio River. These increases in flow are attributable to increases in treated effluent from all wastewater discharges (most notably associated with projected growth in Bexar County) and increases in springflow (associated with Edwards Aquifer Recharge Type 2 Projects).
- Edwards Aquifer Recharge Enhancement through the construction of Type 2 recharge dams contributes not only to municipal water supply, but also to maintenance of springflow, protection of endangered species in and below the springs, increased instream flows, and increased freshwater inflows to the Guadalupe Estuary.
- The 2011 Regional Water Plan emphasizes beneficial use of existing surface water rights thereby minimizing the development of new water supply sources and associated environmental impacts. Examples include reliance on presently under-utilized water rights held by the Guadalupe-Blanco River Authority (GBRA) and Dow Chemical Company (Dow) below the confluence of the Guadalupe and San Antonio Rivers and by the Lower Colorado River Authority (LCRA) on the Lower Colorado River. Enhanced use of existing surface water rights accounts for approximately one-quarter of the total new water supplies for municipal, industrial, steam-electric, and mining uses by 2060.
- The Regional Water Plan avoids large-scale development of new mainstem reservoirs having associated terrestrial and aquatic habitat and cultural resources impacts and focuses on smaller, off-channel reservoirs.
- Inclusion of Edwards Aquifer transfers from irrigation use to municipal use through lease/purchase of pumpage rights and development of conserved water through installation of LEPA irrigation systems results in substantial increases in municipal water supply without construction of additional transmission and storage facilities having associated environmental effects.
- Inclusion of groundwater development has limited associated environmental effects as compared to those typically associated with development of new surface water supply reservoirs.
- Inclusion of Seawater Desalination is perceived to have fewer associated environmental effects, as compared to those typically associated with development of new (fresh) surface water supplies.

ES.10 Environmental Concerns

- Potential reductions in freshwater inflows to bays and estuaries, including associated effects on wetland and marsh habitats and marine species, are identified as matters of concern. Primary concerns focus upon the potential effects of the LCRA-SAWS Water Project on freshwater inflows to Matagorda Bay and the GBRA New Appropriation (Lower Basin) on freshwater inflows to the Guadalupe Estuary. It is important to note, however, that as part of the studies directed through the LCRA-

SAWS Definitive Agreement, the Matagorda Bay inflow criteria and the Aquatic Habitat Instream Flow studies were studied thoroughly and shown to meet the legislative directives of protecting Bay Health and the Lower Colorado River aquatic systems. Concerns have also been expressed that increased uses of existing water rights may reduce freshwater inflows to bays and estuaries.

- Concentration of Edwards Aquifer pumpage closer to Comal Springs as a result of implementation of Edwards Transfers tends to reduce discharge from Comal Springs.
- Potential conflicts with stream segments identified by TPWD as ecologically significant are associated with the LCRA-SAWS Water Project, Edwards Recharge – Type 2 Projects, GBRA New Appropriation (Lower Basin), Lavaca River Off-Channel Reservoir, and Storage Above Canyon (ASR).
- Potential effects on small springs and instream flows below these springs may be associated with the development of groundwater supplies.
- Intake siting, brine discharge location(s), and potential effects on marine habitat and species, as well as large demands for electrical power, are environmental concerns associated with Seawater Desalination.

ES.11 Regional Water Plan Summary

Recommended water management strategies to meet the projected needs of each city, utility, water user group, and wholesale water provider in the South Central Texas Region are summarized by county in Table ES-4.

ES.12 Summary of the First Biennium Studies

ES.12.1 Study 1 – Lower Guadalupe Water Supply Project for Upstream GBRA Needs

The purpose of Study 1 was to further analyze and refine the Lower Guadalupe Water Supply Project for GBRA Needs (LGWSP for GBRA Needs), a water management strategy recommended to meet projected needs in the 2006 South Central Texas Regional Water Plan (SCTRWP). Further analyses were precipitated by issues that arose during final preparation of the 2006 SCTRWP and interpretation of language in House Bill 3776 of the 80th Texas Legislature.

The results of Study 1 provided information of relevance to the SCTRWPG for consideration of a refined LGWSP for Upstream GBRA Needs as a recommended or alternative water management strategy (WMS) in the 2011 SCTRWP. Ultimately, both the LGWSP for Upstream GBRA Needs WMS (Section 4C.12) and the LGWSP for Upstream GBRA Needs at Reduced Capacity WMS (Section 4C.11) are listed as alternative WMS for GBRA in the 2011 Initially Prepared Plan.

Table ES-4. Regional Water Supply Plan Summary

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Atascosa County		**Table 2-12**		**Table 4A-1**	**Section 4B.2.1**		
Benton City WSC	1,189	2,569	0	885	Municipal Water Conservation		153
					Local Carrizo Aquifer		1,613
					Purchase from WWP (BMWD)		
Charlotte	296	350	0	0	Municipal Water Conservation	20	43
					Drought Management	15	
					Purchase from WWP (BMWD)		
					Local Carrizo Aquifer		
					Facilities Expansions		
Jourdanton	801	1,026	112	338	Municipal Water Conservation	60	222
					Drought Management	40	
					Local Carrizo Aquifer	403	403
Lytle	479	526	141	188	Municipal Water Conservation	38	108
					Edwards Transfers	141	188
					Drought Management	24	
McCoy WSC	1,106	2,328	0	812	Municipal Water Conservation		129
					Local Carrizo Aquifer		1,613
Pleasanton	1,906	2,151	0	0	Municipal Water Conservation	156	615
					Local Carrizo Aquifer		
					Facilities Expansions		
Poteet	735	752	0	0	Municipal Water Conservation	60	213
Rural	449	97	0	0	Municipal Water Conservation	11	
					Drought Management[1]		
					Purchase from WWP (BMWD)		
					Edwards Transfers		
					Facilities Expansions		
Industrial	6	6	0	0			
Steam-Electric	7,000	7,672	263	942	Local Carrizo Aquifer	807	1613
Mining	1,298	1,509	0	0			
Irrigation	40,885	34,502	6,095	291	Irrigation Water Conservation	5369	291
Livestock	1,745	1,745	0	0			
Bexar County				**Table 4A-1**	**Section 4B.2.2**		
Alamo Heights	2,071	2,170	592	691	Municipal Water Conservation	175	865
					Edwards Transfers	592	691
					Drought Management	104	
Atascosa Rural WSC	941	1,613	546	1,218	Municipal Water Conservation		22
					Edwards Transfers	546	1,218
					Drought Management	47	
					Purchase from WWP (BMWD)	120	120
Balcones Heights	514	670	0	0	Municipal Water Conservation	4	37
Bexar Metropolitan Water District	9,888	12,405	3,944	7,038	Municipal Water Conservation		293
					Purchase from WWP (BMWD)	3,944	7,038
Castle Hills	820	771	96	47	Municipal Water Conservation	61	166
					Drought Management	41	
					Purchase from WWP (BMWD)	96	47
China Grove	376	695	0	0	Municipal Water Conservation	28	217
Converse	1,907	3,564	0	969	Municipal Water Conservation		110
					Purchase from WWP (BMWD)	0	969

Table ES-4 (Continued)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
East Central SUD	1,523	2,793	0	942	Municipal Water Conservation		104
					Purchase from WWP (CRWA)	0	942
Elmendorf	112	156	0	0	Municipal Water Conservation		6
Fair Oaks Ranch	1,434	1,479	0	0	Municipal Water Conservation	125	509
Helotes	1,537	4,047	0	0	Municipal Water Conservation	115	993
Hill Country Village	838	826	730	718	Municipal Water Conservation	77	365
					Purchase from WWP (BMWD)	730	718
					Drought Management	42	
Hollywood Park	2,314	2,616	1,969	2,271	Municipal Water Conservation	212	1,154
					Purchase from WWP (BMWD)	1,969	2,271
					Drought Management	116	
Kirby	1,005	1,034	335	364	Edwards Transfers	335	364
					Drought Management	50	
Lackland AFB (CDP)	3,104	3,016	0	0	Municipal Water Conservation	268	1300
Leon Valley	1,091	1,036	0	0	Municipal Water Conservation		12
Live Oak	1,145	1,284	0	0	Municipal Water Conservation		
Olmos Park	403	484	0	0	Municipal Water Conservation	9	33
San Antonio	216,945	317,727	77,783	194,228	Municipal Water Conservation	5,752	23,711
					Purchase from WWP (SAWS)	68,477	169,336
					Purchase from WWP (BMWD)	9,023	24,476
					Drought Management (SAWS)	37,622	
					Drought Management (BMWD)	1,233	
Selma	1,667	2,605	0	749	Municipal Water Conservation	135	1,122
					Purchase from WWP (SSLGC)	0	749
Shavano Park	819	880	320	381	Municipal Water Conservation	73	382
					Drought Management	41	
					Purchase from WWP (SAWS)	320	381
Somerset	405	709	0	0	Municipal Water Conservation	29	177
St. Hedwig	310	501	0	0	Municipal Water Conservation		14
Terrell Hills	863	1,057	0	0	Municipal Water Conservation	14	65
Universal City	2,608	3,101	113	606	Municipal Water Conservation		148
					Edwards Transfers	113	606
					Drought Management	130	
Water Service Inc. (Apex Water Ser.)	951	2,058	911	2,018	Municipal Water Conservation		105
					Edwards Transfers	587	1,116
					Purchase from WWP (TWA)		1,000
					Purchase from WWP (SSLGC)	324	324
Windcrest	1,204	1,182	235	214	Municipal Water Conservation	99	385
					Edwards Transfers	235	235
Rural	6,624	7,496	0	655	Municipal Water Conservation	49	505
					Purchase from WWP (SAWS)	0	655
Industrial	25,951	42,112	1,340	17,588	Purchase from WWP (SAWS)	12,000	30,000
					Recycled Water	1,340	17,588
Steam-Electric	20,395	39,614	0	0			
Mining	3,582	4,766	0	1,216	Mining Water Conservation		1,216
Irrigation	15,273	12,306	0	0			
Livestock	1,319	1,319	0	0			
Caldwell County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.3**		
Aqua WSC	267	580	49	362	Municipal Water Conservation		19
					Local Carrizo Aquifer	403	403
					Drought Management	13	
Creedmoor-Maha WSC	244	583	108	447	Municipal Water Conservation		11
					Purchase from WWP (GBRA)	108	447
Lockhart	2,451	5,285	0	2,512	Municipal Water Conservation		333
					Local Carrizo Aquifer		2823
					Purchase from WWP (GBRA)		1,120
					Drought Management	123	
Luling	1,067	1,594	0	506	Municipal Water Conservation	70	192
					Local Carrizo Aquifer		807
					Purchase from WWP (GBRA)		1,680
					Drought Management	53	
Martindale	125	158	0	0	Purchase from WWP (CRWA)	0	0
					Drought Management	6	
Martindale WSC	189	329	42	182	Purchase from WWP (CRWA)	396	896
					Drought Management	9	
Maxwell WSC	660	1,733	0	689	Municipal Water Conservation		55
					Purchase from WWP (CRWA)	0	2,000
Mustang Ridge	135	329	19	213	Municipal Water Conservation	10	116
					Purchase from WWP (GBRA)	19	213
					Drought Management	6	
Polonia WSC	668	1,656	0	265	Local Wilcox		323
Rural	237	143	0	0	Municipal Water Conservation	21	29
Industrial	15	29	0	0			

Table ES-4 (Continued)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Steam-Electric	0	0	0	0			
Mining	14	18	0	0			
Irrigation	1,044	578	0	0			
Livestock	918	918	0	0			
Calhoun County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.4**		
Calhoun County WSC	436	632	0	0			
Point Comfort	224	667	46	489	Municipal Water Conservation	18	98
					Purchase from WWP (LNRA)	46	489
					Drought Management	11	
Port Lavaca	1,769	2,345	0	0	Municipal Water Conservation		89
Seadrift	252	258	0	0	Municipal Water Conservation	20	41
Rural (Port O'Conner MUD)	267	269	0	0	Municipal Water Conservation		11
Industrial	49,784	72,238	0	209	Purchase from WWP (LNRA)	10,000	10,000
Steam-Electric	0	0	0	0			
Mining	32	38	0	0			
Irrigation	15,568	9,581	0	0			
Livestock	342	342	0	0			
Comal County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.5**		
Bulverde City	1,053	4,995	653	4,595	Municipal Water Conservation		430
					Purchase from WWP (GBRA)	653	4,595
					Drought Management	53	
Canyon Lake WSC	2,928	13,331	0	6,769	Municipal Water Conservation		1,414
					Purchase from WWP (GBRA)		6,769
					Drought Management[1]		
					Purchase from WWP (TWA)		12,000
Garden Ridge	565	1,360	257	1,052	Municipal Water Conservation	42	460
					Purchase from WWP (SSLGC)	257	1052
					Drought Management	28	
New Braunfels	10,509	26,226	0	13,920	Municipal Water Conservation	815	8,152
					Drought Management	525	
					Purchase from WWP (GBRA)		13,920
Rural	2,721	3,998	1,782	2,960	Municipal Water Conservation		85
					Purchase from WWP (GBRA)	891	1,480
					Purchase from NBU (term)	891	
					Purchase from WWP (TWA)		1,480
Industrial	7,729	11,553	5,199	9,022	Recycled Water	5,199	9,022
Steam-Electric	0	0	0	0			
Mining	2,678	3,401	439	1,173	Mining Water Conservation	439	1,173
Irrigation	204	119	0	0			
Livestock	298	298	0	0			
DeWitt County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.6**		
Cuero	1,249	1,177	0	0	Municipal Water Conservation	99	218
Yoakum	352	328	0	0	Municipal Water Conservation	14	27
Yorktown	343	318	0	0	Municipal Water Conservation		13
Rural	1,013	912	0	0	Municipal Water Conservation		6
Industrial	184	254	0	0			
Steam-Electric	0	0	0	0			
Mining	64	71	0	0			
Irrigation	159	54	0	0			
Livestock	1,689	1,689	0	0			
Dimmit County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.7**		
Asherton	286	279	0	0	Municipal Water Conservation	20	64
Big Wells	149	145	0	0	Municipal Water Conservation	11	33
Carrizo Springs	1,842	1,836	0	0	Municipal Water Conservation	152	777
Rural	284	263	0	0			
Industrial	0	0	0	0			
Steam-Electric	0	0	0	0			
Mining	1,003	1,095	0	0			
Irrigation	10,611	8,987	0	0			
Livestock	552	552	0	0			
Frio County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.8**		
Dilley	1,229	1,825	0	0	Municipal Water Conservation	104	772
Pearsall	1,443	1,449	0	0	Municipal Water Conservation	116	324
Rural	727	1,007	0	0	Municipal Water Conservation		18
Industrial	0	0	0	0			
Steam-Electric	289	91	0	0			
Mining	109	96	0	0			
Irrigation	82,017	68,592	0	0			
Livestock	1,209	1,209	0	0			
Goliad County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.9**		
Goliad	416	594	0	0	Municipal Water Conservation	30	100
Rural	608	848	0	0	Municipal Water Conservation		16
Industrial	4	24	0	0			
Steam-Electric	9,027	16,643	0	0			
Mining	398	46	0	0			

Table ES-4 (Continued)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Irrigation	309	149	0	0			
Livestock	920	920	0	0	Livestock Water Conservation		
Gonzales County	**Table 2-12**		**Table 4-10**		**Section 4B.2.10**		
Gonzales	1,545	1,759	0	0	Municipal Water Conservation	116	414
Gonzales County WSC	1,748	2,360	0	0	Municipal Water Conservation	143	1,002
					Purchase from WWP (TWA)		1,000
Nixon	438	488	0	0	Municipal Water Conservation	35	93
Waelder	154	203	0	0	Municipal Water Conservation		11
Rural	393	204	0	0	Municipal Water Conservation	6	3
Industrial	2,400	3,402	0	0			
Steam-Electric	0	0	0	0			
Mining	28	24	0	0			
Irrigation	1,304	621	0	0			
Livestock	5,453	5,453	0	0			
Guadalupe County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.11**		
Cibolo	866	2,730	0	0	Municipal Water Conservation	65	645
					Purchase from WWP (CRWA)	700	7,180
					Purchase from WWP (BMWD)	500	500
Crystal Clear WSC	2,041	5,551	0	2,716	Municipal Water Conservation		184
					Local Wilcox Aquifer		2,823
					Purchase from WWP (CRWA)	1,300	5,185
					Purchase from WWP (SSLGC)		900
					Purchase from WWP (SHWSC)	0	0
Green Valley SUD	3,039	7,826	0	547	Municipal Water Conservation		20
					Purchase from WWP (CRWA)	700	9,500
					Purchase from NBU	552	552
Marion	164	251	0	75	Municipal Water Conservation		10
					Purchase from WWP (CRWA)	100	400
City of New Berlin	70	180	0	0			
Santa Clara	220	954	76	810	Municipal Water Conservation		79
					Purchase from WWP (CRWA)	100	900
					Drought Management	11	
Schertz	1,451	12,059	0	2,420	Municipal Water Conservation	22	1,088
					Purchase from WWP (SSLGC)	0	5,923
Seguin	5,018	9,047	0	0	Municipal Water Conservation	377	2,131
					Purchase from WWP (SSLGC)		
Springs Hill WSC	2,349	4,330	0	0	Municipal Water Conservation	174	877
					Purchase from WWP (TWA)		3,000
					Brackish Wilcox Groundwater for RWA		1,500
					Facilities Expansions		
Rural	270	13	0	0	Municipal Water Conservation	2	
Industrial	2,638	4,097	0	0			
Steam-Electric	4,788	7,515	0	0			
Mining	306	353	0	0			
Irrigation	1,070	705	0	0			
Livestock	1,057	1,057	0	0			
Hays (Part) County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.12**		
County Line WSC	1,151	3,677	0	2,386	Municipal Water Conservation	43	473
					Local Trinity Aquifer		2,420
					Purchase from WWP (CRWA)	0	570
					Drought Management	58	
					Recycled Water		
Goforth WSC	1,156	3,485	0	1,872	Municipal Water Conservation		111
					Hays/Caldwell PUA Project		1639
					Purchase from WWP (GBRA)		300
Kyle	2,740	5,203	0	1,699	Municipal Water Conservation		443
					Hays/Caldwell PUA Project		9,355
					Drought Management	137	
Mountain City	45	183	0	134	Municipal Water Conservation	1	22
					Hays/Caldwell PUA Project		150
Niederwald	130	449	58	377	Municipal Water Conservation		42
					Purchase from WWP (GBRA)	58	377
					Drought Management	7	
Plum Creek Water Company	566	1,630	0	657	Municipal Water Conservation		54
					Purchase from WWP (GBRA)		657
San Marcos	8,038	24,439	0	11,387	Municipal Water Conservation	417	2,656
					Hays/Caldwell PUA Project		11,910
Wimberley WSC	776	1,966	219	1,409	Municipal Water Conservation		70
					Wimberley and Woodcreek Water Supply	320	1,480
					Drought Management	39	
Woodcreek	246	610	23	387	Municipal Water Conservation		37
					Wimberley and Woodcreek Water Supply	100	400
					Drought Management	12	
Woodcreek Utilities	748	2,873	455	2,580	Municipal Water Conservation	56	771
					Wimberley and Woodcreek Water Supply	700	2,600

Table ES-4 (Continued)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Rural	1,444	2,584	0	0	Municipal Water Conservation		184
Industrial	212	386	0	0			
Steam-Electric	1,009	3,627	0	0			
Mining	142	163	82	103	Wining Water Conservation	82	103
Irrigation	353	338	0	0			
Livestock	280	280	0	0			
Karnes County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.13**		
El Oso WSC	555	728	0	0	Municipal Water Conservation	41	139
Falls City	113	145	0	0	Municipal Water Conservation	8	23
Karnes City	432	512	182	262	Municipal Water Conservation		11
					Local Carrizo	323	323
Kenedy	763	993	0	118	Municipal Water Conservation	58	268
					Local Gulf Coast Aquifer		161
Runge	195	247	0	0	Municipal Water Conservation	15	37
Rural (TDCJ)	500	500	0	0			
Rural	372	822	0	0	Municipal Water Conservation	68	258
Industrial	118	137	0	0			
Steam-Electric	0	0	0	0			
Mining	106	100	0	0			
Irrigation	1,382	836	0	0			
Livestock	1,185	1,185	0	0			
Kendall County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.14**		
Boerne	1,570	4,282	0	276	Municipal Water Conservation	98	816
					Western Canyon WTP Expansion		276
Rural	2,750	7,460	0	3,514	Municipal Water Conservation		264
					Purchase from WWP (GBRA)		3,140
					Western Canyon WTP Expansion		374
Industrial	0	0	0	0			
Steam-Electric	0	0	0	0			
Mining	6	6	0	0			
Irrigation	714	646	0	0			
Livestock	446	446	0	0			
LaSalle County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.15**		
Cotulla	1,407	1,743	0	0	Municipal Water Conservation	118	745
Encinal	110	107	0	0	Municipal Water Conservation	9	14
Rural	282	500	0	0	Municipal Water Conservation	3	42
Industrial	0	0	0	0			
Steam-Electric	0	0	0	0			
Mining	0	0	0	0			
Irrigation	4,791	4,097	0	0			
Livestock	1,687	1,687	0	0			
Medina County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.16**		
Castroville	680	961	294	575	Municipal Water Conservation	53	302
					Edwards Transfers	294	575
					Drought Management	34	
					Purchase from WWP (BMWD)		
Devine	837	896	0	0	Municipal Water Conservation	63	196
East Medina SUD	881	1,385	0	491	Municipal Water Conservation		54
					Edwards Transfers		491
					Drought Management	44	
Hondo	1,784	2,717	319	1,252	Municipal Water Conservation	125	640
					Edwards Transfers	319	1,252
					Drought Management	89	
La Coste	205	281	92	168	Municipal Water Conservation		11
					Edwards Transfers	92	168
					Drought Management	10	
Natalia	330	519	194	383	Municipal Water Conservation	24	73
					Edwards Transfers	194	383
					Drought Management	17	
Yancey WSC	832	1,603	214	985	Municipal Water Conservation	61	316
					Edwards Transfers	214	985
Rural	1,527	2,949	0	1,296	Municipal Water Conservation		244
					Edwards Transfers		1,296
Industrial	67	103	0	0			
Steam-Electric	0	0	0	0			
Mining	130	143	0	0			
Irrigation	54,450	44,015	7,770	0	Irrigation Water Conservation	7,770	0
Livestock	1,298	1,298	0	0			
Refugio County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.17**		
Refugio	645	777	0	0	Municipal Water Conservation	44	144
Woodsboro	283	293	0	0	Municipal Water Conservation	5	20
Rural	321	232	0	0			
Industrial	0	0	0	0			
Steam-Electric	0	0	0	0			
Mining	7	8	0	0			

Table ES-4 (Continued)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Irrigation	69	69	0	0			
Livestock	623	623	0	0			
Uvalde County	Table 2-12		Table 4A-1		Section 4B.2.18		
Sabinal	407	389	127	109	Municipal Water Conservation	34	145
					Edwards Transfers	127	109
					Drought Management	20	
Uvalde	6,087	6,178	3,172	3,263	Municipal Water Conservation	521	2,652
					Edwards Transfers	3,172	3,263
					Drought Management	304	
Rural	1,572	2,532	0	0	Municipal Water Conservation		137
Industrial	432	538	0	0			
Steam-Electric	0	0	0	0			
Mining	313	418	0	0			
Irrigation	55,791	45,703	0	0			
Livestock	1,284	1,284	0	0			
Victoria County	Table 2-12		Table 4A-1		Section 4B.2.19		
Victoria	11,924	14,360	0	0	Municipal Water Conservation	874	2,485
Rural	2,666	3,674	0	310	Municipal Water Conservation		32
					Purchase from WWP (GBRA)		310
Industrial	28,726	43,520	0	14,441	Purchase from WWP (GBRA)		14,441
Steam-Electric	4,052	53,178	1,791	51,076	Purchase from WWP (GBRA - Exelon)		49,126
					Purchase from WWP (GBRA)	1,791	1,950
					Steam Electric Water Conservation	500	500
Mining	3,944	6,041	0	0			
Irrigation	9,936	4,759	0	0			
Livestock	1,085	1,085	0	0			
Wilson County	Table 2-12		Table 4A-1		Section 4B.2.20		
Floresville	1,805	3,000	0	433	Municipal Water Conservation	136	714
					Local Carrizo Aquifer		484
La Vernia	278	764	0	0	Municipal Water Conservation	21	227
					Purchase from WWP (CRWA)	400	400
Oak Hills WSC	693	2,160	0	298	Municipal Water Conservation		136
					Local Carrizo Aquifer		323
Poth	348	585	0	0	Municipal Water Conservation	20	64
SS WSC	1,563	5,030	223	3,690	Municipal Water Conservation		221
					Local Carrizo Aquifer	807	4,033
					Purchase from WWP (CRWA)		690
					Brackish Wilcox Groundwater for SS WSC		1120
					Drought Management	78	
Stockdale	350	558	0	0	Municipal Water Conservation	27	171
Sunko WSC	613	1,326	0	16	Municipal Water Conservation	3	92
					Local Carrizo Aquifer		161
Rural	609	2,006	0	33	Municipal Water Conservation		116
Industrial	1	1	0	0			
Steam-Electric	0	0	0	0			
Mining	242	218	0	0			
Irrigation	11,296	6,330	0	0			
Livestock	1,808	1,808	0	0			
Zavala County	Table 2-12		Table 4A-1		Section 4B.2.21		
Crystal City	2,247	2,370	0	0	Municipal Water Conservation	192	1,002
Rural	864	1,371	0	0	Municipal Water Conservation	42	149
Industrial	1,043	1,315	0	0			
Steam-Electric	0	0	0	0			
Mining	122	130	0	0			
Irrigation	71,800	58,692	54,600	41,492	Irrigation Water Conservation	6,948	6,948
Livestock	756	756	0	0			
Wholesale Water Providers	Tables 2-13 through 2-19		Table 4A-3		Section 4B.3		
San Antonio Water System	217,954	328,442	73,600	193,264	Municipal Water Conservation[2]		
					Drought Management	37,622	0
					Edwards Transfers	35,935	35,935
					ASR Project and Phased Expansion	3,800	16,000
					Recycled Water Program Expansion	15,127	15,127
					Regional Carrizo for SAWS		11,687
					Edwards Aquifer Recharge – Type 2 Projects		21,577
					Brackish Groundwater Desalination (Wilcox)		26,400
					LCRA/SAWS Water Project		90,000
					Seawater Desalination		84,012
Guadalupe-Blanco River Authority	137,065	279,484	0	67,580	Municipal Water Conservation[2]		
					Wimberley and Woodcreek Water Supply Project	4,480	
					Simsboro Groundwater Project		49,777
					GBRA Mid-Basin/Gonzales Project (Surface Water)		25,000
					Storage Above Canyon Reservoir (ASR)		3,140
					GBRA/Exelon Project		49,126

Table ES-4 (Concluded)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Guadalupe-Blanco River Authority					GBRA Lower Basin Storage		26,452
					GBRA New Appropriation (Lower Basin)		11,500
					Western Canyon WTP Expansion		5,600
Bexar Met	43,439	57,954	16,638	35,418	Municipal Water Conservation[2]		
					Edwards Transfers	3,000	3,000
					Local Trinity	2,016	2,016
					Local Carrizo	4,030	16,129
					Medina Lake Firm-Up (ASR – 15 wells)	9,933	9,933
					Purchase from WWP (CRWA)	2,800	8,250
Canyon Regional Water Authority	21,054	53,534	7,920	40,400	Municipal Water Conservation[2]		
					Wells Ranch Project Phase I	5,200	5,200
					Wells Ranch Project Phase II	5,800	5,800
					Purchase from WWP (GBRA)		5,000
					Brackish Wilcox Groundwater for RWA		11,200
					Siesta Project		5,042
					Hays/Caldwell PUA Project		10,260
Lavaca-Navidad River Authority			10,046	10,489	Municipal Water Conservation[2]		
					Lavaca River Off-Channel Reservoir	26,242	26,242
Schertz-Seguin Local Government Corp.	12,704	21,071	0	4,935	Municipal Water Conservation[2]		
					Regional Carrizo for SSLGC Project Expansion		10,364
					Brackish Wilcox Groundwater for RWA		2,000
Springs Hill WSC	3,384	5,365	0	0	Municipal Water Conservation[2]		
					Purchase from WWP (TWA)		3,000
					Brackish Wilcox Groundwater for RWA		1,500
Texas Water Alliance	0	18,480	0	18,480	Municipal Water Conservation[2]		
					TWA Regional Carrizo	27,000	27,000

[1] Historical per capita water use data unavailable or insufficient for calculation of yield.
[2] Municipal Water Conservation

ES.12.2 Study 2 – Brackish Groundwater Supply Evaluation

Study 2 included evaluations of example brackish groundwater projects in: (1) the Gulf Coast Aquifer with projects in southern Calhoun County and Refugio County for the City of Woodsboro and potential developments near Copano Bay; and (2) the Wilcox and Edwards Aquifers in the vicinity of southern Bexar County for municipal supplies in Bexar County. These three aquifers and diverse locations were related, in part, as illustrative examples for evaluation of brackish groundwater as municipal water supply. Evaluations of these water management strategies were intended to demonstrate the range of technical considerations and potential costs associated with development of this water source in Region L.

Based on preliminary information on brackish groundwater and water supply needs in the three areas of interest, the following four strategies were identified for the use of brackish groundwater. They are:

- Gulf Coast Aquifer in southern Calhoun County for potential new development in the vicinity of Seadrift and Port O’Connor;
- Gulf Coast Aquifer in southeastern Refugio County that would replace the conventional groundwater supply for the City of Woodsboro and potential new developments near Copano Bay;
- Wilcox Aquifer in Bexar, Atascosa, and Wilson Counties to provide supplemental water to SAWS (Bexar County); and

- Edwards Aquifer from southern Bexar County to provide supplemental water to SAWS (Bexar County).

In the 2011 Plan, the Wilcox Aquifer in Bexar, Atascosa, and Wilson Counties portion of Study 2 is revised and presented as the Brackish Wilcox Groundwater for SAWS WMS (Section 4C.23). It is a recommended water management strategy for SAWS that will provide up to 26,400 acft/yr of new supply. In addition, a smaller scale version of the Gulf Coast Aquifer in southern Calhoun County portion of Study 2, called Calhoun County Brackish Groundwater Project (Section 4C.26), is listed as an alternative WMS for GBRA to potentially meet needs in portions of Calhoun County should other supplies be unavailable.

ES.12.3 Study 3 – Enhanced Water Conservation, Drought Management, and Land Stewardship

Study 3, Enhanced Water Conservation, Drought Management, and Land Stewardship of the First Biennium of the 2011 South Central Texas Regional Water Plan (SCTRWP) focused on four subject areas of particular interest to the South Central Texas Regional Water Planning Group (SCTRWPG). These four subject areas were fundamental water conservation, as recommended to meet projected needs for additional water supply throughout the South Central Texas Regional Water Planning Area in the 2006 South Central Texas Regional Water Plan, and enhanced water conservation through such means as condensate collection for water supply, drought management, and land stewardship.

Water Conservation (Section 4C.1) continues to be a primary water management strategy in the 2011 Plan. Drought Management (Section 4C.2) is a recommended water management strategy in the 2011 IPP. In addition, Land Stewardship, also identified as Brush Management (Above Canyon Reservoir) (Section 4C.7) has been evaluated in cooperation with Texas A&M University researchers, and is designated as a water management strategy requiring further study and/or funding.

ES.12.4 Study 4 – Environmental Studies

The purpose of Study 4 was to continue environmental studies focused on bays & estuaries, instream flows, bottomland hardwoods, endangered species, and other relevant subjects of interest to the regional water planning group. The results of Study 4 provided information relevant to the potential environmental effects of the regional water plan and aided planning group members in making decisions regarding water management strategies to be recommended for implementation in the 2011 South Central Texas Regional Water Plan (SCTRWP).

Study 4 Part A (Study 4A) focused on three tasks:

1. Research and refine estimates of historical diversions and effluent discharges affecting flows in the lower Guadalupe River and freshwater inflows to the Guadalupe Estuary prior to 1977.
2. Perform ecologically-based streamflow assessments (similar to those for the Guadalupe Estuary in Section 7 of the 2006 Regional Plan) for the Guadalupe River at Victoria and the San Antonio River at Falls City.
3. Develop and deliver presentation materials and GIS-based graphics to support SCTRWPG and education programs focused on regulatory processes, endangered species habitat ranges, and other factors potentially affecting implementation of planned strategies.

Study 4B summarized work performed by Texas A&M University (TAMU) and was presented in a separate report. TAMU developed an ecosystem simulation model that integrated existing project field data with information from the scientific literature to project possible ecosystem responses to variation in freshwater inflows to the Guadalupe Estuary.

The procedures outlined in the ecologically-based streamflow assessment of Study 4A were used to quantify and assess the cumulative effects of the 2011 Plan as summarized in Section 7.

ES.12.5 Study 5 – Environmental Evaluations of Water Management Strategies

The South Central Texas Regional Water Planning Group (SCTRWPG) has prepared two regional water plans[8,9] with unique focus on quantitative reporting of potential effects of plan implementation on surface water flows, groundwater levels, surface water / groundwater interactions, water quality and aquatic habitat, vegetation and terrestrial habitat, endangered and threatened species, and cultural resources. Despite its past efforts, the SCTRWPG has continued to improve its environmental assessments in the 2011 South Central Texas Regional Water Plan (SCTRWP). Seeking the best environmental assessments economically feasible for regional

[8] South Central Texas Regional Water Planning Group, "2001 South Central Texas Regional Water Plan," Vols. I, II, & III, Texas Water Development Board, San Antonio River Authority, HDR Engineering, Inc., et al., January 2001.
[9] South Central Texas Regional Water Planning Group, "2006 South Central Texas Regional Water Plan," Vols. I & II, Texas Water Development Board, San Antonio River Authority, HDR Engineering, Inc., et al., January 2006.

planning purposes as a long-term goal, the South Central Texas Regional Water Planning Group (SCTRWPG) formed an Environmental Assessment Committee in November 2007. The Environmental Assessment Committee made a number of recommendations to the SCTRWPG regarding the environmental evaluations of WMSs. All of these recommendations are reflected in the technical evaluations of WMS (Volume II) and assessments of cumulative effects (Section 7, Volume I) in the 2011 Plan.

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Section 1
Description of the
South Central Texas Region
[31 TAC §357.7(a)(1)]

1.1 Background

Water supplies of the South Central Texas Region are obtained from the Edwards-Balcones Fault Zone, Carrizo-Wilcox, Trinity, Edwards-Trinity (Plateau), and Gulf Coast Aquifers; from three minor aquifers (Queen City, Sparta, and Yegua-Jackson); and from the rivers, streams, and reservoirs within the region. The water supply picture of the region is very complex, involving intricate relationships between surface water and groundwater. The Edwards-Balcones Fault Zone Aquifer (hereinafter referred to as the Edwards Aquifer) supplied approximately 56 percent of the total water used in the South Central Texas Region in 2000. Water demands for the area that is now being supplied from the Edwards Aquifer are projected to grow at a rate of approximately 1.0 percent per year between 2000 and 2020. However, not even the present level of use can be sustained while maintaining levels of flows at Comal and San Marcos Springs adequate to support habitats of threatened and endangered species and also meet downstream water rights. Demands on the Trinity and Carrizo-Wilcox (hereinafter referred to as the Carrizo Aquifer) Aquifers of the South Central Texas Region exceed recharge in some areas. In other areas that now depend upon the Carrizo and Gulf Coast Aquifers, present withdrawal rates are substantially less than recharge. Throughout the region, there is an awareness of the dynamic interrelationships of surface water and groundwater and of the importance of maintaining instream flows and freshwater inflows to bays and estuaries.

Operations of the largest existing surface water supply sources in the region are also directly linked to the Edwards Aquifer. Dependable supplies from Canyon Reservoir for municipal and industrial customers are a function of springflows from the Edwards Aquifer, since inflow passage through Canyon Reservoir is necessary to meet downstream water rights when springflows drop below certain levels. Storage in the Medina Lake System contributes significantly to recharge of the Edwards Aquifer, and reservoirs used for steam-electric power generation (Coleto Creek, Calaveras, and Braunig) and hydropower generation are dependent upon springflows and/or treated municipal effluent that originate from the Edwards Aquifer. Surface water supplies available to the region are also a function of recharge to and withdrawal from the aquifers, as are the quantities of streamflows permitted for use in counties of the Nueces, San Antonio, and Guadalupe River Basins outside of the South Central Texas Region. In water planning for the South Central Texas Region, these factors, together with the numerous potential water management strategies available to the South Central Texas Region, are taken into account herein.

1.2 Physical Description of the South Central Texas Region

The South Central Texas Region includes counties that are located in whole or in part in the Rio Grande, Nueces, San Antonio, Guadalupe, Colorado, and Lavaca River Basins, and the Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces Coastal Basins (Table 1-1). The physical terrain of the region ranges from the Hill Country of the Edwards Plateau to the Coastal Plains. A general description of the region, including geology, climate, water resources, vegetational areas, and major water demand centers, is presented in the following sections.

1.2.1 Climate[1]

The South Central Texas Region lies in three climatic divisions of Texas: the Edwards Plateau, the South Central, and the Upper Coast. The climate of the region is classified as humid subtropical. Summers are usually hot and humid, while winters are often mild and dry. The hot weather is rather persistent from late May through September, accompanied by prevailing southeasterly winds. There is little change in the day-to-day summer weather, except for the occasional thunderstorm, which produces much of the annual precipitation within the region. The cool season, beginning about the first of November and extending through March, is also typically the driest season of the year. Winters are ordinarily short and mild, with most of the precipitation falling as drizzle or light rain. Any accumulation of snow is a rare occurrence. Polar air masses, which penetrate the region in winter, bring northerly winds and sharp drops in temperature for short periods of time.

In the coastal region, the climate is dominated by proximity to the Gulf of Mexico and characterized by prevailing southeasterly winds. During the long humid summers, high daytime temperatures, which are common in inland areas, are moderated in coastal areas by the Gulf breeze.

[1] Texas Water Development Board (TWDB) "Continuing Water Resources Planning and Development for Texas," May 1977.

Table 1-1.
South Central Texas Region – List of Counties
Location by River Basin and Edwards Aquifer Area

County	Edwards Aquifer Area[1]	Nueces Basin	San Antonio Basin	Guadalupe Basin	Lower Colorado Basin	Colorado-Lavaca Coastal Basin	Lavaca Basin	Lavaca-Guadalupe Coastal Basin	San Antonio-Nueces Coastal Basin	Rio Grande
Atascosa	X	X	X							
Bexar	X	X	X							
Caldwell	X			X	X					
Calhoun				X		X		X	X	
Comal	X		X	X						
DeWitt			X	X			X	X		
Dimmit		X								X
Frio		X								
Goliad			X	X					X	
Gonzales				X			X			
Guadalupe	X		X	X						
Hays (Part)	X			X						
Karnes		X	X	X					X	
Kendall			X	X	X					
LaSalle		X								
Medina	X	X	X							
Refugio			X						X	
Uvalde	X	X								
Victoria			X	X			X	X		
Wilson		X	X	X						
Zavala		X								

An X in the column indicates that all or part of the county is located in the River or Coastal Basin named in the column heading.
[1]Edwards Aquifer Area is the area within the Edwards Aquifer Authority statutory boundaries.

Mean annual precipitation in the region ranges from a high of 38 inches per year in DeWitt County in the eastern part of the region, to a low of 23 inches per year in the Nueces River Basin in the west (Table 1-2). There is a general trend of decreasing precipitation from the eastern portions of the region to western portions. There is also a general trend of increasing precipitation from inland areas to coastal areas.

Table 1-2.
Climatological Data for the
South Central Texas Region

	Precipitation			Temperature					Annual Net Reservoir Surface Evaporation (inches)
					Mean Daily Minimum		Mean Daily Maximum		
River Basin	Mean Annual (inches)	Wettest Month(s)	Driest Month(s)	Mean Annual (°F)	January (°F)	July (°F)	January (°F)	July (°F)	
Rio Grande	25	Sept.	Mar.	74	48	74	71	96	65
Nueces	23	May, Sept.	Mar.	71	40	72	65	98	45
San Antonio	30	Sept.	Mar., Dec.	70	41	74	64	96	31
Guadalupe	32	May, Sept.	Mar.	79	37	71	60	95	37
Colorado	34	May, Sept.	Jan.	68	39	74	60	96	35
Lavaca	38	May, Sept.	Mar., July	70	41	72	65	98	24
Lavaca-Guadalupe	37	Sept.	Mar., July	70	44	76	64	94	25
San Antonio-Nueces	33	Sept.	Mar.	71	43	73	65	96	30
Colorado-Lavaca	41	Sept.	Mar., July	70	43	78	64	91	20
Source: Texas Water Development Board, “Continuing Water Resources Planning and Development for Texas,” May 1977.									

Although mean annual temperatures are basically uniform throughout the region, there are some marked seasonal variations, which lead to widely varied values for annual net reservoir surface evaporation. The values for annual net reservoir surface evaporation range from a high of 65 inches per year, for the portion of Dimmit County located in the Rio Grande River Basin, to a low of 24 inches per year, for the portion of DeWitt County that lies in the Lavaca River Basin (Table 1-2).

The South Central Texas Region is subject to the threat of hurricanes each year from mid-June through the end of October, and in those parts of the region along and near the coastline, the hazard of hurricane tides is prevalent. Although hurricane winds and tornadoes spawned by hurricanes cause extensive damage and occasional loss of life, surveys of hurricanes reaching the Texas Coast indicate that storm tides cause by far the greatest destruction and largest number of deaths. Elsewhere, in the inland areas of the region, the greatest concern with regard to hurricanes is the damage that results from winds and flooding. Records dating back to 1871 show that, on average, a tropical storm or hurricane has affected the region once every 3 years.

1.2.2 General Geology[2]

The Hill Country area of the South Central Texas Region is underlain by Cretaceous Age limestone, which forms the Edwards Plateau. East and south of the Plateau are upper Cretaceous chalk, limestone, dolomite, and clay, with the extensive Balcones Fault Zone System marking the boundary between the Edwards Plateau and the Gulf Coastal Region. The entire sequence dips gently toward the southeast.

A Tertiary Age sequence of southeasterly dipping sand, silts, clay, glauconite, volcanic ash, and lignite overlie the Cretaceous Age strata. The primary water-bearing unit of this sequence is the Carrizo Aquifer. A sequence of clay, sand, caliche, and conglomerate of the Pliocene Age Goliad Formation underlie the coastal areas of the region.

Overlying the Goliad Formation is the Quaternary Age Lissie Formation, which consists of sand, silt, clay and minor amounts of gravel. Clay, silt, and fine-grained sand of the Beaumont Formation overlie the Lissie Formation. Throughout the region, alluvial sediments of Recent Age occur along streams and coastal areas.

1.2.3 Vegetational Areas[3]

Biologically, the South Central Texas Region is a region of transition from the lowland forests of the southeastern United States to the arid grasslands of the western uplands and tropical thorn scrub to the south. The essence of this landscape consists of dendritic networks of wooded stream corridors populated by typically eastern species that dissect upland grasslands, and savannahs that harbor western species. The vegetational areas containing portions of the South Central Texas Region are the Edwards Plateau, South Texas Plains, Blackland Prairies, Gulf Prairies and Marshes, and the Post Oak Savannah (Figure 1-1). Each area is described below.

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[2] TWDB, Op. Cit., May 1977.
[3] HDR Engineering, Inc. (HDR), et al., "Trans-Texas Water Program, West Central Study Area, Phase I Interim Report," Volume 2, San Antonio River Authority, et al., May 1994.

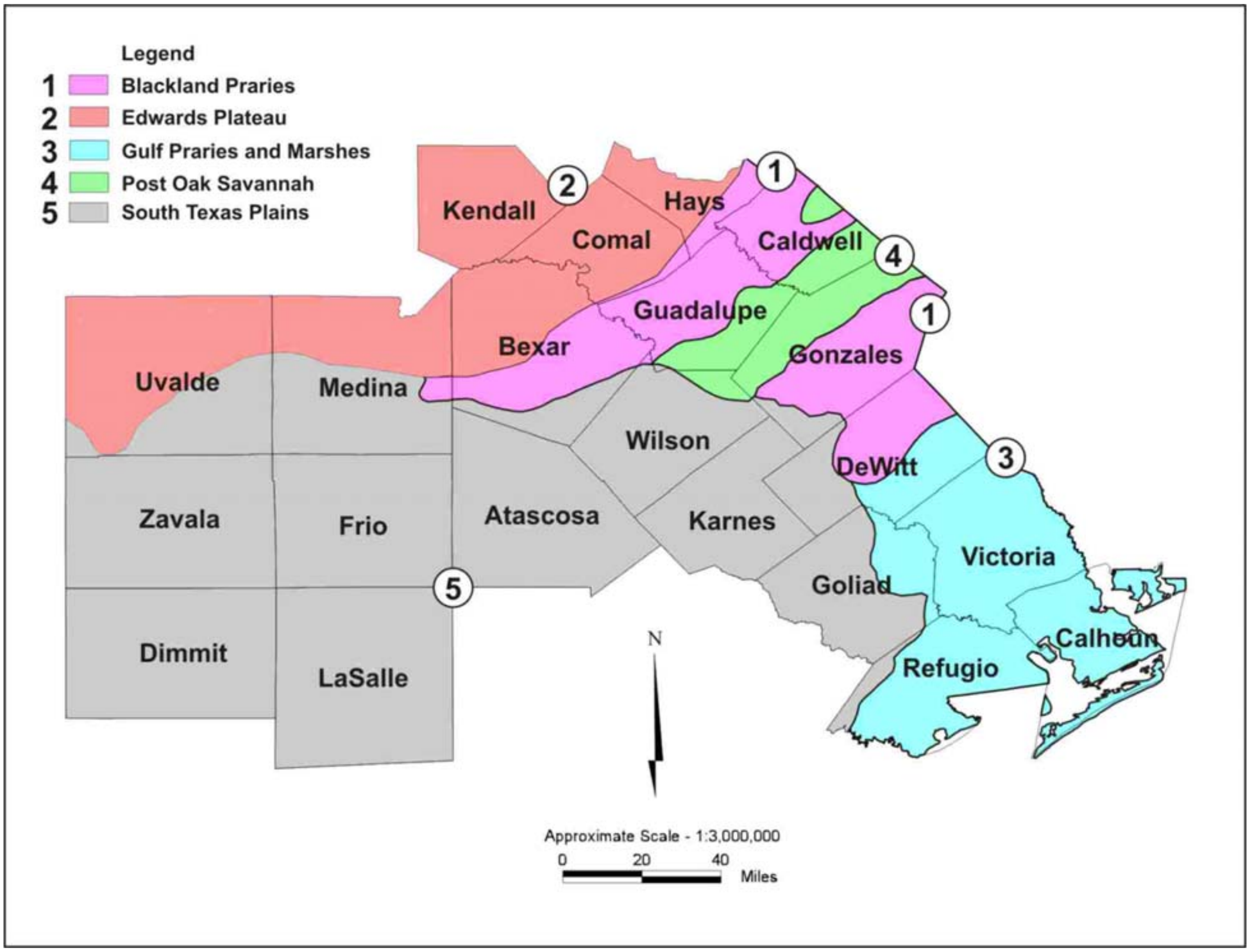

Figure 1-1. Eco-Regions — South Central Texas Region

1.2.3.1 Edwards Plateau

In the South Central Texas Region, the Edwards Plateau vegetational area includes all of Kendall County, the northern portions of Uvalde, Medina, Bexar, and Comal Counties, and the western portion of Hays County located within the planning area. This limestone-based area is characterized by springfed, perennially flowing streams that originate in its interior and flow across the Balcones Escarpment, which bounds it on the south and east. This area is also characterized by the occurrence of numerous ephemeral streams that are important conduits of storm runoff, which contributes to the recharge of the Edwards Aquifer. The soils are shallow, ranging from sands to clays, and are calcareous in reaction. This area is predominantly rangeland, with cultivation confined to limited areas having deeper soils.

Noteworthy is the growth of Bald cypress (*Taxodium distichum*) along the perennially flowing streams. Separated by many miles from cypress growth of the moist Southern Forest Belt, they constitute one of Texas' several "islands" of vegetation.

The principal grasses of the clay soils are several species of bluestem (*Schizachyrium* and *Andropogon* spp.), gramas (*Bouteloua* spp.), Indiangrass (*Sorghastrum nutans*), common curlymesquite (*Hilaria belangeri*), buffalograss (*Buchloe dactyloides)*, and Canadian wild rye (*Elymus canadensis*). The rocky areas support tall or mid-grasses with an overstory of live oak (*Quercus virginiana*) and other oaks (*Q. fusiformis, Q. buckleyi, Q. sinuata* var. *breviloba*), cedar elm (*Ulmus crassifolia*) and mesquite (*Prosopis glandulosa*). The heavy clay soils have a mixture of buffalograss, sideoats grama (*Bouteloua curtipendula*), and mesquite.

1.2.3.2 South Texas Plains

South of San Antonio, including all or parts of Uvalde, Zavala, Dimmit, Medina, Frio, LaSalle, Bexar, Atascosa, Wilson, Karnes, DeWitt, Goliad, and Refugio Counties, lies the South Texas Plains vegetational area, which is characterized by subtropical dryland vegetation consisting of small trees, shrubs, cactus, weeds and grasses. Principal plants are honey mesquite (*Prosopis glandulosa* var. *torreyana*), live oak (*Quercus virginiana*), post oak (*Q. stellata*), several members of the cactus family (Cactaceae), blackbrush acacia (*Acacia rigidula*), guajillo (*Acacia berlandieri*), huisache (*Acacia farnesiana*) and others that often grow very densely. The original vegetation was mainly perennial warm-season bunchgrass in post oak, live oak, and mesquite savannahs. Other brush species form dense thickets on the ridges and along streams. Long-continued grazing, as well as the control of wildfires, has contributed to the dense cover of brush. Most of the desirable grasses have persisted under the protection of brush and cacti.

There are distinct differences in the original plant communities on various soils. Dominant grasses on the sandy loam soils are seacoast bluestem (*Schizachyrium scoparium* var. *littoralis*), bristlegrasses (*Setaria* spp.), and silver bluestem (*Bothriochloa saccharoides*). Dominant grasses on the clay and clay loams are silver bluestem, Arizona cottontop (*Trichachne californica*), buffalograss, common curlymesquite, bristlegrasses, gramas, and Texas wintergrass (*Stipa leucotricha*). Gulf cordgrass (*Spartina* spp.) and seashore saltgrass (*Distichlis spicata*) characterize low saline areas. In the post oak and live oak savannahs, the grasses are mainly seacoast bluestem, Indiangrass, and switchgrass (*Panicum virgatum*).

1.2.3.3 Blackland Prairies

This area, including parts of Bexar, Comal, Guadalupe, Hays, Caldwell, Gonzales, and DeWitt Counties, while called a "prairie," has timber along the streams, including a variety of oaks, pecan (*Carya illinoinensis*), cedar elm and mesquite. In its native state, it was largely a grassy plain.

Most of this fertile area has been cultivated, and only small acreages of meadowland remain in original vegetation. In heavily grazed pastures, buffalograss, Texas grama (*Bouteloua rigidiseta*) and other less-productive grasses have replaced the tall bunchgrass. Mesquite and other woody plants have invaded the grasslands.

The original grass vegetation included big bluestem (*Andropogon gerardii*) and little bluestem (*Schizachyrium scoparium var. frequens*), Indiangrass, switchgrass, sideoats grama, hairy grama (*Bouteloua hirsuta*), tall dropseed (*Sporobolus asper*), Texas wintergrass and buffalograss. Non-grass vegetation is largely legumes and composites.

1.2.3.4 Gulf Prairies and Marshes

The Gulf Prairies and Marshes vegetational area includes all or parts of Victoria, DeWitt, Goliad, Refugio, and Calhoun Counties. There are two subunits: (1) the marsh and salt grasses immediately at tidewater; and (2) a little farther inland, a strip of bluestems and tall grasses, with some gramas in the western part. Many of these grasses make excellent grazing. Oaks, elm, and other hardwoods grow to some extent, especially along streams, and the area has some post oak and brushy extensions along its borders. Much of the Gulf Prairies is fertile farmland.

Principal grasses of the Gulf Prairies are tall bunchgrasses, including big bluestem, little bluestem, seacoast bluestem, Indiangrass, eastern gamagrass (*Tripsacum dactyloides*), Texas wintergrass, switchgrass, and gulf cordgrass. Seashore saltgrass occurs on most saline sites. Heavy grazing has changed the range vegetation in many cases so that the predominant grasses are less desirable broomsedge (*Andropogon virginicus*), smutgrass (*Sporobolus indicus*), threeawns (*Aristida* spp.) and many other inferior grasses. The other plants that have invaded the productive grasslands include oak underbrush, huisache, mesquite, pricklypear (*Opuntia* spp.), ragweed (*Ambrosia psilostachya*), broomweed (*Xanthocephalum* spp.), and others.

1.2.3.5 Post Oak Savannah

This secondary forest region, also called the Post Oak Belt, includes parts of Guadalupe, Caldwell, Wilson, and Gonzales Counties. It is immediately west of the primary forest region, with less annual rainfall and a little higher elevation. Principal trees are post oak, blackjack oak (*Quercus marilandica*) and cedar elm. Pecans, walnuts (*Juglans* spp.) and other kinds of water-demanding trees grow along streams. The southwestern extension of this belt is often poorly defined, with large areas of prairie.

The original vegetation consisted mainly of little bluestem, big bluestem, Indiangrass, switchgrass, silver bluestem, Texas wintergrass, post oak and blackjack oak. The area is still largely native or improved grasslands, with farms located throughout. Intensive grazing has contributed to dense stands of a woody understory of yaupon (*Ilex vomitoria*) and oak brush, and mesquite has become a serious problem. In addition, the control of wildfires has affected the encroachment of brush species on Savannah range lands. Such plants as broomsedge, broomweed, and ragweed have replaced good forage plants.

1.2.4 Natural Resources

1.2.4.1 Water Resources

The South Central Texas Region includes parts of six major river basins (Rio Grande, Nueces, San Antonio, Guadalupe, Lavaca, and Lower Colorado) and overlies the Edwards and Gulf Coast Aquifers, and southern parts of the Trinity, Carrizo, and Edwards-Trinity (Plateau) Aquifers. In addition to these water resources, the area also overlies three minor aquifers (Queen City, Sparta, and Yegua-Jackson). Details about these water resources are presented in Sections 1.7 and 3.

Springs also serve as a significant water resource in the South Central Texas Region. The two most noteworthy springs are the Comal and San Marcos Springs, which both contribute to flow in the Guadalupe River. The San Marcos Springs have the greatest flow dependability and environmental stability of any spring system in the southwestern United States. Constancy of its springflow is apparently key to the unique ecosystem found in the uppermost San Marcos River. Comal Springs, located in New Braunfels, serve as the source for the Comal River, which is a tributary of the Guadalupe River. Unlike the San Marcos Springs, Comal Springs is more responsive to drought conditions and ceased flowing in June of 1956 in response to severe drought conditions. In addition, numerous springs in northern Uvalde and Medina Counties provide surface flows that recharge the Edwards Aquifer and a few springs, such as Leona Springs and Soldier Springs at Uvalde, flow from below the Edwards Aquifer recharge zone providing surface flows for many miles downstream.

1.2.4.2 Fish and Wildlife Resources

The streams and reservoirs of the South Central Texas Region encompass habitats that range from the clear, rocky headwaters of the Guadalupe and Nueces Rivers on the Edwards Plateau to the sluggish, turbid river reaches of the coastal plains, all supporting fish communities typical of warm, carbonate dominated hard waters. These include gar, minnows, topminnows, sunfishes and bass, catfish, and a few species of darters and suckers. Although strongly dependant on the physical habitat factors present, typical species include the common carp, red shiner, blacktail shiner, topminnow, longear and bluegill sunfish, largemouth and Guadalupe bass, channel catfish, bullheads, dusky darter, bigscale logperch, and grey redhorse. The Guadalupe Estuary, at the mouth of the Guadalupe River, is habitat to brown and white shrimp, blue crabs, eastern oysters, red drum, spotted seatrout, black drum, flounder, mullet, Atlantic croaker, sharks, and kingfish.

Common types of wildlife found in the area include white-tailed deer, raccoons, ringtails, gray foxes, coyotes, bobcats, and several species of skunks. Wintering songbirds such as robins and cedar waxwings may also be found. In addition, a growing population of endangered whooping cranes winters in and near the Aransas National Wildlife Refuge which is located on Blackjack Peninsula and Matagorda Island adjacent to San Antonio Bay.

A key concern in the South Central Texas Region is that of threatened and endangered species. There are a number of species listed in the planning region by the U.S. Fish and Wildlife Service or the Texas Parks and Wildlife Department as threatened or endangered. These species are listed by county in Appendix H with notations concerning their habitat preferences and protected status, if any.

1.2.4.3 Agricultural Resources

Of the 12.8 million acres of land area in the planning region, over 10.67 million acres (83 percent) are classified as farmland and ranchland (Table 1-3). In 2007, there were 25,981 farms and ranches in the region with an average size of 695 acres. Of the 10.67 million acres of

Table 1-3.
Agricultural Resources — 2007
South Central Texas Region

County	Total Land Area (acres)	Farms and Ranches (number)	Land in Farms and Ranches (acres)	Average Size (acres)	Total Cropland (acres)	Harvested Cropland (acres)	Irrigated Land (acres)
Atascosa	788,480	1,810	643,594	356	139,080	52,418	22,644
Bexar	798,080	2,496	425,909	171	124,952	59,827	14,091
Caldwell	349,440	1,421	304,737	214	71,459	43,862	909
Calhoun	327,680	291	230,400	792	88,885	61,537	3,569
Comal	359,680	939	192,454	205	37,467	13,468	517
De Witt	581,760	1,811	549,237	303	78,581	42,802	1,213
Dimmit	851,840	388	708,015	1,825	29,108	5,630	5,519
Frio	725,120	724	645,429	891	151,274	57,479	42,895
Goliad	546,560	1,083	469,513	434	58,898	31,576	903
Gonzales	683,520	1,861	654,077	351	99,016	50,836	5,275
Guadalupe	455,040	2,462	385,015	156	125,959	83,517	1,094
Hays (part)[1]	239,360	568	117,784	207	19,633	7,779	471
Karnes	480,000	1,208	417,484	346	104,454	57,740	1,390
Kendall	424,320	1,164	342,515	294	34,071	10,069	694
LaSalle	952,960	399	649,126	1,627	76,270	12,859	8,822
Medina	849,920	2,139	748,144	350	173,541	95,022	41,210
Refugio	492,800	295	490,565	1,663	94,329	75,615	(D)
Uvalde	996,480	690	989,917	1,435	131,420	66,273	45,344
Victoria	565,120	1,351	493,823	366	134,085	79,299	2,844
Wilson	516,480	2,570	467,187	182	153,867	73,012	13,462
Zavala	831,360	311	752,017	2,418	101,534	36,032	26,117
Total	**12,816,000**	**25,981**	**10,676,942**	**695**	**2,031,883**	**1,016,652**	**238,983+(D)**

[1] Estimate for that portion of Hays County located in the planning region.
(D) – Withheld to avoid disclosing data for individual producers.
Source: 2007 Census of Agriculture, Vol. 1 Geographic Area Series, “Table 1: County Summary Highlights — 2007.”

farmland, over 2.03 million acres were classified as cropland, of which about 1.02 million acres were harvested in 2007. Approximately 12 percent (238,983 acres) of the total cropland in the region was reported to be irrigated in 2007.[4] The leading irrigation counties are located in the western part of the region and include Uvalde, Frio, Medina, Atascosa, and Zavala. The sum of irrigated acres in these five counties decreased by 7.1 percent between 2002 and 2007. In Uvalde and Medina Counties, which rely primarily on the Edwards Aquifer, irrigated acres decreased by 17.1 and 25.8 percent respectively, between 2002 and 2007. Major irrigated crops are corn, cotton, grain sorghum, wheat, rice, soybeans, and vegetables. Cow-calf operations are the predominant type of livestock industry, although beef cattle, hogs and pigs, sheep and lambs, and poultry are also produced. (Agricultural production and livestock production are discussed in greater detail in Sections 1.4.2 and 1.4.3, respectively.)

1.2.5 Major Water Demand Centers

In the South Central Texas Region, there are four major water demand centers. These centers are the Interstate Highway 35 (IH-35) corridor from San Antonio to San Marcos, the Edwards Aquifer region west of the City of San Antonio, the Winter Garden area south of the Edwards Aquifer area, and the Coastal area. The San Antonio, New Braunfels, and San Marcos corridor along IH-35 is one of the fastest growing areas in Texas. In the next 60 years, its water use will follow the same trend as population growth, with most of the demand being for municipal use.

The Edwards Aquifer region west of San Antonio, including Uvalde and Medina Counties, is a major demand center for water to be used for irrigated agriculture. The Winter Garden area, including Zavala, Dimmit, Frio, LaSalle, and Atascosa Counties, is also a major demand center for water for irrigated agriculture. The Coastal area, including the cities of Victoria and Port Lavaca, are major demand centers for water for industrial purposes, with some demand for irrigation in Calhoun County.

1.3 Population and Demography

1.3.1 Historical and Recent Trends in Population

According to the Bureau of the Census, the South Central Texas Region population has increased from 806,770 in 1950 to 2,042,221 in 2000, an increase of 1,235,451 or 2.5 times

[4] 2007 Census of Agriculture, Volume 1 Geographic Area Series, "Table 1. County Summary Highlights: 2007."

(Table 1-4). The largest percentage increase occurred between the years 1950 and 1960 (25.8 percent), while the smallest occurred between 1960 and 1970 (16.2 percent). During the period 1950 to 2000, 15 counties had a positive annual growth rate, while six counties (DeWitt, Dimmit, Gonzales, Karnes, LaSalle, and Refugio) had a negative annual growth rate. Historically, the fastest growing counties in the region were Hays (3.30 percent), Comal (3.17 percent), Kendall (3.00 percent), and Guadalupe (2.54 percent), while the slowest growing counties were Zavala (0.07 percent), Goliad (0.22 percent), Frio (0.91 percent), and Uvalde (0.97 percent). Section 2.1 summarizes population projections through the year 2060 for the South Central Texas Region.

There are 111 cities or other water supply entities in the South Central Texas Region for which the TWDB has made population and water demand projections. Of the 111 cities and entities, 44 have a population greater than 5,000. These entities are relatively equally distributed among the 21 counties in the planning region and are located in three commonly used regional references (Coastal, Hill Country, and Winter Garden) (Table 1-5). Bexar County contains 14 entities having a population of 5,000 or more, including San Antonio and its surrounding suburbs. Four counties, Goliad, Karnes, La Salle, and Refugio, do not have an entity of 5,000 or greater in population.

1.3.2 Demographic Characteristics

In 2000, 81 percent of the South Central Texas Region population resided in urban areas, while only 19 percent resided in rural areas (Figure 1-2). LaSalle County had the lowest population in 2000, with 5,866 residents (averaging 3.9 persons per square mile), while Bexar County had the highest population in the region with 1,392,931 residents (averaging 1,117 persons per square mile) (Table 1-6).

Age distribution across the region is characterized by a relatively young population. The two age groups that include the highest percentage of the population are under 18 years of age (28.2 percent) and from 34 to 44 years of age (14.9 percent) (Figure 1-3). The age groups with the lowest percentage of the population are ages 55 to 64 (8.7 percent) and ages 18 to 24 (9.3 percent) (Figure 1-3).

Table 1-4.
Population Growth — 1950 to 2000
South Central Texas Region

County	Year						Growth Rate[1] (%)
	1950	1960	1970	1980	1990	2000	
Atascosa	20,048	18,828	18,696	25,055	30,533	38,628	1.32
Bexar	500,460	687,151	830,460	988,800	1,185,394	1,392,931	2.07
Caldwell	19,350	17,222	21,178	23,637	26,392	32,194	1.02
Calhoun	9,222	16,592	17,831	19,574	19,053	20,647	1.63
Comal	16,357	19,844	24,165	36,446	51,832	78,021	3.17
DeWitt	22,973	20,683	18,660	18,903	18,840	20,013	-0.28
Dimmit	10,654	10,095	9,039	11,367	10,433	10,248	-0.08
Frio	10,357	10,112	11,159	13,785	13,472	16,252	0.91
Goliad	6,219	5,429	4,869	5,193	5,980	6,928	0.22
Gonzales	21,164	17,845	16,375	16,883	17,205	18,628	-0.25
Guadalupe	25,392	29,017	33,554	46,708	64,873	89,023	2.54
Hays (part)[2]	14,272	15,947	22,114	32,475	52,491	72,499	3.30
Karnes	17,139	14,995	13,462	13,593	12,455	15,446	-0.21
Kendall	5,423	5,889	6,964	10,635	14,589	23,743	3.00
LaSalle	7,485	5,972	5,014	5,514	5,254	5,866	-0.49
Medina	17,013	18,904	20,249	23,164	27,312	39,304	1.69
Refugio	10,113	10,975	9,494	9,289	7,976	7,828	-0.51
Uvalde	16,015	16,814	17,348	22,441	23,340	25,926	0.97
Victoria	31,241	46,475	53,766	68,807	74,361	84,088	2.00
Wilson	14,672	13,267	13,041	16,756	22,650	32,408	1.60
Zavala	11,201	12,696	11,370	11,666	12,162	11,600	0.07
Total	**806,770**	**1,014,752**	**1,178,808**	**1,420,691**	**1,696,597**	**2,042,221**	1.87

[1] Compound annual growth rate.
[2] Estimate that 80 percent of the total county population resides within the planning area.
Source: Bureau of the Census, Decadal Censuses of 1950, 1960, 1970, 1980, 1990, and 2000, U.S. Department of Commerce.

Table 1-5.
Major Entities in the
South Central Texas Region*

City Name	County Name	Regional Classification	City Name	County Name	Regional Classification
Alamo Heights	Bexar	Hill Country	Leon Valley	Bexar	Hill Country
Atascosa Rural WSC	Bexar	Hill Country	Live Oak	Bexar	Hill Country
Benton City WSC	Atascosa	Winter Garden	Lockhart	Caldwell	Hill Country
Bexar Met Water District	Bexar	Hill Country	Luling	Caldwell	Hill Country
Boerne	Kendall	Hill Country	McCoy WSC	Atascosa	Winter Garden
Canyon Lake WSC	Comal	Hill Country	New Braunfels	Comal	Hill Country
Carrizo Springs	Dimmit	Winter Garden	Pearsall	Frio	Winter Garden
Converse	Bexar	Hill Country	Pleasanton	Atascosa	Winter Garden
Crystal City	Zavala	Winter Garden	Port Lavaca	Calhoun	Coastal
Crystal Clear WSC	Guadalupe	Hill Country	San Antonio	Bexar	Hill Country
Cuero	DeWitt	Coastal	San Marcos	Hays	Hill Country
East Central WSC	Bexar	Hill Country	Schertz	Guadalupe	Hill Country
East Medina SUD	Medina	Hill Country	Seguin	Guadalupe	Hill Country
Floresville	Wilson	Winter Garden	Springs Hill WSC	Guadalupe	Hill Country
Goforth WSC	Hays	Hill Country	SS WSC	Wilson	Winter Garden
Gonzales	Gonzales	Coastal	Terrell Hills	Bexar	Hill Country
Gonzales County WSC	Gonzales	Coastal	Universal City	Bexar	Hill Country
Green Valley SUD	Guadalupe	Hill Country	Uvalde	Uvalde	Winter Garden
Hondo	Medina	Hill Country	Victoria	Victoria	Coastal
Kirby	Bexar	Hill Country	Water Services Inc.	Bexar	Hill Country
Kyle	Hays	Hill Country	Wimberley WSC	Hays	Hill Country
Lackland AFB	Bexar	Hill Country	Windcrest	Bexar	Hill Country

* Entities with population of 5,000 or more in 2000.

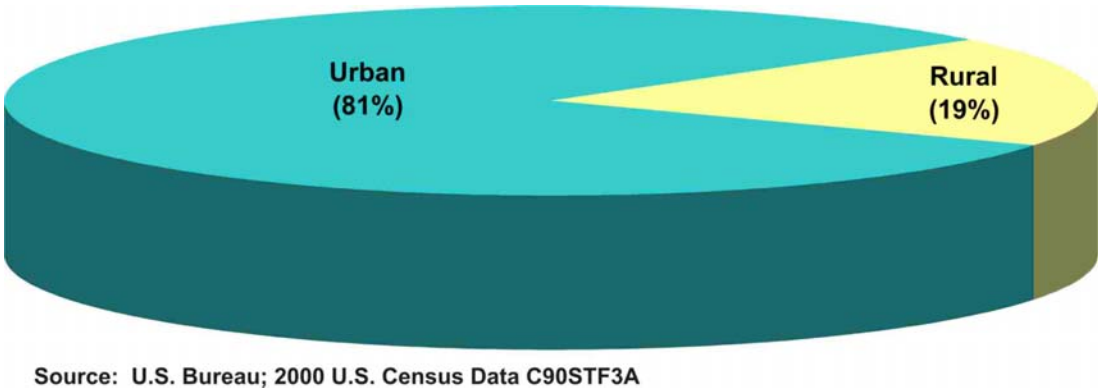

Figure 1-2. Percentages of Population Residing in Urban and Rural Areas (2000) South Central Texas Region

Table 1-6.
County Population and Area
South Central Texas Region

County	Population (2000)	Area (sq. mi.)	County	Population (2000)	Area (sq. mi.)
Atascosa	38,628	1,232	Hays (part)	72,499	374
Bexar	1,392,931	1,247	Karnes	15,446	750
Caldwell	32,194	546	Kendall	23,743	663
Calhoun	20,647	512	LaSalle	5,866	1,489
Comal	78,021	562	Medina	39,304	1,328
DeWitt	20,013	909	Refugio	7,828	770
Dimmit	10,248	1,331	Uvalde	25,926	1,557
Frio	16,252	1,133	Victoria	84,088	883
Goliad	6,928	854	Wilson	32,408	807
Gonzales	18,628	1,068	Zavala	11,600	1,299
Guadalupe	89,023	711	Total	2,042,221	20,025

Source: U.S. Census Bureau, U.S. Department of Commerce.

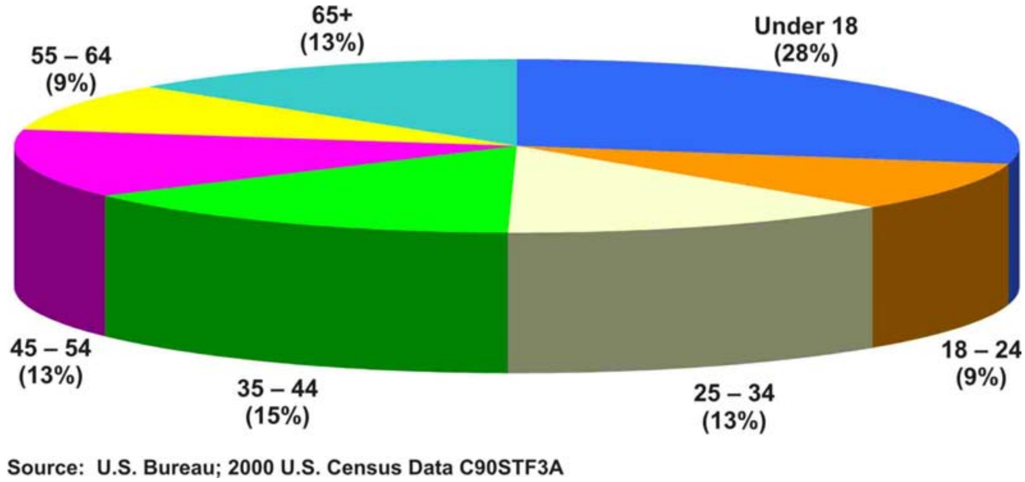

Figure 1-3. Age Distribution of the Population (2000)
South Central Texas Region

The regional population can also be characterized by its level of education. Of those residents in the South Central Texas Region who are 25 years of age or older, 68.2 percent have at least a high school diploma, while 31.8 percent do not. The two largest groups rated according to educational achievement are those who have completed high school, but have not gone on to college (29.0 percent) and those who have completed some college education, but have no degree (20.0 percent). Only 4.7 percent of the population who are 25 years or older have a graduate degree (Figure 1-4).

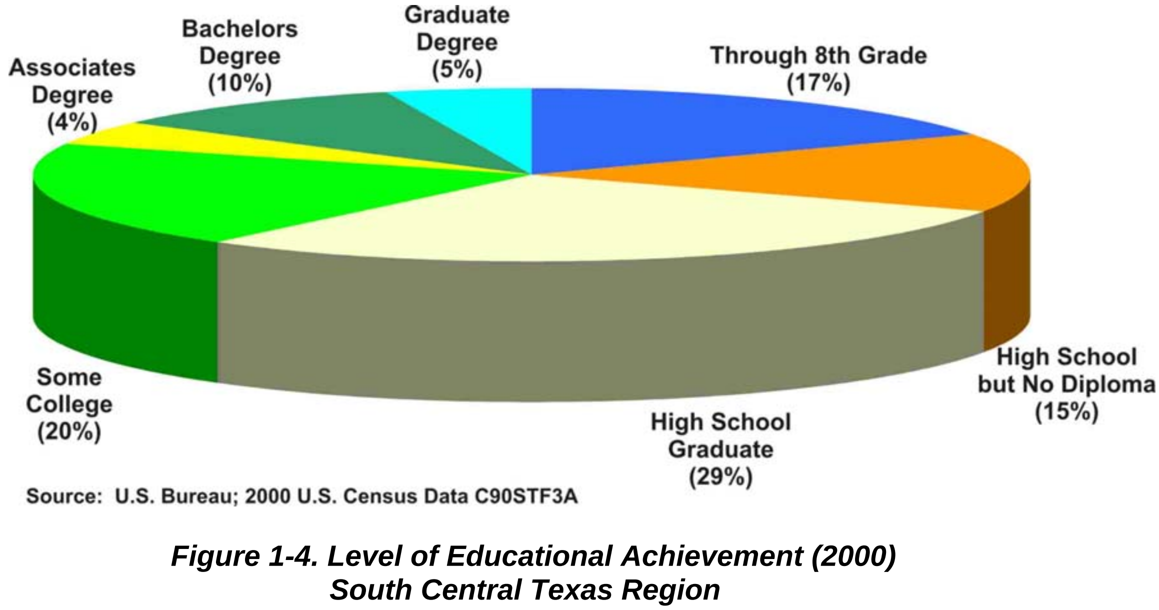

Figure 1-4. Level of Educational Achievement (2000)
South Central Texas Region

1.4 Economy — Major Sectors and Industries

1.4.1 Summary of the South Central Texas Regional Economy[5]

The South Central Texas Region has an economic base centered on agricultural production, livestock production, mining, manufacturing, and trades and services. The region has experienced economic ups and downs throughout the past decade, but all sectors of the economy, with the exception of the mining sector, have experienced solid growth in recent years. Paralleling economic growth, employment in the diversified regional economy is supported by a strong trades and services sector, which accounts for approximately 76 percent of the value of output and a thriving tourism industry in San Antonio. Fabricated metal products, industrial machinery, petrochemicals, and food processing form the core of the manufacturing sector, which accounts for approximately 21 percent of the value of output in the South Central Texas Region. Beef cattle, corn, and grain sorghum are the dominant agricultural enterprises, although vegetables produced in the Winter Garden area add diversity to the agricultural sector. More detailed summaries of the agricultural, livestock, mining, manufacturing, and trades and services sectors are presented in the following sections.

1.4.2 Agricultural Production

It is estimated that over 2.7 million acres in the South Central Texas Region were used in crop production in 2007. Of this total, only 238,983 acres (8.7 percent) were irrigated while the remaining 91.3 percent of the total cropland was farmed using dryland techniques. The leading irrigation counties are found primarily in the western part of the region and include Uvalde, Frio, Medina, Atascosa, and Zavala.

According to the 2007 Census of Agriculture, all crops grown in the South Central Texas Region had a market value of over $373 million in 2007. The leading agricultural producing counties in the region, by market value of products, are Bexar, Medina, Frio, Uvalde, and Victoria. The major crops grown in the region include corn, grain sorghum, wheat, soybeans and cotton (Table 1-7).

[5] Information summarized from reports by the Texas Comptroller's Office.

Table 1-7.
Summary of Farm Production Data 2007
South Central Texas Region

	Cropland			Market	Selected Crops Harvested						
County	Total Cropland (acres)	Irrigated Land (acres)	Non-Irrigated Land (acres)	Value of all Crops ($1,000)	Corn (bushels)	Grain Sorghum (bushels)	Wheat (bushels)	Rice (100 lbs)	Cotton (bales)	Soybeans (bushels)	Hay, Alfalfa, Other (tons)
Atascosa	139,080	22,644	116,436	16,569	167,289	100,757	11,250	0	5,342	(D)	96,226
Bexar	124,952	14,091	110,861	64,471	667,681	322,503	163,134	0	4,655	21,220	96,455
Caldwell	71,459	909	70,550	7,463	482,631	300,172	(D)	0	6,114	0	69,987
Calhoun	88,885	3,569	85,316	20,061	2,859,126	801,557	0	179,313	23,008	(D)	6,653
Comal	37,467	517	36,950	2,920	162,004	103,602	34,097	0	0	0	22,161
DeWitt	78,581	1,213	77,368	6,657	620,914	(D)	6,479	0	569	0	93,751
Dimmit	29,108	5,519	23,589	2,617	(D)	32,822	(D)	0	(D)	(D)	4,857
Frio	151,274	42,895	108,379	39,640	452,648	544,033	206,960	0	6,355	0	33,061
Goliad	58,898	903	57,995	4,707	614,410	120,832	(D)	0	3,576	(D)	53,487
Gonzales	99,016	5,275	93,741	15,281	552,774	29,770	(D)	0	0	0	140,070
Guadalupe	125,959	1,094	124,865	18,807	1,422,369	736,145	266,105	0	1,403	0	101,164
Hays (part)[1]	19,633	471	19,162	2,394	53,603	(D)	27,058	0	(D)	0	25,617
Karnes	104,454	1,390	103,064	10,638	1,343,055	244,614	44,276	0	(D)	0	82,729
Kendall	34,071	694	33,377	981	4,700	0	2,750	0	0	0	21,800
LaSalle	76,270	8,822	67,448	7,779	(D)	(D)	38,489	0	0	0	9,017
Medina	173,541	41,210	132,331	43,287	2,770,486	1,160,786	255,277	0	19,220	0	82,326
Refugio	94,329	(D)	(D)	20,039	488,000	2,062,653	(D)	0	40,500	0	8,783
Uvalde	131,420	45,344	86,076	31,783	1,956,506	1,352,904	208,482	0	17,093	0	27,040
Victoria	134,085	2,844	131,241	23,491	4,243,626	544,032	(D)	(D)	7,652	148,791	51,559
Wilson	153,867	13,462	140,405	15,566	960,096	440,412	43,099	0	3,256	0	132,380
Zavala	101,534	26,117	75,417	18,443	230,138	654,839	185,939	0	8,647	0	10,257
Total	**2,738,015**	**238,983+(D)**	**2,499,032+(D)**	**373,594**	**20,052,056+(D)**	**9,552,433+(D)**	**1,493,395+(D)**	**179,313+(D)**	**147,390+(D)**	**170,011+(D)**	**1,169,380**

[1] Estimate for that portion of Hays County located in the planning region.
(D) – Withheld to avoid disclosing data for individual producers.
Source: 2007 Census of Agriculture, Volume 1 Geographic Area Series, "Table 1. County Su mmary Highlights: 2007."

Corn and grain sorghum have historically been the leading crops in the region. In 2007, it was estimated that over 20 million bushels of corn were harvested in the South Central Texas Region, having a market value of $64.8 million. The leading corn producing counties in the region are Victoria, Medina, Calhoun, and Uvalde (Table 1-7).

Grain sorghum also contributes significantly to the agricultural sector. In 2007, it was estimated that over 9 million bushels of grain sorghum were harvested in the region, having a market value of $29.5 million. The leading grain sorghum producing counties in the region are Refugio, Uvalde, Medina, and Calhoun (Table 1-7).

Although wheat production is not as widespread as corn and grain sorghum production, it is still an important part of the regional agricultural production with over 1 million bushels of wheat harvested in 2007, with a market value of close to $8.0 million. The leading wheat producing counties in the region are Guadalupe, Medina, Uvalde, and Frio (Table 1-7).

Because of favorable climatic and soil conditions, the coastal counties of Calhoun and Victoria are able to produce rice. In 2007, these two counties combined produced over 179,000 hundredweight (cwt) of rice which had a market value of over $1.7 million (Table 1-7).

Cotton production is widespread throughout the region. In 2007, the 17 counties in which cotton is produced combined to harvest over 147,000 bales with a market value of over $34 million (Table 1-7).

The majority of soybean production in the region occurs in the area extending from the Gulf Coast to DeWitt and Karnes Counties. The two leading soybean producing counties are Victoria and Bexar, while all counties engaged in soybean production combined to harvest over 170,000 bushels of soybeans with a market value of approximately $1.3 million in 2007 (Table 1-7).

1.4.3 Livestock Production

According to the 2007 Census of Agriculture, livestock marketed in the South Central Texas region had a market value of over $854 million, or about 2.3 times the value of crop production. Major types of livestock produced in the area include cattle and calves, beef cattle, and sheep and lambs. Layers, pullets, and broilers also contribute significantly to livestock production, with Gonzales County producing over 99 percent of these types of livestock within the region. In 2007, the leading livestock producing counties in the region by market value were Gonzales, Uvalde, Zavala, and Caldwell Counties (Table 1-8).

Table 1-8.
Summary of Livestock Production Data — 2007
South Central Texas Region

County	Market Value of Livestock ($1,000)	Livestock and Poultry						
		Cattle & Calves (Number)	Beef Cows (Number)	Milk Cows (Number)	Hogs & Pigs (Number)	Sheep & Lambs (Number)	Layers & Pullets (Number)	Broilers (Number)
Atascosa	33,684	94,226	(D)	(D)	208	1,049	1,584	(D)
Bexar	19,751	35,820	(D)	(D)	1,241	3,403	11,118	1,252
Caldwell	39,570	45,291	28,401	0	93	516	(D)	1,128,540
Calhoun	8,901	19,057	13,174	0	10	254	453	0
Comal	3,636	12,868	7,988	0	137	3,512	2,946	0
DeWitt	34,326	108,324	(D)	(D)	491	356	61,229	(D)
Dimmit	19,074	29,045	11,398	0	30	184	269	0
Frio	30,637	51,411	21,386	0	133	98	311	0
Goliad	15,304	58,236	38,686	46	62	108	884	0
Gonzales	388,738	160,799	74,967	15	606	889	4,909,610	75,471,968
Guadalupe	22,371	52,045	(D)	(D)	1,118	2,676	140,828	(D)
Hays (part)[1]	3,333	8,155	4,970	2	128	785	15,568	28
Karnes	13,925	59,840	(D)	(D)	81	411	572	0
Kendall	6,651	15,485	9,311	25	442	9,491	1,819	(D)
LaSalle	23,271	33,550	15,277	0	27	125	(D)	0
Medina	37,562	55,759	(D)	(D)	360	2,981	2,488	(D)
Refugio	9,338	33,197	23,318	0	47	(D)	154	0
Uvalde	45,903	52,366	17,961	0	120	10,050	846	(D)
Victoria	19,933	59,059	39,441	22	149	303	878	0
Wilson	37,350	96,310	(D)	(D)	714	1,308	3,645	302
Zavala	41,327	66,641	(D)	(D)	(D)	70	162	0
Total	**854,585**	**1,147,484**	**306,278+(D)**	**110+(D)**	**6,197+(D)**	**38,569+(D)**	**5,155,434+(D)**	**76,602,090+(D)**

[1] Estimates that 50 percent of all livestock production in Hays County occurs in the planning region.
(D) – Withheld to avoid disclosing data for individual producers.
Source: 2007 Census of Agriculture, Volume 1 Geographic Area Series, "Table 1. County Summary Highlights: 2007."

1.4.4 Mining

The South Central Texas Region contains many sand and gravel quarries and is also rich in petroleum products including oil, natural gas, and lignite. Much of the stone quarried is used in the production of cement. The leading cement producing areas in the region are located in Bexar and Hays Counties. Most of the stone, gravel, and sand mining activities are located in Bexar, Comal, Gonzales, and Victoria Counties.

The region also derives a significant portion of its mining income from oil and gas activities. All but three counties (Comal, Hays, and Kendall) derived some of their revenues from oil and gas production in 2002. Oil and gas production in the remaining 18 counties generated over $290 million in 2002 and provided approximately 3,500 jobs in the region. The leading oil and gas producing counties in the region are Refugio, Goliad, Victoria, DeWitt, and La Salle.

1.4.5 Manufacturing[6]

In 2002, manufacturing facilities contributed over $13 billion in sales and provided 56,448 jobs in the South Central Texas Region (Table 1-9).[7] The leading manufacturing counties, by value of shipments, in the region are Bexar, Calhoun, Guadalupe, and Victoria. The leading types of manufacturing plants in the region (in 2002) were printing and related support activities; fabricated metal products; miscellaneous products; and food products.

1.4.6 Trades and Services[8]

In 2002, wholesale trade, retail trade, and services contributed over $59 billion in sales or receipts and provided 450,148 jobs in the South Central Texas Region (Table 1-10).[9] Wholesale trade accounted for 31.5 percent of the total sales or receipts and provided 6.9 percent of the jobs within the trades and services classification in 2002. The leading type of wholesale trade within the South Central Texas Region is durable goods, which includes automobile parts and supplies; lumber and construction materials, and machinery, equipment, and supplies. In 2002, the leading counties in wholesale trade were Bexar, Victoria, Guadalupe, and Comal.

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[6] Source: 2002 Census of Manufacturing, U.S. Department of Commerce.
[7] Data for 2002 are the most recent data available.
[8] Source: 2002 Economic Census, U.S. Department of Commerce.
[9] Data for 2002 are the most recent data available.

Table 1-9.
Summary of Manufacturing Activity — 2002
South Central Texas Region

County	***Total Number of Establishments***	***Total Number of Employees***	***Value of Shipments (million dollars)***
Atascosa	0	0	$0
Bexar	1,019	35,121	$6,290
Caldwell	0	0	$0
Calhoun	22	3,815	$2,689
Comal	101	3,272	$611
DeWitt	27	847	$114
Dimmit	0	0	$0
Frio	0	0	$0
Goliad	0	0	$0
Gonzales	20	1,131	$197
Guadalupe	100	5,224	$1,547
Hays (part)[1]	113	2,618	$514
Karnes	0	0	$0
Kendall	41	818	$157
LaSalle	0	0	$0
Medina	21	538	$42
Refugio	0	0	$0
Uvalde	0	0	$0
Victoria	75	3,064	$1,245
Wilson	0	0	$0
Zavala	0	0	$0
Region Total	**1,539**	**56,448**	**$13,406**

[1] Estimated that 90 percent of Hays County's total manufacturing industry is located within the planning region.

Source: 2002 Economic Census, U.S. Department of Commerce.

Table 1-10.
Trades and Services Industry — 2002
South Central Texas Region

County	Total Number of Establishments	Total Number of Employees	Value of Shipments (million dollars)
Atascosa	381	4,357	$496
Bexar	22,487	358,555	$47,486
Caldwell	335	2,514	$262
Calhoun	285	1,509	$187
Comal	1,513	14,846	$1,901
DeWitt	270	2,385	$282
Dimmit	117	974	$92
Frio	154	1,280	$168
Goliad	70	282	$31
Gonzales	254	1,920	$307
Guadalupe	1,045	11,592	$1,666
Hays (part)[1]	1,190	14,275	$1,575
Karnes	165	1,369	$174
Kendall	583	4,065	$717
LaSalle	62	282	$47
Medina	406	3,315	$455
Refugio	93	723	$87
Uvalde	401	3,992	$556
Victoria	1,589	19,208	$2,517
Wilson	263	2,420	$190
Zavala	72	285	$35
Region Total	**31,735**	**450,148**	**$59,231**

[1] Estimated that 70 percent of Hays County's trades and services industry is located within the planning region.

Source: 2002 Economic Census, U.S. Department of Commerce.

Retail trade accounted for 37.4 percent of the total sales or receipts and provided 22.6 percent of the jobs within the trades and services classification in 2002. The leading types of retail trade within the South Central Texas Region are apparel and accessory stores, gas stations, motor vehicle and parts stores, and food and beverage stores. In 2002, the leading counties in retail trade were Bexar, Victoria, Hays, and Comal.

Services accounted for 31.1 percent of the total sales or receipts and provided 70.5 percent of the jobs within the trades and services classification in 2002. The leading types of services within the South Central Texas Region are healthcare and social services, professional and technical services, and accommodation and food services.

1.5 Water Uses[10]

Water use in 2000 within the South Central Texas Region is summarized for each of the river and coastal basin areas of the region in the following paragraphs.

In 2000, total water use in that part of the Rio Grande Basin located in the South Central Texas Region (part of Dimmit County) was approximately 107 acre-feet (acft) of which 2 acft (2 percent) was used for municipal-type (household) purposes, while the remaining 105 acft was for livestock watering.

In the South Central Texas Region portion of the Nueces River Basin, groundwater resources supply about 90 percent of the water used for all purposes in the basin, with surface water resources supplying the remaining 10 percent. In 2000, total water use within the South Central Texas Region of the basin was 367,959 acft. Irrigated agriculture accounts for nearly 87 percent of all the water used in that portion of the Nueces River Basin located in the planning region, while municipal water use accounts for only about 8 percent.

In the San Antonio River Basin, groundwater resources supply about 91 percent of the water used for all purposes, with surface water resources supplying the remaining 9 percent. In 2000, water use for municipal, industrial, and agricultural purposes within the South Central Texas Region totaled 336,944 acft. Municipal water use accounts for about 73 percent of all water use in that portion of the basin located in the planning region, with water used for irrigated agriculture accounting for about 13 percent. Groundwater resources supply about 99 percent of

[10] Data provided by the TWDB.

the water for municipal use in the basin and about 72 percent of the water used for irrigated agriculture.

In the Guadalupe River Basin, groundwater resources supply about 30 percent of the water used for all purposes, with surface water resources supplying the remaining 70 percent. Total basin water use in 2000 was 120,930 acft within the South Central Texas Region. Municipal is the largest water use category in that part of the basin located within the planning region, accounting for more than 45 percent of the total water use, followed by manufacturing, which accounts for about 29 percent.

In 2000, total water use in that part of the Lower Colorado River Basin located in the South Central Texas Region (parts of Caldwell and Kendall Counties) was approximately 562 acft. Of this total, 365 acft (64.9 percent) was used for municipal purposes, 15 acft (2.7 percent) for irrigation purposes, 13 acft (2.3 percent) for mining purposes, and the remaining 169 acft for livestock purposes.

Total basin water use in 2000 for the South Central Texas portion of the Lavaca River Basin was 867 acft. Municipal water use accounts for about 59.2 percent of all water use in that portion of the basin located in the planning region, followed by livestock use, which accounts for 35.8 percent.

In 2000, water use for municipal, industrial, and livestock purposes in that portion of the Colorado-Lavaca Coastal Basin located in the South Central Texas Region totaled 20,128 acft. Industrial water use is the largest in that part of the basin located within the planning area, accounting for nearly 99 percent of all water used.

In the South Central Texas portion of the Lavaca-Guadalupe Coastal Basin, annual water use totaled 45,693 acft in 2000. The largest water-using category in that part of the basin located within the planning region is manufacturing, which accounts for about 51 percent of all water used.

In the South Central Texas portion of the San Antonio-Nueces Coastal Basin, annual water use totaled about 3,162 acft in 2000. The largest water use category in that part of the basin located within the planning region is municipal, which accounts for about 40 percent of all water used.

1.6 Wholesale Water Providers

The Texas Water Development Board's (TWDB) definition of a Wholesale Water Provider (WWP) is as follows:

> "A WWP is any person or entity, including river authorities and irrigation districts, that has contracts to sell more than 1,000 acft of water wholesale in any one year during the five years immediately preceding the adoption of the last Regional Water Plan."

Under this definition, the list of WWPs for the South Central Texas Region is as follows:

- San Antonio Water System (SAWS),
- Bexar Metropolitan Water District (BMWD),
- Guadalupe-Blanco River Authority (GBRA),
- Canyon Regional Water Authority (CRWA),
- Schertz-Seguin Local Government Corporation (SSLGC), and
- Springs Hill Water Supply Corporation (SHWSC).

In addition, the recently-formed Texas Water Alliance (TWA) is included as a WWP because it is expected to enter into contracts to sell more than 1,000 acft/yr wholesale during the planning period. Each wholesale water provider is briefly described in the following sections. Detailed water demand projections for each wholesale water provider are presented in Section 2.10.

1.6.1 San Antonio Water System

The San Antonio Water System (SAWS) is a public utility owned by the City of San Antonio, and its primary water supply source is the Edwards Aquifer. Additional sources include the Carrizo and Trinity Aquifers, Canyon Reservoir, and direct reuse. SAWS has 260,000 separate customers, and serves approximately 1 million people in the urbanized portion of Bexar County. The water supply service area includes most, but not all, of the City of San Antonio, several suburban municipalities, and adjacent areas of Bexar County. In addition to serving its own retail customers, SAWS also provides wholesale water supplies to several utility systems within Bexar County (Section 2.10). SAWS is in the process of developing supplies from other sources, including groundwater from the Carrizo-Wilcox Aquifer and surface water from the Nueces, Guadalupe-San Antonio, and Colorado River Basins and San Antonio Bay.

1.6.2 Bexar Metropolitan Water District

Created in 1945 by the Texas State Legislature, Bexar Metropolitan Water District (BMWD) serves a population of more than 250,000 in the City of San Antonio and other areas in Bexar, Atascosa, and Medina Counties. It is the second-largest water supplier in Bexar County and, at present, obtains most of its water from the Edwards Aquifer with additional supplies from the Trinity and Carrizo Aquifers, the Medina Lake System, and run-of-river water rights on the Medina River. BMWD is in the process of developing supplies from other sources including additional groundwater from the Carrizo and Trinity Aquifers and surface water from the Guadalupe-San Antonio River Basin.

1.6.3 Guadalupe-Blanco River Authority

The Guadalupe-Blanco River Authority (GBRA) was created by the Texas Legislature in 1933 for the purposes of developing, storing, preserving, and distributing the waters of the Guadalupe River Basin for all useful purposes. GBRA is a regional entity serving Hays, Comal, Guadalupe, Caldwell, Gonzales, DeWitt, Victoria, Kendall, Refugio, and Calhoun Counties. GBRA’s activities include supplying hydroelectric power through operations of six hydroelectric dams located on the Guadalupe River in Guadalupe and Gonzales Counties, supplying potable water, treatment of wastewater, and supplying raw water through management of substantial run-of-river rights and storage rights in Canyon Reservoir. GBRA is in the process of developing water supplies from sources including surface water in the Guadalupe-San Antonio River Basin and groundwater from the Simsboro Aquifer, and developing transmission and treatment facilities to deliver these supplies to customers.

1.6.4 Canyon Regional Water Authority

Canyon Regional Water Authority (CRWA) is a subdivision of the State of Texas created by the Texas Legislature in 1989. CRWA is the water planning and development agency for water purveyors that serve large areas of Guadalupe County and portions of Bexar, Hays, Caldwell, Wilson, and Comal Counties. It works as a partnership of 12 water supply corporations, cities, and districts responsible for acquiring, treating, and transporting potable water (Section 2.10). CRWA owns and operates treatment plants at Lake Dunlap on the Guadalupe River and in far western Caldwell County near the San Marcos River for surface water purchased from the GBRA or leased from other water rights owners. CRWA is pursuing the development of additional water supplies including groundwater from the Carrizo and Wilcox Aquifers and surface water from Cibolo Creek.

1.6.5 Schertz-Seguin Local Government Corporation

The Cities of Schertz, located partially in Guadalupe County and partially in Bexar County, and Seguin, located in Guadalupe County, have joined to create the Schertz-Seguin Local Government Corporation (SSLGC). This Corporation is responsible for creating and operating a wholesale water supply system to serve the long-term needs of these two communities. In addition the Corporation sells water to Selma, Universal City, Garden Ridge, and Springs Hill WSC (Section 2.10). The Carrizo Aquifer in Gonzales and Guadalupe Counties is the current source of supply for SSLGC. SSLGC is pursuing the development of additional water supplies from the Carrizo and Wilcox Aquifers.

1.6.6 Springs Hill WSC

Springs Hill Water Supply Corporation (WSC) is a retail and wholesale water supplier serving customers located primarily in Guadalupe County. In addition to serving its own customers, Springs Hill WSC also supplies water to La Vernia (via CRWA), Crystal Clear WSC, and East Central WSC (via CRWA). Springs Hill WSC's current water supply sources include water from Canyon Reservoir (supplied by GBRA and CRWA), and the Carrizo Aquifer (self-supplied and purchased from SSLGC) (Section 2.10). Springs Hill WSC is pursuing development of additional water supplies from the Carrizo and Wilcox Aquifers.

1.6.7 Texas Water Alliance

The Texas Water Alliance (TWA) is a group of landowners located in northeast Gonzales County organized for the purpose of selling groundwater on a wholesale basis to wholesale water providers (WWPs) and water user groups (WUGs) most likely located in the South Central Texas Regional Water Planning Area (Region L). To date, all of the listed WWPs and several WUGs (i.e. Canyon Lake WSC, Gonzales County WSC, San Marcos, and Kyle) in Region L have shown some measure of interest in groundwater supplies potentially available from northeast Gonzales County. It is highly uncertain at this time which one or more of these entities will enter into water supply agreements with the TWA and/or other proximate landowners and whether necessary production permits can be obtained from the Gonzales County Underground

Water Conservation District for use of this groundwater. Hence, for the purposes of this regional water plan, the TWA is designated a WWP to ensure the flexibility necessary to facilitate the activities of individual sponsors and/or coalitions of sponsors in their independent or collective efforts to develop water supplies from groundwater sources in northeast Gonzales County.

1.7 Water Resources and Quality Considerations

1.7.1 Groundwater[11]

There are five major and minor aquifers supplying water to the South Central Texas Region. The five major aquifers are the Edwards, Carrizo, Trinity, Gulf Coast, and Edwards-Trinity (Plateau) Aquifers (Figure 1-5). The three minor aquifers are the Sparta, Queen City, and Yegua-Jackson Aquifers. Each aquifer is described and a general assessment of water quality is provided in the following subsections[12]. A summary of estimated groundwater supplies is presented in Section 3.

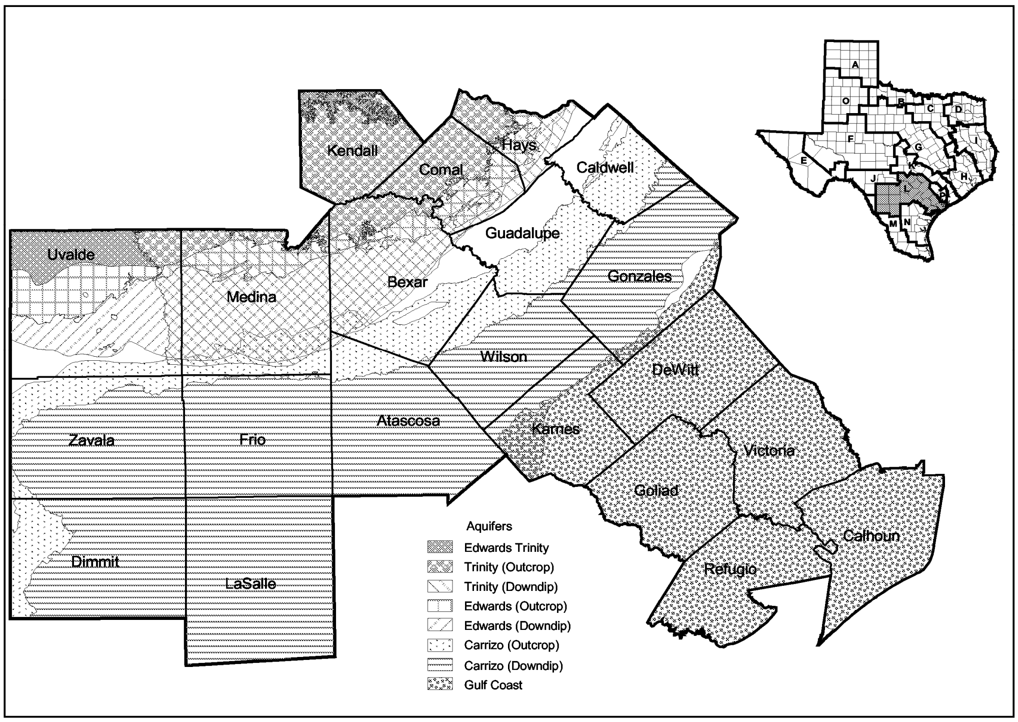

Figure 1-5. Major Aquifers — South Central Texas Region

[11] "Ground-water Availability in Texas," Texas Department of Water Resources, Austin, Texas, September 1979.
[12] Summary descriptive information regarding the Yegua-Jackson Aquifer is available in "Water for Texas 2007" prepared and published by the Texas Water Development Board. Information is not included herein as existing supplies from this aquifer are not known to be relied upon in Region L and no water management strategies contemplate its use in Region L.

1.7.1.1 Edwards-Balcones Fault Zone Aquifer (Edwards Aquifer)

The Edwards Aquifer underlies parts of nine counties (Uvalde, Medina, Bexar, Atascosa, Comal, Guadalupe, Hays, Frio, and Zavala) in the South Central Texas Region. The aquifer forms a narrow belt extending from a groundwater divide in 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 the Austin regions except during severe drought. The name Edwards-BFZ distinguishes this aquifer from the Edwards-Trinity (Plateau) and the Edwards-Trinity (High Plains) Aquifers, however, in this document, it will be referred to as the Edwards Aquifer (Figure 1-5).

The Edwards Aquifer supplied approximately 44 percent of the total water used in the South Central Texas Region in 2000. Water demands of the area that is now being supplied from the Edwards Aquifer are growing at a rate of approximately 1.7 percent per year. Present levels of use cannot be sustained during a repeat of the drought of record without interruption of flow at Comal Springs. Maintenance of adequate levels of flows at Comal and San Marcos Springs are desirable to support habitats of endangered species and provide for downstream water rights.

Water from the aquifer is primarily used for municipal, irrigation, and industrial purposes. In 2008, approximately 62 percent of the total water pumped from the aquifer in the region was used for municipal supply, with 26 percent used for irrigation purposes, 7 percent used for industrial purposes, and an estimated 5 percent used for domestic and livestock purposes and federal facilities.[13] San Antonio, which presently obtains the vast majority of its municipal water supply from the aquifer, is the largest city in the United States and one of the largest in the world that has relied on a single groundwater source. The Edwards Aquifer also supplies water to industries in the San Antonio area and is the source of flow from Comal, San Marcos, Leona, San Antonio, and San Pedro Springs. Both the Guadalupe and San Antonio Rivers are supplied with base flows from springs, which, in turn, are used downstream for municipal, industrial, and agricultural purposes.

The aquifer, composed predominantly of limestone formed during the early Cretaceous Period, exists under water-table conditions in the outcrop and under artesian conditions where it is confined below the overlying Del Rio Clay. The Aquifer consists of the Georgetown Limestone, formations of the Edwards Group (the primary water-bearing unit) and their

[13] Edwards Aquifer Authority, "Hydrologic Data Report for 2008," July 2009.

equivalents, and the Comanche Peak Limestone where it exists. Saturated thickness ranges from 200 to 600 feet.

Recharge to the aquifer occurs primarily by the downward percolation of surface water from streams draining off of the Edwards Plateau to the north and west and by direct infiltration of precipitation on the outcrop. This recharge reaches the aquifer through crevices, faults, and sinkholes in the unsaturated zone. Unknown amounts of groundwater enter the aquifer as lateral underflow from the Glen Rose Formation. Water in the aquifer generally moves from the recharge zone toward natural discharge points such as Comal and San Marcos Springs. Water is withdrawn through hundreds of wells, particularly municipal and industrial wells in Bexar, Comal, and Hays Counties, and irrigation wells in Bexar, Medina, and Uvalde Counties.

In the updip portion, groundwater moving through the aquifer system has dissolved large volumes of rock to create highly permeable solution zones and channels that facilitate rapid flow and relatively high storage capacity within the aquifer. Highly fractured strata in fault zones have also been preferentially dissolved to form conduits capable of transmitting large amounts of water. Due to its extensive honeycombed and cavernous character, the aquifer yields moderate to large quantities of water to wells, with some wells yielding in excess of 16,000 gallons per minute (gpm) (35.6 cfs, 25,810 acft/yr). One well drilled in Bexar County flowed 24,000 gpm (53.5 cfs, 38,720 acft/yr) from a 30-inch diameter pipe. The aquifer is significantly less permeable farther downdip where the concentration of dissolved solids in the water exceeds 1,000 milligrams per liter (mg/L).

Due to its highly permeable nature in the fresh-water zone, the Edwards Aquifer responds quickly to changes and extremes of stress placed on the system. This is indicated by rapid water-level fluctuations during relatively short periods of time. During times of high rainfall and recharge, the Edwards Aquifer is able to supply significant quantities of water for municipal, industrial, and irrigation uses, as well as sustain springflows. However, under conditions of below-average rainfall or drought, when discharge and withdrawals exceed recharge, springflows may decline to levels that are unacceptable to both environmental and downstream water rights concerns.

Operations of the largest existing surface water supply sources in the South Central Texas Region are linked to the Edwards Aquifer. Dependable supplies from Canyon Reservoir for municipal and industrial customers are a function of springflows from the Edwards Aquifer, since inflow passage through Canyon Reservoir is necessary to meet downstream senior water rights when springflows drop below certain levels. Storage in the Medina Lake System contributes significantly to recharge of the Edwards Aquifer, and reservoirs used to provide cooling for steam-electric power generation (Coleto Creek, Calaveras, and Braunig) are dependent to some degree upon springflows and/or treated municipal effluent, which originated from the Edwards Aquifer. Surface water supplies available to the region are also a function of recharge to and withdrawal from the Edwards and other aquifers, as well as the quantities of streamflows permitted for use in counties of the Nueces River Basin outside the South Central Texas Region.

An important management issue for the Edwards Aquifer includes establishing levels of groundwater withdrawals and enhancing natural recharge to ensure adequate water levels and at least minimum springflows. In the three river basin area where the Edwards Aquifer is located, growing demands are increasing the competition for scarce water resources. Aquifer recharge and pumpage affect streamflows and springflows, which in turn affect endangered species at and below the springs, streamflows for downstream water rights holders, instream flows for fish and wildlife, and freshwater inflows to the Guadalupe Estuary.

In 1959, after the severe drought and increasing pumpage from 1950 to 1957 that lowered water levels in the aquifer to record lows and caused Comal Springs in Comal County to go dry for several months, the Texas Legislature created the Edwards Underground Water District. The district included Bexar, Comal, Hays, Medina, and Uvalde Counties and was charged with conserving, protecting, and recharging the underground water-bearing formations within the district and preventing waste and pollution of such underground water. In 1989, Medina and Uvalde Counties withdrew from the district and each formed a countywide district. In 1993, while under threat of federal intervention for alleged failure to protect federally protected species that rely on springflows from the Edwards Aquifer, the Texas Legislature enacted Senate Bill 1477.

Senate Bill 1477 abolished the Edwards Underground Water District and created a new entity, the Edwards Aquifer Authority. Senate Bill 1477 directs the Authority to implement a comprehensive management plan for the aquifer that regulates pumpage, while taking into consideration the interests and needs of all the individuals and entities that rely on the aquifer as a water source, and maintains the delicate relationship between springflows and the environment. In 2007, Senate Bill 3 of the 80th Texas Legislature established a maximum annual amount of permitted withdrawals from the aquifer, specific critical period management plan provisions, interim minimum annualized rates for permitted withdrawals in the critical period, and a Recovery Implementation Program for protection of endangered species.

A “bad water” line generally runs west-east through southern Uvalde and Medina Counties, the northern tip of Atascosa County, Southeastern Bexar, Comal, and Hays Counties, and the western tip of Guadalupe County.[14] South and southeast of the “bad water” line, the aquifer contains water having more than 1,000 milligrams per liter of dissolved solids. The potential for movement of this poor quality water into the fresh water zone, as fresh water levels are lowered during periods of low recharge and high pumpage, is considered a threat to the quality of water in the fresh water zone of the aquifer, and consequently may be a threat to the water supplies of those who depend upon the aquifer.

1.7.1.2 Carrizo-Wilcox Aquifer (Carrizo Aquifer)

The Wilcox Group, including the Calvert Bluff, Simsboro, and Hooper Formations, and the overlying Carrizo Formation of the Claiborne Group, form a hydrologically connected system known as the Carrizo-Wilcox Aquifer, which is referred to in this plan as the Carrizo 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, 13 of which are located in the South Central Texas Region. The Carrizo Sand and Wilcox Group outcrop along a narrow band that is located about 130 miles inland from the Gulf of Mexico at the eastern edge of the South Central Texas Region and about 200 miles inland at the western edge. The aquifer dips beneath the land surface toward the coast.

The Carrizo Aquifer is predominantly composed of sand locally interbedded with gravel, silt, clay, and lignite deposited during the Tertiary Period. Water-bearing thickness of the aquifer ranges from 200 feet in Dimmit County to more than 1,500 feet in the downdip artesian portion in Atascosa County. Where it is found at the surface, the aquifer exists under water-table conditions and, in the subsurface, is under artesian conditions. Yields of wells are commonly 500 gpm (1.1 cfs, 810 acft/yr), and some may reach 3,000 gpm (6.7 cfs, 4,840 acft/yr) downdip where the aquifer is under artesian conditions. Some of the greatest yields are produced from the Carrizo Sand in the southern, or Winter Garden, area of the aquifer.

[14] “Groundwater Resources, and Model Applications for the Edwards (Balcones Fault Zone) Aquifer in the San Antonio Region, Texas,” Texas Department of Water Resources, Klemt, William B., Tommy R. Knowles, Glenward R. Elder, and Thomas W. Sieb, Report 239, Austin, Texas, October 1979.

Historically, municipal and irrigation pumpage account for about 35 percent and 51 percent, respectively, of total pumpage from the Carrizo Aquifer within the region, with irrigation being the predominant use in the Winter Garden region. Significant water-level declines have occurred in the semiarid Winter Garden portion of the Carrizo Aquifer, as the region is heavily dependent on groundwater for irrigation. Since 1920, water levels have declined 100 feet in much of the area and more than 250 feet in the Crystal City area of Zavala County.

In the South Central Texas Region, water from the Carrizo Aquifer is fresh to slightly saline. In the outcrop, the water is hard yet usually low in dissolved solids. Downdip, the water is softer, has a higher temperature, and contains more dissolved solids. A downdip "bad water" line generally runs northeast-southwest through the southeast portion of La Salle and McMullen Counties, the northeast portion of Live Oak and Karnes Counties, and southeast Gonzales County. Southeast of the "bad water" line the groundwater has more than 1,000 mg/L of total dissolved solids. Localized contamination of the aquifer in the Winter Garden region is attributed to direct infiltration of oil field brines on the surface and to downward leakage of saline water from the overlying Bigford Formation. Some sampled wells in Dimmit and Zavala Counties were found to contain high concentrations of dissolved solids, chloride, and/or sulfate. Downward leakage of more highly-mineralized water from overlying strata through the uncemented annular space between the well casings and boreholes of such wells is considered to be the most likely cause. Nitrate and gross alpha above maximum concentration limits have been observed in the Winter Garden District. Caldwell and Gonzales Counties have areas where water from the aquifer is high in iron and manganese. The Calvert Bluff, Simsboro, and Hooper formations of the Wilcox group all contain mean iron concentrations greater than the secondary drinking water standard of 0.3 mg/L. Water from all three formations is hard to very hard. Mean concentrations of sulfate and chloride are below regulatory standards in all three formations.

1.7.1.3 Trinity Aquifer

The Trinity Aquifer provides water to all or parts of 55 counties in Texas, including six counties (Hays, Comal, Kendall, Bexar, Medina, and Uvalde) in the South Central Texas Region. The Trinity Aquifer consists of early Cretaceous Age formations of the Trinity Group that are organized into the lower Trinity Aquifer (Hosston Sand and Sligo Limestone), the middle Trinity Aquifer (lower Glen Rose Limestone, the Hensell Sand, and Cow Creek Limestone), and the upper Trinity Aquifer (upper Glen Rose Limestone).[15] Because of its depth and poor quality, the lower Trinity has not been extensively developed. The middle Trinity is the most widely used part of the aquifer in the South Central Texas Region. The upper Trinity yields are low due to low porosity and permeability, and water quality is poor due to the presence of evaporate beds.

Trinity well yields are rarely more than 100 gpm (0.22 cfs, 160 acft/yr) in the South Central Texas Region although the SAWS is presently obtaining an average of about 500 gpm from several Trinity wells in northern Bexar County. At the present time, the aquifer is being stressed due to rapid growth in the number of wells being drilled to supply new homes and commercial establishments. Due to the heavy demands being placed upon the aquifer in relation to supplies available, much of the area underlain by the Trinity Aquifer in the Hill Country has been included in a Priority Groundwater Management Area.

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 for municipal supplies. In the southern Hill Country region, the primary contribution to poor quality is wells that have not been adequately cased through the evaporite beds in the upper part of the Glen Rose. Water quality naturally deteriorates in the downdip direction within all the Trinity water-bearing units. A downdip "bad water" line for the Trinity Aquifer generally trends east-west through southern Uvalde and Medina Counties, then trends southeast-northwest through central Bexar County and the southeast edge of Comal and Hays Counties. South and southeast of this "bad water" line, the groundwater contains greater than 1,000 mg/L of total dissolved solids. Average concentrations of nitrates, fluorides, chlorides, and sulfates are below regulatory standards. However, localized areas of nitrate pollution due to human or animal waste, and ranching and farming activities have been identified in parts of Kendall and Hays Counties.

1.7.1.4 Gulf Coast Aquifer

The Gulf Coast Aquifer forms a wide belt along the Gulf of Mexico from Florida to Mexico. In Texas, the aquifer provides water to all or parts of 54 counties, including all or parts of seven coastal counties (Karnes, Gonzales, DeWitt, Goliad, Victoria, Refugio, and Calhoun) in

[15] "Groundwater Availability of the Lower Cretaceous Formations in the Hill Country of South-Central Texas," Texas Department of Water Resources, Austin, Texas, 1983.

the South Central Texas Region. Municipal and irrigation uses have historically accounted for 90 percent of the total pumpage for the aquifer in the planning region.

The aquifer consists of complex interbedded clays, silts, sands, and gravels of the Cenozoic Age, which are hydrologically connected to form a large, leaky artesian aquifer system. This system is comprised of four major components consisting of the following generally recognized water-producing formations. The deepest is the Catahoula, which contains groundwater near the outcrop in relatively restricted sand layers. Above the Catahoula, is the Jasper Aquifer, primarily contained within the Oakville Sandstone. The Burkeville confining layer separates the Jasper from the overlying Evangeline Aquifer, which is contained within the Fleming and Goliad Sands. The Chicot Aquifer, or upper component of the Gulf Coast Aquifer system, consists of the Lissie, Willis, Bentley, Montgomery, and Beaumont Formations, and overlying alluvial deposits. Not all formations are present throughout the system, and nomenclature often differs from one end of the system to the other. In the South Central Texas Region, saturated thickness ranges from 500 feet in Karnes County to about 1,500 feet in Victoria County. Average well yields are about 1,600 gpm. Water quality tends to deteriorate from about 500 mg/L of dissolved solids in Karnes County to over 1,000 mg/L near the coast. Water levels have declined in local areas where significant withdrawals have been made for municipal, industrial, and irrigation purposes. As water levels decline, the threats of land subsidence and salt-water intrusion increase.

In the Gulf Coast Aquifer, 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. From the San Antonio River Basin southwestward to Mexico, quality deterioration is evident in the form of increased chloride concentration and salt-water encroachment along the coast. Little of this groundwater is suitable for prolonged irrigation use due to either high salinity, or alkalinity, or both. The downdip extent of fresh water in the Gulf Coast Aquifer is approximately equal to or somewhat inland from the coast line of the Gulf of Mexico. Elevated levels of TDS, chloride, and/or arsenic can occur locally (e.g., Karnes, Refugio, and Calhoun Counties) necessitating more advanced treatment processes.

1.7.1.5 Edwards-Trinity (Plateau) Aquifer

The Edwards-Trinity (Plateau) Aquifer provides water to the northern portions of Uvalde and Kendall Counties in the South Central Texas Region. The aquifer consists of saturated sediments of lower Cretaceous Age Trinity Group, including the Fredericksburg Group and Washita Group.[16] The Glen Rose Limestone is the primary unit in the Edwards-Trinity (Plateau) Aquifer in the southern areas of its extent. This unit is estimated to have a thickness of up to 300 feet in these southern areas of its extent.

The aquifer generally exists under water-table conditions, however, where the Trinity (Plateau) Aquifer 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 gpm where saturated thickness is thin to more than 1,000 gpm where wells are completed in jointed and cavernous limestone. Water quality ranges from fresh to slightly saline. The water is generally hard and varies in concentrations of calcium, magnesium, and bicarbonate. Average concentrations of nitrate, fluoride, chloride, and sulfates are below regulatory drinking water standards.

1.7.1.6 Sparta Aquifer

The Sparta Aquifer extends in a narrow band from the Frio River in South Texas northeastward to the Louisiana border, and underlies parts of five counties (Frio, LaSalle, Atascosa, Wilson, and Gonzales) in the South Central Texas Region. 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 being produced from the interval. The Sparta provides water for domestic and livestock supply throughout its extent in the region.

The Sparta Formation, part of the Claiborne Group deposited during the Tertiary, consists of sand and interbedded clay with massive sand beds in the basal section. These beds gently dip to the south and southeast toward the Gulf Coast and reach a total thickness of up to 300 feet. Usable quality water is commonly found within the outcrop and for a few miles downdip and in some areas may occur down to depths approaching 2,000 feet. Yields of individual wells are

[16] Barker, Rene A., and Ardis, Ann F., "Hydrogeologic Framework of the Edwards-Trinity Aquifer System, West Central Texas," USGS Professional Paper 1421-B, 1996.

generally less than 100 gpm, although some wells average 400 to 500 gpm, and a few wells produce as much as 1,200 gpm. Water occurs under water-table conditions in the outcrop and under artesian conditions downdip where the Sparta is covered by younger, non water-bearing rocks.

The Sparta Aquifer produces water of excellent quality throughout most of its extent in the South Central Texas Region; however, water quality deteriorates with depth due to high chlorides and dissolved solids in the downdip direction. The extent of downdip fresh water in the Sparta Aquifer generally runs along a line trending southwest-northeast from northern La Salle and McMullen Counties through southeast Atascosa and Wilson Counties to central Gonzales County. In some locations, water within the aquifer may contain iron concentrations in excess of secondary drinking water standards.

1.7.1.7 Queen City Aquifer

The Queen City Aquifer extends across Texas from the Frio River in South Texas northeastward into Louisiana and underlies six counties (Frio, LaSalle, Atascosa, Wilson, Gonzales, and Caldwell) in the South Central Texas Region. 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. The aquifer provides water for domestic and livestock purposes throughout most of its extent and water for irrigation in Wilson County.

Sand, loosely cemented sandstone, and interbedded clay units of the Queen City Formation of the Tertiary Claiborne Group make up the aquifer. These rocks dip gently to the south and southeast toward the Gulf Coast. Total aquifer thickness is usually less than 500 feet. In the outcrop area, water occurs under water-table conditions, while in the downdip subsurface, where the Queen City is covered by younger, non-water-bearing rocks, the water is under artesian conditions. Yields of individual wells are commonly low, but a few exceed 400 gpm.

Water of excellent quality is generally found within the outcrop and for a few miles downdip, but water quality deteriorates with depth in the downdip direction due to high chlorides and dissolved solids. The extent of downdip fresh water in the Queen City Aquifer is approximately the same as the Sparta Aquifer in the previous subsection. Queen City Aquifer groundwater contains relatively high iron concentrations in some locations.

1.7.2 Surface Water

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 (Figure 1-6). Existing surface water supplies of the region include those derived from storage reservoirs and run-of-river water rights. The geographical characteristics of the various river basins are described in the following subsections, along with major reservoirs and/or water rights. In addition, general information is provided regarding water quality characteristics and specific notation is made of stream segments on the 2008 draft list prepared by the Texas Commission on Environmental Quality (TCEQ) pursuant to Section 303(d) of the Federal Clean Water Act. Appearance on this list indicates the possibility that a stream or water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants which could lead to a Total Maximum Daily Load (TMDL) assessment. Existing surface water supplies available during drought are summarized in Section 3.

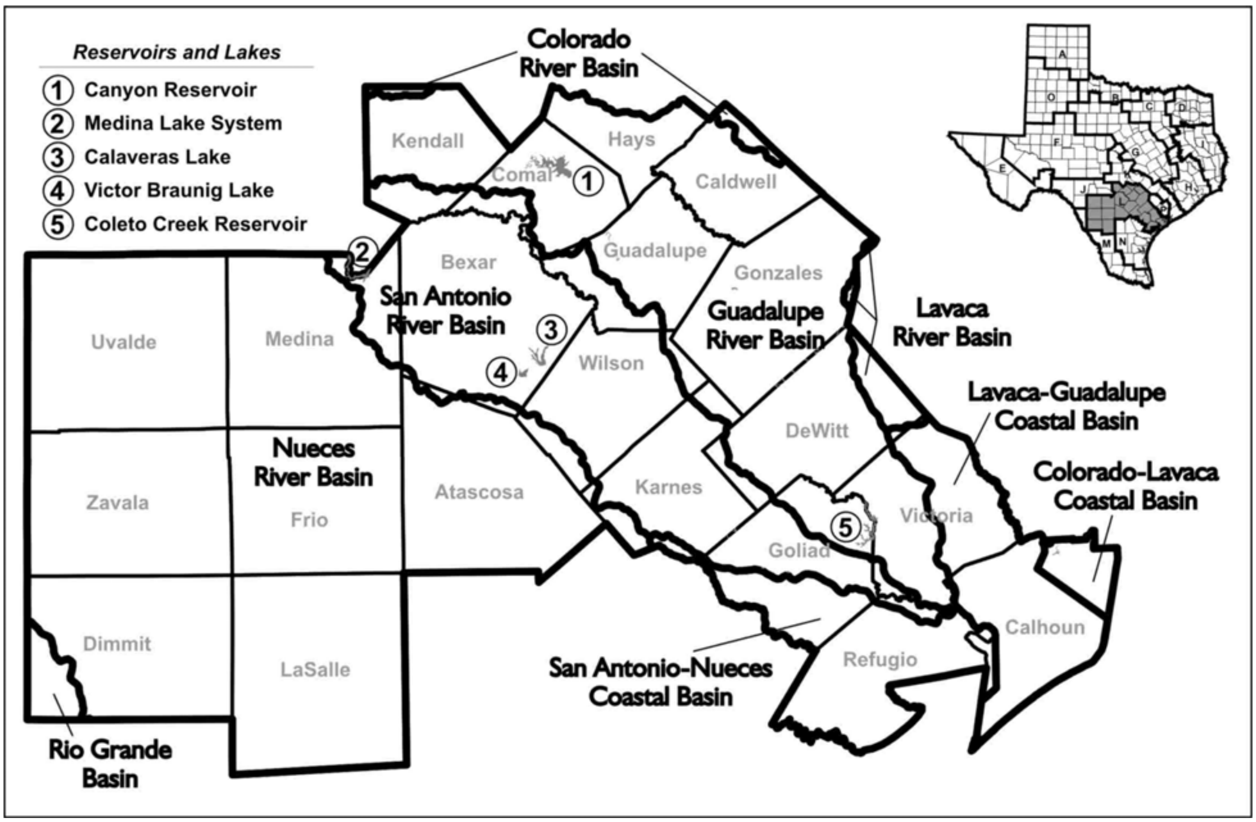

Figure 1-6. River Basins, Coastal Basins, and Reservoirs of the South Central Texas Region

1.7.2.1 Rio Grande Basin

The southwestern corner of Dimmit County, an area of approximately 164 square miles, is located in the Rio Grande Basin and in the South Central Texas Region. The only surface water presently available to this area is that which can be captured in stock tanks.

1.7.2.2 Nueces River Basin

The Nueces River Basin is bounded on the north and east by the Colorado, San Antonio, and Guadalupe River Basins and the San Antonio-Nueces Coastal Basin, and on the west and south by the Rio Grande Basin and the Nueces-Rio Grande Coastal Basin. Total drainage area of the basin is about 16,920 square miles above Calallen Dam, of which 8,973 square miles are located in the South Central Texas planning region. The Nueces River rises in Edwards County and flows 371 river miles from the gage at Laguna in Uvalde County to Nueces Bay on the Gulf of Mexico near Corpus Christi. Principal tributaries of the Nueces River are the Frio and Atascosa Rivers. Major population centers located in the basin include the cities of Uvalde (Uvalde County), Crystal City (Zavala County), Pearsall (Frio County), Pleasanton (Atascosa County), Hondo (Medina County), and Carrizo Springs (Dimmit County). Major water rights in the Nueces River Basin within the South Central Texas Region include those held by the Zavala-Dimmit County WCID #1, which total 28,000 acft/yr.

Water quality in the upper portion of the Nueces River Basin in the less-inhabited reaches is good, except for relatively high nitrate-nitrogen levels occurring naturally in the spring-fed streams. A substantial part of the flow of the upper Nueces River and its tributaries upstream of the Edwards Aquifer recharge zone enters the fractured and cavernous limestone formation of the Edwards Aquifer. As a result, streamflows in the Nueces River Basin downstream from the recharge zone consist almost entirely of stormwater. During low-flow conditions, chloride, sulfate, and total dissolved solids levels increase due to natural and human activities. The Atascosa River has experienced elevated bacteria, depressed dissolved oxygen levels, and impaired fish communities downstream of the City of Pleasanton. Elevated bacteria levels have been observed in the Frio and Leona Rivers and in San Miguel Creek, but additional data and information are needed before a TMDL may be scheduled.

1.7.2.3 San Antonio River Basin

The San Antonio River Basin is bounded on the north and east by the Guadalupe River Basin and on the west and south by the Nueces River Basin and the San Antonio-Nueces Coastal Basin. Total drainage area of the basin is about 4,180 square miles, of which 3,506 square miles are located in the planning region. The San Antonio River has its source in large springs within and near the city limits of San Antonio. The river flows more than 230 river miles across the Coastal Plain to a junction with the Guadalupe River near the Gulf of Mexico. Its principal tributaries are the Medina River and Cibolo Creek, both spring-fed streams. Major population centers located in the basin include the cities of San Antonio (Bexar County), Universal City (Bexar County), Schertz (Bexar County), Live Oak (Bexar County), Leon Valley (Bexar County), Converse (Bexar County), Kirby (Bexar County), Alamo Heights (Bexar County), and Floresville (Wilson County). The largest water rights in the San Antonio River Basin are associated with major reservoirs including the Medina Lake System (66,750 acft/yr), Calaveras Lake (37,000 acft/yr), and Braunig Lake (12,000 acft/yr).

In the past, water quality in the San Antonio Basin varied from very good in the upper basin to relatively poor in the lower basin, particularly during periods of low flow. Since 1987, advanced water treatment has been instituted at the three major San Antonio area water recycling plants, Dos Rios, Leon Creek, and Salado Creek. As a result, dissolved oxygen concentrations in the San Antonio River have been maintained well above the State stream standard of 5.0 mg/L and aquatic life has been significantly enhanced. However, certain water quality concerns remain in the basin. Elevated bacteria levels have occurred in the lower San Antonio River, throughout Cibolo Creek, and in lower Leon Creek. Depressed dissolved oxygen levels have been observed in lower Leon Creek. Impaired fish and macro-benthic communities have been observed in Salado Creek. Finally, PCBs have been found in fish tissue in lower Leon Creek and a high priority has been assigned to initiating TMDL studies.

1.7.2.4 Guadalupe River Basin

The Guadalupe River Basin is bounded on the north by the Colorado River Basin, on the east by the Lavaca River Basin and the Lavaca-Guadalupe Coastal Basin, and on the west and south by the Nueces and San Antonio River Basins. The Guadalupe River rises in the west-central part of Kerr County. A spring-fed stream, it flows eastward through the Hill Country until it issues from the Balcones Escarpment near New Braunfels. It then crosses the Coastal Plain to

San Antonio Bay. Its total length is more than 430 river miles, and its drainage area is approximately 10,128 square miles above the Lower Guadalupe Saltwater Barrier and Diversion Dam, of which about 4,180 square miles are located within the San Antonio River Basin. Its principal tributaries are the San Marcos River, another spring fed stream, which joins the Guadalupe River in Gonzales County; the San Antonio River, which joins it just above its mouth on San Antonio Bay; and the Comal River, which joins it at New Braunfels. Comal Springs are the source of the Comal River, which flows about 2.5 miles before joining the Guadalupe River. Major population centers located in the basin include the cities of Victoria (Victoria County), San Marcos (Hays County), New Braunfels (Comal County), Seguin (Guadalupe County), Lockhart (Caldwell County), Cuero (DeWitt County), Gonzales (Gonzales County), and Luling (Caldwell County). Major reservoirs in the Guadalupe River Basin include Canyon Reservoir with authorized diversions averaging 90,000 acft/yr and Coleto Creek Reservoir with authorized diversions from the Guadalupe River of up to 20,000 acft/yr (excluding supplemental supplies from Canyon Reservoir). In addition, there are groups of run-of-river water rights having significant authorized annual consumptive uses. These rights are held by the GBRA (175,501 acft/yr), INVISTA/DuPont (33,000 acft/yr), and the City of Victoria (20,000 acft/yr).

The Guadalupe River Basin is characterized by generally high water quality throughout. Low dissolved oxygen concentrations have been observed in Peach, Elm, and Sandies Creeks. Elevated levels of bacteria have occurred in Sandies, Geronimo, Plum, and Peach Creeks. In addition, mercury was detected in edible fish tissue from Canyon Reservoir, however, additional data and information are needed before a TMDL may be scheduled.

1.7.2.5 Lower Colorado River Basin

Only a small portion of Kendall and Caldwell Counties is located in that part of the Lower Colorado River Basin located inside the planning region. The total drainage area of the Colorado River Basin is 41,763 square miles, of which only 76 square miles are located in the planning region. The only surface water presently available to these two areas of the South Central Texas Region is from local stock tanks.

1.7.2.6 Lavaca River Basin

Small portions of DeWitt, Gonzales, and Victoria Counties are located in that part of the Lavaca River Basin inside the planning region. The total drainage area of the Lavaca River Basin is 2,309 square miles, of which 156 square miles are located in the planning region. The Lavaca-Navidad River Authority owns and operates Lake Texana and has contracts to provide 32,000 acft/yr of water to customers in the Colorado-Lavaca Coastal Basin, 41,840 acft/yr to Corpus Christi in the Nueces-Rio Grande Coastal Basin, and 594 acft/yr for use in the Lavaca-Guadalupe Coastal Basin.

1.7.2.7 Coastal Basins

Parts of the Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces Coastal Basins are located within the South Central Texas Region. None of these coastal basins has large surface water projects. Because of limited surface water availability from local runoff and groundwater quality considerations, these basins generally rely on adjoining river basins to provide surface water to meet their needs. The Colorado-Lavaca Coastal Basin obtains 32,000 acft/yr of surface water from Lake Texana in the Lavaca River Basin. The Lavaca-Guadalupe Coastal Basin obtains approximately 69,000 acft/yr of imported surface water, the majority of which is supplied from the Guadalupe River. The San Antonio-Nueces Coastal Basin obtains approximately 26,000 acft/yr of imported surface water supplied from the Nueces River Basin.

The TCEQ routinely monitors the Victoria Barge Canal segment in the Lavaca-Guadalupe Coastal Basin, which has no known water quality problems. All water quality standards and uses are supported, although phosphorus and chlorophyll-a levels are occasionally elevated. At certain times during the year, the canal is very biologically productive, but other parameters do not indicate water quality instability. According to the TCEQ, water quality in the Mission and Aransas River tidal segments, located in the San Antonio-Nueces Coastal Basin, may experience elevated bacteria levels, but the rivers otherwise have good water quality.

1.7.3 Major Springs

According to selected references,[17,18] there are six major springs located within the planning area (Comal, San Marcos, Hueco, Leona, San Antonio, and San Pedro Springs).

- **Comal Springs:** Comal Springs is located in Landa Park, New Braunfels in Comal County. Comal Springs discharges water from the Edwards and associated limestones of the Edwards Aquifer and issues through the Comal Springs Fault. Senate Bill 3

[17] TWDB, "Major and Historical Springs of Texas (Report #189)," March 1975.
[18] Brune, Gunnar, "Springs of Texas," Volume I, Branch-Smith, Inc., Fort Worth, Texas, 1981.

limits the quantity of water that can be withdrawn from the Edwards Aquifer in each calendar year for the period beginning January 1, 2008 to no more than 572,000 acft. Senate Bill 3 specifies that the Edwards Aquifer Authority shall implement and enforce water management practices, procedures, and methods to ensure that not later than December 31, 2012, the continuous minimum spring flows of Comal and San Marcos Springs are maintained to protect endangered and threatened species to the extent required by federal law. Senate Bill 3 also specifies critical period management stages, triggers, and associated withdrawal reductions with the provision that, after January 1, 2013, the Authority may not require permitted withdrawals to be less than an annualized rate of 320,000 acft unless necessary for the protection of listed threatened or endangered species to the extent required by federal law. Long-term average discharge from Comal Springs is about 290 cfs.

- **San Marcos Springs:** San Marcos Springs is located 2 miles northeast of San Marcos, in Hays County. San Marcos Springs discharges water from the Edwards and associated limestones of the Edwards Aquifer and issues through the San Marcos Springs Fault. Senate Bill 3, as described in the Comal Springs text above, also applies to San Marcos Springs. Long-term average discharge from San Marcos Springs is about 176 cfs.
- **Hueco Springs:** Hueco Springs is located about 3 miles north of New Braunfels near the confluence of Elm Creek and the Guadalupe River in Comal County. There are two main springs issuing from a fault in the Edwards limestone at this location. Sources of water for these springs include the Edwards Aquifer and, possibly, underflow from the Guadalupe River. Long-term average discharge from Hueco Springs is about 40 cfs.
- **Leona Springs:** Leona Springs consists of three groups of springs located from 1 to 6 miles southeast of Uvalde, in Uvalde County. These springs discharge water from the Edwards Aquifer. Long-term average discharge from Leona Springs is about 25 cfs.
- **San Antonio Springs:** San Antonio Springs is located just above East Hildebrand Street in San Antonio, in Bexar County. San Antonio Springs discharge water from the Edwards Aquifer. Long-term average discharge from San Antonio Springs is about 20 cfs.
- **San Pedro Springs:** San Pedro Springs is located in San Pedro Park, San Antonio in Bexar County. San Pedro Springs discharges water from the Edwards Aquifer. Long-term average discharge from San Pedro Springs is about 5 cfs.

Since present levels of withdrawals from the Edwards Aquifer are greater than the withdrawal rates necessary to ensure continuous minimum discharges at Comal and San Marcos Springs, it may be necessary to either limit future withdrawals during drought or to increase recharge to the aquifer in sufficient quantities to protect endangered species and meet the future needs of those who depend upon it for their water supplies. Therefore, actions to limit withdrawals from the Edwards Aquifer and/or to supplement supplies from the aquifer, directly affect water supplies of the South Central Texas Region. To the extent that critical period pumping restrictions are imposed to limit withdrawals to those specified by Senate Bill 3 in order to maintain flows at Comal and San Marcos Springs at levels sufficient to protect endangered and threatened species to the extent required by federal law, then those that now obtain water from the Edwards Aquifer will be required to obtain water from other sources to meet a part of their present needs and provide for growth.

1.8 Threats to Agricultural and Natural Resources

Pursuant to 31 TAC 357.7(a)(1)(L), the South Central Texas Regional Water Planning Group (SCTRWPG) identified the following threats to agriculture in the South Central Texas Regional Water Planning Area:

- A shortage of economically accessible fresh water of suitable quantity and quality for irrigation and for livestock drinking and sanitation purposes. For example, such a shortage could result from groundwater production at insufficiently sustainable rates and/or lack of control over groundwater production.
- Deterioration of water quality, such that the quantities available are not usable for irrigation or livestock drinking and sanitation. Increased salinity is an example of a water quality threat to agriculture.

The SCTRWPG identified the following threats to natural resources in the planning region:

- Reductions of quantity and/or quality of fresh water available to fish and wildlife.
- Changes to aquatic and riparian habitats associated with use of water from streams and aquifers.
- Temporary or permanent inundation of aquatic, riparian, and terrestrial habitats associated with surface water impoundment.

Technical evaluations of water management strategies (Section 4C, Volume II) and/or assessments of the cumulative effects of plan implementation (Section 7, Volume I) include quantitative and/or qualitative discussion of how identified threats to agriculture or natural resources are expected to be addressed or affected by a water management strategy and/or the plan. Following is a summary of specific quantitative and/or qualitative measures used to meet this requirement:

- Application of Groundwater Availability Models (GAMs) to illustrate projected changes in regional aquifer levels, spring discharges, and surface water/groundwater interactions during the planning period.
- Comparison of the Gross Business Effects (as provided by the TWDB) associated with failure to meet projected agricultural water needs with the costs of potential water management strategies available to the region.

- Applications of Surface Water Availability Models (WAMs) to quantify projected changes in streamflow and/or freshwater inflows to bays and estuaries. Graphical and tabular summaries of projected changes focus on time series data, monthly medians, and/or frequency of occurrence.
- Qualitative assessment of potential changes in groundwater or surface water quality based on available information.
- Acreage temporarily or permanently inundated by a planned reservoir and the frequency of such inundation.

1.9 Summary of Existing Plans

1.9.1 2007 State Water Plan[19]

In Section 26.051 of the Texas Water Code, the Executive Administrator of the TWDB is charged with producing a State Water Plan that addresses the broad public interest of the State. As currently specified in Sections 16.055 and 16.056, the Plan is to be periodically reviewed and updated and serve as a flexible guide to state policy for the development of its water resources. The TCEQ shall consider the State Water Plan in its water regulatory actions, although its actions are not bound by the Plan.

The 2007 Texas Water Plan provides a statewide perspective that places local and regional needs within the state context. Available individual and county-level studies were built into the overall findings, and in formulating water supply solutions, the Plan focused on economic viability while taking environmental sensitivity into consideration. Legislation, passed in the 75th Legislature, specifies a 5-year update period for the Plan that is based on regional planning studies, and provides that related financial assistance applications must be consistent with the regional and State plans for regulatory approval by State agencies.

The ultimate goal of the State Water Plan is to identify those policies and actions that may be needed to meet Texas' near- and long-term water needs, based on a reasonable projected use of water, affordable water supply availability, and the goal of conservation of the State's natural resources.

The 2007 State Water Plan includes water management strategies for the South Central Texas Region that could produce new supplies of as much as 732,779 acft in 2060. These strategies include (1) water conservation; (2) water reuse; (3) purchase/lease and transfer of

[19] TWDB, *State Water Plan: Water for Texas – 2007*, Austin, Texas, 2007.

irrigation rights for municipal use; (4) aquifer storage and recovery; (5) increased use of Canyon Reservoir; (6) Lower Guadalupe River diversions (including 19,000 acft of off-channel storage); (7) Colorado River diversion; (8) brackish groundwater desalination; (9) desalination of seawater; (10) recharge of the Edwards aquifer; (11) enhanced use of the Carrizo Aquifer from Wilson, Gonzales, and Bastrop Counties; and (12) expansion of existing well fields.

1.9.2 2006 Regional Water Plan

The 2006 South Central Texas Regional Water Plan was adopted in January 2006. However, because the SCT Regional Water Plan was not adopted until after the statutory deadline, the SCT Regional Water Plan was not formally approved by the TWDB until 2009 pursuant to an amendment process established by House Bill 3776 of the 80th Texas Legislature. The SCT Regional Water Plan, outlines the water management strategies recommended by the planning group to meet the identified needs in the region. These water management strategies are listed in Appendix 2.1 of the 2007 State Water Plan.

1.9.3 Local Water Plans

During this planning process the South Central Texas Planning Group worked with each local entity to develop a water management plan to meet any identified needs. These plans are contained in Section 4 of this document.

1.9.4 Current Preparations for Drought

Under requirements of Senate Bill 1, 1997 Texas Legislature, drought contingency plans are required by the TCEQ for wholesale water suppliers, irrigation districts, and retail water suppliers. Senate Bill 1 also requires that TCEQ require surface water right holders that supply 1,000 acft or more of water for non-irrigation use and 10,000 acft/yr for irrigation use prepare a water conservation plan. In addition, conservation plans are commonly included in the management plans of groundwater conservation districts.

All drought contingency plans are required to set triggering criteria for initiation and termination of drought response stages and contain supply and demand management measures to be implemented during each stage. The retail and wholesale water suppliers' plans contain measures to limit or restrict the use of water for purposes such as the irrigation of landscaped areas, to wash any motor vehicle, to fill or add water to any indoor or outdoor swimming pool, operation of any ornamental fountain, and the irrigation of golf course greens, tees, and fairways.

The groundwater conservation district management plans also contain conservation plans that set goals and objectives for conserving groundwater within the district. The districts use methods such as requiring wells in areas that are in danger of over producing groundwater and damaging the aquifers to restrict production by means of production permits, metering the amount of water produced, and by working with water utilities, agricultural, and industrial users within the district to promote the efficient use of water.

SAWS' Water Conservation and Reuse Plan aims to reduce the impacts of drought in the San Antonio area of the South Central Texas Region by water conservation programs for its customers. One of the goals of this plan is to increase the public's awareness of water-saving methods, in order to encourage customers to voluntarily conserve water, thus reducing Edwards Aquifer use. Reuse of treated municipal wastewater for landscape irrigation is also a part of the SAWS Conservation and Reuse Plan designed to reduce the use of potable groundwater for non-potable applications. A major goal of this part of the plan is to virtually eliminate the use of groundwater for irrigation and stream augmentation while preserving the integrity of the Edwards Aquifer.

Senate Bill 3 of the 80th Texas Legislature established Critical Period management provisions to address Edwards Aquifer usage during times of drought. These provisions apply to all holders of regular permits, the customers of all permittees who are retail water utilities, and owners of exempt wells. Under these provisions, during times of drought, water use restrictions are placed into effect, as appropriate and necessary.

The South Central Texas Regional Water Plan relies upon local water management agencies and water utilities drought contingency plans to identify factors specific to each source of water supply to be considered in determining whether to initiate a drought response, and actions to be taken as part of the response. Section 6.2 includes additional information and recommendations of the SCTRWPG regarding drought management.

1.10 Water Loss Audits

In accordance with 31 TAC 357.7(a)(1)(M), the South Central Texas 2011 Regional Water Plan includes water loss information below that was compiled by the TWDB from water loss audits performed by retail public utilities of the South Central Texas Regional Water

Planning Area pursuant to §358.6 of this title (relating to Water Loss Audits). In addition, in accordance with 31 TAC 357.7(a)(7)(A)(iv), the regional water planning group has considered strategies to address issues identified in the information compiled by the TWDB from the water loss audits performed by retail public utilities pursuant to §358.6 of this title (relating to Water Loss Audits).

The 2005 Water Loss Data presented herein were submitted to the Texas Water Development Board (TWDB) by water utilities in Texas as required by HB 3338 of the 78th Texas Legislature. HB 3338 required the TWDB to compile the information included in the water audits by type of retail public utility and by regional water planning area, and provide that information to the regional planning groups for use in identifying appropriate water management strategies in the development of their regional water plan. The water loss data presented below were acquired as part of the 2005 Water Loss Audit reporting requirements. The methodology used relies upon self-reporting data provided by public utilities, and due to this, the self-reported data discussed in the TWDB Water Loss Report indicates that some of the data may be suspect and in need of further refinement.[20]

The TWDB provided the list of 119 public utilities of the South Central Texas Water Planning Region that filed a water loss audit report, including the reported information for each of the following 27 factors: (1) population served, (2) quantity of water delivered, (3) percent of master meter accuracy, (4) quantity of water billed and metered, (5) quantity of water billed and unmetered, (6) quantity of water unbilled and metered, (7) quantity of water unbilled and unmetered, (8) total quantity of authorized consumption, (9) percent of customer meter accuracy, (10) quantity of customer meter accuracy loss, (11) quantity of unauthorized consumption, (12) quantity of apparent loss, (13) quantity of main line leaks, (14) quantity of customer line leaks, (15) quantity of storage tank overflows, (16) quantity of real loss, (17) quantity of total loss, (18) quantity of total water loss plus authorized consumption, (19) number of service connections, (20) number of miles of main lines, (21) number of connections per mile of mail lines, (22) quantity of loss per mile of mail lines, (23) quantity of loss per connection, (24) production water cost, (25) dollar value of real loss, (26) retail water cost, and (27) dollar value of apparent loss. On December 15, 2009, staff of TWDB informed the Technical

[20] Alan Plummer Associates, Inc. and Water Prospecting and Resource Consulting, LLC, "An Analysis of Water Loss, as Reported by Water Suppliers in Texas," Texas Water Development Board, Austin, Texas, January, 2007.

Consultants that the TWDB "methodology used in calculating percentage water loss for water systems that receive TWDB loans is as follows: (Balancing Error + Total Water Loss) divided by (Corrected input volume) equals Percentage Water Loss." Data for each of the factors presented in the previous sentence (Balancing Error, Total Water Loss, and Corrected input volume) were included in the data provided by the TWDB, and are shown in Table 1-11. In Table 1-11, Corrected input volume is "Water Produced" and "Water Loss" is the sum of Balancing Error and Total Water Loss.

The cut off point the TWDB uses for inclusion of a water utility as a Water User Group (WUG) member for which population projections and water demand projections are made for regional planning is 280 acft of deliveries during the first year of the planning period, which in the present case is 2000. Of the 119 public utilities that responded to the water loss survey, 68 reported having delivered less than 280 acft in 2005, and 51 reported having delivered more than 280 acft in 2005.

The 119 water utilities that responded to the water loss survey, reported having served 1,982,769 people (about 87 percent of the 2005 estimated regional population) in 2005 (Table 1-11). Total reported quantity of water produced was 305,030 acre-feet, with a reported quantity of water loss of 28,856 acre-feet (Table 1-11). The quantity of water loss, as a percent of estimated total water originating at the source is calculated at about 9.5 percent (Table 1-11).

Of the 49 utilities that produced more than 280 acft/yr reporting with complete data, 4 (8 percent) reported water loss greater than 30 percent and a total of 11 (22 percent) reported losses greater than 20 percent (Table 1-11). For those utilities having water loss rates greater than about 10 percent, leak detection and repair, one of the leading water conservation measures, should be used to locate and repair leaks, thereby reducing the quantities of additional water needed. There were about 60 percent of the utilities (68 utilities) reporting water losses in the 2005 water loss survey that have water loss rates greater than 10 percent. For all utilities and especially those with water loss rates in excess of 10 percent, it is recommended that leak detection be pursued for the purpose of locating and evaluating leaks and providing information for determining if leak repair is a viable water conservation measure to pursue. However, as explained by the TWDB, the self-reported data from the water loss audits appears to be somewhat unreliable, therefore it may be unsuitable as a basis for recommendations concerning specific water management strategies for specific water user groups. It is hoped that future water loss audit information will improve in accuracy and be more useful as a basis for specific water management strategy recommendations for water user groups.

Table 1-11.
Water Loss Audit – 2005
South Central Texas Water Planning Region

No.	Utility Name	Population Served	Water Produced (acft)	Water Loss (acft)	Percent Loss (%)	Per Capita Use (gpcd)
Utilities with Deliveries Less Than 280 acft						
1	BERRY OAKS WATER CO	72	16.04	5.28	32.96	199
2	BexarMet Water District-HEB/Bulverde	30	13.49	1.24	9.20	401
3	BIGFOOT WSC	375	39.44	0.01	0.02	94
4	BMWD BULVERDE HILLS	933	176.44	73.48	41.64	169
5	BMWD CANYON PARK ESTATES	303	61.70	9.89	16.03	182
6	BMWD CHAPARRAL	1,389	201.72	56.89	28.20	130
7	BMWD COUNTRY OAKS ESTATES	357	22.38	2.15	9.60	56
8	BMWD ELM VALLEY PARK	693	146.13	39.36	26.93	188
9	BMWD GERONIMO FOREST WATER SYSTEM	471	87.09	24.98	28.69	165
10	BMWD HIDDEN SPRINGS	81	22.91	0.22	0.98	253
11	BMWD LEON SPRINGS MOBILE VILLA	717	61.39	10.53	17.15	76
12	BMWD MEADOWOOD ACRES WSC	744	85.77	9.34	10.89	103
13	BMWD MOBILE CITY ESTATES	153	14.04	1.49	10.61	82
14	BMWD NORTH SAN ANTONIO HILLS	540	135.61	32.07	23.65	224
15	BMWD OAKLAND ESTATES	465	53.97	6.98	12.94	104
16	BMWD VILLAGE GREEN	825	201.40	16.90	8.39	218
17	BMWD WEST VIEW SUBDIVISION	417	33.62	4.43	13.16	72
18	BMWD WOODS OF SPRING BRANCH	90	10.35	3.16	30.53	103
19	CALHOUN COUNTY RURAL WATER SYSTEM	2,718	256.83	12.36	4.81	84
20	CEDAR OAK MESA WSC	500	34.40	1.65	4.80	61
21	CITY OF AUSTWELL	366	21.02	1.02	4.85	51
22	CITY OF CHARLOTTE	1,637	251.04	Not reported		137
23	CITY OF FALLS CITY	600	112.14	16.14	14.39	167
24	CITY OF LA VERNIA	1,250	263.29	30.77	11.69	188
25	CITY OF MARION	1,890	234.06	22.67	9.68	111
26	CITY OF POINT COMFORT	781	154.16	-1.54	-1.00	176
27	CITY OF RUNGE	4,563	206.34	53.32	25.84	40
28	CITY OF SMILEY	462	99.47	7.27	7.31	192
29	CITY OF WOODSBORO	1,685	273.73	73.03	26.68	145
30	CLEAR WATER ESTATES	459	140.26	0.80	0.57	273
31	CREEKWOOD RANCHES WSC	450	37.55	2.69	7.17	74
32	DEER CREEK WATER CO	720	48.17	5.48	11.37	60
33	DERBY WSC	51	7.58	2.36	31.16	133
34	ENCINAL WSC	819	185.62	15.77	8.50	202
35	FOWLERTON WSC	75	11.41	0.44	3.90	136
36	FRIO CIELO RANCH ASSO WATER SYSTEM	40	13.15	0.03	0.19	293
37	HANCOCK OAK HILLS SUBDIVISION	123	13.50	6.14	45.50	98
38	HIGHWAY 90 RANCH WSC	300	41.40	6.94	16.76	123
39	HIGHWAY 117 WSC	180	33.36	0.03	0.10	165

Table 1-11 (Continued)

No.	Utility Name	Population Served	Water Produced (acft)	Water Loss (acft)	Percent Loss (%)	Per Capita Use (gpcd)
40	KINGS POINT WSC	45	36.61	Not reported		NA
41	KNIPPA WSC	750	145.00	29.00	20.00	173
42	LAKE MCQUEENEY ESTATES	756	62.73	9.18	14.64	74
43	LAKE VALLEY RANCH	258	36.66	5.36	14.61	127
44	LSR WSC	44	4.60	-0.12	-2.54	93
45	MCMAHAN WSC	953	92.10	22.30	24.21	86
46	MEDINA COUNTY WCID 2	700	167.59	78.57	46.88	214
47	MOSS WOODS SUBDIVISION WATER SYSTEM	117	10.46	1.55	14.85	80
48	NEW ALSACE WATER CO INC	175	34.62	0.00	0.00	177
49	OAK COUNTRY PROPERTY OWNERS ASSN	60	8.52	0.00	-0.03	127
50	OAK FOREST WATER SYSTEM	306	35.29	2.76	7.82	103
51	PICOSA WSC	1,896	141.64	19.19	13.55	67
52	PLATTEN CREEK WATER SYSTEM	88	7.10	0.37	5.19	72
53	RADIANCE WSC	85	7.05	0.44	6.28	74
54	RANDOLPH PROPERTIES	690	55.47	Not reported		72
55	REAL WSC	13	16.35	14.58	89.17	NA
56	REBECCA CREEK MUD	1,170	134.82	26.25	19.47	103
57	REFUGIO COUNTY WCID 1	495	67.99	13.42	19.74	123
58	ROCKY CREEK SUBDIVISION WATER SYSTEM	83	7.63	0.13	1.66	82
59	SADDLERIDGE SUBDIVISION	189	27.10	0.05	0.19	128
60	SEVEN OAKS WATER SUPPLY	112	8.61	-0.05	-0.60	69
61	SPRING BRANCH INDIAN HILLS ESTATES	153	38.95	2.39	6.13	227
62	STAPLES FARMERS CORP	648	67.96	10.30	15.16	94
63	THE OAKS WSC	1,152	272.75	29.18	10.70	211
64	UTOPIA WSC	500	67.90	14.73	21.69	121
65	VICTORIA COUNTY WCID 2	750	65.77	15.03	22.86	78
66	VILLE DALSACE WSC	200	35.00	0.00	0.00	156
67	WEST MEDINA WSC	915	229.55	29.60	12.90	224
68	WESTHAVEN ASSOCIATION INC	280	69.97	37.13	53.07	223
	Subtotal Utilities with Less Than 280 acft/yr	**41,907**	**5,777.77**	**917.10**	**15.87**	**123**
	Utilities with Deliveries More Than 280 acft					
69	ATASCOSA RURAL WSC	10,150	1,076.66	42.59	3.96	95
70	BEXAR COUNTY WCID 10 WINDCREST	5,105	1,132.10	50.55	4.46	198
71	BMWD CASTLE HILLS	7,998	1,953.95	167.87	8.59	218
72	BMWD HILL COUNTRY	35,061	9,711.48	718.25	7.40	247
73	BMWD NORTH WEST	36,000	4,394.54	450.26	10.25	109
74	BMWD NORTHEAST	41,226	6,401.64	152.47	2.38	139
75	BMWD TEXAS RESEARCH PARK	114	322.89	98.73	30.58	NA
76	BMWD SOUTHSIDE	101,766	15,543.02	2,816.86	18.12	136
77	BMWD TIMBERWOOD PARK	10,017	2,088.00	502.43	24.06	186
78	CIMARRON PARK WATER CO INC	2,043	330.51	24.97	7.56	144
79	CITY OF ALAMO HEIGHTS	7,319	2,118.36	502.55	23.72	258

Table 1-11 (Concluded)

No.	Utility Name	Population Served	Water Produced (acft)	Water Loss (acft)	Percent Loss (%)	Per Capita Use (gpcd)
80	CITY OF BOERNE	8,900	1,712.56	213.47	12.46	172
81	CITY OF CASTROVILLE	3,500	680.38	143.03	21.02	174
82	CITY OF CIBOLO	8,500	859.91	32.41	3.77	90
83	CITY OF CONVERSE	11,508	1,661.22	262.92	15.83	129
84	CITY OF CUERO	6,571	1,888.44	688.73	36.47	257
85	CITY OF DEVINE	4,140	793.04	12.45	1.57	171
86	CITY OF DILLEY	3,697	647.76	215.69	33.30	156
87	CITY OF GOLIAD	2,018	358.19	22.84	6.38	158
88	CITY OF GONZALES	7,802	2,290.08	803.39	35.08	262
89	CITY OF HONDO	8,481	1,904.69	436.05	22.89	200
90	CITY OF KARNES CITY	3,457	376.51	Not reported		97
91	CITY OF KIRBY	8,673	902.79	135.68	15.03	93
92	CITY OF KYLE	18,500	2,105.04	311.36	14.79	102
93	CITY OF LIVE OAK	7,000	1,255.16	149.02	11.87	160
94	CITY OF NIXON	2,036	817.60	24.23	2.96	358
95	CITY OF PEARSALL	7,257	1,656.79	137.75	8.31	204
96	CITY OF PORT LAVACA	12,000	1,498.25	230.72	15.40	111
97	CITY OF REFUGIO	2,941	604.55	133.38	22.06	184
98	CITY OF SAN MARCOS	49,307	6,228.61	883.64	14.19	113
99	CITY OF SCHERTZ	26,780	3,770.62	169.65	4.50	126
100	CITY OF SHAVANO PARK	1,754	781.16	102.48	13.12	398
101	CITY OF STOCKDALE	2,015	488.38	Not reported		216
102	CITY OF UNIVERSAL CITY	14,849	2,551.51	167.43	6.56	153
103	CITY OF UVALDE	16,233	3,770.85	653.36	17.33	207
104	CITY OF VICTORIA	61,703	10,493.86	1,348.15	12.85	152
105	CITY OF YOAKUM	5,731	1,013.04	110.33	10.89	158
106	EAST MEDINA COUNTY SUD UNIT 1	8,600	767.66	166.64	21.71	80
107	EL OSO WSC	4,242	717.85	190.24	26.50	151
108	FAIR OAKS RANCH UTILITIES	5,602	1,456.17	131.79	9.05	232
109	GONZALES COUNTY WSC	6,555	1,396.28	233.52	16.72	190
110	GREEN VALLEY SUD	27,741	2,860.25	464.79	16.25	92
111	KENDALL COUNTY WCID 1	2,301	306.14	46.08	15.05	119
112	MAXWELL WSC	5,145	383.90	41.73	10.87	67
113	NEW BRAUNFELS UTILITIES	50,805	10,544.86	1,710.35	16.22	185
114	OAK HILLS WSC	4,000	550.16	2.37	0.43	123
115	PORT OCONNOR MUD	3,759	295.50	27.30	9.24	70
116	S S WSC	11,475	1,585.98	41.39	2.61	123
117	SAN ANTONIO WATER SYSTEM	1,239,399	181,035.57	11,797.59	6.52	130
118	SUNKO WSC	3,486	514.48	89.80	17.45	132
119	WIMBERLEY WSC	5,600	652.82	79.78	12.22	104
Subtotal Utilities with More than 280 acft/yr		**1,940,862**	**299,252**	**27,939**	**9.34**	**138**
TOTAL		**1,982,769**	**305,030**	**28,856**	**9.46**	**137**

Section 2
Population and Water Demand Projections
[31 TAC §357.7(a)(2)]

In order to develop water plans to meet future water needs, it is necessary to make projections of future population and water demands for the region. For purposes of the South Central Texas Region, the TWDB has made both population and water demand projections for cities, rural areas, and water using purposes for each of the counties of the region (20 counties and part of Hays County). These counties are located in six major river basins (Nueces, San Antonio, Guadalupe, Lower Colorado, Lavaca, and Rio Grande) and three coastal basins (Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces) (Table 2-1). In accordance with TWDB Rules, Section 357.5(d), which states, "In developing regional water plans, regional water planning groups shall use: (1) state population and water demand projections contained in the state water plan or adopted by the board after consultation with the Texas Commission on Environmental Quality, the Texas Parks and Wildlife Department, and the Texas Department of Agriculture in preparation for revision of the state water plan; or (2) in lieu of paragraph (1) of this subsection, population or water demand projection revisions that have been adopted by the board, after coordination with Texas Commission on Environmental Quality, the Texas Parks and Wildlife Department, and the Texas Department of Agriculture based on changed conditions and availability of new information. Within 45 days of receipt of a request from a regional water planning group for revision of population or water demand projections, the executive administrator shall consult with the requesting regional water planning group and respond to their request," the TWDB-approved projections are presented below.

2.1 Population Projections

The year 2000 Census of Population and Housing by the U.S. Bureau of the Census indicates that Texas has the second highest population among the states of the nation, with a population of more than 20.85 million. The population of the South Central Texas Region was 2.04 million in 2000 and is projected to be 4.3 million in 2060 (Table 2-2 and Figure 2-1). Approximately 68 percent of the population of the region is projected to reside in the San Antonio River Basin in the year 2060, with 24 percent in the Guadalupe River Basin (Table 2-2).

Table 2-1. South Central Texas Region – List of Counties Location by River and Coastal Basin and Edwards Aquifer Area

County	Edwards Aquifer Area	River and Coastal Basin								
		Nueces Basin	San Antonio Basin	Guadalupe Basin	Lower Colorado Basin	Colorado/ Lavaca Coastal Basin	Lavaca Basin	Lavaca/ Guadalupe Coastal Basin	San Antonio/ Nueces Coastal Basin	Rio Grande
Atascosa	X	X	X							
Bexar	X	X	X							
Caldwell	X			X	X					
Calhoun				X		X		X	X	
Comal	X		X	X						
DeWitt			X	X			X	X		
Dimmit		X								X
Frio		X								
Goliad			X	X					X	
Gonzales				X			X			
Guadalupe	X		X	X						
Hays (Part)	X			X						
Karnes		X	X	X					X	
Kendall			X	X	X					
LaSalle		X								
Medina	X	X	X							
Refugio			X						X	
Uvalde	X	X								
Victoria			X	X			X	X		
Wilson		X	X	X						
Zavala		X								

* An X in the column indicates that all or part of the county is located in the River or Coastal Basin named in the column heading.

Table 2-2.
Population Projections
South Central Texas Region
Individual Counties with River Basin Summaries

	Census		Projections					
	1990	2000	2010	2020	2030	2040	2050	2060
Counties								
Atascosa	30,533	38,628	45,504	52,945	59,598	64,844	69,320	72,578
Bexar	1,185,394	1,392,931	1,631,935	1,857,745	2,059,112	2,222,887	2,369,950	2,500,731
Caldwell	26,392	32,194	45,958	59,722	71,459	83,250	95,103	106,575
Calhoun	19,053	20,647	23,556	26,610	29,964	33,046	34,642	36,049
Comal	51,832	78,021	108,219	146,868	190,873	233,964	278,626	326,655
DeWitt	18,840	20,013	20,460	20,964	21,251	21,341	21,021	20,648
Dimmit	10,433	10,248	10,996	11,733	12,187	12,234	11,966	11,378
Frio	13,472	16,252	18,160	20,034	21,628	22,952	23,913	24,412
Goliad	5,980	6,928	8,087	9,508	10,648	11,395	11,964	12,324
Gonzales	17,205	18,628	19,872	21,227	22,260	23,003	23,219	23,151
Guadalupe	64,873	89,023	114,878	146,511	180,725	214,912	252,857	293,736
Hays (Part)	51,478	72,499	120,199	172,674	213,908	255,183	304,337	342,746
Karnes	12,455	15,446	17,001	18,830	20,759	22,305	23,256	23,774
Kendall	14,589	23,743	35,720	50,283	65,752	78,690	89,312	99,698
LaSalle	5,254	5,866	6,599	7,278	7,930	8,578	9,048	9,407
Medina	27,312	39,304	46,675	54,815	62,416	68,987	75,370	81,104
Refugio	7,976	7,828	8,217	8,505	8,609	8,799	8,915	8,877
Uvalde	23,340	25,926	28,616	31,443	33,802	35,650	36,876	37,810
Victoria	74,361	84,088	93,073	102,487	110,221	116,368	121,416	125,865
Wilson	22,650	32,408	44,078	58,621	74,641	90,187	106,373	123,135
Zavala	12,162	11,600	12,796	14,130	15,227	16,086	16,774	17,133
Total	1,695,584	2,042,221	2,460,599	2,892,933	3,292,970	3,644,661	3,984,258	4,297,786
River and Coastal Basins Summaries								
Rio Grande	48	21	23	24	25	25	25	23
Nueces	120,265	143,260	163,549	185,226	204,433	219,978	232,969	242,742
San Antonio	1,261,182	1,503,219	1,783,089	2,059,208	2,315,084	2,530,431	2,729,795	2,914,776
Guadalupe	261,039	330,349	440,279	566,171	683,208	796,948	919,202	1,033,628
Lower Colorado	856	2,960	4,439	6,040	7,482	8,903	10,307	11,666
Lavaca	3,523	3,511	3,582	3,665	3,712	3,724	3,673	3,615
Colorado-Lavaca	1,596	1,515	1,722	2,141	3,124	4,182	4,142	4,118
Lavaca-Guadalupe	38,465	48,968	55,015	61,145	66,386	70,690	74,198	77,277
San Antonio-Nueces	8,610	8,418	8,901	9,313	9,516	9,780	9,947	9,941
Total	1,695,584	2,042,221	2,460,599	2,892,933	3,292,970	3,644,661	3,984,258	4,297,786

Source: Texas Water Development Board (TWDB), Consensus Projections adopted by the TWDB, September 17, 2003.

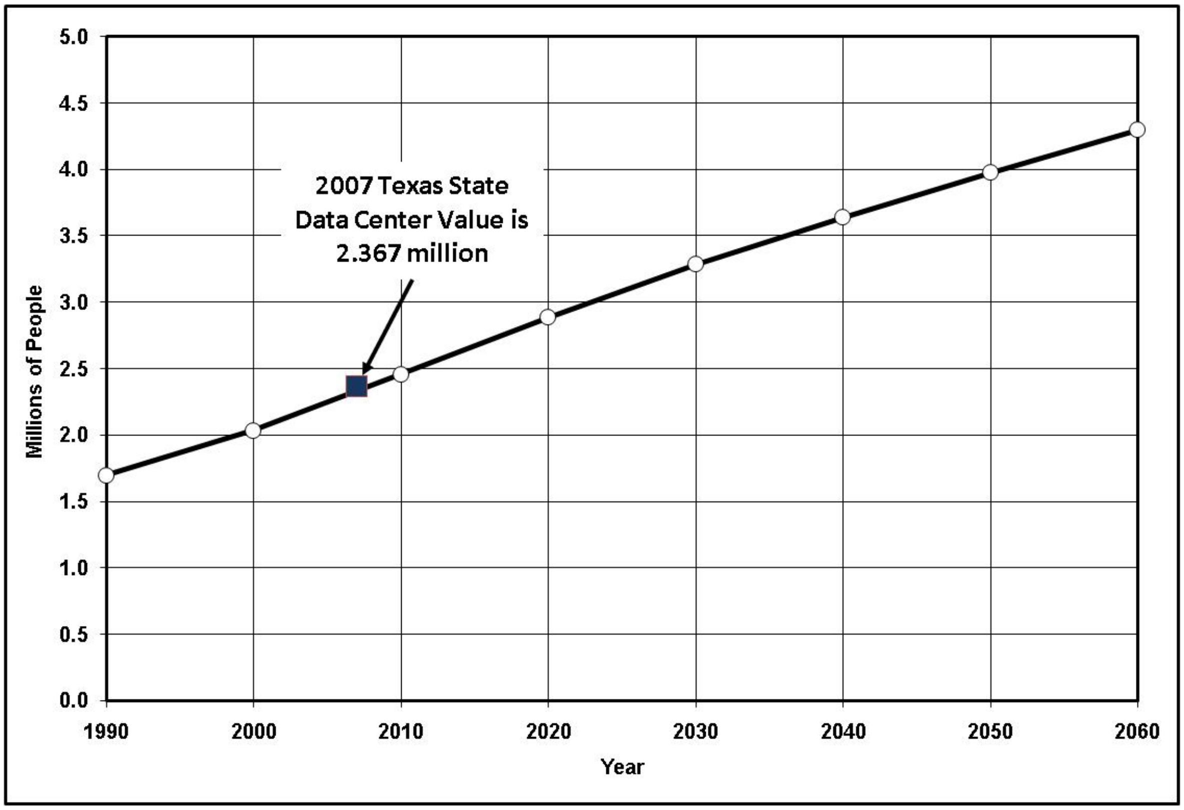

Figure 2-1. Summary of South Central Texas Region's Projected Population

The TWDB's population projections for 165 municipal water user groups (individual cities and water supply districts and/or authorities) and 48 rural areas of each county and part of county of each river basin area of the South Central Texas Region are shown in Table 2-3.

As the next U.S. Census will be performed in 2010 and the results will not be available until 2011 or later, the TWDB has chosen not to perform a comprehensive update of the population projections used in the 2006 regional water plans for the 2011 regional water plans. The TWDB did, however, provide an opportunity for regions to seek revision and approval of updated population projections which could be supported by available estimates of population from the Texas State Data Center and in accordance with specified criteria. Review of 2007 population estimates from the Texas State Data Center provides the following information regarding the South Central Texas Regional Water Planning Area (Region L):

1. Overall population for Region L in 2007 was only 0.15 percent more than those in the current TWDB projections.
2. 2007 population in 17 of 21 counties within Region L were less than those in the current TWDB projections.

Table 2-3.
Population Projections
South Central Texas Region
River Basins, Counties, and Cities

	Census		Projections					
Basin/County/City/Rural	***1990****	***2000***	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Rio Grande Basin (part)								
Dimmit (part) – Rio Grande								
County-Other (Rural)	48	21	23	24	25	25	25	23
Total	48	21	23	24	25	25	25	23
Rio Grande Basin Total	**48**	**21**	**23**	**24**	**25**	**25**	**25**	**23**
Nueces Basin (part)								
Atascosa (part) - Nueces								
Charlotte	1,475	1,637	1,764	1,895	2,010	2,101	2,178	2,234
Jourdanton	3,220	3,732	4,134	4,549	4,914	5,201	5,443	5,620
Lytle	1,911	2,046	2,152	2,261	2,357	2,433	2,497	2,544
Pleasanton	7,678	8,266	8,728	9,205	9,624	9,953	10,231	10,434
Poteet	3,206	3,305	3,383	3,463	3,534	3,589	3,636	3,670
Benton City WSC		4,407	7,046	9,770	12,163	14,042	15,629	16,788
McCoy WSC		6,719	9,798	12,976	15,768	17,961	19,812	21,164
Bexar Met Water District (BMWD)		2,944	3,954	4,996	5,912	6,631	7,238	7,682
County-Other (Rural)	12,367	4,983	3,782	2,871	2,179	1,654	1,256	953
Total	29,857	38,039	44,741	51,986	58,461	63,565	67,920	71,089
Bexar (part) - Nueces								
Lytle	4	14	25	36	46	54	61	67
Atascosa Rural WSC		268	350	427	496	552	602	647
Bexar Met Water District (BMWD)		1,203	1,260	1,314	1,362	1,401	1,436	1,467
County-Other (Rural)	2,747	1,951	2,037	2,118	2,191	2,249	2,302	2,349
Total	2,751	3,436	3,672	3,895	4,095	4,256	4,401	4,530
Dimmit (part) - Nueces								
Asherton	1,608	1,342	1,440	1,536	1,596	1,602	1,567	1,490
Big Wells	834	704	755	806	837	840	822	782
Carrizo Springs	5,745	5,655	6,068	6,474	6,725	6,751	6,603	6,279
County-Other (Rural)	2,198	2,526	2,710	2,893	3,004	3,016	2,949	2,804
Total	10,385	10,227	10,973	11,709	12,162	12,209	11,941	11,355
Frio (part) - Nueces								
Dilley	2,632	3,674	4,389	5,091	5,688	6,184	6,544	6,731
Pearsall	6,924	7,157	7,317	7,474	7,608	7,719	7,800	7,842
Benton City WSC		17	29	40	50	58	64	67
County-Other (Rural)	3,916	5,404	6,425	7,429	8,282	8,991	9,505	9,772
Total	13,472	16,252	18,160	20,034	21,628	22,952	23,913	24,412
Karnes (part) - Nueces								
El Oso WSC		63	68	74	80	85	88	90
County-Other (Rural)	314	107	134	166	200	227	244	253
Total	314	170	202	240	280	312	332	343

Table 2-3 (Continued)

Basin/County/City/Rural	Census		Projections					
	1990*	2000	2010	2020	2030	2040	2050	2060
LaSalle (part) - Nueces								
Cotulla	3,694	3,614	4,052	4,408	4,598	4,790	4,989	5,188
Encinal	608	629	639	648	656	664	670	675
County-Other (Rural)	952	1,623	1,908	2,222	2,676	3,124	3,389	3,544
Total	5,254	5,866	6,599	7,278	7,930	8,578	9,048	9,407
Medina (part) - Nueces								
Devine	3,928	4,140	4,270	4,414	4,548	4,664	4,777	4,878
Hondo	6,018	7,897	9,050	10,324	11,513	12,541	13,540	14,437
Lytle	340	323	323	323	323	323	323	323
Natalia	1,216	1,663	1,937	2,240	2,523	2,768	3,006	3,219
East Medina SUD		5,703	6,700	7,801	8,829	9,718	10,582	11,358
Benton City WSC		3,193	4,103	5,108	6,047	6,858	7,646	8,354
County-Other (Rural)	10,379	8,264	10,549	13,072	15,428	17,465	19,444	21,221
Total	21,881	31,183	36,932	43,282	49,211	54,337	59,318	63,790
Uvalde (part) - Nueces								
Sabinal	1,584	1,586	1,588	1,590	1,592	1,593	1,594	1,595
Uvalde	14,729	14,929	15,137	15,356	15,538	15,681	15,776	15,848
County-Other (Rural)	7,027	9,411	11,891	14,497	16,672	18,376	19,506	20,367
Total	23,340	25,926	28,616	31,443	33,802	35,650	36,876	37,810
Wilson (part) - Nueces								
McCoy WSC		222	377	571	784	991	1,207	1,430
County-Other (Rural)	849	339	481	658	853	1,042	1,239	1,443
Total	849	561	858	1,229	1,637	2,033	2,446	2,873
Zavala (part) - Nueces								
Crystal City	8,263	7,190	7,514	7,713	8,046	8,118	8,192	8,266
County-Other (Rural)	3,899	4,410	5,282	6,417	7,181	7,968	8,582	8,867
Total	12,162	11,600	12,796	14,130	15,227	16,086	16,774	17,133
Nueces Basin Total	**120,265**	**143,260**	**163,549**	**185,226**	**204,433**	**219,978**	**232,969**	**242,742**
San Antonio Basin (part)								
Atascosa (part) - San Antonio								
Benton City WSC		383	612	849	1,057	1,220	1,358	1,459
County-Other (Rural)	676	206	151	110	80	59	42	30
Total	676	589	763	959	1,137	1,279	1,400	1,489
Bexar (part) - San Antonio								
Alamo Heights	6,502	7,319	7,671	8,039	8,148	8,239	8,331	8,423
Balcones Heights (SAWS)	3,022	3,016	3,327	3,670	3,909	4,154	4,414	4,674
China Grove (SAWS)	1,031	1,247	1,671	2,072	2,430	2,721	2,982	3,214
Converse	8,887	11,508	15,339	19,445	23,204	26,132	28,697	30,892
Elmendorf (SAWS)	645	664	773	876	968	1,042	1,109	1,168
Fairoaks Ranch	1,640	3,799	4,699	4,739	4,779	4,819	4,833	4,857
Helotes (SAWS)	1,535	4,285	7,980	11,812	14,808	17,244	19,432	21,378

Table 2-3 (Continued)

Basin/County/City/Rural	Census		Projections					
	1990*	2000	2010	2020	2030	2040	2050	2060
Bexar (part) Continued								
Kirby	8,326	8,673	9,066	9,437	9,768	10,037	10,279	10,494
Leon Valley	9,581	5,876	5,905	5,933	6,014	6,095	6,176	6,256
Leon Valley (SAWS)		3,363	3,379	3,396	3,442	3,488	3,534	3,581
Live Oak	10,023	9,156	9,641	10,126	10,611	11,096	11,581	12,066
Olmos Park (SAWS)	2,161	2,343	2,549	2,744	2,918	3,059	3,186	3,299
San Antonio (SAWS)	935,933	1,013,066	1,198,691	1,374,070	1,530,464	1,657,662	1,771,880	1,873,452
San Antonio (BMWD)		130,080	153,915	176,434	196,515	212,848	227,513	240,556
San Antonio (OTHERS)		1,500	1,775	2,035	2,266	2,454	2,624	2,774
Schertz	3,579	1,045	1,759	2,434	3,036	3,525	3,964	4,355
Selma		722	4,453	5,658	6,826	6,703	6,560	6,413
Shavano Park	1,708	1,754	1,806	1,855	1,899	1,935	1,967	1,995
Somerset (SAWS)	1,144	1,550	2,009	2,443	2,830	3,145	3,428	3,679
St. Hedwig	1,443	1,875	2,364	2,826	3,238	3,573	3,874	4,141
Terrell Hills	4,592	5,019	5,502	5,959	6,366	6,697	6,994	7,258
Universal City	13,057	14,849	17,248	19,722	21,970	21,970	21,970	21,970
Castle Hills (BMWD)	4,198	4,202	4,207	4,211	4,215	4,218	4,221	4,223
Bexar Met Water District	108,988	65,327	68,415	71,332	73,932	76,049	77,948	79,639
Atascosa Rural WSC		6,430	8,393	10,248	11,902	13,247	14,455	15,529
Hill Country Village (BMWD)		1,028	1,028	1,028	1,028	1,028	1,028	1,028
Hollywood Park (BMWD)	3,879	2,983	3,111	3,232	3,340	3,428	3,507	3,577
Green Valley SUD		2,598	5,113	7,490	9,609	11,333	12,881	14,257
Windcrest	5,331	5,105	5,143	5,181	5,218	5,256	5,294	5,331
Water Service Inc. (Apex)		3,009	4,107	5,144	6,069	6,821	7,496	8,097
East Central SUD		7,132	10,199	12,420	14,400	16,017	17,466	18,747
Lackland AFB (CDP)	9,352	7,123	7,123	7,123	7,123	7,123	7,123	7,123
County-Other (SAWS)		42,331	44,332	46,222	47,907	49,279	50,510	51,605
County-Other (Rural)	36,086	9,518	5,570	4,495	3,865	6,194	8,292	10,150
Total	1,182,643	1,389,495	1,628,263	1,853,850	2,055,017	2,218,631	2,365,549	2,496,201
Comal (part) - San Antonio								
Fairoaks Ranch	51	246	248	250	252	254	256	258
Schertz	129	42	71	108	150	191	233	279
Bulverde City		3,730	8,031	13,536	19,803	25,940	32,301	39,142
Bexar Met Water District (BMWD)		1,620	3,363	5,593	8,132	10,619	13,196	15,968
Garden ridge		760	961	1,218	1,511	1,798	2,096	2,416
Selma		16	225	380	571	658	737	814
Water Service Inc. (Apex)		1,632	2,217	2,965	3,817	4,651	5,516	6,446
County-Other (Rural)	6,134	838	940	1,185	1,450	1,808	2,191	2,611
Total	6,314	8,884	16,056	25,235	35,686	45,919	56,526	67,934
DeWitt (part) - San Antonio								
County-Other (Rural)	890	571	584	598	606	609	600	589
Total	890	571	584	598	606	609	600	589
Goliad (part) - San Antonio								
Goliad	1,946	1,975	2,306	2,710	3,035	3,248	3,411	3,514
County-Other (Rural)	2,119	2,054	2,054	2,054	2,054	2,054	2,054	2,054
Total	4,065	4,029	4,360	4,764	5,089	5,302	5,465	5,568

Table 2-3 (Continued)

Basin/County/City/Rural	Census 1990	Census 2000	Projections 2010	2020	2030	2040	2050	2060
Guadalupe (part) - San Antonio								
Cibolo	1,757	3,035	4,497	6,284	8,216	10,146	12,287	14,593
Marion	1,027	1,099	1,213	1,353	1,504	1,655	1,822	2,002
New Berlin			571	698	854	1,045	1,278	1,563
Schertz	14,891	17,333	24,565	33,403	42,957	52,502	63,092	74,497
Selma		50	173	253	334	389	453	523
Green Valley SUD		5,739	7,615	10,004	12,584	15,154	18,003	21,065
Springs Hill WSC		1,676	1,942	2,268	2,620	2,972	3,362	3,782
East Central SUD		747	509	701	896	1,053	1,187	1,292
Water Service Inc. (Apex)		170	217	274	336	398	466	540
Santa Clara		722	1,439	2,316	3,264	4,211	5,261	6,392
County-Other (Rural)	1,385	462	403	322	231	149	80	18
Total	19,060	31,033	43,144	57,876	73,796	89,674	107,291	126,267
Karnes (part) - San Antonio								
Karnes city	2,916	3,457	3,710	4,008	4,322	4,573	4,728	4,812
Kenedy	3,763	3,487	3,585	3,965	4,266	4,522	4,793	4,950
Runge	1,139	1,080	1,099	1,209	1,294	1,367	1,445	1,503
Falls City		591	644	706	772	825	857	875
El Oso WSC		2,419	2,609	2,833	3,069	3,258	3,374	3,437
Sunko WSC		287	316	350	385	413	430	440
County-Other (Rural)	3,977	3,806	4,656	5,303	6,117	6,749	6,991	7,098
Total	11,795	15,127	16,619	18,374	20,225	21,707	22,618	23,115
Kendall (part) - San Antonio								
Boerne	4,274	6,178	8,600	12,208	16,065	19,286	21,925	24,506
Fairoaks Ranch	169	650	1,234	1,282	1,308	1,335	1,362	1,389
Water Service Inc. (Apex)		255	313	383	457	519	570	620
County-Other (Rural)	4,260	6,543	10,043	14,299	18,820	22,601	25,705	28,740
Total	8,703	13,626	20,190	28,172	36,650	43,741	49,562	55,255
Medina (part) - San Antonio								
Castroville	2,159	2,664	2,974	3,316	3,636	3,912	4,180	4,421
La Coste	1,021	1,255	1,399	1,558	1,706	1,834	1,958	2,070
Yancey WSC		3,550	4,531	5,615	6,627	7,502	8,352	9,115
East Medina SUD		327	384	447	506	557	607	651
Bexar Met Water District (BMWD)		115	186	264	337	400	461	516
County-Other (Rural)	2,251	210	269	333	393	445	494	541
Total	5,431	8,121	9,743	11,533	13,205	14,650	16,052	17,314
Refugio (part) - San Antonio								
County-Other (Rural)	86	72	65	60	59	55	53	54
Total	86	72	65	60	59	55	53	54
Victoria (part) - San Antonio								
County-Other (Rural)	273	48	56	64	71	76	80	84
Total	273	48	56	64	71	76	80	84

Table 2-3 (Continued)

Basin/County/City/Rural	Census 1990	Census 2000	Projections 2010	Projections 2020	Projections 2030	Projections 2040	Projections 2050	Projections 2060
Wilson (part) - San Antonio								
Floresville	5,247	5,868	9,000	10,261	11,653	12,999	14,402	15,846
LaVernia	757	931	1,280	1,715	2,194	2,659	3,143	3,645
Poth	1,642	1,850	2,099	2,409	2,750	3,081	3,426	3,783
Stockdale	1,268	1,398	1,553	1,747	1,960	2,167	2,383	2,606
SS WSC		8,701	13,417	19,294	25,767	32,049	38,589	45,362
Oak Hills WSC		3,100	4,655	6,592	8,726	10,797	12,953	15,186
Sunko WSC		2,905	3,646	4,570	5,588	6,576	7,604	8,669
East Central SUD		654	801	982	1,177	1,371	1,588	1,822
El Oso WSC		240	284	339	400	459	520	584
County-Other (Rural)	12,332	5,977	6,167	9,049	12,225	15,306	18,498	21,803
Total	21,246	31,624	42,902	56,958	72,440	87,464	103,106	119,306
San Antonio Basin Total	**1,261,182**	**1,503,219**	**1,783,089**	**2,059,208**	**2,315,084**	**2,530,431**	**2,729,795**	**2,914,776**
Guadalupe Basin (part)								
Caldwell (part) – Guadalupe Basin								
Lockhart	9,205	11,615	16,328	21,083	25,111	29,154	33,216	37,148
Luling	4,661	5,080	6,309	7,301	7,998	8,700	9,407	10,092
Polonia WSC		3,304	5,074	6,988	8,684	10,386	12,094	13,747
Maxwell WSC		2,757	4,356	6,113	7,685	9,260	10,843	12,374
Martindale	1,028	953	1,150	1,291	1,378	1,465	1,553	1,638
Martindale WSC		826	1,307	1,468	1,566	1,666	1,765	1,861
AQUA WSC		1,260	1,782	2,313	2,764	3,217	3,672	4,112
Goforth WSC		1,013	1,770	2,636	3,429	4,226	5,024	5,797
County Line WSC		681	1,262	1,939	2,565	3,193	3,824	4,434
Creedmoor-Maha WSC		616	929	1,264	1,558	1,854	2,150	2,437
Gonzales County WSC		154	215	277	329	381	433	484
Niederwald		83	203	349	489	629	769	904
Mustang Ridge		37	54	74	90	107	124	139
County-Other (Rural)	10,804	1,069	1,109	1,054	947	849	764	683
Total	25,698	29,448	41,848	54,150	64,593	75,087	85,638	95,850
Calhoun (part) – Guadalupe Basin								
County-Other (Rural)	23	0	0	0	0	0	0	0
Total	23	0	0	0	0	0	0	0
Comal (part) – Guadalupe Basin								
Garden Ridge	1,450	1,122	1,419	1,799	2,232	2,656	3,095	3,567
New Braunfels	27,091	35,328	44,826	56,982	70,823	84,376	98,423	113,529
Canyon Lake WSC		9,741	19,509	32,010	46,244	60,182	74,628	90,163
Green Valley SUD		1,818	2,617	3,640	4,804	5,944	7,126	8,397
Crystal Clear WSC		1,557	2,258	3,155	4,177	5,177	6,214	7,329
Schertz		274	461	700	972	1,239	1,516	1,813
Bexar Met Water District (BMWD)		123	255	424	617	806	1,002	1,212
Bulverde City		31	67	113	165	216	269	326
County-Other (Rural)	16,977	19,143	20,751	22,810	25,153	27,449	29,827	32,385
Total	45,518	69,137	92,163	121,633	155,187	188,045	222,100	258,721

Table 2-3 (Continued)

Basin/County/City/Rural	Census		Projections					
	1990	2000	2010	2020	2030	2040	2050	2060
DeWitt (part) – Guadalupe Basin								
Cuero	6,700	6,571	6,718	6,883	6,977	7,007	6,902	6,779
Yorktown	2,207	2,271	2,322	2,379	2,411	2,422	2,385	2,343
Gonzales County WSC		359	367	376	381	383	377	370
County-Other (Rural)	5,736	6,859	7,012	7,185	7,283	7,314	7,204	7,077
Total	14,643	16,060	16,419	16,823	17,052	17,126	16,868	16,569
Goliad (part) – Guadalupe Basin								
County-Other (Rural)	1,465	2,331	2,720	3,199	3,584	3,834	4,026	4,145
Total	1,465	2,331	2,720	3,199	3,584	3,834	4,026	4,145
Gonzales (part) – Guadalupe Basin								
Gonzales	6,527	7,202	7,792	8,435	8,925	9,277	9,379	9,347
Nixon	1,995	2,186	2,353	2,535	2,674	2,774	2,803	2,794
Waelder	744	947	1,124	1,316	1,463	1,568	1,599	1,589
Gonzales County WSC		4,612	5,418	6,296	6,965	7,446	7,586	7,542
County-Other (Rural)	7,873	3,598	3,113	2,585	2,183	1,894	1,810	1,836
Total	17,139	18,545	19,800	21,167	22,210	22,959	23,177	23,108
Guadalupe (part) – Guadalupe Basin								
New Braunfels	243	1,166	2,083	3,204	4,416	5,626	6,969	8,415
Seguin	18,853	22,011	25,309	29,339	33,696	38,048	42,877	48,077
Green Valley SUD		14,042	18,868	24,766	31,142	37,512	44,579	52,190
Springs Hill WSC		9,097	10,543	12,311	14,222	16,131	18,249	20,530
Crystal Clear WSC		9,083	12,367	16,380	20,718	25,052	29,860	35,038
Martindale WSC		232	428	610	831	1,136	1,328	1,554
Santa Clara		177	353	568	800	1,032	1,290	1,567
County-Other (Rural)	26,717	2,182	1,783	1,457	1,104	701	414	98
Total	45,813	57,990	71,734	88,635	106,929	125,238	145,566	167,469
Hays (part) – Guadalupe Basin								
Kyle	2,225	5,314	21,457	31,126	33,613	35,203	39,197	41,850
San Marcos	28,743	34,733	48,814	69,906	90,990	114,477	139,466	158,099
Wimberley WSC	2,520	5,058	7,069	9,370	11,753	14,148	17,026	19,289
Woodcreek	978	1,274	1,730	2,252	2,792	3,335	3,987	4,500
Wood Creek Utilities Inc.		1,950	3,733	5,774	7,888	10,012	12,564	14,571
Goforth WSC		6,006	9,334	13,144	17,090	21,055	25,819	29,565
Crystal Clear WSC		3,114	4,554	6,202	7,909	9,624	11,685	13,306
Plum Creek Water Co.		3,504	5,319	7,397	9,549	11,711	14,309	16,352
County Line WSC		1,512	5,870	12,570	14,684	15,258	16,655	19,014
Maxwell WSC		969	1,360	1,807	2,270	2,735	3,294	3,734
Niederwald		501	818	1,181	1,557	1,935	2,389	2,746
Mountain City		135	282	450	624	799	1,009	1,174
Creedmoor-Maha WSC		70	94	121	149	177	211	238
County-Other (Rural)	17,012	8,359	9,765	11,374	13,040	14,714	16,726	18,308
Total	51,478	72,499	120,199	172,674	213,908	255,183	304,337	342,746
Karnes (part) – Guadalupe Basin								
El Oso WSC		25	27	29	31	33	34	35
County-Other (Rural)	116	74	93	115	138	158	170	176
Total	116	99	120	144	169	191	204	211

Table 2-3 (Continued)

Basin/County/City/Rural	Census 1990	Census 2000	Projections 2010	2020	2030	2040	2050	2060
Kendall (part) – Guadalupe Basin								
County-Other (Rural)	5,724	9,903	15,201	21,643	28,486	34,209	38,908	43,502
Total	5,724	9,903	15,201	21,643	28,486	34,209	38,908	43,502
Victoria (part) – Guadalupe Basin								
Victoria	43,747	40,726	44,157	47,752	50,705	53,052	54,980	56,679
County-Other (Rural)	9,120	13,388	15,600	17,917	19,821	21,334	22,577	23,672
Total	52,867	54,114	59,757	65,669	70,526	74,386	77,557	80,351
Wilson (part) – Guadalupe Basin								
County-Other (Rural)	555	223	318	434	564	690	821	956
Total	555	223	318	434	564	690	821	956
Guadalupe Basin Total	**261,039**	**330,349**	**440,279**	**566,171**	**683,208**	**796,948**	**919,202**	**1,033,628**
Lower Colorado Basin (part)								
Caldwell (part) – Lower Colorado								
Polonia WSC		1,433	2,201	3,031	3,767	4,505	5,246	5,963
Creedmoor-Maha WSC		854	1,288	1,751	2,159	2,569	2,980	3,378
Mustang Ridge		339	501	672	821	970	1,121	1,266
County-Other (Rural)	694	120	120	118	119	119	118	118
Total	694	2,746	4,110	5,572	6,866	8,163	9,465	10,725
Kendall (part) – Lower Colorado								
County-Other (Rural)	162	214	329	468	616	740	842	941
Total	162	214	329	468	616	740	842	941
Lower Colorado Basin Total	**856**	**2,960**	**4,439**	**6,040**	**7,482**	**8,903**	**10,307**	**11,666**
Lavaca Basin (part)								
DeWitt (part) – Lavaca Basin								
Yoakum	2,154	2,137	2,185	2,239	2,269	2,279	2,245	2,205
County-Other (Rural)	1,129	1,245	1,272	1,304	1,324	1,327	1,308	1,285
Total	3,283	3,382	3,457	3,543	3,593	3,606	3,553	3,490
Gonzales (part) – Lavaca Basin								
County-Other (Rural)	66	83	72	60	50	44	42	43
Total	66	83	72	60	50	44	42	43
Victoria (part) – Lavaca Basin								
County-Other (Rural)	174	46	53	62	69	74	78	82
Total	174	46	53	62	69	74	78	82
Lavaca Basin Total	**3,523**	**3,511**	**3,582**	**3,665**	**3,712**	**3,724**	**3,673**	**3,615**
Colorado-Lavaca Coastal Basin (part)								
Calhoun (part) – Colorado-Lavaca CB								
Point Comfort	956	781	1,276	1,870	2,959	4,081	4,081	4,081
County-Other (Rural)	640	734	446	271	165	101	61	37
Total	1,596	1,515	1,722	2,141	3,124	4,182	4,142	4,118
Colorado Lavaca Coastal Basin Total	**1,596**	**1,515**	**1,722**	**2,141**	**3,124**	**4,182**	**4,142**	**4,118**

Table 2-3 (Concluded)

Basin/County/City/Rural	Census 1990	Census 2000	Projections 2010	2020	2030	2040	2050	2060
Lavaca-Guadalupe CB (part)								
Calhoun (part) –Lavaca Guadalupe CB								
Port Lavaca	10,886	12,035	13,163	14,325	15,513	16,717	17,925	19,030
Seadrift	1,277	1,352	1,408	1,459	1,499	1,525	1,537	1,545
Calhoun County WSC		4,470	5,891	7,204	8,232	8,906	9,202	9,408
County-Other (Rural)	5,231	1,231	1,346	1,465	1,587	1,710	1,833	1,946
Total	17,394	19,088	21,808	24,453	26,831	28,858	30,497	31,929
DeWitt (part) –Lavaca Guadalupe CB								
County-Other (Rural)	24	0	0	0	0	0	0	0
Total	24	0	0	0	0	0	0	0
Victoria (part) –Lavaca Guadalupe CB								
Victoria	11,329	19,877	21,552	23,306	24,747	25,893	26,834	27,663
County-Other (Rural)	9,718	10,003	11,655	13,386	14,808	15,939	16,867	17,685
Total	21,047	29,880	33,207	36,692	39,555	41,832	43,701	45,348
Lavaca-Guadalupe CB Total	**38,465**	**48,968**	**55,015**	**61,145**	**66,386**	**70,690**	**74,198**	**77,277**
San Antonio-Nueces CB (part)								
Calhoun (part) – San Antonio-Nueces CB								
County-Other (Rural)	40	44	26	16	9	6	3	2
Total	40	44	26	16	9	6	3	2
Goliad (part) – San Antonio-Nueces CB								
County-Other (Rural)	450	568	663	780	872	935	980	1,011
Total	450	568	663	780	872	935	980	1,011
Karnes (part) – San Antonio-Nueces CB								
El Oso WSC		13	14	15	16	17	18	18
County-Other (Rural)	230	37	46	57	69	78	84	87
Total	230	50	60	72	85	95	102	105
Refugio (part) – San Antonio-Nueces CB								
Refugio	3,158	2,941	3,511	3,933	4,085	4,364	4,534	4,478
Woodsboro	1,731	1,685	1,806	1,896	1,928	1,987	2,023	2,011
County-Other (Rural)	3,001	3,130	2,835	2,616	2,537	2,393	2,305	2,334
Total	7,890	7,756	8,152	8,445	8,550	8,744	8,862	8,823
San Antonio-Nueces CB Total	**8,610**	**8,418**	**8,901**	**9,313**	**9,516**	**9,780**	**9,947**	**9,941**
South Central Texas Region	**1,695,584**	**2,042,221**	**2,460,599**	**2,892,933**	**3,292,970**	**3,644,661**	**3,984,258**	**4,297,786**
River and Coastal Basin Summary								
Rio Grande Basin (part)	48	21	23	24	25	25	25	23
Nueces Basin (part)	120,265	143,260	163,549	185,226	204,433	219,978	232,969	242,742
San Antonio Basin (part)	1,261,182	1,503,219	1,783,089	2,059,208	2,315,084	2,530,431	2,729,795	2,914,776
Guadalupe Basin (part)	261,039	330,349	440,279	566,171	683,208	796,948	919,202	1,033,628
Lower Colorado Basin (part)	856	2,960	4,439	6,040	7,482	8,903	10,307	11,666
Lavaca Basin (part)	3,523	3,511	3,582	3,665	3,712	3,724	3,673	3,615
Colorado-Lavaca CB (part)	1,596	1,515	1,722	2,141	3,124	4,182	4,142	4,118
Lavaca-Guadalupe CB (part)	38,465	48,968	55,015	61,145	66,386	70,690	74,198	77,277
San Antonio-Nueces CB (part)	8,610	8,418	8,901	9,313	9,516	9,780	9,947	9,941
South Central Texas Region	**1,695,584**	**2,042,221**	**2,460,599**	**2,892,933**	**3,292,970**	**3,644,661**	**3,984,258**	**4,297,786**

3. Region L counties with populations apparently growing faster than shown in current TWDB projections include Bexar, Comal, DeWitt, and Guadalupe.

Twenty-five (25) municipal water suppliers in Region L asked the SCTRWPG to consider revisions to their population projections for the 2011 regional water plan, with 23 of 25 of these requests being for increases. These requests, along with any documentation provided by the water suppliers, were informally reviewed by TWDB staff and HDR. This review indicated that 11 requests for increased population projections could readily be technically supported, while others would require substantial additional documentation to support. In order to accommodate many of the requests for increased population projections, the SCTRWPG would have had to reduce population projections for some entities or counties in order to preserve county or regional totals. During its meeting of February 5, 2009, the SCTRWPG decided not to pursue population projection revisions for the 2011 plan, but to provide due consideration of larger or additional water management strategies to meet the needs of water user groups apparently growing faster than the current TWDB population projections indicate.

2.2 Municipal Water Demand Projections

Municipal water is water used primarily for drinking, bathing, dish and clothes washing, cleaning, sanitation, air conditioning, and landscape watering for residential and commercial establishments and public offices and institutions. Residential and commercial uses are categorized together because they are similar types of uses and they are usually served treated water, of drinking quality, from a common system (e.g., a public water system). The projected quantity of water needed for municipal purposes depends upon the size of the population of the service area, climatic conditions, and water conservation measures. In addition to these factors, per capita water use (gallons per person per day of water use) is a key municipal water planning parameter. Population and per capita water use are used to make projections of municipal water demand for each of the 213 municipal water user groups of the South Central Texas Water Planning Region (Table 2-12).

Per capita water use is projected to decline over the planning period from 148 gallons per person per day (gpcd) in year 2000 to 132 gpcd in 2060 (Figure 2-2). However, due to projected population growth between 2000 and 2060, municipal water demand in the South Central Texas Region is projected to increase from 340,030 acft/yr in 2000 to 637,236 acft/yr in 2060

(Figure 2-2 and Table 2-4).[1] The projected municipal water demand for individual counties in the region is shown in Table 2-4. Since Bexar County has the highest population, it also has the largest projected water demand, with almost 60 percent of the projected total water demand for the region by the year 2060 (Figure 2-2 and Table 2-4).

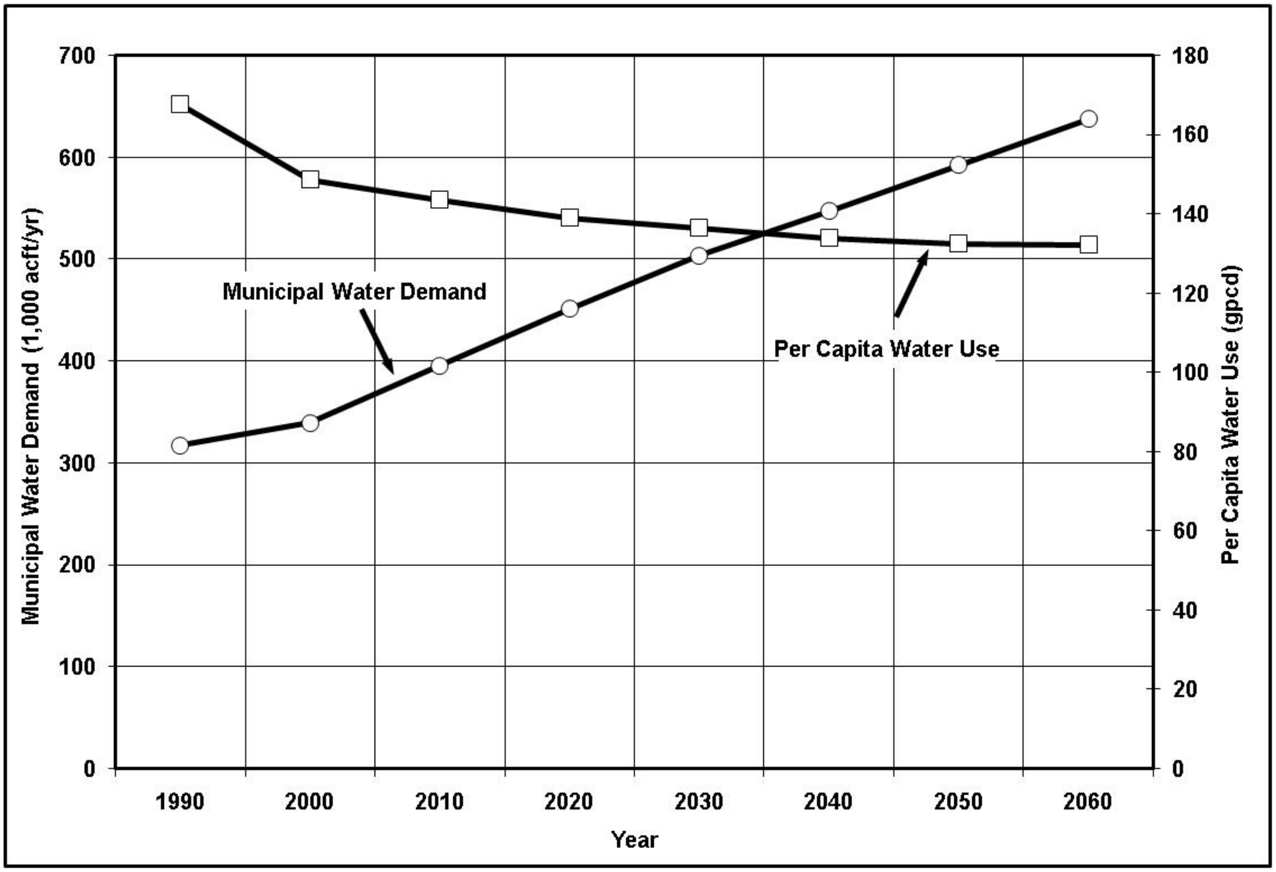

Figure 2-2. Projected Per Capita Water Use and Municipal Water Demand South Central Texas Region – 1990 to 2060

[1] One acre-foot (acft) is 325,851 gallons.

Table 2-4.
Municipal Water Demand Projections
South Central Texas Region
Individual Counties with River Basin Summaries

	Total in 1990 (acft)	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Counties								
Atascosa	5,670	6,229	6,941	7,696	8,335	8,809	9,288	9,666
Bexar	225,626	229,693	262,105	290,071	316,423	336,033	355,246	374,536
Caldwell	4,931	4,643	6,306	7,898	9,222	10,555	11,926	13,328
Calhoun	3,916	2,705	2,948	3,222	3,556	3,870	4,007	4,171
Comal	10,415	14,055	18,771	24,753	31,598	38,304	45,318	53,018
DeWitt	3,556	3,065	3,064	3,071	3,039	2,982	2,889	2,839
Dimmit	2,208	2,432	2,561	2,692	2,756	2,725	2,652	2,523
Frio	3,045	3,114	3,402	3,668	3,890	4,061	4,202	4,287
Goliad	916	908	1,024	1,181	1,286	1,347	1,401	1,442
Gonzales	3,832	3,828	4,108	4,404	4,624	4,765	4,794	4,774
Guadalupe	9,627	13,850	17,113	21,167	25,595	29,907	34,980	40,533
Hays (Part)	9,805	10,926	17,278	24,409	29,964	35,414	42,121	47,474
Karnes	2,187	2,726	2,927	3,190	3,465	3,679	3,822	3,909
Kendall	2,130	3,262	4,649	6,370	8,142	9,610	10,888	12,139
LaSalle	1,233	1,625	1,799	1,946	2,058	2,162	2,262	2,350
Medina	5,254	6,616	7,576	8,660	9,656	10,509	11,395	12,234
Refugio	1,227	1,191	1,249	1,287	1,282	1,299	1,312	1,302
Uvalde	5,278	7,768	8,066	8,394	8,652	8,846	8,964	9,099
Victoria	11,545	13,664	14,590	15,614	16,378	16,884	17,435	18,034
Wilson	3,745	4,813	6,407	8,118	9,977	11,797	13,766	15,836
Zavala	2,349	2,916	3,111	3,300	3,477	3,578	3,676	3,741
Total	318,495	340,030	395,996	451,111	503,375	547,136	592,344	637,236
River and Coastal Basins Summaries								
Rio Grande	6	2	2	2	2	2	2	2
Nueces	24,157	29,599	32,130	34,782	37,029	38,702	40,264	41,555
San Antonio	239,648	247,068	285,030	319,576	352,949	379,144	405,292	431,850
Guadalupe	45,608	53,808	68,487	85,556	101,455	116,696	133,722	150,261
Lower Colorado	236	365	518	676	817	959	1,097	1,239
Lavaca	590	513	511	512	505	495	479	471
Colorado-Lavaca	217	251	289	362	523	691	675	672
Lavaca-Guadalupe	6,696	7,163	7,702	8,269	8,716	9,044	9,394	9,774
San Antonio-Nueces	1,337	1,261	1,327	1,376	1,379	1,403	1,419	1,412
Total	318,495	340,030	395,996	451,111	503,375	547,136	592,344	637,236

Source: Texas Water Development Board (TWDB); Consensus Projections adopted by the TWDB, September 17, 2003.

2.3 Industrial Water Demand Projections

The use of water for the production of goods for domestic and foreign markets varies widely among manufacturing industries in Texas. Manufactured products in Texas range from food and clothing to refined chemical and petroleum products to computers and automobiles. Some processes require direct consumption of water as part of the products being manufactured, while others require very little water consumption, but large volumes of water for cooling or cleaning purposes. Five manufacturing industries account for approximately 90 percent of water used by all manufacturing industries in Texas. These five water-intensive industries are chemical products, petroleum refining, pulp and paper, food and kindred products, and primary metals. The chemical and petroleum refining industries account for nearly 60 percent of the State's annual industrial water use.

The South Central Texas Region's major water using manufacturing sectors are fabricated metal products, industrial machinery, and food processing. All industries in the region used 100,195 acft of water in 2000 and are projected to have a demand of 179,715 acft/yr in 2060 (Figure 2-3 and Table 2-5). As can be seen in Figure 2-3, manufacturing water demand is projected to increase throughout the planning period.

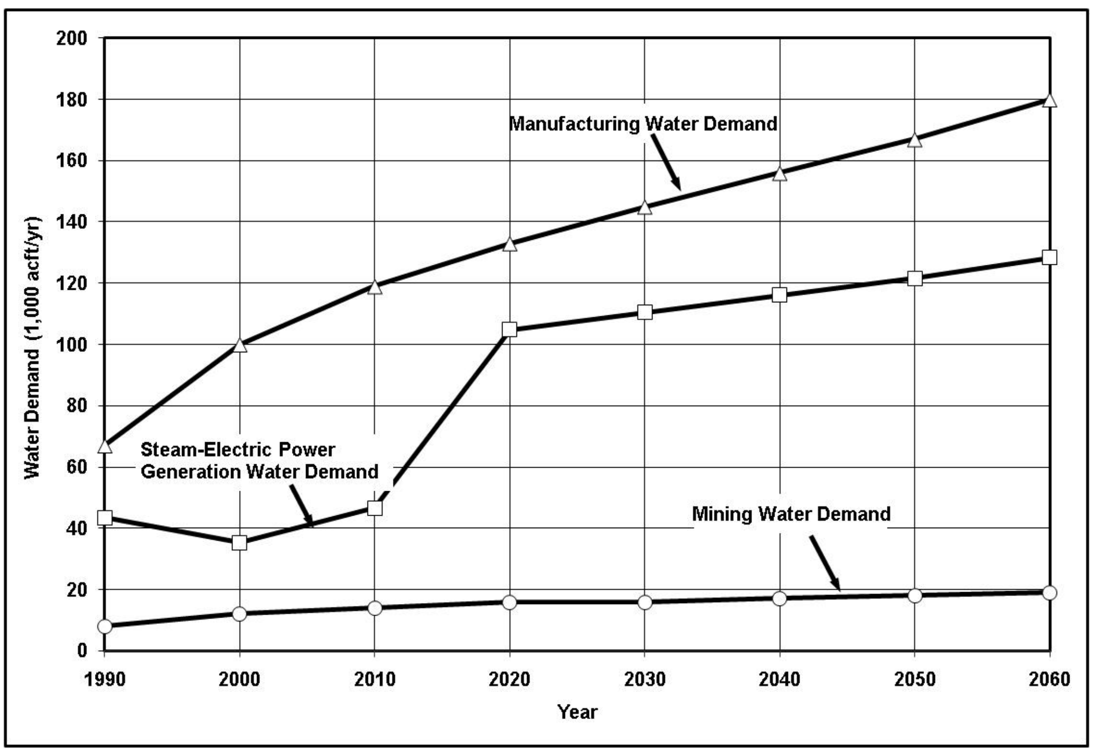

Figure 2-3. Projections of Industrial, Steam-Electric, and Mining Water Demands South Central Texas Region – 1990 to 2060

Table 2-5.
Industrial Water Demand Projections
South Central Texas Region
Individual Counties with River Basin Summaries

	Total in 1990 (acft)	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Counties								
Atascosa	0	6	6	6	6	6	6	6
Bexar	14,049	21,252	25,951	29,497	32,775	36,068	38,965	42,112
Caldwell	0	11	15	18	21	24	27	29
Calhoun	24,539	42,397	49,784	54,857	59,235	63,575	67,406	72,238
Comal	3,248	6,283	7,729	8,563	9,314	10,045	10,672	11,553
DeWitt	91	154	184	199	212	225	236	254
Dimmit	3	0	0	0	0	0	0	0
Frio	0	0	0	0	0	0	0	0
Goliad	0	0	4	8	12	16	20	24
Gonzales	865	2,051	2,400	2,628	2,822	3,011	3,177	3,402
Guadalupe	1,661	2,097	2,638	2,957	3,249	3,530	3,771	4,097
Hays (Part)	57	157	212	249	285	322	355	386
Karnes	270	107	118	122	125	128	130	137
Kendall	2	0	0	0	0	0	0	0
LaSalle	0	0	0	0	0	0	0	0
Medina	286	56	67	75	82	89	95	103
Refugio	0	0	0	0	0	0	0	0
Uvalde	557	378	432	455	473	490	505	538
Victoria	20,032	24,323	28,726	32,095	35,035	37,962	40,578	43,520
Wilson	50	1	1	1	1	1	1	1
Zavala	1,306	922	1,043	1,106	1,154	1,200	1,238	1,315
Total	67,016	100,195	119,310	132,836	144,801	156,692	167,182	179,715
River and Coastal Basins Summaries								
Rio Grande	0	0	0	0	0	0	0	0
Nueces	2,152	1,362	1,548	1,642	1,715	1,785	1,844	1,962
San Antonio	14,323	21,364	26,079	29,633	32,919	36,220	39,123	42,282
Guadalupe	26,235	35,201	42,051	46,871	51,112	55,306	59,014	63,453
Lower Colorado	0	0	0	0	0	0	0	0
Lavaca	0	7	8	9	10	10	11	12
Colorado-Lavaca	6,343	19,175	22,516	24,810	26,790	28,753	30,486	32,671
Lavaca-Guadalupe	17,963	23,086	27,108	29,871	32,255	34,618	36,704	39,335
San Antonio-Nueces	0	0	0	0	0	0	0	0
Total	67,016	100,195	119,310	132,836	144,801	156,692	167,182	179,715

Source: Texas Water Development Board (TWDB); Consensus Projections adopted by the TWDB, September 17, 2003.

2.4 Steam-Electric Power Water Demand Projections

Steam-Electric Power production in Texas is concentrated in ten privately owned utilities, which account for 85 percent of production. Nine percent of power production is from facilities that are both publicly and privately held, and 6 percent is from publicly owned utilities. The industry has faced and will continue to face significant changes in the structure of power generation. These changes range from new generation technology to government regulations on the marketing of electricity. These changes may have an impact on how and where power will be generated and the quantities of water needed.

In the generation of steam-electric power, cooling water is circulated through the power generation plants, with approximately 2 percent being evaporated or consumed, and the remainder being either recirculated or returned to streams. Seven counties (Atascosa, Bexar, Frio, Goliad, Guadalupe, Hays, and Victoria) of the South Central Texas Region have electric power generation plants that use water in steam-electric power production. In 2000, 35,379 acft of water was consumed for electric power generation, and by the year 2060, it is estimated that 128,340 acft/yr of water will be consumed in the production of steam-electric power (Table 2-6 and Figure 2-3).

Considerable uncertainty exists in what the regulatory requirements may be in the future for the control of atmospheric carbon emissions from fossil fuel fired steam-electric power plants. Carbon sequestration and geologic storage may prove to be a mandated or economically attractive option for controlling such emissions. This technology, if employed, would consume considerably more water than existing power plants and remove a significant amount of it from the hydrologic cycle. Since carbon control technologies and legal mandates are not yet established, and because such plants in Region L currently hold excess water capacity, these potential and unquantifiable future effects are not considered in this 2011 Regional Water Plan and will be addressed in the 2016 Regional Water Plan.

2.5 Mining Water Demand Projections

Although the Texas mineral industry is foremost in the production of crude petroleum and natural gas in the United States, it also produces a wide variety of important non-fuel minerals. Texas is the only state to produce native asphalt and is the leading producer nationally of Frasch-mined sulfur. It is also one of the leading states in the production of clay, gypsum, lime, salt, stone, and aggregate. In the South Central Texas Region, the principal uses of water for mining are for the extraction of stone, clay, and petroleum and for sand and gravel washing.

In the region, total mining water demand was 11,757 acft in 2000 and is expected to increase to 18,644 acft/yr in 2060, an increase of over 58 percent (Table 2-7 and Figure 2-3).

Table 2-6.
Steam-Electric Power Water Demand Projections
South Central Texas Region
Individual Counties with River Basin Summaries

	Total in 1990 (acft)	Total in 2000 (acft)	Projections					
			2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Counties								
Atascosa	6,036	5,814	7,000	4,807	6,101	5,997	7,336	7,672
Bexar	24,263	17,399	20,395	25,761	30,139	32,973	36,120	39,614
Caldwell	0	0	0	0	0	0	0	0
Calhoun	62	684	0	0	0	0	0	0
Comal	0	0	0	0	0	0	0	0
DeWitt	0	0	0	0	0	0	0	0
Dimmit	0	0	0	0	0	0	0	0
Frio	38	129	289	268	201	192	76	91
Goliad	12,165	9,027	9,027	16,643	16,643	16,643	16,643	16,643
Gonzales	0	0	0	0	0	0	0	0
Guadalupe	0	129	4,788	3,406	3,326	5,136	5,585	7,515
Hays (Part)	0	0	1,009	718	949	1,949	2,663	3,627
Karnes	0	0	0	0	0	0	0	0
Kendall	0	0	0	0	0	0	0	0
LaSalle	0	0	0	0	0	0	0	0
Medina	0	0	0	0	0	0	0	0
Refugio	0	0	0	0	0	0	0	0
Uvalde	0	0	0	0	0	0	0	0
Victoria	887	2,197	4,052	53,178	53,178	53,178	53,178	53,178
Wilson	0	0	0	0	0	0	0	0
Zavala	0	0	0	0	0	0	0	0
Total	43,451	35,379	46,560	104,781	110,537	116,068	121,601	128,340
River and Coastal Basins Summaries								
Rio Grande	0	0	0	0	0	0	0	0
Nueces	6,074	5,943	7,289	5,075	6,302	6,189	7,412	7,763
San Antonio	24,263	17,399	20,395	25,761	30,139	32,973	36,120	39,614
Guadalupe	13,052	11,353	18,876	73,945	74,096	76,906	78,069	80,963
Lower Colorado	0	0	0	0	0	0	0	0
Lavaca	0	0	0	0	0	0	0	0
Colorado-Lavaca	62	684	0	0	0	0	0	0
Lavaca-Guadalupe	0	0	0	0	0	0	0	0
San Antonio-Nueces	0	0	0	0	0	0	0	0
Total	43,451	35,379	46,560	104,781	110,537	116,068	121,601	128,340

Source: Bureau of Economic Geology (BEG); Water Demand Projections for Power Generation in Texas (Scenario 2L), August 31, 2008 for all counties except Bexar, Goliad, and Victoria. Projections for those counties were developed with local input.

Table 2-7.
Mining Water Demand Projections
South Central Texas Region
Individual Counties with River Basin Summaries

	Total in 1990 (acft)	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Counties								
Atascosa	664	1,125	1,298	1,370	1,405	1,439	1,472	1,509
Bexar	1,591	2,902	3,582	3,934	4,150	4,363	4,576	4,766
Caldwell	27	12	14	15	16	17	18	18
Calhoun	5	28	32	35	36	37	38	38
Comal	946	2,224	2,678	2,897	3,029	3,159	3,287	3,401
DeWitt	129	58	64	67	68	68	70	71
Dimmit	506	919	1,003	1,034	1,051	1,067	1,082	1,095
Frio	313	139	109	104	102	100	98	96
Goliad	0	13	398	282	205	140	76	46
Gonzales	21	33	28	27	26	25	24	24
Guadalupe	8	270	306	321	330	338	346	353
Hays (Part)	0	129	142	151	157	161	162	163
Karnes	187	119	106	103	102	101	101	100
Kendall	0	6	6	6	6	6	6	6
LaSalle	0	0	0	0	0	0	0	0
Medina	120	118	130	135	137	139	141	143
Refugio	77	6	7	8	8	8	8	8
Uvalde	399	250	313	345	364	383	401	418
Victoria	2,409	3,015	3,944	4,511	4,906	5,308	5,721	6,041
Wilson	281	277	242	234	229	225	221	218
Zavala	116	114	122	125	127	128	129	130
Total	7,799	11,757	14,524	15,704	16,454	17,212	17,977	18,644
River and Coastal Basins Summaries								
Rio Grande	0	0	0	0	0	0	0	0
Nueces	2,212	2,715	3,044	3,193	3,273	3,350	3,424	3,498
San Antonio	1,973	3,232	3,980	4,273	4,450	4,630	4,811	4,982
Guadalupe	3,413	4,966	6,288	6,918	7,336	7,758	8,185	8,537
Lower Colorado	0	13	15	15	16	17	17	17
Lavaca	108	37	40	42	43	42	43	43
Colorado-Lavaca	0	1	1	1	1	1	1	1
Lavaca-Guadalupe	12	769	1,003	1,146	1,244	1,344	1,447	1,527
San Antonio-Nueces	81	24	153	116	91	70	49	39
Total	7,799	11,757	14,524	15,704	16,454	17,212	17,977	18,644

Source: Texas Water Development Board (TWDB); Consensus Projections adopted by the TWDB, September 17, 2003.

2.6 Irrigation Water Demand Projections

Irrigated agriculture accounted for almost 60 percent of the total water used in the state in the year 2000. Currently, in Texas, approximately 10 million acft of water is used to grow a variety of crops ranging from food and feed grains to fruits, vegetables, and cotton. Of this 10 million acft of water used for irrigation in Texas, groundwater is approximately 70 percent, and surface water is 30 percent. The TWDB irrigation water use data show annual use for irrigation in the South Central Texas Region in 2000 of 383,332 acft/yr, or 3.8 percent of the total irrigation water used in Texas in 2000 (Figure 2-4 and Table 2-8). Projected irrigation water demands in the region in 2060 are 301,679 acft/yr, or 21.3 percent less than in 2000 (Figure 2-4 and Table 2-8). The projected decline is based upon increased irrigation efficiency and reduced profitability of irrigated agriculture.

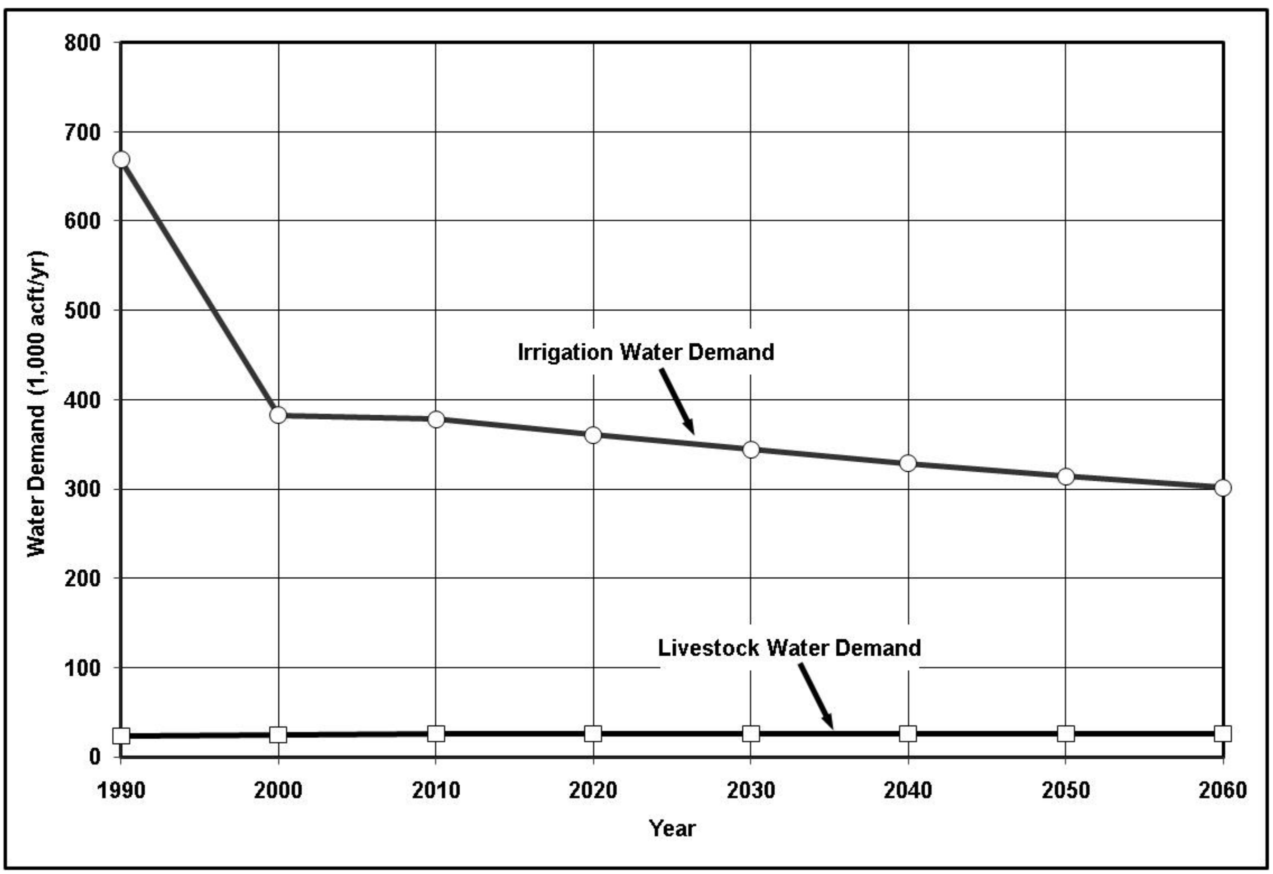

Figure 2-4. Projections of Irrigation and Livestock Water Demands
South Central Texas Region – 1990 to 2060

Table 2-8.
Irrigation Water Demand Projections
South Central Texas Region
Individual Counties with River Basin Summaries

	Total in 1990 (acft)	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Counties								
Atascosa	47,208	35,053	40,885	39,509	38,185	36,911	35,686	34,502
Bexar	37,012	15,865	15,273	14,628	14,010	13,417	12,850	12,306
Caldwell	1,375	989	1,044	928	824	733	651	578
Calhoun	35,421	8,077	15,568	13,654	12,096	11,041	10,285	9,581
Comal	479	50	204	186	169	152	135	119
DeWitt	285	102	159	132	108	87	69	54
Dimmit	11,185	6,750	10,611	10,333	10,225	9,813	9,391	8,987
Frio	83,233	117,098	82,017	79,098	76,302	73,627	71,065	68,592
Goliad	685	359	309	268	232	200	173	149
Gonzales	3,540	2,438	1,304	1,124	969	835	720	621
Guadalupe	2,646	875	1,070	955	846	742	710	705
Hays (Part)	298	162	353	350	347	344	341	338
Karnes	2,034	1,916	1,382	1,250	1,131	1,023	925	836
Kendall	380	396	714	699	685	671	658	646
LaSalle	7,292	4,003	4,791	4,643	4,500	4,361	4,227	4,097
Medina	157,380	56,422	54,450	52,179	50,005	47,922	45,927	44,015
Refugio	0	850	69	69	69	69	69	69
Uvalde	140,669	58,061	55,791	53,609	51,513	49,498	47,563	45,703
Victoria	13,699	6,708	9,936	8,576	7,402	6,388	5,514	4,759
Wilson	13,697	20,883	11,296	10,034	8,921	7,940	7,077	6,330
Zavala	110,922	46,275	71,800	68,963	66,238	63,621	61,107	58,692
Total	669,440	383,332	379,026	361,187	344,777	329,395	315,143	301,679
River and Coastal Basins Summaries								
Rio Grande	0	0	0	0	0	0	0	0
Nueces	539,759	319,890	314,279	302,311	291,011	279,881	269,196	258,935
San Antonio	72,216	42,823	34,568	32,437	30,474	28,668	27,010	25,493
Guadalupe	10,320	5,937	6,032	5,371	4,787	4,263	3,859	3,525
Lower Colorado	20	15	15	14	12	11	10	8
Lavaca	0	0	0	0	0	0	0	0
Colorado-Lavaca	0	0	0	0	0	0	0	0
Lavaca-Guadalupe	47,125	13,806	24,054	20,977	18,417	16,497	14,994	13,645
San Antonio-Nueces	0	861	78	77	76	75	74	73
Total	669,440	383,332	379,026	361,187	344,777	329,395	315,143	301,679

Source: Texas Water Development Board (TWDB); Consensus Projections adopted by the TWDB, September 17, 2003.

2.7 Livestock Water Demand Projections

In the South Central Texas Region in 2007, livestock production was valued at approximately $854 million, which was 2.3 times the value of crops produced in the region in 2007. In 2007, there were approximately 1.15 million head of cattle and calves, 77 million chickens, 39,000 head of sheep and lambs, and about 6,200 hogs and pigs. Although livestock production is an important component of the regional economy, the industry consumes a relatively small amount of water. In 2000, water use in the South Central Texas Region for livestock purposes was estimated at 25,660 acft/yr (Figure 2-5 and Table 2-9). The TWDB projections for livestock use in the region estimate that in the year 2010 livestock demand will be 25,954 acft/yr. After the year 2010, it is projected that livestock demand will remain level at 25,954 acft/yr throughout the planning period (Figure 2-5 and Table 2-9).

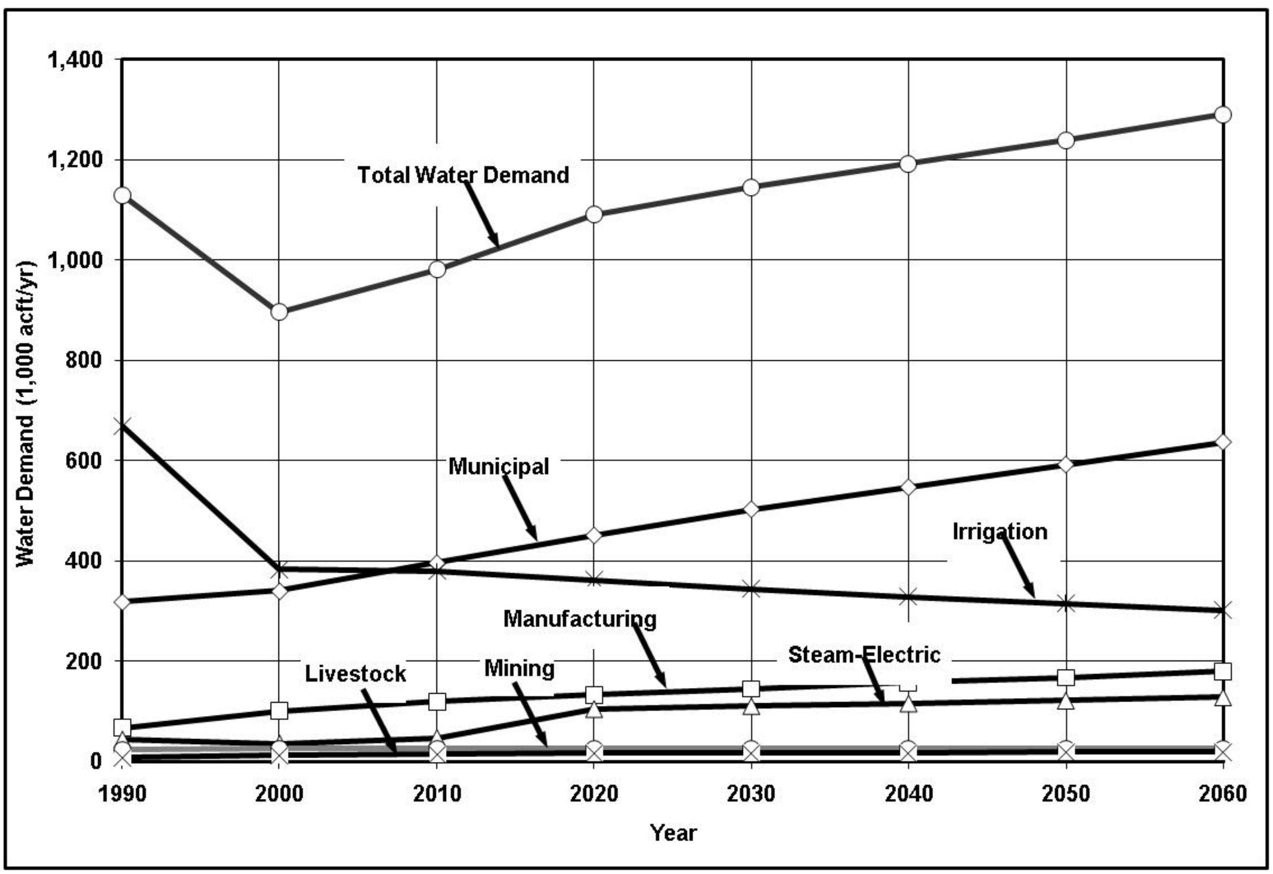

Figure 2-5. Total Water Demand Projections South Central Texas Region – 1990 to 2060

Table 2-9.
Livestock Water Demand Projections
South Central Texas Region
Individual Counties with River Basin Summaries

	Total in 1990 (acft)	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Counties								
Atascosa	1,613	1,745	1,745	1,745	1,745	1,745	1,745	1,745
Bexar	1,376	1,319	1,319	1,319	1,319	1,319	1,319	1,319
Caldwell	816	918	918	918	918	918	918	918
Calhoun	291	342	342	342	342	342	342	342
Comal	316	298	298	298	298	298	298	298
DeWitt	1,840	1,689	1,689	1,689	1,689	1,689	1,689	1,689
Dimmit	987	552	552	552	552	552	552	552
Frio	1,097	1,209	1,209	1,209	1,209	1,209	1,209	1,209
Goliad	884	920	920	920	920	920	920	920
Gonzales	4,108	5,159	5,453	5,453	5,453	5,453	5,453	5,453
Guadalupe	1,031	1,057	1,057	1,057	1,057	1,057	1,057	1,057
Hays (Part)	378	280	280	280	280	280	280	280
Karnes	1,371	1,185	1,185	1,185	1,185	1,185	1,185	1,185
Kendall	389	446	446	446	446	446	446	446
LaSalle	988	1,687	1,687	1,687	1,687	1,687	1,687	1,687
Medina	1,560	1,298	1,298	1,298	1,298	1,298	1,298	1,298
Refugio	563	623	623	623	623	623	623	623
Uvalde	994	1,284	1,284	1,284	1,284	1,284	1,284	1,284
Victoria	1,271	1,085	1,085	1,085	1,085	1,085	1,085	1,085
Wilson	1,813	1,808	1,808	1,808	1,808	1,808	1,808	1,808
Zavala	714	756	756	756	756	756	756	756
Total	24,400	25,660	25,954	25,954	25,954	25,954	25,954	25,954
River and Coastal Basins Summaries								
Rio Grande	192	105	105	105	105	105	105	105
Nueces	7,767	8,450	8,450	8,450	8,450	8,450	8,450	8,450
San Antonio	5,285	5,058	5,058	5,058	5,058	5,058	5,058	5,058
Guadalupe	8,836	9,667	9,914	9,914	9,914	9,914	9,914	9,914
Lower Colorado	147	169	169	169	169	169	169	169
Lavaca	305	310	357	357	357	357	357	357
Colorado-Lavaca	13	17	17	17	17	17	17	17
Lavaca-Guadalupe	898	868	868	868	868	868	868	868
San Antonio-Nueces	957	1,016	1,016	1,016	1,016	1,016	1,016	1,016
Total	24,400	25,660	25,954	25,954	25,954	25,954	25,954	25,954

Source: Texas Water Development Board (TWDB); Consensus Projections adopted by the TWDB, September 17, 2003.

2.8 Total Water Demand Projections

Total water demand projections for the South Central Texas Region are the sum of water demand projections for municipal, manufacturing, steam-electric power generation, mining, irrigation, and livestock water demand projections (Tables 2-4 through 2-9) and are shown in Table 2-10 and Figure 2-5. Total water use in 2000 was 896,353 acft/yr (Table 2-10). Projected total water demand for the region is 1,145,898 acft/yr in 2030 and 1,291,568 acft/yr in 2060 (Table 2-10 and Figure 2-5). Projections of future water demands for municipal, manufacturing, steam-electric power, mining, and livestock increase while projections for irrigation decrease. The reasons for the decline in the projections of demand in future years for irrigation are predictions of increased efficiency in irrigation and economic factors adversely affecting the profitability of irrigation in future years.

Projections of future water demands for the South Central Texas Region show irrigation demand at 30.09 percent of total demand in 2030 and 23.36 percent in 2060 (Table 2-11). Municipal demand, as a percent of total demand, is projected to increase from 37.93 percent in 2000 to 43.93 percent in 2030, and to 49.34 percent in 2060 (Table 2-11), with livestock demand as a percent of total demand decreasing from 2.86 percent in 2000 to 2.26 percent in 2030, and to 2.01 percent in 2060 (Table 2-11). Manufacturing water demand was 11.18 percent of total demand in 2000, and is projected to be 12.64 percent in 2030, and 13.91 percent in 2060 (Table 2-11). Steam-electric power demand increases from 3.95 percent of total demand in 2000 to 9.65 percent in 2030, and 9.94 percent in 2060 (Table 2-11).

Table 2-10.
Total Water Demand Projections
South Central Texas Region
Individual Counties with River Basin Summaries

	Total in 1990 (acft)	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Counties								
Atascosa	61,191	49,972	57,875	55,133	55,777	54,907	55,533	55,100
Bexar	303,917	288,430	325,629	365,210	398,816	424,173	449,076	474,653
Caldwell	7,149	6,573	8,297	9,777	11,001	12,247	13,540	14,871
Calhoun	64,234	54,233	68,674	72,110	75,265	78,865	82,078	86,370
Comal	15,404	22,910	29,680	36,697	44,408	51,958	59,710	68,389
DeWitt	5,901	5,068	5,160	5,158	5,116	5,051	4,953	4,907
Dimmit	14,889	10,653	14,727	14,611	14,584	14,157	13,677	13,157
Frio	87,726	121,689	87,026	84,347	81,704	79,189	76,650	74,275
Goliad	14,650	11,227	11,682	19,302	19,298	19,266	19,233	19,224
Gonzales	12,366	13,509	13,293	13,636	13,894	14,089	14,168	14,274
Guadalupe	14,973	18,278	26,972	29,863	34,403	40,710	46,449	54,260
Hays (Part)	10,538	11,654	19,274	26,157	31,982	38,470	45,922	52,268
Karnes	6,049	6,053	5,718	5,850	6,008	6,116	6,163	6,167
Kendall	2,901	4,110	5,815	7,521	9,279	10,733	11,998	13,237
LaSalle	9,513	7,315	8,277	8,276	8,245	8,210	8,176	8,134
Medina	164,600	64,510	63,521	62,347	61,178	59,957	58,856	57,793
Refugio	1,867	2,670	1,948	1,987	1,982	1,999	2,012	2,002
Uvalde	147,897	67,741	65,886	64,087	62,286	60,501	58,717	57,042
Victoria	49,843	50,992	62,333	115,059	117,984	120,805	123,511	126,617
Wilson	19,586	27,782	19,754	20,195	20,936	21,771	22,873	24,193
Zavala	115,407	50,983	76,832	74,250	71,752	69,283	66,906	64,634
Total	1,130,601	896,353	981,370	1,091,573	1,145,898	1,192,457	1,240,201	1,291,568
River and Coastal Basins Summaries								
Rio Grande	198	107	107	107	107	107	107	107
Nueces	582,121	367,959	366,740	355,453	347,780	338,357	330,590	322,163
San Antonio	357,708	336,944	375,110	416,738	455,989	486,693	517,414	549,279
Guadalupe	107,464	120,932	151,648	228,575	248,700	270,843	292,763	316,653
Lower Colorado	403	562	717	874	1,014	1,156	1,293	1,433
Lavaca	1,003	867	916	920	915	904	890	883
Colorado-Lavaca	6,635	20,128	22,823	25,190	27,331	29,462	31,179	33,361
Lavaca-Guadalupe	72,694	45,692	60,735	61,131	61,500	62,371	63,407	65,149
San Antonio-Nueces	2,375	3,162	2,574	2,585	2,562	2,564	2,558	2,540
Total	1,130,601	896,353	981,370	1,091,573	1,145,898	1,192,457	1,240,201	1,291,568

Source: Texas Water Development Board (TWDB); Consensus Projections adopted by the TWDB, September 17, 2003 as revised for steam-electric power projections.

Table 2-11.
Composition of Total Water Use
South Central Texas Region
1990, 2000, 2030, and 2060

	1990		*2000*		*2030*		*2060*	
Water Use	***acft***	***% Total***	***acft***	***% Total***	***Acft***	***% Total***	***acft***	***% Total***
Municipal	318,495	28.17%	340,030	37.93%	503,375	43.93%	637,236	49.34%
Manufacturing	67,016	5.93%	100,195	11.18%	144,801	12.64%	179,715	13.91%
Steam-Electric Power	43,451	3.84%	35,379	3.95%	110,537	9.65%	128,340	9.94%
Mining	7,799	0.69%	11,757	1.31%	16,454	1.44%	18,644	1.44%
Irrigation	669,440	59.21%	383,332	42.77%	344,777	30.09%	301,679	23.36%
Livestock	24,400	2.16%	25,660	2.86%	25,954	2.26%	25,954	2.01%
Total	1,130,601	100.00%	896,353	100.00%	1,145,898	100.00%	1,291,568	100.00%

2.9 Water Demand Projections for Counties and River Basins

For purposes of this regional planning project, and in accordance with TWDB Rules, Section 357.7(a)(2), water demand projections are tabulated by river and coastal basin, county or part of county located within the river or coastal basin, and city and rural areas of each county or part of county for the South Central Texas Region (Table 2-12).[2] An illustration of how to read Table 2-12 is given below; however, the entire table will not be verbalized here. For example, a part of the rural area of Dimmit County is located in the Rio Grande Basin. The projected 2 acft/yr of water demand for the people who live in this rural area is shown as municipal water demand (Table 2-12). There is no industry, steam-electric power, irrigation, or mining demand projected for that part of Dimmit County located in the Rio Grande Basin. However, there is a livestock demand of 105 acft/yr (Table 2-12).

A part of Atascosa County is located in the Nueces River Basin, and a part is located in the San Antonio River Basin. That part located in the Nueces River Basin contains the cities of Charlotte, Jourdanton, Lytle, Pleasanton, and Poteet, with each city having a municipal water system. In addition, the Benton Water Supply Corporation, McCoy Water Supply Corporation, and Bexar Metropolitan Water District have water service areas in the Nueces Basin part of the county. Rural areas of Atascosa County located in the Nueces River Basin have population which supplies their own water via individual household systems. The municipal water use by

[2] 31 Texas Administrative Code, Chapter 357, Regional Water Planning Guideline Rules, Texas Water Development Board, Austin, Texas, March 11, 1998.

Charlotte in 1990 was 247 acft/yr, and in 2000 was 282 acft/yr, with projected municipal water demand in 2060 of 350 acft/yr (Table 2-12).

Water use in 1990 by Jourdanton was 670 acft/yr and 740 acft/yr in 2000, with projected 2060 demands of 1,026 acft/yr (Table 2-12). Benton Water Supply Corporation supplied 464 acft/yr in 2000, and has a projected demand in 2060 of 1,617 acft/yr. In 1990, rural areas of Atascosa County located in the Nueces River Basin used 1,633 acft/yr for household purposes (municipal type of water use), used 569 acft/yr in 2000, and are projected to have a 2060 demand of 94 acft/yr (Table 2-12). It is important to note that areas served by Benton Water Supply Corporation, McCoy Water Supply Corporation, and Bexar Metropolitan Water District were included as rural areas in 1990, but have been separated out for 2000 through 2060, thus partly explaining the reduced quantities for 2000 through 2060 for rural areas.

There is no industrial demand in Atascosa County in the Nueces River Basin. However, there was an estimated 6,036 acft/yr of water used for steam-electric power in 1990, and 5,814 acft/yr in 2000, with projected steam-electric power water demand in 2060 of 7,672 acft/yr (Table 2-12). Irrigation water demand in Atascosa County in the Nueces River Basin decreased from 45,792 acft/yr in 1990 to 34,107 acft/yr in 2000, with projected demand in 2060 of 33,570 acft/yr (Table 2-12).

Total water use in Atascosa County in the Nueces River Basin in 1990 was 59,619 acft/yr, in 2000 was 48,892 acft/yr, with projected total water demand for this same area at 53,954 acft/yr in 2060 (Table 2-12).

The reader can see the projections for each county or part of county of each respective river or coastal basin of the region in Table 2-12. Total projections for counties and parts of counties of each river and coastal basin area located in the South Central Texas Region are shown at the end of the listing of individual counties and parts of counties of each river or coastal basin. In addition, the basin totals are listed at the end of Table 2-12. For example, total water use in 1990 in the Nueces River Basin part of the South Central Texas Planning Region was 582,121 acft/yr, of which 24,157 acft/yr was for municipal purposes, 2,152 acft/yr was for industrial purposes, 6,074 acft/yr was for steam-electric power purposes, 539,759 acft/yr was for irrigation, 2,212 acft/yr was for mining, and 7,767 acft/yr was for livestock (Page 2-45). In 2000 in the Nueces River Basin part of the South Central Texas Planning Region, total water use was 367,959 acft/yr, of which 29,599 acft/yr was for municipal purposes, 1,362 acft/yr was for manufacturing (industrial) purposes, 5,943 acft/yr was for steam-electric power purposes, 319,890 acft/yr was for irrigation, 2,715 acft/yr was for mining, and 8,450 acft/yr was for livestock (Page 2-45). Projected water demand for the Nueces River Basin part of the planning region in 2060 is 322,163 acft/yr, with 41,555 acft/yr being for municipal demand, 1,962 acft/yr being for manufacturing, 7,763 acft/yr being for steam-electric power, 258,935 acft/yr being for irrigation, 3,498 acft/yr being for mining, and 8,450 acft/yr being for livestock (Page 2-45).

The reader can see the projections, by type of demand, for the Rio Grande, Nueces, San Antonio, Guadalupe, Lower Colorado, and Lavaca River Basins as well as for the Colorado-Lavaca, Lavaca-Guadalupe, and San Antonio-Nueces Coastal Basin areas of the South Central Planning Region in Table 2-12, Pages 2-45 through 2-47. Total water use in the South Central Texas Region in 1990 was 1,130,601 acft/yr, and in 2000 was 896,353 acft/yr, with projected 2060 water demands of 1,291,568 acft/yr (Page 2-47). The quantities of projected water demands in 2060 are 107 acft/yr for the Rio Grande River Basin, 322,163 acft/yr for the Nueces River Basin, 549,279 acft/yr for the San Antonio River Basin, 316,652 acft/yr for the Guadalupe River Basin, 1,433 acft/yr for the Lower Colorado River Basin, 884 acft/yr for the Lavaca River Basin, 33,361 acft/yr for the Colorado-Lavaca Coastal Basin, 65,149 acft/yr for the Lavaca-Guadalupe Coastal Basin, and 2,540 acft/yr for the San Antonio-Nueces Coastal Basin (Page 2-47).

Table 2-12.
Water Demand Projections
South Central Texas Region
River Basins, Counties, Cities, and Water Supply Districts and Authorities

Basin/County/City/Rural	*Use in 1990 (acft)*	*Use in 2000 (acft)*	*Projections*					
			2010 (acft)	*2020 (acft)*	*2030 (acft)*	*2040 (acft)*	*2050 (acft)*	*2060 (acft)*
Rio Grande Basin (part)								
Dimmit (part) - Rio Grande								
County-Other (Rural)	6	2	2	2	2	2	2	2
Municipal Demand	6	2	2	2	2	2	2	2
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	192	105	105	105	105	105	105	105
Total Demand	198	107	107	107	107	107	107	107
Rio Grande Basin								
Municipal Demand	6	2	2	2	2	2	2	2
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	192	105	105	105	105	105	105	105
Rio Grande Basin Total	**198**	**107**	**107**	**107**	**107**	**107**	**107**	**107**
Nueces Basin (part)								
Atascosa (part) - Nueces								
Charlotte	247	282	296	312	324	332	342	350
Jourdanton	670	740	801	861	914	955	994	1,026
Lytle	410	399	412	423	433	439	448	456
Pleasanton	1,556	1,833	1,906	1,969	2,027	2,063	2,109	2,151
Poteet	1,055	729	735	741	740	740	745	752
Benton City Water Supply Corp.		464	710	963	1,185	1,353	1,506	1,617
McCoy Water Supply Corp.		760	1,065	1,381	1,643	1,851	2,042	2,181
Bexar Met Water District		389	505	621	715	780	843	895
County-Other (Rural)	1,633	569	432	328	242	172	124	94
Municipal Demand	5,571	6,165	6,862	7,599	8,223	8,685	9,153	9,522
Manufacturing Demand	0	6	6	6	6	6	6	6
Steam-Electric Power Demand	6,036	5,814	7,000	4,807	6,101	5,997	7,336	7,672
Irrigation Demand	45,792	34,107	39,782	38,442	37,154	35,914	34,723	33,570
Mining Demand	664	1,125	1,298	1,370	1,405	1,439	1,472	1,509
Livestock Demand	1,556	1,675	1,675	1,675	1,675	1,675	1,675	1,675
Total Demand	59,619	48,892	56,623	53,899	54,564	53,716	54,365	53,954

Table 2-12 (Continued)

Basin/County/City/Rural	*Use in 1990 (acft)*	*Use in 2000 (acft)*	*Projections 2010 (acft)*	*2020 (acft)*	*2030 (acft)*	*2040 (acft)*	*2050 (acft)*	*2060 (acft)*
Bexar (part) - Nueces								
Lytle	1	3	5	7	8	10	11	12
Atascosa Rural Water Supply Corp.		31	38	44	51	56	60	65
Bexar Met Water District		159	161	163	165	165	167	171
County-Other (Rural)	330	251	258	263	268	270	273	279
Municipal Demand	331	444	462	477	492	501	511	527
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	3,374	1,333	1,283	1,229	1,177	1,127	1,080	1,034
Mining Demand	147	106	131	144	152	160	168	175
Livestock Demand	23	24	24	24	24	24	24	24
Total Demand	3,875	1,907	1,900	1,874	1,845	1,812	1,783	1,760
Dimmit (part) - Nueces								
Asherton	215	274	286	299	306	301	293	279
Big Wells	178	142	149	156	159	157	153	145
Carrizo Springs	1,592	1,742	1,842	1,943	1,996	1,981	1,930	1,836
County-Other (Rural)	217	272	282	292	293	284	274	261
Municipal Demand	2,202	2,430	2,559	2,690	2,754	2,723	2,650	2,521
Manufacturing Demand	3	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	11,185	6,750	10,611	10,333	10,225	9,813	9,391	8,987
Mining Demand	506	919	1,003	1,034	1,051	1,067	1,082	1,095
Livestock Demand	795	447	447	447	447	447	447	447
Total Demand	14,691	10,546	14,620	14,504	14,477	14,050	13,570	13,050
Frio (part) - Nueces								
Dilley	771	1,041	1,229	1,409	1,555	1,683	1,774	1,825
Pearsall	1,602	1,435	1,443	1,448	1,449	1,435	1,442	1,449
Benton City Water Supply Corp.		2	3	4	5	6	6	6
County-Other (Rural)	672	636	727	807	881	937	980	1,007
Municipal Demand	3,045	3,114	3,402	3,668	3,890	4,061	4,202	4,287
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	38	129	289	268	201	192	76	91
Irrigation Demand	83,233	117,098	82,017	79,098	76,302	73,627	71,065	68,592
Mining Demand	313	139	109	104	102	100	98	96
Livestock Demand	1,097	1,209	1,209	1,209	1,209	1,209	1,209	1,209
Total Demand	87,726	121,689	87,026	84,347	81,704	79,189	76,650	74,275
Karnes (part) - Nueces								
El Oso Water Supply Corp.		12	13	13	14	15	15	16
County-Other (Rural)	39	19	24	29	35	39	42	44
Municipal Demand	39	31	37	42	49	54	57	60
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	118	107	107	107	107	107	107	107
Total Demand	157	138	144	149	156	161	164	167

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
LaSalle (part) - Nueces								
Cotulla	795	1,271	1,407	1,516	1,566	1,615	1,677	1,743
Encinal	98	110	110	109	108	106	107	107
County-Other (Rural)	340	244	282	321	384	441	478	500
Municipal Demand	1,233	1,625	1,799	1,946	2,058	2,162	2,262	2,350
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	7,292	4,003	4,791	4,643	4,500	4,361	4,227	4,097
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	988	1,687	1,687	1,687	1,687	1,687	1,687	1,687
Total Demand	9,513	7,315	8,277	8,276	8,245	8,210	8,176	8,134
Medina (part) - Nueces								
Devine	630	830	837	850	856	862	878	896
Hondo	1,456	1,601	1,784	2,001	2,205	2,374	2,548	2,717
Lytle	73	63	62	60	59	58	58	58
Natalia	294	291	330	374	415	450	485	519
East Medina Special Utility Dist.		735	833	944	1,048	1,132	1,221	1,310
Benton City Water Supply Corp.		336	414	504	589	661	737	805
County-Other (Rural)	1,535	1,194	1,489	1,816	2,108	2,367	2,635	2,876
Municipal Demand	3,988	5,050	5,749	6,549	7,280	7,904	8,562	9,181
Manufacturing Demand	286	56	67	75	82	89	95	103
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	133,196	47,000	45,357	43,465	41,654	39,919	38,257	36,665
Mining Demand	67	62	68	71	72	73	74	75
Livestock Demand	1,336	1,116	1,116	1,116	1,116	1,116	1,116	1,116
Total Demand	138,873	53,284	52,357	51,276	50,204	49,101	48,104	47,140
Uvalde (part) - Nueces								
Sabinal	381	412	407	403	398	393	389	389
Uvalde	3,915	6,070	6,087	6,124	6,144	6,148	6,150	6,178
County-Other (Rural)	982	1,286	1,572	1,867	2,110	2,305	2,425	2,532
Municipal Demand	5,278	7,768	8,066	8,394	8,652	8,846	8,964	9,099
Manufacturing Demand	557	378	432	455	473	490	505	538
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	140,669	58,061	55,791	53,609	51,513	49,498	47,563	45,703
Mining Demand	399	250	313	345	364	383	401	418
Livestock Demand	994	1,284	1,284	1,284	1,284	1,284	1,284	1,284
Total Demand	147,897	67,741	65,886	64,087	62,286	60,501	58,717	57,042
Wilson (part) - Nueces								
McCoy Water Supply Corp.		25	41	61	82	102	124	147
County-Other (Rural)	121	31	42	56	72	86	103	120
Municipal Demand	121	56	83	117	154	188	227	267
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	4,096	5,263	2,847	2,529	2,248	2,001	1,783	1,595
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	146	145	145	145	145	145	145	145
Total Demand	4,363	5,464	3,075	2,791	2,547	2,334	2,155	2,007

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Zavala (part) - Nueces								
Crystal City	1,692	2,175	2,247	2,272	2,343	2,337	2,349	2,370
County-Other (Rural)	657	741	864	1,028	1,134	1,241	1,327	1,371
Municipal Demand	2,349	2,916	3,111	3,300	3,477	3,578	3,676	3,741
Manufacturing Demand	1,306	922	1043	1106	1154	1200	1238	1315
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	110,922	46,275	71,800	68,963	66,238	63,621	61,107	58,692
Mining Demand	116	114	122	125	127	128	129	130
Livestock Demand	714	756	756	756	756	756	756	756
Total Demand	115,407	50,983	76,832	74,250	71,752	69,283	66,906	64,634
Nueces Basin								
Municipal Demand	24,157	29,599	32,130	34,782	37,029	38,702	40,264	41,555
Manufacturing Demand	2,152	1,362	1,548	1,642	1,715	1,785	1,844	1,962
Steam-Electric Power Demand	6,074	5,943	7,289	5,075	6,302	6,189	7,412	7,763
Irrigation Demand	539,759	319,890	314,279	302,311	291,011	279,881	269,196	258,935
Mining Demand	2,212	2,715	3,045	3,193	3,273	3,350	3,424	3,498
Livestock Demand	7,767	8,450	8,450	8,450	8,450	8,450	8,450	8,450
Nueces Basin Total Demand	**582,121**	**367,959**	**366,741**	**355,453**	**347,780**	**338,357**	**330,590**	**322,163**
San Antonio Basin (part)								
Atascosa (part) - San Antonio								
Benton City Water Supply Corp.		40	62	84	103	118	131	141
County-Other (Rural)	99	24	17	13	9	6	4	3
Municipal Demand	99	64	79	97	112	124	135	144
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	1,416	946	1,103	1,067	1,031	997	963	932
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	57	70	70	70	70	70	70	70
Total Demand	1,572	1,080	1,252	1,234	1,213	1,191	1,168	1,146
Bexar (part) - San Antonio								
Alamo Heights	2,210	2,000	2,071	2,134	2,136	2,132	2,146	2,170
Balcones Heights (SAWS)	538	480	514	555	578	600	633	670
China Grove (SAWS)	217	288	376	457	531	591	645	695
Converse	1,213	1,495	1,907	2,331	2,729	3,044	3,311	3,564
Elmendorf (SAWS)	52	99	112	123	132	140	148	156
Fairoaks Ranch	617	889	1,090	1,094	1,097	1,101	1,099	1,104
Helotes (SAWS)	310	845	1,537	2,249	2,820	3,264	3,679	4,047
Kirby	1,080	1,001	1,005	1,004	1,007	1,001	1,013	1,034
Leon Valley	1,715	711	694	678	667	655	650	659
Leon Valley (SAWS)		407	397	388	382	375	372	377
Live Oak	1,221	1,128	1,145	1,157	1,177	1,193	1,232	1,284
Olmos Park (SAWS)	385	381	403	424	441	452	468	484
San Antonio (SAWS)	166,616	166,813	192,007	213,943	234,865	250,671	265,958	281,204
San Antonio (Served by BMWD)		21,419	24,654	27,471	30,157	32,187	34,150	36,107
San Antonio (Served by OTHERS)		247	284	317	348	371	394	416
Schertz	667	167	272	371	456	525	591	649
Selma		252	1,531	1,927	2,309	2,260	2,204	2,155

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Shavano Park	840	802	819	835	847	856	868	880
Somerset (SAWS)		321	405	484	552	609	660	709
St. Hedwig	187	256	310	358	403	436	469	501
Terrell Hills	817	815	863	914	956	983	1,018	1,057
Universal City	2,323	2,329	2,608	2,916	3,175	3,125	3,101	3,101
Castle Hills (Bexar Met WD)	1,311	838	820	807	793	780	771	771
Bexar Met Water District	20,741	8,635	8,736	8,869	8,944	8,945	9,081	9,278
Atascosa Rural Water Supply Corp.		735	903	1,068	1,213	1,335	1,441	1,548
Hill Country Village (BMWD)		842	838	835	831	828	826	826
Hollywood Park (BMWD)	2,174	2,229	2,314	2,389	2,458	2,511	2,565	2,616
Green Valley Special Utility Dist.		247	458	646	818	939	1,068	1,182
Windcrest	1,329	1,212	1,204	1,196	1,187	1,177	1,174	1,182
Water Service Inc (Apex)		435	570	697	809	902	982	1,061
East Central SUD		975	1,325	1,572	1,790	1,974	2,133	2,289
Lackland AFB (CDP)	4,212	3,136	3,104	3,080	3,056	3,032	3,016	3,016
County-Other (SAWS)		5,595	5,661	5,747	5,796	5,796	5,884	6,012
County-Other (Rural)	14,520	1,226	705	559	472	742	985	1,205
Municipal Demand	225,295	229,249	261,643	289,594	315,931	335,532	354,735	374,009
Manufacturing Demand	14,049	21,252	25,951	29,497	32,775	36,068	38,965	42,112
Steam-Electric Power Demand	24,263	17,399	20,395	25,761	30,139	32,973	36,120	39,614
Irrigation Demand	33,638	14,532	13,990	13,399	12,833	12,290	11,770	11,272
Mining Demand	1,444	2,796	3,451	3,790	3,998	4,203	4,408	4,591
Livestock Demand	1,353	1,295	1,295	1,295	1,295	1,295	1,295	1,295
Total Demand	300,042	286,523	326,725	363,336	396,971	422,361	447,293	472,893
Comal (part) - San Antonio								
Fairoaks Ranch	19	58	58	58	58	58	58	59
Schertz	19	7	11	16	23	28	35	42
Bulverde City		501	1,044	1,728	2,507	3,283	4,089	4,954
Bexar Met Water District		214	429	695	984	1,249	1,537	1,860
Garden ridge		185	228	284	347	411	477	549
Selma		6	77	129	193	222	248	274
Water Service Inc (Apex)		236	308	402	509	615	723	845
County-Other (Rural)	1,718	109	118	145	172	209	250	298
Municipal Demand	1,756	1,316	2,273	3,457	4,793	6,075	7,417	8,881
Manufacturing Demand	0	1	1	1	1	2	2	2
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	409	7	30	28	23	22	20	18
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	45	42	42	42	42	42	42	42
Total Demand	2,210	1,366	2,346	3,528	4,859	6,141	7,481	8,943
DeWitt (part) - San Antonio								
County-Other (Rural)	109	67	67	66	65	63	61	60
Municipal Demand	109	67	67	66	65	63	61	60
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	22	8	12	10	8	7	5	5
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	148	135	135	135	135	135	135	135
Total Demand	279	210	214	211	208	205	201	200

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Goliad (part) - San Antonio								
Goliad	412	365	416	480	527	553	577	594
County-Other (Rural)	261	225	252	291	315	329	342	352
Municipal Demand	673	590	668	771	842	882	919	946
Manufacturing Demand	0	0	4	8	12	16	20	24
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	685	298	257	222	193	166	144	124
Mining Demand	0	0	129	91	64	43	21	11
Livestock Demand	345	359	359	359	359	359	359	359
Total Demand	1,703	1,247	1,417	1,451	1,470	1,466	1,463	1,464
Guadalupe (part) - San Antonio								
Cibolo	178	598	866	1,190	1,546	1,898	2,298	2,730
Marion	111	154	164	179	194	209	229	251
New Berlin			70	83	100	122	148	180
Schertz	1,454	2,776	3,797	5,089	6,448	7,822	9,399	11,098
Selma		17	59	86	113	131	152	176
Green Valley Special Utility Dist.		546	683	863	1,072	1,256	1,492	1,746
Springs Hill Water Supply Corp.		323	365	417	475	533	599	674
East Central SUD		102	66	89	112	130	144	158
Water Service Inc (Apex)		25	30	37	45	53	61	71
Santa Clara		92	177	280	395	505	631	766
County-Other (Rural)	1,666	58	50	39	27	17	9	2
Municipal Demand	3,409	4,691	6,327	8,352	10,527	12,676	15,162	17,852
Manufacturing Demand	0	3	4	4	5	5	5	6
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	343	113	137	123	109	96	91	91
Mining Demand	8	14	16	16	17	17	18	18
Livestock Demand	258	264	264	264	264	264	264	264
Total Demand	4,018	5,085	6,748	8,759	10,922	13,058	15,540	18,231
Karnes (part) - San Antonio								
Karnes city	410	418	432	453	474	492	503	512
Kenedy	682	758	763	826	874	912	961	993
Runge	164	195	195	209	219	227	238	247
Falls City		107	113	122	131	138	142	145
El Oso Water Supply Corp.		458	482	514	547	573	590	601
Sunko Water Supply Corp.		46	49	53	57	61	63	64
County-Other (Rural)	820	686	824	933	1,069	1,172	1,214	1,232
Municipal Demand	2,076	2,668	2,858	3,110	3,371	3,575	3,711	3,794
Manufacturing Demand	270	107	118	122	125	128	130	137
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	2,034	1,916	1,382	1,250	1,131	1,023	925	836
Mining Demand	187	105	94	91	90	89	89	88
Livestock Demand	1,088	936	936	936	936	936	936	936
Total Demand	5,655	5,732	5,388	5,509	5,653	5,751	5,791	5,791

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Kendall (part) - San Antonio								
Boerne	785	1,170	1,570	2,188	2,843	3,370	3,831	4,282
Fairoaks Ranch	64	152	286	296	300	305	310	316
Water Service Inc (Apex)		37	43	52	61	69	75	81
County-Other (Rural)	515	748	1,080	1,506	1,939	2,304	2,620	2,930
Municipal Demand	1,364	2,107	2,979	4,042	5,143	6,048	6,836	7,609
Manufacturing Demand	2	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	107	194	189	185	181	177	174
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	70	80	80	80	80	80	80	80
Total Demand	1,436	2,294	3,253	4,311	5,408	6,309	7,093	7,863
Medina (part) - San Antonio								
Castroville	779	621	680	743	802	854	908	961
La Coste	229	190	205	222	239	251	265	281
Yancey Water Supply Corp.		668	832	1,013	1,180	1,328	1,469	1,603
East Medina Special Utility Dist.		42	48	54	60	65	70	75
Bexar Met Water District		15	24	33	41	47	54	60
County-Other (Rural)	258	30	38	46	54	60	67	73
Municipal Demand	1,266	1,566	1,827	2,111	2,376	2,605	2,833	3,053
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	24,184	9,422	9,093	8,714	8,351	8,003	7,670	7,350
Mining Demand	53	56	62	64	65	66	67	68
Livestock Demand	224	182	182	182	182	182	182	182
Total Demand	25,727	11,226	11,164	11,071	10,974	10,856	10,752	10,653
Refugio (part) - San Antonio								
County-Other (Rural)	11	8	7	6	6	5	5	5
Municipal Demand	11	8	7	6	6	5	5	5
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	21	25	25	25	25	25	25	25
Total Demand	32	33	32	31	31	30	30	30
Victoria (part) - San Antonio								
County-Other (Rural)	34	5	5	6	7	7	7	7
Municipal Demand	34	5	5	6	7	7	7	7
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	70	61	61	61	61	61	61	61
Total Demand	104	66	66	67	68	68	68	68

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Wilson (part) - San Antonio								
Floresville	1,044	1,203	1,805	2,011	2,245	2,475	2,726	3,000
LaVernia	218	206	278	367	464	557	658	764
Poth	361	315	348	389	434	480	530	585
Stockdale	273	321	350	386	426	466	510	558
SS Water Supply Corp.		1,072	1,563	2,204	2,886	3,554	4,279	5,030
Oak Hills Water Supply Corp.		479	693	960	1,251	1,536	1,843	2,160
Sunko Water Supply Corp.		465	564	691	826	965	1,107	1,262
East Central SUD		89	104	124	146	169	194	222
El Oso Water Supply Corp.		45	52	62	71	81	91	102
County-Other (Rural)	1,660	542	539	770	1,027	1,269	1,533	1,807
Municipal Demand	3,556	4,737	6,296	7,964	9,776	11,552	13,471	15,490
Manufacturing Demand	2	1	1	1	1	1	1	1
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	9,485	15,474	8,370	7,435	6,610	5,883	5,245	4,691
Mining Demand	281	261	228	221	216	212	208	206
Livestock Demand	1,606	1,609	1,609	1,609	1,609	1,609	1,609	1,609
Total Demand	14,930	22,082	16,504	17,230	18,212	19,257	20,534	21,997
San Antonio Basin								
Municipal Demand	239,648	247,068	285,029	319,576	352,949	379,144	405,292	431,850
Manufacturing Demand	14,323	21,364	26,079	29,633	32,919	36,220	39,123	42,282
Steam-Electric Power Demand	24,263	17,399	20,395	25,761	30,139	32,973	36,120	39,614
Irrigation Demand	72,216	42,823	34,568	32,437	30,474	28,668	27,010	25,493
Mining Demand	1,973	3,232	3,979	4,273	4,450	4,631	4,811	4,981
Livestock Demand	5,285	5,058	5,058	5,058	5,058	5,058	5,058	5,058
San Antonio Basin Total	**357,708**	**336,944**	**375,109**	**416,738**	**455,989**	**486,694**	**517,414**	**549,279**
Guadalupe Basin (part)								
Caldwell (part) - Guadalupe								
Lockhart	1,816	1,795	2,451	3,094	3,629	4,180	4,725	5,285
Luling	1,207	888	1,067	1,210	1,299	1,384	1,486	1,594
Polonia Water supply Corp.		322	466	618	749	884	1,016	1,155
Maxwell Water Supply Corp.		334	503	678	844	996	1,166	1,331
Martindale	101	107	125	134	139	143	150	158
Martindale Water Supply Corp.		93	142	153	158	162	170	179
AQUA Water Supply Corp.		196	267	339	396	458	518	580
Goforth Water Supply corp.		112	184	269	342	417	495	571
County Line Water Supply Corp.		114	204	308	405	501	600	695
Creedmoor-Maha Water Supply Corp.		68	98	127	154	181	207	235
Gonzales County Water Supply Corp.		46	63	79	94	108	122	136
Niederwald		11	26	43	61	78	95	111
Mustang Ridge		9	13	18	21	25	29	33
County-Other (Rural)	1,591	207	214	201	177	154	136	122
Municipal Demand	4,715	4,302	5,823	7,271	8,468	9,671	10,915	12,185
Manufacturing Demand	0	11	15	18	21	24	27	29
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	1,355	974	1,029	914	812	722	641	570
Mining Demand	27	5	5	6	6	6	7	7
Livestock Demand	681	762	762	762	762	762	762	762
Total Demand	6,778	6,054	7,634	8,971	10,069	11,185	12,352	13,553

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Calhoun (part) - Guadalupe								
County-Other (Rural)	3	0	0	0	0	0	0	0
Municipal Demand	3	0	0	0	0	0	0	0
Manufacturing Demand	233	136	160	176	190	204	216	232
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	13	15	16	17	17	18	18
Livestock Demand	0	3	3	3	3	3	3	3
Total Demand	236	152	178	195	210	224	237	253
Comal (part) - Guadalupe								
Garden Ridge	361	273	337	419	513	607	704	811
New Braunfels	6,199	8,073	10,042	12,510	15,390	18,241	21,168	24,416
Canyon Lake Water supply Corp.		1,495	2,928	4,769	6,838	8,898	11,034	13,331
Green Valley Special Utility Dist.		173	235	314	409	493	591	696
Crystal Clear Water Supply Corp.		174	240	325	426	516	619	731
Schertz		44	71	107	146	185	226	270
Bexar Met Water District		16	33	53	75	95	117	141
Bulverde City		4	9	14	21	27	34	41
County-Other (Rural)	2,099	2,487	2,603	2,785	2,987	3,167	3,408	3,700
Municipal Demand	8,659	12,739	16,498	21,296	26,805	32,229	37,901	44,137
Manufacturing Demand	3,248	6,282	7,728	8,562	9,313	10,043	10,670	11,551
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	70	43	174	158	146	130	115	101
Mining Demand	946	2,224	2,678	2,897	3,029	3,159	3,287	3,401
Livestock Demand	271	256	256	256	256	256	256	256
Total Demand	13,194	21,544	27,334	33,169	39,549	45,817	52,229	59,446
DeWitt (part) - Guadalupe								
Cuero	1,716	1,244	1,249	1,257	1,250	1,232	1,198	1,177
Yorktown	405	343	343	344	340	334	323	318
Gonzales County Water Supply Corp.		106	107	108	108	108	106	104
County-Other (Rural)	762	807	801	797	783	762	734	721
Municipal Demand	2,883	2,500	2,500	2,506	2,481	2,436	2,361	2,320
Manufacturing Demand	91	147	176	190	202	215	225	242
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	263	94	147	122	100	80	64	49
Mining Demand	21	9	10	10	10	10	10	11
Livestock Demand	1,378	1,267	1,267	1,267	1,267	1,267	1,267	1,267
Total Demand	4,636	4,017	4,100	4,095	4,060	4,008	3,927	3,889
Goliad (part) - Guadalupe								
County-Other (Rural)	184	256	286	330	357	374	388	399
Municipal Demand	184	256	286	330	357	374	388	399
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	12,165	9,027	9,027	16,643	16,643	16,643	16,643	16,643
Irrigation Demand	0	50	43	38	32	28	24	21
Mining Demand	0	9	137	98	73	51	30	20
Livestock Demand	195	202	202	202	202	202	202	202
Total Demand	12,544	9,544	9,695	17,311	17,307	17,298	17,287	17,285

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Gonzales (part) - Guadalupe								
Gonzales	1,646	1,460	1,545	1,644	1,710	1,756	1,765	1,759
Nixon	373	414	438	460	479	488	490	488
Waelder	169	133	154	175	190	202	204	203
Gonzales County Water Supply Corp.		1,364	1,578	1,805	1,982	2,102	2,133	2,120
County-Other (Rural)	1,636	447	384	313	257	212	197	199
Municipal Demand	3,824	3,818	4,099	4,397	4,618	4,760	4,789	4,769
Manufacturing Demand	865	2,051	2,400	2,628	2,822	3,011	3,177	3,402
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	3,540	2,438	1,304	1,124	969	835	720	621
Mining Demand	21	30	25	24	23	23	22	22
Livestock Demand	4,072	5,107	5,354	5,354	5,354	5,354	5,354	5,354
Total Demand	12,322	13,444	13,182	13,527	13,786	13,983	14,062	14,168
Guadalupe (part) - Guadalupe								
New Braunfels	55	266	467	703	960	1,216	1,499	1,810
Seguin	3,604	4,463	5,018	5,718	6,454	7,203	8,069	9,047
Green Valley Special Utility Dist.		1,337	1,691	2,136	2,651	3,109	3,695	4,326
Springs Hill Water Supply Corp.		1,753	1,984	2,262	2,581	2,891	3,250	3,656
Crystal Clear Water Supply Corp.		1,017	1,316	1,688	2,112	2,498	2,977	3,493
Martindale Water Supply Corp.		26	47	64	84	111	128	150
Santa Clara		23	43	69	97	124	155	188
County-Other (Rural)	2,559	274	220	175	129	79	45	11
Municipal Demand	6,218	9,159	10,786	12,815	15,068	17,231	19,818	22,681
Manufacturing Demand	1,661	2,094	2,634	2,953	3,244	3,525	3,766	4,091
Steam-Electric Power Demand	0	129	4,788	3,406	3,326	5,136	5,585	7,515
Irrigation Demand	2,303	762	933	832	737	646	619	614
Mining Demand	0	256	290	305	313	321	328	335
Livestock Demand	773	793	793	793	793	793	793	793
Total Demand	10,955	13,193	20,224	21,104	23,481	27,652	30,909	36,029
Hays (part) - Guadalupe								
Kyle	326	702	2,740	3,940	4,217	4,377	4,874	5,203
San Marcos	6,321	5,914	8,038	11,198	14,371	17,824	21,559	24,439
Wimberley WS Corp.	732	578	776	997	1,224	1,442	1,736	1,966
Woodcreek	182	188	246	315	385	452	540	610
Wood Creek Utilities Inc.		400	748	1,145	1,564	1,974	2,477	2,873
Goforth WS Corp.		666	972	1,340	1,704	2,075	2,545	2,914
Crystal Clear WS Corp.		349	485	639	806	959	1,165	1,327
Plum Creek Water Co		392	566	762	963	1,168	1,427	1,630
County Line WS Corp.		252	947	1,999	2,319	2,393	2,612	2,982
Maxwell WS Corp.		117	157	200	249	294	354	402
Niederwald		65	104	147	194	238	294	338
Mountain City		22	45	71	98	124	157	183
Creedmoor-Maha WSC		8	10	12	15	17	20	23
County-Other (Rural)	2,244	1,273	1,444	1,644	1,855	2,077	2,361	2,584
Municipal Demand	9,805	10,926	17,278	24,409	29,964	35,414	42,121	47,474
Manufacturing Demand	57	157	212	249	285	322	355	386
Steam-Electric Power Demand	0	0	1,009	718	949	1,949	2,663	3,627
Irrigation Demand	298	162	353	350	347	344	341	338
Mining Demand	0	129	142	151	157	161	162	163
Livestock Demand	378	280	280	280	280	280	280	280
Total Demand	10,538	11,654	19,274	26,157	31,982	38,470	45,922	52,268

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Karnes (part) - Guadalupe								
El Oso Water Supply Corp.		5	5	5	6	6	6	6
County-Other (Rural)	14	13	16	20	24	27	30	31
Municipal Demand	14	18	21	25	30	33	36	37
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	8	7	7	7	7	7	7
Livestock Demand	94	83	83	83	83	83	83	83
Total Demand	108	109	111	115	120	123	126	127
Kendall (part) - Guadalupe								
County-Other (Rural)	746	1,131	1,635	2,279	2,936	3,487	3,966	4,434
Municipal Demand	746	1,131	1,635	2,279	2,936	3,487	3,966	4,434
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	380	289	520	510	500	490	481	472
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	307	353	353	353	353	353	353	353
Total Demand	1,433	1,773	2,508	3,142	3,789	4,330	4,800	5,259
Victoria (part) - Guadalupe								
Victoria	7,269	7,573	8,013	8,505	8,860	9,092	9,361	9,650
County-Other (Rural)	1,220	1,365	1,520	1,686	1,821	1,912	1,998	2,095
Municipal Demand	8,489	8,938	9,533	10,191	10,681	11,004	11,359	11,745
Manufacturing Demand	20,032	24,323	28,726	32,095	35,035	37,962	40,578	43,520
Steam-Electric Power Demand	887	2,197	4,052	53,178	53,178	53,178	53,178	53,178
Irrigation Demand	1,995	979	1,450	1,253	1,081	932	805	695
Mining Demand	2,398	2,267	2,965	3,391	3,688	3,990	4,301	4,541
Livestock Demand	626	507	507	507	507	507	507	507
Total Demand	34,427	39,211	47,233	100,615	104,170	107,573	110,728	114,186
Wilson (part) - Guadalupe								
County-Other (Rural)	68	20	28	37	47	57	68	79
Municipal Demand	68	20	28	37	47	57	68	79
Manufacturing Demand	48	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	116	146	79	70	63	56	49	44
Mining Demand	0	16	14	13	13	13	13	12
Livestock Demand	61	54	54	54	54	54	54	54
Total Demand	293	236	175	174	177	180	184	189
Guadalupe Basin								
Municipal Demand	45,608	53,808	68,487	85,556	101,455	116,696	133,722	150,261
Manufacturing Demand	26,235	35,201	42,051	46,871	51,112	55,306	59,014	63,453
Steam-Electric Power Demand	13,052	11,353	18,876	73,945	74,096	76,906	78,069	80,963
Irrigation Demand	10,320	5,937	6,032	5,371	4,787	4,263	3,859	3,525
Mining Demand	3,413	4,964	6,289	6,918	7,336	7,758	8,184	8,536
Livestock Demand	8,836	9,667	9,914	9,914	9,914	9,914	9,914	9,914
Guadalupe Basin Total	**107,464**	**120,930**	**151,649**	**228,575**	**248,700**	**270,843**	**292,762**	**316,652**

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Lower Colorado Basin (part)								
Caldwell (part) - Lower Colorado								
Polonia Water supply Corp.		140	202	268	325	384	441	501
Creedmoor-Maha Water Supply Corp.		94	136	177	213	250	287	325
Mustang Ridge		84	122	160	194	228	262	296
County-Other (Rural)	216	23	23	22	22	22	21	21
Municipal Demand	216	341	483	627	754	884	1,011	1,143
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	20	15	15	14	12	11	10	8
Mining Demand	0	7	9	9	10	11	11	11
Livestock Demand	135	156	156	156	156	156	156	156
Total Demand	371	519	663	806	932	1,062	1,188	1,318
Kendall (part) - Lower Colorado								
County-Other (Rural)	20	24	35	49	63	75	86	96
Municipal Demand	20	24	35	49	63	75	86	96
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	6	6	6	6	6	6	6
Livestock Demand	12	13	13	13	13	13	13	13
Total Demand	32	43	54	68	82	94	105	115
Lower Colorado Basin								
Municipal Demand	236	365	518	676	817	959	1,097	1,239
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	20	15	15	14	12	11	10	8
Mining Demand	0	13	15	15	16	17	17	17
Livestock Demand	147	169	169	169	169	169	169	169
Lower Colorado Basin Total	**403**	**562**	**717**	**874**	**1,014**	**1,156**	**1,293**	**1,433**
Lavaca Basin (part)								
DeWitt (part) - Lavaca								
Yoakum	425	352	352	354	351	345	334	328
County-Other (Rural)	136	146	145	145	142	138	133	131
Municipal Demand	561	498	497	499	493	483	467	459
Manufacturing Demand	0	7	8	9	10	10	11	12
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	108	34	37	39	40	40	41	41
Livestock Demand	263	253	253	253	253	253	253	253
Total Demand	932	792	795	800	796	786	772	765
Gonzales (part) - Lavaca								
County-Other (Rural)	8	10	9	7	6	5	5	5
Municipal Demand	8	10	9	7	6	5	5	5
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	3	3	3	3	2	2	2
Livestock Demand	36	52	99	99	99	99	99	99
Total Demand	44	65	111	109	108	106	106	106

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Victoria (part) - Lavaca								
County-Other (Rural)	21	5	5	6	6	7	7	7
Municipal Demand	21	5	5	6	6	7	7	7
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	6	5	5	5	5	5	5	5
Total Demand	27	10	10	11	11	12	12	12
Lavaca Basin								
Municipal Demand	590	513	511	512	505	495	479	471
Manufacturing Demand	0	7	8	9	10	10	11	12
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	108	37	40	41	42	43	43	44
Livestock Demand	305	310	357	357	357	357	357	357
Lavaca Basin Total	**1,003**	**867**	**916**	**919**	**914**	**905**	**890**	**884**
Colorado-Lavaca Coastal Basin (part)								
Calhoun (part)-Colorado-Lavaca CB[2]								
Point Comfort	137	140	224	323	500	677	667	667
County-Other (Rural)	80	111	65	39	23	14	8	5
Municipal Demand	217	251	289	362	523	691	675	672
Manufacturing Demand	6,343	19,175	22,516	24,810	26,790	28,753	30,486	32,671
Steam-Electric Power Demand	62	684	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	1	1	1	1	1	1	1
Livestock Demand	13	17	17	17	17	17	17	17
Total Demand	6,635	20,128	22,823	25,190	27,331	29,462	31,179	33,361
Colorado Lavaca Coastal Basin								
Municipal Demand	217	251	289	362	523	691	675	672
Manufacturing Demand	6,343	19,175	22,516	24,810	26,790	28,753	30,486	32,671
Steam-Electric Power Demand	62	684	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	1	1	1	1	1	1	1
Livestock Demand	13	17	17	17	17	17	17	17
Colorado Lavaca CB Total	**6,635**	**20,128**	**22,823**	**25,190**	**27,331**	**29,462**	**31,179**	**33,361**
Lavaca-Guadalupe Coastal Basin (part)								
Calhoun (part)-Lavaca-Guadalupe CB								
Port Lavaca	1,507	1,658	1,769	1,877	1,981	2,079	2,209	2,345
Seadrift	169	247	252	255	257	256	257	258
Calhoun county WSC		356	436	516	572	609	618	632
County-Other (Rural)	2,016	186	198	210	222	234	248	264
Municipal Demand	3,692	2,447	2,655	2,858	3,032	3,178	3,332	3,499
Manufacturing Demand	17,963	23,086	27,108	29,871	32,255	34,618	36,704	39,335
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	35,421	8,077	15,568	13,654	12,096	11,041	10,285	9,581
Mining Demand	1	6	7	8	8	8	8	8
Livestock Demand	278	322	322	322	322	322	322	322
Total Demand	57,355	33,938	45,660	46,713	47,713	49,167	50,651	52,745

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
DeWitt (part)-Lavaca-Guadalupe CB								
County-Other (Rural)	3	0	0	0	0	0	0	0
Municipal Demand	3	0	0	0	0	0	0	0
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	15	17	18	18	18	19	19
Livestock Demand	51	34	34	34	34	34	34	34
Total Demand	54	49	51	52	52	52	53	53
Victoria (part)-Lavaca-Guadalupe CB								
Victoria	1,883	3,696	3,911	4,151	4,324	4,438	4,569	4,710
County-Other (Rural)	1,118	1,020	1,136	1,260	1,360	1,428	1,493	1,565
Municipal Demand	3,001	4,716	5,047	5,411	5,684	5,866	6,062	6,275
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	11,704	5,729	8,486	7,323	6,321	5,456	4,709	4,064
Mining Demand	11	748	979	1,120	1,218	1,318	1,420	1,500
Livestock Demand	569	512	512	512	512	512	512	512
Total Demand	15,285	11,705	15,024	14,366	13,735	13,152	12,703	12,351
Lavaca-Guadalupe Coastal Basin								
Municipal Demand	6,696	7,163	7,702	8,269	8,716	9,044	9,394	9,774
Manufacturing Demand	17,963	23,086	27,108	29,871	32,255	34,618	36,704	39,335
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	47,125	13,806	24,054	20,977	18,417	16,497	14,994	13,645
Mining Demand	12	770	1,003	1,145	1,244	1,344	1,447	1,527
Livestock Demand	898	868	868	868	868	868	868	868
Lavaca-Guadalupe CB Total	**72,694**	**45,693**	**60,735**	**61,130**	**61,500**	**62,371**	**63,407**	**65,149**
San Antonio-Nueces Coastal Basin (part)								
Calhoun (part)-San Antonio-Nueces CB								
County-Other (Rural)	4	7	4	2	1	1	0	0
Municipal Demand	4	7	4	2	1	1	0	0
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	4	8	9	10	10	11	11	11
Livestock Demand	0	0	0	0	0	0	0	0
Total Demand	8	15	13	12	11	12	11	11
Goliad (part)-San Antonio-Nueces CB								
County-Other (Rural)	59	62	70	80	87	91	94	97
Municipal Demand	59	62	70	80	87	91	94	97
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	11	9	8	7	6	5	4
Mining Demand	0	4	132	93	68	46	25	15
Livestock Demand	344	359	359	359	359	359	359	359
Total Demand	403	436	570	540	521	502	483	475

Table 2-12 (Continued)

Basin/County/City/Rural	*Use in 1990 (acft)*	*Use in 2000 (acft)*	*2010 (acft)*	*2020 (acft)*	*2030 (acft)*	*2040 (acft)*	*2050 (acft)*	*2060 (acft)*
Karnes (part)-San Antonio-Nueces CB								
El Oso Water Supply Corp.		2	3	3	3	3	3	3
County-Other (Rural)	58	7	8	10	12	14	15	15
Municipal Demand	58	9	11	13	15	17	18	18
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	6	5	5	5	5	5	5
Livestock Demand	71	59	59	59	59	59	59	59
Total Demand	129	74	75	77	79	81	82	82
Refugio (part)-San Antonio-Nueces CB								
Refugio	569	557	645	709	723	763	787	777
Woodsboro	309	272	283	291	289	292	295	293
County-Other (Rural)	338	354	314	281	264	239	225	227
Municipal Demand	1,216	1,183	1,242	1,281	1,276	1,294	1,307	1,297
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	850	69	69	69	69	69	69
Mining Demand	77	6	7	8	8	8	8	8
Livestock Demand	542	598	598	598	598	598	598	598
Total Demand	1,835	2,637	1,916	1,956	1,951	1,969	1,982	1,972
San Antonio-Nueces Coastal Basin								
Municipal Demand	1,337	1,261	1,327	1,376	1,379	1,403	1,419	1,412
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	861	78	77	76	75	74	73
Mining Demand	81	24	154	116	91	69	49	39
Livestock Demand	957	1,016	1,016	1,016	1,016	1,016	1,016	1,016
San Antonio-Nueces CB Total	**2,375**	**3,162**	**2,575**	**2,585**	**2,562**	**2,563**	**2,558**	**2,540**
South Central Texas Region River and Coastal Basins Summary								
Rio Grande Basin								
Municipal Demand	6	2	2	2	2	2	2	2
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	0	0	0	0	0	0	0
Livestock Demand	192	105	105	105	105	105	105	105
Rio Grande Basin Total	**198**	**107**	**107**	**107**	**107**	**107**	**107**	**107**
Nueces Basin								
Municipal Demand	24,157	29,599	32,130	34,782	37,029	38,702	40,264	41,555
Manufacturing Demand	2,152	1,362	1,548	1,642	1,715	1,785	1,844	1,962
Steam-Electric Power Demand	6,074	5,943	7,289	5,075	6,302	6,189	7,412	7,763
Irrigation Demand	539,759	319,890	314,279	302,311	291,011	279,881	269,196	258,935
Mining Demand	2,212	2,715	3,045	3,193	3,273	3,350	3,424	3,498
Livestock Demand	7,767	8,450	8,450	8,450	8,450	8,450	8,450	8,450
Nueces Basin Total Demand	**582,121**	**367,959**	**366,741**	**355,453**	**347,780**	**338,357**	**330,590**	**322,163**

Table 2-12 (Continued)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
San Antonio Basin								
Municipal Demand	239,648	247,068	285,029	319,576	352,949	379,144	405,292	431,850
Manufacturing Demand	14,323	21,364	26,079	29,633	32,919	36,220	39,123	42,282
Steam-Electric Power Demand	24,263	17,399	20,395	25,761	30,139	32,973	36,120	39,614
Irrigation Demand	72,216	42,823	34,568	32,437	30,474	28,668	27,010	25,493
Mining Demand	1,973	3,232	3,979	4,273	4,450	4,631	4,811	4,981
Livestock Demand	5,285	5,058	5,058	5,058	5,058	5,058	5,058	5,058
San Antonio Basin Total	**357,708**	**336,944**	**375,109**	**416,738**	**455,989**	**486,694**	**517,414**	**549,279**
Guadalupe Basin								
Municipal Demand	45,608	53,808	68,487	85,556	101,455	116,696	133,722	150,261
Manufacturing Demand	26,235	35,201	42,051	46,871	51,112	55,306	59,014	63,453
Steam-Electric Power Demand	13,052	11,353	18,876	73,945	74,096	76,906	78,069	80,963
Irrigation Demand	10,320	5,937	6,032	5,371	4,787	4,263	3,859	3,525
Mining Demand	3,413	4,964	6,289	6,918	7,336	7,758	8,184	8,536
Livestock Demand	8,836	9,667	9,914	9,914	9,914	9,914	9,914	9,914
Guadalupe Basin Total	**107,464**	**120,930**	**151,649**	**228,575**	**248,700**	**270,843**	**292,762**	**316,652**
Lower Colorado Basin								
Municipal Demand	236	365	518	676	817	959	1,097	1,239
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	20	15	15	14	12	11	10	8
Mining Demand	0	13	15	15	16	17	17	17
Livestock Demand	147	169	169	169	169	169	169	169
Lower Colorado Basin Total	**403**	**562**	**717**	**874**	**1,014**	**1,156**	**1,293**	**1,433**
Lavaca Basin								
Municipal Demand	590	513	511	512	505	495	479	471
Manufacturing Demand	0	7	8	9	10	10	11	12
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	108	37	40	41	42	43	43	44
Livestock Demand	305	310	357	357	357	357	357	357
Lavaca Basin Total	**1,003**	**867**	**916**	**919**	**914**	**905**	**890**	**884**
Colorado Lavaca Coastal Basin								
Municipal Demand	217	251	289	362	523	691	675	672
Manufacturing Demand	6,343	19,175	22,516	24,810	26,790	28,753	30,486	32,671
Steam-Electric Power Demand	62	684	0	0	0	0	0	0
Irrigation Demand	0	0	0	0	0	0	0	0
Mining Demand	0	1	1	1	1	1	1	1
Livestock Demand	13	17	17	17	17	17	17	17
Colorado Lavaca CB Total	**6,635**	**20,128**	**22,823**	**25,190**	**27,331**	**29,462**	**31,179**	**33,361**

Table 2-12 (Concluded)

Basin/County/City/Rural	Use in 1990 (acft)	Use in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Lavaca-Guadalupe Coastal Basin								
Municipal Demand	6,696	7,163	7,702	8,269	8,716	9,044	9,394	9,774
Manufacturing Demand	17,963	23,086	27,108	29,871	32,255	34,618	36,704	39,335
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	47,125	13,806	24,054	20,977	18,417	16,497	14,994	13,645
Mining Demand	12	770	1,003	1,145	1,244	1,344	1,447	1,527
Livestock Demand	898	868	868	868	868	868	868	868
Lavaca-Guadalupe CB Total	**72,694**	**45,693**	**60,735**	**61,130**	**61,500**	**62,371**	**63,407**	**65,149**
San Antonio-Nueces Coastal Basin								
Municipal Demand	1,337	1,261	1,327	1,376	1,379	1,403	1,419	1,412
Manufacturing Demand	0	0	0	0	0	0	0	0
Steam-Electric Power Demand	0	0	0	0	0	0	0	0
Irrigation Demand	0	861	78	77	76	75	74	73
Mining Demand	81	24	154	116	91	69	49	39
Livestock Demand	957	1,016	1,016	1,016	1,016	1,016	1,016	1,016
San Antonio-Nueces CB Total	**2,375**	**3,162**	**2,575**	**2,585**	**2,562**	**2,563**	**2,558**	**2,540**
South Central Texas Region								
Municipal Demand	318,495	340,030	395,995	451,111	503,375	547,136	592,344	637,236
Manufacturing Demand	67,016	100,195	119,310	132,836	144,801	156,692	167,182	179,715
Steam-Electric Power Demand	43,451	35,379	46,560	104,781	110,537	116,068	121,601	128,340
Irrigation Demand	669,440	383,332	379,026	361,187	344,777	329,395	315,143	301,679
Mining Demand	7,799	11,757	14,525	15,703	16,454	17,213	17,976	18,644
Livestock Demand	24,400	25,660	25,954	25,954	25,954	25,954	25,954	25,954
Region Total	**1,130,601**	**896,353**	**981,370**	**1,091,572**	**1,145,898**	**1,192,458**	**1,240,200**	**1,291,568**
River and Coastal Basin Totals								
Rio Grande Basin (part)	198	107	107	107	107	107	107	107
Nueces basin (part)	582,121	367,959	366,741	355,453	347,780	338,357	330,590	322,163
San Antonio Basin (part)	357,708	336,944	375,109	416,738	455,989	486,694	517,414	549,279
Guadalupe Basin (part)	107,464	120,930	151,649	228,575	248,700	270,843	292,762	316,652
Lower Colorado Basin (part)	403	562	717	874	1,014	1,156	1,293	1,433
Lavaca Basin (part)	1,003	867	916	919	914	905	890	884
Colorado-Lavaca Coastal Basin (part)	6,635	20,128	22,823	25,190	27,331	29,462	31,179	33,361
Lavaca-Guadalupe Coastal Basin (part)	72,694	45,693	60,735	61,130	61,500	62,371	63,407	65,149
San Antonio-Nueces Coastal Basin(part)	2,375	3,162	2,575	2,585	2,562	2,563	2,558	2,540
Region Total	**1,130,601**	**896,353**	**981,370**	**1,091,572**	**1,145,898**	**1,192,458**	**1,240,200**	**1,291,568**

* Data for Water Supply Corporations and Districts were included in County Other in the 2001 Plan.
[2] CB means Coastal Basin.

2.10 Water Demand Projections for Wholesale Water Providers

The TWDB defines a Wholesale Water Provider (WWP) as any person or entity, including river authorities and irrigation districts, that has contracts to sell more than 1,000 acft of water wholesale in any one year during the five years immediately preceding the adoption of the last Regional Water Plan. Under this definition, the list of WWPs for the South Central Texas Region is as follows:

- San Antonio Water System (SAWS);
- Bexar Metropolitan Water District (BMWD);
- Guadalupe-Blanco River Authority (GBRA);
- Canyon Region Water Authority (CRWA);
- Schertz-Sequin Local Government Corporation (SSLGC); and
- Springs Hill WSC (SHWSC)

In addition, the recently-formed Texas Water Alliance (TWA) is included as a WWP because it is expected to enter into contracts to sell more than 1,000 acft/yr wholesale during the planning period.

2.10.1 San Antonio Water System

The San Antonio Water System (SAWS) provides wholesale water supplies to five utility systems, retail water supplies to six suburban municipalities, retail water supplies for most, but not all, of the City of San Antonio, a portion of County-Other in Bexar County, and a portion of the industrial supplies in Bexar County. SAWS is the sole water provider for the Cities of Elmendorf, Balcones Heights, China Grove, Helotes, Olmos Park, Terrell Hills, and Palm Park Water Co., and provides part of the water supply for East Central WSC, Live Oak, Windcrest, Leon Valley, and San Antonio. SAWS is also projected to meet the needs of Shavano Park.

As noted in the preceding paragraph, several of SAWS' customers also obtain water from other WWPs or supply a portion of their own water. East Central WSC is a customer of BMWD and CRWA, although historically East Central WSC has not obtained water from BMWD. Leon Valley obtains water from SAWS and also supplies a portion of their own water (Table 2-13). The total amount of water needed by SAWS to meet its customers' projected demands in 2030 is 267,501 acft/yr and in 2060 is 328,422 acft/yr (Table 2-13).

Table 2-13.
San Antonio Water System Water Demand Projections

Water Purchaser	Year						
	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Balcones Heights	480	514	555	578	600	633	670
China Grove	288	376	457	531	591	645	695
Elmendorf	99	112	123	132	140	148	156
Helotes	845	1,537	2,249	2,820	3,264	3,679	4,047
Leon Valley	407	397	388	382	375	372	377
Live Oak[1]	338	344	347	353	358	370	385
Olmos Park	381	403	424	441	452	468	484
San Antonio	166,813	192,007	213,943	234,865	250,671	265,958	281,204
Shavano Park[1,2]	303	320	336	348	357	369	381
Terrell Hills	815	863	914	956	983	1,018	1,057
Windcrest	61	60	60	59	59	59	59
East Central WSC	2,240	2,240	2,240	2,240	2,240	2,240	2,240
East Central WSC (Palm Park)	1,120	1,120	1,120	0	0	0	0
Rural	5,595	5,661	5,747	5,796	5,923	6,287	6,667
Industrial (Bexar County)	7,723	12,000	16,000	18,000	22,000	30,000	30,000
Total Demand	187,508	217,954	244,903	267,501	288,013	312,246	328,422

[1] Water demands may be greater than shown due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.
[2] Shavano Park projected needs for additional water supply assigned to SAWS.

2.10.2 Bexar Metropolitan Water District

The Bexar Metropolitan Water District (BMWD) supplies retail water within the District's service area, as well as currently providing water to, or projected to provide water to Atascosa Rural WSC, Castle Hills, Cibolo, Hill Country Village, Hollywood Park, San Antonio, Somerset, East Central WSC, Converse, and Live Oak. The total amount of water needed by BMWD to meet its customers' projected demands in 2030 is 50,369 acft/yr and in 2060 is 58,923 acft/yr (Table 2-14).

Table 2-14.
Bexar Metropolitan Water District Water Demand Projections

Water Purchaser	Year						
	2000 (acft)	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Atascosa Rural WSC	0	120	120	120	120	120	120
Bexar Met Water District (Atascosa County)	389	505	621	715	780	843	895
Bexar Met Water District (Bexar County)	8,794	8,897	9,032	9,109	9,110	9,248	9,449
Bexar Met Water District (Comal County)	230	462	748	1,059	1,344	1,654	2,001
Bexar Met Water District (Medina County)	15	24	33	41	47	54	60
Castle Hills	838	820	807	793	780	771	771
Cibolo[1]	0	500	500	500	500	500	500
Hill Country Village	842	838	835	831	828	826	826
Hollywood Park	2,229	2,314	2,389	2,458	2,511	2,565	2,616
San Antonio	21,419	24,654	27,471	30,157	32,187	34,150	36,107
Somerset	321	405	484	552	609	660	709
East Central WSC	1,400	1,400	1,400	1,400	1,400	1,400	1,400
Converse	0	1,500	1,500	1,634	1,949	2,216	2,469
Live Oak[1]	0	1,000	1,000	1,000	1,000	1,000	1,000
Total Demand	**36,477**	**43,439**	**46,940**	**50,369**	**53,165**	**56,007**	**58,923**

[1] Water demands may be greater than shown due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.

2.10.3 Guadalupe-Blanco River Authority

The Guadalupe-Blanco River Authority (GBRA) supplies potable water and raw water for municipal, industrial, irrigation, and steam-electric purposes through management of substantial quantities of run-of-river rights and storage rights in Canyon Reservoir. As of April 2009, the Authority had contracts to provide water to over 40 public and private entities. The total amount of water needed by GBRA to meet its customers' current contract amounts and projected future contract amounts in 2030 is 238,440 acft/yr, with 22,042 acft/yr being for use in the upper basin (at or above Canyon Dam), 79,056 acft/yr being for use in the mid-basin (below Canyon Dam and above Victoria), and 137,342 acft/yr being for use in the lower basin (at or below Victoria) (Table 2-15). The total amount of water needed by GBRA to meet its customers' current contract amounts and projected future contract amounts in 2060 is 279,484 acft/yr, with 33,151 acft/yr being for use in the upper basin, 95,003 acft/yr being for use in the mid-basin, and 151,330 acft/yr being for use in the lower basin (Table 2-15).

Table 2-15.
Guadalupe-Blanco River Authority Water Demand Projections

Water Purchaser	Year 2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal (Canyon Reservoir)							
Upper Basin - At or above Canyon Reservoir							
Canyon Lake WSC	4,000	6,000	6,000	6,129	8,198	10,466	12,769
City of Blanco	600	600	600	600	600	600	600
HH Ranch Properties	0	250	250	250	250	250	250
Domestic Contracts	25	17	17	17	17	17	17
Rebecca Creek MUD	130	130	130	130	130	130	130
Kendall County Rural	0	221	865	1,522	2,073	2,726	3,514
Kerr County MOU	0	0	0	2,000	2,000	2,000	2,000
WW Sports	1	1	1	1	1	1	1
Yacht Club	4	4	4	4	4	4	4
SJWTX - Bulverde (Western Canyon)	0	400	400	400	400	400	400
SJWTX – Park Village (Western Canyon)	0	322	322	322	322	322	322
Bulverde City (Western Canyon)	0	653	1,342	2,128	2,910	3,723	4,595
City of Boerne (Western Canyon)	0	1,176	1,794	2,449	2,976	3,436	3,887
City of Fair Oaks Ranch (Western Canyon)	0	1,850	1,850	1,850	1,850	1,850	1,850
Cordillera Ranch (Western Canyon)	0	1,000	1,000	1,000	1,000	1,000	1,000
DH Invest.-Johnson Ranch (Western Canyon)	0	400	400	400	400	400	400
Kendall & Tapatio (Western Canyon)	0	750	750	750	750	750	750
Comal Trace (Western Canyon)	0	100	100	100	100	100	100
Kendall County Rural	0	0	0	0	0	0	374
SAWS (Western Canyon)	0	4,550	3,243	1,802	0	0	0
Western Canyon Sub-Total	*0*	*11,201*	*11,201*	*11,201*	*10,708*	*11,981*	*13,678*
Total Upper Basin Municipal (Canyon Reservoir)	**4,760**	**18,424**	**19,068**	**21,854**	**23,981**	**28,175**	**32,963**
Mid Basin- Below Canyon Dam to Above Victoria							
CRWA – BMWD		3,500	0	0	0	0	0
CRWA – Cibolo		1,350	1,350	1,350	1,350	1,350	1,350
CRWA – BMWD / Cibolo		500	0	0	0	0	0
CRWA – East Central WSC		1,100	0	0	0	0	0
CRWA – East Central WSC / Green Valley SUD		300	300	300	300	300	300
CRWA – Green Valley SUD		1,800	1,700	1,700	1,700	1,700	1,700
CRWA – Marion		100	100	100	100	100	100
CRWA – Springs Hill WSC		1,425	1,425	1,425	1,425	1,425	1,425
CRWA – Springs Hill WSC / Green Valley SUD		500	500	500	500	500	500
CRWA Dunlap In District Balance		0	5,200	5,200	5,200	5,200	5,200
CRWA Dunlap Current Contract Subtotal	10,025	10,575	10,575	10,575	10,575	10,575	10,575
CRWA Dunlap Future Contract			5,000	5,000	5,000	5,000	5,000
50% of Comal County Other	0	891	986	1,089	1,181	1,333	1,480
New Braunfels Utilities[1]	6,720	6,720	7,627	10,764	13,871	17,081	20,640
Comal County Manufacturing		5,199	6,033	6,784	7,514	8,141	9,022
City of Seguin	3,000	1,000	1,000	1,000	1,000	1,000	1,000
Dittmar, Gary	5	5	5	5	5	5	5
Dittmar, Ray	5	5	5	5	5	5	5
Gonzales County WSC	700	700	700	700	700	700	700
Green Valley SUD	200	1,000	1,000	1,000	1,000	1,000	1,000
Springs Hill WSC	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Canyon Regional Water Authority (H/C WTP)	2,038	2,038	2,038	2,038	2,038	2,038	2,038
City of Buda (San Marcos WTP)	1,120	1,120	1,120	1,120	1,120	1,120	1,120
City of Kyle (San Marcos WTP)	589	2,957	2,957	2,957	2,957	2,957	2,957

Table 2-15 (Continued)

Water Purchaser	Year 2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
City of Mustang Ridge (San Marcos WTP)	0	19	62	99	137	175	213
City of Niederwald (San Marcos WTP)	0	58	118	183	244	317	377
2428 Partners (San Marcos WTP)	0	3,136	3,136	3,136	3,136	3,136	3,136
Plum Creek WC/Monarch (San Marcos WTP)	0	560	560	560	755	1,014	1,217
City of San Marcos (San Marcos WTP)	5,000	10,000	10,000	10,000	10,000	10,000	10,000
Wimberley WSC (San Marcos WTP)	0	219	440	667	885	1,179	1,409
Woodcreek & Woodcreek Utilities (San Marcos WTP)	0	478	944	1,433	1,910	2,501	2,967
County Line WSC (San Marcos WTP)	0	0	0	0	0	0	0
Creedmoor-Maha WSC (San Marcos WTP)	0	108	180	246	312	378	447
Crystal Clear WSC (San Marcos WTP)	800	800	800	800	800	800	800
Maxwell WSC (San Marcos WTP)	0	0	0	0	0	0	0
Martindale WSC (San Marcos WTP)	0	0	0	0	0	0	0
Goforth WSC (San Marcos WTP)	250	1,050	1,050	1,350	1,350	1,350	1,350
Hays County-Other (San Marcos WTP)	0	1,344	1,344	1,344	1,344	1,344	1,344
San Marcos WTP Sub-Total	*7,759*	*21,849*	*22,711*	*23,895*	*24,950*	*26,271*	*27,337*
Total Mid Basin Municipal (Canyon Reservoir)	**32,952**	**52,482**	**60,180**	**65,355**	**70,339**	**75,649**	**81,302**
Lower Basin – At or Below Victoria							
City of Victoria (pursuant to Canyon Amendment)	1,240	1,240	1,240	1,240	1,240	1,240	1,240
Calhoun County Rural WSC	500	0	0	0	0	0	0
City of Port Lavaca	1,500	0	0	0	0	0	0
Port O'Conner MUD	60	0	0	0	0	0	0
Total Lower Basin Municipal (Canyon Reservoir)	**3,300**	**1,240**	**1,240**	**1,240**	**1,240**	**1,240**	**1,240**
Industrial/Steam-Electric (Canyon Reservoir)							
Mid Basin – Below Canyon Dam to Above Victoria							
Acme	25	25	25	25	25	25	25
CMC Steel	700	700	700	700	700	700	700
Comal Fair	1	1	1	1	1	1	1
Comal Road Department	3	3	3	3	3	3	3
GPP (Panda Energy)	6,840	6,840	6,840	6,840	6,840	6,840	6,840
Guadalupe County	1	1	1	1	1	1	1
Hays Energy LP	2,464	2,464	2,464	2,464	2,464	2,464	2,464
Henk Paving	0	1	1	1	1	1	1
Std. Gypsum	258	258	258	258	258	258	258
Total Mid Basin Industrial/SE (Canyon Reservoir)	**10,292**	**10,293**	**10,293**	**10,293**	**10,293**	**10,293**	**10,293**
Lower Basin – At or Below Victoria							
Coleto Creek	4,000	4,000	6,000	6,000	6,000	6,000	6,000
Ineous (BP)	1,100	0	0	0	0	0	0
Seadrift Coke	334	0	0	0	0	0	0
Dow/UCC	100	0	0	0	0	0	0
Total Lower Basin Industrial/SE (Canyon Reservoir)	**5,534**	**4,000**	**6,000**	**6,000**	**6,000**	**6,000**	**6,000**
Irrigation (Canyon Reservoir)							
Irrigation Contracts (Upper Basin)	**173**	**188**	**188**	**188**	**188**	**188**	**188**
Irrigation Contracts (Mid-Basin)	**736**	**608**	**608**	**608**	**608**	**608**	**608**
Canyon Reservoir Total	**57,747**	**87,235**	**97,577**	**105,538**	**112,649**	**122,153**	**132,594**
Mid-Basin Municipal (Run-of-River)							
Lockhart	1,120	1,120	1,120	1,120	1,120	1,120	1,120
Luling	1,680	1,680	1,680	1,680	1,680	1,680	1,680

Table 2-15 (Concluded)

Water Purchaser	Year						
	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Mid-Basin Municipal (Run-of-River) Total	**2,800**	**2,800**	**2,800**	**2,800**	**2,800**	**2,800**	**2,800**
Lower Basin Municipal (Run-of-River)							
Calhoun County Rural WSC	356	436	516	572	609	618	632
Port Lavaca	1,658	1,769	1,877	1,981	2,079	2,209	2,345
Port O'Conner MUD	186	198	210	222	234	248	264
Victoria County Rural	0	0	0	0	81	193	310
Total Lower Basin Municipal (Run-of-River, Firm)	**2,200**	**2,403**	**2,603**	**2,775**	**3,003**	**3,268**	**3,551**
Lower Basin Industrial/SE (Run-of-River)							
Ineous (BP)	2,200	3,300	3,300	3,300	3,300	3,300	3,300
Seadrift Coke	666	1,000	1,000	1,000	1,000	1,000	1,000
Victoria County Industry	0	0	2,969	5,921	8,860	11,489	14,441
Victoria County Steam Electric		1,791	1,836	1,865	1,895	1,927	1,950
Dow/UCC	15,000	15,100	15,100	15,100	15,100	15,100	15,100
Dow/UCC and Other Existing & New Industry	5,356	7,868	10,647	13,045	15,422	17,520	20,167
Total Lower Basin Industrial/SE (Run-of-River, Firm)	**23,222**	**29,059**	**34,852**	**40,231**	**45,577**	**50,336**	**55,958**
Lower Basin Industrial/SE (Run-of-River, Interruptible)							
Exelon	**0**	**0**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**
Total Lower Basin Industrial/SE (Run-of-River, Interruptible)	**0**	**0**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**
Lower Basin Irrigation (Run-of-River, Interruptible)							
Irrigation Agreements	**8,077**	**15,568**	**13,654**	**12,096**	**11,041**	**10,285**	**9,581**
Lower Basin (Run-of-River, Firm) Total	**25,422**	**31,462**	**37,455**	**43,006**	**48,580**	**53,604**	**59,509**
Lower Basin (Run-of-River, Interruptible) Total	**8,077**	**15,568**	**88,654**	**87,096**	**86,041**	**85,285**	**84,581**
Total Demand	**94,046**	**137,065**	**226,486**	**238,440**	**250,070**	**263,842**	**279,484**
Total Upper Basin Demand	4,933	18,612	19,256	22,042	24,169	28,363	33,151
Total Mid Basin Demand	46,780	66,183	73,881	79,056	84,040	89,350	95,003
Total Lower Basin Demand	42,333	52,270	133,349	137,342	141,861	146,129	151,330
Total Demand	**94,046**	**137,065**	**226,486**	**238,440**	**250,070**	**263,842**	**279,484**

[1] Water demands may be greater than shown due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.

2.10.4 Canyon Regional Water Authority

Canyon Regional Water Authority (CRWA) is a water planning and development agency for water purveyors that serve large areas of Guadalupe County, and portions of Bexar, Caldwell, Hays, Wilson, and Comal Counties. CRWA also serves as a planning and development agency for its 12 member entities. CRWA provides all or part of the water supply for Bexar Metropolitan Water District, Cibolo, County Line WSC, East Central WSC, Green Valley SUD, Marion, Martindale WSC, Springs Hills WSC, Maxwell WSC, and Crystal Clear WSC. In addition to these existing customers, CRWA is projected to meet a portion of the projected demands for the La Vernia, and SS WSC. The total amount of water needed by CRWA to meet its customers' projected demands in 2030 is 43,599 acft/yr and 53,534 acft/yr in 2060 (Table 2-16).

2.10.5 Schertz-Seguin Local Government Corporation

The Schertz-Seguin Local Government Corporation (SSLGC) supplies water to the cities of Schertz and Seguin as well as Springs Hill WSC, Selma, and the Universal City. In addition to these current customers, the SSLGC is projected to meet a portion of the projected demands for Crystal Clear WSC and Garden Ridge. The total amount of water needed by SSLGC to meet its customers' projected demands in 2030 is 15,297 acft/yr and in 2060 is 21,071 acft/yr (Table 2-17).

2.10.6 Springs Hill Water Supply Corporation

Springs Hill WSC provides retail water service within the WSC's service area as well as wholesale water to Crystal Clear WSC. In addition, Springs Hill WSC also supplies water on a wholesale basis to the City of La Vernia and East Central SUD via CRWA. The total amount of water needed by Springs Hill WSC to meet its customers' projected demands in 2030 is 4,091 acft/yr and in 2060 is 5,365 acft/yr (Table 2-18).

Table 2-16.
Canyon Regional Water Authority Water Demand Projections

Water Purchaser	Year 2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Bexar Met Water District	4,000	6,800	8,800	12,800	13,800	14,505	14,505
City of Cibolo[1]	800	2,050	3,030	8,230	8,730	9,230	9,230
County Line WSC	1,267	1,308	1,878	1,878	1,878	1,878	1,878
East Central WSC	1,400	2,585	2,885	2,635	2,635	2,635	2,635
Green Valley SUD[1]	1,800	2,500	3,600	9,300	9,800	10,800	11,300
City of La Vernia	0	400	400	400	400	400	400
City of Marion[1]	100	200	300	500	500	500	500
Martindale	158	190	190	190	190	190	190
Martindale WSC	288	396	396	696	896	896	896
Springs Hill WSC	1,925	2,025	2,025	2,025	2,025	2,025	2,025
SS WSC[1]	0	0	0	0	0	0	690
Santa Clara	0	100	250	350	500	650	900
Maxwell WSC	867	900	1,300	1,700	2,100	2,500	2,900
Crystal Clear WSC[1]	382	1,600	2,895	2,895	2,895	5,485	5,485
Total Demand	**12,987**	**21,054**	**27,949**	**43,599**	**46,349**	**51,694**	**53,534**

[1] Water demands may be greater than shown due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.

Table 2-17.
Schertz-Seguin Local Government Corporation Water Demand Projections

Water Purchaser	Year 2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Schertz[1]	5,143	5,143	5,143	6,082	7,567	9,258	11,066
Seguin[1]	5,144	5,144	5,144	5,144	5,144	5,144	5,144
Selma	800	800	1,086	1,559	1,557	1,548	1,549
Springs Hill WSC	560	560	560	560	560	560	560
Universal City	800	800	800	800	800	800	800
Crystal Clear WSC[1]	0	0	300	600	900	900	900
Garden Ridge[1]	0	257	395	552	710	873	1,052
Total Demand	**12,447**	**12,704**	**13,428**	**15,297**	**17,238**	**19,083**	**21,071**

[1] Water demands may be greater than shown due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.

Table 2-18.
Springs Hill Water Supply Corporation Water Demand Projections

Water Purchaser	Year 2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Springs Hill WSC	2,076	2,349	2,679	3,056	3,424	3,849	4,330
La Vernia (via CRWA)	400	400	400	400	400	400	400
Crystal Clear WSC	250	250	250	250	250	250	250
East Central SUD (via CRWA)	385	385	385	385	385	385	385
Total Demand	**3,111**	**3,384**	**3,714**	**4,091**	**4,459**	**4,884**	**5,365**

2.10.7 Texas Water Alliance

The Texas Water Alliance (TWA) is a group of landowners located in northeast Gonzales County organized for the purpose of selling groundwater on a wholesale basis to wholesale water providers (WWPs) and water user groups (WUGs) most likely located in the South Central Texas Regional Water Planning Area (Region L). To date, all of the listed WWPs and several WUGs (i.e., Canyon Lake WSC, Gonzales County WSC, San Marcos, and Kyle) in Region L have shown some measure of interest in groundwater supplies potentially available from northeast Gonzales County. It is highly uncertain at this time which one or more of these entities will enter into water supply agreements with the TWA and/or other proximate landowners and whether necessary production permits can be obtained from the Gonzales County Underground Water Conservation District for use of this groundwater. The estimated amounts of water needed by TWA to meet potential customer demands are shown in Table 2-19 and total 22,575 acft/yr in 2060.

Table 2-19.
Texas Water Alliance Water Demand Projections

Water Purchaser[1]	Year 2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Canyon Lake WSC	0	0	0	3,000	6,000	9,000	12,000
Water Service Inc.	0	0	1,000	1,000	1,000	1,000	1,000
Comal County Rural Areas	0	0	986	1,089	1,181	1,333	1,480
Gonzales County WSC	0	0	500	500	500	500	500
Springs Hill WSC (WWP)	0	0	1,500	3,000	3,000	3,000	3,000
Bulverde	0	0	1,342	2,128	2,910	3,723	4,595
Total Demand	**0**	**0**	**5,328**	**10,717**	**14,591**	**18,556**	**22,575**

[1] Actual customers of TWA may differ from those shown herein as all wholesale water providers and several water user groups in Region L have shown interest in available groundwater supplies in northeast Gonzales County.

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-Wilcox[1], 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.

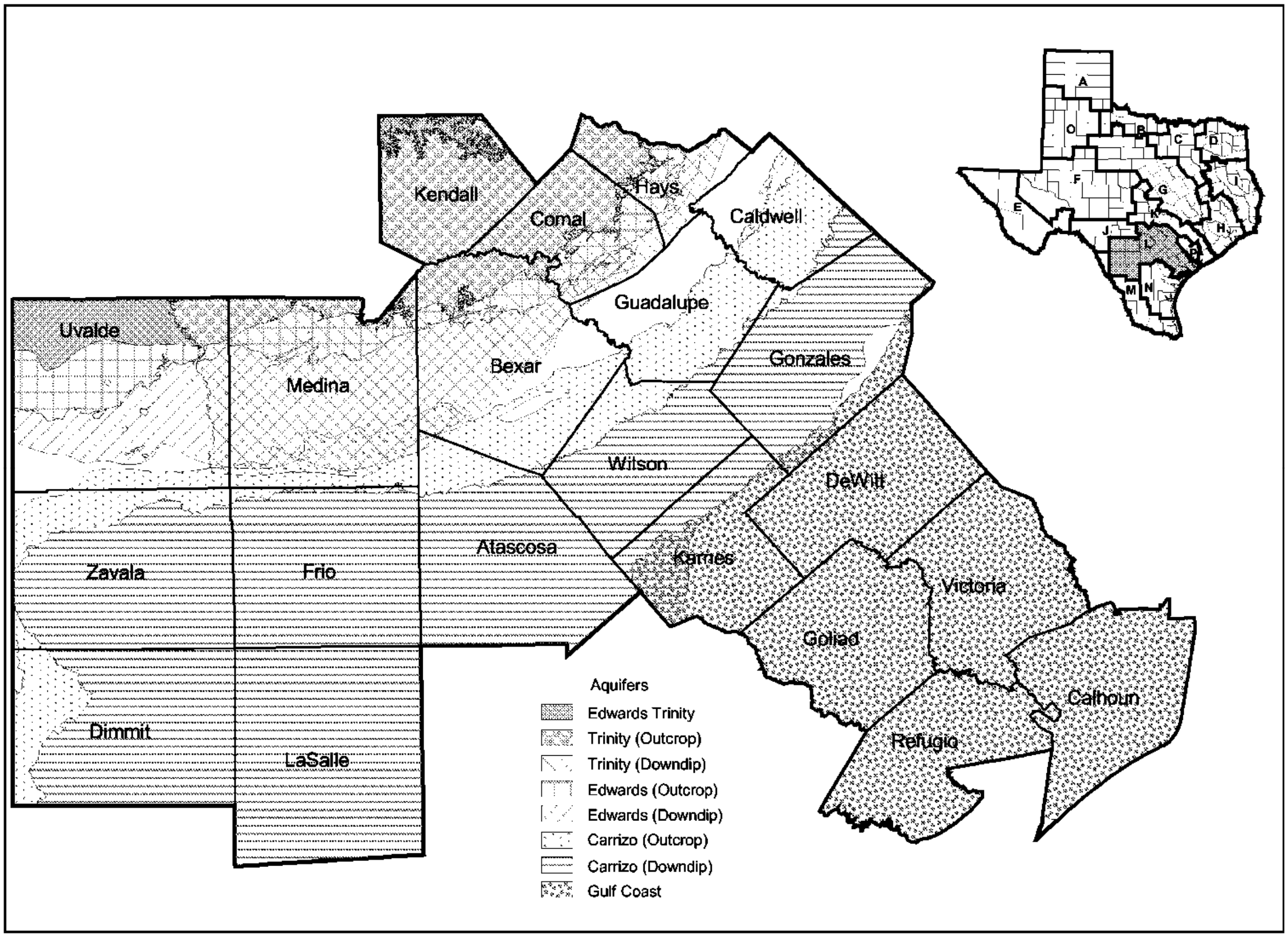

Figure 3-1. Major Aquifers — South Central Texas Region

[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.

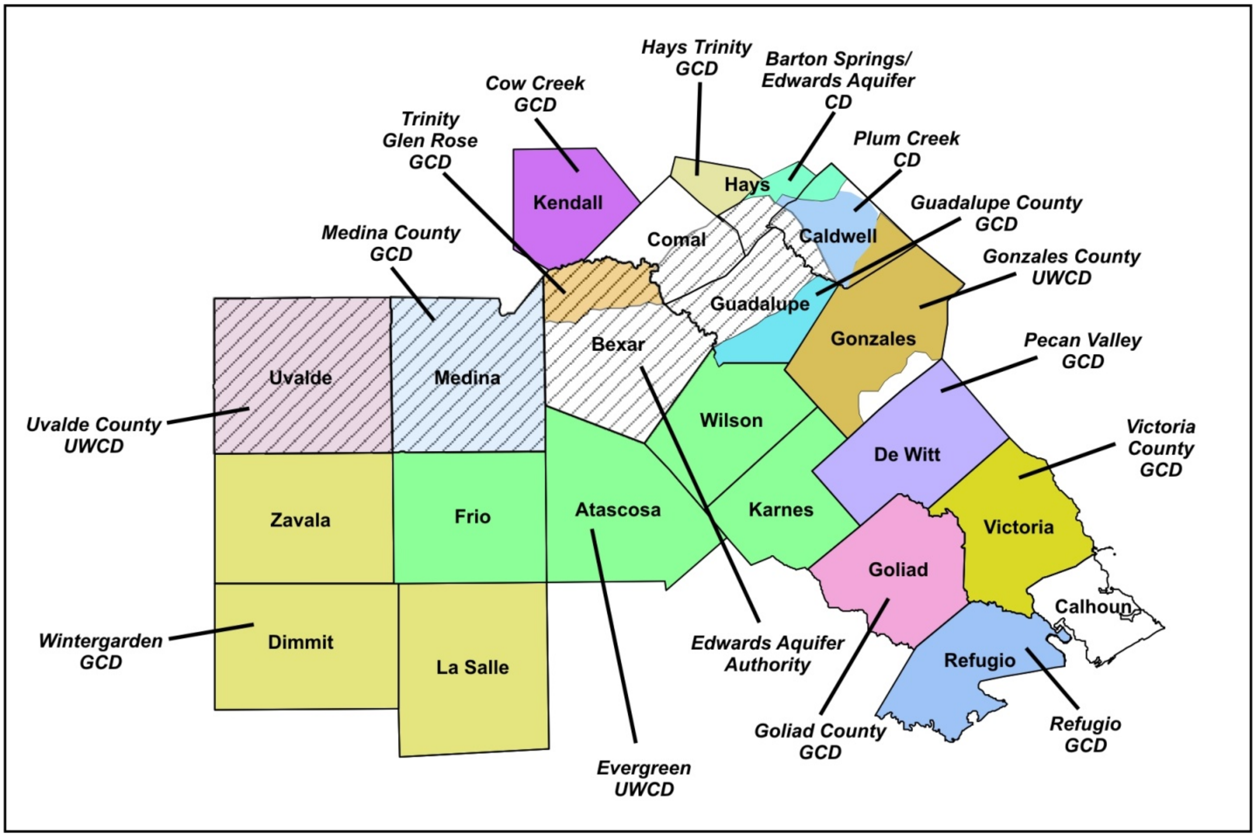

Figure 3-2. Groundwater Conservation Districts

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 purposes[2]. 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] Gulf Coast	Major Aquifer(s)[2] Carrizo-Wilcox	Major Aquifer(s)[2] Trinity	Management Plan Status[3]	Production Limits[4] (acft/ac/yr)	2010 Supply 2006 RWP[5] (acft/yr)	2010 Supply GCD Mgmt. Plan (acft/yr)	2010 Supply Allocated (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					No GCD		17,950		13,498
	Trinity -Glen Rose				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.

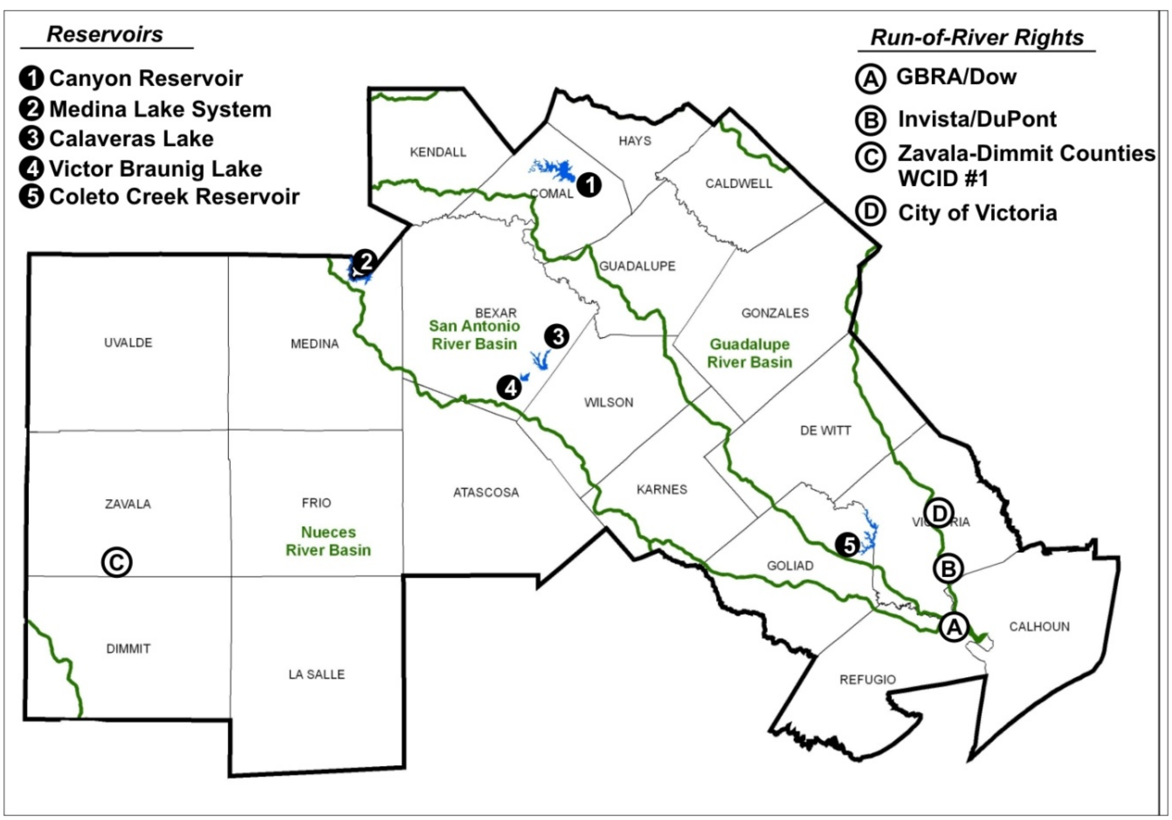

Figure 3-3. Major River Basins, Reservoirs, and Run-of-River Rights

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
Coleto Creek Reservoir	Coleto Creek Power	18-5486	12,500[6]	>12,500[3]	Steam-electric power generation

[1] Based on operation of the Medina Lake System in accordance with CA #19-2130C.
[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.
[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.
[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.
[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.
[6] Includes rights to divert up to 20,000 acft/yr from the Guadalupe River to Coleto Creek Reservoir and to consume up to 12,500 acft/yr.

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).

Coleto Creek Reservoir, owned by Coleto 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 Coleto 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 Coleto Creek Power Station located in Goliad County.

Lakes Dunlap, McQueeny, 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.

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[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 Coleto 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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Section 4A
Comparison of Supply and Demand Projections to Determine Needs [31 TAC §357.7(a)(5-7)]

4A.1 Water Needs Projections by Water User Group

In this section, the demand projections from Section 2 and the supply projections from Section 3 are brought together to estimate projected water needs in the South Central Texas Region through the year 2060. If projected demands exceed projected supplies for a water user group, the difference or shortage, is identified as a water need for that water user group. As a recap, Section 2 presents demand projections for six types of use: municipal, industrial, steam-electric, mining, irrigation, and livestock. The projections are for dry-year demands. Municipal water demand projections are shown for each entity that supplied more than 280 acft of water in the year 2000, and for the County-Other category in each county. Section 3 presents estimates of surface water and groundwater availability.

This section contains a summary of the water needs (shortages) for each Water User Group (WUG) located in the South Central Texas Region. For a detailed analysis of water needs in the region by river and coastal basin as well as supply sources and amount supplied from each source, see Appendix C, entitled, "Comprehensive Water Needs Assessment Data." Table 4A-1 provides a summary of the water needs for each WUG located in the planning area by county. If a WUG is located in multiple counties, it is shown in its "primary" county in Table 4A-1. Table 4A-2 shows WUGs that are located in multiple counties and the "primary" county to which that WUG has been assigned for presentation herein. Region L has a projected annual water need of 174,234 acft in 2010, increasing to 436,750 acft by 2060 (Table 4A-1, end of table).

Table 4A-1.
Summary of Water Needs (Shortages) by WUG

Water User Group	Year 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Atascosa County						
Benton City WSC	0	0	199	454	696	885
Charlotte	0	0	0	0	0	0
Jourdanton	112	172	225	267	306	338
Lytle	141	152	162	169	179	188
McCoy WSC	0	12	208	436	650	812
Pleasanton	0	0	0	0	0	0
Poteet	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**253**	**336**	**794**	**1,326**	**1,831**	**2,223**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	263	0	0	0	604	942
Mining	0	0	0	0	0	0
Irrigation	6,095	4,734	3,413	2,141	924	291
Livestock	0	0	0	0	0	0
County Total	**6,611**	**5,070**	**4,207**	**3,467**	**3,359**	**3,456**
Bexar County						
Alamo Heights	592	655	657	653	667	691
Atascosa Rural WSC	546	717	869	996	1,106	1,218
Balcones Heights	0	0	0	0	0	0
Bexar Met Water District	3,944	4,569	5,357	5,784	6,373	7,038
Castle Hills	96	83	69	56	47	47
China Grove	0	0	0	0	0	0
Converse	0	0	134	449	716	969
East Central WSC	0	0	251	495	716	942
Elmendorf	0	0	0	0	0	0
Fair Oaks Ranch	0	0	0	0	0	0
Helotes	0	0	0	0	0	0
Hill Country Village	730	727	723	720	718	718
Hollywood Park	1,969	2,044	2,113	2,166	2,220	2,271
Kirby	335	334	337	331	343	364
Lackland AFB (CDP)	0	0	0	0	0	0
Leon Valley	0	0	0	0	0	0
Leon Valley (SAWS)	0	0	0	0	0	0
Live Oak	0	0	0	0	0	0
Olmos Park	0	0	0	0	0	0
San Antonio (BMWD)	9,023	15,840	18,526	20,556	22,519	24,476
San Antonio (SAWS)	68,476	93,385	116,922	137,353	153,358	169,336
San Antonio (Others)	284	317	348	371	394	416

Table 4A-1 (Continued)

Water User Group	Year					
	2010 (acft)	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Bexar County (continued)						
Selma	0	316	762	757	748	749
Shavano Park	320	336	348	357	369	381
Somerset	0	0	0	0	0	0
St. Hedwig	0	0	0	0	0	0
Terrell Hills	0	0	0	0	0	0
Universal City	113	421	680	630	606	606
Water Ser Inc (Apex Water Ser)	911	1,148	1,384	1,599	1,801	2,018
Windcrest	235	227	219	209	206	214
County-Other	0	0	0	127	403	655
County-Other (SAWS)	0	0	0	0	0	0
Municipal Total	***87,574***	***121,160***	***149,700***	***173,610***	***193,311***	***213,110***
Manufacturing	1,340	4,886	8,240	11,537	14,438	17,588
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	921	1,020	1,122	1,216
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	***88,914***	***126,046***	***158,861***	***186,167***	***208,871***	***231,914***
Caldwell County						
Aqua WSC	49	121	178	240	300	362
Creedmoor-Maha WSC	108	180	246	312	378	447
Lockhart	0	321	856	1,407	1,952	2,512
Luling	0	122	211	296	398	506
Martindale	0	0	0	0	0	0
Martindale WSC	42	70	95	126	151	182
Maxwell WSC	0	0	77	246	476	689
Mustang Ridge	19	62	99	137	175	213
Polonia WSC	0	0	0	0	66	265
County-Other	0	0	0	0	0	0
Municipal Total	***218***	***876***	***1,762***	***2,764***	***3,896***	***5,176***
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	***218***	***876***	***1,762***	***2,764***	***3,896***	***5,176***

Table 4A-1 (Continued)

Water User Group	Year 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Calhoun County						
Calhoun County WSC	0	0	0	0	0	0
Point Comfort	46	145	322	499	489	489
Port Lavaca	0	0	0	0	0	0
Seadrift	0	0	0	0	0	0
County-Other (Port O'Connor MUD)	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**46**	**145**	**322**	**499**	**489**	**489**
Manufacturing	0	0	0	0	0	2,021
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**46**	**145**	**322**	**499**	**489**	**2,510**
Comal County						
Bulverde	653	1,342	2,128	2,910	3,723	4,595
Canyon Lake WSC	0	0	129	2,198	4,466	6,769
Garden Ridge	257	395	552	710	873	1,052
New Braunfels	0	907	4,044	7,151	10,361	13,920
County-Other	1,782	1,972	2,178	2,362	2,665	2,960
Municipal Total	***2,692***	***4,616***	***9,031***	***15,331***	***22,088***	***29,296***
Manufacturing	5,199	6,033	6,784	7,514	8,141	9,022
Steam-Electric Power	0	0	0	0	0	0
Mining	439	635	753	870	1,068	1,173
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	***8,330***	***11,284***	***16,568***	***23,715***	***31,297***	***39,491***
DeWitt County						
Cuero	0	0	0	0	0	0
Yoakum	0	0	0	0	0	0
Yorktown	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**0**	**0**	**0**	**0**	**0**	**0**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**0**	**0**	**0**	**0**	**0**	**0**

Table 4A-1 (Continued)

Water User Group	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Dimmit County						
Asherton	0	0	0	0	0	0
Big Wells	0	0	0	0	0	0
Carrizo Springs	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**0**	**0**	**0**	**0**	**0**	**0**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**0**	**0**	**0**	**0**	**0**	**0**
Frio County						
Dilley	0	0	0	0	0	0
Pearsall	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**0**	**0**	**0**	**0**	**0**	**0**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**0**	**0**	**0**	**0**	**0**	**0**
Goliad County						
Goliad	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**0**	**0**	**0**	**0**	**0**	**0**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**0**	**0**	**0**	**0**	**0**	**0**
Gonzales County						
Gonzales	0	0	0	0	0	0
Gonzales County WSC	0	0	0	0	0	0
Nixon	0	0	0	0	0	0
Waelder	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**0**	**0**	**0**	**0**	**0**	**0**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**0**	**0**	**0**	**0**	**0**	**0**

Table 4A-1 (Continued)

Water User Group	Year 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Guadalupe County						
Cibolo	0	0	0	0	0	0
Crystal Clear WSC	0	0	509	1,138	1,926	2,716
Green Valley SUD	0	0	0	0	0	640
Marion	0	3	18	33	53	75
New Berlin	0	0	0	0	0	0
Santa Clara	76	205	348	485	642	810
Schertz	0	0	0	0	647	2,436
Seguin	0	0	0	0	0	0
Springs Hill WSC	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**76**	**208**	**875**	**1,656**	**3,268**	**6,677**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**76**	**208**	**875**	**1,656**	**3,268**	**6,677**
Hays County						
County Line WSC	0	1,049	1,433	1,603	1,921	2,386
Goforth WSC	0	29	433	879	1,427	1,872
Kyle	0	436	713	873	1,370	1,699
Mountain City	0	22	49	75	108	134
Niederwald	58	118	183	244	317	377
Plum Creek Water Company	0	0	0	195	454	657
San Marcos	0	0	1,319	4,772	8,507	11,387
Wimberley WSC	219	440	667	885	1,179	1,409
Woodcreek	23	92	162	229	317	387
Woodcreek Utilities Inc	455	852	1,271	1,681	2,184	2,580
County-Other	0	0	0	0	0	0
Municipal Total	**755**	**3,038**	**6,230**	**11,436**	**17,784**	**22,888**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	82	91	97	101	102	103
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**837**	**3,129**	**6,327**	**11,537**	**17,886**	**22,991**

Table 4A-1 (Continued)

Water User Group	Year					
	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Karnes County						
El Oso WSC	0	0	0	0	0	0
Falls City	0	0	0	0	0	0
Karnes City	182	203	224	242	253	262
Kenedy	0	0	0	37	86	118
Runge	0	0	0	0	0	0
County-Other (TDCJ)	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**182**	**203**	**224**	**279**	**339**	**380**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**182**	**203**	**224**	**279**	**339**	**380**
Kendall County						
Boerne	0	0	0	0	0	276
County-Other	221	865	1,522	2,073	2,726	3,514
Municipal Total	**221**	**865**	**1,522**	**2,073**	**2,726**	**3,790**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**221**	**865**	**1,522**	**2,073**	**2,726**	**3,790**
LaSalle County						
Cotulla	0	0	0	0	0	0
Encinal	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**0**	**0**	**0**	**0**	**0**	**0**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**0**	**0**	**0**	**0**	**0**	**0**

Table 4A-1 (Continued)

Water User Group	Year					
	2010 (acft)	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Medina County						
Castroville	294	357	416	468	522	575
Devine	0	0	0	0	0	0
East Medina SUD	0	104	214	303	397	491
Hondo	319	536	740	910	1,083	1,252
La Coste	92	109	126	138	152	168
Natalia	194	238	279	314	349	383
Yancey WSC	214	395	562	710	851	985
County-Other	0	236	528	787	1,055	1,296
Municipal Total	**1,113**	**1,975**	**2,865**	**3,630**	**4,409**	**5,150**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	7,770	5,878	4,067	2,332	670	0
Livestock	0	0	0	0	0	0
County Total	**8,883**	**7,853**	**6,932**	**5,962**	**5,079**	**5,150**
Refugio County						
Refugio	0	0	0	0	0	0
Woodsboro	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**0**	**0**	**0**	**0**	**0**	**0**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**0**	**0**	**0**	**0**	**0**	**0**
Uvalde County						
Sabinal	127	123	118	113	109	109
Uvalde	3,172	3,209	3,229	3,233	3,235	3,263
County-Other	0	0	0	0	0	0
Municipal Total	**3,299**	**3,332**	**3,347**	**3,346**	**3,344**	**3,372**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**3,299**	**3,332**	**3,347**	**3,346**	**3,344**	**3,372**

Table 4A-1 (Continued)

Water User Group	***Year***					
	2010 (acft)	***2020 (acft)***	***2030 (acft)***	***2040 (acft)***	***2050 (acft)***	***2060 (acft)***
Victoria County						
Victoria	0	0	0	0	0	0
County-Other	0	0	0	81	193	310
Municipal Total	**0**	**0**	**0**	**81**	**193**	**310**
Manufacturing	0	2,969	5,921	8,860	11,489	14,441
Steam-Electric Power	1,791	50,962	50,991	51,021	51,053	51,076
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**1,791**	**53,931**	**56,912**	**59,962**	**62,735**	**65,827**
Wilson County						
Floresville	0	0	0	0	159	433
La Vernia	0	0	0	0	0	0
Oak Hills WSC	0	0	0	0	0	298
Poth	0	0	0	0	0	0
SS WSC	223	864	1,546	2,214	2,939	3,690
Stockdale	0	0	0	0	0	0
Sunko WSC	0	0	0	0	0	70
County-Other	0	0	0	0	0	33
Municipal Total	**223**	**864**	**1,546**	**2,214**	**3,098**	**4,524**
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
County Total	**223**	**864**	**1,546**	**2,214**	**3,098**	**4,524**
Zavala County						
Crystal City	0	0	0	0	0	0
County-Other	0	0	0	0	0	0
Municipal Total	**0**	0	0	0	0	0
Manufacturing	0	0	0	0	0	0
Steam-Electric Power	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Irrigation	54,600	51,763	49,038	46,421	43,907	41,492
Livestock	0	0	0	0	0	0
County Total	**54,600**	**51,763**	**49,038**	**46,421**	**43,907**	**41,492**

Table 4A-1 (Concluded)

Water User Group	Year 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Region L (All Counties)						
Municipal	96,652	137,615	178,218	218,245	256,776	297,385
Manufacturing	6,539	13,888	20,945	27,911	34,068	43,072
Steam-Electric Power	2,054	50,962	50,991	51,021	51,657	52,018
Mining	521	726	1,771	1,991	2,292	2,492
Irrigation	68,465	62,375	56,518	50,894	45,501	41,783
Livestock	0	0	0	0	0	0
Region L Total	**174,234**	**265,567**	**308,443**	**350,062**	**390,294**	**436,750**

Table 4A-2. WUGs Located in Multiple Counties

WUG	Counties Served (Primary County Highlighted)			
Benton City WSC	Atascosa	Frio	Medina	
Bexar Met Water District	Atascosa	Bexar	Comal	Medina
County Line WSC	Caldwell	Hays		
Creedmoor-Maha WSC	Caldwell	Hays		
Crystal Clear WSC	Comal	Guadalupe	Hays	
East Central WSC	Bexar	Guadalupe	Wilson	
El Oso WSC	Karnes	Wilson		
Fairoaks Ranch	Bexar	Comal	Kendall	
Goforth WSC	Caldwell	Hays		
Gonzales County WSC	Caldwell	DeWitt	Gonzales	
Green Valley SUD	Bexar	Comal	Guadalupe	
Lytle	Atascosa	Bexar	Medina	
Martindale WSC	Caldwell	Guadalupe		
Maxwell WSC	Caldwell	Hays		
McCoy WSC	Atascosa	Wilson		
New Braunfels	Comal	Guadalupe		
Niederwald	Caldwell	Hays		
Schertz	Bexar	Comal	Guadalupe	
Selma	Bexar	Comal	Guadalupe	
Sunko WSC	Karnes	Wilson		
Water Ser Inc.	Bexar	Comal	Guadalupe	Kendall

4A.1.1 Municipal WUGs with Needs

By the year 2060, there are over 65 municipal WUGs with a projected need (shortage). The total municipal need for the region in 2030 is 178,218 acft/yr, increasing to 297,385 acft/yr in 2060 (Table 4A-1). Thirteen counties (Atascosa, Bexar, Caldwell, Calhoun, Comal, Guadalupe, Hays, Karnes, Kendall, Medina, Uvalde, Victoria, and Wilson) are projected to have at least one WUG with a municipal need (shortage) during the planning period, as shown in Figure 4A-1.

4A1.2 Industrial WUGs with Needs

The total industrial need for the region in 2030 is 20,945 acft, increasing to 43,072 acft in 2060 (Table 4A-1). Four counties (Bexar, Calhoun, Comal, and Victoria) are projected to have an industrial need (shortage) during the planning period, as shown in Figure 4A-2.

4A.1.3 Steam-Electric WUGs with Needs

The total steam-electric need for the region in 2030 is 50,991 acft, increasing to 52,018 acft in 2060 (Table 4A-1). Two counties (Atascosa and Victoria) are projected to have a steam-electric need (shortage) during the planning period, as shown in Figure 4A-3.

4A.1.4 Mining WUGs with Needs

The total mining need for the region in 2030 is 1,771 acft, increasing to 2,492 acft in 2060 (Table 4A-1). Three counties (Bexar, Comal, and Hays) are projected to have a mining need (shortage) during the planning period, as shown in Figure 4A-4.

4A.1.5 Irrigation WUGs with Needs

The total irrigation need for the region in 2030 is 56,518 acft, decreasing to 41,783 acft in 2060 (Table 4A-1). Three counties (Atascosa, Medina, and Zavala) are projected to have an irrigation need (shortage) during the planning period, as shown in Figure 4A-5.

4A.1.6 Livestock WUGs with Needs

There are no projected livestock needs within the planning period.

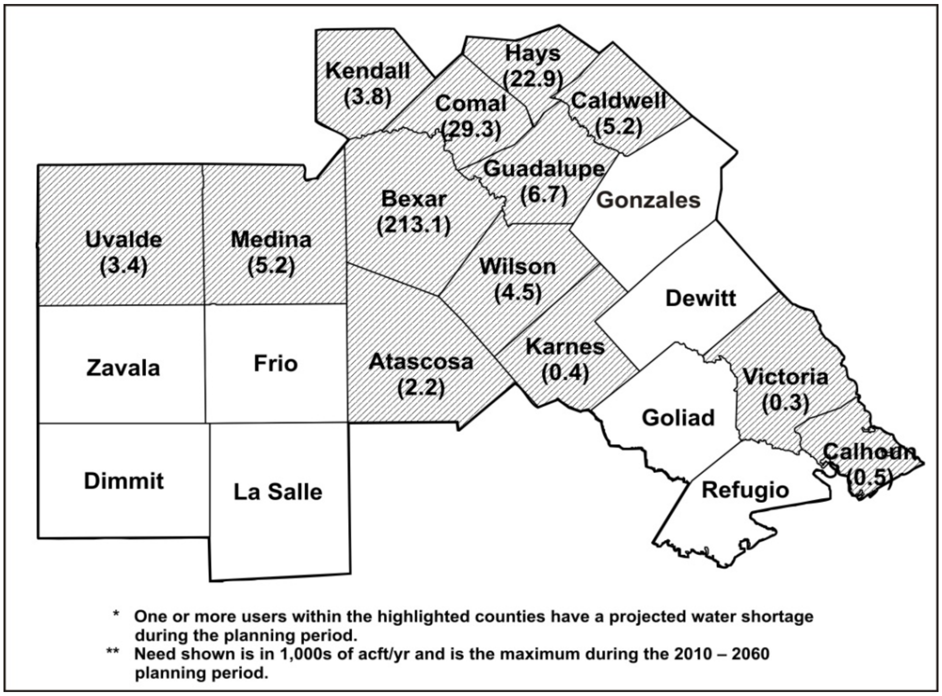

Figure 4A-1. Municipal Water Needs

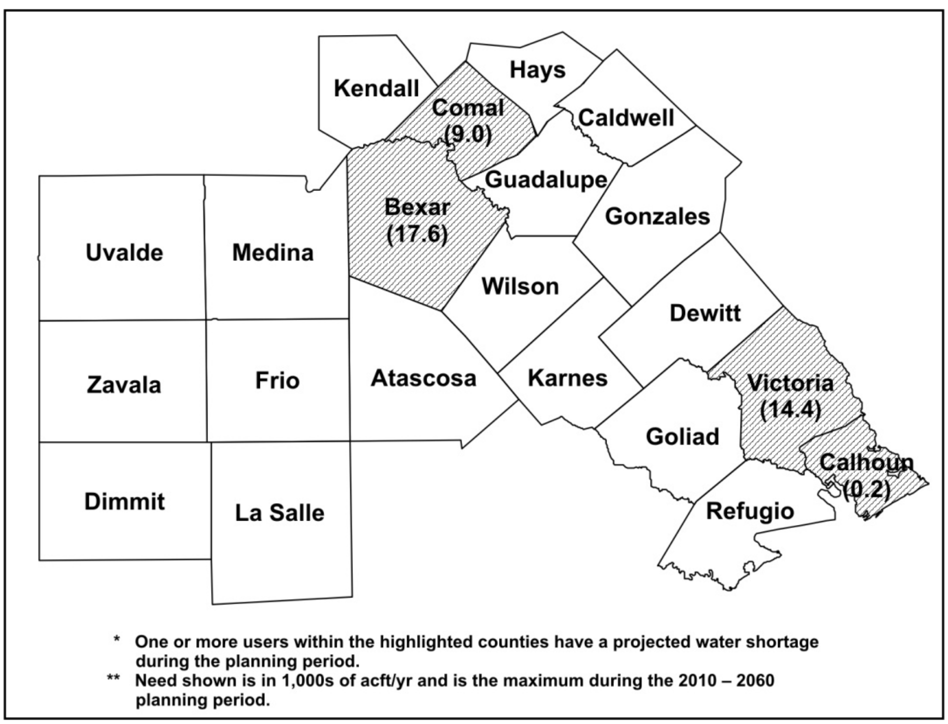

Figure 4A-2. Industrial Water Needs

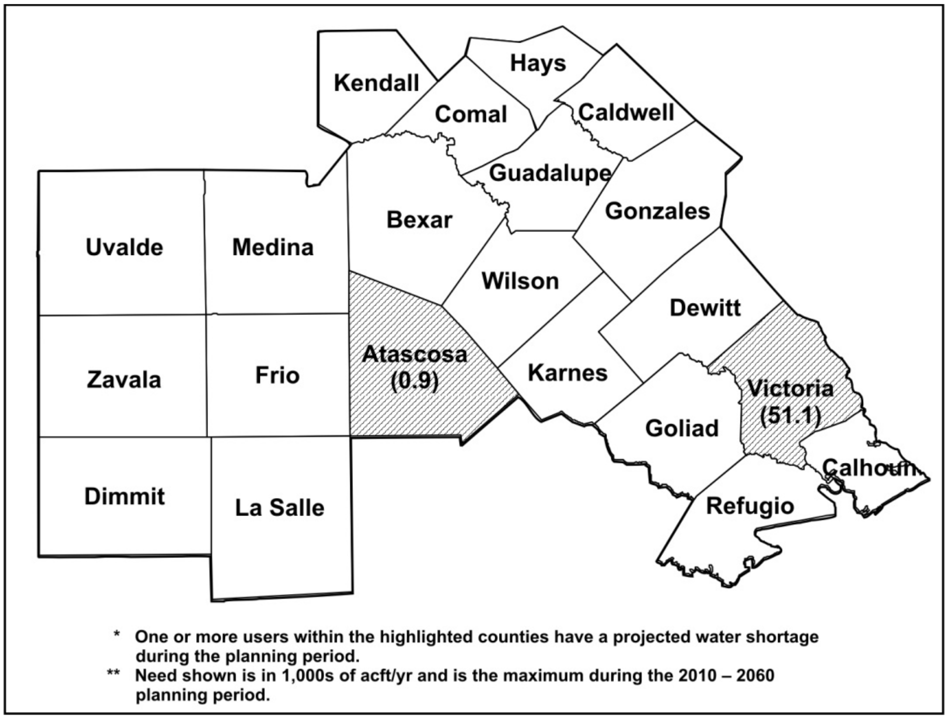

Figure 4A-3. Steam-Electric Water Needs

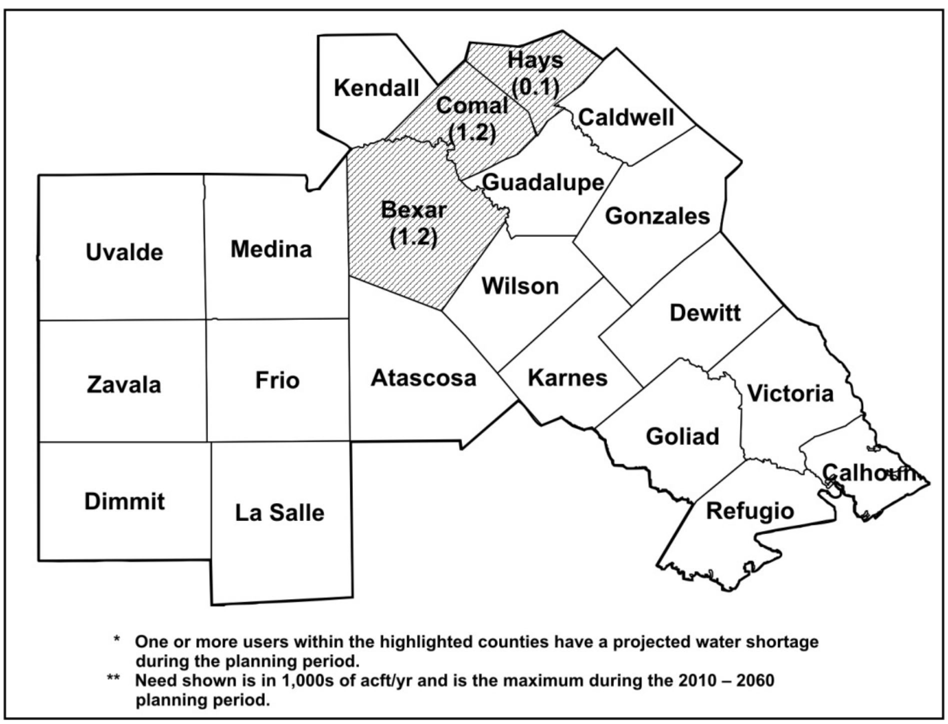

Figure 4A-4. Mining Water Needs

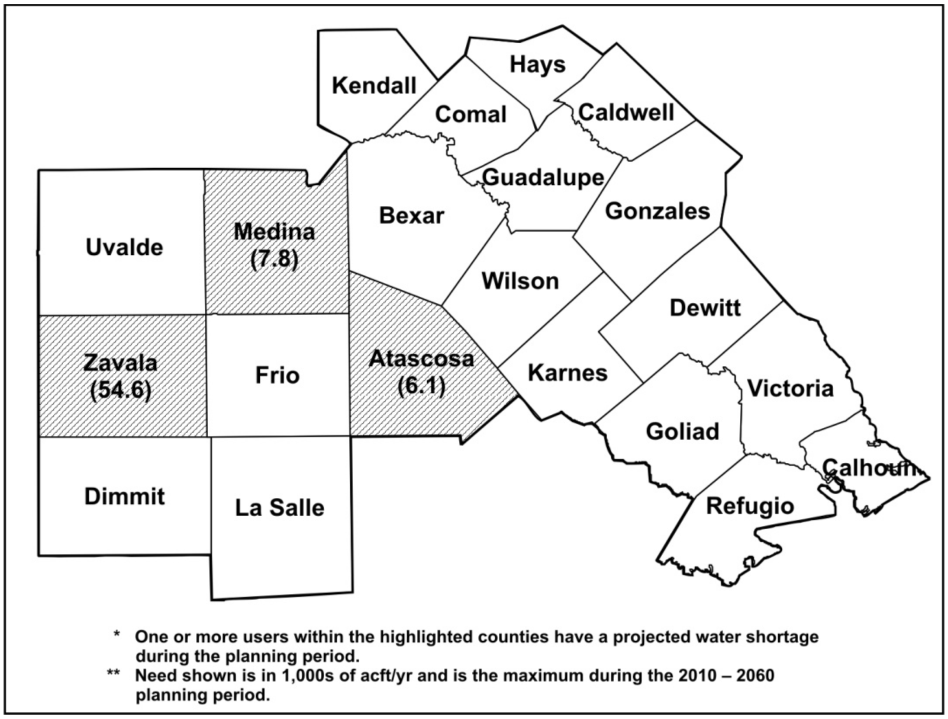

Figure 4A-5. Irrigation Water Needs

4A.2 Water Needs Projections by Wholesale Water Provider

A summary of projected water demands, existing supplies, and needs (shortages) for each Wholesale Water Provider (WWP) in the South Central Texas planning region is provided in Table 4A-3. Projected water demands for each WWP are estimated on the basis of existing and/or future contracts with water user groups (WUGs) expected to continue receiving water or acquire new water supplies from the WWP. Supplies for each WWP are determined in accordance with procedures and assumptions described in Section 3 and are identified by source in Table 4A-3. The Texas Water Alliance, San Antonio Water System (SAWS), Bexar Metropolitan Water District (BMWD), Canyon Regional Water Authority (CRWA), the Guadalupe-Blanco River Authority (GBRA), and Schertz-Seguin Local Government Corporation (SSLGC) each have projected needs for additional water supply throughout the planning period. The Springs Hill WSC (SHWSC), on the other hand, has existing supplies in excess of projected demands throughout the planning period. These existing supplies in excess of projected demand are identified in Table 4A-3 as System Management Supplies.

Table 4A-3. Water Demands, Supplies, and Needs (Shortages) by Wholesale Water Providers

Texas Water Alliance

Projected Demands:

Water Purchaser	Year (acft) 2000	2010	2020	2030	2040	2050	2060
Canyon Lake WSC	0	0	0	3,000	6,000	9,000	12,000
Water Service Inc.	0	0	1,000	1,000	1,000	1,000	1,000
Comal County Rural Areas	0	0	986	1,089	1,181	1,333	1,480
Gonzales County WSC	0	0	500	500	500	500	500
Springs Hill WSC (WWP)	0	0	1,500	3,000	3,000	3,000	3,000
Bulverde	0	0	1,342	2,128	2,910	3,723	4,595
Total Demand	**0**	**0**	**5,328**	**10,717**	**14,591**	**18,556**	**22,575**

Supply:

Source	Year (acft) 2000	2010	2020	2030	2040	2050	2060
Total Supply	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Projected Needs:

	Year (acft) 2000	2010	2020	2030	2040	2050	2060
System Management Supplies / (Needs)	**0**	**0**	**(5,328)**	**(10,717)**	**(14,591)**	**(18,556)**	**(22,575)**

San Antonio Water System (SAWS)

Projected Demands:

Water Purchaser	Year (acft) 2000	2010	2020	2030	2040	2050	2060
Balcones Heights	480	514	555	578	600	633	670
China Grove	288	376	457	531	591	645	695
Elmendorf	99	112	123	132	140	148	156
Helotes	845	1,537	2,249	2,820	3,264	3,679	4,047
Leon Valley	407	397	388	382	375	372	377
Live Oak	338	344	347	353	358	370	385
Olmos Park	381	403	424	441	452	468	484
San Antonio	166,813	192,007	213,943	234,865	250,671	265,958	281,204
Shavano Park	303	320	336	348	357	369	381
Terrell Hills	815	863	914	956	983	1,018	1,057
Windcrest	61	60	60	59	59	59	59
East Central WSC	2,240	2,240	2,240	2,240	2,240	2,240	2,240
East Central WSC (Palm Park)	1,120	1,120	1,120	0	0	0	0
Rural	5,595	5,661	5,747	5,796	5,923	6,287	6,667
Industrial (Bexar County)	7,723	12,000	16,000	18,000	22,000	30,000	30,000
Total Demand	**187,508**	**217,954**	**244,903**	**267,501**	**288,013**	**312,246**	**328,422**

Supply:

Source	Year (acft) 2000	2010	2020	2030	2040	2050	2060
Edwards Aquifer	117,187	117,187	117,187	117,187	117,187	117,187	117,187
Carrizo Aquifer	6,400	6,400	6,400	4,925	4,846	4,770	4,704
Trinity Aquifer	0	3,500	3,500	3,500	3,500	3,500	3,500
Direct Reuse	9,767	9,767	9,767	9,767	9,767	9,767	9,767
Aquifer Storage & Recovery (ASR) Project	0	0	0	0	0	0	0
GBRA (Canyon Reservoir)	0	7,500	5,500	4,000	0	0	0
Total Supply *	**133,354**	**144,354**	**142,354**	**139,379**	**135,300**	**135,224**	**135,158**

Projected Needs:

	Year (acft) 2000	2010	2020	2030	2040	2050	2060
System Management Supplies / (Needs) *	**(54,154)**	**(73,600)**	**(102,549)**	**(128,122)**	**(152,713)**	**(177,022)**	**(193,264)**

* Supplies could be up to 5,000 acft/yr greater (and needs up to 5,000 acft/yr less) as they do not include existing Trinity Aquifer supplies. As indicated in Table 3-1, the Trinity-Glen Rose GCD Management Plan was adopted after completion of the needs assessment for the 2006 regional plan.

Table 4A-3 (Continued)

Bexar Metropolitan Water District (BMWD)

Projected Demands:

Water Purchaser	Year (acft) 2000	2010	2020	2030	2040	2050	2060
Atascosa Rural WSC	389	120	120	120	120	120	120
Bexar Met Water District (Atascosa County)	8,794	505	621	715	780	843	895
Bexar Met Water District (Bexar County)	230	8,897	9,032	9,109	9,110	9,248	9,449
Bexar Met Water District (Comal County)	15	462	748	1,059	1,344	1,654	2,001
Bexar Met Water District (Medina County)	838	24	33	41	47	54	60
Castle Hills	842	820	807	793	780	771	771
Cibolo	2,229	500	500	500	500	500	500
Hill Country Village	21,419	838	835	831	828	826	826
Hollywood Park	321	2,314	2,389	2,458	2,511	2,565	2,616
San Antonio	1,400	24,654	27,471	30,157	32,187	34,150	36,107
Somerset	0	405	484	552	609	660	709
East Central WSC	0	1,400	1,400	1,400	1,400	1,400	1,400
Converse		1,500	1,500	1,634	1,949	2,216	2,469
Live Oak		1,000	1,000	1,000	1,000	1,000	1,000
Total Demand	**36,477**	**43,439**	**46,940**	**50,369**	**53,165**	**56,007**	**58,923**

Supply:

Source	Year (acft) 2000	2010	2020	2030	2040	2050	2060
Run-of-River (Medina River)	4,531	3,797	3,797	3,797	3,797	3,797	3,797
CRWA (Canyon Reservoir)	4,000	4,000	4,000	0	0	0	0
Trinity Aquifer (Bexar & Comal Counties)	158	5,224	5,224	5,224	5,224	5,224	5,224
Carrizo Aquifer (Bexar County)	1,000	1,000	1,000	770	757	745	735
Medina Lake System	0	0	0	0	0	0	0
Edwards Aquifer	12,887	12,781	12,781	12,781	12,781	12,781	12,781
Total Supply	**22,576**	**26,802**	**26,802**	**22,572**	**22,559**	**22,547**	**22,537**

Projected Needs:

	Year (acft) 2000	2010	2020	2030	2040	2050	2060
Needs	**(13,901)**	**(16,638)**	**(20,139)**	**(27,798)**	**(30,607)**	**(33,461)**	**(36,387)**

Guadalupe-Blanco River Authority (GBRA)

Projected Demands (acft/yr):

Water Purchaser	Basin Location	Year (acft) 2000	2010	2020	2030	2040	2050	2060
Municipal (Canyon Reservoir)								
Upper Basin - At or above Canyon Reservoir								
Canyon Lake WSC	U	4,000	6,000	6,000	6,129	8,198	10,466	12,769
City of Blanco	U	600	600	600	600	600	600	600
HH Ranch Properties	U	0	250	250	250	250	250	250
Domestic Contracts	U	25	17	17	17	17	17	17
Rebecca Creek MUD	U	130	130	130	130	130	130	130
Kendall County Rural	U	0	221	865	1,522	2,073	2,726	3,514
Kerr County MOU	U	0	0	0	2,000	2,000	2,000	2,000
WW Sports	U	1	1	1	1	1	1	1
Yacht Club	U	4	4	4	4	4	4	4
SJWTX – Bulverde (Western Canyon)	U	0	400	400	400	400	400	400
SJWTX – Park Village (Western Canyon)	U	0	322	322	322	322	322	322
Bulverde (Western Canyon)	U	0	653	1,342	2,128	2,910	3,723	4,595
City of Boerne (Western Canyon)	U	0	1,176	1,794	2,449	2,976	3,436	3,887
City of Fair Oaks Ranch (Western Canyon)	U	0	1,850	1,850	1,850	1,850	1,850	1,850
Cordillera Ranch (Western Canyon)	U	0	1,000	1,000	1,000	1,000	1,000	1,000
DH Invest.-Johnson Ranch (Western Canyon)	U	0	400	400	400	400	400	400
Kendall & Tapatio (Western Canyon)	U	0	750	750	750	750	750	750
Comal Trace (Western Canyon)	U	0	100	100	100	100	100	100

Table 4A-3 (Continued)

Guadalupe-Blanco River Authority (GBRA) (Continued)								
Kendall County Rural	U	0	0	0	0	0	0	374
SAWS (Western Canyon)	U	0	4,550	3,243	1,802	0	0	0
Western Canyon Sub-Total		*0*	*11,201*	*11,201*	*11,201*	*10,708*	*11,981*	*13,678*
Total Upper Basin Municipal (Canyon Reservoir)		**4,760**	**18,424**	**19,068**	**21,854**	**23,981**	**28,175**	**32,963**
Mid Basin								
CRWA – BMWD	M		3,500	0	0	0	0	0
CRWA – Cibolo	M		1,350	1,350	1,350	1,350	1,350	1,350
CRWA – BMWD / Cibolo	M		500	0	0	0	0	0
CRWA – East Central WSC	M		1,100	0	0	0	0	0
CRWA – East Central WSC / Green Valley SUD	M		300	300	300	300	300	300
CRWA – Green Valley SUD	M		1,800	1,700	1,700	1,700	1,700	1,700
CRWA – Marion	M		100	100	100	100	100	100
CRWA – Springs Hill WSC	M		1,425	1,425	1,425	1,425	1,425	1,425
CRWA – Springs Hill WSC / Green Valley SUD	M		500	500	500	500	500	500
CRWA Dunlap In District Balance	M		0	5,200	5,200	5,200	5,200	5,200
CRWA Dunlap Current Contract Subtotal	M	10,025	10,575	10,575	10,575	10,575	10,575	10,575
CRWA Dunlap Future Contract	M			5,000	5,000	5,000	5,000	5,000
50% of Comal County Other	M	0	891	986	1,089	1,181	1,333	1,480
New Braunfels Utilities[1]	M	6,720	6,720	7,627	10,764	13,871	17,081	20,640
Comal County Manufacturing	M		5,199	6,033	6,784	7,514	8,141	9,022
City of Seguin	M	3,000	1,000	1,000	1,000	1,000	1,000	1,000
Dittmar, Gary	M	5	5	5	5	5	5	5
Dittmar, Ray	M	5	5	5	5	5	5	5
Gonzales County WSC	M	700	700	700	700	700	700	700
Green Valley SUD	M	200	1,000	1,000	1,000	1,000	1,000	1,000
Springs Hill WSC	M	2,500	2,500	4,000	4,000	4,000	4,000	4,000
Canyon Regional Water Authority (H/C WTP)	M	2,038	2,038	2,038	2,038	2,038	2,038	2,038
City of Buda (San Marcos WTP)	M	1,120	1,120	1,120	1,120	1,120	1,120	1,120
City of Kyle (San Marcos WTP)	M	589	2,957	2,957	2,957	2,957	2,957	2,957
City of Mustang Ridge (San Marcos WTP)	M	0	19	62	99	137	175	213
City of Niederwald (San Marcos WTP)	M	0	58	118	183	244	317	377
2428 Partners (San Marcos WTP)	M	0	3,136	3,136	3,136	3,136	3,136	3,136
Plum Creek WC/Monarch (San Marcos WTP)	M	0	560	560	560	755	1,014	1,217
City of San Marcos (San Marcos WTP)	M	5,000	10,000	10,000	10,000	10,000	10,000	10,000
Wimberley WSC (San Marcos WTP)	M	0	219	440	667	885	1,179	1,409
Woodcreek & Woodcreek Utilities (San Marcos WTP)	M	0	478	944	1,433	1,910	2,501	2,967
County Line WSC (San Marcos WTP)	M	0	0	0	0	0	0	0
Creedmoor-Maha WSC (San Marcos WTP)	M	0	108	180	246	312	378	447
Crystal Clear WSC (San Marcos WTP)	M	800	800	800	800	800	800	800
Maxwell WSC (San Marcos WTP)	M	0	0	0	0	0	0	0
Martindale WSC (San Marcos WTP)	M	0	0	0	0	0	0	0
Goforth WSC (San Marcos WTP)	M	250	1,050	1,050	1,350	1,350	1,350	1,350
Hays County-Other (San Marcos WTP)	M	0	1,344	1,344	1,344	1,344	1,344	1,344
San Marcos WTP Sub-Total		*7,759*	*21,849*	*22,711*	*23,895*	*24,950*	*26,271*	*27,337*
Total Mid Basin Municipal (Canyon Reservoir)		**32,952**	**52,482**	**61,680**	**66,855**	**71,839**	**77,149**	**82,802**
Lower Basin								
City of Victoria (pursuant to Canyon Amendment)	L	1,240	1,240	1,240	1,240	1,240	1,240	1,240
Calhoun County Rural WSC	L	500	0	0	0	0	0	0
City of Port Lavaca	L	1,500	0	0	0	0	0	0
Port O'Conner MUD	L	60	0	0	0	0	0	0
Total Lower Basin Municipal (Canyon Reservoir)		**3,300**	**1,240**	**1,240**	**1,240**	**1,240**	**1,240**	**1,240**

Table 4A-3 (Continued)

Guadalupe-Blanco River Authority (GBRA) (Continued)								
Industrial/Steam-Electric (Canyon Reservoir)								
Mid Basin- Below Canyon Dam to Above Victoria								
Acme	M	25	25	25	25	25	25	25
CMC Steel	M	700	700	700	700	700	700	700
Comal Fair	M	1	1	1	1	1	1	1
Comal Road Department	M	3	3	3	3	3	3	3
GPP (Panda Energy)	M	6,840	6,840	6,840	6,840	6,840	6,840	6,840
Guadalupe County	M	1	1	1	1	1	1	1
Hays Energy LP	M	2,464	2,464	2,464	2,464	2,464	2,464	2,464
Henk Paving	M	0	1	1	1	1	1	1
Std. Gypsum	M	258	258	258	258	258	258	258
Total Mid Basin Industrial/SE (Canyon Reservoir)		**10,292**	**10,293**	**10,293**	**10,293**	**10,293**	**10,293**	**10,293**
Lower Basin– At or Below Victoria								
Coleto Creek	L	4,000	4,000	6,000	6,000	6,000	6,000	6,000
Ineous (BP)	L	1,100	0	0	0	0	0	0
Seadrift Coke	L	334	0	0	0	0	0	0
Dow/UCC	L	100	0	0	0	0	0	0
Total Lower Basin Industrial/SE (Canyon Reservoir)		**5,534**	**4,000**	**6,000**	**6,000**	**6,000**	**6,000**	**6,000**
Irrigation (Canyon Reservoir)								
Irrigation Contracts (Upper Basin)	**U**	**173**	**188**	**188**	**188**	**188**	**188**	**188**
Irrigation Contracts (Mid-Basin)	**M**	**736**	**608**	**608**	**608**	**608**	**608**	**608**
Canyon Reservoir Total		**57,747**	**87,235**	**99,077**	**107,038**	**114,149**	**123,653**	**134,094**
Mid-Basin Municipal (Run-of-River)								
Lockhart	M	1,120	1,120	1,120	1,120	1,120	1,120	1,120
Luling	M	1,680	1,680	1,680	1,680	1,680	1,680	1,680
Mid-Basin Municipal (Run-of-River) Total		**2,800**	**2,800**	**2,800**	**2,800**	**2,800**	**2,800**	**2,800**
Lower Basin Municipal (Run-of-River)								
Calhoun County Rural WSC	L	356	436	516	572	609	618	632
Victoria County Rural	L	0	0	0	0	81	193	310
Port Lavaca	L	1,658	1,769	1,877	1,981	2,079	2,209	2,345
Port O'Conner MUD	L	186	198	210	222	234	248	264
Total Lower Basin Municipal (Run-of-River, Firm)		**2,200**	**2,403**	**2,603**	**2,775**	**3,003**	**3,268**	**3,551**
Lower Basin Industrial/SE (Run-of-River)								
Ineous (BP)	L	2,200	3,300	3,300	3,300	3,300	3,300	3,300
Seadrift Coke	L	666	1,000	1,000	1,000	1,000	1,000	1,000
Victoria County Industry	L	0	0	2,969	5,921	8,860	11,489	14,441
Victoria County Steam Electric			1,791	1,836	1,865	1,895	1,927	1,950
Dow/UCC	L	15,000	15,100	15,100	15,100	15,100	15,100	15,100
Dow/UCC and Other Existing & New Industry	L	5,356	7,868	10,647	13,045	15,422	17,520	20,167
Total Lower Basin Industrial/SE (Run-of-River, Firm)		**23,222**	**29,059**	**34,852**	**40,231**	**45,577**	**50,336**	**55,958**
Lower Basin Industrial/SE (Run-of-River, Interruptible)								
Exelon		**0**	**0**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**
Total Lower Basin Industrial/SE (Run-of-River, Interruptible)		**0**	**0**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**
Lower Basin Irrigation (Run-of-River, Interruptible)								
Irrigation Agreements	**L**	**8,077**	**15,568**	**13,654**	**12,096**	**11,041**	**10,285**	**9,581**
Lower Basin (Run-of-River, Firm) Total		**25,422**	**31,462**	**37,455**	**43,006**	**48,580**	**53,604**	**59,509**
Lower Basin (Run-of-River, Interruptible) Total		**8,077**	**15,568**	**88,654**	**87,096**	**86,041**	**85,285**	**84,581**
Total Demand		**94,046**	**137,065**	**227,986**	**239,940**	**251,570**	**265,342**	**280,984**

Table 4A-3 (Continued)

Guadalupe-Blanco River Authority (GBRA) (Continued)								
Total Upper Basin Demand	U	4,933	18,612	19,256	22,042	24,169	28,363	33,151
Total Mid Basin Demand	M	46,780	66,183	75,381	80,556	85,540	90,850	96,503
Total Lower Basin Demand	L	42,333	52,270	133,349	137,342	141,861	146,129	151,330
Total Demand		**94,046**	**137,065**	**227,986**	**239,940**	**251,570**	**265,342**	**280,984**

Supply (acft/yr):

		Year (acft)						
Source		2000	2010	2020	2030	2040	2050	2060
Canyon Reservoir		87,700	87,629	87,558	87,488	87,417	87,346	87,275
Mid-basin Rights		0	0	0	0	0	0	0
Lower Basin Rights (Interruptible, Daily Basis)		133,953	133,953	133,953	133,953	133,953	133,953	133,953
Lower Basin Rights (Firm, Daily Basis)		41,548	41,548	41,548	41,548	41,548	41,548	41,548
Total Supply		**263,201**	**263,130**	**263,059**	**262,989**	**262,918**	**262,847**	**262,776**

Projected Management Supplies (Needs) (acft/yr):

		Year (acft)						
		2000	2010	2020	2030	2040	2050	2060
Canyon Management Supplies/(Needs)[1]		29,953	394	(11,519)	(19,550)	(26,732)	(36,307)	(46,819)
Mid Basin Run-of-River Management Supplies/(Needs)[2]		(2,800)	(2,800)	(2,800)	(2,800)	(2,800)	(2,800)	(2,800)
Lower Basin Run-of-River Firm Mgmt. Supplies / (Needs)[3]		16,126	10,086	4,093	(1,458)	(7,032)	(12,056)	(17,961)
Lower Basin Run-of-River Interruptible Mgmt. Supplies / (Needs)		125,876	118,385	45,299	46,857	47,912	48,668	49,372
Total System Needs[4]		**0**	**0**	**10,226**	**23,808**	**36,564**	**51,163**	**67,580**

U = Upper = At or above Canyon Dam; M = Mid = Below Canyon Dam to Above Victoria; and L = Lower = At or below Victoria.

1 Projected needs for GBRA's customers presently associated with Canyon Reservoir are calculated by subtraction of the Canyon Reservoir Total demands near the middle of page 4A-19 from the Canyon Reservoir supplies on page 4A-20.2 Mid-basin run-of-river customer needs are calculated by subtraction of the Mid-Basin Municipal Run-of-River Total demands near the middle of page 4A-19 from the Mid-Basin Rights supply on page 4A-20.

3 Lower basin firm customer needs are calculated by subtraction of Lower Basin (Run-of-River, Firm) Total demands near the bottom of page 4A-19 from Lower Basin Rights (Firm, Daily Basis) supplies on page 4A-20.

4 Total System Needs are based on firm supplies and demands and are calculated as the sum of Canyon Management Supplies/(Needs), Mid-Basin Run-of-River Management Supplies/(Needs), and Lower Basin Run-of-River Firm Management Supplies/(Needs).

Canyon Regional Water Authority (CRWA)

Projected Demands:

	Year (acft)						
Water Purchaser	2000	2010	2020	2030	2040	2050	2060
Bexar Met Water District	4,000	6,800	8,800	12,800	13,800	14,505	14,505
City of Cibolo	800	2,050	3,030	8,230	8,730	9,230	9,230
County Line WSC	1,267	1,308	1,878	1,878	1,878	1,878	1,878
East Central WSC	1,400	2,585	2,885	2,635	2,635	2,635	2,635
Green Valley SUD	1,800	2,500	3,600	9,300	9,800	10,800	11,300
City of La Vernia	0	400	400	400	400	400	400
City of Marion	100	200	300	500	500	500	500
Martindale	158	190	190	190	190	190	190
Martindale WSC	288	396	396	696	896	896	896
Springs Hill WSC	1,925	2,025	2,025	2,025	2,025	2,025	2,025
SS WSC	0	0	0	0	0	0	690
City of Santa Clara	0	100	250	350	500	650	900
Maxwell WSC	867	900	1,300	1,700	2,100	2,500	2,900
Crystal Clear WSC	382	1,600	2,895	2,895	2,895	5,485	5,485
Total Demand	**12,987**	**21,054**	**27,949**	**43,599**	**46,349**	**51,694**	**53,534**

Supply:

	Year (acft)						
Source	2000	2010	2020	2030	2040	2050	2060
GBRA - Lake Dunlap	10,025	10,575	10,575	10,575	10,575	10,575	10,575
GBRA - Hays/Caldwell	2,038	2,038	2,038	2,038	2,038	2,038	2,038
Water Right Leases	521	521	521	521	521	521	521
Total Supply	**12,584**	**13,134**	**13,134**	**13,134**	**13,134**	**13,134**	**13,134**

Table 4A-3 (Continued)

Canyon Regional Water Authority (CRWA) (cont.)

Projected Needs:

	Year (acft)						
	2000	2010	2020	2030	2040	2050	2060
System Management Supplies / (Needs)	**(403)**	**(7,920)**	**(14,815)**	**(30,465)**	**(33,215)**	**(38,560)**	**(40,400)**

Schertz-Seguin Local Government Corporation (SSLGC)

Projected Demands:

	Year (acft)						
Water Purchaser	2000	2010	2020	2030	2040	2050	2060
Schertz	5,143	5,143	5,143	6,082	7,567	9,258	11,066
Seguin	5,144	5,144	5,144	5,144	5,144	5,144	5,144
Selma	800	800	1,086	1,559	1,557	1,548	1,549
Springs Hill WSC	560	560	560	560	560	560	560
Universal City	800	800	800	800	800	800	800
Crystal Clear WSC	0	0	300	600	900	900	900
Garden Ridge	0	257	395	552	710	873	1,052
Total Demand	**12,447**	**12,704**	**13,428**	**15,297**	**17,238**	**19,083**	**21,071**

Supply:

	Year (acft)						
Source	2000	2010	2020	2030	2040	2050	2060
Carrizo Aquifer (Gonzales County)[1]	12,910	12,910	12,910	12,910	12,910	12,910	12,910
Carrizo Aquifer Guadalupe County)[1]		3,226	3,226	3,226	3,226	3,226	3,226
Total Supply	**12,910**	**16,136**	**16,136**	**16,136**	**16,136**	**16,136**	**16,136**

[1] Permitted production as of August 2004.

Schertz-Seguin Local Government Corporation (SSLGC) (Continued)

Projected Needs:

	Year (acft)						
	2000	2010	2020	2030	2040	2050	2060
System Management Supplies / (Needs)	**463**	**3,432**	**2,708**	**839**	**(1,102)**	**(2,947)**	**(4,935)**

Springs Hill Water Supply Corporation (SHWSC)

Projected Demands:

	Year (acft)						
Water Purchaser	2000	2010	2020	2030	2040	2050	2060
Springs Hill WSC	2,076	2,349	2,679	3,056	3,424	3,849	4,330
La Vernia (via CRWA)	400	400	400	400	400	400	400
Crystal Clear WSC	250	250	250	250	250	250	250
East Central WSC (via CRWA)	385	385	385	385	385	385	385
Total Demand	**3,111**	**3,384**	**3,714**	**4,091**	**4,459**	**4,884**	**5,365**

Table 4A-3 (Concluded)

Springs Hill Water Supply Corporation (SHWSC) (cont.)

Supply:

Source	Year (acft)						
	2000	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
GBRA (Canyon Reservoir)	2,500	2,500	2,500	2,500	2,500	2,500	2,500
CRWA (Canyon Reservoir)	1,925	2,025	2,025	2,025	2,025	2,025	2,025
Carrizo Aquifer (Guadalupe County)	1,050	1,050	1,050	1,050	1,050	1,050	1,050
Carrizo Aquifer (Gonzales County) (SSLGC)	560	560	560	560	560	560	560
Total Supply	**6,035**	**6,135**	**6,135**	**6,135**	**6,135**	**6,135**	**6,135**

Projected Management Supplies / (Needs):

	Year (acft)						
	2000	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
System Management Supplies / (Needs)	**2,924**	**2,751**	**2,421**	**2,044**	**1,676**	**1,251**	**770**

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Section 4B
Water Supply Plans
[31 TAC §357.7(a)(5-7)

The South Central Texas Regional Water Planning Group (SCTRWPG) has used a planning process (Figure 4B-1) focused on the development of a Regional Water Plan to meet the needs of every water user group in the region for a planning period extending through the year 2060. Given the history of sharp and divisive conflict concerning water planning in this region, the planning process has provided extraordinary opportunities for participation by water user groups in providing input to achieve the goal of a plan that will "provide for the orderly development, management, and conservation of water resources…" 31 TAC §357.5(a). In order to build consensus among the constituencies represented by the members of the SCTRWPG, the planning process has emphasized the coordination and careful integration of technical information with information provided through public participation.

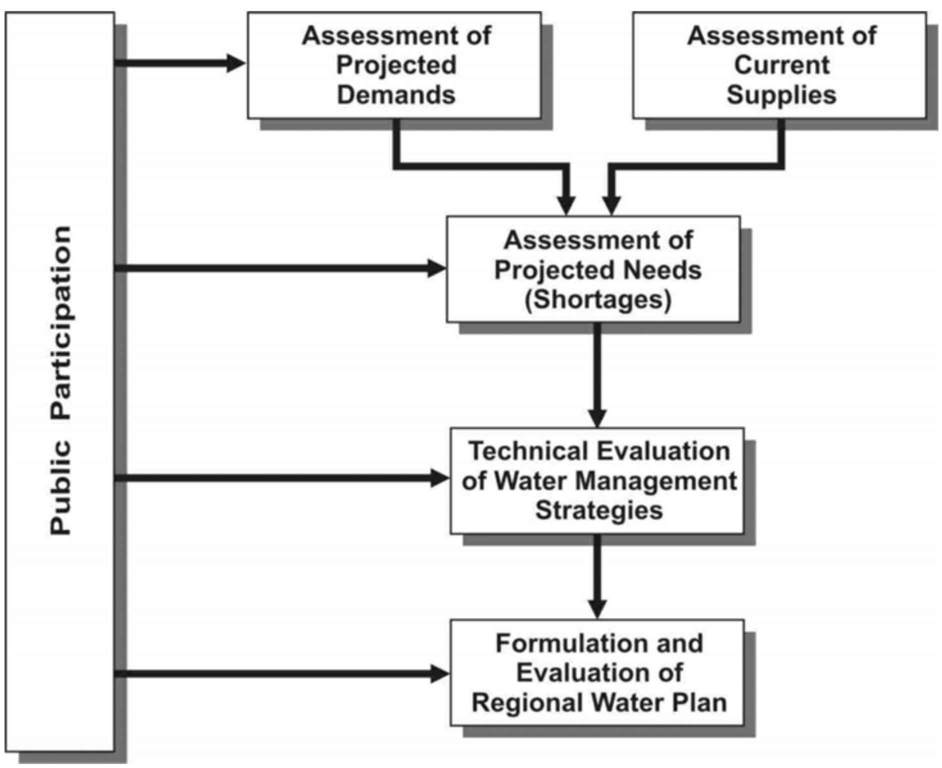

Figure 4B.1-1. Planning Process

Conflict over the past several decades in this region has focused on how to manage the Edwards Aquifer so as to meet the needs of many water user groups. Central to progress in resolving this conflict, and thus in achieving the formulation of a water plan acceptable to all constituencies represented in the SCTRWPG, is the assurance that all of the different, competing strategies for meeting water needs are given consideration. It has thus been central to the viability of the planning process itself that the evaluation of diverse water management strategies as a cohesive regional plan receive extraordinary attention.

To this end, the SCTRWPG adopted a planning process that ensures evaluation of virtually all the water management strategies that have been proposed or discussed in the past, together with new ones that had been subject to only limited technical evaluation. To achieve confidence by all constituencies in the planning process, it was necessary in the development of the 2001 South Central Texas Regional Water Plan to evaluate water management strategies both on a stand-alone basis and in various combinations in the context of five alternative plans. In keeping with logical and acceptable planning methods, the SCTRWPG was able to recommend the best components of these alternative plans and adopt the 2001 South Central Texas Regional Water Plan, which then became a part of the 2002 State Water Plan.

In the development of the 2006 Regional Water Plan, the following process for Identification of Potentially Feasible Water Management Strategies was used:[1]

1) Developed draft scope of work including necessary updates to recommended water management strategies included in the 2001 Regional Water Plan, with technical evaluation of several specific water management strategies that are potentially feasible for meeting needs in the region. Draft scope of work also included identification and evaluation of unspecified water management strategies to meet needs for new retail utility water user groups previously aggregated in County-Other (Rural Area Residential & Commercial).
2) Presented scope of work at a series of public meetings (January 29–31, 2002) and received comments.
3) Refined scope of work and obtained TWDB approval in August 2002.

1 Pursuant to 357.5(e)(4) of the Regional Water Planning Guidelines which states: "Before a regional water planning group begins the process of identifying potentially feasible water management strategies, it shall document the process by which it will list all possible water management strategies and identify the water management strategies that are potentially feasible for meeting a need in the region."

4) Solicited current water planning information, including specific water management strategies of interest, from water user groups.
5) Compared water demand projections and available supplies to obtain projections of water needs (shortages) by water user group.
6) Prepared a draft list of water management strategies that were potentially feasible to meet projected needs of water user groups subject to changed conditions and of new retail utility water user groups that were aggregated in County-Other in the 2001 Regional Water Plan. Draft list included the recommended water management strategies in the 2001 Regional Water Plan, and specific water management strategies submitted in response to the solicitation for current water planning information.
7) Presented draft list of potentially feasible water management strategies during public meetings of the RWPG and received comments.
8) Refined list of potentially feasible water management strategies for water user groups subject to changed conditions and new retail utility water user groups for RWPG consideration and approval.
9) Performed technical evaluations of water management strategies approved by RWPG.

Development of the 2011 South Central Texas Regional Water Plan has focused on refinement of the 2006 Regional Water Plan. In addition, new estimates of groundwater availability and a refined evaluation of surface water supply has provided the tools for more detailed technical assessment of needs for additional water supplies and the potential effects of implementation of recommended water management strategies. In the development of the 2011 South Central Texas Regional Water Plan (SCTRWP), the process for Identification of Potentially Feasible Water Management Strategies outlined below has been followed:

1) The South Central Texas Regional Water Planning Group (SCTRWPG) first recognizes that the 2011 SCTRWP is essentially an update of the 2001 and 2006 SCTRWPs. In the development of the 2001 SCTRWP, virtually all of the water management strategies proposed or discussed previously (along with a variety of new strategies) were technically evaluated on a stand-alone basis and in various combinations in the context of five alternative regional plans. The 2006 SCTRWP is an update of the 2001 SCTRWP including technical evaluations of new or refined water management strategies.
2) Developed draft scope of work, including necessary updates to recommended water management strategies included in the adopted 2006 SCTRWP, with technical evaluation of several additional water management strategies that are potentially feasible for meeting needs in the region. Draft scope of work included identification and evaluation of unspecified water management strategies to meet needs for new retail utility water user groups and/or wholesale water providers.
3) Presented draft versions of the scope of work at public meetings of the SCTRWPG (February 7, 2008 and May 1, 2008) and received comments.

4) Refined scope of work with due consideration of comments received and obtained TWDB approval on August 25, 2008.
5) Current water planning information, including specific water management strategies of interest, was solicited from water user groups in June 2009.
   a) Solicitation for planning information included a draft list of water management strategies deemed potentially feasible to meet projected needs.
   b) Draft list generally included the recommended water management strategies in the 2006 SCTRWP, strategies included in the Technical Consultant Scope of Work, and/or other strategies perceived to be of interest to water user groups.
   c) Water user groups were encouraged to classify each water management strategy on their draft list as recommended, alternative, or rejected.
6) Considering information responsive to the solicitation and information from required technical evaluations, draft lists of potentially feasible water management strategies were prepared and comments received during the August 2009 meeting of the SCTRWPG.
7) Refined lists of potentially feasible water management strategies recommended to meet water user group needs were compiled for SCTRWPG consideration in November and December 2009 and SCTRWPG approval for publication in the Initially Prepared 2011 SCTRWP in February 2010.

4B.1 Water Management Strategies

4B.1.1 Regional Summary

The South Central Texas Regional Water Plan includes recommended water management strategies that emphasize water conservation; maximize utilization of available resources, water rights, and reservoirs; engage the efficiency of conjunctive use of surface and groundwater, avoid development of large new reservoirs; and limit depletion of storage in aquifers. There are additional strategies that have significant support within the region, yet require further study regarding quantity of dependable water supply made available during severe drought, feasibility, and/or cost of implementation, that are also included in the Plan. Water management strategies recommended to meet projected needs in the South Central Texas Region could produce new supplies in excess of 755,000 acft/yr in 2060 and may be categorized by source as shown in Figure 4B.1-2. The plan does not propose any changes to existing water contracts or option agreements. Further, the plan was created in close cooperation with each Wholesale Water Provider in the region, and no strategy contained in the plan would adversely affect any existing water contracts or option agreements.

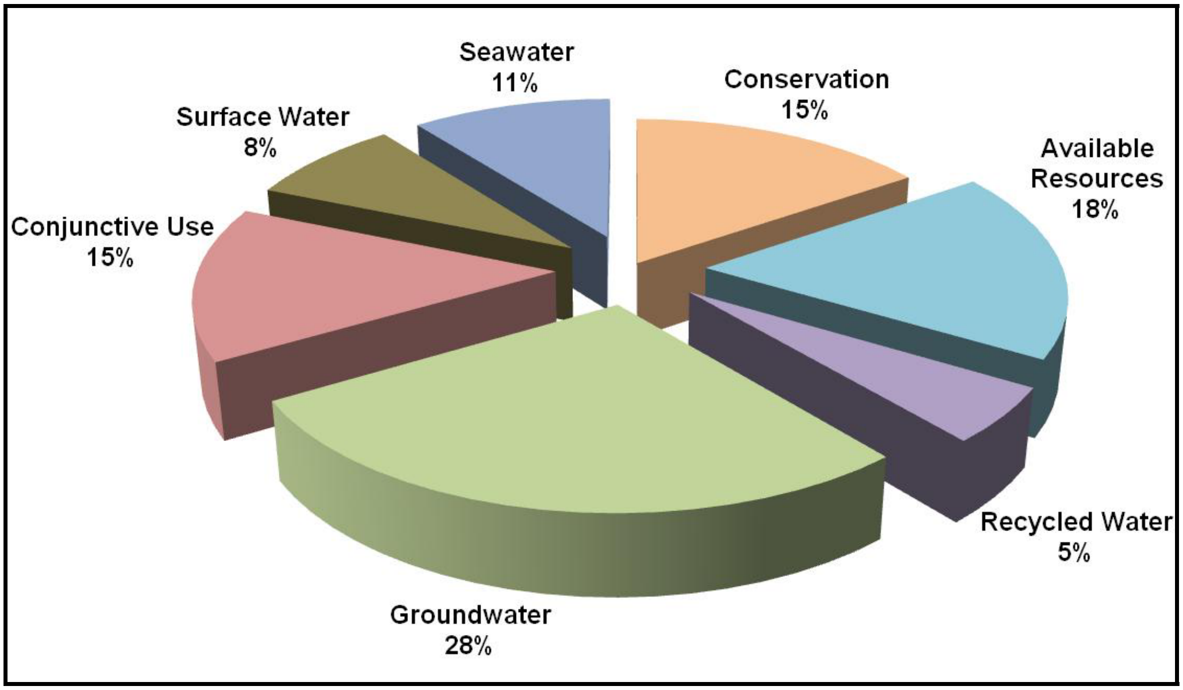

Figure 4B.1-2. Sources of New Supply in 2060

Specific recommended water management strategies in the Plan are summarized by approximate timing of potential implementation in Figure 4B.1-3 and Appendix D, and by geographic location in Figure 4B.1-4. Water management strategies emphasizing conservation comprise about 15.5 percent of recommended new supplies and include:

- Municipal Water Conservation (72,666 acft/yr @ $648/acft/yr[2]);
- Irrigation Water Conservation (7,238 acft/yr @ $143/acft/yr);
- Drought Management (41,240 acft/yr); and
- Mining Water Conservation (2,493 acft/yr).

Water management strategies maximizing use of available resources, water rights, and reservoirs comprise about 18.0 percent of recommended new supplies and include:

- Edwards Transfers (51,875 acft/yr @ $454/acft/yr);
- GBRA-Exelon Project (49,126 acft/yr @ $641/acft/yr);
- GBRA Lower Basin Storage (100 acre site) (28,369 acft/yr @ $104/acft/yr);
- Medina Lake Firm-Up (ASR) (9,933 acft/yr @ $1,696/acft/yr);

[2] $648/acft/yr is an average cost of municipal water conservation. Actual unit costs vary from WUG to WUG and from decade to decade.

- Wimberley & Woodcreek Water Supply Project (4,480 acft/yr @ $2,453/acft/yr);
- Surface Water Rights[3]; and
- Facilities Expansions.

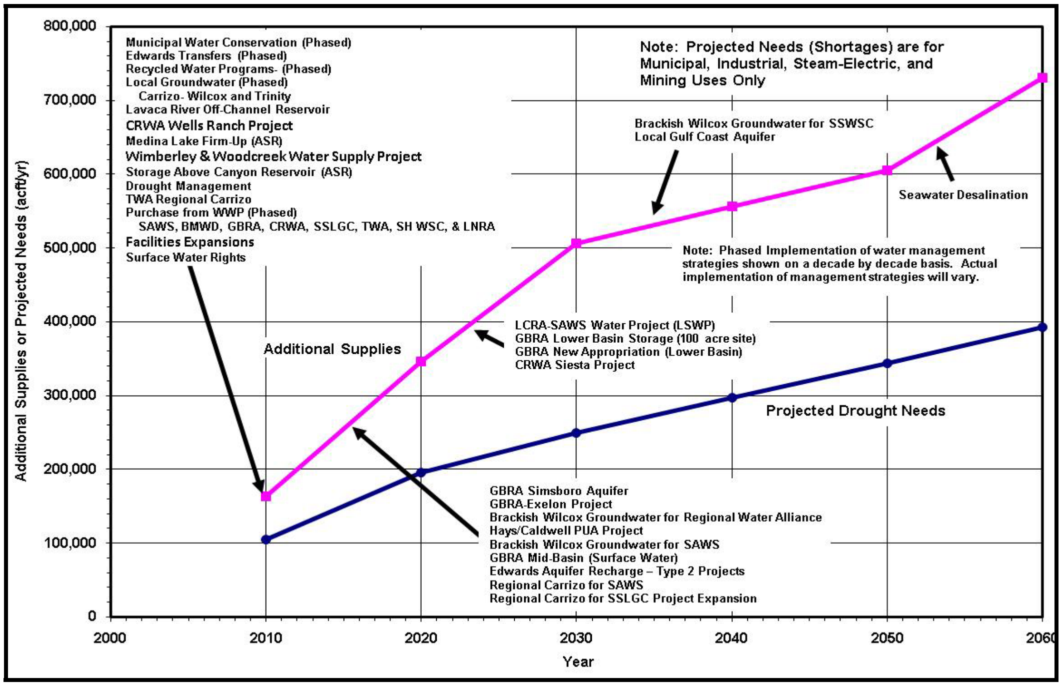

Figure 4B.1-3. Phased Implementation of Water Management Strategies

The Regional Water Plan includes the Recycled Water Programs water management strategy at 41,737 acft/yr which could represent approximately 5.2 percent of the recommended new supplies.

Water management strategies that simultaneously develop groundwater supplies and limit depletion of storage in regional aquifers comprise about 27.9 percent of recommended new supplies and include:

- GBRA Simsboro Project (49,777 acft/yr @ $982/acft/yr)[4];
- Local Groundwater Supplies (Carrizo, Gulf Coast, and Trinity) (38,471 acft/yr @ $687/acft/yr - $1,823/acft/yr);

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[3] As new supplies and associated costs have not been quantified, this strategy is more explicitly identified as an activity consistent with the 2011 Regional Water Plan.

[4] The new firm supply associated with this strategy was reduced from 50,000 acft/yr to 49,777 acft/yr to resolve a potential inter-regional conflict with Region G. This small change did not warrant revision of Section 4C.21. A portion of the new firm supply for this strategy to be obtained from the Carrizo-Wilcox Aquifer in Bastrop County is identified as an "overdraft" to resolve a potential inter-regional conflict with Region K. See the response to TWDB Level I Comment No. 52 in Section 10 for additional information.

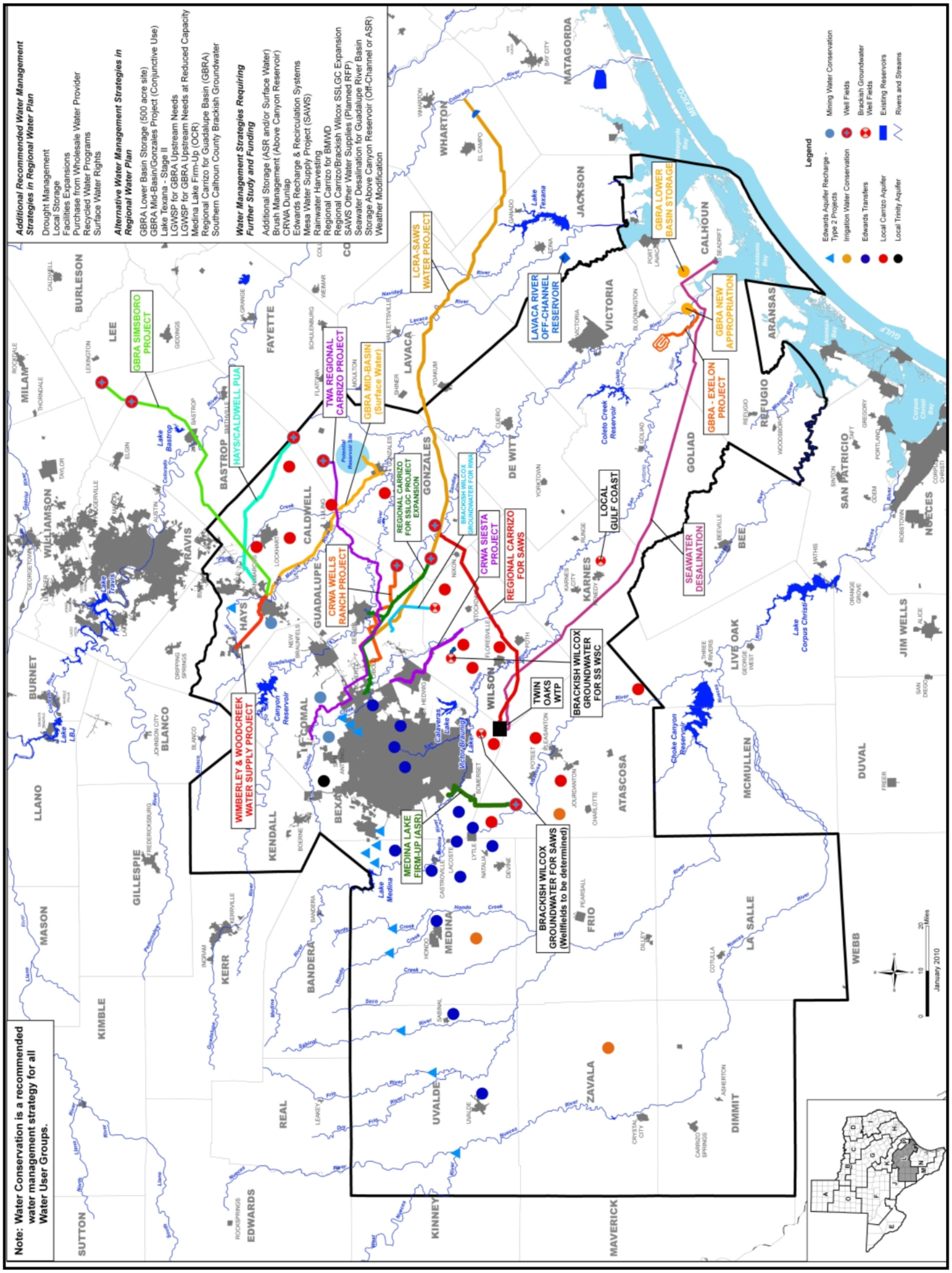

Figure 4B.1-4. Recommended Water Management Strategies

- Hays/Caldwell PUA Project (35,000 acft/yr @ $1,245/acft/yr);
- TWA Regional Carrizo (27,000 acft/yr @ $1,523/acft/yr);
- Brackish Wilcox Groundwater for SAWS (26,400 acft/yr @ $1,245/acft/yr);
- Regional Carrizo for SAWS (11,687 acft/yr @ $1,343/acft/yr);
- Brackish Wilcox Groundwater for Regional Water Alliance (14,700 acft/yr @ $1,293/acft/yr);
- CRWA Wells Ranch Project (11,000 acft/yr @ $725/acft/yr);
- Regional Carrizo for SSLGC Project Expansion (10,364 acft/yr @ $608/acft/yr); and
- Brackish Wilcox Groundwater for SSWSC (1,120 acft/yr @ $1,883/acft/yr).

Water management strategies that engage the efficiency of conjunctive use of surface and groundwater as well as maximize the use of available resources and water rights comprise approximately 14.6 percent of recommended new supplies and include:

- LCRA-SAWS Water Project (90,000 acft/yr @ $2,394/acft/yr);
- Edwards Aquifer Recharge – Type 2 Projects (21,577 acft/yr @ $1,728/acft/yr); and
- CRWA Siesta Project (5,042 acft/yr @ $1,421/acft/yr).

Water management strategies that involve new surface water appropriations while avoiding development of large mainstem reservoirs comprise approximately 8.2 percent of recommended new supplies and include:

- Lavaca River Off-Channel Reservoir (26,242 acft/yr @ $701/acft);
- GBRA Mid-Basin Project (Surface Water) (25,000 acft/yr @ $2,204/acft/yr);
- GBRA New Appropriation (Lower Basin) (11,300 acft/yr @ $1,953/acft/yr); and
- Storage Above Canyon Reservoir (ASR) (3,140 acft/yr @ $1,772/acft/yr).

Finally, the Regional Water Plan includes the development of a Seawater Desalination water management strategy at 84,012 acft/yr (75 mgd) ($2,284/acft/yr) which could represent approximately 10.5 percent of the recommended new supplies.

The South Central Texas Regional Water Planning Group identifies the following as alternative water management strategies that have been technically evaluated in accordance with TWDB rules and may, subject to an appropriate amendment process defined by TWDB rules, replace a recommended water management strategy in the 2011 Regional Water Plan:

- Lower Guadalupe Water Supply Project for Upstream GBRA Needs (60,000 acft/yr @ $1,506/acft/yr);
- GBRA Lower Basin Storage (500 acre site) (59,569 acft/yr @ $109/acft/yr);

- Lower Guadalupe Water Supply Project for Upstream GBRA Needs at Reduced Capacity (35,000 acft/yr @ $2,565/acft/yr);
- GBRA Mid-Basin Project (Conjunctive Use) (25,000 acft/yr @ $1,779/acft/yr);
- Regional Carrizo for Guadalupe Basin (GBRA) (25,000 acft/yr @ $1,280/acft/yr);
- Medina Lake Firm-Up (OCR) (9,078 acft/yr @ $1,197/acft/yr);
- Local Groundwater Supplies (Barton Springs Edwards) (1,358 acft/yr @ $203/acft/yr);
- Calhoun County Brackish Groundwater Project (1,344 acft/yr @ $2,679/acft/yr); and
- Local Groundwater Supplies (Carrizo) (Yancey WSC) (1,210 acft/yr @ $517/acft/yr).

The Regional Water Plan includes several water management strategies that require further study and funding prior to implementation. Several of these strategies rely upon technologies that have been used previously, but further research is necessary to determine the cost of implementation, optimal scale and location, and quantity of dependable water supply that would be available in severe drought. These strategies are:

- Brush Management;
- Weather Modification;
- Rainwater Harvesting;
- Storage Above Canyon Reservoir (Off-Channel);
- Edwards Aquifer Recharge & Recirculation Systems;
- Palmetto Bend – Stage II (LNRA);
- Seawater Desalination for Guadalupe River Basin;
- Mesa Water Supply Project (SAWS);
- SAWS Other Water Supplies (Planned RFP);
- Regional Carrizo for BMWD;
- Regional Carrizo for SSLGC Project Expansion – Wilson County Option;
- CRWA Dunlap Project; and
- Balancing Storage (ASR and/or Surface)[5].

Although specific quantities of new, dependable supply during drought have not been determined for these strategies, it is understood that their implementation will contribute positively to storage and system management of many diverse strategies in the Regional Water

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[5] As new supplies and associated costs have not been quantified, this strategy is more explicitly identified as an activity consistent with the 2011 Regional Water Plan.

Plan. The SCTRWPG recommends that State funding be made available to cooperatively support the refinement and implementation of these strategies.

The 2011 South Central Texas Regional Water Plan also recognizes Edwards Aquifer Recharge and Recirculation Systems (R&R) as a water management strategy requiring further evaluation. As it did in the 2006 Regional Water Plan, the SCTRWPG recommends State and local funding for research at a level that ensures due consideration of this strategy.

There are significant quantities of projected water supply needs or shortages in the region for municipal, industrial, steam-electric, and mining uses. As indicated in Figure 4B.1-3, implementation of a number of water management strategies on an expedited basis will be necessary to avoid significant hardship, water rationing, and/or cessation of discharge from Comal Springs in the event of severe drought during the next decade. Substantial water supply needs or shortages are also projected for irrigation use in the South Central Texas Region. The Irrigation water Conservation Water Management Strategy is projected to meet approximately 42 percent of projected irrigation needs (shortages) in 2010, and 65 percent in 2060. However, based upon present economic conditions for agriculture and the fact that there are no really low-cost water supplies to be developed, the SCTRWPG has determined that it is not economically feasible to meet all projected irrigation needs in Zavala County at this time, since the net farm income to pay for water is less than the costs of water at the potential sources, to say nothing of the cost delivered to farms where water is needed.

Implementation of the 2011 South Central Texas Regional Water Plan will result in the development of new water supplies that will be reliable in the event of a repeat of the most severe drought on record. However, it is evident in Figure 4B.1-3 that implementation of all recommended water management strategies is not likely to be necessary in order to meet projected needs within the planning period. The SCTRWPG explicitly recognizes the difference between additional supplies and projected needs as System Management Supplies and has recommended the associated water management strategies in the Regional Water Plan for the following reasons:

- To recognize both the long lead times and the uncertainty associated with risk factors that may prevent implementation of water management strategies and necessitate replacement strategies;

- To preserve flexibility for water user groups or wholesale water suppliers to select the most feasible projects among several consistent with the Regional Plan and therefore ensure that such projects are potentially eligible for permitting and funding;
- To serve as additional supplies in the event that rules, regulations, or other restrictions limit use of any planned strategies; and/or
- To ensure adequate supplies in the event of a drought more severe than that which occurred historically.

Costs associated with the implementation and long-term operations and maintenance of water management strategies have been estimated in accordance with TWDB rules and general guidelines and reflect regional water treatment capacity and balancing storage facilities sufficient to meet peak daily and seasonal water demands in the larger urban areas. Total estimated project cost (in 2008 dollars) for the recommended water management strategies for municipal supply that will likely require long-term financing for implementation is about $7.6 billion. Annual unit costs for recommended water management strategies for municipal supply in the 2011 South Central Texas Regional Water Plan (in 2008 dollars) are estimated to range from a low of about $104/acft/yr ($0.32 per 1,000 gallons) for GBRA Lower Basin Storage to a high of about $2,429/acft/yr ($7.45 per 1,000 gallons) for the Wimberley/Woodcreek Water Supply Project and average about $1,209/acft/yr ($3.71 per 1,000 gallons). No costs have been included for facilities expansions and potentially feasible water management strategies requiring further study.

4B.1.2 Water Management Strategy Descriptions

A brief description of each of the water management strategies included in the 2011 South Central Texas Regional Water Plan is included in the following text. Descriptions include the dependable (firm) water supply during drought and an estimated annual unit cost (in September 2008 dollars) for water at full operating capacity during the debt service period (if applicable).

4B.1.2.1 Municipal Water Conservation

The Municipal Water Conservation water management strategy includes conservation practices and programs to reduce per capita water use in cities by amounts in addition to reductions already incorporated into the TWDB water demand projections. The SCTRWPG established municipal water conservation goals as follows:

- For municipal WUGs with water use of 140 gpcd and greater, the goal is to reduce per capita water use by one percent per year until the level of 140 gpcd is reached, after which, the goal is to reduce per capita water use by one-fourth percent per year for the remainder of the planning period; and
- For municipal WUGs having year 2000 water use of less than 140 gpcd, the goal is to reduce per capita water use by one-fourth percent per year (0.25% per year).

Best Management Practices (BMPs) for water conservation, as identified by the Water Conservation Implementation Task Force[6], are recommended as means of achieving these municipal water conservation goals. The objective of municipal water conservation programs is to reduce the per capita water use parameter without adversely affecting the quality of life of the people involved. Planned municipal water conservation focuses on the following specific BMPs:

- Use of low flow plumbing fixtures (e.g., toilets, shower heads, and faucets that are designed for low quantities of flow per unit of use);
- The selection and use of more efficient water-using appliances (e.g., clothes washers and dishwashers);
- Modifying and/or installing lawn and landscaping systems to use grass and plants that require less water;
- Repair of plumbing and water-using appliances to reduce leaks; and
- Modification of personal behavior that controls the use of plumbing fixtures, appliances, and lawn watering methods.

The SCTRWPG recognizes that meeting the water conservation goals through implementation of these, or other, BMPs represents the highest practicable level of water conservation pursuant to 31 TAC 357.7(a)(7)(A)(iii). Planned additional municipal water conservation focused on these BMPs could effectively increase supply through demand reduction in the South Central Texas Region by about 72,570 acft/yr in the year 2060 at unit costs ranging from $525 per acft/yr to $770 per acft/yr. Volume II, Section 4C.1 includes a detailed discussion of this water management strategy.

4B.1.2.2 Irrigation Water Conservation

The Irrigation Water Conservation strategy achieves water conservation through the installation of Low Energy Precision Application (LEPA) irrigation systems and furrow dikes.

[6]Water Conservation Implementation Task Force, Report to the 79th Legislature, Texas Water Development Board, Special Report, Austin, Texas, November 2004.

Recommended implementation of these conservation measures in Atascosa, Bexar, Medina, and Zavala Counties could effectively increase supply for irrigation through demand reduction by up to 20,709 acft/yr at a unit cost of $143 per acft/yr. Volume II, Section 4C.1 includes a detailed discussion of this water management strategy.

4B.1.2.3 Industrial Water Conservation

The Industrial Water Conservation strategy can achieve water conservation through the use of BMPs such as water audits, waste reduction submetering, cooling towers, reuse of process water, landscape water conservation, and specific water conservation plans designed for individual manufacturing plants (See Section 4C.1). The SCTRWPG recommends that water conservation be considered by individual industries, as a means to meet a part of the projected water needs.

4B.1.2.4 Steam-Electric Water Conservation

The Steam-Electric Water Conservation strategy achieves water conservation through the use of BMPs such as air-cooling or other cooling systems that can significantly reduce existing and projected water demands for steam-electric power generation. Volume II, Section 4C.1 includes a listing of other potential BMPs. The SCTRWPG recommends that water conservation be considered by individual steam-electric generators, as a means to meet a part of the projected water needs.

4B.1.2.5 Mining Water Conservation

The Mining Water Conservation strategy achieves water conservation through the use of recommended BMPs such as onsite collection and use of precipitation runoff and onsite reuse of process water. Volume II, Section 4C.1 includes a listing of other potential BMPs. The SCTRWPG recommends that water conservation be considered by individual mining operations, as a means to meet a part of the projected water needs.

4B.1.2.6 Drought Management

The SCTRWPG has developed a general methodology for estimating the economic impacts associated with implementation of drought management as a water management strategy.[7] Application of this methodology for regional water planning purposes has facilitated comparison of drought management to other potentially feasible water management strategies on a unit cost basis (Section 4C.2). The SCTRWPG has found, and the San Antonio Water System (SAWS) has demonstrated, that water user groups having sufficient flexibility to focus on discretionary outdoor water use first and avoid water use reductions in the commercial and manufacturing use sectors may find some degrees of drought management to be economically viable and cost-competitive with other water management strategies. Recognizing that implementation of appropriate water management strategies is a matter of local choice, the SCTRWPG recommends due consideration of economically viable drought management as an interim strategy to meet near-term needs through demand reduction until such time as economically viable long-term water supplies can be developed. Hence, new demand reductions associated with the 5 percent drought management scenario are shown at year 2010 for each municipal water user group with projected needs for additional water supply at year 2010[8]. Volume II, Section 4C.2 includes a detailed discussion of this recommended management strategy.

4B.1.2.7 Edwards Transfers

The Edwards Transfers water management strategy is based upon the provisions of Senate Bill 1477, as amended, which provides for the creation of the Edwards Aquifer Authority, establishes a withdrawal permit system, and potentially allows a permit holder to sell or lease up to 50 percent of his irrigation rights. In the 2011 Regional Water Plan, irrigation transfers are included to meet projected needs of 17 municipal water user groups with transfers of 45,645 acft/yr in 2010 increasing to 51,875 acft/yr in 2060 (quantities are part of the 320,000 acft/yr of firm yield used in the development of the 2011 plan). Initial Regular Permit (IRP) value of permits needed to obtain these quantities of firm yield increase from 81,590 acft/yr in 2010 to 92,285 acft/yr in 2060. Based on available data for transactions to date, typical unit costs are $454 per acft/yr for lease of withdrawal rights and $1,072 per acft/yr for permanent acquisition.

[7] SCTRWPG, "2011 Regional Water Plan, Study 3, Enhanced Water Conservation, Drought Management, and Land Stewardship," Texas Water Development Board, San Antonio River Authority, HDR Engineering, Inc., April 2009.
[8] In accordance with the SAWS 2009 Water Management Plan Update, 37,622 acft/yr is the drought management supply (demand reduction) shown for SAWS in year 2010. This quantity is between the 15 and 20 percent drought management scenarios presented in Section 4C.2.

Volume II, Section 4C.3 includes a detailed discussion of this recommended management strategy.

4B.1.2.8 Edwards Recharge – Type 2 Projects

The Edwards Recharge – Type 2 Projects involves the construction of recharge enhancement structures located atop the Edwards Aquifer recharge zone (Type 2 Projects) on streams that are often dry. These structures impound water only for a few days or weeks following storm events and recharge water very quickly to the aquifer, typically draining at a rate of 2 to 3 feet per day. Planned projects include Indian Creek, Lower Frio, Lower Sabinal, Lower Hondo, Lower Verde, San Geronimo, Northern Bexar / Medina County Projects (Limekiln, Culebra, Government Canyon, Deep Creek, Salado Dam No. 3), Salado Creek FRS, Cibolo Dam No. 1, Dry Comal, and Lower Blanco. Consensus Criteria for Environmental Flow Needs were applied in the technical evaluations of projects comprising this management strategy located on streams which typically flow. Implementation of these projects could enhance spring discharge and increase dependable municipal water supply for Bexar County by about 21,600 acft/yr. It is specifically recognized by the SCTRWPG that alternative projects at these locations that may be larger in size and storage capacity are consistent with the 2011 Regional Water Plan. Volume II, Section 4C.4 includes a detailed discussion of this recommended water management strategy.

4B.1.2.9 Recycled Water Programs

The Recycled Water Programs water management strategy involves direct reuse of reclaimed municipal wastewater for non-potable uses such as irrigation of golf courses, parks, and open spaces of cities, landscape watering of large office and business complexes, cooling of large office and business complexes, steam-electric power plant cooling, process or wash water for mining operations, irrigation of farms that produce livestock feed and forage, irrigation of farms that produce sod, ornamentals, and landscape plants, and for instream uses such as riverwalks and waterways. This strategy is being used within the region by entities including SAWS, SARA, New Braunfels Utilities, the City of Seguin and the City of San Marcos and can be expanded as the quantities of municipal wastewater increase with population growth. An advantage of this strategy is that the water has already been developed and brought to the locations of many of the uses listed above. In regional planning, this strategy is used to meet some of the needs for Bexar County Industrial and Comal County Industrial.

The SCTRWPG recognizes that water suppliers throughout the region, including SAWS, City of Marion, City of San Marcos, City of Floresville, SS WSC, and County Line WSC, may choose to reuse or reclaim the increased treated wastewater volumes associated with increased municipal water use, especially such wastewater volumes that are derived from privately owned groundwater and interbasin transfer of surface water. The SCTRWPG further recognizes that this reuse may be accomplished directly ("flange-to-flange") or indirectly through bed and banks delivery to downstream diversion and/or storage sites subject to applicable law. Such lawful reuse of treated wastewater is consistent with the 2011 South Central Texas Regional Water Plan. Volume II, Section 4C.5 includes a detailed discussion of this recommended water management strategy.

4B.1.2.10 Facilities Expansions

Several Water User Groups (WUGs) are interested in projects to expand major components of their existing infrastructure (facilities) so they can continue to provide a safe and reliable water supply to their customers during the planning period. These facilities expansions are considered to be independent of any potential water management strategies to acquire a new water supply, and instead are intended to address expected future improvements to the water system, such as the installation of new water transmission facilities or additional water treatment Volume II, Section 4C.6 summarizes the expansions associated with this recommended water management strategy.

4B.1.2.11 Brush Management

The Brush Management water management strategy focuses on the selective removal of brush from rangeland in the watershed upstream of Canyon Reservoir, located in the Edwards Plateau Vegetational Area. Brush Management could enhance the firm yield of Canyon Reservoir between 5,590 acft/yr and 12,180 acft/yr with land owner participation rates of 25 percent and 50 percent, respectively, of the suitable lands as identified by Texas A&M University. Associated unit costs for the 25 percent and 50 percent participation when financed for 20 years at 6 percent (including contingencies, treatment, and integration) are $897/acft/yr and $799/acft/yr, respectively. Analyses of this water management strategy requiring further study were performed with the assistance of Texas A&M University and are presented in Volume II, Section 4C.7.

4B.1.2.12 Wimberley & Woodcreek Water Supply Project

The Wimberley & Woodcreek Water Supply Project water management strategy involves short-term water supply from Canyon Reservoir and/or San Marcos and long-term supply from the GBRA Mid-Basin Project or the Hays/Caldwell PUA Project. Short-term supplies may be made available through leasing of committed supplies from Canyon Reservoir that are not currently being taken. Once Canyon contract holders grow into their purchased water supplies, Wimberley and Woodcreek will rely on long-term water supplies of 4,480 acft/yr expected to be obtained from one of the projects identified above, each of which includes delivery to the San Marcos Water Treatment Plant (WTP) area located 18 miles from Wimberley. Volume II, Section 4C.8 includes a detailed discussion of this recommended water management strategy.

4B.1.2.13 Storage above Canyon Reservoir

The Storage above Canyon Reservoir water management strategy, which involves diverting streamflows from the Guadalupe River above Canyon Reservoir during wet periods and storing them either in an off-channel reservoir (OCR) or a large-scale Aquifer Storage and Recovery (ASR) system, is a strategy to potentially meet needs for Water User Groups (WUGs) in Kendall and Comal Counties. In the Storage above Canyon Reservoir water management strategy, surface water storage sites and ASR well fields in the watershed upstream of Canyon Reservoir are assessed, and the firm supply is determined using the storage to firm up run-of-river water available under a new appropriation. Only the formulation of this water management strategy relying on ASR is recommended to meet projected needs for additional water supply at this time. Volume II, Section 4C.9 includes a detailed discussion of this strategy.

4B.1.2.14 GBRA-Exelon Project

The GBRA-Exelon Project involves the development of a reliable supply of 49,126 acft/yr of cooling water to the Exelon Generation Company, LLC (Exelon) for the development of nuclear power plant in Victoria County south of Victoria, Texas. Two concepts for supplying raw water to the plant are being considered: the river diversion option, which involves diversion from the Guadalupe River at the GBRA Saltwater Barrier, and the canal diversion option, which involves diversion from the GBRA Calhoun Canal system. Either option could supply up to 75,000 acft/yr from existing GBRA/Dow Lower Basin Water Rights to Exelon's Victoria County

Site. Volume II, Section 4C.10 includes a detailed discussion of this recommended water management strategy.

4B.1.2.15 Lower Guadalupe Water Supply Project (LGWSP) for Upstream GBRA Needs at Reduced Capacity

The Lower Guadalupe Water Supply Project (LGWSP) for Upstream GBRA Needs at Reduced Capacity water management strategy involves the diversion of up to 60,000 acft/yr of presently underutilized surface water rights from the Guadalupe-Blanco River Authority (GBRA) Calhoun Canal System, transmission to an approximately 16,500 acft off-channel reservoir, transmission of 35,000 acft/yr of firm supply to water treatment plants near Luling, San Marcos, New Braunfels, and Canyon Reservoir, and integration into municipal water supply systems. This water management strategy serves to ensure that long-term, reliable, and renewable surface water supplies will be available throughout the GBRA statutory district including Calhoun, Refugio, and Victoria Counties. Volume II, Section 4C.11 includes a detailed discussion of this alternative water management strategy.[9]

4B.1.2.16 Lower Guadalupe Water Supply Project (LGWSP) for Upstream GBRA Needs

The Lower Guadalupe Water Supply Project (LGWSP) for Upstream GBRA Needs at Reduced Capacity water management strategy involves the diversion of up to 75,000 acft/yr of presently underutilized surface water rights from the Guadalupe-Blanco River Authority (GBRA) Calhoun Canal System, transmission to an approximately 19,000 acft off-channel reservoir, transmission of 60,000 acft/yr of firm supply to water treatment plants near Luling, San Marcos, New Braunfels, and Canyon Reservoir, and integration into municipal water supply systems. This water management strategy serves to ensure that long-term, reliable, and renewable surface water supplies will be available throughout the GBRA statutory district including Calhoun, Refugio, and Victoria Counties. Volume II, Section 4C.12 includes a detailed discussion of this alternative water management strategy.[10]

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[9] If fresh groundwater from the lower Guadalupe Basin is added to this strategy, then the plan must be amended in order for the modified strategy to be recommended for implementation.
[10] If fresh groundwater from the lower Guadalupe Basin is added to this strategy, then the plan must be amended in order for the modified strategy to be recommended for implementation.

4B.1.2.17 GBRA Lower Basin Storage

The Guadalupe-Blanco River Authority (GBRA) and Dow Chemical Company (Dow), individually and collectively, own surface water rights in the lower Guadalupe – San Antonio River Basin (the GBRA Lower Basin Water Rights) authorizing diversions totaling 175,501 acre-feet per year (acft/yr). Water available for diversion under these rights is governed by the complex interactions of natural, anthropogenic, and legal factors including rainfall, runoff, springflow, evaporation, aquifer recharge, diversions by other water right owners, reservoir operations, off-channel storage, treated effluent from municipal and industrial water users, terms and conditions of the water rights, and the prior appropriation doctrine as enforced by the South Texas Watermaster of the Texas Commission on Environmental Quality (TCEQ). Given that the GBRA Lower Basin Water Rights point of diversion near Tivoli is below the San Antonio River confluence and that they are senior in priority to most upstream water rights, it is recognized that they are quite reliable but not firm. In order to firm up the existing interruptible GBRA/Dow lower basin water rights, a 100 acre or 500 acre off-channel reservoir is considered for implementation. The two proposed OCR sites would be located approximately 3 miles east of Green Lake near the Dow Chemical Company. The off-channel reservoirs would have a maximum water depth of 25-ft and be capable of impounding 2,500 acft and 12,500 acft of water at the 100 acre and 500 acre OCR sites respectively. The recommended 100-acre site could firm-up an additional 28,369 acft/yr, while the alternative 500-acre site could firm-up an additional 59,569 acft/yr. Volume II, Section 4C.13 includes a detailed discussion of this water management strategy.

4B.1.2.18 GBRA New Appropriation (Lower Basin)

The GBRA New Appropriation (Lower Basin) water management strategy involves diversion of up to 189,484 acft/yr under a new appropriation from the Guadalupe River in Calhoun County using existing gravity-flow diversion facilities located immediately upstream of GBRA's Saltwater Barrier and Diversion Dam at a rate of diversion not to exceed 500 cfs (within the existing 622 cfs maximum authorized diversion rate) and authorization to impound up to 200,000 acft in Calhoun County. The diversions and storage will serve municipal and industrial water users in GBRA's ten-county statutory district and are the subject of Application No. 12482 for surface water rights pending before the Texas Commission on Environmental

Quality (TCEQ). The firm supply from this strategy, with a 100,000 acft off-channel reservoir, is 11,300 acft/yr. Implementation of this water management strategy will help to meet projected demands for current and future GBRA customers through the next 50 years and beyond. Volume II, Section 4C.14 includes a detailed discussion of this recommended water management strategy.[11]

4B.1.2.19 GBRA Mid-Basin (Surface Water)

The Guadalupe-Blanco River Authority (GBRA) is in the planning and permitting stages of a phased Mid-Basin Project to provide supplemental water supplies directly to customers in Hays and Caldwell Counties in the near-term and indirectly to customers in Comal, Guadalupe, and Kendall Counties by replacement or reduction of Canyon Reservoir supplies currently delivered to the San Marcos WTP in the long-term. GBRA is currently considering at least three formulations of the Mid-Basin Project using available surface water and/or groundwater supply sources to ensure unrestricted delivery of a firm yield of approximately 25,000 acft/yr. In all three formulations, 4,000 acft/yr will be delivered to the Luling Water Treatment Plant (WTP) and the remaining balance of approximately 21,000 acft/yr will be delivered to the San Marcos WTP. This water management strategy focuses on the surface water only formulation which would divert run-of-river water from the Guadalupe River below Gonzales backed-up with stored water from an off-channel reservoir in Gonzales County. GBRA has submitted Application No. 12378 for the surface water rights associated with this water management strategy and this application has been declared administratively complete by the TCEQ. Volume II, Section 4C.15 includes a detailed discussion of this recommended water management strategy.[12]

[11] Project subject to senior water rights, full application of environmental flow standards adopted pursuant to Section 11.1471 of the Texas Water Code, and the TCEQ permitting process. If fresh groundwater from the lower Guadalupe Basin is added to this strategy, then the plan must be amended in order for the modified strategy to be recommended for implementation.

[12] Project subject to senior water rights, full application of environmental flow standards adopted pursuant to Section 11.1471 of the Texas Water Code, and the TCEQ permitting process.

4B.1.2.20 GBRA Mid-Basin (Conjunctive Use)

The Guadalupe-Blanco River Authority (GBRA) is in the planning and permitting stages of a phased Mid-Basin Project to provide supplemental water supplies directly to customers in Hays and Caldwell Counties in the near-term and indirectly to customers in Comal, Guadalupe, and Kendall Counties by replacement or reduction of Canyon Reservoir supplies currently delivered to the San Marcos WTP in the long-term. GBRA is currently considering at least three formulations of the Mid-Basin Project using available surface water and/or groundwater supply sources to ensure unrestricted delivery of a firm yield of approximately 25,000 acft/yr. In all three formulations, 4,000 acft/yr will be delivered to the Luling Water Treatment Plant (WTP) and the remaining balance of approximately 21,000 acft/yr will be delivered to the San Marcos WTP. This water management strategy focuses on the conjunctive use formulation which utilizes the Guadalupe River as the primary supply and groundwater in Gonzales County as a supplemental supply. Volume II, Section 4C.16 includes a detailed discussion of this alternative water management strategy.[13]

4B.1.2.21 Regional Carrizo for Guadalupe Basin

The Guadalupe-Blanco River Authority (GBRA) is in the planning and permitting stages of a phased Mid-Basin Project to provide supplemental water supplies directly to customers in Hays and Caldwell Counties in the near-term and indirectly to customers in Comal, Guadalupe, and Kendall Counties by replacement or reduction of Canyon Reservoir supplies currently delivered to the San Marcos WTP in the long-term. GBRA is currently considering at least three formulations of the Mid-Basin Project using available surface water and/or groundwater supply sources to ensure unrestricted delivery of a firm yield of approximately 25,000 acft/yr. In all three formulations, 4,000 acft/yr will be delivered to the Luling Water Treatment Plant (WTP) and the remaining balance of approximately 21,000 acft/yr will be delivered to the San Marcos WTP. This water management strategy focuses on the groundwater only option to supply the

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[13] Project subject to senior water rights, full application of environmental flow standards adopted pursuant to Section 11.1471 of the Texas Water Code, and the TCEQ permitting process.

25,000 acft/yr. Volume II, Section 4C.17 includes a detailed discussion of this alternative water management strategy.[14]

4B.1.2.21 Regional Carrizo for SAWS

The Regional Carrizo for SAWS water management strategy involves the development of an 11,687 acft/yr supply from the Carrizo-Wilcox Aquifer from the SAWS Buckhorn well field for municipal and industrial demands in San Antonio. SAWS is attempting to obtain well construction and production and water export permits from the Gonzales County Underground Water Conservation District (GCUWCD). Groundwater production will come from wells in the SAWS Buckhorn well field. A raw water pipeline with two pump stations will convey groundwater across Gonzales and Wilson Counties to SAWS Twin Oaks WTP where the water will be cooled and excessive iron and manganese removed. Water treatment will require an expansion of the Twin Oaks WTP. A treated water pipeline will deliver the water from the WTP either through a new integration pipeline to the west side of San Antonio or an existing pipeline to the east side of San Antonio. Water from the Gonzales-Carrizo well fields will be delivered at a uniform rate of 10.5 MGD. Production is planned to begin in 2016. Volume II, Section 4C.18 includes a detailed discussion of this recommended water management strategy.[15]

[14] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

[15] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

4B.1.2.22 Regional Carrizo for Schertz-Seguin Local Government Corporations (SSLGC) Project Expansion

The Regional Carrizo for Schertz-Seguin Local Government Corporation (SSLGC) Project Expansion water management strategy involves the expansion of well fields located in southern Gonzales and Guadalupe Counties by the SSLGC. The SSLGC was created to develop and operate a wholesale water supply system to serve the long-term needs of several communities located in Guadalupe and Bexar Counties. This strategy focuses on the development of additional well fields and associated collection and treatment systems as primary transmission facilities for delivery of water to customers are operating at this time. Planned implementation of this strategy will provide an additional dependable annual supply of approximately 10,364 acft/yr at an estimated unit cost of $568/acft/yr. Volume II, Section 4C.19 includes a detailed discussion of this recommended water management strategy.[16]

4B.1.2.23 Hays/Caldwell PUA Project

The Hays/Caldwell PUA Project involves the development of about 35,000 acft/yr of dependable supply from the Carrizo Aquifer in Caldwell and Gonzales Counties. Planned facilities include well field(s) and transmission and treatment systems for delivery to water users in Caldwell and Hays Counties at an estimated unit cost of $1,245/acft/yr. Volume II, Section 4C.20 includes a detailed discussion of this recommended water management strategy.[17]

[16] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

[17] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

4B.1.2.24 GBRA Simsboro Project

The Guadalupe-Blanco River Authority (GBRA) Simsboro Project will provide supplemental water supplies directly to customers in Hays and Caldwell Counties in the near-term and indirectly to customers in Comal, Guadalupe, and Kendall Counties by replacement or reduction of Canyon Reservoir supplies currently delivered to the San Marcos WTP in the long-term. The GBRA Simsboro Project consists of the development of a well field in Bastrop County and another one in Lee County, transporting the water to a water treatment plant near San Marcos, treating the water, and integrating the water into existing water distribution systems. The wells would withdraw water from the Simsboro member of the Wilcox Group, which is part of the Carrizo-Wilcox Aquifer. The GBRA Simsboro Project under consideration is expected to be implemented in two phases, with Phase I delivering 30,000 acft/yr of water from Bastrop County beginning in 2012; and, Phase II delivering 19,777 acft/yr of water from Lee County, possibly also starting in 2012[18]. Volume II, Section 4C.21 includes a detailed discussion of this recommended water management strategy.[19]

4B.1.2.25 Local Groundwater Supplies (Carrizo)

The local Carrizo water management strategy involves the phased development or expansion of well fields in the Carrizo-Wilcox Aquifer for the purposes of meeting local municipal and steam-electric needs in Atascosa, Bexar[20], Caldwell, Gonzales, Guadalupe, Medina, and Wilson Counties. Planned implementation of this strategy provides new dependable supplies totaling about 33,874 acft/yr for the South Central Texas Region in 2060 at estimated

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[18] The new firm supply associated with this strategy was reduced from 50,000 acft/yr to 49,777 acft/yr to resolve a potential inter-regional conflict with Region G. This small change did not warrant revision of Section 4C.21. A portion of the new firm supply for this strategy to be obtained from the Carrizo-Wilcox Aquifer in Bastrop County is identified as an "overdraft" to resolve a potential inter-regional conflict with Region K. See the response to TWDB Level I Comment No. 52 in Section 10 for additional information.

[19] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

[20] The portion of the new firm supply for this strategy to be obtained by Bexar Metropolitan Water District from the Carrizo-Wilcox Aquifer in Bexar County is identified as a "temporary overdraft." See the response to TWDB Level I Comment No. 52 in Section 10 for additional information.

unit costs ranging from $309/acft/yr to $1,427/acft/yr. Volume II, Section 4C.22 includes a detailed discussion of this recommended water management strategy.

4B.1.2.26 Local Groundwater Supplies (Trinity)

The local Trinity water management strategy involves the development of 4,582 acft/yr of water supply from the Trinity Aquifer in northern Bexar and western Caldwell Counties for BMWD and County Line WSC. Estimated unit costs range from $517/acft/yr to $870/acft/yr. Volume II, Section 4C.22 includes a detailed discussion of this recommended management strategy.

4B.1.2.27 Local Groundwater Supplies (Gulf Coast)

The local Gulf Coast water management strategy involves development of 161 acft/yr from one new local supply well in the Gulf Coast Aquifer near Kenedy in Karnes County. Estimated unit cost for the new supply is $1,823/acft/yr. Volume II, Section 4C.22 includes a detailed discussion of this recommended water management strategy.

4B.1.2.28 Brackish Wilcox Groundwater for SAWS

Brackish Wilcox Groundwater for SAWS is a water supply strategy based on the development of brackish groundwater in the Wilcox Aquifer in southern Bexar, southwestern Wilson, and northern Atascosa Counties. Phase I of this strategy is in southern Bexar County and is designed to produce 12,000 acft/yr of potable water. Twelve wells are required and plans are to locate the wells in or near SAWS ASR well field. With allowance for concentrate produced from the desalination process, about 13,500 acft/yr of raw water would have to be pumped from the Wilcox. Water from the Wilcox at this location is expected to have a total dissolved solids concentration of about 1,200-1,500 mg/L. Phases II and III are planned to produce 9,000 and 5,000 acft/yr of potable water, respectively. Phases II and III will require about 10,100 and 5,600 acft/yr of raw water, respectively. The locations these well fields have not been determined. Volume II, Section 4C.23 includes a detailed discussion of this recommended water management strategy.[21]

4B.1.2.29 Brackish Wilcox Groundwater for Regional Water Alliance

The Brackish Wilcox Groundwater for Regional Water Alliance water management strategy includes developing a brackish groundwater supply from the Wilcox Aquifer in Guadalupe and Wilson Counties for members of the Regional Water Alliance (RWA) with service areas in Bexar, Guadalupe, and Wilson Counties. Utility members of the RWA who are potentially interested in this WMS include: Canyon Regional Water Authority, Bexar Met Water District, East Central Special Utility District, Green Valley Special Utility District, and SS Water Supply Corporation. It is designed to produce an average annual water supply of 10 MGD (11,200 acft/yr) and a peak supply of 13 MGD. The well field is planned for northern Wilson County and southern Guadalupe County and near Hwy 123. The water will be delivered to the Liessner Booster Station for distribution to participating water utilities. Volume II, Section 4C.24 includes a detailed discussion of this recommended water management strategy.[22]

4B.1.2.30 Brackish Wilcox Groundwater for SS WSC

The Brackish Wilcox Groundwater for SS Water Supply Corporation (SSWSC) water management strategy includes developing a brackish groundwater supply from the Wilcox Aquifer in Wilson County for the SSWSC. It is designed to produce an average annual water supply of 1.0 MGD (1,120 acft/yr) and a peak demand of 2.0 MGD. The project facilities are

[21] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

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planned to be located in the vicinity of the SSWSC Sutherland Springs Road Plant, which is located about 3 miles west-northwest of Sutherland Springs. The facilities include Wilcox Aquifer wells to provide a brackish groundwater supply, water treatment plant for pretreatment and desalination, delivery of treated water to the existing distribution system, and concentrate disposal to deep injection wells. Volume II, Section 4C.25 includes a detailed discussion of this recommended water management strategy.[23]

4B.1.2.31 Southern Calhoun County Brackish Groundwater

The Calhoun County Brackish Groundwater Project is a strategy to accommodate projected future demands from potential coastal residential developments in the vicinity of Seadrift and between Seadrift and Port O'Connor. This strategy does not include expansion of the City of Seadrift and the Port O'Connor Municipal Utility District water supplies. The project is planned for an average daily demand of 1.2 MGD (1,344 acft/yr) and a peak day demand of 3.0 MGD. The selected peak demand factor is 2.5, which is greater than a typical peak demand factor of 2.0, because of high influx of seasonal residents and visitors in the summer. Volume II, Section 4C.26 includes a detailed discussion of this alternative water management strategy.

4B.1.2.32 CRWA Wells Ranch Project

Canyon Regional Water Authority (CRWA) is in the planning, permitting, and construction stages of a Carrizo Aquifer well field at Wells Ranch, straddling the border of Guadalupe and Gonzales Counties. The project has two phases. Phase I, which is nearly complete, will supply 5,200 acft/yr of water to CRWA customers and Phase II is envisioned to supply an additional 5,800 acft/yr in the future. To date, CRWA has: (1) conducted test drilling and well performance testing, (2) obtained drilling and production permits for wells from the Gonzales County Underground Water Conservation District (GCUWCD) and Guadalupe County Groundwater Conservation District (GCGCD), and (3) built conveyance infrastructure suitable

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for transmitting the full 11,000 acft/yr of supply to their distribution system. Volume II, Section 4C.27 includes a detailed discussion of this management strategy.[24]

4B.1.2.33 CRWA Siesta Project

The Canyon Regional Water Authority (CRWA) Siesta Project is envisioned as a conjunctive use project using interruptible diversions from Cibolo Creek in Wilson County along with treated effluent from wastewater treatment facilities operated by San Antonio River Authority (SARA) as raw water sources for treatment and distribution as a new municipal water supply for CRWA members. Should treated effluent from wastewater treatment facilities not be available, the project could include brackish groundwater as an alternate back-up source. The Siesta Project involves the acquisition/lease of additional water rights and amendment of a surface water right presently held by CRWA in order to increase authorized diversions from Cibolo Creek by CRWA from 42 acft/yr to 5,042 acft/yr. Planned implementation of this strategy could provide an additional dependable annual supply of approximately 5,042 acft/yr at an estimated cost of $1,421/acft/yr. Volume II, Section 4C.28 includes a detailed discussion of this recommended water management strategy.

4B.1.2.34 LCRA-SAWS Water Project

The Lower Colorado River Authority – San Antonio Water System (LCRA-SAWS) Water Project (LSWP) involves the conservation and development of approximately 330,000 acft/yr in the Lower Colorado River Basin Counties of Matagorda, Wharton, and Colorado. Of that 330,000 acft/yr, LCRA could make up to 90,000 acft/yr available to the San Antonio Water System (SAWS), for an 80-year period. In 2002, SAWS signed a Definitive Agreement with LCRA for the purchase and use of this water. The LSWP involves the potential future diversion of water from the Colorado River, development of off-channel storage, and conveyance through a transmission pipeline to a new water treatment plant (WTP) site and

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SAWS terminal storage in western Guadalupe County. Water would then be treated and integrated into municipal supply systems in and around the City of San Antonio. Volume II, Section 4C.29 includes a more detailed discussion of this recommended water management strategy.

4B.1.2.35 Medina Lake Firm-Up

The Medina Lake Firm-Up water management strategy involves implementing Aquifer Storage and Recovery (ASR) and/or off-channel reservoir (OCR) storage to firm-up Bexar Metropolitan Water District's (BMWD) existing water rights and contracts with Bexar-Medina-Atascosa Counties Water Improvement District No. 1 (BMA) for Medina Lake stored water. In addition, it is envisioned that BMWD and Benton City Water Supply Corporation (WSC), along with others, could potentially jointly develop the ASR project option. One option for this water management strategy is a 15-well ASR system, considered as a recommended water management strategy to meet needs in the 2011 SCTRWP. In addition, the off-channel reservoir Site 3 option, is listed as an alternative water management strategy in the 2011 SCTRWP. Volume II, Section 4C.30 includes a more detailed discussion of this water management strategy.

4B.1.2.36 Seawater Desalination

The Seawater Desalination water management strategy involves the long-term development of intake and treatment facilities on the north shore of San Antonio Bay near Seadrift and transmission of treated water for integration and use in Bexar County. This water management strategy utilizes a source of water that is essentially unlimited; however, costs of treatment and location for brine discharge (as may affect marine habitat and species) remain concerns. Planned implementation of this strategy will provide a dependable annual supply of approximately 84,000 acft by 2060 at an estimated unit cost of $2,284/acft/yr. Volume II, Section 4C.31 includes a detailed discussion of this recommended water management strategy.

4B.1.2.37 Surface Water Rights

The Surface Water Rights water management strategy is included to explicitly recognize that use of water supplies made available under existing water rights by lease or purchase agreements between willing buyers and willing sellers is an activity consistent with the 2011 Regional Water Plan. The additions of diversion points or types and places of use for existing surface water rights are also activities consistent with the 2011 Regional Water Plan if necessary authorizations are obtained pursuant to TCEQ rules and applicable law. Volume II, Section 4C.32 includes a more detailed discussion and specific examples of this recommended water management strategy.

4B.1.2.38 Balancing Storage

The Balancing Storage water management strategy is included to explicitly recognize that storage is needed at several locations within the region in order to firm up supplies from run-of-river diversions or interruptible groundwater sources and to ensure that supplies delivered through long distance conveyance facilities are available during drought and of sufficient quantity to meet daily and seasonal demands. The addition of Balancing Storage on the surface or in an aquifer is an activity consistent with the 2011 Regional Water Plan, if necessary authorizations are obtained pursuant to Texas Commission on Environmental Quality (TCEQ) or groundwater conservation district rules and applicable law. Volume II, Section 4C.33 includes a more detailed discussion and specific examples of this recommended water management strategy

4B.1.2.39 Lavaca River Off-Channel Reservoir

The Lavaca River Off-Channel Reservoir is currently being considered by the Lavaca-Navidad River Authority as a potentially recommended water management strategy in Region P that could meet needs in Regions P, L, and N. The project involves building a 75,000 acft off-channel reservoir (OCR) approximately 10 miles west of Lake Texana. The proposed Lavaca River OCR would be constructed in a manner to allow LNRA to divert high flows from the Lavaca River to the reservoir, and then pump water at a constant rate to end users. This creates a mechanism to firm-up what is an otherwise interruptible water source in order to serve area needs. The Lavaca River OCR water management strategy will provide 26,242 acft/yr of water for LNRA. Volume II, Section 4C.34 includes a more detailed discussion of this recommended water management strategy.

4B.1.2.40 Palmetto Bend – Stage II

The Texas Water Development Board (TWDB) and the Lavaca-Navidad River Authority (LNRA) hold a Certificate of Adjudication, #16-2095B, for the completion of Palmetto Bend – Stage II Dam and Reservoir on the Lavaca River. The Palmetto Bend – Stage II water management strategy is the development of a reservoir on the Lavaca River about 1.4 miles upstream of the permitted site by the Lavaca-Navidad River Authority as an alternative water management strategy in Region P that could meet needs in Region L. The Lavaca River OCR water management strategy will provide 22,964 acft/yr of water for LNRA. Volume II, Section 4C.35 includes a more detailed discussion of this alternative water management strategy.

4B.1.2.41 TWA Regional Carrizo

The Texas Water Alliance (TWA) is currently securing groundwater leases in Northeastern Gonzales County to deliver up to 27,000 acft/yr of Carrizo Aquifer groundwater to entities in Gonzales, Guadalupe, and Comal Counties. The TWA Regional Carrizo project would produce 27,000 acft/yr of groundwater from a new well field for treatment and delivery to Gonzales County Water Supply Corporation (WSC) (500 acft/yr), Spring Hills WSC (3,000 acft/yr), and Canyon Lake Water Service Company (12,000 acft/yr). The remaining 11,500 acft/yr is available to meet needs of other Water User Groups within proximity of the pipeline route. The well field includes 17-1,200 gpm Carrizo wells and two standby wells. Volume II, Section 4C.36 includes a more detailed discussion of this recommended water management strategy.[25]

4B.1.2.42 Purchase from Wholesale Water Provider

The Purchase from Wholesale Water Provider water management strategy involves the purchase of water supplies from, or participation in the development of new water supplies with, an identified Wholesale Water Provider. Wholesale water providers include the San Antonio Water System (SAWS), Bexar Metropolitan Water District (BMWD), Guadalupe-Blanco River Authority (GBRA), Canyon Regional Water Authority (CRWA), Schertz-Seguin Local Government Corporation (SSLGC), Springs Hill Water Supply Corporation (SHWSC), the Texas Water Alliance (TWA), and Lavaca-Navidad River Authority (LNRA). Costs for this

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management strategy include those for purchase, treatment, transmission, and distribution of water, and are specific to each project or source of water. For example, purchase by a WUG from a Wholesale Water Provider would be at the unit cost of water from the source and would vary from water source to water source.

4B1.2.43 Weather Modification

The Weather Modification water management strategy involves the seeding of clouds with silver iodide by licensed professionals to increase precipitation within the planning region. This management strategy has been studied and was being practiced in year 2005 in 15 counties of the region's 21 county area. Although it is not possible to estimate the quantities of water that this strategy would contribute during drought, the strategy could contribute to increased precipitation on rangeland and cropland, as well as increasing stream flows and aquifer recharge during non-drought periods. Increased precipitation on range and cropland would contribute directly to crop, livestock, and wildlife production, and in the case of irrigated crop production would reduce the need to apply irrigation water. To the extent that such additions to these water resources are stored for use later, the strategy could contribute to supplies available during drought. The water from this strategy would be available for development or recovery by individual water user groups and by water suppliers that serve several different water user groups.

4B.1.2.44 Rainwater Harvesting

The Rainwater Harvesting water management strategy is the catching and storing of rainwater from roofs of homes and other buildings largely for use at or very near the sites from which the water is caught. The strategy is being used in parts of the South Central Texas Planning Region for household water supplies for both potable and non-potable uses. Although this strategy is limited due to rainfall levels, time of rainfall events, and capacities of storage facilities, the strategy can supply a part, or in some cases all, of the water needed by individual households and business establishments in areas that are too distant or too sparsely settled to be served efficiently by public systems. Rainwater harvesting in the Trinity Aquifer area of the region (Northern Bexar, Comal, Hays, Medina, and Uvalde Counties) can supplement supplies from wells completed in this aquifer, and thereby extend the capabilities of this aquifer to support the demands that are projected to be placed upon it.

4B.1.2.45 Recharge and Recirculation Studies

The Recharge and Recirculation water management strategy involves artificial recharge of the Edwards Aquifer, capture of the resulting increased springflows, and returning these quantities of water to further recharge the aquifer. Artificial recharge could be done using runoff from the Edwards Plateau, water imported from other watersheds, the subsequent increment of springflow resulting from artificial recharge, and/or a combination of these sources. The purpose of this strategy is to maintain springflows at satisfactory levels to protect the habitats of endangered species that exist in the springs and specified reaches of spring fed streams, while at the same time increasing the quantity of water that can be withdrawn from the aquifer to meet the needs of water user groups. The quantities of water that could be withdrawn from the aquifer depend upon the quantities of recharge, the location(s) at which the recharge is made to the aquifer, levels of the aquifer at the time of recharge, residence time of recharged water in the aquifer, and perhaps other factors that are not known or well understood. The major reason for the Recharge and Recirculation strategy is to use the aquifer to store and distribute water to water user groups that have already established themselves in proximity to the aquifer.

4B.1.2.46 Mesa Water Supply Project (SAWS)

This strategy involves the production of groundwater from the Ogallala and Simsboro Aquifers and surface water from the Brazos River and transmission of same via pipelines and the bed and banks of the Brazos River to San Antonio. The SCTRWPG recognizes this as a potential water management strategy requiring further evaluation and study prior to implementation.

4B.1.3 Summary of Key Information

Pursuant to 31 TAC§357.7(a)(7), regional water plan development shall include evaluations of water management strategies providing certain key information pursuant to TWDB criteria. Key information regarding the 2011 South Central Texas Regional Water Plan is summarized by subject area below.

4B.1.3.1 Quantity, Reliability, and Cost

- Plan reflects substantial commitment to Water Conservation throughout the South Central Texas Region, thereby encouraging efficient utilization of existing water supplies and reducing quantities of new supply needed.
- Plan includes reliable new water supplies sufficient to meet projected drought needs for municipal, industrial, steam-electric power, and mining uses through the year 2060.
- Plan recognizes that water management strategies such as brush management, weather modification, rainwater harvesting, and small recharge dams contribute positively to storage and system management of diverse sources of supply.
- Unit costs associated with new supplies delivered to each water user group range from $104/acft/yr to $2,429/acft/yr and average about $1,209/acft/yr or $3.71 per 1,000 gallons based on September 2008 dollars.

4B.1.3.2 Environmental Factors

- See Section 7.3 for summary of environmental benefits and concerns.

4B.1.3.3 Impact on Water Resources

- Plan implementation results in no unmitigated reductions in water available to existing rights.
- Long-term reductions in water levels in the Carrizo-Wilcox Aquifer.

4B.1.3.4 Impacts on Agricultural and Natural Resources

- Inclusion of water management strategies to meet projected irrigation needs (shortages) in full is estimated to be economically infeasible at this time. Irrigation Water Conservation through the installation of Low Energy Precision Application (LEPA) systems is recommended to offset a portion of projected irrigation needs (shortages) in four counties.
- Plan includes Brush Management and Weather Modification which are expected to contribute positively to storage and system management of diverse water management strategies. Weather Modification assists irrigation and dry-land agriculture (crops and ranching), increases water supply for wildlife habitat, and increases Edwards Aquifer recharge.
- Plan includes about 99 percent of potential maximum of unrestricted voluntary transfer of Edwards Aquifer irrigation permits to municipal use through lease or purchase.

4B.1.3.5 Other Relevant Factors per SCTRWPG

- Potential effects of Plan implementation on Edwards Aquifer springflows has been identified as a relevant factor by the SCTRWPG. As shown in Section 7.1, implementation of Plan is expected to increase long-term average discharges from both Comal Springs and San Marcos Springs.
- Flexibility in the phasing and order of implementation of management strategies comprising the Plan has been identified as a relevant factor or concern by the SCTRWPG. Wholesale Water Provides and water user groups need the ability to expedite or reschedule implementation of any specific management strategy as necessary and appropriate.

4B.1.3.6 Comparison of Strategies to Meet Needs

- Selection of water management strategies comprising the 2011 Regional Water Plan is based upon guiding principles and assumptions approved by the SCTRWPG.

4B.1.3.7 Interbasin Transfer Issues

- Plan includes two potential surface water interbasin transfers from the Lower Colorado River near Bay City to Bexar County and from the Lavaca-Navidad River Basin to the Colorado-Lavaca Coastal Basin (Point Comfort).
- Projected needs (shortages) in basins of origin are met throughout the planning period.

4B.1.3.8 Third-Party Impacts of Voluntary Transfers

- Positive effects for municipal water user groups associated with Edwards Transfers.
- Payment to farmers for voluntary irrigation water transfer provides capital for farmers to install higher efficiency irrigation systems. In many cases, this allows irrigation to continue at present levels so that the transfer does not adversely affect the regional economy.
- Lower water levels in some portions of the Carrizo Aquifer.

4B.1.3.9 Regional Efficiency

- Edwards Transfers require no new facilities. Transferred water would likely be available at or very near locations having projected municipal and industrial water needs in Uvalde, Medina, Atascosa, and Bexar Counties.
- Regional water treatment and balancing storage facilities increase efficiency, improve reliability, and reduce unit cost.

4B.1.3.9 Water Quality Considerations

- Assuming that wastewater treatment standards and plant performance continue to improve over time, no significant impacts on water quality are expected to result from implementation of the 2011 South Central Texas Regional Water Plan.

4B.1.3.10 Impacts on Navigation

- None of the recommended water management strategies of the plan have any identifiable effect on navigation.

4B.2 Water User Group Plans by County

The proposed plan to meet the specific needs of municipal, industrial, steam-electric power, and mining water user groups located within the region is to implement water conservation programs to reduce water demands to the extent possible, and develop additional groundwater and surface water supplies located as near as possible to each respective water user to the extent that supplies are available. As local supply development potentials for each respective user group are exhausted, water management strategies located at greater distances from the water users are recommended.

In the case of the irrigation water user group, the South Central Texas Regional Water Planning Group found that, at the present time, it is not economically feasible to meet all of the projected irrigation water need (shortage). However, the proposed plan includes the Irrigation Water Conservation strategy to meet as much as possible of the projected irrigation needs of the region. Therefore, each individual irrigation water user will need to install Low Energy Precision Application (LEPA), or other efficient irrigation systems which will result in irrigation water savings due to lower irrigation water application requirements.

In the case of “Rural Area Residential and Commercial” (individual households and business establishments) water users, the projections have included local surface and groundwater quantities to meet projected needs. However, no specific plans have been formulated to supply the projected quantities of water needed. Instead, it is presumed that those individual households and businesses that are located in rural areas, and rural and investor owned water supply districts, authorities, and companies (those that supplied less than 280 acft or had populations less than 500 in year 2000) that operate public water supply systems to serve rural areas will meet these needs either from locally available supplies, or through arrangements to obtain water from other water utilities. Plans are included for all public water suppliers (cities and water supply districts and authorities) that provided 280 acft or more and/or had populations of 500 or more in year 2000.

Water management strategies recommended for implementation to meet projected needs or shortages in each of the 21 counties within the South Central Texas Region are summarized in a series of figures and tables included as Appendix D. These figures and tables illustrate the phased implementation of water management strategies within each county to meet the needs of WUGs located within the county. Counties are presented in alphabetical order from Atascosa

County to Zavala County. The counties having the greatest combined municipal, industrial, steam-electric, and mining needs and, hence, needing the greatest quantities of new water supply are Bexar, Comal, Hays, and Victoria. Particular attention to the notes in each county table is encouraged. More detailed information regarding allocation of new water supplies to specific cities and other water user groups within each county may be found in the detailed plans for each of the 21 counties of the South Central Texas Planning Region, which are presented in alphabetic order in the following subsections. In each county plan, each water user group of the county is listed, and water conservation has been included in the plan for each municipal water user and the irrigation user group, where appropriate. In addition, if the water user group has a need (shortage) during the planning horizon, one or more water management strategies are recommended to meet the need.

The total unit costs of potable water (surface water treated to regulatory standards for public supply and/or groundwater that meets regulatory standards for public supply), delivered to the water user groups' retail distribution systems were computed as follows. For water user groups whose needs can be met from a single local source by an individual water management strategy that can be scheduled and sized to meet that particular need, such as local groundwater for the City of Floresville, annual and unit costs in September 2008 prices are presented for additional wells to be added at the time of the projected need. Costs were calculated in accordance with TWDB guidance and are presented in Volume II and the following county tables. In this case, and in many cases described herein, water treatment and associated facilities were sized to meet peak day demands, which are approximately twice average day demands. Both debt service and operation and maintenance costs are calculated accordingly.

For water user groups that do not have the potential to implement readily available individual water management strategies using local sources of supply to meet their individual needs at the time these needs are projected to occur, such as utilities of Bexar, Caldwell, Comal, Guadalupe, and Hays Counties, large-scale water management strategies to meet regional needs involving two or more water user groups are recommended by the SCTRWPG in the regional water plan. In the latter cases, total and unit costs (September 2008 prices) are calculated to obtain, convey, treat, and deliver potable water (surface and/or groundwater that meets regulatory standards for public supply) to the respective water user groups' retail distribution systems. As was the case for individual local systems, the costs are computed according to

TWDB guidance and are reported in Volume II and are tabulated in the respective county tables on the following pages.

It was necessary to allocate the costs of large-scale, regional water management strategies among the water user groups they are intended to serve. The allocation procedure was to prorate the total annual costs to each water user group to be supplied from a water management strategy based on the water user group's proportion or share of quantity obtained from that strategy in each decade. In this way, a unit cost representative of the strategy in full operation is shown for all participating water user groups. Water user groups may actually be required to begin paying their pro-rata share of annual debt service at the time the strategy is implemented based on their ultimate share of the new supply whether or not they have begun taking water. The basis for this principle of dividing debt service among water user groups is to facilitate the development of a strategy to its relevant size, and to assure that those user groups who need the water will have invested in and thereby reserved their respective shares so that water will be there when needed. In the case of the South Central Texas Region, many water user groups will need the water as soon as the water management strategy can be implemented. It is important to note that individual water user groups could participate in the development of a water management strategy in the cost sharing manner outlined here, and then lease part or all of their respective shares to others until they have grown enough to fully utilize them. Therefore, few, if any user groups would be paying debt service for idle capacity.

In the case of water to meet the projected needs of the large number of water user groups in Bexar County, it has been assumed that one or more wholesale water providers will implement the large-scale, distantly located water management strategies recommended in the Regional Plan, and since these supplies are needed as soon as possible, the water user groups (customers) will begin paying debt service and operation and maintenance costs on the basis of their pro-rata share of the quantities of water taken. For example, if SAWS implements a strategy, SAWS and its customers will use the water and pay all the costs. If some other supplier implements a strategy, the costs would be prorated among the users on the basis of the proportion of the quantity taken.

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4B.2.1 Atascosa County Water Supply Plan

Table 4B.2.1-1 lists each water user group in Atascosa County and its corresponding management supply or shortage in 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.1-1.
Atascosa County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
Benton City WSC	495	-885	Projected shortage (2030 through 2060)
Bexar Metropolitan Water District			See Bexar County
City of Charlotte	296	241	No projected shortage
City of Jourdanton	-112	-338	Projected shortage (2010 through 2060)
City of Lytle	-141	-188	Projected shortage (2010 through 2060)
McCoy WSC	412	-812	Projected shortage (2030 through 2060)
City of Pleasanton	747	499	No projected shortage
City of Poteet	298	280	No projected shortage
Rural Area Residential and Commercial	188	540	No projected shortage
Industrial	0	0	No projected shortage
Steam-Electric Power	-263	-942	Projected shortage (2010, 2050, 2060)
Mining	31	33	No projected shortage
Irrigation	-6,095	249	Projected shortage (2010 through 2050)
Livestock	2	2	No projected shortage

4B.2.1.1 Benton City WSC

Current water supply for Benton City WSC is obtained from the Carrizo Aquifer. Benton City WSC is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Benton City WSC implement the following water supply plan to meet their projected needs (Table 4B.2.1-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 24 acft/yr by 2040, increasing to 153 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Carrizo) development to be implemented prior to 2030. This strategy can provide an additional 807 acft/yr from 2030 to 2050 and 1,613 acft/yr in 2060. Information received from Benton City WSC indicates that they are currently seeking permits to drill two new wells in the Carrizo Aquifer.

Table 4B.2.1-2.
Recommended Water Supply Plan for Benton City WSC

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	0	0	198	454	696	885
Recommended Plan						
Municipal Water Conservation	—	—	—	24	85	153
Local Groundwater Supplies (Carrizo)	—	—	807	807	807	1,613
Total New Supply	—	—	**807**	**831**	**892**	**1,766**

Estimated costs of the recommended plan to meet Benton City WSC's projected needs are shown in Table 4B.2.1-3.

Table 4B.2.1-3.
Recommended Plan Costs by Decade for Benton City WSC

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	$18,286	$65,146	$117,506
Unit Cost ($/acft)	—	—	—	$762	$766	$768
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	—	—	$320,500	$320,500	$129,914	$450,414
Unit Cost ($/acft)	—	—	$397	$397	$161	$279

In addition, Benton City WSC is a potential participant with BMWD in the Medina Lake Firm-Up (ASR) water management strategy.

4B.2.1.2 City of Charlotte

The City of Charlotte is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Charlotte implement the following water supply plan (Table 4B.2.1-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 20 acft/yr by 2010, increasing to 43 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 15 acft/yr by 2010.
- Facilities Expansions (System Interconnects)

An alternative water management strategy identified by City of Charlotte is the Local Groundwater Supplies (Carrizo).

Table 4B.2.1-4.
Recommended Water Supply Plan for the City of Charlotte

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	20	23	25	26	34	43
Drought Management	15	—	—	—	—	—
Facilities Expansions	—	—	—	—	—	—
Total New Supply	**35**	**23**	**25**	**26**	**34**	**43**

Estimated costs of the recommended plan for the City of Charlotte are shown in Table 4B.2.1-5.

Table 4B.2.1-5.
Recommended Plan Costs by Decade for the City of Charlotte

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$15,490	$17,386	$17,409	$16,460	$20,298	$24,754
Unit Cost ($/acft)	$775	$756	$696	$633	$597	$576
***Drought Management*[1]**						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
Facilities Expansion						
Annual Cost ($/yr)	$3,586,000	$3,586,000	$242,000	$242,000	$242,000	$242,000
Unit Cost ($/acft)	—	—	—	—	—	—
[1]Costs not available due to lack of relevant data.						

In addition, City of Charlotte is a potential participant with BMWD in the Medina Lake Firm-Up (ASR) water management strategy.

4B.2.1.3 City of Jourdanton

Current water supply for City of Jourdanton is obtained from the Carrizo Aquifer. The City of Jourdanton is projected to have a shortage in water supplies throughout the planning period, from 2010 through 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Jourdanton implement the following water supply plan (Table 4B.2.1-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 60 acft/yr by 2010, increasing to 222 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 40 acft/yr by 2010.
- Local Groundwater Supplies (Carrizo) development to be implemented prior to 2010. This strategy can provide an additional 403 acft/yr from 2010 to 2060.

Table 4B.2.1-6.
Recommended Water Supply Plan for the City of Jourdanton

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	112	172	225	267	306	338
Recommended Plan						
Municipal Water Conservation	60	123	156	173	195	222
Drought Management	40	—	—	—	—	—
Local Groundwater Supplies (Carrizo)	403	403	403	403	403	403
Total New Supply	**503**	**526**	**559**	**576**	**598**	**625**
** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*						

Estimated costs of the recommended plan for the City of Jourdanton are shown in Table 4B.2.1-7.

Table 4B.2.1-7.
Recommended Plan Costs by Decade for the City of Jourdanton

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$46,083	$77,232	$91,153	$97,895	$108,361	$122,564
Unit Cost ($/acft)	$768	$628	$584	$566	$556	$552
Drought Management						
Annual Cost ($/yr)	$65,320	—	—	—	—	—
Unit Cost ($/acft)	$1,633	—	—	—	—	—
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	$349,000	$349,000	$136,181	$136,181	$136,181	$136,181
Unit Cost ($/acft)	$865	$865	$338	$338	$338	$338

4B.2.1.4 City of Lytle

Current water supply for the City of Lytle is obtained from the Edwards Aquifer. Lytle is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Lytle implement the following water supply plan to meet the projected needs for the city (Table 4B.2.1-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 38 acft/yr by 2010, increasing to 108 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional 125 acft/yr by 2010, increasing to 176 acft/yr by 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 24 acft/yr by 2010.

Table 4B.2.1-8.
Recommended Water Supply Plan for the City of Lytle

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	141	152	162	169	179	188
Recommended Plan						
Municipal Water Conservation	38	72	82	86	96	108
Edwards Transfers	141	152	162	169	179	188
Drought Management	24	—	—	—	—	—
Total New Supply	**203**	**224**	**244**	**255**	**275**	**296**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet the City of Lytle's projected needs are shown in Table 4B.2.1-9.

Table 4B.2.1-9.
Recommended Plan Costs by Decade for the City of Lytle

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$26,007	$43,028	$46,879	$47,483	$52,075	$58,584
Unit Cost ($/acft)	$684	$598	$572	$552	$542	$542
Edwards Transfers						
Annual Cost ($/yr)	$64,014	$69,008	$73,548	$76,726	$81,266	$85,352
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$14,520	—	—	—	—	—
Unit Cost ($/acft)	$605	—	—	—	—	—

In addition, City of Lytle is a potential participant with BMWD in the Medina Lake Firm-Up (ASR) water management strategy.

4B.2.1.5 McCoy WSC

Current water supply for McCoy WSC is obtained from the Carrizo Aquifer. McCoy WSC is projected to need additional water supplies by 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that McCoy WSC implement the following water supply plan to meet their projected needs (Table 4B.2.1-10).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 13 acft/yr by 2040, increasing to 129 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Carrizo) development to be implemented prior to 2020. This strategy can provide an additional 807 acft/yr by 2020, increasing to 1,613 acft/yr of supply in 2060.

Table 4B.2.1-10.
Recommended Water Supply Plan for McCoy WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	12	208	436	650	812
Recommended Plan						
Municipal Water Conservation	—	—	—	13	68	129
Local Groundwater Supplies (Carrizo)	—	807	807	807	807	1,613
Total New Supply	**—**	**807**	**807**	**820**	**875**	**1,742**

Estimated costs of the recommended plan to meet McCoy WSC's projected needs are shown in Table 4B.2.1-11.

Table 4B.2.1-11.
Recommended Plan Costs by Decade for McCoy WSC

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	$10,182	$52,244	$99,091
Unit Cost ($/acft)	—	—	—	$783	$768	$768
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	—	$389,000	$389,000	$136,033	$136,033	$525,033
Unit Cost ($/acft)	—	$482	$482	$169	$169	$325

4B.2.1.6 City of Pleasanton

The City of Pleasanton is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Pleasanton implement the following water supply plan (Table 4B.2.1-12).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 156 acft/yr by 2010, increasing to 615 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Facilities Expansions (System Upgrades)

Table 4B.2.1-12.
Recommended Water Supply Plan for the City of Pleasanton

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)*	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	156	300	448	523	565	615
Total New Supply	**156**	**300**	**448**	**523**	**565**	**615**
** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*						

Estimated costs of the recommended plan for the City of Pleasanton are shown in Table 4B.2.1-13.

Table 4B.2.1-13.
Recommended Plan Costs by Decade for the City of Pleasanton

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$104,645	$174,786	$248,190	$282,846	$303,440	$329,849
Unit Cost ($/acft)	$671	$583	$554	$541	$537	$536

In addition, the City of Pleasanton is considering the addition of Local Groundwater Supplies (Carrizo) from two new wells and the addition of two elevated storage tanks.

4B.2.1.7 City of Poteet

The City of Poteet is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Poteet implement the following water supply plan (Table 4B.2.1-14).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 60 acft/yr by 2010, increasing to 213 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.1-14.
Recommended Water Supply Plan for the City of Poteet

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	60	116	163	185	198	213
Total New Supply	**60**	**116**	**163**	**185**	**198**	**213**

Estimated costs of the recommended plan for the City of Poteet are shown in Table 4B.2.1-15.

***Table 4B.2.1-15.
Recommended Plan Costs by Decade for the City of Poteet***

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$45,430	$72,170	$93,416	$102,042	$107,518	$115,685
Unit Cost ($/acft)	$757	$622	$573	$552	$543	$543

4B.2.1.8 Rural Area Residential and Commercial

Rural areas are projected to have adequate water supplies available from the Carrizo and Sparta Aquifers to meet their projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected needs for rural areas (Table 4B.2.1-16).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 11 acft/yr by 2010, decreasing to 0 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

***Table 4B.2.1-16.
Recommended Water Supply Plan for Rural Areas***

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	11	17	11	1	—	—
Total New Supply	**11**	**17**	**11**	**1**	**—**	**—**
** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*						

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.1-17.

Table 4B.2.1-17.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$8,554	$12,806	$8,532	$1,061	—	—
Unit Cost ($/acft)	$778	$753	$776	$1,061	—	—

4B.2.1.9 Industrial

Industrial is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group's projected demand during the planning period.

4B.2.1.10 Steam-Electric Power

Current water supply for steam-electric power is obtained from the Carrizo Aquifer. Steam-electric power is projected to need additional water supplies in the year 2010, 2050, and 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that individual steam-electric power operations implement the following water supply plan to meet the projected needs for steam-electric power (Table 4B.2.1-18).

- Local Groundwater Supplies (Carrizo) to be implemented in 2010. This strategy can provide an additional 807 acft/yr of supply in 2010 increasing to 1,613 acft/yr in 2060.

Table 4B.2.1-18.
Recommended Water Supply Plan for Steam-Electric Power

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	263	0	0	0	604	942
Recommended Plan						
Local Groundwater Supplies (Carrizo)	807	807	807	807	807	1,613
Total New Supply	**807**	**807**	**807**	**807**	**807**	**1,613**

Estimated costs of the recommended plan to meet the steam-electric power projected needs are shown in Table 4B.2.1-19.

Table 4B.2.1-19.
Recommended Plan Costs by Decade for Steam-Electric Power

Plan Element	2010	2020	2030	2040	2050	2060
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	$249,500	$249,500	$39,907	$39,907	$39,907	$289,407
Unit Cost ($/acft)	$309	$309	$49	$49	$49	$179

4B.2.1.11 Mining

Mining is projected to have adequate water supplies available from the Carrizo and Queen City Aquifers to meet the water user group's projected demand during the planning period.

4B.2.1.12 Irrigation

Current water supply for irrigation is obtained from the Edwards, Carrizo, Sparta, and Queen City Aquifers, and run-of-river rights. Irrigation is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that individual irrigators implement the following water supply plan to meet the projected needs for irrigation (Table 4B.2.1-20).

- Irrigation water conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 1,961 acft/yr of supply.

Table 4B.2.1-20.
Recommended Water Supply Plan for Irrigation

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	6,095	4,734	3,413	2,141	924	291
Recommended Plan						
Irrigation Water Conservation	5,369	4,734	3,413	2,141	924	291
Total New Supply	**5,369**	**4,734**	**3,413**	**2,141**	**924**	**291**

Estimated costs of the recommended plan to meet the irrigation projected needs are shown in Table 4B.2.1-21.

Table 4B.2.1-21.
Recommended Plan Costs by Decade for Irrigation

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Irrigation Water Conservation						
Annual Cost ($/yr)	$923,468	$814,248	$587,036	$368,252	$158,928	$50,052
Unit Cost ($/acft)	$172	$172	$172	$172	$172	$172

4B.2.1.13 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demand during the planning period.

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4B.2.2 Bexar County Water Supply Plan

Table 4B.2.2-1 lists each water user group in Bexar County and its corresponding management supply or shortage in 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.2-1.
Bexar County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
City of Alamo Heights	-592	-691	Projected shortage (2010 through 2060)
Atascosa Rural WSC	-546	-1218	Projected shortage (2010 through 2060)
City of Balcones Heights	0	0	No projected shortage
Bexar Metropolitan Water District	-3,944	-7,038	Projected shortage (2010 through 2060)
City of Castle Hills	-96	-47	Projected shortage (2010 through 2060)
City of China Grove	0	0	No projected shortage
City of Converse	688	-969	Projected shortage (2030 through 2060)
East Central SUD	1,428	-942	Projected shortage (2030 through 2060)
City of Elmendorf	0	0	No projected shortage
City of Fair Oaks Ranch	660	571	No projected shortage
Green Valley SUD			See Guadalupe County
City of Helotes	0	0	No projected shortage
City of Hill Country Village	-730	-718	Projected shortage (2010 through 2060)
City of Hollywood Park	-1,969	-2,271	Projected shortage (2010 through 2060)
City of Kirby	-335	-364	Projected shortage (2010 through 2060)
Lackland AFB (CDP)	0	0	No projected shortage
City of Leon Valley	91	126	No projected shortage
City of Live Oak	1,183	1,085	No projected shortage
City of Lytle			See Atascosa County
City of Olmos Park	0	0	No projected shortage
City of San Antonio (SAWS)	-68,476	-169,336	Projected shortage (2010 through 2060)
City of San Antonio (BMWD)	-9,023	-24,476	Projected shortage (2010 through 2060)
City of San Antonio (Others)	-284	-416	Projected shortage (2010 through 2060)

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Table 4B.2.2-1 (Concluded)

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
City of Schertz			See Guadalupe County
City of Selma	189	-749	Projected shortage (2020 through 2060)
City of Shavano Park	-320	-381	Projected shortage (2010 through 2060)
City of Somerset	0	0	No projected shortage
City of St. Hedwig	0	0	No projected shortage
City of Terrell Hills	0	0	No projected shortage
City of Universal City	-113	-606	Projected shortage (2010 through 2060)
Water Service Inc. (Apex)	-911	-2,018	Projected shortage (2010 through 2060)
Windcrest (WC&ID No. 10)	-235	-214	Projected shortage (2010 through 2060)
Rural Area Residential and Commercial	1,212	-620	Projected shortage (2040 through 2060)
Industrial	-1,340	-17,588	Projected shortage (2010 through 2060)
Steam-Electric Power	28,505	9,286	No projected shortage
Mining	0	-1,216	Projected shortage (2030 through 2060)
Irrigation	9,737	11,868	No projected shortage
Livestock	55	50	No projected shortage

4B.2.2.1 City of Alamo Heights

Current water supply for the City of Alamo Heights is obtained from the Edwards Aquifer. Alamo Heights is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Alamo Heights implement the following water supply plan to meet the projected needs for the city (Table 4B.2.2-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 175 acft/yr by 2010, increasing to 865 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional supply of 592 acft/yr by 2010, increasing to 691 acft/yr of additional supply by 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 104 acft/yr by 2010.

Table 4B.2.2-2.
Recommended Water Supply Plan for the City of Alamo Heights

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	592	655	657	653	667	691
Recommended Plan						
Municipal Water Conservation	175	337	488	625	769	865
Edwards Transfers	592	655	657	653	667	691
Drought Management	104	—	—	—	—	—
Total New Supply	**871**	**992**	**1,145**	**1,278**	**1,436**	**1,556**

Estimated costs of the recommended plan to meet the City of Alamo Heights's projected needs are shown in Table 4B.2.2-3.

Table 4B.2.2-3.
Recommended Plan Costs by Decade for the City of Alamo Heights

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$111,776	$192,169	$267,391	$334,980	$408,685	$459,018
Unit Cost ($/acft)	$639	$570	$548	$536	$531	$531
Edwards Transfers						
Annual Cost ($/yr)	$268,768	$297,370	$298,278	$296,462	$302,818	$313,714
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$208,369	—	—	—	—	—
Unit Cost ($/acft)	$2,004	—	—	—	—	—

4B.2.2.2 Atascosa Rural WSC

Current water supply for Atascosa Rural WSC is obtained from the Edwards Aquifer. Atascosa Rural WSC is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Atascosa Rural WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.2-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 22 acft/yr by 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional supply of 546 acft/yr by 2010, increasing to 1,218 acft/yr of additional supply by 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 47 acft/yr by 2010.
- Purchase from Wholesale Water Provider (BMWD) to be implemented prior to 2010. Atascosa Rural WSC is a potential participant with BMWD in the Medina Lake Firm-Up (ASR) water management strategy. This strategy can provide an additional supply of 120 acft/yr by 2010 through 2060.
- Facilities Expansions (System Interconnections)

Table 4B.2.2-4.
Recommended Water Supply Plan for Atascosa Rural WSC

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	546	717	869	996	1,106	1,218
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	22
Edwards Transfers	546	717	869	996	1,106	1,218
Drought Management	47	—	—	—	—	—
Purchase from WWP (BMWD)	120	120	120	120	120	120
Facilities Expansions	—	—	—	—	—	—
Total New Supply	**713**	**837**	**989**	**1,116**	**1,226**	**1,338**

Estimated costs of the recommended plan to meet Atascosa Rural WSC's projected needs are shown in Table 4B.2.2-5.

Table 4B.2.2-5.
Recommended Plan Costs by Decade for Atascosa Rural WSC

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$17,081
Unit Cost ($/acft)	—	—	—	—	—	$776
Edwards Transfers						
Annual Cost ($/yr)	$247,884	$325,518	$394,526	$452,184	$502,124	$552,972
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$134,140	—	—	—	—	—
Unit Cost ($/acft)	$2,854	—	—	—	—	—
Purchase from WWP (BMWD)						
Annual Cost ($/yr)	$126,495	$125,501	$69,376	$55,917	$46,479	$46,427
Unit Cost ($/acft)	$1,054	$1,046	$578	$466	$387	$387
Facilities Expansions						
Annual Cost ($/yr)	$6,772,000	$6,772,000	$457,000	$457,000	$457,000	$457,000
Unit Cost ($/acft)	—	—	—	—	—	—

4B.2.2.3 City of Balcones Heights

The City of Balcones Heights is projected to have adequate water supplies available from the Edwards Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Balcones Heights implement the following water supply plan (Table 4B.2.2-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 4 acft/yr by 2010, increasing to 37 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.2-6.
Recommended Water Supply Plan for the City of Balcones Heights

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	4	6	7	9	20	37
Total New Supply	**4**	**6**	**7**	**9**	**20**	**37**

Estimated costs of the recommended plan for the City of Balcones Heights are shown in Table 4B.2.2-7.

Table 4B.2.2-7.
Recommended Plan Costs by Decade for the City of Balcones Heights

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$2,481	$3,821	$4,975	$5,990	$13,578	$22,492
Unit Cost ($/acft)	$620	$637	$711	$666	$679	$608

4B.2.2.4 Bexar Metropolitan Water District

Current water supply for the Bexar Metropolitan Water District (BMWD) is obtained from the Edwards, Trinity, and Carrizo Aquifers as well as the Medina Lake System and run-of-river water rights. BMWD is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the BMWD implement the following water supply plan to meet the projected needs for the District (Table 4B.2.2-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 293 acft/yr by 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (BMWD) to be implemented prior to 2010. This strategy can provide an additional supply of 3,944 acft/yr by 2010, increasing to 7,038 acft/yr of supply in 2060. See Section 4B.3.3 for a list of recommended water management strategies.

Table 4B.2.2-8.
Recommended Water Supply Plan for Bexar Metropolitan Water District

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	3,944	4,569	5,357	5,784	6,373	7,038
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	293
Purchase from WWP (BMWD)	3,944	4,569	5,357	5,784	6,373	7,038
Total New Supply	**3,944**	**4,569**	**5,357**	**5,784**	**6,373**	**7,331**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet BMWD's projected needs are shown in Table 4B.2.2-9.

Table 4B.2.2-9.
Recommended Plan Costs by Decade for Bexar Metropolitan Water District

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$225,525
Unit Cost ($/acft)	—	—	—	—	—	$770
Purchase from WWP (BMWD)						
Annual Cost ($/yr)	$4,157,453	$4,778,462	$3,097,059	$2,695,192	$2,468,400	$2,722,922
Unit Cost ($/acft)	$1,054	$1,046	$578	$466	$387	$387

4B.2.2.5 City of Castle Hills

Current water supply for the City of Castle Hills is obtained from the Edwards Aquifer through BMWD. Castle Hills is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Castle Hills implement the following water supply plan to meet the projected needs for the city (Table 4B.2.2-10).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 61 acft/yr by 2010, increasing to 166 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 41 acft/yr by 2010.
- Purchase from WWP (BMWD) to be implemented prior to 2010. This strategy can provide an additional 96 acft/yr by 2010, decreasing to 47 acft/yr of additional supply by 2060.

Table 4B.2.2-10.
Recommended Water Supply Plan for the City of Castle Hills

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	96	83	69	56	47	47
Recommended Plan						
Municipal Water Conservation	61	120	142	144	151	166
Drought Management	41	—	—	—	—	—
Purchase from WWP (BMWD)	96	83	69	56	47	47
Total New Supply	**198**	**203**	**211**	**200**	**198**	**213**

Estimated costs of the recommended plan to meet the City of Castle Hill's projected needs are shown in Table 4B.2.2-11.

Table 4B.2.2-11.
Recommended Plan Costs by Decade for the City of Castle Hills

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$41,783	$70,958	$80,456	$79,299	$81,152	$89,226
Unit Cost ($/acft)	$685	$591	$567	$551	$537	$538
Drought Management						
Annual Cost ($/yr)	$71,926	—	—	—	—	—
Unit Cost ($/acft)	$1,754	—	—	—	—	—
Purchase from WWP (BMWD)						
Annual Cost ($/yr)	$101,196	$86,805	$39,891	$26,095	$18,204	$18,184
Unit Cost ($/acft)	$1,054	$1,046	$578	$466	$387	$387

4B.2.2.6 City of China Grove

The City of China Grove is projected to have adequate water supplies available from the Edwards Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of China Grove implement the following water supply plan (Table 4B.2.2-12).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 28 acft/yr by 2010, increasing to 217 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.2-12.
Recommended Water Supply Plan for the City of China Grove

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	28	66	116	166	190	217
Total New Supply	**28**	**66**	**116**	**166**	**190**	**217**

Estimated costs of the recommended plan for the City of China Grove are shown in Table 4B.2.2-13.

Table 4B.2.2-13.
Recommended Plan Costs by Decade for the City of China Grove

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$18,235	$37,954	$63,783	$89,992	$102,383	$116,691
Unit Cost ($/acft)	$651	$575	$550	$542	$539	$538

4B.2.2.7 City of Converse

Current water supply for the City of Converse is obtained from the Edwards Aquifer. Converse is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Converse implement the following water supply plan to meet the projected needs for the city (Table 4B.2.2-14).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 21 acft/yr by 2050, increasing to 110 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (BMWD) to be implemented prior to 2030. This strategy can provide an additional 134 acft/yr of supply by 2030, increasing to 969 by 2060.

Table 4B.2.2-14. Recommended Water Supply Plan for the City of Converse

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	134	449	716	969
Recommended Plan						
Municipal Water Conservation	—	—	—	—	21	110
Purchase from WWP (BMWD)	—	—	134	449	716	969
Total New Supply	**—**	**—**	**134**	**449**	**737**	**1,079**

Estimated costs of the recommended plan to meet the City of Converse's projected needs are shown in Table 4B.2.2-15.

Table 4B.2.2-15. Recommended Plan Costs by Decade for the City Converse

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$14,150	$74,857
Unit Cost ($/acft)	—	—	—	—	$674	$681
Purchase from WWP (BMWD)						
Annual Cost ($/yr)	—	—	$77,470	$209,222	$277,322	$374,895
Unit Cost ($/acft)	—	—	$578	$466	$387	$387

4B.2.2.8 East Central SUD

Current water supply for East Central SUD is obtained from the Edwards and Carrizo Aquifers and Canyon Reservoir. East Central SUD is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that East Central SUD implement the following water supply plan to meet the projected needs for the SUD (Table 4B.2.2-16).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 32 acft/yr by 2050, increasing to 104 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (SAWS) to be implemented prior to 2010. This strategy can provide an additional 2,240 acft/yr of supply beginning in 2010 and through 2060.
- Purchase from WWP (CRWA) to be implemented prior to 2030. This strategy can provide an additional 251 acft/yr of supply beginning in 2030, increasing to 942 acft/yr of additional supply in 2060.
- Purchase from WWP (BMWD) to be implemented prior to 2010. This strategy can provide an additional 200 acft/yr of supply beginning in 2010 and through 2060

Table 4B.2.2-16.
Recommended Water Supply Plan for East Central SUD

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	251	495	716	942
Recommended Plan						
Municipal Water Conservation	—	—	—	—	32	104
Purchase from WWP (SAWS)	2,240	2,240	2,240	2,240	2,240	2,240
Purchase from WWP (CRWA)	—	—	251	495	716	942
Purchase from WWP (BMWD)	200	200	200	200	200	200
Total New Supply	**2,440**	**2,440**	**2,691**	**2,935**	**3,188**	**3,486**

Estimated costs of the recommended to meet East Central SUD's projected needs are shown in Table 4B.2.2-17.

Table 4B.2.2-17.
Recommended Plan Costs by Decade for East Central SUD

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$24,845	$80,163
Unit Cost ($/acft)	—	—	—	—	$776	$771
Purchase from WWP (SAWS)						
Annual Cost ($/yr)	$1,222,248	$1,804,294	$3,575,516	$3,119,269	$1,481,249	$2,717,313
Unit Cost ($/acft)	$546	$805	$1,596	$1,393	$661	$1,213
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	—	—	$268,065	$353,108	$320,901	$407,418
Unit Cost ($/acft)	—	—	$1,068	$713	$448	$433
Purchase from WWP (BMWD)						
Annual Cost ($/yr)	$210,824	$209,169	$115,627	$93,195	$77,464	$77,378
Unit Cost ($/acft)	$1,054	$1,046	$578	$466	$387	$387

4B.2.2.9 City of Elmendorf

The City of Elmendorf is projected to have adequate water supplies available from the Edwards Aquifer through the San Antonio Water System (SAWS) to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Elmendorf implement the following water supply plan (Table 4B.2.2-18).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 2 acft/yr by 2050, increasing to 6 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.2-18.
Recommended Water Supply Plan for the City of Elmendorf

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	—	—	—	2	6
Total New Supply	—	—	—	—	**2**	**6**

Estimated costs of the recommended plan for the City of Elmendorf are shown in Table 4B.2.2-19.

Table 4B.2.2-19.
Recommended Plan Costs by Decade for the City of Elmendorf

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$1,393	$4,052
Unit Cost ($/acft)	—	—	—	—	$697	$675

4B.2.2.10 City of Fair Oaks Ranch

The City of Fair Oaks Ranch is projected to have adequate water supplies available from the Trinity Aquifer and Canyon Reservoir to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Fair Oaks Ranch implement the following water supply plan (Table 4B.2.2-20).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 125 acft/yr by 2010, increasing to 509 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.2-20.
Recommended Water Supply Plan for the City of Fair Oaks Ranch

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	125	246	358	460	481	509
Total New Supply	**125**	**246**	**358**	**460**	**481**	**509**

Estimated costs of the recommended plan for the City of Fair Oaks Ranch are shown in Table 4B.2.2-21.

Table 4B.2.2-21.
Recommended Plan Costs by Decade for the City of Fair Oaks Ranch

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	$82,638	$145,582	$203,141	$255,541	$265,435	$280,497
Unit Cost ($/acft)	$661	$592	$567	$556	$552	$551

4B.2.2.11 City of Helotes

The City of Helotes is projected to have adequate water supplies available from the Edwards Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Helotes implement the following water supply plan (Table 4B.2.2-22).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 115 acft/yr by 2010, increasing to 993 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Facilities Expansions (System Interconnects)

Table 4B.2.2-22.
Recommended Water Supply Plan for the City of Helotes

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	115	345	539	674	832	993
Facilities Expansions	—	—	—	—	—	—
Total New Supply	**115**	**345**	**539**	**674**	**832**	**993**

Estimated costs of the recommended plan for the City of Helotes' are shown in Table 4B.2.2-23.

Table 4B.2.2-23.
Recommended Plan Costs by Decade for the City of Helotes

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$78,092	$205,524	$313,824	$386,697	$473,570	$561,561
Unit Cost ($/acft)	$679	$596	$582	$574	$569	$566
Facilities Expansions						
Annual Cost ($/yr)	$269,000	$269,000	$20,000	$20,000	$20,000	$20,000
Unit Cost ($/acft)	—	—	—	—	—	—

4B.2.2.12 City of Hill Country Village

Current water supply for the City of Hill Country Village is obtained from the Edwards Aquifer. Hill Country Village is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Hill Country Village implement the following water supply plan to meet the projected needs for the city (Table 4B.2.2-24).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 77 acft/yr by 2010, increasing to 365 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

- Purchase from WWP (BMWD) to be implemented prior to 2010. This strategy can provide an additional 730 acft/yr by 2010, decreasing to 718 acft/yr of additional supply by 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 42 acft/yr by 2010.

Table 4B.2.2-24.
Recommended Water Supply Plan for the City of Hill Country Village

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	730	727	723	720	718	718
Recommended Plan						
Municipal Water Conservation	77	146	209	265	316	365
Purchase from WWP (BMWD)	730	727	723	720	718	718
Drought Management	42	—	—	—	—	—
Total New Supply	**849**	**873**	**932**	**985**	**1,034**	**1,083**

Estimated costs of the recommended plan to meet the City of Hill Country Village's projected needs are shown in Table 4B.2.2-25.

Table 4B.2.2-25.
Recommended Plan Costs by Decade for the City of Hill Country Village

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$43,077	$78,866	$111,009	$139,853	$166,499	$192,015
Unit Cost ($/acft)	$559	$540	$531	$528	$527	$526
Purchase from WWP (BMWD)						
Annual Cost ($/yr)	$769,508	$760,329	$417,990	$335,501	$278,097	$277,786
Unit Cost ($/acft)	$1,054	$1,046	$578	$466	$387	$387
Drought Management						
Annual Cost ($/yr)	$13,312	—	—	—	—	—
Unit Cost ($/acft)	$317	—	—	—	—	—

4B.2.2.13 City of Hollywood Park

Current water supply for the City of Hollywood Park is obtained from the Edwards Aquifer. Hollywood Park is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Hollywood Park implement the following water supply plan to meet the projected needs for the city (Table 4B.2.2-26).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 212 acft/yr by 2010, increasing to 1,154 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (BMWD) to be implemented prior to 2010. This strategy can provide an additional 1,969 acft/yr by 2010, increasing to 2,271 acft/yr of additional supply by 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 116 acft/yr by 2010.

Table 4B.2.2-26.
Recommended Water Supply Plan for the City of Hollywood Park

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	1,969	2,044	2,113	2,166	2,220	2,271
Recommended Plan						
Municipal Water Conservation	212	414	612	798	980	1,154
Purchase from WWP (BMWD)	1,969	2,044	2,113	2,166	2,220	2,271
Drought Management	116	—	—	—	—	—
Total New Supply	**2,297**	**2,458**	**2,725**	**2,964**	**3,200**	**3,425**

Estimated costs of the recommended plan to meet the City of Hollywood Park's projected needs are shown in Table 4B.2.2-27.

Table 4B.2.2-27.
Recommended Plan Costs by Decade for the City of Hollywood Park

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$119,187	$223,380	$325,464	$421,117	$515,971	$607,281
Unit Cost ($/acft)	$562	$540	$532	$528	$527	$526
Purchase from WWP (BMWD)						
Annual Cost ($/yr)	$2,075,564	$2,137,706	$1,221,595	$1,009,299	$859,854	$878,624
Unit Cost ($/acft)	$1,054	$1,046	$578	$466	$387	$387
Drought Management						
Annual Cost ($/yr)	$33,055	—	—	—	—	—
Unit Cost ($/acft)	$285	—	—	—	—	—

4B.2.2.14 City of Kirby

Current water supply for the City of Kirby is obtained from the Edwards Aquifer. Kirby is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Kirby implement the following water supply plan to meet the projected needs for the city (Table 4B.2.2-28).

- Municipal Water Conservation
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional supply of 335 acft/yr by 2010, increasing to 364 acft/yr of additional supply by 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional supply of 50 acft/yr by 2010.

Table 4B.2.2-28.
Recommended Water Supply Plan for the City of Kirby

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	335	334	337	331	343	364
Recommended Plan						
Edwards Transfers	335	334	337	331	343	364
Drought Management	50	—	—	—	—	—
Total New Supply	**385**	**334**	**337**	**331**	**343**	**364**

Estimated costs of the recommended plan to meet the City of Kirby's projected needs are shown in Table 4B.2.2-29.

Table 4B.2.2-29.
Recommended Plan Costs by Decade for the City of Kirby

Plan Element	2010	2020	2030	2040	2050	2060
Edwards Transfers						
Annual Cost ($/yr)	$152,090	$151,636	$152,998	$150,274	$155,722	$165,256
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$37,755	—	—	—	—	—
Unit Cost ($/acft)	$755	—	—	—	—	—

4B.2.2.15 Lackland AFB (CDP)

Current water supply for Lackland AFB is obtained from the Edwards Aquifer. Lackland AFB is projected to have adequate water supplies available from the Edwards Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Lackland AFB implement the following water supply plan to meet the projected needs for the AFB (Table 4B.2.2-30).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 268 acft/yr by 2010, increasing to 1,300 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.2-30.
Recommended Water Supply Plan for Lackland AFB

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	268	515	736	934	1,119	1,300
Total New Supply	**268**	**515**	**736**	**934**	**1,119**	**1,300**

Estimated costs of the recommended plan for Lackland AFB are shown in Table 4B.2.2-31.

Table 4B.2.2-31.
Recommended Plan Costs by Decade for Lackland AFB

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$148,874	$276,599	$390,737	$492,589	$588,115	$683,167
Unit Cost ($/acft)	$556	$537	$531	$527	$526	$526

4B.2.2.16 City of Leon Valley

The City of Leon Valley is projected to have adequate water supplies available from the Edwards Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Leon Valley implement the following water supply plan (Table 4B.2.2-32).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 12 acft/yr in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.2-32.
Recommended Water Supply Plan for the City of Leon Valley

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	12
Total New Supply	—	—	—	—	—	**12**

Estimated costs of the recommended plan for the City of Leon Valley are shown in Table 4B.2.2-33.

Table 4B.2.2-33.
Recommended Plan Costs by Decade for the City of Leon Valley

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$7,962
Unit Cost ($/acft)	—	—	—	—	—	$664

4B.2.2.17 City of Live Oak

The City of Live Oak is projected to have adequate water supplies available from the Edwards Aquifer to meet the city's projected demands during the planning period. However, water demands may be greater than projected due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan. Potentially feasible water management strategies recommended to meet any unprojected needs include:

- Municipal Water Conservation;
- Edwards Transfers; and
- Purchase from WWP (BMWD).

4B.2.2.18 City of Olmos Park

The City of Olmos Park is projected to have adequate water supplies available from the Edwards Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Olmos Park implement the following water supply plan (Table 4B.2.2-34).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 9 acft/yr by 2010, increasing to 33 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.2-34.
Recommended Water Supply Plan for the City of Olmos Park

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	9	11	13	14	21	33
Total New Supply	**9**	**11**	**13**	**14**	**21**	**33**

Estimated costs of the recommended plan for the City of Olmos Park are shown in Table 4B.2.2-35.

Table 4B.2.2-35.
Recommended Plan Costs by Decade for the City of Olmos Park

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$6,343	$7,676	$8,877	$9,863	$13,461	$19,748
Unit Cost ($/acft)	$705	$698	$683	$705	$641	$598

4B.2.2.19 City of San Antonio

Current water supply for the City of San Antonio is obtained from the Edwards, Trinity, and Carrizo Aquifers, Canyon Reservoir, run-of-river rights, and direct reuse. San Antonio is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that San Antonio implement the following water supply plan to meet the projected needs for the city (Table 4B.2.2-36).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 5,752 acft/yr by 2010, increasing to 23,711 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (SAWS) to be implemented prior to 2010. This strategy can provide an additional supply of 68,760 acft/yr by 2010, increasing to 169,752 acft/yr of additional supply by 2060. See Section 4B.3.2 for a list of recommended water management strategies.
- Purchase from WWP (BMWD) to be implemented prior to 2010. This strategy can provide an additional supply of 12,704 acft/yr by 2010, increasing to 28,157 acft/yr of additional supply by 2060. See Section 4B.3.3 for a list of recommended water management strategies.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 1,233 acft/yr from BMWD and 9,883 acft/yr from SAWS by 2010.

Table 4B.2.2-36.
Recommended Water Supply Plan for the City of San Antonio

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	77,783	109,542	135,796	158,280	176,271	194,228
Recommended Plan						
Municipal Water Conservation	5,752	7,318	8,795	10,490	15,698	23,711
Purchase from WWP (SAWS)	68,477	93,384	116,921	137,353	153,357	169,336
Purchase from WWP (BMWD)	9,023	15,840	18,526	20,556	22,519	24,476
Drought Management (BMWD)	1,233	—	—	—	—	—
Drought Management (SAWS)	37,622	—	—	—	—	—
Total New Supply	**122,107**	**116,542**	**144,242**	**168,399**	**191,574**	**217,523**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet the City of San Antonio's projected needs are shown in Table 4B.2.2-37.

Table 4B.2.2-37.
Recommended Plan Costs by Decade for the City of San Antonio

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$3,451,336	$4,390,988	$5,276,772	$6,134,520	$8,736,963	$12,965,177
Unit Cost ($/acft)	$600	$600	$600	$585	$557	$547
Purchase from WWP (SAWS)						
Annual Cost ($/yr)	$37,388,442	$75,174,120	$186,605,916	$191,332,729	$101,368,977	$205,404,568
Unit Cost ($/acft)	$546	$805	$1,596	$1,393	$661	$1,213
Purchase from WWP (BMWD)						
Annual Cost ($/yr)	$9,510,242	$16,568,640	$10,710,495	$9,578,557	$8,722,094	$9,469,487
Unit Cost ($/acft)	$1,054	$1,046	$578	$466	$387	$387
Drought Management (BMWD)						
Annual Cost ($/yr)	$2,272,791	—	—	—	—	—
Unit Cost ($/acft)	$1,844	—	—	—	—	—
Drought Management (SAWS)						
Annual Cost ($/yr)	$21,632,650	—	—	—	—	—
Unit Cost ($/acft)	$575	—	—	—	—	—

4B.2.2.20 City of Selma

Current water supply for the City of Selma is obtained from the Edwards and Carrizo Aquifers. Selma, with nearly 2,000 acft/yr of water supply from its Edwards Permits and SSLGC Contract. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Selma implement the following water supply plan to meet the projected needs for the city (Table 4B.2.2-38).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 135 acft/yr by 2010, increasing to 1,122 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (SSLGC) to be implemented prior to 2020. This strategy can provide an additional 316 acft/yr of supply by 2020, increasing to 749 acft/yr by 2060.

An alternative water management strategy for the City of Selma, if groundwater permits from Gonzales County are unable to be obtained, is Purchase from WWP (SSLGC).

Table 4B.2.2-38.
Recommended Water Supply Plan for the City of Selma

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	316	762	757	748	749
Recommended Plan						
Municipal Water Conservation	135	344	617	801	966	1,122
Purchase from WWP (SSLGC)	—	316	762	757	748	749
Total New Supply	**135**	**660**	**1,379**	**1,558**	**1,714**	**1,871**

Estimated costs of the recommended plan to meet the City of Selma's projected needs are shown in Table 4B.2.2-39.

Table 4B.2.2-39.
Recommended Plan Costs by Decade for the City of Selma

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$81,797	$191,307	$334,026	$429,317	$514,189	$596,292
Unit Cost ($/acft)	$606	$556	$541	$536	$532	$531
Purchase from WWP (SSLGC)						
Annual Cost ($/yr)	—	$179,488	$522,180	$368,366	$272,392	$272,756
Unit Cost ($/acft)	—	$568	$685	$487	$364	$364

4B.2.2.21 City of Shavano Park

Current water supply for the City of Shavano Park is obtained from the Edwards Aquifer. Shavano Park is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Shavano Park implement the following water supply plan to meet the projected needs for the city (Table 4B.2.2-40).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 73 acft/yr by 2010, increasing to 382 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 41 acft/yr by 2010.
- Purchase from WWP (SAWS) to be implemented by 2010. This strategy can provide an additional 320 acft/yr by 2010, increasing to 381 acft/yr of supply in 2060.

Table 4B.2.2-40.
Recommended Water Supply Plan for the City of Shavano Park

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)*	320	336	348	357	369	381
Recommended Plan						
Municipal Water Conservation	73	142	205	265	324	382
Drought Management	41	—	—	—	—	—
Purchase from WWP (SAWS)	320	336	348	357	369	381
Total New Supply	**434**	**478**	**553**	**622**	**693**	**763**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet the City of Shavano Park's projected needs are shown in Table 4B.2.2-41.

Table 4B.2.2-41.
Recommended Plan Costs by Decade for the City of Shavano Park

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$42,938	$78,273	$109,901	$140,332	$171,283	$201,359
Unit Cost ($/acft)	$588	$551	$536	$530	$529	$527
Drought Management)						
Annual Cost ($/yr)	$15,109	—	—	—	—	—
Unit Cost ($/acft)	$369	—	—	—	—	—
Purchase from WWP (SAWS)						
Annual Cost ($/yr)	$174,607	$270,644	$555,482	$497,134	$244,009	$462,186
Unit Cost ($/acft)	$546	$805	$1,596	$1,393	$661	$1,213

4B.2.2.22 City of Somerset

The City of Somerset is projected to have adequate water supplies available from run-of-river rights to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Somerset implement the following water supply plan (Table 4B.2.2-42).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 29 acft/yr by 2010, increasing to 177 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.2-42.
Recommended Water Supply Plan for the City of Somerset

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	29	70	110	131	152	177
Total New Supply	**29**	**70**	**110**	**131**	**152**	**177**

Estimated costs of the recommended plan for the City of Somerset are shown in Table 4B.2.2-43.

Table 4B.2.2-43.
Recommended Plan Costs by Decade for the City of Somerset

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$19,446	$41,130	$61,277	$72,051	$82,673	$95,795
Unit Cost ($/acft)	$671	$588	$557	$550	$544	$541

4B.2.2.23 City of St. Hedwig

The City of St. Hedwig is projected to have adequate water supplies available from the Edwards Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of St. Hedwig implement the following water supply plan (Table 4B.2.2-44).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 14 acft/yr in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.2-44.
Recommended Water Supply Plan for the City of St. Hedwig

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	14
Total New Supply	—	—	—	—	—	**14**

Estimated costs of the recommended plan for the City of St. Hedwig are shown in Table 4B.2.2-45.

Table 4B.2.2-45.
Recommended Plan Costs by Decade for the City of St. Hedwig

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$10,763
Unit Cost ($/acft)	—	—	—	—	—	$769

4B.2.2.24 City of Terrell Hills

The City of Terrell Hills is projected to have adequate water supplies available from the Edwards Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Terrell Hills implement the following water supply plan (Table 4B.2.2-46).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 14 acft/yr by 2010, increasing to 65 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.2-46.
Recommended Water Supply Plan for the City of Terrell Hills

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	14	18	21	24	39	65
Total New Supply	**14**	**18**	**21**	**24**	**39**	**65**

Estimated costs of the recommended plan for the City of Terrell Hill are shown in Table 4B.2.2-47.

Table 4B.2.2-47.
Recommended Plan Costs by Decade for the City of Terrell Hills

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$9,495	$12,125	$14,510	$16,484	$24,216	$37,910
Unit Cost ($/acft)	$678	$674	$691	$687	$621	$583

4B.2.2.25 City of Universal City

Current water supply for the City of Universal City is obtained from the Edwards and Carrizo Aquifers. Universal City is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Universal City implement the following water supply plan to meet the projected needs for the city (Table 4B.2.2-48).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 49 acft/yr by 2050, increasing to 148 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional supply of 113 acft/yr by 2010, increasing to 606 acft/yr of additional supply by 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 130 acft/yr by 2010.

Table 4B.2.2-48.
Recommended Water Supply Plan for the City of Universal City

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	113	421	680	630	606	606
Recommended Plan						
Municipal Water Conservation	—	—	—	—	49	148
Edwards Transfers	113	421	680	630	606	606
Drought Management	130	—	—	—	—	—
Total New Supply	**243**	**421**	**680**	**630**	**655**	**754**

Estimated costs of the recommended plan to meet the City of Universal City's projected needs are shown in Table 4B.2.2-49.

Table 4B.2.2-49.
Recommended Plan Costs by Decade for the City of Universal City

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$33,518	$92,827
Unit Cost ($/acft)	—	—	—	—	$684	$627
Edwards Transfers						
Annual Cost ($/yr)	$51,302	$191,134	$308,720	$286,020	$275,124	$275,124
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$116,789	—	—	—	—	—
Unit Cost ($/acft)	$898	—	—	—	—	—

4B.2.2.26 Water Service Inc. (Apex)

Current water supply for Water Service Inc. is obtained from the Edwards Aquifer. Water Service Inc. is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Water Service Inc. implement the following water supply plan to meet the projected needs for the entity (Table 4B.2.2-50).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 18 acft/yr by 2040, increasing to 105 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional supply of 587 acft/yr by 2010, increasing to 1,116 acft/yr of additional supply by 2060.
- Purchase from WWP (TWA) to be implemented prior to 2020. This strategy can provide an additional supply of 1,000 acft/yr by 2020, through 2060.
- Purchase from WWP (SSLGC) to be implemented prior to 2010. This strategy can provide an additional supply of 324 acft/yr by 2010, through 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 48 acft/yr by 2010.

Alternative water management strategies for the Water Service, Inc, if groundwater permits from Gonzales County are unable to be obtained, is Purchase from WWP (SAWS) and/or additional Edwards Transfers.

Table 4B.2.2-50.
Recommended Water Supply Plan for Water Service Inc.

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	911	1,148	1,384	1,599	1,801	2,018
Recommended Plan						
Municipal Water Conservation	—	—	—	18	50	105
Edwards Transfers	587	723	844	945	1,031	1,116
Purchase from WWP (TWA)	—	1,000	1,000	1,000	1,000	1,000
Purchase from WWP (SSLGC)	324	324	324	324	324	324
Drought Management	48	—	—	—	—	—
Total New Supply	**959**	**2,047**	**2,168**	**2,287**	**2,405**	**2,545**

Estimated costs of the recommended plan to meet Water Service Inc.'s projected needs are shown in Table 4B.2.2-51.

Table 4B.2.2-51.
Recommended Plan Costs by Decade for Water Service Inc.

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	$13,791	$38,479	$81,122
Unit Cost ($/acft)	—	—	—	$766	$770	$773
Edwards Transfers						
Annual Cost ($/yr)	$266,498	$328,242	$383,176	$429,030	$468,074	$506,664
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Purchase from WWP (TWA)						
Annual Cost ($/yr)	—	$1,523,000	$1,523,000	$512,000	$512,000	$512,000
Unit Cost ($/acft)	—	$1,523	$1,523	$512	$512	$512
Purchase from WWP (SSLGC)						
Annual Cost ($/yr)	$160,380	$184,032	$222,029	$157,663	$117,988	$117,988
Unit Cost ($/acft)	$495	$568	$685	$487	$364	$364
Drought Management						
Annual Cost ($/yr)	$21,089	—	—	—	—	—
Unit Cost ($/acft)	$459	—	—	—	—	—

4B.2.2.27 City of Windcrest

The City of Windcrest obtains its water supply from the Edwards Aquifer and is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Windcrest implement the following water supply plan (Table 4B.2.2-52).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 99 acft/yr by 2010, increasing to 385 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional 235 acft/yr by 2010 through 2060.

Table 4B.2.2-52.
Recommended Water Supply Plan for the City of Windcrest

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	235	227	219	209	206	214
Recommended Plan						
Municipal Water Conservation	99	189	270	343	362	385
Edwards Transfers	235	235	235	235	235	235
Total New Supply	**334**	**424**	**505**	**578**	**597**	**620**

Estimated costs of the recommended plan to meet the City of Windcrest's projected needs are shown in Table 4B.2.2-53.

Table 4B.2.2-53.
Recommended Plan Costs by Decade for the City of Windcrest

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$65,703	$110,082	$149,707	$185,027	$193,335	$205,282
Unit Cost ($/acft)	$664	$582	$554	$539	$534	$533
Edwards Transfers						
Annual Cost ($/yr)	$106,690	$106,690	$106,690	$106,690	$106,690	$106,690
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454

4B.2.2.28 Rural Area Residential and Commercial

Current water supply for Rural Areas is obtained from the Edwards Aquifer, Trinity Aquifer, and Canyon Reservoir. Rural Areas are projected to need additional water supplies prior to 2040. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected needs for rural areas (Table 4B.2.2-54).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 49 acft/yr in 2010, increasing to 505 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

- Purchase from WWP (SAWS) to be implemented prior to 2010. This strategy can provide an additional 127 acft/yr by year 2040, increasing to 655 acft/yr by 2060.

Table 4B.2.2-54.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	127	403	655
Recommended Plan						
Municipal Water Conservation	49	96	140	191	310	505
Purchase from WWP (SAWS)	—	—	—	127	403	655
Total New Supply	**49**	**96**	**140**	**318**	**713**	**1,160**

Estimated costs of the recommended plan to meet the projected needs of rural areas are shown in Table 4B.2.2-55.

Table 4B.2.2-55.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$37,759	$73,618	$107,959	$147,203	$238,677	$389,088
Unit Cost ($/acft)	$771	$767	$771	$771	$770	$770
Purchase from WWP (SAWS)						
Annual Cost ($/yr)	—	—	—	$176,851	$266,493	$794,571
Unit Cost ($/acft)	—	—	—	$1,393	$661	$1,213

4B.2.2.29 Industrial

Current water supply for industrial is obtained from the Edwards Aquifer, Trinity Aquifer, run-of-river rights, and direct reuse. Industrial is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that individual industrial operations implement the following water supply plan to meet the projected needs for industrial (Table 4B.2.2-56).

- Purchase from WWP (SAWS) to be implemented prior to 2010. This strategy can provide an additional 12,000 acft/yr of supply in 2010, increasing to

30,000 acft/yr of additional supply in 2060. See Section 4B.3.2 for an individual project list.

- Recycled Water is to be implemented prior to 2010. This strategy can provide an additional 1,340 acft/yr of supply in 2010, increasing to 17,588 acft/yr of additional supply in 2060, capable of meeting the entire needs.

Table 4B.2.2-56.
Recommended Water Supply Plan for Industrial

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	1,340	4,886	8,240	11,537	14,438	17,588
Recommended Plan						
Purchase from WWP (SAWS)	4,240	8,240	18,000	22,000	30,000	30,000
Recycled Water	1,340	4,886	8,240	11,537	14,438	17,588
Total New Supply	**5,580**	**13,126**	**26,240**	**33,537**	**44,438**	**47,588**

Estimated costs of the recommended plan to meet the Industrial projected needs are shown in Table 4B.2.2-57.

Table 4B.2.2-57.
Recommended Plan Costs by Decade for Industrial

Plan Element	2010	2020	2030	2040	2050	2060
Purchase from WWP (SAWS)						
Annual Cost ($/yr)	$2,315,040	$6,633,200	$28,731,827	$30,635,681	$19,838,157	$36,392,585
Unit Cost ($/acft)	$546	$805	$1,596	$1,393	$661	$1,213
Recycled Water						
Annual Cost ($/yr)	$777,200	$2,833,880	$807,520	$10,164,097	$12,719,878	$3,605,540
Unit Cost ($/acft)	$580	$580	$98	$881	$881	$205

4B.2.2.30 Steam-Electric Power

Steam-electric power is projected to have adequate water supplies available from Victor Braunig Lake and Calaveras Lake to meet the water user group's projected demand during the planning period.

4B.2.2.31 Mining

Current water supply for mining is obtained from the Carrizo Aquifer. Mining is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that individual mining operations implement the following water supply plan to meet the projected needs for mining (Table 4B.2.2-58).

- Mining Water Conservation to be implemented prior to 2010.

Table 4B.2.2-58.
Recommended Water Supply Plan for Mining

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	921	1,020	1,122	1,216
Recommended Plan						
Mining Water Conservation	—	—	921	1,020	1,122	1,216
Total New Supply	—	—	**921**	**1,020**	**1,122**	**1,216**

Estimated costs of the recommended plan to meet the Mining projected needs are shown in Table 4B.2.2-59.

Table 4B.2.2-59.
Recommended Plan Costs by Decade for Mining

Plan Element	2010	2020	2030	2040	2050	2060
Mining Water Conservation						
Annual Cost ($/yr)	—	—	N/A	N/A	N/A	N/A
Unit Cost ($/acft)	—	—	N/A	N/A	N/A	N/A
**Costs not available due to lack of relevant data.*						

4B.2.2.32 Irrigation

Current water supply for irrigation is obtained from the Edwards Aquifer, Carrizo Aquifer, and run-of-river rights. Irrigation is projected to have adequate water supplies available.

4B.2.2.33 Livestock

Current water supply for livestock is obtained from the Edwards, Carrizo, and Trinity Aquifers and local sources. Livestock is projected to have adequate water supplies available.

4B.2.3 Caldwell County Water Supply Plan

Table 4B.2.3-1 lists each water user group in Caldwell County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.3-1.
Caldwell County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
Aqua WSC	-49	-362	Projected shortage (2010 through 2060)
County Line WSC			See Hays County
Creedmoor-Maha WSC	-108	-447	Projected shortage (2010 through 2060)
Goforth WSC			See Hays County
Gonzales County WSC			See Gonzales County
City of Lockhart	322	-2,512	Projected shortage (2020 through 2060)
City of Luling	21	-506	Projected shortage (2020 through 2060)
City Martindale	34	1	No projected shortage
Martindale WSC	-42	-182	Projected shortage (2010 through 2060)
Maxwell WSC	384	-689	Projected shortage (2030 through 2060)
City of Mustang Ridge	-19	-213	Projected shortage (2010 through 2060)
City of Niederwald			See Hays County
Polonia WSC	723	-265	Projected shortage (2050 through 2060)
Rural Area Residential and Commercial	500	594	No projected shortage
Industrial	14	0	No projected shortage
Steam-Electric Power	0	0	No projected demand
Mining	5	1	No projected shortage
Irrigation	0	466	No projected shortage
Livestock	0	0	No projected shortage

4B.2.3.1 Aqua WSC

Current water supply for Aqua WSC is obtained from the Carrizo Aquifer. Aqua WSC is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Aqua WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.3-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 6 acft/yr by 2050, increasing to 19 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Carrizo) to be implemented prior to 2010. This strategy can provide an additional 403 acft/yr by 2010, continuing through 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 13 acft/yr by 2010.

Table 4B.2.3-2.
Recommended Water Supply Plan for Aqua WSC

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	49	121	178	240	300	362
Recommended Plan						
Municipal Water Conservation	—	—	—	—	6	19
Local Groundwater Supplies (Carrizo)	403	403	403	403	403	403
Drought Management	13	—	—	—	—	—
Total New Supply	**416**	**403**	**403**	**403**	**409**	**422**

Estimated costs of the recommended plan to meet Aqua WSC’s projected needs are shown in Table 4B.2.3-3.

Table 4B.2.3-3.
Recommended Plan Costs by Decade for Aqua WSC

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$4,655	$14,729
Unit Cost ($/acft)	—	—	—	—	$776	$775
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	$303,000	$303,000	$303,000	$130,025	$130,025	$130,025
Unit Cost ($/acft)	$751	$751	$751	$322	$322	$322
Drought Management						
Annual Cost ($/yr)	$383,813	—	—	—	—	—
Unit Cost ($/acft)	$2,952	—	—	—	—	—

4B.2.3.2 Creedmoor-Maha WSC

Current water supplies for Creedmoor-Maha WSC are obtained from the Edwards (Barton Springs) Aquifer. Creedmoor-Maha WSC is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Creedmoor-Maha WSC implement the following water supply plan (Table 4B.2.3-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 11 acft/yr by 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (GBRA) to be implemented prior to 2010. This strategy can provide an additional 108 acft/yr by 2010, increasing to 447 acft/yr in 2060.

Table 4B.2.3-4.
Recommended Water Supply Plan for Creedmoor-Maha WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	108	180	246	312	378	447
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	11
Purchase from WWP (GBRA)	108	180	246	312	378	447
Total New Supply	**108**	**180**	**246**	**312**	**378**	**458**

Estimated costs of the recommended plan for Creedmoor-Maha WSC are shown in Table 4B.2.3-5.

Table 4B.2.3-5.
Recommended Plan Costs by Decade for Creedmoor-Maha WSC

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$8,700
Unit Cost ($/acft)	—	—	—	—	—	$791
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	$105,592	$250,020	$341,694	$158,808	$192,402	$175,224
Unit Cost ($/acft)	$978	$1,389	$1,389	$509	$509	$392

4B.2.3.3 City of Lockhart

Current water supply for the City of Lockhart is obtained from the Carrizo Aquifer and Guadalupe-Blanco River Authority run-of-river rights. Lockhart is projected to need additional water supplies prior to 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Lockhart implement the following water supply plan to meet the projected needs for the city (Table 4B.2.3-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 28 acft/yr by 2030, increasing to 333 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Carrizo) to be implemented prior to 2020. This strategy can provide an additional 403 acft/yr by 2020, increasing to 2,823 acft/yr by 2060.
- Purchase from WWP (GBRA) to be implemented prior to 2020. This strategy can provide an additional 1,120 acft/yr from 2020 through 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 123 acft/yr by 2010.

Table 4B.2.3-6.
Recommended Water Supply Plan for the City of Lockhart

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	321	856	1,407	1,952	2,512
Recommended Plan						
Municipal Water Conservation	—	—	28	103	195	333
Local Groundwater Supplies (Carrizo)	—	403	1,210	1,613	2,016	2,823
Purchase from WWP (GBRA)	—	1,120	1,120	1,120	1,120	1,120
Drought Management	123	—	—	—	—	—
Total New Supply	**123**	**1,523**	**2,358**	**2,836**	**3,331**	**4,276**

Estimated costs of the recommended plan to meet the City of Lockhart's projected needs are shown in Table 4B.2.3-7.

Table 4B.2.3-7.
Recommended Plan Costs by Decade for the City of Lockhart

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	$18,838	$70,011	$132,630	$220,164
Unit Cost ($/acft)	—	—	$673	$680	$680	$661
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	—	$428,429	$1,285,286	$1,411,730	$1,236,191	$1,791,064
Unit Cost ($/acft)	—	$1,062	$1,062	$875	$613	$634
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	—	$1,556,158	$1,556,158	$570,065	$570,065	$439,563
Unit Cost ($/acft)	—	$1,389	$1,389	$509	$509	$392
Drought Management						
Annual Cost ($/yr)	$213,481	—	—	—	—	—
Unit Cost ($/acft)	$1,736	—	—	—	—	—

4B.2.3.4 City of Luling

Current water supply for the City of Luling is obtained from the Carrizo Aquifer and Guadalupe-Blanco River Authority run-of-river rights. Luling is projected to need additional water supplies prior to 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Luling implement the following water supply plan to meet the projected needs for the city (Table 4B.2.3-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 70 acft/yr by 2010, increasing to 192 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Carrizo) to be implemented prior to 2020. This strategy can provide an additional 403 acft/yr of supply in 2020, increasing to 807 acft/yr of additional supply in 2060.[1]
- Purchase from WWP (GBRA) to be implemented prior to 2020. This strategy can provide an additional 1,680 acft/yr from 2020 through 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 53 acft/yr by 2010.

Table 4B.2.3-8.
Recommended Water Supply Plan for the City of Luling

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	122	211	296	398	506
Recommended Plan						
Municipal Water Conservation	70	90	108	117	148	192
Local Groundwater Supplies (Carrizo)	—	403	403	403	403	807
Purchase from WWP (GBRA)	—	1,680	1,680	1,680	1,680	1,680
Drought Management	53	—	—	—	—	—
Total New Supply	**123**	**2,173**	**2,191**	**2,200**	**2,231**	**2,679**

[1] In response to the Infrastructure Financing Survey in 2005, Luling explained that it does not plan to add a well in the Carrizo Aquifer. Review of Luling's existing water supplies indicates that the reliability of existing surface water supplies may be underestimated, thereby eliminating the need for the Local Groundwater Supplies (Carrizo) water management strategy recommended in the plan. However, if the need arises, the strategy is included and available for consideration by the City.

Estimated costs of the recommended plan to meet the City of Luling's projected needs are shown in Table 4B.2.3-9.

Table 4B.2.3-9.
Recommended Plan Costs by Decade for the City of Luling

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$53,961	$67,257	$71,761	$70,867	$85,077	$109,043
Unit Cost ($/acft)	$771	$747	$664	$606	$575	$568
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	—	$437,500	$437,500	$180,043	$180,043	$617,543
Unit Cost ($/acft)	—	$1,085	$1,085	$446	$446	$766
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	—	$2,334,237	$2,334,237	$855,098	$855,098	$659,344
Unit Cost ($/acft)	—	$1,389	$1,389	$509	$509	$392
Drought Management						
Annual Cost ($/yr)	$30,083	—	—	—	—	—
Unit Cost ($/acft)	$568	—	—	—	—	—

4B.2.3.5 City of Martindale

The City of Martindale is projected to have adequate water supplies available from run-of-river rights to meet the city's projected demand during the planning period. The following water supply plan is recommended to meet any shortages for the City of Martindale (Table 4B.2.3-10).

- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 6 acft/yr by 2010.

Table 4B.2.3-10.
Recommended Water Supply Plan for the City of Martindale

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Drought Management	6	—	—	—	—	—
Total New Supply	**6**	—	—	—	—	—

Estimated costs of the recommended plan for the City of Martindale are shown in Table 4B.2.3-11.

Table 4B.2.3-11.
Recommended Plan Costs by Decade for the City of Martindale

Plan Element	2010	2020	2030	2040	2050	2060
Drought Management						
Annual Cost ($/yr)	$2,825	—	—	—	—	—
Unit Cost ($/acft)	$471	—	—	—	—	—

4B.2.3.6 Martindale WSC

Current water supply for Martindale WSC is obtained from Canyon Reservoir and run-of-river rights through Canyon Regional Water Authority (CRWA). Martindale WSC is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Martindale WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.3-12).

- Municipal Water Conservation
- Purchase from WWP (CRWA) to be implemented prior to 2010. This strategy can provide an additional 396 acft/yr by 2010, increasing to 896 acft/yr by 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 9 acft/yr by 2010.

Alternative water management strategies identified by Martindale WSC include Local Groundwater Supplies (Trinity), Purchase from San Marcos, Surface Water Rights, Recycled Water Programs, and/or Hays/Caldwell PUA Project.

Table 4B.2.3-12.
Recommended Water Supply Plan for Martindale WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	42	70	95	126	151	182
Recommended Plan						
Purchase from WWP (CRWA)	396	396	696	896	896	896
Drought Management	9	—	—	—	—	—
Total New Supply	**405**	**396**	**696**	**896**	**896**	**896**

Estimated costs of the recommended plan to meet Martindale WSC's projected needs are shown in Table 4B.2.3-13.

Table 4B.2.3-13.
Recommended Plan Costs by Decade for Martindale WSC

Plan Element	2010	2020	2030	2040	2050	2060
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	$287,100	$435,475	$743,318	$639,162	$401,574	$387,522
Unit Cost ($/acft)	$725	$1,100	$1,068	$713	$448	$433
Drought Management						
Annual Cost ($/yr)	$9,157	—	—	—	—	—
Unit Cost ($/acft)	$1,017	—	—	—	—	—

4B.2.3.7 Maxwell WSC

Current water supply for Maxwell WSC is obtained from the Edwards Aquifer, Canyon Reservoir, and run-of-river rights through Canyon Regional Water Authority (CRWA). Maxwell WSC is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Maxwell WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.3-14).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 11 acft/yr by 2050, increasing to 55 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (CRWA) to be implemented prior to 2020. This strategy can provide an additional 400 acft/yr by 2020, increasing to 2,000 acft/yr by 2060.

Alternative water management strategies identified by Maxwell WSC include Local Groundwater Supplies (Trinity), Purchase from San Marcos, Surface Water Rights, and/or Recycled Water Programs.

Table 4B.2.3-14.
Recommended Water Supply Plan for Maxwell WSC

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	0	0	77	246	476	689
Recommended Plan						
Municipal Water Conservation	—	—	—	—	11	55
Purchase from WWP (CRWA)	—	400	800	1,200	1,600	2,000
Total New Supply	—	**400**	**800**	**1,200**	**1,611**	**2,055**

Estimated costs of the recommended plan to meet Maxwell WSC's projected needs are shown in Table 4B.2.3-15.

Table 4B.2.3-15.
Recommended Plan Costs by Decade for Maxwell WSC

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$8,599	$42,527
Unit Cost ($/acft)	—	—	—	—	$782	$773
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	—	$854,389	$856,020	$717,097	$865,005	$854,389
Unit Cost ($/acft)	—	$1,100	$1,068	$713	$448	$433

4B.2.3.8 City of Mustang Ridge

Current water supply for the City of Mustang Ridge is obtained from the Carrizo Aquifer. Mustang Ridge is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Mustang Ridge implement the following water supply plan to meet the projected needs for the city (Table 4B.2.3-16).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 10 acft/yr by 2010, increasing to 116 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (GBRA) to be implemented prior to 2010. This strategy can provide an additional 19 acft/yr by 2010, increasing to 213 acft/yr in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 6 acft/yr by 2010.

Table 4B.2.3-16.
Recommended Water Supply Plan for the City of Mustang Ridge

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	19	62	99	137	175	213
Recommended Plan						
Municipal Water Conservation	10	26	48	74	98	116
Purchase from WWP (GBRA)	19	62	99	137	175	213
Drought Management	6	—	—	—	—	—
Total New Supply	**35**	**88**	**147**	**211**	**273**	**329**

Estimated costs of the recommended plan to meet the City of Mustang Ridge's projected needs are shown in Table 4B.2.3-17.

Table 4B.2.3-17.
Recommended Plan Costs by Decade for the City of Mustang Ridge

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$7,274	$15,610	$26,775	$40,651	$53,189	$62,850
Unit Cost ($/acft)	$727	$600	$558	$549	$543	$542
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	$18,576	$86,118	$137,511	$69,733	$89,075	$83,496
Unit Cost ($/acft)	$978	$1,389	$1,389	$509	$509	$392
Drought Management*						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
** Insufficient data to develop a cost estimate.*						

4B.2.3.9 Polonia WSC

Current water supply for Polonia WSC is obtained from the Carrizo Aquifer. Polonia WSC is projected to need additional water supplies prior to 2050. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Polonia WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.3-18).

- Municipal Water Conservation
- Local Groundwater Supplies (Wilcox) to be implemented prior to 2050. This strategy can provide an additional 161 acft/yr by 2050, increasing to 323 acft/yr in 2060.

Table 4B.2.3-18.
Recommended Water Supply Plan for Polonia WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	66	265
Recommended Plan						
Local Groundwater Supplies (Wilcox)	—	—	—	—	161	323
Total New Supply	—	—	**—**	**—**	**161**	**323**

Estimated costs of the recommended plan to meet Polonia WSC's projected needs are shown in Table 4B.2.3-19.

Table 4B.2.3-19.
Recommended Plan Costs by Decade for Polonia WSC

Plan Element	2010	2020	2030	2040	2050	2060
Local Wilcox						
Annual Cost ($/yr)	—	—	—	—	$142,000	$284,000
Unit Cost ($/acft)	—	—	—	—	$880	$880

4B.2.3.10 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Carrizo Aquifer, Queen City Aquifer, and run-of-river rights to meet their projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected needs for rural areas (Table 4B.2.3-20).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 21 acft/yr by 2010, increasing to 29 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Facilities Expansions (System Interconnects)

Table 4B.2.3-20.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	21	37	36	31	28	29
Facilities Expansions	—	—	—	—	—	—
Total New Supply	**21**	**37**	**36**	**31**	**28**	**29**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.3-21.

Table 4B.2.3-21.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$16,475	$24,451	$22,357	$18,050	$15,873	$15,929
Unit Cost ($/acft)	$785	$661	$621	$582	$567	$549
Facilities Expansions						
Annual Cost ($/yr)	$1,644,000	$1,644,000	$111,000	$111,000	$111,000	$111,000
Unit Cost ($/acft)	—	—	—	—	—	—

In addition, the Tri-Community WSC in Rural Caldwell County is considering the addition of Local Groundwater Supplies (Carrizo) from a new well and interconnections with Maxwell WSC and/or City of Luling.

4B.2.3.11 Industrial

Industrial is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group's projected demands during the planning period.

4B.2.3.12 Steam-Electric Power

There is no projected steam-electric power water demand in Caldwell County, therefore no water management strategies are recommended for this water user group.

4B.2.3.13 Mining

Mining is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group's projected demands during the planning period.

4B.2.3.14 Irrigation

Irrigation is projected to have adequate water supplies available from the Carrizo Aquifer, Queen City Aquifer, and run-of-river rights to meet the water user group's projected demands during the planning period.

4B.2.3.9 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demands during the planning period.

4B.2.4 Calhoun County Water Supply Plan

Table 4B.2.4-1 lists each water user group in Calhoun County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.4-1.
Calhoun County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
Calhoun County WSC	1,064	868	No projected shortage
City of Point Comfort	-46	-489	Projected shortage (2010 through 2060)
City of Port Lavaca	2,711	2,135	No projected shortage
City of Seadrift	476	470	No projected shortage
Rural Area Residential and Commercial	4,222	4,220	No projected shortage
Industrial*	20,469	-1,985	Projected shortage (2060)
Steam-Electric Power	0	0	No projected shortage
Mining	6	0	No projected shortage
Irrigation	0	5,988	No projected shortage
Livestock	0	0	No projected shortage

These values represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages.

4B.2.4.1 Calhoun County WSC

Calhoun County WSC is projected to have adequate water supplies available from run-of-river rights of the Guadalupe-Blanco River Authority (GBRA) to meet the WSC's projected demands during the planning period.

4B.2.4.2 City of Point Comfort

Current water supply for the City of Point Comfort is obtained from Lake Texana. Point Comfort is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Point Comfort implement the following water supply plan to meet the projected needs for the city (Table 4B.2.4-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 18 acft/yr by 2010, increasing to 98 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (LNRA) to be implemented prior to 2010. This strategy can provide an additional 46 acft/yr by 2010, increasing to 499 acft/yr in 2040, and decreasing to 489 acft/yr in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 11 acft/yr by 2010.

Table 4B.2.4-2.
Recommended Water Supply Plan for the City of Point Comfort

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	46	145	322	499	489	489
Recommended Plan						
Municipal Water Conservation	18	34	55	78	84	98
Purchase from WWP (LNRA)	46	145	322	499	489	489
Drought Management	11	—	—	—	—	—
Total New Supply	**75**	**179**	**377**	**577**	**573**	**587**

Estimated costs of the recommended plan to meet the City of Point Comfort's projected needs are shown in Table 4B.2.4-3.

Table 4B.2.4-3.
Recommended Plan Costs by Decade for the City of Point Comfort

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$13,536	$24,111	$36,406	$47,601	$48,315	$55,877
Unit Cost ($/acft)	$752	$709	$662	$610	$575	$570
Purchase from WWP (LNRA)[1]						
Annual Cost ($/yr)	$32,246	$101,645	$181,286	$280,937	$48,900	$48,900
Unit Cost ($/acft)	$701	$701	$563	$563	$100	$100
Drought Management						
Annual Cost ($/yr)	$104	—	—	—	—	—
Unit Cost ($/acft)	$9	—	—	—	—	—

4B.2.4.3 City of Port Lavaca

The City of Port Lavaca is projected to have adequate water supplies available from run-of-river rights of the Guadalupe-Blanco River Authority (GBRA) to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Port Lavaca implement the following water supply plan (Table 4B.2.4-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 30 acft/yr by 2050, increasing to 89 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.4-4.
Recommended Water Supply Plan for the City of Port Lavaca

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	—	—	—	30	89
Total New Supply	—	—	—	—	**30**	**89**

Estimated costs of the recommended plan for the City of Port Lavaca are shown in Table 4B.2.4-5.

Table 4B.2.4-5.
Recommended Plan Costs by Decade for the City of Port Lavaca

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$22,725	$68,162
Unit Cost ($/acft)	—	—	—	—	$758	$766

4B.2.4.4 City of Seadrift

The City of Seadrift is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Seadrift implement the following water supply plan (Table 4B.2.4-6).

- Municipal Water Conservation to be implemented or enhanced in the future. This strategy can provide an additional 20 acft/yr by 2010, increasing to 41 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.4-6.
Recommended Water Supply Plan for the City of Seadrift

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	20	29	30	32	36	41
Total New Supply	**20**	**29**	**30**	**32**	**36**	**41**

Estimated costs of the recommended plan for the City of Seadrift are shown in Table 4B.2.4-7.

Table 4B.2.4-7.
Recommended Plan Costs by Decade for the City of Seadrift

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$15,284	$19,576	$19,242	$18,614	$20,369	$23,351
Unit Cost ($/acft)	$764	$675	$641	$582	$566	$570

4B.2.4.5 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Gulf Coast Aquifer and run-of-river rights of the Guadalupe-Blanco River Authority (GBRA) to meet their projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan for rural areas (Table 4B.2.4-8).

- Municipal Water Conservation to be implemented or enhanced in the future. This strategy can provide an additional 4 acft/yr by 2050, increasing to 11 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

An alternative water management strategy identified by GBRA for Rural Calhoun County is the Calhoun County Brackish Groundwater Project.

Table 4B.2.4-8.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	—	—	—	4	11
Total New Supply	—	—	—	—	**4**	**11**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.4-9.

Table 4B.2.4-9.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$3,079	$8,263
Unit Cost ($/acft)	—	—	—	—	$770	$751

4B.2.4.6 Industrial

Industrial is projected to have adequate water supplies available from the Gulf Coast Aquifer, Lake Texana, and run-of-river rights of the Guadalupe-Blanco River Authority (GBRA) to meet the water user group's projected demands during the planning period. The following water supply plan is recommended for Calhoun County Industrial.

- Purchase from WWP (LNRA) to be implemented by 2010. This strategy can provide an additional 10,000 acft/yr by 2010, continuing through 2060.

Table 4B.2.4-10.
Recommended Water Supply Plan for Industrial

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	2,021
Recommended Plan						
Purchase from WWP (LNRA)*	—	10,000	10,000	10,000	10,000	10,000
Total New Supply	—	**10,000**	**10,000**	**10,000**	**10,000**	**10,000**
** 10,000 acft/yr is for Formosa Plastics Corporation based on information provided by LNRA during an inter-regional coordination meeting held on April 8, 2009.*						

Estimated costs of the recommended plan for Industrial are shown in Table 4B.2.4-11.

Table 4B.2.4-11.
Recommended Plan Costs by Decade for Industrial

Plan Element	2010	2020	2030	2040	2050	2060
Purchase from WWP (LNRA)						
Annual Cost ($/yr)	—	$7,010,000	$5,630,000	$5,630,000	$1,000,000	$1,000,000
Unit Cost ($/acft)	—	$701	$563	$563	$100	$100

4B.2.4.7 Steam-Electric Power

Steam-electric power is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group's projected demands during the planning period.

4B.2.4.8 Mining

Mining is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group's projected demands during the planning period.

4B.2.4.9 Irrigation

Irrigation is projected to have adequate water supplies available from run-of-river rights to meet the water user group's projected demands during the planning period.

4B.2.4.10 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demands during the planning period.

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4B.2.5 Comal County Water Supply Plan

Table 4B.2.5-1 lists each water user group in Comal County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.5-1.
Comal County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
Bexar Metropolitan Water District			See Bexar County
City of Bulverde	-653	-4,595	Projected shortage (2010 through 2060)
Canyon Lake WSC	3,806	-6,769	Projected shortage (2030 through 2060)
Crystal Clear WSC			See Guadalupe County
Fair Oaks Ranch			See Bexar County
City of Garden Ridge	-257	-1052	Projected shortage (2010 through 2060)
Green Valley SUD			See Guadalupe County
City of New Braunfels	1,797	-13,920	Projected shortage (2020 through 2060)
City of Schertz			See Guadalupe County
City of Selma			See Bexar County
Water Service Inc.			See Bexar County
Rural Area Residential and Commercial*	-1,380	-2,742	Projected shortage (2010 through 2060)
Industrial*	-4,848	-8,672	Projected shortage (2010 through 2060)
Steam-Electric Power	0	0	No projected demand
Mining	-439	-1,173	Projected shortage (2010 through 2060)
Irrigation	807	892	No projected shortage
Livestock	0	0	No projected shortage

**These values represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages.*

4B.2.5.1 City of Bulverde

Current water supply for the City of Bulverde is obtained from Canyon Reservoir and Trinity Aquifer through Canyon Lake Water Service Company. City of Bulverde is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Bulverde implement the following water supply plan to meet the projected needs for the city (Table 4B.2.5-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 38 acft/yr by 2030, increasing to 430 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (TWA) through Canyon Lake WSC to be implemented prior to 2020. This strategy can provide an additional 653 acft/yr by 2010, increasing to 4,595 acft/yr in 2060.
- Purchase from WWP (GBRA) to be implemented prior to 2020. This strategy can provide an additional 653 acft/yr by 2010, increasing to 4,595 acft/yr in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 53 acft/yr by 2010.

Table 4B.2.5-2.
Recommended Water Supply Plan for the City of Bulverde

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	653	1,342	2,128	2,910	3,723	4,595
Recommended Plan						
Municipal Water Conservation	—	—	38	130	260	430
Purchase from WWP (TWA)	—	1,342	2,128	2,910	3,723	4,595
Purchase from WWP (GBRA)	653	1,342	2,128	2,910	3,723	4,595
Drought Management	53	—	—	—	—	—
Total New Supply	**1,359**	**2,684**	**4,294**	**5,950**	**7,706**	**9,620**

Estimated costs of the recommended plan to meet the City of Bulverde's projected needs are shown in Table 4B.2.5-3.

Table 4B.2.5-3.
Recommended Plan Costs by Decade for the City of Bulverde

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	$25,608	$88,450	$176,820	$293,074
Unit Cost ($/acft)	—	—	$674	$680	$680	$682
Purchase from WWP (TWA)						
Annual Cost ($/yr)	—	$2,043,866	$3,240,944	$1,489,920	$1,906,176	$2,352,640
Unit Cost ($/acft)	—	$1,523	$1,523	$512	$512	$512
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	$638,438	$1,312,073	$2,080,546	$2,845,107	$4,813,839	$5,941,335
Unit Cost ($/acft)	$978	$978	$978	$978	$1,293	$1,293
Drought Management						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—

4B.2.5.2 Canyon Lake WSC

Current water supply for Canyon Lake WSC is obtained from Canyon Reservoir and the Trinity Aquifer. Canyon Lake WSC is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Canyon Lake WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.5-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 96 acft/yr by 2020, increasing to 1,414 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (GBRA) to be implemented prior to 2010. This strategy can provide an additional 129 acft/yr by 2030, increasing to 6,769 acft/yr in 2060.
- Drought Management to be implemented or enhanced in the immediate future.
- Purchase from WWP (TWA) to be implemented prior to 2030. This strategy can provide an additional 3,000 acft/yr by 2030, increasing to 12,000 acft/yr in 2060.

Table 4B.2.5-4.
Recommended Water Supply Plan for Canyon Lake WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	129	2,198	4,466	6,769
Recommended Plan						
Municipal Water Conservation	—	96	254	543	929	1,414
Purchase from WWP (GBRA)	—	—	129	2,198	4,466	6,769
Drought Management[1]	—	—	—	—	—	—
Purchase from WWP (TWA)	—	—	3,000	6,000	9,000	12,000
Total New Supply	—	**96**	**3,383**	**8,741**	**14,395**	**20,183**

[1]Historical per capita water use data unavailable or insufficient for calculation of yield.

Estimated costs of the recommended plan to meet Canyon Lake WSC's projected needs are shown in Table 4B.2.5-5.

Table 4B.2.5-5.
Recommended Plan Costs by Decade for Canyon Lake WSC

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	—	$74,261	$195,883	$418,001	$715,563	$1,063,887
Unit Cost ($/acft)	—	$774	$771	$770	$770	$752
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	—	—	$179,236	$1,118,753	$2,273,134	$2,656,607
Unit Cost ($/acft)	—	—	$1,389	$509	$509	$392
Drought Management[1]						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
Purchase from WWP (TWA)						
Annual Cost ($/yr)	—	—	$4,569,000	$9,138,000	$4,608,000	$6,144,000
Unit Cost ($/acft)	—	—	$1,523	$1,523	$512	$512

[1]Historical per capita water use data unavailable or insufficient for calculation of annual cost and unit cost.

4B.2.5.3 City of Garden Ridge

Current water supply for the City of Garden Ridge is obtained from the Edwards Aquifer. Garden Ridge is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Garden Ridge implement the following water supply plan to meet the projected needs for the city (Table 4B.2.5-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 42 acft/yr by 2010, increasing to 460 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (SSLGC) to be implemented prior to 2010. This strategy can provide an additional 257acft/yr by 2010, increasing to 1,052 acft/yr in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 28 acft/yr by 2010.

An alternative water management strategy for the City of Garden Ridge, if groundwater permits from Gonzales County are unable to be obtained, is Purchase from WWP (CRWA).

Table 4B.2.5-6.
Recommended Water Supply Plan for the City of Garden Ridge

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)*	257	395	552	710	873	1,052
Recommended Plan						
Municipal Water Conservation	42	103	187	294	379	460
Purchase from WWP (SSLGC)	257	395	552	710	873	1,052
Drought Management	28	—	—	—	—	—
Total New Supply	**327**	**498**	**739**	**1,004**	**1,252**	**1,512**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet the City of Garden Ridge's projected needs are shown in Table 4B.2.5-7.

Table 4B.2.5-7.
Recommended Plan Costs by Decade for the City of Garden Ridge

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$27,442	$58,811	$101,682	$157,724	$202,378	$245,216
Unit Cost ($/acft)	$653	$571	$544	$536	$534	$533
Purchase from WWP (SSLGC)						
Annual Cost ($/yr)	$127,215	$224,360	$378,272	$345,495	$317,912	$383,097
Unit Cost ($/acft)	$495	$568	$685	$487	$364	$364
Drought Management						
Annual Cost ($/yr)	$11,631	—	—	—	—	—
Unit Cost ($/acft)	$415	—	—	—	—	—

4B.2.5.4 City of New Braunfels

Current water supply for the City of New Braunfels is obtained from the Edwards Aquifer, Canyon Reservoir, and run-of-river rights. New Braunfels is projected to need additional water supplies prior to 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that New Braunfels implement the following water supply plan to meet the projected needs for the city (Table 4B.2.5-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 815 acft/yr by 2010, increasing to 8,152 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 525 acft/yr by 2010.
- Purchase from WWP (GBRA) to be implemented prior to 2010. This strategy can provide an additional 907 acft/yr by 2020, increasing to 13,920 acft/yr in 2060.

Table 4B.2.5-8.
Recommended Water Supply Plan for the City of New Braunfels

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	0	907	4,044	7,151	10,361	13,920
Recommended Plan						
Municipal Water Conservation	815	1,965	3,632	5,433	6,650	8,152
Drought Management	525	—	—	—	—	—
Purchase from WWP (GBRA)	—	907	4,044	7,151	10,361	13,920
Total New Supply	**1,340**	**2,872**	**7,676**	**12,584**	**17,011**	**22,072**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet the City of New Braunfels' projected needs are shown in Table 4B.2.5-9.

Table 4B.2.5-9.
Recommended Plan Costs by Decade for the City of New Braunfels

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$542,429	$1,135,506	$2,009,283	$2,957,523	$3,595,588	$4,400,341
Unit Cost ($/acft)	$666	$578	$553	$544	$541	$540
Drought Management						
Annual Cost ($/yr)	$175,878	—	—	—	—	—
Unit Cost ($/acft)	$335	—	—	—	—	—
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	—	$1,260,210	$5,618,841	$3,639,764	$5,273,611	$5,463,136
Unit Cost ($/acft)	—	$1,389	$1,389	$509	$509	$392

4B.2.5.5 Rural Area Residential and Commercial

Current water supply for Rural Areas is obtained from the Edwards Aquifer, Trinity Aquifer, Canyon Reservoir, and run-of-river rights. Rural Areas are projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected needs for rural areas (Table 4B.2.5-10).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 85 acft/yr in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (GBRA) to be implemented prior to 2010. This strategy can provide an additional 891acft/yr by 2010, increasing to 1,480 acft/yr in 2060.
- Purchase from NBU (term) to be implemented prior to 2010. This strategy can provide an additional 891acft/yr by 2010.
- Purchase from WWP (TWA) to be implemented prior to 2020. This strategy can provide an additional 986 acft/yr by 2010, increasing to 1,480 acft/yr in 2060.

Table 4B.2.5-10.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	1,782	1,972	2,178	2,362	2,665	2,960
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	85
Purchase from WWP (GBRA)	891	986	1,089	1,181	1,333	1,480
Purchase water from NBU (term)	891	—	—	—	—	—
Purchase from WWP (TWA)	—	986	1,089	1,181	1,333	1,480
Total New Supply	**1,782**	**1,972**	**2,178**	**2,362**	**2,666**	**3,045**

Estimated costs of the recommended plan to meet the projected needs of rural areas are shown in Table 4B.2.5-11.

Table 4B.2.5-11.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$65,700
Unit Cost ($/acft)	—	—	—	—	—	$773
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	$871,131	$964,012	$1,064,715	$1,154,664	$1,723,569	$1,913,640
Unit Cost ($/acft)	$978	$978	$978	$978	$1,293	$1,293
Purchase water from NBU (term)						
Annual Cost ($/yr)	$708,345	—	—	—	—	—
Unit Cost ($/acft)	$795	—	—	—	—	—
Purchase from WWP (TWA)						
Annual Cost ($/yr)	—	$1,501,678	$1,658,547	$604,672	$682,496	$757,760
Unit Cost ($/acft)	—	$1,523	$1,523	$512	$512	$512

4B.2.5.6 Industrial

Current water supply for industrial is obtained from the Edwards Aquifer, Canyon Reservoir, and run-of-river rights. Industrial is projected to need additional water supplies prior to the year 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that individual industrial operations implement the following water supply plan to meet the projected needs for industrial (Table 4B.2.5-12).

- Recycled water is to be implemented prior to 2010. This strategy can provide an additional 5,199 acft/yr of supply in 2010, increasing to 9,022 acft/yr of additional supply in 2060, capable of meeting the entire needs.
- Purchase from WWP (GBRA) is to be implemented prior to 2010. This strategy can provide an additional 5,199 acft/yr of supply in 2010, increasing to 9,022 acft/yr of additional supply in 2060.

Table 4B.2.5-12.
Recommended Water Supply Plan for Industrial

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	5,199	6,033	6,784	7,514	8,141	9,022
Recommended Plan						
Recycled Water	5,199	6,033	6,784	7,514	8,141	9,022
Purchase from WWP (GBRA)	5,199	6,033	6,784	7,514	8,141	9,022
Total New Supply	**10,298**	**12,066**	**13,568**	**15,028**	**16,282**	**18,044**

Estimated costs of the recommended plan to meet the industrial projected needs are shown in Table 4B.2.5-13.

Table 4B.2.5-13.
Recommended Plan Costs by Decade for Industrial

Plan Element	2010	2020	2030	2040	2050	2060
Recycled Water						
Annual Cost ($/yr)	$3,015,420	$3,499,140	$664,832	$736,372	$797,818	$884,156
Unit Cost ($/acft)	$580	$580	$98	$98	$98	$98
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	$5,083,062	$5,898,464	$6,632,717	$7,346,438	$10,526,313	$11,665,446
Unit Cost ($/acft)	$978	$978	$978	$978	$1,293	$1,293

4B.2.5.7 Steam-Electric Power

There is no projected steam-electric power water demand in Comal County, therefore no water management strategies are recommended for this water user group.

4B.2.5.8 Mining

Current water supply for mining is obtained from the Trinity Aquifer. Mining is projected to need additional water supplies in the planning year 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that individual mining operations implement the following water supply plan to meet the projected needs for mining (Table 4B.2.5-14).

- Mining water conservation to be implemented prior to 2010.

Table 4B.2.5-14.
Recommended Water Supply Plan for Mining

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	439	635	753	870	1,068	1,173
Recommended Plan						
Mining Water Conservation	439	635	753	870	1,068	1,173
Total New Supply	**439**	**635**	**753**	**870**	**1,068**	**1,173**

Estimated costs of the recommended plan to meet the mining projected needs are shown in Table 4B.2.5-15.

Table 4B.2.5-15.
Recommended Plan Costs by Decade for Mining

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Mining Water Conservation*						
Annual Cost ($/yr)	N/A	N/A	N/A	N/A	N/A	N/A
Unit Cost ($/acft)	N/A	N/A	N/A	N/A	N/A	N/A
**Costs not available due to lack of relevant data.*						

4B.2.5.9 Irrigation

Irrigation is projected to have adequate water supplies available from the Edwards Aquifer, Canyon Reservoir, and run-of-river rights to meet the water user group's projected demand during the planning period.

4B.2.5.10 Livestock

Current water supply for livestock is obtained from the Trinity Aquifer and local sources. Livestock is projected to have adequate water supplies through 2060.

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4B.2.6 DeWitt County Water Supply Plan

Table 4B.2.6-1 lists each water user group in DeWitt County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.6-1.
DeWitt County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage		Comment
	2010 (acft/yr)	2060 (acft/yr)	
City of Cuero	3,827	3,899	No projected shortage
Gonzales County WSC			See Gonzales County
City of Yoakum	1,148	1,172	No projected shortage
City of Yorktown	806	831	No projected shortage
Rural Area Residential and Commercial	263	364	No projected shortage
Industrial	76	6	No projected shortage
Steam-Electric Power	0	0	No projected demand
Mining	7	0	No projected shortage
Irrigation	0	105	No projected shortage
Livestock	0	0	No projected shortage

4B.2.6.1 City of Cuero

The City of Cuero is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the city’s projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Cuero implement the following water supply plan (Table 4B.2.6-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 99 acft/yr by 2010, increasing to 218 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.6-2.
Recommended Water Supply Plan for the City of Cuero

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	99	181	187	190	197	218
Total New Supply	**99**	**181**	**187**	**190**	**197**	**218**

Estimated costs of the recommended plan for the City of Cuero are shown in Table 4B.2.6-3.

Table 4B.2.6-3.
Recommended Plan Costs by Decade for the City of Cuero

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$76,250	$117,473	$115,153	$111,355	$111,074	$121,828
Unit Cost ($/acft)	$770	$649	$616	$586	$564	$559

4B.2.6.2 City of Yoakum

The City of Yoakum is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the city’s projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Yoakum implement the following water supply plan (Table 4B.2.6-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 14 acft/yr by 2010, increasing to 27 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.6-4.
Recommended Water Supply Plan for the City of Yoakum

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	14	16	17	18	20	27
Total New Supply	**14**	**16**	**17**	**18**	**20**	**27**

Estimated costs of the recommended plan for the City of Yoakum are shown in Table 4B.2.6-5.

Table 4B.2.6-5.
Recommended Plan Costs by Decade for the City of Yoakum

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	$10,915	$11,989	$12,800	$13,132	$13,016	$16,667
Unit Cost ($/acft)	$780	$749	$753	$730	$651	$617

4B.2.6.3 City of Yorktown

The City of Yorktown is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Yorktown implement the following water supply plan (Table 4B.2.6-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 2 acft/yr by 2020, increasing to 13 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.6-6.
Recommended Water Supply Plan for the City of Yorktown

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	2	2	2	5	13
Total New Supply	—	**2**	**2**	**2**	**5**	**13**

Estimated costs of the recommended plan for the City of Yorktown are shown in Table 4B.2.6-7.

Table 4B.2.6-7.
Recommended Plan Costs by Decade for the City of Yorktown

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	$1,215	$1,594	$1,801	$3,871	$9,753
Unit Cost ($/acft)	—	$608	$797	$901	$774	$750

4B.2.6.4 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Gulf Coast Aquifer to meet their projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan for rural areas (Table 4B.2.6-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 6 acft/yr in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.6-8.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	6
Total New Supply	—	—	—	—	—	**6**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.6-9.

Table 4B.2.6-9.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$4,961
Unit Cost ($/acft)	—	—	—	—	—	$827

4B.2.6.5 Industrial

Industrial is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group’s projected demand during the planning period.

4B.2.6.6 Steam-Electric Power

There is no projected steam-electric power water demand in DeWitt County, therefore no water management strategies are recommended for this water user group.

4B.2.6.7 Mining

Mining is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group's projected demand during the planning period.

4B.2.6.8 Irrigation

Irrigation is projected to have adequate water supplies available from the Gulf Coast Aquifer and run-of-river rights to meet the water user group's projected demand during the planning period.

4B.2.6.9 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demand during the planning period.

4B.2.7 Dimmit County Water Supply Plan

Table 4B.2.7-1 lists each water user group in Dimmit County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.7-1.
Dimmit County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
City of Asherton	327	334	No projected shortage
City of Big Wells	502	506	No projected shortage
City of Carrizo Springs	368	374	No projected shortage
Rural Area Residential and Commercial	59	80	No projected shortage
Industrial	0	0	No projected demand
Steam-Electric Power	0	0	No projected demand
Mining	92	0	No projected shortage
Irrigation	0	1,624	No projected shortage
Livestock	0	0	No projected shortage

4B.2.7.1 City of Asherton

The City of Asherton is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Asherton implement the following water supply plan (Table 4B.2.7-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 20 acft/yr by 2010, increasing to 64 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.7-2.
Recommended Water Supply Plan for the City of Asherton

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	20	43	58	59	62	64
Total New Supply	**20**	**43**	**58**	**59**	**62**	**64**

Estimated costs of the recommended plan for the City of Asherton are shown in Table 4B.2.7-3.

Table 4B.2.7-3.
Recommended Plan Costs by Decade for the City of Asherton

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$15,404	$26,899	$33,391	$32,594	$33,605	$34,805
Unit Cost ($/acft)	$770	$626	$576	$552	$542	$544

4B.2.7.2 City of Big Wells

The City of Big Wells is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city’s projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Big Wells implement the following water supply plan (Table 4B.2.7-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 11 acft/yr by 2010, increasing to 33 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.7-4.
Recommended Water Supply Plan for the City of Big Wells

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	11	23	30	30	32	33
Total New Supply	**11**	**23**	**30**	**30**	**32**	**33**

Estimated costs of the recommended plan for the City of Big Wells are shown in Table 4B.2.7-5.

Table 4B.2.7-5.
Recommended Plan Costs by Decade for the City of Big Wells

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$8,603	$14,638	$17,438	$17,012	$17,547	$18,185
Unit Cost ($/acft)	$782	$636	$581	$567	$548	$551

4B.2.7.3 City of Carrizo Springs

The City of Carrizo Springs is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Carrizo Springs implement the following water supply plan (Table 4B.2.7-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 152 acft/yr by 2010, increasing to 777 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.7-6.
Recommended Water Supply Plan for the City of Carrizo Springs

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	152	312	464	590	700	777
Total New Supply	**152**	**312**	**464**	**590**	**700**	**777**

Estimated costs of the recommended plan for the City of Carrizo Springs are shown in Table 4B.2.7-7.

Table 4B.2.7-7.
Recommended Plan Costs by Decade for the City of Carrizo Springs

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$102,816	$183,308	$257,908	$318,509	$374,006	$414,285
Unit Cost ($/acft)	$676	$588	$556	$540	$534	$533

4B.2.7.4 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Carrizo Aquifer to meet their projected demands during the planning period.

4B.2.7.5 Industrial

There is no projected industrial water demand in Dimmit County, therefore no water management strategies are recommended for this water user group.

4B.2.7.6 Steam-Electric Power

There is no projected steam-electric power water demand in Dimmit County, therefore no water management strategies are recommended for this water user group.

4B.2.7.7 Mining

Mining is projected to have adequate water supplies available from the Carrizo Aquifer and run-of-river rights to meet the water user group's projected demand during the planning period.

4B.2.7.8 Irrigation

Irrigation is projected to have adequate water supplies available from the Carrizo Aquifer and run-of-river rights to meet the water user group's projected demand during the planning period.

4B.2.7.9 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demand during the planning period.

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4B.2.8 Frio County Water Supply Plan

Table 4B.2.8-1 lists each water user group in Frio County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.8-1.
Frio County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
Benton City WSC			See Atascosa County
City of Dilley	878	282	No projected shortage
City of Pearsall	1,288	1,282	No projected shortage
Rural Area Residential and Commercial	293	13	No projected shortage
Industrial	0	0	No projected demand
Steam-Electric Power	0	198	No projected shortage
Mining	30	43	No projected shortage
Irrigation	35,081	48,506	No projected shortage
Livestock	0	0	No projected shortage

4B.2.8.1 City of Dilley

The City of Dilley is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Dilley implement the following water supply plan (Table 4B.2.8-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 104 acft/yr by 2010, increasing to 772 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.8-2.
Recommended Water Supply Plan for the City of Dilley

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	104	229	362	511	652	772
Total New Supply	**104**	**229**	**362**	**511**	**652**	**772**

Estimated costs of the recommended plan for the City of Dilley are shown in Table 4B.2.8-3.

Table 4B.2.8-3.
Recommended Plan Costs by Decade for the City of Dilley

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$72,733	$136,570	$203,925	$281,326	$354,219	$417,515
Unit Cost ($/acft)	$699	$596	$563	$551	$543	$541

4B.2.8.2 City of Pearsall

The City of Pearsall is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Pearsall implement the following water supply plan (Table 4B.2.8-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 116 acft/yr by 2010, increasing to 324 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.8-4.
Recommended Water Supply Plan for the City of Pearsall

	2010 (acft/yr)	**2020 (acft/yr)**	**2030 (acft/yr)**	**2040 (acft/yr)**	**2050 (acft/yr)**	**2060 (acft/yr)**
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	116	223	272	271	294	324
Total New Supply	**116**	**223**	**272**	**271**	**294**	**324**

Estimated costs of the recommended plan for the City of Pearsall are shown in Table 4B.2.8-5.

Table 4B.2.8-5.
Recommended Plan Costs by Decade for the City of Pearsall

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	$78,787	$132,441	$154,632	$148,799	$159,650	$175,453
Unit Cost ($/acft)	$679	$594	$569	$549	$543	$542

4B.2.8.3 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Carrizo Aquifer to meet their projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan for rural areas (Table 4B.2.8-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 18 acft/yr in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.8-6.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	18
Total New Supply	—	—	—	—	—	**18**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.8-7.

Table 4B.2.8-7.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$13,845
Unit Cost ($/acft)	—	—	—	—	—	$769

4B.2.8.4 Industrial

There is no projected industrial water demand in Frio County, therefore no water management strategies are recommended for this water user group.

4B.2.8.5 Steam-Electric Power

Steam-electric power is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group’s projected demand during the planning period.

4B.2.8.6 Mining

Mining is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group’s projected demand during the planning period.

4B.2.8.7 Irrigation

Irrigation is projected to have adequate water supplies available from the Carrizo Aquifer, Queen City Aquifer, Sparta Aquifer, and run-of-river rights to meet the water user group’s projected demand during the planning period.

4B.2.8.8 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demand during the planning period.

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4B.2.9 Goliad County Water Supply Plan

Table 4B.2.9-1 lists each water user group in Goliad County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.9-1.
Goliad County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage		Comment
	2010 (acft/yr)	2060 (acft/yr)	
City of Goliad	527	364	No projected shortage
Rural Area Residential and Commercial	368	134	No projected shortage
Industrial	20	0	No projected shortage
Steam-Electric Power	7,676	2,060	No projected shortage
Mining	0	0	No projected shortage
Irrigation	3,985	4,170	No projected shortage
Livestock	-3	0	Projected shortage (2010 through 2020)

4B.2.9.1 City of Goliad

The City of Goliad is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Goliad implement the following water supply plan (Table 4B.2.9-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 30 acft/yr by 2010, increasing to 100 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.9-2.
Recommended Water Supply Plan for the City of Goliad

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	30	59	67	73	85	100
Total New Supply	**30**	**59**	**67**	**73**	**85**	**100**

Estimated costs of the recommended plan for the City of Goliad are shown in Table 4B.2.9-3.

Table 4B.2.9-3.
Recommended Plan Costs by Decade for the City of Goliad

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$23,424	$38,872	$41,790	$42,695	$48,426	$56,450
Unit Cost ($/acft)	$781	$659	$624	$585	$570	$565

4B.2.9.2 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Gulf Coast Aquifer to meet their projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan for rural areas (Table 4B.2.9-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 16 acft/yr in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.9-4.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	16
Total New Supply	—	—	—	—	—	**16**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.9-5.

Table 4B.2.9-5.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$12,663
Unit Cost ($/acft)	—	—	—	—	—	$791

4B.2.9.3 Industrial

Industrial is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group's projected demand during the planning period.

4B.2.9.4 Steam-Electric Power

Current water supply for steam-electric power is obtained from the Gulf Coast Aquifer and Coleto Creek Reservoir. Steam-electric power is projected to have adequate supplies through 2060.

4B.2.9.5 Mining

Mining is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group's projected demand during the planning period.

4B.2.9.6 Irrigation

Irrigation is projected to have adequate water supplies available from the Gulf Coast Aquifer and run-of-river rights to meet the water user group's projected demand during the planning period.

4B.2.9.7 Livestock

Livestock obtains its water supply from local sources. Shortages of 3 acft/yr and 1 acft/yr are projected for years 2010 and 2020, respectively. Livestock Water Conservation is recommended to meet this transient need. However, a cost estimate is not available due to lack of relevant data.

4B.2.10 Gonzales County Water Supply Plan

Table 4B.2.10-1 lists each water user group in Gonzales County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.10-1.
Gonzales County Management Supply/Shortage by Water User Group

	Management Supply/Shortage		
Water User Group	2010 (acft/yr)	2060 (acft/yr)	Comment
City of Gonzales	1,040	826	No projected shortage
Gonzales County WSC	745	133	No projected shortage
City of Nixon	2,282	2,232	No projected shortage
City of Waelder	444	395	No projected shortage
Rural Area Residential and Commercial	179	368	No projected shortage
Industrial	1,135	133	No projected shortage
Steam-Electric Power	0	0	No projected demand
Mining	6	10	No projected shortage
Irrigation	2,118	2,801	No projected shortage
Livestock	72	72	No projected shortage

4B.2.10.1 City of Gonzales

The City of Gonzales is projected to have adequate water supplies available from the Carrizo Aquifer and run-of-river rights to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Gonzales implement the following water supply plan (Table 4B.2.10-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 116 acft/yr by 2010, increasing to 414 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.10-2.
Recommended Water Supply Plan for the City of Gonzales

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	116	245	325	353	381	414
Total New Supply	**116**	**245**	**325**	**353**	**381**	**414**

Estimated costs of the recommended plan for the City of Gonzales are shown in Table 4B.2.10-3.

Table 4B.2.10-3.
Recommended Plan Costs by Decade for the City of Gonzales

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	$89,431	$154,089	$190,182	$200,317	$212,805	$229,940
Unit Cost ($/acft)	$771	$629	$585	$567	$559	$555

4B.2.10.2 Gonzales County WSC

Current water supply for Gonzales County WSC is obtained from the Carrizo Aquifer and Canyon Reservoir. Gonzales County WSC is projected to have adequate water supplies through 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Gonzales County WSC implement the following water supply plan (Table 4B.2.10-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 143 acft/yr by 2010, increasing to 1,002 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (TWA) to be implemented by 2020. This strategy can provide an additional 500 acft/yr by 2020 through 2060.
- Facilities Expansions (System Interconnects)

Table 4B.2.10-4.
Recommended Water Supply Plan for Gonzales County WSC

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	143	312	505	693	858	1,002
Purchase from WWP (TWA)	—	500	500	500	500	500
Total New Supply	**143**	**812**	**1,005**	**1,193**	**1,358**	**1,502**

Estimated costs of the recommended plan for Gonzales County WSC are shown in Table 4B.2.10-5.

Table 4B.2.10-5.
Recommended Plan Costs by Decade for Gonzales County WSC

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$97,959	$182,594	$281,442	$376,878	$461,395	$536,658
Unit Cost ($/acft)	$685	$585	$557	$544	$538	$536
Purchase from WWP (TWA)						
Annual Cost ($/yr)	—	$761,500	$761,500	$256,000	$256,000	$256,000
Unit Cost ($/acft)	—	$1,523	$1,523	$512	$512	$512

4B.2.10.3 City of Nixon

The City of Nixon is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Nixon implement the following water supply plan (Table 4B.2.10-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 35 acft/yr by 2010, increasing to 93 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.10-6.
Recommended Water Supply Plan for the City of Nixon

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	35	64	72	75	83	93
Total New Supply	**35**	**64**	**72**	**75**	**83**	**93**

Estimated costs of the recommended plan for the City of Nixon are shown in Table 4B.2.10-7.

Table 4B.2.10-7.
Recommended Plan Costs by Decade for the City of Nixon

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$26,707	$41,079	$44,133	$44,084	$47,526	$52,622
Unit Cost ($/acft)	$763	$642	$613	$588	$573	$566

4B.2.10.4 City of Waelder

The City of Waelder is projected to have adequate water supplies available from the Queen City Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Waelder implement the following water supply plan (Table 4B.2.10-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 3 acft/yr by 2040, increasing to 11 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.10-8.
Recommended Water Supply Plan for the City of Waelder

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	—	—	3	7	11
Total New Supply	**—**	**—**	**—**	**3**	**7**	**11**

Estimated costs of the recommended plan for the City of Waelder are shown in Table 4B.2.10-9.

Table 4B.2.10-9.
Recommended Plan Costs by Decade for the City of Waelder

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	$2,582	$5,110	$8,815
Unit Cost ($/acft)	—	—	—	$861	$730	$801

4B.2.10.5 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Carrizo Aquifer to meet their projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan for rural areas (Table 4B.2.10-10).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 6 acft/yr by 2010, decreasing to 3 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.10-10.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	6	7	5	—	—	3
Total New Supply	**6**	**7**	**5**	—	—	**3**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.10-11.

Table 4B.2.10-11.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$4,791	$5,521	$3,910	—	—	$2,398
Unit Cost ($/acft)	$799	$789	$782	—	—	$799

4B.2.10.6 Industrial

Industrial is projected to have adequate water supplies available from the Carrizo Aquifer and Sparta Aquifer to meet the water user group's projected demand during the planning period.

4B.2.10.7 Steam-Electric Power

There is no projected steam-electric power water demand in Gonzales County, therefore no water management strategies are recommended for this water user group.

4B.2.10.8 Mining

Mining is projected to have adequate water supplies available from the Carrizo Aquifer, Sparta Aquifer, and Queen City Aquifer to meet the water user group's projected demand during the planning period.

4B.2.10.9 Irrigation

Irrigation is projected to have adequate water supplies available from the Carrizo Aquifer, Sparta Aquifer, Queen City Aquifer, Gulf Coast Aquifer, Canyon Reservoir, and run-of-river rights to meet the water user group's projected demand during the planning period.

4B.2.10.10 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demand during the planning period.

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4B.2.11 Guadalupe County Water Supply Plan

Table 4B.2.11-1 lists each water user group in Guadalupe County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.11-1.
Guadalupe County Management Supply/Shortage by Water User Group

Water User Group	*Management Supply/Shortage* 2010 (acft/yr)	*Management Supply/Shortage* 2060 (acft/yr)	*Comment*
City of Cibolo	484	120	No projected shortage
Crystal Clear WSC	794	-2,716	Projected shortage (2030 through 2060)
East Central SUD			See Bexar County
Green Valley SUD	750	-547	Projected shortage (2060)
City of Marion	12	-75	Projected shortage (2020 through 2060)
Martindale WSC			See Caldwell County
City of New Berlin	0	0	No projected shortage
City of New Braunfels			See Comal County
Santa Clara	-76	-810	Projected shortage (2010 through 2060)
City of Schertz*	5,488	-2,420	Projected shortage (2050 through 2060)
City of Seguin	4,647	618	No projected shortage
City of Selma			See Bexar County
Springs Hill WSC	2,501	520	No projected shortage
Water Service Inc.			See Bexar County
Rural Area Residential and Commercial	179	436	No projected shortage
Industrial	1,460	1	No projected shortage
Steam-Electric Power	4,292	1,565	No projected shortage
Mining	47	0	No projected shortage
Irrigation	597	962	No projected shortage
Livestock	0	0	No projected shortage

**These values represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages.*

4B.2.11.1 City of Cibolo

Current water supply for the City of Cibolo is obtained from Canyon Reservoir through CRWA. Cibolo is projected to have adequate water supply through 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Cibolo implement the following water supply plan (Table 4B.2.11-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 65 acft/yr by 2010, increasing to 645 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (CRWA) to be implemented prior to 2010. This strategy can provide an additional 700 acft/yr in 2010, increasing to 7,180 acft/yr in 2060.
- Purchase from WWP (BMWD) to be implemented prior to 2010. This strategy can provide an additional 500 acft/yr in 2010 through 2060.

Table 4B.2.11-2.
Recommended Water Supply Plan for the City of Cibolo

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)*	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	65	176	281	374	499	645
Purchase from WWP (CRWA)	700	980	6,180	6,680	7,180	7,180
Purchase from WWP (BMWD)	500	500	500	500	500	500
Total New Supply	**1,265**	**1,656**	**6,961**	**7,554**	**8,179**	**8,325**
** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*						

Estimated costs of the recommended plan for the City of Cibolo are shown in Table 4B.2.11-3.

Table 4B.2.11-3.
Recommended Plan Costs by Decade for the City of Cibolo

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$44,008	$104,545	$161,586	$212,045	$280,697	$361,068
Unit Cost ($/acft)	$677	$594	$575	$567	$563	$560
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	$507,500	$1,077,690	$6,600,155	$4,765,178	$3,217,972	$3,105,369
Unit Cost ($/acft)	$725	$1,100	$1,068	$713	$448	$433
Purchase from WWP (BMWD)						
Annual Cost ($/yr)	$527,060	$522,922	$289,067	$232,987	$193,661	$193,444
Unit Cost ($/acft)	$1,054	$1,046	$578	$466	$387	$387

4B.2.11.2 Crystal Clear WSC

Current water supply for Crystal Clear WSC is obtained from the Edwards Aquifer, Canyon Reservoir, and run-of-river rights. Crystal Clear WSC is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Crystal Clear WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.11-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 41 acft/yr by 2050, increasing to 184 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Wilcox) to be implemented prior to 2030. This strategy can provide an additional 605 acft/yr by 2030, increasing to 2,823 acft/yr of supply by 2060.
- Purchase from WWP (CRWA) to be implemented prior to 2010. This strategy can provide an additional 1,300 acft/yr by 2010, increasing to 5,185 by 2060.
- Purchase from WWP (SSLGC) to be implemented prior to 2020. This strategy can provide an additional 300 acft/yr by 2020, increasing to 900 acft/yr of supply in 2040, continuing through 2060.

Alternative water management strategies identified by Crystal Clear WSC include Local Groundwater Supplies (Trinity), Brackish Edwards, and/or Purchase from WWP (GBRA).

Project Table 4B.2.11-4.
Recommended Water Supply Plan for Crystal Clear WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	0	0	509	1,138	1,926	2,716
Recommended Plan						
Municipal Water Conservation	—	—	—	—	41	184
Local Groundwater Supplies (Wilcox)	—	—	605	1,210	2,016	2,823
Purchase from WWP (CRWA)	1,300	2,595	2,595	2,595	5,185	5,185
Purchase from WWP (SSLGC)	—	300	600	900	900	900
Total New Supply	**1,300**	**2,895**	**3,800**	**4,705**	**8,142**	**9,092**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet Crystal Clear WSC's projected needs are shown in Table 4B.2.11-5.

Table 4B.2.11-5.
Recommended Plan Costs by Decade for Crystal Clear WSC

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$31,476	$141,432
Unit Cost ($/acft)	—	—	—	—	$768	$769
Local Groundwater Supplies (Wilcox)						
Annual Cost ($/yr)	—	—	$863,357	$1,726,714	$2,247,248	$2,767,782
Unit Cost ($/acft)	—	—	$1,427	$1,427	$1,114	$980
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	$942,500	$2,853,679	$2,771,424	$1,851,143	$2,323,842	$2,242,526
Unit Cost ($/acft)	$725	$1,100	$1,068	$713	$448	$433
Purchase from WWP (SSLGC)						
Annual Cost ($/yr)	—	$170,400	$411,166	$437,952	$327,745	$327,745
Unit Cost ($/acft)	—	$568	$685	$487	$364	$364

4B.2.11.3 Green Valley SUD

Current water supply for Green Valley SUD is obtained from the Edwards Aquifer and Canyon Reservoir. Green Valley SUD is projected to need additional water supplies prior to 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Green Valley SUD implement the following water supply plan to meet the projected needs for the SUD (Table 4B.2.11-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 20 acft/yr in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (CRWA) to be implemented prior to 2010. This strategy can provide an additional 700 acft/yr by 2010, increasing to 9,500 acft/yr of supply in 2060.
- Purchase from NBU to be implemented by 2010 and can provide an additional 552 acft/yr through 2060.

Alternative water management strategies identified by Green Valley SUD include Local Groundwater Supplies (Trinity) and/or Purchase from WWP (GBRA).

Table 4B.2.11-6.
Recommended Water Supply Plan for Green Valley SUD

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)*	0	0	0	0	0	640
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	20
Purchase from WWP (CRWA)	700	1,800	7,500	8,000	9,000	9,500
Purchase water from NBU	552	552	552	552	552	552
Total New Supply	**1,252**	**2,352**	**8,052**	**8,552**	**9,552**	**10,072**
** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*						

Estimated costs of the recommended plan to meet Green Valley SUD's projected need are shown in Table 4B.2.11-7.

Table 4B.2.11-7.
Recommended Plan Costs by Decade for Green Valley SUD

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$15,704
Unit Cost ($/acft)	—	—	—	—	—	$785
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	$507,500	$1,979,430	$8,009,897	$5,706,800	$4,033,669	$4,108,775
Unit Cost ($/acft)	$725	$1,100	$1,068	$713	$448	$433
Purchase from NBU						
Annual Cost ($/yr)	$438,840	$438,840	$438,840	$438,840	$438,840	$438,840
Unit Cost ($/acft)	$795	$795	$795	$795	$795	$795

4B.2.11.4 City of Marion

Current water supply for the City of Marion is obtained from the Edwards Aquifer and Canyon Reservoir through CRWA. Marion is projected to need additional water supplies prior to 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Marion implement the following water supply plan to meet the projected needs for the city (Table 4B.2.11-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 3 acft/yr by 2050, increasing to 10 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (CRWA) to be implemented prior to 2010. This strategy can provide an additional 100 acft/yr by 2010, increasing to 400 acft/yr of supply in 2060.

An alternative water management strategy identified by City of Marion to potentially meet needs is Recycled Water Programs.

Table 4B.2.11-8.
Recommended Water Supply Plan for the City of Marion

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	3	18	33	53	75
Recommended Plan						
Municipal Water Conservation	—	—	—	—	3	10
Purchase from WWP (CRWA)	100	200	400	400	400	400
Total New Supply	**100**	**200**	**400**	**400**	**403**	**410**

Estimated costs of the recommended plan to meet the City of Marion's projected needs are shown in Table 4B.2.11-9.

Table 4B.2.11-9.
Recommended Plan Costs by Decade for the City of Marion

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$2,680	$7,652
Unit Cost ($/acft)	—	—	—	—	$893	$765
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	$72,500	$219,937	$427,195	$285,340	$179,274	$173,001
Unit Cost ($/acft)	$725	$1,100	$1,068	$713	$448	$433

4B.2.11.5 City of Santa Clara

Current water supply for the City of Santa Clara is obtained from the Carrizo Aquifer. Santa Clara is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Santa Clara implement the following water supply plan to meet the projected needs for the city (Table 4B.2.11-10).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 10 acft/yr by 2030, increasing to 79 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (CRWA) to be implemented prior to 2010. This strategy can provide an additional 100 acft/yr by 2010, increasing to 900 acft/yr of supply in 2060.

- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 11 acft/yr by 2010.

Table 4B.2.11-10.
Recommended Water Supply Plan for the City of Santa Clara

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	76	205	348	485	642	810
Recommended Plan						
Municipal Water Conservation	—	—	10	23	47	79
Purchase from WWP (CRWA)	100	300	400	500	700	900
Drought Management	11	—	—	—	—	—
Total New Supply	**111**	**300**	**410**	**523**	**747**	**979**

Estimated costs of the recommended plan to meet the City of Santa Clara's projected needs are shown in Table 4B.2.11-11.

Table 4B.2.11-11.
Recommended Plan Costs by Decade for the City of Santa Clara

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	$7,877	$17,462	$36,225	$61,080
Unit Cost ($/acft)	—	—	$788	$759	$771	$773
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	$72,500	$329,905	$427,195	$356,675	$313,730	$389,252
Unit Cost ($/acft)	$725	$1,100	$1,068	$713	$448	$433
Drought Management*						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
** Insufficient data to develop a cost estimate.*						

4B.2.11.6 City of Schertz

Current water supply for the City of Schertz is obtained from the Edwards Aquifer and Carrizo Aquifer. Schertz is projected to need additional water supplies prior to 2050. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Schertz implement the following water supply plan to meet the projected needs for the city (Table 4B.2.11-12).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 22 acft/yr by 2010, increasing to 1,088 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (SSLGC) to be implemented prior to 2030. This strategy can provide an additional 939 acft/yr by 2030, increasing to 5,923 acft/yr of supply in 2060.

Alternative water management strategies identified by City of Schertz include Local Groundwater Supplies (Trinity) and/or Purchase from WWP (TWA).

Table 4B.2.11-12.
Recommended Water Supply Plan for the City of Schertz

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)*	0	0	0	0	647	2,436
Recommended Plan						
Municipal Water Conservation	22	87	182	365	694	1,088
Purchase from WWP (SSLGC)	—	—	939	2,424	4,115	5,923
Total New Supply	**22**	**87**	**1,121**	**2,789**	**4,809**	**7,011**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet the City of Schertz's projected needs are shown in Table 4B.2.11-13.

Table 4B.2.11-13.
Recommended Plan Costs by Decade for the City of Schertz

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$15,118	$59,574	$123,652	$248,424	$460,271	$684,006
Unit Cost ($/acft)	$687	$685	$679	$681	$663	$629
Purchase from WWP (SSLGC)						
Annual Cost ($/yr)	—	—	$643,474	$1,179,550	$1,498,522	$2,156,924
Unit Cost ($/acft)	—	—	$685	$487	$364	$364

4B.2.11.7 City of Seguin

The City of Seguin is projected to have adequate water supplies available from the Carrizo Aquifer, Canyon Reservoir, and run-of-river rights to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Seguin implement the following water supply plan (Table 4B.2.11-14).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 377 acft/yr by 2010, increasing to 2,131 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Alternative water management strategies identified by City of Seguin include Purchase from WWP (SSLGC), Purchase from WWP (GBRA), and/or Purchase from WWP (TWA).

Table 4B.2.11-14.
Recommended Water Supply Plan for the City of Seguin

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	377	853	1,229	1,448	1,744	2,131
Total New Supply	**377**	**853**	**1,299**	**1,448**	**1,744**	**2,131**
** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*						

Estimated costs of the recommended plan for the City of Seguin are shown in Table 4B.2.11-15.

Table 4B.2.11-15.
Recommended Plan Costs by Decade for the City of Seguin

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$256,904	$503,785	$691,151	$798,805	$951,488	$1,158,748
Unit Cost ($/acft)	$681	$591	$562	$552	$546	$544

4B.2.11.8 Springs Hill WSC

Springs Hill WSC is projected to have adequate water supplies available from the Carrizo Aquifer and Canyon Reservoir to meet the WSC's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Springs Hill WSC implement the following water supply plan (Table 4B.2.11-16).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 174 acft/yr by 2010, increasing to 877 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (SHWSC) to be implemented by 2020. This strategy can provide an additional 1,500 acft/yr by 2020, increasing to 3,000 acft/yr of supply by 2030, continuing through 2060.
- Facilities Expansion (Lake Placid WTP)

Table 4B.2.11-16.
Recommended Water Supply Plan for Springs Hill WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	174	381	477	571	701	877
Purchase from WWP (SHWSC)	—	1,500	3,000	3,000	3,000	3,000
Facilities Expansion	—	—	—	—	—	—
Total New Supply	**174**	**1,881**	**3,477**	**3,571**	**3,701**	**3,877**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan for Springs Hill WSC are shown in Table 4B.2.11-17.

Table 4B.2.11-17.
Recommended Plan Costs by Decade for Springs Hill WSC

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$134,027	$239,728	$287,191	$330,685	$397,267	$492,788
Unit Cost ($/acft)	$770	$629	$602	$579	$567	$562
Purchase from WWP (SHWSC)						
Annual Cost ($/yr)	—	$2,184,000	$4,435,000	$1,533,000	$1,533,000	$1,464,000
Unit Cost ($/acft)	—	$1,456	$1,478	$511	$511	$488
Facilities Expansion						
Annual Cost ($/yr)	$722,000	$722,000	$524,000	$524,000	$524,000	$524,000
Unit Cost ($/acft)	—	—	—	—	—	—

4B.2.11.9 Rural Area Residential and Commercial

Current water supply for Rural Areas is obtained from the Edwards Aquifer, Carrizo Aquifer, Queen City Aquifer, Canyon Reservoir, and run-of-river rights. Rural Areas are projected to have adequate water supplies through 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan (Table 4B.2.11-18).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 2 acft/yr in 2010 (Volume II, Section 4C.1.1).

Table 4B.2.11-18.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	2	—	—	—	—	—
Total New Supply	**2**	**—**	**—**	**—**	**—**	**—**

Estimated costs of the recommended plan for the rural areas are shown in Table 4B.2.11-19.

Table 4B.2.11-19.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$1,449	—	—	—	—	—
Unit Cost ($/acft)	$725	—	—	—	—	—

4B.2.11.10 Industrial

Industrial is projected to have adequate water supplies available from the Edwards Aquifer, Carrizo Aquifer, Canyon Reservoir, and run-of-river rights to meet the water user group's projected demand during the planning period.

4B.2.1.11 Steam-Electric Power

Current water supply for steam-electric power is obtained from Canyon Reservoir and reuse water. Steam-electric power is projected to have adequate water supplies through 2060.

4B.2.11.12 Mining

Mining is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group's projected demand during the planning period.

4B.2.11.13 Irrigation

Irrigation is projected to have adequate water supplies available from the Carrizo Aquifer, Canyon Reservoir, and run-of-river rights to meet the water user group's projected demand during the planning period.

4B.2.11.14 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demand during the planning period.

4B.2.12 Hays County Water Supply Plan

Table 4B.2.12-1 lists each water user group in Hays County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.12-1.
Hays County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
County Line WSC	140	-2,386	Projected shortage (2020 through 2060)
Creedmoor-Maha WSC			See Caldwell County
Crystal Clear WSC			See Guadalupe County
Goforth WSC	457	-1,872	Projected shortage (2030 through 2060)
City of Kyle	764	-1,699	Projected shortage (2020 through 2060)
Maxwell WSC			See Caldwell County
City of Mountain City	4	-134	Projected shortage (2020 and 2060)
City of Niederwald	-58	-377	Projected shortage (2010 through 2060)
Plum Creek Water Company	407	-657	Projected shortage (2040 through 2060)
City of San Marcos	5,014	-11,387	Projected shortage (2030 through 2060)
Wimberley WSC	-219	-1,409	Projected shortage (2010 through 2060)
City of Woodcreek	-23	-387	Projected shortage (2010 through 2060)
Woodcreek Utilities, Inc.	-455	-2,580	Projected shortage (2010 through 2060)
Rural Area Residential and Commercial	1,829	689	No projected shortage
Industrial	1,353	1,179	No projected shortage
Steam-Electric Power	5,151	2,533	No projected shortage
Mining	-82	-103	Projected shortage (2010 through 2060)
Irrigation	316	331	No projected shortage
Livestock	0	0	No projected shortage

4B.2.12.1 County Line WSC

Current water supply for County Line WSC is obtained from the Edwards Aquifer, Canyon Reservoir, and run-of-river rights. County Line WSC is projected to need additional water supplies prior to 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that County Line WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.12-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 43 acft/yr by 2010, increasing to 473 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Trinity) to be implemented prior to 2020. This strategy can provide an additional 1,129 acft/yr by 2020, increasing to 2,420 acft/yr of supply in 2060.
- Purchase from WWP (CRWA) to be implemented prior to 2020. This strategy can provide an additional 570 acft/yr by 2020, through 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 58 acft/yr by 2010.

Alternative water management strategies identified by County Line WSC include Recycled Water Programs and/or Brackish Barton Springs Edwards.

Project Table 4B.2.12.-2.
Recommended Water Supply Plan for County Line WSC

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)*	0	1,049	1,433	1,603	1,921	2,386
Recommended Plan						
Municipal Water Conservation	43	110	176	227	344	473
Local Groundwater Supplies (Trinity)	—	1,129	1,452	1,613	1,936	2,420
Purchase from WWP (CRWA)	—	570	570	570	570	570
Drought Management	58	—	—	—	—	—
Total New Supply	**101**	**1,809**	**2,198**	**2,410**	**2,850**	**3,463**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet County Line WSC's projected needs are shown in Table 4B.2.12-3.

Table 4B.2.12-3.
Recommended Plan Costs by Decade for County Line WSC

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$32,760	$84,518	$135,342	$164,888	$231,092	$305,884
Unit Cost ($/acft)	$762	$768	$769	$726	$672	$647
Local Trinity						
Annual Cost ($/yr)	—	$982,333	$1,263,000	$566,741	$608,381	$909,868
Unit Cost ($/acft)	—	$870	$870	$351	$314	$376
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	—	$626,820	$608,752	$406,610	$255,466	$246,527
Unit Cost ($/acft)	—	$1,100	$1,068	$713	$448	$433
Drought Management						
Annual Cost ($/yr)	$9,527	—	—	—	—	—
Unit Cost ($/acft)	$164	—	—	—	—	—

4B.2.12.2 Goforth WSC

Current water supply for Goforth WSC is obtained from the Edwards (Barton Springs) Aquifer. Goforth WSC is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Goforth WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.12-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 22 acft/yr by 2050, increasing to 111 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Hays/Caldwell PUA Project[2] to be implemented prior to 2020. This strategy can provide an additional 1,639 acft/yr by 2020, continuing through 2060.

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[2] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

- Purchase from WWP (GBRA) to be implemented prior to 2030. This strategy can provide an additional 300 acft/yr by 2030, continuing through 2060.

Alternative water management strategies identified by Goforth WSC include Local Groundwater Supplies (Edwards – Barton Springs), Brackish Edwards (Barton Springs), and/or Local Groundwater Supplies (Trinity). An alternative water management strategy for the Goforth WSC, if groundwater permits from Gonzales County are unable to be obtained, is Purchase from WWP (GBRA).

Table 4B.2.12-4.
Recommended Water Supply Plan for Goforth WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	0	29	433	879	1,427	1,872
Recommended Plan						
Municipal Water Conservation	—	—	—	—	22	111
Hays/Caldwell PUA Project	—	1,639	1,639	1,639	1,639	1,639
Purchase from WWP (GBRA)	—	—	300	300	300	300
Total New Supply	**0**	**1,639**	**1,939**	**1,939**	**1,961**	**2,050**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet Goforth WSC's projected needs are shown in Table 4B.2.12-5.

Table 4B.2.12-5.
Recommended Plan Costs by Decade for Goforth WSC

Recommended Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$17,198	$85,581
Unit Cost ($/acft)	—	—	—	—	$782	$771
Hays/Caldwell PUA Project						
Annual Cost ($/yr)	—	$2,040,555	$2,040,555	$719,521	$719,521	$719,521
Unit Cost ($/acft)	—	$1,245	$1,245	$439	$439	$439
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	—	—	$416,828	$152,696	$152,696	$117,740
Unit Cost ($/acft)	—	—	$1,389	$509	$509	$392

4B.2.12.3 City of Kyle

Current water supply for the City of Kyle is obtained from the Edwards Aquifer, Edwards (Barton Springs) Aquifer, and Canyon Reservoir. City of Kyle is projected to need additional water supplies prior to 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Kyle implement the following water supply plan to meet the projected needs for the city (Table 4B.2.12-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 27 acft/yr by 2020, increasing to 443 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Hays/Caldwell PUA Project[3] to be implemented prior to 2030. This strategy can provide an additional supply of 464 acft/yr by 2030, increasing to 9,355 acft/yr by 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 137 acft/yr by 2010.

An alternative water management strategy for the City of Kyle, if groundwater permits from Gonzales County are unable to be obtained, is Purchase from WWP (GBRA).

Table 4B.2.12-6.
Recommended Water Supply Plan for the City of Kyle

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)*	0	436	713	873	1,370	1,699
Recommended Plan						
Municipal Water Conservation	—	27	96	167	302	443
Hays/Caldwell PUA Project	—	500	1,000	2,416	5,144	9,355
Drought Management	137	—	—	—	—	—
Total New Supply	**137**	**27**	**560**	**2,583**	**5,446**	**9,798**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

[3] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

Estimated costs of the recommended plan to meet the City of Kyle's projected needs are shown in Table 4B.2.12-7.

Table 4B.2.12-7.
Recommended Plan Costs by Decade for the City of Kyle

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	$18,091	$65,039	$113,927	$205,763	$301,858
Unit Cost ($/acft)	—	$670	$677	$682	$681	$681
Hays/Caldwell PUA Project						
Annual Cost ($/yr)	—	$622,500	$1,245,000	$1,060,624	$2,258,216	$4,106,845
Unit Cost ($/acft)	—	$1,245	$1,245	$439	$439	$439
Drought Management						
Annual Cost ($/yr)	$161,234	—	—	—	—	—
Unit Cost ($/acft)	$1,177	—	—	—	—	—

4B.2.12.4 City of Mountain City

Current water supply for the City of Mountain City is obtained from the Edwards (Barton Springs) Aquifer. Mountain City is projected to need additional water supplies prior to 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Mountain City implement the following water supply plan to meet the projected needs for the city (Table 4B.2.12-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 1 acft/yr by 2010, increasing to 22 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Hays/Caldwell PUA Project[4] to be implemented by 2020. This strategy can provide an additional 150 acft/yr by 2020, continuing through 2060.

[4] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

Table 4B.2.12-8.
Recommended Water Supply Plan for the City of Mountain City

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	22	49	75	108	134
Recommended Plan						
Municipal Water Conservation	1	3	6	10	16	22
Hays/Caldwell PUA Project	—	150	150	150	150	150
Total New Supply	**1**	**153**	**156**	**160**	**166**	**172**

Estimated costs of the recommended plan to meet the City of Mountain City's projected needs are shown in Table 4B.2.12-9.

Table 4B.2.12-9.
Recommended Plan Costs by Decade for the City of Mountain City

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$1,109	$2,321	$4,477	$7,140	$10,794	$14,626
Unit Cost ($/acft)	$1,109	$774	$746	$714	$675	$665
Hays/Caldwell PUA Project						
Annual Cost ($/yr)	—	$186,750	$186,750	$65,850	$65,850	$65,850
Unit Cost ($/acft)	—	$1,245	$1,245	$439	$439	$439

4B.2.12.5 City of Niederwald

Current water supply for the City of Niederwald is obtained from the Edwards (Barton Springs) Aquifer. Niederwald is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Niederwald implement the following water supply plan to meet the projected needs for the city (Table 4B.2.12-10).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 1 acft/yr by 2020, increasing to 42 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

- Purchase from WWP (GBRA) to be implemented prior to 2010. This strategy can provide an additional 58 acft/yr by 2010, increasing to 377 acft/yr of supply in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 7 acft/yr by 2010.

Table 4B.2.12-10.
Recommended Water Supply Plan for the City of Niederwald

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	58	118	183	244	317	377
Recommended Plan						
Municipal Water Conservation	—	1	8	15	27	42
Purchase from WWP (GBRA)	58	118	183	244	317	377
Drought Management	7	—	—	—	—	—
Total New Supply	**65**	**119**	**191**	**259**	**344**	**419**

Estimated costs of the recommended plan to meet the City of Niederwald's projected needs are shown in Table 4B.2.12-11.

Table 4B.2.12-11.
Recommended Plan Costs by Decade for the City of Niederwald

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	$877	$5,986	$11,172	$20,827	$32,038
Unit Cost ($/acft)	—	$877	$748	$745	$771	$763
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	$56,707	$163,902	$254,187	$124,196	$161,353	$147,784
Unit Cost ($/acft)	$978	$1,389	$1,389	$509	$509	$392
Drought Management*						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
** Insufficient data to develop a cost estimate.*						

4B.2.12.6 Plum Creek Water Company

Current water supply for Plum Creek Water Company is obtained from the Edwards (Barton Springs) Aquifer. Plum Creek Water Company is projected to need additional water supplies prior to 2040. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Plum Creek Water Company implement the following water supply plan to meet the projected needs for the entity (Table 4B.2.12-12).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 12 acft/yr by 2050, increasing to 54 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (GBRA) to be implemented prior to 2010. This strategy can provide an additional 195 acft/yr by 2040, increasing to 657 acft/yr of supply in 2060.

Table 4B.2.12-12.
Recommended Water Supply Plan for Plum Creek Water Company

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)*	0	0	0	195	454	657
Recommended Plan						
Municipal Water Conservation	—	—	—	—	12	54
Purchase from WWP (GBRA)	—	—	—	195	454	657
Total New Supply	—	—	—	**195**	**466**	**711**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet Plum Creek Water Company's projected needs are shown in Table 4B.2.12-13.

Table 4B.2.12-13.
Recommended Plan Costs by Decade for Plum Creek Water Company

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$9,431	$41,541
Unit Cost ($/acft)	—	—	—	—	$786	$769
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	—	—	—	$99,252	$231,080	$257,851
Unit Cost ($/acft)	—	—	—	$509	$509	$392

4B.2.12.7 City of San Marcos

Current water supply for the City of San Marcos is obtained from the Edwards Aquifer, Canyon Reservoir, and run-of-river rights. San Marcos is projected to need additional water supplies prior to 2030. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that San Marcos implement the following water supply plan to meet the projected needs for the city (Table 4B.2.12-14).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 417 acft/yr by 2010, increasing to 2,656 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Hays/Caldwell PUA Project[5] to be implemented prior to 2030. This strategy can provide an additional 1,548 acft/yr by 2030, increasing to 11,910 by 2060.

Alternative water management strategies identified by City of San Marcos include Recycled Water Programs and/or Purchase from WWP (GBRA).

[5] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

Table 4B.2.12-14.
Recommended Water Supply Plan for the City of San Marcos

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	0	0	1,319	4,772	8,507	11,387
Recommended Plan						
Municipal Water Conservation	417	554	815	1,282	1,875	2,656
Hays/Caldwell PUA Project	—	—	1,548	4,953	8,675	11,910
Total New Supply	**417**	**554**	**2,363**	**6,235**	**10,550**	**14,566**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet the City of San Marcos' projected needs are shown in Table 4B.2.12-15.

Table 4B.2.12-15.
Recommended Plan Costs by Decade for the City of San Marcos

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$284,314	$377,577	$539,269	$772,590	$1,080,431	$1,503,171
Unit Cost ($/acft)	$682	$682	$662	$603	$576	$566
Hays/Caldwell PUA Project						
Annual Cost ($/yr)	—	—	$1,927,260	$6,166,485	$3,808,325	$5,228,490
Unit Cost ($/acft)	—	—	$1,245	$1,245	$439	$439

4B.2.12.8 Wimberley WSC

Current water supply for Wimberley WSC is obtained from the Trinity Aquifer. Wimberley WSC is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Wimberley implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.12-16).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 19 acft/yr by 2050, increasing to 70 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

- Wimberley and Woodcreek Water Supply Project to be implemented prior to 2010. This strategy can provide an additional 320 acft/yr by 2010, increasing to 1,480 acft/yr of supply in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 39 acft/yr by 2010.

Table 4B.2.12-16.
Recommended Water Supply Plan for Wimberley WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	219	440	667	885	1,179	1,409
Recommended Plan						
Municipal Water Conservation	—	—	—	—	19	70
Wimberley and Woodcreek Water Supply Project	336	1,425	1,425	1,425	1,425	1,425
Drought Management	39	—	—	—	—	—
Total New Supply	**375**	**1,425**	**1,425**	**1,425**	**1,444**	**1,495**

Estimated costs of the recommended plan to meet Wimberley WSC's projected needs are shown in Table 4B.2.12-17.

Table 4B.2.12-17.
Recommended Plan Costs by Decade for Wimberley WSC

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$14,676	$53,642
Unit Cost ($/acft)	—	—	—	—	$772	$766
Wimberley and Woodcreek Water Supply Project						
Annual Cost ($/yr)	$764,400	$3,461,325	$3,461,325	$2,525,100	$2,525,100	$2,525,100
Unit Cost ($/acft)	$2,275	$2,429	$2,429	$1,772	$1,772	$1,772
Drought Management*						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—

** Insufficient data to develop a cost estimate.*

4B.2.12.9 City of Woodcreek

Current water supply for the City of Woodcreek is obtained from the Trinity Aquifer. Woodcreek is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Woodcreek implement the following water supply plan to meet the projected needs for the city (Table 4B.2.12-18).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 2 acft/yr by 2030, increasing to 37 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Wimberley and Woodcreek Water Supply Project to be implemented prior to 2010. This strategy can provide an additional 100 acft/yr by 2010, increasing to 400 acft/yr of supply in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 12 acft/yr by 2010.

Table 4B.2.12-18. Recommended Water Supply Plan for the City of Woodcreek

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	23	92	162	229	317	387
Recommended Plan						
Municipal Water Conservation	—	—	2	6	20	37
Wimberley and Woodcreek Water Supply Project	112	400	400	400	400	400
Drought Management	12	—	—	—	—	—
Total New Supply	**124**	**400**	**402**	**406**	**420**	**437**

Estimated costs of the recommended plan to meet the City of Woodcreek's projected needs are shown in Table 4B.2.12-19.

Table 4B.2.12-19.
Recommended Plan Costs by Decade for the City of Woodcreek

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	$1,323	$4,535	$15,573	$28,752
Unit Cost ($/acft)	—	—	$662	$756	$779	$777
Wimberley and Woodcreek Water Supply Project						
Annual Cost ($/yr)	$254,800	$971,600	$971,600	$708,800	$708,800	$708,800
Unit Cost ($/acft)	$2,275	$2,429	$2,429	$1,772	$1,772	$1,772
Drought Management						
Annual Cost ($/yr)	$12,009	—	—	—	—	—
Unit Cost ($/acft)	$1,001	—	—	—	—	—

4B.2.12.10 Woodcreek Utilities, Inc.

Current water supply for the Woodcreek Utilities is obtained from the Trinity Aquifer. Woodcreek Utilities is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Woodcreek Utilities implement the following water supply plan to meet the projected needs for the utility (Table 4B.2.12-20).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 56 acft/yr by 2010, increasing to 771 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Wimberley and Woodcreek Water Supply Project to be implemented prior to 2010. This strategy can provide an additional 700 acft/yr by 2010, increasing to 2,600 acft/yr of supply in 2060.

Table 4B.2.12-20.
Recommended Water Supply Plan for Woodcreek Utilities

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	455	852	1,271	1,681	2,184	2,580
Recommended Plan						
Municipal Water Conservation	56	177	337	455	619	771
Wimberley and Woodcreek Water Supply Project	672	2,655	2,655	2,655	2,655	2,655
Total New Supply	**728**	**2,832**	**2,992**	**3,110**	**3,274**	**3,426**

Estimated costs of the recommended plan to meet Woodcreek Utilities' projected needs are shown in Table 4B.2.12-21.

Table 4B.2.12-21.
Recommended Plan Costs by Decade Woodcreek Utilities

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$38,437	$104,785	$193,365	$257,964	$348,401	$431,974
Unit Cost ($/acft)	$686	$592	$574	$567	$563	$560
Wimberley and Woodcreek Water Supply Project						
Annual Cost ($/yr)	$1,528,800	$6,448,995	$6,448,995	$4,704,660	$4,704,660	$4,704,660
Unit Cost ($/acft)	$2,275	$2,429	$2,429	$1,772	$1,772	$1,772

4B.2.12.11 Rural Area Residential and Commercial

Current water supply for Rural Areas is obtained from the Edwards Aquifer and Trinity Aquifer. Rural Areas are projected to have adequate water supplies through 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan (Table 4B.2.12-22).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 12 acft/yr in 2030, increasing to 184 acft/yr in 2060 (Volume II, Section 4C.1.1).

Alternative water management strategies identified by Rural Hays County include Hays/Caldwell PUA Project, Purchase from WWP (GBRA), and/or Rainwater Harvesting.

Table 4B.2.12-22.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	—	12	49	112	184
Total New Supply	**—**	**—**	**12**	**49**	**112**	**184**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.12-23.

Table 4B.2.12-23.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	$9,433	$37,534	$86,547	$141,576
Unit Cost ($/acft)	—	—	$786	$766	$773	$769

4B.2.12.12 Industrial

Industrial is projected to have adequate water supplies available from the Edwards Aquifer and run-of-river rights to meet the water user group’s projected demand during the planning period.

4B.2.12.13 Steam-Electric Power

Current water supply for steam-electric power is obtained from Canyon Reservoir and reclaimed water. Steam-electric power is projected to have adequate water supplies available through 2060.

4B.2.12.14 Mining

Current water supply for mining is obtained from the Trinity Aquifer. Mining is projected to need additional water supplies prior to year 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that individual mining operations implement the following water supply plan to meet the projected needs for mining (Table 4B.2.12-24).

- Mining Water Conservation to be implemented prior to 2010. This strategy can provide an additional 82 acft/yr by 2010, increasing to 103 acft/yr in 2060, meeting the entire needs.

Table 4B.2.12-24. Recommended Water Supply Plan for Mining

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	82	91	97	101	102	103
Recommended Plan						
Mining Water Conservation	82	91	97	101	102	103
Total New Supply	**82**	**91**	**97**	**101**	**102**	**103**

Estimated costs of the recommended plan to meet the mining projected needs are shown in Table 4B.2.12-25.

Table 4B.2.12-25. Recommended Plan Costs by Decade for Mining

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Mining Water Conservation						
Annual Cost ($/yr)	N/A	N/A	N/A	N/A	N/A	N/A
Unit Cost ($/acft)	N/A	N/A	N/A	N/A	N/A	N/A
**Costs not available due to lack of relevant data.*						

4B.2.12.15 Irrigation

Irrigation is projected to have adequate water supplies available from the Edwards Aquifer and run-of-river rights to meet the water user group's projected demand during the planning period.

4B.2.12.16 Livestock

Current water supply for livestock is obtained from the Trinity Aquifer and local sources. Livestock is projected to have adequate water supplies through 2060.

4B.2.13 Karnes County Water Supply Plan

Table 4B.2.13-1 lists each water user group in Karnes County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.13-1. Karnes County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
El Oso WSC	241	68	No projected shortage
City of Falls City	58	26	No projected shortage
City of Karnes City	-182	-262	Projected shortage (2010 through 2060)
City of Kenedy	112	-118	Projected shortage (2040 through 2060)
City of Runge	104	52	No projected shortage
Sunko WSC			See Wilson County
Rural Area Residential and Commercial	608	158	No projected shortage
Industrial	21	2	No projected shortage
Steam-Electric Power	0	0	No projected demand
Mining	7	13	No projected shortage
Irrigation	0	546	No projected shortage
Livestock	0	0	No projected shortage

4B.2.13.1 El Oso WSC

El Oso WSC is projected to have adequate water supplies available from the Carrizo Aquifer to meet the WSC's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that El Oso WSC implement the following water supply plan (Table 4B.2.13-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 41 acft/yr by 2010, increasing to 139 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.13-2.
Recommended Water Supply Plan for El Oso WSC

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	41	83	92	105	120	139
Total New Supply	**41**	**83**	**92**	**105**	**120**	**139**

Estimated costs of the recommended plan for El Oso WSC are shown in Table 4B.2.13-3.

Table 4B.2.13-3.
Recommended Plan Costs by Decade for El Oso WSC

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	$31,484	$53,313	$56,249	$61,216	$68,398	$78,425
Unit Cost ($/acft)	$768	$642	$611	$583	$570	$564

4B.2.13.2 City of Falls City

The City of Falls City is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Falls City implement the following water supply plan (Table 4B.2.13-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 8 acft/yr by 2010, increasing to 23 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.13-4.
Recommended Water Supply Plan for the City of Falls City

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	8	13	14	16	19	23
Total New Supply	**8**	**13**	**14**	**16**	**19**	**23**

Estimated costs of the recommended plan for the City of Falls City are shown in Table 4B.2.13-5.

Table 4B.2.13-5.
Recommended Plan Costs by Decade for the City of Falls City

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$5,827	$8,537	$8,884	$9,683	$10,953	$12,810
Unit Cost ($/acft)	$728	$657	$635	$605	$576	$557

4B.2.13.3 City of Karnes City

The City of Karnes City obtains its water supply from the Carrizo Aquifer and is projected to have a shortage prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Karnes City implement the following water supply plan (Table 4B.2.13-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 11 acft/yr in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Carrizo) to be implemented prior to 2010. This strategy can provide an additional 323 acft/yr in 2010, through 2060.

Table 4B.2.13-6.
Recommended Water Supply Plan for the City of Karnes City

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	182	203	224	242	253	262
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	11
Local Groundwater Supplies (Carrizo)	323	323	323	323	323	323
Total New Supply	**182**	**203**	**224**	**242**	**253**	**273**

Estimated costs of the recommended plan for the City of Karnes City are shown in Table 4B.2.13-7.

Table 4B.2.13-7.
Recommended Plan Costs by Decade for the City of Karnes City

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$8,554
Unit Cost ($/acft)	—	—	—	—	—	$778
Local Groundwater Supplies (Carrizo) Aquifer						
Annual Cost ($/yr)	$404,000	$404,000	$104,955	$104,955	$104,955	$104,955
Unit Cost ($/acft)	$1,251	$1,251	$325	$325	$325	$325

4B.2.13.4 City of Kenedy

Current water supply for the City of Kenedy is obtained from the Gulf Coast Aquifer. Kenedy is projected to need additional water supplies prior to 2040. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Kenedy implement the following water supply plan to meet the projected needs for the city (Table 4B.2.13-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 58 acft/yr by 2010, increasing to 268 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Gulf Coast) to be implemented prior to 2040. This strategy can provide an additional 161 acft/yr by 2040, through 2060.

An alternative water management strategy identified by the City of Kenedy is obtaining surface water rights from the San Antonio River.

Table 4B.2.13-8.
Recommended Water Supply Plan for the City of Kenedy

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	37	86	118
Recommended Plan						
Municipal Water Conservation	58	121	189	216	242	268
Local Gulf Coast	—	—	—	161	161	161
Total New Supply	**58**	**121**	**189**	**377**	**403**	**429**

Estimated costs of the recommended plan to meet the City of Kenedy's projected needs are shown in Table 4B.2.13-9.

Table 4B.2.13-9.
Recommended Plan Costs by Decade for the City of Kenedy

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$44,446	$74,521	$107,130	$118,102	$130,600	$144,501
Unit Cost ($/acft)	$766	$616	$567	$547	$540	$539
Local Gulf Coast						
Annual Cost ($/yr)	—	—	—	$294,000	$294,000	$102,716
Unit Cost ($/acft)	—	—	—	$1,823	$1,823	$637

4B.2.13.5 City of Runge

The City of Runge is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Runge implement the following water supply plan (Table 4B.2.13-10).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 15 acft/yr by 2010, increasing to 37 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.13-10.
Recommended Water Supply Plan for the City of Runge

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	15	22	24	26	31	37
Total New Supply	**15**	**22**	**24**	**26**	**31**	**37**

Estimated costs of the recommended plan for the City of Runge are shown in Table 4B.2.13-11.

Table 4B.2.13-11.
Recommended Plan Costs by Decade for the City of Runge

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$11,749	$15,103	$15,406	$15,405	$17,787	$21,291
Unit Cost ($/acft)	$783	$687	$642	$593	$574	$575

4B.2.13.6 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Carrizo Aquifer and the Gulf Coast Aquifer to meet their projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected needs for rural areas (Table 4B.2.13-12).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 68 acft/yr by 2010, increasing to 258 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.13-12.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	68	121	157	193	227	258
Total New Supply	**68**	**121**	**157**	**193**	**227**	**258**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.13-13.

Table 4B.2.13-13.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$52,693	$85,066	$105,807	$124,816	$143,861	$160,393
Unit Cost ($/acft)	$775	$703	$674	$647	$634	$622

4B.2.13.7 Industrial

Industrial is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group's projected demand during the planning period.

4B.2.13.8 Steam-Electric Power

There is no projected steam-electric power water demand in Karnes County, therefore no water management strategies are recommended for this water user group.

4B.2.13.9 Mining

Mining is projected to have adequate water supplies available from the Carrizo Aquifer and Gulf Coast Aquifer to meet the water user group's projected demand during the planning period.

4B.2.13.10 Irrigation

Irrigation is projected to have adequate water supplies available from the Gulf Coast Aquifer and run-of-river rights to meet the water user group's projected demand during the planning period.

4B.2.13.11 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demand during the planning period.

4B.2.14 Kendall County Water Supply Plan

Table 4B.2.14-1 lists each water user group in Kendall County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.14-1.
Kendall County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
City of Boerne	2,435	-276	Projected shortage (2060)
City of Fair Oaks Ranch			See Bexar County
Water Service Inc.			See Bexar County
Rural Area Residential and Commercial*	1,194	-3,514	Projected shortage (2030 through 2060)
Industrial	0	0	No projected demand
Steam-Electric Power	0	0	No projected demand
Mining	0	0	No projected shortage
Irrigation	28	84	No projected shortage
Livestock	0	9	No projected shortage

**These values represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages.*

4B.2.14.1 City of Boerne

Current water supply for the City of Boerne is obtained from the Trinity Aquifer, Canyon Reservoir, and Boerne Lake. Boerne is projected to need additional water supplies prior to 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Boerne implement the following water supply plan to meet the projected needs for the city (Table 4B.2.14-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 98 acft/yr by 2010, increasing to 816 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Western Canyon WTP Expansion to be implemented by 2050. This strategy can provide an additional 276 acft/yr by 2060.

Table 4B.2.14-2.
Recommended Water Supply Plan for the City of Boerne

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	276
Recommended Plan						
Municipal Water Conservation	98	280	394	502	652	816
Western Canyon Expansion	—	—	—	—	—	276
Total New Supply	**98**	**280**	**394**	**502**	**652**	**1,092**

Estimated costs of the recommended plan to meet the City of Boerne's projected needs are shown in Table 4B.2.14-3.

Table 4B.2.14-3.
Recommended Plan Costs by Decade for the City of Boerne

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$75,359	$176,767	$237,434	$289,858	$371,749	$461,545
Unit Cost ($/acft)	$769	$631	$603	$577	$570	$566
Western Canyon Expansion						
Annual Cost ($/yr)	—	—	—	—	—	$86,940
Unit Cost ($/acft)	—	—	—	—	—	$315

4B.2.14.2 Rural Area Residential and Commercial

Current water supply for Rural Areas is obtained from the Edwards-Trinity Aquifer, Trinity Aquifer, and Canyon Reservoir. Rural Areas are projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected needs for rural areas (Table 4B.2.14-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 73 acft/yr by 2050, increasing to 264 acft/yr in 2060 (Volume II, Section 4C.1.1).
- Western Canyon Expansion to be implemented by 2060. This strategy can provide an additional 374 acft/yr by 2060.

- Purchase from WWP (GBRA) to be implemented prior to 2010. Supply from unused Western Canyon commitments in 2010. The Storage Above Canyon Reservoir (ASR) strategy can provide 3,140 acft/yr by 2020 and through 2060.

Table 4B.2.14-4.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	221	865	1,522	2,073	2,726	3,514
Recommended Plan						
Municipal Water Conservation	—	—	—	—	73	264
Western Canyon Expansion	—	—	—	—	—	374
Purchase from WWP (GBRA)	221	3,140	3,140	3,140	3,140	3,140
Total New Supply	**3,140**	**3,140**	**3,140**	**3,140**	**3,213**	**3,778**

Estimated costs of the recommended plan to meet the projected needs of rural areas are shown in Table 4B.2.14-5.

Table 4B.2.14-5.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$56,422	$203,520
Unit Cost ($/acft)	—	—	—	—	$773	$771
Western Canyon Expansion						
Annual Cost ($/yr)	—	—	—	—	—	$117,810
Unit Cost ($/acft)	—	—	—	—	—	$315
Purchase from WWP (GBRA)[1]						
Annual Cost ($/yr)	$205,309	$4,361,460	$4,361,460	$1,598,260	$1,598,260	$1,230,880
Unit Cost ($/acft)	$929	$1,389	$1,389	$509	$509	$392
[1]Unit cost from 2020 through 2060 based on cost estimate in Section 4C.9, plus treatment and integration associated with delivery of 3,140 acft/yr of water						

4B.2.14.3 Industrial

There is no projected industrial water demand in Kendall County, therefore no water management strategies are recommended for this water user group.

4B.2.14.4 Steam-Electric Power

There is no projected steam-electric power water demand in Kendall County, therefore no water management strategies are recommended for this water user group.

4B.2.14.5 Mining

Mining is projected to have adequate water supplies available from the Trinity Aquifer to meet the water user group's projected demand during the planning period.

4B.2.1.6 Irrigation

Current water supply for irrigation is obtained from the Trinity Aquifer and run-of-river rights. Irrigation is projected to have adequate water supplies through 2060.

4B.2.14.7 Livestock

Current water supply for livestock is obtained from the Trinity Aquifer and local sources. Livestock is projected to have adequate water supply through 2060.

4B.2.15 LaSalle County Water Supply Plan

Table 4B.2.15-1 lists each water user group in LaSalle County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.15-1.
LaSalle County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
City of Cotulla	802	466	No projected shortage
City of Encinal	158	161	No projected shortage
Rural Area Residential and Commercial	218	0	No projected shortage
Industrial	0	0	No projected demand
Steam-Electric Power	0	0	No projected demand
Mining	0	0	No projected demand
Irrigation	1,200	1,894	No projected shortage
Livestock	0	0	No projected shortage

4B.2.15.1 City of Cotulla

The City of Cotulla is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Cotulla implement the following water supply plan (Table 4B.2.15-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 118 acft/yr by 2010, increasing to 745 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.15-2.
Recommended Water Supply Plan for the City of Cotulla

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	118	248	369	488	615	745
Total New Supply	**118**	**248**	**369**	**488**	**615**	**745**

Estimated costs of the recommended plan for the City of Cotulla are shown in Table 4B.2.15-3.

Table 4B.2.15-3.
Recommended Plan Costs by Decade for the City of Cotulla

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	$77,526	$143,185	$203,733	$262,287	$327,697	$396,081
Unit Cost ($/acft)	$657	$577	$552	$537	$533	$532

4B.2.15.2 City of Encinal

The City of Encinal is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Encinal implement the following water supply plan (Table 4B.2.15-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 9 acft/yr by 2010, increasing to 14 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.15-4.
Recommended Water Supply Plan for the City of Encinal

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	9	9	10	10	11	14
Total New Supply	**9**	**9**	**10**	**10**	**11**	**14**

Estimated costs of the recommended plan for the City of Encinal are shown in Table 4B.2.15-5.

Table 4B.2.15-5.
Recommended Plan Costs by Decade for the City of Encinal

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$6,568	$7,087	$7,017	$5,981	$6,637	$7,876
Unit Cost ($/acft)	$730	$787	$702	$598	$603	$563

4B.2.15.3 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Carrizo Aquifer to meet their projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected needs for rural areas (Table 4B.2.15-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 3 acft/yr by 2010, increasing to 42 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.15-6.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	3	4	11	17	29	42
Total New Supply	**3**	**4**	**11**	**17**	**29**	**42**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.15-7.

Table 4B.2.15-7.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$2,160	$2,958	$8,526	$12,845	$22,694	$32,667
Unit Cost ($/acft)	$720	$740	$775	$756	$783	$778

4B.2.15.4 Industrial

There is no projected industrial water demand in LaSalle County, therefore no water management strategies are recommended for this water user group.

4B.2.15.5 Steam-Electric Power

There is no projected steam-electric power water demand in LaSalle County, therefore no water management strategies are recommended for this water user group.

4B.2.15.6 Mining

There is no projected mining water demand in LaSalle County, therefore no water management strategies are recommended for this water user group.

4B.2.15.7 Irrigation

Irrigation is projected to have adequate water supplies available from the Carrizo Aquifer, Sparta Aquifer, and run-of-river rights to meet the water user group's projected demand during the planning period.

4B.2.15.8 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demand during the planning period.

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4B.2.16 Medina County Water Supply Plan

Table 4B.2.16-1 lists each water user group in Medina County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.16-1.
Medina County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
Benton City WSC			See Atascosa County
Bexar Metropolitan Water District			See Bexar County
City of Castroville	-294	-575	Projected shortage (2010 through 2060)
City of Devine	146	87	No projected shortage
East Medina SUD	13	-491	Projected shortage (2020 through 2060)
City of Hondo	-319	-1,252	Projected shortage (2010 through 2060)
City of La Coste	-92	-168	Projected shortage (2010 through 2060)
City of Lytle			See Atascosa County
City of Natalia	-194	-383	Projected shortage (2010 through 2060)
Yancey WSC	-214	-985	Projected shortage (2010 through 2060)
Rural Area Residential and Commercial*	229	-1,193	Projected shortage (2020 through 2060)
Industrial	1,246	1,210	No projected shortage
Steam-Electric Power	0	0	No projected demand
Mining	13	0	No projected shortage
Irrigation*	-4,994	5,441	Projected shortage (2010 through 2030)
Livestock	0	0	No projected shortage

**These values represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages.*

4B.2.16.1 City of Castroville

Current water supply for the City of Castroville is obtained from the Edwards Aquifer. Castroville is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Castroville implement the following water supply plan to meet the projected needs for the city (Table 4B.2.16-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 53 acft/yr by 2010, increasing to 302 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional 294 acft/yr by 2010, increasing to 575 acft/yr of supply in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 34 acft/yr by 2010.
- Facilities Expansions (Systems Interconnect)

Table 4B.2.16-2.
Recommended Water Supply Plan for the City of Castroville

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	294	357	416	468	522	575
Recommended Plan						
Municipal Water Conservation	53	111	176	242	270	302
Edwards Transfers	294	357	416	468	522	575
Drought Management	34	—	—	—	—	—
Facilities Expansions	—	—	—	—	—	—
Total New Supply	**381**	**468**	**592**	**710**	**792**	**877**

Estimated costs of the recommended plan to meet the City of Castroville's projected needs are shown in Table 4B.2.16-3.

Table 4B.2.16-3.
Recommended Plan Costs by Decade for the City of Castroville

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$39,208	$67,285	$99,086	$132,169	$146,096	$163,265
Unit Cost ($/acft)	$740	$606	$563	$546	$541	$541
Edwards Transfers						
Annual Cost ($/yr)	$133,476	$162,078	$188,864	$212,472	$236,988	$261,050
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$110,122	—	—	—	—	—
Unit Cost ($/acft)	$3,239	—	—	—	—	—
Facilities Expansions						
Annual Cost ($/yr)	$1,033,000	$1,033,000	$70,000	$70,000	$70,000	$70,000
Unit Cost ($/acft)	—	—	—	—	—	—

In addition, City of Castroville is a potential participant with BMWD in the Medina Lake Firm-Up (ASR) water management strategy.

4B.2.16.2 City of Devine

The City of Devine is projected to have adequate water supplies available from the Edwards Aquifer and the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Devine implement the following water supply plan (Table 4B.2.16-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 63 acft/yr by 2010, increasing to 196 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.16-4.
Recommended Water Supply Plan for the City of Devine

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	63	127	152	159	175	196
Total New Supply	**63**	**127**	**152**	**159**	**175**	**196**

Estimated costs of the recommended plan for the City of Devine are shown in Table 4B.2.16-5.

Table 4B.2.16-5.
Recommended Plan Costs by Decade for the City of Devine

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$48,304	$79,690	$88,673	$88,210	$95,560	$106,876
Unit Cost ($/acft)	$767	$627	$583	$555	$546	$545

4B.2.16.3 East Medina SUD

Current water supply for East Medina SUD is obtained from the Edwards Aquifer. East Medina SUD is projected to need additional water supplies prior to 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that East Medina SUD implement the following water supply plan to meet the projected needs for the SUD (Table 4B.2.16-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 19 acft/yr by 2050, increasing to 54 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2020. This strategy can provide an additional 104 acft/yr by 2020, increasing to 491 acft/yr of supply in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 44 acft/yr by 2010.

Table 4B.2.16-6.
Recommended Water Supply Plan for East Medina SUD

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	104	214	303	397	491
Recommended Plan						
Municipal Water Conservation	—	—	—	—	19	54
Edwards Transfers	—	104	214	303	397	491
Drought Management	44	—	—	—	—	—
Total New Supply	**44**	**104**	**214**	**303**	**416**	**545**

Estimated costs of the recommended plan to meet East Medina SUD's projected needs are shown in Table 4B.2.16-7.

Table 4B.2.16-7.
Recommended Plan Costs by Decade for East Medina SUD

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$14,753	$41,817
Unit Cost ($/acft)	—	—	—	—	$776	$774
Edwards Transfers						
Annual Cost ($/yr)	—	$47,216	$97,156	$137,562	$180,238	$222,914
Unit Cost ($/acft)	—	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$57,986	—	—	—	—	—
Unit Cost ($/acft)	$1,318	—	—	—	—	—

4B.2.16.4 City of Hondo

Current water supply for the City of Hondo is obtained from the Edwards Aquifer. Hondo is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Hondo implement the following water supply plan to meet the projected needs for the city (Table 4B.2.16-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 125 acft/yr by 2010, increasing to 640 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional 319 acft/yr by 2010, increasing to 1,252 acft/yr of supply in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 89 acft/yr by 2010.

Table 4B.2.16-8.
Recommended Water Supply Plan for the City of Hondo

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	319	536	740	910	1,083	1,252
Recommended Plan						
Municipal Water Conservation	125	289	420	477	551	640
Edwards Transfers	319	536	740	910	1,083	1,252
Drought Management	89	—	—	—	—	—
Total New Supply	**533**	**825**	**1,160**	**1,387**	**1,634**	**1,892**

Estimated costs of the recommended plan to meet the City of Hondo's projected needs are shown in Table 4B.2.16-9.

Table 4B.2.16-9.
Recommended Plan Costs by Decade for the City of Hondo

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$96,064	$179,692	$245,330	$270,796	$307,217	$355,156
Unit Cost ($/acft)	$769	$622	$584	$568	$558	$555
Edwards Transfers						
Annual Cost ($/yr)	$144,826	$243,344	$335,960	$413,140	$491,682	$568,408
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$185,648	—	—	—	—	—
Unit Cost ($/acft)	$2,086	—	—	—	—	—

4B.2.16.5 City of La Coste

Current water supply for the City of La Coste is obtained from the Edwards Aquifer. La Coste is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that La Coste implement the following water supply plan to meet the projected needs for the city (Table 4B.2.16-10).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 4 acft/yr by 2050, increasing to 11 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional 92 acft/yr by 2010, increasing to 168 acft/yr of supply in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 10 acft/yr by 2010.

Table 4B.2.16-10.
Recommended Water Supply Plan for the City of La Coste

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	92	109	126	138	152	168
Recommended Plan						
Municipal Water Conservation	—	—	—	—	4	11
Edwards Transfers	92	109	126	138	152	168
Drought Management	10	—	—	—	—	—
Total New Supply	**102**	**109**	**126**	**138**	**156**	**179**

Estimated costs of the recommended plan to meet the City of La Coste's projected needs are shown in Table 4B.2.16-11.

Table 4B.2.16-11.
Recommended Plan Costs by Decade for the City of La Coste

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$3,178	$8,617
Unit Cost ($/acft)	—	—	—	—	$795	$783
Edwards Transfers						
Annual Cost ($/yr)	$41,768	$49,486	$57,204	$62,652	$69,008	$76,272
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$6,126	—	—	—	—	—
Unit Cost ($/acft)	$613	—	—	—	—	—

4B.2.16.6 City of Natalia

Current water supply for the City of Natalia is obtained from the Edwards Aquifer. Natalia is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Natalia implement the following water supply plan to meet the projected needs for the city (Table 4B.2.16-12).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 24 acft/yr by 2010, increasing to 73 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional 194 acft/yr by 2010, increasing to 383 acft/yr of supply in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 17 acft/yr by 2010.

Table 4B.2.16-12.
Recommended Water Supply Plan for the City of Natalia

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	194	238	279	314	349	383
Recommended Plan						
Municipal Water Conservation	24	31	38	46	58	73
Edwards Transfers	194	238	279	314	349	383
Drought Management	17	—	—	—	—	—
Total New Supply	**235**	**269**	**317**	**360**	**407**	**456**

Estimated costs of the recommended plan to meet the City of Natalia's projected needs are shown in Table 4B.2.16-13.

Table 4B.2.16-13.
Recommended Plan Costs by Decade for the City of Natalia

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$18,238	$22,828	$26,368	$29,512	$35,132	$43,549
Unit Cost ($/acft)	$760	$736	$694	$642	$606	$597
Edwards Transfers						
Annual Cost ($/yr)	$88,076	$108,052	$126,666	$142,556	$158,446	$173,882
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$30,258	—	—	—	—	—
Unit Cost ($/acft)	$1,780	—	—	—	—	—

4B.2.16.7 Yancey WSC

Current water supply for Yancey WSC is obtained from the Edwards Aquifer. Yancey WSC is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Yancey WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.16-14).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 61 acft/yr by 2010, increasing to 316 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional 214 acft/yr by 2010, increasing to 985 acft/yr of supply in 2060.
- Facilities Expansions (System Upgrades)

Alternative water management strategies identified by Yancey WSC include Local Groundwater Supplies (Carrizo) to be implemented prior to 2010. This strategy can provide an additional 403 acft/yr by 2010, increasing to 1,210 acft/yr by 2060.

Table 4B.2.16-14.
Recommended Water Supply Plan for Yancey WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	214	395	562	710	851	985
Recommended Plan						
Municipal Water Conservation	61	136	171	214	259	316
Edwards Transfers	214	395	562	710	851	985
Total New Supply	**275**	**531**	**733**	**924**	**1,110**	**1,301**

Estimated costs of the recommended plan to meet Yancey WSC's projected needs are shown in Table 4B.2.16-15.

Table 4B.2.16-15.
Recommended Plan Costs by Decade for Yancey WSC

Recommended Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$47,146	$88,373	$106,268	$128,622	$152,055	$183,043
Unit Cost ($/acft)	$773	$650	$621	$601	$587	$579
Edwards Transfers						
Annual Cost ($/yr)	$97,156	$179,330	$255,148	$322,340	$386,354	$447,190
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454

4B.2.16.8 Rural Area Residential and Commercial

Current water supply for Rural Areas is obtained from the Edwards Aquifer, Trinity Aquifer, and the Carrizo Aquifer. Rural Areas are projected to need additional water supplies prior to 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected needs for rural areas (Table 4B.2.16-16).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 20 acft/yr by 2020, increasing to 244 acft/yr in 2060 (Volume II, Section 4C.1.1).

- Edwards Transfers to be implemented prior to 2020. This strategy can provide an additional 236 acft/yr by 2020, increasing to 1,296 acft/yr in 2060.

Table 4B.2.16-16.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	236	528	787	1,055	1,296
Recommended Plan						
Municipal Water Conservation	—	20	41	86	160	244
Edwards Transfers	—	236	528	787	1,055	1,296
Total New Supply	—	**256**	**569**	**873**	**1,215**	**1,540**

Estimated costs of the recommended plan to meet the projected needs of rural areas are shown in Table 4B.2.16-17.

Table 4B.2.16-17.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	$15,020	$31,826	$66,279	$123,399	$187,503
Unit Cost ($/acft)	—	$751	$776	$771	$771	$768
Edwards Transfers						
Annual Cost ($/yr)	—	$107,144	$239,712	$357,298	$478,970	$588,384
Unit Cost ($/acft)	—	$454	$454	$454	$454	$454

4B.2.16.9 Industrial

Industrial is projected to have adequate water supplies available from the Edwards Aquifer to meet the water user group's projected demand during the planning period.

4B.2.16.10 Steam-Electric Power

There is no projected steam-electric power water demand in Medina County, therefore no water management strategies are recommended for this water user group.

4B.2.16.11 Mining

Mining is projected to have adequate water supplies available from the Carrizo Aquifer and the Trinity Aquifer to meet the water user group's projected demand during the planning period.

4B.2.1.12 Irrigation

Current water supply for irrigation is obtained from the Edwards Aquifer, Carrizo Aquifer, and run-of-river rights. Irrigation is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that individual irrigators implement the following water supply plan to meet a portion of the projected needs for irrigation (Table 4B.2.16-18).

- Irrigation water conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 7,770 acft/yr of supply.

Table 4B.2.16-18. Recommended Water Supply Plan for Irrigation

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	7,770	5,878	4,067	2,332	670	0
Recommended Plan						
Irrigation Water Conservation	7,770	5,878	4,067	2,332	670	—
Total New Supply	**7,770**	**5,878**	**4,067**	**2,332**	**670**	—

Estimated costs of the recommended plan to meet the irrigation projected needs are shown in Table 4B.2.16-19.

Table 4B.2.16-19. Recommended Plan Costs by Decade for Irrigation

Plan Element	2010	2020	2030	2040	2050	2060
Irrigation Water Conservation						
Annual Cost ($/yr)	$1,072,260	$811,164	$561,246	$321,816	$92,460	—
Unit Cost ($/acft)	$138	$138	$138	$138	$138	—

4B.2.16.13 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group’s projected demand during the planning period.

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4B.2.17 Refugio County Water Supply Plan

Table 4B.2.17-1 lists each water user group in Refugio County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.17-1.
Refugio County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
City of Refugio	792	660	No projected shortage
City of Woodsboro	391	381	No projected shortage
Rural Area Residential and Commercial	132	221	No projected shortage
Industrial	0	0	No projected demand
Steam-Electric Power	0	0	No projected demand
Mining	1	0	No projected shortage
Irrigation	0	0	No projected shortage
Livestock	0	0	No projected shortage

4B.2.17.1 City of Refugio

The City of Refugio is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Refugio implement the following water supply plan (Table 4B.2.17-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 44 acft/yr by 2010, increasing to 144 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.17-2.
Recommended Water Supply Plan for the City of Refugio

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	44	94	100	114	130	144
Total New Supply	**44**	**94**	**100**	**114**	**130**	**144**

Estimated costs of the recommended plan for the City of Refugio are shown in Table 4B.2.17-3.

Table 4B.2.17-3.
Recommended Plan Costs by Decade for the City of Refugio

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$33,794	$60,341	$60,375	$65,588	$72,966	$80,476
Unit Cost ($/acft)	$768	$642	$604	$575	$561	$559

4B.2.17.2 City of Woodsboro

The City of Woodsboro is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Woodsboro implement the following water supply plan (Table 4B.2.17-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 5 acft/yr by 2010, increasing to 20 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

It is noted that groundwater quality and a potential change in the arsenic standard may necessitate additional treatment or alternative supplies, such as Brackish Groundwater Desalination (Gulf Coast) or Purchase from WWP.

Table 4B.2.17-4.
Recommended Water Supply Plan for the City of Woodsboro

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	5	6	7	8	14	20
Total New Supply	**5**	**6**	**7**	**8**	**14**	**20**

Estimated costs of the recommended plan for the City of Woodsboro are shown in Table 4B.2.17-5.

Table 4B.2.17-5.
Recommended Plan Costs by Decade for the City of Woodsboro

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$3,894	$4,740	$5,344	$5,907	$9,354	$12,840
Unit Cost ($/acft)	$779	$790	$763	$738	$668	$642

4B.2.1.3 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Gulf Coast Aquifer to meet their projected demands during the planning period.

4B.2.17.4 Industrial

There is no projected industrial water demand in Refugio County, therefore no water management strategies are recommended for this water user group.

4B.2.17.5 Steam-Electric Power

There is no projected steam-electric power water demand in Refugio County, therefore no water management strategies are recommended for this water user group.

4B.2.17.6 Mining

Mining is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group’s projected demand during the planning period.

4B.2.17.7 Irrigation

Irrigation is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group's projected demand during the planning period.

4B.2.17.8 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demand during the planning period.

4B.2.18 Uvalde County Water Supply Plan

Table 4B.2.18-1 lists each water user group in Uvalde County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.18-1.
Uvalde County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
City of Sabinal	-127	-109	Projected shortage (2010 through 2060)
City of Uvalde	-3,172	-3,263	Projected shortage (2010 through 2060)
Rural Area Residential and Commercial	1,277	317	No projected shortage
Industrial	943	837	No projected shortage
Steam-Electric Power	0	0	No projected demand
Mining	105	0	No projected shortage
Irrigation	14,680	24,768	No projected shortage
Livestock	0	0	No projected shortage

4B.2.18.1 City of Sabinal

Current water supply for the City of Sabinal is obtained from the Edwards Aquifer. Sabinal is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Sabinal implement the following water supply plan to meet the projected needs for the city (Table 4B.2.18-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 34 acft/yr by 2010, increasing to 145 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional 127 acft/yr by 2010, decreasing to 109 acft/yr of supply in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 20 acft/yr by 2010.

Table 4B.2.18-2.
Recommended Water Supply Plan for the City of Sabinal

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	127	123	118	113	109	109
Recommended Plan						
Municipal Water Conservation	34	65	92	116	139	145
Edwards Transfers	127	123	118	113	109	109
Drought Management	20	—	—	—	—	—
Total New Supply	**181**	**188**	**210**	**229**	**248**	**254**

Estimated costs of the recommended plan to meet the City of Sabinal's projected needs are shown in Table 4B.2.18-3.

Table 4B.2.18-3.
Recommended Plan Costs by Decade for the City of Sabinal

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$24,444	$39,084	$51,968	$63,222	$74,396	$77,939
Unit Cost ($/acft)	$719	$601	$565	$545	$535	$538
Edwards Transfers						
Annual Cost ($/yr)	$57,658	$55,842	$53,572	$51,302	$49,486	$49,486
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$16,302	—	—	—	—	—
Unit Cost ($/acft)	$815	—	—	—	—	—

4B.2.18.2 City of Uvalde

Current water supply for the City of Uvalde is obtained from the Edwards Aquifer. Uvalde is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Uvalde implement the following water supply plan to meet the projected needs for the city (Table 4B.2.18-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 521 acft/yr by 2010, increasing to 2,652 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional 3,172 acft/yr by 2010, increasing to 3,263 acft/yr of supply in 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 304 acft/yr by 2010.

Table 4B.2.18-4.
Recommended Water Supply Plan for the City of Uvalde

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	3,172	3,209	3,229	3,233	3,235	3,263
Recommended Plan						
Municipal Water Conservation	521	1,017	1,471	1,882	2,269	2,652
Edwards Transfers	3,172	3,209	3,229	3,233	3,235	3,263
Drought Management	304	—	—	—	—	—
Total New Supply	**3,997**	**4,226**	**4,700**	**5,115**	**5,504**	**5,915**

Estimated costs of the recommended plan to meet the City of Uvalde's projected needs are shown in Table 4B.2.18-5.

Table 4B.2.18-5.
Recommended Plan Costs by Decade for the City of Uvalde

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	$331,239	$579,229	$804,800	$1,007,941	$1,201,842	$1,402,664
Unit Cost ($/acft)	$636	$570	$547	$536	$530	$529
Edwards Transfers						
Annual Cost ($/yr)	$1,440,088	$1,456,886	$1,465,966	$1,467,782	$1,468,690	$1,481,402
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Drought Management						
Annual Cost ($/yr)	$3,371	—	—	—	—	—
Unit Cost ($/acft)	$11	—	—	—	—	—

4B.2.18.3 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Edwards Aquifer and Carrizo Aquifer to meet their projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected needs for rural areas (Table 4B.2.18-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 33 acft/yr by 2040, increasing to 137 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.18-6.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	—	—	—	33	73	137
Total New Supply	—	—	—	**33**	**73**	**137**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.18-7.

Table 4B.2.18-7.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	$25,734	$56,398	$105,635
Unit Cost ($/acft)	—	—	—	$780	$773	$771

4B.2.18.4 Industrial

Industrial is projected to have adequate water supplies available from the Edwards Aquifer to meet the water user group’s projected demand during the planning period.

4B.2.18.5 Steam-Electric Power

There is no projected steam-electric power water demand in Uvalde County, therefore no water management strategies are recommended for this water user group.

4B.2.18.6 Mining

Mining is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group’s projected demand during the planning period.

4B.2.18.7 Irrigation

Irrigation is projected to have adequate water supplies available from the Edwards Aquifer and run-of-river rights to meet the water user group’s projected demand during the planning period.

4B.2.18.8 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group’s projected demand during the planning period.

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4B.2.19 Victoria County Water Supply Plan

Table 4B.2.19-1 lists each water user group in Victoria County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.19-1.
Victoria County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
City of Victoria	3,505	551	No projected shortage
Rural Area Residential and Commercial	833	-310	Projected shortage (2050 through 2060)
Industrial	419	-14,441	Projected shortage (2020 through 2060)
Steam-Electric Power	-1,791	-51,076	Projected shortage (2010 through 2060)
Mining	0	0	No projected shortage
Irrigation	0	0	No projected shortage
Livestock	0	0	No projected shortage

4B.2.19.1 City of Victoria

The City of Victoria is projected to have adequate water supplies available from the Gulf Coast Aquifer and run-of-river rights to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Victoria implement the following water supply plan (Table 4B.2.19-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 874 acft/yr by 2010, increasing to 2,485 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Surface Water Rights and Balancing Storage have been identified as recommended water management strategies.

Table 4B.2.19-2.
Recommended Water Supply Plan for the City of Victoria

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	874	1,597	1,733	1,844	2,118	2,485
Total New Supply	**874**	**1,597**	**1,733**	**1,844**	**2,118**	**2,485**

Estimated costs of the recommended plan for the City of Victoria are shown in Table 4B.2.19-3.

Table 4B.2.19-3.
Recommended Plan Costs by Decade for the City of Victoria

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$595,101	$974,331	$1,014,018	$1,035,513	$1,167,614	$1,361,420
Unit Cost ($/acft)	$681	$610	$585	$562	$551	$548

4B.2.19.2 Rural Area Residential and Commercial

Rural Areas obtain their water supplies from the Gulf Coast Aquifer to meet their projected demands during the planning period. A projected shortage is expected prior to 2040. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected needs for rural areas (Table 4B.2.19-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 32 acft/yr in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (GBRA) to be implemented by 2040. This strategy can provide an additional 81 acft/yr in 2040, increasing to 310 acft/yr by 2060.

Table 4B.2.19-4.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	81	193	310
Recommended Plan						
Municipal Water Conservation	—	—	—	—	—	32
Purchase from WWP (GBRA)	—	—	—	81	193	310
Total New Supply	**—**	**—**	**—**	**81**	**193**	**342**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.19-5.

Table 4B.2.19-5.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	—	$24,722
Unit Cost ($/acft)	—	—	—	—	—	$773
Purchase from WWP (GBRA) [1]						
Annual Cost ($/yr)	—	—	—	$158,193	$376,929	$290,470
Unit Cost ($/acft)	—	—	—	$1,953	$1,953	$937
[1]*Unit cost based on cost estimate in Section 4C.14, plus treatment associated with delivery of 500 acft/yr of water.*						

4B.2.19.3 Industrial

Current water supply for industrial is obtained from the Gulf Coast Aquifer and run-of-river rights. Industrial is projected to need additional water supplies starting in the planning year 2020. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that individual industrial operations implement the following water supply plan to meet the projected needs for Industrial (Table 4B.2.19-6).

- Purchase from WWP (GBRA) to be implemented in 2020. This strategy can provide an additional 2,969 acft/yr of supply in 2020 increasing to 14,441 acft/yr in 2060.

Table 4B.2.19-6.
Recommended Water Supply Plan for Industrial

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	—	2,969	5,921	8,860	11,489	14,441
Recommended Plan						
Purchase from WWP (GBRA)	—	2,969	5,921	8,860	11,489	14,441
Total New Supply	**—**	**2,969**	**5,921**	**8,860**	**11,489**	**14,441**

Estimated costs of the recommended plan to meet the industrial projected needs are shown in Table 4B.2.19-7.

Table 4B.2.19-7.
Recommended Plan Costs by Decade for Industrial

Plan Element	2010	2020	2030	2040	2050	2060
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	—	$311,745	$3,931,544	$5,883,040	$3,745,414	$4,707,766
Unit Cost ($/acft)	—	$105	$664	$664	$326	$326

4B.2.19.4 Steam-Electric Power

Steam-electric power obtains water supply from the Gulf Coast Aquifer and run-of-river rights to meet the water user group's projected needs during the entire planning period. The following water supply plan is recommended for Steam-Electric Power for Victoria County.

- Purchase from WWP (GBRA – Exelon) to be implemented in 2020. This strategy can provide an additional 49,126 acft/yr starting in 2020 through 2060.
- Purchase from WWP (GBRA) to be implemented in 2010. This strategy can provide an additional 1,791 acft/yr starting in 2010, increasing to 1,950 acft/yr by 2060.

Table 4B.2.19-8.
Recommended Water Supply Plan for Steam-Electric Power

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	1,791	50,962	50,991	51,021	51,053	51,076
Recommended Plan						
Purchase from WWP (GBRA – Exelon)	—	49,126	49,126	49,126	49,126	49,126
Purchase from WWP (GBRA)	1,791	1,836	1,865	1,895	1,927	1,950
Total New Supply	**1,791**	**50,962**	**50,991**	**51,021**	**51,053**	**51,076**

Estimated costs of the recommended plan to meet the Steam-Electric Power projected needs are shown in Table 4B.2.19-9.

Table 4B.2.19-9.
Recommended Plan Costs by Decade for Steam-Electric Power

Plan Element	2010	2020	2030	2040	2050	2060
Purchase from WWP (GBRA – Exelon)						
Annual Cost ($/yr)	—	$31,735,396	$31,735,396	$22,990,968	$22,990,968	$11,004,224
Unit Cost ($/acft)	—	$646	$646	$468	$468	$224
Purchase from WWP (GBRA)*						
Annual Cost ($/yr)	$188,055	$192,780	$1,238,360	$1,258,280	$628,202	$635,700
Unit Cost ($/acft)	$105	$105	$664	$664	$326	$326
**Unit cost based on cost estimate in Section 4C.14, plus treatment associated with delivery of 500 acft/yr of water.*						

4B.2.19.5 Mining

Mining is projected to have adequate water supplies available from the Gulf Coast Aquifer to meet the water user group’s projected demand during the planning period.

4B.2.19.6 Irrigation

Irrigation is projected to have adequate water supplies available from the Gulf Coast Aquifer and run-of-river rights to meet the water user group’s projected demand during the planning period.

4B.2.19.7 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demand during the planning period.

4B.2.20 Wilson County Water Supply Plan

Table 4B.2.20-1 lists each water user group in Wilson County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.20-1.
Wilson County Management Supply/Shortage by Water User Group

Water User Group	***Management Supply/Shortage***		***Comment***
	2010 (acft/yr)	***2060 (acft/yr)***	
East Central SUD			See Bexar County
El Oso WSC			See Karnes County
City of Floresville	762	-433	Projected shortage (2050 and 2060)
City of La Vernia	777	291	No projected shortage
McCoy WSC			See Atascosa County
Oak Hills WSC	1,169	-298	Projected shortage (2060)
City of Poth	955	718	No projected shortage
SS WSC	-223	-3,690	Projected shortage (2010 through 2060)
City of Stockdale	1,412	1,204	No projected shortage
Sunko WSC*	697	-16	Projected shortage (2060)
Rural Area Residential and Commercial	1,364	-33	Projected shortage (2060)
Industrial	0	0	No projected shortage
Steam-Electric Power	0	0	No projected demand
Mining	0	0	No projected shortage
Irrigation	307	5,273	No projected shortage
Livestock	0	0	No projected shortage

**These values represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages.*

4B.2.20.1 City of Floresville

Current water supply for the City of Floresville is obtained from the Carrizo Aquifer. Floresville is projected to need additional water supplies prior to 2050. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Floresville implement the following water supply plan to meet the projected needs for the city (Table 4B.2.20-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 136 acft/yr by 2010, increasing to 714 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Carrizo) to be implemented prior to 2050. This strategy can provide an additional 484 acft/yr by 2050, through 2060.

Alternative water management strategies identified by City of Floresville include Recycled Water Programs and/or Brackish Wilcox Groundwater.

Table 4B.2.20-2.
Recommended Water Supply Plan for the City of Floresville

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	159	433
Recommended Plan						
Municipal Water Conservation	136	291	433	504	596	714
Local Groundwater Supplies (Carrizo)	—	—	—	—	484	484
Total New Supply	**136**	**291**	**433**	**504**	**1,080**	**1,198**

Estimated costs of the recommended plan to meet the City of Floresville's projected needs are shown in Table 4B.2.20-3.

Table 4B.2.20-3.
Recommended Plan Costs by Decade for the City of Floresville

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation						
Annual Cost ($/yr)	$104,780	$180,789	$249,346	$281,909	$328,209	$391,478
Unit Cost ($/acft)	$770	$621	$576	$559	$551	$548
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	—	—	—	—	$356,000	$356,000
Unit Cost ($/acft)	—	—	—	—	$736	$736

4B.2.20.2 City of La Vernia

Current water supply for the City of La Vernia is obtained from the Carrizo Aquifer. La Vernia is projected to have adequate water supplies through 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that La Vernia implement the following water supply plan (Table 4B.2.20-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 21 acft/yr by 2010, increasing to 227 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Purchase from WWP (CRWA) to be implemented prior to 2010. This strategy can provide an additional 400 acft/yr from 2010 through 2060.

Table 4B.2.20-4.
Recommended Water Supply Plan for the City of La Vernia

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	21	56	105	146	184	227
Purchase from WWP (CRWA)	400	400	400	400	400	400
Total New Supply	**421**	**456**	**505**	**546**	**584**	**627**

Estimated costs of the recommended plan for the City of La Vernia are shown in Table 4B.2.20-5.

Table 4B.2.20-5.
Recommended Plan Costs by Decade for the City of La Vernia

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$16,157	$34,445	$60,222	$81,476	$102,604	$126,114
Unit Cost ($/acft)	$769	$615	$574	$558	$558	$556
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	$290,000	$439,873	$427,195	$285,340	$179,274	$173,001
Unit Cost ($/acft)	$725	$1,100	$1,068	$713	$448	$433

4B.2.20.3 Oak Hills WSC

Current water supply for Oak Hills WSC is obtained from the Carrizo Aquifer. Oak Hills WSC is projected to need additional water supplies prior to 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Oak Hills WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.20-6).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 26 acft/yr by 2040, increasing to 136 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Carrizo) to be implemented prior to 2060. This strategy can provide an additional 323 acft/yr by 2060.

Table 4B.2.20-6.
Recommended Water Supply Plan for Oak Hills WSC

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	298
Recommended Plan						
Municipal Water Conservation	—	—	—	26	76	136
Local Groundwater Supplies (Carrizo)	—	—	—	—	—	323
Total New Supply	—	—	—	**26**	**76**	**459**

Estimated costs of the recommended plan to meet Oak Hills WSC's projected needs are shown in Table 4B.2.20-7.

Table 4B.2.20-7.
Recommended Plan Costs by Decade for Oak Hills WSC

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	$20,004	$58,480	$100,600
Unit Cost ($/acft)	—	—	—	$769	$769	$740
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	—	—	—	—	—	$260,000
Unit Cost ($/acft)	—	—	—	—	—	$806

4B.2.20.4 City of Poth

The City of Poth is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Poth implement the following water supply plan (Table 4B.2.20-8).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 20 acft/yr by 2010, increasing to 64 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

An alternative water management strategy identified by City of Poth is Local Groundwater Supplies (Carrizo).

Table 4B.2.20-8.
Recommended Water Supply Plan for the City of Poth

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	20	22	25	28	46	64
Total New Supply	**20**	**22**	**25**	**28**	**46**	**64**
** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*						

Estimated costs of the recommended plan for the City of Poth are shown in Table 4B.2.20-9.

Table 4B.2.20-9.
Recommended Plan Costs by Decade for the City of Poth

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$15,634	$16,790	$18,217	$18,712	$27,907	$37,476
Unit Cost ($/acft)	$782	$763	$729	$668	$607	$586

4B.2.20.5 SS WSC

Current water supply for SS WSC is obtained from the Carrizo Aquifer. SS WSC is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that SS WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.20-10).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 84 acft/yr by 2050, increasing to 221 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Carrizo) to be implemented prior to 2010. This strategy can provide an additional 807 acft/yr by 2010, increasing to 4,033 acft/yr of supply by 2060.
- Purchase from WWP (CRWA) to be implemented prior to 2060. This strategy can provide an additional 690 acft/yr in 2060.
- Brackish Wilcox Groundwater for SS WSC[6] to be implemented by 2040. This strategy can provide an additional 1,120 acft/yr by 2040, through 2060.
- Drought Management to be implemented or enhanced in the immediate future. This strategy can provide an additional 78 acft/yr by 2010.

An alternative water management strategy identified by SS WSC is Recycled Water Programs.

[6] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

Table 4B.2.20-10.
Recommended Water Supply Plan for SS WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	223	864	1,546	2,214	2,939	3,690
Recommended Plan						
Municipal Water Conservation	—	—	—	—	84	221
Local Groundwater Supplies (Carrizo)	807	1,613	1,613	2,420	3,226	4,033
Purchase from WWP (CRWA)	—	—	—	—	—	690
Brackish Wilcox Groundwater for SS WSC	—	—	—	1,120	1,120	1,120
Drought Management	78	—	—	—	—	—
Total New Supply	**885**	**1,613**	**1,613**	**3,540**	**4,430**	**6,064**

** Additional Water Supply Needs in Drought may be greater than shown in some decades due to locally observed population growth rates greater than approved population projections for the 2011 Region L Water Plan.*

Estimated costs of the recommended plan to meet SS WSC's projected needs are shown in Table 4B.2.20-11.

Table 4B.2.20-11.
Recommended Plan Costs by Decade for SS WSC

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	—	$64,588	$169,800
Unit Cost ($/acft)	—	—	—	—	$769	$768
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	$926,400	$1,852,800	$1,337,763	$1,749,127	$2,675,527	$3,086,890
Unit Cost ($/acft)	$1,149	$1,149	$829	$723	$829	$765
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	—	—	—	—	—	$298,427
Unit Cost ($/acft)	—	—	—	—	—	$433
Brackish Wilcox Groundwater for SS WSC						
Annual Cost ($/yr)	—	—	—	$2,108,960	$2,108,960	$856,800
Unit Cost ($/acft)	—	—	—	$1,883	$1,883	$765
Drought Management						
Annual Cost ($/yr)	$86,090	—	—	—	—	—
Unit Cost ($/acft)	$1,104	—	—	—	—	—

4B.2.20.6 City of Stockdale

The City of Stockdale is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Stockdale implement the following water supply plan (Table 4B.2.20-12).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 27 acft/yr by 2010, increasing to 171 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

An alternative water management strategy identified by City of Stockdale is Local Groundwater Supplies (Carrizo).

Table 4B.2.20-12.
Recommended Water Supply Plan for the City of Stockdale

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	27	57	93	128	147	171
Total New Supply	**27**	**57**	**93**	**128**	**147**	**171**

Estimated costs of the recommended plan for the City of Stockdale are shown in Table 4B.2.20-13.

Table 4B.2.20-13.
Recommended Plan Costs by Decade for the City of Stockdale

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$20,213	$34,888	$52,515	$70,039	$79,781	$92,384
Unit Cost ($/acft)	$749	$612	$565	$547	$543	$540

4B.2.20.7 Sunko WSC

Current water supply for Sunko WSC is obtained from the Carrizo Aquifer. Sunko WSC is projected to need additional water supplies prior to 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Sunko WSC implement the following water supply plan to meet the projected needs for the WSC (Table 4B.2.20-14).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 3 acft/yr by 2010, increasing to 92 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).
- Local Groundwater Supplies (Carrizo) to be implemented prior to 2060. This strategy can provide an additional 161 acft/yr by 2060.

Table 4B.2.20-14.
Recommended Water Supply Plan for Sunko WSC

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	0	0	0	0	0	70
Recommended Plan						
Municipal Water Conservation	3	6	10	29	54	92
Local Groundwater Supplies (Carrizo)	—	—	—	—	—	161
Total New Supply	**3**	**6**	**10**	**29**	**54**	**253**

Estimated costs of the recommended plan to meet Sunko WSC's projected needs are shown in Table 4B.2.20-15.

Table 4B.2.20-15.
Recommended Plan Costs by Decade for Sunko WSC

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Municipal Water Conservation						
Annual Cost ($/yr)	$2,522	$4,800	$7,421	$22,111	$39,363	$60,669
Unit Cost ($/acft)	$841	$800	$742	$762	$729	$659
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	—	—	—	—	—	$161,000
Unit Cost ($/acft)	—	—	—	—	—	$998

4B.2.20.8 Rural Area Residential and Commercial

Rural Areas obtain their water supplies from the Carrizo Aquifer and run-of-river rights to meet their projected demands during the planning period. A projected shortage is expected in year 2060. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected need for rural areas (Table 4B.2.20-16).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 14 acft/yr by 2040, increasing to 116 acft/yr in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.20-16.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	33
Recommended Plan						
Municipal Water Conservation	—	—	—	14	58	116
Total New Supply	—	—	—	**14**	**58**	**116**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.20-17.

Table 4B.2.20-17.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	—	—	—	$10,542	$44,842	$89,671
Unit Cost ($/acft)	—	—	—	$753	$773	$773

4B.2.20.9 Industrial

Industrial is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group’s projected demand during the planning period.

4B.2.20.10 Steam-Electric Power

There is no projected steam-electric power water demand in Wilson County, therefore no water management strategies are recommended for this water user group.

4B.2.20.11 Mining

Mining is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group’s projected demand during the planning period.

4B.2.20.12 Irrigation

Irrigation is projected to have adequate water supplies available from the Carrizo Aquifer, Sparta Aquifer, Queen City Aquifer, and run-of-river rights to meet the water user group’s projected demand during the planning period.

4B.2.20.13 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group’s projected needs during the planning period.

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4B.2.21 Zavala County Water Supply Plan

Table 4B.2.21-1 lists each water user group in Zavala County and its corresponding management supply or shortage in years 2010 and 2060. For each water user group with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.2.21-1.
Zavala County Management Supply/Shortage by Water User Group

Water User Group	Management Supply/Shortage 2010 (acft/yr)	Management Supply/Shortage 2060 (acft/yr)	Comment
City of Crystal City	1,277	1,154	No projected shortage
Rural Area Residential and Commercial	524	17	No projected shortage
Industrial	272	0	No projected shortage
Steam-Electric Power	0	0	No projected demand
Mining	8	0	No projected shortage
Irrigation	-54,600	-41,492	Projected shortage (2010 through 2060)
Livestock	0	0	No projected shortage

4B.2.21.1 City of Crystal City

The City of Crystal City is projected to have adequate water supplies available from the Carrizo Aquifer to meet the city's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that the City of Crystal City implement the following water supply plan (Table 4B.2.21-2).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 192 acft/yr by 2010, increasing to 1,002 acft/yr of supply in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.21-2.
Recommended Water Supply Plan for the City of Crystal City

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	192	364	543	695	850	1,002
Total New Supply	**192**	**364**	**543**	**695**	**850**	**1,002**

Estimated costs of the recommended plan for the City of Crystal City are shown in Table 4B.2.21-3.

Table 4B.2.21-3.
Recommended Plan Costs by Decade for the City of Crystal City

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$131,689	$214,268	$302,422	$375,117	$454,514	$534,401
Unit Cost ($/acft)	$686	$589	$557	$540	$535	$533

4B.2.21.2 Rural Area Residential and Commercial

Rural Areas are projected to have adequate water supplies available from the Carrizo Aquifer to meet their projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that rural area water supply districts and authorities and individual households and/or businesses not served by public water supply systems implement the following water supply plan to meet the projected needs for rural areas (Table 4B.2.21-4).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 42 acft/yr by 2010, increasing to 149 acft/yr in 2060 (Volume II, Section 4C.1.1).

Table 4B.2.21-4.
Recommended Water Supply Plan for Rural Areas

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation	42	54	71	89	115	149
Total New Supply	**42**	**54**	**71**	**89**	**115**	**149**

Estimated costs of the recommended plan for rural areas are shown in Table 4B.2.21-5.

Table 4B.2.21-5.
Recommended Plan Costs by Decade for Rural Areas

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation						
Annual Cost ($/yr)	$32,321	$41,667	$54,983	$62,138	$74,636	$92,728
Unit Cost ($/acft)	$770	$772	$774	$698	$649	$622

4B.2.21.3 Industrial

Industrial is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group’s projected demand during the planning period.

4B.2.21.4 Steam-Electric Power

There is no projected steam-electric water demand in Zavala County, therefore no water management strategies are recommended for this water user group.

4B.2.21.5 Mining

Mining is projected to have adequate water supplies available from the Carrizo Aquifer to meet the water user group’s projected demand during the planning period.

4B.2.21.6 Irrigation

Current water supply for irrigation is obtained from the Carrizo Aquifer. Irrigation is projected to need additional water supplies prior to 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that individual irrigators implement the following water supply plan to meet a portion of the projected needs for irrigation (Table 4B.2.21-6).

- Irrigation Water Conservation to be implemented or enhanced in the immediate future. This strategy can provide an additional 6,948 acft/yr of supply. The SCTRWPG has determined that it is not economically feasible for agricultural producers to pay for additional supplies to meet projected needs.

Table 4B.2.21-6.
Recommended Water Supply Plan for Irrigation

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)	54,600	51,763	49,038	46,421	43,907	41,492
Recommended Plan						
Irrigation Water Conservation	6,948	6,948	6,948	6,948	6,948	6,948
Total New Supply	**6,948**	**6,948**	**6,948**	**6,948**	**6,948**	**6,948**

Estimated costs of the recommended plan to meet the Irrigation projected needs are shown in Table 4B.2.21-7.

Table 4B.2.21-7.
Recommended Plan Costs by Decade for Irrigation

Plan Element	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Irrigation Water Conservation						
Annual Cost ($/yr)	$882,396	$882,396	$882,396	$882,396	$882,396	$882,396
Unit Cost ($/acft)	$127	$127	$127	$127	$127	$127

4B.2.21.7 Livestock

Livestock is projected to have adequate water supplies available from local sources to meet the water user group's projected demand during the planning period.

4B.3 Water Supply Plans for Wholesale Water Providers

Table 4B.3-1 lists each Wholesale Water Provider identified by the SCTRWPG and their corresponding management supply or shortage in years 2010 and 2060. For each Wholesale Water Provider with a projected shortage, or need, a water supply plan has been developed and is presented in the following subsections.

Table 4B.3-1.
Wholesale Water Provider Management Supply/Shortage

Major Water Provider	*Management Supply/Shortage* 2010 (acft/yr)	*Management Supply/Shortage* 2060 (acft/yr)	*Comment*
San Antonio Water System (SAWS)	-73,600	-193,264	Projected shortage (2010 through 2060)
Bexar Metropolitan Water District (BMWD)	-16,638	-36,387	Projected shortage (2010 through 2060)
Guadalupe-Blanco River Authority (GBRA)	126,065	-16,708	Projected shortage (2050 through 2060)
Canyon Regional Water Authority (CRWA)	-7,920	-40,400	Projected shortage (2010 through 2060)
Lavaca-Navidad River Authority (LNRA)*	-10,046	-10,489	Projected shortage (2010 through 2060)
Schertz-Seguin Local Government Corporation (SSLGC)	3,432	-4,935	Projected shortage (2040 through 2060)
Springs Hill WSC (SHWSC)	2,751	770	No projected shortage
Texas Water Alliance (TWA)	0	-21,095	Projected shortage (2020 through 2060)

* LNRA, while located outside of Region L, is the WWP for municipal (Point Comfort) and industrial (Formosa Plastics Corporation) users in the portion of Calhoun County east of Lavaca Bay. LNRA is presented in Section 4B.3 only. Management Supply/Shortage for LNRA based on Region L demands only.

4B.3.1 San Antonio Water System (SAWS)

Current water supply for SAWS is obtained from the Edwards Aquifer, Trinity Aquifer, Carrizo Aquifer, Canyon Reservoir, Aquifer Storage and Recovery (ASR) Project, and Direct Reuse. SAWS is projected to need additional water supplies prior to the year 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that SAWS implement the following water supply plan to meet the projected needs for SAWS (Table 4B.3.1-1).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy has been assigned to each individual Water User Group (WUG) based on the Municipal Water Conservation water management strategy recommended by the SCTRWPG.

- Drought Management[7] to be implemented prior to 2010. This strategy can provide an additional 37,622 acft/yr of supply for the year 2010.
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional 35,935 acft/yr of supply for the years 2010 through 2060.
- ASR Project and Phased Expansion[8] to be implemented prior to 2010. This strategy can provide an additional 3,800 acft/yr of supply for the year 2010, increasing to 16,000 acft/yr through 2060.
- Recycled Water Programs[9] to be implemented prior to 2010. This strategy can provide an additional 15,127 acft/yr of supply by the year 2010 through 2060.
- Facilities Expansions/Integration Pipelines[10]
- Regional Carrizo for SAWS[11] to be implemented prior to 2020. This strategy can provide an additional 11,687 acft/yr of supply for the years 2020 through 2060.
- Edwards Aquifer Recharge – Type 2 Projects to be implemented prior to 2020. This strategy can provide an additional 13,451 acft/yr of supply for the years 2020 through 2050, increasing to 21,577 acft/yr in 2060.
- Brackish Wilcox Groundwater for SAWS[11] to be implemented prior to 2020. This strategy can provide an additional 12,000 acft/yr of supply by 2020, increasing to 26,400 acft/yr by 2060.
- LCRA/SAWS Water Project to be implemented prior to 2030. This strategy can provide an additional 90,000 acft/yr of supply for the years 2030 through 2060.
- Seawater Desalination to be implemented prior to 2060. This strategy can provide an additional 84,012 acft/yr of supply for the year 2060.

Water management strategies requiring further study prior to implementation include: Edwards Aquifer Recharge and Recirculation, Mesa Water Supply Project, and the Other Water Supplies (Planned RFP).

[7] Periodic activation of drought contingency measures resulting in demand reductions considered as a near-term alternative to development of water supplies that are reliable during drought. Amount shown is near-term Permitted Supply Gap from SAWS 2009 Water Management Plan Update.
[8] Amounts shown are from SAWS 2009 Water Management Plan Update.
[9] Uncommitted portion of existing 35,000 acft/yr Recycled Water system capacity.
[10] Systems and pipelines have no associated firm yield, but are necessary to deliver new sources of supply to SAWS customers.
[11] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

Table 4B.3.1-1.
Recommended Water Supply Plan for SAWS

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	73,600	102,549	128,122	152,713	177,022	193,264
Recommended Plan						
Municipal Water Conservation[1]	—	—	—	—	—	—
Drought Management	37,622	—	—	—	—	—
Edwards Transfers	35,935	35,935	35,935	35,935	35,935	35,935
ASR Project and Phased Expansion	3,800	16,000	16,000	16,000	16,000	16,000
Recycled Water Program Expansion	15,127	15,127	15,127	15,127	15,127	15,127
Regional Carrizo for SAWS	—	11,687	11, 687	11, 687	11, 687	11, 687
Edwards Aquifer Recharge – Type 2 Projects	—	13,451	13,451	13,451	13,451	21,577
Brackish Wilcox Groundwater for SAWS	—	12,000	21,000	26,400	26,400	26,400
LCRA/SAWS Water Project	—	—	90,000	90,000	90,000	90,000
Seawater Desalination	—	—	—	—	—	84,012
Total New Supply	**92,484**	**104,200**	**203,200**	**208,600**	**208,600**	**300,738**

[1] *Assigned by Water User Group based on Municipal Conservation water management strategy recommended by SCTRWPG.*

Estimated costs of the recommended plan to meet the SAWS projected needs are shown in Table 4B.3.1-2.

Table 4B.3.1-2.
Recommended Plan Costs by Decade for SAWS

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation[1]						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
Drought Management						
Annual Cost ($/yr)	$21,632,650	—	—	—	—	—
Unit Cost ($/acft)	$575	—	—	—	—	—
Edwards Transfers						
Annual Cost ($/yr)	$16,314,490	$16,314,490	$16,314,490	$16,314,490	$16,314,490	$16,314,490
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
ASR Project and Phased Expansion						
Annual Cost ($/yr)	NA	NA	NA	NA	NA	NA
Unit Cost ($/acft)	NA	NA	NA	NA	NA	NA
Recycled Water Programs						
Annual Cost ($/yr)	$13,565,102	$14,160,410	$14,725,443	$3,913,671	$4,237,753	$4,498,681
Unit Cost ($/acft)	$725	$602	$525	$124	$124	$124
Regional Carrizo for SAWS						
Annual Cost ($/yr)	—	$15,695,641	$15,695,641	$3,786,588	$3,786,588	$3,786,588
Unit Cost ($/acft)	—	$1,343	$1,343	$324	$324	$324
Edwards Aquifer Recharge – Type 2 Projects						
Annual Cost ($/yr)	—	$11,940,000	$11,940,000	$11,117,000	$11,117,000	$37,275,000
Unit Cost ($/acft)	—	$888	$888	$826	$826	$1,728
Brackish Wilcox Groundwater for SAWS						
Annual Cost ($/yr)	—	$17,976,000	$31,458,000	$19,668,000	$19,668,000	$19,668,000
Unit Cost ($/acft)	—	$1,498	$1,498	$745	$745	$745
LCRA/SAWS Water Project						
Annual Cost ($/yr)	—	—	$215,460,000	$215,460,000	$74,610,000	$74,610,000
Unit Cost ($/acft)	—	—	$2,394	$2,394	$829	$829
Seawater Desalination						
Annual Cost ($/yr)	—	—	—	—	—	$191,857,000
Unit Cost ($/acft)	—	—	—	—	—	$2,284

[1] These costs have been assigned to the individual Water User Groups.

4B.3.2 Bexar Metropolitan Water District (BMWD)

Current water supply for BMWD is obtained from the Edwards Aquifer, Carrizo Aquifer, Trinity Aquifer, Canyon Reservoir, Medina Lake System, and run-of-river rights. BMWD is projected to need additional water supplies prior to the year 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that BMWD implement the following water supply plan to meet the projected needs for BMWD (Table 4B.3.2-1).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy has been assigned to each individual BMWD customer Water User Group (WUG) based on the Municipal Conservation water management strategy recommended by the SCTRWPG. Quantities shown in Table 4B.3.3-1 are approximate and for general reference only.
- Edwards Transfers to be implemented prior to 2010. This strategy can provide an additional 3,000 acft/yr of supply for the years 2010 through 2060.
- Surface Water Rights[12].
- Local Groundwater Supplies (Trinity) to be implemented prior to 2010. This strategy can provide an additional 2,016 acft/yr of supply for the years 2010 through 2060.
- Local Groundwater Supplies (Carrizo) to be implemented prior to 2010. This strategy can provide an additional 4,030 acft/yr of supply for the years 2010, increasing to 16,129 acft/yr by 2060.
- Medina Lake Firm-Up (ASR) to be implemented prior to 2010. This strategy can provide an additional 9,933 acft/yr of supply for the years 2010 through 2060.
- Purchase from WWP (CRWA) to be implemented prior to 2010. This strategy can provide an additional 2,800 acft/yr of supply in the year 2010, increasing to 8,250 acft/yr of additional supply in 2020, and continuing at 8,250 acft/yr to 2060.
- Facilities Expansions (System Interconnects)[13]

Medina Lake Firm-Up (OCR) is listed as an alternative water management strategy.

[12] Purchase of junior water rights on the Medina River likely to have little, if any firm yield. Such water rights could be used in non-drought years and/or as part of the Medina Lake Firm-Up WMS.
[13] Systems and pipelines have no associated firm yield, but are necessary to deliver new sources of supply to BMWD customers.

Table 4B.3.2-1.
Recommended Water Supply Plan for BMWD

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	16,638	20,139	27,798	30,607	33,461	36,387
Recommended Plan						
Municipal Water Conservation[1]	—	—	—	—	—	—
Edwards Transfers	3,000	3,000	3,000	3,000	3,000	3,000
Local Groundwater Supplies (Trinity)	2,016	2,016	2,016	2,016	2,016	2,016
Local Groundwater Supplies (Carrizo)	4,030	6,448	8,060	8,060	12,090	16,129
Medina Lake Firm-Up (ASR)	9,933	9,933	9,933	9,933	9,933	9,933
Purchase from WWP (CRWA)	2,800	8,250	8,250	8,250	8,250	8,250
Total New Supply	**21,779**	**29,647**	**31,259**	**31,259**	**35,289**	**39,328**

[1] Assigned by Water User Group based on Municipal Conservation water management strategy recommended by SCTRWPG.

Estimated costs of the recommended plan to meet the BMWD projected needs are shown in Table 4B.3.2-2.

Table 4B.3.2-2.
Recommended Plan Costs by Decade for BMWD

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation[1]						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
Edwards Transfers						
Annual Cost ($/yr)	$1,362,000	$1,362,000	$1,362,000	$1,362,000	$1,362,000	$1,362,000
Unit Cost ($/acft)	$454	$454	$454	$454	$454	$454
Local Groundwater Supplies (Trinity)						
Annual Cost ($/yr)	$1,043,000	$1,043,000	$1,043,000	$1,043,000	$1,043,000	$1,043,000
Unit Cost ($/acft)	$517	$517	$517	$517	$517	$517
Local Groundwater Supplies (Carrizo)						
Annual Cost ($/yr)	$1,676,750	$2,682,800	$2,386,357	$1,806,071	$3,095,964	$4,772,714
Unit Cost ($/acft)	$416	$416	$296	$224	$256	$296
Medina Lake Firm-Up (ASR)						
Annual Cost ($/yr)	$16,846,368	$16,846,368	$4,469,850	$4,469,850	$4,469,850	$4,469,850
Unit Cost ($/acft)	$1,696	$1,696	$450	$450	$450	$450
Purchase from WWP (CRWA)						
Annual Cost ($/yr)	$2,030,000	$9,072,389	$8,810,887	$5,885,138	$3,697,530	$3,568,147
Unit Cost ($/acft)	$725	$1,100	$1,068	$713	$448	$433

[1] These costs have been assigned to the individual Water User Groups.

4B.3.3 Canyon Regional Water Authority (CRWA)

Current water supply for CRWA is obtained from GBRA and various water right leases. CRWA is projected to need additional water supplies prior to the year 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that CRWA implement the following water supply plan to meet the projected needs for CRWA (Table 4B.3.3-1).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy has been assigned to each individual member Water User Group (WUG) based on the Municipal Conservation water management strategy recommended by the SCTRWPG, and quantities are not tabulated in the CRWA tables referenced here.
- CRWA Wells Ranch Project Phase I[14] to be implemented prior to 2010. This strategy can provide an additional 5,200 acft/yr of supply for the years 2010 through 2060.
- CRWA Wells Ranch Project Phase II[14] to be implemented prior to 2010. This strategy can provide an additional 5,800 acft/yr of supply for the years 2010 through 2060.
- Purchase from WWP (GBRA) to be implemented prior to 2020. This strategy can provide an additional 5,000 acft/yr of supply for the years 2020 through 2060.
- Brackish Wilcox Groundwater for RWA[14] to be implemented prior to 2030. This strategy can provide an additional 5,600 acft/yr of supply for the years 2030 and 2040, increasing to 11,200 acft/yr for 2050 through 2060.
- CRWA Siesta Project to be implemented prior to 2030. This strategy can provide an additional 1,000 acft/yr for 2030, increasing to 5,042 acft/yr of supply for the years 2040 through 2060.
- Hays/Caldwell PUA Project[14] to be implemented prior to 2020. This strategy can provide an additional 5,000 acft/yr of supply in the year 2020, increasing to 10,260 acft/yr of additional supply through 2060.

[14] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

Table 4B.3.3-1.
Recommended Water Supply Plan for CRWA

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	7,920	14,815	30,465	33,215	38,560	40,400
Recommended Plan						
Municipal Water Conservation[1]	—	—	—	—	—	—
CRWA Wells Ranch Project Phase I	5,200	5,200	5,200	5,200	5,200	5,200
CRWA Wells Ranch Project Phase II	5,800	5,800	5,800	5,800	5,800	5,800
Purchase from WWP (GBRA)	—	5,000	5,000	5,000	5,000	5,000
Brackish Wilcox Groundwater for RWA	—	—	5,600	5,600	11,200	11,200
CRWA Siesta Project	—	—	1,000	5,042	5,042	5,042
Hays/Caldwell PUA Project	—	5,000	10,260	10,260	10,260	10,260
Total New Supply	**11,000**	**21,000**	**32,860**	**36,902**	**42,502**	**42,502**

[1] *Assigned by Water User Group based on Municipal Conservation water management strategy recommended by SCTRWPG.*

Estimated costs of the recommended plan to meet the CRWA projected needs are shown in Table 4B.3.3-2.

Table 4B.3.3-2.
Recommended Plan Costs by Decade for CRWA

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation[1]						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
CRWA Wells Ranch Project Phase I						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
CRWA Wells Ranch Project Phase II						
Annual Cost ($/yr)	$4,205,000	$4,205,000	$1,160,000	$1,160,000	$1,160,000	$1,160,000
Unit Cost ($/acft)	$725	$725	$200	$200	$200	$200
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	—	$6,947,133	$6,947,133	$2,544,933	$2,544,933	$1,962,333
Unit Cost ($/acft)	—	$1,389	$1,389	$509	$509	$392
Brackish Wilcox Groundwater for RWA						
Annual Cost ($/yr)	—	—	$7,240,800	$7,240,800	$6,003,200	$6,003,200
Unit Cost ($/acft)	—	—	$1,293	$1,293	$536	$536
CRWA Siesta Project						
Annual Cost ($/yr)	—	—	$1,421,000	$7,164,682	$2,505,874	$2,505,874
Unit Cost ($/acft)	—	—	$1,421	$1,421	$497	$497
Hays/Caldwell PUA Project						
Annual Cost ($/yr)	—	$6,225,000	$12,773,700	$4,504,140	$4,504,140	$4,504,140
Unit Cost ($/acft)	—	$1,245	$1,245	$439	$439	$439

[1] *These costs have been assigned to the individual Water User Groups.*

4B.3.4 Guadalupe-Blanco River Authority (GBRA)

Current water supply for GBRA is obtained from Canyon Reservoir and run-of-river rights. GBRA is projected to need additional water supplies soon after year 2010 to meet the Wholesale Water Provider's projected demands; however, certain portions of the GBRA system are projected to have a shortage (need) at year 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that GBRA implement the following water supply plan to meet the projected needs for GBRA (Table 4B.3.4-1).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy has been assigned to each individual Water User Group (WUG) based on the Municipal Conservation water management strategy recommended by the SCTRWPG.
- Wimberley and Woodcreek Water Supply Project to be implemented prior to 2010. This strategy can provide an additional 1,120 acft/yr upon implementation soon after 2010 and an additional 4,480 acft/yr for 2020 through 2060.
- GBRA Simsboro Aquifer[15,16] to be implemented prior to 2020. This strategy can provide an additional 30,000 acft/yr for 2020, increasing to 49,777 acft/yr of supply for the years 2050 through 2060.
- GBRA Mid-Basin (Surface Water) to be implemented prior to 2020. This strategy can provide an additional 25,000 acft/yr for 2020 through 2060.
- Storage Above Canyon Reservoir (ASR) to be implemented prior to 2020. This strategy can provide an additional 3,140 acft/yr for 2020 through 2060.
- GBRA-Exelon Project to be implemented prior to 2020. This strategy can provide an additional 49,126 acft/yr for 2020 through 2060.
- GBRA Lower Basin Storage (100 acre Site)[17] to be implemented prior to 2030. This strategy can provide an additional 26,452 acft/yr for 2030 through 2060.
- GBRA New Appropriation (Lower Basin) to be implemented prior to 2030. This strategy can provide an additional 11,500 acft/yr for 2030 through 2060.
- Western Canyon WTP Expansion to be implemented prior to 2050. This strategy can provide an additional 5,600 acft/yr for 2050 through 2060.

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[15] Source of water is Simsboro Aquifer in Regions K and G with delivery to the San Marcos WTP.

[16] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

[17] Firm yield estimate based on off-channel storage of 2,500 acft.

The following are alternative water management strategies: Lower Guadalupe Water Supply Project (LGWSP) for Upstream GBRA Needs, GBRA Lower Basin Storage (500 acre Site), Regional Carrizo for Guadalupe Basin (GBRA), GBRA Mid-Basin (Conjunctive Use), and Calhoun County Brackish Groundwater.

Table 4B.3.4-1.
Recommended Water Supply Plan for GBRA

	2010 (acft/yr)	*2020 (acft/yr)*	*2030 (acft/yr)*	*2040 (acft/yr)*	*2050 (acft/yr)*	*2060 (acft/yr)*
Projected Need (Shortage)*	0	10,226	23,808	36,564	51,163	67,580
Recommended Plan						
Municipal Water Conservation[1]	—	—	—	—	—	—
Wimberley and Woodcreek Water Supply Project	1,120	4,480	4,480	4,480	4,480	4,480
GBRA Simsboro Aquifer	—	30,000	30,000	30,000	49,777	49,777
GBRA Mid-Basin (Surface Water)	—	25,000	25,000	25,000	25,000	25,000
Storage Above Canyon Reservoir (ASR)	—	3,140	3,140	3,140	3,140	3,140
GBRA-Exelon Project	—	49,126	49,126	49,126	49,126	49,126
GBRA Lower Basin Storage	—	—	28,369	28,369	28,369	28,369
GBRA New Appropriation (Lower Basin)	—	—	11,300	11,300	11,300	11,300
Western Canyon WTP Expansion	—	—	—	—	5,600	5,600
Total New Supply	**4,480**	**107,266**	**146,935**	**146,935**	**172,312**	**172,312**

** Projected needs in upper portion of GBRA district are offset by management supplies in the lower portion of the GBRA district.*
[1] Assigned by Water User Group based on Municipal Conservation water management strategy recommended by SCTRWPG.

Estimated costs of the recommended plan to meet the GBRA projected needs are shown in Table 4B.3.4-2.

Table 4B.3.4-2.
Recommended Plan Costs by Decade for GBRA

Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation[1]						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
Wimberley and Woodcreek Water Supply Project						
Annual Cost ($/yr)	$2,747,360	$10,989440	$9,253,000	$9,253,000	$9,253,000	$9,253,000
Unit Cost ($/acft)	$2,453	$2,453	$2,065	$2,065	$2,065	$2,065
GBRA Simsboro Aquifer						
Annual Cost ($/yr)	—	$29,460,000	$29,460,000	$11,580,000	$19,300,000	$19,300,000
Unit Cost ($/acft)	—	$982	$982	$386	$386	$386
GBRA Mid-Basin (Surface Water)						
Annual Cost ($/yr)	—	$46,975,000	$46,975,000	$16,200,000	$16,200,000	$9,250,000
Unit Cost ($/acft)	—	$1,879	$1,879	$648	$648	$370
Storage Above Canyon Reservoir (ASR)						
Annual Cost ($/yr)	—	$5,564,080	$5,564,080	$1,843,180	$1,843,180	$1,843,180
Unit Cost ($/acft)	—	$1,772	$1,772	$587	$587	$587
GBRA-Exelon Project						
Annual Cost ($/yr)	—	$31,735,396	$31,735,396	$22,990,968	$22,990,968	$11,004,224
Unit Cost ($/acft)	—	$646	$646	$468	$468	$224
GBRA Lower Basin Storage						
Annual Cost ($/yr)	—	—	$2,751,008	$2,751,008	$1,587,120	$1,587,120
Unit Cost ($/acft)	—	—	$104	$104	$60	$60
GBRA New Appropriation (Lower Basin)						
Annual Cost ($/yr)	—	—	$21,585,000	$21,585,000	$2,521,000	$2,521,000
Unit Cost ($/acft)	—	—	$1,910	$1,910	$223	$223
Western Canyon WTP Expansion						
Annual Cost ($/yr)	—	—	—	—	$1,764,000	$1,764,000
Unit Cost ($/acft)	—	—	—	—	$315	$315

[1] *These costs have been assigned to the individual Water User Groups.*

4B.3.5 Lavaca-Navidad River Authority (LNRA)

Lavaca-Navidad River Authority obtains its supply from Lake Texana Stage I and is projected to have shortages throughout the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that LNRA implement the following water supply plan to meet the projected needs for LNRA (Table 4B.3.5-1).

- Lavaca River Off-Channel Reservoir to be implemented prior to 2010. This strategy can provide an additional 26,242 acft/yr of supply, starting in 2020 and continuing through 2060.
- Facilitate temporary reallocation of presently contracted supplies to meet projected needs of Point Comfort until addition firm supplies are developed.

Table 4B.3.5-1.
Recommended and Alternative Water Supply Plan for LNRA

	2010 (acft/yr)	***2020 (acft/yr)***	***2030 (acft/yr)***	***2040 (acft/yr)***	***2050 (acft/yr)***	***2060 (acft/yr)***
Projected Need (Shortage)*	10,046	10,145	10,322	10,499	10,489	10,489
Recommended Plan						
Lavaca River Off-Channel Reservoir	26,242	26,242	26,242	26,242	26,242	26,242
Total New Supply	**26,242**	**26,242**	**26,242**	**26,242**	**26,242**	**26,242**

* *Projected needs are reported only for the portion of LNRA service area within Calhoun County in Region L. 10,000 acft/yr of the projected need is for Formosa Plastics Corporation based on information provided by LNRA during an inter-regional coordination meeting held on April 8, 2009. The remainder is for Point Comfort.*

Estimated costs of the recommended and alternative plan to meet the LNRA projected needs are shown in Table 4B.3.5-2.

Table 4B.3.5-2.
Recommended and Alternative Plan Costs by Decade for LNRA

Recommended Plan Element	***2010***	***2020***	***2030***	***2040***	***2050***	***2060***
Municipal Water Conservation[1]						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
Lavaca River Off-Channel Reservoir						
Annual Cost ($/yr)	$18,395,642	$18,395,642	$14,774,246	$14,774,246	$2,624,200	$2,624,200
Unit Cost ($/acft)	$701	$701	$563	$563	$100	$100

[1] *These costs have been assigned to the individual Water User Groups.*

4B.3.6 Schertz-Seguin Local Government Corporation (SSLGC)

Current water supply for SSLGC is obtained from the Carrizo Aquifer. SSLGC is projected to need additional water supplies prior to the year 2040. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that SSLGC implement the following water supply plan to meet the projected needs for SSLGC (Table 4B.3.6-1).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy has been assigned to each individual Water User Group (WUG) based on the Municipal Conservation water management strategy recommended by the SCTRWPG.
- Regional Carrizo for SSLGC Project Expansion[18] to be implemented prior to 2020. This strategy can provide an additional 10,364 acft/yr of supply in the year 2020 through 2060.
- Brackish Wilcox Groundwater for RWA[18] to be implemented prior to 2030. This strategy can provide an additional 2,000 acft/yr of supply in the year 2030 through 2060.

An alternative water management strategy is the Regional Carrizo for SSLGC Project Expansion – Wilson County Option.

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[18] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

Table 4B.3.6-1.
Recommended Water Supply Plan for SSLGC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	—	—	—	1,102	2,947	4,935
Recommended Plan						
Municipal Water Conservation[1]	—	—	—	—	—	—
Regional Carrizo for SSLGC Project Expansion	—	10,364	10,364	10,364	10,364	10,364
Brackish Wilcox Groundwater for RWA	—	—	2,000	2,000	2,000	2,000
Total New Supply	—	**10,364**	**12,364**	**12,364**	**12,364**	**12,364**

[1] *Assigned by Water User Group based on Municipal Conservation water management strategy recommended by SCTRWPG.*

Estimated costs of the recommended plan to meet the SSLGC projected needs are shown in Table 4B.3.6-2.

Table 4B.3.6-2.
Recommended Plan Costs by Decade for SSLGC

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation[1]						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
Regional Carrizo for SSLGC Project Expansion						
Annual Cost ($/yr)	—	$5,885,000	$5,885,000	$3,427,000	$3,427,000	$3,427,000
Unit Cost ($/acft)	—	$568	$568	$331	$331	$331
Brackish Wilcox Groundwater for RWA						
Annual Cost ($/yr)	—	—	$2,586,000	$2,586,000	$1,072,000	$1,072,000
Unit Cost ($/acft)	—	—	$1,293	$1,293	$536	$536

[1] *These costs have been assigned to the individual Water User Groups.*

4B.3.7 Springs Hill WSC (SHWSC)

Springs Hill WSC is projected to have adequate water supplies available from the Carrizo Aquifer and Canyon Reservoir to meet the WSC's projected demands during the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that Springs Hill WSC implement the following water supply plan (Table 4B.3.7-1).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy has been assigned to each individual Water User Group (WUG) based on the Municipal Conservation water management strategy recommended by the SCTRWPG.
- TWA Regional Carrizo[19] to be implemented prior to 2020. This strategy can provide an additional 1,500 acft/yr from 2020, increasing to 3,000 in 2030 through 2060.
- Purchase from GBRA to be implemented prior to 2020, providing 1,500 acft/yr of water through 2060.
- Brackish Wilcox Groundwater for RWA[19] to be implemented prior to 2060. This strategy can provide an additional 1,500 in 2060.

Table 4B.3.7-1.
Recommended Water Supply Plan for Springs Hill WSC

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	0	0	0	0	0
Recommended Plan						
Municipal Water Conservation[1]	—	—	—	—	—	—
Purchase from WWP (TWA)	—	1,500	3,000	3,000	3,000	3,000
Purchase from WWP (GBRA)	—	1,500	1,500	1,500	1,500	1,500
Brackish Wilcox Groundwater for RWA	—	—	—	—	—	1,500
Total New Supply	—	**3,000**	**4,500**	**4,500**	**4,500**	**6,000**

[1] Assigned by Water User Group (WUG) based on Municipal Conservation water management strategy recommended by SCTRWPG.

[19] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

Estimated costs of the recommended plan for Springs Hill WSC are shown in Table 4B.3.7-2.

Table 4B.3.7-2.
Recommended Plan Costs by Decade for Springs Hill WSC

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation[1]						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
Purchase from WWP (TWA)						
Annual Cost ($/yr)	—	$2,284,500	$4,569,000	$1,536,000	$1,536,000	$1,536,000
Unit Cost ($/acft)	—	$1,523	$1,523	$512	$512	$512
Purchase from WWP (GBRA)						
Annual Cost ($/yr)	—	$2,083,500	$2,083,500	$763,500	$763,500	$588,000
Unit Cost ($/acft)	—	$1,389	$1,389	$509	$509	$392
Brackish Wilcox Groundwater for RWA						
Annual Cost ($/yr)	—	—	—	—	—	$804,000
Unit Cost ($/acft)	—	—	—	—	—	$536

[1] These costs have been assigned to the individual Water User Groups.

4B.3.8 Texas Water Alliance (TWA)

Texas Water Alliance is projected to have shortages during the planning period. There is no current supply for TWA. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that TWA implement the following water supply plan (Table 4B.3.8-1).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy has been assigned to each individual Water User Group (WUG) based on the Municipal Conservation water management strategy recommended by the SCTRWPG.

- TWA Regional Carrizo[20] is to be implemented by 2020. This strategy can provide an additional supply of 27,000 acft/yr, starting in 2020, continuing through 2060.

Table 4B.3.8-1.
Recommended Water Supply Plan for Texas Water Alliance

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)	0	5,328	10,717	14,591	18,556	22,575
Recommended Plan						
Municipal Water Conservation[1]	—	—	—	—	—	—
TWA Regional Carrizo	—	27,000	27,000	27,000	27,000	27,000
Total New Supply	—	27,000	27,000	27,000	27,000	27,000

[1] Assigned by Water User Group (WUG) based on Municipal Conservation water management strategy recommended by SCTRWPG.

Estimated costs of the recommended plan for Texas Water Alliance are shown in Table 4B.3.8-2.

Table 4B.3.8-2.
Recommended Plan Costs by Decade for Texas Water Alliance

Plan Element	2010	2020	2030	2040	2050	2060
Municipal Water Conservation[1]						
Annual Cost ($/yr)	—	—	—	—	—	—
Unit Cost ($/acft)	—	—	—	—	—	—
TWA Regional Carrizo						
Annual Cost ($/yr)	—	$41,121,000	$41,121,000	$13,824,000	$13,824,000	$13,824,000
Unit Cost ($/acft)	—	$1,523	$1,523	$512	$512	$512

[1] These costs have been assigned to the individual Water User Groups.

[20] Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

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Section 5
Impacts of Water Management Strategies on Key Parameters of Water Quality [31 TAC §357.7(a)(12)] and Moving Water from Rural and Agricultural Areas [31 TAC §357.7(a)(8)]

5.1 Impacts of Water Management Strategies on Key Parameters of Water Quality

In accordance with 31 TAC §357.7(a)(12), Regional Water Planning Guidelines, the South Central Texas Regional Planning Group (SCTRWPG) must consider the impacts of water management strategies on key parameters of water quality.

Regional Water Planning Guidelines 357.7(a)(12)

> *Regional water plan development shall include a description of the major impacts of recommended water management strategies on key parameters of water quality identified by the regional water planning group as important to the use of the water resource and comparing conditions with the recommended water management strategies to current conditions using best available data.*

The SCTRWPG has selected the following water quality constituents to be considered in a qualitative analysis:

- Chlorides,
- Sulfates,
- Total Dissolved Solids (TDS),
- Dissolved Oxygen (DO),
- pH Range,
- Indicator Bacteria,
- Temperature, and
- Nitrates.

Table 5-1 contains median values for these eight water quality parameters for each of the water supply sources of the water management strategies recommended in the 2011 Regional Water Plan. Supplemental information from the 2008 Texas 303(d) List issued by the Texas Commission on Environmental Quality (TCEQ) pursuant to the federal Clean Water Act was also considered. In addition, the SCTRWPG has considered the impacts of implementation of the Regional Water Plan on recreation, aquatic life, domestic water supply, and agriculture.

Table 5-1.
Median Values of Key Parameters of Water Quality

Water Source	Chlorides (mg/L)	Sulfates (mg/L)	Total Dissolved Solids (TDS) (mg/L)	Dissolved Oxygen (DO) (mg/L)	pH	Indicator Bacteria (#/100 ml)	Temperature (Deg C)	Nitrates (mg/L)
Edwards Groundwater	20	18	321	6.2	7.4	0	21	0.9
Gonzales-Carrizo Aquifer	23	39	248	0.0	7.5	0	35	<0.1
Bexar-Carrizo Aquifer	37	27	190	0.0	6.1	0	26	<0.1
Bastrop/Lee-Simsboro Aquifer	23	54	121	0.0	7.3	0	24	<0.1
Bexar-Wilcox Aquifer	145	258	1200	1.0	7.6	0	21	0.6
Trinity Aquifer	23	37	294	1.0	7.5	0	23	1.0
Gulf Coast Aquifer	253	90	877	2.0	7.8	0	29	0.5
San Antonio River	120	110	610	7.9	7.9	194	23	3.9
Cibolo Creek	71	47	530	6.2	7.6	91	25	5.4
Guadalupe River	31	36	380	7.6	7.9	100	23	1.1
Lavaca River	40	16	490	7.9	8.1	160	23	0.2
Colorado River	70	44	406	7.0	8.0	43	22	0.2

Potential water quality impacts considered herein are associated with source and receiving water characteristics, treatment requirements, blending compatibility, and treated effluent quality and quantity. For the purposes of this general assessment, it is assumed that wastewater treatment standards and plant performance will continue to improve over time. Other applicable assumptions regarding baseline conditions and conditions with implementation of the recommended water management strategies are consistent with those described in Section 7 regarding consistency of the Regional Water Plan with long-term protection of the State's water, agricultural, and natural resources.

Table 5-2 summarizes a general qualitative assessment of the potential impacts of the implementation of recommended water management strategies on the key parameters of water quality listed above. Each water quality parameter was assigned an impact level associated with the implementation of each recommended water management strategy. A value of '0' is used to indicate that no impacts are expected; a value of '1' indicates minimal impacts are expected; a value of '2' indicates moderate impacts are expected; and a value of '3' indicates severe impacts are expected from the implementation of the water management strategy. As it is understood that any future wastewater discharges, potable water deliveries, and/or recycled water use will be in compliance with TCEQ requirements, water quality impact scores presented herein may be viewed as relative indicators of concern or risk among water quality parameters potentially affecting or affected by a project.

For example, the LCRA/SAWS Water Project scores a '0' (no impact) for the dissolved oxygen, pH, temperature, and nitrates parameters. The LCRA/SAWS Water Project scores a '1' (minimal potential impacts) for the chlorides, sulfates, indicator bacteria, and total dissolved solids (TDS) parameters. These associated concentrations are somewhat higher in the surface water obtained from the Colorado River than the existing supply (Edwards Aquifer) for the City of San Antonio. Therefore, a '1' score was given for these parameters to indicate the minimal, yet possible, impact of the strategy.

In general, the water management strategies recommended for implementation are expected to have little, if any, measurable impacts on water quality. Only two of the recommended water management strategies score as high as a '2' for any water quality parameter. These two strategies are the GBRA-Exelon Project (temperature) and Seawater

Table 5-2..
Impacts of Recommended Water Management Strategies on Key Parameters of Water Quality

Water Management Strategy	*Water Quality Parameter*								
	Chlorides	*Sulfates*	*Total Dissolved Solids (TDS)*	*Dissolved Oxygen (DO)*	*pH*	*Indicator Bacteria*	*Temperature*	*Nitrates*	*Total Score*
Conservation									
Municipal Water Conservation	0	0	0	0	0	0	0	0	0
Irrigation Water Conservation	0	0	0	0	0	0	0	0	0
Drought Management	0	0	0	0	0	0	0	0	0
Mining Water Conservation	0	0	0	0	0	0	0	0	0
Available Resources, Water Rights, & Reservoirs									
Edwards Transfers	0	0	0	0	0	0	0	0	0
GBRA-Exelon Project	0	0	1	0	0	0	2	0	3
GBRA Lower Basin Storage (100 acre site)	0	0	0	0	0	0	0	0	0
Recycled Water Programs	0	0	0	0	0	0	0	0	0
Medina Lake Firm-Up (ASR)	0	0	0	0	0	0	0	0	0
Wimberley and Woodcreek Water Supply Project	0	0	0	0	0	1	0	0	1
Surface Water Rights	0	0	0	0	0	0	0	0	0
Facilities Expansions	0	0	0	0	0	0	0	0	0
Groundwater									
GBRA Simsboro Project	0	0	0	1	0	0	0	0	1
Hays/Caldwell PUA Project	0	0	0	1	1	0	0	0	2
Local Groundwater Supplies (Carrizo)	0	0	0	1	0	0	0	0	1
TWA Regional Carrizo	0	0	0	1	0	0	1	0	2
Brackish Wilcox Groundwater for SAWS	1	1	1	1	0	0	1	0	5
Regional Carrizo for SAWS	0	0	0	1	0	0	1	0	2
Brackish Wilcox Groundwater for Regional Water Alliance	1	1	1	1	0	0	1	0	5
CRWA Wells Ranch Project	0	0	0	1	1	0	0	0	2
Regional Carrizo for SSLGC Project Expansion	0	0	0	1	1	0	0	0	2
Local Groundwater Supplies (Trinity)	0	0	0	0	0	0	0	0	0
Brackish Wilcox Groundwater for SSWSC	1	1	1	1	0	0	1	0	5
Local Groundwater Supplies (Gulf Coast)	0	0	0	0	0	0	0	0	0
Conjunctive Use									
LCRA-SAWS Water Project	1	1	1	0	0	1	0	0	4
Edwards Aquifer Recharge . Type 2 Projects	0	1	0	0	0	1	0	0	2
CRWA Siesta Project	0	0	0	1	0	1	0	0	2
Surface Water									
Lavaca River Off-Channel Reservoir	0	0	0	0	0	1	0	0	1
GBRA Mid-Basin (Surface Water)	0	0	0	0	0	0	0	0	0
GBRA New Appropriation (Lower Basin)	0	0	0	0	0	1	0	1	2
Storage Above Canyon Reservoir (ASR)	0	0	0	0	0	0	0	0	0
Seawater									
Seawater Desalination	2	1	1	0	0	0	0	0	4

Key for Water Quality Parameter Scores: 0 = No impacts are expected; 1 = Minimal impacts are expected; 2 = Moderate impacts are expected; 3 = Severe impacts are expected

Desalination (chlorides). Only the Brackish Wilcox Groundwater strategies and the LCRA-SAWS Water Project (LSWP) received scores (though none greater than '1') in four or more of the key water quality parameters. Fourteen (44 percent) of the recommended water management strategies received a score of zero (no impacts expected) and twenty-seven (84 percent) received a score greater than zero in two or less of the key water quality parameters.

Nine strategies could potentially impact domestic water use and agricultural water use: Drought Management, Edwards Transfers, Surface Water Rights, GBRA Simsboro Project, Hays/Caldwell PUA Project, TWA Regional Carrizo, Regional Carrizo for SAWS, CRWA Wells Ranch Project, and/or Regional Carrizo for SSLGC Project Expansion. Five other strategies may provide benefits to domestic and/or agricultural water use: Municipal Water Conservation, Irrigation Water Conservation, GBRA Lower Basin Storage, LSWP, and/or Edwards Aquifer Recharge – Type 2 Projects. In addition, the Irrigation Water Conservation strategy could have beneficial effects on water quality through decreased runoff carrying pesticides and fertilizers from cultivated areas to receiving streams. It is anticipated that none of the recommended water management strategies will have associated effects on water quality sufficient to impact recreation or instream aquatic life uses to a significant degree.

5.2 Impacts of Voluntary Redistribution of Water from Rural and Agricultural Areas

Similar to third-party impacts of voluntary redistribution, the Regional Water Plan shall include a quantitative reporting of socioeconomic impacts on agricultural resources including analysis of third-party gross business activity and employment impacts of moving water from rural and agricultural areas.[1] In this case, voluntary redistribution is the acquisition of water by willing buyers from willing sellers, subject to conditions of existing groundwater management plans and rules of Groundwater Conservation Districts, in the case of groundwater supplies, and subject to existing surface water permits and water available from such permits (see Sections 3.1 and 3.2 for descriptions of methods used in determining quantities of groundwater and surface water available to meet projected water demands in the South Central Texas Water Planning Region).

[1] It is important to note that the most likely places from which water can be obtained to meet the needs of municipalities and other water users of the South Central Texas Region are rural areas, many of which are also agricultural areas.

In the development of the South Central Texas Regional Water Plan, the following principles have been followed: (1) water conservation has been the first water management strategy recommended to meet projected needs (shortages) of water user groups (WUGs); and (2) all other recommended water management strategies consider only quantities of water that are surplus to the year 2060 projected needs of local areas and/or water uses of the areas from which such supplies are proposed to be obtained, with the exception of voluntary transfers of Edwards rights from irrigation to municipal and industrial uses, as will be further explained below. The water management strategies of the 2011 South Central Texas Regional Water Plan were carefully selected so as to have minimal impacts upon the supplies of water projected to be needed for use in rural and agricultural areas. In addition, the costing of each water management strategy includes estimated payments to landowners from which groundwater would be obtained and to holders of surface water rights to reflect that implementation of these water management strategies would compensate the owners of the water by the water users who would obtain and use the water (i.e., the willing seller willing buyer condition underlying the voluntary transfer concept).

Recommended water management strategies of the South Central Texas Regional Water Plan that may involve voluntary redistribution of water from rural and agricultural areas within Region L are listed as follows, along with the portion of the firm new supply potentially considered a voluntary redistribution:[2]

- Edwards Transfers ....51,875 acft/yr
- Regional Carrizo for SAWS ....11,687 acft/yr
- Regional Carrizo for SSLGC Project Expansion..........................10,364 acft/yr
- Hays/Caldwell PUA Project ....35,000 acft/yr
- TWA Regional Carrizo...27,000 acft/yr
- CRWA Wells Ranch Project...11,000 acft/yr

Total ....146,926 acft/yr

[2] The LCRA-SAWS Water Project is not included here, since it includes new supplies to meet agricultural needs in Region K as a part of the strategy to make supplies available to Region L. Similarly, Surface Water Rights is not included as supply quantities are not specified. The GBRA Simsboro Project is not included because the groundwater source is not located in Region L.

5.3 Social and Economic Impacts of Not Meeting Projected Water Needs

Section 357.7(4) of the rules for implementing Senate Bill 1 requires that the social and economic impacts of not meeting regional water supply needs be evaluated by the SCTRWPG. TWDB is required to provide technical assistance, upon request, to complete the evaluations. SCTRWPG requested technical assistance of TWDB to perform the required analyses. TWDB conducted the required analysis of the impacts of the identified needs for the South Central Texas Region using the same methodology that was used for all other regions.

The purpose of this element of Senate Bill 1 planning is to provide an estimate of the social and economic importance of meeting projected water needs or, conversely, provide estimates of potential costs of not meeting projected needs of each water user group. The social and economic effects of not meeting a projected water need can be viewed as the potential benefit to be gained from implementing a strategy to meet the particular need. The summation of all the impacts gives a view of the ultimate magnitude of the impacts caused by not meeting all of the projected needs.

The projected total water demands for the South Central Texas Region increase from 981,370 acft/yr in 2010 to 1.146 million acft/yr in 2030, and 1.292 million acft/yr in 2060 (Table 2-10). Under historic drought of record water supply conditions, and with no water management strategies in place, water needs (shortages) were calculated at 177,915 acft/yr in 2010, increasing to 312,123 acft/yr in 2030 and to 440,430 acft/yr by 2060 (Table 4A-1).

The water needs (shortages) of the region amount to about 18 percent of the projected demand in 2010, increasing to 27.2 percent in 2030, and to 34.1 percent in 2060. This means that by 2060 the region would be able to meet only 65.9 percent of the projected water demands unless supply development or other water management strategies are implemented.

The SCTRWPG identified 82 individual WUGs that showed an unmet need (shortage) during drought-of-record supply conditions (Table 4A-1). Of the 21 counties of the South Central Texas Region, 14 have water user groups with projected water needs (shortages). The water user groups having projected water needs, together with the quantities of projected needs (shortages), are listed by county and river basin of location in the region in Table 4A-1. For example, the projected municipal needs for the City of Lytle (Atascosa County) are 141 acft/yr in 2010, 162 acft/yr in 2030, and 188 acft/yr in 2060 (Table 4A-1). The projected needs for irrigation in Atascosa County are 6,095 acft/yr in 2010, 3,413 acft/yr in 2030, and 291 acft/yr in

2060 (Table 4A-1). The total projected need for Atascosa County is 6,611 acft/yr in 2010, 4,207 acft/yr in 2030, and in 2060 is 3,456 acft/yr (Table 4A-1). The projected quantities of water needed (shortages) for each of the other WUGs of each county can be viewed in Table 4A-1.

The detailed results of the social and economic analyses of not meeting the projected water needs (shortages) for the region and river basins of the region are shown in Appendix E, Tables 9 through 15, and in Appendix 2 Tables of Appendix E for counties. In the case of irrigation, livestock, mining, manufacturing, and steam-electric power generation water user groups with a need, the economic impacts are evaluated in terms of effects upon income, taxes, and employment (jobs lost) due to lost production (Appendix E).[3] In the case of municipal water user groups with a projected need, the economic impact evaluation is presented in terms of monetary value of domestic shortages, lost income from reduced commercial business activity, lost jobs from reduced commercial business activity, lost state and local taxes from reduced commercial business activity, and lost utility revenues. The total regional effects upon business, personal income, tax payments to governments, employment, population and school enrollment are summarized below.

5.3.1 Lost Income from Reduced (Lost) Production

The estimated effect of water shortages projected for the South Central Texas Region upon income from lost production in the manufacturing, commercial business, steam-electric power generation, mining, and irrigation water using sectors is calculated at $298.84 million annually in year 2010, and is projected at $5.94 billion annually in 2030, and $8.94 billion annually in 2060 (Table 5-3). The economic impact of unmet water needs varies depending on the water user group for which the shortage is projected. The largest impacts result from shortages in manufacturing, commercial establishments, and steam-electric power generation, while shortages for mining and irrigation typically result in the smallest impact (Table 5-3).

5.3.2 Tax Effects

The economic effects of unmet water needs in 2010 upon tax payments to units of local and state governments is $39.26 million annually, $667.9 million annually in 2030, and $964.71 million annually in 2060 (Table 5-3). The manufacturing, commercial business, and steam-

[3] Norvell, Stuart, and Shaw, S. Doug, “Socioeconomic Impacts of Projected Water Needs for the South Central Texas Regional Water Planning Area (Region L),” Texas Water Development Board, Austin, Texas, June 2010.

Table 5-3. Socioeconomic Impacts of Unmet Water Needs South Central Texas Region

Impacts	*Units*	*Years* 2010	2020	2030	2040	2050	2060
Projected Water Needs (Shortages)[1]	**acft**	**177,915**	**269,210**	**312,123**	**353,742**	**393,974**	**440,430**
Lost Income Due to Reduced (Lost) Production – Annual							
Manufacturing	$ million	146.77	324.94	496.18	948.36	1,451.00	1,777.09
Commercial Business Activity	$ million	42.91	1,417.03	1,909.07	2,547.77	3,197.28	3,621.31
Steam-Electric Power	$ million	63.17	3,493.56	3,495.55	3,497.61	3,503.90	3,505.77
Mining	$ million	2.67	3.12	4.64	5.01	6.44	6.81
Irrigation	$ million	43.32	40.63	38.04	35.55	33.17	31.13
Total	**$ million**	**298.84**	**5,279.28**	**5,943.48**	**7,034.30**	**8,191.79**	**8,942.11**
Lost State and Local Taxes from Reduced (Lost) Production – Annual							
Manufacturing	$ million	22.22	52.44	81.52	159.05	245.34	301.91
Commercial Business Activity	$ million	5.67	7.66	82.41	111.92	134.26	157.25
Steam-Electric Power	$ million	9.07	501.45	501.73	502.03	502.93	503.49
Mining	$ million	0.14	0.17	0.34	0.37	0.48	0.51
Irrigation	$ million	2.16	2.03	1.90	1.77	1.66	1.55
Total	**$ million**	**39.26**	**563.75**	**667.90**	**775.14**	**884.67**	**964.71**
Jobs Lost – Annual							
Manufacturing	Number	8,274	11,956	15,436	23,170	31,553	38,187
Commercial Business Activity	Number	1,067	1,512	17,808	24,229	29,081	34,108
Steam-Electric Power	Number	215	5,938	5,941	5,945	5,963	5,973
Mining	Number	27	31	53	57	72	77
Irrigation	Number	545	511	478	447	416	391
Total	**Number**	**10,128**	**19,948**	**39,716**	**53,848**	**67,085**	**78,736**
Effects of Water Shortages Upon Water Utility Revenues, Population, and School Enrollment							
Value of Domestic Water Shortages	**$ million**	**715.54**	**1,479.80**	**1,331.33**	**1,805.79**	**2,426.71**	**2,823.29**
Water Utility Revenue Losses	**$ million**	**149.36**	**212.55**	**276.64**	**340.64**	**402.51**	**468.01**
Population Losses/Unemployment[3]	**Number**	**12,886**	**43,823**	**58,402**	**74,857**	**86,896**	**94,874**
Declines in School Enrollment[3]	**Number**	**3,635**	**12,433**	**15,470**	**13,835**	**16,049**	**17,547**

1 See Table 4A-1 for water needs by county by type of water use, and Region L Totals.
2 Individual Households and Non-water Intensive Commercial Establishments.
3 Population and associated school enrollment losses due to jobs lost from unmet water needs.

Source: "Socioeconomic Impacts of Projected Water Shortages for the South Central Texas Water Planning Area (Region L)," TWDB, June 2010.

electric power generation sectors are the largest components of these estimated tax impacts of water shortages (Table 5-3).

5.3.3 Employment Effects

Shortages of water for manufacturing, commercial businesses, steam-electric power generation, mining, and irrigation purposes would result in reduced number of jobs in theses economic sectors of the region. The socioeconomic impact analysis shows 10,128 fewer jobs in 2010, 39,716 fewer in 2030, and 78,736 fewer in 2060 due to the employment or unemployment effects of unmet water needs (Table 5-3).

5.3.4 Value of Domestic Water Shortages and Water Utility Revenue Losses

In Region L, there are 71 municipal water user (WUGS) groups with projected needs (shortages) during the planning period. The value of domestic water shortages for these WUGS in 2010 was computed at $715.54 million annually, and is projected at $1.33 billion annually in 2030 and $2.82 billion annually in 2060 (Table 5-3). The value of lost water utility revenues is $149.36 million annually in 2010, and is projected at $276.64 million annually in 2030 and $468.01 million annually in 2060 (Table 5-3).

5.3.5 Population

The projected population growth of the region would be reduced through a reduced rate of job creation if projected water needs are not met. Shortages of water for manufacturing, commercial businesses, steam-electric power generation, mining, and irrigation purposes would result in out-migration of some current population, and reduced in-migration, resulting in reduced future population growth. The region could expect 12,886 fewer people in 2010, 58,402 fewer in 2030, and 94,874 fewer in 2060 due to the employment or unemployment effects of unmet water needs (Table 5-3).

5.3.6 School Enrollment

School enrollment is related to the size of the population of childbearing age, which is dependent upon employment, as mentioned above. Failure to meet the projected water needs of the region, such that employment opportunities are affected, would result in lower population and reduced school enrollment. School enrollment estimates for the region, as a result of population losses due to unemployment resulting from unmet water needs are 3,635 less in 2010, 15,470 less in 2030, and 17,547 less in 2060 than if the projected water needs

5.4 Discussion Related to Rural and Agricultural Areas

The recommended Edwards Transfers would result in the transfer of irrigation water supply projected to be needed for irrigation use in the amount of 11,973 acft/yr in 2010, declining to 6,200 acft/yr in 2020, 1,362 acft/yr in 2030, and zero thereafter (Section 4C.3). None of the other recommended water management strategies of the South Central Texas Regional Water Plan would transfer water from rural and agricultural areas that is projected to be needed in those areas during the planning period. Thus, the only lost production and third-party economic impacts of transfers are expected from the Edwards Transfers listed above. However, implementation of the recommended water management strategies would result in: (1) drawdown of the water table, increasing local area pump lifts in the aquifer areas from which groundwater would be obtained; and would (2) provide payments to landowners for groundwater and to holders of surface water permits for use of surface water at rates established by the surface water permit holders. In addition, implementation of recommended water management strategies can be expected to result in construction and associated expenditures in local areas where such projects are constructed, but neither the economic benefits of such expenditures, nor the subsequent economic development that might result from such expenditures are estimated due to lack of information pertaining to such activities.

Although it is not possible to estimate total costs of any additional pump lifts or deepening of wells resulting from implementation of recommended water management strategies in the Region L Plan due to lack of information about location and numbers of wells that might be affected, estimates for a single family home range from less than $2.00 per year where additional lift might be 25 feet to less than $10.00 per year if lift is increased by 150 feet.

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Section 6
Water Conservation and Drought Management Recommendations
[31 TAC § 357.7(a)(11)]

6.1 Water Conservation

The South Central Texas Regional Water Planning Group (SCTRWPG) strongly supports water conservation, and for the 2011 Regional Water Plan has recommended municipal, irrigation, and mining water conservation water management strategies. Water conservation strategies in the industrial and steam-electric power generation use categories are encouraged as well. Each of the water conservation water management strategies is described briefly below.

Municipal Water Conservation: The South Central Texas Regional Water Planning Group established municipal water conservation goals, as follows:

- For municipal water user groups (WUGs) with water use of 140 gpcd and greater, reduction of per capita water use by 1 percent per year until the level of 140 gpcd is reached, after which, the rate of reduction of per capita water use is one-fourth percent (0.25 percent) per year for the remainder of the planning period; and
- For municipal WUGs having year 2000 water use of less than 140 gpcd, reduction of per capita water use by one-fourth percent per year.

The municipal water conservation water management strategy included in the 2006 and 2011 Regional Water Plans is based upon water conservation Best Management Practices (BMPs) for municipal water users, as included in the Water Conservation Implementation Task Force November 2004 Report to the 79th Texas Legislature. The list of Municipal Water Conservation BMPs is as follows:

1. System Water Audit and Water Loss;
2. Water Conservation Pricing;
3. Prohibition on Wasting Water;
4. Showerhead, Aerator, and Toilet Flapper Retrofit;
5. Residential Ultra-Low Flow Toilet Replacement Programs;
6. Residential Clothes Washer Incentive Program;
7. School Education;
8. Water Survey for Single-Family and Multi-Family Customers;
9. Landscape Irrigation Conservation and Incentives;
10. Water-Wise Landscape Design and Conversion Programs;
11. Athletic Field Conservation;
12. Golf Course Conservation;

13. Metering of all New Connections and Retrofitting of Existing Connections;
14. Wholesale Agency Assistance Programs;
15. Conservation Coordinator;
16. Reuse of Reclaimed Water;
17. Public Information;
18. Rainwater Harvesting and Condensate Reuse;
19. New Construction Graywater;
20. Park Conservation; and
21. Conservation Programs for Industrial, Commercial, and Institutional Accounts.

The SCTRWPG acknowledges and supports the creation and activities of the Water Conservation Advisory Council created by House Bill 4 and Senate Bill 3 of the 80th Texas Legislature. In addition, the SCTRWPG acknowledges and supports the implementation of House Bill 2667 of the 81st Texas Legislature relating to performance standards for plumbing fixtures sold in Texas.

The Municipal Water Conservation water management strategy includes retrofit of plumbing fixtures, adoption and use of efficient clothes washers, and significant reduction of lawn and landscape watering. The combined plumbing fixtures, clothes washers, and lawn watering water conservation practices would reduce municipal water demand by 13,231 acft/yr in 2010, 31,616 acft/yr in 2030, and 72,570 acft/yr in 2060 (Section 4C.1). Of these totals, in 2010, 91 percent would be from plumbing fixtures and clothes washers, and 9 percent would be from lawn watering. In 2030, of the 31,616 acft/yr of municipal water conservation, 48 percent would be from plumbing fixture and clothes washer retrofit, and 52 percent would be from lawn irrigation, while in 2060, the 72,570 acft/yr of municipal water conservation would be 26 percent would be from plumbing fixtures and clothes washers, and 74 percent would be from lawn irrigation.

In 2010, total cost for implementation and administration of the municipal water conservation water management strategy to meet the Region L goals, as described in the municipal water conservation water management strategy (Section 4C.1), is $8.57 million ($648/acft/yr), increasing to $18.47 million ($584/acft/yr) in 2030, and to $41.05 in 2060 ($566/acft/yr). As the quantity of water conservation (demand reduction) increases, the unit cost decreases from $648 per acft in 2010, to $584 per acft in 2030, and to $566 per acft in 2060.

Irrigation Water Conservation: The irrigation water conservation water management strategy is based upon water conservation Best Management Practices for agricultural water, as included in the Water Conservation Implementation Task Force November 2004 Report to the 79th Texas Legislature. The list of Irrigation BMPs is as follows:

1. Irrigation Scheduling;
2. Volumetric Measurement of Irrigation Water Use;
3. Crop Residue Management and Conservation Tillage;
4. On-farm Irrigation audit;
5. Furrow Dikes;
6. Land Leveling;
7. Contour Farming;
8. Conservation of Supplemental Irrigated Farmland to Dry-Land Farmland;
9. Brush Control/Management;
10. Lining of On-Farm Irrigation Ditches;
11. Replacement of On-/farm Irrigation Ditches with Pipelines;
12. Low Pressure Center Pivot Sprinkler Irrigation Systems;
13. Drip/Micro-Irrigation System;
14. Gated and Flexible Pipe for Field Water Distribution Systems;
15. Surge Flow Irrigation for Field Water Distribution Systems;
16. Linear Move Sprinkler Irrigation Systems;
17. Lining of District Irrigation Canals;
18. Replacement of District Irrigation Canals and Lateral Canals with Pipelines;
19. Tailwater Recovery and Use System; and
20. Nursery Production Systems.

Best Management Practices of Low Energy Precision Application (LEPA) techniques are estimated to reduce water needed per acre by 20 percent of the rates estimated to have been used in Region L in year 2000. Based upon estimates that irrigation water conservation practices of LEPA, with furrow dikes, can be applied to 75 percent of the acreages that were irrigated in year 2000 in the counties of the region for which water needs have been projected, it is estimated that 23,074 acft/yr of irrigation water conservation can be accomplished at an average cost of $137/acft/yr (Section 4C.1).

Industrial, Steam-Electric Power, and Mining Water Conservation: Best Management Practices for industrial, steam-electric power, and mining water conservation, as included in the Water Conservation Implementation Task Force November 2004 Report to the 79th Texas Legislature are as follows:

1. Industrial Water Audit;
2. Industrial Water Waste Reduction;
3. Industrial Submetering;

4. Cooling Towers;
5. Cooling Systems Other than Cooling Towers;
6. Industrial Alternative Sources and Reuse of Process Water;
7. Rinsing/Cleaning;
8. Water Treatment;
9. Boiler and Steam Systems;
10. Refrigeration (including Chilled Water);
11. Once-through Cooling;
12. Management and Employee Programs;
13. Industrial Landscape; and
14. Industrial Site Specific Conservation.

BMPs of air cooling, reuse of treated wastewater, and onsite collection and use of precipitation runoff for mining are recommended. Potential quantities and costs, however, could not be estimated due to lack of data (Section 4C.1).

Model Municipal Water Conservation Plan: The model municipal water conservation plan required for the South Central Texas Regional Water Plan is included in Appendix F, and has the following components:

A. Utility Profile
   I. Population and Customer Data
   II. Water Use Data for Service Area
   III. Water Supply System Data
   IV. Wastewater System Data
B. Requirements for Water Conservation Plans for Municipal Water Use by Public Water Suppliers
   1. Specific, Quantified 5 and 10 year water conservation targets and goals for municipal water use, in gallons per capita per day
   2. Metering Devices – Description Required
   3 Universal Metering – Program Required
   4. Unaccounted-For Water Use – Measures to Determine and Control
   5. Continuing Public Education & Information – Program Description Required
   6. Non-Promotional Water Rate Structure – Required, and included in Water Conservation Plan
   7. Reservoir Systems Operation Plan – Required, if Applicable
   8. Enforcement Procedure & Plan Adoption – Means of Implementation and Enforcement Requirements
   9. Coordination with the Regional Water Planning Group(s) – Documentation of consistency with Regional Water Plans
   10. Additional Requirements
      a. Program for Leak Detection, Repair, and Water Loss Accounting
      b. Record Management System, and
      c. Plan Review and Update every 5 years.

Water conservation information and guidance in the development of municipal water conservation plans can be found at the following web site:

- www.tceq.state.tx.us/permitting/water_supply/water_rights/conserve.html

Model Irrigation Water Conservation Plan: There is no model irrigation water conservation plan in the South Central Texas Regional Water Plan. A form is provided by TCEQ to assist in conservation plan development for individually operated irrigation systems at the following web site:

- www.tceq.state.tx.us/assets/public/permitting/watersupply/water_rights/10238.pdf

Model Industrial/Mining Water Conservation Plan: There is no model industrial/mining water conservation plan in the South Central Texas Regional Water Plan. A form is provided by TCEQ to assist in conservation plan development for industrial/mining water use at the following web site:

- www.tceq.state.tx.us/assets/public/permitting/forms/10213.pdf

Recommendation: The South Central Texas Regional Water Planning Group strongly recommends the implementation of the Municipal, Industrial, Irrigation, Steam-Electric Power Generation, and Mining Water Conservation, and that each water user develop, implement, and maintain a Water Conservation Plan that meets or exceeds the requirements of applicable law.

6.2 Drought Management

31 TAC §357.7(a)(11) requires that the regional water plan identify: (A) factors specific to each source of water supply to be considered in determining whether to initiate a drought response; and (B) actions to be taken as part of the response. The general recommendations of the SCTRWPG regarding identification and initiation of drought responses for current water supply sources in the South Central Texas Region are listed in Table 6-1. As the SCTRWPG is a planning body only, with no implementation authority, it is emphasized that these drought responses are recommendations only. Local public and private water suppliers and water districts have been required by TCEQ to adopt a Drought Contingency Plan that contains drought triggers and responses unique to each specific entity. Furthermore, these entities have the authority and responsibility to manage their particular water supply within the bounds created by applicable

law. Therefore, the SCTRWPG encourages these entities to implement their respective plans with due consideration of the recommendations summarized in Table 6-1.

The SCTRWPG has developed a general methodology for estimating the economic impacts associated with implementation of drought management as a water management strategy.[1] Application of this methodology for regional water planning purposes has facilitated comparison of drought management to other potentially feasible water management strategies on a unit cost basis (Section 4C.2). The SCTRWPG has found, and the San Antonio Water System (SAWS) has demonstrated, that water user groups having sufficient flexibility to focus on discretionary outdoor water use first and avoid water use reductions in the commercial and manufacturing use sectors may find some degrees of drought management to be economically viable and cost-competitive with other water management strategies. Recognizing that implementation of appropriate water management strategies is a matter of local choice, the SCTRWPG recommends due consideration of economically viable drought management as an interim strategy to meet near-term needs through demand reduction until such time as economically viable long-term water supplies can be developed.

Table 6-1.
Identification and Initiation of Drought Responses

Source of Water Supply	***Factors to be Considered in Initiating Drought Response(s)***	***Potential Drought Responses***
Edwards Aquifer	• Local/regional well levels • Springflow maintenance • Water needs for health & safety • Availability of alternative sources	• Reductions in allowable withdrawals • Implementation of Drought Contingency Plans • Increase reliance on alternative sources
Carrizo & Other Aquifers	• Local/regional well levels • Water stored in formation vs. use • Acceptable long-term drawdown • Production facility constraints	• Implementation of Drought Contingency Plans • Groundwater district rules • Increase production facility capacity
Surface Water	• Streamflow/reservoir storage • Water right priority and special conditions • Dependable supply vs. use • Availability of alternative sources	• Implementation of Drought Contingency Plans • Coordination with TCEQ Watermaster • Increase reliance on alternative sources

[1] SCTRWPG, “2011 Regional Water Plan, Study 3, Enhanced Water Conservation, Drought Management, and Land Stewardship,” Texas Water Development Board, San Antonio River Authority, HDR Engineering, Inc., April 2009.

Model Drought Contingency Plan for Retail Public Water Suppliers: The model municipal drought contingency plan required for the South Central Texas Regional Water Plan is included in Appendix G, and has the following components:

Section	Contents
I	Declaration of Policy, Purpose, and Intent
II	Public Involvement
III	Public Education
IV	Coordination with Regional Water Planning Groups
V	Authorization
VI	Application
VII	Definitions
VIII	Criteria for Initiation and Termination of Drought Response Stages • Stage 1 Triggers – Mild Water Shortage Condition • Stage 2 Triggers – Moderate Water Shortage Conditions • Stage 3 Triggers – Severe Water Shortage Conditions • Stage 4 Triggers – Critical Water Shortage Conditions • Stage 5 Triggers – Emergency Water Shortage Conditions • Stage 6 Water Allocation
IX	Drought Response Stages • Notification • Response(s) (See Appendix G for list of potential responses by Stage)

Information and guidance in the development of drought contingency plans can be found at the following web site:

- www.tceq.state.tx.us/permitting/water_supply/water_rights/contingency.html

Recommendation: The South Central Texas Regional Water Planning Group recommends that each municipal water supplier develop, implement, and maintain a Drought Contingency Plan that meets or exceeds the requirements of applicable law.

6.2.1 Groundwater

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.[2] The Edwards Aquifer Authority (EAA) has adopted Demand Management and Critical Period rules that are consistent with Senate Bill 3 and establish trigger conditions for recognition of drought and specify reductions in withdrawals from the Edwards Aquifer when these trigger conditions are met. Subject to permitted withdrawals totaling 572,000 acft/yr, these rules reflect staged reductions in permitted withdrawals ranging from five to 40 percent during periods in which water levels in representative monitoring wells in Bexar and Uvalde Counties or discharges at Comal or San Marcos Springs have fallen below specified trigger levels. Tables 6-2 and 6-3 summarize the factors specific to the Edwards Aquifer in determining whether to initiate a drought response and the reductions in withdrawal expected as part of the response. For comprehensive information supplementing that shown in Tables 6-2 and 6-2, please refer to the rules of the EAA.

It is expected that U.S. Fish & Wildlife Service approval of an Habitat Conservation Plan will form the basis for identification of appropriate springflow levels or other measures for protection of threatened and endangered species. Until these springflow levels and/or other measures are identified and approved, appropriate timing for initiation of drought responses is uncertain. The SCTRWPG encourages the timely implementation of this Regional Water Plan as a preemptive drought response so that alternative sources of supply and/or enhanced supplies from the Edwards Aquifer will be available to satisfy regional water needs, maintain springflow, and protect endangered species to the extent required by State and Federal law.

Water supplies available from the Carrizo Aquifer and other aquifers in Region L are less subject to transient hydrologic drought conditions than the Edwards Aquifer and are more dependent upon water stored in the formation and the acceptability of long-term depletion or drawdown. If depletion of storage in these aquifers is occurring at an unacceptable pace (typically measured over many years, rather than a few months), there is likely to be sufficient time to amend groundwater district rules and/or develop alternative sources of supply. As with any source of water supply, production facility constraints may necessitate expedited increases in production capacity or implementation of drought contingency measures during dry periods when peak water demands are greatest.

[2] 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 6-2.
Senate Bill 3 Critical Period Withdrawal Reduction Stages for the San Antonio Pool

Reduction Stage	Triggers Initiating Drought Response				San Antonio Pool Withdrawal Reduction
	J-17 (ft-msl)	Springflows (cfs) San Marcos	Springflows (cfs) Comal	J-27 (ft-msl)	
I	660	96	225	N/A	20 %
II	650	80	200	N/A	30 %
III	640	N/A	150	N/A	35 %
IV	630	N/A	100	N/A	40 %

Table 6-3.
Senate Bill 3 Critical Period Withdrawal Reduction Stages for the Uvalde Pool

Reduction Stage	Triggers Initiating Drought Response				Uvalde Pool Withdrawal Reduction
	J-17 (ft-msl)	Springflows (cfs) San Marcos	Springflows (cfs) Comal	J-27 (ft-msl)	
I	N/A	N/A	N/A		N/A
II	N/A	N/A	N/A	850	5 %
III	N/A	N/A	N/A	845	20 %
IV	N/A	N/A	N/A	842	35 %

6.2.2 Surface Water

Supplies from surface water sources such as run-of-river water rights and reservoirs are determined on the basis of minimum month availability and firm yield, respectively. Hence, the current surface water supplies presented herein are, by TWDB definition, dependable during drought. Factors that are typically considered in initiating drought response for surface water sources are low streamflow and/or low reservoir storage, since these factors can be conveniently measured and monitored. In contrast to groundwater sources, water right priority with respect to other rights and special permit conditions regarding minimum instream flows can also be important factors in determining whether to initiate drought responses for surface water sources. In the Guadalupe-San Antonio and Nueces River Basins, coordination with the TCEQ South Texas Watermaster is an essential drought response for all entities dependent upon surface water supply sources.

6.2.2.1 Potential for Emergency Transfers of Surface Water

In accordance with [31 TAC §357.5 (i)], the SCTRWPG is to consider emergency transfers of surface water including a determination of the portion of each right for non-municipal use that may be transferred without causing unreasonable damage to the property of the non-municipal water right holder. The Executive Director of TCEQ, after notice to the Governor, may issue emergency permits or temporarily suspend or amend permit conditions without notice or hearing to address emergency conditions for a limited period of not more than 120 days if an imminent threat to public health and safety exists. A person desiring to obtain an emergency authorization is required to justify the request to TCEQ. If TCEQ determines the request is justified, it may issue an emergency authorization without notice and hearing, or with notice and hearing, if practicable. Applicants for emergency authorizations are required to pay fair market value for the water they are allowed to divert, as well as any damages caused by the transfer. In transferring the quantity of water pursuant to an emergency authorization request, the Executive Director, or the TCEQ, shall allocate the requested quantity among two or more water rights held for purposes other than domestic or municipal purposes.

Surface water availability models have been developed for the streams of the South Central Texas Region (Region L) in which the locations, quantities, and reliabilities of the surface water rights of the region have been quantified as described in Section 3, entitled Water Supply Analyses. The Regional Water Plan incorporates Appendix B as a source of information to water user groups and the TCEQ for use in cases of emergencies that result in a threat to public health and safety. Water user groups located in proximity to one or more existing surface water diversion permits for non-municipal use can readily estimate quantities of water that might be available for emergency use applications. With regard to the determination of amounts “that may be transferred without causing unreasonable damage to the property of the non-municipal water rights holder,” the SCTRWPG defers to the judgment of the TCEQ inasmuch as the TCEQ is charged with consideration of sworn applications for emergency transfer authorizations. The SCTRWPG recommends that water user groups of the region develop emergency water supply plans to be activated in the event that public health and safety are threatened.

Section 7
Consistency with Long-Term Protection of the State's Water, Agricultural, and Natural Resources [31 TAC §357.7(a)(13) and §357.14(2)(C)]

The 2011 South Central Texas Regional Water Plan (2011 Plan) is consistent with long-term protection of the state's water resources, agricultural resources, and natural resources and is based on principles outlined in the Texas Administrative Code Chapter 358–State Water Planning Guidelines. The 2011 Plan was formulated and developed with an understanding of the importance of orderly development, management, and conservation of water resources to meet the Region's near and long-term water needs during drought. The plan recognizes and honors all laws and existing permits applicable to water use for the state and regional water planning areas and, in the case of groundwater, recognizes and takes into account the programs and rules of groundwater conservation districts within the South Central Texas Water Planning Region (Section 3).

The 2011 Plan identifies actions and policies necessary to meet the Region's projected municipal, industrial, steam-electric power, mining, livestock, and most of irrigation needs, by developing and recommending water management strategies (WMS) to meet these needs at a reasonable cost (Section 4B). It was not possible, however, to develop economically feasible strategies to meet all of the projected needs of irrigated agriculture. A socioeconomic impact analysis was performed to estimate the economic loss associated with not meeting these needs (Appendix E).

Development of the 2011 Plan included consideration of environmental information resulting from site-specific studies and ongoing water development projects when evaluating water management strategies. A list of endangered and threatened species and species of concern for each county of the region was obtained from the Texas Parks & Wildlife Department (TPWD) and the possible habitats for these species were considered for each water management strategy (Appendix H). In addition, a comprehensive environmental assessment, potential environmental effects analysis, and cumulative effects analyses were performed for the recommended water management strategies of the plan (Sections 7.1 and 7.2). Section 7.3 summarizes the environmental benefits and concerns associated with implementation of the 2011 South Central Texas Regional Water Plan.

The 2011 Plan includes water conservation and drought management water management strategies based upon municipal water conservation best management practices (BMPs), and initiatives to respond to drought conditions by the municipal water user groups, and the use of water conservation BMPs in the irrigation water use group.

Implementation of the water management strategies recommended in the plan is generally scheduled to meet projected needs at the least capital, operating, and environmental costs, and thereby the plan meets the condition of "feasible strategies at reasonable costs," as specified in Texas Water Development Board (TWDB) guidelines for regional water planning. The 2011 Plan is based on the condition of voluntary transfers of water resources to meet projected needs, including the underlying principles that local area projected needs to 2060 are met before any consideration is given to movement of water from rural and agricultural areas to meet projected needs at more distant locations, that compensation will be made to water owners for water to meet projected needs of others, and an evaluation made of the social and economic impacts of voluntary transfers of water from rural and agricultural areas (Section 5.2).

The South Central Texas Regional Water Planning Group (SCTRWPG) conducted quarterly public meetings during the 2011 planning cycle and based its decisions upon the best available information. The SCTRWPG coordinated water planning and management activities with local, regional, state, and federal agencies and cooperated and coordinated with Regions N, P, K, G, and J (Coastal Bend, Lavaca, Lower Colorado, Brazos G, and Plateau, respectively) to identify common needs and cooperative opportunities.

The SCTRWPG has conditionally recommended that five stream segments be designated as having unique ecological value by the Texas Legislature. The SCTRWPG developed policy recommendations for the 2011 Plan including improved water demand and water supply data, continued support for the rule of capture as modified by the rules and regulations of existing groundwater conservation districts, continued funding for regional water planning, and especially that the Legislature provide adequate funding for the implementation of water management strategies of the plan (Section 8).

7.1 Cumulative Effects of Regional Water Plan Implementation

Sophisticated hydrologic models have been employed to quantify the cumulative effects of implementation of the South Central Texas Regional Water Plan through the year 2060. Such models include the GWSIM-IV Edwards Aquifer model (GWSIM-IV),[1,2] Groundwater Availability Models for Carrizo-Wilcox, Queen City, and Sparta Aquifers (Southern Carrizo GAM and Central Carrizo GAM),[3] Guadalupe-San Antonio River Basin Water Availability Model (GSAWAM),[4] Nueces River Basin Water Availability Model (Nueces WAM),[5] and Lower Nueces River Basin and Estuary Model (NUBAY).[6]

The cumulative effects are quantified through long-term simulation of natural hydrologic processes including precipitation, streamflow, aquifer recharge, springflow, and evaporation as they are affected by human influences such as aquifer pumpage, reservoirs, diversions, and the discharge of treated effluent. Figure 7.1-1 illustrates the connectivity of the various groundwater and surface water models, as well as the water management strategies of the 2011 Regional Water Plan.

7.1.1 Groundwater and Springs

Cumulative effects of plan implementation on the Edwards Aquifer are measured against a baseline representative of full utilization of Initial Regular Permits of a total of 572,000 acft/yr subject to Critical Period Management rules, as outlined in Senate Bill 3 of the 80th Texas Legislature, without any additional recharge enhancement projects. The baseline also includes approximately 20,000 acft/yr of domestic, livestock, and federal use. Edwards Aquifer

[1] Texas Department of Water Resources, "Groundwater Resources and Model Applications for the Edwards (Balcones Fault Zone) Aquifer in the San Antonio Region," Report 239, October 1979.
[2] Texas Water Development Board, "Model Refinement and Applications for the Edwards (Balcones Fault Zone) Aquifer in the San Antonio Region, Texas," Report 340, July 1992.
[3] INTERA Incorporated, "Groundwater Availability Models for the Queen City and Sparta Aquifers," Texas Water Development Board, October 2004.
[4] HDR Engineering, Inc., "Water Availability in the Guadalupe-San Antonio River Basin," Texas Natural Resource Conservation Commission (TNRCC), December 1999.
[5] HDR Engineering, Inc., "Water Availability in the Nueces River Basin," TNRCC, October 1999.
[6] HDR Engineering, Inc., "Updates and Enhancements to Lower Nueces River Basin Bay and Estuary Model and Corpus Christi Water Supply Model," City of Corpus Christi, January 2006.

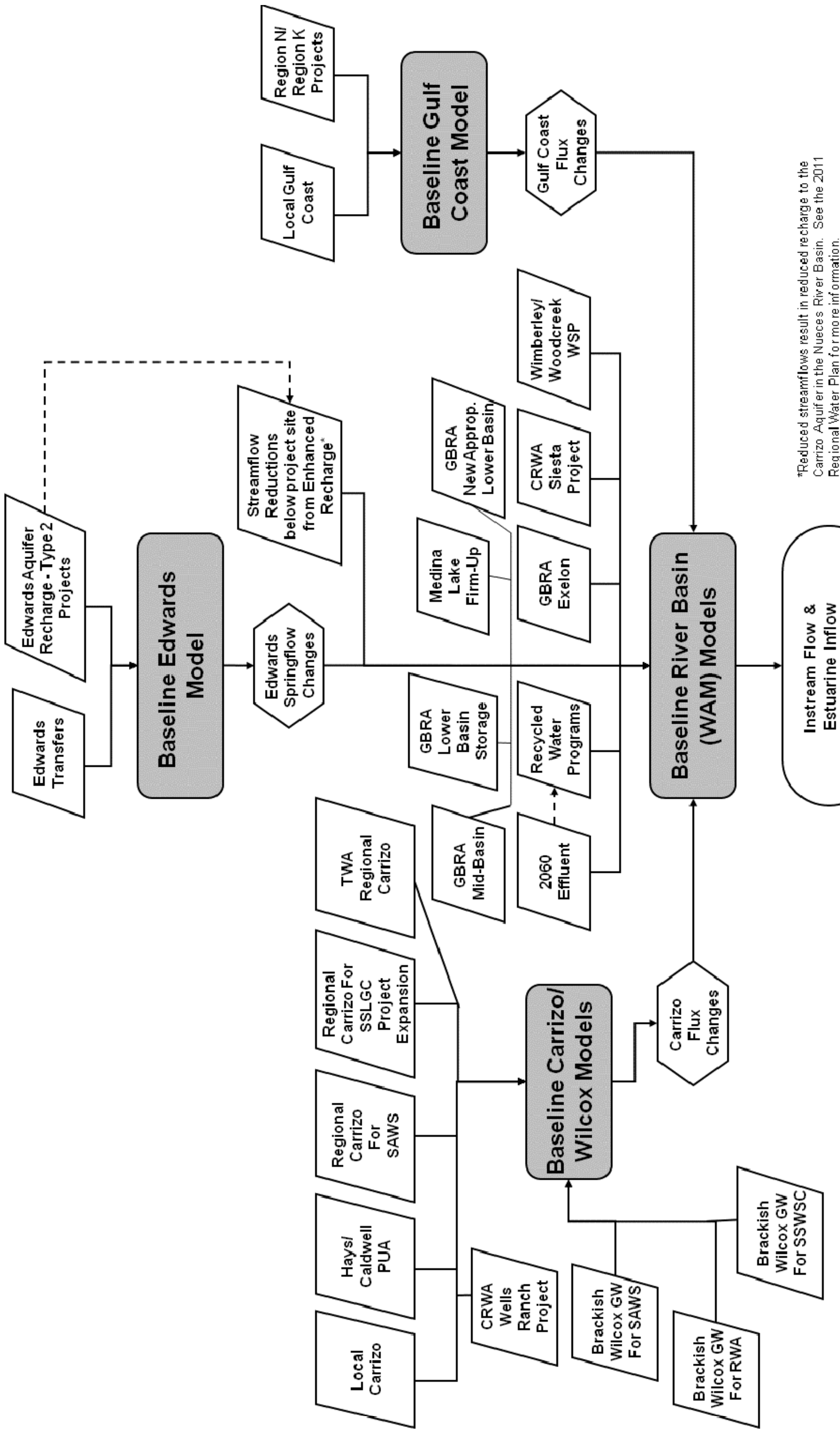


Figure 7.1-1. Flowchart for Assessment of Cumulative Effects of Regional Water Plan Implementation on Surface Water Resources

simulations with implementation of the Plan do not reflect the use of available System Management Supplies as may be necessary to offset Edwards Aquifer pumpage reductions to maintain springflow. Cumulative effects of plan implementation on Carrizo and Wilcox Aquifer levels are measured against a baseline of projected local pumpage.

The potential cumulative effects of plan implementation on Comal Springs discharge from the Edwards Aquifer are shown in Figure 7.1-2 for a 56-year historical simulation period. Springflows would increase by a net average of about 11 cfs (5.7 percent) considering the off-setting effects of Edwards Recharge – Type 2 Projects (Figure 7.1-3) and increased pumpage closer to the springs associated with Edwards Transfers. Additional information regarding Edwards Transfers and Recharge – Type 2 Projects can be found in Sections 4C.3 and 4C.4 (Volume II) respectively. As shown in Figures 7.1-4 and 7.1-5, simulated San Marcos Springs and Leona Springs discharges would increase substantially because of the Edwards Recharge – Type 2 Projects, particularly the Lower Blanco Project and the Indian Creek Project, respectively. Overall pumpage from the Edwards Aquifer could increase (Figure 7.1-6) due to potential Edwards Aquifer Authority permits for recharge recovery and decreased frequency of withdrawal restrictions pursuant to development of the Edwards Recharge – Type 2 Projects. Figure 7.1-7 shows simulated water levels at key monitoring wells in Uvalde and Bexar Counties with implementation of the Plan.

The long-term cumulative effects of recommended water management strategies in the 2011 Regional Water Plan on the Carrizo Aquifer have been simulated using the Southern Carrizo GAM and the Central Carrizo GAM. The Southern Carrizo GAM provides suitable coverage over most of the Carrizo Aquifer in Region L, including the western part of Gonzales County; however, the model coverage ends about 6-miles northeast Gonzales County. Therefore, the Central Carrizo GAM was used to evaluate WMS projects in eastern Gonzales County to avoid interference from the general head boundary, which may inaccurately represent drawdown conditions for pumping near the model boundary.

For the purpose of the cumulative effects evaluation, desired project sizes, as requested by the sponsors, by decade were totaled and the predictive pumpage was amended to conform to groundwater availability provided by groundwater conservation districts, where applicable. Therefore, pumpage associated with all of the WMS (except for projects in Caldwell County) was reduced on a pro-rata basis, from the quantities used in the WMS evaluations. For example, in Gonzales County the amount of water remaining for WMS in 2060 after subtracting local groundwater demands from the groundwater availability provided by GCUWCD is 23,852 acft from the Carrizo Aquifer. However, the total amount requested by specific entities totals 75,790 acft. Therefore, for cumulative effects modeling purposes, the amount of pumpage applied to each entity was proportioned based on their requested amount in order to total 23,852 acft in 2060. Figure 7.1-8 presents the cumulative effects predictive pumpage for Gonzales County by decade.

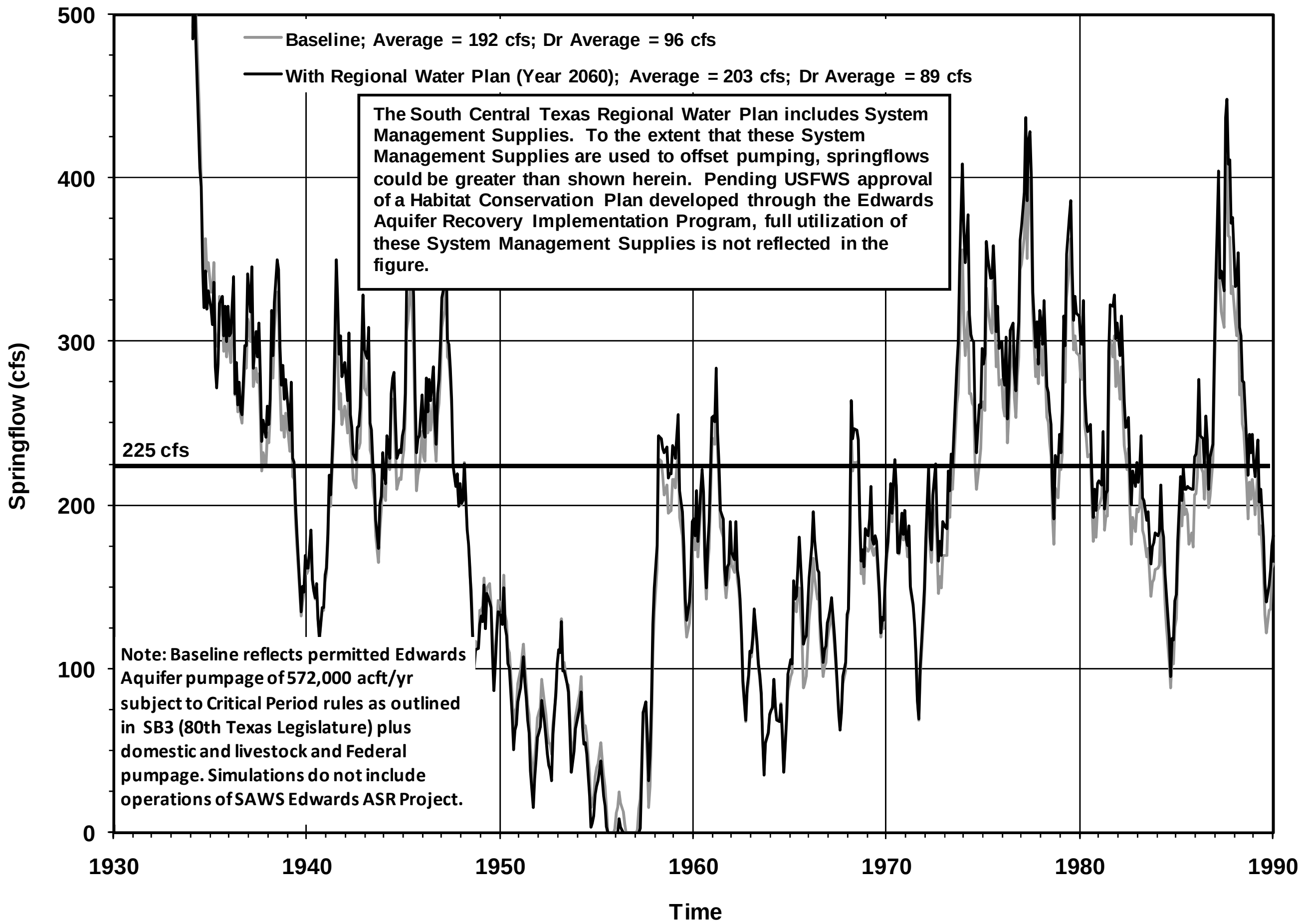


Figure 7.1-2. Simulated Comal Springflow

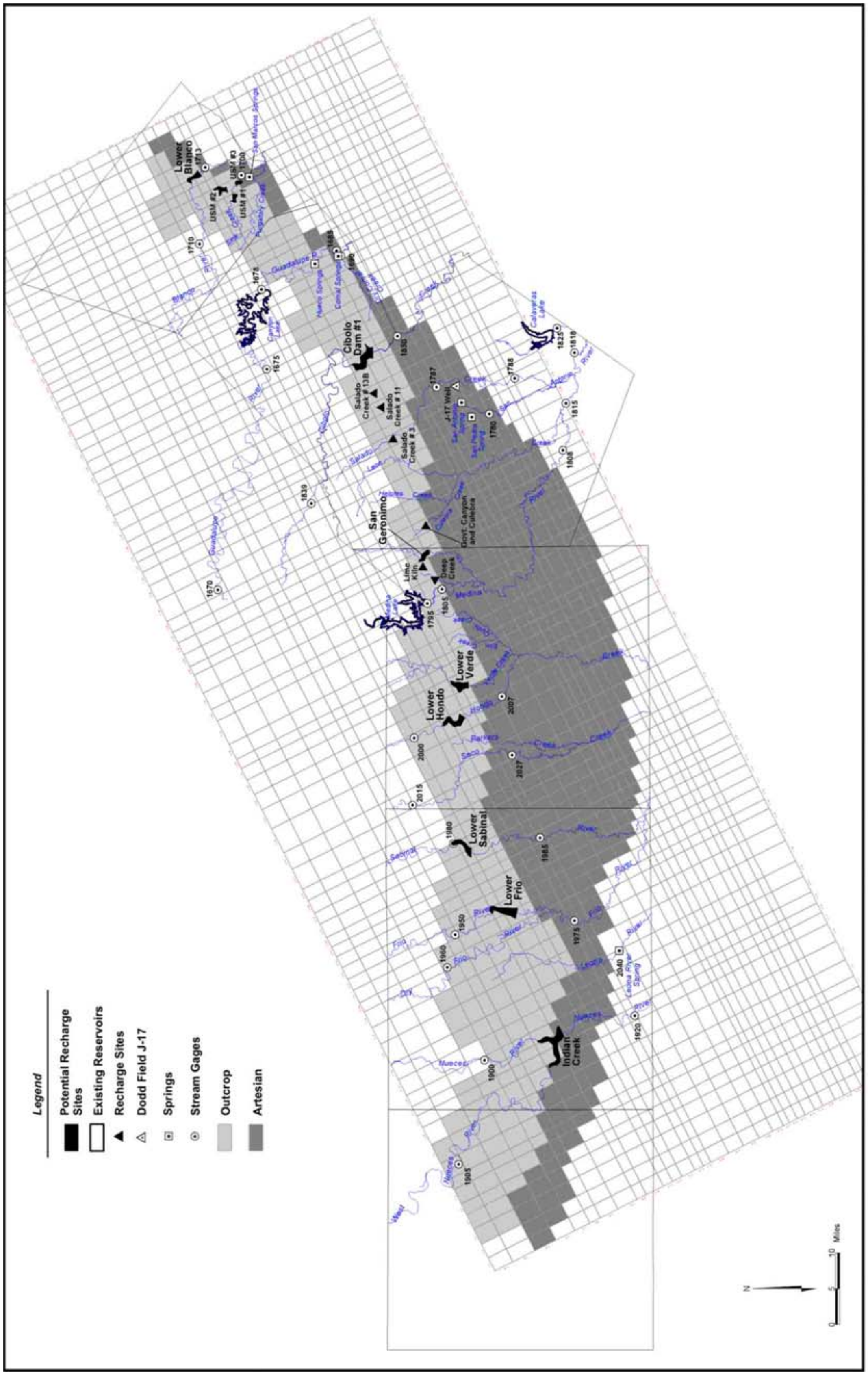


Figure 7.1-3. Edwards Recharge — Type 2 Projects

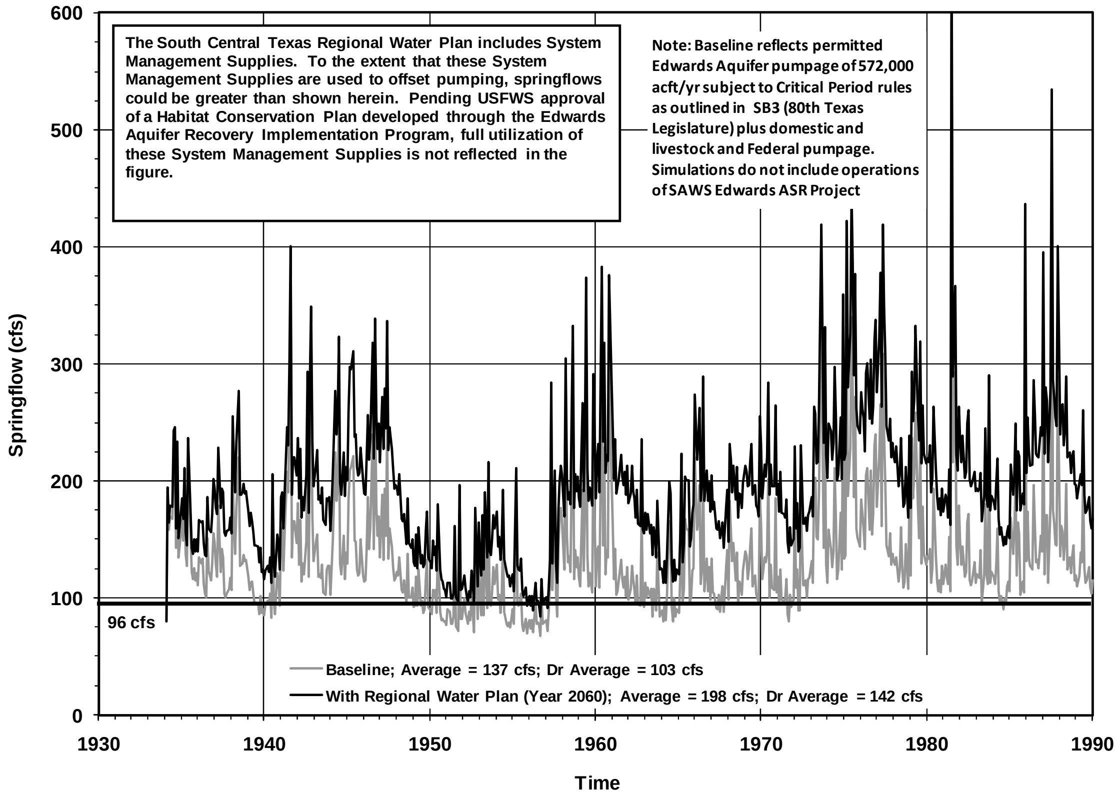


Figure 7.1-4. Simulated San Marcos Springflow

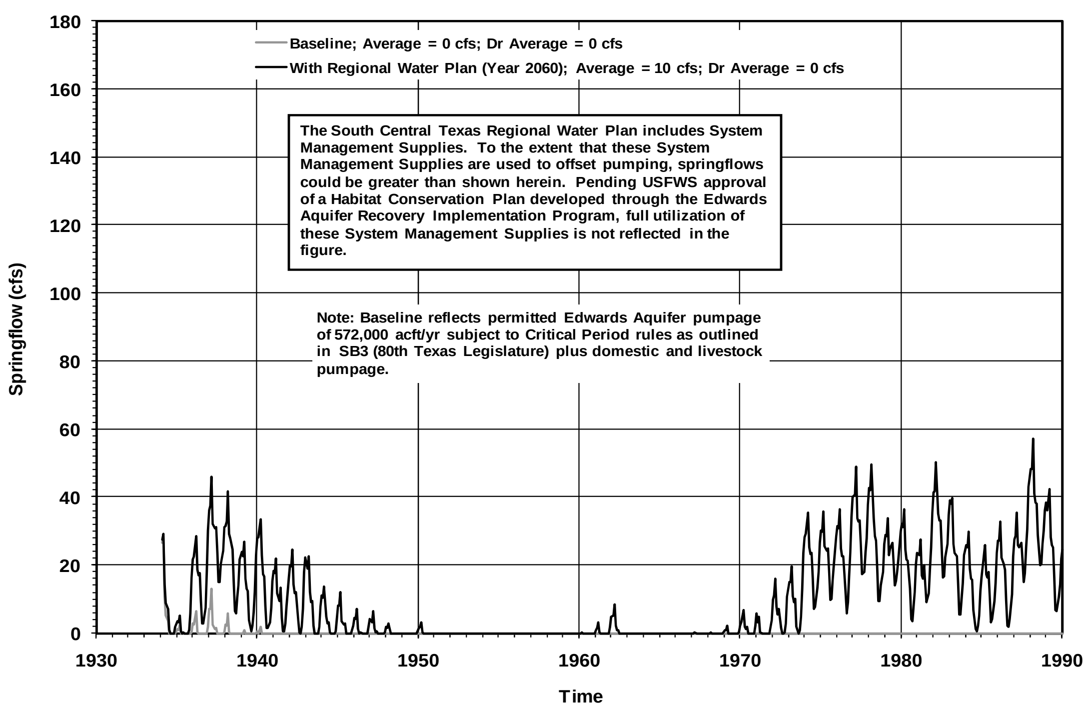


Figure 7.1-5. Simulated Leona Springflow

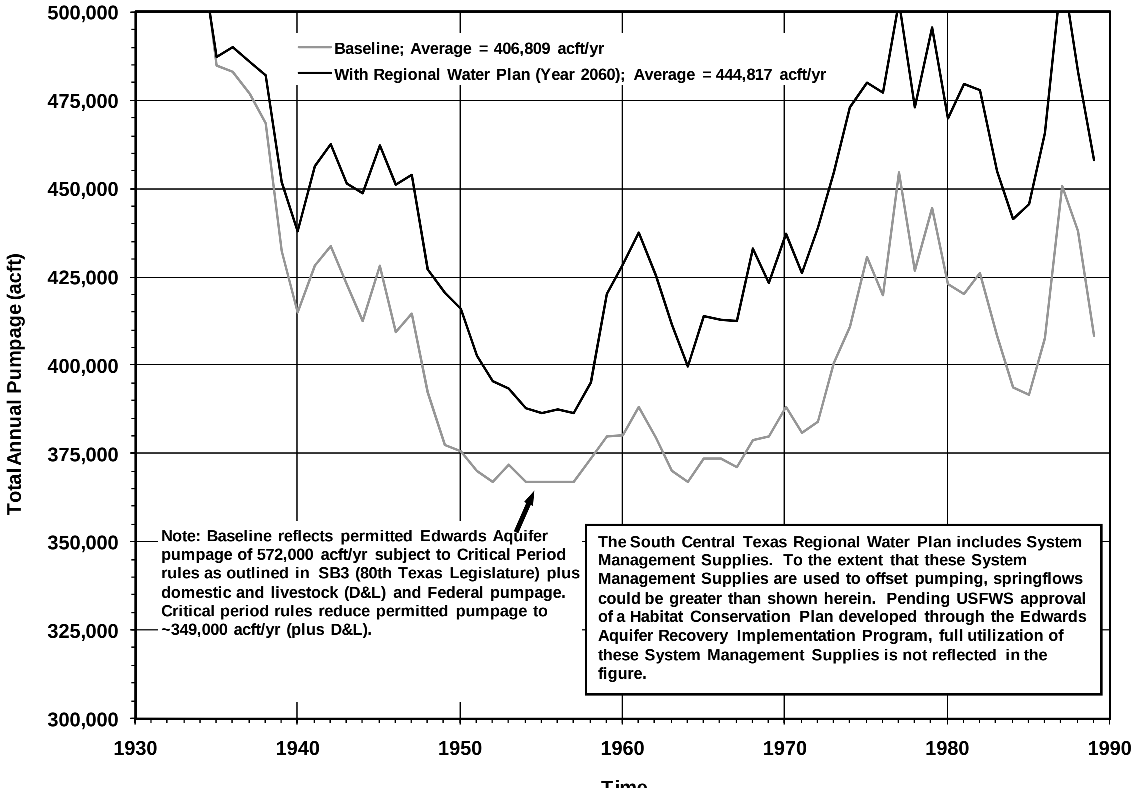


Figure 7.1-6. Simulated Edwards Aquifer Pumpage

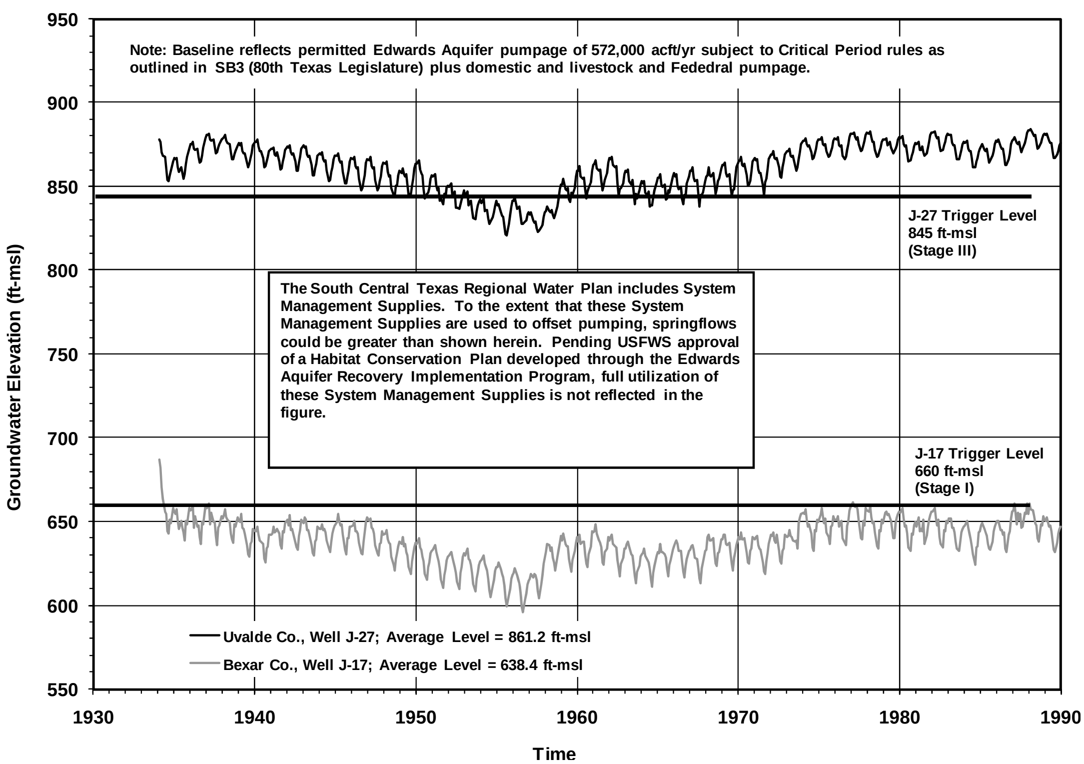


Figure 7.1-7. Simulated Edwards Aquifer Levels with Plan

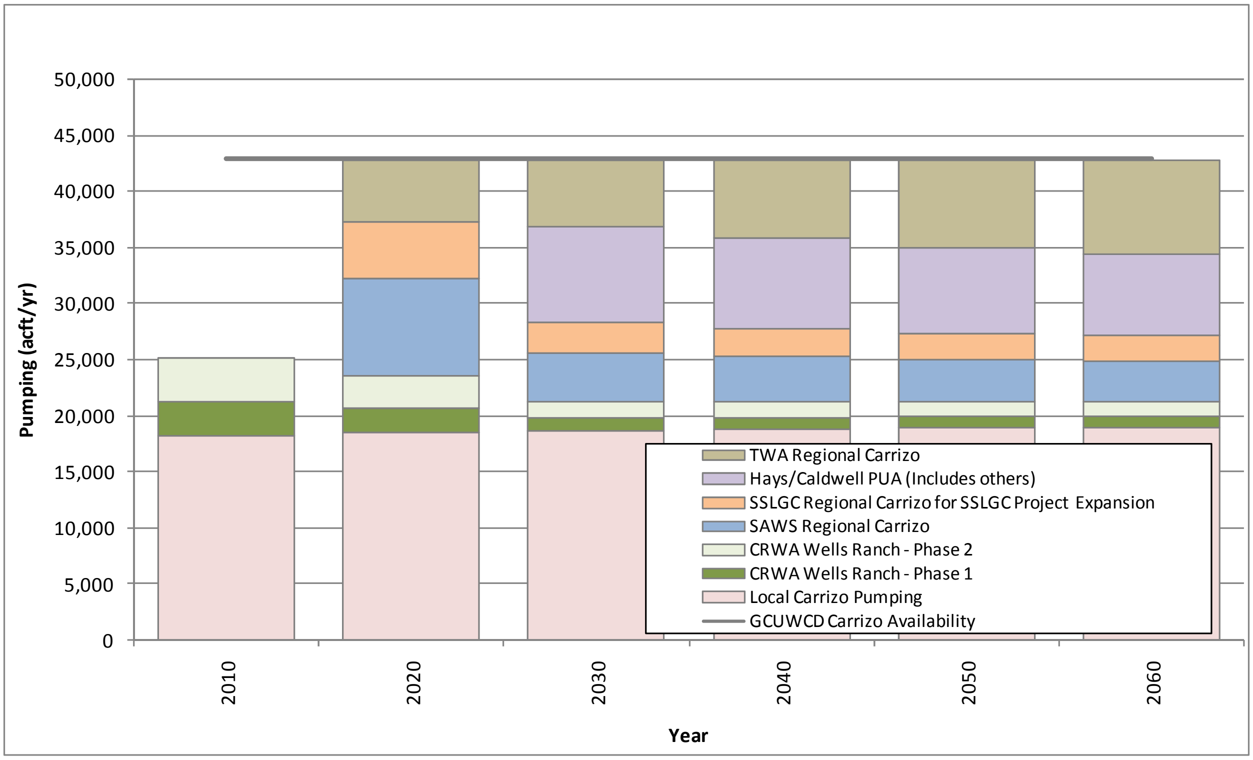


Figure 7.1-8. Cumulative Effects Simulation Predictive Groundwater Pumpage by Decade (Gonzales County Example)

Predictive simulations were performed for the 2002-2060 time period. Local pumpage and groundwater project pumpage resulted in water surface elevations in the Carrizo and Wilcox Aquifers being reduced over the time period of the simulation. The resulting Carrizo and Wilcox Aquifer drawdowns over the 59-year simulation period are presented in Figures 7.1-9 and 7.1-10, respectively, and drawdown hydrographs at WMS pumping centers are presented in Figures 7.1-11 and Figure 7.1-12. Fluctuations in drawdowns over time are a result of pumping adjustments as new WMS come online. For example, in Gonzales County, as new projects come online, the proportion of pumping for each project is reduced, as shown in Figure 7.1-8.

Due to the effect of vertical communication between adjacent geologic formations, pumping in the Carrizo may also cause lesser drawdown in adjacent formations such as the Wilcox, Queen City, and Sparta Aquifers. Drawdown in the outcrop areas of each aquifer, where hydrologic interaction between the aquifers and the stream channels occurs, resulted in a reduction of the modeled flow (flux) that naturally occurs from the aquifers to the stream channel. The cumulative effects of drawdown in all modeled aquifers in the Southern Carrizo

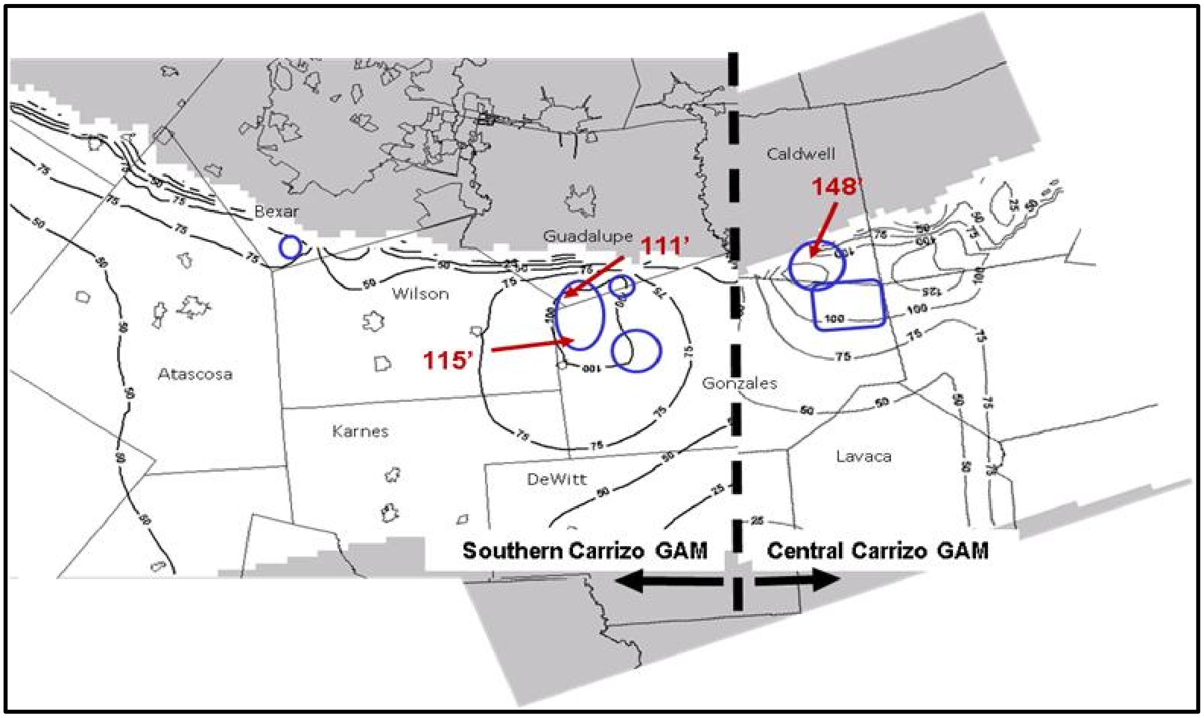


Figure 7.1-9 Southern Carrizo GAM and Central Carrizo GAM Cumulative Effects Simulation 2002 to 2060 Carrizo Drawdown

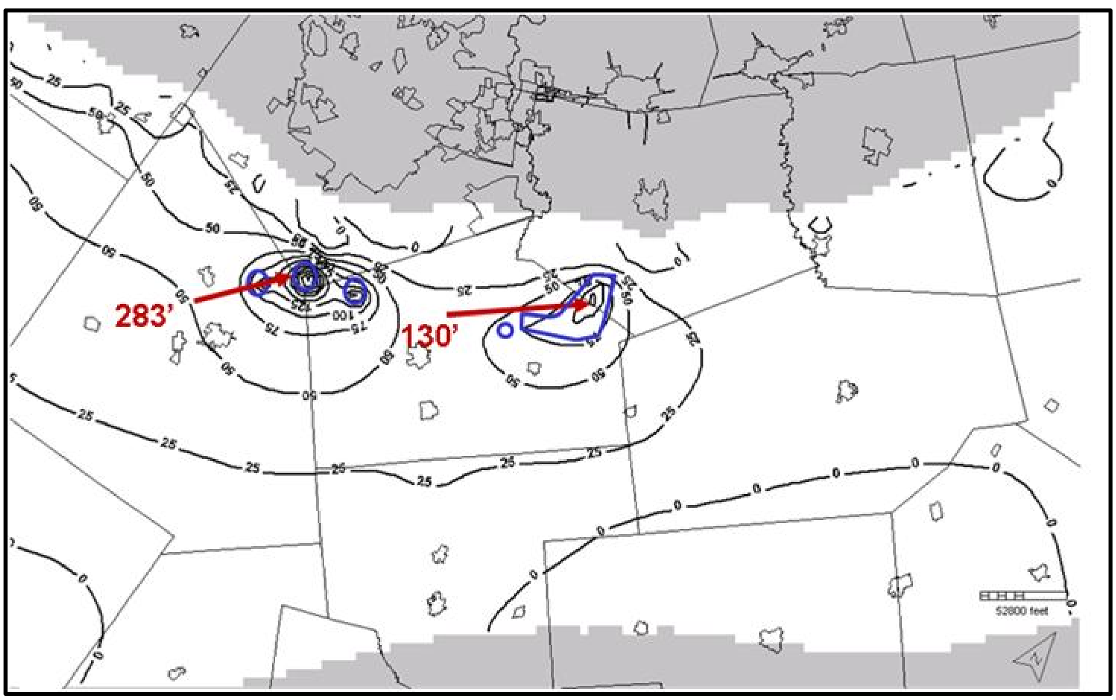


Figure 7.1-10 Southern Carrizo GAM Cumulative Effects Simulation 2002 to 2060 Wilcox Drawdown

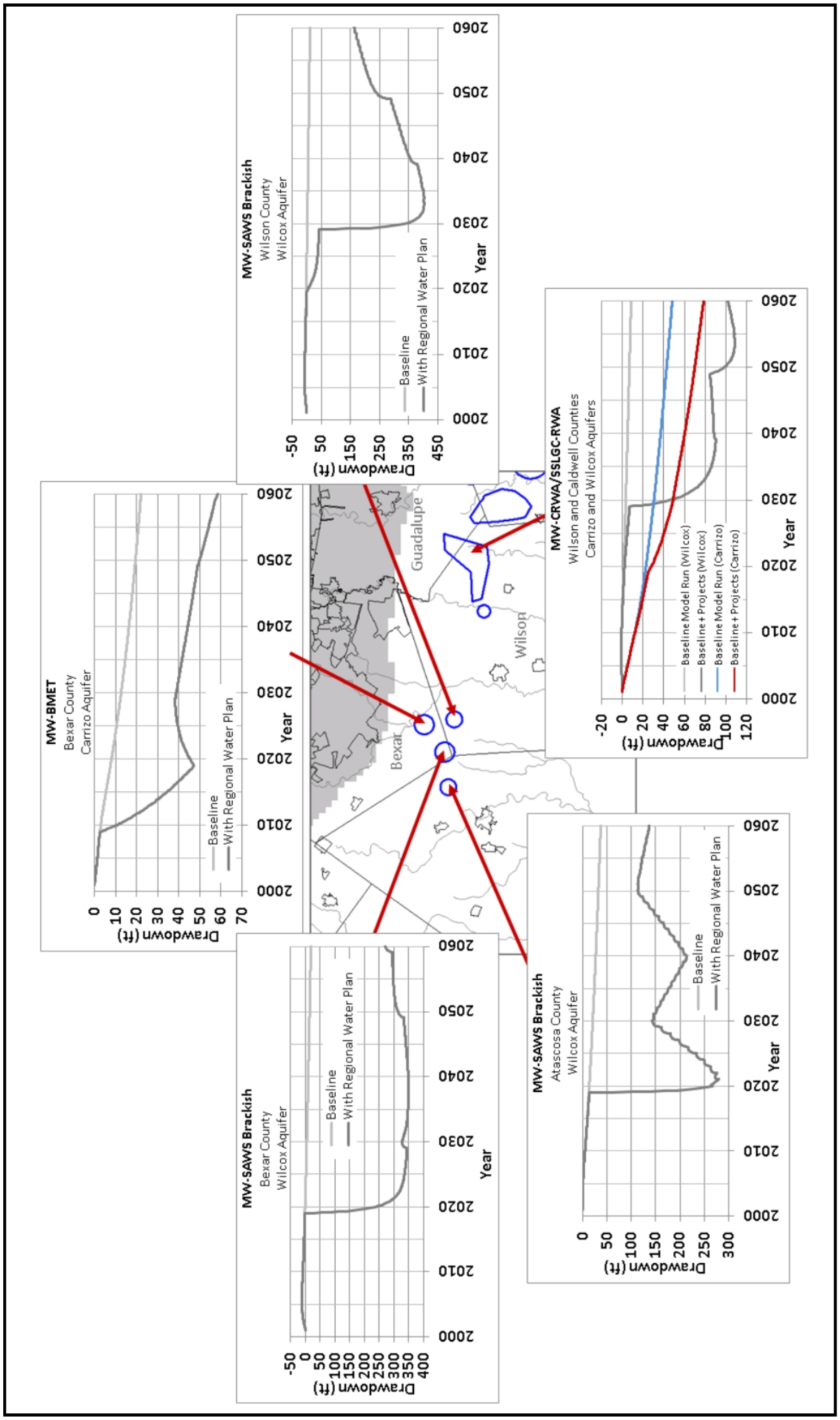


Figure 7.1-11. Drawdown Hydrographs for Projects in Atascosa, Bexar, and Wilson Counties

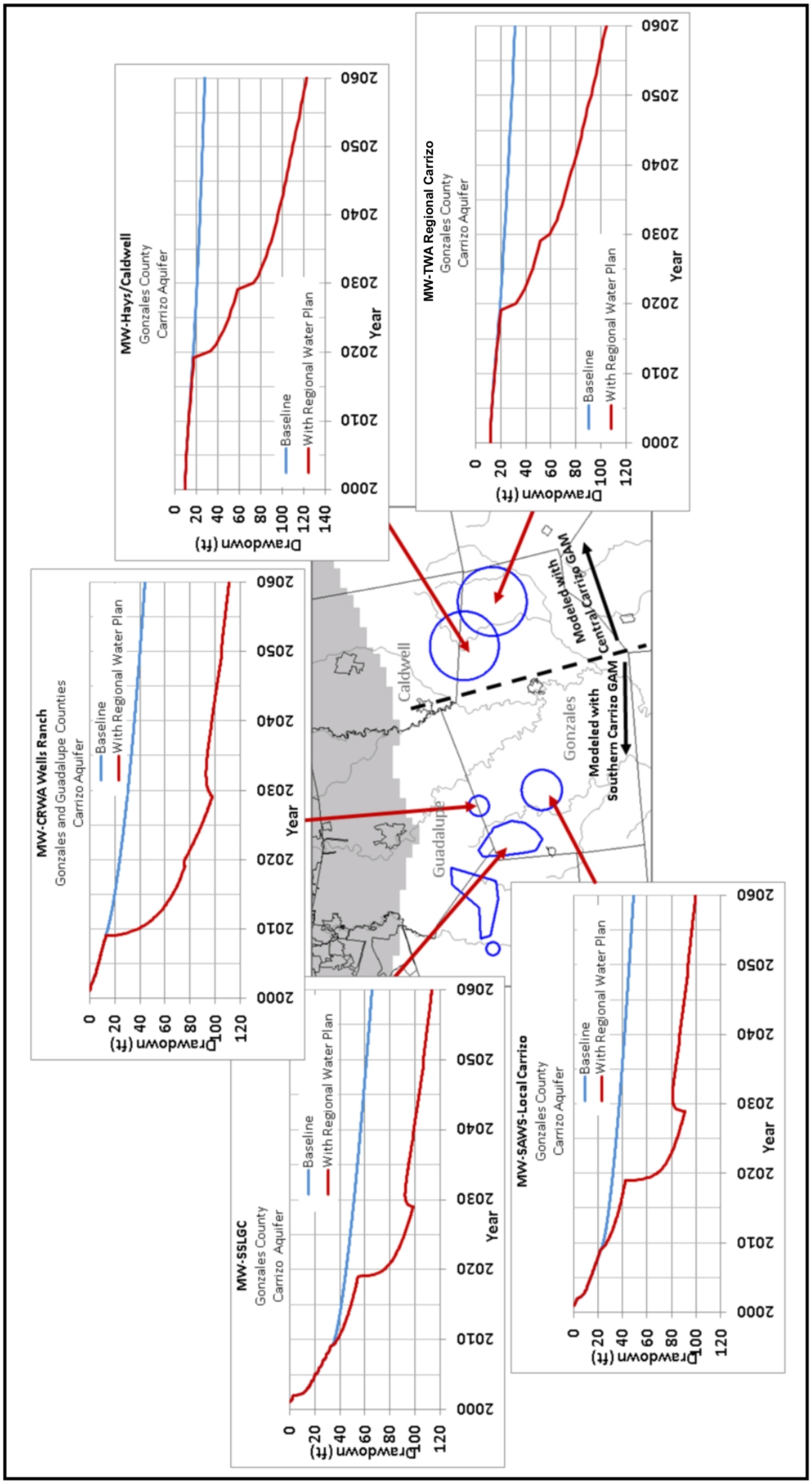


Figure 7.1-12. Drawdown Hydrographs for Projects in Gonzales County

GAM model resulted in a reduction in the amount of discharge from the aquifers to the major stream channels within the model domain. This reduction occurs gradually over time. It is noted that this reduction does not occur at a single point in space or time, but is a cumulative result from diffuse sources along the bed and banks of the modeled streams in the watershed over the entire length of stream channel in the model. Table 7.1-1 summarizes the potential effects of local groundwater production and regional projects recommended in the regional water plan on long-term surface water / groundwater interactions. As indicated in Table 7.1-1, increased use of existing wells and implementation of recommended Local Carrizo strategies are expected to have greater effects on San Antonio River and Cibolo Creek flows than recommended regional projects. The opposite is true of the Guadalupe and San Marcos Rivers. The reductions associated with recommended regional projects have been included in the GSAWAM for simulation of associated effects on instream flows and freshwater inflows to the Guadalupe Estuary.

Table 7.1-1.
Flux From Southern Carrizo GAM Aquifers to Streams (cfs)[1]

	San Antonio River (+Tributaries)	*Cibolo Creek*	*Guadalupe River*	*San Marcos River (+ Tributaries)*
Effects of Local Pumpage	-10.1	-4.3	-0.7	-6.7
Effects of Regional Projects	-2.4	-0.8	-1.5	-10.6

[1]Numbers represent flux from streams to aquifers. Negative values indicate less water flowing from aquifers to streams. No initial upstream flow is included.

As the only recommended water management strategy relying on the Gulf Coast Aquifer in Region L is for local municipal water needs in the Kenedy area and is relatively small, any effects of this strategy on streamflows would be virtually undetectable. All other uses of the Gulf Coast Aquifer are part of the existing local supplies used to calculate projected water needs. Hence, modeling of Gulf Coast Aquifer is not presented herein. It is noted that the U.S. Geological Survey and the San Antonio River Authority are nearing completion of a multi-year study of interactions between surface water and groundwater in the lower San Antonio River and the underlying aquifers.

7.1.2 Surface Water

Potential cumulative effects of implementation of the 2011 South Central Texas Regional Water Plan on instream flows and freshwater inflows to bays and estuaries have been assessed for the eleven locations in the Guadalupe-San Antonio and Nueces River Basins shown in Figure 7.1-13. The cumulative effects simulation includes growth in effluent due to increased water demands for Bexar County (Table 7.1-2). The baseline for consideration of effects on flows reflects the baseline for the Edwards Aquifer, full utilization of existing water rights, and treated effluent discharge representative of current conditions.

The cumulative effects at these selected locations in the Guadalupe – San Antonio River Basin are summarized in Figures 7.1-14 through 7.1-20. Streamflow comparisons indicate that flows in the San Antonio River at Falls City (Figure 7.1-17) and Goliad (Figure 7.1-18) are expected to increase throughout the flow regime with implementation of the Plan. For the San Marcos River at Luling (Figure 7.1-15), the Guadalupe River at Victoria (Figure 7.1-16), the Guadalupe River at Diversion Dam & Saltwater Barrier near Tivoli (Figure 7.1-19), and the Guadalupe Estuary (Figure 7.1-20), streamflows are expected to increase in the lower portions of the flow regimes and decrease in the higher portions with full implementation of the Plan. Streamflows in the Guadalupe River above Comal River at New Braunfels are not expected to change significantly during the planning period. Projected increases in streamflows and freshwater inflows to the Guadalupe Estuary generally occur below the median and are attributable to increases in treated effluent associated with increased municipal and industrial water use and to Edwards Recharge – Type 2 Projects and the associated increases in Comal and San Marcos springflow. Projected decreases in streamflows and freshwater inflows to the Guadalupe Estuary generally occur above the median and are primarily the result of recommended projects including new surface water diversions.

Potential effects of implementation of the South Central Texas Regional Water Plan on flows in the Nueces River Basin are summarized in Figures 7.1-21 through 7.1-24. Decreased streamflows for the Nueces River below Uvalde (Figure 7.1-21), the Nueces River at Cotulla (Figure 7.1-22), and the Frio River near Derby (Figure 7.1-23) are attributable to enhanced recharge associated with Edwards Recharge – Type 2 Projects. Increased median streamflows for the Frio River near Derby (Figure 7.1-23) in some months may be attributed to increases in

#	Location	USGS Streamgage #
Guadalupe-San Antonio River Basin		
1	Guadalupe River above Comal River @ New Braunfels	08168500
2	San Marcos River @ Luling	08172000
3	Guadalupe River @ Victoria	08176500
4	San Antonio River near Falls City	08183500
5	San Antonio River @ Goliad	08188500
6	Guadalupe River @ Diversion Dam & Saltwater Barrier near Tivoli	08188800
7	Guadalupe Estuary	-
Nueces River Basin		
8	Nueces River below Uvalde	08192000
9	Nueces River @ Cotulla	08194000
10	Frio River near Derby	08205500
11	Nueces Estuary	-

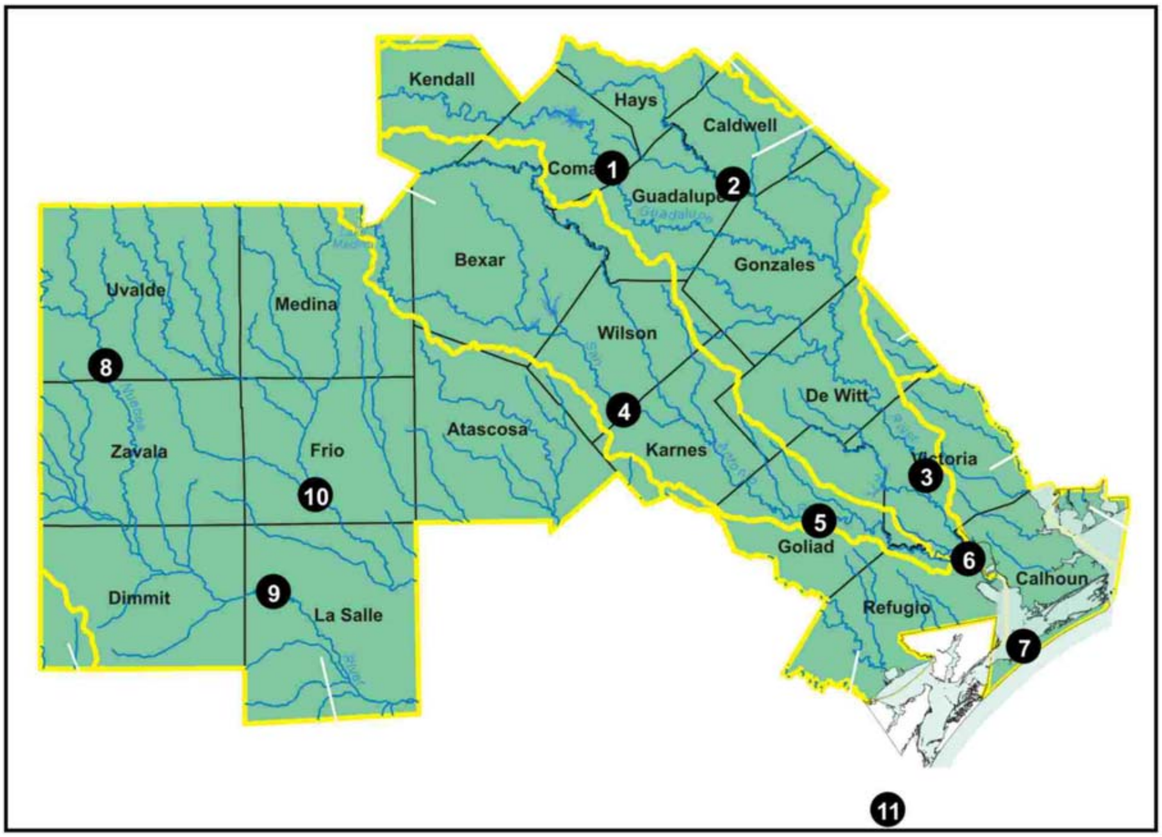


Figure 7.1-13. Flow Assessment Locations

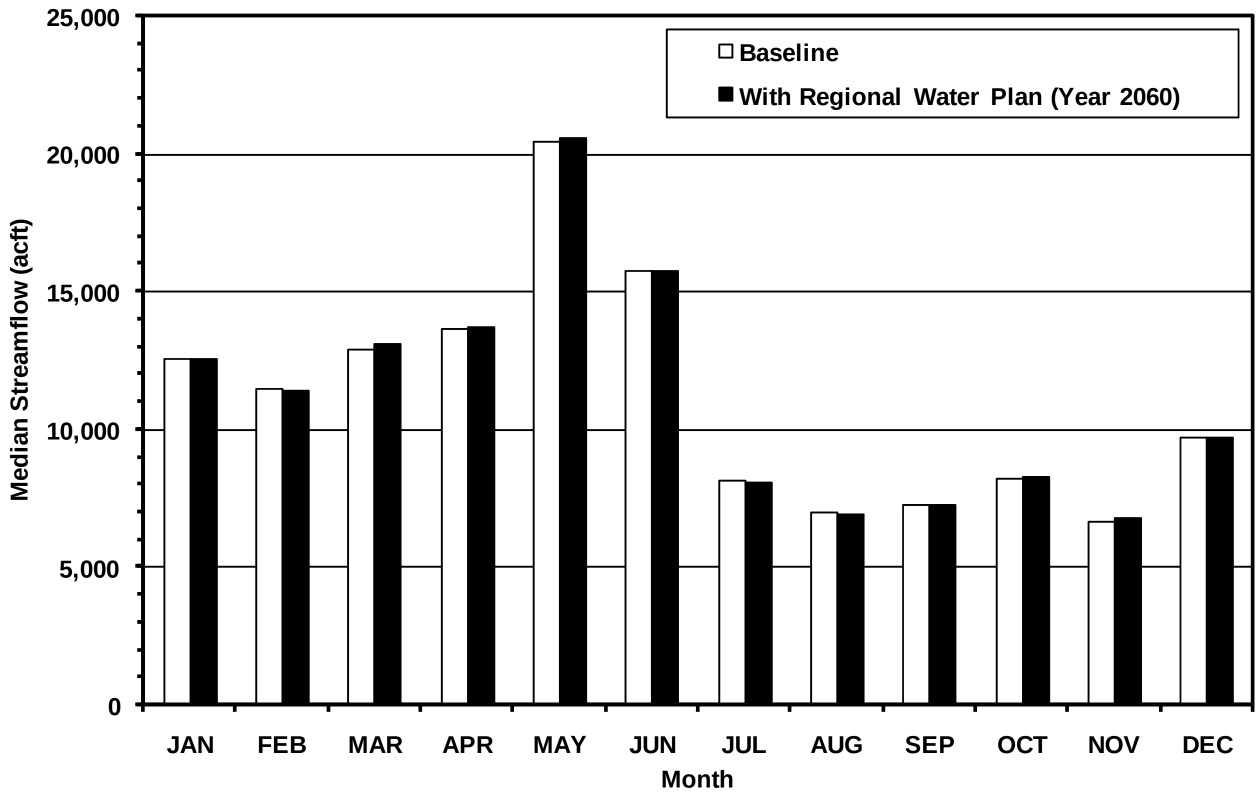
Table 7.1-2.
Effluent Accounting

Description	*2010*	*2020*	*2030*	*2040*	*2050*	*2060*
Total Bexar Co Municipal Demand [+]	262,104	290,072	316,424	336,033	355,246	374,536
Total Bexar Co Municipal Conservation [-]	7,223	10,384	13,379	16,353	22,884	32,800
Total Bexar Co Industrial Demand [+]	25,951	29,497	32,775	36,068	38,965	42,112
Total Bexar Co M & I Demand [=]	280,832	309,185	335,820	355,748	371,327	383,848
Total Bexar Co Effluent (60% of Total M&I Demand)	**168,499**	**185,511**	**201,492**	**213,449**	**222,796**	**230,309**
Current Recycle Program (Consumptive; Capacity = 35,000 Acft/yr)	24,894	35,000	35,000	35,000	35,000	35,000
Bexar Co Effluent After Consumptive Recycle Program*	**143,605**	**150,511**	**166,492**	**178,449**	**187,796**	**195,309**

** City Public Service (CPS) has an opportunity to divert effluent as make-up water in accordance with its water rights (CA# 19-2161 & CA# 19-2162). Subject to full authorized consumptive use at the reservoirs, total diversions from the San Antonio River range from about 36,000 acft/yr to about 72,000 acft/yr and average about 56,000 acft/yr.*

Leona Springs discharge due primarily to the Indian Creek Project, which is the largest of the Edwards Recharge – Type 2 Projects. Increased freshwater inflows to the Nueces Estuary (Figure 7.1-24) in the lower three quarters of the flow regime are primarily caused by increased return flows or treated effluent associated with increased municipal and industrial water demands. Decreases in freshwater inflows in the higher quarter of the flow regime are primarily due to implementation of water management strategies recommended in the 2011 Coastal Bend Regional Water Plan. The Edwards Recharge – Type 2 Projects recommended in the 2011 South Central Texas Regional Water Plan have relatively small effects on freshwater inflows to the Nueces Estuary.

The SCTRWPG has recommended legislative designation of five stream segments in Region L as having unique ecological value. These segments and the bases for recommended designation are described in Appendix I. Implementation of the 2011 Regional Water Plan is not



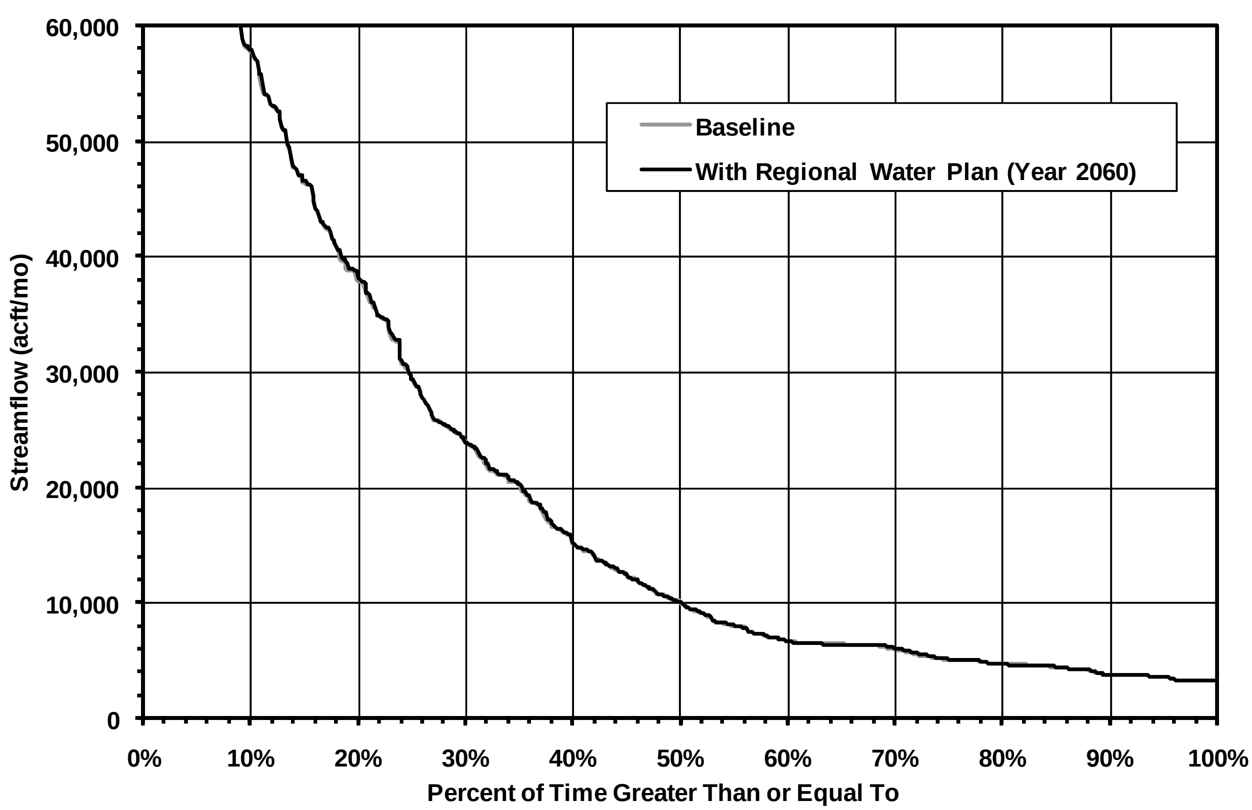


Figure 7.1-14. Guadalupe River above Comal River at New Braunfels

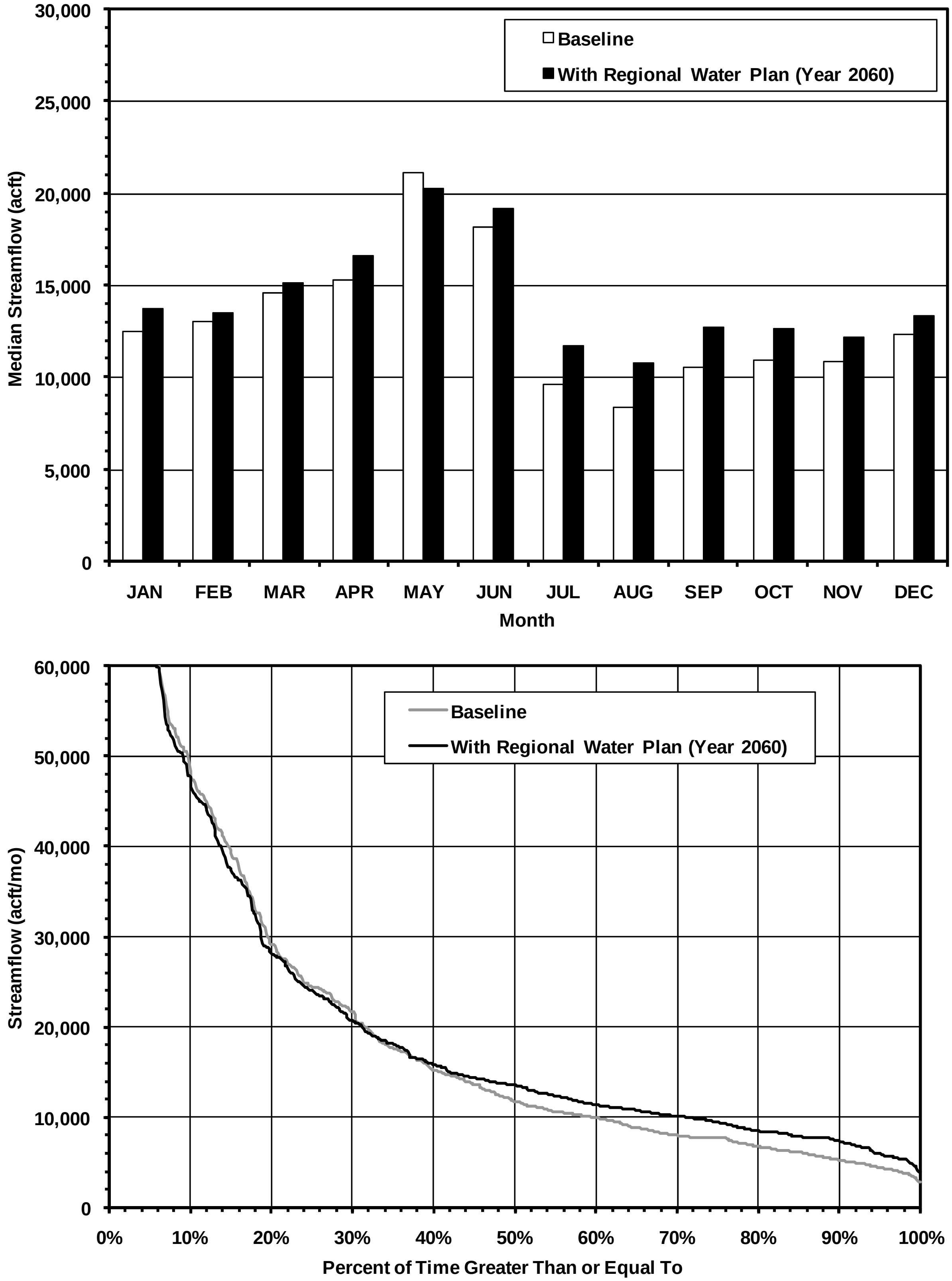
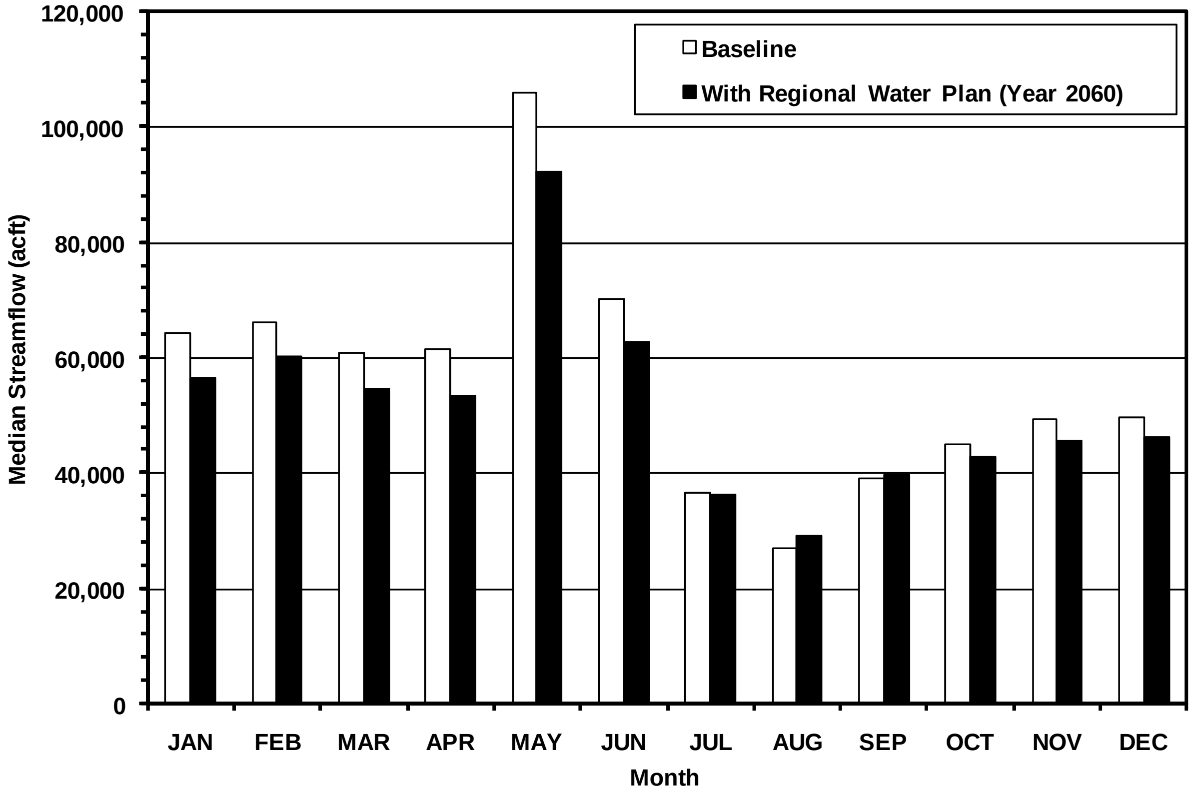


Figure 7.1-15. San Marcos River at Luling



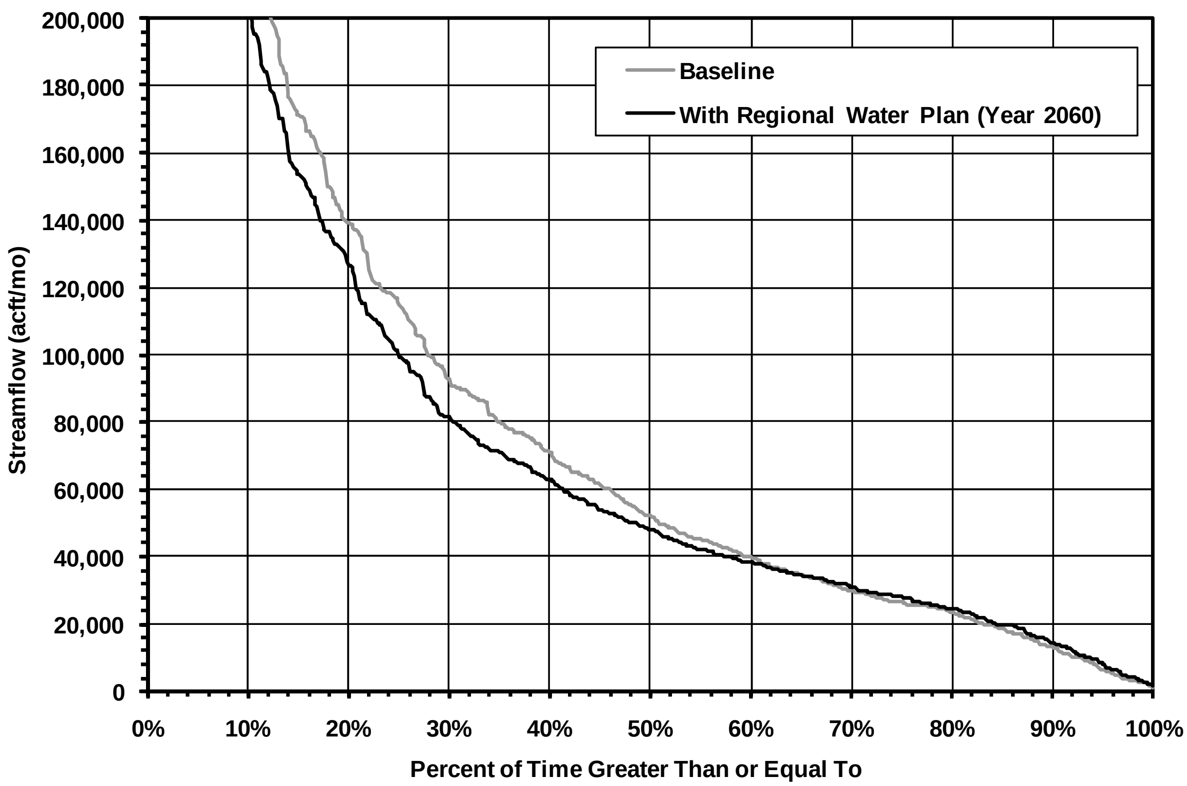
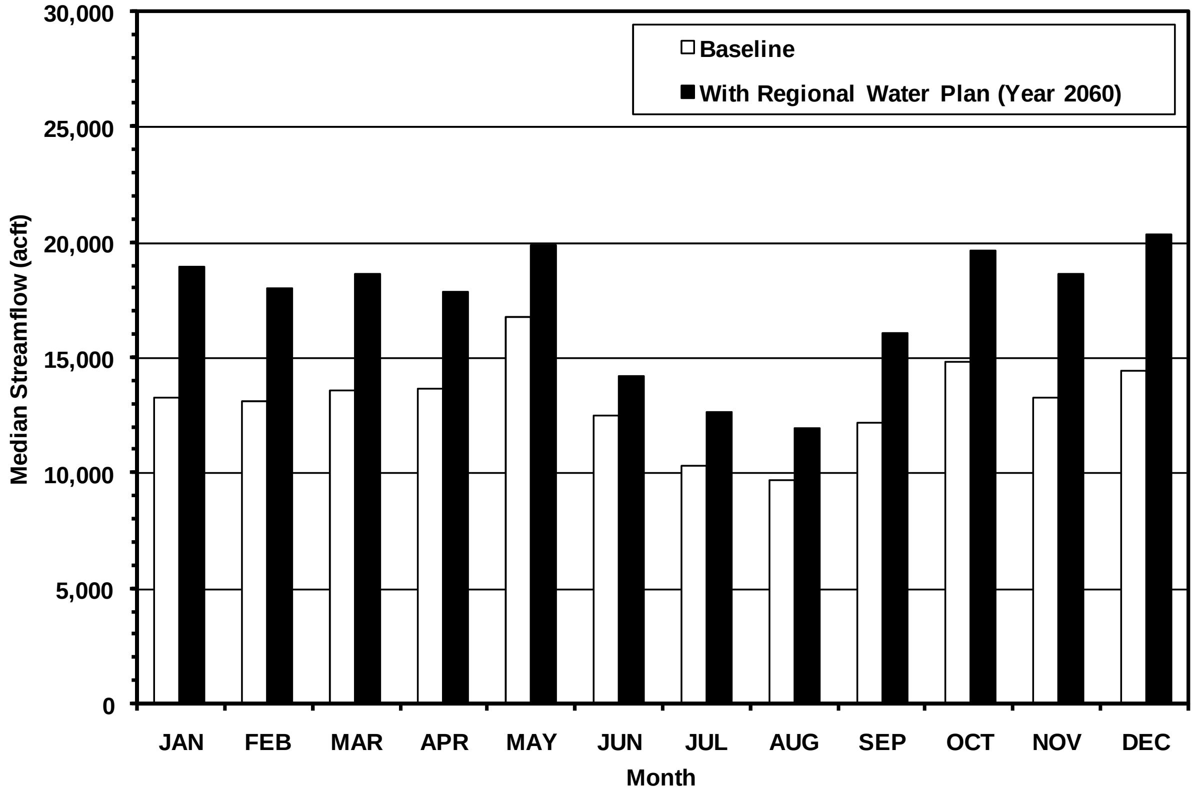


Figure 7.1-16. Guadalupe River at Victoria



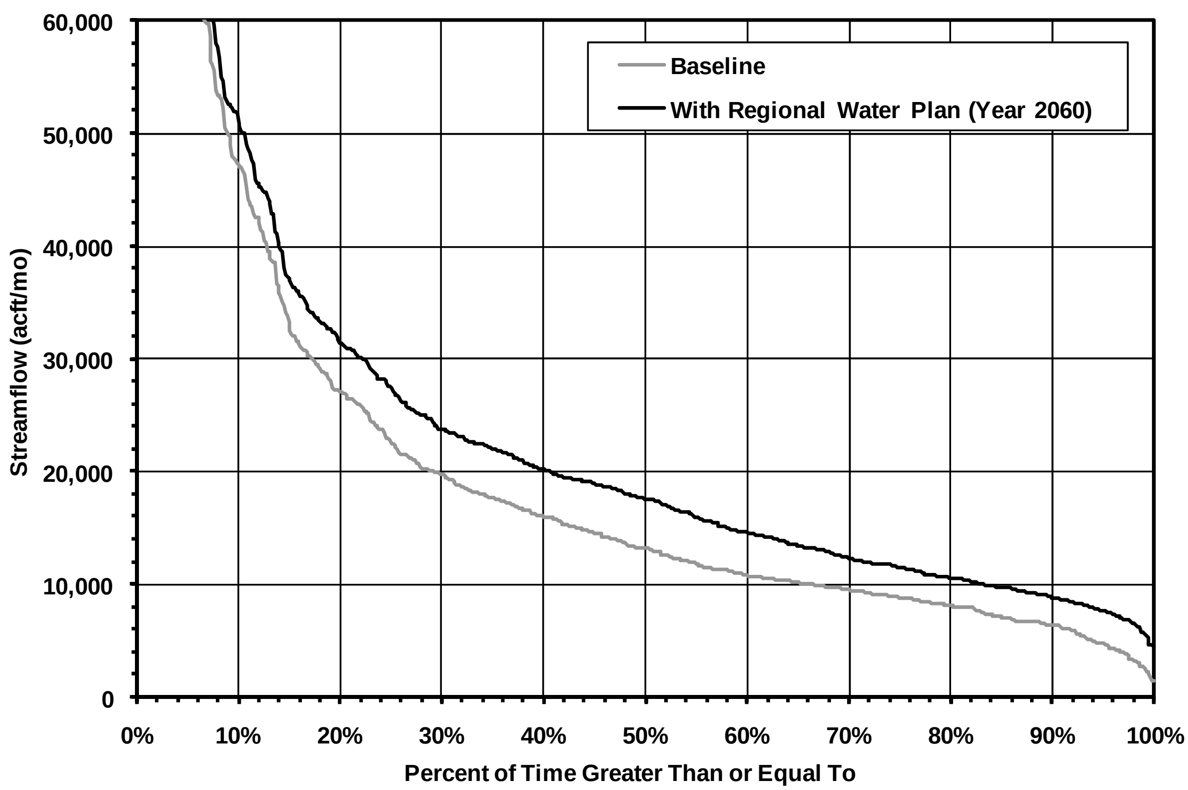


Figure 7.1-17. San Antonio River near Falls City

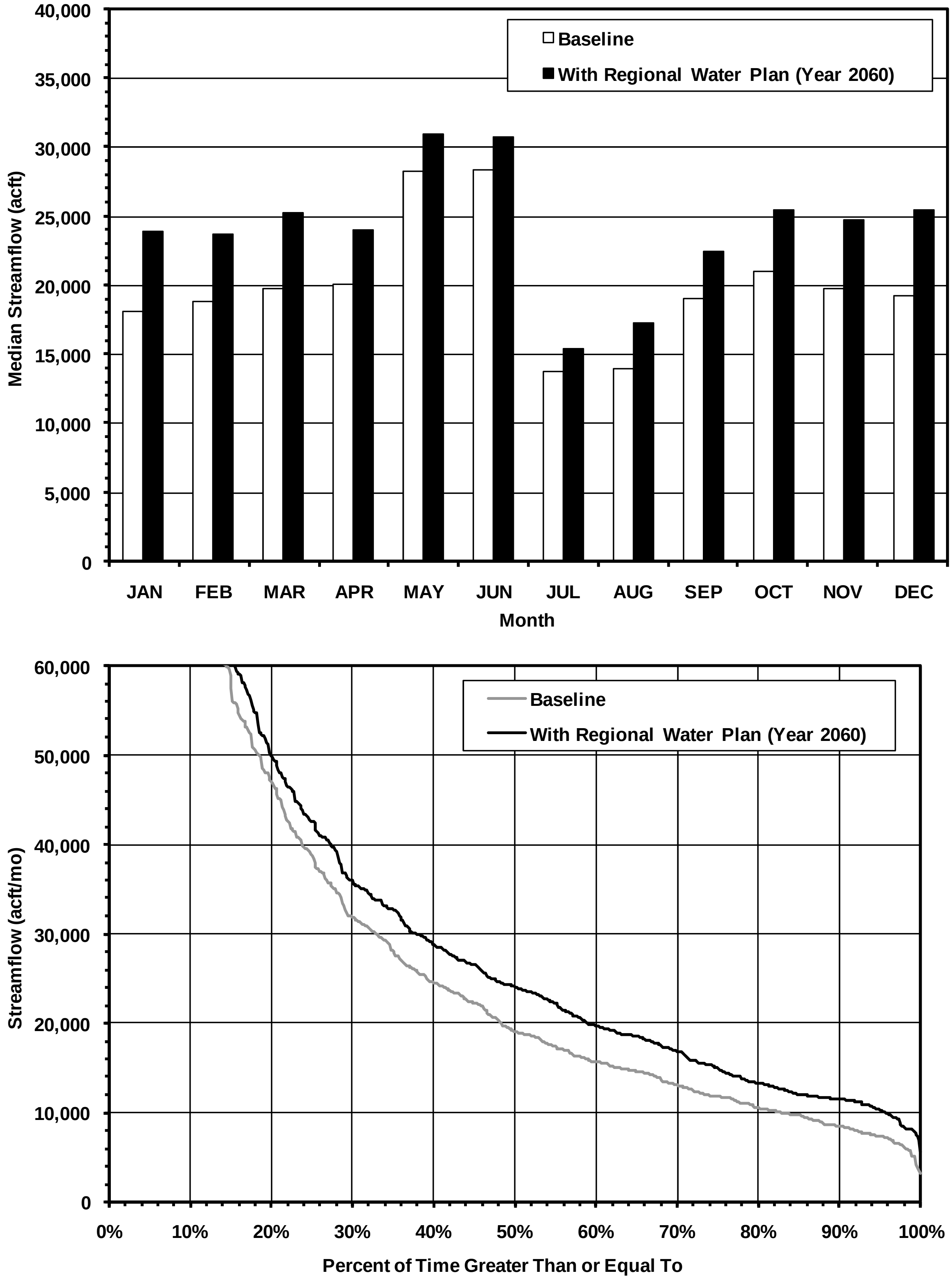
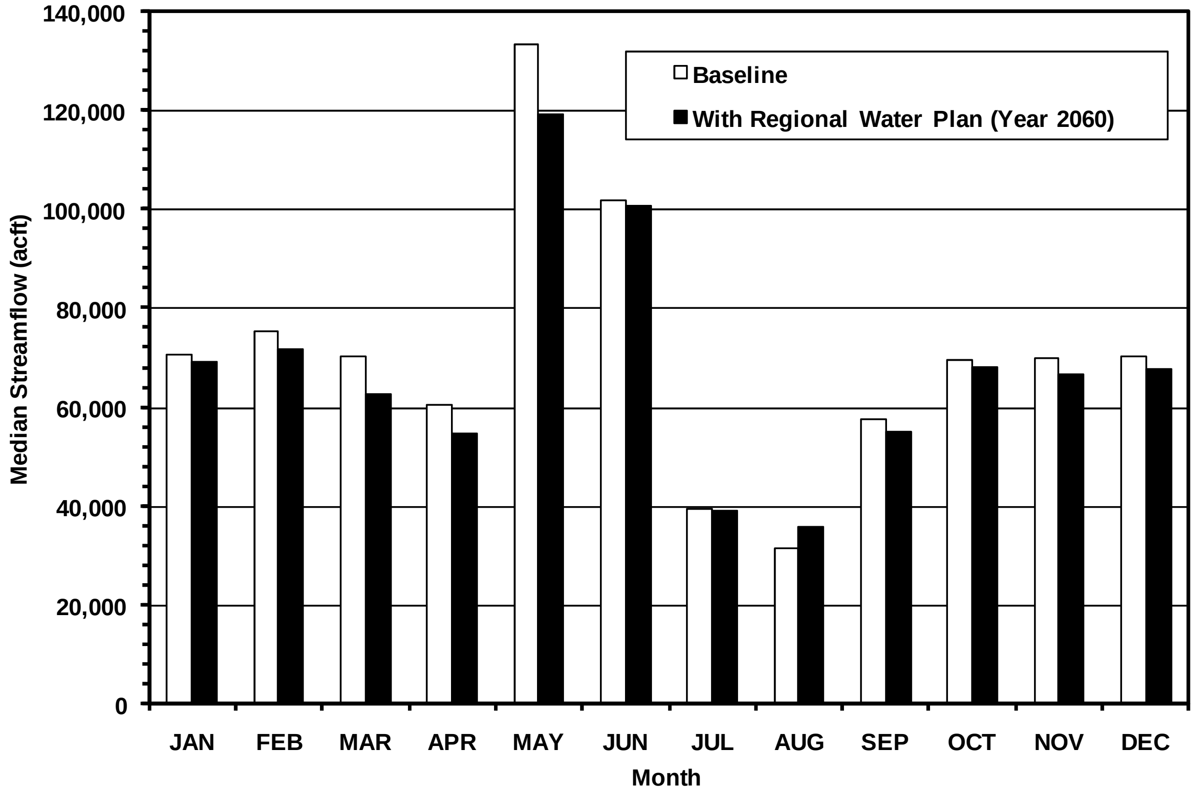


Figure 7.1-18. San Antonio River at Goliad



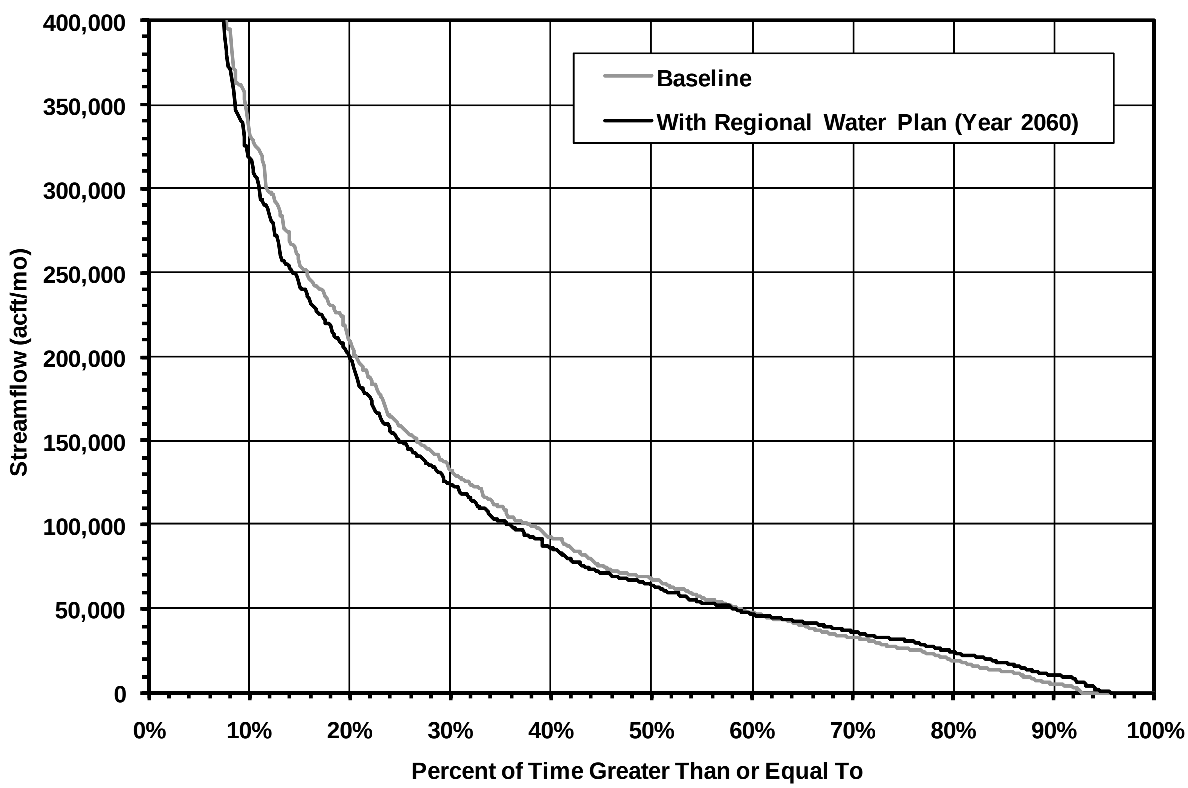


Figure 7.1-19. Guadalupe River at Diversion Dam and Saltwater Barrier near Tivoli

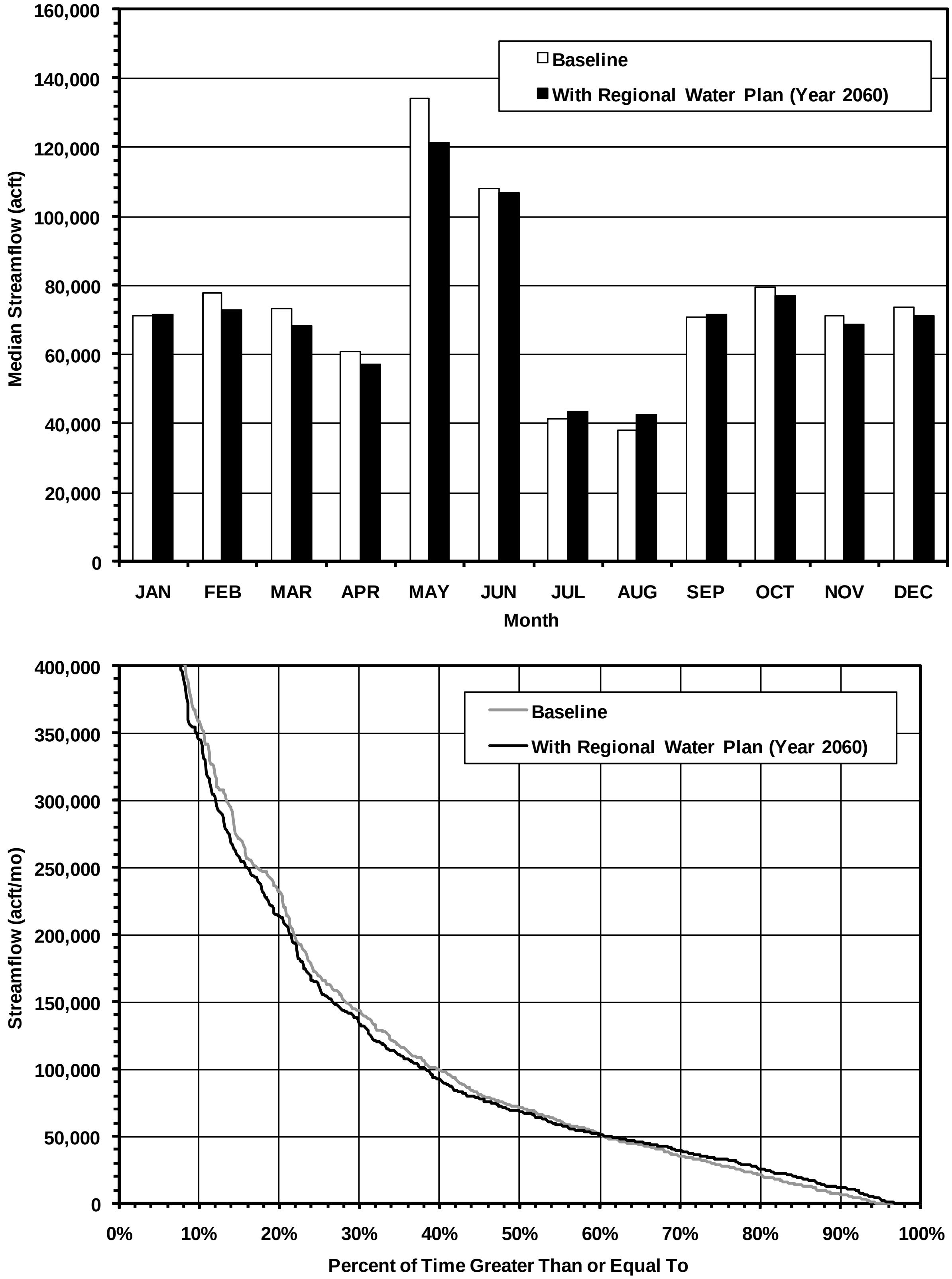
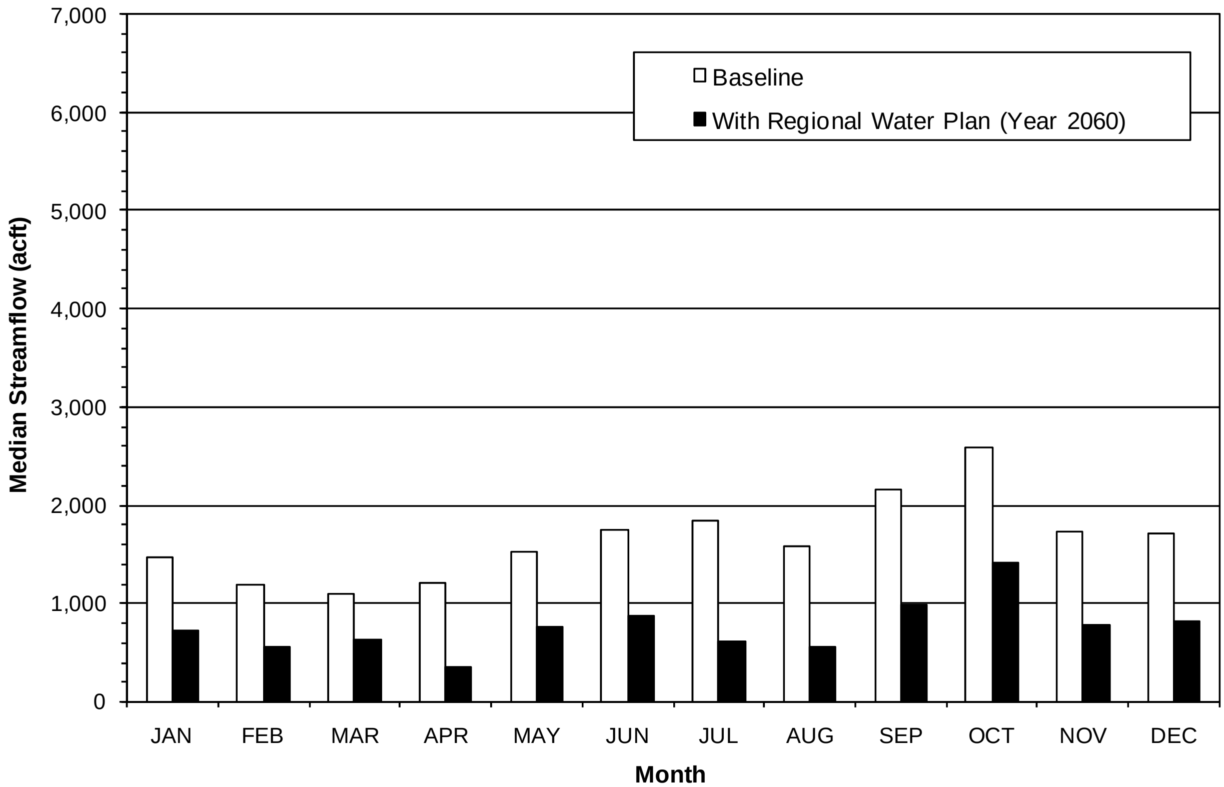


Figure 7.1-20. Guadalupe Estuary



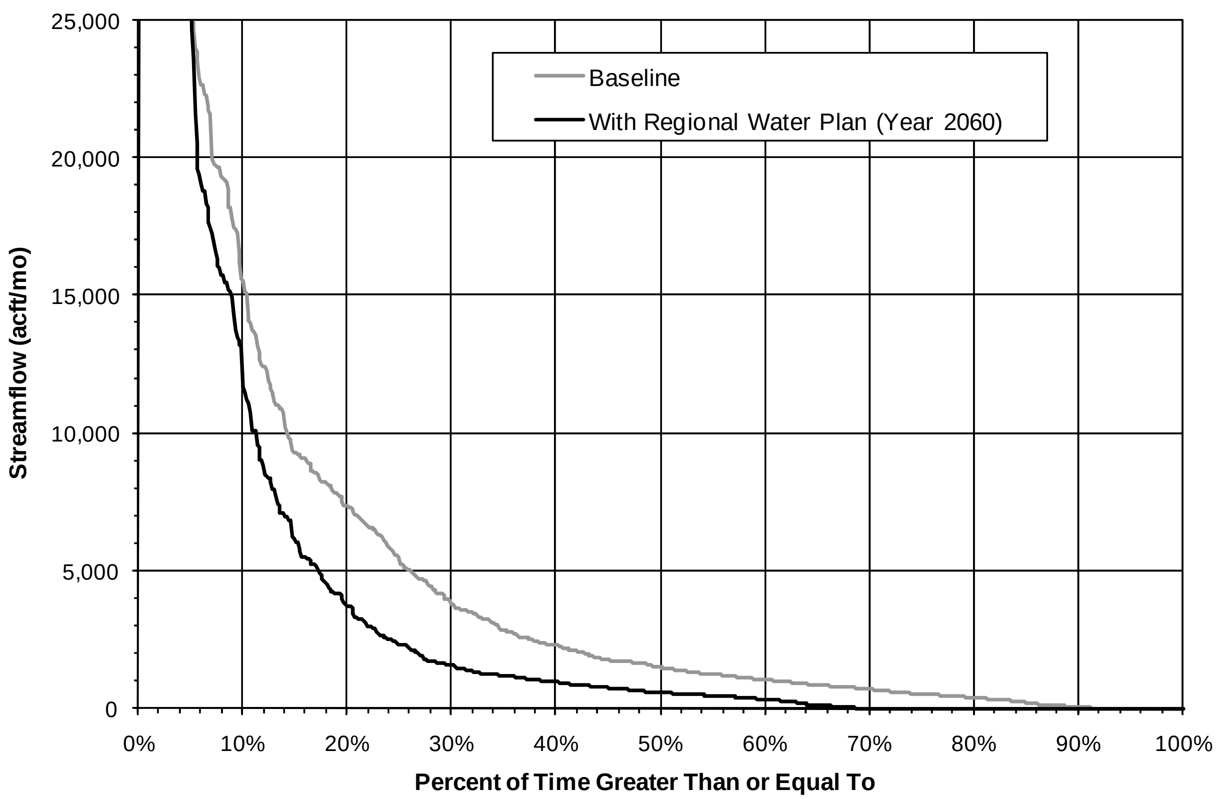
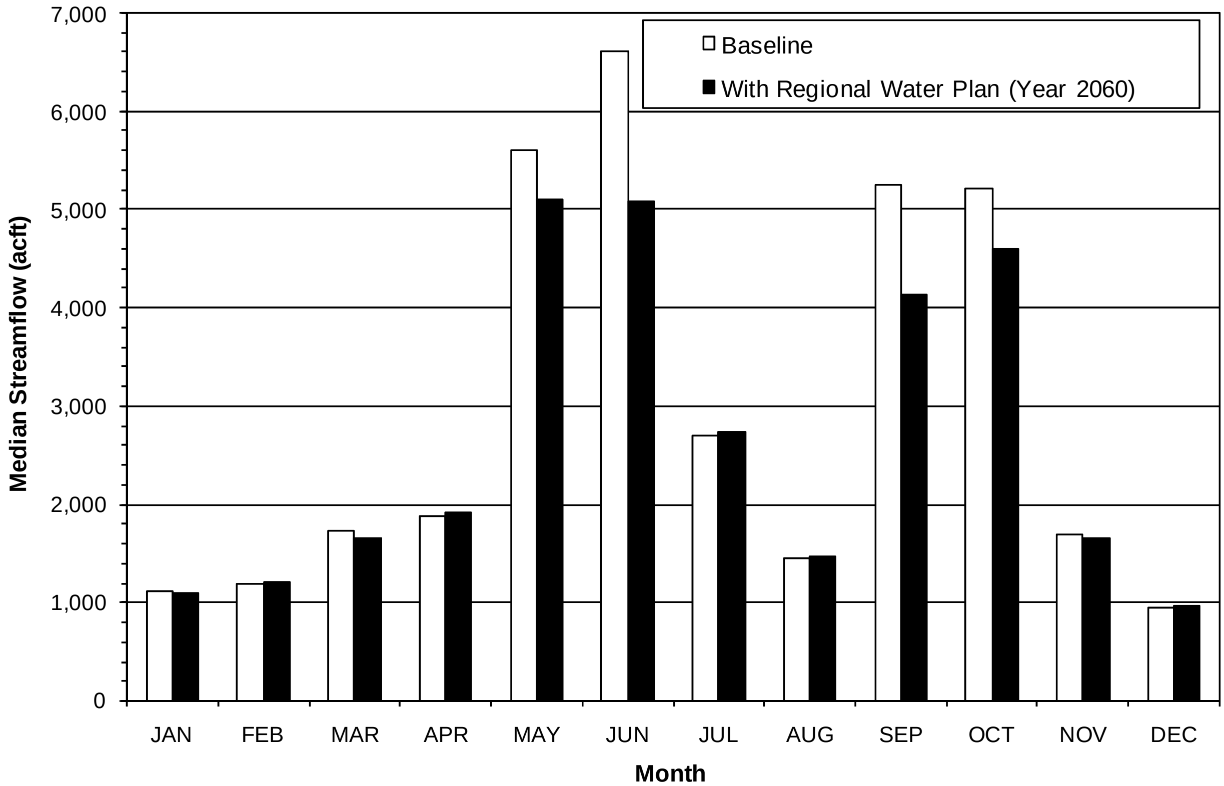


Figure 7.1-21. Nueces River below Uvalde



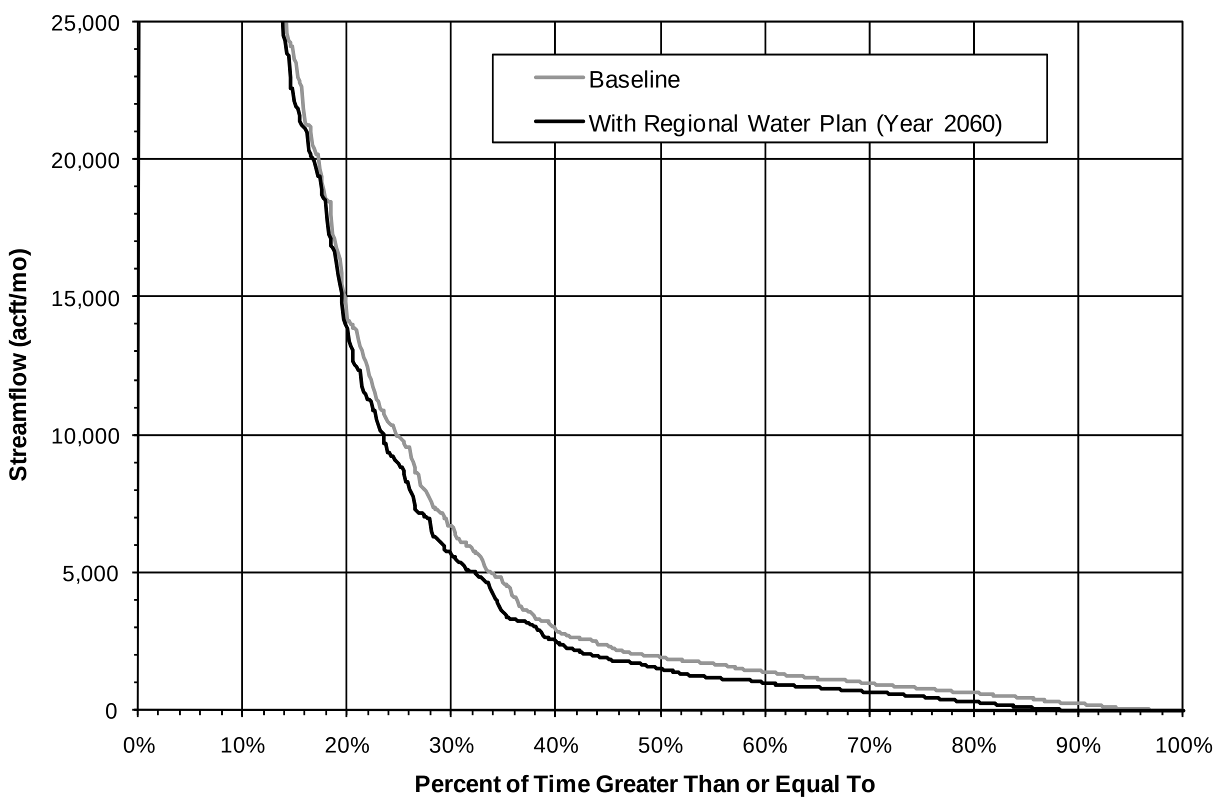
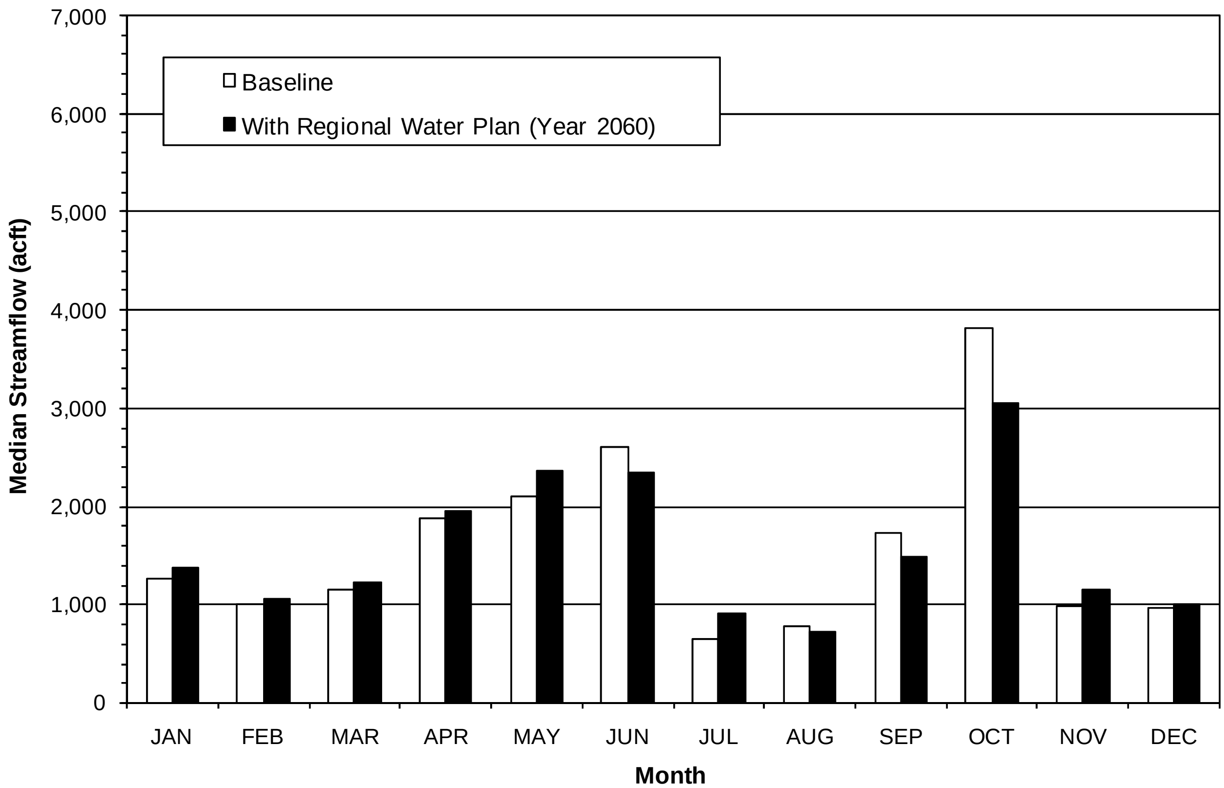


Figure 7.1-22. Nueces River near Cotulla



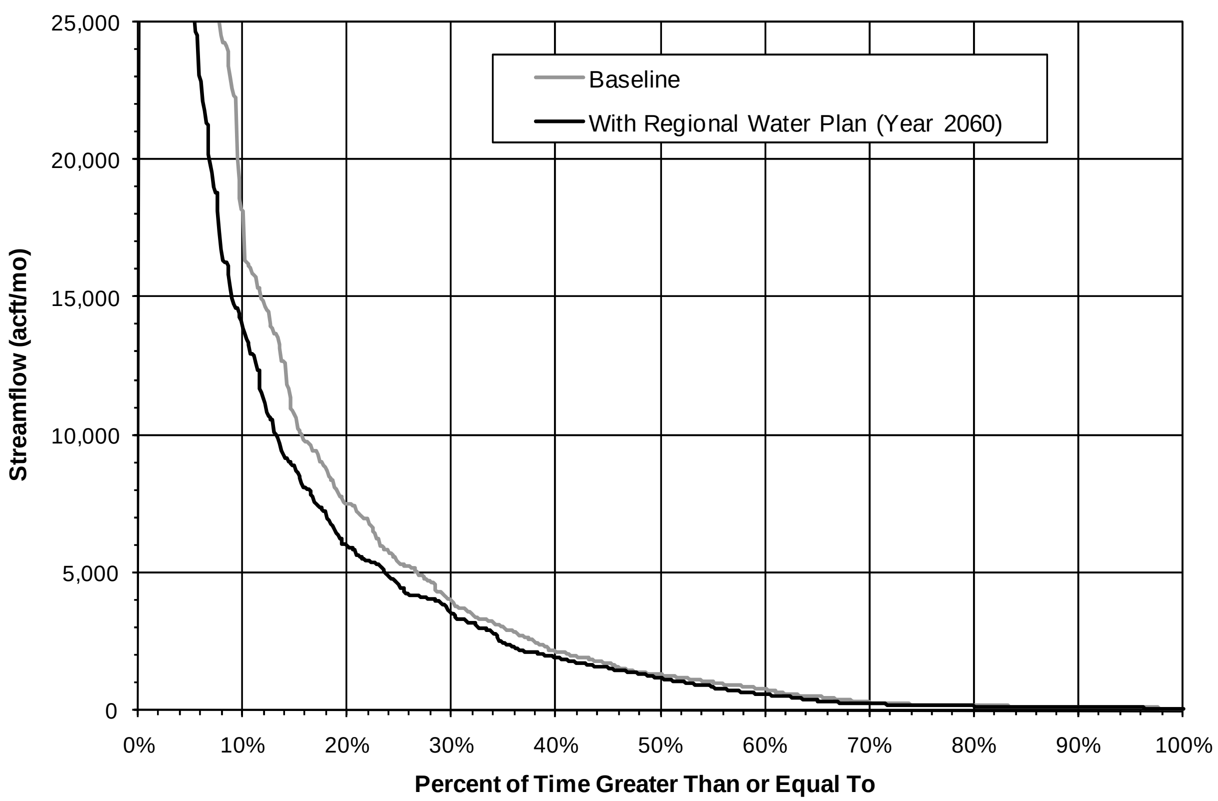
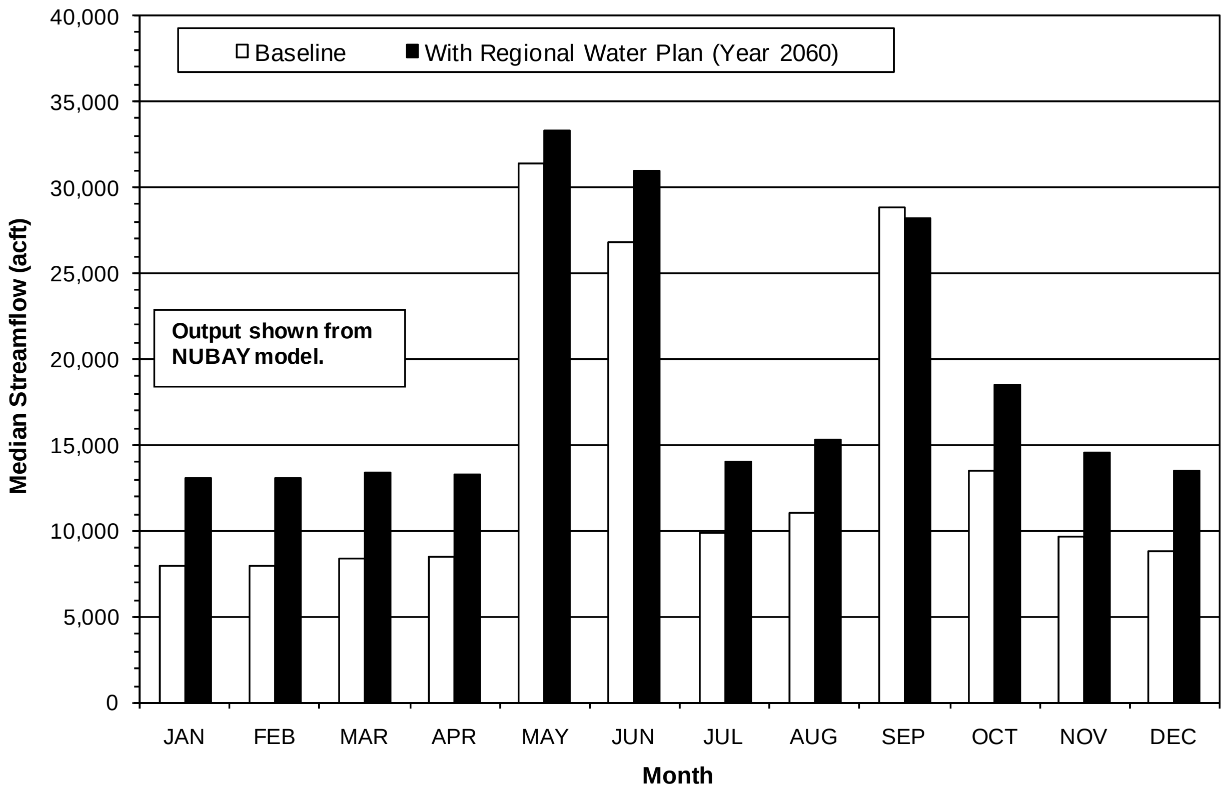


Figure 7.1-23. Frio River near Derby



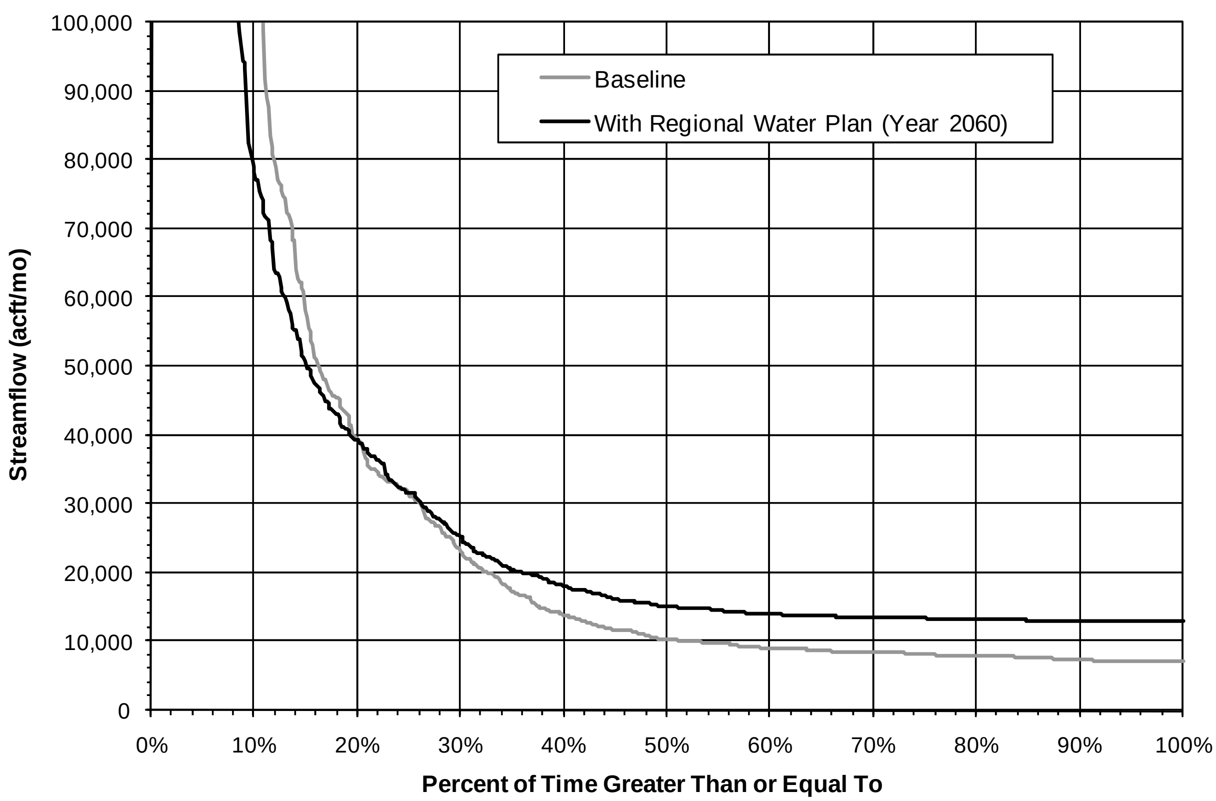


Figure 7.1-24. Nueces Estuary

expected to have any effect on the Nueces, Frio, and Sabinal River segments having unique ecological value as these segments are located upstream of the Edwards Aquifer recharge zone and recommended Edwards Aquifer Recharge - Type 2 Projects on these rivers would be located on the recharge zone. As shown in Figures 7.1-2 and 7.1-4, implementation of the 2011 Regional Water Plan is expected to increase long-term average spring discharges which should serve to preserve or enhance the ecological values of the Comal River and San Marcos River segments recommended for designation[7].

7.1.3 Supplemental Evaluations of Potential Long-Term Changes in Streamflow and Freshwater Inflows to the Guadalupe Estuary

The National Wildlife Federation (NWF) approached the SCTRWPG in May 2005 with a proposal to supplement the assessment of potential cumulative effects of regional water plan implementation on the Guadalupe Estuary by adding two alternative baselines for comparison and two ecologically-based assessments of inflows, for inclusion in the 2006 SCTRWP. The SCTRWPG has opted to continue this analysis in the 2011 SCTRWP. Additional baselines for comparison include freshwater inflows under "Natural" and "Present" Conditions. The two ecologically-based assessments (described in Section 7.1.3.2.2) rely, in part, upon the freshwater inflow recommendations of the Texas Parks & Wildlife Department (TPWD) and the Texas Water Development Board (TWDB)[8] and focus on spring / early summer freshwater inflow pulses and drought periods during the months of March through October as used in a recent NWF publication entitled "Bays in Peril, A Forecast for Freshwater Flows to Texas Estuaries."[9]

As one of the first biennium studies for the 2011 SCTRWP, the SCTRWPG applied a similar ecologically-based assessment to the potential changes in streamflows of the Guadalupe River at Victoria and the San Antonio River near Falls City associated with the 2006 SCTRWP.[10] The ecologically-based streamflow assessment examines frequency of streamflow occurrences compared to high, base, and low flow criteria. The SCTRWPG has chosen to

[7] With USFWS approval of a Habitat Conservation Plan and implementation of strategies identified through the Edwards Aquifer Recovery Implementation Program and potential use of existing and recommended water management strategies to offset Edwards pumping, it is likely that discharges from Comal Springs during drought will be greater than shown in Figure 7.1-2.

[8] TPWD & TWDB, "Freshwater Inflow Recommendation for the Guadalupe Estuary of Texas," TPWD Coastal Studies Technical Report No. 98-1, December 1998.

[9] Johns, N.D., Hess, M., Kaderka, S., McCormick, L., & McMahon, J., "Bays in Peril, A Forecast for Freshwater Flows to Texas Estuaries," National Wildlife Federation, October 2004.

[10] South Central Texas Regional Water Planning Group, "2011 Regional Water Plan Environmental Studies, Study 4, Part A," Texas Water Development Board, San Antonio River Authority, HDR Engineering, Inc., April 2009.

include a similar ecologically-based assessment of potential changes in streamflow associated with the 2011 SCTRWP. Supplemental ecologically-based assessments of changes in streamflow and freshwater inflow are summarized in the following sub-sections.

7.1.3.1 Simulation Descriptions

7.1.3.1.1 Natural Conditions

The Natural Condition is an historical set of theoretical streamflows and estuarine inflows in which the effects of mankind on the water resource have been removed. While the effects of historical reservoir operations, diversions, and treated effluent have been accounted for in the naturalized flows of the Guadalupe-San Antonio Water Availability Model (GSAWAM), it is noted that these natural flows reflect historical pumpage and spring discharges from the Edwards Aquifer. Thus, while other effects of mankind on surface water flows have been removed, spring discharges, which have direct bearing on surface water flows, reflect historical pumping levels from the Edwards Aquifer. More conceptually appropriate estimates of natural flows have been estimated using simulated historical springflows with zero Edwards Aquifer pumpage. The GWSIM-IV Edwards Aquifer model was used to simulate historical springflows without pumpage. The GSAWAM was then used to estimate resulting natural streamflows throughout the basin and freshwater inflows to the Guadalupe Estuary.

7.1.3.1.2 Present Conditions

The Present Conditions simulation is intended to be a realistic, but somewhat conservative, portrayal of present conditions with respect to springflows, water rights use, and effluent discharges. The present condition may be derived based on Texas Commission on Environmental Quality (TCEQ) Run 8 analyses with appropriate modifications. With the exception of the major water rights discussed below, the values found in the Run 8 data file are used as the present level of water rights use and wastewater discharges. The modifications below were made to reflect likely usage levels in the near-term (2-5years) if the South Central Texas Region were to experience a severe drought.

1. *Canyon Reservoir (CA# 18-2074E)* – GBRA has contracts for approximately 90,000 acft/yr, the firm yield of the reservoir. In addition, Canyon has an agreement with Guadalupe River Trout Unlimited (GRTU) that is in effect until the year 2018. Canyon operations are in accordance with CA#18-2074E and the GRTU agreement.

2. *GBRA Lower Basin Water Rights (CA# 18-5173 through CA# 18-5178 and CA# 18-3863)* – GBRA has water rights totaling 175,501 acft/yr in the lower basin authorized for municipal, industrial, and irrigation use. During the period of 1996 through 2003, the municipal portion of these rights had a maximum annual use of 10,400 acft, the industrial portion had a maximum annual use of 26,600 acft, and the irrigation portion had a maximum annual use of 36,700 acft. Cumulatively, this totals 73,700 acft/yr. For the Present Conditions simulation, 73,700 acft/yr was included for these water rights, allocated by use type as listed has been simulated. Available information indicates that wastewater due to the municipal diversions does not return to the Guadalupe Estuary. Effluent discharges for the industrial portion of the GBRA Lower Basin water rights, which are discharged to the estuary via the Victoria Barge Canal, are not included[11].

3. *Invista/DuPont (CA# 18-3861)* – Information gathered from the South Texas Watermaster indicates that Invista/DuPont diverted 25,254 acft in 1999, their highest in the period of 1998 - 2003. This amount is included in the Present Conditions simulation for Invista/DuPont. It is important to note that Invista/DuPont has a return factor of 45 percent on diversions, which is derived from the ratio of 27,000 acft/yr (total permitted diversion of 60,000 acft/yr minus permitted consumption of 33,000 acft/yr) over 60,000 acft/yr (total permitted diversion). Thus, the consumptive amount associated with the 25,254 acft/yr is 13,889.7 acft/yr.

4. *City of Victoria (Permit# 5466)* – Data from the City of Victoria indicates that their maximum diversion during the period of 1997-2004 was 9,854 acft in 2003. This amount is used in the Present Conditions simulation.

5. *Braunig & Calaveras Lakes (CA# 19-2161 & CA# 19-2162, respectively)* – Historical data received from City Public Service (CPS), which operates the steam-electric power generation facilities using these reservoirs, indicates that the maximum water use (from forced evaporation) during the period of 1992-2004 occurred in 1999 for Calaveras (13,365 acft) and in 2000 for Braunig (4,057 acft). These amounts are used in the Present Conditions simulation.

[11] These return flows will be included and documentation revised accordingly prior to distribution of the Initially Prepared Plan.

6. *Coleto Creek Reservoir (CA# 18-5486)* – Data from the report entitled "Power Generation Water Use for the Years 2000 through 2060 - Final Report," prepared for the TWDB in 2003 indicates that the 2000 consumptive use for Coleto Creek Reservoir (from forced evaporation) was 9,027 acft. For the Present Conditions simulation, this consumptive amount is used.

7. *Medina Lake System (CA# 19-2130)* – The Medina Lake System has used its full permitted amount in the recent past. Thus, the current use associated with the Medina Lake System is its authorized use.

In addition, springflows consistent with an Edwards pumpage of 572,000 acft/yr (plus domestic, livestock, and Federal use of about 20,000 acft/yr) subject to Critical Period Rules as outlined in Senate Bill 3 of the 80th Texas Legislature are used to represent present conditions. Except as noted above, effluent discharges, as reported for 2006 and adjusted for SAWS direct recycled water use of about 24,900 acft/yr (based on contracts for consumptive use), are also used in the Present Conditions simulation.

7.1.3.1.3 Baseline (Full Permits)

The Baseline simulation is the product of hydrologic assumptions and operational procedures for the assessment of surface water supply (Section 3.2.3.1) as adopted by the SCTRWPG and approved by the TWDB. These assumptions reflect Edwards Aquifer permitted pumpage of 572,000 acft/yr (plus domestic, livestock, and Federal use of about 20,000 acft/yr) subject to Critical Period Rules as outlined in Senate Bill 3 of the 80th Texas Legislature, full utilization of existing water rights, and treated effluent discharge representative of current conditions (2006 reported discharges adjusted for SAWS direct recycled water program). These are the same assumptions as used to determine surface water supply reliability and perform technical evaluations of surface water management strategies.

7.1.3.1.4 Regional Water Plan

The Regional Water Plan simulation attempts to portray the potential cumulative effects of all recommended water management strategies on streamflow and estuarine inflow. Starting with the baseline simulations, the water management strategies of the Edwards Aquifer are incorporated into the GWSIM-IV groundwater model. Resulting springflows from the Edwards

Aquifer are then integrated into the GSAWAM data files. Streamflow impacts due to water management strategies in the Carrizo-Wilcox Aquifer are estimated using the Southern Carrizo and Central Carrizo GAMs. These streamflow changes are also incorporated into the GSAWAM data files. Finally, the surface water management strategies are added to the GSAWAM to form the Regional Water Plan simulation.

7.1.3.2 Ecologically-Based Assessment Descriptions

7.1.3.2.1 Streamflow Criteria

Similar to the ecologically-based freshwater inflow assessment, the ecologically-based streamflow assessment includes high and low streamflow criteria. In addition, a normal (or base) streamflow criterion is incorporated to more fully assess streamflow changes at the two locations. Scientists from the Texas Water Development Board, Texas Parks and Wildlife Department, National Wildlife Federation, and San Antonio River Authority were consulted in selection of appropriate assessment criteria for low, base, and high streamflow conditions. Each of those consulted is a participant in ongoing efforts by the state to implement the Texas Instream Flows Program (Senate Bill 2 of the 77th Texas Legislature)[12] and establish environmental flow standards (Senate Bill 3 of the 80th Texas Legislature). Ultimate selection of streamflow criteria or standards is part of statewide programs defined by the Texas Legislature. All criteria applied herein may be considered "placeholder" values until such time that the SB2 and SB3 processes are complete.

7.1.3.2.1.1 High Flow Criteria

An important aspect of high streamflows is the ability for the stream to maintain aquatic and riparian habitats, and provide for stream connectivity with the floodplain.[13] These natural processes are accomplished through high flow pulses and overbanking flows. High flow pulses are short, high flow events following storms that stay within the channel, while overbanking flows are less frequent, high flow flood events in which streamflow rises above the normal channel. Scientists consulted generally suggested that a flood flow approximating a 2-year return period would be typical of an overbanking event and a good measure for the high flow

[12] National Research Council of the National Academies, "The Science of Instream Flows, A Review of the Texas Instream Flow Program," The National Academies Press, 2005.
[13] Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, & Texas Water Development Board, "Texas Instream Flow Studies: Technical Overview," TWDB Report 369, May 2008.

criteria. Therefore, flood flow statistics were analyzed for both the Guadalupe River at Victoria and the San Antonio River near Falls City to determine the 2-year flood event. These flows are shown in Table 7.1-3.

Table 7.1-3.
Flow Criteria for Ecologically-Based Streamflow Assessment

Criteria	*Month*	*Guadalupe River at Victoria*	*San Antonio River near Falls City*
High Flow (cfs)	**Any**	16,043	4,366
Base Flow (cfs)	**Jan**	565	92
	Feb	578	93
	Mar	617	139
	Apr	710	130
	May	779	155
	Jun	674	142
	Jul	466	93
	Aug	367	82
	Sept	363	99
	Oct	389	70
	Nov	372	76
	Dec	602	84
Low Flow (cfs)	**Jan**	150	76
	Feb	150	76
	Mar	200	76
	Apr	250	76
	May	200	76
	Jun	250	76
	Jul	300	76
	Aug	300	76
	Sept	200	76
	Oct	150	76
	Nov	150	76
	Dec	150	76

7.1.3.2.1.2 Low Flow Criteria

The low (subsistence) streamflow criteria needs to be high enough to maintain aquatic habitat sufficient for endemic species to survive transient low flow periods and to maintain dissolved oxygen (DO) in the stream.[14] These low flows are characterized by seasonal periods of infrequent streamflow well below the normal flow. The minimum accepted DO level, as established by the TCEQ for the stream locations considered herein, is 5 mg/L.[15] A statistic such as 7Q2 (seven day low flow with a return period of 2 years), the state-wide default low flow standard, may not necessarily be an accurate measure of the flow a particular stream needs in order to meet DO standards. Furthermore, in a base flow dominated stream, the 7Q2 may be substantially greater than that necessary to sustain aquatic habitat sufficient for endemic species to survive transient low flow periods. For example, the published 7Q2 values for the Guadalupe River at Victoria and San Antonio near Falls City locations are 607 cfs and 188 cfs, respectively, while site-specific studies, permit conditions, and informal agreements indicate that substantially less flow is necessary to meet environmental needs for short stress periods.

Candidate low flow criteria for the Guadalupe River at Victoria and the San Antonio River near Falls City were examined in Study 4A of the first biennium studies for the 2011 SCTRWP.[16] The selected criterion for each of the streamflow locations is presented in Table 7.1-3.

7.1.3.2.1.3 Base Flow Criteria

Like the high and low streamflow criteria, the base streamflow criteria are yet to be uniformly defined among river basin stakeholders, researchers, and resource agency staff in Texas. Guiding principles in selection of base streamflow criteria are that they should reflect the "normal" flow condition in the stream between storm events and ensure adequate habitat conditions, including variability, to support the natural biologic community.[17]

Candidate base streamflow criteria for the Guadalupe River at Victoria and the San Antonio River near Falls City were examined in Study 4A of the first biennium studies for the

[14] Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, & Texas Water Development Board, "Texas Instream Flow Studies: Technical Overview," TWDB Report 369, May 2008.
[15] Texas Commission on Environmental Quality, Texas Surface Water Quality Standards - Section 307.7, August 2000.
[16] South Central Texas Regional Water Planning Group, "2011 Regional Water Plan Environmental Studies, Study 4, Part A," Texas Water Development Board, San Antonio River Authority, HDR Engineering, Inc., April 2009.
[17] Texas Commission on Environmental Quality, Texas Parks and Wildlife Department, & Texas Water Development Board, "Texas Instream Flow Studies: Technical Overview," TWDB Report 369, May 2008.

2011 SCTRWP.[18] The selected criterion for each of the streamflow locations is presented in Table 7.1-3.

7.1.3.2.2 Estuary Inflow Criteria

Two ecologically-based assessments are used in comparison of simulated inflows to the Guadalupe Estuary under the four estuarine inflow scenarios described above. The two assessments are the spring / early summer freshwater pulse criteria and the low-flow inflow criteria.

7.1.3.2.2.1 Spring/Early Summer Freshwater Pulse Criteria

The spring/early summer freshwater pulse criteria examines how often adequate seasonal spring-to-early-summer pulses of inflows would occur. When looking at seasonal inflows, the focus is on a cumulative sum of inflow occurring within a multi-month period, rather than on the flows in each individual month within the period. The same total volume of water would be required to satisfy either standard, but with the seasonal approach higher flows in any of the four months apply toward the target cumulative sum of inflows. These spring/early summer "freshwater pulses," sometimes referred to as "freshetes" are generally indicated to support strong levels of reproduction and growth. Thus, the freshwater pulse evaluations represent an assessment of how well the estuaries would be expected to fare under 'Regional Water Plan' conditions during years that spring/early summer rainfall is in the normal to high range. For the analysis here, a seasonal spring/early summer window of 4 consecutive months during which the occurrence of a freshwater pulse would be assessed is identified. The 4 months included are those with the highest consecutive target level inflow criteria in the state's studies of freshwater inflow needs (known as MaxH). This is an attempt to focus on the most critical 4-month spring/early summer period, occurring no later than July. For the Guadalupe Estuary, the highest four consecutive months in this window are April – July. The sum of the MaxH recommendations for these 4 months (about 526,000 acft) is used as the benchmark or criteria for assessment of the spring/early summer freshwater pulse.

[18] Op. Cit., South Central Texas Regional Water Planning Group, Study 4A, April 2009.

7.1.3.2.2.2 Low-Flow Inflow Criteria for the Guadalupe Estuary

Because of weather variability in Texas, a second assessment criteria is focused on whether enough freshwater would be available to maintain salinity conditions within reasonable tolerance ranges and enable sufficient populations of organisms such as oysters, shrimp, and crabs to survive drought periods.

In addition to the criteria used in the spring/early summer freshwater pulse analysis, the state's freshwater inflow study results for each bay also include a set of lower inflow criteria known as MinQsal. These inflows reflect the amount needed "…to avoid reproductive failure and loss of biodiversity…" during lower inflow periods. As noted in the state's studies, for inflows between the target and the drought tolerance values "biological productivity and fisheries harvest … are significantly reduced from average historical levels." Basically, these inflows are calculated to maintain salinity levels in the estuaries within identified salinity bounds. Thus, inflows equaling drought-tolerance values would just maintain salinity levels within tolerance limits for key species at various points in the estuary. Inflows at these low levels would not be expected to maintain substantial fishery production over an extended period.

For this analysis, a period of 6 consecutive months below MinQsal inflow is used because such a period represents a significant portion of the life-cycle of several principal estuarine species. Subject to a half-year-long period of inflows below the MinQsal level, any area of lower salinity would likely be compressed into regions near the mouth of Guadalupe River. Upper estuary marshes could begin to become saltier. Direct effects on populations of fishery species (crabs, shrimp, and some finfish) could be anticipated due to lack of food and habitat, or to unfavorable salinities, especially if occurring in the spring/early fall period. Thus, a six-month consecutive period is considered in this assessment to be indicative of a significant deprivation of freshwater inflows. This analysis is limited to periods of six consecutive months falling only within the March-October window because low flows in the winter and early spring months would be of lesser concern for biological activity within Texas estuaries.[19]

[19] A more complete discussion is available in the methodology section of Johns, N.D., Hess, M., Kaderka, S., McCormick, L., & McMahon, J., "Bays in Peril, A Forecast for Freshwater Flows to Texas Estuaries," National Wildlife Federation, October 2004.

7.1.3.3 Results of the Ecologically-Based Assessments

7.1.3.3.1 Streamflow Assessments Results

Streamflows under each of the four scenarios are compared to the three criteria for both the Guadalupe River at Victoria and the San Antonio River near Falls City. For the high flow criteria, the daily modeled streamflow is evaluated to see how many flood events exceeded the criteria flow during the 56-year simulation period (1934 – 1989). When evaluating scenario streamflow against the base flow criteria, the total number of days in which the streamflow is below the base flow criteria is calculated. Likewise, using the low flow criteria, the total number of days in which the streamflow is below the low flow criteria is calculated. In addition, the maximum number of consecutive days per year in which the streamflow is below the low flow criteria is calculated. A summary and discussion of the results is presented below for each location.

7.1.3.3.1.1 Results for Guadalupe River at Victoria

As shown in Table 7.1-4, the Guadalupe River at Victoria has between 40 and 48 high flow events during the simulation period, depending on the scenario. There is no significant difference in the number of events among the three scenarios with the influence of man. Occurrences vary between zero and three events in any given year. The low variation indicates that existing and planned impoundments, diversions, returns, and groundwater withdrawals have had no significant effect on the occurrence of high flow events in the Guadalupe River at Victoria.

Table 7.1-4.
Guadalupe River at Victoria – High Flow Events

	Natural Conditions	Present Conditions	Baseline (Full Permits)	Regional Water Plan
Flood Events	48	40	40	40

Throughout the 56-year simulation period, the Guadalupe River at Victoria would experience between 2,918 days (Natural Conditions) and 6,896 days (Regional Water Plan) below the base flow criteria (Table 7.1-5), depending on simulation scenario. While the percent of time the streamflow is less than or equal to the base flow criteria for the Natural Conditions scenario is considerably less than that for the Regional Water Plan, differences between the

Present Conditions, Baseline (Full Permits), and Regional Water Plan scenarios are very small. Hence, implementation of the strategies recommended in the 2011 SCTRWP would be expected to have very limited effects on base flows in the Guadalupe River at Victoria relative to those under present conditions.

Table 7.1-5.
Guadalupe River at Victoria – Occurrences of Flows below the Base Criteria

	Natural Conditions	Present Conditions	Baseline (Full Permits)	Regional Water Plan
Total Days Less Than	2,918	6,426	6,842	6,896
Percent of Time Less than or Equal To	14%	31%	33%	34%

There are at least two important measures to consider when comparing simulated streamflows under the specified scenarios to the low flow criteria – the total number of days below the criteria and the maximum number of consecutive days below the criteria in a given year. Table 7.1-6 summarizes the total number of days less than the low flow criteria and Table 7.1-7 summarizes the maximum number of consecutive days below the low flow criteria by year, for each of the four scenario simulations. Review of Tables 7.1-6 and 7.1-7 indicates that implementation of water management strategies in the 2011 SCTRWP would not be expected to cause significant changes in the frequency or duration of low flow periods in the Guadalupe River at Victoria relative to present conditions.

Table 7.1-6.
Guadalupe River at Victoria – Low Flow Occurrences

	Natural Conditions	Present Conditions	Baseline (Full Permits)	Regional Water Plan
Total Days Less Than	456	2,181	2,321	2,144
Percent of Time Less than or Equal To	2%	11%	11%	10%

7.1.3.3.1.2 Results for San Antonio River near Falls City

The San Antonio River near Falls City has between 38 and 74 high flow events during the simulation period (Table 7.1-8), depending on the scenario. The difference in the number of

Table 7.1-7.
Guadalupe River at Victoria – Maximum Consecutive Days below the Low Flow Criteria

Year	Natural Conditions	Present Conditions	Baseline (Full Permits)	Regional Water Plan
1934	0	0	0	0
1935	0	0	0	0
1936	0	0	0	0
1937	0	0	0	0
1938	0	0	0	0
1939	0	33	35	35
1940	0	3	8	3
1941	0	0	0	0
1942	0	0	0	0
1943	0	0	2	0
1944	0	0	1	1
1945	0	1	1	0
1946	0	0	0	0
1947	0	0	0	0
1948	0	30	38	38
1949	0	8	12	8
1950	0	54	54	54
1951	7	75	75	75
1952	24	48	48	48
1953	11	49	49	49
1954	25	199	199	198
1955	14	105	188	161
1956	46	152	229	152
1957	1	36	36	36
1958	0	0	0	0
1959	0	0	0	0
1960	0	0	0	0
1961	0	0	0	0
1962	0	31	36	19
1963	3	73	74	71
1964	0	34	34	34
1965	0	0	0	0
1966	0	0	0	0
1967	18	77	78	44
1968	0	0	0	0
1969	0	0	0	0
1970	0	0	0	0
1971	5	31	32	31
1972	0	0	0	0
1973	0	0	0	0

Table 7.1-7 (Concluded)

Year	*Natural Conditions*	*Present Conditions*	*Baseline (Full Permits)*	*Regional Water Plan*
1974	0	0	0	0
1975	0	0	0	0
1976	0	0	0	0
1977	0	0	0	0
1978	0	0	0	0
1979	0	0	0	0
1980	0	3	12	3
1981	0	0	0	0
1982	0	1	3	0
1983	0	0	1	0
1984	9	120	121	75
1985	0	0	0	0
1986	0	0	0	0
1987	0	0	0	0
1988	0	0	0	0
1989	3	99	99	91

high flow events between the Natural and Present Conditions scenarios is primarily attributable to the Medina Lake System. The reduction in the simulated number of high flow events from Present Conditions to Baseline and Plan scenarios is due, in large part, to increased diversions for steam-electric power generation uses at Braunig and Calaveras Reservoirs under existing water rights. High flow occurrences vary between zero and four events in any given year.

Throughout the 56-year simulation period, the San Antonio River near Falls City has between 1,798 days (Regional Water Plan) and 2,231 days (Present Conditions) below the base flow criteria (Table 7.1-9). The effects of San Antonio effluent are apparent in Table 7.1-9, as the Natural Condition simulation has the most days below the base flow criteria. Effects of increased effluent projected in the SCTRWP are evident in the decrease in number of days below the base flow criteria between the Baseline and Regional Water Plan scenarios.

Table 7.1-8.
San Antonio River near Falls City – High Flow Events

	Natural Conditions	*Present Conditions*	*Baseline (Full Permits)*	*Regional Water Plan*
Flood Events	74	42	38	40

Table 7.1-9.
San Antonio River near Falls City – Occurrences of Flows below the Base Criteria

	Natural Conditions	Present Conditions	Baseline (Full Permits)	Regional Water Plan
Total Days Less Than	3,060	2,231	3,788	1,798
Percent of Time Less than or Equal To	15%	11%	19%	9%

Tables 7.1-10 and 7.1-11 summarize total days and consecutive days within a calendar year below the low flow criteria, respectively, for each of four simulation scenarios. Low flow occurrences are most frequent and typically of greatest duration under Natural Conditions because of the absence of effluent and the influences of historical Edwards Aquifer pumpage on San Antonio and San Pedro Springs. In general, Tables 7.1-10 and 7.1-11 indicate that implementation of the 2011 SCTRWP could be expected to increase the frequency and duration of low flow occurrences relative to Present Conditions, but significantly decrease the frequency and duration of low flow occurrences relative to the Baseline and Natural Conditions scenarios.

Table 7.1-10.
San Antonio River near Falls City – Low Flow Occurrences

	Natural Conditions	Present Conditions	Baseline (Full Permits)	Regional Water Plan
Total Days Less Than	2,296	904	1,834	530
Percent of Time Less than or Equal To	11%	4%	9%	3%

7.1.3.3.2 *Estuary Inflow Assessments Results*

The GSA WAM simulates a repeat of the weather patterns and resulting streamflows over the 56-year period of 1934-89. Considering both the 'freshwater pulse' and 'low-flow inflow criteria,' how often the simulated inflows under natural conditions fall below the criteria is first tabulated. Then, how often the inflows predicted would fall below the inflow criteria under the Present Conditions, Baseline (Full Permits), and Regional Water Plan scenarios are tabulated for the same time period.

Table 7.1-11.
San Antonio River near Falls City – Maximum Consecutive Days below the Low Flow Criterion

Year	*Natural Condition*	*Present Condition*	*Baseline (Full Permits)*	*Regional Water Plan*
1934	0	0	19	0
1935	0	0	0	0
1936	0	0	0	0
1937	0	0	0	0
1938	0	0	0	0
1939	0	0	1	0
1940	1	1	10	0
1941	0	0	0	0
1942	0	0	0	0
1943	0	0	0	0
1944	0	0	0	0
1945	0	0	0	0
1946	0	0	0	0
1947	0	0	0	0
1948	28	6	27	6
1949	1	0	2	0
1950	18	3	18	0
1951	16	13	34	4
1952	33	8	61	9
1953	45	45	39	19
1954	26	48	61	3
1955	25	50	40	15
1956	40	37	30	26
1957	19	12	19	19
1958	7	0	16	0
1959	0	0	0	0
1960	18	3	7	4
1961	9	0	0	0
1962	18	16	30	3
1963	35	13	24	10
1964	25	32	19	9
1965	13	2	2	0
1966	7	0	3	0
1967	24	27	42	12
1968	0	0	0	0
1969	25	14	57	9
1970	26	6	26	6
1971	26	22	37	15
1972	2	0	0	0
1973	0	0	0	0

Table 7.1-11 (Concluded)

Year	*Natural Condition*	*Present Condition*	*Baseline (Full Permits)*	*Regional Water Plan*
1974	2	0	0	0
1975	0	0	0	0
1976	0	0	0	0
1977	0	0	0	0
1978	27	19	29	27
1979	0	0	0	0
1980	15	21	31	6
1981	11	0	0	0
1982	28	7	16	0
1983	3	0	0	0
1984	6	0	0	0
1985	5	0	0	0
1986	2	0	27	0
1987	1	0	0	0
1988	18	11	18	2
1989	21	13	16	9

Tables 7.1-12 and 7.1-13 present the performance results of the freshwater pulse and low-flow inflow criteria, respectively, for the four estuarine inflow scenarios. There is not much effect of Regional Water Plan implementation, compared to present use conditions, as measured by the spring/early summer pulse criteria. The spring/early summer pulse criteria are a measure of fairly substantial inflows which generally can only be affected by a large capture and storage of inflows. The lack of change in meeting these criteria is a reflection of the fact that the regional water plan does not include any water management strategies based on new mainstem reservoirs. The number of years with low 4-month spring/early summer freshwater inflow pulses decreases between the Baseline and the Regional Water Plan due primarily to the increased effluent in the basin. In Table 7.1-13, the number of occurrences of six months or longer periods below drought tolerance for both the Baseline and the Regional Water Plan scenarios is eight. It is important to note that three of these eight years are consecutive (1954-1956) while the other five occurrences are isolated events (1963, 1967, 1982, 1984, & 1988).

***Table 7.1-12.
Number of Years with Low 4-Month Spring/Early Summer Freshwater Inflow Pulses Defined by State Criteria***

Estuary	*No. of Years*	*Natural*	*Present Conditions*	*Baseline (Full Permits)*	*Regional Water Plan*
Guadalupe Estuary	49	19	20	23	24

***Table 7.1-13.
Number of Occurrences of 6 Months or Longer Periods Below Drought Tolerance Level (MinQsal) within Critical (Mar-Oct) Months***

Estuary	*No. of Years*	*Natural*	*Present Conditions*	*Baseline (Full Permits)*	*Regional Water Plan*
Guadalupe Estuary	49	3	5	8	8

Monthly median freshwater inflow to the Guadalupe Estuary for each of the four inflow scenarios is shown in Figure 7.1-25. In general, changes in estuarine inflow are greater going from Natural Conditions to Present Conditions than going from Present Conditions to full implementation of the Regional Water Plan. Changes from Present Conditions to the Regional Water Plan are associated in large part with moving from a current level to fully permitted use of existing water rights.

Figure 7.1-26 shows the frequency of the monthly freshwater inflow to the Guadalupe Estuary for the four inflow scenarios, while Figures 7.1-27 and 7.1-28 focus on wet and dry months, respectively. Freshwater inflows under Natural Conditions exceed 100,000 acft/mo 59 percent of the time. Under Present Conditions, this inflow level is reached at least 45 percent of the time. Looking at the Baseline (Full Permits) and the Regional Water Plan scenarios, the 100,000 acft/mo level is achieved about 40 percent and 39 percent of the time, respectively.

A time-series plot of freshwater inflows to the Guadalupe Estuary for the 1950 through 1956 period during the drought of record is shown in Figure 7.1-29. This figure illustrates freshwater inflows to the estuary during the most critical of low-flow times for each of the four inflow scenarios. As shown in Figure 7.1-29, freshwater inflows during drought with implementation of the Regional Water Plan are expected to be less than those under Natural and Present Conditions and greater than those under Baseline conditions.

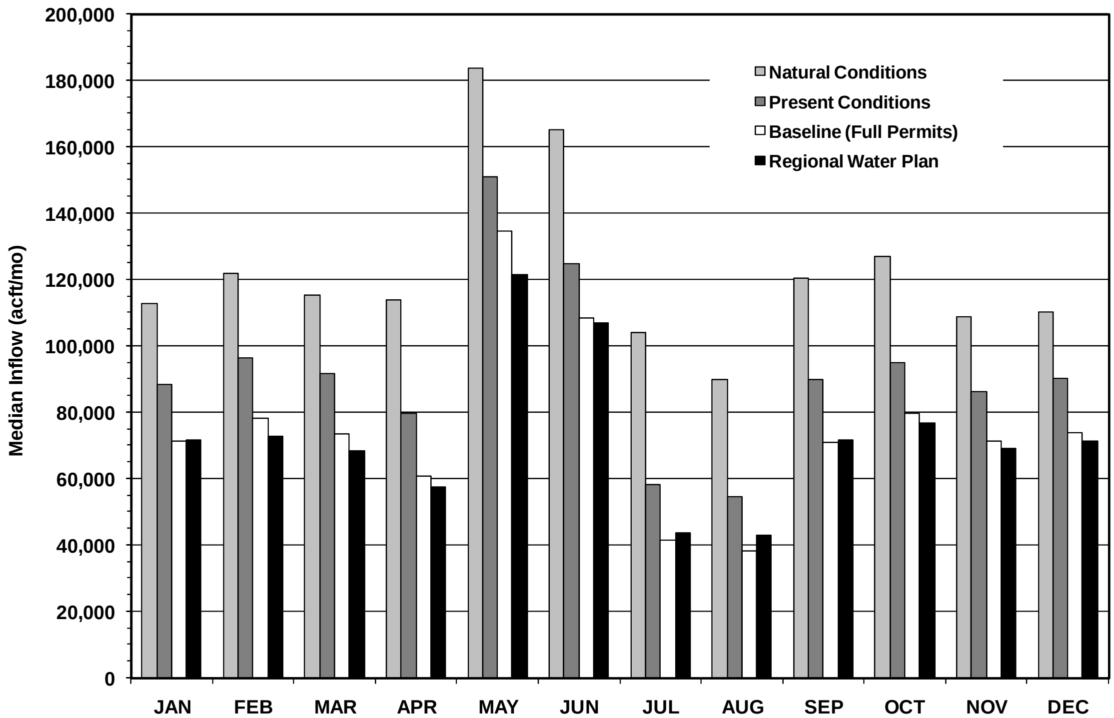


Figure 7.1-25. Monthly Median Guadalupe Estuary Freshwater Inflows

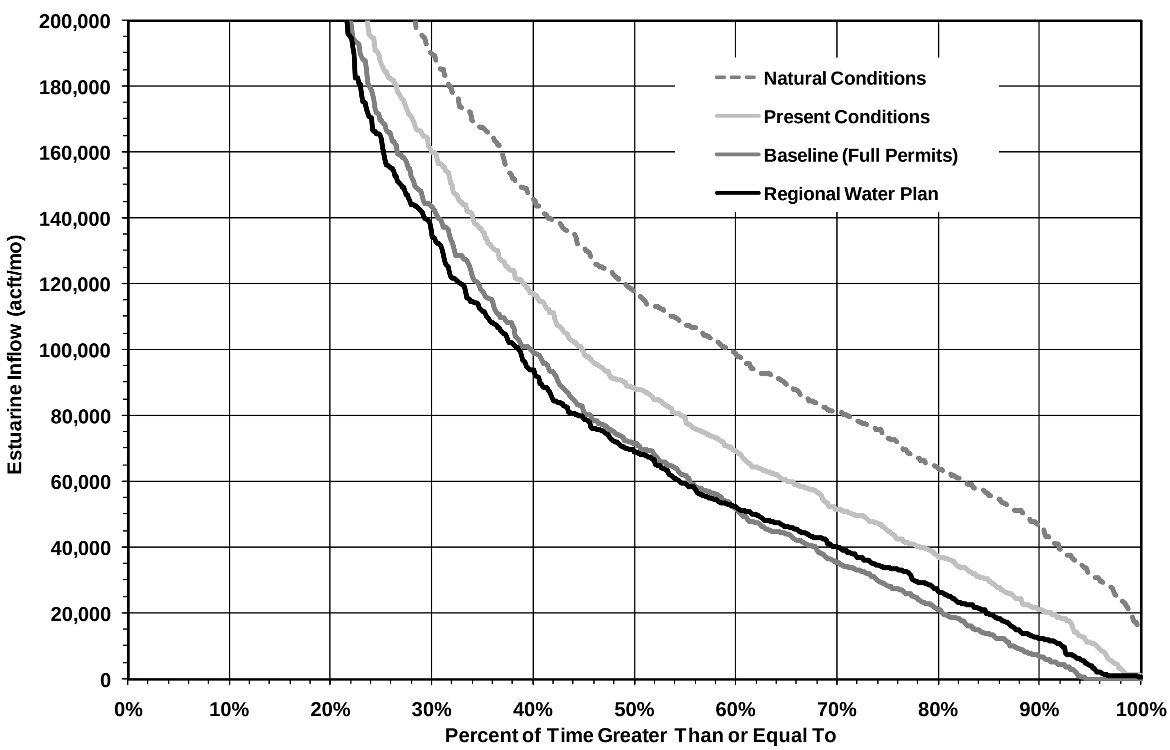


Figure 7.1-26 Frequency of Guadalupe Estuary Freshwater Inflows

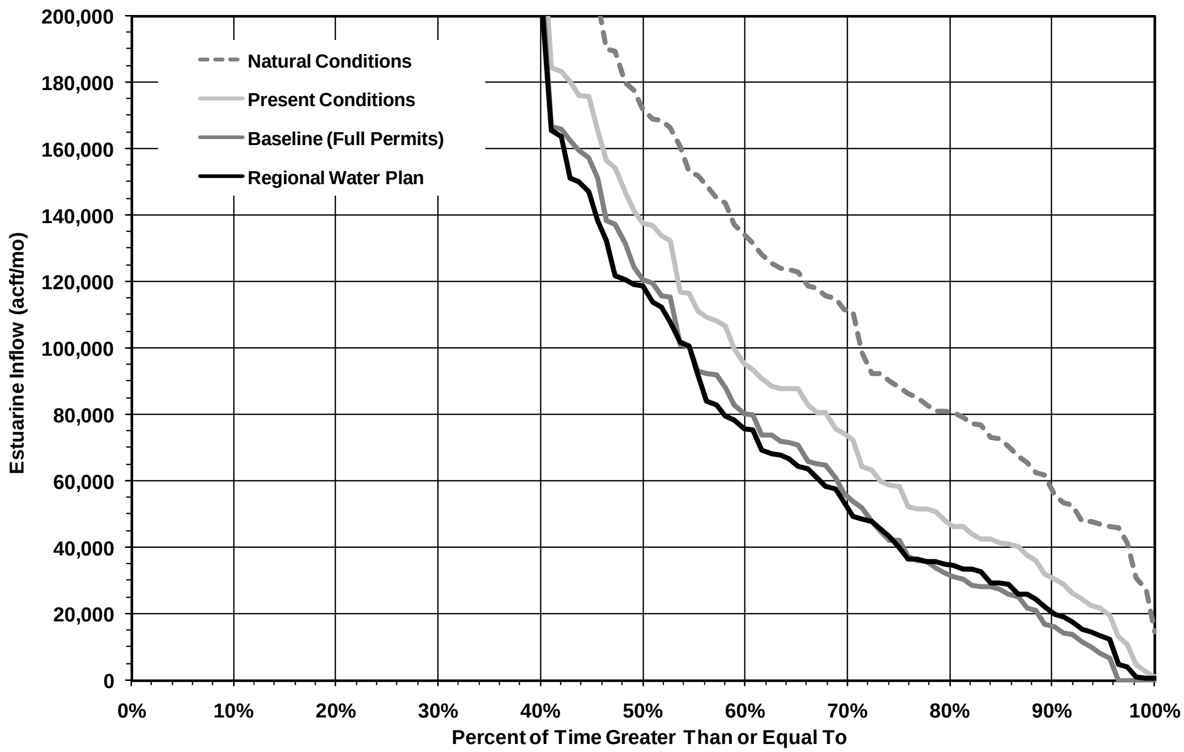


Figure 7.1-27 Frequency of Guadalupe Estuary Freshwater Inflows During Wet Periods (May and June)

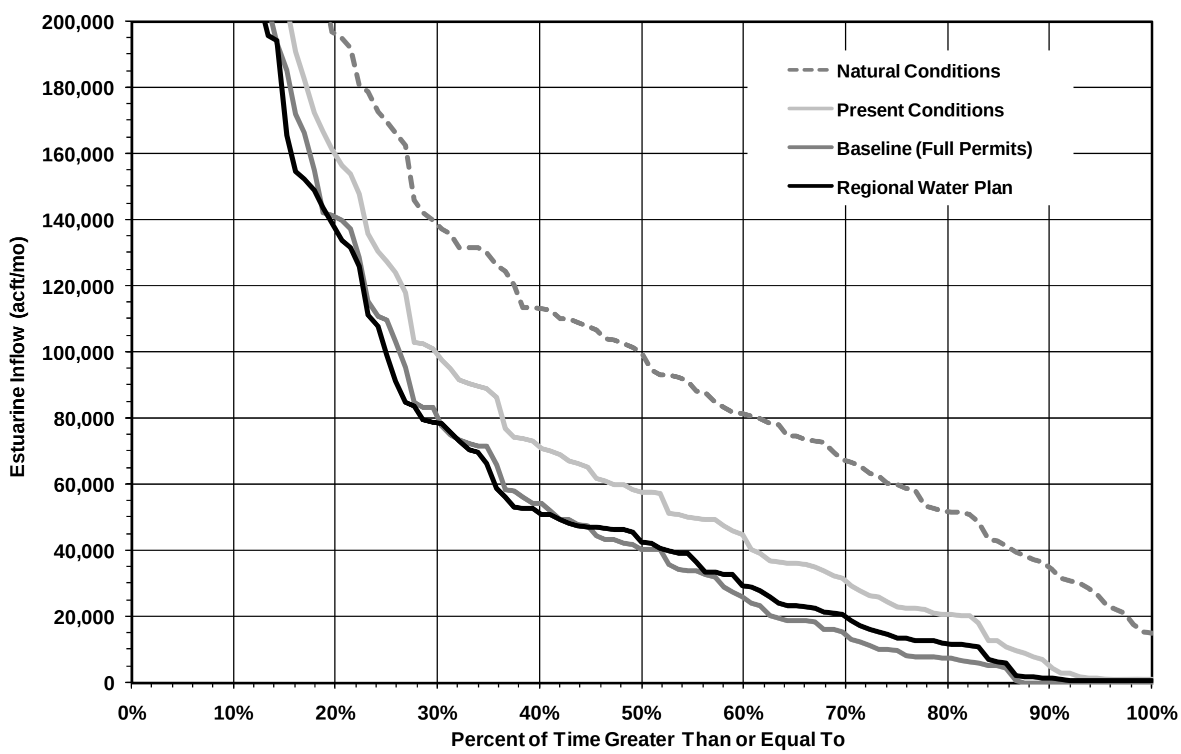


Figure 7.1-28 Frequency of Guadalupe Estuary Freshwater Inflows During Dry Periods (July and August)

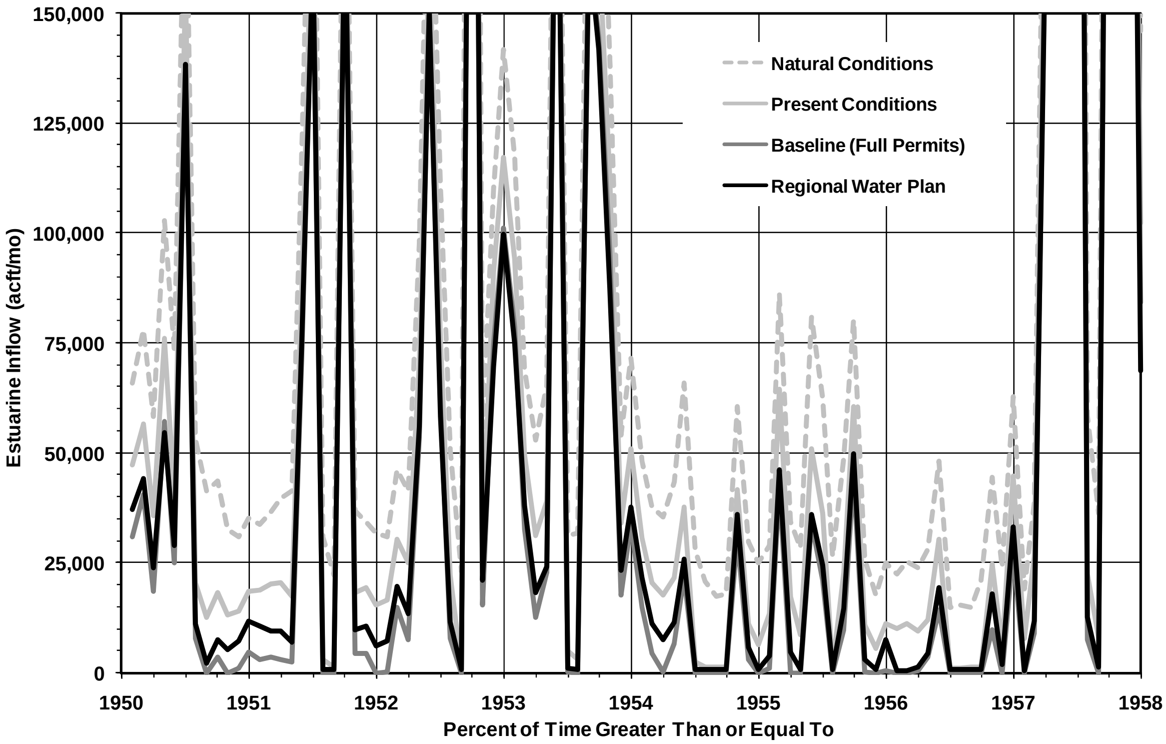


Figure 7.1-29 Guadalupe Estuary Freshwater Inflows during Drought

7.1.3.4 Discussion of Ecologically-Based Assessments

7.1.3.4.1 <u>Discussion of Streamflow Assessment</u>

The results of the ecologically-based streamflow assessments for the Guadalupe River at Victoria show that the regional plan would have very limited effects on streamflow as measured by the ecologically-based criteria selected. For the San Antonio River near Falls City, implementation of the regional water plan would have limited effects in all three flow regimes considered (high, base, and low). Such limited effects could be considered positive with respect to the Baseline as flows increase due to increased San Antonio effluent and the frequency of occurrence and durations of flows below the flow criteria are reduced. The ecological significance of these limited effects is unknown and further complicated by the significant differences between Natural Conditions and the other three scenarios considered. Ongoing instream flow studies on the San Antonio River will likely yield additional information regarding appropriate criteria for ecologically-based streamflow assessments. It is anticipated that, with continued refinement in the assessment criteria and improved knowledge of the instream flow needs, the SCTRWPG will be able to further consider this issue in a future round of planning.

7.1.3.4.2 Discussion of Estuary Inflow Assessment

The results presented in Table 7.1-12 for the spring/early summer pulse inflow criteria are very encouraging and show that the regional plan would have very limited effects on freshwater inflow as measured by the ecologically-based criteria selected. However, the low inflow period assessment (Table 7.1-13) may indicate some issues with regard to cumulative effects of the regional plan on the Guadalupe Estuary, though such effects are associated with increasing use of existing water rights than with regional water plan implementation. These results taken together, also indicate areas of potential focus of attention for future efforts to consider the health of the estuary in the regional water planning process as it moves forward. Ongoing studies of the estuary will yield additional information on inflow and productivity relationships. It is anticipated that, with continued refinement in the assessment criteria and improved knowledge of Guadalupe Estuary inflow needs, the SCTRWPG will be able to further consider this issue in a future round of planning.

7.2 Environmental Assessment

7.2.1 Regional Environment

The South Central Texas Regional Water Planning Area (Region L) spans southern Texas from Hays and Caldwell Counties in the north to the Guadalupe Estuary on the Gulf Coast, to the headwaters of the Nueces River in Uvalde County. The region exhibits a unique biological diversity as a consequence of its location in an area of transition between major vegetational and faunal regions to the north, east and south (respectively, the Balconian, Texan, and Tamulipan)[20], and its position astride migration corridors important to numerous bird, bat and insect populations. Locally, the prairie and coastal ecoregions circumscribe sets of habitats, plants and animals distinct from those of the Central Texas Plateau, and the more tropical affinities of the Southern Texas Plains. The major population centers in Region L are located along the eastern and southern margins of the Edwards Plateau, where a series of rugged, wooded canyons are traversed by clear, spring fed streams intimately associated with the cavernous limestone Edwards Aquifer that provides the present major water supply for the region.

[20] Blair, W. Frank, "The Biotic Provinces of Texas," Texas Journal of Science 2(1):93-117, 1950.

Omernik[21] utilized criteria that included topography, climate, vegetation type, and land use characteristics to divide the United States into ecological regions, or ecoregions, that exhibit more or less distinct sets of physical habitats and species. According to updated classification based on Omernik's criteria, Region L includes parts of five Ecoregions: the Edwards Plateau, Southern Texas Plains, Texas Blackland Prairies, East Central Texas Plains, and the Western Gulf Coastal Plains.[22] Focusing specifically on Texas, and excluding explicit land use criteria, Gould[23] delineated ten vegetational areas, which generally correspond to the portions of Omernik's Ecoregions that extend into the state. The corresponding names for the vegetational areas found in Region L are the Edwards Plateau, South Texas Plains, Blackland Prairies, Post Oak Savannah, and the Gulf Prairies and Marshes (Figure 7.2-1).

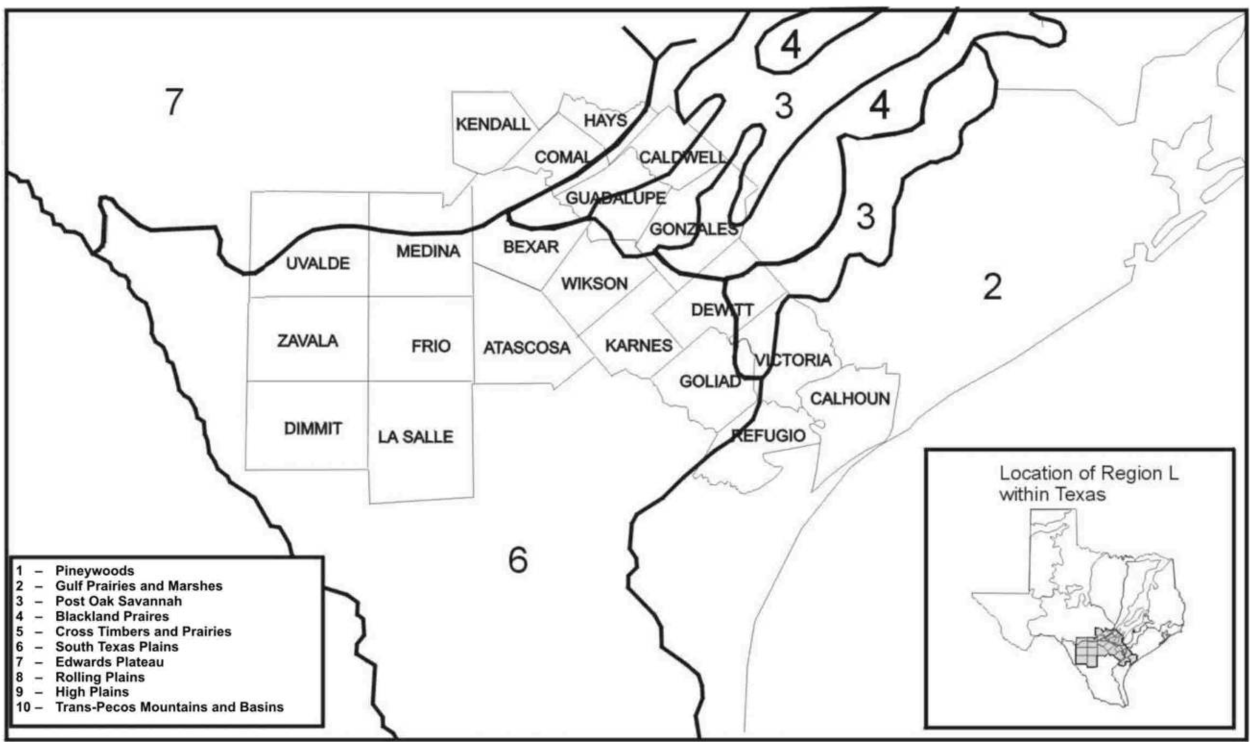


Figure 7.2-1. Gould's Vegetational Areas within Region L

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[21] Omernik, James M., "Ecoregions of the Conterminous United States," Annals of the Association of American Geographers, 77(1) pp. 118-125, 1987.
[22] Griffith, G.E., Bryce, S.A., Omernik, J.M., Comstock, J.A., Rogers, A.C., Harrison, B., Hatch, S.L., and Bezanson, D., 2004, Ecoregions of Texas (color poster with map, descriptive text, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:2,3000,000).
[23] Gould, F.W. 1975. The Grasses of Texas. Texas A&M University Press, College Station, Texas.

The Edwards Plateau vegetational area encompasses approximately 24 million acres of tall or mid-grass understory and a brushy, savanna-type overstory complex of live oak (*Quercus virginiana*) and other oaks (*Q. fusiformis, Q. buckleyi, Q sinuata* var. *breviloba*), ashe junipers (*Juniperus ashei*), cedar elm (*Ulmus crassifolia*), mesquite (*Prosopis* sp.), various species of acacia (*Acacia* sp.), and sumacs, including the prairie flame-leaf (*Rhus copallina* var. *lanceolata*). The most important climax grasses include switchgrass (*Panicum virgatum*), several species of bluestem (*Schizachyrium* and *Andropogon* spp.), gramas (*Bouteloua* spp.), Indiangrass (*Sorghastrum nutans*), Canadian wild rye (*Elymus canadensis*), buffalograss (*Buchloe dactyloides*) and curly mesquite (*Hilaria belangeri*).[24]

Juniper and mesquite brush are generally considered invaders into a presumed climax of largely grassland or savannah, except on the steeper slopes which have continually supported a dense cedar-oak thicket. Bald cypress (*Taxodium distichum*) occurs along perennial streams and rivers, while pecan (*Carya illinoinensis*), Arizona and little walnut (*Juglans major, J. microcarpa*), hackberry (*Celtis laevigata*), black and sandbar willow (*Salix nigra, S. interior*), and eastern cottonwood (*Populus deltoides*) are more widely distributed in riparian areas of both perennial and intermittent streams. Cultivated fields are generally in the relatively broad, level stream valleys where deeper soils have accumulated.[25] Upland agriculture consists primarily of livestock grazing and harvest of cedar and oak for fence posts and firewood, respectively.

The South Texas Plains vegetational area encompasses approximately 20 million acres of level to rolling topography, with elevations ranging from 1,000 ft-msl to about sea level. Soil types cover a wide range, from clays to sandy loams, creating variations in soil drainage and moisture-holding capacities. Though there are large areas of cultivated land, most of the area is still rangeland. The South Texas Plains region originally supported a grassland or savannah climax vegetation.[26] Long periods of grazing and the reduction of fire has affected these plant communities and led to an increase of brush within the area. Species which have increased in the area include honey mesquite (*Prosopis glandulosa*), post oak, live oak, several acacias (*Acacia* spp.) and members of the cactus family (Cactaceae). Distinct differences in climax plant communities and successional patterns occur on the many range sites that are found in the region.

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[24] Correll, D.S., and M.C. Johnston, "Manual of Vascular Plants of Texas," Texas Research Foundation, Renner, Texas, 1979.
[25] Ibid.
[26] Thomas, G.W, Op. Cit., 1975.

Elevations in the Blackland Prairies range from 300 to 800 ft-msl. Uniform, dark-colored calcareous clays, which are interspersed with gray acid sandy loams, constitute the fertile Blackland soils. According to Thomas, most of the region is, or has been under cultivation, although there are some excellent native hay meadows and a few unplowed ranches remaining.[27] The characteristic vegetation of the Blackland Prairies, which includes little bluestem (*Schizachyrium scoparium*) as the climax dominant of the region, is considered true prairie. Big bluestem (*Andropogon gerardi*), Indiangrass, switchgrass, sideoats grama (*Bouteloua curtipendula*), hairy grama (*Bouteloua hirsuta*), tall dropseed (*Sporobolus asper*), silver bluestem (*Bothriochloa saccharoides*), and Texas wintergrass (*Stipa leucotricha*) are other important grasses in the region.[28] If heavy grazing is allowed, Texas wintergrass, buffalograss, Texas grama (*Bouteloua rigidiseta*), smutgrass (*Sporobolus indicus*), and many annuals may increase or invade the prairies, causing deterioration of the native community.[29] Other invasive species include mesquite in the southern portion of the Blackland Prairies, and post oak and blackjack oak in areas of medium to light-textured soils. Grasses that have been used to seed improved pastures within the Blackland Prairies include dallisgrass (*Paspalum dilatatum*), common and coastal bermudagrass (*Cynodon dactylon*), and some native species.

The Post Oak Savannah vegetational area, which covers approximately 8.5 million acres, consists of gently rolling or hilly country, with elevations ranging from 300 to 800 ft-msl. Upland soils of the region are light-colored acid sandy loams or sands. Bottomland soils are light brown to dark gray and acid, with textures ranging from sandy loams to clays. The area is characterized by pasturelands which include frequent stands of woodland and occasional areas of cropland. The dominant species of the Post Oak Savannah is post oak (*Quercus stellata*), which occurs in open stands with a ground cover of grasses.[30] Other associated species include blackjack oak (*Quercus marilandica*), black hickory (*Carya texana*), cedar elm (*Ulmus crassifolia*), and eastern redcedar (*Juniperus virginiana*). This vegetation type is either considered to be a part of the Eastern Deciduous Forest association or as part of the Prairie

[27] Thomas, G.W, "Texas Plants – An Ecological Summary," In: F.W. Gould. 1975. Texas Plants – a Checklist and Ecological Summary. Texas Agricultural Experiment Station, MP-585/Rev., College Station, Texas, 1975.
[28] Correll, D.S., and M.C. Johnston, Op. Cit., 1979.
[29] Ibid.
[30] Ibid.

association.[31,32,33,34] During the last few decades, many areas of open savannah have been converted into dense woodland stands of post oak and winged elm (*Ulmus alata*). This has occurred as a result of overgrazing, abandonment from cultivation, and removal of fire. Grazing is the major land use of both upland and bottomland sites within this vegetation type. Large acreages of both upland and bottomland forests have been cleared for grazing and most of these are in tame pasture.

The Gulf Prairies and Marshes vegetational region of Texas consists of about 9,500,000 acres. This nearly level, slowly drained plain is less than 150 ft-msl in elevation and is cut by sluggish rivers, creeks, bayous, and sloughs. Habitats include coastal salt marshes, dunes, prairies, river bottoms, and freshwater ponds. Soils are acid sands, sandy loams and clays. The upland prairie soils tend to be heavier textured acid clays or clay loams. Much of the region is fertile farmland or pastureland. The climax vegetation of the region is mostly tall grass prairie or post oak savannah.[35] Principal grasses are big bluestem, little bluestem, seacoast bluestem (*S. scoparium* var. *litoralis*), Indiangrass, eastern gamma grass (*Tripsacum dactyloides*), Texas wintergrass, switchgrass, and gulf cordgrass (*Spartina* spp.). Seashore saltgrass (*Distichlis spicata*) occurs on moist saline sites within the area. Since the region is heavily used for ranching and agriculture, extensive disturbance has allowed invader species, such as mesquite, huisache (*Acacia smallii*), prickly pear (*Opuntia* spp.), Acacia (*Acacia* spp.), ragweed (*Ambrosia psilostachya*), broomweed (*Xanthocephalum* spp.) and others to become well established.[36,37] Heavy grazing and/or abandoned farmland has changed the predominant grasses to species such as broomsedge (*Andropogon virginicus*), smutgrass, and threeawns (*Aristida* spp.), and introduced bermudagrass, fescue (*Festuca* spp.), and dallisgrass.

Large acreages of both upland and bottomland forests have been cleared for grazing and much of this land is planted with domestic grasses. Major creek and river floodplains may retain more or less well-developed hardwood forests, but upland areas are generally cleared for cultivation or pasturage. However, uplands support scattered, dense, shrubby thickets of oak,

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[31] Tharp, B.C., "The Vegetation of Texas," Texas Acad. Sci., Anson Jones Press, Houston, 1939.
[32] Braun, E.L., "Deciduous Forests of Eastern North America," Hafner Publishing Co., Inc., New York, 1950.
[33] Weaver, J.E. and F.E. Clements, " Plant Ecology," 2nd Ed. McGraw-Hill Book Co., New York, 1938.
[34] Daubenmire, Rexford, "Plant Geography with Special Reference to North America," Academic Press, New York, 1978.
[35] Correll, D.S., and M.C. Johnston, Op. Cit., 1979.
[36] Johnston, M.C., "The Vascular Plants of Texas, A List Updating the Manual of the Vascular Plants of Texas," Austin, Texas, 1988.
[37] Thomas, G.W, Op. Cit., 1975.

huisache, and mesquite and occasional freshwater marshes in relict drainages. Principal tree and shrub species observed in upland areas include live oak, post oak, cedar elm, hackberry, honey mesquite, huisache, and yaupon (*Ilex vomitoria*).[38,39,40]

In addition to the physiographic and biological diversity of Region L, it is also the location of a unique, region-wide geologic feature called the Edwards Aquifer. The Edwards Aquifer, together with the karst geology of its recharge zone and the remaining major perennial springs, constitute a unique set of habitats in which a significant concentration of isolated, endemic species has developed. The porous to cavernous limestones and dolomites making up the Edwards Aquifer are also the groundwater source that presently supplies water to the City of San Antonio and numerous other users. The Edwards Aquifer is the only underground aquatic habitat in Texas in which vertebrate species live[41] and it supports a surprisingly diverse ecosystem. The aquifer has three parts: the drainage, or catchment area, the recharge zone, and the reservoir zone. Input to the aquifer comes from rainfall over the watershed as a whole, but recharge occurs primarily in the beds of streams crossing the recharge zone. The recharge zone consists of a band of fractured and cavernous limestone (Karst geology) through which surface water enters the aquifer. In addition to the aquatic fauna of the aquifer, the karst limestones in the upland portions of the recharge and contributing zones also harbor a number of endemic, terrestrial cave species.

Where rivers flowing across the plateau have carved deep canyons and exposed the base of the Edwards Limestone, spring fed streams arise and flow south and eastward over the less permeable older formations to the recharge zone, at the base of which a set of large springs (e.g., Leona, San Antonio, Comal, and San Marcos Springs) emerge that support still more species of limited distribution. In addition to their importance as water supplies, the large springs and their associated rivers are also of regional economic importance as scenic and recreational destinations.

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[38] U.S. Bureau of Reclamation, "Palmetto Bend Project – Texas Final Environmental Impact Statement," Bureau of Reclamation, U.S. Department of the Interior, 1974.
[39] Soil Conservation Service, "Soil Survey of Calhoun County, Texas," Soil Conservation Service, Temple, Texas, 1978.
[40] Texas Department of Water Resources, "Land Use/Land Cover Maps of Texas," Austin, Texas. LP-62, 1977, Reprinted 1978.
[41] Edwards, Robert J., Glen Longley, Randy Moss, John Ward, Ray Mathews, and Bruce Stewart, "A Classification of Texas Aquatic Communities with Special Consideration toward the Conservation of Endangered and Threatened Taxa," Vol. 41, No. 3, The Texas Journal of Science, University of Texas at Austin, Austin, Texas, 1989.

Species listed by the Federal and State governments as Endangered or Threatened, species that are candidates for listing as endangered and threatened, and other species of concern are listed and discussed in terms of the potential impacts of each water management strategy in Volume II, and are summarized by county in Appendix F. Endangered species are not distributed uniformly throughout Region L; they tend to be most densely abundant in the canyons, caves, and springs on the eastern and southern edges of the Edwards Plateau (western Hays and Comal Counties, and northern Bexar County) and in the wetland and brackish environments of Calhoun and Refugio Counties.

Listed species tend to fall into one of two broad categories. There are widespread, but rare species whose populations do not appear to be dependent on specific habitat resources that are (at this time) in limited supply (e.g., foraging and nesting areas). These include many of the birds, such as the eagles and hawks that suffered population declines as a result of persistent pesticide toxicity, and Whooping Cranes that were decimated by market hunting. Other listed species tend to be rare because their habitat requirements are met in only a few locations. This group includes migratory songbirds with specific nesting requirements (i.e., Golden-cheeked Warbler and Black-Capped Vireo), and reaches the extremes of endemism in the spring and cave species found along the edges of the Edwards Plateau in Bexar, Comal, and Hays Counties.

In support of the regional water planning process, the Texas Parks and Wildlife Department (TPWD) screened Texas rivers and streams for reaches or segments that supported significant biological resources or functions, or whose continued flows were deemed critical to the maintenance of a downstream resource or public property. Stream reaches identified by TPWD as Ecologically Significant River and Stream Segments in Region L are listed, along with the listing criteria employed in the identification process, in Table 7.2-1. Segment locations are shown in Figure 7.2-2.

With respect to Cultural Resources, Region L is the location of much of the earliest European activity in Texas, including concentrations of important historical sites on Matagorda Bay, along the Guadalupe and San Antonio Rivers, in Bexar County, and at the perennial springs along the margin of the Edwards Plateau. Prehistoric sites also tend to be concentrated in many of the same areas, and Region L contains some of the oldest Native American habitation sites known in the United States. Large National Historic Districts encompass areas on the lower Guadalupe and San Antonio Rivers that are particularly rich in both historic and prehistoric remains.

Table 7.2-1.
Ecologically Significant River and Stream Segments Nominated by TPWD in and Adjacent to the South Central Texas Regional Water Planning Area

Segment Name	Biological Function	Hydrologic Function	Riparian Conservation	Water Quality Aquatic Life/Uses	Endangered, Threatened, or Species of Concern
Aransas River	Extensive estuarine wetland habitat				Reddish egret, Piping plover, snowy plover, white-faced ibis, wood stork, and brown pelican
Arenosa Creek				ecoregion stream	
Blanco River		Edwards Aquifer Recharge		overall use	
Carpers Creek				ecoregion stream	
Comal River		Edwards Aquifer Recharge	Landa Park		multiple spring-dependent species
Cypress Creek		Edwards Aquifer Recharge		overall use	
Dry Comal Creek		Edwards Aquifer Recharge			
Frio River	Texas Natural River Systems Nominee	Edwards Aquifer Recharge	Garner State Park	overall use, aesthetic	
Garcitas Creek	Estuarine wetlands			ecoregion stream	diamondback terrapin[1]
Geronimo Creek				ecoregion stream	
Guadalupe River, Upper		Edwards Aquifer Recharge	Guadalupe River Park	overall use #2 scenic river in Texas	
Guadalupe River, Middle					golden orb
Guadalupe River, Lower	Freshwater and marine wetlands		Victoria Municipal Park, Guadalupe Delta WMA	overall use	whooping crane
Honey Creek			Honey Creek Natural Area		

Table 7.2-2 (Concluded)

Segment Name	***Biological Function***	***Hydrologic Function***	***Riparian Conservation***	***Water Quality Aquatic Life/Uses***	***Endangered, Threatened, or Species of Concern***
Little Blanco River		Edwards Aquifer Recharge			
Mission River	Freshwater and marine wetlands				
Upper Nueces River	T. Nat R Systems	Edwards Aquifer Recharge		Aesthetic	
Sabinal River	T. Nat R Systems	Edwards Aquifer Recharge		Aesthetic	
Upper San Marcos River			multiple University and City parks	overall use	multiple spring-dependent species
Lower San Marcos River			Palmetto State Park		
San Miguel Creek				ecoregion stream	
West Nueces River		Edwards Aquifer Recharge			
West Verde Creek		Hill Country Natural Area			
West Carancahua Creek				ecoregion stream	
Colorado River-Bastrop				overall use	blue sucker
Tidal Colorado River	Freshwater and marine wetlands				
Onion Creek				ecoregion stream	

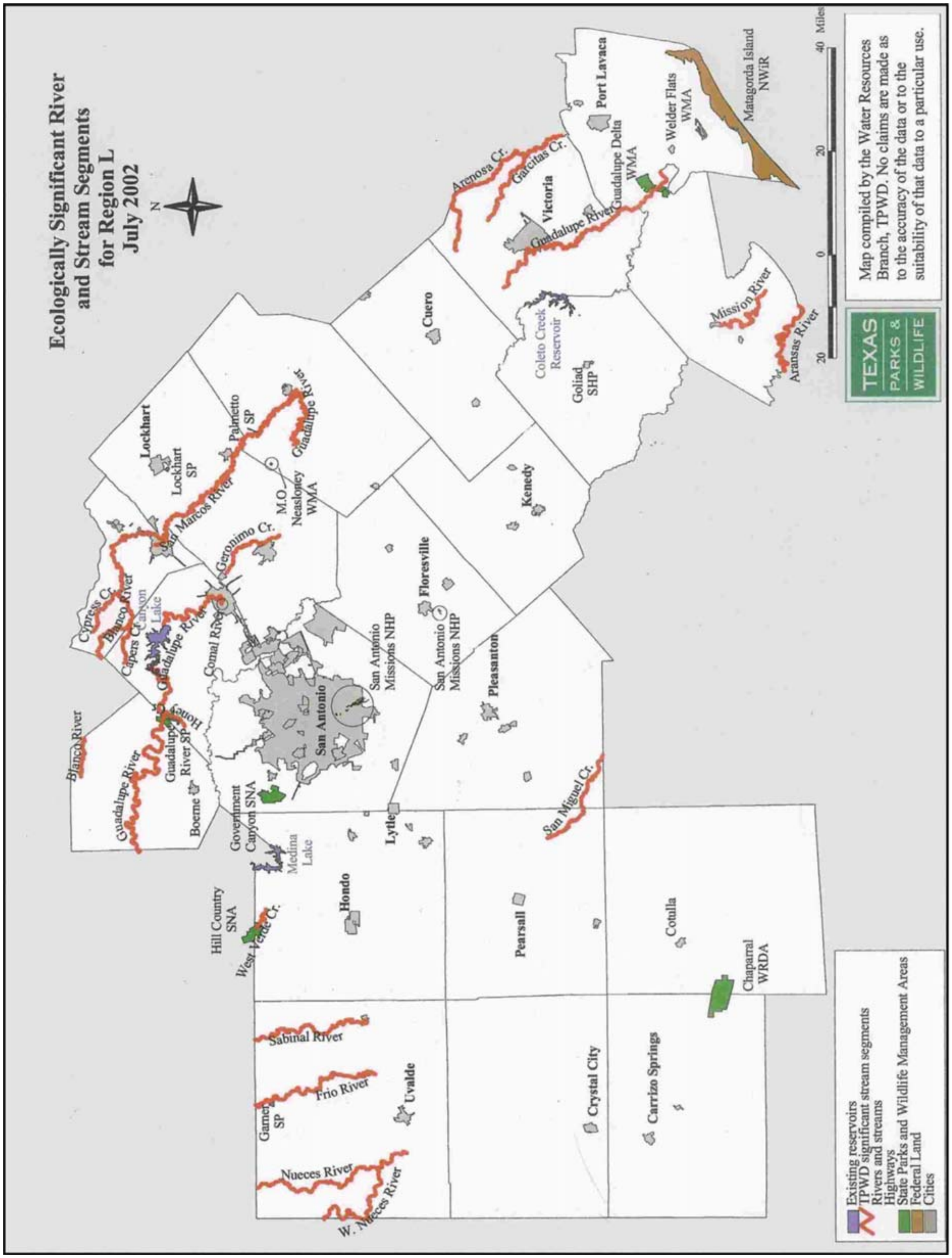

Figure 7.2-2. Ecologically Significant River and Stream Segments for Region L

7.2.2 Environmental Effects

In attempting to evaluate the environmental effects of any activity it is often useful to consider the effects of construction and operations separately, even if only for "bookkeeping" purposes, so as not to miss anything. Construction effects are generally due to disturbances of vegetation and soils, although in specific locations and circumstances, waste disposal, construction in aquatic habitats, noise, or airborne particulates may be important factors. Operations effects may include (for example) impacts to vegetation, habitats, or endangered species through maintenance practices, changes in streamflows or water quality or groundwater availability. The potential environmental effects of each water management strategy were evaluated individually and the results are included with the discussion of that strategy in Volume II. The evaluation in this section focuses on the cumulative impact of all recommended water management strategies in the 2011 South Central Texas Regional Water Plan, and how that compares with the potential impacts of the water management strategies recommended for the South Central Texas Region in past state water plans.

The environmental assessments of individual water management strategies should be regarded as "worst case" and preliminary in the sense that neither environmental nor engineering site-specific studies have been performed to verify the published data employed, finalize facility locations and operational routines, identify locations where risks to environmental resources can be avoided or minimized, and propose compensation for unavoidable impacts. Most of the facilities evaluated here have been designed and located only in a conceptual sense; the actual locations of intakes, pipeline rights-of-way, and other project features will not be finally determined until site-specific field studies and land acquisition programs have been completed. For that reason, many, if not most, of the potential impacts discussed in the respective water management strategies evaluations, can be avoided or significantly mitigated by relocation of project elements. This is particularly the case with respect to facilities such as pipelines and individual well pads and less so for reservoirs, for which there may be a limited set of suitable sites.

Some of the water management strategies considered in this regional water plan are expected to involve little potential impact to environmental or cultural resources, except secondarily with respect to changes in land use practices that may affect wildlife habitats and uses in both rural and urban areas. These would seem to include the Water Conservation, Drought Management, Facilities Expansions, Local Groundwater, and Recycled Water strategies, and strategies that reallocate previously permitted and developed water among different sets of users (e.g., Edwards Transfers and Surface Water Rights which are generally moving water from irrigation to municipal uses). Hence, these strategies are not included in the assessment of environmental effects.

Potential adverse environmental and cultural resources impacts are minimized in the 2011 Regional Water Plan by the recommendation of strategies that maximize the efficient use of existing surface water resources, or which develop groundwater and seawater supplies. These water management strategies avoid the extensive habitat conversions and streamflow changes that can accompany comparable new surface water development. The estimated new water supplies provided by the water management strategies recommended in the current 2011 Regional Water Plan for Region L and included in the assessment of environmental effects are summarized in Table 7.2-2, along with strategies included in previous State Water Plans. These water management strategies include: a) Eight (8) that involve development of fresh or brackish groundwater from the Carrizo-Wilcox Aquifer; b) Four (4) that rely on surface water diversions from the Guadalupe or Lavaca River and off-channel surface or aquifer storage; c) Four (4) that develop additional firm supplies from available surface water sources; d) Three (3) that would use surface water and groundwater conjunctively; and e) One (1) that involves diversion and desalination of seawater from the Guadalupe Estuary.

Regardless of water source and location, all the water management strategies comprising the Regional Water Plan, except the Edwards Recharge Projects, involve the construction of dispersed facilities that typically have substantial flexibility in terms of alignment or site selection such as water intakes, off-channel storage, pipelines, and well fields. The recommended strategies typically result in relatively only localized disturbances. While a major pipeline may disturb several hundred acres in total, effects are generally minor at the landscape scale because construction and maintenance activities are dispersed among the much larger physiographic and habitat elements in which they are placed. In comparison with storage reservoir projects, the total land area impacted by a well field or river diversion and transmission pipeline is smaller, often by orders of magnitude. Field studies conducted prior to design and easement procurement can substantially reduce the potential to adversely affect unique habitats, endangered species, historic

Table 7.2-2. Estimated Firm Yields of Water Management Strategies in State Water Plans (acft/yr)

ID#	Water Management Strategy	State Water Plan					
		1984	1990	1997	2002	2007	2012
G-16C1	Cuero Reservoir	152,606	152,606				
G-17C1	Lindenau (Sandies) Reservoir	80,836	80,836	80,836			
G-40	Cloptin Crossing Reservoir	32,458					
G-21	Lockhart Reservoir	5,627					
S-14D	Applewhite Reservoir	4,032	4,032				
S-16C	Goliad Reservoir	99,687	99,687				
S-15C	Cibolo Reservoir	33,200					
S-15Da	Cibolo Reservoir w/ SA River		69,925	69,925			
LGWSP	Lower Guadalupe Water Supply Project				104,487		
LGWSP	LGWSP for GBRA Needs					63,072	
LSWP	LCRA-SAWS Water Project				150,000	150,000	90,000
SCTN-3c	Simsboro Aquifer				55,000		
L-18a	Edwards Recharge Projects				21,577	21,577	21,577
SCTN-17	Seawater Desalination				84,012	84,012	84,012
CZ-10C	Carrizo Aquifer - Wilson & Gonzales				16,000		
CZ-10D	Carrizo Aquifer - Gonzales & Bastrop				27,500		
G-24	Wimberley and Woodcreek Water Supply Project				4,636	4,636	4,480
	Canyon Amendment			40,000	40,000		
	Regional Carrizo for SAWS					62,588	11,687
	SSLGC Carrizo Project Expansion				12,800	12,800	
	Hays/Caldwell PUA					15,000	35,000

Table 7.2-2 (Concluded)

ID#	Water Management Strategy	State Water Plan					
		1984	**1990**	**1997**	**2002**	**2007**	**2012**
	Recycled Water Program Expansion		97,000		52,215	36,258	
	Brackish Wilcox Desalination					5,662	
	Wells Ranch Project				9,000	9,000	11,000
	CRWA Siesta Project				5,042	5,042	5,042
	GBRA Simsboro Aquifer						50,000
	GBRA-Exelon Project--River Diversion Option						49,126
	GBRA New Appropriation (Lower Basin)						11,500
	GBRA Mid Basin (Surface Water)						25,000
	GBRA Lower Basin Storage						26,452
	Regional Carrizo for SSLGC						10,364
	Brackish Wilcox Groundwater for SAWS						26,400
	Brackish Wilcox Groundwater for Regional Water Alliance						11,200
	Brackish Wilcox Groundwater for SSWSC						1,120
	Medina Lake Firm-Up (ASR)						13,730
	Lavaca River Off-Channel Reservoir						26,242
	Storage Above Canyon (ASR)						3,140
	TWA Regional Carrizo						27,000
Totals		**408,446**	**504,086**	**190,761**	**582,269**	**469,647**	**544,085**

and prehistoric sites, and other resources that are present only at particular locations. For example, where sensitive resources at stream crossings cannot be adequately protected or avoided, boring or tunneling can be considered as construction options to avoid disturbance to aquatic habitats.

The Edwards Recharge Projects (Section 4C.4, Volume II) involve construction of dams where selected streams cross the Edwards Aquifer recharge zone to increase the amount of water entering the aquifer. Most of the recharge occurs during heavy rains that result in streamflows exceeding the maximum possible recharge rate of the reach over the recharge zone that contribute instead to downstream flow. In addition, most of the time streambeds in the recharge zone (and for substantial distances downstream) are dry, and streamflows entering the recharge zone are usually well below maximum recharge amounts (i.e., streamflows are usually zero and the streambed dry at the downstream edge of the recharge zone). Slowing the flow of water in order to increase the amount of time water remains over the recharge zone will increase recharge to the aquifer without substantially impacting stream habitats and populations, because water is not present in most of the stream reaches recommended at frequencies sufficient to support other than ephemeral aquatic communities in the recharge and downstream reaches. The recharge structures are designed to drain rapidly and to pass minimum flows downstream for water rights holders and environmental flow needs based on default instream flow criteria for regional planning (Consensus Criteria for Environmental Flow Needs). As a result of the low frequency and persistence of inundation, limited changes in the terrestrial environment will occur in the recharge impoundment areas. Inspection of the existing recharge structures on Parkers, Verde, and San Geronimo Creeks shows little or no apparent impact to vegetational cover within and downstream of their impoundments.

Major exceptions include the Nueces and Blanco River sites that do ordinarily exhibit surface water and aquatic communities at the proposed recharge sites. Perennial aquatic habitats are generally limited to pools in the Nueces River between US 90 and its "braided reach." The Frio River and its tributaries between US 90 and Choke Canyon Reservoir also experience intermittent flows. Impacts to the Blanco River are minimized because it joins with the San Marcos River only a few miles below the proposed recharge dam site. Most of the water entering the aquifer from the Blanco River recharge structure is expected to be discharged from the nearby springs in San Marcos and flow down the San Marcos River. Recharge sites proposed for northern Bexar County (e.g., a site in Government Canyon State Park) are near caves in which reside populations of federally listed endangered invertebrates. Construction of the recharge projects in the Nueces River Basin would result in small decreases in the firm yield of the Choke Canyon Reservoir/Lake Corpus Christi System and inflows to the Nueces Estuary. At the same time, instream flows would increase in the Guadalupe-San Antonio River Basin, as would inflows to the Guadalupe Estuary.

The largest run-of-river diversion water management strategy, the LCRA-SAWS Water Project (LSWP), involves diversion of both appropriated and unappropriated water for which rights will have to be obtained through the state permitting process as well as groundwater development for irrigation uses deemed necessary to make surface water available for municipal and industrial uses. Five other recommended strategies, the GBRA Mid-Basin Project, GBRA New Appropriation (Lower Basin), Lavaca River Off-Channel Reservoir, Storage above Canyon Reservoir (ASR), and Medina Lake Firm-Up (ASR) include off-channel storage facilities which will be used to ensure firm supplies throughout a drought comparable to the most severe on record. The off-channel storage is necessary because the existing water rights and the unappropriated water are either not physically present during low flow periods, or are unavailable due to the demands of senior water rights or environmental flow needs. The bulk of these proposed diversions will occur during higher flow periods—when streamflows exceed the monthly medians (for a given month in the period of record, half the time flows are less than the median, and half the time flows are greater than the median), and low flow regimes may not be affected at all. Recent studies indicate that the firm yield associated with the LCRA-SAWS Water Project that could be allocated to SAWS is now about 90,000 acft/yr rather than the full 150,000 acft/yr assumed in previous regional water plans. Unlike the Edwards Recharge Projects, the LCRA-SAWS Water Project includes long transmission pipelines that traverse multiple ecologically distinct regions, which inflate the potential effects on vegetation and terrestrial habitats, place project facilities adjacent to more protected species, and increase the potential for significant adverse effects. The same might be said of the GBRA Mid-Basin Project, though its transmission pipeline is less than one-third the length.

The water management strategies that include development of large amounts of groundwater all avoid the potential environmental and cultural resources impacts usually attendant to development of similar volumes of surface water. However, local residents of the areas that would be affected have expressed concerns about declining well levels and potential impacts to springs and streamflows. Development of a large amount of groundwater from the

Carrizo-Wilcox Aquifer will likely result in some reductions in streamflow in both the San Antonio and Guadalupe Rivers, and in inflows to the Guadalupe Estuary. However, modeling the net effect on streamflows in the San Antonio and Guadalupe Rivers of complete implementation of all the currently recommended water management strategies has not indicated significant changes in streamflows in either river, particularly with respect to low flows. These groundwater projects do, however, include transmission pipelines from the well fields to the users which may include similar consequent effects as noted for the LCRA-SAWS Water Supply Project and the GBRA Mid-Basin Project.

The seawater and brackish groundwater desalination projects involve little construction disturbance except for the necessary raw water intakes or wells and transmission pipelines. Use of either seawater or brackish bay water sources will entail potential impacts due to impingement and entrainment of aquatic organisms at the intake, and to the need to discharge water 2-3 times as salty as the raw water. Potential impacts from desalination operations can be avoided or significantly minimized by appropriate site selection and design of intake and discharge structures based on the biological and hydrodynamic characteristics of the receiving water. The Seawater Desalination strategy includes a long transmission pipeline for delivery of water from San Antonio Bay to Bexar County.

In order to assess the potential cumulative environmental impacts of all the recommended water management strategies having quantifiable impacts, a method was developed to numerically characterize the environmental effects of each water management strategy in terms such that very different kinds of impacts could be aggregated and the results compared. To evaluate the resulting impact scores of the 2011 Regional Water Plan (which will become a part of the 2012 State Water Plan) relative to the possible universe of water management strategies available to the region, we compare the present set of recommended water management strategies to those proposed for the South Central Texas Region in previous State Water Plans.

The location and extent of potential disturbances to environmental and cultural resources are based on the descriptions and environmental assessments of the water management strategies in Section 4C (Volume II) of the South Central Texas Regional Water Plan and updated information developed by HDR Engineering, Inc. during the current regional water planning effort. Pipeline routes were produced digitally by HDR and pipeline lengths and areas were calculated using ArcMap geographic information system software. A 30-foot permanent easement corridor was assigned to pipelines with pipe diameters less than 36 inches and a 40-

foot corridor for those with diameters greater than 36 inches. A 100-foot temporary construction corridor was assumed for all pipelines. Areas inundated by reservoirs were obtained from the 2001 South Central Texas Regional Water Plan, as well as other estimations of land area disturbed. The total areas for facilities such as water treatment plants, pump stations, storage units, and wells were calculated by subtracting any reservoir areas and permanent pipeline easement areas from the total impact areas.

Recommended water management strategies that involve only reallocation of previously appropriated water using existing infrastructure are not included in this analysis. These strategies, which include conservation, reuse, transfer of water among user groups, and local groundwater development, do not generally require additional reservoirs, pipelines, or other structures that would have significant environmental impacts. For consistency with water planning evaluation protocols used in this report, diversion and use of appropriated water is not considered to result in certain aquatic habitat impacts.

This assessment was completed using a matrix approach to perform a series of parallel evaluations of each water management strategy for its potential to impact:

(1) Endangered and Threatened Species;
(2) Vegetation and Wildlife Habitats;
(3) Water Quality and Aquatic Habitats;
(4) Cultural Resources; and/or
(5) Ecologically Significant River and Stream Segments as identified by the Texas Parks & Wildlife Department (TPWD).

The impact values were tabulated, summed for all water management strategies in each of the State Water Plans, and the aggregate scores normalized by dividing them by the total firm yield of the respective State Water Plan strategies (Table 7.2-2), and again by the average score of the six State Water Plans.

7.2.2.1 Endangered and Threatened Species

The potential impacts of the individual water management strategies were first evaluated with respect to state- and federally-listed endangered and threatened species, and species of special concern, using a two-part index system. First, each listed species was assigned a score that reflected its status—1 for species of concern; 2 for threatened; or 3 for endangered. In cases where status varies among state and federal agencies, the higher status was used. The most current county lists and mapped occurrences of endangered and threatened species within Region L were obtained from the TPWD Natural Diversity Database and used.

Each water management strategy was then evaluated with respect to its potential impact on the species present by assigning a numerical value from zero (0) to three (3) to each instance in which construction or operational disturbances could result in an impact to one of these species according to the following criteria:

- 0 - No adverse impact expected, project in historic range only
- 1 - Species known to occur within county, but not likely to be impacted
- 2 - Species or potential habitat known to occur within the project area, may impact habitats or individuals of widespread species
- 3 - Species or habitat present within the corridor, significant reductions in critical habitat or population of endemic species possible.

Each potential impact score was then multiplied by the status score to obtain a final impact assessment for that species and strategy. Status, potential impact and impact assessment scores are shown in the Endangered, Threatened, and Species of Concern tables in the respective water management strategy discussions in Section 4C (Volume II). The summed impact assessment scores are listed, and the overall endangered and threatened species impact values for each of the State Water Plans are presented in Table 7.2-3.

The potential impacts to endangered and threatened species associated with the six State Water Plans are compared in Figure 7.2-3, which indicates a higher potential for impacts to occur in the 2012 State Water Plan. This finding is a direct result of the changing nature of the water management strategies; many small projects requiring long pipelines that cross numerous ecologically distinct areas, and those constructed in regions where many protected species occur will have more project facilities adjacent to sensitive species and habitats, and thus higher impact potential, than larger, more compact projects that are not located in areas of many protected species. In Table 7.2-3, the highest impact scores go to the water management strategies located in areas of relatively high protected species density and the projects requiring the longest pipelines. The high score for the Edwards Recharge Projects is due primarily to the proposed recharge sites located in northern Bexar County, where increased water levels during runoff/recharge events may adversely affect cave communities adjacent to and within the recharge reservoirs that include federally listed endangered invertebrates.

Table 7.2-3. Potential Impacts to Endangered, Threatened, and Species of Concern from Water Management Strategies in State Water Plans

ID#	Water Management Strategy	State Water Plan					
		1984	1990	1997	2002	2007	2012
G-16C1	Cuero Reservoir	70	70				
G-17C1	Lindenau (Sandies) Reservoir	74	74	74			
G-40	Cloptin Crossing Reservoir	67					
G-21	Lockhart Reservoir	40					
S-14D	Applewhite Reservoir	66	66				
S-16C	Goliad Reservoir	78	78				
S-15C	Cibolo Reservoir	53					
S-15Da	Cibolo Reservoir w/ SA River		59	59			
LGWSP	Lower Guadalupe Water Supply Project				91		
LGWSP	LGWSP for GBRA Needs					114	
LSWP	LCRA-SAWS Water Project				103	103	85
SCTN-3c	Simsboro Aquifer				68		
L-18a	Edwards Recharge Projects				84	84	84
SCTN-17	Seawater Desalination				67	67	67
CZ-10C	Carrizo Aquifer - Wilson & Gonzales				46		
CZ-10D	Carrizo Aquifer - Gonzales & Bastrop				65		
	Regional Carrizo for SAWS					47	30
	Hays/Caldwell PUA					19	19
G-24	Wimberley and Woodcreek Water Supply Project				78	78	35

Table 7.2-3 (Concluded)

ID#	Water Management Strategy	State Water Plan					
		1984	**1990**	**1997**	**2002**	**2007**	**2012**
	Brackish Wilcox Desalination					44	
	Wells Ranch Project				21	21	21
	CRWA Siesta Project				23	23	23
	GBRA Simsboro Aquifer						38
	GBRA-Exelon Project--River Diversion Option						66
	GBRA New Appropriation (Lower Basin)						56
	GBRA Mid Basin (Surface Water)						37
	GBRA Lower Basin Storage						34
	Regional Carrizo for SSLGC						30
	Brackish Wilcox Groundwater for SAWS						28
	Brackish Wilcox Groundwater for Regional Water Alliance						27
	Brackish Wilcox Groundwater for SSWSC						28
	Medina Lake Firm-Up (ASR)						53
	Lavaca River Off-Channel Reservoir						33
	Storage above Canyon (ASR)						54
	TWA Regional Carrizo						42
Factor 1,000	**Raw Score**	**448**	**347**	**133**	**646**	**600**	**860**
	Score / Unit Supply	**1.097**	**0.688**	**0.697**	**1.109**	**1.278**	**1.581**
	Normalized Score / Unit Supply	**1.020**	**0.640**	**0.649**	**1.032**	**1.188**	**1.470**
	Rank	**3**	**1**	**2**	**4**	**5**	**6**

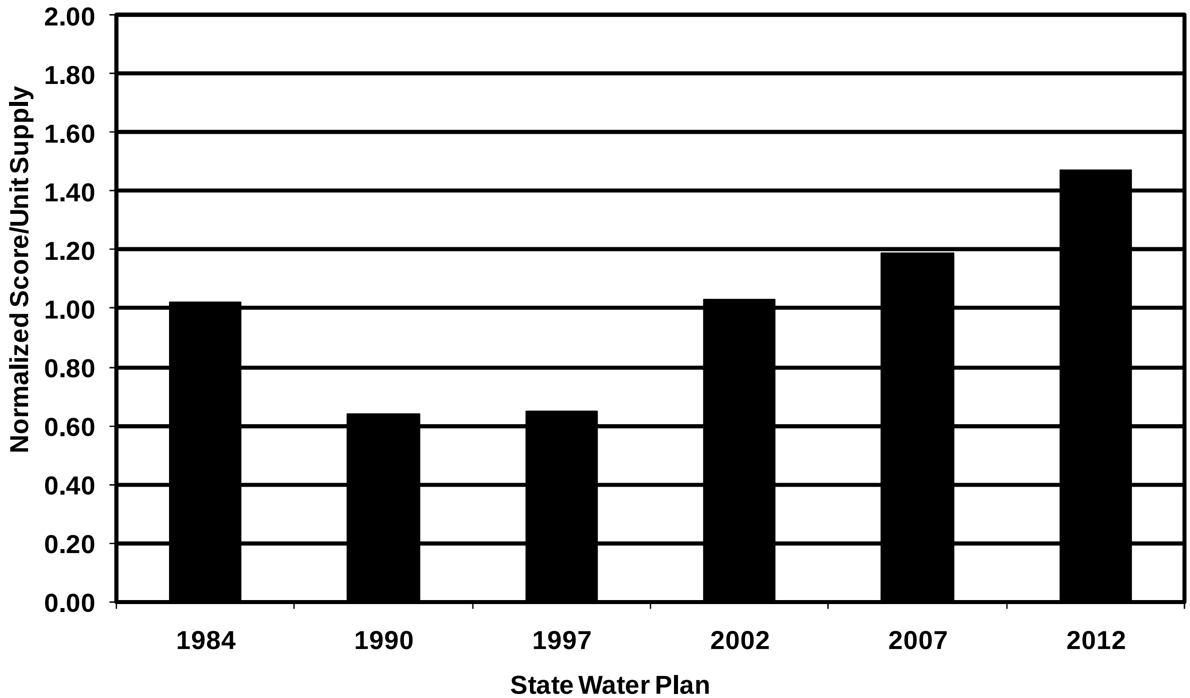

Figure 7.2-3. Cumulative Potential Impact Scores for Endangered, Threatened, and Species of Concern

7.2.2.2 Vegetation and Wildlife Habitats

To evaluate potential impacts on vegetation and wildlife habitats, each of the water management strategies was given a "total adjusted impact value" based on the total area of each habitat type disturbed by construction activities and the level of potential impacts on those resources. For each water management strategy, the total land area potentially disturbed was divided into categories based on types of disturbance. For example, inundation of land due to the construction of a reservoir versus the temporary construction corridor of a pipeline easement. The potential level, or severity, of impacts to vegetation and wildlife was evaluated by assigning an expected impact score:

1 - Low impacts = temporary habitat disturbance (e.g., a pipeline construction corridor);
2 - Medium impacts = permanent or continuing habitat disturbance that does not entirely destroy its original ecological functions; or
3 - High impacts = habitat is permanently removed through inundation or construction.

The area of each type of disturbance was then divided into four categories of habitat type with corresponding scores reflecting their relative values (e.g., forests and wetlands are generally considered more important ecologically than grassland types):

1 - 0-30% canopy cover (grasslands, shrub land and cropland);
2 - 31-70% canopy cover (brush lands, and parkland);
3 - 70-100% canopy cover (woods and forestland); or
4 - All wetland and wooded riparian areas regardless of canopy cover.

These four categories were based on a clustering of the eight Physiognomic Regions of vegetation provided by the TPWD.[42] The digital pipeline routes provided were then projected over a map of the vegetation types of Texas from the TPWD to determine the proportions of the four habitat categories potentially affected by each water management strategy.

The product of the level of impact score times the habitat value score times the acreage affected is the adjusted impact value. Adjusted impact values are summed for the habitats potentially affected by each water management strategy and overall vegetation and habitat scores are shown in Table 7.2-4. Figure 7.2-4 presents a graphical comparison of six State Water Plans. These results are clearly the opposite of those obtained above for protected species; the 2011 Regional Water Plan (2012 State Water Plan) exhibits a lesser impact to this environmental resource category than earlier state water plans. In this case, the large areas to be inundated in the storage reservoir projects recommended in the 1984 to 1997 State Water Plans eliminated large areas of terrestrial and flowing aquatic habitat, replacing them with a lake-type environment.

7.2.2.3 Water Quality and Aquatic Habitats

Potential impacts to water quality and aquatic habitats were assessed in a single stage as each water management strategy was evaluated with respect to a list of eight potential impact classes and assigned an appropriate score for each occurrence of the eight evaluation categories:

(1) Inundation/Conversion of lotic to lentic habitat: 1

(2) Streamflow reductions: 1, or 0.25 if compliant with Consensus Criteria for Environmental Flow Needs (CCEFN)

(3) Alteration of flood frequency (below storage reservoirs): 1

(4) Alteration of physio-chemical characteristics of streamflow: 1, or 0.25 if compliant with CCEFN

(5) Blocks aquatic migration (any dam on a perennial stream): 1

[42] McMahan, Roy G. Frye, Kirby L. Brown. 1984. The Vegetation Types of Texas Including Cropland. Texas Parks and Wildlife Department. Austin. Texas.

Table 7.2-4.
Potential Impacts to Vegetation and Wildlife Habitats from Water Management Strategies in State Water Plans

ID#	Water Management Strategy	State Water Plan					
		1984	1990	1997	2002	2007	2012
G-16C1	Cuero Reservoir	243,933	243,933				
G-17C1	Lindenau (Sandies) Reservoir	242,980	242,980	242,980			
G-40	Cloptin Crossing Reservoir	30,171					
G-21	Lockhart Reservoir	13,639					
S-14D	Applewhite Reservoir	12,712	12,712				
S-16C	Goliad Reservoir	136,422	136,422				
S-15C	Cibolo Reservoir	84,604					
S-15Da	Cibolo Reservoir w/ SA River		84,717	84,717			
LGWSP	Lower Guadalupe Water Supply Project				10,816		
LGWSP	LGWSP for GBRA Needs					12,004	
LSWP	LCRA-SAWS Water Project				26,739	55,798	21,799
SCTN-3c	Simsboro Aquifer				4,422		
L-18a	Edwards Recharge Projects				13,769	13,769	13,769
SCTN-17	Seawater Desalination				4,343	4,343	4,343
CZ-10C	Carrizo Aquifer - Wilson & Gonzales				3,088		
CZ-10D	Carrizo Aquifer - Gonzales & Bastrop				8,762		
	Regional Carrizo for SAWS					4,797	1,790
	Hays/Caldwell PUA					1,890	1,934

Table 7.2-4 (Concluded)

ID#	***Water Management Strategy***	***State Water Plan***					
		1984	***1990***	***1997***	***2002***	***2007***	***2012***
G-24	Wimberley and Woodcreek Water Supply Project				1,128	1,128	674
	Brackish Wilcox Desalination					478	
	Wells Ranch Project				1,307	1,307	1,307
	CRWA Siesta Project				1,149	1,149	1,149
	GBRA Simsboro Aquifer						2,982
	GBRA-Exelon Project--River Diversion Option						15,063
	GBRA New Appropriation (Lower Basin)						12,400
	GBRA Mid Basin (Surface Water)						34,767
	GBRA Lower Basin Storage						1,829
	Brackish Wilcox Groundwater for SAWS						72
	Brackish Wilcox Groundwater for Regional Water Alliance						836
	Brackish Wilcox Groundwater for SSWSC						118
	Medina Lake Firm-Up (ASR)						688
	Lavaca River Off-Channel Reservoir						9,371
	Storage above Canyon (ASR)						453
	TWA Regional Carrizo						4,274
Factor 1	**Raw Score**	**764,461**	**720,764**	**327,697**	**75,525**	**96,663**	**129,618**
	Score / Unit Supply	**1.872**	**1.430**	**1.718**	**0.130**	**0.206**	**0.238**
	Normalized Score / Unit Supply	**2.008**	**1.534**	**1.843**	**0.139**	**0.221**	**0.256**
	Rank	**6**	**4**	**5**	**1**	**2**	**3**

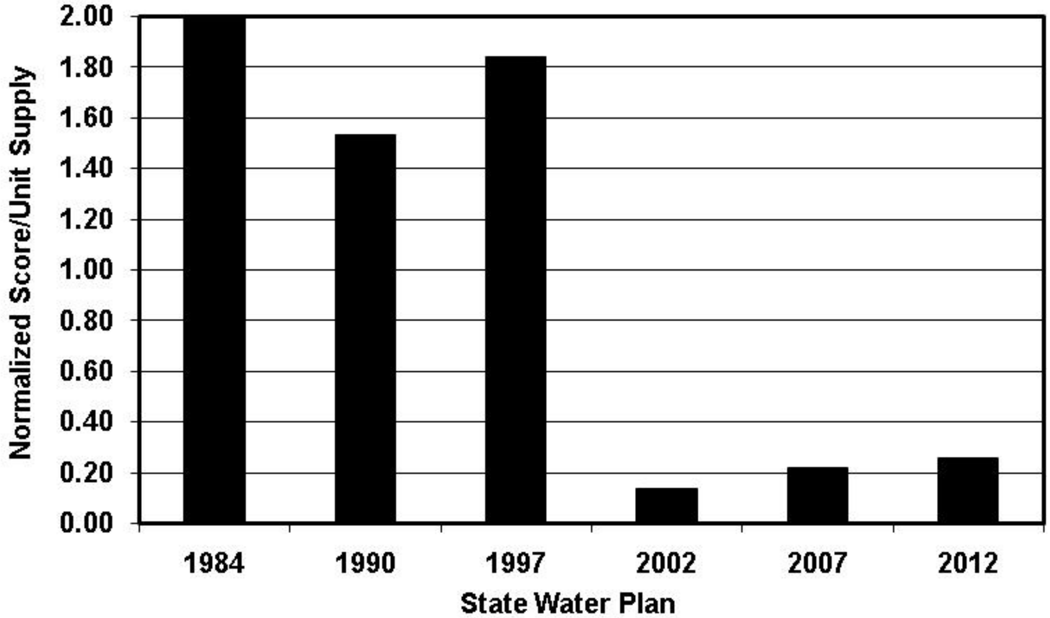

Figure 7.2-4. Cumulative Potential Impact Scores for Vegetation and Wildlife Habitats

(6) Alteration of annual hydrograph: 1, or 0.25 if compliant with CCEFN

(7) Construction disturbances: 1 each for four categories; outfalls, intakes, pipeline stream crossings, or dams (maximum value of 4)

(8) Bay and Estuary inflows: 1, or 0.25 if compliant with CCEFN

Scores were tabulated for each water management strategy and summed for each State Water Plan.

The State Water Plans were also scored on the net flow impacts following implementation of all recommended water management strategies on major streams at four locations: the Guadalupe River at Cuero/Victoria; the Guadalupe River at the Saltwater Barrier near Tivoli; the Nueces Estuary near Corpus Christi; and the Colorado River at Bay City. Net flow impact scores were based on the following scale, with the greatest impact score being associated with the greatest potential change in streamflow or freshwater inflow:

0 - Flow increase or no change at low (less than 50th percentile), no change or minor decrease at high flows;

1 - Moderate decrease at low flows (less than 10 percent between 25th and 50th percentiles);

2 - Moderate decrease at low flows, (greater than 20 percent decrease between 50th and 75th percentiles);

3 - Greater than 10 percent decrease between 25th and 50th percentiles; or

4 - Greater than 10 percent decrease between 25th and 50th percentiles, greater than 20 percent decrease between 50th and 75th percentiles.

The summed water quality/habitat and net stream flow scores for each State Water Plan, divided by the plan yields, were added together and normalized. The results are presented in Table 7.2-5, and Figure 7.2-5 is a graphical comparison of the six water plans. The impact score for the 2012 plan is greater than those for the 2002 and 2007 plans because of the additions of several new run-of-river diversion projects with off-channel storage.

7.2.2.4 Cultural Resources

Assessment of potential impacts to historical sites included evaluation of data provided by the Texas Historical Commission which included the locations of National Register Properties, Historical Markers, and cemeteries within the state. Possible impacts to these historical sites were determined according to their proximity to the probable construction areas and the type of site, if known. All historical sites within a mile of the pipeline corridor were entered into the impact matrix along with their distances from the project disturbance area and any other details relevant to determining probable impact. Impact scores were based on the following scale, with the greatest impact score being associated with the permanent inundation of any historical site:

0 - Historical sites mapped greater than 0.50 mile from the project disturbance;

1 - Historical sites between 0.25 and 0.50 mile from the project disturbance;

2 - Historical sites less than 0.25 mile from the project disturbance;

3 - Permanently inundated historical sites; and

1 - An additional impact point assigned for any cemetery.

Table 7.2-5.
Potential Impacts to Water Quality and Aquatic Habitats from Water Management Strategies in State Water Plans

ID#	Water Management Strategy	State Water Plan					
		1984	1990	1997	2002	2007	2012
G-16C1	Cuero Reservoir	6.00	6.00				
G-17C1	Lindenau (Sandies) Reservoir	7.00	7.00	7.00			
G-40	Cloptin Crossing Reservoir	5.75					
G-21	Lockhart Reservoir	5.75					
S-14D	Applewhite Reservoir	5.00	5.00				
S-16C	Goliad Reservoir	6.00	6.00				
S-15C	Cibolo Reservoir	6.00					
S-15Da	Cibolo Reservoir w/ SA River		7.00	7.00			
LGWSP	Lower Guadalupe Water Supply Project				4.00		
LGWSP	LGWSP for GBRA Needs					4.00	
LSWP	LCRA-SAWS Water Project				6.00	6.00	6.00
SCTN-3c	Simsboro Aquifer				1.00		
L-18a	Edwards Recharge Projects				3.25	3.25	3.25
SCTN-17	Seawater Desalination				2.00	2.00	2.00
CZ-10C	Carrizo Aquifer - Wilson & Gonzales				1.00		
CZ-10D	Carrizo Aquifer - Gonzales & Bastrop				1.00		
	Regional Carrizo for SAWS					1.00	1.00
	Hays/Caldwell PUA					1.00	1.00
G-24	Wimberley and Woodcreek Water Supply Project				1.00	1.00	1.00
	Brackish Wilcox Desalination					0.00	
	Wells Ranch Project				1.00	1.00	1.00
	CRWA Siesta Project				2.5	2.5	2.5
	GBRA Simsboro Aquifer						1.00

Table 7.2-5 (Concluded)

ID#	***Water Management Strategy***	***State Water Plan***					
		1984	***1990***	***1997***	***2002***	***2007***	***2012***
	GBRA-Exelon Project--River Diversion Option						4.00
	GBRA New Appropriation (Lower Basin)						4.00
	GBRA Mid Basin (Surface Water)						5.00
	GBRA Lower Basin Storage						0
	Regional Carrizo for SSLGC						1.00
	Brackish Wilcox Groundwater for SAWS						1.00
	Brackish Wilcox Groundwater for Regional Water Alliance						1.00
	Brackish Wilcox Groundwater for SSWSC						0
	Medina Lake Firm-Up (ASR)						2.00
	Lavaca River Off-Channel Reservoir						5.00
	Storage above Canyon (ASR)						3.00
	TWA Regional Carrizo						1.00
Raw Score		**42**	**31**	**14**	**23**	**22**	**45**
Score / Unit Supply		**1.016**	**0.615**	**0.734**	**0.391**	**0.463**	**0.822**
Net Streamflow Change							
Guadalupe River @ Cuero/Victoria		4	4	4	0	0	1
San Antonio River @ Falls City		0	4	4	0	0	0
Guadalupe River @ Saltwater Barrier		4	4	4	0	0	1
Colorado River @ Bay City		0	0	0	4	4	4
Total		**8**	**12**	**12**	**4**	**4**	**6**
Score / Unit Supply		**0.196**	**0.238**	**0.629**	**0.069**	**0.085**	**0.110**
Combined Score / Unit Supply		**1.212**	**0.853**	**1.363**	**0.459**	**0.548**	**0.933**
Normalized Combined Score / Unit Supply		**1.355**	**0.953**	**1.523**	**0.513**	**0.613**	**1.043**
Rank		**5**	**3**	**6**	**1**	**2**	**4**

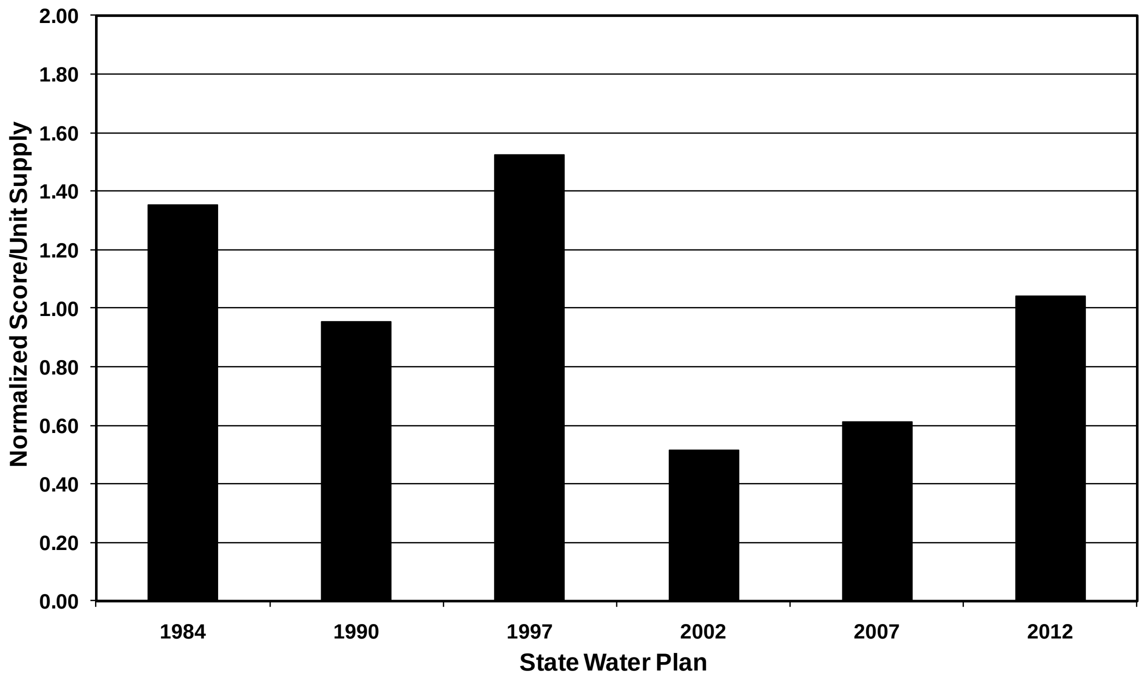

Figure 7.2-5. Cumulative Potential Impact Scores for Water Quality and Aquatic Habitats

Potential impacts to archaeological resources were estimated by compiling the number of proposed disturbances to landforms considered to be of relatively high potential for containing buried archaeological deposits. The high-potential areas were defined to be stream terraces bordering both perennial and intermittent streams. A probable impact index was devised which includes factors reflecting site potential and type of disturbance for each instance of the activity, with the greatest impact score being associated with the permanent inundation of any stream:

For Pipeline Routes the values used are as follows:

1.5 - Perennial stream crossings;

1 - Intermittent stream crossings;

2.5 - Construction parallel to perennial stream channels; or

2 - Construction parallel to intermittent stream channels.

For Reservoir Areas the values used are as follows:

4 - Intermittent streams inundated;

5 - Perennial streams inundated.

For each water management strategy, impact values for historical sites were added to the potential archaeological site impact estimates to arrive at the total impact values shown in Table 7.2-6. Figure 7.2-6 presents a graphical comparison of the six State Water Plans.

The high impact scores for water management strategies with long pipelines also reflect the large number of stream terrace transgressions that will occur as pipelines are constructed across the tributaries of the San Antonio, Guadalupe, and Colorado Rivers.

7.2.2.5 Ecologically Significant River and Stream Segments

Potential impacts to stream segments identified as Ecologically Significant River and Stream Segments by TPWD (Table 7.2-1 and Figure 7.2-2) were assessed by tabulating the instances of the following construction and operations items occurring in or affecting a significant segment:

- Recharge dam;
- Channel dam, diversion pool only;
- Reservoir diversion;
- River diversion;
- Tributary impoundment;
- Pipeline crossing;
- Groundwater withdrawals with a significant effect on streamflow; and/or
- Reduced flood peaks from upstream dam operation.

The summed, normalized scores for the six State Water Plans are presented in Table 7.2-7 and Figure 7.2-7. The locations of the water management strategies recommended for the 2001, 2006, and 2011 Regional Water Plans result in more potential conflicts with the ecological functions or features of the identified segments than do those in the three earlier plans which included major mainstem reservoirs.

Table 7.2-6.
Potential Impacts to Cultural Resources
from Water Management Strategies in State Water Plans

ID#	Water Management Strategy	State Water Plan					
		1984	1990	1997	2002	2007	2012
G-16C1	Cuero Reservoir	184	184				
G-17C1	Lindenau (Sandies) Reservoir	176	176	176			
G-40	Cloptin Crossing Reservoir	22					
G-21	Lockhart Reservoir	22					
S-14D	Applewhite Reservoir	55	55				
S-16C	Goliad Reservoir	144	144				
S-15C	Cibolo Reservoir	44					
S-15Da	Cibolo Reservoir w/ SA River		79	79			
LGWSP	Lower Guadalupe Water Supply Project for GBRA Needs				83	114	
LSWP	LCRA-SAWS Water Project				267	267	267
SCTN-3c	Simsboro Aquifer				89		
L-18a	Edwards Recharge Projects				26	26	26
SCTN-17	Seawater Desalination				151	151	151
CZ-10C	Carrizo Aquifer - Wilson & Gonzales				79		
CZ-10D	Carrizo Aquifer - Gonzales & Bastrop				85		
	Regional Carrizo for SAWS					125	85
	Hays/Caldwell PUA					72	72
G-24	Wimberley/Woodcreek from Canyon				23	23	31
	Brackish Wilcox Desalination					7	
	Wells Ranch Project				54	54	54
	CRWA Siesta Project				47	47	47

Table 7.2-6 (Concluded)

ID#	***Water Management Strategy***	***State Water Plan***					
		1984	***1990***	***1997***	***2002***	***2007***	***2012***
	GBRA Simsboro Aquifer						172
	GBRA-Exelon Project--River Diversion Option						14
	GBRA New Appropriation (Lower Basin)						0
	GBRA Mid Basin (Surface Water)						178
	GBRA Lower Basin Storage						0
	Brackish Wilcox Groundwater for SAWS						0
	Brackish Wilcox Groundwater for Regional Water Alliance						21
	Brackish Wilcox Groundwater for SSWSC						0
	Medina Lake Firm-Up (ASR)						57
	Lavaca River Off-Channel Reservoir						15
	Storage above Canyon (ASR)						17
	TWA Regional Carrizo						187
Factor 10,000	**Raw Score**	**646**	**637**	**254**	**904**	**886**	**1,392**
	Score / Unit Supply	**15.816**	**12.637**	**13.315**	**15.517**	**18.855**	**25,584**
	Normalized Score / Unit Supply	**0.933**	**0.745**	**0.785**	**0.915**	**1.112**	**1.509**
	Rank	**4**	**1**	**2**	**3**	**5**	**6**

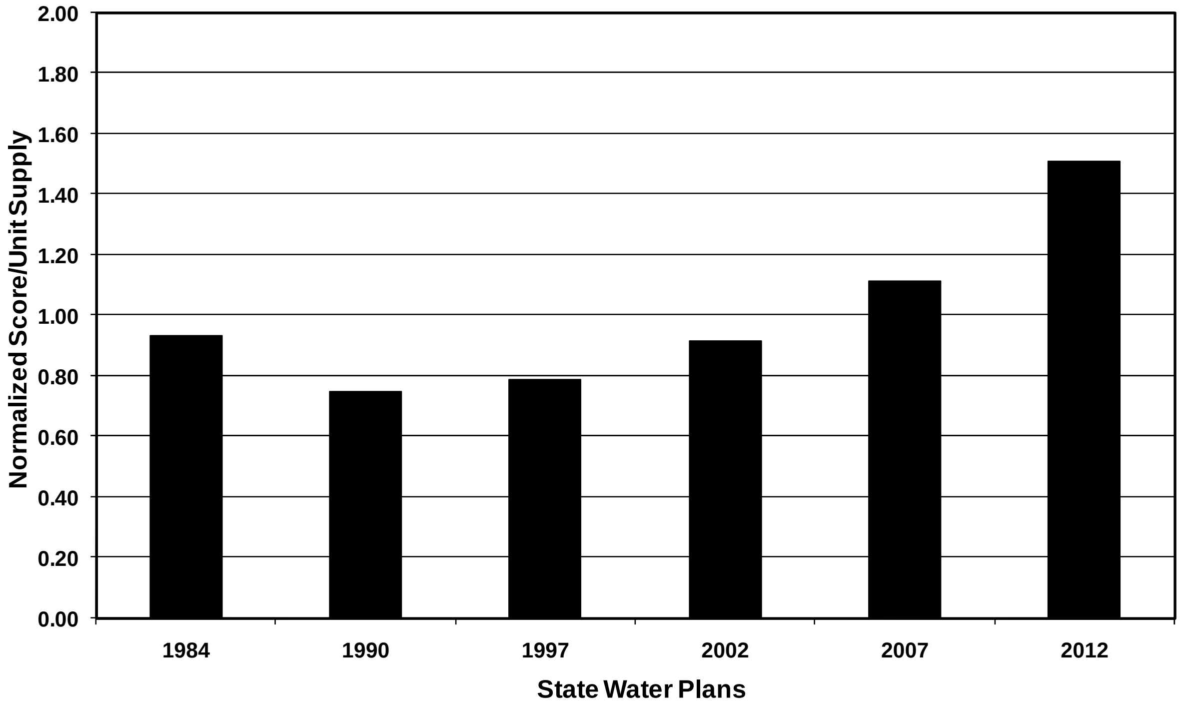

Figure 7.2-6. Cumulative Potential Impacts to Cultural Resources

Table 7.2-7.
Potential Impacts to Ecologically Significant River and Stream Segments from Water Management Strategies in State Water Plans

	Year					
	1984	***1990***	***1997***	***2002***	***2007***	***2012***
Crossings	0	0	0	11	6	6
Unappropriated Div.	1	0	1	4	3	5
Dam	1	0	0	4	4	5
Raw Score	**2**	**0**	**1**	**19**	**13**	**16**
Score / Unit Supply	**0.049**	**0.000**	**0.052**	**0.326**	**0.277**	**0.294**
Normalized Score / Unit Supply	**0.294**	**0.000**	**0.315**	**1.961**	**1.663**	**1.767**
Rank	**2**	**1**	**3**	**6**	**4**	**5**

7.2.2.6 Composite Comparison

Figure 7.2-8 is a composite comparison of the six State Water Plans aggregating the results of the assessments of four of the individual environmental resource categories. The scores associated with Ecologically Significant River and Stream Segments are excluded as the

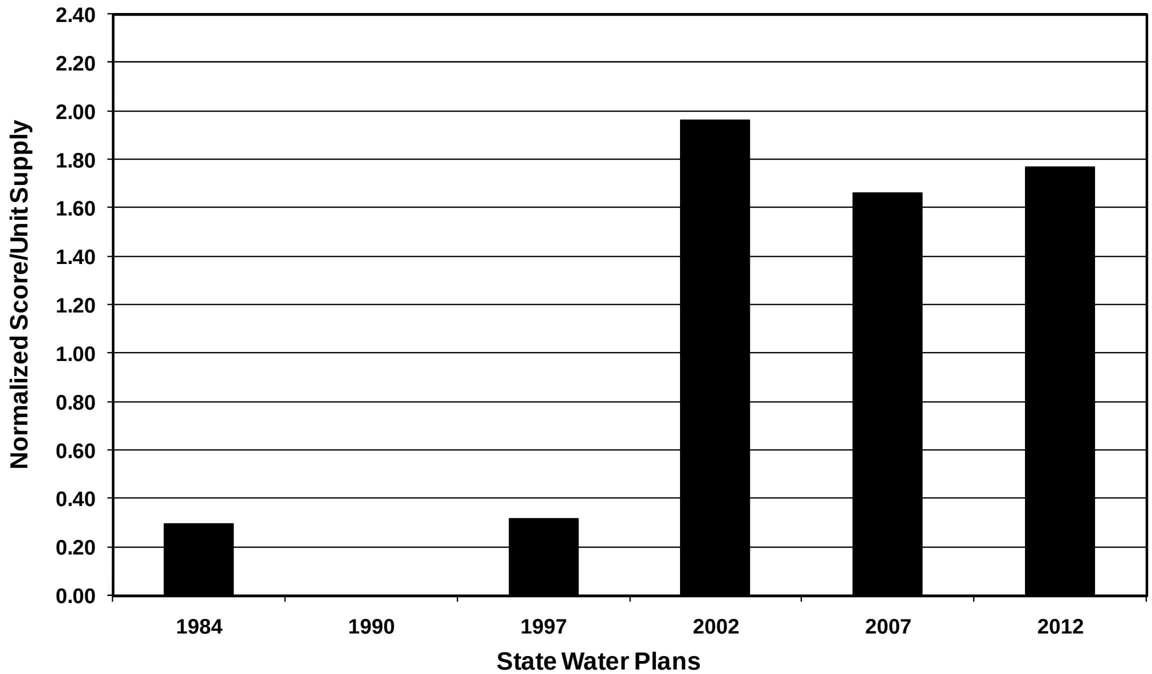

Figure 7.2-7. Cumulative Potential Impacts to Ecologically Significant River and Stream Segments

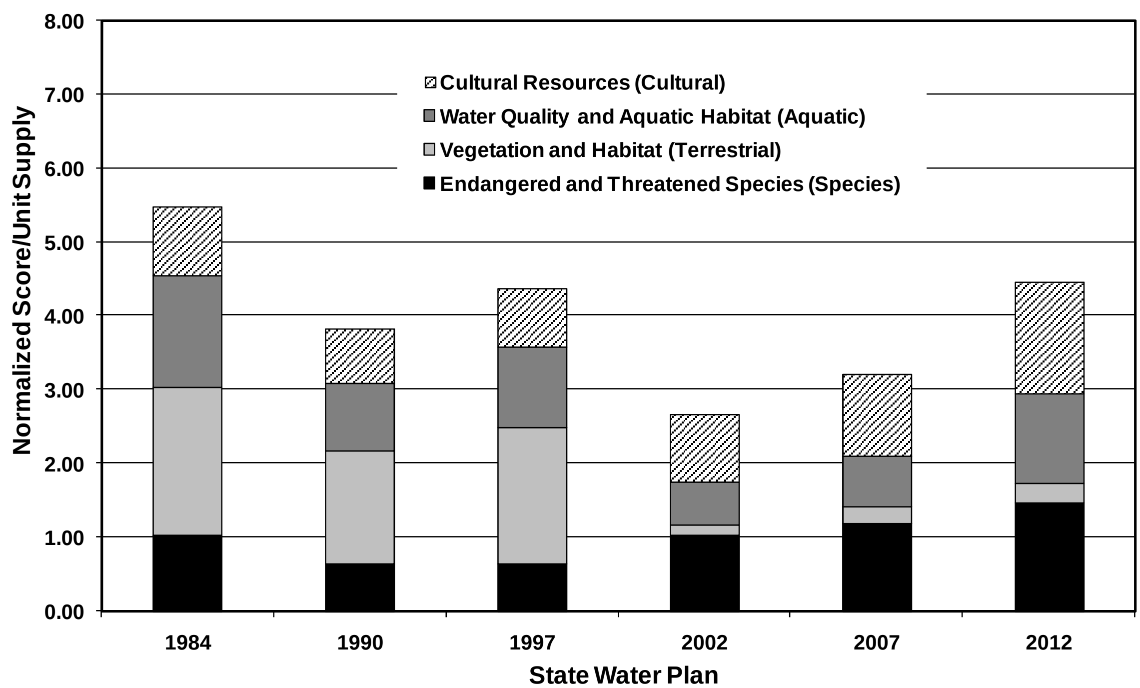

Figure 7.2-8. Cumulative Potential Impact Scores for South Central Texas Regional Water Planning Area

basis for such ecological significance is typically related to the first four categories for which scoring has been performed (endangered & threatened species, vegetation & wildlife habitats,water quality & aquatic habitats, and/or cultural resources). It is apparent from this comparison that, despite avoidance of the large mainstem reservoirs in the early state water plans, the 2012 plan may actually have a greater overall effect on the environment and cultural resources per unit of new water supply developed. This somewhat unexpected observation is due, in part, to the number and smaller sizes of water management strategies in the 2012 plan for the South Central Texas regional planning area. For example, the environmental assessment of the 2012 plan includes 20 strategies which are deemed necessary to develop essentially the same additional firm water supply as the 1990 plan which included only six strategies. The broad geographic distribution and lengthy pipelines to key demand centers associated with many strategies in the 2012 plan creates more opportunities to encounter important species and cultural resources. Similarly, the effort to minimize concentrated terrestrial impacts in Region L in recent plans has resulted in the recommendation of projects with diffuse aquatic habitat perturbations throughout Region L and adjacent regions as well. Because the nature of many of the projects in the 2012 plan is such that actual impacts can be identified and avoided or mitigated based on information from field studies required by permitting agencies, realized impacts are expected to be significantly less than the potential impacts discussed herein. This would not be expected to be the case with respect to the reservoir projects, which offer little opportunity for impact avoidance due to inflexibility in size and location, and whose primary impacts (permanent disturbance, inundation of lotic and terrestrial habitats, and concentrated streamflow perturbations) may not be amenable to minimization or compensation.

7.3 Environmental Benefits and Concerns

The South Central Texas Regional Water Planning Group has identified the following environmental benefits and concerns associated with the implementation of the 2011 Regional Water Plan.

7.3.1 Environmental Benefits

- Substantial commitment to water conservation through adoption of an aggressive water conservation water management strategy effectively reduces projected water shortages thereby delaying or eliminating the need for implementation of other water management strategies having greater associated environmental impacts. Implementation of economically appropriate drought management strategies, as determined at the water user group level, may provide similar benefits while projects delivering reliable water supplies to meet projected needs are permitted and constructed.

- Development of new water supply sources for Bexar, Comal, and Hays Counties reduces reliance on the Edwards Aquifer during drought thereby contributing to maintenance of springflow and protection of endangered species. The Regional Water Plan recognizes the on-going efforts of the participants in the Edwards Aquifer Recovery Implementation Program (EARIP) to develop a Habitat Conservation Plan which will help to define the requirements for maintenance of springflow and protection of endangered species and meet with approval from the U.S. Fish & Wildlife Service.
- Implementation of the 2011 Regional Water Plan is likely to result in increased instream flows in the San Antonio River. These increases in flow are attributable to increases in treated effluent from all wastewater discharges (most notably associated with projected growth in Bexar County) and increases in springflow (associated with Edwards Aquifer Recharge Type 2 Projects).
- Edwards Aquifer Recharge Enhancement through the construction of Type 2 recharge dams contributes not only to municipal water supply, but also to maintenance of springflow, protection of endangered species in and below the springs, increased instream flows, and increased freshwater inflows to the Guadalupe Estuary.
- The 2011 Regional Water Plan emphasizes beneficial use of existing surface water rights thereby minimizing the development of new water supply sources and associated environmental impacts. Examples include reliance on presently under-utilized water rights held by the Guadalupe-Blanco River Authority (GBRA) and Dow Chemical Company (Dow) below the confluence of the Guadalupe and San Antonio Rivers and by the Lower Colorado River Authority (LCRA) on the Lower Colorado River. Enhanced use of existing surface water rights accounts for approximately one-quarter of the total new water supplies for municipal, industrial, steam-electric, and mining uses by 2060.
- The Regional Water Plan avoids large-scale development of new mainstem reservoirs having associated terrestrial and aquatic habitat and cultural resources impacts and focuses on smaller, off-channel reservoirs.
- Inclusion of Edwards Aquifer transfers from irrigation use to municipal use through lease/purchase of pumpage rights and development of conserved water through installation of LEPA irrigation systems results in substantial increases in municipal water supply without construction of additional transmission and storage facilities having associated environmental effects.
- Inclusion of groundwater development has limited associated environmental effects as compared to those typically associated with development of new surface water supply reservoirs.

- Inclusion of Seawater Desalination is perceived to have fewer associated environmental effects, as compared to those typically associated with development of new (fresh) surface water supplies.

7.3.2 Environmental Concerns

- Potential reductions in freshwater inflows to bays and estuaries, including associated effects on wetland and marsh habitats and marine species, are identified as matters of concern. Primary concerns focus upon the potential effects of the LCRA-SAWS Water Project on freshwater inflows to Matagorda Bay and the GBRA New Appropriation (Lower Basin) on freshwater inflows to the Guadalupe Estuary. It is important to note, however, that as part of the studies directed through the LCRA-SAWS Definitive Agreement, the Matagorda Bay inflow criteria and the Aquatic Habitat Instream Flow studies were studied thoroughly and shown to meet the legislative directives of protecting Bay Health and the Lower Colorado River aquatic systems. Concerns have also been expressed that increased uses of existing water rights may reduce freshwater inflows to bays and estuaries.
- Concentration of Edwards Aquifer pumpage closer to Comal Springs as a result of implementation of Edwards Transfers tends to reduce discharge from Comal Springs.
- Potential conflicts with stream segments identified by TPWD as ecologically significant are associated with the LCRA-SAWS Water Project, Edwards Recharge – Type 2 Projects, GBRA New Appropriation (Lower Basin), Lavaca River Off-Channel Reservoir, and Storage Above Canyon (ASR).
- Potential effects on small springs and instream flows below these springs may be associated with the development of groundwater supplies.
- Intake siting, brine discharge location(s), and potential effects on marine habitat and species, as well as large demands for electrical power, are environmental concerns associated with Seawater Desalination.

Section 8
Policies and Recommendations
[31 TAC §357.7(a)(10); 31 TAC §357.8; and 31 TAC §357.9]

8.1 Agricultural Water

Feasibility of Meeting Irrigation Water Needs: The SCTRWPG finds that, under current conditions, it is not economically feasible for agricultural producers to pay for additional water supplies to meet all of the projected irrigation water shortages. See Section 4C.1.2 for an analysis of economic feasibility underlying this finding of the Regional Water Planning Group.

The SCTRWPG recommends that the TWDB undertake economic studies of water management strategies that may meet irrigation needs in Texas.

Agricultural Water Conservation Programs: The SCTRWPG recommends restoring funding to the Agricultural Water Conservation programs provided by the TWDB.

Water Use Information: The SCTRWPG recommends that TWDB improve the water use information for irrigation and livestock watering categories.

8.2 Rural Water

Given the increasing number of proposals to export large amounts of water, the legislature should review Section 36.122 of the Texas Water Code. Any necessary changes should allow for sufficient revenue to support high quality technical studies and should be made to ensure that districts are fully equipped to analyze and respond to such proposals, to fully consider their effect on local communities, the rural environment and economy.

8.3 Groundwater

Groundwater Management: The SCTRWPG respects the rules and regulations of groundwater districts, just as it does those of all other state subdivisions and agencies. The SCTRWPG believes that all rules should be adopted pursuant to accepted administrative procedures based on the standards of rationality, equity, and scientific evidence. Furthermore, the SCTRWPG supports the determinations of Managed Available Groundwater (MAG) based on Desired Future Conditions (DFC) established by Groundwater Management Area (GMA) pursuant to House Bill 1763 of the 79th Texas Legislature.

Recognizing the management challenges facing groundwater conservation districts with multiple recommended water management strategies potentially seeking permits to withdraw groundwater supplies in excess of amounts determined to be available, the SCTRWPG approved the following note to be included at appropriate locations in the 2011 Regional Water Plan.

> *Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.*[1]

Groundwater Sustainability: The SCTRWPG has adopted the goal of groundwater sustainability and recommends management strategies needed to accomplish this goal. This recommendation is intended to help protect all users of those aquifers that are subject to increased withdrawals, to help preserve the long-term integrity of those aquifers, and to build awareness of the effects of pumping on those aquifers and of their recovery capabilities. The SCTRWPG recommends that any person implementing any groundwater option or strategy identified as part of this Regional Plan consider and incorporate groundwater monitoring of both quantity and quality, recharge protection and enhancement, conservation methods and related practices, as determined to be appropriate by local groundwater districts. Where no district exists, the developer should monitor impacts and, when appropriate, take corrective action consistent with the goal of groundwater sustainability.

Shared Groundwater Resources among Planning Regions: In the event a Water User Group relies on a groundwater management strategy to meet the Water User Group's demand during the planning period and the strategy would have a significant impact on a groundwater resource shared among planning region(s), notice should be provided to the region(s) of the proposed date of implementation and anticipated acre-feet per year demand on the shared groundwater resource. The SCTRWPG provided such notice to the Lower Colorado (K) and

[1] Relevant policy regarding management supplies is found in Section 8.10.

Brazos G planning regions with regard to the GBRA Simsboro Project recommended to meet projected needs in the 2011 South Central Texas Regional Water Plan.

Equity in Groundwater and Surface Water Law: The SCTRWPG recognizes a need for equity in groundwater and surface water law to facilitate the proper balance of the use of those resources. The SCTRWPG recommends that the state provide incentives to develop conjunctive use projects that more efficiently utilize groundwater and surface water.

Land Stewardship: The SCTRWPG encourages State support of implementing or enhancing land stewardship management practices that are shown to augment the quality and quantity of the state's surface water and groundwater resources.

Development and Use of Groundwater: The SCTRWPG encourages legislation that promotes public or private entities planning to develop groundwater projects to provide an economic analysis of the impact to communities, instream flows, and bay and estuary systems incurred by movement of the groundwater.

Funding of Groundwater Conservation Districts: Given the increasing number of proposals to export large amounts of water, the Legislature should review Section 36.122 of the Texas Water Code. Any necessary changes should allow for sufficient revenue to support high quality technical studies and should be made to ensure that Groundwater Conservation Districts are fully equipped to analyze and respond to such proposals, and to fully consider their effect on local communities, the rural environment and the economy.

Region L's Matrix Approach: The SCTRWPG encourages the Texas Water Development Board to fund development, in general accordance with the SCTRWPG proposal to TWDB submitted in June 2004, of a generic "Analytical Tool" that will provide a standard method for regional water planning groups, groundwater conservation districts, groundwater developers, and others to use to evaluate local hydrologic, environmental, social, and economic impacts on specific groundwater exportation/marketing proposals.

8.4 Surface Water

Surface Water Rights Monitoring and Administration: The TCEQ should be adequately staffed and funded to ensure the legal and appropriate use of permitted surface water rights through comprehensive monitoring and administrative programs, such as the Watermaster program.

Equity in Groundwater and Surface Water Law: The SCTRWPG recognizes a need for equity in groundwater and surface water law to facilitate the proper balance of the use of those resources. The SCTRWPG recommends that the state provide incentives to develop conjunctive use projects that more efficiently utilize groundwater and surface water.

Surface Water Rights and Interbasin Transfer: The SCTRWPG considered the positive and negative impacts of certain provisions added to Chapter 11.085 of the Texas Water Code regarding Interbasin Transfers pursuant to Senate Bill 1 of the 75th Legislature. Among the negative impacts cited by some members are these:

- It imposes limitations on surface water rights permits that have previously been issued, possibly diminishing the value of some permits to the owners.
- It forces greater use of groundwater supplies, and potentially, encourages the mining of aquifers.
- It can result in construction of new reservoirs that would not be needed if seniority of rights and existing environmental flow requirements were preserved in interbasin transfers because of the need to provide reliable water supplies in the plans.

Other members of the SCTRWPG cite the following positive effects of these provisions added by Senate Bill 1.

- The junior water rights provision protects municipalities and other water users, especially in cases where the interbasin transfer of senior water rights would put junior rights at risk.
- Bays and estuaries and instream flows have added protection from the impact of water exportation.
- Establishing the seniority of basin-of-origin water rights over those used for export preserves the economic value of the resource for the future development of the basin-of-origin.

The SCTRWPG makes no specific recommendation at this time for legislative changes to Chapter 11.085 of the Texas Water Code.

8.5 Conservation

Conservation Planning Guidelines: Because of the central role of conservation in achieving the water supply objectives of the South Central Texas Regional Water Plan, the SCTRWPG has previously adopted the Water Conservation Implementation Task Force recommendations to establish GPCD Targets and Goals related to average annual reductions in residential indoor use. The SCTRWPG recognizes that the creation of conservation programs and the selection of specific conservation technologies is a matter of local choice and recommends that the water user groups reference the Water Conservation Best Management Practices Guide, TWDB Report 362, as an educational tool that can facilitate understanding of the importance of conservation efforts and the wide range of methods available for use.

Region L has addressed, defined, and adopted the most reasonably practical level of conservation to be:

(1) For Water Use Groups (WUGS) with per capita water use of 140 gpcd and greater in year 2000, reduce gpcd by 1 percent per year until reaching 140 gpcd, and reduce gpcd by 0.25 percent per year thereafter.
(2) For WUGS with per capita water use less than 140 gpcd in year 2000, reduce gpcd by 0.25 percent per year.

Implementation of Water Conservation Advisory Committee Recommendations: SCTRWPG recognizes and supports recent legislative focus on successfully passing legislation which promotes implementation of broad-based conservation measures throughout the state. The SCTRWPG supports legislation and funding to implement the HB 4 (2007) Water Conservation Advisory Committee's recommendations, particularly the statewide public education programs such as Water IQ, further definition of gpcd definitions, and the development of regional conservation data that can be used by the SCTRWPG members to optimize future conservation efforts. The SCTRWPG also supports further efforts by the Legislature and state agencies that aggressively promote practical and successful water conservation measures as an important component to future water plans.

Irrigation Technology Center: The State should provide additional funding for the Irrigation Technology Center, as instituted by the Texas A&M University System, in order to provide hands-on access to state-of-the-art water conservation technologies tailored to the specific urban and agricultural conservation needs of this region.

8.6 Innovative Strategies

Assistance for Alternative Water Supply Strategies: The State should increase funding to assist water planning regions and local water entities in developing demonstration projects for alternative water supply strategies and technologies, such as, but not limited to, desalination. With this assistance, water planning regions could avoid short-term projects that may be less costly, but also less desirable, because of environmental and socio-economic impacts. By funding demonstration projects for alternative technologies that may not yet be cost-effective, the State can help local water management entities avoid adverse impacts to the environment, to property rights, and to local socio-economic conditions. In this way, the State can play a crucial role in guiding regions to water supply solutions that meet needs while also resolving conflict. Funding to demonstrate the value of innovative long-term strategies thus can help achieve cost-saving, efficient regional water management solutions.

Desalination: The SCTRWPG supports the funding of a state and/or federal program for research and potential incentives to make desalination more affordable. This includes both brackish groundwater and seawater desalination. Should such incentives, technical advances, and/or other factors make a seawater desalination strategy similar to that described in Section 4C.31 sufficiently attractive to a water user group or WWP that implementation prior to year 2060 is desired, it is explicitly recognized by the SCTRWPG that such rescheduled implementation is consistent with the 2011 South Central Texas Regional Water Plan.

Rangeland Management (Brush Management): The SCTRWPG encourages the Legislature to increase funding to the Texas State Soil and Water Conservation Board for the purpose of increasing brush control programs integrated with proven rangeland management practices.

Rainwater Harvesting and Other Systems: The SCTRWPG encourages the use of rainwater harvesting systems in both commercial and residential new development. The SCTRWPG recommends the TWDB develop programs to educate the public and building industry on the benefits of rainwater harvesting, water re-use and gray water systems. The educational programs should include distribution of materials to the building industry to encourage use of these systems.

Weather Modification: The SCTRWPG urges the state to continue to support the existing Weather Modification Program.

Drought Management: The SCTRWPG has developed a general methodology for estimating the economic impacts associated with implementation of drought management as a water management strategy.[2] Application of this methodology for regional water planning purposes has facilitated comparison of drought management to other potentially feasible water management strategies on a unit cost basis (Section 4C.2). The SCTRWPG has found, and the San Antonio Water System (SAWS) has demonstrated, that water user groups having sufficient

[2] SCTRWPG, "2011 Regional Water Plan, Study 3, Enhanced Water Conservation, Drought Management, and Land Stewardship," Texas Water Development Board, San Antonio River Authority, HDR Engineering, Inc., April 2009.

flexibility to focus on discretionary outdoor water use first and avoid water use reductions in the commercial and manufacturing use sectors may find some degrees of drought management to be economically viable and cost-competitive with other water management strategies. Recognizing that implementation of appropriate water management strategies is a matter of local choice, the SCTRWPG recommends due consideration of economically viable drought management as an interim strategy to meet near-term needs through demand reduction until such time as economically viable long-term water supplies can be developed.

8.7 Environmental

Protection of Edwards Aquifer Springflow and Downstream Water Rights: While the plan assumes annual withdrawals of 320,000 acft from the Edwards Aquifer under drought of record conditions pursuant to Senate Bill 3 (SB3) of the 80th Texas Legislature, it is projected that this level of pumpage will not protect springflows in all drought conditions unless additional measures are in place and operational. A Recovery Implementation Program created by SB3 is presently underway with a goal of producing a Habitat Conservation Plan for approval by the United States Fish and Wildlife Service (USFWS). If the USFWS or other government authorities mandate reductions in pumpage from the Edwards Aquifer below 320,000 acre-feet, annually, or other strategies to provide further protection for the associated endangered species, water options and management strategies in addition to those identified in this plan will be needed to meet the projected demands of Water User Groups.

Ecosystem Health, Quality of Life, and Growth Management for Texas: The rapid growth occurring in South Central Texas has the potential to negatively impact quality of life. Human demands for water and infrastructure development may outstrip the ability of all of the region's resources to respond and to be sustainable. Texas should focus on these issues and evaluate land use and the health of its ecosystem in order to prepare for the future and support a sustainable quality of life for all Texans.

Ecologically Unique Stream Segments and Unique Reservoir Sites: The Legislature has clarified that the designation of a stream segment as having unique ecological value "solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream segment designated by the legislature." The SCTRWPG conditionally recommends to the Texas Legislature that, in accordance with

Subsection 16.051 of the Texas Water Code, it designate the following five stream segments in Region L as having unique ecological value:

- The Nueces River from the northern boundary of Region L downstream to United States Geological Survey (USGS) gauge # 08190000 at Laguna;
- The Frio River from the northern boundary of Region L downstream to USGS gauge #08195000 at Concan;
- The Sabinal River from the northern boundary of Region L downstream to the State Highway 187 crossing located approximately 2.7 miles upstream of USGS gauge #08198000 near Sabinal;
- The San Marcos River extending from IH 35 up to a point 0.4 miles upstream of Loop 82 in San Marcos; and
- The Comal River extending from the confluence with the Guadalupe River upstream to Klingemann Street in New Braunfels.

The South Central Texas Regional Water Planning Group further notes that the recommendation of these stream segments for designation as having unique ecological value is not intended to affect the repair, rehabilitation, or replacement of existing dams and reservoirs. Because the consequences of such designations by the Legislature are not well understood, these recommendations are conditioned upon legislation providing for these designations containing the following clarifying provisions or substantially similar provisions approved by Region L:

1. A provision affirming that the only constraint that may result from these ecologically unique stream segment designations is that constraint described in Subsection 16.051(f) Water Code which prohibits a state agency or political subdivision of the state from financing the construction of a reservoir in a designated stream segment.
2. A provision stating that the constraint described in Subsection 16.051(f) Water Code does not apply to the construction, operation, maintenance, or replacement of any new or existing weir, diversion, flood control, drainage, water supply, or recreation facility located within the city limits of San Marcos or New Braunfels.
3. A provision stating that the constraint described in Subsection 16.051(f) Water Code does not apply to a weir, diversion, flood control, drainage, water supply, or recreation facility currently owned by a political subdivision.
4. A provision stating that these designations will not constrain the permitting, financing, construction, operation, maintenance, or replacement of any water management strategy recommended, or designated as an alternative, to meet projected needs for additional water supply in the 2011 Regional Water Plan for Region L.

5. A provision affirming that these designations are not related to the “wild and scenic” federal program or to any similar initiative that could result in “buffer zones,” inadvertent takings, or overreaching regulation.

6. A provision stating that all affected landowners shall retain all existing legal private property rights.

7. A provision recognizing that the unique ecological value of the designated segments is due, in part, to the conscientious, voluntary stewardship of many landowners on the adjoining properties.

The SCTRWPG Recommendation of Stream Segments Having Unique Ecological Value for Legislative Designation is included as Appendix I, along with a letter from Texas Parks & Wildlife Department summarizing their review of the recommendation package.

Instream Flows and Bays and Estuaries: The SCTRWPG is appreciative of legislative action in the form of Senate Bill 3 (SB3, 80th Texas Legislature) that established and funded an environmental flows process integrating best-available science and diverse regional stakeholder input into the process for selection of appropriate instream flow and freshwater inflow goals on a stream-by-stream and estuary-by-estuary basis. The appropriate balance of environmental and human needs during severe drought has very significant effects on the firm yield and associated cost of potential water supply projects.

The SCTRWPG encourages completion of the Texas Instream Flow Studies Program and improvement of the State’s bays and estuaries freshwater inflow studies, with special attention paid to the report of the Science Advisory Committee of the Study Commission on Water for Environmental Flows.

Pursuant to discussions during three meetings of a Guadalupe Basin Water Needs Workgroup, November 5, 2009 action of the SCTRWPG, and agreement of the Guadalupe-Blanco River Authority, two recommended water management strategies identified as GBRA New Appropriation (Lower Basin) and GBRA Mid-Basin Project (Surface Water) are subject to senior water rights, full application of environmental flow standards adopted pursuant to Section 11.1471 of the Texas Water Code, and the Texas Commission on Environmental Quality permitting process.

Environmental Studies: The SCTRWPG recognizes that significant needs exist in Bexar and the surrounding counties and that new supplies need to be developed in the Guadalupe River and San Antonio River watersheds. There are issues related to environmental impacts that need further study to determine feasibility of a range of recommended surface water, groundwater, reuse, and conjunctive use water management strategies. Therefore, the

SCTRWPG recommends that additional environmental studies be undertaken to be able to evaluate the effects of such projects on the ecosystems that rely on inflow to San Antonio Bay and flows of the Guadalupe River and San Antonio River watersheds.

8.8 Providing and Financing Water and Wastewater Systems

Plan Implementation: Given the unprecedented level of time and money expended in the development of Regional Water Plans across the state, the SCTRWPG urges the Legislature to act promptly to help ensure full implementation of these plans.

Funding: The SCTRWPG believes that State funding should be provided as a key incentive for partnership in funding from local, regional and federal governmental agencies.

The SCTRWPG encourages a more active State support in solicitation of Federal funding for development of new water supply sources, especially when the need for which is based in part upon Federal requirements, such as the Endangered Species Act.

State Water Plan Implementation: State support is fundamental for the successful implementation of the water resources projects in the State Water Plan resulting from the SB1 Regional Planning Process. Specifically, new legislation to create State support for implementation of the State Plan should include the following:

- A statewide funding mechanism for projects included in the State Water Plan.
- Sufficient funding for TWDB and TCEQ to administer their programs and activities associated with planning, financing, and permitting of the projects in the State Plan.

Continuation of Regional Water Planning: The SB1 Planning Process is an important program, and funding should be continued to sustain the work of the Regional Water Planning Groups.

State Position in Federal Permitting: In the context of the federal permitting processes pertaining to water resources, all state agencies should present a single position consistent with the State's position as articulated in the State Water Plan.

The SCTRWPG supports the concept that a state agency (TWDB) be responsible for implementation of and advocacy for projects in the State Water Plan with regard to funding and permitting at the state and federal levels.

8.9 Data

Water Data Collection: The Legislature should fully fund the cooperative, federal-state-local program of basic water data collection, including: (a) Stream gages-quantity and quality; (b) Groundwater monitoring-water levels and quality; (c) Hydrographic surveys and sediment accumulation in reservoirs; (d) Water surface evaporation rates; (e) Water use data for all water user groups; and (f) Population projections.

Access to State Water Data: There should be adequate funding for the critical roles of TWDB and TCEQ in facilitating access to water data essential for local and regional planning and plan implementation purposes.

Population and Water Demand Projections: The SCTRWPG recognizes that the TWDB bases its water demand projections on patterns of population and economic growth while also permitting revisions of state data to incorporate additional information developed by the planning regions. Nevertheless, some groups believe that the methodology puts an unfair limitation on access to water for future growth, particularly in areas that may experience more rapid change than they have in the past. The Legislature should modify the Regional Water Planning process to allow for greater flexibility and for earlier and more active involvement of the Regional Water Planning Groups in developing growth and water demand projection methodologies consistent with water availability strategies. Water demand projections used in developing the Regional Water Plan should be consensus figures arrived at by using TWDB data along with local input from the cities, counties, and groundwater districts.

Coastal Basins: Coastal basins adjacent to major river basins are considered part of the major basins. The SCTRWPG recommends eliminating the requirement to tabulate data for these areas by county and basin boundary since the result is a set of essentially empty tables.

8.10 Other Issues

Planning for System Management Water Supplies: System management water supplies, i.e. supplies over and above those apparently needed to meet projected demands, may be included in the plan for the following reasons: 1) to recognize both the long lead times and the uncertainty associated with risk factors that may prevent implementation of water management strategies and necessitate replacement strategies; 2) to preserve flexibility for water user groups or wholesale water suppliers to select the most feasible projects among several consistent with the Regional Plan and therefore potentially eligible for permitting and funding; 3) to serve as additional supplies in the event rules, regulations, or other restrictions limit use of any planned strategies; and 4) to ensure adequate supplies in the event of a drought more severe than that which occurred historically. The plan should specify those factors affecting reliability of the recommended options and strategies and indicate what alternatives are available as possible replacements.

The amount of the management supply should be limited by consideration of the following factors: 1) potential disruptive impacts of planning for projects that have low probability of implementation; and 2) citing of specific reasons for management supplies that exceed the projected needs of the region.

Public Education on Water: The State should fund a state-wide program to educate the general public about water in coordination with the Agricultural Extension Service offices. The program should produce water-related materials with special components adapted for each water planning region and should also include a component comparable to the "Major Rivers" program that would be available to the public schools through the Regional Education Service Centers and by other means.

SCTRWPG supports legislation for funding to implement the Water Conservation Task Force recommendations, particularly the statewide public education programs, such as Water IQ.

County Authority: Counties should have additional authority for land use planning and for regulating development based on availability and protection of water resources.

Planning Requirements: There should be no changes in the planning process or additional planning requirements except through the formal rule-making procedure. Contract requirements should be established and in place prior to submission of grant proposals.

Regional Boundaries Should Foster Collaboration: The SCTRWPG recommends that the Legislature make it very clear to all Texans that the boundaries of the regional water planning regions were drawn only to define water planning regions and that the boundaries are not intended to be barriers to prevent water transport from one region to another – nor to pit one region against another for any reason.

Condemnation and Eminent Domain: The SCTRWPG is of the opinion that it is not appropriate for a regional water planning group to tell a governmental entity to abandon its eminent domain powers if it wants its project to be approved as a recommended water management strategy. The SCTRWPG is further of the opinion that it is not within the planning group's jurisdiction to judge the merits of eminent domain. It is, however, the understanding of the SCTRWPG that all land needed for implementation of water management strategies will be obtained using a process of willing seller and willing buyer and that limited condemnation will be used as a last resort.

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Section 9
Water Infrastructure Funding Recommendations
[31 TAC §357.7(a)(14)]

9.1 Introduction

Senate Bill 2 (77th Texas Legislature) requires that an Infrastructure Financing Report (IFR) be incorporated into the regional water planning process. In order to meet this requirement, each Regional Water Planning Group (RWPG) is required to examine the funding needed to implement the water management strategies and projects identified and recommended in the region's 2011 Regional Water Plan.

9.2 Objectives of the Infrastructure Financing Report

The primary objective of the Infrastructure Financing Report is to determine the financing options proposed by political subdivisions to meet future water infrastructure needs (including the identification of any State funding sources considered).

9.3 Methods and Procedures

For the South Central Texas Regional Water Planning Area, all municipal water user groups and wholesale water providers having water needs and recommended water management strategies in the Regional Water Plan with an associated capital cost were surveyed using the questionnaire provided by the TWDB. Individual municipalities and wholesale water providers were emailed a link to complete the survey online through the TWDB's website. They were also mailed a hardcopy of the survey so they could complete it by hand, if desired.

For each project with an identified capital cost, the survey respondents were asked to enter only the amounts that they wish to receive from one or more of the TWDB programs listed below:

- Planning, Design, and Permitting: Costs were entered into this category if the entity wants to participate in the WIF-Deferred Program. The WIF-Deferred Program offers subsidized interest and deferral of principal and interest for up to 10 years for planning, design, and permitting costs.
- Acquisition and Construction: Costs were entered into this category if the entity wants to participate in the WIF-Construction Program. The WIF-Construction Program offers subsidized interest for all construction costs, including planning, acquisition, design, and construction.

- Excess Capacity: Costs were entered into this category if the entity wants to participate in the State Participation Program. State Participating funding offers partial interest and principal deferral for the incremental cost of project elements which are designed and built to serve needs beyond 10 years.
- Rural: Costs were entered into this category if the entity wants to participate in the Rural Areas Funding Program. Rural Areas funding offers grants and 0% interest loans for service areas which are not in a Metropolitan Statistical Area (MSA) and in which the population does not exceed 5,000. The service area must also meet Economically Distressed Areas Program (EDAP) eligibility criteria.
- Disadvantaged: Costs were entered into this category if the entity wants to participate in the EDAP. EDAP offers funding through grants and loans for service areas within a project which meet the EDAP eligibility criteria. Eligibility for the TWDB's EDAP requires that the median household income of the area to be served by the proposed project be less than 75% of the Texas median household income ($39,927), as shown in the 2000 Census. EDAP eligibility also requires adoption of Model Subdivision rules by the appropriate planning entities.

9.4 Survey Responses

The South Central Texas RWPG sent links to 24 municipal water user groups and wholesale water providers and received 10 responses, a 42 percent response rate. As shown in Table 9-1, the 10 responses represent about 99 percent of the estimated capital costs of water management strategies included in the Regional Water Plan. Of those responding, for which the total capital cost for facilities is $6,727,772,325[1], the survey shows that approximately $509.3 million (7.6 percent of the total capital costs) would be sought through the WIF-Deferred Program, approximately $2.4 billion (35.0 percent of the total capital costs) would be sought through the WIF-Construction Program, and approximately $653.3 million (9.7 percent of the total capital costs) would be sought through the State Participation Program. No responses indicated pursuit of funding through either the Rural Areas Funding Program or the EDAP Program. It is unclear how the remaining 47.7 percent of capital costs for survey respondents would be paid, but those costs could possibly be covered through local cash reserves, bonds, or private funding. Furthermore, it is unclear how the remaining one percent of the capital costs for those entities not responding to the survey would be financed. In summary, about 67 percent of

[1] As some recommended water management strategies and associated costs were modified in response to public comment on the Initially Prepared Plan and such modifications occurred after responses to the infrastructure financing survey were received, a small discrepancy exists in the total capital cost of facilities. On a percentage basis, this discrepancy is insignificant.

Table 9-1.
Summary of Responses to the Infrastructure Financing Survey

Name of Political Subdivision	Recommended Project/Strategy	Capital Cost (to be Paid by Political Subdivision)	Planning, Design, and Permitting	Acquisition and Construction	Excess Capacity	Rural	Disadvantaged
Bexar Met Water District	Local Groundwater (Carrizo)	$44,372,000	$3,106,040	$41,265,960	$0	$0	$0
Bexar Met Water District	Local Groundwater (Trinity)	$ 9,662,000	$676,340	$8,985,660	$0	$0	$0
Bexar Met Water District	Medina Lake Firm-Up (ASR)	$146,237,000	$10,236,590	$136,000,410	$0	$0	$0
Canyon Regional Water Authority	Brackish Groundwater Desalination (Wilcox)	$77,702,500	$7,702,500	$70,000,000	$0	$0	$0
Canyon Regional Water Authority	CRWA Siesta Project	$53,481,000	$3,481,000	$50,000,000	$0	$0	$0
Canyon Regional Water Authority	CRWA Wells Ranch Project Phase II	$12,375,000	$0	$12,375,000	$0	$0	$0
Canyon Regional Water Authority	Hays/Caldwell PUA Project	$94,771,913	$4,500,000	$30,000,000	$0	$0	$0
Crystal Clear WSC	Local Groundwater (Carrizo)	$33,754,000	$4,500,000	$29,254,000	$0	$0	$0
Guadalupe-Blanco River Authority	GBRA Exelon Project	$280,598,000	$0	$0	$0	$0	$0
Guadalupe-Blanco River Authority	GBRA Lower Basin Storage	$33,800,000	$3,000,000	$15,400,000	$15,400,000	$0	$0
Guadalupe-Blanco River Authority	GBRA Mid-Basin (Surface Water)	$546,941,000	$4,000,000	$271,470,500	$271,470,500	$0	$0
Guadalupe-Blanco River Authority	GBRA New Appropriation (Lower Basin)	$246,849,000	$6,000,000	$120,424,500	$120,424,500	$0	$0
Guadalupe-Blanco River Authority	GBRA Simbsboro Project	$330,782,000	$4,000,000	$163,391,000	$163,391,000	$0	$0
Guadalupe-Blanco River Authority	Storage Above Canyon Reservoir (ASR)	$37,326,000	$3,000,000	$17,163,000	$17,163,000	$0	$0
Kyle	Hays/Caldwell PUA Project	$86,412,402	$7,300,000	$79,100,000	$0	$0	$0
San Antonio Water System	Brackish Groundwater Desalination (Wilcox)	$236,220,000	$56,059,000	$158,734,000	$0	$0	$0
San Antonio Water System	Edwards Aquifer Recharge - Type 2 Projects	$527,643,000	$46,303,000	$97,852,000	$0	$0	$0
San Antonio Water System	LCRA/SAWS Water Project	$1,986,684,000	$0	$0	$0	$0	$0
San Antonio Water System	Regional Carrizo for SAWS	$136,550,000	$32,575,000	$98,723,000	$0	$0	$0
San Antonio Water System	Seawater Desalination	$1,293,827,000	$295,678,000	$880,528,000	$0	$0	$0
San Marcos	Hays/Caldwell PUA Project	$110,013,010	$11,900,000	$32,500,000	$65,500,000	$0	$0
Schertz-Seguin LGC	Brackish Groundwater Desalination (Wilcox)	$15,540,500	$0	$0	$0	$0	$0
Schertz-Seguin LGC	Regional Carrizo for SSLGC Project Expansion	$28,189,000	$0	$0	$0	$0	$0
SS WSC	Brackish Groundwater Desalination (Wilcox)	$14,357,000	$1,579,270	$12,777,730	$0	$0	$0
SS WSC	Local Groundwater (Carrizo)	$29,537,000	$3,658,330	$25,787,670	$0	$0	$0
Texas Water Alliance	TWA Regional Carrizo	$314,148,000	$0	$0	$0	$0	$0
	Totals	**$6,727,772,325**	**$509,255,070**	**$2,351,732,430**	**$653,349,000**	**$0**	**$0**

Table 9-1.
Summary of Responses to the Infrastructure Financing Survey (Concluded)

Name of Political Subdivision	Recommended Project/Strategy	Capital Cost (to be Paid by Political Subdivision)	Planning, Design, and Permitting	Acquisition and Construction	Excess Capacity	Rural	Disadvantaged
Benton City WSC*	Local Groundwater (Carrizo)	$13,116,000					
County Line WSC*	Local Groundwater (Trinity)	$20,562,000					
Floresville*	Local Groundwater (Carrizo)	$2,344,000					
Goforth WSC*	Hays/Caldwell PUA Project	$30,278,980					
Jourdanton*	Local Groundwater (Carrizo)	$2,441,000					
Karnes City*	Local Groundwater (Carrizo)	$3,430,000					
Kenedy*	Local Groundwater (Gulf Coast)	$2,194,000					
Lockhart*	Local Groundwater (Carrizo)	$24,246,000					
Luling*	Local Groundwater (Carrizo)	$5,906,000					
McCoy WSC*	Local Groundwater (Carrizo)	$11,606,000					
Mountain City*	Hays/Caldwell PUA Project	$1,385,554					
Oak Hills WSC*	Local Groundwater (Carrizo)	$ 259,000					
Polonia WSC*	Local Groundwater (Carrizo)	$4,174,000					
Sunko WSC*	Local Groundwater (Carrizo)	$1,375,000					
	Totals	**$123,317,534**					

* Did not respond.

the funds likely to be requested by respondents will be from the WIF Construction Program, with the remaining 19 percent and 14 percent from the State Participation and the WIF Deferred Programs, respectively.

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Section 10
Regional Water Plan Adoption
[31 TAC §357.11-12]

10.0 Overview

Facilitation and Public Participation played an integral part in the development of the 2001 and 2006 Regional Water Plans. The contributions of facilitation and public participation in were also evident in the timely, consensus adoption of the 2011 Regional Water Plan. The facilitation process is presented in Section 10.1 and the public participation process is presented in Section 10.2, with responses to comments received on the Initially Prepared Plan (IPP) presented in Section 10.2.3.

10.1 Facilitation

From the outset of the planning process, the South Central Texas Regional Water Planning Group (SCTRWPG) decided to emphasize a consensus approach to decision-making. That process has been facilitated first by the members' awareness of the need for cooperative and open attitudes when dealing with controversial issues. This process has also drawn extensively on the public involvement effort that has kept the SCTRWPG members informed at critical times of the full range of ideas, values, and concerns of constituencies throughout the region. This is an on-going process that will continue through approval of the Regional Water Plan. The following is a brief summary of the facilitation efforts undertaken in developing the 2011 South Central Texas Regional Water Plan, by both the Chair and the facilitation consultant, to aid Members of the SCTRWPG in the process of developing the Initially Prepared Plan. In addition, the Technical Consultant supported the process of building consensus by providing the necessary tools and technical means for testing alternative approaches.

10.1.1 Facilitation Process for the 2011 Regional Water Plan

The SCTRWPG contracted with Ximenes and Associates (Ximenes) as the facilitation consultant for the 2011 Regional Water Plan. During the course of the planning cycle, the facilitation team worked with the Chairman to improve interpersonal communication among the planning group members, initiating a pre-meeting social time to encourage members to get to know one another and discuss upcoming issues informally. The facilitation consultants provided support at public meetings and hearings.

Beginning in October 2007, Ximenes interviewed the Members of the Regional Water Planning Group by telephone regarding their interests in regional water planning, their background and experience, their assessments of the planning process and its effectiveness, their needs for additional preparation (orientation, terminology, technical issues), and their impressions of stumbling blocks to effective planning. Each interview was summarized in a detailed report to the planning group.

An Environmental Assessment Committee to consider potential improvements to the environmental assessments to be incorporated into the Region L plan was formed in December 2007. This committee was comprised of selected SCTRWPG members and representatives from interested organizations and agencies. HDR provided a summary of the environmental assessments completed in development of the 2006 Regional Water Plan, and Ximenes provided a summary of comments regarding environmental issues in the 2006 Regional Water Plan for background documentation. The group reviewed the 2006 Regional Water Plan environmental assessments and the cumulative effects analysis, then brainstormed possible improvements to the process, different approaches, effectiveness of previous assessments, etc. Recommendations of the Environmental Assessment Committee are summarized in a report[1] and implementation of these recommendations is reflected in the technical evaluations of water management strategies (Section 4C, Volume II) and assessments of cumulative effects (Section 7, Volume I) in the 2011 Regional Water Plan.

In August 2008, Ximenes contacted planning group members to schedule telephone interviews to discuss the Lower Guadalupe Water Supply Project for GBRA needs. A summary report was provided to the SCTRWPG.

Upon identifying two contentious sets of issues affecting the development of the IPP, Chairman Con Mims created the Guadalupe Basin Water Needs Workgroup (Guadalupe Workgroup) and the Gonzales County Groundwater Projects Workgroup (Gonzales Workgroup) involving selected SCTRWPG members and representatives from interested parties. Objectives for the Guadalupe Workgroup were identified as: 1) Develop a set of recommended projects and

[1] South Central Texas Regional Water Planning Group, "2011 Regional Water Plan, Study 5, Environmental Evaluations of Water Management Strategies," Texas Water Development Board, San Antonio River Authority, HDR Engineering, Inc., Ximenes & Associates, April 2009.

alternative projects, if needed, to meet the water needs of the Guadalupe Basin; 2) Ensure there is no "double dipping" of projects using the same water source; and 3) Describe how the San Antonio Bay and estuaries will be protected. The objective for the Gonzales Workgroup was to recommend how to account for the allocation of available Carrizo Aquifer groundwater from Gonzales County among proposed water projects, while preserving the Gonzales County Underground Water Conservation District's (GCUWCD) responsibility to issue permits and the project developers' ability to apply for permits.

Beginning in August 2009 and concluding in October 2009, the Guadalupe Workgroup held a series of three workshops resulting in a set of recommendations adopted by the SCTRWPG on November 5, 2009 and refined by the SCTRWPG on December 3, 2009. Similarly, the Gonzales Workgroup met in September 2009 and developed a recommendation adopted by the SCTRWPG on November 5, 2009. The activities of each workgroup were led by Chairman Mims, technically supported by HDR, and documented by Ximenes. Recommendations developed by these workgroups are reflected throughout the 2011 Regional Water Plan and facilitated its adoption by consensus.

10.2 Public Participation

Laura Raun Public Relations (LRPR) was contracted by the SCTRWPG to provide Public Participation professional services. The approach used by LRPR continued the two-way communications model used in the previous two planning cycles. The objective was to enable the SCTRWPG to provide information about its activities to the public and receive feedback about those activities in a systematic way. Public participation for the 2011 Regional Water Plan was conducted in three phases:

1. Phase I was improvement of the Region L website.
2. Phase II was public involvement in the technical studies conducted for the Regional Water Plan.
3. Phase III was public comment on the 2011 Initially Prepared Regional Water Plan.

10.2.1 Phase I: Website Improvement

The SCTRWPG website, http://www.regionltexas.org, plays a key role in the public participation process. Information about planning group meetings, members, technical studies, and the 2011 Initially Prepared Regional Water Plan has been made available for public review in a timely manner and feedback has been invited.

In 2007, the website was redesigned with oversight by a Region L Communications Committee, comprised of four SCTRWPG members. The website improvements were intended to:

- Make it easier to find key information, such as meeting details;
- Improve site navigation; and
- Create a more intuitive look and feel.

Text was condensed, photos updated, hyperlinks added, and the 2006 Regional Water Plan posted. Information was added on past and future meetings, SCTRWPG members, and involvement opportunities in the 2007-2011 water planning cycle. Finally, the website was moved to a new host and given a more intuitive URL.

The goal was to provide a high-level overview that would increase the website's appeal and relevance to a wider range of audiences, whether newcomers to the site or stakeholders wanting to stay abreast of the planning process. The redesigned website allowed visitors to dig down to a more detailed level if additional information was required.

The website was updated in about one month. This accelerated schedule was used to make the site available to members prior to the group's quarterly meeting. A logo was created for Region L and added to the website.

10.2.2 Phase II: Public Involvement in Technical Studies

Public input was gathered at each SCTRWPG meeting and through direct communications from the public, about the technical studies and general topics. Comments were informally categorized for the purposes of identifying trends and relaying information to the Planning Group.

The comment categories were essentially those used in the 2006 Regional Water Plan, with minor refinements. A total of 105 public comments on all topics were received by the Planning Group prior to issuance of the Initially Prepared Plan. Of those comments, 15 related to the five technical studies were posted on the Region L website.

10.2.3 Phase III: Comment on Initially Prepared Plan

The Initially Prepared 2011 South Central Texas Regional Water Plan (IPP) was posted for review and comment on the Region L website on March 1, 2010. The comment period ended on June 16, 2010. Three public hearings were held to receive comments on the IPP: Victoria (April 12, 2010), San Marcos (April 13, 2010), and San Antonio (April 15, 2010). Over 100 people attended the sessions. Informal notes of public comments at the hearings were taken by the public participation consultant and the technical consultant. Audio recordings of each public hearing were posted on the website, along with the sign-in sheets and comment cards.

During the comment period on the 2011 IPP, a total of 105 comments were received by the Public Participation consultant, directly or indirectly, for categorizing. Those received indirectly were forwarded by the San Antonio River Authority, HDR Engineering, the Texas Water Development Board, and/or other entities. Written comments received before the June 16 deadline were posted on the SCTRWPG website. An additional 217 comments were received after the June 16 deadline. In addition to public comments on the IPP, TWDB staff and Texas Parks and Wildlife Department staff provided comments.

Comments on the Initially Prepared 2011 South Central Texas Regional Water Plan and South Central Texas Regional Water Planning Group responses are provided herein. Responses to TWDB comments, as required, are addressed in Section 10.2.3.1. Comments from Texas Parks and Wildlife Department are presented and addressed in Section 10.2.3.2. Finally, public comment is categorically addressed in Section 10.2.3.3, which also includes a section dedicated to comments received from the Lone Star Chapter of the Sierra Club.

10.2.3.1 TWDB Comments on Initially Prepared 2011 South Central Texas Regional Water Plan and SCTRWPG Responses

TWDB Staff Comments, Letter of June 28, 2010: Attachment -- South Central Texas Regional Water Plan – Region L

LEVEL 1. Comments and questions must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements.

<u>General Comment</u>

1. Population, demand, and water availability figures in various tables and text are slightly different than the amounts in the online planning database (DB12). These differences may be

due to rounding or reallocation between river basins. Please revise or coordinate with TWDB staff to ensure that the data in the plan is consistent with DB12. (e.g. Page ES-4, last paragraph, total municipal water demand should be 637,235 acft/yr not 637,236 acft/yr; Page ES-9, total Carrizo Aquifer groundwater availability differs by 2 acft/yr from the online planning database data in each planning decade.) *[Title 31 Texas Administrative Code (TAC) §357.7(d)(1)&(2) and §357.5(a)(3)]*

Response: Revisions have been made to the plan and DB12 to ensure consistency.

<u>Chapter 1</u>

2. Page 1-9, 3rd paragraph: The Yegua-Jackson is an official minor aquifer and covers parts of La Salle, Atascosa, Wilson, Karnes, and Gonzales counties within Region L. Please mention the Yegua-Jackson as a minor aquifer that underlies the region. *[31 TAC §357.7(a)(1)(D)]*

Response: Reference to the Yegua-Jackson Aquifer has been included.

3. Page 1-31, 1st paragraph: Frio and Zavala counties should to be added to the list of counties overlying the Edwards Aquifer. *[31 TAC §357.7(a)(1)(D)]*

Response: Reference to Frio and Zavala counties has been included.

<u>Chapter 3</u>

4. Comal, Hays, and Kendall counties in Region L are located in the Hill Country Priority Groundwater Management Area and have water availability requirements adopted by county commissioner’s courts. Guadalupe and Medina counties also have water availability requirements adopted by county commissioner’s courts. Please provide a statement regarding any water availability requirements promulgated by a county commissioners court pursuant to TWC §35.019. *[31 TAC §357.5(k)(1)(H)]*

Response: A statement regarding water availability requirements promulgated by a county commissioners court has been added to Chapter 3.

5. Page 3-3, 4th paragraph: Please include a discussion of how groundwater availability models were used to calculate groundwater availability, for example, describe whether the

groundwater availability values used from district management plans were developed using groundwater availability models.

Response: A discussion of how groundwater availability models (GAMs) were used to calculate groundwater availability has been added to Chapter 3.

6. Page 3-5, Table 3-1: Total volumes for the Gulf Coast Aquifer 2010 supplies in Table 3-1 (100,640 acft/yr) do not match the total Gulf Coast Aquifer 2010 supplies in Table 3-2 (102,723 acft/yr). Please revise as appropriate throughout plan.

Response: A line indicating the estimated 2010 groundwater supply of 2,083 acft/yr from the Gulf Coast Aquifer in Gonzales County has been added to Table 3-1, thereby increasing the total 2010 Gulf Coast Aquifer supplies shown in Table 3-1 to 102,723 acft/yr and matching Table 3-2.

7. Page 3-5, Table 3-1: Values for the Gulf Coast Aquifer 2010 supplies in Table 3-1 do not include Gulf Coast Aquifer supply values for Gonzales County. Please revise as appropriate throughout plan. *[Contract Exhibit "C", Section 3]*

Response: See response to Comment #6.

8. Page 3-5, Table 3-1: Values for the Carrizo Aquifer 2010 supply in Table 3-1 (437,841 acft/yr) do not match the Carrizo Aquifer 2010 supplies in Table 3-2 (438,539 acft/yr). Please revise as appropriate throughout plan and, if necessary, in the online planning database.

Response: A line indicating the estimated 2010 groundwater supply of 699 acft/yr from the Carrizo Aquifer in Karnes County has been added to Table 3-1, thereby increasing the total 2010 Carrizo Aquifer supplies shown in Table 3-1 to 438,539 acft/yr and matching Table 3-2.

9. Page 3-5, Table 3-1: Table 3-1 does not include Carrizo Aquifer values for Karnes and Zavala counties. Please revise as appropriate throughout plan and, if necessary, in the online planning database.

Response: See response to Comment #8 with regard to Karnes County. Table 3-1 does include Carrizo Aquifer values for Zavala County.

10. Page 3-14 Recycled water supply is not summarized in Chapter 3. Please present recycled water supplies in plan. *[Contract Exhibit "C", Section 3]*

Response: Existing supplies from reuse or recycled water are summarized in Chapter 3 and included in the computation of needs for additional supply summarized in Appendix C.

Chapter 4

11. Please describe how publicly available plans of major agricultural, municipal, manufacturing and commercial water users were considered. *[31 TAC §357.5(k)(1)(E)]*

Response: Planning information from water user groups was generally obtained and considered as part of the process for identification of potentially feasible water management strategies for the 2011 plan as outlined beginning on page 4B.1-3.

12. Page 4A-4: Calhoun County Manufacturing ('Industrial') water need of 245 acft/yr in 2060 does not match the Calhoun County Manufacturing water need volume of 209 acft/yr presented in Table 4B.2.4-1 (page 4B2-71) or 4B.2.4-11 (page 4B.2-76). Please revise as appropriate throughout plan.

Response: The revised need for Calhoun County Manufacturing ('Industrial') is 2,021 acft/yr in 2060. The plan has been revised accordingly.

13. Page 4A-4: Comal County-Other water need of 2,960 acft/yr in 2060 does not match the Comal County-Other ('Rural Area Residential and Commercial') water need volume of 2,742 acft/yr presented in Table 4B.2.5-1 (page 4B.2-79). Please revise as appropriate throughout plan.

Response: Values in Table 4B.2.5-1 represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages. A footnote has been added to Table 4B.2.5-1.

14. Page 4A-4: Comal County Manufacturing ('Industrial') water need of 9,022 acft/yr in 2060 does not match the Comal County Manufacturing water need volume of 8,672 acft/yr presented in Table 4B.2.4-1 (page 4B.2-79). Please revise as appropriate throughout plan.

Response: Values in Table 4B.2.4-1 represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages. A footnote has been added to Table 4B.2.4-1.

15. Page 4A-6: Schertz water need of 2,436 acft/yr in 2060 does not match the Schertz water need volume of 2,420 acft/yr presented in Table 4B.2.11-1 (page 4B.2-121). Please revise as appropriate throughout plan.

Response: Values in Table 4B.2.11-1 represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages. A footnote has been added to Table 4B.2.11-1.

16. Page 4A-7: Kendall County-Other water needs of 211 acft/yr in 2010 does not match the Kendall County-Other ('Rural Area Residential and Commercial') water need volume (zero) presented in Table 4B.2.14-1 (page 4B.2-171). Please revise as appropriate throughout plan.

Response: Values in Table 4B.2.14-1 represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages. A footnote has been added to Table 4B.2.14-1.

17. Page 4A-8: Medina County-Other water needs do not match the Medina County-Other ('Rural Area Residential and Commercial') water need volumes presented in Table 4B.2.16-1 (page 4B.2-171). Please revise as appropriate throughout plan.

Response: Values in Table 4B.2.16-1 represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages. A footnote has been added to Table 4B.2.16-1.

18. Page 4A-8: Medina Irrigation water needs do not match the Medina Irrigation water need volumes presented in Table 4B.2.16-1 (page 4B.2-171). Please revise as appropriate throughout plan.

Response: Values in Table 4B.2.16-1 represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages. A footnote has been added to Table 4B.2.16-1.

19. Page 4A-9: Sunko Water Supply Corporation water needs of 70 acft/yr in 2060 do not match the Sunko water need volume of 16 acft/yr presented in Table 4B.2.20-1 (page 4B.2-201). Please revise as appropriate throughout plan.

Response: Values in Table 4B.2.20-1 represent the sum of the Surplus/Shortage values for each river basin and/or across the entire county. These values may differ from the Need value reported in other tables because the Need represents only the sum of the shortages. A footnote has been added to Table 4B.2.20-1.

20. Page 4A-19, second and third sections of Table 4A-3: Regional water plans are required to be based on drought of record conditions including firm supplies available during a drought of record. 'Interruptible' water supplies should not be included in total Guadalupe-Blanco River Authority supplies on 4A-18 and 19. Please revise plan to present water supplies available on a firm yield basis as available in a drought of record. *[31 TAC §357.7(a)(3)(B)]*

Response: Under hydrologic assumptions approved by the TWDB for Region L planning, firm supplies under the GBRA/Dow water rights in the lower Guadalupe – San Antonio River Basin are estimated to be 89,501 acft/yr on a monthly computation basis (as is consistent with TWDB guidance). Appendix B, page B-3 includes a breakdown of the 89,501 acft/yr firm supply associated with the GBRA/Dow water rights in Calhoun County. Although all of these supplies are not shown in Appendix C for Calhoun County, sufficient supplies are shown to meet all projected demands for water to be supplied by GBRA under drought of record conditions. No revisions to the plan pursuant to Comment #20 are perceived to be necessary as the plan does present water supplies available on a firm yield basis in a drought of record.

Firm supplies available from the GBRA/Dow water rights in the lower Guadalupe – San Antonio River Basin are estimated to be 41,548 acft/yr on a daily computation basis as shown in Table 4A-3 on page 4A-19. This information is presented in Table 4A-3 only for consistency between state, regional, and GBRA water supply planning. Similarly, the

appearance of interruptible water supplies in Table 4A-3 simply reflects the actual agreements that GBRA has with irrigators and the Exelon Generation Company under which GBRA has not contracted for delivery of firm supplies. For example, Exelon has contracted for 75,000 acft/yr of interruptible water supply (Table 4A-3) and has a projected drought demand of 49,126 acft/yr (Victoria County, Table 2-6) which can be met on a firm basis with interruptible supplies from GBRA and storage available through cooling reservoir operations, as described in Section 4C.10. GBRA contracts for irrigation supply in Calhoun County are "year-to-year" and need not be sustained through a drought of record. In other words, irrigation demands in Calhoun County exist, but GBRA is not required to meet them in prolonged drought. Hence, GBRA's periodic commitments of existing supplies to irrigation in Calhoun County are, in fact, interruptible.

21. Page 4A-19, Table 4A-3, third section: Basis for calculation of Guadalupe-Blanco River Authority's total identified water needs is not clear. Please present the method used for determining Guadalupe-Blanco River Authority water needs. *[31 TAC §357.7(a)(4)(A)]*

Response: GBRA water needs presented in Table 4A-3 are consistent with current and planned uses of existing supply sources which include Canyon Reservoir, run-of-river ("mid-basin") water rights on the San Marcos River, and the GBRA/Dow lower basin water rights (which include both firm and interruptible components). Projected needs for GBRA's customers presently associated with Canyon Reservoir are calculated by subtraction of the Canyon Reservoir Total demands near the middle of page 4A-18 from the Canyon Reservoir supplies on page 4A-19. Mid-basin run-of-river customer needs are calculated by subtraction of the Mid-Basin Municipal Run-of-River Total demands near the middle of page 4A-18 from the Mid-Basin Rights supply on page 4A-19. Lower basin interruptible customer needs are calculated by subtraction of Lower Basin (Run-of-River, Interruptible) Total demands near the bottom of page 4A-18 from Lower Basin Rights (Interruptible, Daily Basis) supplies on page 4A-19. Finally, Lower basin firm customer needs are calculated by subtraction of Lower Basin (Run-of-River, Firm) Total demands near the bottom of page 4A-18 from Lower Basin Rights (Firm, Daily Basis) supplies on page 4A-19. Explanatory footnotes have been added to Table 4A-3.

22. Page 4B.1-14, Section 4B.1.2.7: ‘Edwards Transfers’ volume of 51,628 acft/yr does not match the volume presented on page ES-15 or in Appendix D, Table 2 of 51,875 acft/yr. Please revise as appropriate throughout plan.

Response: The value of 51,875 acft/yr is correct. The plan has been revised throughout.

23. Page 4B.1-22 footnote 10: In accordance with the standard footnote (e.g. footnote10) regarding inclusion of additional ‘management supplies’ (e.g. additional water management strategies) for entities that have recommended water management strategies relying on Gonzales County groundwater but which may not be able to obtain a groundwater permit, please identify the alternative sources of water that are associated with these additional water management strategies that would be used to meet needs of all associated entities (e.g. Garden Ridge, Goforth Water Supply Corporation, Kyle, San Marcos, Selma, Water Services Inc).

Response: Conservation is a recommended strategy to meet a component of the projected needs of all water user groups seeking groundwater supplies from Gonzales County. Similarly, the SCTRWPG recommends due consideration of economically viable Drought Management as an interim strategy to meet near-term needs through demand reduction until such time as economically viable long-term water supplies can be developed. Following is a summary of observations and/or alternative water management strategies identified for the water user groups list in Comment #23. The recommended Conservation strategy appears to provide sufficient demand reductions to meet projected needs for Selma in the absence of additional groundwater from Gonzales County. Purchase from WWP (GBRA) is identified as an alternative source for San Marcos, Kyle, and Goforth WSC as each of these water users has an existing contract with GBRA. Purchase from WWP (CRWA), possibly through Green Valley SUD, is identified as an alternative source for Garden Ridge based on proximity and potential difficulties in obtaining additional supplies from the Trinity Aquifer. Finally, Purchase from WWP (SAWS) and/or Edwards Transfers are identified as alternative sources for Water Services, Inc. based on proximity. Section 4B-2 (text) and Appendix D have been modified to reflect alternative sources for the referenced water users.

24. Page 4B.1-22, Section 4B.1.2.22: ‘Regional Carrizo for SSLGC’ unit cost of $568/acft/yr does not match the unit cost on page ES-16 or in Appendix D, Table 2 of $608/acft/yr. Please revise as appropriate throughout plan.

Response: The unit cost for Regional Carrizo for SSLGC is $568/acft/yr. The plan has been revised accordingly.

25. Page 4B.1-24, Section 4B.1.2.25: ‘Local Groundwater Supplies (Carrizo)’ volume of 29,933 acft/yr does not match the volume in Appendix D, Table 2 of 33,874 acft/yr. Please revise as appropriate throughout plan.

Response: The value of 33,874 acft/yr is correct. The plan has been revised accordingly.

26. Page 4B.3-1, Table 4B.3-1: Wholesale water provider Lavaca-Navidad River Authority and Texas Water Alliance water supplies and water needs are presented in Table 4B.3-1 but not referred to in the wholesale water provider Table 4A-3 on page 4A-15. Please revise to ensure consistent references to wholesale water providers throughout the plan.

Response: Texas Water Alliance is shown as a WWP in Table 4A-3 on page 4A-15. LNRA is not shown in Table 4A-3 because they are not a WWP physically located or relying on water sources in the South Central Texas Planning Region. LNRA is referenced in Section 4B.3 because it is the WWP for municipal (Point Comfort) and industrial (Formosa Plastics Corporation) uses in the portion of Calhoun County east of Lavaca Bay. Clarifying language has been added to Section 4B.3.

27. Page 4B.3-3: The 2010 San Antonio Water System drought management supply of 37,622 acft/yr does not match the 2010 San Antonio Water System drought management supply amount of 19,767 acft/yr on page D-8, Appendix D, Table 3 and is greater than the total 2010 region-wide drought management supply of 13,627 presented in Appendix D, Table 2 and on page ES-15. Please revise as appropriate throughout plan and, if necessary, in the online planning database.

Response: A 2010 drought management supply of 37,622 acft/yr has been included for SAWS in Appendix D Tables 1, 2, and 3, in Table ES-4, and in DB12.

28. Page 4B.3-3: The 2060 'Regional Carrizo for SAWS' supply of 11,687 acft/yr does not match the 2060 'Regional Carrizo for SAWS' supply amount of 11,700 acft/yr on page D-8, Appendix D, Table 3. Please revise as appropriate throughout plan and, if necessary, in the online planning database.

Response: Table ES-4 and Appendix D, Table 3 have been revised to show 11,687 acft/yr.

29. Page 4B.3-6, Table 4B.3.2-1: Totals shown at the bottom of the table appear incorrect based on the data contained within the table. Please revise as appropriate throughout plan.

Response: Totals have been revised.

30. Page 4B.3-12: The 2010 'GBRA Lower Basin Storage' supply of 28,369 acft/yr does not match the 2010 'GBRA Lower Basin Storage' supply amount of 26,452 acft/yr on page D-8, Appendix D, Table 3. Please revise as appropriate throughout plan and, if necessary, in the online planning database.

Response: The value of 28,369 acft/yr is correct. The plan has been revised accordingly.

31. Page 4B.3-12: The 2010 and 2060 'Wimberley and Woodcreek Water Supply Project' supplies of 4,480 af/yr and 0 af/yr, respectively, do not match the associated 2010 and 2060 'Wimberley and Woodcreek Water Supply Project' supply amounts of 1,120 acft/yr and 4,480 acft/yr presented on Appendix D, page D-2, Table 2. Please revise as appropriate throughout plan (e.g. page 4B.3-11) and, if necessary, in the online planning database.

Response: Table 4B.3.4-1 on page 4B.3-12 and relevant text on page 4B.3-11 have been revised for consistency with Appendix D.

32. Page 4B.3-20: The 2010 'TWA Regional Carrizo' supply of 0 acft/yr does not match the 2010 'TWA Regional Carrizo' supply amount of 27,000 acft/yr on page D-8, Appendix D, Table 3. Please revise as appropriate throughout plan and, if necessary, in the online planning database.

Response: The TWA Regional Carrizo Project is to come online by 2020. Appendix D has been revised accordingly.

Appendix C

33. It appears that total County Surplus/Shortage and Total Basin Surplus/Shortage volumes were calculated incorrectly throughout Appendix C Tables by subtracting 'Total [county-wide] Demand' from 'Total [county-wide] Supply'. Please revise to reflect total county water needs as the sum of the individual needs of each water user group in the county; needs that are calculated based on each water user group's own demands and supplies.

Response: County water needs based on the sum of the individual needs of each water user group in the county are presented elsewhere in the Appendix C tables and in Table 4A-1. Referenced headings have been modified to "County Balance" and "Total Basin Balance" to clarify that these county or basin estimates of "shortage" and not necessarily equivalent to "needs."

Appendix D

34. Table 1: Please clarify, for example by including a footnote, whether the list of water management strategies included in Appendix D, Table 1 comprises the complete list of potentially feasible water management strategies referred to within bullet number 7 on page 4B.1-4. *[Contract Exhibit "C" Section 11.1]*

Response: A footnote has been added to Appendix D Table 1 to clarify that it is intended to be a complete list recommended water management strategies.

35. Table 2: Various unit costs of water in Appendix D, Table 2 do not appear to match unit costs based on the total annual costs and total supplies in the planning database (DB12). Although some of these differences may be due to multiple users of strategies and the underlying weighting of associated volumes and costs, for single-sponsor projects these numbers should align. Please revise unit costs as appropriate or coordinate with TWDB staff to ensure that the annual cost data in the plan is consistent with the online planning database (e.g. Appendix D, Table 2: Guadalupe Blanco River Authority (GBRA) Exelon Project; GBRA Lower Basin Storage; GBRA Mid Basin Project; CRWA Siesta Project; LCRA-SAWS Water Project; TWA Regional Carrizo). *[31 TAC §357.7(a)(8)(A)(1);Contract Exhibits "C" and "D"]*

Response: Unit costs have been revised as appropriate to ensure that the plan is consistent with the online planning database (DB12).

36. Table 2: Storage Above Canyon Reservoir (ASR) First Decade Unit cost of $1,772/acft/yr does not match the unit costs presented on first summary page in Volume II, Section 4C.9 of $1,599/acft/yr or in Volume II, Table 4C.9-9 of $1,598/acft/yr. Please revise as appropriate throughout plan and, if necessary, in the online planning database.

Response: The unit cost for Storage Above Canyon Reservoir is $1,598/acft/yr. However, in implementing this project, it is likely that the water will be delivered via the Guadalupe River and/or Canyon Reservoir. Thus, secondary treatment and integration costs have been added to the project, making the unit cost in the plan $1,772/acft/yr.

37. Table 2: GBRA-Exelon Project (River Diversion) First Decade Unit cost of $641/acft/yr is less than both unit costs presented in Volume II, Section 4C.10 summary page (e.g $646/acft/yr). Please revise as appropriate throughout plan and, if necessary, in the online planning database.

Response: The unit cost for GBRA-Exelon Project (River Diversion) is $646/acft/yr. The plan has been revised accordingly.

38. Table 2: Supply of 27,000 af/yr for TWA Regional Carrizo project in year 2010 does not match page 4B.3-20, Table 4B.3.8-1 which shows zero acft/yr of supply in 2010. Please revise as appropriate throughout plan and, if necessary, in the online planning database.

Response: The TWA Regional Carrizo Project is to come online by 2020. Appendix D has been revised accordingly.

39. Table 2: GBRA New Appropriation (Lower Basin) First Decade Unit cost of $1,953/acft/yr does not match unit cost presented in Volume II, Section 4C.9 summary page of $1,910/acft/yr or in Volume II, Table 4C.9-9 of $1,598/acft/yr. Please revise as appropriate throughout plan and, if necessary, in DB12.

Response: The unit cost for GBRA New Appropriation (Lower Basin) is $1910/acft/yr. The plan has been revised accordingly.

40. Table 2: Regional Carrizo for SSLGC First Decade Unit cost of $608/acft/yr is less than both unit costs presented in Volume II, Section 4C.19 summary page of $568/acft/yr. Please

revise as appropriate throughout plan (e.g. page 4B.3-11) and, if necessary, in the online planning database.

Response: The unit cost for Regional Carrizo for SSLGC is $568/acft/yr. The plan has been revised accordingly.

41. Table 2: 'Recommended' water management strategies 'Facilities Expansions' and 'Surface Water Rights' do not have quantified water amounts and costs associated with them. Please revise Appendix Table 2 to include only recommended water management strategies that have been evaluated for supply, impacts, and cost. *[31 TAC §357.7(a)(8)(A)(1); Contract Exhibits "C" and "D"]*

Response: Appendix D Table 2 has been modified to include technical information relevant to Facilities Expansions to be considered recommended water management strategies. This table and additional references throughout the plan have been modified to identify the Surface Water Rights water management strategy as an activity consistent with the 2011 regional water plan.

42. Table 2: Table does not include 'Balancing Storage' as a recommended water management strategy although it is described as "recommended" on page 4B.1-29. This recommended water management strategy also does not appear in the online planning database and has no water volume or cost associated with it. Please revise plan as necessary regarding Balancing Storage strategy in Section 4B, Appendix D, Table 2 and the online planning database to include only recommended water management strategies that have been evaluated for supply, impacts, and cost. *[31 TAC §357.7(a)(8)(A)(1); Contract Exhibit "C"]*

Response: Appendix D Table 2 and additional references throughout the plan have been modified to identify the Balancing Storage water management strategy as an activity consistent with the 2011 regional water plan.

43. Table 2: Table does not include 'Purchase from Wholesale Water Provider' as a recommended water management strategy although it appears to be a 'recommended' water management strategy on page 4B.1-30 and in DB12. Please revise the plan and the online planning database as necessary to present 'Purchase from Wholesale Provider' as a

recommended strategy in Appendix D, Table 2, including the associated water volumes. *[31 TAC §357.7(a)(8)(A)(1); Contract Exhibit "C"]*

Response: Purchase from Wholesale Water Provider has been added to Appendix D Table 2 as a recommended water management strategy.

VOLUME II

44. Section 4C.2: The determination of specific volumes, by decade, of drought management water supply for each entity using this strategy is not presented. Please present a table, for example equivalent to Table 4C.1-10 for conservation, showing how water amounts provided by drought management by entity were derived for each water user group. *[31 TAC §357.7(a)(8)(A)(1)]*

Response: The SCTRWPG has indicated that drought management is an interim strategy to meet near-term needs through demand reduction until such time as economically viable long-term water supplies can be developed. Hence, projections of potential demand reductions associated with Drought Management into future decades, as shown for Conservation in Table 4C.1-10, were not developed. Table 4C.2-4 shows potential demand reductions associated with various degrees of drought management based on 2010 demands. Text has been added to the plan to clarify that, with the exception of SAWS, only the 5 percent demand reduction scenario is recommended.

45. Page 4C.8-3, Section 4C.8: Potential water supply sources listed include Canyon Reservoir and groundwater. Please clarify the water supply for the recommended Wimberley and Woodcreek Water Supply Project water management strategy. Canyon Reservoir is indicated as the supply in the online planning database.

Response: As described in Section 4C.8, presently committed, but unused, supplies from Canyon Reservoir are the initial source and the GBRA Mid-Basin Project (Surface Water) and/or Hays/Caldwell PUA project will be the long-term source(s). Each of the potential long-term sources produces treated water at or very near the San Marcos Water Treatment Plant from which the recommended transmission facilities to the Wimberley area originate. The SCTRWPG has not expressed a preference among the potential long-term sources, recognizing that either is potentially feasible.

46. Section 4C.20 does not explain how capital costs of the Hays/Caldwell PUA Project were allocated among wholesale water suppliers and water user groups. Please show how capital costs are allocated among project participants. *[31 TAC §357.7(a)(8)(A)(1); Contract Exhibit "C"]*

Response: A table showing an example allocation of capital costs among participants has been added to Section 4C.20.

47. Section 4C.22, Table 4C.22-1: Please clarify in plan whether costs for local groundwater supply strategies include associated land acquisition, environmental permitting and mitigation costs. *[Contract Exhibit "C"]*

Response: Text has been added to Section 4C.22 to clarify that cost for local groundwater supply strategies include land acquisition, environmental permitting, and mitigation.

48. Section 4C.22, Table 4C.22-1: 'Total Project Cost' for Oak Hills WSC appears to be incorrect at $269,000 which is less than the 'Capital Cost' of $1,207,000. Please revise as appropriate throughout plan and, if necessary, in the online planning database.

Response: The 'Total Project Cost' for Oak Hills WSC should be $1,721,000. Table 4C.22-1 has been corrected.

49. Section 4C.24: Section does not explain how capital costs of the Brackish Wilcox Groundwater for Regional Water Alliance project were allocated among wholesale water providers and water user groups. Please show the allocation of capital costs among participants. *[31 TAC §357.7(a)(8)(A)(1); Contract Exhibit "C"]*

Response: A table showing an example allocation of capital costs among participants has been added to Section 4C.24.

50. Page 4C.31-20, Table 4C.31-7: 'Distribution' system improvement costs should not be included in the regional water plan. Costs should be limited to the infrastructure costs associated with developing and conveying increased water supplies from water supply sources and to treat the water for end water user group requirements. Please extract costs of project elements that do not enhance water supply volumes delivered to water user groups (e.g. $86,825,000 in

distribution costs associated with the 75 MGD capacity plant). *[31 TAC §357.7(a)(5); Contract Exhibit "C"]*

Response: "Distribution" has been replaced with "Integration" which is intended to represent connection of the water treatment plant to one or more major delivery points within a water system.

51. *(Attachment B)* Comments on the online planning database (i.e. DB12) are herein being provided in spreadsheet format. These Level 1 comments are based on a direct comparison of the online planning database against the Initially Prepared Regional Water Plan document as submitted. The table only includes numbers that do not reconcile between the plan (left side of spreadsheet) and online database (right side of spreadsheet). An electronic version of this spreadsheet will be provided upon request.

Response: Appropriate revisions to DB12 for consistency between the plan and DB12 have been completed.

52. *(Attachment C)* Based on the information provided to date by the regional water planning groups, TWDB has also attached a summary, in spreadsheet format, of potential interregional conflicts, apparent water source over allocations, and apparent unmet water needs that were identified during the review of the online planning database and Initially Prepared Regional Water Plan. *[Additional TWDB comments regarding the general conformance of the online planning database (DB12) format and content to the Guidelines for Regional Water Planning Data Deliverables (Contract Exhibit D) are being provided by TWDB staff under separate cover as 'Exception Reports']*

Response: The TWDB has identified two potential interregional conflicts associated with the GBRA Simsboro Project. The potential conflict with Region G has been resolved by reduction of the maximum planned Lee County withdrawals associated with the GBRA Simsboro Project from 20,000 acft/yr to 19,777 acft/yr. Region L initially sought to resolve the potential conflict with Region K in a manner similar to that used by Region L to address potential source over allocations in Gonzales County. More specifically, Region L recognizes the regulatory authority of the Lost Pines Groundwater Conservation District (LPGCD) to issue (or not issue) permits in accordance with its rules and state law. As permits for the GBRA Simsboro Project and/or for the Expansion of Carrizo-Wilcox

Aquifer strategy in the Region K plan have yet to be granted, Region L has included additional recommended and/or alternative water management strategies to ensure that projected needs can be met in the event that such permits are not granted. It was the expectation of the SCTRWPG that Region K would do the same recognizing that applications or permits associated with the GBRA Simsboro Project are pending before LPGCD. Region K, however, did not choose to identify one or more alternative water management strategies in the event that permits for the Expansion of Carrizo-Wilcox Aquifer strategy in Bastrop County are not issued by the LPGCD. Furthermore, Region K chose not to identify Expansion of Carrizo-Wilcox Aquifer as an overdraft despite the facts that the LPGCD has issued permits totaling 43,486 acft/yr when estimated total availability from the Carrizo-Wilcox Aquifer in Bastrop County is only 28,000 acft/yr and new supply associated with this strategy (up to 14,166 acft/yr) exceeds the difference between total availability and existing supplies pumped in 2009 (20,198 acft/yr)[2]. The SCTRWPG has decided to resolve this potential conflict by including "overdraft" notation and explanatory language to documentation of the GBRA Simsboro Project in the 2011 Regional Water Plan.

In the absence of a groundwater conservation district (GCD) regulating the Carrizo Aquifer in Bexar County, water users groups (WUGs) or wholesale water providers (WWPs) therein may be able to produce groundwater well in excess of the availability estimates in the regional water plan which actually date to the 1997 state water plan. This potential over allocation has been resolved by "temporary overdraft" notation and/or identification of alternative water management strategies to meet projected needs in the event that WUGs or WWPs are unable to develop planned new supplies from the Carrizo Aquifer.

A discussion of unmet irrigation needs is found on page 4B.1-10.

[2] Information provided by LPGCD during an August 2, 2010 coordination meeting involving representatives of Region L and Region K interests.

LEVEL 2. Comments and suggestions that might be considered to clarify or enhance the plan.

Executive Summary

1. Page ES-14, Figure ES-7 and page 4B.1-5, Figure 4B.1-2: Drought management is a distinct water management strategy and not a subcategory of conservation. Please consider presenting drought management as a separate category of water supply in Figure 4B.1-2 and throughout plan.

Response: Due to the reliance of both the Water Conservation and Drought Management strategies on significant reductions in residential landscape irrigation use, Drought Management is not identified as a separate category of water supply in the referenced summary figures in the 2011 regional water plan. Potential separation of these water management strategies in summary graphics will be considered for the 2016 plan.

Chapter 1

2. Page 1-1, 1st paragraph: Section 1.7 states there are five major aquifers, however the Edwards-Trinity (Plateau) is missing from the first sentence in Section 1.1. Please consider including the Edwards-Trinity (Plateau) as a major aquifer.

Response: The Edwards-Trinity (Plateau) has been added as a major aquifer.

3. Page 1-3, Table 1-1: Please consider clarifying in Table 1-1 whether Edwards Aquifer Area means the area covered by the Edwards Aquifer or the Edwards Aquifer Authority. If the region is referring to the Edwards Aquifer, it should include an 'X' next to Frio and Zavala counties.

Response: A footnote has been added to Table 1-1 to clarify that the Edwards Aquifer Area means the area within the Edwards Aquifer Authority statutory boundaries.

Chapter 3

4. Page 3-5, Table 3-1: Text on page 3-3 and 3-4 states that Table 3-1 shows availability for all major aquifers except the Edwards Aquifer. Please consider including the Edwards-Trinity (Plateau) Aquifer in Table 3-1 or revising the text on page 3-3.

Response: Text on page 3-3 has been revised to indicate that availability for the Edwards-Trinity (Plateau) Aquifer is not shown in Table 3-1.

Chapter 4

5. Consider presenting the capital costs of water management strategies associated with Water User Groups' water supply plans, within Chapter 4 for ease of locating associated project costs.

Response: Capital costs associated with water management strategies are presented in Section 9 (Volume I), Appendix D (Volume I), and Section 4C (Volume II). The SCTRWPG will consider adding capital cost to the project descriptions in Section 4B.2 for the 2016 Regional Water Plan.

6. Page ES-14, Figure ES-7 and page 4B.1-5, Figure 4B.1-2: Drought management is a distinct water management strategy and not a subcategory of conservation. Please consider presenting drought management as a separate category of water supply in Figure 4B.1-2 and throughout plan.

Response: See response to Level 2 Comment #1.

7. Page ES-14, Figure ES-7 and page 4B.1-5, Figure 4B.1-2: While recycled water is a recommended water management strategy it is not presented in Figure 4B.1-2. Please consider presenting recycled water as a separate category of water supply in Figure 4B.1-2.

Response: Figures ES-7 and 4B.1-2 and relevant text have been revised to show Recycled Water as a category of new water supplies separate from Available Resources.

Chapter 5

8. Chapter 5: Consider presenting quantitative reporting of and impacts of voluntarily redistributing water in Chapter 5, instead of Chapter 4 in accordance with TWDB Guidance.

Response: Presentation of quantitative reporting and impacts of voluntarily redistributing water has been moved to Chapter 5.

Appendix C

9. Page C-33 and C-78: Pages contain tables that do not present any data and that occur between connected tables. Please consider deleting these empty table/pages.

Response: Empty table segments and pages have been deleted.

<u>VOLUME II</u>

10. Section 4C.18, 4C.18-4, 1st paragraph: Please consider updating the statement indicating that desired future conditions have not been established for Groundwater Management Area 13. Groundwater Management Area 13 has since adopted desired future conditions on April 9, 2010.

Response: Text has been revised to reflect that GMA13 adopted Desired Future Conditions on April 9, 2010.

10.2.3.2 TPWD Comments on the Initially Prepared 2011 South Central Texas Regional Water Plan and SCTRWPG Responses

TPWD Letter of June 15, 2010 – South Central Texas Region L Initially Prepared Plan

Thank you for the opportunity to review and comment on the 2010 Initially Prepared Regional Water Plan (IPP) for South Central Texas Region L. Texas Parks and Wildlife (TPW) acknowledges the time, money and effort required to produce the regional water plan as mandated by Senate Bill 1 of the 75th Legislature. A number of positive steps have been taken since the first planning cycle to advance the issue of environmental protection. For example, the regional water planning groups are required by TAC §357.7(a)(8)(A), to perform a "quantitative reporting of environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico" when evaluating water management strategies (WMS). Quantification of environmental impacts is a critical step in planning for our state's future water needs while also protecting environmental resources.

TPW staff has reviewed the IPP with a focus on the following questions:

- Does the plan include a quantitative reporting of environmental factors including the effects on environmental water needs, and habitat?

- Does the plan include a description of natural resources and threats to natural resources due to water quantity or quality problems?
- Does the plan discuss how these threats will be addressed?
- Does the plan describe how it is consistent with long-term protection of natural resources?
- Does the plan include water conservation as a water management strategy? Reuse?
- Does the plan recommend any stream segments be nominated as ecologically unique?
- If the plan includes strategies identified in the 2006 regional water plan, does it address concerns raised by TPW at that time?

The South Central Texas Region L IPP includes a brief description of natural resources including fish and wildlife resources. A detailed table listing threatened and endangered species by county with notations concerning their habitat preferences and protected status is presented in Appendix H of the IPP. Major springs are also described and potential threats to natural resources were evaluated.

The Region L IPP includes a detailed quantitative reporting of environmental factors. Volume II of the IPP discusses technical evaluations of strategies and presents water management strategy summary sheets that include acreages impacted by each strategy. Where applicable, changes in environmental flows are predicted using Water Availability Models.

Environmental assessments are presented for proposed water management strategies included in the 2010 IPP as well as for the 1984, 1990, 1997, 2002 and 2007 Water Plans. While necessarily broad in scope, this quantitative analysis comparing each water plan highlights some interesting trends. For example, the 2010 IPP is projected to have more impact (per unit of supply) than any plan listed when considering endangered, threatened, and species of concern due to the number of projects and pipelines traversing sensitive areas. The 2010 IPP is also projected to have a greater environmental impact (per unit of supply) on vegetation and wildlife habitat than either the 2007 or 2002 plans and fewer impacts (per unit of supply) to wildlife habitat than the 1984, 1990, or 1997 plans, largely due to the absence of large main-stem reservoirs included in earlier plans. Finally, the 2010 IPP appears to project moderate water quality and aquatic habitat impacts, although this is difficult to evaluate because the numbers in Table 7.2-5 do not match the values shown in Figure 7.2-5. Please double-check the calculations and presentation of the results. Overall, the 2010 IPP appears to have the highest cumulative impacts (per unit of supply) compared to earlier plans except for the 1984 plan.

While specific conclusions cannot be made at this point, TPW staff tends to agree with the statement that the predicted impacts associated with the smaller (but more numerous) strategies in the 2010 IPP may be more easily avoided and/or mitigated than the large scale impacts associated with reservoirs in earlier water plans.

The Region L IPP recommends water conservation for all water user groups. Region L is to be commended for including advanced water conservation as a water management strategy. According to the IPP, per capita water use in Region L is projected to decline over the planning period from 148 gallons per person per day in 2000 to 132 gallons per person per day in 2060. The IPP also recommends the expansion of water recycling, or use of reclaimed wastewater, for non-potable purposes such as parkland irrigation and instream flow augmentation.

Region L is also to be commended for considering and recommending reasonable drought management strategies to reduce water demands during droughts. While TPW understands the need for planning to provide needed water supplies, municipalities and other water user groups have successfully promoted sensible restrictions during droughts. It is important that the success of these programs be reflected in regional water planning.

TPW staff is encouraged that Region L has recommended five segments for nomination as ecologically unique. TPW staff believes that the “clarifying provisions” provided by Region L are consistent with existing statutes.

The 2010 Region L IPP is a well organized report. Recognition is deserved for proposed designation of five ecologically unique stream segments, advanced conservation, drought management as a water management strategy, seawater desalination, use of off-channel reservoirs, recommended use of recycled water for non-potable uses for several WUGs, aquifer recharge, aquifer storage and recovery, brush management, and an ecological analysis of the impact of the 2010 plan. No major on-channel reservoirs are proposed within the region at this time.

While TPW is pleased to see that many of our earlier comments have been addressed, and appreciated being included in discussions with the Environmental Committee, concerns remain regarding potential impacts associated with several strategies. Increased reliance on groundwater from the Carrizo-Wilcox aquifer, particularly in Wilson, Gonzales, and Caldwell counties, is projected to cause substantial local drawdowns which could impact seeps, small springs, instream flows, and the biota dependent on these habitats. Recommended placement of four Type II recharge structures in stream segments identified by TPW as ecologically significant stream segments could result in environmental impacts to those segments. With this IPP in place, Comal Springs is projected to stop flowing if a repeat of the drought of record occurs, imperiling endangered species. The proposed interbasin transfer from the lower Colorado River could also potentially negatively impact the Matagorda Bay ecosystem. New appropriations from the Guadalupe River and/or increased use of previously unused water rights from the Guadalupe River will impact instream flows and freshwater inflows to San Antonio Bay that will likely reduce long-term inflows and increase bay salinities. This will invoke a host of complex estuarine community changes. Both seawater and brackish groundwater desalination can be ecologically advantageous strategies, as long as issues such as impingement and entrainment at intake locations and brine disposal options are carefully considered. Continued consultation with TPW staff will help to ensure that fish and wildlife impacts can be avoided or minimized.

Section 7.1.3.3 illustrates model simulations comparing “natural”, “present”, “baseline” and “RWP” scenarios. In our opinion, the “present” simulation results in an overly conservative demand scenario since stacking the ten-year maximum diversion of each water right into a single year has not been observed. In part because of this assumption, the “present” conditions simulation results are fairly close to the “baseline” and “RWP” results, all of which show substantial deviations from the “natural” condition. TPW suggests that a comparison also be made with the average or median of the last 10 years for each water right and associated return flows. This scenario is significantly different from the “baseline” and “present” scenarios and will allow a useful representation of current, on-the-ground, conditions. Please let us know if we can help in this endeavor.

Thank you for your consideration of these comments. TPW looks forward to continuing to work with the planning group to develop water supply strategies that not only meet the future water supply needs of the region but also preserve the ecological health of the region's aquatic resources. Please contact Cindy Loeffler at (512) 389-8715 if you have any questions or comments.

General Response: The SCTRWPG appreciates the thoughtful and constructive comments provided by the Texas Parks & Wildlife Department (TPWD) on the Initially Prepared 2011 South Central Texas Regional Water Plan. In addition, the SCTRWPG gratefully acknowledges the valuable technical support provided by TPWD staff throughout the development of the 2011 Regional Water Plan. Such technical support is exemplified by staff participation in the Environmental Assessment Committee, sharing of resource information relevant to the recommendation of five stream segments for legislative designation as having unique ecological value, and valuable contributions to SCTRWPG and workgroup meetings.

Following are SCTRWPG responses to specific comments:

A. Water Quality and Aquatic Habitat

The 2010 IPP appears to project moderate water quality and aquatic habitat impacts, although this is difficult to evaluate because the numbers in Table 7.2-5 do not match the values shown in Figure 7.2-5. Please double check the calculations and presentation of results.

Response: Table 7.2-5 is correct. Figure 7.2-5 has been revised to portray the correct values.

B. Present Conditions Simulations in the Cumulative Effects (Section 7)

TPW suggests that a comparison also be made with the average or median of the last 10 years for each water right and associated return flows.

Response: The South Central Texas Regional Planning Group will consider performing such an analysis for the 2016 Plan.

10.2.3.3 Public Comments on the Initially Prepared 2011 South Central Texas Regional Water Plan and SCTRWPG Responses

Public Comments

A. Freshwater Inflows

Several commentors expressed concern about freshwater inflows into the Guadalupe Estuary. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

A.1. There are concerns that SB3 won't be enough to protect freshwater inflows.

Response: The environmental flows process established by SB3 is just underway for the Guadalupe - San Antonio River Basin and the Guadalupe Estuary. Among other things, both the Bay and Basin Stakeholder Committee and the Bay and Basin Expert Science Team will be considering the freshwater inflows necessary to maintain a sound ecological environment. Pursuant to TWDB guidance for regional water planning, Consensus Criteria for Environmental Flow Needs (CCEFN) have been applied in the technical evaluation of potentially feasible water management strategies.

A.2. Increased uses of existing water rights will reduce freshwater inflows during dry periods.

Response: Full utilization of existing water rights is authorized by Texas water law and recognized in the fundamental hydrologic assumptions adopted by the SCTRWPG and approved by the TWDB for regional water planning. Changes in freshwater inflows to the Guadalupe Estuary are illustrated in Figures 7.1-25 through 7.1-29 and are deemed acceptable by the SCTRWPG. Due to natural hydrologic conditions and the doctrine of prior appropriation, it is unlikely that every existing water right will be able to divert its full authorization during a repeat of the drought of record.

A.3. Environmental needs are not considered in plan.

Response: The 2006 South Central Texas Regional Water Plan offered the most comprehensive environmental analyses of any regional water plan in the State of Texas. As the 2011 plan includes the same, and additional, environmental analyses, it is expected that

Region L will again compare quite favorably with other planning regions. Water needs of the environment are considered in the application of Consensus Criteria for Environmental Flow Needs (CCEFN) as part the technical evaluation of each water management strategy including a new appropriation of surface water.

A.4. Fisheries are impacted by low flows.

Response: Freshwater inflows are but one factor affecting the fisheries. Low freshwater inflows, caused by both natural and anthropogenic means, along with many other factors (e.g., hurricanes, harvest effort, red tide, sediment deposition, nutrient loadings, pollution, etc.) can affect the Guadalupe Estuary and associated fisheries.

A.5. March-October low-flows can adversely affect species and the plan affects these flows.

Response: Compared to the Baseline, the Plan does not increase the number of occurrences of 6 month or longer periods below an assumed Drought Tolerance Level (MinQsal) within critical months of March through October (Table 7.1-13).

A.6. Groundwater pumpage affects surface water.

Response: The decline in water levels in aquifers due to increased groundwater use can affect surface water. The effects of increased groundwater pumpage are accounted for in the cumulative effects assessment found in Section 7 of the South Central Texas Regional Water Plan.

A.7. SB3 Process will help define environmental needs.

Response: See A.1.

A.8. If planned supplies from the Colorado River (LCRA-SAWS Project) do not develop, freshwater inflows could be less.

Response: Should the LCRA-SAWS Water Project not come to fruition, SAWS would likely develop alternative sources of supply to replace it. If these alternative sources are non-Edwards groundwater or originate outside of the Guadalupe – San Antonio River Basin (e.g., Seawater Desalination), then freshwater inflows with plan implementation would be similar to those presented in Section 7 of the 2011 plan.

A.9. Reduced water flows during sparse rainfall conditions raised salinity levels in San Antonio Bay to 60-year record highs during the 2008/2009 period, directly affecting game fish and other aquatic life in the system.

Response: Noted.

A.10. Ecological integrity is essential to the economic vitality of Aransas County.

Response: Noted.

B. Whooping Cranes

Several commentors expressed concern about the Whooping Crane population that winters in or near the Aransas National Refuge, adjacent to the Guadalupe Estuary. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

B.1. Crane mortality in 2008-2009 is a significant concern.

Response: There is uncertainty in the estimation of crane mortality for 2008-2009, however, loss of this endangered species is clearly a matter of concern.

B.2. Use of existing water rights contributes to the deaths of cranes.

Response: Linkage, if any, between the mortality of whooping cranes and freshwater inflows, much less changes in freshwater inflows due to uses of surface water rights, has yet to be accurately defined. The SCTRWPG is monitoring scientific studies to better define this potential linkage, including the San Antonio Guadalupe Estuarine System research conducted by Texas A&M University.

B.3. If we can save snail darters and the spotted owl, surely we can spare a couple 100,000 acft of water for cranes and redfish.

Response: Noted.

B.4. The Region L Plan does not adequately address the needs of the Whooping Cranes.

Response: The 2011 South Central Texas Regional Water Plan has been prepared in accordance with TWDB rules and guidance and the actual needs of Whooping Cranes are not known in sufficient specificity.

C. Opposition to GBRA-Exelon Project

Several commentors expressed opposition to the GBRA-Exelon Project. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

C.1. This (water management strategy) should not be a recommended project and should be moved to the "needs further study" category, so it can be studied in the next cycle of planning.

Response: Noted.

C.2. The GBRA Exelon Project will not be needed in the 2010-2020 decade.

Response: The timing of the GBRA Exelon Project is uncertain. Exelon has, however, filed an Early Site Permit application with the Nuclear Regulatory Commission and could file a Combined Operation License Application at any point in time. Exelon holds a reservation contract with GBRA for up to 75,000 acft/yr of water from GBRA's existing water rights.

C.3. The project is uncertain: permits are not in place.

Response: Exelon is and will be pursuing permits in a timely manner, as they deem necessary.

C.4. No serious analysis of its impact on the environment and the endangered whooping crane is included.

Response: Environmental Impact Studies would be part of the permitting process and a subject of future feasibility studies.

D. Support for the GBRA-Exelon Project

Several commentors expressed support for the GBRA-Exelon Project. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

D.1. The project offers potential benefits to the local and regional economies.

Response: Noted.

D.2. The project is a responsible use of existing water rights.

Response: Noted.

E. GBRA Mid-Basin Projects

Several commentors provided comments on the GBRA Mid-Basin Projects. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

E.1. Support for the projects and recommendation that one of them should deliver water to the Lake Placid WTP.

Response: Noted.

E.2. There have been insufficient environmental studies. The plan does not take into account flow rates among other factors and the impact on the ecology of the rivers and wetlands.

Response: The GBRA Mid-Basin Project has been evaluated in accordance with TWDB guidance for regional planning. Detailed environmental studies would be part of the permitting process and future feasibility studies.

E.3. Project will modify the existing flow regime below the Gonzales diversion.

Response: Noted.

E.4. It is in the early formulation stage and would be appropriate to postpone until the next water plan when more info is available.

Response: There is a pending surface water right application at TCEQ for this water management strategy. One of the requirements for the permit is consistency with a regional water plan. By placing the GBRA Mid-Basin Project (Surface Water) in the Plan, the South Central Texas Regional Planning Group does not impede GBRA's pursuit of such permits.

F. GBRA Simsboro Project

The Lost Pines Groundwater Conservation District expressed concern about the GBRA Simsboro Project. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

F.1. The GBRA Simsboro Project was not represented in the GMA 12 simulations.

Response: Noted.

F.2. There is enough water from other projects (GBRA Mid-Basin Projects) that the GBRA Simsboro Project is not necessary.

Response: Noted.

F.3. The project creates an inter-regional conflict with Regions G and Regions K.

Response: The GBRA Simsboro Project has been revised to avoid an inter-regional conflict with Region G. The amount of water exported from Lee County (Region G) has been reduced from 20,000 acft/yr to 19,777 acft/yr in order to avoid the source over-allocation in Lee County. As a result, the size of the project has been reduced from 50,000 acft/yr to 49,777 acft/yr.

The SCTRWPG has decided to resolve this potential conflict by including "overdraft" notation and explanatory language to documentation of the GBRA Simsboro Project in the 2011 Regional Water Plan. Additional information is available in the SCTRWPG response to Level I Comment No. 52 provided by the TWDB.

G. Opposition to GBRA New Appropriation (Lower Basin)

Several commentors expressed opposition to two water management strategies sponsored by GBRA – the GBRA-Exelon Project and the GBRA New Appropriation (Lower Basin). Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

G.1. This (water management strategy) should not be a recommended strategy and should be moved to the "needs further study" category, so it can be studied in the next cycle of planning.

Response: There are pressing water demands within the GBRA district and a pending application at TCEQ for this water management strategy. One of the requirements for the permit is consistency with a regional water plan. By placing the GBRA New Appropriation (Lower Basin) in the Plan, the South Central Texas Regional Planning Group does not impede GBRA in pursuing such permits.

G.2. Recommends project wait until the next water plan 2016-2017.

Response: See response to G.1.

H. Opposition to the Lower Guadalupe Water Supply Project for Upstream Needs (60,000 acft/yr) and the Lower Guadalupe Water Supply Project for Upstream Needs at Reduced Capacity (35,000 acft/yr)

One commentor expressed opposition to two alternative water management strategies sponsored by GBRA – the Lower Guadalupe Water Supply Project for Upstream Needs (60,000 acft/yr) and the Lower Guadalupe Water Supply Project for Upstream Needs at Reduced Capacity (35,000 acft/yr). Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

H.1. It is unclear as to whether this project would involve adding fresh groundwater to the strategy.

Response: Neither alternative water management strategy includes fresh groundwater, nor are there plans to add fresh groundwater to either strategy.

H.2. It is unclear about the relationship of these two strategies with regards to the GBRA Exelon strategy and other planned GBRA projects.

Response: Both the Lower Guadalupe Water Supply Project for Upstream Needs (60,000 acft/yr) and the Lower Guadalupe Water Supply Project for Upstream Needs at Reduced Capacity (35,000 acft/yr) are alternative strategies. At this time GBRA is not pursuing either project. Should one or more of GBRA's other recommended water management strategies become infeasible (GBRA Simsboro Project, GBRA Mid-Basin Project, GBRA New Appropriation (Lower Basin), etc), GBRA may ask the South Central Texas Regional Planning Group to elevate one of these alternative strategies to recommended status. Which of the two water management strategies GBRA would pursue depends on the status of the GBRA Exelon Project. As noted, if the GBRA Exelon Project is still active and being sought, then the Lower Guadalupe Water Supply Project for Upstream Needs at Reduced Capacity (35,000 acft/yr) would be the only viable option. However, if the GBRA Exelon Project is no longer active, then GBRA could choose either alternative water management strategy to elevate to recommended status.

I. Off-Channel Reservoirs / Private Property Rights

Several commentors expressed concern about private property rights, especially where condemnation could be required for siting of off-channel reservoirs. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

I.1. Off-channel reservoirs should be located closer to the point(s) of use.

Response: The locations and physical characteristics of off-channel reservoirs are subject to feasibility studies and permitting.

I.2. Property condemnation for an off-channel reservoir should be avoided.

Response: The South Central Texas Regional Planning Group specifically adopted a policy pertaining to condemnation. In Section 8 of the Plan, it states "*The SCTRWPG is of the opinion that it is not appropriate for a regional water planning group to tell a governmental entity to abandon its eminent domain powers if it wants its project to be approved as a recommended water management strategy. The SCTRWPG is further of the opinion that it is not within the planning group's jurisdiction to judge the merits of eminent domain. It is, however, the understanding of the SCTRWPG that all land needed for implementation of water management strategies will be obtained using a process of willing seller and willing buyer and that limited condemnation will be used as a last resort*."

I.3. Reservoir sites are selected as examples only.

Response: As with all water management strategies in the South Central Texas Regional Water Plan, the locations and facilities are planning level approximations, subject to revision during permitting, design, and/or construction. Furthermore, some water management strategies, such as the Storage above Canyon Reservoir strategy, are illustrative to show the potential of a similar project. Detailed siting feasibility studies could be necessary before some projects move forward.

I.4. Surveys and documentation will be required before this process moves forward.

Response: As with all water projects, surveys and documentation are necessary for permitting, design, and construction.

I.5. Eminent domain should only be used to acquire pipeline easements as a last resort.

Response: See response to I.2.

J. Storage above Canyon Reservoir

One commentor had comments pertaining to the Storage above Canyon Reservoir water management strategy. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

J.1. While the shallow soils of the Hill Country are relatively "poor" in comparison to the deep soils of the Blackland Prairies, they do not render the land as useless or valueless as this seems to imply. Furthermore, the comments regarding recreation are totally inaccurate. Texans consider the Hill Country their big backyard and are utilized for a wide range of recreation, including mountain biking, hunting, hiking, fishing, bird-watching, and nature photography.

Response: The Storage above Canyon Reservoir description has been revised to correct the implication that the soils are useless. In addition, the statement about recreation has been revised to accurately depict the wide range of recreational activities in this area.

J.2. Eminent domain should only be used to acquire pipeline easements, as it relates to the ASR options of the water management strategy, as a last resort. It should be the goal of Region L to enlist voluntary cooperators.

Response: See response to I.2.

K. Groundwater Rights

One commentor expressed concern about private property rights regarding groundwater. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

K.1. Projects should not infringe upon groundwater or private property rights.

Response: Noted.

L. Groundwater Availability/Supply Definitions

One commentor had a comment regarding confusion about the definitions of groundwater availability, existing groundwater supplies, and drought of record.

L.1. It is suggested that there be a glossary of terms included in the Plan.

Response: The terminology used in the Plan is defined in TWDB's guidance for regional planning, which is available on the TWDB website.

M. Gonzales County Groundwater Strategies

Several commentors expressed concerns about large groundwater export projects from Gonzales County. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

M.1. All the pumpage for exports from Gonzales County could adversely affect the local pumpers by shifting the brackish groundwater line.

Response: The possibility of such a shift would most likely be evaluated in the permitting process before the Gonzales County Underground Water Conservation District.

M.2. Impacts to the springs and rivers due to the increased pumpage are of concern.

Response: Potential declines in water levels in aquifers due to increased groundwater pumpage can affect surface water. The estimated effects of increased groundwater pumpage are accounted for in the cumulative effects assessment (Section 7) of the South Central Texas Regional Water Plan.

M.3. The transfer of large amounts of water from one aquifer region to another is not part of a natural process and is damaging to the environment.

Response: While such transfers are certainly not a natural process, additional data is needed to determine whether these transfers are damaging to the environment.

M.4. There are insufficient water allocations given to agricultural (food-producing) areas. Water resources in the areas of food production are already over-allocated. Areas that have water may welcome economic development.

Response: Noted.

N. CRWA Wells Ranch Project

Several commentors, including entities that would receive water from the project, indicated that the description and cost estimate of the CRWA Wells Ranch Project did not include pipeline segments that need to be built to fully deliver the water from the Wells Ranch well field.

N.1 Please show costs for the pipeline segments of the CRWA Wells Ranch Project that are not currently constructed.

Response: After some discussion, CRWA and their engineer clarified the project status and gave direction of the missing pipeline segments. The CRWA Wells Ranch Project description and cost estimate has been revised to account for the pipeline segments.

O. TWA Carrizo Project

Representatives from Springs Hill WSC, Gonzales County WSC, and Canyon Lake WSC suggested minor revisions to the TWA Carrizo Project, including pipeline realignment.

O.1 Please revise the TWA Regional Carrizo Project pipeline to go east and south of the City of Gonzales.

Response: The TWA Carrizo Project has been revised to show the desired pipeline route. The documentation, including the cost estimate, has been updated as well.

P. Combined Pipeline from Gonzales County through Guadalupe County

Several commentors, including sponsoring entities of many of the Gonzales County Projects, expressed interest in a combined pipeline delivering supplies associated with two or more projects through Guadalupe County. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

P.1. The plan should consider a combined pipeline through Guadalupe County, capable of carrying SSLGC, CRWA, and SAWS Water.

Response: Due to time and budget constraints, combined pipelines were not evaluated in the 2011 Plan. However, several pipeline routes have been realigned so that they share

common transportation corridors. It is the understanding of the South Central Texas Regional Water Planning Group that the TWDB will accept applications for a combined pipeline if two or more projects have pipelines in the general vicinity and it can be shown that a combined pipeline is more economical than separate pipelines.

P.2. The combined pipeline should be over-sized to accommodate TWA and Simsboro water as well.

Response: See response to P.1.

P.3. Consider expanding the pipeline network to include the area from Guadalupe County to Bexar and Comal counties.

Response: Noted.

Q. Water Use Data and Demand Projections

Several commentors expressed concern that the water use estimates and demand projections for several WUGs are too low. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

Q.1. Water use and demand projections shown in Region L do not match that used in at least one Groundwater Conservation District Management Plan. Region L should use data provided by the groundwater conservation districts.

Response: Water demand projections are prepared and provided by the Texas Water Development Board and are based on a number of factors.

Q.2. Region L water demand projections for irrigation and mining (oil and gas) are underestimated.

Response: Water demand projections are prepared and provided by the Texas Water Development Board and are based on a number of factors.

Q.3. Region L is showing a decrease in irrigation demand in Gonzales and DeWitt Counties. With the falling value of the US Dollar, the profitability and demand for products should be increasing.

Response: Noted.

Q.4. Mining water uses in Karnes, DeWitt, and Goliad Counties for the fracturing of shale to release natural gas should be included.

Response: Water demand projections are prepared and provided by the Texas Water Development Board and are based on a number of factors. The SCTRWPG encourages the TWDB to carefully consider such mining water uses in the development of water demand projections for use in the 2016 Regional Water Plan.

Q.5. Steam-Electric demand projections in Victoria County are too low.

Response: Steam-electric water demand projections for the region, including Victoria County, were revised based on information from the steam-electric power generators within the region. TWDB approved these revisions.

R. Lavaca Off-Channel Reservoir

Several commentors expressed a desire to remove the Lavaca Off-Channel Reservoir from the Plan. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

R.1. LNRA, sponsor of the Lavaca Off-Channel Reservoir, has requested that the water management strategy be removed from the South Central Texas Regional Water Plan as a recommended strategy and designated as a water management strategy needing further funding or study.

Response: The Plan has not been modified as the Lavaca Off-Channel Reservoir is needed to meet needs in Calhoun County (Point Comfort and Calhoun County Industrial).

S. Palmetto Bend – Stage II

Over 100 commentors expressed a desire to remove the Palmetto Bend – Stage II from the Plan. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

S.1. Lake Texana did not deliver the economic benefits as promised.

Response: Additional data is necessary to support or reject this statement.

S.2. The Leave Our Lavaca River Alone (LOLA) organization will not sit back and let Region L take their water.

Response: The SCTRWPG appreciates the active engagement of LOLA in the planning process.

S.3. Other storage technologies exist.

Response: Noted.

S.4. Palmetto Bend – Stage II will increase taxes in Jackson County.

Response: Additional data is necessary to support or reject this statement.

S.5. The project would be in Jackson County, but would be delivered to Calhoun County, taking jobs with it.

Response: Additional data is necessary to support or reject this statement.

S.6. Damming the last remaining free river in Texas is simply the wrong thing to do when there are other options.

Response: Noted. The Lavaca River is not the last remaining free-flowing river in Texas.

S.7. If the Lavaca River is dammed, eminent domain will be used.

Response: See response to I.2.

S.8. The estuaries are already in danger, especially since the BP oil spill. Cutting off freshwater inflow just doesn't make sense.

Response: Noted.

S.9. LNRA, sponsor of Palmetto Bend – Stage II, has requested that the water management strategy be removed from the South Central Texas Regional Water Plan as an alternative strategy and designated as a water management strategy needing further funding or study.

Response: The Plan has been modified to designate Palmetto Bend – Stage II a water management strategy needing further funding or study prior to implementation.

T. Drought Management as a Water Management Strategy

One commentor provided a few comments regarding Drought Management as a Water Management Strategy. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

T.1. Praise for Region L recognizing Drought Management – not meeting non-essential water demands makes sense.

Response: Thank you.

T.2. It should be more than an interim strategy.

Response: The South Central Texas Regional Water Planning Group chose to recommend that water user groups consider implementing Drought Management as a means to reduce demands and meet near-term needs until other water management strategies are implemented. Potential recommendation of Drought Management as a long-term water management strategy may be considered in the development of the 2016 regional water plan.

T.3. The economic analyses should be re-evaluated. Based on SAWS experience, unit costs could be less than shown.

Response: The economic analyses of Drought Management water management strategy were developed using data from the TWDB.

U. Blanco Recharge Dam

Two commentors had varying opinions on the Blanco Recharge Dam (one of the Edwards Recharge – Type II projects). Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

U.1. It's a large dam on one of the last free flowing rivers in the state.

Response: Noted.

U.2. There will be sediment (gravel) issues due to the movement of the river during flooding.

Response: Noted.

U.3. The Blanco River dries up during drought, thus no water is available for springflow protection when it's needed.

Response: As a recharge enhancement project, the Blanco Recharge dam would take advantage of limited transient storage within the Edwards Aquifer and incrementally enhance spring discharges at San Marcos and Barton Springs.

U.4. There would be a great loss of water due to evaporation within the reservoir.

Response: Compared to conventional reservoirs, the Blanco Recharge Dam would lose less water to evaporation as a result of direct percolation into the Edwards Aquifer and diversions to the Edwards Aquifer recharge zone.

U.5. The Blanco Recharge Dam will help alleviate the flooding situation on the Blanco River.

Response: Noted.

V. Recommended & Alternative Water Management Strategies

Several commentors had general comments about the length of the list of recommended and alternative water management strategies, especially those that are planned to be implemented in the distant future. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

V.1. Strategies that aren't likely to be implemented in the next 5 years should be reclassified as alternative Water Management Strategies.

Response: Per TWDB guidance and rules for regional planning, recommended water management strategies must be identified to meet projected needs throughout the entire multi-decade planning period.

V.2. The plan should include recommended strategies that just meet the projected demands only and other projects should be listed as alternatives

Response: Water management strategies that will provide management supplies in excess of projected demands are recommended for a variety of reasons. These reasons include planning in the event of a drought worse than the drought of record, uncertainty in the firm supply of existing supply sources (e.g., the Edwards Aquifer), flexibility for entities to pursue permits and studies to determine the best strategy for them, and opportunities to refine water management strategies in response to public concerns regarding potential environmental impacts. The SCTRWPG may consider criteria for integration of management supplies in the development of the 2016 Regional Water Plan.

W. Population Growth

One commentor was concerned about the large population growth in the region as it relates to the ability of the region to support it and the environment. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

W.1. Growth can't continue beyond the capacity of the land to sustain the ecosystem.

Response: Noted.

X. Water Management

One commentor was concerned that water is becoming a commodity. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

X.1. Water is a community resource rather than a resource commodity.

Response: Noted.

Y. Springs Hill WSC: Wholesale Water Provider (WWP) Table

Springs Hill WSC requested changes to their WWP Table. Revisions should show purchase from GBRA (WWP) at 1,500 acft/yr for 2010 through 2060, and the Brackish Wilcox Groundwater for RWA should be limited to 1,500 acft/yr in 2060 only.

Response: The requested revisions have been made.

Z. Brush Management

One commentor had concern about the analysis performed in the Brush Management water management strategy. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

Z.1. Much of the recent research by Bradford Wilcox and Yun Huang disputes the claim that removal of Ashe Juniper increases river flows.

Response: Texas A&M University staff, including Bradford Wilcox, were technical consultants for the evaluation of the Brush Management water management strategy and worked with HDR Engineering in evaluating the strategy.

Z.2. Recommendation that Appendix D (in Volume II, which pertains to Brush Management) be revised and any part of the plan that relies on the clearing of brush be revised.

Response: Brush Management is not a recommended or alternative water management strategy in the Plan. At this time, no water user groups rely on the clearing of brush to meet projected needs.

AA. Rural Water Needs

One commentor had concern about how rural water needs are met. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

AA.1. The Plan makes no apparent provision for any anticipated future water needs of families residing in rural subdivisions with no access to municipal water supply systems.

Response: TWDB aggregates residences, including those in rural subdivisions, that lie outside of a designated Water User Group (WUG) into the County Rural WUG. TWDB guidance for water planning defines a WUG as a city serving more than 500 people or a water supplier supplying more than 280 acft/yr. Furthermore, TWDB is funding a separate ongoing study in Hays County to address this issue the regional planning process.

AA.2. The Regional Water Plan is to meet the needs of every Water User Group in the region.

Response: See AA.1.

AA.3. It may make sense to consider an inter-basin transfer from the Colorado Basin to meet the needs of rural Hays County.

Response: Noted.

BB. Support of the Region L Plan and the Regional Water Planning Process

Several commentors supported and praised the Plan and the regional planning process. Below are the specific comments and the South Central Texas Regional Water Planning Group responses.

BB.1. The Region L Plan is a well-organized, readable plan.

Response: Thank you.

BB.2. Compliments on the fact that Region L exceeds the state's requirements when it comes to environmental assessment and is the best plan in the state.

Response: Thank you.

BB.3. The planning process provides the public an opportunity to participate.

Response: Noted.

BB.4. Plan supports development of desalination projects.

Response: Noted.

BB.5. Plan supports development of regional pipelines.

Response: Noted.

Comments received from Sierra Club with SCTRWPG Responses

Sierra Club Letter, dated June 16, 2010, with Responses

Dear Mr. Mims and Planning Group Members:

The Lone Star Chapter of the Sierra Club appreciates the opportunity to review and comment on the Initially Prepared 2010 South Central Texas Regional Water Plan (Region L). The planning group, along with their consultants, has prepared a well-organized document that provides an understanding of the plan components and documents potential impacts.

The Sierra Club acknowledges the positive steps taken in the development and preparation of the plan, including the incorporation of drought management strategies, brush management/land stewardship efforts and the designation of unique stream segments. We also greatly appreciate the more thorough quantitative assessment of the environmental impacts of the plan as it relates to freshwater inflows to bays and estuaries. This assessment provides a more accurate depiction of the potential impact the South Central Texas Regional Water Plan may have on freshwater inflows to San Antonio Bay. It also highlights our overarching concern regarding the Plan.

In 2004, the National Wildlife Federation (NWF) released a report called *Bays in Peril: A Forecast for Freshwater Inflows to Texas Estuaries*. The report used a standard TCEQ water availability model (WAM) run for the Guadalupe and San Antonio Rivers to forecast inflows to the estuary if all the existing water permits were fully used and if reuse of wastewater were increased to 50%. The report then evaluated the predicted inflows against each of two ecologically significant criteria: a drought criterion and a freshwater pulse (or higher flows) productivity criterion based on the results of the state's freshwater inflows studies. In the report, San Antonio Bay received a ranking of Danger because of the potential impacts to the bay resulting from increased reliance on existing water rights.

The quantitative analysis prepared by the Region L consultants is based on the NWF analysis. It compares the number of occurrences of six months or longer periods below drought tolerance levels during critical months (March-October). Under Natural Conditions, there were <u>three</u> times during the period of analysis (1934-1989) when inflows to the estuary fell below drought tolerance levels. Under Current Usage, the model predicts the number of times these flow conditions would have occurred would have increased to <u>five</u>; and with implementation of the regional water plan and the full use of existing water rights, the number of times the bay doesn't get enough water during drought increases to <u>eight</u>.

The 2010 Initially Prepared South Central Texas Regional Water Plan, with its reliance on increased groundwater pumping that reduces baseflows in rivers and stream in the San Antonio and Guadalupe Basin, its reliance on the full utilization of existing water rights, and its reliance on additional surface water withdrawals from the Guadalupe River, is likely to have significant impacts to San Antonio Bay, if implemented.

The environmental flows process created by Senate Bill 3 is now beginning for the Guadalupe and San Antonio River basins. This new process will help to more precisely define needed freshwater inflows and to identify mechanisms for achieving those inflows. It will be imperative that the next water plan uses this information to better address the issue of insufficient freshwater inflows to our bays and estuaries.

Response: The SCTRWPG appreciates the thoughtful and constructive comments provided by the Lone Star Chapter of the Sierra Club on the Initially Prepared 2011 South Central Texas Regional Water Plan. Following are responses to specific comments.

Finally, we note at least two places in the document (Pages 4B.1-15 and 4B.1-32) where the 2006 Regional Water Plan is referenced. We believe the reference should be to the 2011 Regional Water Plan.

Response: Inappropriate references to the 2006 Regional Water Plan have been eliminated from the 2011 Regional Water Plan.

Page Specific Comments

Executive Summary

[1] (Page ES-20, first bullet): *Implementation of the 2011 Regional Water Plan is likely to result in increased instream flows in the San Antonio River.* It may be helpful to the reader to explain the reason for increased flows; it is not readily intuitive.

Response: Text has been added to explain that expected increases in San Antonio River flows are attributable to increases in treated effluent from all wastewater discharges (most notably associated with projected growth in Bexar County) and increases in springflow (associated with Edwards Aquifer Recharge Type 2 Projects).

[2] (Page ES-20, third bullet): Emphasizing the beneficial use of existing surface water rights does minimize the development of new water supplies and associated environmental impacts. However, if existing rights were issued without environmental flow protections, the use of existing rights may have significant adverse effects.

Response: Potential effects of increased use of existing surface water rights on instream flows and freshwater inflows to the Guadalupe Estuary are reported in Chapter 7. More data is being compiled and evaluated as part of the Texas Environmental Flows Program (pursuant to SB2 and SB3) to better understand the magnitude and significance of these effects with respect to habitat and species of interest.

[3] (Page ES-20, fourth bullet): *Plan avoids large-scale development of new mainstem reservoir.* The inclusion of Palmetto Bend II as an alternate strategy makes this statement invalid.

Response: The decisions of the SCTRWPG to include the Lavaca Off-Channel Reservoir as a recommended water management strategy and Palmetto Bend Stage II as an alternative water management strategy are the basis for this environmental benefit. These decisions were made despite the facts that Palmetto Bend Stage II has an existing water rights permit and has been designated a site of unique value for construction of a reservoir by the Texas Legislature.

[4] (Page ES-20, eighth bullet): Potential reductions in freshwater inflows to bays and estuaries also result from the implementation of existing GBRA appropriations.

Response: Text has been added to note concerns that increased uses of existing water rights may reduce freshwater inflows to bays and estuaries.

[5] (Page ES-21, second bullet): Large demands for electrical power should be acknowledged as additional environmental "concerns" for seawater desalination.

Response: Text has been added to note that there are concerns with electrical power demands associated with seawater desalination.

Section 4B.1.2 Water Management Strategy Descriptions

4B.1.2.6 Drought Management

[6] (Page 4B.1-14): The carryover paragraph from the previous page notes "*Drought management is an interim strategy to meet near-term needs through demand reduction until such time as economically viable long-term water supplies can be developed*."

We feel that such an approach does not accurately depict the role drought management plays as a water management strategy. Drought management in and of itself is an economically viable long-term water strategy that allows a water supplier to forego the development and maintenance of new sources by reducing non-essential water uses during times of drought.

As publicly noted by the San Antonio Water System, drought management efforts in 2009 resulted in a savings of between 24,000 and 30,000 acre-feet at a unit cost of $25 per acre-foot. We cannot imagine a more economically viable long-term strategy.

Response: The SCTRWPG may consider whether to recommend Drought Management as a long-term, rather than an interim, water management strategy in the development of the 2016 Regional Water Plan.

4B.1.2.11 Brush Management

[7] (Page 4B.1-16): We appreciate the efforts of the planning group to further inclusion of brush management (land stewardship) as a water management strategy.

Response: Thank you.

4B.1.2.13 Storage above Canyon Reservoir

[8] (Page 4B.1-17): We appreciate the consideration of this strategy as an Aquifer Storage and Recovery system rather than one relying on off-channel reservoirs.

Response: Thank you.

4B.1.2.14 GBRA-Exelon Project

[9] (Page 4B.1-17) We have grave concerns regarding the potential implementation of this water management strategy. As noted in the first paragraphs of these comments, the full utilization of existing water rights on the Guadalupe River is predicted to have significant impact to species that rely on sufficient freshwater inflows to San Antonio Bay.

Response: See Response to Comment #2.

4B.1.2.24 GBRA Simsboro Project

[10] (Page 4B.1-23): According to a letter from Region K Chairman, John Burke to Chairman Con Mims, dated February 10, 2010, the Simsboro Project creates a potential conflict between Region L and Region K.

Response: Regional water planning boundaries are not a factor in the consideration of applications for groundwater production permits by a groundwater conservation district. As permit applications for this project have been pending with the responsible groundwater conservation district for some time, it is anticipated that any potential conflicts in regional water planning will be resolved.

4B.1.2.39 Lavaca River Off-Channel Reservoir

[11] (Page 4B.1-29): According to Appendix D, water demands in Calhoun County for industrial use in 2060 are predicted to be 209 ac-ft (Note: Table 4A-1 in Section 4A shows this demand as 245 ac-ft). According to our records, until the January 2010 meeting of the Region L planning group, this small amount was to be met by means of purchase from the Lavaca-Navidad River Authority.

At the January 2010 meeting of the Region L planning group, this strategy (supplying 10,000 acre-ft to meet a 209 ac-ft need) was presented as a possible recommended strategy. While the Lone Star Chapter of the Sierra Club understands that there may have been circumstances beyond the control of consultant and the planning group, we are surprised that such a strategy was presented to the planning group on the same day it was to vote to approve the plan.

During this round of planning, the consultants and leadership of the South Texas Regional Water Planning Group have provided ample opportunity for planning group members and the public to understand and comment on various proposed water management strategies. We are disappointed that little opportunity was provided for fully vetting this controversial project.

Response: Representatives of the SCTRWPG were made aware of a request by Formosa Plastics Corporation (Formosa) for an additional 10,000 acft/yr for industrial use in eastern Calhoun County during an April 2009 inter-regional coordination meeting among Regions L, N, and P. During this meeting, representatives of the Lavaca-Navidad River Authority (LNRA), which currently supplies Formosa about 30,000 acft/yr, advised that it intended to continue as the future wholesale water provider for Formosa and Point Comfort and would need to develop new sources in order to do so. As the SCTRWPG decided not to voluntarily pursue formal demand projections revisions (except those required by the TWDB for steam-electric power), the new demands of Formosa were addressed informally in a manner similar to that for a number of other water users in Region L that are growing faster than approved demand projections show. In the course of further coordination, LNRA provided relevant data and technical evaluation documentation for the Lavaca Off-Channel Reservoir. Unfortunately, however, this information was received late in the planning cycle providing limited time for consideration by the SCTRWPG.

4B.1.2.40 Palmetto Bend – Stage II

[12] See comments for 4B.1.2.39 Lavaca River Off-Channel Reservoir

Response: See Response to Comment #11.

4B.1.2.44 Rainwater Harvesting

[13] (Page 4B.1-31): We appreciate the comment noting rainwater harvesting's ability to supplement supplies from wells completed in the Trinity Aquifer. This is an important component of this strategy.

Response: Acknowledged.

Section 4C Technical Evaluations of Water Management Strategies

Section 4C.2 Drought Management

[14] There were several changes to the discussion of Drought Management in the April 2009 Study 3: Enhanced Water Conservation, Drought Management, and Land Stewardship. These

changes do not appear to have been transferred to Section 4C.2, including the discussion of the refined methodology for SAWS.

Response: The refined methodology for SAWS described in Study 3 was used for technical evaluation of the Drought Management strategy for all water user groups with projected needs in 2010 in development of the 2011 Regional Water Plan.

[15] (Page 4C.2-3): …*the WUG is planning to manage water shortages through drought contingency plan activation or water rationing if needed*. We feel the inclusion of the term "water rationing" presents a distorted picture of drought management as a water management strategy. First, we are not aware of any municipal water suppliers in the planning region that actually utilize water rationing as part of their drought contingency plan. Second, drought management, as used as a water management strategy in the plan only calls for a five percent reduction in use; this is very unlikely to result in the need for water rationing whereby water users are allocated only a certain amount of water for a given period of time.

Response: References to "water rationing" in association with the Drought Management strategy have been eliminated, although it is recognized that enforcement is a necessary component of most drought contingency plans and many water conservation plans.

[16] (Page 4C.2-5): The first paragraph discusses the methodology used to determine risk factors. As we have noted in two comment letters to the consultant and members of the regional planning group (February 5, 2008 and November 4, 2008), we have concerns with the method used to develop the Risk Factor. The Risk Factor is determined from a Risk Curve that is calculated using variations in annual per capita water use from 1964-2005.

We feel that utilizing such historical per capita water use may unnecessarily bias the Risk Curve. In more recent years, the variances in per capita water use have declined with the increased awareness and implementation of water conservation activities. Such decreases in variance should lessen the slope of the Risk Curve, and consequently, diminish the Risk Factor.

Response: The general methodology used to perform a technical evaluation of the Drought Management strategy clearly involves simplifying assumptions commensurate with funding allocated to this effort. It is noted that variances in per capita water use have

also declined as a result of the implementation of drought restrictions on Edwards Aquifer users since 1996.

[17] Our second concern relates to the determination of the Impact Factor. While we have made this comment previously, we feel it warrants repeating. The Impact Factor is obtained from the Texas Water Development Board and is used by the Board for calculating the economic impacts of not meeting water needs. The use of this Factor is inappropriate to determining the costs related Drought Management.

Drought Management efforts focus on directing available supplies from nonessential uses to more critical uses during times of shortage. The calculations used by the Board include factors such as lost sales for manufacturing. It is not reasonable to assume that the economic impacts of having water unavailable temporarily to fill a fountain, keep a lawn green, or wash a car are the same as having water unavailable to run a manufacturing line. In fact, most drought management plans do not reduce water available for manufacturing.

Response: Coordination with TWDB staff regarding applicability of Impact Factors in the technical evaluation of the Drought Management strategy indicates that such factors have been appropriately used in estimating the costs associated with this strategy for the 2011 Regional Water Plan. As described on page 4C.2-5, reductions in the manufacturing sector are not assumed to occur until reductions in residential use exceed 25 percent.

Section 4C.10 GBRA-Exelon Project

[18] (Page 4C.10-16): *After a review of the habitat requirements for each listed species, it is not anticipated that this project will have any permanent adverse effect on any federally listed threatened or endangered species, its habitat, or designated habitat, nor would it adversely affect any state listed species*. Given current litigation, we do not believe this to be a prudent statement.

Response: Noted.

Section 4C.14 GBRA New Appropriation (Lower Basin)

[19] (Page 4C.14-2): The first paragraph notes that the appropriation is subject the full application of environmental flow standards adopted pursuant to Section 11.1471 of the Texas

Water Code. For clarification, and by agreement of the Guadalupe Basin Water Needs Workgroup, Section A(2) of the Recommendations (October 12, 2009) should be added to this section.

Response: Section A(2) of the Guadalupe Basin Water Needs Workgroup Recommendations has been added to Section 4C.14.

[20] (Page 4C.14-14): *After a review of the habitat requirements for each listed species, it is not anticipated that this project will have any permanent adverse effect on any federally listed threatened or endangered species, its habitat, or designated habitat, nor would it adversely affect any state listed species.* Given current litigation, we do not believe this to be a prudent statement.

Response: Noted.

Section 4C.15 GBRA Mid-Basin (Surface Water)

[21] (Page 4C.15-2): The first paragraph notes that the appropriation is subject to the full application of environmental flow standards adopted pursuant to Section 11.1471 of the Texas Water Code. For clarification, and by agreement of the Guadalupe Basin Water Needs Workgroup, Section A(2) of the Recommendations (October 12, 2009) should be added to this section.

Response: Section A(2) of the Guadalupe Basin Water Needs Workgroup Recommendations has been added to Section 4C.15.

Section 4C.16 GBRA Mid-Basin (Conjunctive Use)

[22] (Page 4C.15-2): The first paragraph notes that the appropriation is subject the full application of environmental flow standards adopted pursuant to Section 11.1471 of the Texas Water Code. For clarification, and by agreement of the Guadalupe Basin Water Needs Workgroup, Section A(2) of the Recommendations (October 12, 2009) should be added to this section.

Response: Section A(2) of the Guadalupe Basin Water Needs Workgroup Recommendations has been added to Section 4C.16.

Section 7. Consistency with Long-Term Protection of the State's Water, Agricultural, and Natural Resources

[23] We appreciate the commitment by the consultants and the planning group to this section. It is well researched, organized, and informative.

Response: Thank you.

[24] (Page 7-85): Emphasizing the beneficial use of existing surface water rights is cited as an environmental benefit. Yet, Section 7.1.3.4.2 Discussion of Estuary Inflow Assessment highlights how increasing the use of existing water rights in the regional water plan results in increased low-inflow periods in San Antonio Bay. We do not see this as a benefit, only a trade-off.

Response: Noted.

Thank you for the consideration of these comments. Please feel free to contact us if you have any questions.

10.4 Coordination with Other Regions

Members of the SCTRWPG (Region L) have maintained contact with neighboring RWPGs for purposes of communicating content, status, and progress of planning work of the respective RWPGs. Meetings were held involving representatives of Regions L, N, and P, to discuss water management strategies of mutual interest, particularly the Lavaca Off-Channel Reservoir and Palmetto Bend – Stage II Project. Likewise, meetings were held involving representatives from Region L and Regions G and K, separately, to resolve potential conflicts associated with the GBRA Simsboro Project and various recommended water management strategies in Regions G and K.

10.5 Final Plan Adoption

As explained in Section 10.2.3, the RWGP held public hearings in Victoria, San Antonio, and San Marcos and also gathered written comments submitted by various individuals and organizations as well as public agencies. The TWDB reviewed the IPP and provided comments and questions. The TWDB comments, together with SCTRWPG responses are included in

Section 10.2.3.1. TPWD comments and SCTRWPG responses are presented in Section 10.2.3.2. A summary of public comments and SCTRWPG responses are presented in Section 10.2.3.3.

The SCTRWPG met on August 5, 2010 to consider adoption of the 2011 South Central Texas Regional Water Plan as revised pursuant to comments on the Initially Prepared Plan and the SCTRWPG adopted the Regional Water Plan by consensus.

Appendix A
Summary of References

Appendix A
List of References

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Appendix B
Reliability Information for Surface Water Rights

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Basin	County of Diversion Location(s)	Use	WR ID#	Authorized Diversion (acft/yr)	Volume Reliability (%)	Minimum Annual Supply (acft)	Owner	Stream
Guadalupe	Caldwell	HYD	P4492_1	15,000	69.8	0	HYDRACO POWER INC	SAN MARCOS RIVER
Guadalupe	Caldwell	IRR	P4569_2	240	71.9	0	ROBERT L BOOTHE	SAN MARCOS RIVER
Guadalupe	Caldwell	IRR	C3898_1	20	90.8	0	CITY OF LULING	SAN MARCOS RIVER
Guadalupe	Caldwell	IRR	P3600_3	750	77.4	0	THE LULING FOUNDATION	SAN MARCOS RIVER
Guadalupe	Caldwell	IRR	P4080_1	425	77.2	0	BENO CORPORATION	SAN MARCOS RIVER
Guadalupe	Caldwell	IRR	P4502_1	600	72.1	0	JOHN SCOTT GREENE ET AL	SAN MARCOS RIVER
Guadalupe	Caldwell	IRR	C3899_1	1,180	90.8	0	MIGUEL CALZADA URQUIZA ET UX	SAN MARCOS RIVER
Guadalupe	Caldwell	IRR	C3890_1	50	90.8	0	GEORGE PARTNERSHIP LTD	SAN MARCOS RIVER
Guadalupe	Caldwell	IRR	P4022_1	450	78.3	0	MARY ANN LANGFORD ET AL	SAN MARCOS RIVER
Guadalupe	Caldwell	IRR	P4043_1	150	78.3	0	TERRAND LTD ET AL	SAN MARCOS RIVER
Guadalupe	Caldwell	IRR	C3904_1	28	79.7	0	SHERRY CHAPPELL	ELM CRK
Guadalupe	Caldwell	IRR	P4518_1	120	79.8	0	JOHN H COX	PLUM CRK
Guadalupe	Caldwell	IRR	P4033_1	300	78.3	0	DICK BROWN	SAN MARCOS RIVER
Guadalupe	Caldwell	IRR	C3886_1	150	80.3	0	HAYS COUNTY REC ASSOC INC	BLANCO RIVER
Guadalupe	Caldwell	IRR	C3906_1	63	89.4	0	TEXAS PARKS & WILDLIFE DEPT	CLEAR FRK PLUM CRK
Guadalupe	Caldwell	IRR	C3906_2	12	92.3	0	TEXAS PARKS & WILDLIFE DEPT	CLEAR FRK PLUM CRK
Guadalupe	Caldwell	MUN	C3888_1	320	96.7	0	JOHN F BAUGH	SAN MARCOS RIVER
Guadalupe	Caldwell	MUN	P5092_2	150	70.7	0	WILLIAM JAMES WOOTEN ET AL	SAN MARCOS RIVER
Guadalupe	Caldwell	MUN	C3889_1	24	100.0	24	CANYON REGIONAL	SAN MARCOS RIVER
Guadalupe	Caldwell	MUN	C3891_1	500	100.0	500	TRI-COMMUNITY WSC	SAN MARCOS RIVER
Guadalupe	Caldwell	MUN	C3896_1	1,500	87.6	0	GUADALUPE-BLANCO RIVER AUTH	SAN MARCOS RIVER
Guadalupe	Caldwell	MUN	C3896_2	1,300	79.4	0	GUADALUPE-BLANCO RIVER AUTH	SAN MARCOS RIVER
Guadalupe	Caldwell	MUN	P5234_2	1,022	70.0	0		
Guadalupe	Caldwell	MUN	C3887_2	772	100.0	772	MAXWELL	SAN MARCOS RIVER
Guadalupe	Calhoun	IND	C5178_1	75,000	97.1	0	GBRA - Exelon	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5178_2	20,000	100.0	20,000	GBRA - DOW/UCC	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5174_3	1,870	100.0	1,870	GBRA - Future Industrial	GUADALUPE RIVER
Guadalupe	Calhoun	IND	P4586_1	272	82.1	0	DEL & GLORIA WILLIAMS, Crawfis	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5175_2	940	100.0	940	GBRA - Future Industrial	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5176_1	9,944	100.0	9,944	GBRA - Future Industrial	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5177_1	10,000	100.0	10,000	GBRA - DOW/UCC	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5177_2	2,000	100.0	2,000	GBRA - DOW/UCC	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5177_3	8,000	100.0	8,000	GBRA - DOW/UCC	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5177_4	1,400	100.0	1,400	GBRA - Ineous	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5177_5	400	100.0	400	GBRA - Seadrift Coke	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5177_7	10,871	100.0	10,871	GBRA - CCR, Victoria, UB	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5177_8	8,632	100.0	8,632	GBRA - Future Industrial	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5173_1	1,900	100.0	1,900	GBRA - Ineous	GUADALUPE RIVER
Guadalupe	Calhoun	IND	C5173_2	600	100.0	600	GBRA - Seadrift Coke	GUADALUPE RIVER
Guadalupe	Calhoun	IRR	C5178_3	11,000	98.8	0	GBRA - Irrigation	GUADALUPE RIVER
Guadalupe	Calhoun	IRR	C3863_1	200	100.0	200	JESS YELL WOMACK II ET AL	GUADALUPE RIVER
Guadalupe	Calhoun	MUN	C5177_6a	4,480	100.0	4,480	GBRA - Port Lavaca	GUADALUPE RIVER
Guadalupe	Calhoun	MUN	C5177_6b	1,500	100.0	1,500	GBRA - CCRWSC	GUADALUPE RIVER
Guadalupe	Calhoun	MUN	C5177_6c	1,120	100.0	1,120	GBRA - POCMUD	GUADALUPE RIVER
Guadalupe	Calhoun	MUN	C5177_6d	2,844	100.0	2,844	GBRA - Future MUN	GUADALUPE RIVER
Guadalupe	Calhoun	MUN	C3863_2	3,000	100.0	3,000	GUADALUPE-BLANCO RIVER AUTH	GUADALUPE RIVER
Guadalupe	Calhoun	OTH	P5381_1	150	82.6	0	BRETT BRATCHER	GUADALUPE RIVER
Guadalupe	Comal	HYD	C3824_1	124,870	84.0	0	NEW BRAUNFELS UTILITIES	COMAL RIVER
Guadalupe	Comal	IRR	C3824_4	200	61.0	0	NEW BRAUNFELS UTILITIES	COMAL RIVER
Guadalupe	Comal	IRR	C3820_1	4	98.6	0	VETERANS OF FOREIGN WARS	GUADALUPE RIVER
Guadalupe	Comal	IRR	C2072_1	35	97.3	0	ELOY GARCIA JR ET UX	GUADALUPE RIVER
Guadalupe	Comal	IRR	C1954_1	15	45.9	0	LAWRENCE D KRAUSE	JENTSCH CRK
Guadalupe	Comal	IRR	C1954_2	5	64.8	0	LAWRENCE D KRAUSE	JENTSCH CRK
Guadalupe	Comal	IRR	C3819_1	14	98.0	0	PATRICK S MOLAK	GUADALUPE RIVER
Guadalupe	Comal	IRR	C3821_1	4	98.5	0	ROBERT & MARY RAE PRESTON	GUADALUPE RIVER
Guadalupe	Comal	IRR	C3821_2	1	98.5	0	ROBERT & MARY RAE PRESTON	GUADALUPE RIVER
Guadalupe	Comal	IRR	C1955_1	10	44.8	0	CHESTER & RICKIE KRAUSE	UNNAMED TRIB JENTSCH CRK
Guadalupe	Comal	IRR	C3826_1	100	29.7	0	CITY OF NEW BRAUNFELS	OLD CHL COMAL RIVER
Guadalupe	Comal	IRR	P4607_1	50	95.4	0	PURALLOY INC	GUADALUPE RIVER
Guadalupe	Comal	IRR	C2068_1	72	83.9	0	KWW Ranches LTD	lter Creek

Basin	County of Diversion Location(s)	Use	WR ID#	Authorized Diversion (acft/yr)	Volume Reliability (%)	Minimum Annual Supply (acft)	Owner	Stream
Guadalupe	Comal	IRR	C3822_1	3	99.8	0	ROBERT KRUEGER ET AL	GUADALUPE RIVER
Guadalupe	Comal	IRR	C2070_1	98	17.8	0	FRANK A STANUSH	GUADALUPE RIVER
Guadalupe	Comal	IRR	C2070_2	22	17.8	0	FRANK A STANUSH	GUADALUPE RIVER
Guadalupe	Comal	IRR	C3817_1	79	96.5	0	CLARENCE B ANDERSON ET AL	GUADALUPE RIVER
Guadalupe	Comal	IRR	C3828_1	1	99.8	0	CAMP WARNECKE INC	COMAL RIVER
Guadalupe	Comal	IRR	C3828_2	2	99.5	0	LIBERTY PARTNERSHIP LTD	COMAL RIVER
Guadalupe	Comal	IRR	C2071_1	1	99.1	0	GUADALUPE RIVER RANCH & CATTLE	GUADALUPE RIVER
Guadalupe	Comal	MUN	C3830_2	5	72.1	0	NEW BRAUNFELS UTILITIES	COMAL RIVER
Guadalupe	Comal	MUN	C3824_5	2,240	99.9	1,295	NEW BRAUNFELS UTILITIES	COMAL RIVER
Guadalupe	Comal	MUN	C3824_6	3,418	73.4	0	NEW BRAUNFELS UTILITIES	COMAL RIVER
Guadalupe	Comal	MUN	C3819_2	9	98.5	0	PATRICK S MOLAK	GUADALUPE RIVER
Guadalupe	Comal	MUN	C3815_1	3	19.3	0	J D MURRELL	GUADALUPE RIVER
Guadalupe	Comal	MUN	P4106_1	25	95.7	0	TEXAS PARKS & WILDLIFE DEPT	GUADALUPE RIVER
Guadalupe	Comal	MUN	C2074_7	40,000	98.3	0	GUADALUPE-BLANCO RIVER AUTH	GUADALUPE RIVER
Guadalupe	Comal	MUN	P4491_1	120	90.7	0	COMAL CO FRESH WSD #1	REBECCA CRK
Guadalupe	Comal	MUN	C3823_2	1,289	72.4	0	NEW BRAUNFELS UTILITIES	COMAL RIVER
Guadalupe	Comal	REC	P4114_1	3,711	17.4	0	BAD SCHOLOESS INC	COMAL RIVER
Guadalupe	Comal	REC	P4114_2	1,289	22.7	0	BAD SCHOLOESS INC	COMAL RIVER
Guadalupe	Comal	REC	C3816_1	1,460	19.3	0	WHITEWATER SPORTS INC	GUADALUPE RIVER
Guadalupe	Dewitt	HYD	C3853_1	538,560	55.1	0	CUERO HYDROELECTRIC, INC.	GUADALUPE RIVER
Guadalupe	Dewitt	IRR	C3856_1	50	81.6	0	PATRICK B & MARY KARYN ELDER	GUADALUPE RIVER
Guadalupe	Dewitt	IRR	P4318_1	80	80.8	0	F T BUCHEL	GUADALUPE RIVER
Guadalupe	Dewitt	IRR	P5006_2	299	83.5	0	LORITA MAE FITZGERALD	GUADALUPE RIVER
Guadalupe	Dewitt	IRR	C3850_1	80	97.7	0	JOSEPHINE B MUSSELMAN ET AL	GUADALUPE RIVER
Guadalupe	Dewitt	IRR	C3855_1	26	97.7	0	MRS JOHN C LEY	GUADALUPE RIVER
Guadalupe	Dewitt	REC	P5294_1	15	79.2	0	CITY OF YORKTOWN	YORKTOWN CRK
Guadalupe	Dewitt	WRP	C3852_1	35	99.4	0	JOHN BRADEN JR ET AL	GUADALUPE RIVER
Guadalupe	Dewitt	WRP	C3854_1	32	98.4	0	J D BRAMLETTE JR	GUADALUPE RIVER
Guadalupe	Dewitt	WRP	C3851_1	182	99.4	0	JACK H BOOTHE	GUADALUPE RIVER
Guadalupe	Gonzales	HYD	C3846_1	796,363	49.8	0	CITY OF GONZALES	GUADALUPE RIVER
Guadalupe	Gonzales	HYD	C5172_1	585,599	54.7	0	GUADALUPE-BLANCO R A H-4	GUADALUPE RIVER
Guadalupe	Gonzales	HYD	C5172_2	574,832	55.4	0	GUADALUPE-BLANCO R A H-5	GUADALUPE RIVER
Guadalupe	Gonzales	IRR	P5037_1	230	79.4	0	RICHARD D BRAMLET	SAN MARCOS RIVER
Guadalupe	Gonzales	IRR	P4089_1	830	79.6	0	DR I V EPSTEIN	SAN MARCOS RIVER
Guadalupe	Gonzales	IRR	C3908_1	670	90.8	0	LARRY E & PHYLIS A BROWNE	SAN MARCOS RIVER
Guadalupe	Gonzales	IRR	P5038_1	66	79.4	0	ARTHUR DENNIS HUEBNER ET AL	SAN MARCOS RIVER
Guadalupe	Gonzales	IRR	P4075_1	225	68.0	0	DAVID S SHELTON	GUADALUPE RIVER
Guadalupe	Gonzales	IRR	P4539_1	8	86.4	0	T PAUL SIDES	UNNAMED TRIB COTTLE CRK
Guadalupe	Gonzales	IRR	C3847_1	250	97.7	0	DR JAMES W NIXON JR	GUADALUPE RIVER
Guadalupe	Gonzales	IRR	C3848_1	1,800	100.0	1,800	KING RANCH INC	GUADALUPE RIVER
Guadalupe	Gonzales	IRR	P3916_1	50	81.6	0	DON A LIGHTSEY ET UX	SAN MARCOS RIVER
Guadalupe	Gonzales	MUN	C3846_2	2,240	100.0	2,240	CITY OF GONZALES	GUADALUPE RIVER
Guadalupe	Guadalupe	HYD	C5488_1	663,892	47.7	0	GUADALUPE-BLANCO R A TP-1	GUADALUPE RIVER
Guadalupe	Guadalupe	HYD	C5488_2	659,995	47.8	0	GUADALUPE-BLANCO R A TP-3	GUADALUPE RIVER
Guadalupe	Guadalupe	HYD	C5488_3	655,323	48.0	0	GUADALUPE-BLANCO R A TP-4	GUADALUPE RIVER
Guadalupe	Guadalupe	HYD	C5488_4	624,781	50.0	0	GUADALUPE-BLANCO R A TP-5	GUADALUPE RIVER
Guadalupe	Guadalupe	HYD	CANSUBB U	26,938	0.0	0	GUADALUPE-BLANCO R A TP-1	GUADALUPE RIVER
Guadalupe	Guadalupe	IND	C3829_1	5,000	98.6	0	MISSION VALLEY TEXTILES, INC	GUADALUPE RIVER
Guadalupe	Guadalupe	IND	C3836_1	25	100.0	25	ACME BRICK COMPANY	GUADALUPE RIVER
Guadalupe	Guadalupe	IND	C3837_1	34	98.8	0	STRUCTURAL METALS INC	GUADALUPE RIVER
Guadalupe	Guadalupe	IND	P5240_1	31	72.4	0	H B SHANKLIN	SAN MARCOS RIVER
Guadalupe	Guadalupe	IRR	C3839_3	200	99.3	0	SEGUIN MUNICIPAL UTILITIES	GUADALUPE RIVER
Guadalupe	Guadalupe	IRR	C3835_1	19	83.8	0	OTTO VOIGT	YOUNGS CRK
Guadalupe	Guadalupe	IRR	P4597_1	320	71.6	0	JOHN T O'BANION JR ET AL	SAN MARCOS RIVER
Guadalupe	Guadalupe	IRR	C3841_1	5	44.3	0	LEO P CLOUD JR ET AL	GERONIMO CRK
Guadalupe	Guadalupe	IRR	P4110_1	240	77.4	0	LYNN STORM	SAN MARCOS RIVER
Guadalupe	Guadalupe	IRR	P3857_1	144	81.6	0	ROBERT M KIEHN	SAN MARCOS RIVER
Guadalupe	Guadalupe	IRR	P4373_1	300	72.2	0	CONTINENTAL WHOLESALE FLORISTS	SAN MARCOS RIVER
Guadalupe	Guadalupe	IRR	P4373_2	300	71.5	0	CONTINENTAL WHOLESALE FLORISTS	SAN MARCOS RIVER

Basin	County of Diversion Location(s)	Use	WR ID#	Authorized Diversion (acft/yr)	Volume Reliability (%)	Minimum Annual Supply (acft)	Owner	Stream
Guadalupe	Guadalupe	IRR	P3973_1	73	23.8	0	DONALD J JOHNSON ET UX	GUADALUPE RIVER
Guadalupe	Guadalupe	IRR	C3842_1	158	100.0	158	SARA DARILEK RAINWATER	GERONIMO CRK
Guadalupe	Guadalupe	IRR	C3832_1	44	100.0	44	RAY E DITTMAR	GUADALUPE RIVER
Guadalupe	Guadalupe	IRR	C3900_2	500	86.4	0	JAMES D JAMISON	UNNAMED TRIB
Guadalupe	Guadalupe	IRR	C3843_1	27	100.0	27	LEONARD FLEMING	GUADALUPE RIVER
Guadalupe	Guadalupe	IRR	P5604_1	8	67.9	0	ALBERT GREEN, ET UX	SAN MARCOS RIVER
Guadalupe	Guadalupe	IRR	C3838_1	37	21.3	0	DONALD E NORED	GUADALUPE RIVER
Guadalupe	Guadalupe	IRR	C3844_1	608	100.0	608	KENNETH E CASTLE	GUADALUPE RIVER
Guadalupe	Guadalupe	IRR	C3834_1	71	100.0	71	CANYON REGIONAL WATER AUTH	GUADALUPE RIVER
Guadalupe	Guadalupe	IRR	C3840_1	34	87.6	0	ARNO NEUMANN	GERONIMO CRK
Guadalupe	Guadalupe	MUN	C3839_1	7,000	99.8	3,273	SEGUIN MUNICIPAL UTILITIES	GUADALUPE RIVER
Guadalupe	Guadalupe	MUN	C3895_2	580	85.4	0	STATE BANK & TRUST COMPANY	SAN MARCOS RIVER
Guadalupe	Guadalupe	MUN	C3833_1	56	100.0	56	GARY A DITTMAR	GUADALUPE RIVER
Guadalupe	Guadalupe	MUN	C3833_2	5	99.7	0	GARY A DITTMAR	GUADALUPE RIVER
Guadalupe	Guadalupe	MUN	C3834_2	19	100.0	19	CANYON REGIONAL WATER AUTH	GUADALUPE RIVER
Guadalupe	Guadalupe	REC	P5121_1	83	64.8	0	GUADALUPE SKI-PLEX HOME ASSOC	YORK CRK
Guadalupe	Hays	HYD	C3865_1	64,370	98.1	30,317	SOUTHWEST TEXAS STATE UNIV	SAN MARCOS RIVER
Guadalupe	Hays	IND	C3869_1	10,000	100.0	10,000	TEXAS PARKS & WILDLIFE DEPT	SAN MARCOS RIVER
Guadalupe	Hays	IND	C3865_3	534	92.1	0	SOUTHWEST TEXAS STATE UNIV	SAN MARCOS RIVER
Guadalupe	Hays	IND	C3866_1	60	80.1	0	SOUTHWEST TEXAS STATE UNIV	SAN MARCOS RIVER
Guadalupe	Hays	IRR	P5545_1	8	72.6	0	FRANK T & PAMELA H ARNOSKY	UNNAMED TRIB
Guadalupe	Hays	IRR	C3884_1	20	80.4	0	BRUCE COLLIE ET AL	BLANCO RIVER
Guadalupe	Hays	IRR	C3884_2	90	83.4	0	BRUCE COLLIE ET AL	BLANCO RIVER
Guadalupe	Hays	IRR	C3868_2	70	100.0	70	J R THORNTON, ET AL	SAN MARCOS RIVER
Guadalupe	Hays	IRR	P4027_1	9	63.7	0	JESS WEBB ET UX	BLANCO RIVER
Guadalupe	Hays	IRR	P4027_2	82	63.7	0	THOMAS L HUSBANDS ET UX	BLANCO RIVER
Guadalupe	Hays	IRR	P5426_1	165	73.3	0	JOHN G CURRIE	LTL BLANCO RIVER
Guadalupe	Hays	IRR	C3881_1	40	100.0	40	LYON L BRINSMADE	BLANCO RIVER
Guadalupe	Hays	IRR	P5371_1	5	66.0	0	ROBERT BOURKE SIMPSON	UNNAMED TRIB CYPRESS CRK
Guadalupe	Hays	IRR	C3901_1	100	32.7	0	M D HEATLY SR	PECAN SPRINGS
Guadalupe	Hays	IRR	C3865_5	100	90.0	0	SOUTHWEST TEXAS STATE UNIV	SAN MARCOS RIVER
Guadalupe	Hays	IRR	C3882_1	100	94.5	0	NEWTON B THOMPSON	PIN OAK CRK
Guadalupe	Hays	IRR	C3866_2	20	92.0	0	SOUTHWEST TEXAS STATE UNIV	SAN MARCOS RIVER
Guadalupe	Hays	IRR	C3887_1	15	100.0	15	GREEN VALLEY FARMS INC	SAN MARCOS RIVER
Guadalupe	Hays	IRR	C3902_1	30	85.1	0	FRITZ OTTO ANTON	BUNTON BR
Guadalupe	Hays	IRR	C3866_3	20	59.7	0	SOUTHWEST TEXAS STATE UNIV	SAN MARCOS RIVER
Guadalupe	Hays	IRR	C3887_3	5	100.0	5	GREEN VALLEY FARMS INC	SAN MARCOS RIVER
Guadalupe	Hays	MUN	C3865_4	513	91.3	0	SOUTHWEST TEXAS STATE UNIV	SAN MARCOS RIVER
Guadalupe	Hays	OTH	C3865_2	700	92.2	0	SOUTHWEST TEXAS STATE UNIV	SAN MARCOS RIVER
Guadalupe	Kendall	IRR	C2059_1	39	17.8	0	ROBERT C REINARZ ET AL	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2044_1	16	100.0	16	LION'S LAIR LLC	GUADALUPE RIVER
Guadalupe	Kendall	IRR	P5534_1	20	72.7	0	MARGOT O BURRELL	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2061_1	16	17.8	0	LOUIS SCOTT FELDER ET UX	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2044_2	2	100.0	2	PATRICIA GALT STEVES	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2061_2	18	17.8	0	MARJORIE RANZAU INGENHUETT	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2061_3	37	17.8	0	MURRAY A WINN JR	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2049_1	5	17.8	0	KENNETH M & CYNTHIA RUSCH	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2034_1	2	95.9	0	CHESTER P HEINEN ET AL	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2066_1	5	17.8	0	ROY C SMITH ESTATE	SABINAS CRK
Guadalupe	Kendall	IRR	P5528_1	98	72.7	0	GEORGE A SCHMIDT ET UX	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2045_1	8	100.0	8	MARSHALL STEVES	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2062_1	60	41.3	0	WILLIAM L PULS	WASP CRK
Guadalupe	Kendall	IRR	C2051_1	2	86.3	0	JOE B. KERCHEVILLE	JOSHUA CRK
Guadalupe	Kendall	IRR	C2051_2	260	84.7	0	JOE B. KERCHEVILLE	JOSHUA CRK
Guadalupe	Kendall	IRR	P5321_1	150	78.5	0	LARRY J LANGBEIN	E SISTER CRK
Guadalupe	Kendall	IRR	C2035_1	2	17.8	0	HARRY C MECKEL	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2067_1	20	17.8	0	TY RAMPY ET AL	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2041_1	25	93.1	0	THOMAS L BRUNDAGE ET AL	CYPRESS CRK
Guadalupe	Kendall	IRR	C2056_1	20	51.7	0	MARK E. WATSON, JR., ET UX	WILLIE CRK
Guadalupe	Kendall	IRR	C2067_2	20	44.9	0	TY RAMPY ET AL	GUADALUPE RIVER

Basin	County of Diversion Location(s)	Use	WR ID#	Authorized Diversion (acft/yr)	Volume Reliability (%)	Minimum Annual Supply (acft)	Owner	Stream
Guadalupe	Kendall	IRR	C2041_2	109	92.0	0	THOMAS L BRUNDAGE ET AL	CYPRESS CRK
Guadalupe	Kendall	IRR	P4598_1	80	17.0	0	JACOB C GASS	GUADALUPE RIVER
Guadalupe	Kendall	IRR	P5490_1	10	72.7	0	BILLY J. & KARAN R. BOLES	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2046_1	28	17.8	0	WILLIAM G & MILDRED D SPROWLS	GUADALUPE RIVER
Guadalupe	Kendall	IRR	P5474_1	10	72.7	0	ELTON RUST	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2063_1	44	96.3	0	FROST-LANCASTER PROPERTIES	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2052_1	232	96.3	0	ZARCO FOWARDING, INC	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2063_2	15	96.3	0	RONALD L BAETZ ET AL	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C3870_1	3	99.9	0	PATRICIA RYAN	BLANCO RIVER
Guadalupe	Kendall	IRR	C3870_2	22	99.7	0	T R IMMEL ET UX	BLANCO RIVER
Guadalupe	Kendall	IRR	C2036_1	125	42.7	0	WILLIAM K ANDERSON ET UX	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2057_1	25	52.2	0	MARK E. WATSON, JR., ET UX	ASKEY CRK
Guadalupe	Kendall	IRR	P4590_1	50	17.0	0	GEORGE M WILLIAMS SR ET AL	GUADALUPE RIVER
Guadalupe	Kendall	IRR	P5107_1	518	88.4	0	WILLIAM K ANDERSON ET UX	UNNAMED TRIB GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2047_1	20	96.3	0	H C SEIDENSTICKER	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2064_1	4	97.5	0	EARL S DODERER ET UX	SABINAS CRK
Guadalupe	Kendall	IRR	C2064_2	8	95.8	0	SYBIL R JONES CO-TRUSTEE ET AL	SABINAS CRK
Guadalupe	Kendall	IRR	C2053_1	32	17.8	0	ERNO SPENRATH	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2069_1	30	97.9	0	DOUBLE U-SPRING BRANCH	SIMMONS CRK
Guadalupe	Kendall	IRR	C2058_1	40	17.8	0	OTTO KASTEN	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2043_1	17	17.6	0	EDGAR SEIDENSTICKER ET UX	CYPRESS CRK
Guadalupe	Kendall	IRR	P5501_1	5	16.8	0	BARRY T & KATHRYN B NALL	FLAT ROCK CRK
Guadalupe	Kendall	IRR	C2060_1	10	17.8	0	TEXAS BEVERAGE PACKERS INC	GUADALUPE RIVER
Guadalupe	Kendall	IRR	C2043_2	4	17.6	0	L J MANNERING ET UX	CYPRESS CRK
Guadalupe	Kendall	IRR	C2043_3	20	17.6	0	MARY LEE EDWARDS	CYPRESS CRK
Guadalupe	Kendall	IRR	C2048_1	100	20.0	0	RAYMOND JAMES ROSE	BLOCK CRK
Guadalupe	Kendall	IRR	C2065_1	10	17.7	0	G PHIL BERRYMAN ET UX	SABINAS CRK
Guadalupe	Kendall	IRR	C2065_2	10	17.7	0	GUY BODINE III ET UX	SABINAS CRK
Guadalupe	Kendall	IRR	C2054_1	80	17.8	0	EDMUND BEHR ESTATE	GUADALUPE RIVER
Guadalupe	Victoria	IND	P3895_1	9,676	93.2	0	KATE S O'CONNOR TRUST	GUADALUPE RIVER
Guadalupe	Victoria	IND	C3859_1	1,900	94.3	0	SOUTH TEXAS ELECTRIC COOP INC	GUADALUPE RIVER
Guadalupe	Victoria	IND	P5376_1	2	100.0	2	HELDENFELS BROTHERS INC	SPRING CRK
Guadalupe	Victoria	IND	C5486_1	12,500	100.0	12,500	CENTRAL POWER & LIGHT CO	COLETO CREEK
Guadalupe	Victoria	IND	C3861_1	60,000	99.5	28,217	E I DU PONT DE NEMOURS	GUADALUPE RIVER
Guadalupe	Victoria	IRR	C3862_1	263	100.0	263	BIG RACK LTD	GUADALUPE RIVER
Guadalupe	Victoria	IRR	C3862_2	137	100.0	137	E I DUPONT DE NEMOURS & CO	GUADALUPE RIVER
Guadalupe	Victoria	IRR	P5012_1	140	62.5	0	JOE D. HAWES	ELM BAYOU
Guadalupe	Victoria	IRR	P4441_1	200	83.5	0	S F RUSCHHAUPT III	GUADALUPE RIVER
Guadalupe	Victoria	IRR	C3858_1	1,000	97.7	0	FIRST VICTORIA NATL BANK, TRST	GUADALUPE RIVER
Guadalupe	Victoria	IRR	P4182_1	200	83.8	0	MAXINE ROBSON KYLE ET AL	GUADALUPE RIVER
Guadalupe	Victoria	IRR	P4062_1	90	83.8	0	RONALD A KURTZ ET UX	GUADALUPE RIVER
Guadalupe	Victoria	IRR	P4020_1	100	83.8	0	NELSON PANTEL	GUADALUPE RIVER
Guadalupe	Victoria	MUN	P5466_1	20,000	85.1	0	VICTORIA, CITY OF	GUADALUPE RIVER
Guadalupe	Victoria	MUN	C3860_2	260	78.8	0	W L LIPSCOMB ET AL	GUADALUPE RIVER
Guadalupe	Victoria	OTH	P5489_1	750	88.4	0	JESS Y WOMACK II	CUSHMAN BAYOU
San Antonio	Bexar	IND	C2161_1	12,000	97.7	0	CITY OF SAN ANTONIO	Arroyo Seco/San Antonio R.
San Antonio	Bexar	IND	C2162_2	60,000	93.7	0	CITY OF SAN ANTONIO	Arroyo Seco/San Antonio R.
San Antonio	Bexar	IND	C2162_3	36,900	99.8	0	CITY OF SAN ANTONIO	Arroyo Seco/San Antonio R.
San Antonio	Bexar	IND	C2162_5	11	99.6	0	CITY OF SAN ANTONIO	Arroyo Seco/San Antonio R.
San Antonio	Bexar	IND	P5337_1	25	38.4	0	H B ZACHRY CO	SIX MILE CRK
San Antonio	Bexar	IND	P5469_2	1,500	67.8	0	HAUSMAN ROAD W S C	LEON CRK
San Antonio	Bexar	IRR	P4187_2	333	74.4	0	LOTTIE WALSH MAHLA ESTATE	LEON CRK
San Antonio	Bexar	IRR	P4187_3	85	9.7	0	LOTTIE WALSH MAHLA ESTATE	LEON CRK
San Antonio	Bexar	IRR	P4141_3	179	69.7	0	JOHN POWELL WALKER TRUSTEE	LEON CRK
San Antonio	Bexar	IRR	P4141_4	77	69.7	0	PEOPLES SAVINGS & LOAN ASSN	LEON CRK
San Antonio	Bexar	IRR	C2159_1	60	100.0	60	CITY OF SAN ANTONIO	SAN ANTONIO RIVER
San Antonio	Bexar	IRR	C2150_1	62	98.3	0	ANGELINA BORDANO	LEON CRK
San Antonio	Bexar	IRR	C1170_1	17	99.8	4	JAMES N EVANS SR ET AL	MARTINEZ
San Antonio	Bexar	IRR	P4135_1	200	71.6	0	BESSIE WALSH	MEDINA RIVER
San Antonio	Bexar	IRR	P4497_1	20	80.6	0		

Basin	County of Diversion Location(s)	Use	WR ID#	Authorized Diversion (acft/yr)	Volume Reliability (%)	Minimum Annual Supply (acft)	Owner	Stream
San Antonio	Bexar	IRR	P4497_2	186	80.2	0		
San Antonio	Bexar	IRR	P4294_1	40	99.2	0	MARY HARPER TUDHOPE	PARITA CRK
San Antonio	Bexar	IRR	P5289_1	300	34.1	0	SOUTHEAST INVESTMENTS INC	ROSILLO CRK
San Antonio	Bexar	IRR	C2149_1	32	98.9	5	RANDALL S PREISSIG TRUSTEE	LEON CRK
San Antonio	Bexar	IRR	P3888_1	290	72.4	0	ALAN D BARIBEAU ET UX	MEDINA RIVER
San Antonio	Bexar	IRR	C2155_1	240	100.0	240	LES MENDELSOHN	MEDINA RIVER
San Antonio	Bexar	IRR	C1960_1	20	43.0	0	JOHN O SPICE	SALADO CRK
San Antonio	Bexar	IRR	P5503_1	220	57.3	0	O-SPORTS GOLF DEVELOPMENT II	PANTHER SPRING CRK
San Antonio	Bexar	IRR	C1944_1	16	47.2	0	SAN ANTONIO MISSIONS NATL PARK	SAN ANTONIO RIVER
San Antonio	Bexar	IRR	C1933_1	480	75.2	0	MISSION CEMETERY CO	SAN ANTONIO RIVER
San Antonio	Bexar	IRR	C2145_1	32	91.7	0	JERRY & MARIAM SPEARS	MEDINA RIVER
San Antonio	Bexar	IRR	C1965_1	300	49.5	0	LOMAS SANTA FE LTD	SALADO CRK
San Antonio	Bexar	IRR	P5577_1	420	69.4	0	ROBERT L G WATSON	SAN ANTONIO RIVER
San Antonio	Bexar	IRR	C2151_1	1,500	73.3	0	SOUTH LOOP LAND & CATTLE LC	SAUZ CRK
San Antonio	Bexar	IRR	P4136_1	124	71.6	0	SAWS	MEDINA RIVER
San Antonio	Bexar	IRR	C2151_2	401	17.0	0	SOUTH LOOP LAND & CATTLE LC	SAUZ CRK
San Antonio	Bexar	IRR	P3476_1	100	75.0	0	SAN ANTONIO RANCH LTD	UNNAMED OF LOS REYES CRK
San Antonio	Bexar	IRR	P4498_1	83	79.8	0	VIRGINIA JAKSIK	MARTINEZ CRK
San Antonio	Bexar	IRR	P4105_1	150	88.9	0	CITY OF LIVE OAK	SALITRILLO CRK
San Antonio	Bexar	IRR	C2156_1	294	100.0	294	CITY OF SAN ANTONIO	MEDINA RIVER
San Antonio	Bexar	IRR	C2141_1	75	81.0	0	BIPPERT FARMS	E BR BIG SOUS CRK
San Antonio	Bexar	IRR	C2146_1	215	100.0	215	BURRELL DAY	MEDINA RIVER
San Antonio	Bexar	IRR	C2152_1	409	81.9	0	CAROLYN VANCE COOK	MITCHELL LAKE
San Antonio	Bexar	IRR	P4137_1	34	72.4	0	SAWS	MEDINA RIVER
San Antonio	Bexar	IRR	P4499_1	54	79.8	0	JOSEPH M STANUSH ET AL	MARTINEZ CRK
San Antonio	Bexar	IRR	P5265_1	35	76.9	0	MARY JAKSIK ZIGMOND	MARTINEZ CRK
San Antonio	Bexar	IRR	C2142_1	197	89.9	0	ANTONIO MARIO FERNANDEZ	MEDINA RIVER
San Antonio	Bexar	IRR	C2157_1	50	100.0	50	LOUIS PAWELEK	SAN ANTONIO RIVER
San Antonio	Bexar	IRR	C1962_1	10	49.8	0	JULIA H. KUSENER JACQUET ET AL	SALADO CRK
San Antonio	Bexar	IRR	C2142_2	3	87.8	0	BEXAR, COUNTY OF	MEDINA RIVER
San Antonio	Bexar	IRR	C2147_1	28	94.8	0	JOSE LUIS AMADOR	ELM CRK
San Antonio	Bexar	IRR	P4138_1	126	71.6	0	JOHN H SMALL	MEDINA RIVER
San Antonio	Bexar	IRR	C3091_4	498	64.9	0	RICHARD DALE LEDOUX ET AL	COMANCHE CRK
San Antonio	Bexar	IRR	C3184_2	150	70.2	0	JOHN E MINNE ET AL	SPRING CRK
San Antonio	Bexar	IRR	P4138_2	23	71.6	0	SAN ANTONIO WATER SYSTEM	MEDINA RIVER
San Antonio	Bexar	IRR	P5266_1	45	59.7	0	RANDALL K HOOVER ET UX	SAN ANTONIO RIVER
San Antonio	Bexar	IRR	C1942_1	886	91.9	0	ESPADA DITCH COMPANY	SAN ANTONIO RIVER
San Antonio	Bexar	IRR	C1146_1	26	99.1	0	CIBOLO CREEK MUNICIPAL AUTH	CIBOLO CRK
San Antonio	Bexar	IRR	C1931_1	1,440	87.8	0	SAN JUAN DITCH WSC	SAN ANTONIO RIVER
San Antonio	Bexar	IRR	C2158_1	24	100.0	24	JOE S GARCIA JR ET UX	SAN ANTONIO RIVER
San Antonio	Bexar	IRR	C1146_2	62	96.6	0	DOUG WISE	CIBOLO CRK
San Antonio	Bexar	IRR	C1146_3	5	92.1	0	JOHN E NEWTON ET AL	CIBOLO CRK
San Antonio	Bexar	IRR	C1146_4	8	91.4	0	JOHN K KOHLHAAS	CIBOLO CRK
San Antonio	Bexar	IRR	P4134_1	200	70.9	0	ANITA T WALSH ESTATE	MEDINA RIVER
San Antonio	Bexar	IRR	P4187_1	333	70.6	0	LOTTIE WALSH MAHLA ESTATE	LEON CRK
San Antonio	Bexar	IRR	P4496_1	30	80.6	0	WILLIAM WALLS JR	MARTINEZ CRK
San Antonio	Bexar	IRR	C2148_1	8	90.4	0	DONALD G RAMBIE	ELM CRK
San Antonio	Bexar	IRR	P5262_1	250	40.5	0	ANTHONY J GRANIERI	E CHANNEL
San Antonio	Bexar	IRR	C2154_2	200	52.0	0	ARNOLD ALBERT	MITCHELL LAKE
San Antonio	Bexar	IRR	P4139_1	200	71.1	0	BESSIE WALSH	LEON CRK
San Antonio	Bexar	IRR	C2160_1	116	100.0	116	BEN B MORRIS ESTATE	SAN ANTONIO RIVER
San Antonio	Bexar	IRR	P4141_1	20	70.1	0	GULF LAND & INVESTMENT CO INC	LEON CRK
San Antonio	Bexar	IRR	P4141_2	23	69.9	0	H H GIRDLEY TRUSTEE	LEON CRK
San Antonio	Bexar	MIN	P4025_1	431	71.7	0	CAPITOL AGGREGATES INC	MEDINA RIVER
San Antonio	Bexar	MIN	P4025_2	769	70.8	0	CAPITOL AGGREGATES INC	MEDINA RIVER
San Antonio	Bexar	MIN	P4025_3	3,304	51.3	0	CAPITOL AGGREGATES INC	MEDINA RIVER
San Antonio	Bexar	MUN	C4768_1	89	100.0	89	BEXAR METROPOLITAN WATER DIST	MEDIO CRK
San Antonio	Bexar	MUN	P5517_1	7,500	63.2	0	LEON CREEK WSC	LEON CRK
San Antonio	Bexar	MUN	C4768_2	417	100.0	417	BEXAR METROPOLITAN WATER DIST	MEDIO CRK
San Antonio	Bexar	MUN	C4768_3	4,494	99.4	3,217	BEXAR METROPOLITAN WATER	Medio Cr. & Medina R.

Basin	County of Diversion Location(s)	Use	WR ID#	Authorized Diversion (acft/yr)	Volume Reliability (%)	Minimum Annual Supply (acft)	Owner	Stream
							DIST	
San Antonio	Bexar	MUN	P5549_1	2,250	52.0	0	BEXAR METROPOLITAN WATER DIST	POLECAT CRK
San Antonio	Bexar	MUN	C2144_1	215	97.8	74	BEXAR METROPOLITAN WATER DIST	MEDIO CRK
San Antonio	Bexar	MUN	C2144_2	93	94.0	0	BEXAR METROPOLITAN WATER DIST	MEDIO CRK
San Antonio	Bexar	MUN	C2144_3	308	56.1	0	BEXAR METROPOLITAN WATER DIST	MEDIO CRK
San Antonio	Bexar	MUN	C2140_1	963	78.5	0	METROPOLITAN RESOURCES INC	MEDINA RIVER
San Antonio	Bexar	MUN	P5598_1	120	74.0	0	VERSTRAETEN BROTHERS FARMS INC	LONG HOLLOW CRK
San Antonio	Bexar	MUN	C1959_1	150	95.4	0	BEXAR METROPOLITAN WATER DIST	SAN ANTONIO RIVER
San Antonio	Bexar	MUN	P4136_2	276	72.0	0	BMWD	MEDINA RIVER
San Antonio	Bexar	MUN	P5211_1	100	67.4	0	LONE STAR GROWERS CO	MEDINA RIVER
San Antonio	Bexar	MUN	P5211_2	2,900	50.5	0	LONE STAR GROWERS CO	MEDINA RIVER
San Antonio	Bexar	MUN	C2162_4	100	99.6	0	CITY OF SAN ANTONIO	Arroyo Seco/San Antonio R.
San Antonio	Bexar	MUN	C2130_6	19,974	92.0	0	BEXAR-MEDINA-ATASCOSA COS WCID	MEDINA RIVER
San Antonio	Bexar	MUN	C1966_1	481	97.6	0	BEXAR METROPOLITAN WATER DIST	SAN ANTONIO RIVER
San Antonio	Bexar	MUN	P4137_2	566	71.9	0	BMWD	MEDINA RIVER
San Antonio	Bexar	MUN	P4138_3	152	71.9	0	BMWD	MEDINA RIVER
San Antonio	Bexar	REC	C2019_1	241	100.0	241	THE BLUE WING CLUB	SAN ANTONIO RIVER
San Antonio	Bexar	REC	C2019_2	509	99.8	75	THE BLUE WING CLUB	SAN ANTONIO RIVER
San Antonio	Bexar	REC	C2019_3	250	54.5	0	THE BLUE WING CLUB	SAN ANTONIO RIVER
San Antonio	Bexar	WRP	P5596_1	770	46.9	0	BILLY T MITCHELL	MEDINA RIVER
San Antonio	Goliad	IRR	C2196_1	336	100.0	336	COLETO CATTLE COMPANY	SAN ANTONIO RIVER
San Antonio	Goliad	IRR	P5079_1	114	92.4	0	JOHN C & SHERRY BROOKE	SAN ANTONIO RIVER
San Antonio	Goliad	IRR	C2197_1	86	94.0	0	JAMES M PETTUS II	SAN ANTONIO RIVER
San Antonio	Goliad	IRR	C2193_1	284	94.2	0	JAMES M PETTUS ET AL	SAN ANTONIO RIVER
San Antonio	Goliad	IRR	P5478_1	300	75.2	0	PATRICIA PITTMAN LIGHT	SAN ANTONIO RIVER
San Antonio	Goliad	IRR	C2198_2	333	100.0	333	SAM HOUSTON CLINTON	SAN ANTONIO RIVER
San Antonio	Goliad	IRR	C2194_1	1,020	100.0	1,020	JULIA GANTT NEWTON ET AL	SAN ANTONIO RIVER
San Antonio	Goliad	IRR	C2199_1	325	100.0	325	SAM HOUSTON CLINTON ET AL	SAN ANTONIO RIVER
San Antonio	Goliad	IRR	P4117_1	950	94.6	0	JUNE PETTUS	SAN ANTONIO RIVER
San Antonio	Goliad	IRR	P5313_1	100	99.7	1	EDWIN JACOBSON ET AL	SAN ANTONIO RIVER
San Antonio	Goliad	IRR	P5220_1	90	92.4	0	CLARENCE F SCHENDEL ET UX	SAN ANTONIO RIVER
San Antonio	Goliad	WRP	C2195_1	410	100.0	410	JOE F FRENCH	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P3803_1	80	90.1	0	OLIVE L RIDLEY ET AL	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P3803_2	80	90.7	0	OLIVE L RIDLEY ET AL	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5367_1	300	74.8	0	SUSIE LEE YANTA	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	C2186_1	70	92.7	0	VINCENT LABUS JR	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P3808_1	232	75.0	0	FLAVIAN B MOCZYGEMBA	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	C2192_1	140	100.0	140	HALLIS DAVENPORT REVC MAN TR	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P3767_1	20	92.7	0	FELIX MOCZYGEMBA	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P4512_1	160	92.9	0	OLIVE L RIDLEY ET AL	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P3852_1	50	90.0	0	THOMAS A KORZEKWA	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P3852_2	25	70.9	0	THOMAS A KORZEKWA	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P4407_1	50	90.0	0	TOMMY NAJVAR ET UX	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5043_1	150	92.4	0	MELANIE A JACOBS ET AL	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P4538_1	150	90.0	0	ALICE P JENDRUSCH ET AL	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P4561_1	525	89.7	0	RIO GRANDE RESOURCES CORP	CIBOLO CRK
San Antonio	Karnes	IRR	P5368_1	300	74.8	0	ARTHUR RAY YANTA ET UX	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5002_1	150	89.6	0	WM A JEFFERS JR & ANN JACKSON	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5296_1	74	89.9	0	DENNIS J MOY	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5044_1	150	89.6	0	CHARLES WAYNE HUBBARD ET AL	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	C2183_2	100	100.0	100	B. Pawelek/Yanta	
San Antonio	Karnes	IRR	P4503_1	55	75.2	0	HENRY D STRINGER JR	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	C2188_1	40	92.7	0	ALFRED MOCZYGEMBA	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P4002_1	80	80.5	0	CASPER F MOCZYGEMBA JR ET AL	CIBOLO CRK
San Antonio	Karnes	IRR	P4490_1	90	74.9	0	DANIEL R ANDERSON ET AL	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5532_1	3	71.2	0	FELIX BRONDER	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5062_1	100	89.6	0	ALFRED J RAHE	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5333_1	90	75.0	0	HECTOR O HERRERA, ET UX	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5333_2	300	74.8	0	HECTOR O HERRERA, ET UX	SAN ANTONIO RIVER

Basin	County of Diversion Location(s)	Use	WR ID#	Authorized Diversion (acft/yr)	Volume Reliability (%)	Minimum Annual Supply (acft)	Owner	Stream
San Antonio	Karnes	IRR	C2184_1	120	82.8	0	BONNIE SKLOSS	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	C2184_2	80	74.9	0	BONNIE SKLOSS	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	C2190_1	100	100.0	100	FLORENCE S BAUMANN ET AL	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	C1167_1	5	100.0	5	FRANK B KRAWIETZ	CIBOLO CRK
San Antonio	Karnes	IRR	P5306_1	200	89.6	0	HERBERT JOHN EWALD JR ET AL	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5323_1	100	75.0	0	WILLIAM I DUBEL	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P3431_1	60	92.7	0	ANDREW RIVES ET UX	CIBOLO CRK
San Antonio	Karnes	IRR	P5239_1	4	89.6	0	HOLY TRINITY CATHOLIC CHURCH	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P4536_1	100	90.0	0	JAMES M & NANCY W BAILEY	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P4536_2	200	89.6	0	JAMES M & NANCY W BAILEY	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5622_1	240	70.1	0	JAY E. BAKER ET AL	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	C2185_1	90	92.7	0	FRANCIS MOY & MARY MOY KOWALIK	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P5455_1	3	75.0	0	DAVID C. "CHARLIE" ZUNKER	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	P3851_1	50	90.0	0	SAM M. KORZEKWA	SAN ANTONIO RIVER
San Antonio	Karnes	IRR	C1168_1	30	100.0	30	ALOYS PAWELEK	CIBOLO CRK
San Antonio	Karnes	WRP	C2189_1	350	100.0	350	CLEM R CANNON ET AL	SAN ANTONIO RIVER
San Antonio	Kendall	IRR	C1144_1	48	97.2	0	WILLIS JAY HARPOLE	FREDERICK CRK
San Antonio	Kendall	IRR	C1144_2	7	97.0	0	WILLIS JAY HARPOLE	ROBROY CRK
San Antonio	Kendall	IRR	C1142_1	4	94.2	0	JEB B MAEBIUS JR ET UX	CIBOLO CRK
San Antonio	Kendall	MUN	C1143_1	523	99.1	0	CITY OF BOERNE	CIBOLO CRK
San Antonio	Kendall	MUN	C1143_2	310	99.0	0	CITY OF BOERNE	CIBOLO CRK
San Antonio	Medina	IRR	C2133_1	18	76.6	0	HARLEY & DOROTHY TSCHIRHART	MEDINA RIVER
San Antonio	Medina	IRR	C2134_1	17	77.2	0	GLENNIS W STEIN	MEDINA RIVER
San Antonio	Medina	IRR	C2139_1	112	76.7	0	A L GILLIAM	MEDINA RIVER
San Antonio	Medina	IRR	C2130_4	45,856	89.4	0	BEXAR-MEDINA-ATASCOSA COS WCID	MEDINA RIVER
San Antonio	Medina	IRR	P4170_1	15	66.8	0	TWAIN J JAGGE ET UX	MEDINA RIVER
San Antonio	Medina	IRR	C2135_1	5	95.7	0	KITTIE NELSON FERGUSON	SAN GERONIMO CRK
San Antonio	Medina	IRR	P4159_1	50	66.8	0	MARIE I HABY ET AL	MEDINA RIVER
San Antonio	Medina	IRR	C2136_1	6	86.9	0	KITTIE NELSON FERGUSON	UNNAMED TRIB SAN GERONIMO CRK
San Antonio	Medina	IRR	P4149_1	20	66.9	0	GLENNIS W STEIN	MEDINA RIVER
San Antonio	Medina	IRR	P4140_1	185	66.9	0	KATHLEEN DAVENPORT CARSKADDEN	MEDINA RIVER
San Antonio	Medina	IRR	P4151_1	170	66.8	0	JAMES A OPPELT ET UX	MEDINA RIVER
San Antonio	Medina	MUN	C2130_1	750	96.1	0	BEXAR-MEDINA-ATASCOSA COS WCID	MEDINA RIVER
San Antonio	Medina	MUN	C2130_2	170	96.1	0	BEXAR-MEDINA-ATASCOSA COS WCID	MEDINA RIVER
San Antonio	Medina	RCG	P3220_1	9,996	8.0	0	EDWARDS UNDERGROUND WD	SAN GERONIMO
San Antonio	Wilson	IRR	C2181_1	64	100.0	64	FRED J LYSSY ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2181_2	157	74.8	0	FRED J LYSSY ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2181_3	159	74.8	0	FRED J LYSSY ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C1158_1	30	94.0	0	VIVA LEA MILLS	CIBOLO CRK
San Antonio	Wilson	IRR	C1164_1	6	94.5	0	JANE LYSSY OPIELA ET AL	CIBOLO CRK
San Antonio	Wilson	IRR	P5320_1	200	65.6	0	SHELBY KOEHLER ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2165_1	50	92.7	0	ED WISEMAN MARITAL TRUST	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2165_2	70	65.6	0	ED WISEMAN MARITAL TRUST	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2171_1	63	100.0	63	R C CARROLL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C1154_1	69	100.0	69	JONAH H WILSON	CIBOLO CRK
San Antonio	Wilson	IRR	P5308_1	100	70.1	0	SAM JARZOMBEK	CIBOLO CRK
San Antonio	Wilson	IRR	C1160_1	140	94.0	0	MRS MAGGIE WEBER	CIBOLO CRK
San Antonio	Wilson	IRR	P5587_1	300	50.1	0	ALOIS D KOLLODZIEJ ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2176_1	105	100.0	105	POTH LAND & CATTLE CO	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5126_1	150	74.8	0	WILLIAM M PAVLISKA	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2176_2	145	67.2	0	POTH LAND & CATTLE CO	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2182_1	700	92.7	0	LEO V LYSSY ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P3994_1	1,056	74.7	0	BOENING ENTERPRISES	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2182_2	166	67.2	0	LEO V LYSSY ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C1159_1	0	94.2	0	DEBORAH M IRWIN ET VIR	CIBOLO CRK
San Antonio	Wilson	IRR	C1148_1	11	100.0	11	ALLAN G LYNHAM ET UX	CIBOLO CRK
San Antonio	Wilson	IRR	C1159_2	13	94.2	0	GAYLON T CLICK ET UX	CIBOLO CRK
San Antonio	Wilson	IRR	C1165_1	4	100.0	4	EMERYK KELLER	CIBOLO CRK
San Antonio	Wilson	IRR	C1150_1	200	100.0	200	PAT HIGGINS ESTATE	CIBOLO CRK

Basin	County of Diversion Location(s)	Use	WR ID#	Authorized Diversion (acft/yr)	Volume Reliability (%)	Minimum Annual Supply (acft)	Owner	Stream
San Antonio	Wilson	IRR	C1159_3	16	94.2	0	GAYLON T CLICK ET UX	CIBOLO CRK
San Antonio	Wilson	IRR	C1159_4	7	94.2	0	PATRICK NEIDORF	CIBOLO CRK
San Antonio	Wilson	IRR	C1171_1	80	100.0	80	ROSS OWEN SCULL	CIBOLO CRK
San Antonio	Wilson	IRR	C2166_1	105	98.6	0	NICK KOLENDA	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C1159_5	3	94.2	0	WAYNE DODD ET AL TRUSTEES	CIBOLO CRK
San Antonio	Wilson	IRR	C1171_2	250	90.0	0	ROSS OWEN SCULL	CIBOLO CRK
San Antonio	Wilson	IRR	P4121_1	38	75.2	0	BENITO D. CABRIALES ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2166_2	95	67.0	0	NICK KOLENDA	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2172_1	18	100.0	18	CLYDE R MAHA ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C1171_3	330	78.8	0	ROSS OWEN SCULL	CIBOLO CRK
San Antonio	Wilson	IRR	P5395_1	254	65.4	0	RENATO MARTINEZ ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5395_2	450	64.1	0	RENATO MARTINEZ ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5243_1	54	74.9	0	FRANK R BOLF	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5499_1	50	63.4	0	GARY ZOOK, ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5264_1	130	66.9	0	LILLIAN S WISEMAN TRUST ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C1161_1	15	94.0	0	JOHN DRZYMALA	CIBOLO CRK
San Antonio	Wilson	IRR	C2177_1	81	100.0	81	FRANK & J A LABUS	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5171_1	200	74.8	0	MESCALERO PROPERTIES	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C1149_1	62	100.0	62	RAY SMITH ET UX	CIBOLO CRK
San Antonio	Wilson	IRR	C1166_1	25	94.5	0	GERVAS JASKINIA ESTATE	CIBOLO CRK
San Antonio	Wilson	IRR	C2167_1	17	100.0	17	TOMAS CAVAZOS	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P4181_1	86	74.9	0	BERTRAND O BAETZ ESTATE ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P4484_1	5	75.0	0	DELBERT J KELLER	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P4181_2	120	74.9	0	BERTRAND O BAETZ ESTATE ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P3837_1	21	75.2	0	LAWRENCE R HALLIBURTON ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P4484_2	200	90.0	0	DELBERT J KELLER	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5182_1	100	79.3	0	JAMES T WATSON	CIBOLO CRK
San Antonio	Wilson	IRR	P3837_2	29	75.2	0	W H HALLIBURTON, ESTATE OF	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P4484_3	100	92.8	0	DELBERT J KELLER	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C1156_1	35	100.0	35	WAYNE H STROUD ET AL	CIBOLO CRK
San Antonio	Wilson	IRR	C1162_1	2	92.7	0	ALVIN PRUSKI	CIBOLO CRK
San Antonio	Wilson	IRR	C1162_2	78	76.9	0	ALVIN PRUSKI	CIBOLO CRK
San Antonio	Wilson	IRR	C2178_1	1	100.0	1	FELIX J JANEK JR ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2163_1	44	100.0	44	CHARLES HONEYCUTT, ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2178_2	5	100.0	5	FELIX J JANEK JR ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2163_2	256	74.8	0	CHARLES HONEYCUTT, ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2178_3	15	75.0	0	FELIX J JANEK JR ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2178_4	42	100.0	42	SIX J FARMS INC	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2178_5	175	100.0	175	SIX J FARMS INC	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2178_6	485	74.4	0	SIX J FARMS INC	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5202_1	75	74.9	0	GEORGE R GAWLIK ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P4495_1	50	75.2	0	WILLIAM & IRENE C WALLS JR	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C1152_1	35	98.6	0	BILL & MELVIN DEAGEN ET AL	CIBOLO CRK
San Antonio	Wilson	IRR	C2168_1	16	95.0	0	H W FINCK	UNNAMED TRIB SEGUIN BR
San Antonio	Wilson	IRR	C2174_1	14	100.0	14	WILLIE HOSEK ESTATE	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2180_1	18	100.0	18	DONALD A OCKER ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2180_2	110	100.0	110	DONALD A OCKER ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2180_3	497	74.4	0	DONALD A OCKER ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5194_1	210	74.8	0	JOE R HOLLAWAY JR ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5224_1	60	77.1	0	JOHNNY KOSUB & BETTY KOSUB	CIBOLO CRK
San Antonio	Wilson	IRR	P3861_1	200	75.0	0	GEO D POOL & RONALD R STINSON	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C1163_1	80	100.0	80	CYNTHIA A TITZMAN ET VIR	CIBOLO CRK
San Antonio	Wilson	IRR	P3897_1	716	46.4	0	ALFRED J NEWMAN, ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2179_1	47	100.0	47	A D D CORPORATION	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2164_1	23	100.0	23	JOHN WILLIAM HELTON JR ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2179_2	72	100.0	72	A D D CORPORATION	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2164_2	59	67.2	0	JOHN WILLIAM HELTON JR ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5611_1	175	63.3	0	ELIAS DUGI, ET UX	CIBOLO CREEK
San Antonio	Wilson	IRR	C2179_3	39	100.0	39	A D D CORPORATION	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2179_4	467	74.4	0	A D D CORPORATION	SAN ANTONIO RIVER

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San Antonio	Wilson	IRR	P5218_1	360	77.4	0	WILLIAM P REDDICK ET UX	CIBOLO CRK
San Antonio	Wilson	IRR	P5559_1	99	64.3	0	RALPH MCGREW ET UX	CIBOLO CRK
San Antonio	Wilson	IRR	C1153_1	100	92.7	0	WAYNE H STROUD ET AL	CIBOLO CRK
San Antonio	Wilson	IRR	P3887_1	50	75.2	0	PATTILLO FAMILY FARMS INC	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5307_1	300	66.9	0	JAMES R LEININGER	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2169_1	29	100.0	29	JIMMY E HOLT ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2169_2	18	100.0	18	RICHARD E ULLMANN ET UX	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	C2175_1	38	100.0	38	WELMA L R KIRCHOFF ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5633_1	130	93.6	0	LOUIS T. AND SONIA ROSENBERG	UNNAMED TRIB SAN ANTONIO
San Antonio	Wilson	IRR	C2175_2	60	63.9	0	WELMA L R KIRCHOFF ET AL	SAN ANTONIO RIVER
San Antonio	Wilson	IRR	P5633_2	8	0.0	0	LOUIS T. AND SONIA ROSENBERG	UNNAMED TRIB SAN ANTONIO
San Antonio	Wilson	MUN	C1155_1	42	100.0	42	SIESTA CATTLE COMPANY	CIBOLO CRK
San Antonio	Wilson	MUN	C1157_2	117	92.9	0	OSCAR SANDERS	CIBOLO CRK
San Antonio	Wilson	WRP	C2173_1	78	100.0	78	CECIL MARK RICHARDSON ET AL	SAN ANTONIO RIVER
Nueces	Atascosa	IRR	C3213_1	13	1.0	0	SAM COUNTISS	UNNAMED TRIB LIVE OAK CRK
Nueces	Atascosa	IRR	C3216_1	20	14.1	0	ATASCOSA COWBOY RECREATION	UNNAMED TRIB ATASCOSA RIVER
Nueces	Atascosa	IRR	C3217_1	27	14.3	0	WOODROW W MARSH	ATASCOSA RIVER
Nueces	Atascosa	IRR	C3218_1	7	14.3	0	JACK L MCGINNIS ET UX	ATASCOSA RIVER
Nueces	Atascosa	IRR	C3218_2	11	14.3	0	DOYLE LAWHON ET UX	ATASCOSA RIVER
Nueces	Atascosa	IRR	C3219_1	30	14.5	0	ERNEST KORUS	ATASCOSA RIVER
Nueces	Atascosa	IRR	C4772_1	2	98.4	0	MAGSONS N. V.	BONITA CRK
Nueces	Atascosa	MIN	P5511_1	120	2.4	0	SAN MIGUEL ELECTRIC COOP INC	UNNAMED TRIB LA PARITA CRK
Nueces	Dimmit	IRR	C3082_8	19,996	78.0	0	ZAVALA-DIMMIT CO WID 1	NUECES RIVER
Nueces	Dimmit	IRR	C3086_1	554	38.6	0	CHARLES W. WILSON, SR., ET AL	NUECES RIVER
Nueces	Dimmit	IRR	C3093_1	102	100.0	102	CHARLES H THALMAN	BERMUDA RES- SOLDIER SLOUGH
Nueces	Dimmit	IRR	C3094_1	300	100.0	300	ALBERT IVY	LIVE OAK CRK
Nueces	Dimmit	IRR	C3095_1	1,090	100.0	1,090	MARRS MCLEAN BOWMAN	NUECES RIVER
Nueces	Dimmit	IRR	C3095_2	201	100.0	201	MARRS MCLEAN BOWMAN	NUECES RIVER
Nueces	Dimmit	IRR	C3096_1	337	100.0	337	DONALD JACKSON ET UX	NUECES RIVER
Nueces	Dimmit	IRR	C3097_1	231	100.0	231	DALE L HASTEN	NUECES RIVER
Nueces	Dimmit	IRR	C3098_1	60	68.1	0	LUCILE C WHITECOTTON ET AL	SOLDIER SLOUGH
Nueces	Dimmit	IRR	C3099_1	34	35.8	0	CHARLES W & MARJORIE V WILSON	EL BARROSA CRK
Nueces	Dimmit	IRR	C3102_1	15	29.1	0	NEEDMORE RANCH INC	APPURCEON CRK
Nueces	Dimmit	IRR	C3103_1	400	89.1	0	R W BRIGGS, JR	BURRO CRK
Nueces	Dimmit	MIN	C3082_9	4	61.9	0	ZAVALA-DIMMIT CO WID 1	NUECES RIVER
Nueces	Dimmit	MIN	C3093_2	1	100.0	1	CHARLES H THALMAN	SOLDIER SLOUGH
Nueces	Frio	IRR	C3193_1	8	32.1	0	HOWARD F BENNETT	FRIO RIVER
Nueces	Frio	IRR	C3199_1	50	17.9	0	JAMES BAKER III	UNNAMED TRIB TODOS SANTOS CRK
Nueces	Frio	IRR	C3208_1	230	1.3	0	COX FEEDLOTS INC	UNNAMED TRIB CHACON CRK
Nueces	Frio	IRR	C3209_1	118	86.8	0	E F MORRIS	CHACON CRK
Nueces	Frio	IRR	C3210_1	20	31.4	0	FRANCIS MALDONADO	UNNAMED TRIB SAN MIGUEL CRK
Nueces	Frio	IRR	C3211_1	40	92.8	0	GLEN EARL BAKER	SAN MIGUEL CRK
Nueces	Frio	IRR	C3211_2	60	73.3	0	GLEN EARL BAKER	SAN MIGUEL CRK
Nueces	Frio	IRR	C3212_1	25	2.5	0	CHARLES CURTIS RAMSEY ET UX	BUCKHORN CRK
Nueces	Frio	IRR	P3884_1	80	0.6	0	CLAUDE D J SMITH	SAN MIGUEL CRK
Nueces	Frio	IRR	P3914_1	19	6.3	0	A E SCHLETZE FARMS	ELM CRK
Nueces	Frio	IRR	P3914_2	7	6.3	0	A R GALLOWAY ET UX	ELM CRK
Nueces	Frio	IRR	P4014_1	124	1.4	0	JOE H BERRY	LEONA RIVER
Nueces	Frio	IRR	P4041_1	25	0.3	0	FLOYD B NEUMAN	SAN MIGUEL CRK
Nueces	Frio	IRR	P4041_2	20	0.4	0	FLOYD B NEUMAN	SAN MIGUEL CRK
Nueces	Frio	IRR	P4113_1	15	2.6	0	DR LESLIE R FRICKE	SAN MIGUEL CRK
Nueces	Karnes	IRR	C3201_1	649	35.8	0	JEFF E RUSK ET AL	FRIO RIVER
Nueces	La Salle	IRR	C3104_1	250	98.6	0	WAITZ SUPER MARKET, INC	NUECES RIVER
Nueces	La Salle	IRR	C3105_1	150	99.8	1	FRANKLIN JERRY MEEKS	NUECES RIVER
Nueces	La Salle	IRR	C3106_1	20	94.3	0	M C WHITWELL ET UX	UNNAMED TRIB NUECES RIVER
Nueces	La Salle	IRR	C3106_2	20	93.2	0	M C WHITWELL ET UX	UNNAMED TRIB NUECES RIVER
Nueces	La Salle	IRR	C3107_1	210	43.3	0	CARL CONWAY	NUECES RIVER
Nueces	La Salle	IRR	C3108_1	298	31.5	0	C L LEHMAN ESTATE	NUECES RIVER
Nueces	La Salle	IRR	C3109_1	10	48.2	0	M C WHITWELL ET UX	NUECES RIVER

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Nueces	La Salle	IRR	C3110_1	22	47.7	0		
Nueces	La Salle	IRR	C3111_1	30	95.3	0	EUGENE WHITE	NUECES RIVER
Nueces	La Salle	IRR	C3112_1	47	98.4	0	FREDNA K DOBIE	NUECES RIVER
Nueces	La Salle	IRR	C3114_1	199	98.3	0	RALPH P. GUTTMAN	NUECES RIVER
Nueces	La Salle	IRR	C3115_1	55	98.3	0	VALLEY FLEA MARKET INC	NUECES RIVER
Nueces	La Salle	IRR	C3116_1	33	98.3	0	BRENDA JOAN BOYD	NUECES RIVER
Nueces	La Salle	IRR	C3116_2	145	98.2	0	PRINCE WOOD ET AL	NUECES RIVER
Nueces	La Salle	IRR	C3117_1	270	97.5	0	ROBERT CARL HART ET UX	NUECES RIVER
Nueces	La Salle	IRR	C3118_1	50	100.0	50	GLENN T ROBERTS ET UX	NUECES RIVER
Nueces	La Salle	IRR	C3119_1	40	100.0	40	NORMA D GARCIA ET VIR	NUECES RIVER
Nueces	La Salle	IRR	C3120_1	200	100.0	200	JOE L. GILBERT	NUECES RIVER
Nueces	La Salle	IRR	C3121_1	5	100.0	5	RUDY & TERESA RODRIGUEZ SR	NUECES RIVER
Nueces	La Salle	IRR	C3122_1	30	100.0	30	SANTANA A MORIN ET AL	NUECES RIVER
Nueces	La Salle	IRR	C3123_1	70	100.0	70	LOUIS OSWALD LIND	UNNAMED TRIB NUECES RIVER
Nueces	La Salle	IRR	C3123_2	130	100.0	67	LOUIS OSWALD LIND	UNNAMED TRIB NUECES RIVER
Nueces	La Salle	IRR	C3124_1	5	99.9	0	RAUL DEL TORO ET UX	UNNAMED TRIB NUECES RIVER
Nueces	La Salle	IRR	C3125_1	20	84.0	0	GEORGE & SHARON TRIGO	NUECES RIVER
Nueces	La Salle	IRR	C3126_1	100	82.8	0	SILLER BROTHERS	NUECES RIVER
Nueces	La Salle	IRR	C3126_2	260	62.2	0	SILLER BROTHERS	NUECES RIVER
Nueces	La Salle	IRR	C3127_1	180	91.3	0	LEE M & VALDA M GATES	NUECES RIVER
Nueces	La Salle	IRR	C3128_1	39	91.8	0	VALDA M GATES	NUECES RIVER
Nueces	La Salle	IRR	C3129_1	180	92.8	0	LOUISE G DAVIS	NUECES RIVER
Nueces	La Salle	IRR	C3130_1	126	91.2	0	BILLIE JEAN TAYLOR	NUECES RIVER
Nueces	La Salle	IRR	C3131_1	50	90.9	0	RONALD C FEUDO	NUECES RIVER
Nueces	La Salle	IRR	C3132_1	195	90.8	0	EL TRES EXPLORATION INC	UNNAMED TRIB NUECES RIVER
Nueces	La Salle	IRR	C3133_1	54	95.8	0	H B RAMSEY	NUECES RIVER
Nueces	La Salle	IRR	C3133_2	296	95.1	0	RODNEY D JONES	NUECES RIVER
Nueces	La Salle	IRR	C3134_1	398	92.8	0	GEORGE C HIXON	NUECES RIVER
Nueces	La Salle	IRR	C3135_1	42	100.0	42	H.B. RAMSEY	UNNAMED TRIB NUECES RIVER
Nueces	La Salle	IRR	C3135_2	38	91.7	0	H.B. RAMSEY	UNNAMED TRIB NUECES RIVER
Nueces	La Salle	IRR	C3136_1	200	100.0	200	DOROTHY M. KINSEL	NUECES RIVER
Nueces	La Salle	IRR	C3137_1	84	91.5	0	T.G. RANKIN	NUECES RIVER
Nueces	La Salle	IRR	C3138_1	55	91.4	0	CHARLES D. JOHNSON	UNNAMED TRIB NUECES RIVER
Nueces	La Salle	IRR	C3139_1	2,023	98.3	0	HOLLAND TEXAS DAM & IRR. CO.	UNNAMED TRIB NUECES RIVER
Nueces	La Salle	IRR	C3140_1	76	56.4	0	FRED HILLJE ESTATE	NUECES RIVER
Nueces	La Salle	IRR	C3203_1	106	33.1	0	DOUGLAS A MILLER, ET AL	UNNAMED SLOUGH FRIO RIVER
Nueces	Medina	IRR	C3189_1	40	7.7	0	RICHARD W SCHWEERS	HONDO CRK
Nueces	Medina	IRR	C3190_1	80	28.8	0	THOMAS J MOORE III	UNNAMED TRIB HONDO CRK
Nueces	Medina	IRR	C3191_1	20	15.3	0	L S MOLLERE, TRUSTEE	SECO CRK
Nueces	Medina	IRR	C3207_1	2,000	1.5	0	BEXAR-MEDINA-ATASCOSA WCID 1	CHACON CRK
Nueces	Medina	IRR	P4286_1	4	1.0	0	C H PIFER	CHACON CRK
Nueces	Medina	IRR	P4506_1	40	1.7	0	JAMES THOMAS BAGBY JR	HONDO CRK
Nueces	Medina	RCG	C3192_1	6,012	0.1	0	EDWARDS UNDERGROUND WATER DIST	PARKERS CRK
Nueces	Medina	RCG	P3745_1	12,172	4.7	0	EDWARDS UNDERGROUND W D	MIDDLE VERDE
Nueces	Medina	RCG	P3806_1	42,258	2.6	0	EDWARDS UNDERGROUND W D	SECO CRK
Nueces	Uvalde	IND	C3087_1	10	86.1	0	R L WHITE COMPANY	GATO CRK
Nueces	Uvalde	IRR	C3064_1	150	32.4	0	ADANA TEAGUE	NUECES RIVER
Nueces	Uvalde	IRR	C3065_1	720	100.0	720	F. KENNETH BAILEY JR.	NUECES RIVER
Nueces	Uvalde	IRR	C3066_1	10	31.4	0	GEORGE H MOFF	NUECES RIVER
Nueces	Uvalde	IRR	C3067_1	1,461	90.2	0	EVERETT L CLARK	NUECES RIVER
Nueces	Uvalde	IRR	C3068_1	310	87.7	0	WILLARD R WALLACE ET AL	NUECES RIVER
Nueces	Uvalde	IRR	C3069_1	134	45.2	0	ARIZONA T CRUMP	NUECES RIVER
Nueces	Uvalde	IRR	C3072_1	200	83.3	0	MIRASOL RANCH FAMILY LTD PART	NUECES RIVER
Nueces	Uvalde	IRR	C3073_1	144	26.8	0	SAM BARKLEY	NUECES RIVER
Nueces	Uvalde	IRR	C3163_1	113	36.3	0	JOHN HAMMAN JR ESTATE	FRIO RIVER
Nueces	Uvalde	IRR	C3163_2	133	3.5	0	JOHN HAMMAN JR ESTATE	FRIO RIVER
Nueces	Uvalde	IRR	C3165_1	86	36.1	0	WALLACE S & ISABEL B WILSON	FRIO RIVER
Nueces	Uvalde	IRR	C3166_1	35	36.5	0	JOE C KRANZ ET UX	FRIO RIVER
Nueces	Uvalde	IRR	C3167_1	11	36.4	0	MACONDA BROWN O'CONNOR	FRIO RIVER
Nueces	Uvalde	IRR	C3168_1	4	36.3	0	JOHN S BUCHANAN	FRIO RIVER

Basin	County of Diversion Location(s)	Use	WR ID#	Authorized Diversion (acft/yr)	Volume Reliability (%)	Minimum Annual Supply (acft)	Owner	Stream
Nueces	Uvalde	IRR	C3168_2	37	36.2	0	JOHN S BUCHANAN	FRIO RIVER
Nueces	Uvalde	IRR	C3169_1	40	36.2	0	JOHN S. GRAVES, JR, ET AL	MAYHEW
Nueces	Uvalde	IRR	C3170_1	19	9.2	0	JOHN M & MARY ANN BARKLEY	FRIO RIVER
Nueces	Uvalde	IRR	C3171_1	75	26.2	0	MICHAEL L STONER	FRIO RIVER
Nueces	Uvalde	IRR	C3172_1	1,000	3.8	0	THOMAS & GRETEL EKBAUM	FRIO RIVER
Nueces	Uvalde	IRR	C3173_1	1,000	3.8	0	ALVIN M RIMKUS	FRIO RIVER
Nueces	Uvalde	IRR	C3174_1	31	12.1	0	RIO GRANDE CHILDRENS HOME INC	DRY FRIO RIVER
Nueces	Uvalde	IRR	C3175_1	9	9.2	0	EL CAMINO GIRL SCOUT COUNCIL	DRY FRIO RIVER
Nueces	Uvalde	IRR	C3182_1	40	8.3	0	PAUL G SILBER JR	SABINAL RIVER
Nueces	Uvalde	IRR	C3194_1	50	2.7	0	GEORGE E LIGOCKY	UNNAMED TRIB COOK'S SLOUGH
Nueces	Uvalde	IRR	C3194_2	49	2.4	0	GEORGE E LIGOCKY	UNNAMED TRIB COOK'S SLOUGH
Nueces	Uvalde	IRR	C3196_1	40	7.9	0	SAMUEL DON SMITH	LEONA RIVER
Nueces	Uvalde	IRR	C3197_1	523	90.6	0	MARJORIE LEE KERR ESTATE	LEONA RIVER
Nueces	Uvalde	IRR	C3197_2	305	90.5	0	MARJORIE LEE KERR ESTATE	LEONA RIVER
Nueces	Uvalde	IRR	P3988_1	28	2.8	0	GEORGE LIGOCKY	UNNAMED TRIB COOK'S SLOUGH
Nueces	Uvalde	IRR	P3989_1	56	4.5	0	JAMES C HENRY, ET UX	UNNAMED TRIB COOK'S SLOUGH
Nueces	Uvalde	IRR	P3990_1	30	1.4	0	DON INMAN	UNNAMED TRIB COOK'S SLOUGH
Nueces	Uvalde	IRR	P3991_1	250	82.3	0	D S TURNER ET UX	UNNAMED TRIB COOK'S SLOUGH
Nueces	Uvalde	IRR	P4177_1	200	3.7	0	MARVIN G VERSTUYFT ET AL	FRIO RIVER
Nueces	Uvalde	IRR	P4177_2	795	3.5	0	MARVIN G VERSTUYFT ET AL	FRIO RIVER
Nueces	Uvalde	IRR	P4238_1	140	3.7	0	CON CAN ENTERPRISES INC	FRIO RIVER
Nueces	Uvalde	IRR	P4305_1	1,140	3.8	0	A C SANDERLIN ET AL	FRIO RIVER
Nueces	Uvalde	IRR	P4352_1	110	2.1	0	LOUIS A WATERS	LITTLE CRK
Nueces	Uvalde	IRR	P5063_1	94	3.8	0	GAFFORD FAMILY PARTNERSHIP	FRIO RIVER
Nueces	Uvalde	IRR	P5241_1	108	3.5	0	BARKAT LAND & CATTLE CO	FRIO RIVER
Nueces	Uvalde	IRR	P5325_1	255	2.0	0	RONALD E LEE, JR	SABINAL RIVER
Nueces	Uvalde	IRR	P5372_1	320	1.6	0	ROBERT L K LYNCH ET AL	FRIO RIVER
Nueces	Uvalde	MUN	P4505_1	200	2.6	0	UTOPIA WATER SUPPLY CORP	SABINAL RIVER
Nueces	Uvalde	MUN	P5063_2	6	3.9	0	GAFFORD FAMILY PARTNERSHIP	FRIO RIVER
Nueces	Uvalde	MUN	P5497_1	35	2.2	0	CONCAN WATER SUPPLY CORP	FRIO RIVER
Nueces	Zavala	IRR	C3074_1	200	17.1	0	DONALD R LINDENBORN JR TRUSTEE	NUECES RIVER
Nueces	Zavala	IRR	C3075_1	124	17.1	0	WALTER D MOORE	NUECES RIVER
Nueces	Zavala	IRR	C3076_1	200	17.1	0	DON P DIXON	NUECES RIVER
Nueces	Zavala	IRR	C3077_1	200	17.1	0	K & M FARMS	NUECES RIVER
Nueces	Zavala	IRR	C3078_1	200	17.1	0	WILBA RALPH WALKER ET AL	NUECES RIVER
Nueces	Zavala	IRR	C3079_1	313	17.0	0	JACK RUTLEDGE	NUECES RIVER
Nueces	Zavala	IRR	C3080_1	75	8.4	0	F F BONNET EX UX	NUECES RIVER
Nueces	Zavala	IRR	C3081_1	390	38.5	0	GEORGE C THOREEN ET AL	NUECES RIVER
Nueces	Zavala	IRR	C3082_1	8,000	61.7	0	ZAVALA-DIMMIT CO WID 1	NUECES RIVER
Nueces	Zavala	IRR	C3083_1	230	39.3	0	MARIO A ESCOBAR ET UX	NUECES RIVER
Nueces	Zavala	IRR	C3084_1	80	39.0	0	OPAL E C MARBURGER	NUECES RIVER
Nueces	Zavala	IRR	C3085_1	320	27.0	0	WARD L BOX	NUECES RIVER
Nueces	Zavala	IRR	C3088_1	150	80.4	0	CHAPARROSA RANCHES, LTD	CHAPARROSA CRK
Nueces	Zavala	IRR	C3089_1	206	77.4	0	ERROL O JONSSON ET AL	CHACON CRK
Nueces	Zavala	IRR	C3090_1	45	45.4	0	JIM G FERGUSON, JR	COMANCHE CRK
Nueces	Zavala	IRR	C3090_2	65	29.4	0	JIM G FERGUSON, JR	COMANCHE CRK
Nueces	Zavala	IRR	C3091_1	800	67.3	0	L C ROBBINS JR	COMANCHE CRK
Nueces	Zavala	IRR	C3091_2	400	66.3	0	TURKEY CREEK RANCHES LTD	COMANCHE CRK
Nueces	Zavala	IRR	C3091_3	400	65.7	0	FRANK W HARBORTH	COMANCHE CRK
Nueces	Zavala	IRR	C3092_1	684	46.3	0	TURKEY CREEK RANCHES LTD	UNNAMED TRIB COMANCHE CRK
Nueces	Zavala	IRR	C3198_1	150	6.3	0	DENVER C CARNES	LEONA RIVER

Appendix C
Comprehensive Water Needs Assessment Data

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Table C-1 Projected Water Demands, Supplies, and Needs Atascosa County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Municipal Demand								
Nueces Basin								
Benton City WSC		464	710	963	1,185	1,353	1,506	1,617
Bexar Met Water District		389	505	621	715	780	843	895
Charlotte		282	296	312	324	332	342	350
Jourdanton*		740	801	861	914	955	994	1,026
Lytle*		399	412	423	433	439	448	456
McCoy WSC		760	1,065	1,381	1,643	1,851	2,042	2,181
Pleasanton*		1,833	1,906	1,969	2,027	2,063	2,109	2,151
Poteet		729	735	741	740	740	745	752
Rural		569	432	328	242	172	124	94
Subtotal		6,165	6,862	7,599	8,223	8,685	9,153	9,522
San Antonio Basin								
Benton City WSC		40	62	84	103	118	131	141
Rural		24	17	13	9	6	4	3
Subtotal		64	79	97	112	124	135	144
Total Municipal Demand		6,229	6,941	7,696	8,335	8,809	9,288	9,666
Municipal Existing Supply								
Nueces Basin								
Benton City WSC	Carrizo	1007	1007	1007	1007	1007	1007	1007
Bexar Met Water District	ROR (San Antonio)	186	186	186	186	186	186	186
Charlotte	Carrizo	593	592	592	592	592	592	591
Jourdanton	Carrizo	690	689	689	689	688	688	688
Lytle	Edwards	290	290	290	290	290	290	290
McCoy WSC	Carrizo	1,472	1,469	1,468	1,468	1,468	1,468	1,468
Pleasanton	Carrizo	2,659	2,653	2,652	2,652	2,652	2,651	2,650
Poteet	Carrizo	1,035	1,033	1,033	1,033	1,033	1,032	1,032
Rural	Carrizo	265	265	265	265	265	265	265
	Queen City	350	350	350	350	350	350	350
Rural Subtotal		615	615	615	615	615	615	615
Subtotal		8,547	8,534	8,532	8,532	8,531	8,529	8,527
San Antonio Basin								
Benton City WSC	Carrizo	84	84	84	84	84	84	84
Rural	Carrizo	22	22	22	22	22	22	22
Subtotal		106	106	106	106	106	106	106
Total Existing Municipal Supply		8,653	8,640	8,638	8,638	8,637	8,635	8,633
Municipal Surplus/Shortage								
Nueces Basin								
Benton City WSC		543	297	44	-178	-346	-499	-610
Bexar Met Water District		-203	-319	-435	-529	-594	-657	-709
Charlotte		311	296	280	268	260	250	241
Jourdanton*		-50	-112	-172	-225	-267	-306	-338
Lytle*		-109	-122	-133	-143	-149	-158	-166
McCoy WSC		712	404	87	-175	-383	-574	-713
Pleasanton*		826	747	683	625	589	542	499
Poteet		306	298	292	293	293	287	280
Rural		46	183	287	373	443	491	521
Subtotal		2,382	1,672	933	309	-154	-624	-995
San Antonio Basin								
Benton City WSC		44	22	0	-19	-34	-47	-57
Rural		-2	5	9	13	16	18	19
Subtotal		42	27	9	-6	-18	-29	-38
Total Municipal Suprlus/Shortage		2,424	1,699	942	303	-172	-653	-1,033
Municipal New Supply Need								
Nueces Basin								

Table C-1 Projected Water Demands, Supplies, and Needs Atascosa County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Benton City WSC		0	0	0	178	346	499	610
Bexar Met Water District		203	319	435	529	594	657	709
Charlotte		0	0	0	0	0	0	0
Jourdanton*		50	112	172	225	267	306	338
Lytle*		109	122	133	143	149	158	166
McCoy WSC		0	0	0	175	383	574	713
Pleasanton*		0	0	0	0	0	0	0
Poteet		0	0	0	0	0	0	0
Rural		0	0	0	0	0	0	0
Subtotal		362	553	740	1,250	1,739	2,194	2,536
San Antonio Basin								
Benton City WSC		0	0	0	19	34	47	57
Rural		2	0	0	0	0	0	0
Subtotal		2	0	0	19	34	47	57
Total Municipal New Supply Need		364	553	740	1,269	1,773	2,241	2,593
Industrial Demand								
Nueces Basin		6	6	6	6	6	6	6
San Antonio Basin		0	0	0	0	0	0	0
Total Industrial Demand		6	6	6	6	6	6	6
Industrial Existing Supply								
Nueces Basin	Carrizo	6	6	6	6	6	6	6
San Antonio Basin		0	0	0	0	0	0	0
Total Industrial Supply		6	6	6	6	6	6	6
Industrial Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Total Industrial Surplus/Shortage		0	0	0	0	0	0	0
Industrial New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Total Industrial New Supply Need		0	0	0	0	0	0	0
Steam-Electric Demand								
Nueces Basin		5,814	7,000	4,807	6,101	5,997	7,336	7,672
San Antonio Basin		0	0	0	0	0	0	0
Total Steam-Electric Demand		5,814	7,000	4,807	6,101	5,997	7,336	7,672
Steam-Electric Existing Supply								
Nueces Basin	Carrizo	6,751	6,737	6,734	6,734	6,733	6,732	6,730
San Antonio Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		6,751	6,737	6,734	6,734	6,733	6,732	6,730
Steam-Electric Surplus/Shortage								
Nueces Basin		937	-263	1,927	633	736	-604	-942
San Antonio Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		937	-263	1,927	633	736	-604	-942
Steam-Electric New Supply Need								
Nueces Basin		0	263	0	0	0	604	942
San Antonio Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	263	0	0	0	604	942
Irrigation Demand								
Nueces Basin		34,107	39,782	38,442	37,154	35,914	34,723	33,570
San Antonio Basin		946	1,103	1,067	1,031	997	963	932
Total Irrigation Demand		35,053	40,885	39,509	38,185	36,911	35,686	34,502

Table C-1 Projected Water Demands, Supplies, and Needs Atascosa County South Central Texas Region								
		Total in	**Projections**					
Basin	**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Irrigation Supply								
Nueces Basin	Edwards	353	353	353	353	353	353	353
	Run-of-River	0	0	0	0	0	0	0
	Carrizo	32,944	32,877	32,862	32,860	32,858	32,851	32,841
	Queen City	916	916	916	916	916	916	916
Subtotal		34,213	34,146	34,131	34,129	34,127	34,120	34,110
San Antonio Basin	Edwards	166	166	166	166	166	166	166
	Carrizo	476	478	478	477	477	476	475
Subtotal		642	644	644	643	643	642	641
Total Irrigation Supply		34,855	34,790	34,775	34,772	34,770	34,762	34,751
Irrigation Surplus/Shortage								
Nueces Basin		106	-5,636	-4,311	-3,025	-1,787	-603	540
San Antonio Basin		-304	-459	-423	-388	-354	-321	-291
Total Irrigation Surplus/Shortage		-198	-6,095	-4,734	-3,413	-2,141	-924	249
Irrigation New Supply Need								
Nueces Basin		0	5,636	4,311	3,025	1787	603	0
San Antonio Basin		304	459	423	388	354	321	291
Total Irrigation New Supply Need		304	6,095	4,734	3,413	2,141	924	291
Mining Demand								
Nueces Basin		1,125	1,298	1,370	1,405	1,439	1,472	1,509
San Antonio Basin		0	0	0	0	0	0	0
Total Mining Demand		1,125	1,298	1,370	1,405	1,439	1,472	1,509
Mining Supply								
Nueces Basin	Carrizo	436	532	553	556	558	569	582
	Sparta	208	256	266	268	269	273	281
	Queen City	506	541	583	613	644	663	679
Subtotal		1,150	1,329	1,402	1,437	1,471	1,505	1,542
San Antonio Basin		0	0	0	0	0	0	0
Total Mining Supply		1,150	1,329	1,402	1,437	1,471	1,505	1,542
Mining Surplus/Shortage								
Nueces Basin		25	31	32	32	32	33	33
San Antonio Basin		0	0	0	0	0	0	0
Total Mining Surplus/Shortage		25	31	32	32	32	33	33
Mining New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Total Mining New Supply Need		0	0	0	0	0	0	0
Livestock Demand								
Nueces Basin		1,675	1,675	1,675	1,675	1,675	1,675	1,675
San Antonio Basin		70	70	70	70	70	70	70
Total Livestock Demand		1,745	1,745	1,745	1,745	1,745	1,745	1,745
Livestock Supplies								
Nueces Basin	Carrizo	387	386	386	386	386	386	386
	Queen City	414	346	361	378	394	408	415
	Sparta	37	31	32	33	35	36	37
	Local	838	913	897	879	861	846	838
Subtotal		1,676	1,676	1,676	1,676	1,676	1,676	1,676
San Antonio Basin	Carrizo	20	18	18	19	19	20	21
	Local	51	53	53	52	52	51	50
Subtotal		71	71	71	71	71	71	71
Total Livestock Supply		1,747	1,747	1,747	1,747	1,747	1,747	1,747

Table C-1 Projected Water Demands, Supplies, and Needs Atascosa County South Central Texas Region								
		Total in	**Projections**					
Basin	**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Livestock Surplus/Shortage								
Nueces Basin		1	1	1	1	1	1	1
San Antonio Basin		1	1	1	1	1	1	1
Total Livestock Surplus/Shortage		2	2	2	2	2	2	2
Livestock New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Total Livestock New Supply Need		0	0	0	0	0	0	0
Total County Demand								
Municipal		6,229	6,941	7,696	8,335	8,809	9,288	9,666
Industrial		6	6	6	6	6	6	6
Steam-Electric		5,814	7,000	4,807	6,101	5,997	7,336	7,672
Irrigation		35,053	40,885	39,509	38,185	36,911	35,686	34,502
Mining		1,125	1,298	1,370	1,405	1,439	1,472	1,509
Livestock		1,745	1,745	1,745	1,745	1,745	1,745	1,745
Total County Demand		49,972	57,875	55,133	55,777	54,907	55,533	55,100
Total County Supply								
Municipal		8,653	8,640	8,638	8,638	8,637	8,635	8,633
Industrial		6	6	6	6	6	6	6
Steam-Electric		6,751	6,737	6,734	6,734	6,733	6,732	6,730
Irrigation		34,855	34,790	34,775	34,772	34,770	34,762	34,751
Mining		1,150	1,329	1,402	1,437	1,471	1,505	1,542
Livestock		1,747	1,747	1,747	1,747	1,747	1,747	1,747
Total County Supply		53,162	53,249	53,302	53,334	53,364	53,387	53,409
Total County Balance								
Municipal		2,424	1,699	942	303	-172	-653	-1,033
Industrial		0	0	0	0	0	0	0
Steam-Electric		937	-263	1,927	633	736	-604	-942
Irrigation		-198	-6,095	-4,734	-3,413	-2,141	-924	249
Mining		25	31	32	32	32	33	33
Livestock		2	2	2	2	2	2	2
Total County Surplus/Shortage		3,190	-4,626	-1,831	-2,443	-1,543	-2,146	-1,691

Table C-1 Projected Water Demands, Supplies, and Needs Atascosa County South Central Texas Region								
		Total in	**Projections**					
Basin	**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Total Basin Demand								
Nueces								
Municipal		6,165	6,862	7,599	8,223	8,685	9,153	9,522
Industrial		6	6	6	6	6	6	6
Steam-Electric		5,814	7,000	4,807	6,101	5,997	7,336	7,672
Irrigation		34,107	39,782	38,442	37,154	35,914	34,723	33,570
Mining		1125	1298	1370	1405	1439	1472	1509
Livestock		1,675	1,675	1,675	1,675	1,675	1,675	1,675
Total Nueces Basin Demand		48,892	56,623	53,899	54,564	53,716	54,365	53,954
San Antonio								
Municipal		64	79	97	112	124	135	144
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		946	1,103	1,067	1,031	997	963	932
Mining		0	0	0	0	0	0	0
Livestock		70	70	70	70	70	70	70
Total San Antonio Basin Demand		1,080	1,252	1,234	1,213	1,191	1,168	1,146
Total Basin Supply								
Nueces								
Municipal		8,547	8,534	8,532	8,532	8,531	8,529	8,527
Industrial		6	6	6	6	6	6	6
Steam-Electric		6,751	6,737	6,734	6,734	6,733	6,732	6,730
Irrigation		34,213	34,146	34,131	34,129	34,127	34,120	34,110
Mining		1,150	1,329	1,402	1,437	1,471	1,505	1,542
Livestock		1,676	1,676	1,676	1,676	1,676	1,676	1,676
Total Nueces Basin Supply		52,343	52,428	52,481	52,514	52,544	52,568	52,591
San Antonio								
Municipal		106	106	106	106	106	106	106
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		642	644	644	643	643	642	641
Mining		0	0	0	0	0	0	0
Livestock		71	71	71	71	71	71	71
Total San Antonio Basin Supply		819	821	821	820	820	819	818
Total Basin Balance								
Nueces								
Municipal		2,382	1,672	933	309	-154	-624	-995
Industrial		0	0	0	0	0	0	0
Steam-Electric		937	-263	1,927	633	736	-604	-942
Irrigation		106	-5,636	-4,311	-3,025	-1,787	-603	540
Mining		25	31	32	32	32	33	33
Livestock		1	1	1	1	1	1	1
Total Nueces Basin Supply		3,451	-4,195	-1,418	-2,050	-1,172	-1,797	-1,363
San Antonio								
Municipal		42	27	9	-6	-18	-29	-38
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		-304	-459	-423	-388	-354	-321	-291
Mining		0	0	0	0	0	0	0
Livestock		1	1	1	1	1	1	1
Total San Antonio Basin Supply		-261	-431	-413	-393	-371	-349	-328
Groundwater Supplies								
Available								
Nueces	Edwards	353	353	353	353	353	353	353

Table C-1 Projected Water Demands, Supplies, and Needs Atascosa County South Central Texas Region								
		Total in	**Projections**					
Basin	**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
San Antonio	Edwards	166	166	166	166	166	166	166
Nueces	Carrizo	47,288	47,288	47,288	47,288	47,288	47,288	47,288
San Antonio	Carrizo	518	518	518	518	518	518	518
Nueces	Sparta	1,150	1,150	1,150	1,150	1,150	1,150	1,150
Nueces	Queen City	4,380	4,380	4,380	4,380	4,380	4,380	4,380
Total Available		53,855	53,855	53,855	53,855	53,855	53,855	53,855
Allocated								
Nueces	Edwards	353	353	353	353	353	353	353
San Antonio	Edwards	166	166	166	166	166	166	166
Nueces	Carrizo	47,288	47,288	47,288	47,288	47,288	47,288	47,288
San Antonio	Carrizo	518	518	518	518	518	518	518
Nueces	Sparta	245	287	298	301	304	309	318
Nueces	Queen City	2,186	2,153	2,210	2,257	2,304	2,337	2,360
Total Allocated		50,756	50,765	50,833	50,883	50,933	50,971	51,003
Total Unallocated		3,099	3,090	3,022	2,972	2,922	2,884	2,852
* Projected demands, shortages, and needs may be greater than shown. These WUGs are requesting a population/demand revision.								

Table C-2 Projected Water Demands, Supplies, and Needs Bexar County South Central Texas Region								
Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand									
Nueces Basin									
Atascosa Rural WSC			31	38	44	51	56	60	65
Bexar Met Water District*			159	161	163	165	165	167	171
Lytle*			3	5	7	8	10	11	12
Rural			251	258	263	268	270	273	279
	Subtotal		444	462	477	492	501	511	527
San Antonio Basin									
Alamo Heights			2,000	2,071	2,134	2,136	2,132	2,146	2,170
Atascosa Rural WSC			735	903	1,068	1,213	1,335	1,441	1,548
Balcones Heights			480	514	555	578	600	633	670
Bexar Met Water District*			8,635	8,736	8,869	8,944	8,945	9,081	9,278
Castle Hills (BMWD)			838	820	807	793	780	771	771
China Grove			288	376	457	531	591	645	695
Converse			1,495	1,907	2,331	2,729	3,044	3,311	3,564
East Central SUD			975	1,325	1,572	1,790	1,974	2,133	2,289
Elmendorf			99	112	123	132	140	148	156
Fair Oaks Ranch			889	1,090	1,094	1,097	1,101	1,099	1,104
Green Valley SUD*			247	458	646	818	939	1,068	1,182
Helotes			845	1,537	2,249	2,820	3,264	3,679	4,047
Hill Country Village (BMWD)			842	838	835	831	828	826	826
Hollywood Park (BMWD)			2,229	2,314	2,389	2,458	2,511	2,565	2,616
Kirby			1,001	1,005	1,004	1,007	1,001	1,013	1,034
Lackland AFB (CDP)			3,136	3,104	3,080	3,056	3,032	3,016	3,016
Leon Valley			711	694	678	667	655	650	659
Leon Valley (SAWS)			407	397	388	382	375	372	377
Live Oak*			1,128	1,145	1,157	1,177	1,193	1,232	1,284
Olmos Park			381	403	424	441	452	468	484
San Antonio (BMWD)*			21,419	24,654	27,471	30,157	32,187	34,150	36,107
San Antonio (SAWS)			166,813	192,007	213,943	234,865	250,671	265,958	281,204
San Antonio (Others)			247	284	317	348	371	394	416
Schertz*			167	272	371	456	525	591	649
Selma			252	1,531	1,927	2,309	2,260	2,204	2,155
Shavano Park*			802	819	835	847	856	868	880
Somerset (BMWD)			321	405	484	552	609	660	709
St. Hedwig			256	310	358	403	436	469	501
Terrell Hills			815	863	914	956	983	1,018	1,057
Universal City			2,329	2,608	2,916	3,175	3,125	3,101	3,101
Water Service Inc. (Apex Water Ser.)			435	570	697	809	902	982	1,061
Windcrest			1,212	1,204	1,196	1,187	1,177	1,174	1,182
Rural			1,226	705	559	472	742	985	1,205
Rural (SAWS)			5,595	5,661	5,747	5,796	5,796	5,884	6,012
	Subtotal		229,250	261,642	289,595	315,932	335,532	354,735	374,009
Total Municipal Demand			229,694	262,104	290,072	316,424	336,033	355,246	374,536
Municipal Existing Supply									
Nueces Basin									
Atascosa Rural WSC		Edwards	16	16	16	16	16	16	16
Bexar Met Water District		ROR (San Antonio)	76	76	76	76	76	76	76
Lytle		Edwards	2	2	2	2	2	2	2
Rural		Carrizo	314	314	314	314	314	314	314
	Subtotal		408	408	408	408	408	408	408
San Antonio Basin									
Alamo Heights		Edwards	1,479	1,479	1,479	1,479	1,479	1,479	1,479
Atascosa Rural WSC		Edwards	379	379	379	379	379	379	379
Balcones Heights		Edwards (SAWS)	480	514	555	578	600	633	670

Table C-2 Projected Water Demands, Supplies, and Needs Bexar County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Bexar Met Water District		Edwards	0	0	0	0	0	0	0
		Trinity	1,500	1,500	1,500	1,500	1,500	1,500	1,500
		Carrizo	1,000	1,000	1,000	770	757	745	735
		ROR (San Antonio)	3,214	3,130	3,051	2,983	2,926	2,875	2,826
Bexar Met Water District Subtotal			5,714	5,630	5,551	5,253	5,183	5,120	5,061
Castle Hills (BMWD)		Edwards (BMWD)	724	724	724	724	724	724	724
China Grove		Edwards (SAWS)	288	376	457	531	591	645	695
Converse		Edwards	1,095	1,095	1,095	1,095	1,095	1,095	1,095
		Edwards (BMWD)	0	1,500	1,500	1,500	1,500	1,500	1,500
Converse Subtotal			1,095	2,595	2,595	2,595	2,595	2,595	2,595
East Central SUD		Canyon (CRWA - Dunlap)	1,170	1,170	251	251	251	251	251
		Carrizo (Springs Hill/CRWA)	322	322	322	322	322	322	322
		Edwards (BMWD)	1,003	1,003	1,003	1,003	1,003	1,003	1,003
East Central Subtotal			2,495	2,495	1,576	1,576	1,576	1,576	1,576
Elmendorf		Edwards (SAWS)	99	112	123	132	140	148	156
Fair Oaks Ranch		Trinity (Comal County)	197	197	197	197	197	161	161
		Canyon (GBRA - Western Cany	0	1,388	1,388	1,388	1,388	1,388	1,388
Fair Oaks Ranch Subtotal			197	1,585	1,585	1,585	1,585	1,549	1,549
Green Valley SUD		Edwards	317	317	317	317	317	317	317
		Edwards (East Central)	21	21	21	21	21	21	21
		Canyon (GBRA)	251	251	575	575	575	575	575
		Canyon (CRWA - Dunlap)	193	193	193	193	193	193	193
Green Valley SUD Subtotal			782	782	1,106	1,106	1,106	1,106	1,106
Helotes		Edwards (SAWS)	845	1,537	2,249	2,820	3,264	3,679	4,047
Hill Country Village (BMWD)		Edwards (BMWD)	108	108	108	108	108	108	108
Hollywood Park (BMWD)		Edwards (BMWD)	345	345	345	345	345	345	345
Kirby		Edwards	670	670	670	670	670	670	670
Lackland AFB (CDP)		Edwards (SAWS)	3,136	3,104	3,080	3,056	3,032	3,016	3,016
Leon Valley		Edwards	785	785	785	785	785	785	785
Leon Valley (SAWS)		Edwards (SAWS)	407	397	388	382	375	372	377
Live Oak		Edwards	984	984	984	984	984	984	984
		Edwards (SAWS)	338	344	347	353	358	370	385
		Edwards (BMWD)	0	1,000	1,000	1,000	1,000	1,000	1,000
Live Oak Subtotal			1,322	2,328	2,331	2,337	2,342	2,354	2,369
Olmos Park		Edwards (SAWS)	381	403	424	441	452	468	484
San Antonio (BMWD)		Edwards (BMWD)	10,450	7,950	7,950	7,950	7,950	7,950	7,950
		Trinity (BMWD)	0	3,681	3,681	3,681	3,681	3,681	3,681
		Canyon (CRWA - Dunlap)	4,000	4,000	0	0	0	0	0
		ROR (San Antonio)	0	0	0	0	0	0	0
San Antonio (BMWD) Subtotal			14,450	15,631	11,631	11,631	11,631	11,631	11,631
San Antonio (SAWS)		Edwards	103,622	102,696	101,723	102,083	101,537	100,895	100,229
		Carrizo	6,400	6,400	6,400	4,925	4,846	4,770	4,704
		Trinity	0	3,500	3,500	3,500	3,500	3,500	3,500
		Canyon (GBRA - Western Cany	0	7,500	5,500	4,000	0	0	0
		Direct Reuse (SAWS)	3,435	3,435	3,435	3,435	3,435	3,435	3,435
San Antonio (SAWS) Subtotal			113,457	123,531	120,558	117,943	113,318	112,600	111,868
San Antonio (Others)		ROR (San Antonio)	0	0	0	0	0	0	0
Schertz		Edwards	55	55	55	55	55	55	55
		Carrizo (Guadalupe) - S/S	0	194	194	194	194	194	194
		Carrizo (Gonzales) - S/S	354	354	354	354	354	354	354
Schertz Subtotal			409	603	603	603	603	603	603
Selma		Edwards	837	837	837	837	837	837	837
		Carrizo (Gonzales) - S/S	733	733	733	733	733	733	733
Selma Subtotal			1,570	1,570	1,570	1,570	1,570	1,570	1,570
Shavano Park		Edwards	499	499	499	499	499	499	499
Somerset (BMWD)		ROR (San Antonio)	321	405	484	552	609	660	709
St. Hedwig	Estimate	Edwards	256	310	358	403	436	469	501
Terrell Hills		Edwards (SAWS)	815	863	914	956	983	1,018	1,057

Table C-2 Projected Water Demands, Supplies, and Needs Bexar County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Universal City		Edwards	1,695	1,695	1,695	1,695	1,695	1,695	1,695
		Carrizo (Gonzales) - S/S	800	800	800	800	800	800	800
Universal City Subtotal			2,495	2,495	2,495	2,495	2,495	2,495	2,495
Water Service Inc. (Apex Water Ser.)		Edwards	24	24	24	24	24	24	24
Windcrest		Edwards	909	909	909	909	909	909	909
		Edwards (SAWS)	61	60	60	59	59	59	59
Windcrest Subtotal			970	969	969	968	968	968	968
Rural		Edwards	628	574	526	481	448	415	383
		Edwards (SAWS/EC) - PP	1,120	1,120	1,120	0	0	0	0
		Trinity	167	167	167	167	167	167	167
Rural Subtotal			1,915	1,861	1,813	648	615	582	550
Rural (SAWS)		Edwards (SAWS)	5,595	5,661	5,747	5,796	5,796	5,884	6,012
	Subtotal		164,508	180,770	174,174	170,969	166,877	166,753	166,677
Total Existing Municipal Supply			164,915	181,178	174,582	171,377	167,285	167,161	167,085
Municipal Surplus/Shortage									
Nueces Basin									
Atascosa Rural WSC			-15	-22	-28	-35	-40	-44	-49
Bexar Met Water District			-83	-85	-87	-89	-89	-91	-95
Lytle*			-1	-3	-5	-6	-8	-9	-10
Rural			63	56	51	46	44	41	35
	Subtotal		-36	-54	-69	-84	-93	-103	-119
San Antonio Basin									
Alamo Heights			-521	-592	-655	-657	-653	-667	-691
Atascosa Rural WSC			-356	-524	-689	-834	-956	-1,062	-1,169
Balcones Heights			0	0	0	0	0	0	0
Bexar Met Water District			-2,921	-3,106	-3,318	-3,691	-3,762	-3,961	-4,217
Castle Hills (BMWD)			-114	-96	-83	-69	-56	-47	-47
China Grove			0	0	0	0	0	0	0
Converse			-400	688	264	-134	-449	-716	-969
East Central SUD			1,520	1,170	4	-214	-398	-557	-713
Elmendorf			0	0	0	0	0	0	0
Fair Oaks Ranch			-692	495	491	488	484	450	445
Green Valley SUD*			535	324	460	288	167	38	-76
Helotes			0	0	0	0	0	0	0
Hill Country Village (BMWD)			-734	-730	-727	-723	-720	-718	-718
Hollywood Park (BMWD)			-1,884	-1,969	-2,044	-2,113	-2,166	-2,220	-2,271
Kirby			-331	-335	-334	-337	-331	-343	-364
Lackland AFB (CDP)			0	0	0	0	0	0	0
Leon Valley			74	91	107	118	130	135	126
Leon Valley (SAWS)			0	0	0	0	0	0	0
Live Oak*			194	1,183	1,174	1,160	1,149	1,122	1,085
Olmos Park			0	0	0	0	0	0	0
San Antonio (BMWD)*			-6,969	-9,023	-15,840	-18,526	-20,556	-22,519	-24,476
San Antonio (SAWS)			-53,356	-68,476	-93,385	-116,922	-137,353	-153,358	-169,336
San Antonio (Others)			-247	-284	-317	-348	-371	-394	-416
Schertz*			242	331	232	147	78	12	-46
Selma			1,318	39	-357	-739	-690	-634	-585
Shavano Park*			-303	-320	-336	-348	-357	-369	-381
Somerset (BMWD)			0	0	0	0	0	0	0
St. Hedwig			0	0	0	0	0	0	0
Terrell Hills			0	0	0	0	0	0	0
Universal City			166	-113	-421	-680	-630	-606	-606
Water Service Inc. (Apex Water Ser.)			-411	-546	-673	-785	-878	-958	-1,037
Windcrest			-242	-235	-227	-219	-209	-206	-214
Rural			689	1,156	1,254	176	-127	-403	-655
Rural (SAWS)			0	0	0	0	0	0	0
	Subtotal		-64,742	-80,872	-115,421	-144,963	-168,655	-187,982	-207,332
Total Municipal Surplus/Shortage			-64,779	-80,926	-115,490	-145,047	-168,748	-188,085	-207,451

Table C-2 Projected Water Demands, Supplies, and Needs Bexar County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Municipal New Supply Need								
Nueces Basin								
Atascosa Rural WSC		15	22	28	35	40	44	49
Bexar Met Water District		83	85	87	89	89	91	95
Lytle*		1	3	5	6	8	9	10
Rural		0	0	0	0	0	0	0
Subtotal		99	110	120	130	137	144	154
San Antonio Basin								
Alamo Heights		521	592	655	657	653	667	691
Atascosa Rural WSC		356	524	689	834	956	1,062	1,169
Balcones Heights		0	0	0	0	0	0	0
Bexar Met Water District		2,921	3,106	3,318	3,691	3,762	3,961	4,217
Castle Hills (BMWD)		114	96	83	69	56	47	47
China Grove		0	0	0	0	0	0	0
Converse		400	0	0	134	449	716	969
East Central SUD		0	0	0	214	398	557	713
Elmendorf		0	0	0	0	0	0	0
Fair Oaks Ranch		692	0	0	0	0	0	0
Green Valley SUD*		0	0	0	0	0	0	76
Helotes		0	0	0	0	0	0	0
Hill Country Village (BMWD)		734	730	727	723	720	718	718
Hollywood Park (BMWD)		1,884	1,969	2,044	2,113	2,166	2,220	2,271
Kirby		331	335	334	337	331	343	364
Lackland AFB (CDP)		0	0	0	0	0	0	0
Leon Valley		0	0	0	0	0	0	0
Leon Valley (SAWS)		0	0	0	0	0	0	0
Live Oak*		0	0	0	0	0	0	0
Olmos Park		0	0	0	0	0	0	0
San Antonio (BMWD)*		6,969	9,023	15,840	18,526	20,556	22,519	24,476
San Antonio (SAWS)		53,356	68,476	93,385	116,922	137,353	153,358	169,336
San Antonio (Others)		247	284	317	348	371	394	416
Schertz*		0	0	0	0	0	0	46
Selma		0	0	357	739	690	634	585
Shavano Park*		303	320	336	348	357	369	381
Somerset (BMWD)		0	0	0	0	0	0	0
St. Hedwig		0	0	0	0	0	0	0
Terrell Hills		0	0	0	0	0	0	0
Universal City		0	113	421	680	630	606	606
Water Service Inc. (Apex Water Ser.)		411	546	673	785	878	958	1,037
Windcrest		242	235	227	219	209	206	214
Rural		0	0	0	0	127	403	655
Rural (SAWS)		0	0	0	0	0	0	0
Subtotal		69,481	86,349	119,406	147,339	170,662	189,738	208,987
Total Municipal New Supply Need		69,580	86,459	119,526	147,469	170,799	189,882	209,141
Industrial Demand								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		21,252	25,951	29,497	32,775	36,068	38,965	42,112
Total Industrial Demand		21,252	25,951	29,497	32,775	36,068	38,965	42,112

Table C-2 Projected Water Demands, Supplies, and Needs Bexar County South Central Texas Region								
Basin	Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Industrial Existing Supply								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin	Edwards	16,855	16,855	16,855	16,855	16,855	16,855	16,855
	Carrizo	329	329	329	253	249	245	242
	Trinity	5,711	5,711	5,711	5,711	5,711	5,711	5,711
	Run-of-River	0	0	0	0	0	0	0
	Direct Reuse (SAWS)	1,716	1,716	1,716	1,716	1,716	1,716	1,716
San Antonio Basin Subtotal		24,611	24,611	24,611	24,535	24,531	24,527	24,524
Total Industrial Existing Supply		24,611	24,611	24,611	24,535	24,531	24,527	24,524
Industrial Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		3,359	-1,340	-4,886	-8,240	-11,537	-14,438	-17,588
Total Industrial Surplus/Shortage		3,359	-1,340	-4,886	-8,240	-11,537	-14,438	-17,588
Industrial New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	1,340	4,886	8,240	11,537	14,438	17,588
Total Industrial New Supply Need		0	1,340	4,886	8,240	11,537	14,438	17,588
Steam-Electric Demand								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		17,399	20,395	25,761	30,139	32,973	36,120	39,614
Total Steam-Electric Demand		17,399	20,395	25,761	30,139	32,973	36,120	39,614
Steam-Electric Existing Supply								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin	Victor Braunig Lake	12,000	12,000	12,000	12,000	12,000	12,000	12,000
	Calaveras Lake	36,900	36,900	36,900	36,900	36,900	36,900	36,900
San Antonio Basin Subtotal		48,900	48,900	48,900	48,900	48,900	48,900	48,900
Total Steam-Electric Existing Supply		48,900	48,900	48,900	48,900	48,900	48,900	48,900
Steam-Electric Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		31,501	28,505	23,139	18,761	15,927	12,780	9,286
Total Steam-Electric Surplus/Shortage		31,501	28,505	23,139	18,761	15,927	12,780	9,286
Steam-Electric New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
Nueces Basin		1,333	1,283	1,229	1,177	1,127	1,080	1,034
San Antonio Basin		14,532	13,990	13,399	12,833	12,290	11,770	11,272
Total Irrigation Demand		15,865	15,273	14,628	14,010	13,417	12,850	12,306
Irrigation Supply								
Nueces Basin	Edwards	824	824	824	824	824	824	824
	Carrizo	984	959	946	358	350	342	335
Nueces Basin Subtotal		1,808	1,783	1,770	1,182	1,174	1,166	1,159

Table C-2 Projected Water Demands, Supplies, and Needs Bexar County South Central Texas Region								
Basin	**Source**	**Total in 2000 (acft)**	**Projections 2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
San Antonio Basin	Edwards	16,550	16,550	16,550	16,550	16,550	16,550	16,550
	Run-of-River	1,008	1,008	1,008	1,008	1,008	1,008	1,008
	Reuse (SARA)	230	230	230	230	230	230	230
	Reuse (SAWS)	4,616	4,616	4,616	4,616	4,616	4,616	4,616
	Reuse (CCMA)	24	24	24	24	24	24	24
	Carrizo	799	799	799	615	605	596	587
San Antonio Basin Subtotal		23,227	23,227	23,227	23,043	23,033	23,024	23,015
Total Irrigation Supply		25,035	25,010	24,997	24,225	24,207	24,190	24,174
Irrigation Surplus/Shortage								
Nueces Basin		475	500	541	5	47	86	125
San Antonio Basin		8,695	9,237	9,828	10,210	10,743	11,254	11,743
Total Irrigation Surplus/Shortage		9,170	9,737	10,369	10,215	10,790	11,340	11,868
Irrigation New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0
Mining Demand								
Nueces Basin		106	131	144	152	160	168	175
San Antonio Basin		2,796	3,451	3,790	3,998	4,203	4,408	4,591
Total Mining Demand		2,902	3,582	3,934	4,150	4,363	4,576	4,766
Mining Supply								
Nueces Basin	Carrizo	106	131	144	152	160	168	175
San Antonio Basin	Carrizo	2,796	3,451	3,790	3,077	3,183	3,286	3,375
Total Mining Supply		2,902	3,582	3,934	3,229	3,343	3,454	3,550
Mining Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	-921	-1,020	-1,122	-1,216
Total Mining Surplus/Shortage		0	0	0	-921	-1,020	-1,122	-1,216
Mining New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	921	1,020	1,122	1,216
Total Mining New Supply Need		0	0	0	921	1,020	1,122	1,216

Table C-2
Projected Water Demands, Supplies, and Needs
Bexar County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Livestock Demand									
Nueces Basin			24	24	24	24	24	24	24
San Antonio Basin			1,295	1,295	1,295	1,295	1,295	1,295	1,295
Total Livestock Demand			1,319	1,319	1,319	1,319	1,319	1,319	1,319
Livestock Supply									
Nueces Basin		Edwards (D&L)[2]	8	8	8	8	8	8	8
		Carrizo	2	2	2	2	2	2	2
		Trinity	2	2	2	2	2	2	2
		Local	12	12	12	12	12	12	12
	Subtotal		24	24	24	24	24	24	24
San Antonio Basin		Carrizo	113	113	113	87	86	84	83
		Trinity	268	268	268	268	268	268	268
		Edwards (D&L)[2]	320	321	322	346	346	346	346
		Local	648	648	648	648	648	648	648
	Subtotal		1,349	1,350	1,351	1,349	1,348	1,346	1,345
Total Livestock Supply			1,373	1,374	1,375	1,373	1,372	1,370	1,369
Livestock Surplus/Shortage									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			54	55	56	54	53	51	50
Total Livestock Surplus/Shortage			54	55	56	54	53	51	50
Livestock New Supply Need									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0
Total Bexar County Demand									
Municipal			229,694	262,104	290,072	316,424	336,033	355,246	374,536
Industrial			21,252	25,951	29,497	32,775	36,068	38,965	42,112
Steam-Electric			17,399	20,395	25,761	30,139	32,973	36,120	39,614
Irrigation			15,865	15,273	14,628	14,010	13,417	12,850	12,306
Mining			2,902	3,582	3,934	4,150	4,363	4,576	4,766
Livestock			1,319	1,319	1,319	1,319	1,319	1,319	1,319
Total County Demand			288,431	328,624	365,211	398,817	424,173	449,076	474,653
Total Bexar County Supply									
Municipal			164,915	181,178	174,582	171,377	167,285	167,161	167,085
Industrial			24,611	24,611	24,611	24,535	24,531	24,527	24,524
Steam-Electric			48,900	48,900	48,900	48,900	48,900	48,900	48,900
Irrigation			25,035	25,010	24,997	24,225	24,207	24,190	24,174
Mining			2,902	3,582	3,934	3,229	3,343	3,454	3,550
Livestock			1,373	1,374	1,375	1,373	1,372	1,370	1,369
Total County Supply			267,736	284,655	278,399	273,639	269,638	269,602	269,602
Total Bexar County Balance									
Municipal			-64,779	-80,926	-115,490	-145,047	-168,748	-188,085	-207,451
Industrial			3,359	-1,340	-4,886	-8,240	-11,537	-14,438	-17,588
Steam-Electric			31,501	28,505	23,139	18,761	15,927	12,780	9,286
Irrigation			9,170	9,737	10,369	10,215	10,790	11,340	11,868
Mining			0	0	0	-921	-1,020	-1,122	-1,216
Livestock			54	55	56	54	53	51	50
Total County Surplus/Shortage			-20,695	-43,969	-86,812	-125,178	-154,535	-179,474	-205,051

Table C-2 Projected Water Demands, Supplies, and Needs Bexar County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Total Basin Demand								
Nueces								
Municipal		444	462	477	492	501	511	527
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		1,333	1,283	1,229	1,177	1,127	1,080	1,034
Mining		106	131	144	152	160	168	175
Livestock		24	24	24	24	24	24	24
Total Nueces Basin Demand		1,907	1,900	1,874	1,845	1,812	1,783	1,760
San Antonio								
Municipal		229,250	261,642	289,595	315,932	335,532	354,735	374,009
Industrial		21,252	25,951	29,497	32,775	36,068	38,965	42,112
Steam-Electric		17,399	20,395	25,761	30,139	32,973	36,120	39,614
Irrigation		14,532	13,990	13,399	12,833	12,290	11,770	11,272
Mining		2,796	3,451	3,790	3,998	4,203	4,408	4,591
Livestock		1,295	1,295	1,295	1,295	1,295	1,295	1,295
Total San Antonio Basin Demand		286,524	326,724	363,337	396,972	422,361	447,293	472,893
Total Basin Supply								
Nueces								
Municipal		408	408	408	408	408	408	408
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		1,808	1,783	1,770	1,182	1,174	1,166	1,159
Mining		106	131	144	152	160	168	175
Livestock		24	24	24	24	24	24	24
Total Nueces Basin Supply		2,346	2,346	2,346	1,766	1,766	1,766	1,766
San Antonio								
Municipal		164,508	180,770	174,174	170,969	166,877	166,753	166,677
Industrial		24,611	24,611	24,611	24,535	24,531	24,527	24,524
Steam-Electric		48,900	48,900	48,900	48,900	48,900	48,900	48,900
Irrigation		23,227	23,227	23,227	23,043	23,033	23,024	23,015
Mining		2,796	3,451	3,790	3,077	3,183	3,286	3,375
Livestock		1,349	1,350	1,351	1,349	1,348	1,346	1,345
Total San Antonio Basin Supply		265,391	282,309	276,053	271,873	267,872	267,836	267,836

Table C-2
Projected Water Demands, Supplies, and Needs
Bexar County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Basin Balance									
Nueces									
Municipal			-36	-54	-69	-84	-93	-103	-119
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			475	500	541	5	47	86	125
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Total Nueces Basin Surplus/Shortage			439	446	472	-79	-46	-17	6
San Antonio									
Municipal			-64,742	-80,872	-115,421	-144,963	-168,655	-187,982	-207,332
Industrial			3,359	-1,340	-4,886	-8,240	-11,537	-14,438	-17,588
Steam-Electric			31,501	28,505	23,139	18,761	15,927	12,780	9,286
Irrigation			8,695	9,237	9,828	10,210	10,743	11,254	11,743
Mining			0	0	0	-921	-1,020	-1,122	-1,216
Livestock			54	55	56	54	53	51	50
Total San Antonio Basin Surplus/Shortage			-21,133	-44,415	-87,284	-125,099	-154,489	-179,457	-205,057
Groundwater Supplies									
	Available								
	Nueces	Edwards	824	824	824	824	824	824	824
	San Antonio	Edwards	175,112	175,112	175,112	175,112	175,112	175,112	175,112
	Nueces	Edwards (D&L)	8	8	8	8	8	8	8
	San Antonio	Edwards (D&L)	320	321	322	346	346	346	346
	Nueces	Carrizo	1,406	1,406	1,406	826	826	826	826
	San Antonio	Carrizo	16,544	16,544	16,544	9,726	9,726	9,726	9,726
	Nueces	Trinity	223	223	223	223	223	223	223
	San Antonio	Trinity	32,544	32,544	32,544	32,544	32,544	32,544	32,544
	Total Available		226,981	226,982	226,983	219,609	219,609	219,609	219,609
	Allocated								
	Nueces	Edwards	824	824	824	824	824	824	824
	San Antonio	Edwards	175,112	175,112	175,112	175,112	175,112	175,112	175,112
	Nueces	Edwards (D&L)	8	8	8	8	8	8	8
	San Antonio	Edwards (D&L)	320	321	322	346	346	346	346
	Nueces	Carrizo	1,406	1,406	1,406	826	826	826	826
	Nueces	Trinity	2	2	2	2	2	2	2
	San Antonio	Carrizo	11,437	12,092	12,431	9,726	9,726	9,726	9,726
	San Antonio	Trinity	11,327	14,827	14,827	14,827	14,827	14,827	14,827
	Total Allocated		200,436	204,592	204,932	201,671	201,671	201,671	201,671
	Total Unallocated		26,545	22,390	22,051	17,938	17,938	17,938	17,938

Notes:
[1] Used for irrigation of golf courses and open spaces.
[2] There is limited supply from the Edwards Aquifer for D&L; however, these values are not part of the 320,000 acft/yr allocated to other uses.
* Projected demands, shortages, and needs may be greater than shown. These WUGs are requesting a population/demand revision.

Table C-3 Projected Water Demands, Supplies, and Needs Caldwell County South Central Texas Region									
Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand									
Guadalupe Basin									
Aqua WSC			194	267	339	396	458	518	580
County Line WSC			114	204	308	405	501	600	695
Creedmore-Maha WSC			68	98	127	154	181	207	235
Goforth WSC*			112	184	269	342	417	495	571
Gonzales County WSC			46	63	79	94	108	122	136
Lockhart			1,795	2,451	3,094	3,629	4,180	4,725	5,285
Luling			888	1,067	1,210	1,299	1,384	1,486	1,594
Martindale			107	125	134	139	143	150	158
Martindale WSC			93	142	153	158	162	170	179
Maxwell WSC			334	503	678	844	996	1,166	1,331
Mustang Ridge			9	13	18	21	25	29	33
Niederwald			11	26	43	61	78	95	111
Polonia WSC			322	466	618	749	884	1,016	1,155
Rural			207	214	201	177	154	136	122
	Subtotal		4,300	5,823	7,271	8,468	9,671	10,915	12,185
Lower Colorado Basin									
Creedmore-Maha WSC			94	136	177	213	250	287	325
Mustang Ridge			84	122	160	194	228	262	296
Polonia WSC			140	202	268	325	384	441	501
Rural			23	23	22	22	22	21	21
	Subtotal		341	483	627	754	884	1,011	1,143
Total Municipal Demand			4,641	6,306	7,898	9,222	10,555	11,926	13,328
Municipal Existing Supply									
Guadalupe Basin									
Aqua WSC		Carrizo	218	218	218	218	218	218	218
County Line WSC		Edwards	13	13	13	13	13	13	13
		ROR (Guadalupe) - CRWA	56	56	56	56	56	56	56
		Canyon (CRWA)	272	272	272	272	272	272	272
County Line WSC Total			341	341	341	341	341	341	341
Creedmore-Maha WSC		Edwards (Barton Springs)	54	54	54	54	54	54	54
Goforth WSC		Edwards (Barton Springs)	92	92	92	92	92	92	92
		Canyon (GBRA)		151	151	151	151	151	151
Goforth WSC Subtotal			92	243	243	243	243	243	243
Gonzales County WSC		Carrizo	129	129	129	129	129	129	129
		Canyon (GBRA)	21	21	21	21	21	21	21
Gonzales County WSC Subtotal			150	150	150	150	150	150	150
Lockhart		Carrizo	2,773	2,773	2,773	2,773	2,773	2,773	2,773
Luling		Carrizo	1,088	1,088	1,088	1,088	1,088	1,088	1,088
		Run-of-River	0	0	0	0	0	0	0
Luling Subtotal			1,088	1,088	1,088	1,088	1,088	1,088	1,088
Martindale		ROR (Guadalupe)	159	159	159	159	159	159	159
Martindale WSC		Canyon (CRWA)	39	39	39	39	39	39	39
		ROR (Guadalupe)	74	74	74	74	74	74	74
Martindale WSC Subtotal			113	113	113	113	113	113	113
Maxwell WSC		Edwards	116	116	116	116	116	116	116
		Canyon (CRWA)	477	477	477	477	477	477	477
		ROR (Guadalupe) - CRWA	174	174	174	174	174	174	174
Maxwell Subtotal			767	767	767	767	767	767	767
Mustang Ridge		Carrizo (Aqua WSC)	11	11	11	11	11	11	11
Niederwald		Edwards (Barton Springs)	18	18	18	18	18	18	18
Polonia WSC		Carrizo	970	970	970	970	970	970	970
Rural		Carrizo	86	86	86	86	86	86	86
		Queen City	122	122	122	122	122	122	122
		Run-of-River	500	500	500	500	500	500	500
Rural Subtotal			708	708	708	708	708	708	708
	Subtotal		7,463	7,614	7,614	7,614	7,614	7,614	7,614

Table C-3 Projected Water Demands, Supplies, and Needs Caldwell County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Lower Colorado Basin									
Creedmore-Maha WSC		Edwards (Barton Springs)	75	75	75	75	75	75	75
Mustang Ridge		Carrizo (Aqua WSC)	105	105	105	105	105	105	105
Polonia WSC		Carrizo	421	421	421	421	421	421	421
Rural		Carrizo	29	29	29	29	29	29	29
	Subtotal		630	630	630	630	630	630	630
Total Municipal Existing Supply			8,093	8,244	8,244	8,244	8,244	8,244	8,244
Municipal Surplus/Shortage									
Guadalupe Basin									
Aqua WSC			24	-49	-121	-178	-240	-300	-362
County Line WSC			227	137	33	-64	-160	-259	-354
Creedmore-Maha WSC			-14	-44	-73	-100	-127	-153	-181
Goforth WSC*			-20	59	-26	-99	-174	-252	-328
Gonzales County WSC			104	87	71	56	42	28	14
Lockhart			978	322	-321	-856	-1,407	-1,952	-2,512
Luling			200	21	-122	-211	-296	-398	-506
Martindale			52	34	25	20	16	9	1
Martindale WSC			20	-29	-40	-45	-49	-57	-66
Maxwell WSC			433	264	89	-77	-229	-399	-564
Mustang Ridge			2	-2	-7	-10	-14	-18	-22
Niederwald			7	-8	-25	-43	-60	-77	-93
Polonia WSC			648	504	352	221	86	-46	-185
Rural			501	494	507	531	554	572	586
	Subtotal		3,163	1,791	343	-854	-2,057	-3,301	-4,571
Lower Colorado Basin									
Creedmore-Maha WSC			-19	-61	-102	-138	-175	-212	-250
Mustang Ridge			21	-17	-55	-89	-123	-157	-191
Polonia WSC			281	219	153	96	37	-20	-80
Rural			6	6	7	7	7	8	8
	Subtotal		289	147	3	-124	-254	-381	-513
Total Municipal Surplus/Shortage			3,452	1,938	346	-978	-2,311	-3,682	-5,084
Municipal New Supply Need									
Guadalupe Basin									
Aqua WSC			0	49	121	178	240	300	362
County Line WSC			0	0	0	64	160	259	354
Creedmore-Maha WSC			14	44	73	100	127	153	181
Goforth WSC*			20	0	26	99	174	252	328
Gonzales County WSC			0	0	0	0	0	0	0
Lockhart			0	0	321	856	1,407	1,952	2,512
Luling			0	0	122	211	296	398	506
Martindale			0	0	0	0	0	0	0
Martindale WSC			0	29	40	45	49	57	66
Maxwell WSC			0	0	0	77	229	399	564
Mustang Ridge			0	2	7	10	14	18	22
Niederwald			0	8	25	43	60	77	93
Polonia WSC			0	0	0	0	0	46	185
Rural			0	0	0	0	0	0	0
	Subtotal		34	132	735	1,682	2,755	3,910	5,172
Lower Colorado Basin									
Creedmore-Maha WSC			19	61	102	138	175	212	250
Mustang Ridge			0	17	55	89	123	157	191
Polonia WSC			0	0	0	0	0	20	80
Rural			0	0	0	0	0	0	0
	Subtotal		19	78	157	227	298	389	521
Total Municipal New Supply Need			53	210	892	1,909	3,053	4,299	5,693
Industrial Demand									
Guadalupe Basin			11	15	18	21	24	27	29
Lower Colorado Basin			0	0	0	0	0	0	0
Total Industrial Demand			11	15	18	21	24	27	29

Table C-3 Projected Water Demands, Supplies, and Needs Caldwell County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)

Table C-3 Projected Water Demands, Supplies, and Needs Caldwell County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Industrial Existing Supply								
Guadalupe Basin	Carrizo	29	29	29	29	29	29	29
Lower Colorado Basin		0	0	0	0	0	0	0
Total Industrial Existing Supply		29	29	29	29	29	29	29
Industrial Surplus/Shortage								
Guadalupe Basin		18	14	11	8	5	2	0
Lower Colorado Basin		0	0	0	0	0	0	0
Total Industrial Surplus/Shortage		18	14	11	8	5	2	0
Industrial New Supply Need								
Guadalupe Basin		0	0	0	0	0	0	0
Lower Colorado Basin		0	0	0	0	0	0	0
Total Industrial New Supply Need		0	0	0	0	0	0	0
Steam-Electric Demand								
Guadalupe Basin		0	0	0	0	0	0	0
Lower Colorado Basin		0	0	0	0	0	0	0
Total Steam-Electric Demand		0	0	0	0	0	0	0
Steam-Electric Existing Supply								
Guadalupe Basin		0	0	0	0	0	0	0
Lower Colorado Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage								
Guadalupe Basin		0	0	0	0	0	0	0
Lower Colorado Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		0	0	0	0	0	0	0
Steam-Electric New Supply Need								
Guadalupe Basin		0	0	0	0	0	0	0
Lower Colorado Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
Guadalupe Basin		974	1,029	914	812	722	641	570
Lower Colorado Basin		15	15	14	12	11	10	8
Total Irrigation Demand		989	1,044	928	824	733	651	578
Irrigation Supply								
Guadalupe Basin	Run-of-River	0	0	0	0	0	0	0
	Carrizo	952	952	952	952	952	952	952
	Queen City	77	77	77	77	77	77	77
Guadalupe Basin Subtotal		1,029	1,029	1,029	1,029	1,029	1,029	1,029
Lower Colorado Basin	Carrizo	15	15	15	15	15	15	15
Total Irrigation Supply		1,044	1,044	1,044	1,044	1,044	1,044	1,044
Irrigation Surplus/Shortage								
Guadalupe Basin		55	0	115	217	307	388	459
Lower Colorado Basin		0	0	1	3	4	5	7
Total Irrigation Surplus/Shortage		55	0	116	220	311	393	466
Irrigation New Supply Need								
Guadalupe Basin		0	0	0	0	0	0	0
Lower Colorado Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0

Table C-3 Projected Water Demands, Supplies, and Needs Caldwell County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Mining Demand									
Guadalupe Basin			5	5	6	6	6	7	7
Lower Colorado Basin			7	9	9	10	11	11	11
Total Mining Demand			12	14	15	16	17	18	18
Mining Supply									
Guadalupe Basin		Carrizo	6	6	6	6	6	6	6
		Queen City	2	2	2	2	2	2	2
Guadalupe Basin Subtotal			8	8	8	8	8	8	8
Lower Colorado Basin		Carrizo	11	11	11	11	11	11	11
Total Mining Supply			19	19	19	19	19	19	19
Mining Surplus/Shortage									
Guadalupe Basin			3	3	2	2	2	1	1
Lower Colorado Basin			4	2	2	1	0	0	0
Total Mining Surplus/Shortage			7	5	4	3	2	1	1
Mining New Supply Need									
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Mining New Supply Need			0	0	0	0	0	0	0
Livestock Demand									
Guadalupe Basin			762	762	762	762	762	762	762
Lower Colorado Basin			156	156	156	156	156	156	156
Total Livestock Demand			918	918	918	918	918	918	918
Livestock Supply									
Guadalupe Basin		Carrizo	381	381	381	381	381	381	381
		Local	381	381	381	381	381	381	381
	Subtotal		762	762	762	762	762	762	762
Lower Colorado Basin		Carrizo	78	78	78	78	78	78	78
		Local	78	78	78	78	78	78	78
	Subtotal		156	156	156	156	156	156	156
Total Livestock Supply			918	918	918	918	918	918	918
Livestock Surplus/Shortage									
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	0	0
Livestock New Supply Need									
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0
Total Caldwell County Demand									
Municipal			4,641	6,306	7,898	9,222	10,555	11,926	13,328
Industrial			11	15	18	21	24	27	29
Steam-Electric			0	0	0	0	0	0	0
Irrigation			989	1,044	928	824	733	651	578
Mining			12	14	15	16	17	18	18
Livestock			918	918	918	918	918	918	918
Total County Demand			6,571	8,297	9,777	11,001	12,247	13,540	14,871
Total Caldwell County Supply									
Municipal			8,093	8,244	8,244	8,244	8,244	8,244	8,244
Industrial			29	29	29	29	29	29	29
Steam-Electric			0	0	0	0	0	0	0
Irrigation			1,044	1,044	1,044	1,044	1,044	1,044	1,044
Mining			19	19	19	19	19	19	19
Livestock			918	918	918	918	918	918	918
Total County Supply			10,103	10,254	10,254	10,254	10,254	10,254	10,254

Table C-3 Projected Water Demands, Supplies, and Needs Caldwell County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Total Caldwell County Balance								
Municipal		3,452	1,938	346	-978	-2,311	-3,682	-5,084
Industrial		18	14	11	8	5	2	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		55	0	116	220	311	393	466
Mining		7	5	4	3	2	1	1
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		3,532	1,957	477	-747	-1,993	-3,286	-4,617
Total Basin Demand								
Guadalupe								
Municipal		4,300	5,823	7,271	8,468	9,671	10,915	12,185
Industrial		11	15	18	21	24	27	29
Steam-Electric		0	0	0	0	0	0	0
Irrigation		974	1,029	914	812	722	641	570
Mining		5	5	6	6	6	7	7
Livestock		762	762	762	762	762	762	762
Total Guadalupe Basin Demand		6,052	7,634	8,971	10,069	11,185	12,352	13,553
Colorado								
Municipal		341	483	627	754	884	1,011	1,143
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		15	15	14	12	11	10	8
Mining		7	9	9	10	11	11	11
Livestock		156	156	156	156	156	156	156
Total Colorado Basin Demand		519	663	806	932	1,062	1,188	1,318
Total Basin Supply								
Guadalupe								
Municipal		7,463	7,614	7,614	7,614	7,614	7,614	7,614
Industrial		29	29	29	29	29	29	29
Steam-Electric		0	0	0	0	0	0	0
Irrigation		1,029	1,029	1,029	1,029	1,029	1,029	1,029
Mining		6	6	6	6	6	6	6
Livestock		762	762	762	762	762	762	762
Unallocated Groundwater Supply		16,611	16,611	16,611	16,611	16,611	16,611	16,611
Total Guadalupe Basin Supply		25,899	26,050	26,050	26,050	26,050	26,050	26,050
Colorado								
Municipal		630	630	630	630	630	630	630
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		15	15	15	15	15	15	15
Mining		11	11	11	11	11	11	11
Livestock		156	156	156	156	156	156	156
Unallocated Groundwater Supply		677	677	677	677	677	677	677
Total Colorado Basin Supply		1,489	1,489	1,489	1,489	1,489	1,489	1,489
Total Basin Balance								
Guadalupe								
Municipal		3,163	1,791	343	-854	-2,057	-3,301	-4,571
Industrial		18	14	11	8	5	2	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		55	0	115	217	307	388	459
Mining		1	1	0	0	0	-1	-1
Livestock		0	0	0	0	0	0	0
Unallocated Groundwater Supply		16,611	16,611	16,611	16,611	16,611	16,611	16,611
Total Guadalupe Basin Surplus/Shortage		19,847	18,416	17,079	15,981	14,865	13,698	12,497

Table C-3
Projected Water Demands, Supplies, and Needs
Caldwell County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Colorado									
Municipal			289	147	3	-124	-254	-381	-513
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	1	3	4	5	7
Mining			4	2	2	1	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			677	677	677	677	677	677	677
Total Colorado Basin Surplus/Shortage			970	826	683	557	427	301	171
Groundwater Supplies									
	Available								
	Guadalupe	Carrizo	23,534	23,534	23,534	23,534	23,534	23,534	23,534
	Colorado	Carrizo	926	926	926	926	926	926	926
	Guadalupe	Queen City	320	320	320	320	320	320	320
	Total Available		24,779	24,779	24,779	24,779	24,779	24,779	24,779
	Allocated								
	Guadalupe	Carrizo	6,923	6,923	6,923	6,923	6,923	6,923	6,923
	Colorado	Carrizo	249	249	249	249	249	249	249
	Guadalupe	Queen City	320	320	320	320	320	320	320
	Total Allocated		7,492	7,492	7,492	7,492	7,492	7,492	7,492
	Total Unallocated		17,287	17,287	17,287	17,287	17,287	17,287	17,287

* Projected demands, shortages, and needs may be greater than shown. These WUGs are requesting a population/demand revision.

Table C-4 Projected Water Demands, Supplies, and Needs Calhoun County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Municipal Demand									
Guadalupe Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin									
Point Comfort			140	224	323	500	677	667	667
Rural			111	65	39	23	14	8	5
	Subtotal		251	289	362	523	691	675	672
Lavaca-Guadalupe Coastal Basin									
Calhoun County WS			356	436	516	572	609	618	632
Port Lavaca			1,658	1,769	1,877	1,981	2,079	2,209	2,345
Seadrift			247	252	255	257	256	257	258
Rural (Port O'Connor MUD)			186	198	210	222	234	248	264
	Subtotal		2,447	2,655	2,858	3,032	3,178	3,332	3,499
San Antonio-Nueces Coastal Basin									
Rural			7	4	2	1	1	0	0
	Subtotal		7	4	2	1	1	0	0
Total Municipal Demand			2,705	2,948	3,222	3,556	3,870	4,007	4,171
Municipal Existing Supply									
Guadalupe Basin									
Rural		Run-of-River (GBRA)	3,000	3,000	3,000	3,000	3,000	3,000	3,000
	Subtotal		3,000	3,000	3,000	3,000	3,000	3,000	3,000
Colorado-Lavaca Coastal Basin									
Point Comfort		Lake Texana (LNRA)	178	178	178	178	178	178	178
Rural		Gulf Coast	139	139	139	139	139	139	139
	Subtotal		317	317	317	317	317	317	317
Lavaca-Guadalupe Coastal Basin									
Calhoun County WS		Run-of-River (GBRA)	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Port Lavaca		Run-of-River (GBRA)	4,480	4,480	4,480	4,480	4,480	4,480	4,480
Seadrift		Gulf Coast	728	728	728	728	728	728	728
Rural (Port O'Connor MUD)		Run-of-River (GBRA)	1,120	1,120	1,120	1,120	1,120	1,120	1,120
		Gulf Coast	221	221	221	221	221	221	221
Rural (Port O'Connor MUD) Subtotal			1,341	1,341	1,341	1,341	1,341	1,341	1,341
	Subtotal		8,049	8,049	8,049	8,049	8,049	8,049	8,049
San Antonio-Nueces Coastal Basin									
Rural		Gulf Coast	9	9	9	9	9	9	9
	Subtotal		9	9	9	9	9	9	9
Total Municipal Existing Supply			11,375	11,375	11,375	11,375	11,375	11,375	11,375
Municipal Surplus/Shortage									
Guadalupe Basin									
Rural			3,000	3,000	3,000	3,000	3,000	3,000	3,000
	Subtotal		3,000	3,000	3,000	3,000	3,000	3,000	3,000
Colorado-Lavaca Coastal Basin									
Point Comfort			38	-46	-145	-322	-499	-489	-489
Rural			28	74	100	116	125	131	134
	Subtotal		66	28	-45	-206	-374	-358	-355
Lavaca-Guadalupe Coastal Basin									
Calhoun County WS			1,144	1,064	984	928	891	882	868
Port Lavaca			2,822	2,711	2,603	2,499	2,401	2,271	2,135
Seadrift			481	476	473	471	472	471	470
Rural (Port O'Connor MUD)			1,155	1,143	1,131	1,119	1,107	1,093	1,077
	Subtotal		5,602	5,394	5,191	5,017	4,871	4,717	4,550

Table C-4 Projected Water Demands, Supplies, and Needs Calhoun County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
San Antonio-Nueces Coastal Basin									
Rural			2	5	7	8	8	9	9
	Subtotal		2	5	7	8	8	9	9
Total Municipal Surplus/Shortage			8,670	8,427	8,153	7,819	7,505	7,368	7,204
Municipal New Supply Need									
Guadalupe Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin									
Point Comfort			0	46	145	322	499	489	489
Rural			0	0	0	0	0	0	0
	Subtotal		0	46	145	322	499	489	489
Lavaca-Guadalupe Coastal Basin									
Calhoun County WS			0	0	0	0	0	0	0
Port Lavaca			0	0	0	0	0	0	0
Seadrift			0	0	0	0	0	0	0
Rural (Port O'Connor MUD)			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
San Antonio-Nueces Coastal Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need			0	46	145	322	499	489	489
Industrial Demand									
Guadalupe Basin			136	160	176	190	204	216	232
Colorado-Lavaca Coastal Basin			19,175	22,516	24,810	26,790	28,753	30,486	32,671
Lavaca-Guadalupe Coastal Basin			23,086	27,108	29,871	32,255	34,618	36,704	39,335
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Industrial Demand			42,397	49,784	54,857	59,235	63,575	67,406	72,238
Industrial Existing Supply									
Guadalupe Basin		Run-of-River (GBRA)	250	250	250	250	250	250	250
Colorado-Lavaca Coastal Basin		Lake Texana (LNRA)	30,650	30,650	30,650	30,650	30,650	30,650	30,650
Lavaca-Guadalupe Coastal Basin		Run-of-River (Guadalupe)	39,353	39,353	39,353	39,353	39,353	39,353	39,353
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Industrial Existing Supply			70,253	70,253	70,253	70,253	70,253	70,253	70,253
Industrial Surplus/Shortage									
Guadalupe Basin			114	90	74	60	46	34	18
Colorado-Lavaca Coastal Basin			11,475	8,134	5,840	3,860	1,897	164	-2,021
Lavaca-Guadalupe Coastal Basin			16,267	12,245	9,482	7,098	4,735	2,649	18
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Industrial Surplus/Shortage			27,856	20,469	15,396	11,018	6,678	2,847	-1,985
Industrial New Supply Need									
Guadalupe Basin			0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin			0	0	0	0	0	0	2,021
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Industrial New Supply Need			0	0	0	0	0	0	2,021

Table C-4 Projected Water Demands, Supplies, and Needs Calhoun County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Steam-Electric Demand								
Guadalupe Basin		0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin		684	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Demand		684	0	0	0	0	0	0
Steam-Electric Existing Supply								
Guadalupe Basin		0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin	Gulf Coast	684	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		684	0	0	0	0	0	0
Steam-Electric Surplus/Shortage								
Guadalupe Basin		0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		0	0	0	0	0	0	0
Steam-Electric New Supply Need								
Guadalupe Basin		0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
Guadalupe Basin		0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		8,077	15,568	13,654	12,096	11,041	10,285	9,581
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Irrigation Demand		8,077	15,568	13,654	12,096	11,041	10,285	9,581
Irrigation Supply								
Guadalupe Basin		0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin	Run-of-River (Guadalupe)	14,528	14,528	14,528	14,528	14,528	14,528	14,528
	Gulf Coast Aquifer	216	216	216	216	216	216	216
	Gulf Coast Aquifer (C-L CB)	0	824	824	824	824	824	824
Lavaca-Guadalupe CB Total		14,744	15,568	15,568	15,568	15,568	15,568	15,568
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Irrigation Supply		14,744	15,568	15,568	15,568	15,568	15,568	15,568
Irrigation Surplus/Shortage								
Guadalupe Basin		0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		6,667	0	1,914	3,472	4,527	5,283	5,987
San Antonio-Nueces Basin		0	0	0	0	0	0	1
Total Irrigation Surplus/Shortage		6,667	0	1,914	3,472	4,527	5,283	5,988
Irrigation New Supply Need								
Guadalupe Basin		0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0

Table C-4 Projected Water Demands, Supplies, and Needs Calhoun County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Mining Demand									
Guadalupe Basin			13	15	16	17	17	18	18
Colorado-Lavaca Coastal Basin			1	1	1	1	1	1	1
Lavaca-Guadalupe Coastal Basin			6	7	8	8	8	8	8
San Antonio-Nueces Basin			8	9	10	10	11	11	11
Total Mining Demand			28	32	35	36	37	38	38
Mining Supply									
Guadalupe Basin		Gulf Coast	18	18	18	18	18	18	18
Colorado-Lavaca Coastal Basin		Gulf Coast	1	1	1	1	1	1	1
Lavaca-Guadalupe Coastal Basin		Gulf Coast	8	8	8	8	8	8	8
San Antonio-Nueces Basin		Gulf Coast	11	11	11	11	11	11	11
Total Mining Supply			38	38	38	38	38	38	38
Mining Surplus/Shortage									
Guadalupe Basin			5	3	2	1	1	0	0
Colorado-Lavaca Coastal Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			2	1	0	0	0	0	0
San Antonio-Nueces Basin			3	2	1	1	0	0	0
Total Mining Surplus/Shortage			10	6	3	2	1	0	0
Mining New Supply Need									
Guadalupe Basin			0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Mining New Supply Need			0	0	0	0	0	0	0
Livestock Demand									
Guadalupe Basin			3	3	3	3	3	3	3
Colorado-Lavaca Coastal Basin			17	17	17	17	17	17	17
Lavaca-Guadalupe Coastal Basin			322	322	322	322	322	322	322
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Livestock Demand			342	342	342	342	342	342	342
Livestock Supply									
Guadalupe Basin		Gulf Coast	1	1	1	1	1	1	1
		Local	2	2	2	2	2	2	2
	Subtotal		3	3	3	3	3	3	3
Colorado-Lavaca Coastal Basin		Gulf Coast	8	8	8	8	8	8	8
		Local	9	9	9	9	9	9	9
	Subtotal		17	17	17	17	17	17	17
Lavaca-Guadalupe Coastal Basin		Gulf Coast	161	161	161	161	161	161	161
		Local	161	161	161	161	161	161	161
	Subtotal		322	322	322	322	322	322	322
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Livestock Supply			342	342	342	342	342	342	342
Livestock Surplus/Shortage									
Guadalupe Basin			0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	0	0
Livestock New Supply Need									
Guadalupe Basin			0	0	0	0	0	0	0
Colorado-Lavaca Coastal Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0

Table C-4 Projected Water Demands, Supplies, and Needs Calhoun County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Total Calhoun County Demand								
Municipal		2,705	2,948	3,222	3,556	3,870	4,007	4,171
Industrial		42,397	49,784	54,857	59,235	63,575	67,406	72,238
Steam-Electric		684	0	0	0	0	0	0
Irrigation		8,077	15,568	13,654	12,096	11,041	10,285	9,581
Mining		28	32	35	36	37	38	38
Livestock		342	342	342	342	342	342	342
Total County Demand		54,233	68,674	72,110	75,265	78,865	82,078	86,370
Total Calhoun County Supply								
Municipal		11,375	11,375	11,375	11,375	11,375	11,375	11,375
Industrial		70,253	70,253	70,253	70,253	70,253	70,253	70,253
Steam-Electric		684	0	0	0	0	0	0
Irrigation		14,744	15,568	15,568	15,568	15,568	15,568	15,568
Mining		38	38	38	38	38	38	38
Livestock		342	342	342	342	342	342	342
Total County Supply		97,436	97,576	97,576	97,576	97,576	97,576	97,576
Total Calhoun County Balance								
Municipal		8,670	8,427	8,153	7,819	7,505	7,368	7,204
Industrial		27,856	20,469	15,396	11,018	6,678	2,847	-1,985
Steam-Electric		0	0	0	0	0	0	0
Irrigation		6,667	0	1,914	3,472	4,527	5,283	5,987
Mining		10	6	3	2	1	0	0
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		43,203	28,902	25,466	22,311	18,711	15,498	11,206
Total Basin Demand								
Guadalupe								
Municipal		0	0	0	0	0	0	0
Industrial		136	160	176	190	204	216	232
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		13	15	16	17	17	18	18
Livestock		3	3	3	3	3	3	3
Total Guadalupe Basin Demand		152	178	195	210	224	237	253
Colorado-Lavaca								
Municipal		251	289	362	523	691	675	672
Industrial		19,175	22,516	24,810	26,790	28,753	30,486	32,671
Steam-Electric		684	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		1	1	1	1	1	1	1
Livestock		17	17	17	17	17	17	17
Total Colorado-Lavaca Basin Demand		20,128	22,823	25,190	27,331	29,462	31,179	33,361
Lavaca-Guadalupe								
Municipal		2,447	2,655	2,858	3,032	3,178	3,332	3,499
Industrial		23,086	27,108	29,871	32,255	34,618	36,704	39,335
Steam-Electric		0	0	0	0	0	0	0
Irrigation		8,077	15,568	13,654	12,096	11,041	10,285	9,581
Mining		6	7	8	8	8	8	8
Livestock		322	322	322	322	322	322	322
Total Lavaca-Guadalupe Basin Demand		33,938	45,660	46,713	47,713	49,167	50,651	52,745

Table C-4 Projected Water Demands, Supplies, and Needs Calhoun County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
San Antonio-Nueces								
Municipal		7	4	2	1	1	0	0
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		8	9	10	10	11	11	11
Livestock		0	0	0	0	0	0	0
Total San Antonio-Nueces Basin Demand		15	13	12	11	12	11	11
Total Basin Supply								
Guadalupe								
Municipal		3,000	3,000	3,000	3,000	3,000	3,000	3,000
Industrial		250	250	250	250	250	250	250
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		18	18	18	18	18	18	18
Livestock		3	3	3	3	3	3	3
Unallocated Groundwater Supply		23	23	23	23	23	23	23
Total Guadalupe Basin Supply		3,294	3,294	3,294	3,294	3,294	3,294	3,294
Colorado-Lavaca								
Municipal		317	317	317	317	317	317	317
Industrial		30,650	30,650	30,650	30,650	30,650	30,650	30,650
Steam-Electric		684	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		1	1	1	1	1	1	1
Livestock		17	17	17	17	17	17	17
Unallocated Groundwater Supply		386	246	246	246	246	246	246
Total Colorado-Lavaca Basin Supply		32,055	31,231	31,231	31,231	31,231	31,231	31,231
Lavaca-Guadalupe								
Municipal		8,049	8,049	8,049	8,049	8,049	8,049	8,049
Industrial		39,353	39,353	39,353	39,353	39,353	39,353	39,353
Steam-Electric		0	0	0	0	0	0	0
Irrigation		14,744	15,568	15,568	15,568	15,568	15,568	15,568
Mining		8	8	8	8	8	8	8
Livestock		322	322	322	322	322	322	322
Unallocated Groundwater Supply		0	0	0	0	0	0	0
Total Lavaca-Guadalupe Basin Supply		62,476	63,300	63,300	63,300	63,300	63,300	63,300
San Antonio-Nueces								
Municipal		9	9	9	9	9	9	9
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		11	11	11	11	11	11	11
Livestock		0	0	0	0	0	0	0
Unallocated Groundwater Supply		77	77	77	77	77	77	77
Total San Antonio-Nueces Basin Supply		97	97	97	97	97	97	97
Total Basin Balance								
Guadalupe								
Municipal		3,000	3,000	3,000	3,000	3,000	3,000	3,000
Industrial		114	90	74	60	46	34	18
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		5	3	2	1	1	0	0
Livestock		0	0	0	0	0	0	0
Unallocated Groundwater Supply		23	23	23	23	23	23	23
Total Guadalupe Basin Surplus/Shortage		3,142	3,116	3,099	3,084	3,070	3,057	3,041

Table C-4 Projected Water Demands, Supplies, and Needs Calhoun County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
			(acft)	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**
Colorado-Lavaca									
Municipal			66	28	-45	-206	-374	-358	-355
Industrial			11,475	8,134	5,840	3,860	1,897	164	-2,021
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			386	246	246	246	246	246	246
Total Colorado-Lavaca Basin Surplus/Shortage			11,927	8,408	6,041	3,900	1,769	52	-2,130
Lavaca-Guadalupe									
Municipal			5,602	5,394	5,191	5,017	4,871	4,717	4,550
Industrial			16,267	12,245	9,482	7,098	4,735	2,649	18
Steam-Electric			0	0	0	0	0	0	0
Irrigation			6,667	0	1,914	3,472	4,527	5,283	5,987
Mining			2	1	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			0	0	0	0	0	0	0
Total Lavaca-Guadalupe Basin Surplus/Shortage			28,538	17,640	16,587	15,587	14,133	12,649	10,555
San Antonio-Nueces									
Municipal			2	5	7	8	8	9	9
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			3	2	1	1	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			77	77	77	77	77	77	77
Total San Antonio-Nueces Basin Surplus/Shortage			82	84	85	86	85	86	86
Groundwater Supplies									
	Available								
	Guadalupe	Gulf Coast	42	42	42	42	42	42	42
	Lavaca-Guadalupe	Gulf Coast	1,334	1,334	1,334	1,334	1,334	1,334	1,334
	Colorado-Lavaca	Gulf Coast	1,467	1,467	1,467	1,467	1,467	1,467	1,467
	San Antonio-Nueces	Gulf Coast	97	97	97	97	97	97	97
	Total Available		2,940	2,940	2,940	2,940	2,940	2,940	2,940
	Allocated								
	Guadalupe	Gulf Coast	19	19	19	19	19	19	19
	Lavaca-Guadalupe	Gulf Coast	1,334	1,334	1,334	1,334	1,334	1,334	1,334
	Colorado-Lavaca	Gulf Coast	1,081	1,221	1,221	1,221	1,221	1,221	1,221
	San Antonio-Nueces	Gulf Coast	20	20	20	20	20	20	20
	Total Allocated		2,454	2,594	2,594	2,594	2,594	2,594	2,594
	Total Unallocated		486	346	346	346	346	346	346

Table C-5
Projected Water Demands, Supplies, and Needs
Comal County
South Central Texas Region

Basin	Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand								
San Antonio Basin								
Bexar Met Water District*		214	429	695	984	1,249	1,537	1,860
Bulverde City		501	1,044	1,728	2,507	3,283	4,089	4,954
Fair Oaks Ranch		58	58	58	58	58	58	59
Garden Ridge*		185	228	284	347	411	477	549
Schertz (part)*		7	11	16	23	28	35	42
Selma		6	77	129	193	222	248	274
Water Service Inc. (Apex Water Ser)		236	308	402	509	615	723	845
Rural		109	118	145	172	209	250	298
Subtotal		1,316	2,273	3,457	4,793	6,075	7,417	8,881
Guadalupe Basin								
Bexar Met Water District*		16	33	53	75	95	117	141
Bulverde City		4	9	14	21	27	34	41
Canyon Lake WSC		1,495	2,928	4,769	6,838	8,898	11,034	13,331
Crystal Clear WSC*		174	240	325	426	516	619	731
Garden Ridge*		273	337	419	513	607	704	811
Green Valley SUD*		173	235	314	409	493	591	696
New Braunfels*		8,073	10,042	12,510	15,390	18,241	21,168	24,416
Schertz*		44	71	107	146	185	226	270
Rural		2,487	2,603	2,785	2,987	3,167	3,408	3,700
Subtotal		12,739	16,498	21,296	26,805	32,229	37,901	44,137
Total Municipal Demand		14,055	18,771	24,753	31,598	38,304	45,318	53,018
Municipal Existing Supply								
San Antonio Basin								
Bexar Met Water District	Trinity	43	43	43	43	43	35	35
Bulverde City	Canyon (GBRA - Western Canyo	0	396	396	396	396	396	396
Fair Oaks Ranch	Trinity	13	13	13	13	13	11	11
	Canyon (GBRA - Western Canyo	0	74	74	74	74	74	74
Fair Oaks Ranch Subtotal		13	87	87	87	87	85	85
Garden Ridge	Edwards	106	106	106	106	106	106	106
Schertz (part)	Edwards	3	3	3	3	3	3	3
	Carrizo (Guadalupe) - S/S	0	32	32	32	32	32	32
	Carrizo (Gonzales) - S/S	23	23	23	23	23	23	23
Schertz Subtotal		26	58	58	58	58	58	58
Selma	Edwards (Bexar)	151	151	151	151	151	151	151
	Carrizo (Gonzales) - S/S	18	18	18	18	18	18	18
Selma Subtotal		169	169	169	169	169	169	169
Water Service Inc. (Apex Water Ser)	Edwards	13	13	13	13	13	13	13
Rural	Trinity	20	20	20	20	20	16	16
	Canyon (GBRA - Western Canyo	0	500	500	500	500	500	500
Rural Subtotal		20	520	520	520	520	516	516
Subtotal		390	1,392	1,392	1,392	1,392	1,378	1,378
Guadalupe Basin								
Bexar Met Water District								
Bulverde City	Canyon (GBRA - Western Canyo	0	4	4	4	4	4	4
Canyon Lake WSC	Canyon (GBRA)	4,000	6,000	6,000	6,000	6,000	6,000	6,000
	Trinity	768	734	718	709	700	568	562
Canyon Lake WSC Subtotal		4,768	6,734	6,718	6,709	6,700	6,568	6,562
Crystal Clear WSC	Edwards	56	56	56	56	56	56	56
	ROR (Guadalupe) - CRWA	16	16	16	16	16	16	16
	Canyon (CRWA)	49	49	49	49	49	49	49
	Canyon (CRWA - Dunlap) - Sprir	28	28	28	28	28	28	28
	Canyon (New Braunfels)	102	102	102	102	102	102	102
	Canyon (GBRA)	90	90	90	90	90	90	90
Crystal Clear WSC		341	341	341	341	341	341	341
Garden Ridge	Edwards	202	202	202	202	202	202	202

Table C-5
Projected Water Demands, Supplies, and Needs
Comal County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Green Valley SUD		Edwards	216	216	216	216	216	216	216
		Edwards (East Central)	15	15	15	15	15	15	15
		Canyon (GBRA)	225	225	225	225	225	225	225
		Canyon (CRWA - Dunlap)	135	135	135	135	135	135	135
Green Valley SUD Subtotal			591	591	591	591	591	591	591
New Braunfels		Edwards	5,060	5,060	5,060	5,060	5,060	5,060	5,060
		Canyon (GBRA)	5,634	5,634	5,634	5,634	5,634	5,634	5,634
		ROR (Guadalupe)	1,036	1,036	1,036	1,036	1,036	1,036	1,036
New Braunfels Subtotal			11,730	11,730	11,730	11,730	11,730	11,730	11,730
Schertz		Edwards	14	14	14	14	14	14	14
		Carrizo (Guadalupe) - S/S	0	65	65	65	65	65	65
		Carrizo (Gonzales) - S/S	129	129	129	129	129	129	129
Schertz Subtotal			143	208	208	208	208	208	208
Rural		Edwards	73	73	73	73	73	73	73
		Trinity	362	346	338	334	330	268	265
		Run-of-River	0	0	0	0	0	0	0
		Canyon (GBRA)	402	402	402	402	402	402	402
Rural Subtotal			837	821	813	809	805	743	740
	Subtotal		18,612	20,631	20,607	20,594	20,581	20,387	20,378
Total Municipal Existing Supply			19,002	22,023	21,999	21,986	21,973	21,765	21,756
Municipal Surplus/Shortage									
San Antonio Basin									
Bexar Met Water District*			-171	-386	-652	-941	-1,206	-1,502	-1,825
Bulverde City			-501	-648	-1,332	-2,111	-2,887	-3,693	-4,558
Fair Oaks Ranch			-45	29	29	29	29	27	26
Garden Ridge*			-79	-122	-178	-241	-305	-371	-443
Schertz (part)*			19	47	42	35	30	23	16
Selma			163	92	40	-24	-53	-79	-105
Water Service Inc. (Apex Water Ser)			-223	-295	-389	-496	-602	-710	-832
Rural			-89	402	375	348	311	266	218
	Subtotal		-926	-881	-2,065	-3,401	-4,683	-6,039	-7,503
Guadalupe Basin									
Bexar Met Water District*			-16	-33	-53	-75	-95	-117	-141
Bulverde City			-4	-5	-10	-17	-23	-30	-37
Canyon Lake WSC			3,273	3,806	1,949	-129	-2,198	-4,466	-6,769
Crystal Clear WSC*			167	101	16	-85	-175	-278	-390
Garden Ridge*			-71	-135	-217	-311	-405	-502	-609
Green Valley SUD*			418	356	277	182	98	0	-105
New Braunfels*			3,657	1,688	-780	-3,660	-6,511	-9,438	-12,686
Schertz*			99	137	101	62	23	-18	-62
Rural			-1,650	-1,782	-1,972	-2,178	-2,362	-2,665	-2,960
	Subtotal		5,873	4,133	-689	-6,211	-11,648	-17,514	-23,759
Total Municipal Surplus/Shortage			4,947	3,252	-2,754	-9,612	-16,331	-23,553	-31,262
Municipal New Supply Need									
San Antonio Basin									
Bexar Met Water District*			171	386	652	941	1,206	1,502	1,825
Bulverde City			501	648	1,332	2,111	2,887	3,693	4,558
Fair Oaks Ranch			45	0	0	0	0	0	0
Garden Ridge*			79	122	178	241	305	371	443
Schertz (part)*			0	0	0	0	0	0	0
Selma			0	0	0	24	53	79	105
Water Service Inc. (Apex Water Ser)			223	295	389	496	602	710	832
Rural			89	0	0	0	0	0	0
	Subtotal		1,108	1,451	2,551	3,813	5,053	6,355	7,763

Table C-5 Projected Water Demands, Supplies, and Needs Comal County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Guadalupe Basin									
Bexar Met Water District*			16	33	53	75	95	117	141
Bulverde City			4	5	10	17	23	30	37
Canyon Lake WSC			0	0	0	129	2,198	4,466	6,769
Crystal Clear WSC*			0	0	0	85	175	278	390
Garden Ridge*			71	135	217	311	405	502	609
Green Valley SUD*			0	0	0	0	0	0	105
New Braunfels*			0	0	780	3,660	6,511	9,438	12,686
Schertz*			0	0	0	0	0	18	62
Rural			1,650	1,782	1,972	2,178	2,362	2,665	2,960
	Subtotal		1,741	1,955	3,032	6,455	11,769	17,514	23,759
Total Municipal New Supply Need			2,849	3,406	5,583	10,268	16,822	23,869	31,522
Industrial Demand									
San Antonio Basin			1	1	1	1	2	2	2
Guadalupe Basin			6,282	7,728	8,562	9,313	10,043	10,670	11,551
Total Industrial Demand			6,283	7,729	8,563	9,314	10,045	10,672	11,553
Industrial Existing Supply									
San Antonio Basin		Edwards	352	352	352	352	352	352	352
Guadalupe Basin		Edwards	2,524	2,524	2,524	2,524	2,524	2,524	2,524
		Run-of-River	0	0	0	0	0	0	0
		Canyon (GBRA)	5	5	5	5	5	5	5
Guadalupe Basin Subtotal			2,529	2,529	2,529	2,529	2,529	2,529	2,529
Total Industrial Existing Supply			2,881	2,881	2,881	2,881	2,881	2,881	2,881
Industrial Surplus/Shortage									
San Antonio Basin			351	351	351	351	350	350	350
Guadalupe Basin			-3,753	-5,199	-6,033	-6,784	-7,514	-8,141	-9,022
Total Industrial Surplus/Shortage			-3,402	-4,848	-5,682	-6,433	-7,164	-7,791	-8,672
Industrial New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			3,753	5,199	6,033	6,784	7,514	8,141	9,022
Total Industrial New Supply Need			3,753	5,199	6,033	6,784	7,514	8,141	9,022
Steam-Electric Demand									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Total Steam-Electric Demand			0	0	0	0	0	0	0
Steam-Electric Existing Supply									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Total Steam-Electric Existing Supply			0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage			0	0	0	0	0	0	0
Steam-Electric New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Total Steam-Electric New Supply Need			0	0	0	0	0	0	0

Table C-5
Projected Water Demands, Supplies, and Needs
Comal County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Irrigation Demand									
San Antonio Basin			7	30	28	23	22	20	18
Guadalupe Basin			43	174	158	146	130	115	101
Total Irrigation Demand			50	204	186	169	152	135	119
Irrigation Supply									
San Antonio Basin		Edwards	32	32	32	32	32	32	32
San Antonio Basin Subtotal			32	32	32	32	32	32	32
Guadalupe Basin		Edwards	511	511	511	511	511	511	511
		Canyon (GBRA)	376	376	376	376	376	376	376
		Direct Reuse (New Braunfels)	0	92	92	92	92	92	92
		Run-of-River	0	0	0	0	0	0	0
Guadalupe Basin Subtotal			887	979	979	979	979	979	979
Total Irrigation Supply			919	1,011	1,011	1,011	1,011	1,011	1,011
Irrigation Surplus/Shortage									
San Antonio Basin			25	2	4	9	10	12	14
Guadalupe Basin			844	805	821	833	849	864	878
Total Irrigation Surplus/Shortage			869	807	825	842	859	876	892
Irrigation New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Total Irrigation New Supply Need			0	0	0	0	0	0	0
Mining Demand									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			2,224	2,678	2,897	3,029	3,159	3,287	3,401
Total Mining Demand			2,224	2,678	2,897	3,029	3,159	3,287	3,401
Mining Supply									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin		Trinity	342	393	416	430	443	373	382
		Edwards	1,846	1,846	1,846	1,846	1,846	1,846	1,846
Guadalupe Basin Subtotal			2,188	2,239	2,262	2,276	2,289	2,219	2,228
Total Mining Supply			2,188	2,239	2,262	2,276	2,289	2,219	2,228
Mining Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			-36	-439	-635	-753	-870	-1,068	-1,173
Total Mining Surplus/Shortage			-36	-439	-635	-753	-870	-1,068	-1,173
Mining New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			36	439	635	753	870	1,068	1,173
Total Mining New Supply Need			36	439	635	753	870	1,068	1,173
Livestock Demand									
San Antonio Basin			42	42	42	42	42	42	42
Guadalupe Basin			256	256	256	256	256	256	256
Total Livestock Demand			298	298	298	298	298	298	298
Livestock Supply									
San Antonio Basin		Trinity	3	3	3	3	3	2	2
		Edwards (D&L)[1]	18	18	18	18	18	19	19
		Local	21	21	21	21	21	21	21
	Subtotal		42	42	42	42	42	42	42
Guadalupe Basin		Trinity	20	19	18	18	18	15	14
		Edwards (D&L)[1]	108	109	110	110	110	113	114
		Local	128	128	128	128	128	128	128
	Subtotal		256	256	256	256	256	256	256
Total Livestock Supply			298	298	298	298	298	298	298

Table C-5 Projected Water Demands, Supplies, and Needs Comal County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Livestock Surplus/Shortage								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Livestock Surplus/Shortage[1]		0	0	0	0	0	0	0
Livestock New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Livestock New Supply Need		0	0	0	0	0	0	0
Total Comal County Demand								
Municipal		14,055	18,771	24,753	31,598	38,304	45,318	53,018
Industrial		6,283	7,729	8,563	9,314	10,045	10,672	11,553
Steam-Electric		0	0	0	0	0	0	0
Irrigation		50	204	186	169	152	135	119
Mining		2,224	2,678	2,897	3,029	3,159	3,287	3,401
Livestock		298	298	298	298	298	298	298
Total County Demand		22,910	29,680	36,697	44,408	51,958	59,710	68,389
Total Comal County Supply								
Municipal		19,002	22,023	21,999	21,986	21,973	21,765	21,756
Industrial		2,881	2,881	2,881	2,881	2,881	2,881	2,881
Steam-Electric		0	0	0	0	0	0	0
Irrigation		919	1,011	1,011	1,011	1,011	1,011	1,011
Mining		2,188	2,239	2,262	2,276	2,289	2,219	2,228
Livestock		298	298	298	298	298	298	298
Total County Supply		25,288	28,452	28,451	28,452	28,452	28,174	28,174
Total Comal County Balance								
Municipal		4,947	3,252	-2,754	-9,612	-16,331	-23,553	-31,262
Industrial		-3,402	-4,848	-5,682	-6,433	-7,164	-7,791	-8,672
Steam-Electric		0	0	0	0	0	0	0
Irrigation		869	807	825	842	859	876	892
Mining		-36	-439	-635	-753	-870	-1,068	-1,173
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		2,378	-1,228	-8,246	-15,956	-23,506	-31,536	-40,215
Total Basin Demand								
San Antonio								
Municipal		1,316	2,273	3,457	4,793	6,075	7,417	8,881
Industrial		1	1	1	1	2	2	2
Steam-Electric		0	0	0	0	0	0	0
Irrigation		7	30	28	23	22	20	18
Mining		0	0	0	0	0	0	0
Livestock		42	42	42	42	42	42	42
Total San Antonio Basin Demand		1,366	2,346	3,528	4,859	6,141	7,481	8,943
Guadalupe								
Municipal		12,739	16,498	21,296	26,805	32,229	37,901	44,137
Industrial		6,282	7,728	8,562	9,313	10,043	10,670	11,551
Steam-Electric		0	0	0	0	0	0	0
Irrigation		43	174	158	146	130	115	101
Mining		2,224	2,678	2,897	3,029	3,159	3,287	3,401
Livestock		256	256	256	256	256	256	256
Total Guadalupe Basin Demand		21,544	27,334	33,169	39,549	45,817	52,229	59,446

Table C-5 Projected Water Demands, Supplies, and Needs Comal County South Central Texas Region								
			Total in	Projections				
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Basin Supply									
San Antonio									
Municipal			390	1,392	1,392	1,392	1,392	1,378	1,378
Industrial			352	352	352	352	352	352	352
Steam-Electric			0	0	0	0	0	0	0
Irrigation			32	32	32	32	32	32	32
Mining			0	0	0	0	0	0	0
Livestock			42	42	42	42	42	42	42
Total San Antonio Basin Supply			816	1,818	1,818	1,818	1,818	1,804	1,804
Guadalupe									
Municipal			18,612	20,631	20,607	20,594	20,581	20,387	20,378
Industrial			2,529	2,529	2,529	2,529	2,529	2,529	2,529
Steam-Electric			0	0	0	0	0	0	0
Irrigation			887	979	979	979	979	979	979
Mining			2,188	2,239	2,262	2,276	2,289	2,219	2,228
Livestock			256	256	256	256	256	256	256
Total Guadalupe Basin Supply			24,472	26,634	26,633	26,634	26,634	26,370	26,370
Total Basin Balance									
San Antonio									
Municipal			-926	-881	-2,065	-3,401	-4,683	-6,039	-7,503
Industrial			351	351	351	351	350	350	350
Steam-Electric			0	0	0	0	0	0	0
Irrigation			25	2	4	9	10	12	14
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Total San Antonio Basin Surplus/Shortage			-550	-528	-1,710	-3,041	-4,323	-5,677	-7,139
Guadalupe									
Municipal			5,873	4,133	-689	-6,211	-11,648	-17,514	-23,759
Industrial			-3,753	-5,199	-6,033	-6,784	-7,514	-8,141	-9,022
Steam-Electric			0	0	0	0	0	0	0
Irrigation			844	805	821	833	849	864	878
Mining			-36	-439	-635	-753	-870	-1,068	-1,173
Livestock			0	0	0	0	0	0	0
Total Guadalupe Basin Surplus/Shortage			2,928	-700	-6,536	-12,915	-19,183	-25,859	-33,076
Groundwater Supplies									
	Available								
	San Antonio	Edwards	384	384	384	384	384	384	384
	Guadalupe	Edwards	11,354	11,354	11,354	11,354	11,354	11,354	11,354
	San Antonio	Edwards (D&L)	18	18	18	18	18	19	19
	Guadalupe	Edwards (D&L)	108	109	110	110	110	113	114
	San Antonio	Trinity	309	309	309	309	309	253	253
	Guadalupe	Trinity	1,491	1,491	1,491	1,491	1,491	1,223	1,223
	Total Available		13,664	13,665	13,666	13,666	13,666	13,346	13,347
	Allocated								
	San Antonio	Edwards	384	384	384	384	384	384	384
	Guadalupe	Edwards	11,354	11,354	11,354	11,354	11,354	11,354	11,354
	San Antonio	Edwards (D&L)	18	18	18	18	18	19	19
	Guadalupe	Edwards (D&L)	108	109	110	110	110	113	114
	San Antonio	Trinity	309	309	309	309	309	253	253
	Guadalupe	Trinity	1,491	1,491	1,491	1,491	1,491	1,223	1,223
	Total Allocated		13,664	13,665	13,666	13,666	13,666	13,346	13,347
	Total Unallocated		0	0	0	0	0	0	0

Notes:

[1] There is limited supply from the Edwards Aquifer for D&L; however, these values are not part of the 320,000 acft/yr allocated to other uses.

* Projected demands, shortages, and needs may be greater than shown. These WUGs are requesting a population/demand revision.

Table C-6 Projected Water Demands, Supplies, and Needs DeWitt County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Municipal Demand									
San Antonio Basin									
Rural			67	67	66	65	63	61	60
	Subtotal		67	67	66	65	63	61	60
Guadalupe Basin									
Cuero			1,244	1,249	1,257	1,250	1,232	1,198	1,177
Gonzales County WSC			106	107	108	108	108	106	104
Yorktown			343	343	344	340	334	323	318
Rural			807	801	797	783	762	734	721
	Subtotal		2,500	2,500	2,506	2,481	2,436	2,361	2,320
Lavaca Basin									
Yoakum			352	352	354	351	345	334	328
Rural			146	145	145	142	138	133	131
	Subtotal		498	497	499	493	483	467	459
Lavaca-Guadalupe Coastal Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal Demand			3,065	3,064	3,071	3,039	2,982	2,889	2,839
Municipal Existing Supply									
San Antonio Basin									
Rural		Gulf Coast	84	84	84	84	84	84	84
	Subtotal		84	84	84	84	84	84	84
Guadalupe Basin									
Cuero		Gulf Coast	5,076	5,076	5,076	5,076	5,076	5,076	5,076
Gonzales County WSC		Carrizo	71	71	71	71	71	71	71
		Canyon (GBRA)	49	49	49	49	49	49	49
Gonzales County WSC Subtotal			120	120	120	120	120	120	120
Yorktown		Gulf Coast	1,149	1,149	1,149	1,149	1,149	1,149	1,149
Rural		Gulf Coast	1,009	1,009	1,009	1,009	1,009	1,009	1,009
	Subtotal		7,354	7,354	7,354	7,354	7,354	7,354	7,354
Lavaca Basin									
Yoakum		Gulf Coast	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Rural		Gulf Coast	183	183	183	183	183	183	183
	Subtotal		1,683	1,683	1,683	1,683	1,683	1,683	1,683
Lavaca-Guadalupe Coastal Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal Existing Supply			9,121	9,121	9,121	9,121	9,121	9,121	9,121
Municipal Surplus/Shortage									
San Antonio Basin									
Rural			17	17	18	19	21	23	24
	Subtotal		17	17	18	19	21	23	24
Guadalupe Basin									
Cuero			3,832	3,827	3,819	3,826	3,844	3,878	3,899
Gonzales County WSC			14	13	12	12	12	14	16
Yorktown			806	806	805	809	815	826	831
Rural			202	208	212	226	247	275	288
	Subtotal		4,854	4,854	4,848	4,873	4,918	4,993	5,034

Table C-6 Projected Water Demands, Supplies, and Needs DeWitt County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Lavaca Basin									
Yoakum			1,148	1,148	1,146	1,149	1,155	1,166	1,172
Rural			37	38	38	41	45	50	52
	Subtotal		1,185	1,186	1,184	1,190	1,200	1,216	1,224
Lavaca-Guadalupe Coastal Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal Surplus/Shortage			6,056	6,057	6,050	6,082	6,139	6,232	6,282
Municipal New Supply Need									
San Antonio Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Guadalupe Basin									
Cuero			0	0	0	0	0	0	0
Gonzales County WSC			0	0	0	0	0	0	0
Yorktown			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Lavaca Basin									
Yoakum			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need			0	0	0	0	0	0	0
Industrial Demand									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			147	176	190	202	215	225	242
Lavaca Basin			7	8	9	10	10	11	12
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Industrial Demand			154	184	199	212	225	236	254
Industrial Existing Supply									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin		Gulf Coast	245	245	245	245	245	245	245
Lavaca Basin		Gulf Coast	15	15	15	15	15	15	15
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Industrial Existing Supply			260	260	260	260	260	260	260
Industrial Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			98	69	55	43	30	20	3
Lavaca Basin			8	7	6	5	5	4	3
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Industrial Surplus/Shortage			106	76	61	48	35	24	6

Table C-6
Projected Water Demands, Supplies, and Needs
DeWitt County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Industrial New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Industrial New Supply Need			0	0	0	0	0	0	0
Steam-Electric Demand									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Steam-Electric Demand			0	0	0	0	0	0	0
Steam-Electric Existing Supply									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Steam-Electric Existing Supply			0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage			0	0	0	0	0	0	0
Steam-Electric New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Steam-Electric New Supply Need			0	0	0	0	0	0	0
Irrigation Demand									
San Antonio Basin			8	12	10	8	7	5	5
Guadalupe Basin			94	147	122	100	80	64	49
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Irrigation Demand			102	159	132	108	87	69	54
Irrigation Supply									
San Antonio Basin		Gulf Coast	12	12	12	12	12	12	12
Guadalupe Basin		Run-of-River	0	0	0	0	0	0	0
		Gulf Coast	147	147	147	147	147	147	147
	Subtotal		147	147	147	147	147	147	147
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Irrigation Supply			159	159	159	159	159	159	159

Table C-6 Projected Water Demands, Supplies, and Needs DeWitt County South Central Texas Region								
		Total in	**Projections**					
Basin	**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Irrigation Surplus/Shortage								
San Antonio Basin		4	0	2	4	5	7	7
Guadalupe Basin		53	0	25	47	67	83	98
Lavaca Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
Total Irrigation Surplus/Shortage		57	0	27	51	72	90	105
Irrigation New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Lavaca Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0
Mining Demand								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		9	10	10	10	10	10	11
Lavaca Basin		34	37	39	40	40	41	41
Lavaca-Guadalupe Coastal Basin		15	17	18	18	18	19	19
Total Mining Demand		58	64	67	68	68	70	71
Mining Supply								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin	Gulf Coast	11	11	11	11	11	11	11
Lavaca Basin	Gulf Coast	41	41	41	41	41	41	41
Lavaca-Guadalupe Coastal Basin	Gulf Coast	19	19	19	19	19	19	19
Total Mining Supply		71	71	71	71	71	71	71
Mining Surplus/Shortage								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		2	1	1	1	1	1	0
Lavaca Basin		7	4	2	1	1	0	0
Lavaca-Guadalupe Coastal Basin		4	2	1	1	1	0	0
Total Mining Surplus/Shortage		13	7	4	3	3	1	0
Mining New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Lavaca Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
Total Mining New Supply Need		0	0	0	0	0	0	0
Livestock Demand								
San Antonio Basin		135	135	135	135	135	135	135
Guadalupe Basin		1,267	1,267	1,267	1,267	1,267	1,267	1,267
Lavaca Basin		253	253	253	253	253	253	253
Lavaca-Guadalupe Coastal Basin		34	34	34	34	34	34	34
Total Livestock Demand		1,689	1,689	1,689	1,689	1,689	1,689	1,689

Table C-6 Projected Water Demands, Supplies, and Needs DeWitt County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Livestock Supply									
San Antonio Basin		Gulf Coast	67	67	67	67	67	67	67
		Local	68	68	68	68	68	68	68
	Subtotal		135	135	135	135	135	135	135
Guadalupe Basin		Gulf Coast	633	633	633	633	633	633	633
		Local	634	634	634	634	634	634	634
	Subtotal		1,267	1,267	1,267	1,267	1,267	1,267	1,267
Lavaca Basin		Gulf Coast	126	126	126	126	126	126	126
		Local	127	127	127	127	127	127	127
	Subtotal		253	253	253	253	253	253	253
Lavaca-Guadalupe Coastal Basin		Gulf Coast	17	17	17	17	17	17	17
		Local	17	17	17	17	17	17	17
	Subtotal		34	34	34	34	34	34	34
Total Livestock Supply			1,689	1,689	1,689	1,689	1,689	1,689	1,689
Livestock Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	0	0
Livestock New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0
Total DeWitt County Demand									
Municipal			3,065	3,064	3,071	3,039	2,982	2,889	2,839
Industrial			154	184	199	212	225	236	254
Steam-Electric			0	0	0	0	0	0	0
Irrigation			102	159	132	108	87	69	54
Mining			58	64	67	68	68	70	71
Livestock			1,689	1,689	1,689	1,689	1,689	1,689	1,689
Total County Demand			5,068	5,160	5,158	5,116	5,051	4,953	4,907
Total DeWitt County Supply									
Municipal			9,121	9,121	9,121	9,121	9,121	9,121	9,121
Industrial			260	260	260	260	260	260	260
Steam-Electric			0	0	0	0	0	0	0
Irrigation			159	159	159	159	159	159	159
Mining			71	71	71	71	71	71	71
Livestock			1,689	1,689	1,689	1,689	1,689	1,689	1,689
Total County Supply			11,300	11,300	11,300	11,300	11,300	11,300	11,300
Total DeWitt County Balance									
Municipal			6,056	6,057	6,050	6,082	6,139	6,232	6,282
Industrial			106	76	61	48	35	24	6
Steam-Electric			0	0	0	0	0	0	0
Irrigation			57	0	27	51	72	90	105
Mining			13	7	4	3	3	1	0
Livestock			0	0	0	0	0	0	0
Total County Surplus/Shortage			6,232	6,140	6,142	6,184	6,249	6,347	6,393

Table C-6 Projected Water Demands, Supplies, and Needs DeWitt County South Central Texas Region								
Basin	**Source**	**Total in 2000 (acft)**	**Projections 2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Total Basin Demand								
San Antonio								
Municipal		67	67	66	65	63	61	60
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		8	12	10	8	7	5	5
Mining		0	0	0	0	0	0	0
Livestock		135	135	135	135	135	135	135
Total San Antonio Basin Demand		210	214	211	208	205	201	200
Guadalupe								
Municipal		2,500	2,500	2,506	2,481	2,436	2,361	2,320
Industrial		147	176	190	202	215	225	242
Steam-Electric		0	0	0	0	0	0	0
Irrigation		94	147	122	100	80	64	49
Mining		9	10	10	10	10	10	11
Livestock		1,267	1,267	1,267	1,267	1,267	1,267	1,267
Total Guadalupe Basin Demand		4,017	4,100	4,095	4,060	4,008	3,927	3,889
Lavaca								
Municipal		498	497	499	493	483	467	459
Industrial		7	8	9	10	10	11	12
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		34	37	39	40	40	41	41
Livestock		253	253	253	253	253	253	253
Total Lavaca Basin Demand		792	795	800	796	786	772	765
Lavaca-Guadalupe								
Municipal		0	0	0	0	0	0	0
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		15	17	18	18	18	19	19
Livestock		34	34	34	34	34	34	34
Total Lavaca-Guadalupe Basin Demand		49	51	52	52	52	53	53
Total Basin Supply								
San Antonio								
Municipal		84	84	84	84	84	84	84
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		12	12	12	12	12	12	12
Mining		0	0	0	0	0	0	0
Livestock		135	135	135	135	135	135	135
Unallocated Groundwater Supply		972	972	972	972	972	972	972
Total San Antonio Basin Supply		1,203	1,203	1,203	1,203	1,203	1,203	1,203

Table C-6 Projected Water Demands, Supplies, and Needs DeWitt County South Central Texas Region								
		Total in	Projections					
Basin	**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Guadalupe								
Municipal		7,354	7,354	7,354	7,354	7,354	7,354	7,354
Industrial		245	245	245	245	245	245	245
Steam-Electric		0	0	0	0	0	0	0
Irrigation		147	147	147	147	147	147	147
Mining		11	11	11	11	11	11	11
Livestock		1,267	1,267	1,267	1,267	1,267	1,267	1,267
Unallocated Groundwater Supply		3,167	3,167	3,167	3,167	3,167	3,167	3,167
Total Guadalupe Basin Supply		12,191	12,191	12,191	12,191	12,191	12,191	12,191
Lavaca								
Municipal		1,683	1,683	1,683	1,683	1,683	1,683	1,683
Industrial		15	15	15	15	15	15	15
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		41	41	41	41	41	41	41
Livestock		253	253	253	253	253	253	253
Unallocated Groundwater Supply		468	468	468	468	468	468	468
Total Lavaca Basin Supply		2,460	2,460	2,460	2,460	2,460	2,460	2,460
Lavaca-Guadalupe								
Municipal		0	0	0	0	0	0	0
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		19	19	19	19	19	19	19
Livestock		34	34	34	34	34	34	34
Unallocated Groundwater Supply		59	59	59	59	59	59	59
Total Lavaca-Guadalupe Basin Supply		112	112	112	112	112	112	112
Total Basin Balance								
San Antonio								
Municipal		17	17	18	19	21	23	24
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		4	0	2	4	5	7	7
Mining		0	0	0	0	0	0	0
Livestock		0	0	0	0	0	0	0
Unallocated Groundwater Supply		972	972	972	972	972	972	972
Total San Antonio Basin Surplus/Shortage		993	989	992	995	998	1,002	1,003
Guadalupe								
Municipal		4,854	4,854	4,848	4,873	4,918	4,993	5,034
Industrial		98	69	55	43	30	20	3
Steam-Electric		0	0	0	0	0	0	0
Irrigation		53	0	25	47	67	83	98
Mining		2	1	1	1	1	1	0
Livestock		0	0	0	0	0	0	0
Unallocated Groundwater Supply		3,167	3,167	3,167	3,167	3,167	3,167	3,167
Total Guadalupe Basin Surplus/Shortage		8,174	8,091	8,096	8,131	8,183	8,264	8,302

Table C-6 Projected Water Demands, Supplies, and Needs DeWitt County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Lavaca									
Municipal			1,185	1,186	1,184	1,190	1,200	1,216	1,224
Industrial			8	7	6	5	5	4	3
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			7	4	2	1	1	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			468	468	468	468	468	468	468
Total Lavaca Basin Surplus/Shortage			1,668	1,665	1,660	1,664	1,674	1,688	1,695
Lavaca-Guadalupe									
Municipal			0	0	0	0	0	0	0
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			4	2	1	1	1	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			59	59	59	59	59	59	59
Total Lavaca-Guadalupe Basin Surplus/Shortage			63	61	60	60	60	59	59
Groundwater Supplies									
	Available								
	San Antonio	Gulf Coast	1,135	1,135	1,135	1,135	1,135	1,135	1,135
	Guadalupe	Gulf Coast	11,437	11,437	11,437	11,437	11,437	11,437	11,437
	Lavaca	Gulf Coast	2,333	2,333	2,333	2,333	2,333	2,333	2,333
	Lavaca-Guadalupe	Gulf Coast	95	95	95	95	95	95	95
	Total Available		15,000	15,000	15,000	15,000	15,000	15,000	15,000
	Allocated								
	San Antonio	Gulf Coast	163	163	163	163	163	163	163
	Guadalupe	Gulf Coast	8,270	8,270	8,270	8,270	8,270	8,270	8,270
	Lavaca	Gulf Coast	1,865	1,865	1,865	1,865	1,865	1,865	1,865
	Lavaca-Guadalupe	Gulf Coast	36	36	36	36	36	36	36
	Total Allocated		10,334	10,334	10,334	10,334	10,334	10,334	10,334
	Total Unallocated		4,666	4,666	4,666	4,666	4,666	4,666	4,666

Table C-7 Projected Water Demands, Supplies, and Needs Dimmit County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand									
Rio Grande Basin									
Rural			2	2	2	2	2	2	2
	Subtotal		2	2	2	2	2	2	2
Nueces Basin									
Asherton			274	286	299	306	301	293	279
Big Wells			142	149	156	159	157	153	145
Carrizo Springs			1,742	1,842	1,943	1,996	1,981	1,930	1,836
Rural			272	282	292	293	284	274	261
	Subtotal		2,430	2,559	2,690	2,754	2,723	2,650	2,521
Total Municipal Demand			2,432	2,561	2,692	2,756	2,725	2,652	2,523
Municipal Existing Supply									
Rio Grande Basin									
Rural		Carrizo	3	3	3	3	3	3	3
	Subtotal		3	3	3	3	3	3	3
Nueces Basin									
Asherton		Carrizo	613	613	613	613	613	613	613
Big Wells		Carrizo	651	651	651	651	651	651	651
Carrizo Springs		Carrizo	2,210	2,210	2,210	2,210	2,210	2,210	2,210
Rural		Carrizo	340	340	340	340	340	340	340
	Subtotal		3,814	3,814	3,814	3,814	3,814	3,814	3,814
Total Municipal Existing Supply			3,817	3,817	3,817	3,817	3,817	3,817	3,817
Municipal Surplus/Shortage									
Rio Grande Basin									
Rural			1	1	1	1	1	1	1
	Subtotal		1	1	1	1	1	1	1
Nueces Basin									
Asherton			339	327	314	307	312	320	334
Big Wells			509	502	495	492	494	498	506
Carrizo Springs			468	368	267	214	229	280	374
Rural			68	58	48	47	56	66	79
	Subtotal		1,384	1,255	1,124	1,060	1,091	1,164	1,293
Total Municipal Surplus/Shortage			1,385	1,256	1,125	1,061	1,092	1,165	1,294
Municipal New Supply Need									
Rio Grande Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Nueces Basin									
Asherton			0	0	0	0	0	0	0
Big Wells			0	0	0	0	0	0	0
Carrizo Springs			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need			0	0	0	0	0	0	0

Table C-7 Projected Water Demands, Supplies, and Needs Dimmit County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Industrial Demand									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Industrial Demand			0	0	0	0	0	0	0
Industrial Existing Supply									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Industrial Existing Supply			0	0	0	0	0	0	0
Industrial Surplus/Shortage									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Industrial Surplus/Shortage			0	0	0	0	0	0	0
Industrial New Supply Need									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Industrial New Supply Need			0	0	0	0	0	0	0
Steam-Electric Demand									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Steam-Electric Demand			0	0	0	0	0	0	0
Steam-Electric Existing Supply									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Steam-Electric Existing Supply			0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage			0	0	0	0	0	0	0
Steam-Electric New Supply Need									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Steam-Electric New Supply Need			0	0	0	0	0	0	0
Irrigation Demand									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			6,750	10,611	10,333	10,225	9,813	9,391	8,987
Total Irrigation Demand			6,750	10,611	10,333	10,225	9,813	9,391	8,987
Irrigation Supply									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin		Run-of-River	2,261	2,261	2,261	2,261	2,261	2,261	2,261
		Carrizo	8,350	8,350	8,350	8,350	8,350	8,350	8,350
Nueces Basin Subtotal			10,611	10,611	10,611	10,611	10,611	10,611	10,611
Total Irrigation Supply			10,611	10,611	10,611	10,611	10,611	10,611	10,611

Table C-7 Projected Water Demands, Supplies, and Needs Dimmit County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Irrigation Surplus/Shortage									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			3,861	0	278	386	798	1,220	1,624
Total Irrigation Surplus/Shortage			3,861	0	278	386	798	1,220	1,624
Irrigation New Supply Need									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Irrigation New Supply Need			0	0	0	0	0	0	0
Mining Demand									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			919	1,003	1,034	1,051	1,067	1,082	1,095
Total Mining Demand			919	1,003	1,034	1,051	1,067	1,082	1,095
Mining Supply									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin		Run-of-River	1	1	1	1	1	1	1
		Carrizo	1,094	1,094	1,094	1,094	1,094	1,094	1,094
Nueces Basin Subtotal			1,095	1,095	1,095	1,095	1,095	1,095	1,095
Total Mining Supply			1,095	1,095	1,095	1,095	1,095	1,095	1,095
Mining Surplus/Shortage									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			176	92	61	44	28	13	0
Total Mining Surplus/Shortage			176	92	61	44	28	13	0
Mining New Supply Need									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Mining New Supply Need			0	0	0	0	0	0	0
Livestock Demand									
Rio Grande			105	105	105	105	105	105	105
Nueces Basin			447	447	447	447	447	447	447
Total Livestock Demand			552	552	552	552	552	552	552
Livestock Supply									
Rio Grande		Carrizo	52	52	52	52	52	52	52
		Local	53	53	53	53	53	53	53
	Subtotal		105	105	105	105	105	105	105
Nueces Basin		Carrizo	223	223	223	223	223	223	223
		Local	224	224	224	224	224	224	224
	Subtotal		447	447	447	447	447	447	447
Total Livestock Supply			552	552	552	552	552	552	552
Livestock Surplus/Shortage									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	0	0
Livestock New Supply Need									
Rio Grande			0	0	0	0	0	0	0
Nueces Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0

Table C-7 Projected Water Demands, Supplies, and Needs Dimmit County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Dimmit County Demand								
Municipal		2,432	2,561	2,692	2,756	2,725	2,652	2,523
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		6,750	10,611	10,333	10,225	9,813	9,391	8,987
Mining		919	1,003	1,034	1,051	1,067	1,082	1,095
Livestock		552	552	552	552	552	552	552
Total County Demand		10,653	14,727	14,611	14,584	14,157	13,677	13,157
Total Dimmit County Supply								
Municipal		3,817	3,817	3,817	3,817	3,817	3,817	3,817
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		10,611	10,611	10,611	10,611	10,611	10,611	10,611
Mining		1,095	1,095	1,095	1,095	1,095	1,095	1,095
Livestock		552	552	552	552	552	552	552
Total County Supply		16,075	16,075	16,075	16,075	16,075	16,075	16,075
Total Dimmit County Balance								
Municipal		1,385	1,256	1,125	1,061	1,092	1,165	1,294
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		3,861	0	278	386	798	1,220	1,624
Mining		176	92	61	44	28	13	0
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		5,422	1,348	1,464	1,491	1,918	2,398	2,918
Total Basin Demand								
Rio Grande								
Municipal		2	2	2	2	2	2	2
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		0	0	0	0	0	0	0
Livestock		105	105	105	105	105	105	105
Total Rio Grande Basin Demand		107	107	107	107	107	107	107
Nueces								
Municipal		2,430	2,559	2,690	2,754	2,723	2,650	2,521
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		6,750	10,611	10,333	10,225	9,813	9,391	8,987
Mining		919	1,003	1,034	1,051	1,067	1,082	1,095
Livestock		447	447	447	447	447	447	447
Total Nueces Basin Demand		10,546	14,620	14,504	14,477	14,050	13,570	13,050
Total Basin Supply								
Rio Grande								
Municipal		3	3	3	3	3	3	3
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		0	0	0	0	0	0	0
Livestock		105	105	105	105	105	105	105
Unallocated Groundwater Supply		2,973	2,973	2,973	2,973	2,973	2,973	2,973
Total Rio Grande Basin Supply		3,081	3,081	3,081	3,081	3,081	3,081	3,081

Table C-7 Projected Water Demands, Supplies, and Needs Dimmit County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Nueces									
Municipal			3,814	3,814	3,814	3,814	3,814	3,814	3,814
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			10,611	10,611	10,611	10,611	10,611	10,611	10,611
Mining			1,095	1,095	1,095	1,095	1,095	1,095	1,095
Livestock			447	447	447	447	447	447	447
Unallocated Groundwater Supply			7,271	7,271	7,271	7,271	7,271	7,271	7,271
Total Nueces Basin Supply			23,238	23,238	23,238	23,238	23,238	23,238	23,238
Total Basin Balance									
Rio Grande									
Municipal			1	1	1	1	1	1	1
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			2,973	2,973	2,973	2,973	2,973	2,973	2,973
Total Rio Grande Basin Surplus/Shortage			2,974	2,974	2,974	2,974	2,974	2,974	2,974
Nueces									
Municipal			1,384	1,255	1,124	1,060	1,091	1,164	1,293
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			3,861	0	278	386	798	1,220	1,624
Mining			176	92	61	44	28	13	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			7,271	7,271	7,271	7,271	7,271	7,271	7,271
Total Nueces Basin Surplus/Shortage			12,692	8,618	8,734	8,761	9,188	9,668	10,188
Groundwater Supplies									
	Available								
	Rio Grande	Carrizo	3,028	3,028	3,028	3,028	3,028	3,028	3,028
	Nueces	Carrizo	20,752	20,752	20,752	20,752	20,752	20,752	20,752
	Total Available		23,780	23,780	23,780	23,780	23,780	23,780	23,780
	Allocated								
	Rio Grande	Carrizo	55	55	55	55	55	55	55
	Nueces	Carrizo	13,482	13,482	13,482	13,482	13,482	13,482	13,482
	Total Allocated		13,537	13,537	13,537	13,537	13,537	13,537	13,537
	Total Unallocated		10,244	10,244	10,244	10,244	10,244	10,244	10,244

Table C-8 Projected Water Demands, Supplies, and Needs Frio County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Municipal Demand									
Nueces Basin									
Benton City WSC			2	3	4	5	6	6	6
Dilley			1,041	1,229	1,409	1,555	1,683	1,774	1,825
Pearsall			1,435	1,443	1,448	1,449	1,435	1,442	1,449
Rural			636	727	807	881	937	980	1,007
	Subtotal		3,114	3,402	3,668	3,890	4,061	4,202	4,287
Total Municipal Demand			3,114	3,402	3,668	3,890	4,061	4,202	4,287
Municipal Existing Supply									
Nueces Basin									
Benton City WSC		Carrizo	6	6	6	6	6	6	6
Dilley		Carrizo	2,107	2,107	2,107	2,107	2,107	2,107	2,107
Pearsall		Carrizo	2,731	2,731	2,731	2,731	2,731	2,731	2,731
Rural		Carrizo	1,020	1,020	1,020	1,020	1,020	1,020	1,020
Total Municipal Existing Supply			5,864	5,864	5,864	5,864	5,864	5,864	5,864
Municipal Surplus/Shortage									
Nueces Basin									
Benton City WSC			4	3	2	1	0	0	0
Dilley			1,066	878	698	552	424	333	282
Pearsall			1,296	1,288	1,283	1,282	1,296	1,289	1,282
Rural			384	293	213	139	83	40	13
	Subtotal		2,750	2,462	2,196	1,974	1,803	1,662	1,577
Total Municipal Surplus/Shortage			2,750	2,462	2,196	1,974	1,803	1,662	1,577
Municipal New Supply Need									
Nueces Basin									
Benton City WSC			0	0	0	0	0	0	0
Dilley			0	0	0	0	0	0	0
Pearsall			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need			0	0	0	0	0	0	0
Industrial Demand									
Nueces Basin			0	0	0	0	0	0	0
Total Industrial Demand			0	0	0	0	0	0	0
Industrial Existing Supply									
Nueces Basin			0	0	0	0	0	0	0
Total Industrial Existing Supply			0	0	0	0	0	0	0
Industrial Surplus/Shortage									
Nueces Basin			0	0	0	0	0	0	0
Total Industrial Surplus/Shortage			0	0	0	0	0	0	0
Industrial New Supply Need									
Nueces Basin			0	0	0	0	0	0	0
Total Industrial New Supply Need			0	0	0	0	0	0	0

Table C-8 Projected Water Demands, Supplies, and Needs Frio County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Steam-Electric Demand								
Nueces Basin		129	289	268	201	192	76	91
Total Steam-Electric Demand		129	289	268	201	192	76	91
Steam-Electric Existing Supply								
Nueces Basin	Carrizo	289	289	289	289	289	289	289
Total Steam-Electric Existing Supply		289	289	289	289	289	289	289
Steam-Electric Surplus/Shortage								
Nueces Basin		160	0	21	88	97	213	198
Total Steam-Electric Surplus/Shortage		160	0	21	88	97	213	198
Steam-Electric New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
Nueces Basin		117,098	82,017	79,098	76,302	73,627	71,065	68,592
Total Irrigation Demand		117,098	82,017	79,098	76,302	73,627	71,065	68,592
Irrigation Supply								
Nueces Basin	Run-of-River	0	0	0	0	0	0	0
	Queen City	560	560	560	560	560	560	560
	Carrizo	116,538	116,538	116,538	116,538	116,538	116,538	116,538
Total Irrigation Supply		117,098	117,098	117,098	117,098	117,098	117,098	117,098
Irrigation Surplus/Shortage								
Nueces Basin		0	35,081	38,000	40,796	43,471	46,033	48,506
Total Irrigation Surplus/Shortage		0	35,081	38,000	40,796	43,471	46,033	48,506
Irrigation New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0
Mining Demand								
Nueces Basin		139	109	104	102	100	98	96
Total Mining Demand		139	109	104	102	100	98	96
Mining Supply								
Nueces Basin								
	Carrizo	139	139	139	139	139	139	139
Total Mining Supply		139	139	139	139	139	139	139
Mining Surplus/Shortage								
Nueces Basin		0	30	35	37	39	41	43
Total Mining Surplus/Shortage		0	30	35	37	39	41	43
Mining New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Mining New Supply Need		0	0	0	0	0	0	0
Livestock Demand								
Nueces Basin		1,209	1,209	1,209	1,209	1,209	1,209	1,209
Total Livestock Demand		1,209	1,209	1,209	1,209	1,209	1,209	1,209

Table C-8 Projected Water Demands, Supplies, and Needs Frio County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Livestock Supply								
Nueces Basin	Carrizo	496	496	496	496	496	496	496
	Queen City	101	101	101	101	101	101	101
	Sparta	7	7	7	7	7	7	7
	Local	605	605	605	605	605	605	605
Total Livestock Supply		1,209	1,209	1,209	1,209	1,209	1,209	1,209
Livestock Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
Total Livestock Surplus/Shortage		0	0	0	0	0	0	0
Livestock New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Livestock New Supply Need		0	0	0	0	0	0	0
Total Frio County Demand								
Municipal		3,114	3,402	3,668	3,890	4,061	4,202	4,287
Industrial		0	0	0	0	0	0	0
Steam-Electric		129	289	268	201	192	76	91
Irrigation		117,098	82,017	79,098	76,302	73,627	71,065	68,592
Mining		139	109	104	102	100	98	96
Livestock		1,209	1,209	1,209	1,209	1,209	1,209	1,209
Total County Demand		121,689	87,026	84,347	81,704	79,189	76,650	74,275
Total Frio County Supply								
Municipal		5,864	5,864	5,864	5,864	5,864	5,864	5,864
Industrial		0	0	0	0	0	0	0
Steam-Electric		289	289	289	289	289	289	289
Irrigation		117,098	117,098	117,098	117,098	117,098	117,098	117,098
Mining		139	139	139	139	139	139	139
Livestock		1,209	1,209	1,209	1,209	1,209	1,209	1,209
Total County Supply		124,599	124,599	124,599	124,599	124,599	124,599	124,599
Total Frio County Balance								
Municipal		2,750	2,462	2,196	1,974	1,803	1,662	1,577
Industrial		0	0	0	0	0	0	0
Steam-Electric		160	0	21	88	97	213	198
Irrigation		0	35,081	38,000	40,796	43,471	46,033	48,506
Mining		0	30	35	37	39	41	43
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		2,910	37,573	40,252	42,895	45,410	47,949	50,324
Total Basin Demand								
Nueces								
Municipal		3,114	3,402	3,668	3,890	4,061	4,202	4,287
Industrial		0	0	0	0	0	0	0
Steam-Electric		129	289	268	201	192	76	91
Irrigation		117,098	82,017	79,098	76,302	73,627	71,065	68,592
Mining		139	109	104	102	100	98	96
Livestock		1,209	1,209	1,209	1,209	1,209	1,209	1,209
Total Nueces Basin Demand		121,689	87,026	84,347	81,704	79,189	76,650	74,275

Table C-8 Projected Water Demands, Supplies, and Needs Frio County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Total Basin Supply									
Nueces									
Municipal			5,864	5,864	5,864	5,864	5,864	5,864	5,864
Industrial			0	0	0	0	0	0	0
Steam-Electric			289	289	289	289	289	289	289
Irrigation			117,098	117,098	117,098	117,098	117,098	117,098	117,098
Mining			139	139	139	139	139	139	139
Livestock			1,209	1,209	1,209	1,209	1,209	1,209	1,209
Total Nueces Basin Supply			124,599	124,599	124,599	124,599	124,599	124,599	124,599
Total Basin Balance									
Nueces									
Municipal			2,750	2,462	2,196	1,974	1,803	1,662	1,577
Industrial			0	0	0	0	0	0	0
Steam-Electric			160	0	21	88	97	213	198
Irrigation			0	35,081	38,000	40,796	43,471	46,033	48,506
Mining			0	30	35	37	39	41	43
Livestock			0	0	0	0	0	0	0
Total Nueces Basin Surplus/Shortage			2,910	37,573	40,252	42,895	45,410	47,949	50,324
Groundwater Supplies									
	Available								
	Nueces	Carrizo	130,765	130,765	130,765	130,765	130,765	130,765	130,765
	Nueces	Sparta	1,260	1,260	1,260	1,260	1,260	1,260	1,260
	Nueces	Queen City	8,000	8,000	8,000	8,000	8,000	8,000	8,000
	Total Available		140,025	140,025	140,025	140,025	140,025	140,025	140,025
	Allocated								
	Nueces	Carrizo	123,320	123,320	123,320	123,320	123,320	123,320	123,320
	Nueces	Sparta	7	7	7	7	7	7	7
	Nueces	Queen City	661	661	661	661	661	661	661
	Total Allocated		123,988	123,988	123,988	123,988	123,988	123,988	123,988
	Total Unallocated		16,037	16,037	16,037	16,037	16,037	16,037	16,037

Table C-9 Projected Water Demands, Supplies, and Needs Goliad County South Central Texas Region									
Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand									
San Antonio Basin									
Goliad			365	416	480	527	553	577	594
Rural			225	252	291	315	329	342	352
	Subtotal		590	668	771	842	882	919	946
Guadalupe Basin									
Rural			256	286	330	357	374	388	399
	Subtotal		256	286	330	357	374	388	399
San Antonio-Nueces Coastal Basin									
Rural			62	70	80	87	91	94	97
	Subtotal		62	70	80	87	91	94	97
Total Municipal Demand*			908	1,024	1,181	1,286	1,347	1,401	1,442
Municipal Existing Supply									
San Antonio Basin									
Goliad		Gulf Coast	958	943	954	958	958	958	958
Rural		Gulf Coast	355	349	354	355	355	355	355
	Subtotal		1,313	1,292	1,308	1,313	1,313	1,313	1,313
Guadalupe Basin									
Rural		Gulf Coast	527	527	527	527	527	527	527
	Subtotal		527	527	527	527	527	527	527
San Antonio-Nueces Coastal Basin									
Rural		Gulf Coast	100	100	100	100	100	100	100
	Subtotal		100	100	100	100	100	100	100
Total Municipal Existing Supply			1,940	1,919	1,935	1,940	1,940	1,940	1,940
Municipal Surplus/Shortage									
San Antonio Basin									
Goliad			593	527	474	431	405	381	364
Rural			130	97	63	40	26	13	3
	Subtotal		723	624	537	471	431	394	367
Guadalupe Basin									
Rural			271	241	197	170	153	139	128
	Subtotal		271	241	197	170	153	139	128
San Antonio-Nueces Coastal Basin									
Rural			38	30	20	13	9	6	3
	Subtotal		38	30	20	13	9	6	3
Total Municipal Surplus/Shortage*			1,032	895	754	654	593	539	498
Municipal New Supply Need									
San Antonio Basin									
Goliad			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Guadalupe Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
San Antonio-Nueces Coastal Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need*			0	0	0	0	0	0	0

Table C-9 Projected Water Demands, Supplies, and Needs Goliad County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Industrial Demand								
San Antonio Basin		0	4	8	12	16	20	24
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Industrial Demand*		0	4	8	12	16	20	24
Industrial Existing Supply								
San Antonio Basin	Gulf Coast	24	24	24	24	24	24	24
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Industrial Existing Supply		24	24	24	24	24	24	24
Industrial Surplus/Shortage								
San Antonio Basin		24	20	16	12	8	4	0
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Industrial Surplus/Shortage*		24	20	16	12	8	4	0
Industrial New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Industrial New Supply Need*		0	0	0	0	0	0	0
Steam-Electric Demand								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		9,027	9,027	16,643	16,643	16,643	16,643	16,643
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Demand		9,027	9,027	16,643	16,643	16,643	16,643	16,643
Steam-Electric Existing Supply								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin	Gulf Coast	203	203	203	203	203	203	203
	Canyon (GBRA)	4,000	4,000	6,000	6,000	6,000	6,000	6,000
	Coleto Creek Reservoir[1]	12,500	12,500	12,500	12,500	12,500	12,500	12,500
Guadalupe Basin Subtotal		16,703	16,703	18,703	18,703	18,703	18,703	18,703
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		16,703	16,703	18,703	18,703	18,703	18,703	18,703
Steam-Electric Surplus/Shortage								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		7,676	7,676	2,060	2,060	2,060	2,060	2,060
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		7,676	7,676	2,060	2,060	2,060	2,060	2,060
Steam-Electric New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0

Table C-9
Projected Water Demands, Supplies, and Needs
Goliad County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Irrigation Demand									
San Antonio Basin			298	257	222	193	166	144	124
Guadalupe Basin			50	43	38	32	28	24	21
San Antonio-Nueces Basin			11	9	8	7	6	5	4
Total Irrigation Demand*			359	309	268	232	200	173	149
Irrigation Supply									
San Antonio Basin		Run-of-River	2,425	2,425	2,425	2,425	2,425	2,425	2,425
		Gulf Coast	1,572	1,547	1,567	1,572	1,572	1,572	1,572
	Subtotal		3,997	3,972	3,992	3,997	3,997	3,997	3,997
Guadalupe Basin		Gulf Coast	263	263	263	263	263	263	263
San Antonio-Nueces Basin		Gulf Coast	59	59	59	59	59	59	59
Total Irrigation Supply			4,319	4,294	4,314	4,319	4,319	4,319	4,319
Irrigation Surplus/Shortage									
San Antonio Basin			3,699	3,715	3,770	3,804	3,831	3,853	3,873
Guadalupe Basin			213	220	225	231	235	239	242
San Antonio-Nueces Basin			48	50	51	52	53	54	55
Total Irrigation Surplus/Shortage*			3,960	3,985	4,046	4,087	4,119	4,146	4,170
Irrigation New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Irrigation New Supply Need*			0	0	0	0	0	0	0
Mining Demand									
San Antonio Basin			0	129	91	64	43	21	11
Guadalupe Basin			9	137	98	73	51	30	20
San Antonio-Nueces Basin			4	132	93	68	46	25	15
Total Mining Demand*			13	398	282	205	140	76	46
Mining Supply									
San Antonio Basin		Gulf Coast	0	129	91	64	43	21	11
Guadalupe Basin		Gulf Coast	9	137	98	73	51	30	20
San Antonio-Nueces Basin		Gulf Coast	4	132	93	68	46	25	15
Total Mining Supply			13	398	282	205	140	76	46
Mining Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Mining Surplus/Shortage*			0	0	0	0	0	0	0
Mining New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Mining New Supply Need*			0	0	0	0	0	0	0
Livestock Demand									
San Antonio Basin			359	359	359	359	359	359	359
Guadalupe Basin			202	202	202	202	202	202	202
San Antonio-Nueces Basin			359	359	359	359	359	359	359
Total Livestock Demand			920	920	920	920	920	920	920

Table C-9 Projected Water Demands, Supplies, and Needs Goliad County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Livestock Supply									
San Antonio Basin		Gulf Coast	179	176	178	179	179	179	179
		Local	180	180	180	180	180	180	180
	Subtotal		359	356	358	359	359	359	359
Guadalupe Basin		Gulf Coast	101	101	101	101	101	101	101
		Local	101	101	101	101	101	101	101
	Subtotal		202	202	202	202	202	202	202
San Antonio-Nueces Basin		Gulf Coast	179	179	179	179	179	179	179
		Local	180	180	180	180	180	180	180
	Subtotal		359	359	359	359	359	359	359
Total Livestock Supply			920	917	919	920	920	920	920
Livestock Surplus/Shortage									
San Antonio Basin			0	-3	-1	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	-3	-1	0	0	0	0
Livestock New Supply Need									
San Antonio Basin			0	3	1	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	3	1	0	0	0	0
Total Goliad County Demand									
Municipal			908	1,024	1,181	1,286	1,347	1,401	1,442
Industrial			0	4	8	12	16	20	24
Steam-Electric			9,027	9,027	16,643	16,643	16,643	16,643	16,643
Irrigation			359	309	268	232	200	173	149
Mining			13	398	282	205	140	76	46
Livestock			920	920	920	920	920	920	920
Total County Demand			11,227	11,682	19,302	19,298	19,266	19,233	19,224
Total Goliad County Supply									
Municipal			1,940	1,919	1,935	1,940	1,940	1,940	1,940
Industrial			24	24	24	24	24	24	24
Steam-Electric			16,703	16,703	18,703	18,703	18,703	18,703	18,703
Irrigation			4,319	4,294	4,314	4,319	4,319	4,319	4,319
Mining			13	398	282	205	140	76	46
Livestock			920	917	919	920	920	920	920
Total County Supply			23,919	24,255	26,177	26,111	26,046	25,982	25,952
Total Goliad County Balance									
Municipal			1,032	895	754	654	593	539	498
Industrial			24	20	16	12	8	4	0
Steam-Electric			7,676	7,676	2,060	2,060	2,060	2,060	2,060
Irrigation			3,960	3,985	4,046	4,087	4,119	4,146	4,170
Mining			0	0	0	0	0	0	0
Livestock			0	-3	-1	0	0	0	0
Total County Surplus/Shortage			12,692	12,573	6,875	6,813	6,780	6,749	6,728

Table C-9 Projected Water Demands, Supplies, and Needs Goliad County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Total Basin Demand								
San Antonio								
Municipal		590	668	771	842	882	919	946
Industrial		0	4	8	12	16	20	24
Steam-Electric		0	0	0	0	0	0	0
Irrigation		298	257	222	193	166	144	124
Mining		0	129	91	64	43	21	11
Livestock		359	359	359	359	359	359	359
Total San Antonio Basin Demand		1,247	1,417	1,451	1,470	1,466	1,463	1,464
Guadalupe								
Municipal		256	286	330	357	374	388	399
Industrial		0	0	0	0	0	0	0
Steam-Electric		9,027	9,027	16,643	16,643	16,643	16,643	16,643
Irrigation		50	43	38	32	28	24	21
Mining		9	137	98	73	51	30	20
Livestock		202	202	202	202	202	202	202
Total Guadalupe Basin Demand		9,544	9,695	17,311	17,307	17,298	17,287	17,285
San Antonio-Nueces								
Municipal		62	70	80	87	91	94	97
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		11	9	8	7	6	5	4
Mining		4	132	93	68	46	25	15
Livestock		359	359	359	359	359	359	359
Total San Antonio-Nueces Basin Demand		436	570	540	521	502	483	475
Total Basin Supply								
San Antonio								
Municipal		1,313	1,292	1,308	1,313	1,313	1,313	1,313
Industrial		24	24	24	24	24	24	24
Steam-Electric		0	0	0	0	0	0	0
Irrigation		3,997	3,972	3,992	3,997	3,997	3,997	3,997
Mining		0	129	91	64	43	21	11
Livestock		359	356	358	359	359	359	359
Unallocated Groundwater Supply		80	0	0	16	37	59	69
Total San Antonio Basin Supply		5,773	5,773	5,773	5,773	5,773	5,773	5,773
Guadalupe								
Municipal		527	527	527	527	527	527	527
Industrial		0	0	0	0	0	0	0
Steam-Electric		16,703	16,703	18,703	18,703	18,703	18,703	18,703
Irrigation		263	263	263	263	263	263	263
Mining		9	137	98	73	51	30	20
Livestock		202	202	202	202	202	202	202
Total Guadalupe Basin Supply		17,704	17,832	19,793	19,768	19,746	19,725	19,715
San Antonio-Nueces								
Municipal		100	100	100	100	100	100	100
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		59	59	59	59	59	59	59
Mining		4	132	93	68	46	25	15
Livestock		359	359	359	359	359	359	359
Unallocated Groundwater Supply		2,674	2,546	2,585	2,610	2,632	2,653	2,663
Total San Antonio-Nueces Basin Supply		3,196	3,196	3,196	3,196	3,196	3,196	3,196

Table C-9
Projected Water Demands, Supplies, and Needs
Goliad County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Basin Balance									
San Antonio									
Municipal			723	624	537	471	431	394	367
Industrial			24	20	16	12	8	4	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			3,699	3,715	3,770	3,804	3,831	3,853	3,873
Mining			0	0	0	0	0	0	0
Livestock			0	-3	-1	0	0	0	0
Unallocated Groundwater Supply			80	0	0	16	37	59	69
Total San Antonio Basin Surplus/Shortage			4,526	4,356	4,322	4,303	4,307	4,310	4,309
Guadalupe									
Municipal			271	241	197	170	153	139	128
Industrial			0	0	0	0	0	0	0
Steam-Electric			7,676	7,676	2,060	2,060	2,060	2,060	2,060
Irrigation			213	220	225	231	235	239	242
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Total Guadalupe Basin Surplus/Shortage			8,160	8,137	2,482	2,461	2,448	2,438	2,430
San Antonio-Nueces									
Municipal			38	30	20	13	9	6	3
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			48	50	51	52	53	54	55
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			2,674	2,546	2,585	2,610	2,632	2,653	2,663
Total San Antonio-Nueces Basin Surplus/Shortage			2,760	2,626	2,656	2,675	2,694	2,713	2,721
Groundwater Supplies									
	Available								
	San Antonio	Gulf Coast	3,168	3,168	3,168	3,168	3,168	3,168	3,168
	Guadalupe	Gulf Coast	1,816	1,816	1,816	1,816	1,816	1,816	1,816
	San Antonio-Nueces	Gulf Coast	3,016	3,016	3,016	3,016	3,016	3,016	3,016
	Total Available		8,000	8,000	8,000	8,000	8,000	8,000	8,000
	Allocated								
	San Antonio	Gulf Coast	3,088	3,168	3,168	3,152	3,131	3,109	3,099
	Guadalupe	Gulf Coast	1,103	1,231	1,192	1,167	1,145	1,124	1,114
	San Antonio-Nueces	Gulf Coast	342	470	431	406	384	363	353
	Total Allocated		4,533	4,869	4,791	4,725	4,660	4,596	4,566
	Total Unallocated		3,467	3,131	3,209	3,275	3,340	3,404	3,434

Note:
[1] Supply from Coleto Creek Reservoir is dependent upon a contract with GBRA for delivery of stored water from Canyon Reservoir.
* Projected demands, shortages, and needs may be greater than shown. These WUGs are requesting a population/demand revision.

Table C-10 Projected Water Demands, Supplies, and Needs Gonzales County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Municipal Demand									
Guadalupe Basin									
Gonzales			1,460	1,545	1,644	1,710	1,756	1,765	1,759
Gonzales County WSC			1,364	1,578	1,805	1,982	2,101	2,133	2,120
Nixon			414	438	460	479	488	490	488
Waelder			133	154	175	190	202	204	203
Rural			447	384	313	257	212	197	199
	Subtotal		3,818	4,099	4,397	4,618	4,759	4,789	4,769
Lavaca Basin									
Rural			10	9	7	6	5	5	5
	Subtotal		10	9	7	6	5	5	5
Total Municipal Demand			3,828	4,108	4,404	4,624	4,764	4,794	4,774
Municipal Existing Supply									
Guadalupe Basin									
Gonzales		Run-of-River	2,240	2,240	2,240	2,240	2,240	2,240	2,240
		Carrizo	345	345	345	345	345	345	345
Gonzales Subtotal			2,585	2,585	2,585	2,585	2,585	2,585	2,585
Gonzales County WSC		Carrizo	1,593	1,593	1,593	1,593	1,593	1,593	1,593
		Canyon (GBRA)	630	630	630	630	630	630	630
Gonzales County WSC Subtotal			2,223	2,223	2,223	2,223	2,223	2,223	2,223
Nixon		Carrizo	2,720	2,720	2,720	2,720	2,720	2,720	2,720
Waelder		Queen City	598	598	598	598	598	598	598
Rural		Carrizo	559	559	559	559	559	559	559
	Subtotal		8,685	8,685	8,685	8,685	8,685	8,685	8,685
Lavaca Basin									
Rural		Carrizo	13	13	13	13	13	13	13
	Subtotal		13	13	13	13	13	13	13
Total Municipal Existing Supply			8,698	8,698	8,698	8,698	8,698	8,698	8,698
Municipal Surplus/Shortage									
Guadalupe Basin									
Gonzales			1,125	1,040	941	875	829	820	826
Gonzales County WSC			859	645	418	241	122	90	103
Nixon			2,306	2,282	2,260	2,241	2,232	2,230	2,232
Waelder			465	444	423	408	396	394	395
Rural			112	175	246	302	347	362	360
	Subtotal		4,867	4,586	4,288	4,067	3,926	3,896	3,916
Lavaca Basin									
Rural			3	4	6	7	8	8	8
	Subtotal		3	4	6	7	8	8	8
Total Municipal Surplus/Shortage			4,870	4,590	4,294	4,074	3,934	3,904	3,924
Municipal New Supply Need									
Guadalupe Basin									
Gonzales			0	0	0	0	0	0	0
Gonzales County WSC			0	0	0	0	0	0	0
Nixon			0	0	0	0	0	0	0
Waelder			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0

Table C-10 Projected Water Demands, Supplies, and Needs Gonzales County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Lavaca Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need			0	0	0	0	0	0	0
Industrial Demand									
Guadalupe Basin			2,051	2,400	2,628	2,822	3,011	3,177	3,402
Lavaca Basin			0	0	0	0	0	0	0
Total Industrial Demand			2,051	2,400	2,628	2,822	3,011	3,177	3,402
Industrial Existing Supply									
Guadalupe Basin		Sparta	1,135	1,135	1,135	1,135	1,135	1,135	1,135
		Carrizo	2,400	2,400	2,400	2,400	2,400	2,400	2,400
Guadalupe Basin Subtotal			3,535	3,535	3,535	3,535	3,535	3,535	3,535
Lavaca Basin			0	0	0	0	0	0	0
Total Industrial Existing Supply			3,535	3,535	3,535	3,535	3,535	3,535	3,535
Industrial Surplus/Shortage									
Guadalupe Basin			1,484	1,135	907	713	524	358	133
Lavaca Basin			0	0	0	0	0	0	0
Total Industrial Surplus/Shortage			1,484	1,135	907	713	524	358	133
Industrial New Supply Need									
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Total Industrial New Supply Need			0	0	0	0	0	0	0
Steam-Electric Demand									
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Total Steam-Electric Demand			0	0	0	0	0	0	0
Steam-Electric Existing Supply									
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Total Steam-Electric Existing Supply			0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage									
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage			0	0	0	0	0	0	0
Steam-Electric New Supply Need									
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Total Steam-Electric New Supply Need			0	0	0	0	0	0	0
Irrigation Demand									
Guadalupe Basin			2,438	1,304	1,124	969	835	720	621
Lavaca Basin			0	0	0	0	0	0	0
Total Irrigation Demand			2,438	1,304	1,124	969	835	720	621

Table C-10 Projected Water Demands, Supplies, and Needs Gonzales County South Central Texas Region								
		Total in	Projections					
Basin	**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Irrigation Supply								
Guadalupe Basin	Canyon (GBRA)	7	7	7	7	7	7	7
	Run-of-River	1,800	1,800	1,800	1,800	1,800	1,800	1,800
	Carrizo	950	950	950	950	950	950	950
	Sparta	293	293	293	293	293	293	293
	Queen City	271	271	271	271	271	271	271
	Gulf Coast	101	101	101	101	101	101	101
Guadalupe Basin Subtotal		3,422	3,422	3,422	3,422	3,422	3,422	3,422
Lavaca Basin		0	0	0	0	0	0	0
Total Irrigation Supply		3,422	3,422	3,422	3,422	3,422	3,422	3,422
Irrigation Surplus/Shortage								
Guadalupe Basin		984	2,118	2,298	2,453	2,587	2,702	2,801
Lavaca Basin		0	0	0	0	0	0	0
Total Irrigation Surplus/Shortage		984	2,118	2,298	2,453	2,587	2,702	2,801
Irrigation New Supply Need								
Guadalupe Basin		0	0	0	0	0	0	0
Lavaca Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0
Mining Demand								
Guadalupe Basin		30	25	24	23	23	22	22
Lavaca Basin		3	3	3	3	2	2	2
Total Mining Demand		33	28	27	26	25	24	24
Mining Supply								
Guadalupe Basin	Carrizo	15	15	15	15	15	15	15
	Sparta	8	8	8	8	8	8	8
	Queen City	8	8	8	8	8	8	8
Guadalupe Basin Subtotal		31	31	31	31	31	31	31
Lavaca Basin	Carrizo	3	3	3	3	3	3	3
Total Mining Supply		34	34	34	34	34	34	34
Mining Surplus/Shortage								
Guadalupe Basin		1	6	7	8	8	9	9
Lavaca Basin		0	0	0	0	1	1	1
Total Mining Surplus/Shortage		1	6	7	8	9	10	10
Mining New Supply Need								
Guadalupe Basin		0	0	0	0	0	0	0
Lavaca Basin		0	0	0	0	0	0	0
Total Mining New Supply Need		0	0	0	0	0	0	0
Livestock Demand								
Guadalupe Basin		5,107	5,354	5,354	5,354	5,354	5,354	5,354
Lavaca Basin		52	99	99	99	99	99	99
Total Livestock Demand		5,159	5,453	5,453	5,453	5,453	5,453	5,453

Table C-10 Projected Water Demands, Supplies, and Needs Gonzales County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Livestock Supply									
Guadalupe Basin		Carrizo	1,407	1,407	1,407	1,407	1,407	1,407	1,407
		Queen City	813	813	813	813	813	813	813
		Sparta	405	405	405	405	405	405	405
		Local	2,554	2,801	2,801	2,801	2,801	2,801	2,801
	Subtotal		5,179	5,426	5,426	5,426	5,426	5,426	5,426
Lavaca Basin		Carrizo	26	26	26	26	26	26	26
		Local	26	73	73	73	73	73	73
	Subtotal		52	99	99	99	99	99	99
Total Livestock Supply			5,231	5,525	5,525	5,525	5,525	5,525	5,525
Livestock Surplus/Shortage									
Guadalupe Basin			72	72	72	72	72	72	72
Lavaca Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			72	72	72	72	72	72	72
Livestock New Supply Need									
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0
Total Gonzales County Demand									
Municipal			3,828	4,108	4,404	4,624	4,764	4,794	4,774
Industrial			2,051	2,400	2,628	2,822	3,011	3,177	3,402
Steam-Electric			0	0	0	0	0	0	0
Irrigation			2,438	1,304	1,124	969	835	720	621
Mining			33	28	27	26	25	24	24
Livestock			5,159	5,453	5,453	5,453	5,453	5,453	5,453
Total County Demand			13,509	13,293	13,636	13,894	14,088	14,168	14,274
Total Gonzales County Supply									
Municipal			8,698	8,698	8,698	8,698	8,698	8,698	8,698
Industrial			3,535	3,535	3,535	3,535	3,535	3,535	3,535
Steam-Electric			0	0	0	0	0	0	0
Irrigation			3,422	3,422	3,422	3,422	3,422	3,422	3,422
Mining			34	34	34	34	34	34	34
Livestock			5,231	5,525	5,525	5,525	5,525	5,525	5,525
Total County Supply			20,920	21,214	21,214	21,214	21,214	21,214	21,214
Total Gonzales County Balance									
Municipal			4,870	4,590	4,294	4,074	3,934	3,904	3,924
Industrial			1,484	1,135	907	713	524	358	133
Steam-Electric			0	0	0	0	0	0	0
Irrigation			984	2,118	2,298	2,453	2,587	2,702	2,801
Mining			1	6	7	8	9	10	10
Livestock			72	72	72	72	72	72	72
Total County Surplus/Shortage			7,411	7,921	7,578	7,320	7,126	7,046	6,940

Table C-10 Projected Water Demands, Supplies, and Needs Gonzales County South Central Texas Region								
	Source	Total in	Projections					
Basin		2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Basin Demand								
Guadalupe								
Municipal		3,818	4,099	4,397	4,618	4,759	4,789	4,769
Industrial		2,051	2,400	2,628	2,822	3,011	3,177	3,402
Steam-Electric		0	0	0	0	0	0	0
Irrigation		2,438	1,304	1,124	969	835	720	621
Mining		30	25	24	23	23	22	22
Livestock		5,107	5,354	5,354	5,354	5,354	5,354	5,354
Total Guadalupe Basin Demand		13,444	13,182	13,527	13,786	13,982	14,062	14,168
Lavaca								
Municipal		10	9	7	6	5	5	5
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		3	3	3	3	2	2	2
Livestock		52	99	99	99	99	99	99
Total Lavaca Basin Demand		65	111	109	108	106	106	106
Total Basin Supply								
Guadalupe								
Municipal		8,685	8,685	8,685	8,685	8,685	8,685	8,685
Industrial		3,535	3,535	3,535	3,535	3,535	3,535	3,535
Steam-Electric		0	0	0	0	0	0	0
Irrigation		3,422	3,422	3,422	3,422	3,422	3,422	3,422
Mining		31	31	31	31	31	31	31
Livestock		5,179	5,426	5,426	5,426	5,426	5,426	5,426
Unallocated Groundwater Supply		44,518	44,518	44,518	44,518	44,518	44,518	44,518
Total Guadalupe Basin Supply		65,370	65,617	65,617	65,617	65,617	65,617	65,617
Lavaca								
Municipal		13	13	13	13	13	13	13
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		3	3	3	3	3	3	3
Livestock		52	99	99	99	99	99	99
Unallocated Groundwater Supply		261	261	261	261	261	261	261
Total Lavaca Basin Supply		329	376	376	376	376	376	376
Total Basin Balance								
Guadalupe								
Municipal		4,867	4,586	4,288	4,067	3,926	3,896	3,916
Industrial		1,484	1,135	907	713	524	358	133
Steam-Electric		0	0	0	0	0	0	0
Irrigation		984	2,118	2,298	2,453	2,587	2,702	2,801
Mining		1	6	7	8	8	9	9
Livestock		72	72	72	72	72	72	72
Unallocated Groundwater Supply		44,518	44,518	44,518	44,518	44,518	44,518	44,518
Total Guadalupe Basin Surplus/Shortage		51,926	52,435	52,090	51,831	51,635	51,555	51,449

Table C-10 Projected Water Demands, Supplies, and Needs Gonzales County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Lavaca									
Municipal			3	4	6	7	8	8	8
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			0	0	0	0	1	1	1
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			261	261	261	261	261	261	261
Total Lavaca Basin Surplus/Shortage			264	265	267	268	270	270	270
Groundwater Supplies									
	Available								
	Guadalupe	Carrizo	60,319	60,319	60,319	60,319	60,319	60,319	60,319
	Guadalupe	Sparta	4,500	4,500	4,500	4,500	4,500	4,500	4,500
	Guadalupe	Queen City	4,590	4,590	4,590	4,590	4,590	4,590	4,590
	Guadalupe	Gulf Coast	1,901	1,901	1,901	1,901	1,901	1,901	1,901
	Lavaca	Carrizo	121	121	121	121	121	121	121
	Lavaca	Gulf Coast	182	182	182	182	182	182	182
	Total Available		71,613	71,613	71,613	71,613	71,613	71,613	71,613
	Allocated								
	Guadalupe	Carrizo	23,161	23,161	23,161	23,161	23,161	23,161	23,161
	Guadalupe	Sparta	1,841	1,841	1,841	1,841	1,841	1,841	1,841
	Guadalupe	Queen City	1,690	1,690	1,690	1,690	1,690	1,690	1,690
	Guadalupe	Gulf Coast	101	101	101	101	101	101	101
	Lavaca	Carrizo	42	42	42	42	42	42	42
	Lavaca	Gulf Coast	0	0	0	0	0	0	0
	Total Allocated		26,834	26,834	26,834	26,834	26,834	26,834	26,834
	Total Unallocated		44,779	44,779	44,779	44,779	44,779	44,779	44,779

Table C-11
Projected Water Demands, Supplies, and Needs
Guadalupe County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand									
San Antonio Basin									
Cibolo			598	866	1,190	1,546	1,898	2,298	2,730
East Central SUD			102	94	128	166	203	240	282
Green Valley SUD*			546	655	824	1,018	1,183	1,396	1,622
Marion			154	164	179	194	209	229	251
New Berlin				70	83	100	122	148	180
Santa Clara			92	177	280	395	505	631	766
Schertz (part)*			2,776	3,797	5,089	6,448	7,822	9,399	11,098
Selma			17	59	86	113	131	152	176
Springs Hill WSC			323	365	417	475	533	599	674
Water Service Inc. (Apex Water Ser)			25	30	37	45	53	61	71
Rural			58	50	39	27	17	9	2
	Subtotal		4,691	6,327	8,352	10,527	12,676	15,162	17,852
Guadalupe Basin									
Crystal Clear WSC*			1,017	1,316	1,688	2,112	2,498	2,977	3,493
Green Valley SUD			1,337	1,691	2,136	2,651	3,109	3,695	4,326
Martindale WSC			26	47	64	84	111	128	150
New Braunfels			266	467	703	960	1,216	1,499	1,810
Santa Clara			23	43	69	97	124	155	188
Seguin			4,463	5,018	5,718	6,454	7,203	8,069	9,047
Springs Hill WSC			1,753	1,984	2,262	2,581	2,891	3,250	3,656
Rural			274	220	175	129	79	45	11
	Subtotal		9,159	10,786	12,815	15,068	17,231	19,818	22,681
Total Municipal Demand			13,850	17,113	21,167	25,595	29,907	34,980	40,533
Municipal Existing Supply									
San Antonio Basin									
Cibolo		Canyon (CRWA - Dunlap)	800	1,350	2,850	2,850	2,850	2,850	2,850
East Central SUD		Canyon (CRWA - Dunlap)	123	123	26	26	26	26	26
		Carrizo (Springs Hill/CRWA)	34	0	0	0	0	0	0
		Edwards (BMWD)	106	106	106	106	106	106	106
East Central Subtotal			263	229	132	132	132	132	132
Green Valley SUD		Edwards	187	187	187	187	187	187	187
		Edwards (East Central)	47	47	47	47	47	47	47
		Canyon (GBRA)	100	100	100	100	100	100	100
		Canyon (CRWA - Dunlap)	427	391	1,478	1,461	1,439	1,413	1,381
Green Valley SUD Subtotal			761	725	1,812	1,795	1,773	1,747	1,715
Marion		Edwards	76	76	76	76	76	76	76
		Canyon (CRWA - Dunlap)	100	100	100	100	100	100	100
Marion Subtotal			176	176	176	176	176	176	176
New Berlin		Carrizo (East Central-CRWA)		34	34	34	34	34	34
		Canyon (Green Valley-CRWA)		36	49	66	88	114	146
New Berlin Subtotal			0	70	83	100	122	148	180
Santa Clara	estimated	Carrizo	115	115	115	115	115	115	115
Schertz (part)		Edwards	921	921	921	921	921	921	921
		Carrizo (Guadalupe) - S/S	0	2,935	2,935	2,935	2,935	2,935	2,935
		Carrizo (Gonzales) - S/S	4,914	4,914	4,914	4,914	4,914	4,914	4,914
Schertz Subtotal			5,835	8,770	8,770	8,770	8,770	8,770	8,770
Selma		Edwards (Bexar County)	67	67	67	67	67	67	67
		Carrizo (Gonzales) - S/S	49	49	49	49	49	49	49
Selma Subtotal			116	116	116	116	116	116	116
Springs Hill WSC		Canyon (GBRA)	375	375	375	375	375	375	375
		Canyon (CRWA - Dunlap)	251	266	266	266	266	266	266
		Carrizo	0	0	0	0	0	0	0
		Carrizo (Gonzales) - S/S	87	87	87	87	87	87	87
Springs Hill WSC Subtotal			713	728	728	728	728	728	728
Water Service Inc. (Apex Water Ser)		Edwards	1	1	1	1	1	1	1
Rural		Carrizo	58	58	58	58	58	58	58
	Subtotal		8,838	12,338	14,841	14,841	14,841	14,841	14,841

Table C-11 Projected Water Demands, Supplies, and Needs Guadalupe County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Guadalupe Basin									
Crystal Clear WSC		Edwards	325	325	325	325	325	325	325
		ROR (Guadalupe) - CRWA	58	58	58	58	58	58	58
		Canyon (CRWA)	158	158	158	158	158	158	158
		Canyon (CRWA-Dunlap) - Spring	165	165	165	165	165	165	165
		Canyon (New Braunfels)	594	594	594	594	594	594	594
		Canyon (GBRA)	528	528	528	528	528	528	528
Crystal Clear WSC Subtotal			1,828	1,828	1,828	1,828	1,828	1,828	1,828
Green Valley SUD		Edwards	105	105	105	105	105	105	105
		Edwards (East Central)	116	116	116	116	116	116	116
		Canyon (GBRA)	424	424	100	100	100	100	100
		Canyon (CRWA - Dunlap)	1,045	1,045	3,545	3,545	3,545	3,545	3,545
Green Valley SUD Subtotal			1,691	1,691	3,867	3,867	3,867	3,867	3,867
Martindale WSC		Canyon (CRWA)	11	11	11	11	11	11	11
		ROR (Guadalupe)	23	23	23	23	23	23	23
Martindale WSC Subtotal			34	34	34	34	34	34	34
New Braunfels		Edwards	131	131	131	131	131	131	131
		Run-of-River	259	259	259	259	259	259	259
		Canyon (GBRA)	186	186	186	186	186	186	186
New Braunfels Subtotal			576	576	576	576	576	576	576
Santa Clara	estimated	Carrizo	29	29	29	29	29	29	29
Seguin		Run-of-River	3,273	3,273	3,273	3,273	3,273	3,273	3,273
		Canyon (GBRA)	3,000	1,000	1,000	1,000	1,000	1,000	1,000
		Carrizo (Gonzales) - S/S	5,392	5,392	5,392	5,392	5,392	5,392	5,392
Seguin Subtotal			11,665	9,665	9,665	9,665	9,665	9,665	9,665
Springs Hill WSC		Canyon (GBRA)	2,125	2,125	2,125	2,125	2,125	2,125	2,125
		Canyon (CRWA - Dunlap)	1,424	1,509	1,509	1,509	1,509	1,509	1,509
		Carrizo	15	15	15	15	15	15	15
		Carrizo (Gonzales) - S/S	473	473	473	473	473	473	473
Springs Hill WSC Subtotal			4,037	4,122	4,122	4,122	4,122	4,122	4,122
Rural		Queen City	118	118	118	118	118	118	118
		Carrizo	207	207	207	207	207	207	207
		Run-of-River	56	56	56	56	56	56	56
		Canyon (GBRA)	10	10	10	10	10	10	10
Rural Subtotal			391	391	391	391	391	391	391
	Subtotal		20,251	18,336	20,512	20,512	20,512	20,512	20,512
Total Municipal Existing Supply			29,089	30,674	35,353	35,353	35,353	35,353	35,353
Municipal Surplus/Shortage									
San Antonio Basin									
Cibolo			202	484	1,660	1,304	952	552	120
East Central SUD			161	135	4	-34	-71	-108	-150
Green Valley SUD*			215	70	988	777	590	351	93
Marion			22	12	-3	-18	-33	-53	-75
New Berlin			0	0	0	0	0	0	0
Santa Clara			23	-62	-165	-280	-390	-516	-651
Schertz (part)*			3,059	4,973	3,681	2,322	948	-629	-2,328
Selma			99	57	30	3	-15	-36	-60
Springs Hill WSC			390	363	311	253	195	129	54
Water Service Inc. (Apex Water Ser)			-24	-29	-36	-44	-52	-60	-70
Rural			0	8	19	31	41	49	56
	Subtotal		4,147	6,011	6,489	4,314	2,165	-321	-3,011

Table C-11 Projected Water Demands, Supplies, and Needs Guadalupe County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Guadalupe Basin									
Crystal Clear WSC*			811	512	140	-284	-670	-1,149	-1,665
Green Valley SUD*			354	0	1,731	1,216	758	172	-459
Martindale WSC			8	-13	-30	-50	-77	-94	-116
New Braunfels			310	109	-127	-384	-640	-923	-1,234
Santa Clara			6	-14	-40	-68	-95	-126	-159
Seguin			7,202	4,647	3,947	3,211	2,462	1,596	618
Springs Hill WSC			2,284	2,138	1,860	1,541	1,231	872	466
Rural			117	171	216	262	312	346	380
	Subtotal		11,092	7,550	7,697	5,444	3,281	694	-2,169
Total Municipal Surplus/Shortage			15,239	13,561	14,186	9,758	5,446	373	-5,180
Municipal New Supply Need									
San Antonio Basin									
Cibolo			0	0	0	0	0	0	0
East Central SUD			0	0	0	34	71	108	150
Green Valley SUD*			0	0	0	0	0	0	0
Marion			0	0	3	18	33	53	75
New Berlin			0	0	0	0	0	0	0
Santa Clara			0	62	165	280	390	516	651
Schertz (part)*			0	0	0	0	0	629	2,328
Selma			0	0	0	0	15	36	60
Springs Hill WSC			0	0	0	0	0	0	0
Water Service Inc. (Apex Water Ser)			24	29	36	44	52	60	70
Rural			0	0	0	0	0	0	0
	Subtotal		24	91	204	376	561	1,402	3,334
Guadalupe Basin									
Crystal Clear WSC*			0	0	0	284	670	1,149	1,665
Green Valley SUD*			0	0	0	0	0	0	459
Martindale WSC			0	13	30	50	77	94	116
New Braunfels			0	0	127	384	640	923	1,234
Santa Clara			0	14	40	68	95	126	159
Seguin			0	0	0	0	0	0	0
Springs Hill WSC			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	28	197	786	1,482	2,292	3,633
Total Municipal New Supply Need			24	119	401	1,162	2,043	3,694	6,967
Industrial Demand									
San Antonio Basin			3	4	4	5	5	5	6
Guadalupe Basin			2,094	2,634	2,953	3,244	3,525	3,766	4,091
Total Industrial Demand			2,097	2,638	2,957	3,249	3,530	3,771	4,097
Industrial Existing Supply									
San Antonio Basin		Carrizo	6	6	6	6	6	6	6
Guadalupe Basin		Edwards	160	160	160	160	160	160	160
		Carrizo	2,923	2,923	2,923	2,923	2,923	2,923	2,923
		Run-of-River	25	25	25	25	25	25	25
		Canyon (GBRA)	984	984	984	984	984	984	984
Guadalupe Basin Subtotal			4,092	4,092	4,092	4,092	4,092	4,092	4,092
Total Industrial Existing Supply			4,098	4,098	4,098	4,098	4,098	4,098	4,098
Industrial Surplus/Shortage									
San Antonio Basin			3	2	2	1	1	1	0
Guadalupe Basin			1,998	1,458	1,139	848	567	326	1
Total Industrial Surplus/Shortage			2,001	1,460	1,141	849	568	327	1

Table C-11
Projected Water Demands, Supplies, and Needs
Guadalupe County
South Central Texas Region

Basin	Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Industrial New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Industrial New Supply Need		0	0	0	0	0	0	0
Steam-Electric Demand								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		129	4,788	3,406	3,326	5,136	5,585	7,515
Total Steam-Electric Demand		129	4,788	3,406	3,326	5,136	5,585	7,515
Steam-Electric Existing Supply								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin	Canyon (GBRA)	6,840	6,840	6,840	6,840	6,840	6,840	6,840
	Reuse (City of Seguin)	0	2,240	2,240	2,240	2,240	2,240	2,240
Guadalupe Basin Subtotal		6,840	9,080	9,080	9,080	9,080	9,080	9,080
Total Steam-Electric Existing Supply		6,840	9,080	9,080	9,080	9,080	9,080	9,080
Steam-Electric Surplus/Shortage								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		6,711	4,292	5,674	5,754	3,944	3,495	1,565
Total Steam-Electric Surplus/Shortage		6,711	4,292	5,674	5,754	3,944	3,495	1,565
Steam-Electric New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
San Antonio Basin		113	137	123	109	96	91	91
Guadalupe Basin		762	933	832	737	646	619	614
Total Irrigation Demand		875	1,070	955	846	742	710	705
Irrigation Supply								
San Antonio Basin	Carrizo	137	137	137	137	137	137	137
Guadalupe Basin	Run-of-River	908	908	908	908	908	908	908
	Canyon (GBRA)	342	342	342	342	342	342	342
	Carrizo	280	280	280	280	280	280	280
Guadalupe Basin Subtotal		1,530	1,530	1,530	1,530	1,530	1,530	1,530
Total Irrigation Supply		1,667	1,667	1,667	1,667	1,667	1,667	1,667
Irrigation Surplus/Shortage								
San Antonio Basin		24	0	14	28	41	46	46
Guadalupe Basin		768	597	698	793	884	911	916
Total Irrigation Surplus/Shortage		792	597	712	821	925	957	962
Irrigation New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0
Mining Demand								
San Antonio Basin		14	16	16	17	17	18	18
Guadalupe Basin		256	290	305	313	321	328	335
Total Mining Demand		270	306	321	330	338	346	353
Mining Supply								
San Antonio Basin	Carrizo	18	18	18	18	18	18	18
Guadalupe Basin	Carrizo	335	335	335	335	335	335	335
Total Mining Supply		353	353	353	353	353	353	353

Table C-11 Projected Water Demands, Supplies, and Needs Guadalupe County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Mining Surplus/Shortage									
San Antonio Basin			4	2	2	1	1	0	0
Guadalupe Basin			79	45	30	22	14	7	0
Total Mining Surplus/Shortage			83	47	32	23	15	7	0
Mining New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Total Mining New Supply Need			0	0	0	0	0	0	0
Livestock Demand									
San Antonio Basin			264	264	264	264	264	264	264
Guadalupe Basin			793	793	793	793	793	793	793
Total Livestock Demand			1,057	1,057	1,057	1,057	1,057	1,057	1,057
Livestock Supply									
San Antonio Basin		Carrizo	132	132	132	132	132	132	132
		Local	132	132	132	132	132	132	132
	Subtotal		264	264	264	264	264	264	264
Guadalupe Basin		Carrizo	396	396	396	396	396	396	396
		Local	397	397	397	397	397	397	397
	Subtotal		793	793	793	793	793	793	793
Total Livestock Supply			1,057	1,057	1,057	1,057	1,057	1,057	1,057
Livestock Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	0	0
Livestock New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0
Total Guadalupe County Demand									
Municipal			13,850	17,113	21,167	25,595	29,907	34,980	40,533
Industrial			2,097	2,638	2,957	3,249	3,530	3,771	4,097
Steam-Electric			129	4,788	3,406	3,326	5,136	5,585	7,515
Irrigation			875	1,070	955	846	742	710	705
Mining			270	306	321	330	338	346	353
Livestock			1,057	1,057	1,057	1,057	1,057	1,057	1,057
Total County Demand			18,278	26,972	29,863	34,403	40,710	46,449	54,260
Total Guadalupe County Supply									
Municipal			29,089	30,674	35,353	35,353	35,353	35,353	35,353
Industrial			4,098	4,098	4,098	4,098	4,098	4,098	4,098
Steam-Electric			6,840	9,080	9,080	9,080	9,080	9,080	9,080
Irrigation			1,667	1,667	1,667	1,667	1,667	1,667	1,667
Mining			353	353	353	353	353	353	353
Livestock			1,057	1,057	1,057	1,057	1,057	1,057	1,057
Total County Supply			43,104	46,929	51,608	51,608	51,608	51,608	51,608
Total Guadalupe County Balance									
Municipal			15,239	13,561	14,186	9,758	5,446	373	-5,180
Industrial			2,001	1,460	1,141	849	568	327	1
Steam-Electric			6,711	4,292	5,674	5,754	3,944	3,495	1,565
Irrigation			792	597	712	821	925	957	962
Mining			83	47	32	23	15	7	0
Livestock			0	0	0	0	0	0	0
Total County Surplus/Shortage			24,826	19,957	21,745	17,205	10,898	5,159	-2,652

Table C-11 Projected Water Demands, Supplies, and Needs Guadalupe County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Total Basin Demand								
San Antonio								
Municipal		4,691	6,327	8,352	10,527	12,676	15,162	17,852
Industrial		3	4	4	5	5	5	6
Steam-Electric		0	0	0	0	0	0	0
Irrigation		113	137	123	109	96	91	91
Mining		14	16	16	17	17	18	18
Livestock		264	264	264	264	264	264	264
Total San Antonio Basin Demand		5,085	6,748	8,759	10,922	13,058	15,540	18,231
Guadalupe								
Municipal		9,159	10,786	12,815	15,068	17,231	19,818	22,681
Industrial		2,094	2,634	2,953	3,244	3,525	3,766	4,091
Steam-Electric		129	4,788	3,406	3,326	5,136	5,585	7,515
Irrigation		762	933	832	737	646	619	614
Mining		256	290	305	313	321	328	335
Livestock		793	793	793	793	793	793	793
Total Guadalupe Basin Demand		13,193	20,224	21,104	23,481	27,652	30,909	36,029
Total Basin Supply								
San Antonio								
Municipal		8,838	12,338	14,841	14,841	14,841	14,841	14,841
Industrial		6	6	6	6	6	6	6
Steam-Electric		0	0	0	0	0	0	0
Irrigation		137	137	137	137	137	137	137
Mining		18	18	18	18	18	18	18
Livestock		264	264	264	264	264	264	264
Total San Antonio Basin Supply		9,263	12,763	15,266	15,266	15,266	15,266	15,266
Guadalupe								
Municipal		20,251	18,336	20,512	20,512	20,512	20,512	20,512
Industrial		4,092	4,092	4,092	4,092	4,092	4,092	4,092
Steam-Electric		6,840	6,840	6,840	6,840	6,840	6,840	6,840
Irrigation		1,530	1,530	1,530	1,530	1,530	1,530	1,530
Mining		335	335	335	335	335	335	335
Livestock		793	793	793	793	793	793	793
Total Guadalupe Basin Supply		33,841	31,926	34,102	34,102	34,102	34,102	34,102
Total Basin Balance								
San Antonio								
Municipal		4,147	6,011	6,489	4,314	2,165	-321	-3,011
Industrial		3	2	2	1	1	1	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		24	0	14	28	41	46	46
Mining		4	2	2	1	1	0	0
Livestock		0	0	0	0	0	0	0
Total San Antonio Basin Surplus/Shortage		4,178	6,015	6,507	4,344	2,208	-274	-2,965
Guadalupe								
Municipal		11,092	7,550	7,697	5,444	3,281	694	-2,169
Industrial		1,998	1,458	1,139	848	567	326	1
Steam-Electric		6,711	2,052	3,434	3,514	1,704	1,255	-675
Irrigation		768	597	698	793	884	911	916
Mining		79	45	30	22	14	7	0
Livestock		0	0	0	0	0	0	0
Total Guadalupe Basin Surplus/Shortage		20,648	11,702	12,998	10,621	6,450	3,193	-1,927

Table C-11 Projected Water Demands, Supplies, and Needs Guadalupe County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
			(acft)	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**
Groundwater Supplies									
	Available								
	Guadalupe	Edwards	160	160	160	160	160	160	160
	San Antonio	Edwards	0	0	0	0	0	0	0
	Guadalupe	Carrizo	9,573	9,573	9,573	9,573	9,573	9,573	9,573
	San Antonio	Carrizo	3,010	3,010	3,010	3,010	3,010	3,010	3,010
	Total Available		12,743	12,743	12,743	12,743	12,743	12,743	12,743
	Allocated								
	Guadalupe	Edwards	160	160	160	160	160	160	160
	San Antonio	Edwards	0	0	0	0	0	0	0
	Guadalupe	Carrizo	8,417	8,417	8,417	8,417	8,417	8,417	8,417
	San Antonio	Carrizo	495	495	495	495	495	495	495
	Total Allocated		9,072	9,072	9,072	9,072	9,072	9,072	9,072
	Total Unallocated		3,671	3,671	3,671	3,671	3,671	3,671	3,671
* Projected demands, shortages, and needs may be greater than shown. These WUGs are requesting a population/demand revision.									

Table C-12 Projected Water Demands, Supplies, and Needs Hays County (Part) South Central Texas Region								
Basin	Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand								
Guadalupe Basin								
County Line WSC		252	947	1,999	2,319	2,393	2,612	2,982
Creedmore-Maha WSC		8	10	12	15	17	20	23
Crystal Clear WSC*		349	485	639	806	959	1,165	1,327
Goforth WSC		666	972	1,340	1,704	2,075	2,545	2,914
Kyle		702	2,740	3,940	4,217	4,377	4,874	5,203
Maxwell WSC		117	157	200	249	294	354	402
Mountain City		22	45	71	98	124	157	183
Niederwald		65	104	147	194	238	294	338
Plum Creek Water Company (Monarch Utilities)		392	566	762	963	1,168	1,427	1,630
San Marcos		5,914	8,038	11,198	14,371	17,824	21,559	24,439
Wimberley WSC		578	776	997	1,224	1,442	1,736	1,966
Woodcreek		188	246	315	385	452	540	610
Woodcreek Utilities		400	748	1,145	1,564	1,974	2,477	2,873
Rural		1,273	1,444	1,644	1,855	2,077	2,361	2,584
Subtotal		10,926	17,278	24,409	29,964	35,414	42,121	47,474
Total Municipal Demand		10,926	17,278	24,409	29,964	35,414	42,121	47,474
Municipal Existing Supply								
Guadalupe Basin								
County Line WSC	Edwards	30	30	30	30	30	30	30
	ROR (Guadalupe) - CRWA	140	140	140	140	140	140	140
	Canyon (CRWA)	780	780	780	780	780	780	780
County Line WSC Subtotal		950	950	950	950	950	950	950
Creedmore-Maha WSC	Edwards (Barton Springs)	7	7	7	7	7	7	7
Crystal Clear WSC	Edwards	111	111	111	111	111	111	111
	ROR (Guadalupe) - CRWA	27	27	27	27	27	27	27
	Canyon (CRWA)	85	85	85	85	85	85	85
	Canyon (CRWA-Dunlap) - Spring	57	57	57	57	57	57	57
	Canyon (New Braunfels)	204	204	204	204	204	204	204
	Canyon (GBRA)	182	182	182	182	182	182	182
Crystal Clear WSC Subtotal		666	666	666	666	666	666	666
Goforth WSC	Edwards (Barton Springs)	471	471	471	471	471	471	471
	Canyon (GBRA)		899	899	899	899	899	899
Goforth WSC Subtotal		471	1,370	1,370	1,370	1,370	1,370	1,370
Kyle	Edwards	243	243	243	243	243	243	243
	Edwards (Barton Springs)	304	304	304	304	304	304	304
	Canyon (GBRA)	589	2,957	2,957	2,957	2,957	2,957	2,957
Kyle Subtotal		1,136	3,504	3,504	3,504	3,504	3,504	3,504
Maxwell WSC	Edwards	41	41	41	41	41	41	41
	Canyon (CRWA)	167	167	167	167	167	167	167
	ROR (Guadalupe) - CRWA	69	69	69	69	69	69	69
Maxwell WSC Subtotal		277	277	277	277	277	277	277
Mountain City	Edwards (Barton Springs)	49	49	49	49	49	49	49
Niederwald	Edwards (Barton Springs)	54	54	54	54	54	54	54
Plum Creek Water Company (Monarch	Edwards (Barton Springs)	413	413	413	413	413	413	413
	Canyon (GBRA)	560	560	560	560	560	560	560
Plum Creek WC Subtotal		973	973	973	973	973	973	973
San Marcos	Edwards	3,052	3,052	3,052	3,052	3,052	3,052	3,052
	ROR (Guadalupe)	0	0	0	0	0	0	0
	Canyon (GBRA)	5,000	10,000	10,000	10,000	10,000	10,000	10,000
San Marcos Subtotal		8,052	13,052	13,052	13,052	13,052	13,052	13,052
Wimberley WSC	Trinity	557	557	557	557	557	557	557
Woodcreek	Trinity	223	223	223	223	223	223	223
Woodcreek Utilities	Trinity	223	223	223	223	223	223	223
	Edwards	70	70	70	70	70	70	70
Woodcreek Utilities Subtotal		293	293	293	293	293	293	293

Table C-12 Projected Water Demands, Supplies, and Needs Hays County (Part) South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Rural		Edwards	13	13	13	13	13	13	13
		Trinity	124	124	124	124	124	124	124
		Canyon (GBRA)	3,136	3,136	3,136	3,136	3,136	3,136	3,136
Rural Subtotal			3,273	3,273	3,273	3,273	3,273	3,273	3,273
	Subtotal		16,980	25,247	25,247	25,247	25,247	25,247	25,247
Total Municipal Existing Supply			16,980	25,247	25,247	25,247	25,247	25,247	25,247
Municipal Surplus/Shortage									
Guadalupe Basin									
County Line WSC			698	3	-1,049	-1,369	-1,443	-1,662	-2,032
Creedmore-Maha WSC			-1	-3	-5	-8	-10	-13	-16
Crystal Clear WSC*			317	181	27	-140	-293	-499	-661
Goforth WSC			-195	398	30	-334	-705	-1,175	-1,544
Kyle			434	764	-436	-713	-873	-1,370	-1,699
Maxwell WSC			160	120	77	28	-17	-77	-125
Mountain City			27	4	-22	-49	-75	-108	-134
Niederwald			-11	-50	-93	-140	-184	-240	-284
Plum Creek Water Company (Monarch Utilities)			581	407	211	10	-195	-454	-657
San Marcos			2,138	5,014	1,854	-1,319	-4,772	-8,507	-11,387
Wimberley WSC			-21	-219	-440	-667	-885	-1,179	-1,409
Woodcreek			35	-23	-92	-162	-229	-317	-387
Woodcreek Utilities			-107	-455	-852	-1,271	-1,681	-2,184	-2,580
Rural			2,000	1,829	1,629	1,418	1,196	912	689
	Subtotal		5,236	7,391	1,836	-2,865	-7,715	-13,524	-17,973
Total Municipal Surplus/Shortage			5,236	7,391	1,836	-2,865	-7,715	-13,524	-17,973
Municipal New Supply Need									
Guadalupe Basin									
County Line WSC			0	0	1,049	1,369	1,443	1,662	2,032
Creedmore-Maha WSC			1	3	5	8	10	13	16
Crystal Clear WSC*			0	0	0	140	293	499	661
Goforth WSC			195	0	0	334	705	1,175	1,544
Kyle			0	0	436	713	873	1,370	1,699
Maxwell WSC			0	0	0	0	17	77	125
Mountain City			0	0	22	49	75	108	134
Niederwald			11	50	93	140	184	240	284
Plum Creek Water Company (Monarch Utilities)			0	0	0	0	195	454	657
San Marcos			0	0	0	1,319	4,772	8,507	11,387
Wimberley WSC			21	219	440	667	885	1,179	1,409
Woodcreek			0	23	92	162	229	317	387
Woodcreek Utilities			107	455	852	1,271	1,681	2,184	2,580
Rural			0	0	0	0	0	0	0
	Subtotal		335	750	2,989	6,173	11,363	17,786	22,916
Total Municipal New Supply Need			335	750	2,989	6,173	11,363	17,786	22,916
Industrial Demand									
Guadalupe Basin			157	212	249	285	322	355	386
Total Industrial Demand			157	212	249	285	322	355	386
Industrial Existing Supply									
Guadalupe Basin		Edwards	1,565	1,565	1,565	1,565	1,565	1,565	1,565
		Run-of-River	0	0	0	0	0	0	0
Total Industrial Existing Supply			1,565	1,565	1,565	1,565	1,565	1,565	1,565
Industrial Surplus/Shortage									
Guadalupe Basin			1,408	1,353	1,316	1,280	1,243	1,210	1,179
Total Industrial Surplus/Shortage			1,408	1,353	1,316	1,280	1,243	1,210	1,179

Table C-12 Projected Water Demands, Supplies, and Needs Hays County (Part) South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Industrial New Supply Need								
Guadalupe Basin		0	0	0	0	0	0	0
Total Industrial New Supply Need		0	0	0	0	0	0	0
Steam-Electric Demand								
Guadalupe Basin		0	1,009	718	949	1,949	2,663	3,627
Total Steam-Electric Demand		0	1,009	718	949	1,949	2,663	3,627
Steam-Electric Existing Supply								
Guadalupe Basin	Canyon (GBRA)	2,464	2,464	2,464	2,464	2,464	2,464	2,464
	San Marcos Reclaimed	0	3,696	3,696	3,696	3,696	3,696	3,696
Total Steam-Electric Existing Supply		2,464	6,160	6,160	6,160	6,160	6,160	6,160
Steam-Electric Surplus/Shortage								
Guadalupe Basin		2,464	5,151	5,442	5,211	4,211	3,497	2,533
Total Steam-Electric Surplus/Shortage		2,464	5,151	5,442	5,211	4,211	3,497	2,533
Steam-Electric New Supply Need								
Guadalupe Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
Guadalupe Basin		162	353	350	347	344	341	338
Total Irrigation Demand		162	353	350	347	344	341	338
Irrigation Supply								
Guadalupe Basin	Edwards	544	544	544	544	544	544	544
	Run-of-River	125	125	125	125	125	125	125
Total Irrigation Supply		669	669	669	669	669	669	669
Irrigation Surplus/Shortage								
Guadalupe Basin		507	316	319	322	325	328	331
Total Irrigation Surplus/Shortage		507	316	319	322	325	328	331
Irrigation New Supply Need								
Guadalupe Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0
Mining Demand								
Guadalupe Basin		129	142	151	157	161	162	163
Total Mining Demand		129	142	151	157	161	162	163
Mining Supply								
Guadalupe Basin	Trinity	60	60	60	60	60	60	60
Total Mining Supply		60	60	60	60	60	60	60
Mining Surplus/Shortage								
Guadalupe Basin		-69	-82	-91	-97	-101	-102	-103
Total Mining Surplus/Shortage		-69	-82	-91	-97	-101	-102	-103
Mining New Supply Need								
Guadalupe Basin		69	82	91	97	101	102	103
Total Mining New Supply Need		69	82	91	97	101	102	103
Livestock Demand								
Guadalupe Basin		280	280	280	280	280	280	280
Total Livestock Demand		280	280	280	280	280	280	280

Table C-12									
Projected Water Demands, Supplies, and Needs									
Hays County (Part)									
South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
			(acft)	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**
Livestock Supply									
Guadalupe Basin		Edwards (D&L)[1]	114	114	114	114	114	114	114
		Trinity	26	26	26	26	26	26	26
		Local	140	140	140	140	140	140	140
Total Livestock Supply			280	280	280	280	280	280	280
Livestock Surplus/Shortage									
Guadalupe Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	0	0
Livestock New Supply Need									
Guadalupe Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0
Total Hays County Demand									
Municipal			10,926	17,278	24,409	29,964	35,414	42,121	47,474
Industrial			157	212	249	285	322	355	386
Steam-Electric			0	1,009	718	949	1,949	2,663	3,627
Irrigation			162	353	350	347	344	341	338
Mining			129	142	151	157	161	162	163
Livestock			280	280	280	280	280	280	280
Total County Demand			11,654	19,274	26,157	31,982	38,470	45,922	52,268
Total Hays County Supply									
Municipal			16,980	25,247	25,247	25,247	25,247	25,247	25,247
Industrial			1,565	1,565	1,565	1,565	1,565	1,565	1,565
Steam-Electric			2,464	6,160	6,160	6,160	6,160	6,160	6,160
Irrigation			669	669	669	669	669	669	669
Mining			60	60	60	60	60	60	60
Livestock			280	280	280	280	280	280	280
Total County Supply			22,018	33,981	33,981	33,981	33,981	33,981	33,981
Total Hays County Balance									
Municipal			6,054	7,969	838	-4,717	-10,167	-16,874	-22,227
Industrial			1,408	1,353	1,316	1,280	1,243	1,210	1,179
Steam-Electric			2,464	5,151	5,442	5,211	4,211	3,497	2,533
Irrigation			507	316	319	322	325	328	331
Mining			-69	-82	-91	-97	-101	-102	-103
Livestock			0	0	0	0	0	0	0
Total County Surplus/Shortage			10,364	14,707	7,824	1,999	-4,489	-11,941	-18,287
Total Basin Demand									
Guadalupe									
Municipal			10,926	17,278	24,409	29,964	35,414	42,121	47,474
Industrial			157	212	249	285	322	355	386
Steam-Electric			0	1,009	718	949	1,949	2,663	3,627
Irrigation			162	353	350	347	344	341	338
Mining			129	142	151	157	161	162	163
Livestock			280	280	280	280	280	280	280
Total Guadalupe Basin Demand			11,654	19,274	26,157	31,982	38,470	45,922	52,268
Total Basin Supply									
Guadalupe									
Municipal			16,980	25,247	25,247	25,247	25,247	25,247	25,247
Industrial			1,565	1,565	1,565	1,565	1,565	1,565	1,565
Steam-Electric			2,464	6,160	6,160	6,160	6,160	6,160	6,160
Irrigation			669	669	669	669	669	669	669
Mining			60	60	60	60	60	60	60
Livestock			280	280	280	280	280	280	280
Total Guadalupe Basin Supply			22,018	33,981	33,981	33,981	33,981	33,981	33,981

Table C-12
Projected Water Demands, Supplies, and Needs
Hays County (Part)
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Basin Balance									
Guadalupe									
Municipal			6,054	7,969	838	-4,717	-10,167	-16,874	-22,227
Industrial			1,408	1,353	1,316	1,280	1,243	1,210	1,179
Steam-Electric			2,464	5,151	5,442	5,211	4,211	3,497	2,533
Irrigation			507	316	319	322	325	328	331
Mining			-69	-82	-91	-97	-101	-102	-103
Livestock			0	0	0	0	0	0	0
Total Guadalupe Basin Surplus/Shortage			10,364	14,707	7,824	1,999	-4,489	-11,941	-18,287
Groundwater Supplies									
	Available								
	Guadalupe	Edwards	6,179	6,179	6,179	6,179	6,179	6,179	6,179
	Guadalupe	Edwards (D&L)	114	114	114	114	114	114	114
	Guadalupe	Trinity	1,213	1,213	1,213	1,213	1,213	1,213	1,213
	Total Available		7,506	7,506	7,506	7,506	7,506	7,506	7,506
	Allocated								
	Guadalupe	Edwards	6,179	6,179	6,179	6,179	6,179	6,179	6,179
	Guadalupe	Edwards (D&L)	114	114	114	114	114	114	114
	Guadalupe	Trinity	1,213	1,213	1,213	1,213	1,213	1,213	1,213
	Total Allocated		7,506	7,506	7,506	7,506	7,506	7,506	7,506
	Total Unallocated		0	0	0	0	0	0	0

Notes:
[1] There is limited supply from the Edwards Aquifer for D&L; however, these values are not part of the 320,000 acft/yr allocated to other uses.
* Projected demands, shortages, and needs may be greater than shown. These WUGs are requesting a population/demand revision.

Table C-13 Projected Water Demands, Supplies, and Needs Karnes County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand									
Nueces Basin									
El Oso WSC			12	13	13	14	15	15	16
Rural			19	24	29	35	39	42	44
	Subtotal		31	37	42	49	54	57	60
San Antonio Basin									
El Oso WSC			458	482	514	547	573	590	601
Falls City			107	113	122	131	138	142	145
Karnes City			418	432	453	474	492	503	512
Kenedy			758	763	826	874	912	961	993
Runge			195	195	209	219	227	238	247
Sunko WSC			46	49	53	57	61	63	64
Rural (TDCJ)			478	500	500	500	500	500	500
Rural			208	324	433	569	672	714	732
	Subtotal		2,668	2,858	3,110	3,371	3,575	3,711	3,794
Guadalupe Basin									
El Oso WSC			5	5	5	6	6	6	6
Rural			13	16	20	24	27	30	31
	Subtotal		18	21	25	30	33	36	37
San Antonio-Nueces Coastal Basin									
El Oso WSC			2	3	3	3	3	3	3
Rural			7	8	10	12	14	15	15
	Subtotal		9	11	13	15	17	18	18
Total Municipal Demand			2,726	2,927	3,190	3,465	3,679	3,822	3,909
Municipal Existing Supply									
Nueces Basin									
El Oso WSC		Carrizo	17	17	17	17	17	17	17
Rural		Carrizo	44	44	44	44	44	44	44
	Subtotal		61	61	61	61	61	61	61
San Antonio Basin									
El Oso WSC		Carrizo	153	153	153	153	153	153	153
		Gulf Coast	510	510	510	510	510	510	510
El Oso WSC Subtotal			663	663	663	663	663	663	663
Falls City		Carrizo	171	171	171	171	171	171	171
Karnes City		Carrizo	250	250	250	250	250	250	250
Kenedy		Gulf Coast	875	875	875	875	875	875	875
Runge		Gulf Coast	299	299	299	299	299	299	299
Sunko WSC		Carrizo	118	118	118	118	118	118	118
Rural (TDCJ)		Gulf Coast	500	500	500	500	500	500	500
Rural		Carrizo	5	5	5	5	5	5	5
		Gulf Coast	880	880	880	880	880	880	880
Rural Subtotal			885	885	885	885	885	885	885
	Subtotal		3,761	3,761	3,761	3,761	3,761	3,761	3,761
Guadalupe Basin									
El Oso WSC		Carrizo	7	7	7	7	7	7	7
Rural		Carrizo	23	23	23	23	23	23	23
		Gulf Coast	8	8	8	8	8	8	8
Rural Subtotal			31	31	31	31	31	31	31
	Subtotal		38	38	38	38	38	38	38
San Antonio-Nueces Coastal Basin									
El Oso WSC		Carrizo	4	4	4	4	4	4	4
Rural		Gulf Coast	20	20	20	20	20	20	20
	Subtotal		24	24	24	24	24	24	24
Total Municipal Existing Supply			3,884	3,884	3,884	3,884	3,884	3,884	3,884

Table C-13 Projected Water Demands, Supplies, and Needs Karnes County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Surplus/Shortage									
Nueces Basin									
El Oso WSC			5	4	4	3	2	2	1
Rural			25	20	15	9	5	2	0
	Subtotal		30	24	19	12	7	4	1
San Antonio Basin									
El Oso WSC			205	181	149	116	90	73	62
Falls City			64	58	49	40	33	29	26
Karnes City			-168	-182	-203	-224	-242	-253	-262
Kenedy			117	112	49	1	-37	-86	-118
Runge			104	104	90	80	72	61	52
Sunko WSC			72	69	65	61	57	55	54
Rural (TDCJ)			22	0	0	0	0	0	0
Rural			677	561	452	316	213	171	153
	Subtotal		1,093	903	651	390	186	50	-33
Guadalupe Basin									
El Oso WSC			2	2	2	1	1	1	1
Rural			18	15	11	7	4	1	0
	Subtotal		20	17	13	8	5	2	1
San Antonio-Nueces Coastal Basin									
El Oso WSC			2	1	1	1	1	1	1
Rural			13	12	10	8	6	5	5
	Subtotal		15	13	11	9	7	6	6
Total Municipal Surplus/Shortage			1,158	957	694	419	205	62	-25
Municipal New Supply Need									
Nueces Basin									
El Oso WSC			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
San Antonio Basin									
El Oso WSC			0	0	0	0	0	0	0
Falls City			0	0	0	0	0	0	0
Karnes City			168	182	203	224	242	253	262
Kenedy			0	0	0	0	37	86	118
Runge			0	0	0	0	0	0	0
Sunko WSC			0	0	0	0	0	0	0
Rural (TDCJ)			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		168	182	203	224	279	339	380
Guadalupe Basin									
El Oso WSC			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
San Antonio-Nueces Coastal Basin									
El Oso WSC			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need			168	182	203	224	279	339	380

Table C-13 Projected Water Demands, Supplies, and Needs Karnes County South Central Texas Region								
Basin	Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Industrial Demand								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		107	118	122	125	128	130	137
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Industrial Demand		107	118	122	125	128	130	137
Industrial Existing Supply								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin	Gulf Coast	139	139	139	139	139	139	139
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Industrial Existing Supply		139	139	139	139	139	139	139
Industrial Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		32	21	17	14	11	9	2
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Industrial Surplus/Shortage		32	21	17	14	11	9	2
Industrial New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Industrial New Supply Need		0	0	0	0	0	0	0
Steam-Electric Demand								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Demand		0	0	0	0	0	0	0
Steam-Electric Existing Supply								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		0	0	0	0	0	0	0
Steam-Electric New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0

Table C-13 Projected Water Demands, Supplies, and Needs Karnes County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Irrigation Demand								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		1,916	1,382	1,250	1,131	1,023	925	836
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Irrigation Demand		1,916	1,382	1,250	1,131	1,023	925	836
Irrigation Supply								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin	Run-of-River	725	725	725	725	725	725	725
	Gulf Coast	657	657	657	657	657	657	657
San Antonio Basin Subtotal		1,382	1,382	1,382	1,382	1,382	1,382	1,382
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Irrigation Supply		1,382	1,382	1,382	1,382	1,382	1,382	1,382
Irrigation Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		-534	0	132	251	359	457	546
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Irrigation Surplus/Shortage		-534	0	132	251	359	457	546
Irrigation New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		534	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		534	0	0	0	0	0	0
Mining Demand								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		105	94	91	90	89	89	88
Guadalupe Basin		8	7	7	7	7	7	7
San Antonio-Nueces Basin		6	5	5	5	5	5	5
Total Mining Demand		119	106	103	102	101	101	100
Mining Supply								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin	Carrizo	5	5	5	5	5	5	5
	Gulf Coast	95	95	95	95	95	95	95
San Antonio Basin Subtotal		100	100	100	100	100	100	100
Guadalupe Basin	Carrizo	7	7	7	7	7	7	7
San Antonio-Nueces Basin	Gulf Coast	6	6	6	6	6	6	6
Total Mining Supply		113	113	113	113	113	113	113
Mining Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		-5	6	9	10	11	11	12
Guadalupe Basin		-1	0	0	0	0	0	0
San Antonio-Nueces Basin		0	1	1	1	1	1	1
Total Mining Surplus/Shortage		-6	7	10	11	12	12	13

Table C-13 Projected Water Demands, Supplies, and Needs Karnes County South Central Texas Region									
			Total in	Projections					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Mining New Supply Need									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			5	0	0	0	0	0	0
Guadalupe Basin			1	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Mining New Supply Need			6	0	0	0	0	0	0
Livestock Demand									
Nueces Basin			107	107	107	107	107	107	107
San Antonio Basin			936	936	936	936	936	936	936
Guadalupe Basin			83	83	83	83	83	83	83
San Antonio-Nueces Basin			59	59	59	59	59	59	59
Total Livestock Demand			1,185	1,185	1,185	1,185	1,185	1,185	1,185
Livestock Supply									
Nueces Basin		Carrizo	9	9	9	9	9	9	9
		Gulf Coast	45	45	45	45	45	45	45
		Local	53	53	53	53	53	53	53
	Subtotal		107	107	107	107	107	107	107
San Antonio Basin		Gulf Coast	468	468	468	468	468	468	468
		Local	468	468	468	468	468	468	468
	Subtotal		936	936	936	936	936	936	936
Guadalupe Basin		Carrizo	5	5	5	5	5	5	5
		Gulf Coast	37	37	37	37	37	37	37
		Local	41	41	41	41	41	41	41
	Subtotal		83	83	83	83	83	83	83
San Antonio-Nueces Basin		Gulf Coast	30	30	30	30	30	30	30
		Local	29	29	29	29	29	29	29
	Subtotal		59	59	59	59	59	59	59
Total Livestock Supply			1,185	1,185	1,185	1,185	1,185	1,185	1,185
Livestock Surplus/Shortage									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	0	0
Livestock New Supply Need									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0
Total Karnes County Demand									
Municipal			2,726	2,927	3,190	3,465	3,679	3,822	3,909
Industrial			107	118	122	125	128	130	137
Steam-Electric			0	0	0	0	0	0	0
Irrigation			1,916	1,382	1,250	1,131	1,023	925	836
Mining			119	106	103	102	101	101	100
Livestock			1,185	1,185	1,185	1,185	1,185	1,185	1,185
Total County Demand			6,053	5,718	5,850	6,008	6,116	6,163	6,167

Table C-13								
Projected Water Demands, Supplies, and Needs								
Karnes County								
South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Total Karnes County Supply								
Municipal		3,884	3,884	3,884	3,884	3,884	3,884	3,884
Industrial		139	139	139	139	139	139	139
Steam-Electric		0	0	0	0	0	0	0
Irrigation		1,382	1,382	1,382	1,382	1,382	1,382	1,382
Mining		113	113	113	113	113	113	113
Livestock		1,185	1,185	1,185	1,185	1,185	1,185	1,185
Total County Supply		6,703	6,703	6,703	6,703	6,703	6,703	6,703
Total Karnes County Balance								
Municipal		1,158	957	694	419	205	62	-25
Industrial		32	21	17	14	11	9	2
Steam-Electric		0	0	0	0	0	0	0
Irrigation		-534	0	132	251	359	457	546
Mining		-6	7	10	11	12	12	13
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		650	985	853	695	587	540	536
Total Basin Demand								
Nueces								
Municipal		31	37	42	49	54	57	60
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		0	0	0	0	0	0	0
Livestock		107	107	107	107	107	107	107
Total Nueces Basin Demand		138	144	149	156	161	164	167
San Antonio								
Municipal		2,668	2,858	3,110	3,371	3,575	3,711	3,794
Industrial		107	118	122	125	128	130	137
Steam-Electric		0	0	0	0	0	0	0
Irrigation		1,916	1,382	1,250	1,131	1,023	925	836
Mining		105	94	91	90	89	89	88
Livestock		936	936	936	936	936	936	936
Total San Antonio Basin Demand		5,732	5,388	5,509	5,653	5,751	5,791	5,791
Guadalupe								
Municipal		18	21	25	30	33	36	37
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		8	7	7	7	7	7	7
Livestock		83	83	83	83	83	83	83
Total Guadalupe Basin Demand		109	111	115	120	123	126	127
San Antonio-Nueces								
Municipal		9	11	13	15	17	18	18
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		6	5	5	5	5	5	5
Livestock		59	59	59	59	59	59	59
Total San Antonio-Nueces Basin Demand		74	75	77	79	81	82	82

Table C-13 Projected Water Demands, Supplies, and Needs Karnes County South Central Texas Region								
Basin	Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Basin Supply								
Nueces								
Municipal		61	61	61	61	61	61	61
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		0	0	0	0	0	0	0
Livestock		107	107	107	107	107	107	107
Unallocated Groundwater Supply		1,620	1,620	1,620	1,620	1,620	1,620	1,620
Total Nueces Basin Supply		1,788	1,788	1,788	1,788	1,788	1,788	1,788
San Antonio								
Municipal		3,761	3,761	3,761	3,761	3,761	3,761	3,761
Industrial		139	139	139	139	139	139	139
Steam-Electric		0	0	0	0	0	0	0
Irrigation		1,382	1,382	1,382	1,382	1,382	1,382	1,382
Mining		5	5	5	5	5	5	5
Livestock		936	936	936	936	936	936	936
Unallocated Groundwater Supply		7,453	7,453	7,453	7,453	7,453	7,453	7,453
Total San Antonio Basin Supply		13,676	13,676	13,676	13,676	13,676	13,676	13,676
Guadalupe								
Municipal		38	38	38	38	38	38	38
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		7	7	7	7	7	7	7
Livestock		83	83	83	83	83	83	83
Unallocated Groundwater Supply		325	325	325	325	325	325	325
Total Guadalupe Basin Supply		453	453	453	453	453	453	453
San Antonio-Nueces								
Municipal		24	24	24	24	24	24	24
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		6	6	6	6	6	6	6
Livestock		59	59	59	59	59	59	59
Unallocated Groundwater Supply		733	733	733	733	733	733	733
Total San Antonio-Nueces Basin Supply		822	822	822	822	822	822	822
Total Basin Balance								
Nueces								
Municipal		30	24	19	12	7	4	1
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		0	0	0	0	0	0	0
Livestock		0	0	0	0	0	0	0
Unallocated Groundwater Supply		1,620	1,620	1,620	1,620	1,620	1,620	1,620
Total Nueces Basin Surplus/Shortage		1,650	1,644	1,639	1,632	1,627	1,624	1,621

Table C-13 Projected Water Demands, Supplies, and Needs Karnes County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
San Antonio									
Municipal			1,093	903	651	390	186	50	-33
Industrial			32	21	17	14	11	9	2
Steam-Electric			0	0	0	0	0	0	0
Irrigation			-534	0	132	251	359	457	546
Mining			-100	-89	-86	-85	-84	-84	-83
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			7,453	7,453	7,453	7,453	7,453	7,453	7,453
Total San Antonio Basin Surplus/Shortage			7,944	8,288	8,167	8,023	7,925	7,885	7,885
Guadalupe									
Municipal			20	17	13	8	5	2	1
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			-1	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			325	325	325	325	325	325	325
Total Guadalupe Basin Surplus/Shortage			344	342	338	333	330	327	326
San Antonio-Nueces									
Municipal			15	13	11	9	7	6	6
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			0	1	1	1	1	1	1
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			733	733	733	733	733	733	733
Total San Antonio-Nueces Basin Surplus/Shortage			748	747	745	743	741	740	740
Groundwater Supplies									
	Available								
	Guadalupe	Carrizo	35	35	35	35	35	35	35
	Nueces	Carrizo	53	53	53	53	53	53	53
	San Antonio	Carrizo	611	611	611	611	611	611	611
	San Antonio-Nueces	Gulf Coast	789	789	789	789	789	789	789
	Guadalupe	Gulf Coast	370	370	370	370	370	370	370
	Nueces	Gulf Coast	1,665	1,665	1,665	1,665	1,665	1,665	1,665
	San Antonio	Gulf Coast	12,376	12,376	12,376	12,376	12,376	12,376	12,376
	Total Available		15,899	15,899	15,899	15,899	15,899	15,899	15,899
	Allocated								
	Guadalupe	Carrizo	35	35	35	35	35	35	35
	Nueces	Carrizo	53	53	53	53	53	53	53
	San Antonio	Carrizo	611	611	611	611	611	611	611
	San Antonio-Nueces	Gulf Coast	56	56	56	56	56	56	56
	Guadalupe	Gulf Coast	45	45	45	45	45	45	45
	Nueces	Gulf Coast	45	45	45	45	45	45	45
	San Antonio	Gulf Coast	4,923	4,923	4,923	4,923	4,923	4,923	4,923
	Total Allocated		5,768	5,768	5,768	5,768	5,768	5,768	5,768
	Total Unallocated		10,131	10,131	10,131	10,131	10,131	10,131	10,131

Table C-14
Projected Water Demands, Supplies, and Needs
Kendall County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand									
San Antonio Basin									
Boerne			1,170	1,570	2,188	2,843	3,370	3,831	4,282
Fair Oaks Ranch			152	286	296	300	305	310	316
Water Service Inc (Apex Water Ser)			37	43	52	61	69	75	81
Rural			748	1,080	1,506	1,939	2,304	2,620	2,930
	Subtotal		2,107	2,979	4,042	5,143	6,048	6,836	7,609
Guadalupe Basin									
Rural			1,131	1,635	2,279	2,936	3,487	3,966	4,434
	Subtotal		1,131	1,635	2,279	2,936	3,487	3,966	4,434
Lower Colorado Basin									
Rural			24	35	49	63	75	86	96
	Subtotal		24	35	49	63	75	86	96
Total Municipal Demand			3,262	4,649	6,370	8,142	9,610	10,888	12,139
Municipal Existing Supply									
San Antonio Basin									
Boerne		Boerne Lake	0	0	0	0	0	0	0
		Canyon (GBRA -	0	3,611	3,611	3,611	3,611	3,611	3,611
		Trinity	394	394	394	394	394	395	395
Boerne Subtotal			394	4,005	4,005	4,005	4,005	4,006	4,006
Fair Oaks Ranch		Trinity (Comal)	34	34	34	34	34	28	28
		Canyon (GBRA -	0	389	389	389	389	389	389
Fair Oaks Ranch Subtotal			34	423	423	423	423	417	417
Water Service Inc (Apex Water Ser)		Edwards	2	2	2	2	2	2	2
Rural		Trinity	373	373	373	373	373	375	375
		Canyon (GBRA -	0	2,072	2,072	2,072	2,072	2,072	2,072
Rural Subtotal			373	2,445	2,445	2,445	2,445	2,447	2,447
	Subtotal		803	6,875	6,875	6,875	6,875	6,872	6,872
Guadalupe Basin									
Rural		Edwards-Trinity	31	31	31	31	31	31	31
		Trinity	1,383	1,383	1,383	1,383	1,383	1,383	1,383
Rural Subtotal			1,414	1,414	1,414	1,414	1,414	1,414	1,414
	Subtotal		1,414	1,414	1,414	1,414	1,414	1,414	1,414
Lower Colorado Basin									
Rural		Edwards-Trinity	46	46	46	46	46	46	46
		Trinity	39	39	39	39	39	39	39
	Subtotal		85	85	85	85	85	85	85
Total Municipal Existing Supply			2,302	8,374	8,374	8,374	8,374	8,371	8,371
Municipal Surplus/Shortage									
San Antonio Basin									
Boerne			-776	2,435	1,817	1,162	635	175	-276
Fair Oaks Ranch			-118	137	127	123	118	107	101
Water Service Inc (Apex Water Ser)			-35	-41	-50	-59	-67	-73	-79
Rural			-375	1,365	939	506	141	-173	-483
	Subtotal		-1,304	3,896	2,833	1,732	827	36	-738
Guadalupe Basin									
Rural			283	-221	-865	-1,522	-2,073	-2,552	-3,020
	Subtotal		283	-221	-865	-1,522	-2,073	-2,552	-3,020

Table C-14 Projected Water Demands, Supplies, and Needs Kendall County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Lower Colorado Basin									
Rural			61	50	36	22	10	-1	-11
	Subtotal		61	50	36	22	10	-1	-11
Total Municipal Surplus/Shortage			-960	3,725	2,004	232	-1,237	-2,518	-3,769
Municipal New Supply Need									
San Antonio Basin									
Boerne			776	0	0	0	0	0	276
Fair Oaks Ranch			118	0	0	0	0	0	0
Water Service Inc (Apex Water Ser)			35	41	50	59	67	73	79
Rural			375	0	0	0	0	173	483
	Subtotal		1,304	41	50	59	67	246	838
Guadalupe Basin									
Rural			0	221	865	1,522	2,073	2,552	3,020
	Subtotal		0	221	865	1,522	2,073	2,552	3,020
Lower Colorado Basin									
Rural			0	0	0	0	0	1	11
	Subtotal		0	0	0	0	0	1	11
Total Municipal New Supply Need			1,304	262	915	1,581	2,140	2,799	3,869
Industrial Demand									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Industrial Demand			0	0	0	0	0	0	0
Industrial Existing Supply									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Industrial Existing Supply			0	0	0	0	0	0	0
Industrial Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Industrial Surplus/Shortage			0	0	0	0	0	0	0
Industrial New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Industrial New Supply Need			0	0	0	0	0	0	0
Steam-Electric Demand									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Steam-Electric Demand			0	0	0	0	0	0	0

Table C-14 Projected Water Demands, Supplies, and Needs Kendall County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Steam-Electric Existing Supply								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Lower Colorado Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Lower Colorado Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		0	0	0	0	0	0	0
Steam-Electric New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Lower Colorado Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
San Antonio Basin		107	194	189	185	181	177	174
Guadalupe Basin		289	520	510	500	490	481	472
Lower Colorado Basin		0	0	0	0	0	0	0
Total Irrigation Demand		396	714	699	685	671	658	646
Irrigation Supply								
San Antonio Basin	Trinity	54	54	54	54	54	42	42
	Trinity (Guadalup	140	140	140	140	140	140	140
San Antonio Basin Total		194	194	194	194	194	182	182
Guadalupe Basin	Run-of-River	18	18	18	18	18	18	18
	Trinity	530	530	530	530	530	530	530
Guadalupe Basin Subtotal		548	548	548	548	548	548	548
Lower Colorado Basin		0	0	0	0	0	0	1
Total Irrigation Supply		602	602	602	602	602	590	591
Irrigation Surplus/Shortage								
San Antonio Basin		87	0	5	9	13	5	8
Guadalupe Basin		259	28	38	48	58	67	76
Lower Colorado Basin		0	0	0	0	0	0	0
Total Irrigation Surplus/Shortage		346	28	43	57	71	72	84
Irrigation New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Lower Colorado Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0
Mining Demand								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Lower Colorado Basin		6	6	6	6	6	6	6
Total Mining Demand		6	6	6	6	6	6	6

Table C-14 Projected Water Demands, Supplies, and Needs Kendall County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Mining Supply									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin		Trinity	6	6	6	6	6	6	6
Lower Colorado Basin Subtotal			6	6	6	6	6	6	6
Total Mining Supply			6	6	6	6	6	6	6
Mining Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Mining Surplus/Shortage			0	0	0	0	0	0	0
Mining New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Mining New Supply Need			0	0	0	0	0	0	0
Livestock Demand									
San Antonio Basin			80	80	80	80	80	80	80
Guadalupe Basin			353	353	353	353	353	353	353
Lower Colorado Basin			13	13	13	13	13	13	13
Total Livestock Demand			446	446	446	446	446	446	446
Livestock Supply									
San Antonio Basin		Trinity	40	40	40	40	40	49	49
		Local	40	40	40	40	40	40	40
	Subtotal		80	80	80	80	80	89	89
Guadalupe Basin		Trinity	176	176	176	176	176	176	176
		Local	177	177	177	177	177	177	177
	Subtotal		353	353	353	353	353	353	353
Lower Colorado Basin		Trinity	6	6	6	6	6	6	6
		Local	7	7	7	7	7	7	7
	Subtotal		13	13	13	13	13	13	13
Total Livestock Supply			446	446	446	446	446	455	455
Livestock Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	9	9
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	9	9
Livestock New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lower Colorado Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0

Table C-14 Projected Water Demands, Supplies, and Needs Kendall County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Kendall County Demand								
Municipal		3,262	4,649	6,370	8,142	9,610	10,888	12,139
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		396	714	699	685	671	658	646
Mining		6	6	6	6	6	6	6
Livestock		446	446	446	446	446	446	446
Total County Demand		4,110	5,815	7,521	9,279	10,733	11,998	13,237
Total Kendall County Supply								
Municipal		2,302	8,374	8,374	8,374	8,374	8,371	8,371
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		602	602	602	602	602	590	591
Mining		6	6	6	6	6	6	6
Livestock		446	446	446	446	446	455	455
Total County Supply		3,356	9,428	9,428	9,428	9,428	9,422	9,423
Total Kendall County Balance								
Municipal		-960	3,725	2,004	232	-1,237	-2,518	-3,769
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		206	-112	-97	-83	-69	-68	-55
Mining		0	0	0	0	0	0	0
Livestock		0	0	0	0	0	9	9
Total County Surplus/Shortage		-754	3,613	1,907	149	-1,306	-2,577	-3,815
Total Basin Demand								
San Antonio								
Municipal		2,107	2,979	4,042	5,143	6,048	6,836	7,609
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		107	194	189	185	181	177	174
Mining		0	0	0	0	0	0	0
Livestock		80	80	80	80	80	80	80
Total San Antonio Basin Demand		2,294	3,253	4,311	5,408	6,309	7,093	7,863
Guadalupe								
Municipal		1,131	1,635	2,279	2,936	3,487	3,966	4,434
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		289	520	510	500	490	481	472
Mining		0	0	0	0	0	0	0
Livestock		353	353	353	353	353	353	353
Total Guadalupe Basin Demand		1,773	2,508	3,142	3,789	4,330	4,800	5,259
Lower Colorado								
Municipal		24	35	49	63	75	86	96
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		6	6	6	6	6	6	6
Livestock		13	13	13	13	13	13	13
Total Lower Colorado Basin Demand		43	54	68	82	94	105	115

Table C-14 Projected Water Demands, Supplies, and Needs Kendall County South Central Texas Region								
Basin	**Source**	**Total in 2000 (acft)**	**Projections 2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Total Basin Supply								
San Antonio								
Municipal		803	6,875	6,875	6,875	6,875	6,872	6,872
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		194	194	194	194	194	182	182
Mining		0	0	0	0	0	0	0
Livestock		80	80	80	80	80	89	89
Total San Antonio Basin Supply		1,077	7,149	7,149	7,149	7,149	7,143	7,143
Guadalupe								
Municipal		1,414	1,414	1,414	1,414	1,414	1,414	1,414
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		548	548	548	548	548	548	548
Mining		0	0	0	0	0	0	0
Livestock		353	353	353	353	353	353	353
Unallocated Groundwater Supply		866	866	866	866	866	866	866
Total Guadalupe Basin Supply		3,181	3,181	3,181	3,181	3,181	3,181	3,181
Lower Colorado								
Municipal		85	85	85	85	85	85	85
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	1
Mining		6	6	6	6	6	6	6
Livestock		13	13	13	13	13	13	13
Unallocated Groundwater Supply		0	0	0	0	0	0	0
Total Lower Colorado Basin Supply		104	104	104	104	104	104	105
Total Basin Balance								
San Antonio								
Municipal		-1,304	3,896	2,833	1,732	827	36	-738
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		87	0	5	9	13	5	8
Mining		0	0	0	0	0	0	0
Livestock		0	0	0	0	0	9	9
Total San Antonio Basin Surplus/Shortage		-1,217	3,896	2,838	1,741	840	50	-721
Guadalupe								
Municipal		283	-221	-865	-1,522	-2,073	-2,552	-3,020
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		259	28	38	48	58	67	76
Mining		0	0	0	0	0	0	0
Livestock		0	0	0	0	0	0	0
Unallocated Groundwater Supply		866	866	866	866	866	866	866
Total Guadalupe Basin Surplus/Shortage		1,408	673	39	-608	-1,149	-1,619	-2,078

Table C-14 Projected Water Demands, Supplies, and Needs Kendall County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Lower Colorado									
Municipal			61	50	36	22	10	-1	-11
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	1
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			0	0	0	0	0	0	0
Total Lower Colorado Basin Surplus/Shortage			61	50	36	22	10	-1	-10
Groundwater Supplies									
	Available								
	Colorado	Edwards-Trinity	46	46	46	46	46	46	46
	Guadalupe	Edwards-Trinity	103	103	103	103	103	103	103
	San Antonio	Edwards-Trinity	169	169	169	169	169	169	169
	Colorado	Trinity	51	51	51	51	51	51	51
	Guadalupe	Trinity	3,023	3,023	3,023	3,023	3,023	3,023	3,023
	San Antonio	Trinity	861	861	861	861	861	861	861
	Total Available		4,253	4,253	4,253	4,253	4,253	4,253	4,253
	Allocated								
	Colorado	Edwards-Trinity	46	46	46	46	46	46	46
	Guadalupe	Edwards-Trinity	31	31	31	31	31	31	31
	San Antonio	Edwards-Trinity	0	0	0	0	0	0	0
	Colorado	Trinity	51	51	51	51	51	51	51
	Guadalupe	Trinity	2,229	2,229	2,229	2,229	2,229	2,229	2,229
	San Antonio	Trinity	861	861	861	861	861	861	861
	Total Allocated		3,218	3,218	3,218	3,218	3,218	3,218	3,218
	Total Unallocated		1,035	1,035	1,035	1,035	1,035	1,035	1,035

Table C-15 Projected Water Demands, Supplies, and Needs LaSalle County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand									
Nueces Basin									
Cotulla			1,271	1,407	1,516	1,566	1,615	1,677	1,743
Encinal*			110	110	109	108	106	107	107
Rural			244	282	321	384	441	478	500
	Subtotal		1,625	1,799	1,946	2,058	2,162	2,262	2,350
Total Municipal Demand			1,625	1,799	1,946	2,058	2,162	2,262	2,350
Municipal Existing Supply									
Nueces Basin									
Cotulla		Carrizo	2,209	2,209	2,209	2,209	2,209	2,209	2,209
Encinal		Carrizo	268	268	268	268	268	268	268
Rural		Carrizo	500	500	500	500	500	500	500
	Subtotal		2,977	2,977	2,977	2,977	2,977	2,977	2,977
Total Municipal Existing Supply			2,977	2,977	2,977	2,977	2,977	2,977	2,977
Municipal Surplus/Shortage									
Nueces Basin									
Cotulla			938	802	693	643	594	532	466
Encinal*			158	158	159	160	162	161	161
Rural			256	218	179	116	59	22	0
	Subtotal		1,352	1,178	1,031	919	815	715	627
Total Municipal Surplus/Shortage			1,352	1,178	1,031	919	815	715	627
Municipal New Supply Need									
Nueces Basin									
Cotulla			0	0	0	0	0	0	0
Encinal*			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need			0	0	0	0	0	0	0
Industrial Demand									
Nueces Basin			0	0	0	0	0	0	0
Total Industrial Demand			0	0	0	0	0	0	0
Industrial Existing Supply									
Nueces Basin			0	0	0	0	0	0	0
Total Industrial Existing Supply			0	0	0	0	0	0	0
Industrial Surplus/Shortage									
Nueces Basin			0	0	0	0	0	0	0
Total Industrial Surplus/Shortage			0	0	0	0	0	0	0
Industrial New Supply Need									
Nueces Basin			0	0	0	0	0	0	0
Total Industrial New Supply Need			0	0	0	0	0	0	0
Steam-Electric Demand									
Nueces Basin			0	0	0	0	0	0	0
Total Steam-Electric Demand			0	0	0	0	0	0	0

Table C-15								
Projected Water Demands, Supplies, and Needs								
LaSalle County								
South Central Texas Region								
		Total in	**Projections**					
Basin	**Source**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
		(acft)	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**
Steam-Electric Existing Supply								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		0	0	0	0	0	0	0
Steam-Electric New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
Nueces Basin		4,003	4,791	4,643	4,500	4,361	4,227	4,097
Total Irrigation Demand		4,003	4,791	4,643	4,500	4,361	4,227	4,097
Irrigation Supply								
Nueces Basin	Run-of-River	705	705	705	705	705	705	705
	Carrizo	4,427	4,427	4,427	4,427	4,427	4,427	4,427
	Sparta	859	859	859	859	859	859	859
Total Irrigation Supply		5,991	5,991	5,991	5,991	5,991	5,991	5,991
Irrigation Surplus/Shortage								
Nueces Basin		1,988	1,200	1,348	1,491	1,630	1,764	1,894
Total Irrigation Surplus/Shortage		1,988	1,200	1,348	1,491	1,630	1,764	1,894
Irrigation New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0
Mining Demand								
Nueces Basin		0	0	0	0	0	0	0
Total Mining Demand		0	0	0	0	0	0	0
Mining Supply								
Nueces Basin		0	0	0	0	0	0	0
Total Mining Supply		0	0	0	0	0	0	0
Mining Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
Total Mining Surplus/Shortage		0	0	0	0	0	0	0
Mining New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Mining New Supply Need		0	0	0	0	0	0	0
Livestock Demand								
Nueces Basin		1,687	1,687	1,687	1,687	1,687	1,687	1,687
Total Livestock Demand		1,687	1,687	1,687	1,687	1,687	1,687	1,687
Livestock Supply								
Nueces Basin	Carrizo	609	609	609	609	609	609	609
	Sparta	234	234	234	234	234	234	234
	Local	844	844	844	844	844	844	844
Total Livestock Supply		1,687	1,687	1,687	1,687	1,687	1,687	1,687
Livestock Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
Total Livestock Surplus/Shortage		0	0	0	0	0	0	0
Livestock New Supply Need								

Table C-15 Projected Water Demands, Supplies, and Needs LaSalle County South Central Texas Region								
			Total in	**Projections**				
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Nueces Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Table C-15 Projected Water Demands, Supplies, and Needs LaSalle County South Central Texas Region									
Total La Salle County Demand									
Municipal			1,625	1,799	1,946	2,058	2,162	2,262	2,350
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			4,003	4,791	4,643	4,500	4,361	4,227	4,097
Mining			0	0	0	0	0	0	0
Livestock			1,687	1,687	1,687	1,687	1,687	1,687	1,687
Total County Demand			7,315	8,277	8,276	8,245	8,210	8,176	8,134
Total La Salle County Supply									
Municipal			2,977	2,977	2,977	2,977	2,977	2,977	2,977
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			5,991	5,991	5,991	5,991	5,991	5,991	5,991
Mining			0	0	0	0	0	0	0
Livestock			1,687	1,687	1,687	1,687	1,687	1,687	1,687
Total County Supply			10,655	10,655	10,655	10,655	10,655	10,655	10,655
Total La Salle County Balance									
Municipal			1,352	1,178	1,031	919	815	715	627
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			1,988	1,200	1,348	1,491	1,630	1,764	1,894
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Total County Surplus/Shortage			3,340	2,378	2,379	2,410	2,445	2,479	2,521
Total Basin Demand									
Nueces									
Municipal			1,625	1,799	1,946	2,058	2,162	2,262	2,350
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			4,003	4,791	4,643	4,500	4,361	4,227	4,097
Mining			0	0	0	0	0	0	0
Livestock			1,687	1,687	1,687	1,687	1,687	1,687	1,687
Total Nueces Basin Demand			7,315	8,277	8,276	8,245	8,210	8,176	8,134
Total Basin Supply									
Nueces									
Municipal			2,977	2,977	2,977	2,977	2,977	2,977	2,977
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			5,991	5,991	5,991	5,991	5,991	5,991	5,991
Mining			0	0	0	0	0	0	0
Livestock			1,687	1,687	1,687	1,687	1,687	1,687	1,687
Unallocated Groundwater Supply			19,664	19,664	19,664	19,664	19,664	19,664	19,664
Total Nueces Basin Supply			30,319	30,319	30,319	30,319	30,319	30,319	30,319
Total Basin Balance									
Nueces									
Municipal			1,352	1,178	1,031	919	815	715	627
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			1,988	1,200	1,348	1,491	1,630	1,764	1,894
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			19,664	19,664	19,664	19,664	19,664	19,664	19,664
Total Nueces Basin Surplus/Shortage			23,004	22,042	22,043	22,074	22,109	22,143	22,185

Table C-15 Projected Water Demands, Supplies, and Needs LaSalle County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Groundwater Supplies									
	Available								
	Nueces	Carrizo	27,341	27,341	27,341	27,341	27,341	27,341	27,341
	Nueces	Sparta	1,100	1,100	1,100	1,100	1,100	1,100	1,100
	Nueces	Queen City	330	330	330	330	330	330	330
	Total Available		28,770	28,770	28,770	28,770	28,770	28,770	28,770
	Allocated								
	Nueces	Carrizo	8,013	8,013	8,013	8,013	8,013	8,013	8,013
	Nueces	Sparta	1,093	1,093	1,093	1,093	1,093	1,093	1,093
	Nueces	Queen City	0	0	0	0	0	0	0
	Total Allocated		9,106	9,106	9,106	9,106	9,106	9,106	9,106
	Total Unallocated		19,664	19,664	19,664	19,664	19,664	19,664	19,664

* Projected demands, shortages, and needs may be greater than shown. These WUGs are requesting a population/demand revision.

Table C-16
Projected Water Demands, Supplies, and Needs
Medina County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand									
Nueces Basin									
Benton City WSC			336	414	504	589	661	737	805
Devine			830	837	850	856	862	878	896
East Medina SUD			735	833	944	1,048	1,132	1,221	1,310
Hondo			1,601	1,784	2,001	2,205	2,375	2,548	2,717
Lytle*			63	62	60	59	58	58	58
Natalia			291	330	374	415	450	485	519
Rural			1,194	1,489	1,816	2,108	2,367	2,635	2,876
	Subtotal		5,050	5,749	6,549	7,280	7,905	8,562	9,181
San Antonio Basin									
Bexar Met Water District*			15	24	33	41	47	54	60
Castroville			621	680	743	802	854	908	961
East Medina SUD			42	48	54	60	65	70	75
La Coste			190	205	222	239	251	265	281
Yancey WSC			668	832	1,013	1,180	1,328	1,469	1,603
Rural			30	38	46	54	60	67	73
	Subtotal		1,566	1,827	2,111	2,376	2,605	2,833	3,053
Total Municipal Demand			6,616	7,576	8,660	9,656	10,510	11,395	12,234
Municipal Existing Supply									
Nueces Basin									
Benton City WSC		Carrizo	587	587	587	587	587	587	587
Devine		Edwards	512	512	512	512	512	512	512
		Carrizo	471	471	471	471	471	471	471
Devine Subtotal			983	983	983	983	983	983	983
East Medina SUD		Edwards	846	846	846	846	846	846	846
Hondo		Edwards	1,465	1,465	1,465	1,465	1,465	1,465	1,465
Lytle		Edwards	46	46	46	46	46	46	46
Natalia		Edwards	136	136	136	136	136	136	136
Rural		Edwards	441	441	441	441	441	441	441
		Carrizo	1,139	1,139	1,139	1,139	1,139	1,139	1,139
Rural Subtotal			1,580	1,580	1,580	1,580	1,580	1,580	1,580
	Subtotal		5,643	5,643	5,643	5,643	5,643	5,643	5,643
San Antonio Basin									
Bexar Met Water District		Edwards (BMWD)	9	9	9	9	9	9	9
Castroville		Edwards	386	386	386	386	386	386	386
East Medina SUD		Edwards	48	48	48	48	48	48	48
La Coste		Edwards	113	113	113	113	113	113	113
Yancey WSC		Edwards	618	618	618	618	618	618	618
Rural		Edwards	175	175	175	175	175	175	175
		Trinity	1	1	1	1	1	1	1
Rural Subtotal			176	176	176	176	176	176	176
	Subtotal		1,350	1,350	1,350	1,350	1,350	1,350	1,350
Total Municipal Existing Supply			6,993	6,993	6,993	6,993	6,993	6,993	6,993

Table C-16
Projected Water Demands, Supplies, and Needs
Medina County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Surplus/Shortage									
Nueces Basin									
Benton City WSC			251	173	83	-2	-74	-150	-218
Devine			153	146	133	127	121	105	87
East Medina SUD			111	13	-98	-202	-286	-375	-464
Hondo			-136	-319	-536	-740	-910	-1,083	-1,252
Lytle*			-17	-16	-14	-13	-12	-12	-12
Natalia			-155	-194	-238	-279	-314	-349	-383
Rural			386	91	-236	-528	-787	-1,055	-1,296
	Subtotal		593	-106	-906	-1,637	-2,262	-2,919	-3,538
San Antonio Basin									
Bexar Met Water District*			-6	-15	-24	-32	-38	-45	-51
Castroville			-235	-294	-357	-416	-468	-522	-575
East Medina SUD			6	0	-6	-12	-17	-22	-27
La Coste			-77	-92	-109	-126	-138	-152	-168
Yancey WSC			-50	-214	-395	-562	-710	-851	-985
Rural			146	138	130	122	116	109	103
	Subtotal		-216	-477	-761	-1,026	-1,255	-1,483	-1,703
Total Municipal Surplus/Shortage			377	-583	-1,667	-2,663	-3,517	-4,402	-5,241
Municipal New Supply Need									
Nueces Basin									
Benton City WSC			0	0	0	2	74	150	218
Devine			0	0	0	0	0	0	0
East Medina SUD			0	0	98	202	286	375	464
Hondo			136	319	536	740	910	1,083	1,252
Lytle*			17	16	14	13	12	12	12
Natalia			155	194	238	279	314	349	383
Rural			0	0	236	528	787	1,055	1,296
	Subtotal		308	529	1,122	1,764	2,383	3,024	3,625
San Antonio Basin									
Bexar Met Water District*			6	15	24	32	38	45	51
Castroville			235	294	357	416	468	522	575
East Medina SUD			0	0	6	12	17	22	27
La Coste			77	92	109	126	138	152	168
Yancey WSC			50	214	395	562	710	851	985
Rural			0	0	0	0	0	0	0
	Subtotal		368	615	891	1,148	1,371	1,592	1,806
Total Municipal New Supply Need			676	1,144	2,013	2,912	3,754	4,616	5,431
Industrial Demand									
Nueces Basin			56	67	75	82	89	95	103
San Antonio Basin			0	0	0	0	0	0	0
Total Industrial Demand			56	67	75	82	89	95	103
Industrial Existing Supply									
Nueces Basin		Edwards	963	963	963	963	963	963	963
San Antonio Basin		Edwards	350	350	350	350	350	350	350
Total Industrial Existing Supply			1,313	1,313	1,313	1,313	1,313	1,313	1,313
Industrial Surplus/Shortage									
Nueces Basin			907	896	888	881	874	868	860
San Antonio Basin			350	350	350	350	350	350	350
Total Industrial Surplus/Shortage			1,257	1,246	1,238	1,231	1,224	1,218	1,210

Table C-16 Projected Water Demands, Supplies, and Needs Medina County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Industrial New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Total Industrial New Supply Need		0	0	0	0	0	0	0
Steam-Electric Demand								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Total Steam-Electric Demand		0	0	0	0	0	0	0
Steam-Electric Existing Supply								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		0	0	0	0	0	0	0
Steam-Electric New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand[1]								
Nueces Basin		47,000	45,357	43,465	41,654	39,919	38,257	36,665
San Antonio Basin		9,422	9,093	8,714	8,351	8,003	7,670	7,350
Total Irrigation Demand		56,422	54,450	52,179	50,005	47,922	45,927	44,015
Irrigation Supply								
Nueces Basin	Edwards	32,477	32,477	32,477	32,477	32,477	32,477	32,477
	Carrizo	5,110	5,110	5,110	5,110	5,110	5,110	5,110
Nueces Basin Subtotal		37,587	37,587	37,587	37,587	37,587	37,587	37,587
San Antonio Basin	Edwards	11,831	11,831	11,831	11,831	11,831	11,831	11,831
	Run-of-River	0	0	0	0	0	0	0
	Carrizo	38	38	38	38	38	38	38
San Antonio Basin Subtotal		11,869	11,869	11,869	11,869	11,869	11,869	11,869
Total Irrigation Supply		49,456	49,456	49,456	49,456	49,456	49,456	49,456
Irrigation Surplus/Shortage								
Nueces Basin		-9,413	-7,770	-5,878	-4,067	-2,332	-670	922
San Antonio Basin		2,447	2,776	3,155	3,518	3,866	4,199	4,519
Total Irrigation Surplus/Shortage		-6,966	-4,994	-2,723	-549	1,534	3,529	5,441
Irrigation New Supply Need								
Nueces Basin		9,413	7,770	5,878	4,067	2,332	670	0
San Antonio Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		9,413	7,770	5,878	4,067	2,332	670	0
Mining Demand								
Nueces Basin		62	68	71	72	73	74	75
San Antonio Basin		56	62	64	65	66	67	68
Total Mining Demand		118	130	135	137	139	141	143

Table C-16 Projected Water Demands, Supplies, and Needs Medina County South Central Texas Region								
			Total in	Projections				
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Mining Supply									
Nueces Basin		Carrizo	46	46	46	46	46	46	46
		Trinity	29	29	29	29	29	29	29
Subtotal			75	75	75	75	75	75	75
San Antonio Basin		Carrizo	1	1	1	1	1	1	1
		Trinity	67	67	67	67	67	67	67
Subtotal			68	68	68	68	68	68	68
Total Mining Supply			143	143	143	143	143	143	143
Mining Surplus/Shortage									
Nueces Basin			13	7	4	3	2	1	0
San Antonio Basin			12	6	4	3	2	1	0
Total Mining Surplus/Shortage			25	13	8	6	4	2	0
Mining New Supply Need									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			0	0	0	0	0	0	0
Total Mining New Supply Need			0	0	0	0	0	0	0
Livestock Demand									
Nueces Basin			1,116	1,116	1,116	1,116	1,116	1,116	1,116
San Antonio Basin			182	182	182	182	182	182	182
Total Livestock Demand			1,298	1,298	1,298	1,298	1,298	1,298	1,298
Livestock Supply									
Nueces Basin		Carrizo	205	205	205	205	205	205	205
		Trinity	89	89	89	89	89	89	89
		Edwards (D&L)[2]	264	264	264	264	264	264	264
		Local	558	558	558	558	558	558	558
	Subtotal		1,116	1,116	1,116	1,116	1,116	1,116	1,116
San Antonio Basin		Trinity	23	23	23	23	23	23	23
		Edwards (D&L)[2]	68	68	68	68	68	68	68
		Local	91	91	91	91	91	91	91
	Subtotal		182	182	182	182	182	182	182
Total Livestock Supply			1,298	1,298	1,298	1,298	1,298	1,298	1,298
Livestock Surplus/Shortage									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	0	0
Livestock New Supply Need									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0
Total Medina County Demand									
Municipal			6,616	7,576	8,660	9,656	10,510	11,395	12,234
Industrial			56	67	75	82	89	95	103
Steam-Electric			0	0	0	0	0	0	0
Irrigation			56,422	54,450	52,179	50,005	47,922	45,927	44,015
Mining			118	130	135	137	139	141	143
Livestock			1,298	1,298	1,298	1,298	1,298	1,298	1,298
Total County Demand			64,510	63,521	62,347	61,178	59,958	58,856	57,793

Table C-16
Projected Water Demands, Supplies, and Needs
Medina County
South Central Texas Region

Basin	Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Medina County Supply								
Municipal		6,993	6,993	6,993	6,993	6,993	6,993	6,993
Industrial		1,313	1,313	1,313	1,313	1,313	1,313	1,313
Steam-Electric		0	0	0	0	0	0	0
Irrigation		49,456	49,456	49,456	49,456	49,456	49,456	49,456
Mining		143	143	143	143	143	143	143
Livestock		1,298	1,298	1,298	1,298	1,298	1,298	1,298
Total County Supply		59,203	59,203	59,203	59,203	59,203	59,203	59,203
Total Medina County Balance								
Municipal		377	-583	-1,667	-2,663	-3,517	-4,402	-5,241
Industrial		1,257	1,246	1,238	1,231	1,224	1,218	1,210
Steam-Electric		0	0	0	0	0	0	0
Irrigation		-6,966	-4,994	-2,723	-549	1,534	3,529	5,441
Mining		25	13	8	6	4	2	0
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		-5,307	-4,318	-3,144	-1,975	-755	347	1,410
Total Basin Demand								
Nueces								
Municipal		5,050	5,749	6,549	7,280	7,905	8,562	9,181
Industrial		56	67	75	82	89	95	103
Steam-Electric		0	0	0	0	0	0	0
Irrigation		47,000	45,357	43,465	41,654	39,919	38,257	36,665
Mining		62	68	71	72	73	74	75
Livestock		1,116	1,116	1,116	1,116	1,116	1,116	1,116
Total Nueces Basin Demand		53,284	52,357	51,276	50,204	49,102	48,104	47,140
San Antonio								
Municipal		1,566	1,827	2,111	2,376	2,605	2,833	3,053
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		9,422	9,093	8,714	8,351	8,003	7,670	7,350
Mining		56	62	64	65	66	67	68
Livestock		182	182	182	182	182	182	182
Total San Antonio Basin Demand		11,226	11,164	11,071	10,974	10,856	10,752	10,653
Total Basin Supply								
Nueces								
Municipal		5,643	5,643	5,643	5,643	5,643	5,643	5,643
Industrial		963	963	963	963	963	963	963
Steam-Electric		0	0	0	0	0	0	0
Irrigation		37,587	37,587	37,587	37,587	37,587	37,587	37,587
Mining		75	75	75	75	75	75	75
Livestock		1,116	1,116	1,116	1,116	1,116	1,116	1,116
Total Nueces Basin Supply		45,384	45,384	45,384	45,384	45,384	45,384	45,384
San Antonio								
Municipal		1,350	1,350	1,350	1,350	1,350	1,350	1,350
Industrial		350	350	350	350	350	350	350
Steam-Electric		0	0	0	0	0	0	0
Irrigation		11,869	11,869	11,869	11,869	11,869	11,869	11,869
Mining		68	68	68	68	68	68	68
Livestock		182	182	182	182	182	182	182
Total San Antonio Basin Supply		13,819	13,819	13,819	13,819	13,819	13,819	13,819

Table C-16
Projected Water Demands, Supplies, and Needs
Medina County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Basin Balance									
Nueces									
Municipal			593	-106	-906	-1,637	-2,262	-2,919	-3,538
Industrial			907	896	888	881	874	868	860
Steam-Electric			0	0	0	0	0	0	0
Irrigation			-9,413	-7,770	-5,878	-4,067	-2,332	-670	922
Mining			13	7	4	3	2	1	0
Livestock			0	0	0	0	0	0	0
Total Nueces Basin Surplus/Shortage			-7,900	-6,973	-5,892	-4,820	-3,718	-2,720	-1,756
San Antonio									
Municipal			-216	-477	-761	-1,026	-1,255	-1,483	-1,703
Industrial			350	350	350	350	350	350	350
Steam-Electric			0	0	0	0	0	0	0
Irrigation			2,447	2,776	3,155	3,518	3,866	4,199	4,519
Mining			12	6	4	3	2	1	0
Livestock			0	0	0	0	0	0	0
Total San Antonio Basin Surplus/Shortage			2,593	2,655	2,748	2,845	2,963	3,067	3,166
Groundwater Supplies									
	Available								
	Nueces	Edwards	37,226	37,226	37,226	37,226	37,226	37,226	37,226
	San Antonio	Edwards	13,473	13,473	13,473	13,473	13,473	13,473	13,473
	Nueces	Edwards (D&L)	264	264	264	264	264	264	264
	San Antonio	Edwards (D&L)	68	68	68	68	68	68	68
	Nueces	Carrizo	13,661	13,661	13,661	13,661	13,661	13,661	13,661
	San Antonio	Carrizo	39	39	39	39	39	39	39
	Nueces	Trinity	7,389	7,389	7,389	7,389	7,389	7,389	7,389
	San Antonio	Trinity	1,511	1,511	1,511	1,511	1,511	1,511	1,511
	Total Available		73,631	73,631	73,631	73,631	73,631	73,631	73,631
	Allocated								
	Nueces	Edwards	37,226	37,226	37,226	37,226	37,226	37,226	37,226
	San Antonio	Edwards	13,473	13,473	13,473	13,473	13,473	13,473	13,473
	Nueces	Edwards (D&L)	264	264	264	264	264	264	264
	San Antonio	Edwards (D&L)	68	68	68	68	68	68	68
	Nueces	Carrizo	8,656	8,656	8,656	8,656	8,656	8,656	8,656
	San Antonio	Carrizo	39	39	39	39	39	39	39
	Nueces	Trinity	118	118	118	118	118	118	118
	San Antonio	Trinity	91	91	91	91	91	91	91
	Total Allocated		59,935	59,935	59,935	59,935	59,935	59,935	59,935
	Total Unallocated		13,696	13,696	13,696	13,696	13,696	13,696	13,696

Notes:
[1] The projected irrigation demand for Medina County does not include conveyance losses of surface water from the BMA canal system between the diversion points and the irrigated farms. Pursuant to TWDB guidelines for regional water planning, supplies from the Medina Lake System are not included because they are not reliable during severe drought.
[2] There is limited supply from the Edwards Aquifer for D&L; however, these values are not part of the 320,000 acft/yr allocated to other uses.
* Projected demands, shortages, and needs may be greater than shown. These WUGs are requesting a population/demand revision.

Table C-17 Projected Water Demands, Supplies, and Needs Refugio County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Municipal Demand									
San Antonio Basin									
Rural			8	7	6	6	5	5	5
	Subtotal		8	7	6	6	5	5	5
San Antonio-Nueces Coastal Basin									
Refugio			557	645	709	723	763	787	777
Woodsboro			272	283	291	289	292	295	293
Rural			354	314	281	264	239	225	227
	Subtotal		1,183	1,242	1,281	1,276	1,294	1,307	1,297
Total Municipal Demand			1,191	1,249	1,287	1,282	1,299	1,312	1,302
Municipal Existing Supply									
San Antonio Basin									
Rural		Gulf Coast	10	10	10	10	10	10	10
	Subtotal		10	10	10	10	10	10	10
San Antonio-Nueces Coastal Basin									
Refugio		Gulf Coast	1,437	1,437	1,437	1,437	1,437	1,437	1,437
Woodsboro		Gulf Coast	674	674	674	674	674	674	674
Rural		Gulf Coast	443	443	443	443	443	443	443
	Subtotal		2,554	2,554	2,554	2,554	2,554	2,554	2,554
Total Municipal Existing Supply			2,564	2,564	2,564	2,564	2,564	2,564	2,564
Municipal Surplus/Shortage									
San Antonio Basin									
Rural			2	3	4	4	5	5	5
	Subtotal		2	3	4	4	5	5	5
San Antonio-Nueces Coastal Basin									
Refugio			880	792	728	714	674	650	660
Woodsboro			402	391	383	385	382	379	381
Rural			89	129	162	179	204	218	216
	Subtotal		1,371	1,312	1,273	1,278	1,260	1,247	1,257
Total Municipal Surplus/Shortage			1,373	1,315	1,277	1,282	1,265	1,252	1,262
Municipal New Supply Need									
San Antonio Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
San Antonio-Nueces Coastal Basin									
Refugio			0	0	0	0	0	0	0
Woodsboro			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need			0	0	0	0	0	0	0
Industrial Demand									
San Antonio Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Industrial Demand			0	0	0	0	0	0	0

Table C-17 Projected Water Demands, Supplies, and Needs Refugio County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Industrial Existing Supply								
San Antonio Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Industrial Existing Supply		0	0	0	0	0	0	0
Industrial Surplus/Shortage								
San Antonio Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Industrial Surplus/Shortage		0	0	0	0	0	0	0
Industrial New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Industrial New Supply Need		0	0	0	0	0	0	0
Steam-Electric Demand								
San Antonio Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Demand		0	0	0	0	0	0	0
Steam-Electric Existing Supply								
San Antonio Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage								
San Antonio Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		0	0	0	0	0	0	0
Steam-Electric New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
San Antonio Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		850	69	69	69	69	69	69
Total Irrigation Demand		850	69	69	69	69	69	69
Irrigation Supply								
San Antonio Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin	Gulf Coast	850	69	69	69	69	69	69
Total Irrigation Supply		850	69	69	69	69	69	69
Irrigation Surplus/Shortage								
San Antonio Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Irrigation Surplus/Shortage		0	0	0	0	0	0	0
Irrigation New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
San Antonio-Nueces Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0

Table C-17 Projected Water Demands, Supplies, and Needs Refugio County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Mining Demand									
San Antonio Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			6	7	8	8	8	8	8
Total Mining Demand			6	7	8	8	8	8	8
Mining Supply									
San Antonio Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin		Gulf Coast	8	8	8	8	8	8	8
Total Mining Supply			8	8	8	8	8	8	8
Mining Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			2	1	0	0	0	0	0
Total Mining Surplus/Shortage			2	1	0	0	0	0	0
Mining New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Mining New Supply Need			0	0	0	0	0	0	0
Livestock Demand									
San Antonio Basin			25	25	25	25	25	25	25
San Antonio-Nueces Basin			598	598	598	598	598	598	598
Total Livestock Demand			623	623	623	623	623	623	623
Livestock Supply									
San Antonio Basin		Gulf Coast	12	12	12	12	12	12	12
		Local	13	13	13	13	13	13	13
	Subtotal		25	25	25	25	25	25	25
San Antonio-Nueces Basin		Gulf Coast	299	299	299	299	299	299	299
		Local	299	299	299	299	299	299	299
	Subtotal		598	598	598	598	598	598	598
Total Livestock Supply			623	623	623	623	623	623	623
Livestock Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	0	0
Livestock New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
San Antonio-Nueces Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0
Total Refugio County Demand									
Municipal			1,191	1,249	1,287	1,282	1,299	1,312	1,302
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			850	69	69	69	69	69	69
Mining			6	7	8	8	8	8	8
Livestock			623	623	623	623	623	623	623
Total County Demand			2,670	1,948	1,987	1,982	1,999	2,012	2,002

Table C-17 Projected Water Demands, Supplies, and Needs Refugio County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Refugio County Supply								
Municipal		2,564	2,564	2,564	2,564	2,564	2,564	2,564
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		850	69	69	69	69	69	69
Mining		8	8	8	8	8	8	8
Livestock		623	623	623	623	623	623	623
Total County Supply		4,045	3,264	3,264	3,264	3,264	3,264	3,264
Total Refugio County Balance								
Municipal		1,373	1,315	1,277	1,282	1,265	1,252	1,262
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		2	1	0	0	0	0	0
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		1,375	1,316	1,277	1,282	1,265	1,252	1,262
Total Basin Demand								
San Antonio								
Municipal		8	7	6	6	5	5	5
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		0	0	0	0	0	0	0
Livestock		25	25	25	25	25	25	25
Total San Antonio Basin Demand		33	32	31	31	30	30	30
San Antonio-Nueces								
Municipal		1,183	1,242	1,281	1,276	1,294	1,307	1,297
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		850	69	69	69	69	69	69
Mining		6	7	8	8	8	8	8
Livestock		598	598	598	598	598	598	598
Total San Antonio-Nueces Basin Demand		2,637	1,916	1,956	1,951	1,969	1,982	1,972
Total Basin Supply								
San Antonio								
Municipal		10	10	10	10	10	10	10
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		0	0	0	0	0	0	0
Livestock		25	25	25	25	25	25	25
Unallocated Groundwater Supply		1,113	1,113	1,113	1,113	1,113	1,113	1,113
Total San Antonio Basin Supply		1,148	1,148	1,148	1,148	1,148	1,148	1,148

Table C-17
Projected Water Demands, Supplies, and Needs
Refugio County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
San Antonio-Nueces									
Municipal			2,554	2,554	2,554	2,554	2,554	2,554	2,554
Industrial			850	69	69	69	69	69	69
Steam-Electric			0	0	0	0	0	0	0
Irrigation			850	69	69	69	69	69	69
Mining			8	8	8	8	8	8	8
Livestock			598	598	598	598	598	598	598
Unallocated Groundwater Supply			19,654	20,435	20,435	20,435	20,435	20,435	20,435
Total San Antonio-Nueces Basin Supply			24,514	23,733	23,733	23,733	23,733	23,733	23,733
Total Basin Balance									
San Antonio									
Municipal			2	3	4	4	5	5	5
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			1,113	1,113	1,113	1,113	1,113	1,113	1,113
Total San Antonio Basin Surplus/Shortage			1,115	1,116	1,117	1,117	1,118	1,118	1,118
San Antonio-Nueces									
Municipal			1,371	1,312	1,273	1,278	1,260	1,247	1,257
Industrial			850	69	69	69	69	69	69
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			2	1	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			19,654	20,435	20,435	20,435	20,435	20,435	20,435
Total San Antonio Basin-Nueces Surplus/Shortage			21,877	21,817	21,777	21,782	21,764	21,751	21,761
Groundwater Supplies									
	Available								
	San Antonio	Gulf Coast	1,135	1,135	1,135	1,135	1,135	1,135	1,135
	San Antonio-Nueces	Gulf Coast	23,365	23,365	23,365	23,365	23,365	23,365	23,365
	Total Available		24,500	24,500	24,500	24,500	24,500	24,500	24,500
	Allocated								
	San Antonio	Gulf Coast	22	22	22	22	22	22	22
	San Antonio-Nueces	Gulf Coast	3,711	2,930	2,930	2,930	2,930	2,930	2,930
	Total Allocated		3,733	2,952	2,952	2,952	2,952	2,952	2,952
	Total Unallocated		20,767	21,548	21,548	21,548	21,548	21,548	21,548

Table C-18 Projected Water Demands, Supplies, and Needs Uvalde County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
			(acft)	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**
Municipal Demand									
Nueces Basin									
Sabinal*			412	407	403	398	393	389	389
Uvalde			6,070	6,087	6,124	6,144	6,148	6,150	6,178
Rural			1,286	1,572	1,867	2,110	2,305	2,425	2,532
	Subtotal		7,768	8,066	8,394	8,652	8,846	8,964	9,099
Total Municipal Demand			7,768	8,066	8,394	8,652	8,846	8,964	9,099
Municipal Existing Supply									
Nueces Basin									
Sabinal		Edwards	280	280	280	280	280	280	280
Uvalde		Edwards	2,915	2,915	2,915	2,915	2,915	2,915	2,915
Rural		Edwards	448	448	448	448	448	448	448
		Carrizo	2,401	2,401	2,401	2,401	2,401	2,401	2,401
Rural Subtotal			2,849	2,849	2,849	2,849	2,849	2,849	2,849
	Subtotal		6,044	6,044	6,044	6,044	6,044	6,044	6,044
Total Municipal Existing Supply			6,044	6,044	6,044	6,044	6,044	6,044	6,044
Municipal Surplus/Shortage									
Nueces Basin									
Sabinal*			-132	-127	-123	-118	-113	-109	-109
Uvalde			-3,155	-3,172	-3,209	-3,229	-3,233	-3,235	-3,263
Rural			1,563	1,277	982	739	544	424	317
	Subtotal		-1,724	-2,022	-2,350	-2,608	-2,802	-2,920	-3,055
Total Municipal Surplus/Shortage			-1,724	-2,022	-2,350	-2,608	-2,802	-2,920	-3,055
Municipal New Supply Need									
Nueces Basin									
Sabinal*			132	127	123	118	113	109	109
Uvalde			3,155	3,172	3,209	3,229	3,233	3,235	3,263
Rural			0	0	0	0	0	0	0
	Subtotal		3,287	3,299	3,332	3,347	3,346	3,344	3,372
Total Municipal New Supply Need			3,287	3,299	3,332	3,347	3,346	3,344	3,372
Industrial Demand									
Nueces Basin			378	432	455	473	490	505	538
Total Industrial Demand			378	432	455	473	490	505	538
Industrial Existing Supply									
Nueces Basin		Edwards	1,375	1,375	1,375	1,375	1,375	1,375	1,375
Total Industrial Existing Supply			1,375	1,375	1,375	1,375	1,375	1,375	1,375
Industrial Surplus/Shortage									
Nueces Basin			997	943	920	902	885	870	837
Total Industrial Surplus/Shortage			997	943	920	902	885	870	837
Industrial New Supply Need									
Nueces Basin			0	0	0	0	0	0	0
Total Industrial New Supply Need			0	0	0	0	0	0	0

Table C-18 Projected Water Demands, Supplies, and Needs Uvalde County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Steam-Electric Demand								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Demand		0	0	0	0	0	0	0
Steam-Electric Existing Supply								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		0	0	0	0	0	0	0
Steam-Electric New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
Nueces Basin		58,061	55,791	53,609	51,513	49,498	47,563	45,703
Total Irrigation Demand		58,061	55,791	53,609	51,513	49,498	47,563	45,703
Irrigation Supply								
Nueces Basin	Edwards	69,751	69,751	69,751	69,751	69,751	69,751	69,751
	Run-of-River	720	720	720	720	720	720	720
Total Irrigation Supply		70,471	70,471	70,471	70,471	70,471	70,471	70,471
Irrigation Surplus/Shortage								
Nueces Basin		12,410	14,680	16,862	18,958	20,973	22,908	24,768
Total Irrigation Surplus/Shortage		12,410	14,680	16,862	18,958	20,973	22,908	24,768
Irrigation New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0
Mining Demand								
Nueces Basin		250	313	345	364	383	401	418
Total Mining Demand		250	313	345	364	383	401	418
Mining Supply								
Nueces Basin	Carrizo	418	418	418	418	418	418	418
Total Mining Supply		418	418	418	418	418	418	418
Mining Surplus/Shortage								
Nueces Basin		168	105	73	54	35	17	0
Total Mining Surplus/Shortage		168	105	73	54	35	17	0
Mining New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Mining New Supply Need		0	0	0	0	0	0	0
Livestock Demand								
Nueces Basin		1,284	1,284	1,284	1,284	1,284	1,284	1,284
Total Livestock Demand		1,284	1,284	1,284	1,284	1,284	1,284	1,284

Table C-18 Projected Water Demands, Supplies, and Needs Uvalde County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Livestock Supply								
Nueces Basin	Carrizo	27	27	27	27	27	27	27
	Edwards-Trinity	430	430	430	430	430	430	430
	Trinity	12	12	12	12	12	12	12
	Edwards (D&L)[1]	173	173	173	173	173	173	173
	Local	642	642	642	642	642	642	642
Total Livestock Supply		1,284	1,284	1,284	1,284	1,284	1,284	1,284
Livestock Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
Total Livestock Surplus/Shortage		0	0	0	0	0	0	0
Livestock New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Livestock New Supply Need		0	0	0	0	0	0	0
Total Uvalde County Demand								
Municipal		7,768	8,066	8,394	8,652	8,846	8,964	9,099
Industrial		378	432	455	473	490	505	538
Steam-Electric		0	0	0	0	0	0	0
Irrigation		58,061	55,791	53,609	51,513	49,498	47,563	45,703
Mining		250	313	345	364	383	401	418
Livestock		1,284	1,284	1,284	1,284	1,284	1,284	1,284
Total County Demand		67,741	65,886	64,087	62,286	60,501	58,717	57,042
Total Uvalde County Supply								
Municipal		6,044	6,044	6,044	6,044	6,044	6,044	6,044
Industrial		1,375	1,375	1,375	1,375	1,375	1,375	1,375
Steam-Electric		0	0	0	0	0	0	0
Irrigation		70,471	70,471	70,471	70,471	70,471	70,471	70,471
Mining		418	418	418	418	418	418	418
Livestock		1,284	1,284	1,284	1,284	1,284	1,284	1,284
Total County Supply		79,592	79,592	79,592	79,592	79,592	79,592	79,592
Total Uvalde County Balance								
Municipal		-1,724	-2,022	-2,350	-2,608	-2,802	-2,920	-3,055
Industrial		997	943	920	902	885	870	837
Steam-Electric		0	0	0	0	0	0	0
Irrigation		12,410	14,680	16,862	18,958	20,973	22,908	24,768
Mining		168	105	73	54	35	17	0
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		11,851	13,706	15,505	17,306	19,091	20,875	22,550
Total Basin Demand								
Nueces								
Municipal		7,768	8,066	8,394	8,652	8,846	8,964	9,099
Industrial		378	432	455	473	490	505	538
Steam-Electric		0	0	0	0	0	0	0
Irrigation		58,061	55,791	53,609	51,513	49,498	47,563	45,703
Mining		250	313	345	364	383	401	418
Livestock		1,284	1,284	1,284	1,284	1,284	1,284	1,284
Total Nueces Basin Demand		67,741	65,886	64,087	62,286	60,501	58,717	57,042

Table C-18 Projected Water Demands, Supplies, and Needs Uvalde County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Total Basin Supply									
Nueces									
Municipal			6,044	6,044	6,044	6,044	6,044	6,044	6,044
Industrial			1,375	1,375	1,375	1,375	1,375	1,375	1,375
Steam-Electric			0	0	0	0	0	0	0
Irrigation			70,471	70,471	70,471	70,471	70,471	70,471	70,471
Mining			418	418	418	418	418	418	418
Livestock			1,284	1,284	1,284	1,284	1,284	1,284	1,284
Total Nueces Basin Supply			79,592	79,592	79,592	79,592	79,592	79,592	79,592
Total Basin Balance									
Nueces									
Municipal			-1,724	-2,022	-2,350	-2,608	-2,802	-2,920	-3,055
Industrial			997	943	920	902	885	870	837
Steam-Electric			0	0	0	0	0	0	0
Irrigation			12,410	14,680	16,862	18,958	20,973	22,908	24,768
Mining			168	105	73	54	35	17	0
Livestock			0	0	0	0	0	0	0
Total Nueces Basin Surplus/Shortage			11,851	13,706	15,505	17,306	19,091	20,875	22,550
Groundwater Supplies									
	Available								
	Nueces	Edwards	74,769	74,769	74,769	74,769	74,769	74,769	74,769
	Nueces	Carrizo	33,276	33,276	33,276	33,276	33,276	33,276	33,276
	Nueces	Edwards-Trinity	3,912	3,912	3,912	3,912	3,912	3,912	3,912
	Nueces	Trinity	712	712	712	712	712	712	712
	Total Available		112,669	112,669	112,669	112,669	112,669	112,669	112,669
	Allocated								
	Nueces	Edwards	74,769	74,769	74,769	74,769	74,769	74,769	74,769
	Nueces	Carrizo	2,846	2,846	2,846	2,846	2,846	2,846	2,846
	Nueces	Edwards-Trinity	430	430	430	430	430	430	430
	Nueces	Trinity	12	12	12	12	12	12	12
	Total Allocated		78,057	78,057	78,057	78,057	78,057	78,057	78,057
	Total Unallocated		34,612	34,612	34,612	34,612	34,612	34,612	34,612
Notes:									
[1] There is limited supply from the Edwards Aquifer for D&L; however, these values are not part of the 320,000 acft/yr allocated to other uses.									
* Projected demands, shortages, and needs may be greater than shown. These WUGs are requesting a population/demand revision.									

Table C-19 Projected Water Demands, Supplies, and Needs Victoria County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Municipal Demand									
San Antonio Basin									
Rural			5	5	6	7	7	7	7
	Subtotal		5	5	6	7	7	7	7
Guadalupe Basin									
Victoria			7,573	8,013	8,505	8,860	9,092	9,361	9,650
Rural			1,365	1,520	1,686	1,821	1,912	1,998	2,095
	Subtotal		8,938	9,533	10,191	10,681	11,004	11,359	11,745
Lavaca Basin									
Rural			5	5	6	6	7	7	7
	Subtotal		5	5	6	6	7	7	7
Lavaca-Guadalupe Coastal Basin									
Victoria			3,696	3,911	4,151	4,324	4,438	4,569	4,710
Rural			1,020	1,136	1,260	1,360	1,428	1,493	1,565
	Subtotal		4,716	5,047	5,411	5,684	5,866	6,062	6,275
Total Municipal Demand			13,664	14,590	15,614	16,378	16,884	17,435	18,034
Municipal Existing Supply									
San Antonio Basin									
Rural		Gulf Coast	7	7	7	7	7	7	7
	Subtotal		7	7	7	7	7	7	7
Guadalupe Basin									
Victoria		Gulf Coast	9,848	9,462	9,313	9,218	9,120	9,019	8,944
		Run-of-River (GBRA)	1,240	1,240	1,240	1,240	1,240	1,240	1,240
		Run-of-River	0	0	0	0	0	0	0
Victoria Subtotal			11,088	10,702	10,553	10,458	10,360	10,259	10,184
Rural		Gulf Coast	2,021	1,920	1,882	1,857	1,831	1,805	1,785
	Subtotal		13,109	12,622	12,435	12,315	12,191	12,064	11,969
Lavaca Basin									
Rural		Gulf Coast	7	7	7	7	7	7	7
	Subtotal		7	7	7	7	7	7	7
Lavaca-Guadalupe Coastal Basin									
Victoria		Gulf Coast	4,727	4,727	4,727	4,727	4,727	4,727	4,727
		Run-of-River (GBRA)	0	0	0	0	0	0	0
		Run-of-River	0	0	0	0	0	0	0
Victoria Subtotal			4,727	4,727	4,727	4,727	4,727	4,727	4,727
Rural		Gulf Coast	1,565	1,565	1,565	1,565	1,565	1,565	1,565
	Subtotal		6,292	6,292	6,292	6,292	6,292	6,292	6,292
Total Municipal Existing Supply			19,415	18,928	18,741	18,621	18,497	18,370	18,275
Municipal Surplus/Shortage									
San Antonio Basin									
Rural			2	2	1	0	0	0	0
	Subtotal		2	2	1	0	0	0	0
Guadalupe Basin									
Victoria			3,515	2,689	2,048	1,598	1,268	898	534
Rural			656	400	196	36	-81	-193	-310
	Subtotal		4,171	3,089	2,244	1,634	1,187	705	224
Lavaca Basin									
Rural			2	2	1	1	0	0	0
	Subtotal		2	2	1	1	0	0	0

Table C-19 Projected Water Demands, Supplies, and Needs Victoria County South Central Texas Region									
			Total in	Projections					
Basin		**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Lavaca-Guadalupe Coastal Basin									
Victoria			1,031	816	576	403	289	158	17
Rural			545	429	305	205	137	72	0
	Subtotal		1,576	1,245	881	608	426	230	17
Total Municipal Surplus/Shortage			5,751	4,338	3,127	2,243	1,613	935	241
Municipal New Supply Need									
San Antonio Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Guadalupe Basin									
Victoria			0	0	0	0	0	0	0
Rural			0	0	0	0	81	193	310
	Subtotal		0	0	0	0	81	193	310
Lavaca Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin									
Victoria			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need			0	0	0	0	81	193	310
Industrial Demand									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			24,323	28,726	32,095	35,035	37,962	40,578	43,520
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Industrial Demand			24,323	28,726	32,095	35,035	37,962	40,578	43,520
Industrial Existing Supply									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin		Run-of-River	28,217	28,217	28,217	28,217	28,217	28,217	28,217
		Gulf Coast	976	928	909	897	885	872	862
Guadalupe Basin Subtotal			29,193	29,145	29,126	29,114	29,102	29,089	29,079
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Industrial Existing Supply			29,193	29,145	29,126	29,114	29,102	29,089	29,079
Industrial Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			4,870	419	-2,969	-5,921	-8,860	-11,489	-14,441
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Industrial Surplus/Shortage			4,870	419	-2,969	-5,921	-8,860	-11,489	-14,441
Industrial New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	2,969	5,921	8,860	11,489	14,441
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Industrial New Supply Need			0	0	2,969	5,921	8,860	11,489	14,441
Steam-Electric Demand									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			2,197	4,052	53,178	53,178	53,178	53,178	53,178
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Steam-Electric Demand			2,197	4,052	53,178	53,178	53,178	53,178	53,178

Table C-19
Projected Water Demands, Supplies, and Needs
Victoria County
South Central Texas Region

Basin	Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Steam-Electric Existing Supply								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin	Run-of-River	0	0	0	0	0	0	0
	Gulf Coast	2,380	2,261	2,216	2,187	2,157	2,125	2,102
Guadalupe Basin Subtotal		2,380	2,261	2,216	2,187	2,157	2,125	2,102
Lavaca Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		2,380	2,261	2,216	2,187	2,157	2,125	2,102
Steam-Electric Surplus/Shortage								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		183	-1,791	-50,962	-50,991	-51,021	-51,053	-51,076
Lavaca Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		183	-1,791	-50,962	-50,991	-51,021	-51,053	-51,076
Steam-Electric New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	1,791	50,962	50,991	51,021	51,053	51,076
Lavaca Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	1,791	50,962	50,991	51,021	51,053	51,076
Irrigation Demand								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		979	1,450	1,253	1,081	932	805	695
Lavaca Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		5,729	8,486	7,323	6,321	5,456	4,709	4,064
Total Irrigation Demand		6,708	9,936	8,576	7,402	6,388	5,514	4,759
Irrigation Supply								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin	Run-of-River	400	400	400	400	400	400	400
	Gulf Coast (San Antoni	257	605	485	374	278	197	125
	Gulf Coast	322	445	368	307	254	208	170
Guadalupe Basin Subtotal		979	1,450	1,253	1,081	932	805	695
Lavaca Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin	Gulf Coast	5,729	7,724	7,323	6,321	5,456	4,709	4,064
	Gulf Coast (San Antoni	0	762	0	0	0	0	0
Lavaca-Guadalupe CB Subtotal		5,729	8,486	7,323	6,321	5,456	4,709	4,064
Total Irrigation Supply		6,708	9,936	8,576	7,402	6,388	5,514	4,759
Irrigation Surplus/Shortage								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Lavaca Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
Total Irrigation Surplus/Shortage		0	0	0	0	0	0	0
Irrigation New Supply Need								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Lavaca Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		0	0	0	0	0	0	0
Total Irrigation New Supply Need		0	0	0	0	0	0	0
Mining Demand								
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		2,267	2,965	3,391	3,688	3,990	4,301	4,541
Lavaca Basin		0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		748	979	1,120	1,218	1,318	1,420	1,500
Total Mining Demand		3,015	3,944	4,511	4,906	5,308	5,721	6,041

Table C-19 Projected Water Demands, Supplies, and Needs Victoria County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Mining Supply									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin		Gulf Coast	2,187	2,718	3,046	3,269	3,488	3,705	3,870
		Gulf Coast (Lavaca)	222	222	222	222	222	222	222
		Gulf Coast (San Antoni	0	25	123	197	280	374	449
Guadalupe Basin Subtotal			2,409	2,965	3,391	3,688	3,990	4,301	4,541
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin		Gulf Coast	748	979	1,120	1,218	1,318	1,420	1,500
Total Mining Supply			3,157	3,944	4,511	4,906	5,308	5,721	6,041
Mining Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			142	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Mining Surplus/Shortage			142	0	0	0	0	0	0
Mining New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Mining New Supply Need			0	0	0	0	0	0	0
Livestock Demand									
San Antonio Basin			61	61	61	61	61	61	61
Guadalupe Basin			507	507	507	507	507	507	507
Lavaca Basin			5	5	5	5	5	5	5
Lavaca-Guadalupe Coastal Basin			512	512	512	512	512	512	512
Total Livestock Demand			1,085	1,085	1,085	1,085	1,085	1,085	1,085
Livestock Supply									
San Antonio Basin		Gulf Coast	30	30	30	30	30	30	30
		Local	31	31	31	31	31	31	31
	Subtotal		61	61	61	61	61	61	61
Guadalupe Basin		Gulf Coast	253	253	253	253	253	253	253
		Local	254	254	254	254	254	254	254
	Subtotal		507	507	507	507	507	507	507
Lavaca Basin		Gulf Coast	2	2	2	2	2	2	2
		Local	3	3	3	3	3	3	3
	Subtotal		5	5	5	5	5	5	5
Lavaca-Guadalupe Coastal Basin		Gulf Coast	256	256	256	256	256	256	256
		Local	256	256	256	256	256	256	256
	Subtotal		512	512	512	512	512	512	512
Total Livestock Supply			1,085	1,085	1,085	1,085	1,085	1,085	1,085
Livestock Surplus/Shortage									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	0	0
Livestock New Supply Need									
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Lavaca Basin			0	0	0	0	0	0	0
Lavaca-Guadalupe Coastal Basin			0	0	0	0	0	0	0
Total Livestock New Supply Need			0	0	0	0	0	0	0
Total Victoria County Demand									
Municipal			13,664	14,590	15,614	16,378	16,884	17,435	18,034
Industrial			24,323	28,726	32,095	35,035	37,962	40,578	43,520
Steam-Electric			2,197	4,052	53,178	53,178	53,178	53,178	53,178
Irrigation			6,708	9,936	8,576	7,402	6,388	5,514	4,759

Table C-19 Projected Water Demands, Supplies, and Needs Victoria County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Mining			3,015	3,944	4,511	4,906	5,308	5,721	6,041
Livestock			1,085	1,085	1,085	1,085	1,085	1,085	1,085
Total County Demand			50,992	62,333	115,059	117,984	120,805	123,511	126,617

Table C-19 Projected Water Demands, Supplies, and Needs Victoria County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Victoria County Supply								
Municipal		19,415	18,928	18,741	18,621	18,497	18,370	18,275
Industrial		29,193	29,145	29,126	29,114	29,102	29,089	29,079
Steam-Electric		2,380	2,261	2,216	2,187	2,157	2,125	2,102
Irrigation		6,708	9,936	8,576	7,402	6,388	5,514	4,759
Mining		3,157	3,944	4,511	4,906	5,308	5,721	6,041
Livestock		1,085	1,085	1,085	1,085	1,085	1,085	1,085
Total County Supply		61,938	65,299	64,255	63,315	62,537	61,904	61,341
Total Victoria County Balance								
Municipal		5,751	4,338	3,127	2,243	1,613	935	241
Industrial		4,870	419	-2,969	-5,921	-8,860	-11,489	-14,441
Steam-Electric		183	-1,791	-50,962	-50,991	-51,021	-51,053	-51,076
Irrigation		0	0	0	0	0	0	0
Mining		142	0	0	0	0	0	0
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		10,946	2,966	-50,804	-54,669	-58,268	-61,607	-65,276
Total Basin Demand								
San Antonio								
Municipal		5	5	6	7	7	7	7
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		0	0	0	0	0	0	0
Livestock		61	61	61	61	61	61	61
Total San Antonio Basin Demand		66	66	67	68	68	68	68
Guadalupe								
Municipal		8,938	9,533	10,191	10,681	11,004	11,359	11,745
Industrial		24,323	28,726	32,095	35,035	37,962	40,578	43,520
Steam-Electric		2,197	4,052	53,178	53,178	53,178	53,178	53,178
Irrigation		979	1,450	1,253	1,081	932	805	695
Mining		2,267	2,965	3,391	3,688	3,990	4,301	4,541
Livestock		507	507	507	507	507	507	507
Total Guadalupe Basin Demand		39,211	47,233	100,615	104,170	107,573	110,728	114,186
Lavaca								
Municipal		5	5	6	6	7	7	7
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		0	0	0	0	0	0	0
Livestock		5	5	5	5	5	5	5
Total Lavaca Basin Demand		10	10	11	11	12	12	12

Table C-19 Projected Water Demands, Supplies, and Needs Victoria County South Central Texas Region								
Basin	Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Lavaca-Guadalupe								
Municipal		4,716	5,047	5,411	5,684	5,866	6,062	6,275
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		5,729	8,486	7,323	6,321	5,456	4,709	4,064
Mining		748	979	1,120	1,218	1,318	1,420	1,500
Livestock		512	512	512	512	512	512	512
Total Lavaca-Guadalupe Basin Demand		11,705	15,024	14,366	13,735	13,152	12,703	12,351
Total Basin Supply								
San Antonio								
Municipal		7	7	7	7	7	7	7
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		0	0	0	0	0	0	0
Livestock		61	61	61	61	61	61	61
Unallocated Groundwater Supply		1,238	103	887	924	937	924	921
Total San Antonio Basin Supply		1,306	171	955	992	1,005	992	989
Guadalupe								
Municipal		13,109	12,622	12,435	12,315	12,191	12,064	11,969
Industrial		29,193	29,145	29,126	29,114	29,102	29,089	29,079
Steam-Electric		2,380	2,261	2,216	2,187	2,157	2,125	2,102
Irrigation		979	1,450	1,253	1,081	932	805	695
Mining		2,409	2,965	3,391	3,688	3,990	4,301	4,541
Livestock		507	507	507	507	507	507	507
Unallocated Groundwater Supply		0	0	0	0	0	0	0
Total Guadalupe Basin Supply		48,577	48,950	48,928	48,892	48,879	48,891	48,893
Lavaca								
Municipal		7	7	7	7	7	7	7
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		0	0	0	0	0	0	0
Mining		0	0	0	0	0	0	0
Livestock		5	5	5	5	5	5	5
Unallocated Groundwater Supply		0	0	0	0	0	0	0
Total Lavaca Basin Supply		12	12	12	12	12	12	12

Table C-19 Projected Water Demands, Supplies, and Needs Victoria County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Lavaca-Guadalupe									
Municipal			6,292	6,292	6,292	6,292	6,292	6,292	6,292
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			5,729	8,486	7,323	6,321	5,456	4,709	4,064
Mining			748	979	1,120	1,218	1,318	1,420	1,500
Livestock			512	512	512	512	512	512	512
Unallocated Groundwater Supply			2,226	0	260	1,164	1,929	2,574	3,139
Total Lavaca-Guadalupe Basin Supply			15,507	16,269	15,507	15,507	15,507	15,507	15,507
Total Basin Balance									
San Antonio									
Municipal			2	2	1	0	0	0	0
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			1,238	103	887	924	937	924	921
Total San Antonio Basin Surplus/Shortage			1,240	105	888	924	937	924	921
Guadalupe									
Municipal			4,171	3,089	2,244	1,634	1,187	705	224
Industrial			4,870	419	-2,969	-5,921	-8,860	-11,489	-14,441
Steam-Electric			183	-1,791	-50,962	-50,991	-51,021	-51,053	-51,076
Irrigation			0	0	0	0	0	0	0
Mining			142	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			0	0	0	0	0	0	0
Total Guadalupe Basin Surplus/Shortage			9,366	1,717	-51,687	-55,278	-58,694	-61,837	-65,293
Lavaca									
Municipal			2	2	1	1	0	0	0
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			0	0	0	0	0	0	0
Total Lavaca Basin Surplus/Shortage			2	2	1	1	0	0	0
Lavaca-Guadalupe									
Municipal			1,576	1,245	881	608	426	230	17
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			0	0	0	0	0	0	0
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			2,226	0	260	1,164	1,929	2,574	3,139
Total Lavaca-Guadalupe Basin Surplus/Shortage			3,802	1,245	1,141	1,772	2,355	2,804	3,156
Groundwater Supplies									
	Available								
	Guadalupe	Gulf Coast	15,887	15,887	15,887	15,887	15,887	15,887	15,887
	Lavaca	Gulf Coast	231	231	231	231	231	231	231
	Lavaca-Guadalupe	Gulf Coast	17,351	17,351	17,351	17,351	17,351	17,351	17,351
	San Antonio	Gulf Coast	1,532	1,532	1,532	1,532	1,532	1,532	1,532
	Total Available		35,000	35,000	35,000	35,000	35,000	35,000	35,000
	Allocated								
	Guadalupe	Gulf Coast	15,887	15,887	15,887	15,887	15,887	15,887	15,887
	Lavaca	Gulf Coast	231	231	231	231	231	231	231
	Lavaca-Guadalupe	Gulf Coast	15,125	17,351	17,091	16,187	15,422	14,777	14,212
	San Antonio	Gulf Coast	294	1,429	645	608	595	608	611
	Total Allocated		31,537	34,897	33,854	32,913	32,135	31,503	30,941

Table C-19 Projected Water Demands, Supplies, and Needs Victoria County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
			(acft)	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**
	Total Unallocated		3,463	103	1,146	2,087	2,865	3,497	4,059

Table C-20
Projected Water Demands, Supplies, and Needs
Wilson County
South Central Texas Region

Basin		Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Municipal Demand									
Nueces Basin									
McCoy WSC			25	41	61	82	102	124	147
Rural			31	42	56	72	86	103	120
	Subtotal		56	83	117	154	188	227	267
San Antonio Basin									
East Central SUD			89	104	124	146	169	194	222
El Oso WSC			45	52	62	71	81	91	102
Floresville			1,203	1,805	2,011	2,245	2,475	2,726	3,000
La Vernia			206	278	367	464	557	658	764
Oak Hills WSC			479	693	960	1,251	1,536	1,843	2,160
Poth*			315	348	389	434	480	530	585
SS WSC*			1,072	1,563	2,204	2,886	3,554	4,279	5,030
Stockdale*			321	350	386	426	466	510	558
Sunko WSC			465	564	691	826	965	1,107	1,262
Rural			542	539	770	1,027	1,269	1,533	1,807
	Subtotal		4,737	6,296	7,964	9,776	11,552	13,471	15,490
Guadalupe Basin									
Rural			20	28	37	47	57	68	79
	Subtotal		20	28	37	47	57	68	79
Total Municipal Demand			4,813	6,407	8,118	9,977	11,797	13,766	15,836
Municipal Existing Supply									
Nueces Basin									
McCoy WSC		Carrizo	49	49	49	49	49	48	48
Rural		Carrizo	120	120	120	120	120	120	120
	Subtotal		169	169	169	169	169	168	168
San Antonio Basin									
East Central SUD		Canyon (CRWA - Dunlap)	106	106	23	23	23	23	23
		Carrizo (Springs Hill/CRWA)	29	29	29	29	29	29	29
		Edwards (BMWD)	91	91	91	91	91	91	91
East Central WSC Subtotal			227	227	143	143	143	143	143
El Oso WSC		Carrizo	105	105	105	105	105	105	105
Floresville		Carrizo	2,567	2,567	2,567	2,567	2,567	2,567	2,567
La Vernia		Carrizo	655	655	655	655	655	655	655
		Carrizo (Guadalupe) - SH/CRWA	400	400	400	400	400	400	400
La Vernia Subtotal			1,055	1,055	1,055	1,055	1,055	1,055	1,055
Oak Hills WSC		Carrizo	1,862	1,862	1,862	1,862	1,862	1,862	1,862
Poth		Carrizo	1,303	1,303	1,303	1,303	1,303	1,303	1,303
SS WSC		Carrizo	1,340	1,340	1,340	1,340	1,340	1,340	1,340
Stockdale		Carrizo	1,762	1,762	1,762	1,762	1,762	1,762	1,762
Sunko WSC		Carrizo	1,192	1,192	1,192	1,192	1,192	1,192	1,192
Rural		Carrizo	1,774	1,774	1,774	1,774	1,774	1,774	1,774
		ROR (San Antonio)	0	0	0	0	0	0	0
Rural Subtotal			1,774	1,774	1,774	1,774	1,774	1,774	1,774
	Subtotal		13,187	13,187	13,103	13,103	13,103	13,103	13,103
Guadalupe Basin									
Rural		Carrizo	79	79	79	79	79	79	79
	Subtotal		79	79	79	79	79	79	79
Total Municipal Existing Supply			13,435	13,435	13,351	13,351	13,351	13,350	13,350
Municipal Surplus/Shortage									
Nueces Basin									
McCoy WSC			24	8	-12	-33	-53	-76	-99
Rural			89	78	64	48	34	17	0
	Subtotal		113	86	52	15	-19	-59	-99

Table C-20 Projected Water Demands, Supplies, and Needs Wilson County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
San Antonio Basin									
East Central SUD			138	123	19	-3	-26	-51	-79
El Oso WSC			60	53	43	34	24	14	3
Floresville			1,364	762	556	322	92	-159	-433
La Vernia			849	777	688	591	498	397	291
Oak Hills WSC			1,383	1,169	902	611	326	19	-298
Poth*			988	955	914	869	823	773	718
SS WSC*			268	-223	-864	-1,546	-2,214	-2,939	-3,690
Stockdale*			1,441	1,412	1,376	1,336	1,296	1,252	1,204
Sunko WSC			727	628	501	366	227	85	-70
Rural			1,232	1,235	1,004	747	505	241	-33
	Subtotal		8,450	6,891	5,139	3,327	1,551	-368	-2,387
Guadalupe Basin									
Rural			59	51	42	32	22	11	0
	Subtotal		59	51	42	32	22	11	0
Total Municipal Surplus/Shortage			8,622	7,028	5,233	3,374	1,554	-416	-2,486
Municipal New Supply Need									
Nueces Basin									
McCoy WSC			0	0	12	33	53	76	99
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	12	33	53	76	99
San Antonio Basin									
East Central SUD			0	0	0	3	26	51	79
El Oso WSC			0	0	0	0	0	0	0
Floresville			0	0	0	0	0	159	433
La Vernia			0	0	0	0	0	0	0
Oak Hills WSC			0	0	0	0	0	0	298
Poth*			0	0	0	0	0	0	0
SS WSC*			0	223	864	1,546	2,214	2,939	3,690
Stockdale*			0	0	0	0	0	0	0
Sunko WSC			0	0	0	0	0	0	70
Rural			0	0	0	0	0	0	33
	Subtotal		0	223	864	1,549	2,240	3,149	4,603
Guadalupe Basin									
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need			0	223	876	1,582	2,293	3,225	4,702
Industrial Demand									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			1	1	1	1	1	1	1
Guadalupe Basin			0	0	0	0	0	0	0
Total Industrial Demand			1	1	1	1	1	1	1
Industrial Existing Supply									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin		Carrizo	1	1	1	1	1	1	1
Guadalupe Basin			0	0	0	0	0	0	0
Total Industrial Existing Supply			1	1	1	1	1	1	1

Table C-20 Projected Water Demands, Supplies, and Needs Wilson County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Industrial Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Industrial Surplus/Shortage		0	0	0	0	0	0	0
Industrial New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Industrial New Supply Need		0	0	0	0	0	0	0
Steam-Electric Demand								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Steam-Electric Demand		0	0	0	0	0	0	0
Steam-Electric Existing Supply								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		0	0	0	0	0	0	0
Steam-Electric New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
Nueces Basin		5,263	2,847	2,529	2,248	2,001	1,783	1,595
San Antonio Basin		15,474	8,370	7,435	6,610	5,883	5,245	4,691
Guadalupe Basin		146	79	70	63	56	49	44
Total Irrigation Demand		20,883	11,296	10,034	8,921	7,940	7,077	6,330
Irrigation Supply								
Nueces Basin	Carrizo	2,319	2,319	2,319	2,319	2,319	2,319	2,319
	Queen City	800	800	800	800	800	800	800
Nueces Basin Subtotal		3,119	3,119	3,119	3,119	3,119	3,119	3,119
San Antonio Basin	Carrizo	3,200	3,200	3,200	3,200	3,200	3,200	3,200
	Queen City	3,400	3,400	3,400	3,400	3,400	3,400	3,400
	Run-of-River	1,770	1,770	1,770	1,770	1,770	1,770	1,770
San Antonio Basin Subtotal		8,370	8,370	8,370	8,370	8,370	8,370	8,370
Guadalupe Basin	Carrizo	114	114	114	114	114	114	114
Total Irrigation Supply		11,603	11,603	11,603	11,603	11,603	11,603	11,603

Table C-20 Projected Water Demands, Supplies, and Needs Wilson County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Irrigation Surplus/Shortage									
Nueces Basin			-2,144	272	590	871	1,118	1,336	1,524
San Antonio Basin			-7,104	0	935	1,760	2,487	3,125	3,679
Guadalupe Basin			-32	35	44	51	58	65	70
Total Irrigation Surplus/Shortage			-9,280	307	1,569	2,682	3,663	4,526	5,273
Irrigation New Supply Need									
Nueces Basin			2,144	0	0	0	0	0	0
San Antonio Basin			7,104	0	0	0	0	0	0
Guadalupe Basin			32	0	0	0	0	0	0
Total Irrigation New Supply Need			9,280	0	0	0	0	0	0
Mining Demand									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			261	228	221	216	212	208	206
Guadalupe Basin			16	14	13	13	13	13	12
Total Mining Demand			277	242	234	229	225	221	218
Mining Supply									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin		Carrizo	261	228	221	216	212	208	206
Guadalupe Basin		Carrizo	16	14	13	13	13	13	12
Total Mining Supply			277	242	234	229	225	221	218
Mining Surplus/Shortage									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Total Mining Surplus/Shortage			0	0	0	0	0	0	0
Mining New Supply Need									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Total Mining New Supply Need			0	0	0	0	0	0	0
Livestock Demand									
Nueces Basin			145	145	145	145	145	145	145
San Antonio Basin			1,609	1,609	1,609	1,609	1,609	1,609	1,609
Guadalupe Basin			54	54	54	54	54	54	54
Total Livestock Demand			1,808	1,808	1,808	1,808	1,808	1,808	1,808
Livestock Supply									
Nueces Basin		Carrizo	72	72	72	72	72	72	72
		Local	73	73	73	73	73	73	73
	Subtotal		145	145	145	145	145	145	145
San Antonio Basin		Carrizo	804	804	804	804	804	804	804
		Local	805	805	805	805	805	805	805
	Subtotal		1,609	1,609	1,609	1,609	1,609	1,609	1,609
Guadalupe Basin		Carrizo	27	27	27	27	27	27	27
		Local	27	27	27	27	27	27	27
	Subtotal		54	54	54	54	54	54	54
Total Livestock Supply			1,808	1,808	1,808	1,808	1,808	1,808	1,808
Livestock Surplus/Shortage									
Nueces Basin			0	0	0	0	0	0	0
San Antonio Basin			0	0	0	0	0	0	0
Guadalupe Basin			0	0	0	0	0	0	0
Total Livestock Surplus/Shortage			0	0	0	0	0	0	0

Table C-20 Projected Water Demands, Supplies, and Needs Wilson County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Livestock New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
San Antonio Basin		0	0	0	0	0	0	0
Guadalupe Basin		0	0	0	0	0	0	0
Total Livestock New Supply Need		0	0	0	0	0	0	0
Total Wilson County Demand								
Municipal		4,813	6,407	8,118	9,977	11,797	13,766	15,836
Industrial		1	1	1	1	1	1	1
Steam-Electric		0	0	0	0	0	0	0
Irrigation		20,883	11,296	10,034	8,921	7,940	7,077	6,330
Mining		277	242	234	229	225	221	218
Livestock		1,808	1,808	1,808	1,808	1,808	1,808	1,808
Total County Demand		27,782	19,754	20,195	20,936	21,771	22,873	24,193
Total Wilson County Supply								
Municipal		13,435	13,435	13,351	13,351	13,351	13,350	13,350
Industrial		1	1	1	1	1	1	1
Steam-Electric		0	0	0	0	0	0	0
Irrigation		11,603	11,603	11,603	11,603	11,603	11,603	11,603
Mining		277	242	234	229	225	221	218
Livestock		1,808	1,808	1,808	1,808	1,808	1,808	1,808
Total County Supply		27,124	27,089	26,997	26,992	26,988	26,983	26,980
Total Wilson County Balance								
Municipal		8,622	7,028	5,233	3,374	1,554	-416	-2,486
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		-9,280	307	1,569	2,682	3,663	4,526	5,273
Mining		0	0	0	0	0	0	0
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		-658	7,335	6,802	6,056	5,217	4,110	2,787
Total Basin Demand								
Nueces								
Municipal		56	83	117	154	188	227	267
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		5,263	2,847	2,529	2,248	2,001	1,783	1,595
Mining		0	0	0	0	0	0	0
Livestock		145	145	145	145	145	145	145
Total Nueces Basin Demand		5,464	3,075	2,791	2,547	2,334	2,155	2,007
San Antonio								
Municipal		4,737	6,296	7,964	9,776	11,552	13,471	15,490
Industrial		1	1	1	1	1	1	1
Steam-Electric		0	0	0	0	0	0	0
Irrigation		15,474	8,370	7,435	6,610	5,883	5,245	4,691
Mining		261	228	221	216	212	208	206
Livestock		1,609	1,609	1,609	1,609	1,609	1,609	1,609
Total San Antonio Basin Demand		22,082	16,504	17,230	18,212	19,257	20,534	21,997

Table C-20 Projected Water Demands, Supplies, and Needs Wilson County South Central Texas Region								
		Total in	Projections					
Basin	Source	2000	2010	2020	2030	2040	2050	2060
		(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Guadalupe								
Municipal		20	28	37	47	57	68	79
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		146	79	70	63	56	49	44
Mining		16	14	13	13	13	13	12
Livestock		54	54	54	54	54	54	54
Total Guadalupe Basin Demand		236	175	174	177	180	184	189
Total Basin Supply								
Nueces								
Municipal		169	169	169	169	169	168	168
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		3,119	3,119	3,119	3,119	3,119	3,119	3,119
Mining		0	0	0	0	0	0	0
Livestock		145	145	145	145	145	145	145
Unallocated Groundwater Supply		870	870	870	870	870	870	870
Total Nueces Basin Supply		4,303	4,303	4,303	4,303	4,303	4,302	4,302
San Antonio								
Municipal		13,187	13,187	13,103	13,103	13,103	13,103	13,103
Industrial		1	1	1	1	1	1	1
Steam-Electric		0	0	0	0	0	0	0
Irrigation		8,370	8,370	8,370	8,370	8,370	8,370	8,370
Mining		261	228	221	216	212	208	206
Livestock		1,609	1,609	1,609	1,609	1,609	1,609	1,609
Unallocated Groundwater Supply		2,893	2,926	2,933	2,938	2,942	2,946	2,948
Total San Antonio Basin Supply		26,321	26,321	26,237	26,237	26,237	26,237	26,237
Guadalupe								
Municipal		79	79	79	79	79	79	79
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		114	114	114	114	114	114	114
Mining		16	14	13	13	13	13	12
Livestock		54	54	54	54	54	54	54
Unallocated Groundwater Supply		781	783	784	784	784	784	785
Total Guadalupe Basin Supply		1,044	1,044	1,044	1,044	1,044	1,044	1,044
Total Basin Balance								
Nueces								
Municipal		113	86	52	15	-19	-59	-99
Industrial		0	0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		-2,144	272	590	871	1,118	1,336	1,524
Mining		0	0	0	0	0	0	0
Livestock		0	0	0	0	0	0	0
Unallocated Groundwater Supply		870	870	870	870	870	870	870
Total Nueces Basin Surplus/Shortage		-1,161	1,228	1,512	1,756	1,969	2,147	2,295

Table C-20 Projected Water Demands, Supplies, and Needs Wilson County South Central Texas Region									
			Total in	**Projections**					
Basin		**Source**	**2000**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
			(acft)	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**	**(acft)**
San Antonio									
Municipal			8,450	6,891	5,139	3,327	1,551	-368	-2,387
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			-7,104	0	935	1,760	2,487	3,125	3,679
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			2,893	2,926	2,933	2,938	2,942	2,946	2,948
Total San Antonio Basin Surplus/Shortage			4,239	9,817	9,007	8,025	6,980	5,703	4,240
Guadalupe									
Municipal			59	51	42	32	22	11	0
Industrial			0	0	0	0	0	0	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			-32	35	44	51	58	65	70
Mining			0	0	0	0	0	0	0
Livestock			0	0	0	0	0	0	0
Unallocated Groundwater Supply			781	783	784	784	784	784	785
Total Guadalupe Basin Surplus/Shortage			808	869	870	867	864	860	855
Groundwater Supplies									
	Available								
	Guadalupe	Carrizo	236	236	236	236	236	236	236
	Nueces	Carrizo	2,520	2,520	2,520	2,520	2,520	2,520	2,520
	San Antonio	Carrizo	19,048	19,048	19,048	19,048	19,048	19,048	19,048
	Guadalupe	Sparta	95	95	95	95	95	95	95
	Nueces	Sparta	185	185	185	185	185	185	185
	San Antonio	Sparta	700	700	700	700	700	700	700
	Guadalupe	Queen City	686	686	686	686	686	686	686
	Nueces	Queen City	1,476	1,476	1,476	1,476	1,476	1,476	1,476
	San Antonio	Queen City	3,488	3,488	3,488	3,488	3,488	3,488	3,488
	Total Available		28,434	28,434	28,434	28,434	28,434	28,434	28,434
	Allocated								
	Guadalupe	Carrizo	236	234	233	233	233	233	232
	Nueces	Carrizo	2,511	2,511	2,511	2,511	2,511	2,511	2,511
	San Antonio	Carrizo	16,943	16,910	16,903	16,898	16,894	16,890	16,888
	Guadalupe	Sparta	0	0	0	0	0	0	0
	Nueces	Sparta	0	0	0	0	0	0	0
	San Antonio	Sparta	0	0	0	0	0	0	0
	Guadalupe	Queen City	0	0	0	0	0	0	0
	Nueces	Queen City	800	800	800	800	800	800	800
	San Antonio	Queen City	3,400	3,400	3,400	3,400	3,400	3,400	3,400
	Total Allocated		23,890	23,856	23,848	23,843	23,839	23,835	23,832
	Total Unallocated		4,544	4,578	4,586	4,591	4,595	4,599	4,602
* Projected demands, shortages, and needs may be greater than shown. These WUGs are requesting a population/demand revision.									

Table C-21 Projected Water Demands, Supplies, and Needs Zavala County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000	2010	2020	2030	2040	2050	2060
			(acft)	(acft)	(acft)	(acft)	(acft)	(acft)	(acft)
Municipal Demand									
Nueces Basin									
Crystal City			2,175	2,247	2,272	2,343	2,337	2,349	2,370
Rural			741	864	1,028	1,134	1,241	1,327	1,371
	Subtotal		2,916	3,111	3,300	3,477	3,578	3,676	3,741
Total Municipal Demand			2,916	3,111	3,300	3,477	3,578	3,676	3,741
Municipal Existing Supply									
Nueces Basin									
Crystal City		Carrizo	3,524	3,524	3,524	3,524	3,524	3,524	3,524
Rural		Carrizo	1,388	1,388	1,388	1,388	1,388	1,388	1,388
	Subtotal		4,912	4,912	4,912	4,912	4,912	4,912	4,912
Total Municipal Existing Supply			4,912	4,912	4,912	4,912	4,912	4,912	4,912
Municipal Surplus/Shortage									
Nueces Basin									
Crystal City			1,349	1,277	1,252	1,181	1,187	1,175	1,154
Rural			647	524	360	254	147	61	17
	Subtotal		1,996	1,801	1,612	1,435	1,334	1,236	1,171
Total Municipal Surplus/Shortage			1,996	1,801	1,612	1,435	1,334	1,236	1,171
Municipal New Supply Need									
Nueces Basin									
Crystal City			0	0	0	0	0	0	0
Rural			0	0	0	0	0	0	0
	Subtotal		0	0	0	0	0	0	0
Total Municipal New Supply Need			0	0	0	0	0	0	0
Industrial Demand									
Nueces Basin			922	1,043	1,106	1,154	1,200	1,238	1,315
Total Industrial Demand			922	1,043	1,106	1,154	1,200	1,238	1,315
Industrial Existing Supply									
Nueces Basin		Carrizo	1,315	1,315	1,315	1,315	1,315	1,315	1,315
Total Industrial Existing Supply			1,315	1,315	1,315	1,315	1,315	1,315	1,315
Industrial Surplus/Shortage									
Nueces Basin			393	272	209	161	115	77	0
Total Industrial Surplus/Shortage			393	272	209	161	115	77	0
Industrial New Supply Need									
Nueces Basin			0	0	0	0	0	0	0
Total Industrial New Supply Need			0	0	0	0	0	0	0

Table C-21 Projected Water Demands, Supplies, and Needs Zavala County South Central Texas Region								
		Total in	Projections					
Basin	**Source**	**2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Steam-Electric Demand								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Demand		0	0	0	0	0	0	0
Steam-Electric Existing Supply								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Existing Supply		0	0	0	0	0	0	0
Steam-Electric Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric Surplus/Shortage		0	0	0	0	0	0	0
Steam-Electric New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Steam-Electric New Supply Need		0	0	0	0	0	0	0
Irrigation Demand								
Nueces Basin		46,275	71,800	68,963	66,238	63,621	61,107	58,692
Total Irrigation Demand		46,275	71,800	68,963	66,238	63,621	61,107	58,692
Irrigation Supply								
Nueces Basin	Carrizo	17,200	17,200	17,200	17,200	17,200	17,200	17,200
Total Irrigation Supply		17,200	17,200	17,200	17,200	17,200	17,200	17,200
Irrigation Surplus/Shortage								
Nueces Basin		-29,075	-54,600	-51,763	-49,038	-46,421	-43,907	-41,492
Total Irrigation Surplus/Shortage		-29,075	-54,600	-51,763	-49,038	-46,421	-43,907	-41,492
Irrigation New Supply Need								
Nueces Basin		29,075	54,600	51,763	49,038	46,421	43,907	41,492
Total Irrigation New Supply Need		29,075	54,600	51,763	49,038	46,421	43,907	41,492
Mining Demand								
Nueces Basin		114	122	125	127	128	129	130
Total Mining Demand		114	122	125	127	128	129	130
Mining Supply								
Nueces Basin	Carrizo	130	130	130	130	130	130	130
Total Mining Supply		130	130	130	130	130	130	130
Mining Surplus/Shortage								
Nueces Basin		16	8	5	3	2	1	0
Total Mining Surplus/Shortage		16	8	5	3	2	1	0
Mining New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Mining New Supply Need		0	0	0	0	0	0	0

Table C-21
Projected Water Demands, Supplies, and Needs
Zavala County
South Central Texas Region

Basin	Source	Total in 2000 (acft)	Projections 2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Livestock Demand								
Nueces Basin		756	756	756	756	756	756	756
Total Livestock Demand		756	756	756	756	756	756	756
Livestock Supply								
Nueces Basin	Carrizo	378	378	378	378	378	378	378
	Local	378	378	378	378	378	378	378
Total Livestock Supply		756	756	756	756	756	756	756
Livestock Surplus/Shortage								
Nueces Basin		0	0	0	0	0	0	0
Total Livestock Surplus/Shortage		0	0	0	0	0	0	0
Livestock New Supply Need								
Nueces Basin		0	0	0	0	0	0	0
Total Livestock New Supply Need		0	0	0	0	0	0	0
Total Zavala County Demand								
Municipal		2,916	3,111	3,300	3,477	3,578	3,676	3,741
Industrial		922	1,043	1,106	1,154	1,200	1,238	1,315
Steam-Electric		0	0	0	0	0	0	0
Irrigation		46,275	71,800	68,963	66,238	63,621	61,107	58,692
Mining		114	122	125	127	128	129	130
Livestock		756	756	756	756	756	756	756
Total County Demand		50,983	76,832	74,250	71,752	69,283	66,906	64,634
Total Zavala County Supply								
Municipal		4,912	4,912	4,912	4,912	4,912	4,912	4,912
Industrial		1,315	1,315	1,315	1,315	1,315	1,315	1,315
Steam-Electric		0	0	0	0	0	0	0
Irrigation		17,200	17,200	17,200	17,200	17,200	17,200	17,200
Mining		130	130	130	130	130	130	130
Livestock		756	756	756	756	756	756	756
Total County Supply		24,313	24,313	24,313	24,313	24,313	24,313	24,313
Total Zavala County Balance								
Municipal		1,996	1,801	1,612	1,435	1,334	1,236	1,171
Industrial		393	272	209	161	115	77	0
Steam-Electric		0	0	0	0	0	0	0
Irrigation		-29,075	-54,600	-51,763	-49,038	-46,421	-43,907	-41,492
Mining		16	8	5	3	2	1	0
Livestock		0	0	0	0	0	0	0
Total County Surplus/Shortage		-26,670	-52,519	-49,937	-47,439	-44,970	-42,593	-40,321

Table C-21 Projected Water Demands, Supplies, and Needs Zavala County South Central Texas Region									
			Total in	Projections					
Basin		Source	2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Total Basin Demand									
Nueces									
Municipal			2,916	3,111	3,300	3,477	3,578	3,676	3,741
Industrial			922	1,043	1,106	1,154	1,200	1,238	1,315
Steam-Electric			0	0	0	0	0	0	0
Irrigation			46,275	71,800	68,963	66,238	63,621	61,107	58,692
Mining			114	122	125	127	128	129	130
Livestock			756	756	756	756	756	756	756
Total Nueces Basin Demand			50,983	76,832	74,250	71,752	69,283	66,906	64,634
Total Basin Supply									
Nueces									
Municipal			4,912	4,912	4,912	4,912	4,912	4,912	4,912
Industrial			1,315	1,315	1,315	1,315	1,315	1,315	1,315
Steam-Electric			0	0	0	0	0	0	0
Irrigation			17,200	17,200	17,200	17,200	17,200	17,200	17,200
Mining			130	130	130	130	130	130	130
Livestock			756	756	756	756	756	756	756
Total Nueces Basin Supply			24,313	24,313	24,313	24,313	24,313	24,313	24,313
Total Basin Balance									
Nueces									
Municipal			1,996	1,801	1,612	1,435	1,334	1,236	1,171
Industrial			393	272	209	161	115	77	0
Steam-Electric			0	0	0	0	0	0	0
Irrigation			-29,075	-54,600	-51,763	-49,038	-46,421	-43,907	-41,492
Mining			16	8	5	3	2	1	0
Livestock			0	0	0	0	0	0	0
Total Nueces Basin Surplus/Shortage			-26,670	-52,519	-49,937	-47,439	-44,970	-42,593	-40,321
Groundwater Supplies									
	Available								
	Nueces	Carrizo	23,936	23,936	23,936	23,936	23,936	23,936	23,936
	Total Available		23,936	23,936	23,936	23,936	23,936	23,936	23,936
	Allocated								
	Nueces	Carrizo	23,935	23,935	23,935	23,935	23,935	23,935	23,935
	Total Allocated		23,935	23,935	23,935	23,935	23,935	23,935	23,935
	Total Unallocated		0	0	0	0	0	0	0

Table C-22
Projected Water Demands, Supplies, and Needs
River Basin and South Central Texas Region Summaries
South Central Texas Region

Basin	Total in 2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Nueces Basin Demand							
Municipal	29,599	32,130	34,782	37,029	38,703	40,264	41,555
Industrial	1,362	1,548	1,642	1,715	1,785	1,844	1,962
Steam-Electric	5,943	7,289	5,075	6,302	6,189	7,412	7,763
Irrigation	319,890	314,279	302,311	291,011	279,881	269,196	258,935
Mining	2,715	3,044	3,193	3,273	3,350	3,424	3,498
Livestock	8,450	8,450	8,450	8,450	8,450	8,450	8,450
Total Nueces Basin Demand	367,959	366,740	355,453	347,780	338,358	330,590	322,163
Nueces Basin Supply							
Municipal		38,426	38,424	38,424	38,423	38,420	38,418
Industrial		3,659	3,659	3,659	3,659	3,659	3,659
Steam-Electric		7,026	7,023	7,023	7,022	7,021	7,019
Irrigation		298,006	297,978	297,388	297,378	297,363	297,346
Mining		3,317	3,403	3,446	3,488	3,530	3,574
Livestock		8,451	8,451	8,451	8,451	8,451	8,451
Unallocated Groundwater Supply		29,425	29,425	29,425	29,425	29,425	29,425
Total Nueces Basin Supply		388,310	388,363	387,816	387,846	387,869	387,892
Nueces Basin Balance [1]							
Municipal		6,296	3,642	1,395	-280	-1,844	-3,137
Industrial		2,111	2,017	1,944	1,874	1,815	1,697
Steam-Electric		-263	1,948	721	833	-391	-744
Irrigation		-16,273	-4,333	6,377	17,497	28,167	38,411
Mining		273	210	173	138	106	76
Livestock		1	1	1	1	1	1
Unallocated Groundwater Supply		29,425	29,425	29,425	29,425	29,425	29,425
San Antonio Basin Demand							
Municipal	247,069	285,028	319,577	352,950	379,144	405,292	431,850
Industrial	21,364	26,079	29,633	32,919	36,220	39,123	42,282
Steam-Electric	17,399	20,395	25,761	30,139	32,973	36,120	39,614
Irrigation	42,823	34,568	32,437	30,474	28,668	27,010	25,493
Mining	3,232	3,980	4,273	4,450	4,630	4,811	4,982
Livestock	5,058	5,058	5,058	5,058	5,058	5,058	5,058
Total San Antonio Basin Demand	336,945	375,108	416,739	455,990	486,693	517,414	549,279
San Antonio Basin Supply							
Municipal		221,172	217,012	213,812	209,720	209,579	209,503
Industrial		25,483	25,483	25,407	25,403	25,399	25,396
Steam-Electric		48,900	48,900	48,900	48,900	48,900	48,900
Irrigation		49,839	49,859	49,679	49,669	49,647	49,637
Mining		3,899	4,193	3,448	3,529	3,606	3,683
Livestock		5,111	5,114	5,113	5,112	5,119	5,118
Unallocated Groundwater Supply		12,567	13,358	13,416	13,454	13,467	13,476
Total San Antonio Basin Supply		366,970	363,918	359,774	355,786	355,716	355,712
San Antonio Basin Balance [1]							
Municipal		-63,857	-102,566	-139,139	-169,425	-195,714	-222,348
Industrial		-596	-4,150	-7,512	-10,817	-13,724	-16,886
Steam-Electric		28,505	23,139	18,761	15,927	12,780	9,286
Irrigation		15,271	17,422	19,205	21,001	22,637	24,144
Mining		-81	-80	-1,002	-1,101	-1,205	-1,299
Livestock		53	56	55	54	61	60
Unallocated Groundwater Supply		12,567	13,358	13,416	13,454	13,467	13,476

Table C-22 Projected Water Demands, Supplies, and Needs River Basin and South Central Texas Region Summaries South Central Texas Region							
Basin	**Total in 2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Guadalupe Basin Demand							
Municipal	53,805	68,487	85,556	101,455	116,695	133,722	150,260
Industrial	35,201	42,051	46,871	51,112	55,306	59,014	63,453
Steam-Electric	11,353	18,876	73,945	74,096	76,906	78,069	80,963
Irrigation	5,937	6,032	5,371	4,787	4,263	3,859	3,525
Mining	4,966	6,288	6,918	7,336	7,758	8,185	8,537
Livestock	9,667	9,914	9,914	9,914	9,914	9,914	9,914
Total Guadalupe Basin Demand	120,929	151,648	228,575	248,700	270,842	292,763	316,652
Guadalupe Basin Supply							
Municipal		105,547	107,512	107,379	107,242	106,921	106,817
Industrial		41,390	41,371	41,359	41,347	41,334	41,324
Steam-Electric		31,964	33,919	33,890	33,860	33,828	33,805
Irrigation		10,151	9,954	9,782	9,633	9,506	9,396
Mining		5,823	6,232	6,518	6,811	7,031	7,269
Livestock		9,986	9,986	9,986	9,986	9,986	9,986
Unallocated Groundwater Supply		66,291	66,292	66,292	66,292	66,292	66,293
Total Guadalupe Basin Supply		271,152	275,266	275,206	275,171	274,898	274,890
Guadalupe Basin Balance [1]							
Municipal		37,060	21,956	5,924	-9,453	-26,801	-43,443
Industrial		-661	-5,500	-9,753	-13,959	-17,680	-22,129
Steam-Electric		13,088	-40,026	-40,206	-43,046	-44,241	-47,158
Irrigation		4,119	4,583	4,995	5,370	5,647	5,871
Mining		-465	-686	-818	-947	-1,154	-1,268
Livestock		72	72	72	72	72	72
Unallocated Groundwater Supply		66,291	66,292	66,292	66,292	66,292	66,293
Lower Colorado Basin Demand							
Municipal	365	518	676	817	959	1,097	1,239
Industrial	0	0	0	0	0	0	0
Steam-Electric	0	0	0	0	0	0	0
Irrigation	15	15	14	12	11	10	8
Mining	13	15	15	16	17	17	17
Livestock	169	169	169	169	169	169	169
Total Lower Colorado Basin Demand	562	717	874	1,014	1,156	1,293	1,433
Lower Colorado Basin Supply							
Municipal		715	715	715	715	715	715
Industrial		0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0
Irrigation		15	15	15	15	15	16
Mining		17	17	17	17	17	17
Livestock		169	169	169	169	169	169
Unallocated Groundwater Supply		677	677	677	677	677	677
Total Lower Colorado Basin Supply		1,593	1,593	1,593	1,593	1,593	1,594
Lower Colorado Basin Balance [1]							
Municipal		197	39	-102	-244	-382	-524
Industrial		0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0
Irrigation		0	1	3	4	5	8
Mining		2	2	1	0	0	0
Livestock		0	0	0	0	0	0
Unallocated Groundwater Supply		677	677	677	677	677	677

Table C-22 Projected Water Demands, Supplies, and Needs River Basin and South Central Texas Region Summaries South Central Texas Region							
Basin	Total in 2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Colorado-Lavaca Basin Demand							
Municipal	251	289	362	523	691	675	672
Industrial	19,175	22,516	24,810	26,790	28,753	30,486	32,671
Steam-Electric	684	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0	0
Mining	1	1	1	1	1	1	1
Livestock	17	17	17	17	17	17	17
Total Colorado-Lavaca Basin Demand	20,128	22,823	25,190	27,331	29,462	31,179	33,361
Colorado-Lavaca Basin Supply							
Municipal		317	317	317	317	317	317
Industrial		30,650	30,650	30,650	30,650	30,650	30,650
Steam-Electric		0	0	0	0	0	0
Irrigation		0	0	0	0	0	0
Mining		1	1	1	1	1	1
Livestock		17	17	17	17	17	17
Unallocated Groundwater Supply		246	246	246	246	246	246
Total Colorado-Lavaca Basin Supply		31,231	31,231	31,231	31,231	31,231	31,231
Colorado-Lavaca Basin Balance [1]							
Municipal		28	-45	-206	-374	-358	-355
Industrial		8,134	5,840	3,860	1,897	164	-2,021
Steam-Electric		0	0	0	0	0	0
Irrigation		0	0	0	0	0	0
Mining		0	0	0	0	0	0
Livestock		0	0	0	0	0	0
Unallocated Groundwater Supply		246	246	246	246	246	246
Lavaca Basin Demand							
Municipal	513	511	512	505	495	479	471
Industrial	7	8	9	10	10	11	12
Steam-Electric	0	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0	0
Mining	37	40	42	43	42	43	43
Livestock	310	357	357	357	357	357	357
Total Lavaca Basin Demand	867	916	920	915	904	890	883
Lavaca Basin Supply							
Municipal		1,703	1,703	1,703	1,703	1,703	1,703
Industrial		15	15	15	15	15	15
Steam-Electric		0	0	0	0	0	0
Irrigation		0	0	0	0	0	0
Mining		44	44	44	44	44	44
Livestock		357	357	357	357	357	357
Unallocated Groundwater Supply		729	729	729	729	729	729
Total Lavaca Basin Supply		2,848	2,848	2,848	2,848	2,848	2,848
Lavaca Basin Balance [1]							
Municipal		1,192	1,191	1,198	1,208	1,224	1,232
Industrial		7	6	5	5	4	3
Steam-Electric		0	0	0	0	0	0
Irrigation		0	0	0	0	0	0
Mining		4	2	1	2	1	1
Livestock		0	0	0	0	0	0
Unallocated Groundwater Supply		729	729	729	729	729	729

Table C-22 Projected Water Demands, Supplies, and Needs River Basin and South Central Texas Region Summaries South Central Texas Region							
Basin	**Total in 2000 (acft)**	**2010 (acft)**	**2020 (acft)**	**2030 (acft)**	**2040 (acft)**	**2050 (acft)**	**2060 (acft)**
Lavaca-Guadalupe Basin Demand							
Municipal	7,163	7,702	8,269	8,716	9,044	9,394	9,774
Industrial	23,086	27,108	29,871	32,255	34,618	36,704	39,335
Steam-Electric	0	0	0	0	0	0	0
Irrigation	13,806	24,054	20,977	18,417	16,497	14,994	13,645
Mining	769	1,003	1,146	1,244	1,344	1,447	1,527
Livestock	868	868	868	868	868	868	868
Total Lavaca-Guadalupe Basin Demand	45,692	60,735	61,131	61,500	62,371	63,407	65,149
Lavaca-Guadalupe Basin Supply							
Municipal		14,341	14,341	14,341	14,341	14,341	14,341
Industrial		39,353	39,353	39,353	39,353	39,353	39,353
Steam-Electric		0	0	0	0	0	0
Irrigation		24,054	22,891	21,889	21,024	20,277	19,632
Mining		1,006	1,147	1,245	1,345	1,447	1,527
Livestock		868	868	868	868	868	868
Unallocated Groundwater Supply		60	319	1,223	1,988	2,633	3,198
Total Lavaca-Guadalupe Basin Supply		79,682	78,919	78,919	78,919	78,919	78,919
Lavaca-Guadalupe Basin Balance [1]							
Municipal		6,639	6,072	5,625	5,297	4,947	4,567
Industrial		12,245	9,482	7,098	4,735	2,649	18
Steam-Electric		0	0	0	0	0	0
Irrigation		0	1,914	3,472	4,527	5,283	5,987
Mining		3	1	1	1	0	0
Livestock		0	0	0	0	0	0
Unallocated Groundwater Supply		60	319	1,223	1,988	2,633	3,198
San Antonio-Nueces Basin Demand							
Municipal	1,261	1,327	1,376	1,379	1,403	1,419	1,412
Industrial	0	0	0	0	0	0	0
Steam-Electric	0	0	0	0	0	0	0
Irrigation	861	78	77	76	75	74	73
Mining	24	153	116	91	70	49	39
Livestock	1,016	1,016	1,016	1,016	1,016	1,016	1,016
Total San Antonio-Nueces Basin Demand	3,162	2,574	2,585	2,562	2,564	2,558	2,540
San Antonio-Nueces Basin Supply							
Municipal		2,687	2,687	2,687	2,687	2,687	2,687
Industrial		69	69	69	69	69	69
Steam-Electric		0	0	0	0	0	0
Irrigation		128	128	128	128	128	128
Mining		157	118	93	71	50	40
Livestock		1,016	1,016	1,016	1,016	1,016	1,016
Unallocated Groundwater Supply		23,791	23,830	23,855	23,877	23,898	23,908
Total San Antonio-Nueces Basin Supply		27,848	27,848	27,848	27,848	27,848	27,848
San Antonio-Nueces Basin Balance [1]							
Municipal		1,360	1,311	1,308	1,284	1,268	1,275
Industrial		69	69	69	69	69	69
Steam-Electric		0	0	0	0	0	0
Irrigation		50	51	52	53	54	55
Mining		4	2	2	1	1	1
Livestock		0	0	0	0	0	0
Unallocated Groundwater Supply		23,791	23,830	23,855	23,877	23,898	23,908

Table C-22 Projected Water Demands, Supplies, and Needs River Basin and South Central Texas Region Summaries South Central Texas Region							
Basin	Total in 2000 (acft)	2010 (acft)	2020 (acft)	2030 (acft)	2040 (acft)	2050 (acft)	2060 (acft)
Rio Grande Basin Demand							
Municipal	2	2	2	2	2	2	2
Industrial	0	0	0	0	0	0	0
Steam-Electric	0	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0	0
Mining	0	0	0	0	0	0	0
Livestock	105	105	105	105	105	105	105
Total Rio Grande Basin Demand	107	107	107	107	107	107	107
Rio Grande Basin Supply							
Municipal		3	3	3	3	3	3
Industrial		0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0
Irrigation		0	0	0	0	0	0
Mining		0	0	0	0	0	0
Livestock		105	105	105	105	105	105
Unallocated Groundwater Supply		2,973	2,973	2,973	2,973	2,973	2,973
Total Rio Grande Basin Supply		3,081	3,081	3,081	3,081	3,081	3,081
Rio Grande Basin Balance [1]							
Municipal		1	1	1	1	1	1
Industrial		0	0	0	0	0	0
Steam-Electric		0	0	0	0	0	0
Irrigation		0	0	0	0	0	0
Mining		0	0	0	0	0	0
Livestock		0	0	0	0	0	0
Unallocated Groundwater Supply		2,973	2,973	2,973	2,973	2,973	2,973
South Central Texas Region Demand							
Municipal	340,028	395,994	451,112	503,376	547,136	592,344	637,235
Industrial	100,195	119,310	132,836	144,801	156,692	167,182	179,715
Steam-Electric	35,379	46,560	104,781	110,537	116,068	121,601	128,340
Irrigation	383,332	379,026	361,187	344,777	329,395	315,143	301,679
Mining	11,757	14,524	15,704	16,454	17,212	17,977	18,644
Livestock	25,660	25,954	25,954	25,954	25,954	25,954	25,954
Total South Central Texas Region Demand	896,351	981,368	1,091,574	1,145,899	1,192,457	1,240,201	1,291,567
South Central Texas Region Supply							
Municipal		384,910	382,713	379,380	375,150	374,685	374,503
Industrial		140,619	140,600	140,512	140,496	140,479	140,466
Steam-Electric		87,890	89,842	89,813	89,782	89,749	89,724
Irrigation		382,193	380,825	378,881	377,847	376,936	376,155
Mining		14,264	15,155	14,812	15,306	15,726	16,155
Livestock		26,080	26,083	26,082	26,081	26,088	26,087
Unallocated Groundwater Supply		136,758	137,849	138,836	139,661	140,340	140,925
Total South Central Texas Region Supply		1,172,714	1,173,067	1,168,316	1,164,323	1,164,003	1,164,015
South Central Texas Region Balance [1]							
Municipal		-11,084	-68,399	-123,996	-171,986	-217,659	-262,732
Industrial		21,309	7,764	-4,289	-16,196	-26,703	-39,249
Steam-Electric		41,330	-14,939	-20,724	-26,286	-31,852	-38,616
Irrigation		3,167	19,638	34,104	48,452	61,793	74,476
Mining		-260	-549	-1,642	-1,906	-2,251	-2,489
Livestock		126	129	128	127	134	133
Unallocated Groundwater Supply		136,758	137,849	138,836	139,661	140,340	140,925

Notes:

[1] The values listed in this section of the table are not necessarily additive due to the fact that demands and supplies are not necessarily located in close proximity to each other.

Appendix D
Summary of Water Management Strategies

Appendix D, Table 1
2011 South Central Texas Regional Water Plan
Water Management Strategies

	Section	Description	Short-term Unit Cost* ($/acft/yr)	Long-term Unit Cost* ($/acft/yr)	Quantity of Water (acft/yr)	First Decade Needed	Notes
Recommended Water Management Strategies	4C.1	Municipal Water Conservation	$ 648	-	72,570	2010	Unit Cost and Quantity at 2060.
	4C.3	Edwards Transfers	$ 454	-	51,875	2010	
	4C.22	Local Groundwater Supplies (Carrizo)	$ 687	$ 258	33,874	2010	Quantity is cumulative of all Recommended WMS. Unit cost is average unit cost.
	4C.36	TWA Regional Carrizo	$ 1,523	$ 512	27,000	2010	
	4C.5	Recycled Water Programs	Varies	Varies	26,756	2010	
	4C.34	Lavaca River Off-Channel Reservoir	$ 701	$ 100	26,242	2010	LNRA WMS
	4C.1	Irrigation Water Conservation	$ 143	-	20,709	2010	Maximum potential for Atascosa, Medina, & Zavala Counties.
	4C.2	Drought Management	Varies	Varies	41,240	2010	
	4C.27	CRWA Wells Ranch Project	$ 725	$ 672	11,000	2010	
	4C.30	Medina Lake Firm-Up (ASR)	$ 1,696	$ 450	9,933	2010	15 Wells size
	4C.22	Local Groundwater Supplies (Trinity)	$ 710	$ 116	4,436	2010	Quantity is cumulative of all Recommended WMS. Unit cost is average unit cost.
	4C.8	Wimberley and Woodcreek Water Supply Project	$ 2,429	$ 1,772	4,480	2010	
	4C.9	Storage Above Canyon Reservoir (ASR)	$ 1,772	$ 587	3,140	2010	Meets needs Kendall County Rural
	4C.1	Mining Water Conservation	Varies	Varies	2,492	2010	
	4C.6	Facilities Expansions	-	-	-	2010	
	4C.32	Surface Water Rights	-	-	-	2010	Acquisition of existing rights only. As new supplies and associated costs have not been quantified, this strategy is more explicitly identified as an activity consistent with the 2011 Regional Water Plan.
	4C.21	GBRA Simsboro Project	$ 982	$ 386	49,777	2020	
	4C.10	GBRA-Exelon Project	$ 641	$ 224	49,126	2020	River Diversion
	4C.20	Hays/Caldwell PUA Project	$ 1,245	$ 439	35,000	2020	CRWA, San Marcos, Kyle, & Buda
	4C.23	Brackish Wilcox Groundwater for SAWS	$ 1,245	$ 465	26,400	2020	
	4C.15	GBRA Mid-Basin (Surface Water)	$ 2,204	$ 405	25,000	2020	
	4C.4	Edwards Aquifer Recharge – Type 2 Projects	$ 2,005	$ 340	21,577	2020	Includes full spectrum of potential projects.
	4C.24	Brackish Wilcox Groundwater for Regional Water Alliance	$ 1,293	$ 536	14,700	2020	13.1 MGD Capacity
	4C.18	Regional Carrizo for SAWS	$ 1,343	$ 324	11,687	2020	
	4C.19	Regional Carrizo for SSLGC Project Expansion	$ 608	$ 293	10,364	2020	
	4C.29	LCRA-SAWS Water Project	$ 2,394	$ 555	90,000	2030	
	4C.13	GBRA Lower Basin Storage (100 acre site)	$ 104	$ 15	28,369	2030	
	4C.14	GBRA New Appropriation (Lower Basin)	$ 1,953	$ 239	11,300	2030	100,000 acft Off-Channel Storage Size
	4C.28	CRWA Siesta Project	$ 1,421	$ 497	5,042	2030	
	4C.25	Brackish Wilcox Groundwater for SSWSC	$ 1,883	$ 766	1,120	2040	
	4C.22	Local Groundwater Supplies (Gulf Coast)	$ 1,823	$ 637	161	2040	City of Kenedy
	4C.31	Seawater Desalination	$ 2,284	$ 941	84,012	2060	San Antonio Bay source.
		Purchase from WWP (GBRA)	Varies	Varies	*	2010	* Quantity already accounted for in other WMSs
		Purchase from WWP (CRWA)	Varies	Varies	*	2010	* Quantity already accounted for in other WMSs
		Purchase from WWP (BMWD)	Varies	Varies	*	2010	* Quantity already accounted for in other WMSs
		Purchase from WWP (SAWS)	Varies	Varies	*	2010	* Quantity already accounted for in other WMSs
		Purchase from WWP (SHWSC)	Varies	Varies	*	2010	* Quantity already accounted for in other WMSs
		Purchase from WWP (TWA)	Varies	Varies	*	2010	* Quantity already accounted for in other WMSs
		Purchase from WWP (LNRA)	Varies	Varies	*	2010	* Quantity already accounted for in other WMSs
		Purchase from WWP (SSLGC)	Varies	Varies	*	2010	* Quantity already accounted for in other WMSs
Alternative Water Management Strategies	4C.12	LGWSP for Upstream GBRA Needs	$ 1,506	$ 536	60,000		
	4C.13	GBRA Lower Basin Storage (500 acre site)	$ 109	$ 14	59,569		
	4C.11	LGWSP for Upstream GBRA Needs at Reduced Capacity	$ 2,565	$ 726	35,000		
	4C.16	GBRA Mid-Basin Project (Conjunctive Use)	$ 1,779	$ 425	25,000		
	4C.17	Regional Carrizo for Guadalupe Basin (GBRA)	$ 1,280	$ 454	25,000		
	4C.30	Medina Lake Firm-Up (OCR)	$ 1,197	$ 199	9,078		Site 3
	4C.22	Local Groundwater Supplies (Barton Springs Edwards)	$ 203	$ 47	1,358		Goforth WSC
	4C.26	Calhoun County Brackish Groundwater Project	$ 2,679	$ 1,064	1,344		
	4C.22	Local Groundwater Supplies (Carrizo) (Yancy WSC)	$ 517	$ 99	1,210		Yancy WSC
		Purchase from WWP (GBRA)	Varies	Varies			
		Purchase from WWP (CRWA)	Varies	Varies			
		Purchase from WWP (SAWS)	Varies	Varies			
Water Management Strategies Requiring Further Study & Funding	4C.33	Balancing Storage (ASR and/or Surface)					
	4C.7	Brush Management (Above Canyon Reservoir)	$ 897	$ 244	5,500		25% Participation
	4C.9	Storage Above Canyon Reservoir (Off-Channel)					
	4C.35	Palmetto Bend - Stage II	$ 887	$ 84	22,964		LNRA WMS
		CRWA Dunlap Project					
		Edwards Recharge and Recirculation Systems					
		Mesa Water Supply Project (SAWS)					
		Rainwater Harvesting					
		Regional Carrizo for BMWD					
		Regional Carrizo for SSLGC Project Expansion - Wilson County Option					
		SAWS Other Water Supplies (Planned RFP)					
		Seawater Desalination for Guadalupe River Basin					
		Weather Modification					

**Cost in September 2008 dollars*

Recommended Water Management Strategy Total for Municipal, Industrial, Steam-Electric, and Mining Uses Only = ~737,000 acft/yr

Appendix D, Table 2
2011 South Central Texas Regional Water Plan
Recommended Water Management Strategies

Region	Section	Description	Total Capital Costs	First Decade Estimated Annual Average Unit Cost ($/acft/yr)	Water Supply Volume (acre-feet per year)						Year 2060 Estimated Annual Average Unit Cost ($/acft/yr)
					2010	2020	2030	2040	2050	2060	
L	4C.1	Municipal Water Conservation	-	$ 648	13,231	22,742	31,616	40,528	53,925	72,570	-
L	4C.1	Irrigation Water Conservation	$1,035,034	$ 143	20,087	17,561	14,429	11,421	8,543	7,238	-
L	4C.1	Mining Water Conservation	-	Varies	521	726	1,771	1,991	2,292	2,492	Varies
L	4C.2	Drought Management	-	Varies	41,240	0	0	0	0	0	Varies
L	4C.3	Edwards Transfers	$23,551,250	$ 454	45,896	47,479	48,931	49,870	50,855	51,875	-
L	4C.4	Edwards Aquifer Recharge – Type 2 Projects	$527,643,000	$ 2,005	0	13,451	13,451	13,451	13,451	21,577	$ 340
L	4C.5	Recycled Water Programs	$465,339,000	Varies	21,666	26,046	30,151	34,178	37,706	41,737	Varies
L	4C.6	Facilities Expansions	$144,560,579	-	0	0	0	0	0	0	-
L	4C.8	Wimberley and Woodcreek Water Supply Project	$33,771,000	$ 2,429	1,120	4,480	4,480	4,480	4,480	4,480	$ 1,772
L	4C.9	Storage Above Canyon Reservoir (ASR)	$37,326,000	$ 1,772	0	3,140	3,140	3,140	3,140	3,140	$ 587
L	4C.10	GBRA-Exelon Project	$280,598,000	$ 646	0	49,126	49,126	49,126	49,126	49,126	$ 224
L	4C.13	GBRA Lower Basin Storage (100 acre site)	$33,800,000	$ 104	0	0	28,369	28,369	28,369	28,369	$ 60
L	4C.14	GBRA New Appropriation (Lower Basin)	$246,849,000	$ 1,910	0	0	11,300	11,300	11,300	11,300	$ 223
L	4C.15	GBRA Mid-Basin (Surface Water)	$546,941,000	$ 1,879	0	25,000	25,000	25,000	25,000	25,000	$ 370
L	4C.18	Regional Carrizo for SAWS	$136,550,000	$ 1,343	0	11,687	11,687	11,687	11,687	11,687	$ 324
L	4C.19	Regional Carrizo for SSLGC Project Expansion	$28,189,000	$ 568	0	10,364	10,364	10,364	10,364	10,364	$ 331
L	4C.20	Hays/Caldwell PUA Project	$323,296,000	$ 1,245	0	12,000	12,000	35,000	35,000	35,000	$ 439
L	4C.21	GBRA Simsboro Project	$330,782,000	$ 982	0	30,000	30,000	30,000	49,777	49,777	$ 386
L	4C.22	Local Groundwater Supplies (Carrizo)	$166,718,000	$ 687	6,773	11,610	15,440	17,255	23,947	33,874	$ 258
L	4C.22	Local Groundwater Supplies (Gulf Coast)	$2,194,000	$ 1,823	0	0	0	161	161	161	$ 637
L	4C.22	Local Groundwater Supplies (Trinity)	$30,224,000	$ 710	2,016	3,146	3,468	3,630	3,952	4,436	$ 116
L	4C.23	Brackish Wilcox Groundwater for SAWS	$236,220,000	$ 1,245	0	12,000	21,000	26,400	26,400	26,400	$ 465
L	4C.24	Brackish Wilcox Groundwater for RWA	$127,753,000	$ 1,293	0	0	7,600	7,600	13,200	14,700	$ 536
L	4C.25	Brackish Wilcox Groundwater for SSWSC	$14,357,000	$ 1,883	0	0	0	1,120	1,120	1,120	$ 766
L	4C.27	CRWA Wells Ranch Project	$34,910,000	$ 725	11,000	11,000	11,000	11,000	11,000	11,000	$ 672
L	4C.28	CRWA Siesta Project	$53,481,000	$ 1,421	0	0	1,000	5,042	5,042	5,042	$ 497
L	4C.29	LCRA-SAWS Water Project	$1,986,684,000	$ 2,394	0	0	90,000	90,000	90,000	90,000	$ 829
L	4C.30	Medina Lake Firm-Up (ASR)	$146,237,000	$ 1,696	9,933	9,933	9,933	9,933	9,933	9,933	$ 450
L	4C.31	Seawater Desalination	$1,293,827,000	$ 2,284	0	0	0	0	0	84,012	$ 941
L	4C.34	Lavaca River Off-Channel Reservoir	$224,183,000	$ 701	26,242	26,242	26,242	26,242	26,242	26,242	$ 100
L	4C.36	TWA Regional Carrizo	$313,060,000	$ 1,523	0	27,000	27,000	27,000	27,000	27,000	$ 512

Appendix D, Table 3.
Regional Water Supply Plan Summary

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Atascosa County		**Table 2-12**		**Table 4A-1**	**Section 4B.2.1**		
Benton City WSC	1,189	2,569	0	885	Municipal Water Conservation		153
					Local Carrizo Aquifer		1,613
					Purchase from WWP (BMWD)		
Charlotte	296	350	0	0	Municipal Water Conservation	20	43
					Drought Management	15	
					Purchase from WWP (BMWD)		
					Local Carrizo Aquifer		
					Facilities Expansions		
Jourdanton	801	1,026	112	338	Municipal Water Conservation	60	222
					Drought Management	40	
					Local Carrizo Aquifer	403	403
Lytle	479	526	141	188	Municipal Water Conservation	38	108
					Edwards Transfers	141	188
					Drought Management	24	
McCoy WSC	1,106	2,328	0	812	Municipal Water Conservation		129
					Local Carrizo Aquifer		1,613
Pleasanton	1,906	2,151	0	0	Municipal Water Conservation	156	615
					Local Carrizo Aquifer		
					Facilities Expansions		
Poteet	735	752	0	0	Municipal Water Conservation	60	213
Rural	449	97	0	0	Municipal Water Conservation	11	
					Drought Management[1]		
					Purchase from WWP (BMWD)		
					Edwards Transfers		
					Facilities Expansions		
Industrial	6	6	0	0			
Steam-Electric	7,000	7,672	263	942	Local Carrizo Aquifer	807	1613
Mining	1,298	1,509	0	0			
Irrigation	40,885	34,502	6,095	291	Irrigation Water Conservation	5369	291
Livestock	1,745	1,745	0	0			
Bexar County				**Table 4A-1**	**Section 4B.2.2**		
Alamo Heights	2,071	2,170	592	691	Municipal Water Conservation	175	865
					Edwards Transfers	592	691
					Drought Management	104	
Atascosa Rural WSC	941	1,613	546	1,218	Municipal Water Conservation		22
					Edwards Transfers	546	1,218
					Drought Management	47	
					Purchase from WWP (BMWD)	120	120
Balcones Heights	514	670	0	0	Municipal Water Conservation	4	37
Bexar Metropolitan Water District	9,888	12,405	3,944	7,038	Municipal Water Conservation		293
					Purchase from WWP (BMWD)	3,944	7,038
Castle Hills	820	771	96	47	Municipal Water Conservation	61	166
					Drought Management	41	
					Purchase from WWP (BMWD)	96	47
China Grove	376	695	0	0	Municipal Water Conservation	28	217
Converse	1,907	3,564	0	969	Municipal Water Conservation		110
					Purchase from WWP (BMWD)	0	969
East Central SUD	1,523	2,793	0	942	Municipal Water Conservation		104
					Purchase from WWP (CRWA)	0	942
Elmendorf	112	156	0	0	Municipal Water Conservation		6
Fair Oaks Ranch	1,434	1,479	0	0	Municipal Water Conservation	125	509
Helotes	1,537	4,047	0	0	Municipal Water Conservation	115	993
Hill Country Village	838	826	730	718	Municipal Water Conservation	77	365
					Purchase from WWP (BMWD)	730	718
					Drought Management	42	
Hollywood Park	2,314	2,616	1,969	2,271	Municipal Water Conservation	212	1,154
					Purchase from WWP (BMWD)	1,969	2,271
					Drought Management	116	
Kirby	1,005	1,034	335	364	Edwards Transfers	335	364
					Drought Management	50	
Lackland AFB (CDP)	3,104	3,016	0	0	Municipal Water Conservation	268	1300
Leon Valley	1,091	1,036	0	0	Municipal Water Conservation		12
Live Oak	1,145	1,284	0	0	Municipal Water Conservation		
Olmos Park	403	484	0	0	Municipal Water Conservation	9	33
San Antonio	216,945	317,727	77,783	194,228	Municipal Water Conservation	5,752	23,711
					Purchase from WWP (SAWS)	68,760	169,752
					Purchase from WWP (BMWD)	9,023	24,476
					Drought Management (SAWS)	37,622	
					Drought Management (BMWD)	1,233	

Appendix D, Table 3 (Continued)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Selma	1,667	2,605	0	749	Municipal Water Conservation	135	1,122
					Purchase from WWP (SSLGC)	0	749
Shavano Park	819	880	320	381	Municipal Water Conservation	73	382
					Drought Management	41	
					Purchase from WWP (SAWS)	320	381
Somerset	405	709	0	0	Municipal Water Conservation	29	177
St. Hedwig	310	501	0	0	Municipal Water Conservation		14
Terrell Hills	863	1,057	0	0	Municipal Water Conservation	14	65
Universal City	2,608	3,101	113	606	Municipal Water Conservation		148
					Edwards Transfers	113	606
					Drought Management	130	
Water Service Inc. (Apex Water Ser.)	951	2,058	911	2,018	Municipal Water Conservation		105
					Edwards Transfers	587	1,116
					Purchase from WWP (TWA)		1,000
					Purchase from WWP (SSLGC)	324	324
Windcrest	1,204	1,182	235	214	Municipal Water Conservation	99	385
					Edwards Transfer	235	235
Rural	6,624	7,496	0	655	Municipal Water Conservation	49	505
					Purchase from WWP (SAWS)	0	655
Industrial	25,951	42,112	1,340	17,588	Purchase from WWP (SAWS)	12,000	30,000
					Recycled Water	1,340	17,588
Steam-Electric	20,395	39,614	0	0			
Mining	3,582	4,766	0	1,216	Mining Water Conservation		1,216
Irrigation	15,273	12,306	0	0			
Livestock	1,319	1,319	0	0			
Caldwell County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.3**		
Aqua WSC	267	580	49	362	Municipal Water Conservation		19
					Local Carrizo Aquifer	403	403
					Drought Management	13	
Creedmoor-Maha WSC	244	583	108	447	Municipal Water Conservation		11
					Purchase from WWP (GBRA)	108	447
Lockhart	2,451	5,285	0	2,512	Municipal Water Conservation		333
					Local Carrizo Aquifer		2823
					Purchase from WWP (GBRA)		1,120
					Drought Management	123	
Luling	1,067	1,594	0	506	Municipal Water Conservation	70	192
					Local Carrizo Aquifer		807
					Purchase from WWP (GBRA)		1,680
					Drought Management	53	
Martindale	125	158	0	0	Purchase from WWP (CRWA)	0	0
					Drought Management	6	
Martindale WSC	189	329	42	182	Purchase from WWP (CRWA)	396	896
					Drought Management	9	
Maxwell WSC	660	1,733	0	689	Municipal Water Conservation		55
					Purchase from WWP (CRWA)	0	2,000
Mustang Ridge	135	329	19	213	Municipal Water Conservation	10	116
					Purchase from WWP (GBRA)	19	213
					Drought Management	6	
Polonia WSC	668	1,656	0	265	Local Wilcox		323
Rural	237	143	0	0	Municipal Water Conservation	21	29
Industrial	15	29	0	0			
Steam-Electric	0	0	0	0			
Mining	14	18	0	0			
Irrigation	1,044	578	0	0			
Livestock	918	918	0	0			
Calhoun County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.4**		
Calhoun County WSC	436	632	0	0			
Point Comfort	224	667	46	489	Municipal Water Conservation	18	98
					Purchase from WWP (LNRA)	46	489
					Drought Management	11	
Port Lavaca	1,769	2,345	0	0	Municipal Water Conservation		89
Seadrift	252	258	0	0	Municipal Water Conservation	20	41
Rural (Port O'Conner MUD)	267	269	0	0	Municipal Water Conservation		11
Industrial	49,784	72,238	0	209	Purchase from WWP (LNRA)	10,000	10,000
Steam-Electric	0	0	0	0			
Mining	32	38	0	0			
Irrigation	15,568	9,581	0	0			
Livestock	342	342	0	0			
Comal County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.5**		
Bulverde City	1,053	4,995	653	4,595	Municipal Water Conservation		430
					Purchase from WWP (GBRA)	653	4,595
					Drought Management	53	

Appendix D, Table 3 (Continued)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Canyon Lake WSC	2,928	13,331	0	6,769	Municipal Water Conservation		1,414
					Purchase from WWP (GBRA)		6,769
					Drought Management[1]		
					Purchase from WWP (TWA)		12,000
Garden Ridge	565	1,360	257	1,052	Municipal Water Conservation	42	460
					Purchase from WWP (SSLGC)	257	1052
					Drought Management	28	
New Braunfels	10,509	26,226	0	13,920	Municipal Water Conservation	815	8,152
					Drought Management	525	
					Purchase from WWP (GBRA)		13,920
Rural	2,721	3,998	1,782	2,960	Municipal Water Conservation		85
					Purchase from WWP (GBRA)	891	1,480
					Purchase from NBU (term)	891	
					Purchase from WWP (TWA)		1,480
Industrial	7,729	11,553	5,199	9,022	Recycled Water	5,199	9,022
Steam-Electric	0	0	0	0			
Mining	2,678	3,401	439	1,173	Mining Water Conservation	439	1,173
Irrigation	204	119	0	0			
Livestock	298	298	0	0			
DeWitt County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.6**		
Cuero	1,249	1,177	0	0	Municipal Water Conservation	99	218
Yoakum	352	328	0	0	Municipal Water Conservation	14	27
Yorktown	343	318	0	0	Municipal Water Conservation		13
Rural	1,013	912	0	0	Municipal Water Conservation		6
Industrial	184	254	0	0			
Steam-Electric	0	0	0	0			
Mining	64	71	0	0			
Irrigation	159	54	0	0			
Livestock	1,689	1,689	0	0			
Dimmit County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.7**		
Asherton	286	279	0	0	Municipal Water Conservation	20	64
Big Wells	149	145	0	0	Municipal Water Conservation	11	33
Carrizo Springs	1,842	1,836	0	0	Municipal Water Conservation	152	777
Rural	284	263	0	0			
Industrial	0	0	0	0			
Steam-Electric	0	0	0	0			
Mining	1,003	1,095	0	0			
Irrigation	10,611	8,987	0	0			
Livestock	552	552	0	0			
Frio County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.8**		
Dilley	1,229	1,825	0	0	Municipal Water Conservation	104	772
Pearsall	1,443	1,449	0	0	Municipal Water Conservation	116	324
Rural	727	1,007	0	0	Municipal Water Conservation		18
Industrial	0	0	0	0			
Steam-Electric	289	91	0	0			
Mining	109	96	0	0			
Irrigation	82,017	68,592	0	0			
Livestock	1,209	1,209	0	0			
Goliad County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.9**		
Goliad	416	594	0	0	Municipal Water Conservation	30	100
Rural	608	848	0	0	Municipal Water Conservation		16
Industrial	4	24	0	0			
Steam-Electric	9,027	16,643	0	0			
Mining	398	46	0	0			
Irrigation	309	149	0	0			
Livestock	920	920	0	0	Livestock Water Conservation		
Gonzales County	**Table 2-12**		**Table 4-10**		**Section 4B.2.10**		
Gonzales	1,545	1,759	0	0	Municipal Water Conservation	116	414
Gonzales County WSC	1,748	2,360	0	0	Municipal Water Conservation	143	1,002
					Purchase from WWP (TWA)		1,000
Nixon	438	488	0	0	Municipal Water Conservation	35	93
Waelder	154	203	0	0	Municipal Water Conservation		11
Rural	393	204	0	0	Municipal Water Conservation	6	3
Industrial	2,400	3,402	0	0			
Steam-Electric	0	0	0	0			
Mining	28	24	0	0			
Irrigation	1,304	621	0	0			
Livestock	5,453	5,453	0	0			
Guadalupe County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.11**		
Cibolo	866	2,730	0	0	Municipal Water Conservation	65	645
					Purchase from WWP (CRWA)	700	7,180
					Purchase from WWP (BMWD)	500	500

Appendix D, Table 3 (Continued)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Crystal Clear WSC	2,041	5,551	0	2,716	Municipal Water Conservation		184
					Local Wilcox Aquifer		2,823
					Purchase from WWP (CRWA)	1,300	5,185
					Purchase from WWP (SSLGC)		900
					Purchase from WWP (SHWSC)	0	0
Green Valley SUD	3,039	7,826	0	547	Municipal Water Conservation		20
					Purchase from WWP (CRWA)	700	9,500
					Purchase from NBU	552	552
Marion	164	251	0	75	Municipal Water Conservation		10
					Purchase from WWP (CRWA)	100	400
City of New Berlin	70	180	0	0			
Santa Clara	220	954	76	810	Municipal Water Conservation		79
					Purchase from WWP (CRWA)	100	900
					Drought Management	11	
Schertz	1,451	12,059	0	2,420	Municipal Water Conservation	22	1,088
					Purchase from WWP (SSLGC)	0	5,923
Seguin	5,018	9,047	0	0	Municipal Water Conservation	377	2,131
					Purchase from WWP (SSLGC)		
Springs Hill WSC	2,349	4,330	0	0	Municipal Water Conservation	174	877
					Purchase from WWP (TWA)		3,000
					Brackish Wilcox Groundwater for RWA		1,500
					Facilities Expansions		
Rural	270	13	0	0	Municipal Water Conservation	2	
Industrial	2,638	4,097	0	0			
Steam-Electric	4,788	7,515	0	0			
Mining	306	353	0	0			
Irrigation	1,070	705	0	0			
Livestock	1,057	1,057	0	0			
Hays (Part) County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.12**		
County Line WSC	1,151	3,677	0	2,386	Municipal Water Conservation	43	473
					Local Trinity Aquifer		2,420
					Purchase from WWP (CRWA)	0	570
					Drought Management	58	
					Recycled Water		
Goforth WSC	1,156	3,485	0	1,872	Municipal Water Conservation		111
					Hays/Caldwell PUA Project		1639
					Purchase from WWP (GBRA)		300
Kyle	2,740	5,203	0	1,699	Municipal Water Conservation		443
					Hays/Caldwell PUA Project		9,355
					Drought Management	137	
Mountain City	45	183	0	134	Municipal Water Conservation	1	22
					Hays/Caldwell PUA Project		150
Niederwald	130	449	58	377	Municipal Water Conservation		42
					Purchase from WWP (GBRA)	58	377
					Drought Management	7	
Plum Creek Water Company	566	1,630	0	657	Municipal Water Conservation		54
					Purchase from WWP (GBRA)		657
San Marcos	8,038	24,439	0	11,387	Municipal Water Conservation	417	2,656
					Hays/Caldwell PUA Project		11,910
Wimberley WSC	776	1,966	219	1,409	Municipal Water Conservation		70
					Wimberley and Woodcreek Water Supply	320	1,480
					Drought Management	39	
Woodcreek	246	610	23	387	Municipal Water Conservation		37
					Wimberley and Woodcreek Water Supply	100	400
					Drought Management	12	
Woodcreek Utilities	748	2,873	455	2,580	Municipal Water Conservation	56	771
					Wimberley and Woodcreek Water Supply	700	2,600
Rural	1,444	2,584	0	0	Municipal Water Conservation		184
Industrial	212	386	0	0			
Steam-Electric	1,009	3,627	0	0			
Mining	142	163	82	103	Mining Water Conservation	82	103
Irrigation	353	338	0	0			
Livestock	280	280	0	0			
Karnes County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.13**		
El Oso WSC	555	728	0	0	Municipal Water Conservation	41	139
Falls City	113	145	0	0	Municipal Water Conservation	8	23
Karnes City	432	512	182	262	Municipal Water Conservation		11
					Local Carrizo	323	323
Kenedy	763	993	0	118	Municipal Water Conservation	58	268
					Local Gulf Coast Aquifer		161
Runge	195	247	0	0	Municipal Water Conservation	15	37
Rural (TDCJ)	500	500	0	0			
Rural	372	822	0	0	Municipal Water Conservation	68	258
Industrial	118	137	0	0			

Appendix D, Table 3 (Continued)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Steam-Electric	0	0	0	0			
Mining	106	100	0	0			
Irrigation	1,382	836	0	0			
Livestock	1,185	1,185	0	0			
Kendall County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.14**		
Boerne	1,570	4,282	0	276	Municipal Water Conservation	98	816
					Western Canyon WTP Expansion		276
Rural	2,750	7,460	0	3,514	Municipal Water Conservation		264
					Purchase from WWP (GBRA)		3,140
					Western Canyon WTP Expansion		374
Industrial	0	0	0	0			
Steam-Electric	0	0	0	0			
Mining	6	6	0	0			
Irrigation	714	646	0	0			
Livestock	446	446	0	0			
LaSalle County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.15**		
Cotulla	1,407	1,743	0	0	Municipal Water Conservation	118	745
Encinal	110	107	0	0	Municipal Water Conservation	9	14
Rural	282	500	0	0	Municipal Water Conservation	3	42
Industrial	0	0	0	0			
Steam-Electric	0	0	0	0			
Mining	0	0	0	0			
Irrigation	4,791	4,097	0	0			
Livestock	1,687	1,687	0	0			
Medina County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.16**		
Castroville	680	961	294	575	Municipal Water Conservation	53	302
					Edwards Transfers	294	575
					Drought Management	34	
					Purchase from WWP (BMWD)		
Devine	837	896	0	0	Municipal Water Conservation	63	196
East Medina SUD	881	1,385	0	491	Municipal Water Conservation		54
					Edwards Transfers		491
					Drought Management	44	
Hondo	1,784	2,717	319	1,252	Municipal Water Conservation	125	640
					Edwards Transfers	319	1,252
					Drought Management	89	
La Coste	205	281	92	168	Municipal Water Conservation		11
					Edwards Transfers	92	168
					Drought Management	10	
Natalia	330	519	194	383	Municipal Water Conservation	24	73
					Edwards Transfers	194	383
					Drought Management	17	
Yancey WSC	832	1,603	214	985	Municipal Water Conservation	61	316
					Edwards Transfers	214	985
Rural	1,527	2,949	0	1,296	Municipal Water Conservation		244
					Edwards Transfers		1,296
Industrial	67	103	0	0			
Steam-Electric	0	0	0	0			
Mining	130	143	0	0			
Irrigation	54,450	44,015	7,770	0	Irrigation Water Conservation	7,770	
Livestock	1,298	1,298	0	0			
Refugio County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.17**		
Refugio	645	777	0	0	Municipal Water Conservation	44	144
Woodsboro	283	293	0	0	Municipal Water Conservation	5	20
Rural	321	232	0	0			
Industrial	0	0	0	0			
Steam-Electric	0	0	0	0			
Mining	7	8	0	0			
Irrigation	69	69	0	0			
Livestock	623	623	0	0			
Uvalde County	**Table 2-12**		**Table 4A-1**		**Section 4B.2.18**		
Sabinal	407	389	127	109	Municipal Water Conservation	34	145
					Edwards Transfers	127	109
					Drought Management	20	
Uvalde	6,087	6,178	3,172	3,263	Municipal Water Conservation	521	2,652
					Edwards Transfers	3,172	3,263
					Drought Management	304	
Rural	1,572	2,532	0	0	Municipal Water Conservation		137
Industrial	432	538	0	0			
Steam-Electric	0	0	0	0			
Mining	313	418	0	0			
Irrigation	55,791	45,703	0	0			
Livestock	1,284	1,284	0	0			

Appendix D, Table 3 (Continued)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Victoria County	Table 2-12		Table 4A-1		**Section 4B.2.19**		
Victoria	11,924	14,360	0	0	Municipal Water Conservation	874	2,485
Rural	2,666	3,674	0	310	Municipal Water Conservation		32
					Purchase from WWP (GBRA)		310
Industrial	28,726	43,520	0	14,441	Purchase from WWP (GBRA)		14,441
Steam-Electric	4,052	53,178	1,791	51,076	Purchase from WWP (GBRA - Exelon)		49,126
					Purchase from WWP (GBRA)	1,791	1,950
					Steam Electric Water Conservation	500	500
Mining	3,944	6,041	0	0			
Irrigation	9,936	4,759	0	0			
Livestock	1,085	1,085	0	0			
Wilson County	Table 2-12		Table 4A-1		**Section 4B.2.20**		
Floresville	1,805	3,000	0	433	Municipal Water Conservation	136	714
					Local Carrizo Aquifer		484
La Vernia	278	764	0	0	Municipal Water Conservation	21	227
					Purchase from WWP (CRWA)	400	400
Oak Hills WSC	693	2,160	0	298	Municipal Water Conservation		136
					Local Carrizo Aquifer		323
Poth	348	585	0	0	Municipal Water Conservation	20	64
SS WSC	1,563	5,030	223	3,690	Municipal Water Conservation		221
					Local Carrizo Aquifer	807	4,033
					Purchase from WWP (CRWA)		690
					Brackish Wilcox Groundwater for SS WSC		1120
					Drought Management	78	
Stockdale	350	558	0	0	Municipal Water Conservation	27	171
Sunko WSC	613	1,326	0	16	Municipal Water Conservation	3	92
					Local Carrizo Aquifer		161
Rural	609	2,006	0	33	Municipal Water Conservation		116
Industrial	1	1	0	0			
Steam-Electric	0	0	0	0			
Mining	242	218	0	0			
Irrigation	11,296	6,330	0	0			
Livestock	1,808	1,808	0	0			
Zavala County	Table 2-12		Table 4A-1		**Section 4B.2.21**		
Crystal City	2,247	2,370	0	0	Municipal Water Conservation	192	1,002
Rural	864	1,371	0	0	Municipal Water Conservation	42	149
Industrial	1,043	1,315	0	0			
Steam-Electric	0	0	0	0			
Mining	122	130	0	0			
Irrigation	71,800	58,692	54,600	41,492	Irrigation Water Conservation	6,948	6,948
Livestock	756	756	0	0			
Wholesale Water Providers	Tables 2-13 through 2-19		Table 4A-3		**Section 4B.3**		
San Antonio Water System	217,954	328,442	73,600	193,264	Municipal Water Conservation[2]		
					Drought Management	37,622	0
					Edwards Transfers	35,935	35,935
					ASR Project and Phased Expansion	3,800	16,000
					Recycled Water Program Expansion	15,127	15,127
					Regional Carrizo for Bexar County		11,687
					Edwards Aquifer Recharge – Type 2 Projects		21,577
					Brackish Groundwater Desalination (Wilcox)		26,400
					LCRA/SAWS Water Project		90,000
					Seawater Desalination		84,012
Guadalupe-Blanco River Authority	137,065	279,484	0	67,580	Municipal Water Conservation[2]		
					Wimberley and Woodcreek Water Supply Project	4,480	
					Simsboro Groundwater Project		49,777
					GBRA Mid-Basin/Gonzales Project (Surface Water)		25,000
					Storage Above Canyon Reservoir (ASR)		3,140
					GBRA/Exelon Project		49,126
					GBRA Lower Basin Storage		28,369
					GBRA New Appropriation (Lower Basin)		11,500
					Western Canyon WTP Expansion		5,600
Bexar Met	43,439	57,954	16,638	35,418	Municipal Water Conservation[2]		
					Edwards Transfers	3,000	3,000
					Local Trinity	2,016	2,016
					Local Carrizo	4,030	16,129
					Medina Lake Firm-Up (ASR – 15 wells)	9,933	9,933
					Purchase from WWP (CRWA)	2,800	8,250

Appendix D, Table 3 (Concluded)

County/Water User Group	Demand 2010 (acft)	Demand 2060 (acft)	Need (Shortage) 2010 (acft)	Need (Shortage) 2060 (acft)	Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS 2010 (acft)	Amount from WMS 2060 (acft)
Canyon Regional Water Authority	21,054	53,534	7,920	40,400	Municipal Water Conservation[2]		
					Wells Ranch Project Phase I	5,200	5,200
					Wells Ranch Project Phase II	5,800	5,800
					Purchase from WWP (GBRA)		5,000
					Brackish Wilcox Groundwater for RWA		11,200
					Siesta Project		5,042
					Hays/Caldwell PUA Project		10,260
Lavaca-Navidad River Authority			10,046	10,489	Municipal Water Conservation[2]		
					Lavaca River Off-Channel Reservoir	26,242	26,242
Schertz-Seguin Local Government Corp.	12,704	21,071	0	4,935	Municipal Water Conservation[2]		
					Regional Carrizo for SSLGC Project Expansion		10,364
					Brackish Wilcox Groundwater for RWA		2,000
Springs Hill WSC	3,384	5,365	0	0	Municipal Water Conservation[2]		
					Purchase from WWP (TWA)		3,000
					Brackish Wilcox Groundwater for RWA		1,500
Texas Water Alliance	0	18,480	0	18,480	Municipal Water Conservation[2]		
					TWA Regional Carrizo	0	27,000

[1] Historical per capita water use data unavailable or insufficient for calculation of yield.
[2] Municipal Water Conservation

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Appendix E
Socioeconomic Impacts of Unmet Water Needs in the South Central Water Planning Area

(To be provided by Texas Water Development Board
after submittal and review of the Initially Prepared Plan)

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June 15, 2010

Mr. Con Mims
Chairman, South Central Texas
Regional Water Planning Group
c/o Nueces River Authority
P.O. Box 349
Uvalde, Texas 78802-0349

Re: Socioeconomic Impact Analysis of Not Meeting Water Needs for the 2011 South Central Texas Regional Water Plan

Dear Chairman Mims:

We have received your request for technical assistance to complete the socioeconomic impact analysis of not meeting water needs. In response, enclosed is a report that describes our methodology and presents the results. Section 1 provides an overview of the methodology. Section 2 presents results at the regional level, and Appendix 2 show results for individual water user groups.

If you have any questions or comments, please feel free to contact me at (512) 463-7928 or by email at stuart.norvell@twdb.state.tx.us.

Sincerely,

Stuart D. Norvell
Manager, Water Planning Research and Analysis
Water Resources Planning Division

SN/ao

Enclosure

c: Sam Vaughn, HDR Inc
Matt Nelson, TWDB

Socioeconomic Impacts of Projected Water Shortages for the South Central Texas Regional Water Planning Area (Region L)

Prepared in Support of the 2011 South Central Texas Regional Water Plan

Stuart D. Norvell, Managing Economist
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Texas Water Development Board
Austin, Texas

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Austin, Texas

June 2010

Table of Contents

Tables

Introduction

Water shortages during drought would likely curtail or eliminate economic activity in business and industries reliant on water. For example, without water farmers cannot irrigate; refineries cannot produce gasoline, and paper mills cannot make paper. Unreliable water supplies would not only have an immediate and real impact on existing businesses and industry, but they could also adversely affect economic development in Texas. From a social perspective, water supply reliability is critical as well. Shortages would disrupt activity in homes, schools and government and could adversely affect public health and safety. For all of the above reasons, it is important to analyze and understand how restricted water supplies during drought could affect communities throughout the state.

Administrative rules require that regional water planning groups evaluate the impacts of not meeting water needs as part of the regional water planning process, and rules direct TWDB staff to provide technical assistance: "*The executive administrator shall provide available technical assistance to the regional water planning groups, upon request, on water supply and demand analysis, including methods to evaluate the social and economic impacts of not meeting needs*" [(§357.7 (4)(A)]. Staff of the TWDB's Water Resources Planning Division designed and conducted this report in support of the South Central Texas Regional Water Planning Group (Region L).

This document summarizes the results of our analysis and discusses the methodology used to generate the results. Section 1 outlines the overall methodology and discusses approaches and assumptions specific to each water use category (i.e., irrigation, livestock, mining, steam-electric, municipal and manufacturing). Section 2 presents the results for each category where shortages are reported at the regional planning area level and river basin level. Results for individual water user groups are not presented, but are available upon request.

1. Methodology

Section 1 provides a general overview of how economic and social impacts were measured. In addition, it summarizes important clarifications, assumptions and limitations of the study.

1.1 Economic Impacts of Water Shortages

1.1.1 General Approach

Economic analysis as it relates to water resources planning generally falls into two broad areas. Supply side analysis focuses on costs and alternatives of developing new water supplies or implementing programs that provide additional water from current supplies. Demand side analysis concentrates on impacts or benefits of providing water to people, businesses and the environment. Analysis in this report focuses strictly on demand side impacts. When analyzing the economic impacts of water shortages as defined in Texas water planning, three potential scenarios are possible:

1) Scenario 1 involves situations where there are physical shortages of raw surface or groundwater due to drought of record conditions. For example, City A relies on a reservoir with average conservation storage of 500 acre-feet per year and a firm yield of 100 acre feet. In 2010, the city uses about 50 acre-feet per year, but by 2030 their demands are expected to increase to 200

acre-feet. Thus, in 2030 the reservoir would not have enough water to meet the city's demands, and people would experience a shortage of 100 acre-feet assuming drought of record conditions. Under normal or average climatic conditions, the reservoir would likely be able to provide reliable water supplies well beyond 2030.

2) Scenario 2 is a situation where despite drought of record conditions, water supply sources can meet existing use requirements; however, limitations in water infrastructure would preclude future water user groups from accessing these water supplies. For example, City B relies on a river that can provide 500 acre-feet per year during drought of record conditions and other constraints as dictated by planning assumptions. In 2010, the city is expected to use an estimated 100 acre-feet per year and by 2060 it would require no more than 400 acre-feet. But the intake and pipeline that currently transfers water from the river to the city's treatment plant has a capacity of only 200 acre-feet of water per year. Thus, the city's water supplies are adequate even under the most restrictive planning assumptions, but their conveyance system is too small. This implies that at some point – perhaps around 2030 - infrastructure limitations would constrain future population growth and any associated economic activity or impacts.

3) Scenario 3 involves water user groups that rely primarily on aquifers that are being depleted. In this scenario, projected and in some cases existing demands may be unsustainable as groundwater levels decline. Areas that rely on the Ogallala aquifer are a good example. In some communities in the region, irrigated agriculture forms a major base of the regional economy. With less irrigation water from the Ogallala, population and economic activity in the region could decline significantly assuming there are no offsetting developments.

Assessing the social and economic effects of each of the above scenarios requires various levels and methods of analysis and would generate substantially different results for a number of reasons; the most important of which has to do with the time frame of each scenario. Scenario 1 falls into the general category of static analysis. This means that models would measure impacts for a small interval of time such as a drought. Scenarios 2 and 3, on the other hand imply a dynamic analysis meaning that models are concerned with changes over a much longer time period.

Since administrative rules specify that planning analysis be evaluated under drought of record conditions (a static and random event), socioeconomic impact analysis developed by the TWDB for the state water plan is based on assumptions of Scenario 1. Estimated impacts under scenario 1 are point estimates for years in which needs are reported (2010, 2020, 2030, 2040, 2050 and 2060). They are independent and distinct "what if" scenarios for a particular year and shortages are assumed to be temporary events resulting from drought of record conditions. Estimated impacts measure what would happen if water user groups experience water shortages for a period of one year.

The TWDB recognize that dynamic models may be more appropriate for some water user groups; however, combining approaches on a statewide basis poses several problems. For one, it would require a complex array of analyses and models, and might require developing supply and demand forecasts under "normal" climatic conditions as opposed to drought of record conditions. Equally important is the notion that combining the approaches would produce inconsistent results across regions resulting in a so-called "apples to oranges" comparison.

A variety tools are available to estimate economic impacts, but by far, the most widely used today are input-output models (IO models) combined with social accounting matrices (SAMs). Referred to as IO/SAM models, these tools formed the basis for estimating economic impacts for agriculture (irrigation and livestock water uses) and industry (manufacturing, mining, steam-electric and commercial business activity for municipal water uses).

Since the planning horizon extends through 2060, economic variables in the baseline are adjusted in accordance with projected changes in demographic and economic activity. Growth rates for municipal water use sectors (i.e., commercial, residential and institutional) are based on TWDB population forecasts. Future values for manufacturing, agriculture, and mining and steam-electric activity are based on the same underlying economic forecasts used to estimate future water use for each category.

The following steps outline the overall process.

Step 1*: Generate IO/SAM Models and Develop Economic Baseline*

IO/SAM models were estimated using propriety software known as IMPLAN PRO^{TM} (Impact for Planning Analysis). IMPLAN is a modeling system originally developed by the U.S. Forestry Service in the late 1970s. Today, the Minnesota IMPLAN Group (MIG Inc.) owns the copyright and distributes data and software. It is probably the most widely used economic impact model in existence. IMPLAN comes with databases containing the most recently available economic data from a variety of sources.[1] Using IMPLAN software and data, transaction tables conceptually similar to the one discussed previously were estimated for each county in the region and for the region as a whole. Each transaction table contains 528 economic sectors and allows one to estimate a variety of economic statistics including:

- **total sales -** total production measured by sales revenues;
- **intermediate sales -** sales to other businesses and industries within a given region;
- **final sales –** sales to end users in a region and exports out of a region**;**
- **employment -** number of full and part-time jobs (annual average) required by a given industry including self-employment;
- **regional income -** total payroll costs (wages and salaries plus benefits) paid by industries, corporate income, rental income and interest payments; and
- **business taxes -** sales, excise, fees, licenses and other taxes paid during normal operation of an industry (does not include income taxes).

TWDB analysts developed an economic baseline containing each of the above variables using year 2000 data. Since the planning horizon extends through 2060, economic variables in the baseline were allowed to change in accordance with projected changes in demographic and economic activity. Growth rates for municipal water use sectors (i.e., commercial, residential and institutional) are based on TWDB population forecasts. Projections for manufacturing, agriculture, and mining and steam-electric activity are based on the same underlying economic forecasts used to estimate future water use for each category. Monetary impacts in future years are reported in constant year 2006 dollars.

It is important to stress that employment, income and business taxes are the most useful variables when comparing the relative contribution of an economic sector to a regional economy. Total sales as reported in IO/SAM models are less desirable and can be misleading because they include sales to other industries in the region for use in the production of other goods. For example, if a mill buys grain from local farmers and uses it to produce feed, sales of both the processed feed and raw corn are counted

[1]The IMPLAN database consists of national level technology matrices based on benchmark input-output accounts generated by the U.S. Bureau of Economic Analysis and estimates of final demand, final payments, industry output and employment for various economic sectors. IMPLAN regional data (i.e. states, a counties or groups of counties within a state) are divided into two basic categories: 1) data on an industry basis including value-added, output and employment, and 2) data on a commodity basis including final demands and institutional sales. State-level data are balanced to national totals using a matrix ratio allocation system and county data are balanced to state totals.

as "output" in an IO model. Thus, total sales double-count or overstate the true economic value of goods and services produced in an economy. They are not consistent with commonly used measures of output such as Gross National Product (GNP), which counts only final sales.

Another important distinction relates to terminology. Throughout this report, the term *sector* refers to economic subdivisions used in the IMPLAN database and resultant input-output models (528 individual sectors based on Standard Industrial Classification Codes). In contrast, the phrase *water use category* refers to water user groups employed in state and regional water planning including irrigation, livestock, mining, municipal, manufacturing and steam electric. Each IMPLAN sector was assigned to a specific water use category.

Step 2: *Estimate Direct and Indirect Economic Impacts of Water Needs*

Direct impacts are reductions in output by sectors experiencing water shortages. For example, without adequate cooling and process water a refinery would have to curtail or cease operation, car washes may close, or farmers may not be able to irrigate and sales revenues fall. Indirect impacts involve changes in inter-industry transactions as supplying industries respond to decreased demands for their services, and how seemingly non-related businesses are affected by decreased incomes and spending due to direct impacts. For example, if a farmer ceases operations due to a lack of irrigation water, they would likely reduce expenditures on supplies such as fertilizer, labor and equipment, and businesses that provide these goods would suffer as well.

Direct impacts accrue to immediate businesses and industries that rely on water and without water industrial processes could suffer. However, output responses may vary depending upon the severity of shortages. A small shortage relative to total water use would likely have a minimal impact, but large shortages could be critical. For example, farmers facing small shortages might fallow marginally productive acreage to save water for more valuable crops. Livestock producers might employ emergency culling strategies, or they may consider hauling water by truck to fill stock tanks. In the case of manufacturing, a good example occurred in the summer of 1999 when Toyota Motor Manufacturing experienced water shortages at a facility near Georgetown, Kentucky.[2] As water levels in the Kentucky River fell to historic lows due to drought, plant managers sought ways to curtail water use such as reducing rinse operations to a bare minimum and recycling water by funneling it from paint shops to boilers. They even considered trucking in water at a cost of 10 times what they were paying. Fortunately, rains at the end of the summer restored river levels, and Toyota managed to implement cutbacks without affecting production, but it was a close call. If rains had not replenished the river, shortages could have severely reduced output.[3]

To account for uncertainty regarding the relative magnitude of impacts to farm and business operations, the following analysis employs the concept of elasticity. Elasticity is a number that shows how a change in one variable will affect another. In this case, it measures the relationship between a percentage reduction in water availability and a percentage reduction in output. For example, an elasticity of 1.0 indicates that a 1.0 percent reduction in water availability would result in a 1.0 percent reduction in

[2] Royal, W. "*High And Dry - Industrial Centers Face Water Shortages*." in Industry Week, Sept, 2000.

[3] The efforts described above are not planned programmatic or long-term operational changes. They are emergency measures that individuals might pursue to alleviate what they consider a temporary condition. Thus, they are not characteristic of long-term management strategies designed to ensure more dependable water supplies such as capital investments in conservation technology or development of new water supplies.

economic output. An elasticity of 0.50 would indicate that for every 1.0 percent of unavailable water, output is reduced by 0.50 percent and so on. Output elasticities used in this study are:[4]

- if water needs are 0 to 5 percent of total water demand, no corresponding reduction in output is assumed;
- if water needs are 5 to 30 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 0.50 percent reduction in output;
- if water needs are 30 to 50 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 0.75 percent reduction in output; and
- if water needs are greater than 50 percent of total water demand, for each additional one percent of water need that is not met, there is a corresponding 1.0 percent (i.e., a proportional reduction).

In some cases, elasticities are adjusted depending upon conditions specific to a given water user group.

Once output responses to water shortages were estimated, direct impacts to total sales, employment, regional income and business taxes were derived using regional level economic multipliers estimating using IO/SAM models. The formula for a given IMPLAN sector is:

$D_{i,t} = Q_{i,t} *_{,} S_{i,t} * E_Q * RFD_i * DM_{i(Q, L, I, T)}$

where:

$D_{i,t}$ = direct economic impact to sector *i* in period *t*

$Q_{i,t}$ = total sales for sector *i* in period *t* in an affected county

$RFD_{i,}$ = ratio of final demand to total sales for sector *i* for a given region

$S_{i,t}$ = water shortage as percentage of total water use in period *t*

E_Q = elasticity of output and water use

$DM_{i(L, I, T)}$ = direct output multiplier coefficients for labor (L), income (I) and taxes (T) for sector *i*.

Secondary impacts were derived using the same formula used to estimate direct impacts; however, indirect multiplier coefficients are used. Methods and assumptions specific to each water use sector are discussed in Sections 1.1.2 through 1.1.4.

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[4] Elasticities are based on one of the few empirical studies that analyze potential relationships between economic output and water shortages in the United States. The study, conducted in California, showed that a significant number of industries would suffer reduced output during water shortages. Using a survey based approach researchers posed two scenarios to different industries. In the first scenario, they asked how a 15 percent cutback in water supply lasting one year would affect operations. In the second scenario, they asked how a 30 percent reduction lasting one year would affect plant operations. In the case of a 15 percent shortage, reported output elasticities ranged from 0.00 to 0.76 with an average value of 0.25. For a 30 percent shortage, elasticities ranged from 0.00 to 1.39 with average of 0.47. For further information, see, California Urban Water Agencies, "*Cost of Industrial Water Shortages,*" Spectrum Economics, Inc. November, 1991.

General Assumptions and Clarification of the Methodology

As with any attempt to measure and quantify human activities at a societal level, assumptions are necessary and every model has limitations. Assumptions are needed to maintain a level of generality and simplicity such that models can be applied on several geographic levels and across different economic sectors. In terms of the general approach used here several clarifications and cautions are warranted:

1. Shortages as reported by regional planning groups are the starting point for socioeconomic analyses.

2. Estimated impacts are point estimates for years in which needs are reported (i.e., 2010, 2020, 2030, 2040, 2050 and 2060).They are independent and distinct "what if" scenarios for each particular year and water shortages are assumed to be temporary events resulting from severe drought conditions combined with infrastructure limitations. In other words, growth occurs and future shocks are imposed on an economy at 10-year intervals and resultant impacts are measured. Given, that reported figures are not cumulative in nature, it is inappropriate to sum impacts over the entire planning horizon. Doing so, would imply that the analysis predicts that drought of record conditions will occur every ten years in the future, which is not the case. Similarly, authors of this report recognize that in many communities needs are driven by population growth, and in the future total population will exceed the amount of water available due to infrastructure limitations, regardless of whether or not there is a drought. This implies that infrastructure limitations would constrain economic growth. However, since needs as defined by planning rules are based upon water supply and demand under the assumption of drought of record conditions, it improper to conduct economic analysis that focuses on growth related impacts over the planning horizon. Figures generated from such an analysis would presume a 50-year drought of record, which is unrealistic. Estimating lost economic activity related to constraints on population and commercial growth due to lack of water would require developing water supply and demand forecasts under "normal" or "most likely" future climatic conditions.

3. While useful for planning purposes, this study is not a benefit-cost analysis. Benefit cost analysis is a tool widely used to evaluate the economic feasibility of specific policies or projects as opposed to estimating economic impacts of unmet water needs. Nevertheless, one could include some impacts measured in this study as part of a benefit cost study if done so properly. Since this is not a benefit cost analysis, future impacts are not weighted differently. In other words, estimates are not discounted. If used as a measure of economic benefits, one should incorporate a measure of uncertainty into the analysis. In this type of analysis, a typical method of discounting future values is to assign probabilities of the drought of record recurring again in a given year, and weight monetary impacts accordingly. This analysis assumes a probability of one.

4. IO multipliers measure the strength of backward linkages to supporting industries (i.e., those who sell inputs to an affected sector). However, multipliers say nothing about forward linkages consisting of businesses that purchase goods from an affected sector for further processing. For example, ranchers in many areas sell most of their animals to local meat packers who process animals into a form that consumers ultimately see in grocery stores and restaurants. Multipliers do not capture forward linkages to meat packers, and since meat packers sell livestock purchased from ranchers as "final sales," multipliers for the ranching sector do fully account for all losses to a region's economy. Thus, as mentioned previously, in some cases closely linked sectors were moved from one water use category to another.

5. Cautions regarding interpretations of direct and secondary impacts are warranted. IO/SAM multipliers are based on "fixed-proportion production functions," which basically means that input use - including labor - moves in lockstep fashion with changes in levels of output. In a

scenario where output (i.e., sales) declines, losses in the immediate sector or supporting sectors could be much less than predicted by an IO/SAM model for several reasons. For one, businesses will likely expect to continue operating so they might maintain spending on inputs for future use; or they may be under contractual obligations to purchase inputs for an extended period regardless of external conditions. Also, employers may not lay-off workers given that experienced labor is sometimes scarce and skilled personnel may not be readily available when water shortages subside. Lastly people who lose jobs might find other employment in the region. As a result, direct losses for employment and secondary losses in sales and employment should be considered an upper bound. Similarly, since projected population losses are based on reduced employment in the region, they should be considered an upper bound as well.

6. IO models are static. Models and resultant multipliers are based upon the structure of the U.S. and regional economies in 2006. In contrast, water shortages are projected to occur well into the future. Thus, the analysis assumes that the general structure of the economy remains the same over the planning horizon, and the farther out into the future we go, this assumption becomes less reliable.

7. Impacts are annual estimates. If one were to assume that conditions persisted for more than one year, figures should be adjusted to reflect the extended duration. The drought of record in most regions of Texas lasted several years.

8. Monetary figures are reported in constant year 2006 dollars.

1.1.2 Impacts to Agriculture

Irrigated Crop Production

The first step in estimating impacts to irrigation required calculating gross sales for IMPLAN crop sectors. Default IMPLAN data do not distinguish irrigated production from dry-land production. Once gross sales were known other statistics such as employment and income were derived using IMPLAN direct multiplier coefficients. Gross sales for a given crop are based on two data sources:

1) county-level statistics collected and maintained by the TWDB and the USDA Farm Services Agency (FSA) including the number of irrigated acres by crop type and water application per acre, and

2) regional-level data published by the Texas Agricultural Statistics Service (TASS) including prices received for crops (marketing year averages), crop yields and crop acreages.

Crop categories used by the TWDB differ from those used in IMPLAN datasets. To maintain consistency, sales and other statistics are reported using IMPLAN crop classifications. Table 1 shows the TWDB crops included in corresponding IMPLAN sectors, and Table 2 summarizes acreage and estimated annual water use for each crop classification (five-year average from 2003-2007). Table 3 displays average (2003-2007) gross revenues per acre for IMPLAN crop categories.

Table 1: Crop Classifications Used in TWDB Water Use Survey and Corresponding IMPLAN Crop Sectors

IMPLAN Category	TWDB Category
Oilseeds	Soybeans and “other oil crops”
Grains	Grain sorghum, corn, wheat and “other grain crops”
Vegetable and melons	“Vegetables” and potatoes
Tree nuts	Pecans
Fruits	Citrus, vineyard and other orchard
Cotton	Cotton
Sugarcane and sugar beets	Sugarcane and sugar beets
All “other” crops	“Forage crops”, peanuts, alfalfa, hay and pasture, rice and “all other crops”

Table 2: Summary of Irrigated Crop Acreage and Water Demand for the South Central Texas Regional Water Planning Area (average 2003-2007)

Sector	Acres (1000s)	Distribution of acres	Water use (1000s of AF)	Distribution of water use
Oilseeds	2	1%	2	1%
Grains	108	43%	123	38%
Vegetable and melons	34	14%	39	12%
Tree nuts	3	1%	7	2%
Fruits	<1	<1%	<1	<1%
Cotton	32	13%	45	14%
All “other” crops	70	28%	105	33%
Total	251	100%	321	100%

Source: Water demand figures are a 5- year average (2003-2007) of the TWDB’s annual Irrigation Water Use Estimates. Statistics for irrigated crop acreage are based upon annual survey data collected by the TWDB and the Farm Service Agency. Values do not include acreage or water use for the TWDB categories classified by the Farm Services Agency as “failed acres,” “golf course” or “waste water.”

Table 3: Average Gross Sales Revenues per Acre for Irrigated Crops for the South Central Texas Regional Water Planning Area (2003-2007)		
IMPLAN Sector	**Gross revenues per acre**	**Crops included in estimates**
Oilseeds	$178	Based on five-year (2003-2007) average weighted by acreage for “irrigated soybeans” and “irrigated ‘other’ oil crops.”
Grains	$235	Based on five-year (2003-2007) average weighted by acreage for “irrigated grain sorghum”, “irrigated corn”, “irrigated wheat” and “irrigated ‘other’ grain crops.”
Vegetable and melons	$5,725	Based on five-year (2003-2007) average weighted by acreage for “irrigated shallow and deep root vegetables”, “irrigated Irish potatoes” and “irrigated melons.”
Tree nuts	$3,374	Based on five-year (2003-2007) average weighted by acreage for “irrigated pecans.”
Fruits	$26,423	Based on five-year (2003-2007) average weighted by acreage for “irrigated citrus”, “irrigated vineyards” and “irrigated ‘other’ orchard.”
Cotton	$543	Based on five-year (2003-2007) average weighted by acreage for “irrigated cotton.”
All “other” crops	$359	Based on five-year (2003-2007) average weighted by acreage for “irrigated ‘forage’ crops”, “irrigated peanuts”, “irrigated alfalfa”, “irrigated ‘hay’ and pasture” and “irrigated ‘all other’ crops.”

*Figures are rounded. Source: Based on data from the Texas Agricultural Statistics Service, Texas Water Development Board, and Texas A&M University.

An important consideration when estimating impacts to irrigation was determining which crops are affected by water shortages. One approach is the so-called rationing model, which assumes that farmers respond to water supply cutbacks by fallowing the lowest value crops in the region first and the highest valued crops last until the amount of water saved equals the shortage.[5] For example, if farmer A grows vegetables (higher value) and farmer B grows wheat (lower value) and they both face a proportionate cutback in irrigation water, then farmer B will sell water to farmer A. Farmer B will fallow her irrigated acreage before farmer A fallows anything. Of course, this assumes that farmers can and do transfer enough water to allow this to happen. A different approach involves constructing farm-level profit maximization models that conform to widely-accepted economic theory that farmers make decisions based on marginal net returns. Such models have good predictive capability, but data requirements and complexity are high. Given that a detailed analysis for each region would require a substantial amount of farm-level data and analysis, the following investigation assumes that projected shortages are distributed equally across predominant crops in the region. Predominant in this case are crops that comprise at least one percent of total acreage in the region.

The following steps outline the overall process used to estimate direct impacts to irrigated agriculture:

1. *Distribute shortages across predominant crop types in the region*. Again, unmet water needs were distributed equally across crop sectors that constitute one percent or more of irrigated acreage.

2. *Estimate associated reductions in output for affected crop sectors*. Output reductions are based on elasticities discussed previously and on estimated values per acre for different crops. Values per acre stem from the same data used to estimate output for the year 2006 baseline. Using multipliers, we then generate estimates of forgone income, jobs, and tax revenues based on reductions in gross sales and final demand.

Livestock

The approach used for the livestock sector is basically the same as that used for crop production. As is the case with crops, livestock categorizations used by the TWDB differ from those used in IMPLAN datasets, and TWDB groupings were assigned to a given IMPLAN sector (Table 4). Then we:

1) *Distribute projected water needs equally among predominant livestock sectors and estimate lost output*: As is the case with irrigation, shortages are assumed to affect all livestock sectors equally; however, the category of "other" is not included given its small size. If water needs were small relative to total demands, we assume that producers would haul in water by truck to fill stock tanks. The cost per acre-foot ($24,000) is based on 2008 rates charged by various water haulers in Texas, and assumes that the average truck load is 6,500 gallons at a hauling distance of 60 miles.

3) *Estimate reduced output in forward processors for livestock sectors*. Reductions in output for livestock sectors are assumed to have a proportional impact on forward processors in the region such as meat packers. In other words, if the cows were gone, meat-packing plants or fluid milk manufacturers) would likely have little to process. This is not an unreasonable premise. Since the

[5] The rationing model was initially proposed by researchers at the University of California at Berkeley, and was then modified for use in a study conducted by the U.S. Environmental Protection Agency that evaluated how proposed water supply cutbacks recommended to protect water quality in the Bay/Delta complex in California would affect farmers in the Central Valley. See, Zilberman, D., Howitt, R. and Sunding, D. "*Economic Impacts of Water Quality Regulations in the San Francisco Bay and Delt*a." Western Consortium for Public Health. May 1993.

1950s, there has been a major trend towards specialized cattle feedlots, which in turn has decentralized cattle purchasing from livestock terminal markets to direct sales between producers and slaughterhouses. Today, the meat packing industry often operates large processing facilities near high concentrations of feedlots to increase capacity utilization.[6] As a result, packers are heavily dependent upon nearby feedlots. For example, a recent study by the USDA shows that on average meat packers obtain 64 percent of cattle from within 75 miles of their plant, 82 percent from within 150 miles and 92 percent from within 250 miles.[7]

Table 4: Description of Livestock Sectors

IMPLAN Category	TWDB Category
Cattle ranching and farming	Cattle, cow calf, feedlots and dairies
Poultry and egg production	Poultry production.
Other livestock	Livestock other than cattle and poultry (i.e., horses, goats, sheep, hogs)
Milk manufacturing	Fluid milk manufacturing, cheese manufacturing, ice cream manufacturing etc.
Meat packing	Meat processing present in the region from slaughter to final processing

1.1.3 Impacts to Municipal Water User Groups

Disaggregation of Municipal Water Demands

Estimating the economic impacts for the municipal water user groups is complicated for a number of reasons. For one, municipal use comprises a range of consumers including commercial businesses, institutions such as schools and government and households. However, reported water needs are not distributed among different municipal water users. In other words, how much of a municipal need is commercial and how much is residential (domestic)?

The amount of commercial water use as a percentage of total municipal demand was estimated based on "GED" coefficients (gallons per employee per day) published in secondary sources.[8] For example, if year 2006 baseline data for a given economic sector (e.g., amusement and recreation services) shows employment at 30 jobs and the GED coefficient is 200, then average daily water use by that sector

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[6] Ferreira, W.N. "*Analysis of the Meat Processing Industry in the United States*." Clemson University Extension Economics Report ER211, January 2003.

[7] Ward, C.E. "*Summary of Results from USDA's Meatpacking Concentration Study*." Oklahoma Cooperative Extension Service, OSU Extension Facts WF-562.

[8] Sources for GED coefficients include: Gleick, P.H., Haasz, D., Henges-Jeck, C., Srinivasan, V., Wolff, G. Cushing, K.K., and Mann, A. "*Waste Not, Want Not*: *The Potential for Urban Water Conservation in California*." Pacific Institute. November 2003. U.S. Bureau of the Census. 1982 Census of Manufacturers: Water Use in Manufacturing. USGPO, Washington D.C. See also: "*U.S. Army Engineer Institute for Water Resources, IWR Report 88-R-6.*," Fort Belvoir, VA. See also, Joseph, E. S., 1982, "*Municipal and Industrial Water Demands of the Western United States*." Journal of the Water Resources Planning and Management Division, Proceedings of the American Society of Civil Engineers, v. 108, no. WR2, p. 204-216. See also, Baumann, D. D., Boland, J. J., and Sims, J. H., 1981, "*Evaluation of Water Conservation for Municipal and Industrial Water Supply*." U.S. Army Corps of Engineers, Institute for Water Resources, Contract no. 82-C1.

is (30 x 200 = 6,000 gallons) or 6.7 acre-feet per year. Water not attributed to commercial use is considered domestic, which includes single and multi-family residential consumption, institutional uses and all use designated as “county-other.” Based on our analysis, commercial water use is about 5 to 35 percent of municipal demand. Less populated rural counties occupy the lower end of the spectrum, while larger metropolitan counties are at the higher end.

After determining the distribution of domestic versus commercial water use, we developed methods for estimating impacts to the two groups.

Domestic Water Uses

Input output models are not well suited for measuring impacts of shortages for domestic water uses, which make up the majority of the municipal water use category. To estimate impacts associated with domestic water uses, municipal water demand and needs are subdivided into residential, and commercial and institutional use. Shortages associated with residential water uses are valued by estimating proxy demand functions for different water user groups allowing us to estimate the marginal value of water, which would vary depending upon the level of water shortages. The more severe the water shortage, the more costly it becomes. For instance, a 2 acre-foot shortage for a group of households that use 10 acre-feet per year would not be as severe as a shortage that amounted to 8 acre-feet. In the case of a 2 acre-foot shortage, households would probably have to eliminate some or all outdoor water use, which could have implicit and explicit economic costs including losses to the horticultural and landscaping industry. In the case of an 8 acre-foot shortage, people would have to forgo all outdoor water use and most indoor water consumption. Economic impacts would be much higher in the latter case because people, and would be forced to find emergency alternatives assuming alternatives were available.

To estimate the value of domestic water uses, TWDB staff developed marginal loss functions based on constant elasticity demand curves. This is a standard and well-established method used by economists to value resources such as water that have an explicit monetary cost.

A constant price elasticity of demand is estimated using a standard equation:

$$w = kc^{(-\varepsilon)}$$

where:

- w is equal to average monthly residential water use for a given water user group measured in thousands of gallons;
- k is a constant intercept;
- c is the average cost of water per 1,000 gallons; and
- ε is the price elasticity of demand.

Price elasticities (-0.30 for indoor water use and -0.50 for outdoor use) are based on a study by Bell et al.[9] that surveyed 1,400 water utilities in Texas that serve at least 1,000 people to estimate demand elasticity for several variables including price, income, weather etc. Costs of water and average use per month per household are based on data from the Texas Municipal League's annual water and

[9] Bell, D.R. and Griffin, R.C. “*Community Water Demand in Texas as a Century is Turned*.” Research contract report prepared for the Texas Water Development Board. May 2006.

wastewater rate surveys - specifically average monthly household expenditures on water and wastewater in different communities across the state. After examining variance in costs and usage, three different categories of water user groups based on population (population less than 5,000, cities with populations ranging from 5,000 to 99,999 and cities with populations exceeding 100,000) were selected to serve as proxy values for municipal water groups that meet the criteria (Table 5).[10]

Table 5: Water Use and Costs Parameters Used to Estimated Water Demand Functions
(average monthly costs per acre-foot for delivered water and average monthly use per household)

Community Population	Water	Wastewater	Total monthly cost	Avg. monthly use (gallons)
Less than or equal to 5,000	$1,335	$1,228	$2,563	6,204
5,000 to 100,000	$1,047	$1,162	$2,209	7,950
Great than or equal to 100,000	$718	$457	$1,190	8,409

Source: Based on annual water and wastewater rate surveys published by the Texas Municipal League.

As an example, Table 6 shows the economic impact per acre-foot of domestic water needs for municipal water user groups with population exceeding 100,000 people. There are several important assumptions incorporated in the calculations:

1) Reported values are net of the variable costs of treatment and distribution such as expenses for chemicals and electricity since using less water involves some savings to consumers and utilities alike; and for outdoor uses we do not include any value for wastewater.

2) Outdoor and "non-essential" water uses would be eliminated before indoor water consumption was affected, which is logical because most water utilities in Texas have drought contingency plans that generally specify curtailment or elimination of outdoor water use during droughts.[11] Determining how much water is used for outdoor purposes is based on several secondary sources. The first is a major study sponsored by the American Water Works Association, which surveyed cities in states including Colorado, Oregon, Washington, California, Florida and Arizona. On average across all cities surveyed 58 percent of single family residential water use was for outdoor activities. In cities with climates comparable to large metropolitan areas of Texas, the average was 40 percent.[12] Earlier findings of the U.S. Water Resources Council showed a

[10] Ideally, one would want to estimate demand functions for each individual utility in the state. However, this would require an enormous amount of time and resources. For planning purposes, we believe the values generated from aggregate data are more than sufficient.

[11] In Texas, state law requires retail and wholesale water providers to prepare and submit plans to the Texas Commission on Environmental Quality (TCEQ). Plans must specify demand management measures for use during drought including curtailment of "non-essential water uses." Non-essential uses include, but are not limited to, landscape irrigation and water for swimming pools or fountains. For further information see the Texas Environmental Quality Code §288.20.

[12] See, Mayer, P.W., DeOreo, W.B., Opitz, E.M., Kiefer, J.C., Davis, W., Dziegielewski, D., Nelson, J.O. "*Residential End Uses of Water*." Research sponsored by the American Water Works Association and completed by Aquacraft, Inc. and Planning and Management Consultants, Ltd. (PMCL@CDM).

national average of 33 percent. Similarly, the United States Environmental Protection Agency (USEPA) estimated that landscape watering accounts for 32 percent of total residential and commercial water use on annual basis.[13] A study conducted for the California Urban Water Agencies (CUWA) calculated average annual values ranging from 25 to 35 percent.[14] Unfortunately, there does not appear to be any comprehensive research that has estimated non-agricultural outdoor water use in Texas. As an approximation, an average annual value of 30 percent based on the above references was selected to serve as a rough estimate in this study.

3) As shortages approach 100 percent values become immense and theoretically infinite at 100 percent because at that point death would result, and willingness to pay for water is immeasurable. Thus, as shortages approach 80 percent of monthly consumption, we assume that households and non-water intensive commercial businesses (those that use water only for drinking and sanitation would have water delivered by tanker truck or commercial water delivery companies. Based on reports from water companies throughout the state, we estimate that the cost of trucking in water is around $21,000 to $27,000 per acre-feet assuming a hauling distance of between 20 to 60 miles. This is not an unreasonable assumption. The practice was widespread during the 1950s drought and recently during droughts in this decade. For example, in 2000 at the heels of three consecutive drought years Electra - a small town in North Texas - was down to its last 45 days worth of reservoir water when rain replenished the lake, and the city was able to refurbish old wells to provide supplemental groundwater. At the time, residents were forced to limit water use to 1,000 gallons per person per month - less than half of what most people use - and many were having water delivered to their homes by private contractors.[15] In 2003 citizens of Ballinger, Texas, were also faced with a dwindling water supply due to prolonged drought. After three years of drought, Lake Ballinger, which supplies water to more than 4,300 residents in Ballinger and to 600 residents in nearby Rowena, was almost dry. Each day, people lined up to get water from a well in nearby City Park. Trucks hauling trailers outfitted with large plastic and metal tanks hauled water to and from City Park to Ballinger.[16]

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[13] U.S. Environmental Protection Agency. *"Cleaner Water through Conservation*." USEPA Report no. 841-B-95-002. April, 1995.

[14] Planning and Management Consultants, Ltd. "*Evaluating Urban Water Conservation Programs: A Procedures Manual*." Prepared for the California Urban Water Agencies. February 1992.

[15] Zewe, C. "*Tap Threatens to Run Dry in Texas Town*." July 11, 2000. CNN Cable News Network.

[16] Associated Press, "*Ballinger Scrambles to Finish Pipeline before Lake Dries Up*." May 19, 2003.

Table 6: Economic Losses Associated with Domestic Water Shortages in Communities with Populations Exceeding 100,000 people				
Water shortages as a percentage of total monthly household demands	**No. of gallons remaining per household per day**	**No of gallons remaining per person per day**	**Economic loss (per acre-foot)**	**Economic loss (per gallon)**
1%	278	93	$748	$0.00005
5%	266	89	$812	$0.0002
10%	252	84	$900	$0.0005
15%	238	79	$999	$0.0008
20%	224	75	$1,110	$0.0012
25%	210	70	$1,235	$0.0015
30%[a]	196	65	$1,699	$0.0020
35%	182	61	$3,825	$0.0085
40%	168	56	$4,181	$0.0096
45%	154	51	$4,603	$0.011
50%	140	47	$5,109	$0.012
55%	126	42	$5,727	$0.014
60%	112	37	$6,500	$0.017
65%	98	33	$7,493	$0.02
70%	84	28	$8,818	$0.02
75%	70	23	$10,672	$0.03
80%	56	19	$13,454	$0.04
85%	42	14	$18,091 ($24,000)[b]	$0.05 ($0.07)[b]
90%	28	9	$27,363 ($24,000)	$0.08 ($0.07)
95%	14	5	$55,182 ($24,000)	$0.17 ($0.07)
99%	3	0.9	$277,728 ($24,000)	$0.85 ($0.07)
99.9%	1	0.5	$2,781,377 ($24,000)	$8.53 ($0.07)
100%	0	0	Infinite ($24,000)	Infinite ($0.07)

[a] The first 30 percent of needs are assumed to be restrictions of outdoor water use; when needs reach 30 percent of total demands all outdoor water uses would be restricted. Needs greater than 30 percent include indoor use

[b] As shortages approach 100 percent the value approaches infinity assuming there are not alternatives available; however, we assume that communities would begin to have water delivered by tanker truck at an estimated cost of $24,000 per acre-foot when shortages breached 85 percent.

Commercial Businesses

Effects of water shortages on commercial sectors were estimated in a fashion similar to other business sectors meaning that water shortages would affect the ability of these businesses to operate. This is particularly true for “water intensive” commercial sectors that are need large amounts of water (in addition to potable and sanitary water) to provide their services. These include:

- car-washes,
- laundry and cleaning facilities,
- sports and recreation clubs and facilities including race tracks,
- amusement and recreation services,
- hospitals and medical facilities,
- hotels and lodging places, and
- eating and drinking establishments.

A key assumption is that commercial operations would not be affected until water shortages were at least 50 percent of total municipal demand. In other words, we assume that residential water consumers would reduce water use including all non-essential uses before businesses were affected.

An example will illustrate the breakdown of municipal water needs and the overall approach to estimating impacts of municipal needs. Assume City A experiences an unexpected shortage of 50 acre-feet per year when their demands are 200 acre-feet per year. Thus, shortages are only 25 percent of total municipal use and residents of City A could eliminate needs by restricting landscape irrigation. City B, on the other hand, has a deficit of 150 acre-feet in 2020 and a projected demand of 200 acre-feet. Thus, total shortages are 75 percent of total demand. Emergency outdoor and some indoor conservation measures could eliminate 50 acre-feet of projected needs, yet 50 acre-feet would still remain. To eliminate” the remaining 50 acre-feet water intensive commercial businesses would have to curtail operations or shut down completely.

Three other areas were considered when analyzing municipal water shortages: 1) lost revenues to water utilities, 2) losses to the horticultural and landscaping industries stemming for reduction in water available for landscape irrigation, and 3) lost revenues and related economic impacts associated with reduced water related recreation.

Water Utility Revenues

Estimating lost water utility revenues was straightforward. We relied on annual data from the “*Water and Wastewater Rate Survey*” published annually by the Texas Municipal League to calculate an average value per acre-foot for water and sewer. For water revenues, average retail water and sewer rates multiplied by total water needs served as a proxy. For lost wastewater, total unmet needs were adjusted for return flow factor of 0.60 and multiplied by average sewer rates for the region. Needs reported as “county-other” were excluded under the presumption that these consist primarily of self-supplied water uses. In addition, 15 percent of water demand and needs are considered non-billed or “unaccountable” water that comprises things such as leakages and water for municipal government functions (e.g., fire departments). Lost tax receipts are based on current rates for the “miscellaneous gross receipts tax, “which the state collects from utilities located in most incorporated cities or towns in Texas. We do not include lost water utility revenues when aggregating impacts of municipal water shortages to regional and state levels to prevent double counting.

Horticultural and Landscaping Industry

The horticultural and landscaping industry, also referred to as the "green Industry," consists of businesses that produce, distribute and provide services associated with ornamental plants, landscape and garden supplies and equipment. Horticultural industries often face big losses during drought. For example, the recent drought in the Southeast affecting the Carolinas and Georgia horticultural and landscaping businesses had a harsh year. Plant sales were down, plant mortality increased, and watering costs increased. Many businesses were forced to close locations, lay off employees, and even file for bankruptcy. University of Georgia economists put statewide losses for the industry at around $3.2 billion during the 3-year drought that ended in 2008.[17] Municipal restrictions on outdoor watering play a significant role. During drought, water restrictions coupled with persistent heat has a psychological effect on homeowners that reduces demands for landscaping products and services. Simply put, people were afraid to spend any money on new plants and landscaping.

In Texas, there do not appear to be readily available studies that analyze the economic effects of water shortages on the industry. However, authors of this report believe negative impacts do and would result in restricting landscape irrigation to municipal water consumers. The difficulty in measuring them is two-fold. First, as noted above, data and research for these types of impacts that focus on Texas are limited; and second, economic data provided by IMPLAN do not disaggregate different sectors of the green industry to a level that would allow for meaningful and defensible analysis.[18]

Recreational Impacts

Recreational businesses often suffer when water levels and flows in rivers, springs and reservoirs fall significantly during drought. During droughts, many boat docks and lake beaches are forced to close, leading to big losses for lakeside business owners and local communities. Communities adjacent to popular river and stream destinations such as Comal Springs and the Guadalupe River also see their business plummet when springs and rivers dry up. Although there are many examples of businesses that have suffered due to drought, dollar figures for drought-related losses to the recreation and tourism industry are not readily available, and very difficult to measure without extensive local surveys. Thus, while they are important, economic impacts are not measured in this study.

Table 7 summarizes impacts of municipal water shortages at differing levels of magnitude, and shows the ranges of economic costs or losses per acre-foot of shortage for each level.

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[17] Williams, D. *"Georgia landscapers eye rebound from Southeast drought."* Atlanta Business Chronicle, Friday, June 19, 2009

[18] Economic impact analyses prepared by the TWDB for 2006 regional water plans did include estimates for the horticultural industry. However, year 2000 and prior IMPLAN data were disaggregated to a finer level. In the current dataset (2006), the sector previously listed as "Landscaping and Horticultural Services" (IMPLAN Sector 27) is aggregated into "Services to Buildings and Dwellings" (IMPLAN Sector 458).

Table 7: Impacts of Municipal Water Shortages at Different Magnitudes of Shortages		
Water shortages as percent of total municipal demands	Impacts	Economic costs per acre-foot*
0-30%	✓ Lost water utility revenues ✓ Restricted landscape irrigation and non-essential water uses	$730 - $2,040
30-50%	✓ Lost water utility revenues ✓ Elimination of landscape irrigation and non-essential water uses ✓ Rationing of indoor use	$2,040 - $10,970
>50%	✓ Lost water utility revenues ✓ Elimination of landscape irrigation and non-essential water uses ✓ Rationing of indoor use ✓ Restriction or elimination of commercial water use ✓ Importing water by tanker truck	$10,970 - varies
*Figures are rounded		

1.1.4 Industrial Water User Groups

Manufacturing

Impacts to manufacturing were estimated by distributing water shortages among industrial sectors at the county level. For example, if a planning group estimates that during a drought of record water supplies in County A would only meet 50 percent of total annual demands for manufactures in the county, we reduced output for each sector by 50 percent. Since projected manufacturing demands are based on TWDB Water Uses Survey data for each county, we only include IMPLAN sectors represented in the TWBD survey database. Some sectors in IMPLAN databases are not part of the TWDB database given that they use relatively small amounts of water - primarily for on-site sanitation and potable purposes. To maintain consistency between IMPLAN and TWDB databases, Standard Industrial Classification (SIC) codes both databases were cross referenced in county with shortages. Non-matches were excluded when calculating direct impacts.

Mining

The process of mining is very similar to that of manufacturing. We assume that within a given county, shortages would apply equally to relevant mining sectors, and IMPLAN sectors are cross referenced with TWDB data to ensure consistency.

In Texas, oil and gas extraction and sand and gravel (aggregates) operations are the primary mining industries that rely on large volumes of water. For sand and gravel, estimated output reductions are straightforward; however, oil and gas is more complicated for a number of reasons. IMPLAN does not necessarily report the physical extraction of minerals by geographic local, but rather the sales revenues reported by a particular corporation.

For example, at the state level revenues for IMPLAN sector 19 (oil and gas extraction) and sector 27 (drilling oil and gas wells) totals $257 billion. Of this, nearly $85 billion is attributed to Harris County. However, only a very small fraction (less than one percent) of actual production takes place in the county. To measure actual potential losses in well head capacity due to water shortages, we relied on county level production data from the Texas Railroad Commission (TRC) and average well-head market prices for crude and gas to estimate lost revenues in a given county. After which, we used to IMPLAN ratios to estimate resultant losses in income and employment.

Other considerations with respect to mining include:

1) Petroleum and gas extraction industry only uses water in significant amounts for secondary recovery. Known in the industry as enhanced or water flood extraction, secondary recovery involves pumping water down injection wells to increase underground pressure thereby pushing oil or gas into other wells. IMPLAN output numbers do not distinguish between secondary and non-secondary recovery. To account for the discrepancy, county-level TRC data that show the proportion of barrels produced using secondary methods were used to adjust IMPLAN data to reflect only the portion of sales attributed to secondary recovery.

2) A substantial portion of output from mining operations goes directly to businesses that are classified as manufacturing in our schema. Thus, multipliers measuring backward linkages for a given manufacturer might include impacts to a supplying mining operation. Care was taken not to double count in such situations if both a mining operation and a manufacturer were reported as having water shortages.

Steam-electric

At minimum without adequate cooling water, power plants cannot safely operate. As water availability falls below projected demands, water levels in lakes and rivers that provide cooling water would also decline. Low water levels could affect raw water intakes and outfalls at electrical generating units in several ways. For one, power plants are regulated by thermal emission guidelines that specify the maximum amount of heat that can go back into a river or lake via discharged cooling water. Low water levels could result in permit compliance issues due to reduced dilution and dispersion of heat and subsequent impacts on aquatic biota near outfalls.[19] However, the primary concern would be a loss of head (i.e., pressure) over intake structures that would decrease flows through intake tunnels. This would affect safety related pumps, increase operating costs and/or result in sustained shut-downs. Assuming plants did shutdown, they would not be able to generate electricity.

[19] Section 316 (b) of the Clean Water Act requires that thermal wastewater discharges do not harm fish and other wildlife.

Among all water use categories steam-electric is unique and cautions are needed when applying methods used in this study. Measured changes to an economy using input-output models stem directly from changes in sales revenues. In the case of water shortages, one assumes that businesses will suffer lost output if process water is in short supply. For power generation facilities this is true as well. However, the electric services sector in IMPLAN represents a corporate entity that may own and operate several electrical generating units in a given region. If one unit became inoperable due to water shortages, plants in other areas or generation facilities that do not rely heavily on water such as gas powered turbines might be able to compensate for lost generating capacity. Utilities could also offset lost production via purchases on the spot market.[20] Thus, depending upon the severity of the shortages and conditions at a given electrical generating unit, energy supplies for local and regional communities could be maintained. But in general, without enough cooling water, utilities would have to throttle back plant operations, forcing them to buy or generate more costly power to meet customer demands.

Measuring impacts end users of electricity is not part of this study as it would require extensive local and regional level analysis of energy production and demand. To maintain consistency with other water user groups, impacts of steam-electric water shortages are measured in terms of lost revenues (and hence income) and jobs associated with shutting down electrical generating units.

1.2 Social Impacts of Water Shortages

As the name implies, the effects of water shortages can be social or economic. Distinctions between the two are both semantic and analytical in nature – more so analytic in the sense that social impacts are harder to quantify. Nevertheless, social effects associated with drought and water shortages are closely tied to economic impacts. For example, they might include:

- demographic effects such as changes in population,
- disruptions in institutional settings including activity in schools and government,
- conflicts between water users such as farmers and urban consumers,
- health-related low-flow problems (e.g., cross-connection contamination, diminished sewage flows, increased pollutant concentrations),
- mental and physical stress (e.g., anxiety, depression, domestic violence),
- public safety issues from forest and range fires and reduced fire fighting capability,
- increased disease caused by wildlife concentrations,
- loss of aesthetic and property values, and
- reduced recreational opportunities.[21]

[20] Today, most utilities participate in large interstate “power pools” and can buy or sell electricity “on the grid” from other utilities or power marketers. Thus, assuming power was available to buy, and assuming that no contractual or physical limitations were in place such as transmission constraints; utilities could offset lost power that resulted from waters shortages with purchases via the power grid.

[21] Based on information from the website of the National Drought Mitigation Center at the University of Nebraska Lincoln. Available online at: http://www.drought.unl.edu/risk/impacts.htm. See also, Vanclay, F. “*Social Impact Assessment*.” in Petts, J. (ed) International Handbook of Environmental Impact Assessment. 1999.

Social impacts measured in this study focus strictly on demographic effects including changes in population and school enrollment. Methods are based on demographic projection models developed by the Texas State Data Center and used by the TWDB for state and regional water planning. Basically, the social impact model uses results from the economic component of the study and assesses how changes in labor demand would affect migration patterns in a region. Declines in labor demand as measured using adjusted IMPLAN data are assumed to affect net economic migration in a given regional water planning area. Employment losses are adjusted to reflect the notion that some people would not relocate but would seek employment in the region and/or public assistance and wait for conditions to improve. Changes in school enrollment are simply the proportion of lost population between the ages of 5 and 17.

2. Results

Section 2 presents the results of the analysis at the regional level. Included are baseline economic data for each water use category, and estimated economics impacts of water shortages for water user groups with reported deficits. According to the 2011 *South Central Texas Regional Water Plan*, during severe drought irrigation, municipal, manufacturing, mining and steam-electric water user groups would experience water shortages in the absence of new water management strategies.

2.1 Overview of Regional Economy

On an annual basis, the South Central Texas economy generates $82 billion in gross state product for Texas ($76 billion in income and $6 billion worth of business taxes) and supports 1,163,680 jobs (Table 8). Generating about $11 billion worth of income per year manufacturing is the primary base economic sector in the region.[22] Municipal sectors also generate substantial amounts of income and are major employers. However, while municipal sectors are the largest employer and source of wealth, many businesses that make up the municipal category such as restaurants and retail stores are non-basic industries meaning they exist to provide services to people who work would in base industries such as manufacturing, agriculture and mining. In other words, without base industries such agriculture, many municipal jobs in the region would not exist.

[22] Base industries are those that supply markets outside of the region. These industries are crucial to the local economy and are called the economic base of a region. Appendix A shows how IMPLAN's 529 sectors were allocated to water use category, and shows economic data for each sector.

Table 8: The South Central Texas Regional Economy by Water User Group ($millions)*						
Water Use Category	**Total sales**	**Intermediate sales**	**Final sales**	**Jobs**	**Income**	**Business taxes**
Irrigation	$266.54	$47.35	$219.07	4,110	$174.18	$3.23
Livestock	$889.48	$644.74	$244.74	13,506	$134.69	$14.13
Manufacturing	$35,019.65	$4,677.32	$30,342.33	134,359	$11,132.59	$268.65
Mining	$3,841.83	$2,060.19	$1,781.64	9,733	$2,355.49	$194.87
Steam-electric	$534.13	$150.26	$383.87	1,312	$370.93	$63.26
Municipal	$104,098.04	$30,414.34	$73,683.69	1,000,660	$61,736.55	$5,406.62
Regional total	$144,649.67	$37,994.20	$106,655.34	1,163,680	$75,904.43	$5,950.76

[a] Appendix 1 displays data for individual IMPLAN sectors that make up each water use category. Based on data from the Texas Water Development Board, and year 2006 data from the Minnesota IMPLAN Group, Inc.

2.2 Impacts of Agricultural Water Shortages

According to the 2011 *South Central Texas Regional Water Plan*, during severe drought the counties of Atascosa, Medina and Zavala would experiences shortages of irrigation water. Shortages range from about 1 to 76 percent of annual irrigation demands over the planning horizon, and farmers would be short 68,465 acre-feet in 2010 and 41,782 in 2060. Shortages would reduce gross state product (income plus state and local business taxes) by an estimated $45 million per year in 2010 to $33 million in 2060.

Table 9: Economic Impacts of Water Shortages for Irrigation Water User Groups ($millions)			
Decade	**Lost income from reduced crop production [a]**	**Lost state and local tax revenues from reduced crop production**	**Lost jobs from reduced crop production**
2010	$43.32	$2.16	545
2020	$40.63	$2.03	511
2030	$38.04	$1.90	478
2040	$35.55	$1.77	447
2050	$33.17	$1.66	416
2060	$31.13	$1.55	391

*Changes to income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.3 Impacts of Municipal Water Shortages

Water shortages are projected to occur in a significant number of communities in the region. At the regional level, the estimated economic value of domestic water shortages totals $715 million in 2010 and $2,823 million in 2060 (Table 100). Due to curtailment of commercial business activity operation, municipal shortages would reduce gross state product (income plus taxes) by an estimated $53 million in 2020 and $3,780 million in 2060.

Table 10: Economic Impacts of Water Shortages for Municipal Water User Groups ($millions)

Decade	Monetary value of domestic water shortages	Lost income from reduced commercial business activity*	Lost state and local taxes from reduced commercial business activity	Lost jobs from reduced commercial business activity	Lost water utility revenues
2010	$715.54	$42.91	$5.67	1,067	$149.36
2020	$1,479.80	$1,417.03	$7.66	1,512	$212.55
2030	$1,331.33	$1,909.07	$82.41	17,808	$276.64
2040	$1,805.79	$2,547.77	$111.92	24,229	$340.64
2050	$2,426.71	$3,197.28	$134.26	29,081	$402.51
2060	$2,823.29	$3,621.31	$157.25	34,108	$468.01

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.4 Impacts of Manufacturing Water Shortages

Manufacturing water shortages in the region are projected to occur in Bexar, Calhoun, Comal and Victoria counties. In 2010, the planning group estimates that these manufacturers would be short about 6,539 acre-feet; and by 2060, this figure increases to nearly 43,072 acre-feet. Shortages of these magnitudes would reduce gross state product (income plus taxes) by an estimated $179 million in 2010 and $2,080 million in 2060 (Table 11).

Table 11: Economic Impacts of Water Shortages for Manufacturing Water User Groups ($millions)			
Decade	**Lost income due to reduced manufacturing output**	**Lost state and local business tax revenues due to reduced manufacturing output**	**Lost jobs due to reduced manufacturing output**
2010	$146.77	$22.22	8,274
2020	$324.94	$52.44	11,956
2030	$496.18	$81.52	15,436
2040	$948.36	$159.05	23,170
2050	$1,451.00	$245.34	31,553
2060	$1,777.09	$301.91	38,187

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.5 Impacts of Mining Water Shortages

Mining water shortages in Region L are projected to occur in Bexar, Comal and Hays counties and would primarily affect aggregates operations (e.g., sand and gravel producers). Combined shortages for each county would result in estimated losses in gross state product totaling $3 million dollars in 2010, and about $7 million 2060 (Table 12).

Table 12: Economic Impacts of Water Shortages for Mining Water User Groups ($millions)			
Decade	**Lost income due to reduced mining output**	**Lost state and local business tax revenues due to reduced mining output**	**Lost jobs due to reduced mining output**
2010	$2.67	$0.14	27
2020	$3.12	$0.17	31
2030	$4.64	$0.34	53
2040	$5.01	$0.37	57
2050	$6.44	$0.48	72
2060	$6.81	$0.51	77

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.6 Impacts of Steam-electric Water Shortages

Water shortages for electrical generating units are projected to occur in Atascosa and Victoria counties, and would result in estimated losses of gross state product totaling $72 million in 2020, and $4,011 million 2060 (Table 13).

Table 13: Economic Impacts of Water Shortages for Steam-electric Water User Groups ($millions)			
Decade	**Lost income due to reduced electrical generation**	**Lost state and local business tax revenues due to reduced electrical generation**	**Lost jobs due to reduced electrical generation**
2010	$63.17	$9.07	215
2020	$3,493.56	$501.45	5,938
2030	$3,495.55	$501.73	5,941
2040	$3,497.61	$502.03	5,945
2050	$3,503.90	$502.93	5,963
2060	$3,507.77	$503.49	5,973

*Changes to Income and business taxes are collectively equivalent to a decrease in gross state product, which is analogous to gross domestic product measured at the state rather than national level. Appendix 2 shows results by water user group.

2.7 Social Impacts of Water Shortages

As discussed previously, estimated social impacts focus on changes in population and school enrollment in the region. In 2010, estimated population losses total 12,886 with corresponding reductions in school enrollment of 3,635 students (Table 14). In 2060, population in the region would decline by 54,411 and school enrollment would fall by 10,064.

Table 14: Social Impacts of Water Shortages (2010-2060)		
Year	**Population Losses**	**Declines in School Enrollment**
2010	12,886	3,635
2020	43,823	12,433
2030	58,402	15,470
2040	74,857	13,835
2050	86,896	16,049
2060	54,411	10,064

2.8 Distribution of Impacts by Major River Basin

Administrative rules require that impacts are presented by both planning region and major river basin. To meet rule requirements, impacts were allocated among basins based on the distribution of water shortages in relevant basins. For example, if 50 percent of water shortages in River Basin A and 50 percent occur in River Basin B, then impacts were split equally among the two basins. Table 15 displays the results.

Table 15: Distribution of Impacts by Major River Basin (2010-2060)

River Basin	2010	2020	2030	2040	2050	2060
Colorado	<1%	<1%	<1%	<1%	<1%	<1%
Colorado-Lavaca	<1%	<1%	<1%	<1%	<1%	<1%
Guadalupe	7%	27%	27%	29%	30%	32%
Nueces	37%	22%	19%	16%	14%	12%
San Antonio	57%	51%	55%	57%	57%	58%

Appendix 1: Economic Data for Individual IMPLAN Sectors

Economic Data for Agricultural Water User Groups ($millions)

Water Use Category	IMPLAN Sector	IMPLAN Code	Total Sales	Intermediate Sales	Final Sales	Jobs	Income	Business Taxes
Irrigation	Oilseeds	1	$0.36	$0.01	$0.34	10	$0.19	$0.01
Irrigation	Grains	2	$25.64	$4.34	$21.30	1,145	$11.80	$0.46
Irrigation	Vegetable and melons	3	$178.72	$11.67	$167.05	2,122	$131.27	$1.68
Irrigation	Tree nuts	4	$10.65	$6.75	$3.82	154	$7.37	$0.26
Irrigation	Fruits	5	$8.48	$1.24	$7.18	172	$4.82	$0.18
Irrigation	Cotton	8	$17.60	$0.29	$17.34	212	$6.48	$0.16
	All other crops	10	$25.09	$23.05	$2.04	295	$12.25	$0.48
	Total irrigation		$266.54	$47.35	$219.07	4,110	$174.18	$3.23
Livestock	Cattle ranching and farming	11	$605.58	$419.90	$185.67	10,638	$47.84	$12.73
Livestock	Poultry and egg production	12	$247.53	$194.00	$53.53	834	$83.31	$0.84
Livestock	Animal production- except cattle and poultry	13	$36.37	$30.84	$5.53	2,034	$3.54	$0.56
	Total livestock	-	$889.48	$644.74	$244.74	13,506	$134.69	$14.13
	Total agriculture	-	$1,156.02	$692.09	$463.81	17,616	$308.87	$17.36

Based on year 2006 data from the Minnesota IMPLAN Group, Inc.

Economic Data for Mining and Steam-electric Water User Groups ($millions)									
Water Use Category	**IMPLAN Sector**	**IMPLAN Code**	**Total Sales**	**Intermediate Sales**	**Final Sales**	**Jobs**	**Income**	**Business Taxes**
Mining	Oil and gas extraction	19	$1,996.63	$1,854.24	$142.38	3,290	$1,148.96	$120.59
Mining	Support activities for oil and gas operations	28	$1,026.56	$142.59	$883.98	4,522	$930.58	$42.34
Mining	Drilling oil and gas wells	27	$577.01	$2.88	$574.13	997	$150.15	$19.80
Mining	Sand- gravel- clay- and refractory mining	25	$92.43	$9.76	$82.67	537	$54.54	$2.53
Mining	Coal mining	20	$64.63	$24.22	$40.41	207	$23.55	$7.12
Mining	Stone mining and quarrying	24	$44.53	$4.58	$39.95	149	$26.40	$0.27
Mining	Gold- silver- and other metal ore mining	23	$39.13	$21.85	$17.27	27	$20.87	$2.20
Mining	Other nonmetallic mineral mining	26	$0.58	$0.06	$0.52	3	$0.26	$0.02
Mining	Support activities for other mining	29	$0.33	$0.00	$0.33	1	$0.19	$0.00
	Total mining		$534.13	$150.26	$383.87	1,312	$370.93	$63.26
Steam-electric	**Power generation and supply**	**30**	$3,841.83	$2,060.19	$1,781.64	9,733	$2,355.49	$194.87
Based on year 2006 data from the Minnesota IMPLAN Group, Inc.								

Economic Data for Manufacturing Water User Groups ($millions)								
Water Use Category	**IMPLAN Sector**	**IMPLAN Code**	**Total Sales**	**Intermediate Sales**	**Final Sales**	**Jobs**	**Income**	**Business Taxes**
Manufacturing	New residential 1-unit structures- all	33	$3,607.93	$0.00	$3,607.92	23,970	$1,220.47	$19.21
Manufacturing	Plastics material and resin manufacturing	152	$2,571.32	$101.83	$2,469.49	1,813	$469.87	$15.37
Manufacturing	Petroleum refineries	142	$2,362.74	$878.23	$1,484.51	141	$1,068.08	$39.12
Manufacturing	Commercial and institutional buildings	38	$2,045.58	$0.00	$2,045.58	20,895	$1,045.42	$12.89
Manufacturing	Automobile and light truck manufacturing	344	$1,659.11	$1.77	$1,657.33	1,127	$209.81	$5.74
Manufacturing	Pharmaceutical and medicine manufacturing	160	$1,302.79	$238.08	$1,064.71	1,218	$457.37	$10.82
Manufacturing	Aircraft manufacturing	351	$1,231.30	$62.64	$1,168.65	2,422	$220.90	$3.78
Manufacturing	Alumina refining	208	$1,119.35	$50.99	$1,068.35	1,268	$238.82	$20.42
Manufacturing	Soft drink and ice manufacturing	85	$1,048.19	$58.55	$989.64	1,643	$163.97	$7.26
Manufacturing	Other new construction	41	$893.86	$0.00	$893.86	9,585	$484.91	$3.82
Manufacturing	Iron and steel mills	203	$811.22	$58.43	$752.78	873	$210.18	$7.81
Manufacturing	Motor vehicle parts manufacturing	350	$759.01	$61.03	$697.98	2,009	$196.86	$3.17
Manufacturing	Meat processed from carcasses	68	$596.94	$176.11	$420.83	1,360	$66.29	$3.43
Manufacturing	New residential additions and alterations-all	35	$514.58	$0.00	$514.58	2,855	$193.43	$2.73
Manufacturing	Wood kitchen cabinet and countertop manufacturing	362	$480.41	$374.24	$106.18	3,866	$209.65	$3.47
Manufacturing	AC- refrigeration- and forced air heating	278	$459.38	$0.00	$459.38	1,443	$100.71	$2.64
Manufacturing	Highway- street- bridge- and tunnel construct	39	$439.94	$0.00	$439.94	4,046	$223.89	$2.85
Manufacturing	Pesticide and other agricultural chemical man	159	$415.02	$69.54	$345.48	200	$162.38	$2.85
Manufacturing	Bread and bakery product- except frozen- manufacturing	73	$411.42	$91.87	$319.55	2,551	$182.21	$2.93
Manufacturing	New multifamily housing structures- all	34	$396.64	$0.00	$396.64	3,482	$188.50	$1.09
Manufacturing	Cement manufacturing	191	$394.93	$1.06	$393.87	407	$201.94	$4.12
Manufacturing	Other basic organic chemical manufacturing	151	$348.82	$65.03	$283.78	302	$54.93	$2.20
Manufacturing	Aircraft engine and engine parts manufacturing	352	$344.04	$94.27	$249.77	910	$71.12	$1.01
Manufacturing	Other animal food manufacturing	47	$331.48	$39.98	$291.50	465	$29.31	$2.24
Manufacturing	Water- sewer- and pipeline construction	40	$319.41	$0.00	$319.41	2,649	$143.64	$2.08
Manufacturing	Ready-mix concrete manufacturing	192	$316.77	$1.54	$315.23	1,003	$121.49	$3.30
Manufacturing	All other manufacturing	-	$9,837.48	$2,252.12	$7,585.36	41,856	$3,196.44	$82.30
Manufacturing	**Total manufacturing**	-	**$35,019.65**	**$4,677.32**	**$30,342.33**	**134,359**	**$11,132.59**	**$268.65**
Based on year 2006 data from the Minnesota IMPLAN Group, Inc.								

Economic Data for Municipal Water User Groups ($millions)								
Water Use Category	**IMPLAN Sector**	**IMPLAN Code**	**Total Sales**	**Intermediate Sales**	**Final Sales**	**Jobs**	**Income**	**Business Taxes**
Municipal	Owner-occupied dwellings	509	$6,426.35	$0.00	$6,426.35	0	$4,978.29	$759.88
Municipal	Wholesale trade	390	$6,141.21	$2,940.19	$3,201.02	36,563	$3,233.08	$908.45
Municipal	Real estate	431	$5,071.02	$2,007.38	$3,063.64	27,385	$2,934.53	$624.25
Municipal	Insurance carriers	427	$4,588.64	$1,338.03	$3,250.60	16,586	$1,813.63	$225.94
Municipal	Monetary authorities and depository credit in	430	$4,297.56	$1,415.42	$2,882.14	17,925	$3,017.82	$54.97
Municipal	Food services and drinking places	481	$4,044.01	$516.41	$3,527.59	80,052	$1,729.17	$202.02
Municipal	State & Local Education	503	$3,973.22	$0.00	$3,973.22	92,541	$3,973.22	$0.00
Municipal	Federal Military	505	$3,676.66	$0.01	$3,676.66	34,658	$3,676.66	$0.00
Municipal	Offices of physicians- dentists- and other he	465	$3,582.61	$0.00	$3,582.61	29,480	$2,549.08	$22.39
Municipal	Telecommunications	422	$3,560.49	$1,222.96	$2,337.52	7,129	$1,623.90	$270.70
Municipal	Hospitals	467	$2,687.75	$0.00	$2,687.74	22,732	$1,461.31	$18.67
Municipal	Motor vehicle and parts dealers	401	$2,090.72	$227.34	$1,863.37	18,289	$1,083.57	$306.77
Municipal	State & Local Non-Education	504	$1,971.28	$0.00	$1,971.28	34,133	$1,971.28	$0.00
Municipal	Pipeline transportation	396	$1,964.70	$859.23	$1,105.47	1,251	$835.12	$178.13
Municipal	Truck transportation	394	$1,909.79	$1,034.09	$875.69	17,671	$734.47	$16.89
Municipal	Federal Non-Military	506	$1,666.73	$0.01	$1,666.72	9,364	$1,666.72	$0.00
Municipal	Management of companies and enterprises	451	$1,665.00	$1,565.78	$99.22	7,815	$1,007.27	$16.08
Municipal	Architectural and engineering services	439	$1,580.82	$996.49	$584.33	12,844	$849.85	$7.03
Municipal	Hotels and motels- including casino hotels	479	$1,427.17	$735.24	$691.93	14,042	$790.79	$135.39
Municipal	General merchandise stores	410	$1,257.83	$132.57	$1,125.26	21,584	$579.77	$184.49
Municipal	Other State and local government enterprises	499	$1,216.82	$396.23	$820.59	5,493	$477.38	$0.16
Municipal	Legal services	437	$1,201.39	$762.47	$438.92	9,070	$760.65	$23.62
Municipal	Other ambulatory health care services	466	$1,165.44	$75.80	$1,089.64	8,243	$566.52	$8.44
Municipal	Food and beverage stores	405	$1,124.71	$150.37	$974.34	18,856	$578.36	$126.75
Municipal	Funds- trusts- and other financial vehicles	429	$1,119.37	$21.23	$1,098.14	3,732	$246.75	$9.89
Municipal	Securities- commodity contracts- investments	426	$1,110.71	$737.61	$373.10	9,095	$411.31	$12.11
Municipal	**All other municipal**		$29,595.50	$11,187.27	$18,408.23	409,988	$15,779.81	$1,260.49
Manufacturing	**Total**		**$100,117.50**	**$28,322.13**	**$71,795.32**	**966,521**	**$59,330.31**	**$5,373.51**
Based on year 2006 data from the Minnesota IMPLAN Group, Inc.								

Appendix 2: Impacts by Water User Group

Irrigation ($millions)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Atascosa County						
Reduced income from lost crop production	$1.13	$0.88	$0.63	$0.40	$0.17	$0.05
Reduced business taxes from lost crop production	$0.05	$0.04	$0.03	$0.02	$0.01	$0.00
Reduced jobs from lost crop production	13	10	7	5	2	1
Medina County						
Reduced income from lost crop production	$1.29	$0.98	$0.68	$0.39	$0.11	$0.00
Reduced business taxes from lost crop production	$0.07	$0.05	$0.03	$0.02	$0.01	$0.00
Reduced jobs from lost crop production	19	14	10	6	2	0
Zavala County						
Reduced income from lost crop production	$40.90	$38.77	$36.73	$34.77	$32.89	$31.08
Reduced business taxes from lost crop production	$2.04	$1.94	$1.83	$1.74	$1.64	$1.55
Reduced jobs from lost crop production	513	487	461	436	413	390

Manufacturing ($millions)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Bexar County						
Reduced income from lost manufacturing	$32.89	$119.92	$202.26	$566.31	$708.72	$863.34
Reduced business taxes from lost manufacturing	$5.67	$20.68	$34.87	$97.64	$122.19	$148.85
Reduced jobs from lost crop livestock manufacturing	501	1,826	3,080	8,624	10,793	13,148
Calhoun County						
Reduced income from lost manufacturing	$0.00	$0.00	$0.00	$0.00	$0.00	$7.27
Reduced business taxes from lost manufacturing	$0.00	$0.00	$0.00	$0.00	$0.00	$2.12
Reduced jobs from lost crop livestock manufacturing	0	0	0	0	0	755
Comal County						
Reduced income from lost manufacturing	$113.88	$132.15	$148.60	$164.59	$178.32	$197.62
Reduced business taxes from lost manufacturing	$16.55	$19.21	$21.60	$23.92	$25.92	$28.72
Reduced jobs from lost crop livestock manufacturing	7,773	9,020	10,143	11,234	12,171	13,488
Victoria County						
Reduced income from lost manufacturing	$0.00	$72.87	$145.32	$217.45	$563.96	$708.86
Reduced business taxes from lost manufacturing	$0.00	$12.56	$25.06	$37.49	$97.23	$122.22
Reduced jobs from lost crop livestock manufacturing	0	1,110	2,213	3,312	8,588	10,795

Mining ($millions)						
	2010	2020	2030	2040	2050	2060
Bexar County						
Reduced income from lost mining output	$0.00	$0.00	$1.25	$1.38	$1.52	$1.65
Reduced business taxes from lost mining output	$0.00	$0.00	$0.15	$0.17	$0.19	$0.20
Reduced jobs from lost mining output	0	0	18	20	22	24
Comal County						
Reduced income from lost mining output	$0.44	$0.64	$0.76	$0.87	$2.15	$2.36
Reduced business taxes from lost mining output	$0.03	$0.05	$0.05	$0.06	$0.15	$0.17
Reduced jobs from lost mining output	5	7	8	9	22	24
Hays County						
Reduced income from lost mining output	$2.23	$2.48	$2.64	$2.75	$2.78	$2.80
Reduced business taxes from lost mining output	$0.11	$0.12	$0.13	$0.14	$0.14	$0.14
Reduced jobs from lost mining output	22	25	26	27	28	28

Steam-electric ($millions)						
	2010	2020	2030	2040	2050	2060
Atascosa County						
Reduced income from lost electrical generation	$1.78	$0.00	$0.00	$0.00	$4.10	$6.39
Reduced business taxes from lost electrical generation	$0.26	$0.00	$0.00	$0.00	$0.59	$0.92
Reduced jobs from lost electrical generation	6	0	0	0	14	22
Victoria County						
Reduced income from lost electrical generation	$61.39	$3,493.56	$3,495.55	$3,497.61	$3,499.80	$3,501.38
Reduced business taxes from lost electrical generation	$8.81	$501.45	$501.73	$502.03	$502.34	$502.57
Reduced jobs from lost electrical generation	209	5938	5941	5945	5949	5951

Municipal ($millions)						
	2010	2020	2030	2040	2050	2060
Alamo Heights						
Monetary value of domestic water shortages	$0.96	$1.06	$1.07	$1.06	$1.08	$1.12
Lost utility revenues	$1.06	$1.18	$1.18	$1.17	$1.20	$1.24
Aqua WSC						
Monetary value of domestic water shortages	$0.10	$1.68	$4.04	$3.70	$4.53	$5.42
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.17	$0.23	$0.30
Lost jobs due to reduced commercial business activity	0	0	0	7	9	12
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.03	$0.04	$0.05
Lost utility revenues	$0.10	$0.24	$0.35	$0.48	$0.59	$0.72
Atascosa Rural WSC						
Monetary value of domestic water shortages	$9.49	$11.95	$15.32	$17.74	$19.56	$21.76
Lost income from reduced commercial business activity	$2.11	$3.07	$3.92	$4.63	$5.24	$5.87
Lost jobs due to reduced commercial business activity	47	68	87	103	117	131
Lost state and local taxes from reduced commercial business activity	$0.22	$0.33	$0.42	$0.49	$0.56	$0.62
Lost utility revenues	$0.98	$1.29	$1.56	$1.79	$1.99	$2.19
Benton City WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.23	$0.64	$3.12	$3.92
Lost utility revenues	$0.00	$0.00	$0.36	$0.83	$1.28	$1.63
Bexar Met Water District						
Monetary value of domestic water shortages	$29.85	$43.51	$52.16	$59.71	$68.58	$82.71
Lost income from reduced commercial business activity	$8.43	$13.75	$19.10	$23.71	$28.77	$34.02
Lost jobs due to reduced commercial business activity	136	222	308	382	464	548
Lost state and local taxes from reduced commercial business activity	$0.76	$1.24	$1.72	$2.13	$2.59	$3.06
Lost utility revenues	$7.23	$8.43	$9.92	$10.75	$11.88	$13.15

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Boerne						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.25
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.00	$0.50
Bulverde City						
Monetary value of domestic water shortages	$6.31	$24.37	$39.17	$59.32	$75.71	$93.29
Lost income from reduced commercial business activity	$2.26	$5.50	$9.19	$12.86	$16.68	$20.77
Lost jobs due to reduced commercial business activity	91	221	369	517	671	835
Lost state and local taxes from reduced commercial business activity	$0.32	$0.78	$1.31	$1.83	$2.38	$2.96
Lost utility revenues	$1.17	$2.41	$3.83	$5.23	$6.69	$8.26
Canyon Lake WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.11	$3.17	$25.78	$47.65
Lost utility revenues	$0.00	$0.00	$0.23	$3.95	$8.03	$12.17
Castle Hills						
Monetary value of domestic water shortages	$0.12	$0.10	$0.08	$0.07	$0.05	$0.05
Lost utility revenues	$0.19	$0.16	$0.14	$0.11	$0.09	$0.09
Castroville						
Monetary value of domestic water shortages	$3.63	$4.28	$5.55	$8.93	$9.88	$10.75
Lost income from reduced commercial business activity	$0.94	$1.41	$1.84	$2.22	$2.68	$3.08
Lost jobs due to reduced commercial business activity	22	33	43	51	61	70
Lost state and local taxes from reduced commercial business activity	$0.79	$1.17	$1.54	$1.86	$2.19	$2.51
Lost utility revenues	$0.58	$0.71	$0.82	$0.93	$1.03	$1.14
Converse						
Monetary value of domestic water shortages	$0.00	$0.00	$0.12	$0.51	$0.92	$1.57
Lost utility revenues	$0.00	$0.00	$0.24	$0.81	$1.29	$1.74
County Line WSC						
Monetary value of domestic water shortages	$0.00	$13.95	$20.67	$22.12	$32.21	$41.84
Lost income from reduced commercial business activity	$0.00	$1.99	$2.98	$3.21	$3.89	$5.04
Lost jobs due to reduced commercial business activity	0	80	120	129	156	203
Lost state and local taxes from reduced commercial business activity	$0.00	$0.31	$0.46	$0.50	$0.60	$0.78
Lost utility revenues	$0.00	$1.89	$2.59	$2.91	$3.50	$4.35

Municipal (cont.)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
County-other (Bexar)						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.11	$0.37	$0.67
County-other (Comal)						
Monetary value of domestic water shortages	$18.36	$23.89	$26.38	$34.60	$39.04	$43.36
County-other (Kendall)						
Monetary value of domestic water shortages	$0.23	$1.11	$2.47	$10.95	$15.73	$24.74
County-other (Medina)						
Monetary value of domestic water shortages	$0.00	$0.27	$0.76	$1.28	$6.09	$8.23
County-other (Victoria)						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.07	$0.18	$0.32
County-other (Wilson)						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.03
Creedmore –Maha WSC						
Monetary value of domestic water shortages	$1.07	$2.73	$4.75	$5.90	$7.07	$8.75
Lost income from reduced commercial business activity	$0.00	$0.38	$0.58	$0.79	$0.99	$1.21
Lost jobs due to reduced commercial business activity	0	15	23	32	40	48
Lost state and local taxes from reduced commercial business activity	$0.00	$0.06	$0.09	$0.12	$0.15	$0.19
Lost utility revenues	$0.21	$0.36	$0.49	$0.62	$0.75	$0.89
Crystal Clear WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.67	$3.07	$14.98	$23.52
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.63
Lost jobs due to reduced commercial business activity	0	0	0	0	0	25
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.10
Lost utility revenues	$0.00	$0.00	$0.79	$1.78	$3.05	$4.30

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
East Central WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.28	$0.69	$1.87	$3.45
Lost utility revenues	$0.00	$0.00	$0.46	$0.91	$1.32	$1.74
East Medina SUD						
Monetary value of domestic water shortages	$0.00	$0.11	$0.27	$0.44	$0.64	$2.59
Lost utility revenues	$0.00	$0.19	$0.38	$0.54	$0.71	$0.88
Floresville						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.15	$0.50
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.29	$0.78
Garden Ridge						
Monetary value of domestic water shortages	$2.54	$5.97	$9.83	$13.42	$16.68	$20.57
Lost income from reduced commercial business activity	$0.00	$0.58	$0.92	$1.27	$1.62	$2.01
Lost jobs due to reduced commercial business activity	0	23	37	51	65	81
Lost state and local taxes from reduced commercial business activity	$0.00	$0.09	$0.14	$0.20	$0.25	$0.31
Lost utility revenues	$0.51	$0.78	$1.09	$1.41	$1.73	$2.08
Goforth WSC						
Monetary value of domestic water shortages	$0.00	$0.02	$0.56	$4.64	$10.05	$12.53
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$2.58
Lost jobs due to reduced commercial business activity	0	0	0	0	0	104
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.00	$0.00	$0.40
Lost utility revenues	$0.00	$0.05	$0.80	$1.61	$2.61	$3.43

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Green Valley WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.68
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.00	$1.17
Hill Country Village						
Monetary value of domestic water shortages	$26.38	$26.27	$26.12	$26.01	$25.94	$25.94
Lost income from reduced commercial business activity	$4.30	$4.28	$4.25	$4.23	$4.22	$4.22
Lost jobs due to reduced commercial business activity	136	135	134	134	133	133
Lost state and local taxes from reduced commercial business activity	$0.61	$0.61	$0.61	$0.60	$0.60	$0.60
Lost utility revenues	$1.45	$1.44	$1.43	$1.43	$1.42	$1.42
Hollywood Park						
Monetary value of domestic water shortages	$40.26	$41.77	$43.17	$44.23	$45.32	$46.35
Lost income from reduced commercial business activity	$8.29	$8.63	$8.95	$9.19	$9.43	$9.66
Lost jobs due to reduced commercial business activity	261	272	282	290	297	305
Lost state and local taxes from reduced commercial business activity	$1.18	$1.23	$1.27	$1.31	$1.34	$1.38
Lost utility revenues	$3.90	$4.05	$4.18	$4.29	$4.40	$4.50
Hondo						
Monetary value of domestic water shortages	$0.41	$0.87	$3.91	$5.25	$6.88	$7.95
Lost utility revenues	$0.57	$0.96	$1.33	$1.63	$1.95	$2.25
Jourdanton						
Monetary value of domestic water shortages	$0.16	$0.27	$0.35	$0.54	$0.62	$0.69
Lost utility revenues	$0.22	$0.34	$0.45	$0.53	$0.61	$0.67
Karnes City						
Monetary value of domestic water shortages	$1.64	$1.83	$2.46	$2.65	$2.77	$2.87
Lost utility revenues	$0.36	$0.40	$0.44	$0.48	$0.50	$0.52

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Kenedy						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.04	$0.10	$0.16
Lost utility revenues	$0.00	$0.00	$0.00	$0.07	$0.17	$0.23
Kirby						
Monetary value of domestic water shortages	$1.77	$1.76	$1.78	$1.75	$1.81	$1.92
Lost utility revenues	$0.60	$0.60	$0.61	$0.60	$0.62	$0.65
Kyle						
Monetary value of domestic water shortages	$0.00	$0.45	$0.92	$1.12	$2.22	$2.76
Lost utility revenues	$0.00	$0.78	$1.28	$1.57	$2.46	$3.05
Lacoste						
Monetary value of domestic water shortages	$0.91	$1.20	$1.20	$1.43	$1.76	$1.95
Lost income from reduced commercial business activity	$0.00	$0.00	$0.17	$0.19	$0.22	$0.26
Lost jobs due to reduced commercial business activity	0	0	7	8	9	10
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.03	$0.03	$0.03	$0.04
Lost utility revenues	$0.18	$0.22	$0.25	$0.27	$0.30	$0.33
Lockhart						
Monetary value of domestic water shortages	$0.00	$0.33	$1.23	$7.43	$11.27	$17.68
Lost utility revenues	$0.00	$0.58	$1.54	$2.53	$3.51	$4.52
Luling						
Monetary value of domestic water shortages	$0.00	$0.12	$0.24	$0.38	$0.65	$0.82
Lost utility revenues	$0.00	$0.22	$0.38	$0.53	$0.72	$0.91
Lytle						
Monetary value of domestic water shortages	$0.32	$0.39	$0.45	$1.44	$1.54	$1.63
Lost utility revenues	$0.28	$0.30	$0.32	$0.33	$0.35	$0.37
Marion						
Monetary value of domestic water shortages	$0.00	$0.00	$0.02	$0.05	$0.09	$0.15
Lost utility revenues	$0.00	$0.01	$0.04	$0.07	$0.10	$0.15

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Martindale WSC						
Monetary value of domestic water shortages	$0.06	$0.38	$0.76	$1.52	$2.21	$2.88
Lost utility revenues	$0.08	$0.14	$0.19	$0.25	$0.30	$0.36
Maxwell WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.09	$0.43	$0.74	$5.25
Lost utility revenues	$0.00	$0.00	$0.15	$0.49	$0.94	$1.36
McCoy WSC						
Monetary value of domestic water shortages	$0.00	$0.02	$0.48	$1.07	$1.99	$5.63
Lost utility revenues	$0.00	$0.02	$0.38	$0.79	$1.18	$1.48
Mountain City						
Monetary value of domestic water shortages	$0.00	$0.04	$0.54	$1.04	$2.45	$3.04
Lost utility revenues	$0.00	$0.04	$0.10	$0.15	$0.21	$0.27
Mustang Ridge						
Monetary value of domestic water shortages	$0.03	$0.51	$0.98	$1.68	$2.43	$3.41
Lost utility revenues	$0.04	$0.12	$0.20	$0.27	$0.35	$0.42
Natalia						
Monetary value of domestic water shortages	$2.92	$4.25	$5.23	$5.93	$6.56	$7.16
Lost income from reduced commercial business activity	$0.55	$0.73	$0.89	$1.04	$1.18	$1.31
Lost jobs due to reduced commercial business activity	17	23	28	33	37	41
Lost state and local taxes from reduced commercial business activity	$0.08	$0.10	$0.13	$0.15	$0.17	$0.19
Lost utility revenues	$0.38	$0.47	$0.55	$0.62	$0.69	$0.76
New Braunfels						
Monetary value of domestic water shortages	$0.00	$0.91	$8.24	$40.33	$63.55	$105.08
Lost income from reduced commercial business activity	$0.00	$0.00	$1.79	$5.14	$8.84	$12.91
Lost jobs due to reduced commercial business activity	0	0	40	114	197	287
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.19	$0.55	$0.94	$1.37
Lost utility revenues	$0.00	$1.65	$7.34	$12.97	$18.80	$25.25

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Niederwald						
Monetary value of domestic water shortages	$0.56	$1.84	$3.44	$5.86	$7.61	$9.05
Lost utility revenues	$0.11	$0.23	$0.36	$0.48	$0.63	$0.75
Oak Hills WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.41
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.00	$0.59
Plum Creek Water Co.						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.25	$2.40	$3.79
Lost utility revenues	$0.00	$0.00	$0.00	$0.35	$0.82	$1.18
Point Comfort						
Monetary value of domestic water shortages	$0.07	$1.44	$5.15	$9.38	$9.19	$9.19
Lost utility revenues	$0.09	$0.29	$0.64	$0.99	$0.97	$0.97
Polonia WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.06	$0.30
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.12	$0.48
Sabinal						
Monetary value of domestic water shortages	$0.18	$0.17	$0.16	$0.16	$0.15	$0.15
Lost utility revenues	$0.25	$0.24	$0.23	$0.22	$0.22	$0.22
San Antonio						
Monetary value of domestic water shortages	$505.60	$1,169.02	$914.55	$1,223.47	$1,613.29	$1,769.69
Lost income from reduced commercial business activity	$0.00	$0.00	$683.59	$942.18	$1,132.44	$1,322.45
Lost jobs due to reduced commercial business activity	0	0	15,208	20,961	25,194	29,421
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$72.75	$100.27	$120.51	$140.73
Lost utility revenues	$117.71	$165.77	$205.50	$239.53	$266.76	$293.93
San Marcos						
Monetary value of domestic water shortages	$0.00	$0.00	$1.35	$7.74	$49.10	$80.16
Lost utility revenues	$0.00	$0.00	$2.37	$8.58	$15.30	$20.47

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Santa Clara						
Monetary value of domestic water shortages	$0.63	$2.85	$6.54	$11.64	$15.41	$19.44
Lost utility revenues	$0.15	$0.41	$0.69	$0.96	$1.27	$1.60
Schertz						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.67	$3.15
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$1.17	$4.40
Selma						
Monetary value of domestic water shortages	$0.00	$0.56	$1.54	$1.52	$2.01	$2.63
Lost utility revenues	$0.00	$0.71	$1.51	$1.50	$1.48	$1.49
Shavano Park						
Monetary value of domestic water shortages	$2.88	$3.03	$3.14	$3.22	$3.32	$3.43
Lost utility revenues	$0.63	$0.67	$0.69	$0.71	$0.73	$0.75
SS WSC						
Monetary value of domestic water shortages	$0.26	$4.99	$12.19	$19.80	$35.60	$44.69
Lost utility revenues	$0.40	$1.55	$2.78	$3.98	$5.28	$6.63
Sunko WSC						
Monetary value of domestic water shortages	$0.00	$0.00	$0.00	$0.00	$0.00	$0.07
Lost utility revenues	$0.00	$0.00	$0.00	$0.00	$0.00	$0.14
Universal City						
Monetary value of domestic water shortages	$0.10	$0.48	$0.87	$0.81	$0.78	$0.78
Lost utility revenues	$0.20	$0.76	$1.22	$1.13	$1.09	$1.09
Uvalde						
Monetary value of domestic water shortages	$28.56	$28.86	$29.03	$29.06	$29.08	$29.31
Lost income from reduced commercial business activity	$16.03	$16.34	$16.51	$16.54	$16.56	$16.79
Lost jobs due to reduced commercial business activity	357	364	367	368	368	374
Lost state and local taxes from reduced commercial business activity	$1.71	$1.74	$1.76	$1.76	$1.76	$1.79
Lost utility revenues	$5.70	$5.77	$5.81	$5.81	$5.82	$5.87

Municipal (cont.)						
	2010	2020	2030	2040	2050	2060
Water Services Inc.						
Monetary value of domestic water shortages	$21.86	$27.55	$33.22	$38.38	$43.22	$48.43
Lost utility revenues	$1.80	$2.27	$2.74	$3.17	$3.57	$4.00
Wimberly						
Monetary value of domestic water shortages	$0.36	$2.79	$5.26	$7.91	$14.28	$17.07
Lost utility revenues	$0.39	$0.79	$1.20	$1.59	$2.12	$2.53
Windcrest						
Monetary value of domestic water shortages	$0.30	$0.29	$0.28	$0.27	$0.26	$0.27
Lost utility revenues	$0.42	$0.41	$0.39	$0.38	$0.37	$0.38
Woodcreek						
Monetary value of domestic water shortages	$0.03	$0.19	$1.46	$2.51	$4.41	$6.19
Lost utility revenues	$0.05	$0.18	$0.32	$0.45	$0.63	$0.77
Woodcreek Utilities Inc.						
Monetary value of domestic water shortages	$6.33	$19.35	$30.50	$40.34	$52.42	$61.92
Lost utility revenues	$0.90	$1.69	$2.52	$3.33	$4.32	$5.11
Yancey WSC						
Monetary value of domestic water shortages	$0.31	$0.00	$0.00	$7.01	$8.28	$9.54
Lost income from reduced commercial business activity	$0.00	$0.00	$0.00	$0.96	$1.26	$1.55
Lost jobs due to reduced commercial business activity	0	0	0	21	28	34
Lost state and local taxes from reduced commercial business activity	$0.00	$0.00	$0.00	$0.10	$0.13	$0.16
Lost utility revenues	$0.42	$0.78	$1.11	$1.41	$1.69	$1.95

Appendix F

Texas Commission on Environmental Quality

Model
Municipal Water Conservation Plan

Utility Profile and Water Conservation Plan Requirements for Municipal Water Use by Public Water Suppliers

(See following pages of Appendix F)

Web Sites for Information:
http://www.tceq.state.tx.us/assets/public/permitting/forms/10218.pdf

Texas Commission on Environmental Quality

UTILITY PROFILE & WATER CONSERVATION PLAN REQUIREMENTS FOR MUNICIPAL WATER USE BY PUBLIC WATER SUPPLIERS

This form is provided to assist entities in water conservation plan development for municipal water use by a retail public water supplier. Information from this form should be included within a water conservation plan for municipal use. If you need assistance in completing this form or in developing your plan, please contact the conservation staff of the Resource Protection Team in the Water Supply Division at (512) 239-4691.

Name of Entity: ____

Address & Zip: ____

Telephone Number: ______________________________ **Fax:** ____________________

Form Completed By:____

Title: ____

Signature: ______________________________ **Date:** ___________________

Name and Phone Number of Person/Department responsible for implementing a water conservation program: ____

UTILITY PROFILE

I. POPULATION AND CUSTOMER DATA

A. Population and Service Area Data

1. Attach a copy of your service-area map and, if applicable, a copy of your Certificate of Convenience and Necessity (CCN).

2. Service area size (square miles): ________________________________

3. Current population of service area: ______________________________

4. Current population served:

a. water ______________________
b. wastewater ______________________

5. Population served by water utility for the previous five years:

Year	Population
________	_________
________	_________
________	_________
________	_________
________	_________

6. Projected population for service area in the following decades:

Year	Population
2010	_________
2020	_________
2030	_________
2040	_________
2050	_________

7. List source/method for the calculation of current and projected population:

____
____
____
____

B. Active Connections

1. Current number of active connections. Check whether multi-family service is counted as Residential _____ or Commercial _____

Treated water users:	Metered	Not-metered	Total
Residential	________	__________	______
Commercial	________	__________	______
Industrial	________	__________	______
Other	________	__________	______

2. List the net number of new connections per year for most recent three years:

Year	________	________	________
Residential	________	________	________
Commercial	________	________	________
Industrial	________	________	________
Other	________	________	________

C. High Volume Customers

List annual water use for the five highest volume customers
(indicate if treated or raw water delivery)

	Customer	Use (1,000gal./yr.)	Treated/Raw Water
(1)	____________	____________	____________
(2)	____________	____________	____________
(3)	____________	____________	____________
(4)	____________	____________	____________
(5)	____________	____________	____________

II. WATER USE DATA FOR SERVICE AREA

A. Water Accounting Data

1. Amount of water use for previous five years (in 1,000 gal.):
Please indicate : Diverted Water ____________________
Treated Water ____________________

Year	________	________	________	________	________
January	________	________	________	________	________
February	________	________	________	________	________
March	________	________	________	________	________

April	___	___	___	___	___
May	___	___	___	___	___
June	___	___	___	___	___
July	___	___	___	___	___
August	___	___	___	___	___
September	___	___	___	___	___
October	___	___	___	___	___
November	___	___	___	___	___
December	___	___	___	___	___
Total	___	___	___	___	___

Indicate how the above figures were determined (e.g., from a master meter located at the point of a diversion from the source or located at a point where raw water enters the treatment plant, or from water sales).

____

____

____

2. Amount of water (in 1,000 gallons) delivered (sold) as recorded by the following account types for the past five years.

Year	Residential	Commercial	Industrial	Wholesale	Other	Total Sold
___	___	___	___	___	___	___
___	___	___	___	___	___	___
___	___	___	___	___	___	___
___	___	___	___	___	___	___
___	___	___	___	___	___	___

3. List previous five years records for water loss (the difference between water diverted (or treated) and water delivered (or sold))

Year	Amount (gal.)	%
___	___	___
___	___	___
___	___	___
___	___	___
___	___	___

4. Municipal water use for previous five years:

Year	Population	Total Water Diverted or Pumped for Treatment (1,000 gal.)
______________		________________
______________		________________
______________		________________
______________		________________
______________		________________

B. Projected Water Demands

If applicable, attach projected water supply demands for the next ten years using information such as population trends, historical water use, and economic growth in the service area over the next ten years and any additional water supply requirement from such growth.

III. WATER SUPPLY SYSTEM DATA

A. Water Supply Sources

List all current water supply sources and the amounts authorized with each:

	Source	Amount Authorized
Surface Water:	______________________________	____________ acre-feet
Groundwater:	______________________________	____________ acre-feet
Contracts:	______________________________	____________ acre-feet
Other:	______________________________	____________ acre-feet

B. Treatment and Distribution System

1. Design daily capacity of system: _______________ MGD

2. Storage Capacity: Elevated ________ MGD, Ground _______ MGD

3. If surface water, do you recycle filter backwash to the head of the plant? Yes ______ No ______. If yes, approximately ________ MGD.

4. Please attach a description of the water system. Include the number of

treatment plants, wells, and storage tanks. If possible, include a sketch of the system layout.

IV. WASTEWATER SYSTEM DATA

A. Wastewater System Data

1. Design capacity of wastewater treatment plant(s): ___________ MGD

2. Is treated effluent used for irrigation on-site _____, off-site _____, plant washdown _____, or chlorination/dechlorination ______?
   If yes, approximately ________ gallons per month.

3. Briefly describe the wastewater system(s) of the area serviced by the water utility. Describe how treated wastewater is disposed of. Where applicable, identify treatment plant(s) with the TCEQ name and number, the operator, owner, and, if wastewater is discharged, the receiving stream. If possible, attach a sketch or map which locates the plant(s) and discharge points or disposal sites.

B. Wastewater Data for Service Area

1. Percent of water service area served by wastewater system: ______%

2. Monthly volume treated for previous three years (in 1,000 gallons):

Year			
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			
Total			

REQUIREMENTS FOR WATER CONSERVATION PLANS FOR MUNICIPAL WATER USE BY PUBLIC WATER SUPPLIERS

In addition to the utility profile, a water conservation plan for municipal use by a public water supplier must include, at a minimum, additional information as required by Title 30, Texas Administrative Code, §288.2. **Note: If the water conservation plan does not provide information for each requirement, an explanation must be included as to why the requirement is not applicable.**

Specific, Quantified 5 & 10-Year Targets

The water conservation plan must include specific, quantified five-year and ten-year targets for water savings to include goals for water loss programs and goals for ***municipal use in gallons per capita per day*** (see Appendix A). Note that the goals established by a public water supplier under this subparagraph are not enforceable.

Metering Devices

The water conservation plan must include a statement about the water supplier's metering device(s), within an accuracy of plus or minus 5.0% in order to measure and account for the amount of water diverted from the source of supply.

Universal Metering

The water conservation plan must include and a program for universal metering of both customer and public uses of water, for meter testing and repair, and for periodic meter replacement.

Unaccounted-For Water Use

The water conservation plan must include measures to determine and control unaccounted-for uses of water (for example, periodic visual inspections along distribution lines; annual or monthly audit of the water system to determine illegal connections; abandoned services; etc.).

Continuing Public Education & Information

The water conservation plan must include a description of the program of continuing public education and information regarding water conservation by the water supplier.

Non-Promotional Water Rate Structure

The water supplier must have a water rate structure which is not "promotional," i.e., a rate structure which is cost-based and which does not encourage the excessive use of water. This rate structure must be listed in the water conservation plan.

Reservoir Systems Operations Plan

The water conservation plan must include a reservoir systems operations plan, if applicable, providing for the coordinated operation of reservoirs owned by the applicant within a common watershed or river basin in order to optimize available water supplies.

Enforcement Procedure & Plan Adoption

The water conservation plan must include a means of implementation and enforcement which shall be evidenced by 1) a copy of the ordinance, resolution, or tariff indicating **official adoption** of the water conservation plan by the water supplier; and 2) a description of the authority by which the water supplier will implement and enforce the conservation plan.

Coordination with the Regional Water Planning Group(s)

The water conservation plan must include documentation of coordination with the regional water planning group(s) for the service area of the public water supplier in order to ensure consistency with the appropriate approved regional water plans.

Example statement to be included within the water conservation plan:

The service area of the _____________ *(name of water supplier) is located within the* ___________ *(name of regional water planning area or areas) and* ___________ *(name of water supplier) has provided a copy of this water conservation plan to the* ____________ *(name of regional water planning group or groups).*

Additional Requirements:

required of suppliers serving population of 5,000 or more or a projected population of 5,000 or more within ten years)

1. Program for Leak Detection, Repair, and Water Loss Accounting

The plan must include a description of the program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system in order to control unaccounted-for uses of water.

2. Record Management System

The plan must include a record management system to record water pumped, water deliveries, water sales, and water losses which allows for the desegregation of water sales and uses into the following user classes (residential; commercial; public and institutional; and industrial.

Plan Review and Update

Beginning May 1, 2005, a public water supplier for municipal use shall review and update its water conservation plan, as appropriate, based on an assessment of previous five-year and ten-year targets and any other new or updated information. The public water supplier for municipal use shall review and update the next revision of its water conservation plan not later than May 1, 2009, and every five years after that date to coincide with the regional water planning group. The revised plan must also include an implementation report.

Best Management Practices Guide

On November 2004, the Texas Water Development Board's (TWDB) Report 362 was completed by the Water Conservation Implementation Task Force. Report 362 is the Water Conservation Best Management Practices (BMP) Guide. The BMP Guide is a voluntary list of management practices that water users may implement in addition to the required components of Title 30, Texas Administrative Code, Chapter 288. The BMP Guide is available on the TWDB's website at the link below or by calling (512) 463-7847.

http://www.twdb.state.tx.us/assistance/conservation/TaskForceDocs/WCITFBMPGuide.pdf

Appendix A

Definitions of Commonly Used Terms

Conservation – Those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses.

Industrial use – The use of water in processes designed to convert materials of a lower order of value into forms having greater usability and commercial value, commercial fish production, and the development of power by means other than hydroelectric, but does not include agricultural use.

Irrigation – The agricultural use of water for the irrigation of crops, trees, and pastureland, including, but not limited to, golf courses and parks which do not receive water through a municipal distribution system.

Municipal per capita water use – The sum total of water diverted into a water supply system for residential, commercial, and public and institutional uses divided by actual population served.

Municipal use – The use of potable water within or outside a municipality and its environs whether supplied by a person, privately owned utility, political subdivision, or other entity as well as the use of sewage effluent for certain purposes, including the use of treated water for domestic purposes, fighting fires, sprinkling streets, flushing sewers and drains, watering parks and parkways, and recreational purposes, including public and private swimming pools, the use of potable water in industrial and commercial enterprises supplied by a municipal distribution system without special construction to meet its demands, and for the watering of lawns and family gardens.

Municipal use in gallons per capita per day – The total average daily amount of water diverted or pumped for treatment for potable use by a public water supply system. The calculation is made by dividing the water diverted or pumped for treatment for potable use by population served. Indirect reuse volumes shall be credited against total diversion volumes for the purpose of calculating gallons per capita per day for targets and goals.

Pollution – The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to the public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

Public water supplier – An individual or entity that supplies water to the public for human consumption.

Regional water planning group – A group established by the Texas Water Development Board to prepare a regional water plan under Texas Water Code, §16.053.

Retail public water supplier – An individual or entity that for compensation supplies water to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants when that water is not resold to or used by others.

Reuse – The authorized use for one or more beneficial purposes of use of water that remains unconsumed after the water is used for the original purpose of use and before that water is either disposed of or discharged or otherwise allowed to flow into a watercourse, lake, or other body of state-owned water.

Water conservation plan – A strategy or combination of strategies for reducing the volume of water withdrawn from a water supply source, for reducing the loss or waste of water, for maintaining or improving the efficiency in the use of water, for increasing the recycling and reuse of water, and for preventing the pollution of water. A water conservation plan may be a separate document identified as such or may be contained within another water management document(s).

Water loss - The difference between water diverted or treated and water delivered (sold). Water loss can result from:

1. inaccurate or incomplete record keeping;
2. meter error;
3. unmetered uses such as firefighting, line flushing, and water for public buildings and water treatment plants;
4. leaks; and
5. water theft and unauthorized use.

Wholesale public water supplier – An individual or entity that for compensation supplies water to another for resale to the public for human consumption. The term does not include an individual or entity that supplies water to itself or its employees or tenants as an incident of that employee service or tenancy when that water is not resold to or used by others, or an individual or entity that conveys water to another individual or entity, but does not own the right to the water which is conveyed, whether or not for a delivery fee.

Appendix G

Texas Commission on Environmental Quality

Model
Municipal Drought Contingency Plan

Drought Contingency Plan Requirements for
Municipal Retail Public Water Suppliers

Web Site for Information:
http://www.tceq.state.tx.us/assets/public/permitting/watersupply/water_rights/20191.pdf

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Drought Contingency Plan
for a Retail Public Water Supplier

Texas Commission on Environmental Quality

Instructions: The following form is a model of a drought contingency plan for a retail public water supplier. Not all items may apply to your system's situation. This form is supplied for your convenience, but you are not required to use this form to submit your plan to the TCEQ. Submit completed plans to: Water Supply Division MC 160, TCEQ, P.O. Box 13087, Austin TX 78711-3087.

____

(Name of Utility)

____

(Address, City, Zip Code)

____

(CCN#)

____

(PWS #s)

____

(Date)

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the ___________________ (name of your water supplier) hereby adopts the following regulations and restrictions on the delivery and consumption of water through an ordinance/or resolution (see Appendix C for an example).

Water uses regulated or prohibited under this Drought Contingency Plan (the Plan) are considered to be non-essential and continuation of such uses during times of water shortage or other emergency water supply condition are deemed to constitute a waste of water which subjects the offender(s) to penalties as defined in Section XI of this Plan.

Section II: Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by the ______________ (name of your water supplier) by means of ________________ (describe methods used to inform the public about the preparation of the plan and provide opportunities for input; for example, scheduling and providing public notice of a public meeting to accept input on the Plan).

Section III: Public Education

The ______________ (name of your water supplier) will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of __________________ (describe methods to be used to provide information to the public about the Plan; for example, public events, press releases or utility bill inserts).

Section IV: Coordination with Regional Water Planning Groups

The service area of the _____________ (name of your water supplier) is located within the ____________ (name of regional water planning area or areas) and ___________ (name of your water supplier) has provided a copy of this Plan to the ____________ (name of your regional water planning group or groups).

Section V: Authorization

The ___________________ (designated official; for example, the mayor, city manager, utility director, general manager, etc.), or his/her designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The _______________, (designated official) or his/her designee, shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by the __________________ (name of your water supplier). The terms "person" and "customer" as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Definitions

For the purposes of this Plan, the following definitions shall apply:

Aesthetic water use: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

Commercial and institutional water use: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

Conservation: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

Customer: any person, company, or organization using water supplied by _________________ (name of your water supplier).

Domestic water use: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

Even number address: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, and rights-of-way and medians.

Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

(a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;
(b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
(c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
(d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
(e) flushing gutters or permitting water to run or accumulate in any gutter or street;
(f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or jacuzzi-type pools;

(g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
(h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
(i) use of water from hydrants for construction purposes or any other purposes other than fire fighting.

<u>Odd numbered address</u>: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

Section VIII: Criteria for Initiation and Termination of Drought Response Stages

The ________________ (designated official) or his/her designee shall monitor water supply and/or demand conditions on a __________ (example: daily, weekly, monthly) basis and shall determine when conditions warrant initiation or termination of each stage of the Plan, that is, when the specified "triggers" are reached.

The triggering criteria described below are based on ______________________________________
____
(*provide a brief description of the rationale for the triggering criteria; for example, triggering criteria / trigger levels based on a statistical analysis of the vulnerability of the water source under drought of record conditions, or based on known system capacity limits*).

Stage 1 Triggers – MILD Water Shortage Conditions

<u>Requirements for initiation</u>
Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in Section VII–Definitions, when

____
(*describe triggering criteria / trigger levels; see examples below*).

Following are examples of the types of triggering criteria that might be used <u>in one or more successive stages</u> of a drought contingency plan. One or a combination of such criteria must be defined for each drought response stage, but usually <u>not all will apply</u>. Select those appropriate to your system:

Example 1: *Annually, beginning on May 1 through September 30.*

Example 2: *When the water supply available to the _______ (name of your water supplier) is equal to or less than _______ (acre-feet, percentage of storage, etc.).*

Example 3: *When, pursuant to requirements specified in the _____________(name of **your** water supplier) wholesale water purchase contract with ____________ (name* *of your wholesale water supplier), notification is received requesting initiation of Stage 1 of the Drought Contingency Plan.*

Example 4: *When flows in the _______ (name of stream or river) are equal to or less than ____cubic feet per second.*

Example 5: *When the static water level in the ____________ (name of your water supplier) well(s) is equal to or less than _____feet above/below mean sea level.*

Example 6: *When the specific capacity of the __________________ (name of your water supplier) well(s) is equal to or less than _____ percent of the well's original specific capacity.*

Example 7: *When total daily water demand equals or exceeds ______ million gallons for ___consecutive days of ____ million gallons on a single day (example: based on the "safe" operating capacity of water supply facilities).*

Example 8: *Continually falling treated water reservoir levels which do not refill above __ percent overnight (example: based on an evaluation of minimum treated water storage required to avoid system outage).*

The public water supplier may devise other triggering criteria which are tailored to its system.

<u>Requirements for termination</u>
Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g. 3) consecutive days.

Stage 2 Triggers -- MODERATE Water Shortage Conditions

<u>Requirements for initiation</u>
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section IX of this Plan when ____________ (*describe triggering criteria; see examples in Stage 1*).

<u>Requirements for termination</u>
Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (example: 3) consecutive days. Upon termination of Stage 2, Stage 1 becomes operative.

Stage 3 Triggers – SEVERE Water Shortage Conditions

<u>Requirements for initiation</u>
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3 of this Plan when ____________ (*describe triggering criteria; see examples in*

Stage 1).

Requirements for termination
Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (example: 3) consecutive days. Upon termination of Stage 3, Stage 2 becomes operative.

Stage 4 Triggers -- CRITICAL Water Shortage Conditions

Requirements for initiation
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 4 of this Plan when ____________ (*describe triggering criteria; see examples in Stage 1*).

Requirements for termination
Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (example: 3) consecutive days. Upon termination of Stage 4, Stage 3 becomes operative.

Stage 5 Triggers -- EMERGENCY Water Shortage Conditions

Requirements for initiation
Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when ____________ (designated official), or his/her designee, determines that a water supply emergency exists based on:

1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; **or**

2. Natural or man-made contamination of the water supply source(s).

Requirements for termination
Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (example: 3) consecutive days.

Stage 6 Triggers -- WATER ALLOCATION

Requirements for initiation
Customers shall be required to comply with the water allocation plan prescribed in Section IX of this Plan and comply with the requirements and restrictions for Stage 5 of this Plan when ____________ (describe triggering criteria, see examples in Stage 1).

Requirements for termination - Water allocation may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (example: 3) consecutive days.

> *Note: The inclusion of WATER ALLOCATION as part of a drought contingency plan may not be required in all cases. For example, for a given water supplier, an analysis of water supply availability under drought of record conditions may indicate that there is essentially no risk of water supply shortage. Hence, a drought contingency plan for such a water supplier might only address facility capacity limitations and emergency conditions (example: supply source contamination and system capacity limitations).*

Section IX: Drought Response Stages

The _______________ (designated official), or his/her designee, shall monitor water supply and/or demand conditions on a daily basis and, in accordance with the triggering criteria set forth in Section VIII of this Plan, shall determine that a mild, moderate, severe, critical, emergency or water shortage condition exists and shall implement the following notification procedures:

Notification

Notification of the Public:
The _________ (designated official) or his/ her designee shall notify the public by means of:

Examples:
publication in a newspaper of general circulation,
direct mail to each customer,
public service announcements,
signs posted in public places
take-home fliers at schools.

Additional Notification:
The _________ (designated official) or his/ her designee shall notify directly, or cause to be notified directly, the following individuals and entities:

Examples:
Mayor / Chairman and members of the City Council / Utility Board
Fire Chief(s)
City and/or County Emergency Management Coordinator(s)
County Judge & Commissioner(s)
State Disaster District / Department of Public Safety
TCEQ *(required when* mandatory *restrictions are imposed)*
Major water users

Critical water users, i.e. hospitals
Parks / street superintendents & public facilities managers

Note: The plan should specify direct notice only as appropriate to respective drought stages.

Stage 1 Response -- MILD Water Shortage Conditions

Target: Achieve a voluntary ___ percent reduction in __________(example: total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

D*escribe additional measures, if any, to be implemented directly by (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, activation and use of an alternative supply source(s); use of reclaimed water for non-potable purposes.*

Voluntary Water Use Restrictions for Reducing Demand :

(a) Water customers are requested to voluntarily limit the irrigation of landscaped areas to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and to irrigate landscapes only between the hours of midnight and 10:00 a.m. and 8:00 p.m to midnight on designated watering days.

(b) All operations of the ______________ (name of your water supplier) shall adhere to water use restrictions prescribed for Stage 2 of the Plan.

(c) Water customers are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes.

Stage 2 Response -- MODERATE Water Shortage Conditions

Target: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

Water Use Restrictions for Demand Reduction:
Under threat of penalty for violation, the following water use restrictions shall apply to all persons:

(a) Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00 midnight on designated watering days. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle for quick rises. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.

(c) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight.

(d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

(e) Use of water from hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare, except that use of water from designated fire hydrants for construction purposes may be allowed under special permit from the ___________________ (name of your water supplier).

(f) Use of water for the irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days between the hours 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight. However, if the golf course utilizes a water source other than that provided by the _______________ (name of your water supplier), the facility shall not be subject to these regulations.

(g) All restaurants are prohibited from serving water to patrons except upon request of the patron.

(h) The following uses of water are defined as non-essential and are prohibited:

1. wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
2. use of water to wash down buildings or structures for purposes other than immediate fire protection;
3. use of water for dust control;
4. flushing gutters or permitting water to run or accumulate in any gutter or street; and
5. failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 3 Response -- SEVERE Water Shortage Conditions

Target: Achieve a ___ percent reduction in _________ (example: total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

Water Use Restrictions for Demand Reduction:
All requirements of Stage 2 shall remain in effect during Stage 3 except:

(a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. The use of hose-end sprinklers is prohibited at all times.

(b) The watering of golf course tees is prohibited unless the golf course utilizes a water source other than that provided by the ____________________ (name of your water supplier).

(c) The use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.

Stage 4 Response -- CRITICAL Water Shortage Conditions

<u>Target</u>: Achieve a ___ percent reduction in _________ (example: total water use, daily water demand, etc.).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

<u>Water Use Restrictions for Reducing Demand:</u>. All requirements of Stage 2 and 3 shall remain in effect during Stage 4 except:

(a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 6:00 a.m. and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, or drip irrigation only. The use of hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10:00 a.m. and between 6:00 p.m. and 10 p.m.

(c) The filling, refilling, or adding of water to swimming pools, wading pools, and jacuzzi-type pools is prohibited.

(d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

(e) No application for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind shall be approved, and time limits for approval of such applications are hereby suspended for such time as this drought response stage or a higher-numbered stage shall be in effect.

Stage 5 Response -- EMERGENCY Water Shortage Conditions

Target: Achieve a ___ percent reduction in _________ (example: total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ___________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand. All requirements of Stage 2, 3, and 4 shall remain in effect during Stage 5 except:

(a) Irrigation of landscaped areas is absolutely prohibited.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

Stage 6 Response -- WATER ALLOCATION

In the event that water shortage conditions threaten public health, safety, and welfare, the ___________ (designated official) is hereby authorized to allocate water according to the following water allocation plan:

Single-Family Residential Customers

The allocation to residential water customers residing in a single-family dwelling shall be as follows:

Persons per Household	**Gallons per Month**
1 or 2	6,000
3 or 4	7,000
5 or 6	8,000
7 or 8	9,000
9 or 10	10,000
11 or more	12,000

“Household” means the residential premises served by the customer’s meter. “Persons per household” includes only those persons currently physically residing at the premises and expected to reside there for the entire billing period. It shall be assumed that a particular customer’s household is comprised of two (2) persons unless the customer notifies the ____________ (name of your water supplier) of a greater number of persons per household on a form prescribed by the ____________ designated official). The _________ (designated official) shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every residential customer. If, however, a customer does not receive such a

form, it shall be the customer’s responsibility to go to the ____________ (name of your water supplier) offices to complete and sign the form claiming more than two (2) persons per household. New customers may claim more persons per household at the time of applying for water service on the form prescribed by the __________ (designated official). When the number of persons per household increases so as to place the customer in a different allocation category, the customer may notify the _________ (name of water supplier) on such form and the change will be implemented in the next practicable billing period. If the number of persons in a household is reduced, the customer shall notify the _________(name of your water supplier) in writing within two (2) days. In prescribing the method for claiming more than two (2) persons per household, the _________ (designated official) shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of persons in a household or fails to timely notify the ____________ (name of your water supplier) of a reduction in the number of person in a household shall be fined not less than $________.

Residential water customers shall pay the following surcharges:

$____ for the first 1,000 gallons over allocation.
$____ for the second 1,000 gallons over allocation.
$____ for the third 1,000 gallons over allocation.
$____ for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Master-Metered Multi-Family Residential Customers

The allocation to a customer billed from a master meter which jointly measures water to multiple permanent residential dwelling units (example: apartments, mobile homes) shall be allocated 6,000 gallons per month for each dwelling unit. It shall be assumed that such a customer’s meter serves two dwelling units unless the customer notifies the ____________ (name of your water supplier) of a greater number on a form prescribed by the __________ (designated official). The _________ (designated official) shall give his/her best effort to see that such forms are mailed, otherwise provided, or made available to every such customer. If, however, a customer does not receive such a form, it shall be the customer's responsibility to go to the ___________ (name of your water supplier) offices to complete and sign the form claiming more than two (2) dwellings. A dwelling unit may be claimed under this provision whether it is occupied or not. New customers may claim more dwelling units at the time of applying for water service on the form prescribed by the __________ (designated official). If the number of dwelling units served by a master meter is reduced, the customer shall notify the _________(name of your water supplier) in writing within two (2) days. In prescribing the method for claiming more than two (2) dwelling units, the _________ (designated official) shall adopt methods to insure the accuracy of the claim. Any person who knowingly, recklessly, or with criminal negligence falsely reports the number of dwelling units served by a master meter or fails to timely notify the ___________ (name of your water supplier) of a reduction in the number of person in a household shall be fined not less than $________. Customers billed from a master meter under this provision shall pay the following monthly surcharges:

$____ for 1,000 gallons over allocation up through 1,000 gallons for each dwelling unit.
$____, thereafter, for each additional 1,000 gallons over allocation up through a second 1,000 gallons for each dwelling unit.
$____, thereafter, for each additional 1,000 gallons over allocation up through a third 1,000 gallons for each dwelling unit.
$ ____, thereafter for each additional 1,000 gallons over allocation.

Surcharges shall be cumulative.

Commercial Customers

A monthly water allocation shall be established by the __________ (designated official), or his/her designee, for each nonresidential commercial customer other than an industrial customer who uses water for processing purposes. The non-residential customer's allocation shall be approximately __ (e.g. 75%) percent of the customer's usage for corresponding month's billing period for the previous 12 months. If the customer's billing history is shorter than 12 months, the monthly average for the period for which there is a record shall be used for any monthly period for which no history exists. Provided, however, a customer, __ percent of whose monthly usage is less than ____ gallons, shall be allocated ____ gallons. The _________ (designated official) shall give his/her best effort to see that notice of each non-residential customer's allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the ____________ (name of your water supplier) to determine the allocation. Upon request of the customer or at the initiative of the ___________ (designated official), the allocation may be reduced or increased if, (1) the designated period does not accurately reflect the customer's normal water usage, (2) one nonresidential customer agrees to transfer part of its allocation to another nonresidential customer, or (3) other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the ___________ (designated official or alternatively, a special water allocation review committee). Nonresidential commercial customers shall pay the following surcharges:

Customers whose allocation is _____ gallons through ______ gallons per month:

$____ per thousand gallons for the first 1,000 gallons over allocation.
$____ per thousand gallons for the second 1,000 gallons over allocation.
$____ per thousand gallons for the third 1,000 gallons over allocation.
$____ per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is ______ gallons per month or more:

___ times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.
___ times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.
___ times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.
___ times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, "block rate" means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer's allocation.

Industrial Customers

A monthly water allocation shall be established by the __________ (designated official), or his/her designee, for each industrial customer, which uses water for processing purposes. The industrial customer's allocation shall be approximately __ (example: 90%) percent of the customer's water usage baseline. Ninety (90) days after the initial imposition of the allocation for industrial customers, the industrial customer's allocation shall be further reduced to __ (example: 85%) percent of the customer's water usage baseline. The industrial customer's water use baseline will be computed on the average water use for the ______ month period ending prior to the date of implementation of Stage 2 of the Plan. If the industrial water customer's billing history is shorter than ___ months, the monthly average for the period for which there is a record shall be used for any monthly period for which no billing history exists. The _________ (designated official) shall give his/her best effort to see that notice of each industrial customer's allocation is mailed to such customer. If, however, a customer does not receive such notice, it shall be the customer's responsibility to contact the ____________ (name of your water supplier) to determine the allocation, and the allocation shall be fully effective notwithstanding the lack of receipt of written notice. Upon request of the customer or at the initiative of the __________ (designated official), the allocation may be reduced or increased, (1) if the designated period does not accurately reflect the customer's normal water use because the customer had shutdown a major processing unit for repair or overhaul during the period, (2) the customer has added or is in the process of adding significant additional processing capacity, (3) the customer has shutdown or significantly reduced the production of a major processing unit, (4) the customer has previously implemented significant permanent water conservation measures such that the ability to further reduce water use is limited, (5) the customer agrees to transfer part of its allocation to another industrial customer, or (6) if other objective evidence demonstrates that the designated allocation is inaccurate under present conditions. A customer may appeal an allocation established hereunder to the ___________ (designated official or alternatively, a special water allocation review committee). Industrial customers shall pay the following surcharges:

Customers whose allocation is _____ gallons through _______ gallons per month:

$____ per thousand gallons for the first 1,000 gallons over allocation.
$____ per thousand gallons for the second 1,000 gallons over allocation.
$____ per thousand gallons for the third 1,000 gallons over allocation.
$____ per thousand gallons for each additional 1,000 gallons over allocation.

Customers whose allocation is ______ gallons per month or more:

___ times the block rate for each 1,000 gallons in excess of the allocation up through 5 percent above allocation.
___ times the block rate for each 1,000 gallons from 5 percent through 10 percent above allocation.
___ times the block rate for each 1,000 gallons from 10 percent through 15 percent above allocation.
___ times the block rate for each 1,000 gallons more than 15 percent above allocation.

The surcharges shall be cumulative. As used herein, "block rate" means the charge to the customer per 1,000 gallons at the regular water rate schedule at the level of the customer's allocation.

Section X: Enforcement

(a) No person shall knowingly or intentionally allow the use of water from the _________________ (name of your water supplier) for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by ____________(designated official), or his/her designee, in accordance with provisions of this Plan.

(b) Any person who violates this Plan is guilty of a misdemeanor and, upon conviction shall be punished by a fine of not less than _______ dollars ($__) and not more than ______ dollars ($__). Each day that one or more of the provisions in this Plan is violated shall constitute a separate offense. If a person is convicted of three or more distinct violations of this Plan, the ____________ (designated official) shall, upon due notice to the customer, be authorized to discontinue water service to the premises where such violations occur. Services discontinued under such circumstances shall be restored only upon payment of a re-connection charge, hereby established at $______, and any other costs incurred by the __________________ (name of your water supplier) in discontinuing service. In addition, suitable assurance must be given to the _______________ (designated official) that the same action shall not be repeated while the Plan is in effect. Compliance with this plan may also be sought through injunctive relief in the district court.

(c) Any person, including a person classified as a water customer of the _____________ (name of your water supplier), in apparent control of the property where a violation occurs or originates shall be presumed to be the violator, and proof that the violation occurred on the person's property shall constitute a rebuttable presumption that the person in apparent control of the property committed the violation, but any such person shall have the right to show that he/she did not commit the violation. Parents shall be presumed to be responsible for violations of their minor children and proof that a violation, committed by a child, occurred on property within the parents' control shall constitute a rebuttable presumption that the parent committed the violation, but any such parent may be excused if he/she proves that he/she had previously directed the child not to use the water as it was used in violation of this Plan and that the parent could not have reasonably known of the violation.

(d) Any employee of the ______________ (name of your water supplier), police officer, or other _____ employee designated by the ___________ (designated official), may issue a citation to a person he/she reasonably believes to be in violation of this Ordinance. The citation shall be prepared in duplicate and shall contain the name and address of the alleged violator, if known, the offense charged, and shall direct him/her to appear in the ____________ (example: municipal court) on the date shown on the citation for which the date shall not be less than 3 days nor more than 5 days from the date the citation was issued. The alleged violator shall be served a copy of the citation. Service of the citation shall be complete upon delivery of the citation to the alleged violator, to an agent or employee of a violator, or to a person over 14 years of age who is a member of the violator's immediate family or is a resident of the violator's residence. The alleged violator shall appear in _________ (example: municipal court) to enter a plea of guilty or not guilty for the violation of this Plan. If the alleged violator fails to appear in __________ (example: municipal court), a warrant for his/her arrest may be issued. A summons to appear may be issued in lieu of an arrest warrant. These cases shall be expedited and given preferential setting in __________ (example: municipal court) before all other cases.

Section XI: Variances

The ________________ (designated official), or his/her designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the person requesting such variance and if one or more of the following conditions are met:

(a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
(b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the _________________ (name of your water supplier) within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the __________ (designated official), or his/her designee, and shall include the following:

(a) Name and address of the petitioner(s).
(b) Purpose of water use.
(c) Specific provision(s) of the Plan from which the petitioner is requesting relief.
(d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
(e) Description of the relief requested.
(f) Period of time for which the variance is sought.
(g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
(h) Other pertinent information.

Appendix H
Endangered, Threatened, or Species of Concern by County

Table H-1.
Endangered, Threatened, or Species of Concern

Listed for Atascosa County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
BIRDS					
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
CRUSTACEANS					
Nueces crayfish	*Procambarus nueces*	Known only from one tributary to the Nueces River.			Resident
MAMMALS					
Black Bear	*Ursus americanus*	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Ocelot	*Leopardus pardalis*	Found in dense chaparral thickets, and oak mottes.	LE	E	Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
PLANTS					
Big red sage	*Salvia penstemonoides*	Endemic; moist to seasonally wet clay or silt soils in creek beds.			Resident
Elmendorf's onion	*Allium elmendorfii*	Endemic, in deep sands			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Park's jointweed	*Polygonella parksii*	Endemic; deep loose sands of Carrizo and similar Eocene formations.			Resident
Sandhill woollywhite	*Hymenopappus carrizoanus*	Found south of the Guadalupe River and the Balcones Escarpment. Prefers dense riparian corridors.			Resident
REPTILES					
Indigo snake	*Drymarchon corais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Garter Snake	*Thamnophis sirtalis annectens*	Wet or moist microhabitats			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident

LE/LT -- Federally Listed Endangered/Threatened
DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Atascosa County (Updated 5/7/2009),

Table H-2. Endangered, Threatened, or Species of Concern

Listed for Bexar County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
AMPHIBIANS					
Cascade Caverns salamander	*Eurycea latitans complex*	Endemic, subaquatic in Edwards Aquifer Area		T	Resident
Comal Blind Salamander	*Eurycea tridentifera*	Endemic; springs and waters of caves in Bexar County.		T	Resident
Texas Salamander	*Eurycea neotenes*	Endemic; springs, seeps, cave streams, Helotes and Leon Creek drainages in Bexar County			Resident
ARACHNIDS					
Braken Bat Cave Meshweaver	*Cicurina venii*	Karst features in western Bexar County	LE		Resident
Cokendolpher cave harvestman	*Texella cokendolpheri*	Karst features in north-central Bexar County	LE		Resident
Government Canyon Bat Cave Meshweaver	*Cicurina vespera*	Karst features in northwestern Bexar County	LE		Resident
Government Canyon Bat Cave Spider	*Neoleptoneta microps*	Karst features in northwestern Bexar County	LE		Resident
Madla Cave Meshweaver	*Cicurina madla*	Karst features in northern Bexar County	LE		Resident
Robber Baron Cave Meshweaver	*Cicurina baronia*	Karst features in north-central Bexar County	LE		Resident
BIRDS					
Black-capped Vireo	*Vireo atricapillus*	Oak-juniper woodlands,	LE	E	Resident
Golden-cheeked Warbler	*Dendroica chrysoparia*	Juniper-oak woodlands.	LE	E	Resident
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
White-faced Ibis	*Plegadis chihi*	Prefers freshwater marshes.		T	Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
Zone-tailed Hawk	*Buteo albonotatus*	Arid open country, often near watercourses		T	Resident
CRUSTACEANS					
A cave obligate crustacean	*Monodella texana*	Subaquatic, underground freshwater aquifers			Resident
FISHES					
Guadalupe Bass	*Micropterus treculi*	Endemic to perennial streams of the Edwards Plateau region.			Resident
Toothless Blindcat	*Trogloglanis pattersoni*	Troglobitic, blind catfish endemic to the San Antonio Pool of the Edwards Aquifer		T	Resident
Widemouth Blindcat	*Satan eurystomus*	Troglobitic, blind catfish endemic to the San Antonio Pool of the Edwards Aquifer.		T	Resident
INSECTS					
A Ground Beetle	*Rhadine exilis*	Karst features in northern Bexar County	LE		Resident
A Ground Beetle	*Rhadine infernalis*	Karst features in northern and western Bexar County	LE		Resident
Helotes Mold Beetle	*Batrisodes venyivi*	Karst features in northwestern Bexar County	LE		Resident
Manfreda Giant-skipper	*Stallingsia maculosus*	Skipper larvae usually feed inside a leaf shelter.			Resident
Rawson's metalmark	*Calephelis rawsoni*	Moist areas in shaded limestone outcrops			Resident
MAMMALS					
Black Bear	*Ursus americanus*	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Ghost-faced bat	*Mormoops megalophylla*	Roosts in caves, crevices and buildings			Resident
Gray wolf	*Canis lupus*	Extirpated, forests, brushlands or grasslands	LE	E	Historic resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Mimic Cavesnail	*Phreatodrobia imitata*	Subaquatic; only known from two wells penetrating the Edwards Aquifer			Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
Texas fatmucket	*Lampsilis bracteata*	Streams and rivers on sand, mud and gravel, Colorado and Guadalupe River basins.		T*	Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					
Big red sage	*Salvia penstemonoides*	Endemic; moist to seasonally wet clay or silt soils in creek beds.			Resident
Bracted twistflower	*Streptanthus bracteatus*	Endemic: found in shallow, well-drained gravelly clays and clay loams over limestone.			Resident
Correll's false dragon-head	*Physostegia correllii*	Found in wet, silty clay loams on sides of streams and other wet areas.			Resident
Elmendorf's onion	*Allium elmendorfii*	Endemic, in deep sands			Resident
Hill Country wild-mercury	*Argythamnia aphoroides*	Endemic: found in grasslands associated with oak woodlands.			Resident
Park's jointweed	*Polygonella parksii*	Endemic; deep loose sands of Carrizo and similar Eocene formations.			Resident
Sandhill woolywhite	*Hymenopappus carrizoanus*	Found south of the Guadalupe River and the Balcones Escarpment. Prefers dense riparian corridors.			Resident
REPTILES					
Indigo snake	*Drymarchon carais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Garter Snake	*Thamnophis sirtalis annectens*	Wet or moist microhabitats			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident
Timber/ Canebrake Rattlesnake	*Crotalus horridus*	Floodplains, upland pine, deciduous woodlands, riparian zones.		T	Resident

LE/LT -- Federally Listed Endangered/Threatened
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T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Bexar County (Updated 10/6/2009),

Table H-3.
Endangered, Threatened, or Species of Concern

Listed for Caldwell County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
BIRDS					
Bald eagle	*Haliaeetus leucoephalus*	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Henslow's Sparrow	*Ammodramus henslowii*	Found in weedy fields or cut-over areas			Resident
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
FISHES					
Blue sucker	*Cycleptus elongates*	Major rivers in Texas.		T	Resident
Guadalupe Bass	*Micropterus treculi*	Endemic to perennial streams of the Edwards Plateau region.			Resident
Guadalupe Darter	*Percina sciera apristis*	Guadalupe River Basin. Usually found over gravel or gravel and sand raceways of larger streams and rivers.			Resident
MAMMALS					
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
Texas fatmucket	*Lampsilis bracteata*	Streams and rivers on sand, mud and gravel, Colorado and Guadalupe River basins.		T*	Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					
Shinner's sunflower	*Helianthus occidentalis* ssp.	Found on prairies on the Coastal Plain.			Resident
Sandhill woolywhite	*Hymenopappus carrizoanus*	Found south of the Guadalupe River and the Balcones Escarpment. Prefers dense riparian corridors.			Resident
REPTILES					
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Garter Snake	*Thamnophis sirtalis annectens*	Wet or moist microhabitats			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Timber/ Canebrake Rattlesnake	*Crotalus horridus*	Floodplains, upland pine, deciduous woodlands, riparian zones.		T	Resident

LE/LT -- Federally Listed Endangered/Threatened
DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
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Source: TPWD, Annotated County List of Rare Species, Caldwell County (Updated 5/7/2009),

Table H-4.
Endangered, Threatened, or Species of Concern

Listed for Calhoun County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
AMPHIBIANS					
Black-spotted newt	*Notophthalmus meridionalis*	Usually found in wet or sometimes wet areas in the Gulf Coastal Plain south of the San Antonio River.		T	Resident
Sheep frog	*Hypopachus variolosus*	Found in grassland and savanna; moist sites in arid areas.		T	Resident
BIRDS					
Bald eagle	*Haliaeetus leucoephalus*	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Brown pelican	*Pelecanus occidentalis*	*Largely coastal and near shore areas.*	DL	E	Resident
Eskimo curlew	*Numenius borealis*	Historic, nonbreeding.	LE	E	Historic Resident
Henslow's Sparrow	*Ammodramus henslowii*	Found in weedy fields or cut-over areas			Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Found in open country, especially savanna and open woodland.	LE	E	Resident
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Piping plover	*Charadrius melodus*	Wintering migrant along the Texas Gulf Coast.	LT	T	Migrant
Reddish Egret	*Egretta rufescens*	Resident of Texas Gulf coast.		T	Resident
Snowy Plover	*Charadrius alexandrines*	Potential migrant, winters along coast			Migrant
Sooty Tern	*Sterna fuscata*	Usually flies or hovers over water.		T	Resident
Southeastern Snowy Plover	*Charadrius alexandrines tenuirostris*	Wintering migrant along the Texas Gulf Coast.			Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
White-faced Ibis	*Plegadis chihi*	Prefers freshwater marshes.		T	Resident
White-tailed Hawk	*Buteo albicaudatus*	Found near the coast on prairies.		T	Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
FISHES					
American eel	*Anguilla rostrata*	Coastal waterways below reservoirs to gulf.			Resident
Opossum pipefish	*Microphis brachyurus*	Adults found in fresh or low salinity waters.		T	Resident
Smalltooth sawfish	*Pristis pectinata*	Found in bays, estuaries or river mouths.	LE	E	Resident
MAMMALS					
Black Bear	*Ursus americanus*	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Jaguarundi	*Herpailurus yaguarondi*	Found in thick brushlands near water.	LE	E	Resident
Louisiana black bear	*Ursus americanus luteolus*	Possible transient.	LT	T	Transient
Ocelot	*Leopardus pardalis*	Found in dense chaparral thrickets; mesquite-thorn scrub and live oak motts.	LE	E	Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
West Indian manatee	*Trichechus manatus*	Gulf and bay systems.	LE	E	Resident
MOLLUSKS					
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
PLANTS					
Threeflower broomweed	*Thurovia triflora*	Endemic: near coast.			Resident
REPTILES					
Atlantic hawksbill sea turtle	*Eretmochelys imbricate*	Found in Gulf and bay systems.	LE	E	Resident
Green sea turtle	*Chelonia mydas*	Gulf and bay systems.	LT	T	Resident
Gulf Saltmarsh snake	*Nerodia clarkii*	Found on saline flats.			Resident
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Found in gulf and bay systems.	LE	E	Resident
Leatherback sea turtle	*Dermochelys coriacea*	Gulf and bay systems.	LE	E	Resident
Loggerhead sea turtle	*Caretta caretta*	Gulf and bay systems for juveniles, ocean for adults.	LT	T	Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Texas diamondback terrapin	*Malaclemys terrapin littoralis*	Found in coastal marshes and tidal flats.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas scarlet snake	*Cemophora coccinea lineri*	Mixed hardwood scrub on sandy soils.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident
Timber/ Canebrake Rattlesnake	*Crotalus horridus*	Floodplains, upland pine, deciduous woodlands, riparian zones.		T	Resident

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DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Calhoun County (Updated 12/18/2009),

Table H-5. Endangered, Threatened, or Species of Concern

Listed for Comal County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
AMPHIBIANS					
Cascade Caverns salamander	*Eurycea latitans complex*	Endemic, subaquatic in Edwards Aquifer Area		T	Resident
Comal Blind Salamander	*Eurycea tridentifera*	Endemic; springs and waters of caves in Bexar County.		T	Resident
Comal Springs salamander	*Eurycea sp. 8*	Endemic, found in Comal Springs.			Resident
Edwards Plateau spring salamander	*Eurycea sp. 7*	Endemic: found in springs and waters of some caves in the Edwards Plateau.			Resident
BIRDS					
Bald eagle	*Haliaeetus leucoephalus*	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Black-capped Vireo	*Vireo atricapillus*	Oak-juniper woodlands,	LE	E	Resident
Golden-cheeked Warbler	*Dendroica chrysoparia*	Juniper-oak woodlands.	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
CRUSTACEANS					
Ezell's cave amphipod	*Stygobromus flagellates*	Known only from artesian wells.			Resident
Long-legged cave amphipod	*Stygobromus longipes*	Subaquatic crustacean found in streams.			Resident
Peck's cave amphipod	*Stygobromus pecki*	Aquatic crustacean collected at Comal Springs and Hueco Springs.	LE	E	Resident
FISHES					
Fountain darter	*Etheostoma fonticola*	Known only from the San Marcos and Comal Rivers.	LE	E	Resident
Guadalupe Bass	*Micropterus treculi*	Endemic to perennial streams of the Edwards Plateau region.			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Guadalupe Darter	*Percina sciera apristis*	Guadalupe River Basin. Usually found over gravel or gravel and sand raceways of larger streams and rivers.			Resident
INSECTS					
A mayfly	*Pseudocentroptiloides morihari*	Aquatic larval stage, adults generally found in shoreline vegetation.			Resident
Comal Springs diving beetle	*Comaldessus stygius*	Known only from the outflow at Comal Springs.			Resident
Comal Springs dryopid beetle	*Stygoparnus comalensis*	Adults usually found clinging to objects in streams, larvae live in soil or decaying wood.	LE		Resident
Comal Springs riffle beetle	*Heterelmis comalensis*	Found in Comal and San Marcos Springs.	LE		Resident
Edwards Aquifer diving beetle	*Haideoporus texanus*	Known from an artesian well in Hays County.			Resident
Rawson's metalmark	*Calephelis rawsoni*	Moist areas in shaded limestone outcrops			Resident
MAMMALS					
Black Bear	*Ursus americanus*	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Jaguarundi	*Herpailurus yaguarondi*	Found in thick brushlands near water.	LE	E	Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Horseshoe liptooth snail	*Daedalochila hippocrepis*	Terrestrial snail only known from Landa Park in New Braunfels			Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
Texas fatmucket	*Lampsilis bracteata*	Streams and rivers on sand, mud and gravel, Colorado and Guadalupe River basins.		T*	Resident
PLANTS					

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Bracted twistflower	*Streptanthus bracteatus*	Endemic: found in shallow, well-drained gravelly clays and clay loams over limestone.			Resident
Canyon mock-orange	*Philadelphus ernestii*	Endemic: found in shallow well-drained clays in woodlands.			Resident
Comal snakewood	*Colubrina stricta*	Found in El Paso County, historic in Comal County.			Historic Resident
Hill Country wild-mercury	*Argythamnia aphoroides*	Endemic; found primarily in grasslands associated with live oak woodlands.			
Texas mock-orange	*Philadelphus texensis*	Found on limestone outcrops on cliffs and rocky slopes.			Resident
REPTILES					
Cagle's map turtle	*Graptemys caglei*	Endemic to Guadalupe River System. Found within 30 feet of waters' edge.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Garter Snake	*Thamnophis sirtalis annectens*	Wet or moist microhabitats			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident

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DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare

Source: TPWD, Annotated County List of Rare Species, Comal County (Updated 9/24/2009).

Table H-6.
Endangered, Threatened, or Species of Concern

Listed for De Witt County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
BIRDS					
Bald eagle	*Haliaeetus leucoephalus*	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Henslow's Sparrow	*Ammodramus henslowii*	Found in weedy fields or cut-over areas			Resident
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
White-faced Ibis	*Plegadis chihi*	Prefers freshwater marshes.		T	Resident
White-tailed Hawk	*Buteo albicaudatus*	Found near the coast on prairies.		T	Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
FISHES					
Guadalupe Bass	*Micropterus treculi*	Endemic to perennial streams of the Edwards Plateau region.			Resident
Guadalupe Darter	*Percina sciera apristis*	Guadalupe River Basin. Usually found over gravel or gravel and sand raceways of larger streams and rivers.			Resident
INSECTS					
Leonora's dancer damselfly	*Argia leonorae*	Found near small streams and seepages.			Resident
MAMMALS					
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					
Shinner's sunflower	*Helianthus occidentalis ssp. Plantagineus*	Found on prairies on the Coastal Plain			Resident
REPTILES					
Cagle's map turtle	*Graptemys caglei*	Endemic to Guadalupe River System. Found within 30 feet of waters' edge.		T	Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident
Timber/ Canebrake Rattlesnake	*Crotalus horridus*	Floodplains, upland pine, deciduous woodlands, riparian zones.		T	Resident

LE/LT -- Federally Listed Endangered/Threatened
DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, De Witt County (Updated 5/4/2009),

Table H-7
Endangered, Threatened, or Species of Concern

Listed for Dimmit County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
BIRDS					
Audubon's Oriole	*Icterus graduacauda audubonii*	Usually found along water courses in scrub and mesquite.			Resident
Baird's Sparrow	*Ammodramus bairdii*	Found in shortgrass prairie areas. Migratory in the western half of Texas.			Migrant
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mexican Hooded Oriole	*Icterus cucullatus cucullatus*	Found in scrub and mesquite, usually along water courses.			Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Sennett's Hooded Oriole	*Icterus cucullatus sennetti*	This species often builds nests of Spanish moss.			Resident
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
MAMMALS					
Black Bear	*Ursus americanus*	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Carrizo Springs pocket gopher	*Geomys personatus streckeri*	Uses underground burrows in deep sandy soils.			Resident
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Ghost-faced bat	*Mormoops megalophylla*	Roosts in caves, crevices and buildings			Resident
Gray wolf	*Canis lupus*	Extirpated, forests, brushlands or grasslands	LE	E	Historic resident
Jaguarundi	*Herpailurus yaguarondi*	Found in thick brushlands near water.	LE	E	Resident
Ocelot	*Leopardus pardalis*	Found in dense chaparral thrickets; mesquite-thorn scrub and live oak motts.	LE	E	Resident
White-nosed coati	*Nasua narica*	Found in woodlands, riparian corridors and canyons. Mostly transients from Mexico.		T	Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Yuma myotis bat	*Myotis yumanensis*	Primarily found in desert regions in lowland habitats near open water.			Resident
PLANTS					
Dimmit sunflower	*Helianthus praecox ssp hirtus*	Endemic; found in bluestem midgrasslands on loose soils.			Resident
Mexican mud-plantain	*Heteranthera Mexicana*	Found in wet clayey soils of resacas and ephemeral wetlands in South Texas and margins of playas in the Panhandle.			Resident
Shinner's sunflower	*Helianthus occidentalis ssp. Plantagineus*	Found on prairies on the Coastal Plain			Resident
REPTILES					
Indigo snake	*Drymarchon carais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident
Reticulate collared lizard	*Crotaphytus reticulates*	Requires open brush-grasslands; thorn-scrub vegetation.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident

LE/LT -- Federally Listed Endangered/Threatened
DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare

Source: TPWD, Annotated County List of Rare Species, Dimmit County (Updated 6/25/2009).

Table H-8.
Endangered, Threatened, or Species of Concern

Listed for Frio County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
BIRDS					
Baird's Sparrow	*Ammodramus bairdii*	Found in shortgrass prairie areas. Migratory in the western half of Texas.			Migrant
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
MAMMALS					
Black Bear	*Ursus americanus*	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Frio pocket gopher	*Geomys texensis bakeri*	Associated with nearly level Atco soils.			Resident
Ghost-faced bat	*Mormoops megalophylla*	Roosts in caves, crevices and buildings			Resident
Gray wolf	*Canis lupus*	Extirpated, forests, brushlands or grasslands	LE	E	Historic resident
Ocelot	*Leopardus pardalis*	Found in dense chaparral thrickets; mesquite-thorn scrub and live oak motts.	LE	E	Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
PLANTS					
Elmendorf's onion	*Allium elmendorfii*	Endemic, in deep sands			Resident
Sandhill woolywhite	*Hymenopappus carrizoanus*	Found south of the Guadalupe River and the Balcones Escarpment. Prefers dense riparian corridors.			Resident
REPTILES					
Indigo snake	*Drymarchon carais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Reticulate collared lizard	*Crotaphytus reticulates*	Requires open brush-grasslands; thorn-scrub vegetation.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident

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T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Frio County (Updated 6/25/2009),

Table H-9.
Endangered, Threatened, or Species of Concern

Listed for Goliad County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
AMPHIBIANS					
Black-spotted newt	*Notophthalmus meridionalis*	Usually found in wet or sometimes wet areas in the Gulf Coastal Plain south of the San Antonio River.		T	Resident
Sheep frog	*Hypopachus variolosus*	Found in grassland and savanna; moist sites in arid areas.		T	Resident
BIRDS					
Attwater's Greater Prairie Chicken	*Tympanuchus cupido attwateri*	Endemic, within historic range.	LE	E	Historic
Bald eagle	*Haliaeetus leucoephalus*	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Henslow's Sparrow	*Ammodramus henslowii*	Found in weedy fields or cut-over areas			Resident
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
White-faced Ibis	*Plegadis chihi*	Prefers freshwater marshes.		T	Resident
White-tailed Hawk	*Buteo albicaudatus*	Found near the coast on prairies.		T	Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
FISHES					
American eel	*Anguilla rostrata*	Coastal waterways below reservoirs to gulf.			Resident
INSECTS					
Texas asaphomyian tabanid fly	*Asaphomyia texensis*	Globally historic species.			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
MAMMALS					
Ocelot	*Leopardus pardalis*	Found in dense chaparral thrickets; mesquite-thorn scrub and live oak motts.	LE	E	Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
White-nosed coati	*Nasua narica*	Found in woodlands, riparian corridors and canyons. Mostly transients from Mexico.		T	Resident
MOLLUSKS					
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					
Coastal gay-feather	*Liatris bracteata*	Endemic: found in coastal prairie grasslands.			Resident
Runyon's water-willow	*Justicia runyonii*	Found in margins of and openings within subtropical woodlands or thorn shrublands.			Resident
Shinner's sunflower	*Helianthus occidentalis ssp. Plantagineus*	Found on prairies on the Coastal Plain			Resident
Welder machaeranthera	*Psilactis heterocarpa*	Endemic; found in grasslands.			Resident
REPTILES					
Indigo snake	*Drymarchon carais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Timber/ Canebrake Rattlesnake	*Crotalus horridus*	Floodplains, upland pine, deciduous woodlands, riparian zones.		T	Resident

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T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Goliad County (Updated 5/4/2009).

Table H-10.
Endangered, Threatened, or Species of Concern

Listed for Gonzales County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
BIRDS					
Bald eagle	*Haliaeetus leucoephalus*	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Black-capped Vireo	*Vireo atricapillus*	Oak-juniper woodlands,	LE	E	Resident
Henslow's Sparrow	*Ammodramus henslowii*	Found in weedy fields or cut-over areas			Resident
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
FISHES					
Blue sucker	*Cycleptus elongates*	Major rivers in Texas.		T	Resident
Guadalupe Bass	*Micropterus treculi*	Endemic to perennial streams of the Edwards Plateau region.			Resident
Guadalupe Darter	*Percina sciera apristis*	Guadalupe River Basin. Usually found over gravel or gravel and sand raceways of larger streams and rivers.			Resident
MAMMALS					
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Palmetto pill snail	*Euchemostrema leai cheatumi*	Known only from Palmetto State Park.			Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
Texas fatmucket	*Lampsilis bracteata*	Streams and rivers on sand, mud and gravel, Colorado and Guadalupe River basins.		T*	Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					
Elmendorf's onion	*Allium elmendorfii*	Endemic, in deep sands			Resident
REPTILES					
Cagle's map turtle	*Graptemys caglei*	Endemic to Guadalupe River System. Found within 30 feet of waters' edge.		T	Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident
Timber/ Canebrake Rattlesnake	*Crotalus horridus*	Floodplains, upland pine, deciduous woodlands, riparian zones.		T	Resident

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Source: TPWD, Annotated County List of Rare Species, Gonzales County (Updated 5/4/2009).

Table H-11.
Endangered, Threatened, or Species of Concern

Listed for Guadalupe County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
BIRDS					
Bald eagle	*Haliaeetus leucoephalus*	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Found in open country, especially savanna and open woodland.	LE	E	Resident
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
FISHES					
Guadalupe Bass	*Micropterus treculi*	Endemic to perennial streams of the Edwards Plateau region.			Resident
Guadalupe Darter	*Percina sciera apristis*	Guadalupe River Basin. Usually found over gravel or gravel and sand raceways of larger streams and rivers.			Resident
INSECTS					
A mayfly	*Campsurus decoloratus*	Found in Texas and Mexico. Possibly in clay substrates.			Resident
MAMMALS					
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
Texas fatmucket	*Lampsilis bracteata*	Streams and rivers on sand, mud and gravel, Colorado and Guadalupe River basins.		T*	Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					
Big red sage	*Salvia penstemonoides*	Endemic; moist to seasonally wet clay or silt soils in creek beds.			Resident
Elmendorf's onion	*Allium elmendorfii*	Endemic, in deep sands			Resident
Park's jointweed	*Polygonella parksii*	Endemic; deep loose sands of Carrizo and similar Eocene formations.			Resident
Sandhill woolywhite	*Hymenopappus carrizoanus*	Found south of the Guadalupe River and the Balcones Escarpment. Prefers dense riparian corridors.			Resident
REPTILES					
Cagle's map turtle	*Graptemys caglei*	Endemic to Guadalupe River System. Found within 30 feet of waters' edge.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Garter Snake	*Thamnophis sirtalis annectens*	Wet or moist microhabitats			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident
Timber/ Canebrake Rattlesnake	*Crotalus horridus*	Floodplains, upland pine, deciduous woodlands, riparian zones.		T	Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	

LE/LT -- Federally Listed Endangered/Threatened
DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
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Source: TPWD, Annotated County List of Rare Species, Guadalupe County (Updated 5/7/2009).

Table H-12.
Endangered, Threatened, or Species of Concern

Listed for Hays County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
AMPHIBIANS					
Blanco blind salamander	*Eurycea robusta*	Species found in water-filled caverns of the Balcones Aquifer.		T	Resident
Blanco River springs salamander	*Eurycea pterophila*	Found in springs and caves in the Blanco River drainage.			Resident
San Marcos salamander	*Eurycea nana*	Found in the headwaters of the San Marcos River and downstream for approx. ½ mile past IH-35.	LT	T	Resident
Texas blind salamander	*Eurycea rathbuni*	Documented from water-filled subterranean caverns along a six mile stretch of the San Marcos Spring fault near San Marcos.	LE	E	Resident
ARACHNIDS					
Bandit Cave spider	*Cicurina bandida*	Small subterranean obligate spider.			Resident
BIRDS					
Bald eagle	*Haliaeetus leucoephalus*	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Black-capped Vireo	*Vireo atricapillus*	Oak-juniper woodlands,	LE	E	Resident
Golden-cheeked Warbler	*Dendroica chrysoparia*	Juniper-oak woodlands.	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Zone-tailed Hawk	*Buteo albonotatus*	Arid open country, often near watercourses		T	Resident
CRUSTACEANS					
A cave obligate crustacean	*Monodella texana*	Subaquatic, underground freshwater aquifers			Resident
Balcones Cave amphipod	*Stygobromus balconies*	Subaquatic, subterranean amphipod.			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Ezell's cave amphipod	*Stygobromus flagellates*	Known only from artesian wells.			Resident
Texas cave shrimp	*Palaemonetes antrorum*	Found in subterranean sluggish streams and pools.			Resident
Texas troglobitic water slater	*Lireolus smithii*	Subaquatic species, subterranean obligate within aquifers.			Resident
FISHES					
Fountain darter	*Etheostoma fonticola*	Known only from the San Marcos and Comal Rivers.	LE	E	Resident
Guadalupe Bass	*Micropterus treculi*	Endemic to perennial streams of the Edwards Plateau region.			Resident
Guadalupe Darter	*Percina sciera apristis*	Guadalupe River Basin. Usually found over gravel or gravel and sand raceways of larger streams and rivers.			Resident
Ironcolor shiner	*Notropis chalybaeus*	Found in Big Cypress Bayou and Sabine River basins.			Resident
San Marcos gambusia	*Gambusia georgei*	Extinct endemic formerly known from the upper San Marcos River.	LE	E	Resident
INSECTS					
A mayfly	*Procloeon distinctum*	Distinguished by their aquatic larval stage, adults are generally found in shoreline vegetation.			Resident
Comal Springs dryopid beetle	*Stygoparnus comalensis*	Adults usually found clinging to objects in streams, larvae live in soil or decaying wood.	LE		Resident
Comal Springs riffle beetle	*Heterelmis comalensis*	Found in Comal and San Marcos Springs.	LE		Resident
Edwards Aquifer diving beetle	*Haideoporus texanus*	Known from an artesian well in Hays County.			Resident
Flint's net-spinning caddisfly	*Cheumatopsyche flinti*	Occupies spring habitat.			Resident
Leonora's dancer damselfly	*Argia leonorae*	Found near small streams and seepages.			Resident
Rawson's metalmark	*Calephelis rawsoni*	Moist areas in shaded limestone outcrops			Resident
San Marcos saddle-case	*Protoptila arca*	Known from an artesian well in Hays County.			Resident
Texas austrotinodes caddisfly	*Austrotinodes texensis*	Endemic to Karst Springs and spring runs of the Edward Plateau region.			Resident
MAMMALS					
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
Texas fatmucket	*Lampsilis bracteata*	Streams and rivers on sand, mud and gravel, Colorado and Guadalupe River basins.		T*	Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					
Canyon mock-orange	*Philadelphus ernestii*	Endemic: found in shallow well-drained clays in woodlands.			Resident
Hill Country wild-mercury	*Argythamnia aphoroides*	Endemic; found primarily in grasslands associated with live oak woodlands.			Resident
Texas wild rice	*Zizania texana*	Endemic, found in spring-fed river.	LE	E	Resident
Warnock's coral root	*Hexalectric warnockii*	Found in leaf litter and humus in oak-juniper woodlands.			Resident
REPTILES					
Cagle's map turtle	*Graptemys caglei*	Endemic to Guadalupe River System. Found within 30 feet of waters' edge.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Garter Snake	*Thamnophis sirtalis annectens*	Wet or moist microhabitats			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	

LE/LT -- Federally Listed Endangered/Threatened
DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare

Source: TPWD, Annotated County List of Rare Species, Hays County (Updated 7/16/2009).

Table H-13.
Endangered, Threatened, or Species of Concern

Listed for Karnes County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
AMPHIBIANS					
Sheep frog	*Hypopachus variolosus*	Found in grassland and savanna; moist sites in arid areas.		T	Resident
BIRDS					
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
White-faced Ibis	*Plegadis chihi*	Prefers freshwater marshes.		T	Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
INSECTS					
Manfreda Giant-skipper	*Stallingsia maculosus*	Skipper larvae usually feed inside a leaf shelter.			Resident
MAMMALS					
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					
Welder machaeranthera	*Psilactis heterocarpa*	Endemic; found in grasslands.			Resident
REPTILES					
Indigo snake	*Drymarchon carais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident

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DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Karnes County (Updated 5/4/2009).

Table H-14.
Endangered, Threatened, or Species of Concern

Listed for Kendall County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
AMPHIBIANS					
Blanco River springs salamander	*Eurycea pterophila*	Found in springs and caves in the Blanco River drainage.			Resident
Cascade Caverns salamander	*Eurycea latitans complex*	Endemic, subaquatic in Edwards Aquifer Area		T	Resident
Comal Blind Salamander	*Eurycea tridentifera*	Endemic; springs and waters of caves in Bexar County.		T	Resident
Texas Salamander	*Eurycea neotenes*	Endemic; springs, seeps, cave streams, Helotes and Leon Creek drainages in Bexar County			Resident
BIRDS					
Bald eagle	*Haliaeetus leucoephalus*	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Black-capped Vireo	*Vireo atricapillus*	Oak-juniper woodlands,	LE	E	Resident
Golden-cheeked Warbler	*Dendroica chrysoparia*	Juniper-oak woodlands.	LE	E	Resident
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Zone-tailed Hawk	*Buteo albonotatus*	Arid open country, often near watercourses		T	Resident
CRUSTACEANS					
Cascade Cave amphipod	*Stygobromus dejectus*	Subaquatic crustacean which is a subterranean obligate found in pools.			Resident
Long-legged cave amphipod	*Stygobromus longipes*	Found in subterranean streams.			Resident
FISHES					
Guadalupe Bass	*Micropterus treculi*	Endemic to perennial streams of the Edwards Plateau region.			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Guadalupe Darter	*Percina sciera apristis*	Guadalupe River Basin. Usually found over gravel or gravel and sand raceways of larger streams and rivers.			Resident
Headwater catfish	*Ictalurus lupus*	Originally found throughout streams of the Edwards Plateau and the Rio Grande Basin.			Resident
INSECTS					
A mayfly	*Allenhyphes michaeli*	Found in the Texas Hill Country. Distinguished by an aquatic larval stage, with adults generally found in shoreline vegetation.			Resident
A mayfly	*Baetodes alleni*	Adults distinguished by aquatic larval stage, adults generally found in shoreline vegetation.			Resident
Rawson's metalmark	*Calephelis rawsoni*	Moist areas in shaded limestone outcrops			Resident
MAMMALS					
Black Bear	*Ursus americanus*	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Gray wolf	*Canis lupus*	Extirpated, forests, brushlands or grasslands	LE	E	Historic resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
Texas fatmucket	*Lampsilis bracteata*	Streams and rivers on sand, mud and gravel, Colorado and Guadalupe River basins.		T*	Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Basin bellflower	*Campanula reverchonii*	Endemic; found among scattered vegetation on loose gravel and rock outcrops on open slopes.			Resident
Big red sage	*Salvia penstemonoides*	Endemic; moist to seasonally wet clay or silt soils in creek beds.			Resident
Canyon mock-orange	*Philadelphus ernestii*	Endemic: found in shallow well-drained clays in woodlands.			Resident
Hill Country wild-mercury	*Argythamnia aphoroides*	Endemic; found primarily in grasslands associated with live oak woodlands.			
Texas mock-orange	*Philadelphus texensis*	Found on limestone outcrops on cliffs and rocky slopes.			Resident
REPTILES					
Cagle's map turtle	*Graptemys caglei*	Endemic to Guadalupe River System. Found within 30 feet of waters' edge.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Garter Snake	*Thamnophis sirtalis annectens*	Wet or moist microhabitats			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident

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T* -- in the process of being listed as Threatened by State
C -- Species of Concern
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Source: TPWD, Annotated County List of Rare Species, Kendall County (Updated 5/4/2009).

Table H-15. Endangered, Threatened, or Species of Concern

Listed for LaSalle County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
BIRDS					
Audubon's Oriole	*Icterus graduacauda audubonii*	Usually found along water courses in scrub and mesquite.			Resident
Baird's Sparrow	*Ammodramus bairdii*	Found in shortgrass prairie areas. Migratory in the western half of Texas.			Migrant
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Sennett's Hooded Oriole	*Icterus cucullatus sennetti*	This species often builds nests of Spanish moss.			Resident
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
MAMMALS					
Black Bear	*Ursus americanus*	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Gray wolf	*Canis lupus*	Extirpated, forests, brushlands or grasslands	LE	E	Historic resident
Jaguarundi	*Herpailurus yaguarondi*	Found in thick brushlands near water.	LE	E	Resident
Ocelot	*Leopardus pardalis*	Found in dense chaparral thrickets; mesquite-thorn scrub and live oak motts.	LE	E	Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
White-nosed coati	*Nasua narica*	Found in woodlands, riparian corridors and canyons. Mostly transients from Mexico.		T	Resident
PLANTS					

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Kleberg saltbush	*Atriplex klebergorum*	Endemic; usually occurring in sparsely vegetated saline areas.			Resident
Silvery wild-mercury	*Argythamnia argyraea*	Endemic; found among shortgrasses in grasslands or open shrublands.			Resident
REPTILES					
Indigo snake	*Drymarchon carais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident
Reticulate collared lizard	*Crotaphytus reticulates*	Requires open brush-grasslands; thorn-scrub vegetation.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident

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Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, LaSalle County (Updated 6/25/2009).

Table H-16.
Endangered, Threatened, or Species of Concern

Listed for Medina County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
AMPHIBIANS					
Valdina Farms sinkhole salamander	*Eurycea troglodytes complex*	Found in isolated, intermittent pools of subterranean streams and sinkholes within the Edwards Aquifer area.			Resident
BIRDS					
Baird's Sparrow	*Ammodramus bairdii*	Found in shortgrass prairie areas. Migratory in the western half of Texas.			Migrant
Black-capped Vireo	*Vireo atricapillus*	Oak-juniper woodlands,	LE	E	Resident
Golden-cheeked Warbler	*Dendroica chrysoparia*	Juniper-oak woodlands.	LE	E	Resident
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Zone-tailed Hawk	*Buteo albonotatus*	Arid open country, often near watercourses		T	Resident
CRUSTACEANS					
Ezell's cave amphipod	*Stygobromus flagellates*	Known only from artesian wells.			Resident
FISHES					
Edwards Plateau shiner	*Cyprinella lepida*	Found in the Edwards Plateau portion of the Nueces Basin.			Resident
Headwater catfish	*Ictalurus lupus*	Originally found throughout streams of the Edwards Plateau and the Rio Grande Basin.			Resident
Nueces roundnose minnow	*Dionda serena*	Found in the mainstream and tributaries of the Nueces, Frio and Sabinal Rivers.			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
INSECTS					
Leonora's dancer damselfly	*Argia leonorae*	Found near small streams and seepages.			Resident
MAMMALS					
Black Bear	*Ursus americanus*	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Frio pocket gopher	*Geomys texensis bakeri*	Associated with nearly level Atco soils.			Resident
Ghost-faced bat	*Mormoops megalophylla*	Roosts in caves, crevices and buildings			Resident
Gray wolf	*Canis lupus*	Extirpated, forests, brushlands or grasslands	LE	E	Historic resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					
Bracted twistflower	*Streptanthus bracteatus*	Endemic: found in shallow, well-drained gravelly clays and clay loams over limestone.			Resident
Sandhill woolywhite	*Hymenopappus carrizoanus*	Found south of the Guadalupe River and the Balcones Escarpment. Prefers dense riparian corridors.			Resident
Texas mock-orange	*Philadelphus texensis*	Found on limestone outcrops on cliffs and rocky slopes.			Resident
REPTILES					
Indigo snake	*Drymarchon carais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident

<table>
<tr><th rowspan="2">Common Name</th><th rowspan="2">Scientific Name</th><th rowspan="2">Summary of Habitat Preference</th><th colspan="2">Listing Entity</th><th rowspan="2">Potential Occurrence in County</th></tr>
<tr><th>USFWS</th><th>TPWD</th></tr>
<tr><td colspan="6">LE/LT -- Federally Listed Endangered/Threatened
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T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Medina County (Updated 6/25/2009).</td></tr>
</table>

Table H-17.
Endangered, Threatened, or Species of Concern

Listed for Refugio County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
AMPHIBIANS					
Black-spotted newt	*Notophthalmus meridionalis*	Usually found in wet or sometimes wet areas in the Gulf Coastal Plain south of the San Antonio River.		T	Resident
Sheep frog	*Hypopachus variolosus*	Found in grassland and savanna; moist sites in arid areas.		T	Resident
BIRDS					
Attwater's Greater Prairie Chicken	*Tympanuchus cupido attwateri*	Endemic, within historic range.	LE	E	Historic
Bald eagle	*Haliaeetus leucoephalus*	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Brown pelican	*Pelecanus occidentalis*	*Largely coastal and near shore areas.*	DL	E	Resident
Henslow's Sparrow	*Ammodramus henslowii*	Found in weedy fields or cut-over areas			Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	Found in open country, especially savanna and open woodland.	LE	E	Resident
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Piping plover	*Charadrius melodus*	Wintering migrant along the Texas Gulf Coast.	LT	T	Migrant
Reddish Egret	*Egretta rufescens*	Resident of Texas Gulf coast.		T	Resident
Snowy Plover	*Charadrius alexandrines*	Potential migrant, winters along coast			Migrant
Sooty Tern	*Sterna fuscata*	Usually flies or hovers over water.		T	Resident
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
White-faced Ibis	*Plegadis chihi*	Prefers freshwater marshes.		T	Resident
White-tailed Hawk	*Buteo albicaudatus*	Found near the coast on prairies.		T	Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
FISHES					
American eel	*Anguilla rostrata*	Coastal waterways below reservoirs to gulf.			Resident
Opossum pipefish	*Microphis brachyurus*	Adults found in fresh or low salinity waters.		T	Resident
Smalltooth sawfish	*Pristis pectinata*	Found in bays, estuaries or river mouths.	LE	E	Resident
MAMMALS					
Louisiana black bear	*Ursus americanus luteolus*	Possible transient.	LT	T	Transient
Ocelot	*Leopardus pardalis*	Found in dense chaparral thrickets; mesquite-thorn scrub and live oak motts.	LE	E	Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
West Indian manatee	*Trichechus manatus*	Gulf and bay systems.	LE	E	Resident
White-nosed coati	*Nasua narica*	Found in woodlands, riparian corridors and canyons. Mostly transients from Mexico.		T	Resident
MOLLUSKS					
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
PLANTS					
Black lace cactus	*Echinocereus reichenbachii var albertii*	Texas endemic found in grasslands, thorn shrublands and mesquite woodlands.	LE	E	Resident
Coastal gay-feather	*Liatris bracteata*	Endemic: found in coastal prairie grasslands.			Resident
Elmendorf's onion	*Allium elmendorfii*	Endemic, in deep sands			Resident
Plains gumweed	*Grindelia oolepis*	Found on coastal prairies on heavy clay soils.			Resident
Tharp's rhododon	*Rhododon angulatus*	Texas endemic found in deep, loose sands in sparsely vegetated areas.			Resident
Threeflower broomweed	*Thurovia triflora*	Endemic: near coast.			Resident
Welder machaeranthera	*Psilactis heterocarpa*	Endemic; found in grasslands.			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
REPTILES					
Atlantic hawksbill sea turtle	*Eretmochelys imbricate*	Found in Gulf and bay systems.	LE	E	Resident
Green sea turtle	*Chelonia mydas*	Gulf and bay systems.	LT	T	Resident
Gulf Saltmarsh snake	*Nerodia clarkii*	Found on saline flats.			Resident
Indigo snake	*Drymarchon carais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Found in gulf and bay systems.	LE	E	Resident
Leatherback sea turtle	*Dermochelys coriacea*	Gulf and bay systems.	LE	E	Resident
Loggerhead sea turtle	*Caretta caretta*	Gulf and bay systems for juveniles, ocean for adults.	LT	T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas diamondback terrapin	*Malaclemys terrapin littoralis*	Found in coastal marshes and tidal flats.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas scarlet snake	*Cemophora coccinea lineri*	Found in mixed hardwood scrub on sandy soils.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident
Timber/ Canebrake Rattlesnake	*Crotalus horridus*	Floodplains, upland pine, deciduous woodlands, riparian zones.		T	Resident

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DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Refugio County (Updated 12/18/2009).

Table H-187. Endangered, Threatened, or Species of Concern

Listed for Uvalde County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
AMPHIBIANS					
Valdina Farms sinkhole salamander	*Eurycea troglodytes complex*	Found in isolated, intermittent pools of subterranean streams and sinkholes within the Edwards Aquifer area.			Resident
BIRDS					
Baird's Sparrow	*Ammodramus bairdii*	Found in shortgrass prairie areas. Migratory in the western half of Texas.			Migrant
Black-capped Vireo	*Vireo atricapillus*	Oak-juniper woodlands,	LE	E	Resident
Golden-cheeked Warbler	*Dendroica chrysoparia*	Juniper-oak woodlands.	LE	E	Resident
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Sennett's Hooded Oriole	*Icterus cucullatus sennetti*	This species often builds nests of Spanish moss.			Resident
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
Zone-tailed Hawk	*Buteo albonotatus*	Arid open country, often near watercourses		T	Resident
CRUSTACEANS					
A cave obligate crustacean	*Monodella texana*	Subaquatic, underground freshwater aquifers			Resident
FISHES					
Blue sucker	*Cycleptus elongates*	Major rivers in Texas.		T	Resident
Edwards Plateau shiner	*Cyprinella lepida*	Found in the Edwards Plateau portion of the Nueces Basin.			Resident
Guadalupe Bass	*Micropterus treculi*	Endemic to perennial streams of the Edwards Plateau region.			Resident
Headwater catfish	*Ictalurus lupus*	Originally found throughout streams of the Edwards Plateau and the Rio Grande Basin.			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Nueces River shiner	*Cyprinella sp.2*	Edwards Plateau portion of the Nueces Basin in clear, cool, spring-fed headwater creeks.			Resident
Nueces roundnose minnow	*Dionda serena*	Found in the mainstream and tributaries of the Nueces, Frio and Sabinal Rivers.			Resident
INSECTS					
A mayfly	*Allenhyphes michaeli*	Found in the Texas Hill Country. Distinguished by an aquatic larval stage, with adults generally found in shoreline vegetation.			Resident
Coahuila giant skipper	*Agathymus remingtoni valverdiensis*	Found with the Lechugilla plant in desert hills and thorn forests.			Resident
Leonora's dancer damselfly	*Argia leonorae*	Found near small streams and seepages.			Resident
Sage sphinx	*Sphinx eremitoides*	Found in desert, grassland and sandy prairie with sage.			Resident
MAMMALS					
Black Bear	*Ursus americanus*	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Frio pocket gopher	*Geomys texensis bakeri*	Associated with nearly level Atco soils.			Resident
Ghost-faced bat	*Mormoops megalophylla*	Roosts in caves, crevices and buildings			Resident
Gray wolf	*Canis lupus*	Extirpated, forests, brushlands or grasslands	LE	E	Historic resident
Jaguarundi	*Herpailurus yaguarondi*	Found in thick brushlands near water.	LE	E	Resident
Ocelot	*Leopardus pardalis*	Found in dense chaparral thrickets; mesquite-thorn scrub and live oak motts.	LE	E	Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
White-nosed coati	*Nasua narica*	Found in woodlands, riparian corridors and canyons. Mostly transients from Mexico.		T	Resident
PLANTS					
Bracted twistflower	*Streptanthus bracteatus*	Endemic: found in shallow, well-drained gravelly clays and clay loams over limestone.			Resident
Hill Country wild-mercury	*Argythamnia aphoroides*	Endemic; found primarily in grasslands associated with live oak woodlands.			

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Sabinal prairie-clover	*Dalea sabinalis*	Texas endemic; found mostly in bluestem-grama grasslands associated with live oak woodlands.			Resident
Springrun whitehead	*Shinnersia rivularis*	Found in shallow, slow-moving water in spring-fed streams and rivers.			Resident
Texas greasebush	Glossopetalon texense	Texas endemic; found in dry limestone ledges and outcrops.			Resident
Texas largeseed bittercress	*Cardamine macrocarpa var texana*	Found in seasonally moist, loamy soils in pine-oak woodlands at high elevations.			Resident
Texas mock-orange	*Philadelphus texensis*	Found on limestone outcrops on cliffs and rocky slopes.			Resident
Tobusch fishhook cactus	*Sclerocactus brevihamatus ssp.*	Texas endemic; found on shallow, moderately alkaline stony clay and clay loams over limestone.			Resident
REPTILES					
Indigo snake	*Drymarchon carais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident
Reticulate collared lizard	*Crotaphytus reticulates*	Requires open brush-grasslands; thorn-scrub vegetation.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident

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Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Uvalde County (Updated 6/25/2009).

Table H-19.
Endangered, Threatened, or Species of Concern

Listed for Victoria County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
AMPHIBIANS					
Black-spotted newt	*Notophthalmus meridionalis*	Usually found in wet or sometimes wet areas in the Gulf Coastal Plain south of the San Antonio River.		T	Resident
BIRDS					
Attwater's Greater Prairie Chicken	*Tympanuchus cupido attwateri*	Endemic, within historic range.	LE	E	Historic
Bald eagle	*Haliaeetus leucoephalus*	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Brown pelican	*Pelecanus occidentalis*	*Largely coastal and near shore areas.*	DL	E	Resident
Henslow's Sparrow	*Ammodramus henslowii*	Found in weedy fields or cut-over areas			Resident
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Reddish Egret	*Egretta rufescens*	Resident of Texas Gulf coast.		T	Resident
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
White-faced Ibis	*Plegadis chihi*	Prefers freshwater marshes.		T	Resident
White-tailed Hawk	*Buteo albicaudatus*	Found near the coast on prairies.		T	Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
FISHES					
American eel	*Anguilla rostrata*	Coastal waterways below reservoirs to gulf.			Resident
INSECTS					

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
A mayfly	*Tortopus circumfluus*	Aquatic larval stage, adults generally found in shoreline vegetation.			Resident
Texas asaphomyian tabanid fly	*Asaphomyia texensis*	Globally historic species.			Resident
MAMMALS					
Louisiana black bear	*Ursus americanus luteolus*	Possible transient.	LT	T	Transient
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
White-nosed coati	*Nasua narica*	Found in woodlands, riparian corridors and canyons. Mostly transients from Mexico.		T	Resident
MOLLUSKS					
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					
Shinner's sunflower	*Helianthus occidentalis ssp. Plantagineus*	Found on prairies on the Coastal Plain			Resident
Welder machaeranthera	*Psilactis heterocarpa*	Endemic; found in grasslands.			Resident
REPTILES					
Cagle's map turtle	*Graptemys caglei*	Endemic to Guadalupe River System. Found within 30 feet of waters' edge.		T	Resident
Texas diamondback terrapin	*Malaclemys terrapin littoralis*	Found in coastal marshes and tidal flats.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Timber/ Canebrake Rattlesnake	*Crotalus horridus*	Floodplains, upland pine, deciduous woodlands, riparian zones.		T	Resident

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T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Victoria County (Updated 12/18/2009).

Table H-20. Endangered, Threatened, or Species of Concern

Listed for Wilson County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
BIRDS					
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
Whooping Crane	*Grus americana*	Potential migrant	LE	E	Potential Migrant
Wood Stork	*Mycteria americana*	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
INSECTS					
Manfreda Giant-skipper	*Stallingsia maculosus*	Skipper larvae usually feed inside a leaf shelter.			Resident
MAMMALS					
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Plains Spotted Skunk	*Spilogale putorius interrupta*	Prefers wooded, brushy areas.			Resident
Red Wolf	*Canis rufus*	Extirpated.	LE	E	Historic Resident
MOLLUSKS					
Creeper (squawfoot)	*Strophitus undulates*	Small to large streams			Resident
False spike mussel	*Quincuncina mitchelli*	Substrates of cobble and mud with water lilies present. Rio Grande, Brazos, Colorado and Guadalupe river basins.		T*	Resident
Golden orb	*Quadrula aurea*	Sand and gravel, Guadalupe, San Antonio, and Nueces River basins		T*	Resident
Pistolgrip	*Tritogonia verrucosa*	Aquatic, stable substrate. Red through San Antonio river basins.			Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Rock pocketbook	*Arcidens confragosus*	Mud and sand, Red through Guadalupe River basins.			Resident
Texas pimpleback	*Quadrula petrina*	Mud, gravel and sand substrates, Colorado and Guadalupe river basins		T*	Resident
PLANTS					
Big red sage	*Salvia penstemonoides*	Endemic; moist to seasonally wet clay or silt soils in creek beds.			Resident
Elmendorf's onion	*Allium elmendorfii*	Endemic, in deep sands			Resident
Park's jointweed	*Polygonella parksii*	Endemic; deep loose sands of Carrizo and similar Eocene formations.			Resident
REPTILES					
Indigo snake	*Drymarchon carais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident

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DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Wilson County (Updated 5/4/2009).

Table H-21. Endangered, Threatened, or Species of Concern

Listed for Zavala County

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
BIRDS					
Baird's Sparrow	*Ammodramus bairdii*	Found in shortgrass prairie areas. Migratory in the western half of Texas.			Migrant
Interior least tern	*Sterna antillarum athalassos*	Nests along sand and gravel bars in braided streams	LE	E	Resident
Mountain Plover	*Charadrius montanus*	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Peregrine Falcon	*Falco peregrinus anatum* (American)	Resident and local breeder in West Texas. Migrant across the state.	DL	T	Possible Migrant
	Falco peregrinus tundrius (Arctic)	Migrant throughout the state.	DL		Possible Migrant
Sennett's Hooded Oriole	*Icterus cucullatus sennetti*	This species often builds nests of Spanish moss.			Resident
Western Burrowing Owl	*Athene cunicularia hypugaea*	Open grasslands, especially prairie, plains and savanna			Resident
MAMMALS					
Black Bear	*Ursus americanus*	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Carrizo Springs pocket gopher	*Geomys personatus streckeri*	Uses underground burrows in deep sandy soils.			Resident
Cave Myotis Bat	*Myotis velifer*	Roosts colonially in caves, rock crevices			Resident
Frio pocket gopher	*Geomys texensis bakeri*	Associated with nearly level Atco soils.			Resident
Ghost-faced bat	*Mormoops megalophylla*	Roosts in caves, crevices and buildings			Resident
Gray wolf	*Canis lupus*	Extirpated, forests, brushlands or grasslands	LE	E	Historic resident
Ocelot	*Leopardus pardalis*	Found in dense chaparral thrickets; mesquite-thorn scrub and live oak motts.	LE	E	Resident
White-nosed coati	*Nasua narica*	Found in woodlands, riparian corridors and canyons. Mostly transients from Mexico.		T	Resident
REPTILES					
Indigo snake	*Drymarchon carais*	Found south of the Guadalupe river and Balcones Escarpment.		T	Resident
Reticulate collared lizard	*Crotaphytus reticulates*	Requires open brush-grasslands; thorn-scrub vegetation.		T	Resident

Common Name	Scientific Name	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
			USFWS	TPWD	
Spot-tailed earless lizard	*Holbrookia lacerata*	Moderately open prairie-brushland.			Resident
Texas Horned Lizard	*Phrynosoma cornutum*	Varied, sparsely vegetated uplands.		T	Resident
Texas Tortoise	*Gopherus berlandieri*	Open brush w/ grass understory.		T	Resident

LE/LT -- Federally Listed Endangered/Threatened
DL, PDL -- Federally Delisted/proposed for delisting
T/SA -- Listed as Threatened by similarity of appearance
E, T -- State listed Endangered/Threatened
T* -- in the process of being listed as Threatened by State
C -- Species of Concern
Blank -- Not yet listed by TPWD or USFWS, but considered rare
Source: TPWD, Annotated County List of Rare Species, Zavala County (Updated 6/25/2009).

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Appendix I
Recommendation of
Stream Segments Having Unique Ecological Value
for Legislative Designation

Appendix I
Recommendation of
Stream Segments Having Unique Ecological Value
for Legislative Designation

I.1 Legislative Authority, Texas Water Development Board Guidance, and Recommendations

The Texas Legislature has the authority to designate a river or stream segment as having unique ecological value. Authority for such designation is found in Texas Water Code subsection §16.051. State Water Plan: Drought, Conservation, Development, and Management; Effect of Plan. The designation of a stream segment as having unique ecological value solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream segment designated by the legislature.

The Texas Water Development Board (TWDB) Regional Water Planning Guidelines (Title 30, Part 10, Chapter 357, Rule 357.8) also address the topic of ecologically unique river and stream segments. These guidelines state that regional water planning groups may include in adopted regional water plans recommendations for all or parts of any river or stream segment of unique ecological value located within their regional water planning area.

Proposals developed for the purpose of recommending river or stream segments for designation as having unique ecological value are required to address certain specific criteria for each identified segment. The recommendation of a river or stream segment as being of unique ecological value is based upon one or more of the following five criteria:

- Biological Function – stream segments which display significant overall habitat value including both quantity and quality considering the degree of biodiversity, age, and uniqueness observed and including terrestrial, wetland, aquatic, or estuarine habitats.
- Hydrologic Function – stream segments which are fringed by habitats that perform valuable hydrologic functions relating to water quality, flood attenuation, flow stabilization, or groundwater recharge and discharge.
- Riparian Conservation Areas – stream segments which are fringed by significant areas in public ownership including state and federal refuges, wildlife management areas, preserves, parks, mitigation areas, or other areas held by governmental organizations for conservation purposes, or stream segments which are fringed by other areas managed for conservation purposes under a governmentally approved conservation plan.
- High Water Quality/Exceptional or High Aquatic Life Use/High Aesthetic Value – stream segments or spring resources that are significant due to unique or critical habitats and exceptional aquatic life uses dependent or associated with high water quality.

- Threatened or Endangered Species/Unique Communities – sites along streams where water development projects would have significant detrimental effects on state or federally listed threatened and endangered species, and sites along streams significant due to the presence of unique, exemplary, or unusually extensive natural communities.

The South Central Texas Regional Water Planning Group (Region L) conditionally recommends to the Texas Legislature that, in accordance with Subsection 16.051 of the Texas Water Code, it designate the following five stream segments in Region L (Figure 1) as having unique ecological value:

- The Nueces River from the northern boundary of Region L downstream to United States Geological Survey (USGS) gauge # 08190000 at Laguna (within Texas Commission on Environmental Quality (TCEQ) classified stream segment 2112);
- The Frio River from the northern boundary of Region L downstream to USGS gauge #08195000 at Concan (within TCEQ classified stream segment 2113);
- The Sabinal River from the northern boundary of Region L downstream to the State Highway 187 crossing located approximately 2.7 miles upstream of USGS gauge #08198000 near Sabinal (within TCEQ classified stream segment 2111);
- The San Marcos River extending from IH 35 up to a point 0.4 miles upstream of Loop 82 in San Marcos (within TCEQ classified stream segment 1814); and
- The Comal River extending from the confluence with the Guadalupe River upstream to Klingemann Street in New Braunfels (TCEQ classified stream segment 1811).

The South Central Texas Regional Water Planning Group further notes that the recommendation of these stream segments for designation as having unique ecological value is not intended to affect the repair, rehabilitation, or replacement of existing dams and reservoirs.

I.2 Conditions

Because the consequences of such designations by the Legislature are not well understood, these recommendations are conditioned upon legislation providing for these designations containing the following clarifying provisions or substantially similar provisions approved by Region L:

- A provision affirming that the only constraint that may result from these ecologically unique stream segment designations is that constraint described in Subsection 16.051(f) Water Code which prohibits a state agency or political subdivision of the state from financing the construction of a reservoir in a designated stream segment.
- A provision stating that the constraint described in Subsection 16.051(f) Water Code does not apply to the construction, operation, maintenance, or replacement of any new or existing weir, diversion, flood control, drainage, water supply, or recreation facility located within the city limits of San Marcos or New Braunfels.

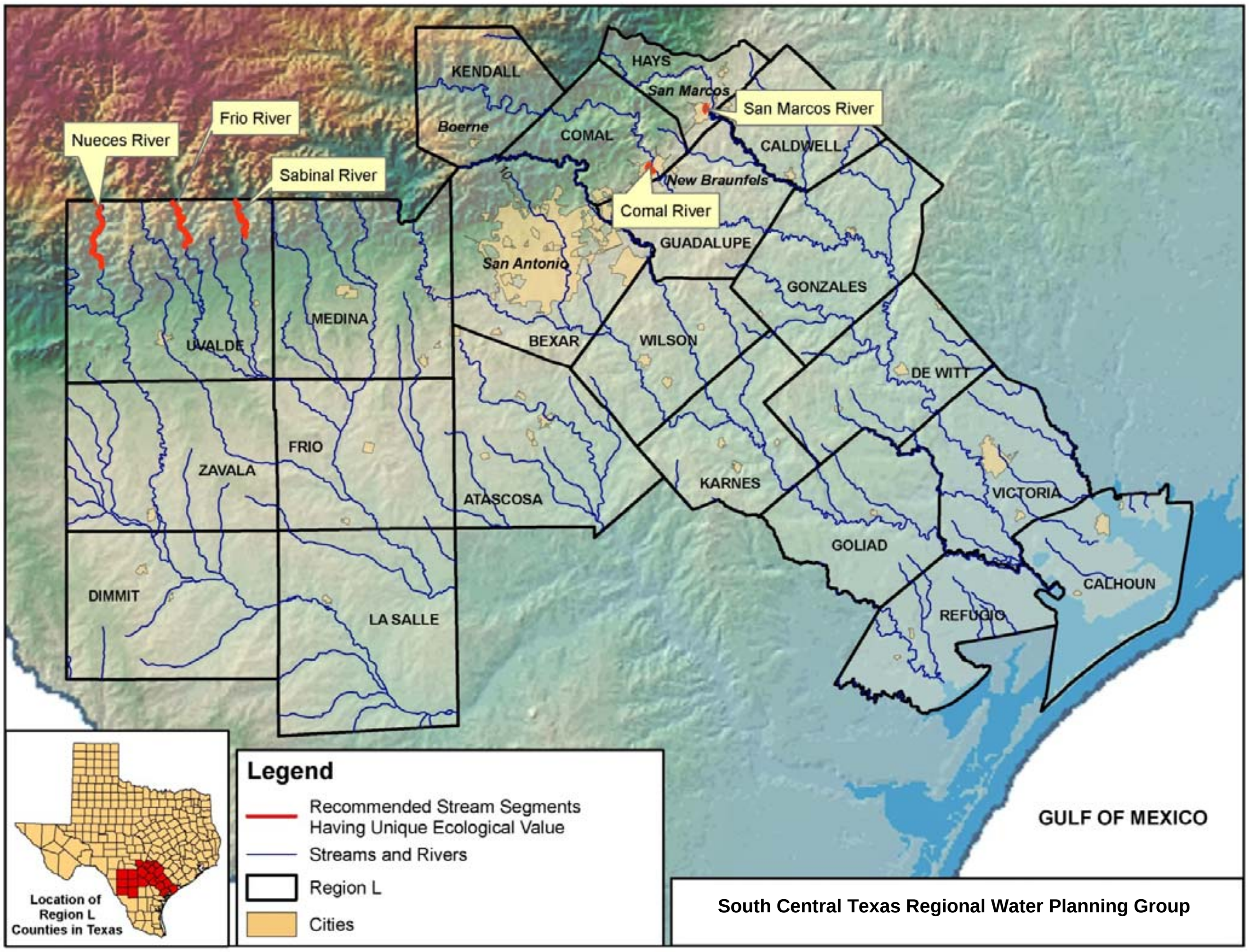

Figure 1. Conditionally Recommended Unique Stream Segments

- A provision stating that the constraint described in Subsection 16.051(f) Water Code does not apply to a weir, diversion, flood control, drainage, water supply, or recreation facility currently owned by a political subdivision.
- A provision stating that these designations will not constrain the permitting, financing, construction, operation, maintenance, or replacement of any water management strategy recommended, or designated as an alternative, to meet projected needs for additional water supply in the 2011 Regional Water Plan for Region L.
- A provision affirming that these designations are not related to the "wild and scenic" federal program or to any similar initiative that could result in "buffer zones," inadvertent takings, or overreaching regulation.
- A provision stating that all affected landowners shall retain all existing legal private property rights.

- A provision recognizing that the unique ecological value of the designated segments is due, in part, to the conscientious, voluntary stewardship of many landowners on the adjoining properties.

I.3 Committee and Process

On February 7, 2008, a subcommittee of the South Central Texas Regional Water Planning Group (SCTRWPG) was formed to consider the potential recommendation of selected stream segments within Region L for legislative designation as having “unique ecological value.” It was the understanding of this subcommittee that such designation “solely means that a state agency or political subdivision of the state may not finance the actual construction of a reservoir in a specific river or stream segment designated by the legislature (TWC16.051).” This subcommittee was comprised of SCTRWPG members Con Mims (Chair), Evelyn Bonavita, Donna Balin, Iliana Peña, and David Langford, with additional technical support provided by Cindy Loeffler of the Texas Parks & Wildlife Department (TPWD) and Sam Vaugh of HDR Engineering, Inc. (HDR).

Discussions among the subcommittee members and others led to initial selection of the five (5) stream segments described above for further consideration by the SCTRWPG as having unique ecological value. The subcommittee further noted that the potential recommendation of these stream segments for designation was not intended to affect the repair, rehabilitation, or replacement of existing dams and reservoirs. Subcommittee discussions, the initial selection of stream segments, and documentation of the process were reviewed by the Staff Workgroup on April 23, 2009. On May 7, 2009, the subcommittee reported the initial selection of stream segments for further consideration to the SCTRWPG. The SCTRWPG acted by consensus to pursue further consideration of the initial selection of stream segments and directed HDR to compile documentation in the form of a draft recommendation package to support designation.

Components of the draft recommendation package were reviewed with the Staff Workgroup on July 23, 2009 and discussed by the SCTRWPG on August 6, 2009 and November 5, 2009. A draft recommendation package, refined in accordance with SCTRWPG comments, was transmitted to TPWD on December 24, 2009 for their review and development of a written evaluation within 30 days of receipt. TPWD comments were received on January __, 2010 and the recommendation package was refined as necessary.

In accordance with TWDB guidance, the assessment of cumulative effects of regional water plan implementation in Section 7 of the 2011 South Central Texas Regional Water Plan includes information specifically relevant to the stream segments recommended for legislative designation.

Subject to action of the SCTRWPG in February 2010, recommendation of stream segments for legislative designation may be included in the Initially Prepared 2011 South Central Texas Regional Water Plan (IPP).

Subject to action of the SCTRWPG in August 2010 (with due consideration of relevant public comments on the IPP), recommendation of stream segments for legislative designation may be included in the adopted 2011 South Central Texas Regional Water Plan.

Upon TWDB approval of the 2011 South Central Texas Regional Water Plan (expected during or prior to January 2011), it will be included in the 2012 State Water Plan to be adopted by the TWDB in January 2012. Hence, potential legislative designation of recommended stream segments of unique ecological value, within Region L and elsewhere across the state, would likely follow TWDB adoption of the 2012 State Water Plan.

I.4 Documentation by Stream Segment

Information used to support the criteria selected for the five segments recommended for unique ecological value designation was acquired from a number of sources. The Nueces, Frio, and Sabinal River segments recommended within Region L are listed in The Nationwide Rivers Inventory (NRI) prepared by the National Park Service (NPS, 1995). This inventory lists more than 3,400 free-flowing river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. All federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI segments based on a 1979 Presidential directive, and related Council on Environmental Quality procedures. Statewide river assessments and federal agencies involved with stream-related projects use the NRI as a source of important information. The inventory can provide the location of the nearest naturally- functioning system which might serve as a reference for monitoring activities for any group concerned with ecosystem management. Restoration efforts on a similar section of river can utilize the NRI as a source for lists of plant and animal species required for restoration efforts. It also provides a listing of free-flowing, relatively undisturbed river segments for the use of recreationalists.

All of the recommended segments lie within areas contributing to or below springs emanating from the Edwards Aquifer. This aquifer is divided into three main zones: the contributing zone, the recharge zone, and the artesian zone (Eckhardt, 2009). The contributing zone is sometimes called the drainage area or the catchment area. Within this area, water falls on the land surface then runs off into streams or infiltrates into aquifers found under the Edwards Plateau. This runoff from the land surface, in addition to water table springs feed streams that flow over relatively impermeable limestones until they reach the Edwards Aquifer Recharge zone (Eckhardt, 2009). The recharge zone includes an area where large quantities of water flow into the aquifer facilitated by the presence of highly faulted and fractured Edwards limestone outcrops at the land surface. Water from the recharge zone is then moved by gravity into the artesian zone where it is trapped by rock formations. Water stored in the aquifer creates pressure gradients that sustain artesian wells and springs within the area. Major examples of this include Comal and San Marcos Springs, the two largest in Texas.

High water quality, and high or exceptional aquatic life values, the criteria for which are specified in the Texas Surface Water Quality Standards are present in all five recommended segments. The Texas Surface Water Quality Standards establish explicit goals for the quality of streams, lakes, and bays throughout the state. These standards are developed to maintain the quality of surface waters in Texas so that these waters support public health and enjoyment and protect aquatic life, consistent with the sustainable economic development of the state.

Table 1 presents the criteria met by each of the five recommended segments of unique ecological value in Region L.

Table 1.
Criteria for Unique Ecological Value and
Stream Segments Recommended for Designation in Region L

Criteria	***Nueces River***	***Frio River***	***Sabinal River***	***San Marcos River***	***Comal River***
Biological Function	✓	✓	✓	✓	✓
Hydrologic Function	✓	✓	✓	✓	✓
Riparian Conservation Areas		✓		✓	✓
High Water Quality/Exceptional or High Aquatic Life Use/High Aesthetic Value	✓	✓	✓	✓	✓
Threatened or Endangered Species/Unique Communities	✓	✓	✓	✓	✓

✓Indicates criteria listed from the Texas Water Development Board Regional Water Planning Guidelines met by each segment recommended for designation.

I.4.1 Nueces River

The Nueces River begins in northwestern Real County and flows south, where it joins its West Fork northwest of Uvalde in Uvalde County. From this confluence the river flows south approximately 357 miles providing freshwater inflows to Nueces Bay and ultimately Corpus Christi Bay. The upper section of the Nueces River is considered to be one of the more aesthetically pleasing stream segments in the state (Belisle, 1974). The East Fork of the Nueces River rises from springs in the Edwards Plateau, and its clear water flows through scenic limestone canyons (Brune, 1981). Historically, many springs could be found along the banks of the Nueces River. However, springs are currently only found in the bottom of the river channel (Brune, 1981). Several spring-fed tributaries, most importantly the Frio River, help to ensure that some flow is present in the Nueces River, although it is often shallow (Belisle, 1974). Water in the Nueces River sinks into gravels in the river bottom as it crosses the Balcones Fault Zone and reappears through several springs in other local creeks and rivers such as Spring Creek and the Leona River (Brune, 1981).

The Edwards Plateau portion of the Nueces River has banks lined with characteristic larger trees including pecan (*Carya illinoensis*), oak (*Quercus* sp.), sycamore (*Platanus occidentalis*), and cedar-elm (*Ulmus crassifolia*). These areas give way to other species such as sagebrush (*Artimesia* sp.), mesquite (*Prosopis glandulosa*), and cacti (*Opuntia* spp.) as the river enters the South Texas Brush Country. The riparian woodlands provide important nesting, migration, and wintering habitat for a variety of birds. Green herons, spotted sandpipers, green kingfishers, turkey vultures and others live in the river corridor (NPS, 1995). River banks within this area are commonly lined with ferns, sedges, switch grass, cardinal lobelia, frog fruit, and water cress. The aquatic and riparian habitats associated with the Nueces River support a diverse assemblage of invertebrates, fish, birds, and plants characteristic of the Edwards Plateau.

This recommended river segment includes that portion of the Nueces River which runs from the northern boundary of Region L at the junction of the Edwards, Real, and Uvalde County borders downstream to USGS gauge # 08190000 at Laguna (within TCEQ classified stream segment 2112), a length of approximately 19 river miles (Exhibit 1).

The recommendation of this segment of the Nueces River as having unique ecological value is based upon the following criteria:

- Biological Function - This segment is included in the National Park Service Nationwide Rivers Inventory for outstandingly remarkable fish and wildlife values (NPS, 1995). (Photo #1 & Exhibit 1)
- Hydrologic Function - Numerous springs along and within the Nueces River provide valuable hydrologic functions relating to the discharge of the Edwards-Trinity (Plateau) Aquifer, and flow within the river provides recharge to the Edwards Balcones Fault Zone Aquifer as it crosses the outcrop portion (Brune, 1981). The recommended segment of the Nueces River is located over the Edwards Aquifer Contributing Zone. Within this area water falls on the land surface then runs off into streams or infiltrates into aquifers found under the Edwards Plateau (Eckhardt, 2009). Northeast of Montell, surface flow of the river may cease as underflow continues to feed nearby Candelaria Springs, the site of an ancient Indian village and the Spanish Mission Nuestra Senora de la Candelaria (Brune, 1981). (Photo #2 & Exhibit 1)
- High Water Quality/Exceptional or High Aquatic Life Use/High Aesthetic Value - This segment of the Nueces River is classified in the high aquatic life use category by the Texas Commission on Environmental Quality as its attributes include highly diverse habitat, regionally expected species assemblage, presence of sensitive species, high diversity and species richness, and/or balanced to slightly imbalanced trophic structure (TCEQ, 2000). The entire segment offers high aesthetic value. It has been recommended by the National Park Service for inclusion in the proposed Texas Natural Rivers System, and is described by that organization as the "purest, cleanest stretch of stream this size in Texas" (NPS, 1995). Often canoeable, portions of this segment have numerous rapids, including geologic oddities such as "pin-ball rapids," and the banks are lined with oaks and pecans (NPS, 1995). (Photo #3 & Exhibit 1)
- Threatened or Endangered Species/Unique Communities - This portion of the Nueces River is a significant segment due to the presence of one state threatened species, and several species of concern (SOC) as listed by Texas Parks and Wildlife Department (TPWD). The state threatened blue sucker (*Cycleptus elongatus*) may potentially occur within Uvalde County. In addition, the Edwards Plateau shiner (*Cyprinella lepida*), Nueces roundnose minnow (*Dionda serena*), Nueces River shiner (*Cyprinella* sp. 2), and Guadalupe bass (*Micropterus treculi*), all SOC, may also occur within this segment. TPWD reports that the numerous springs along the Nueces River and its tributaries provide habitat for an undescribed species of salamander that belongs to the *Eurycea troglodytes* complex (TPWD, 2009). (Photo #4 & Exhibit 1).

Photo #1 – Nueces River

Photo #2 – Nueces River

Photo #3 – Nueces River

Photo #4 – Nueces River

I.4.2 Frio River

The Frio River begins in northeast Real County and flows south and southeast for about 250 miles traversing Uvalde, Medina, Frio, La Salle, McMullen, and Live Oak counties. The Frio River empties into the Nueces River, ultimately contributing freshwater inflow to Nueces and Corpus Christi Bays. Springs that form the Frio River issue from a 3,000-acre ranch north of Leakey, while numerous spring-fed tributaries contribute to its flow (Brune, 1981). The river crosses the Edwards Aquifer recharge zone in central Uvalde County where it disappears into alluvial cobbles and gravels (Brune 1981).

The river passes through limestone formed canyons lined with mesquite (*Prosopis glandulosa*), Texas red bud (*Cercis canadensis*), Ashe juniper (*Juniperus ashei*), lacey oak (*Quercus laceyi*), Texas madrone (*Arbutus xalapensis*), and cedar elm (*Ulmus crassifolia*). River banks are bounded by numerous species including bald cypress (*Taxodium distichum*), pecan (*Carya illinoensis*), sycamore (*Platanus occidentalis*), willow (*Salix nigra*), and Spanish oak (*Quercus buckleyi*) (Belisle, 1974). Considered to be one of top 10 rivers in the state, it is a very popular recreational river for canoeing, tubing, fishing, and wildlife viewing, with the majority of its recreational use occurring around Garner State Park (NPS, 1995). Many shallow rapids exist in the narrow upper section of the river; however water levels generally support recreational activities throughout much of its course (Belisle, 1974).

This segment is important to TPWD stocking experiments involving Guadalupe bass (*Micropterus treculi*) as it is downstream of areas where pure strain Guadalupe bass were stocked in large numbers in an attempt to purify existing hybrid populations (TPWD, 2005).

The aquatic and riparian habitats associated with this segment support an exceptionally diverse assemblage of invertebrates, fish, birds, and plants characteristic of the Edwards Plateau. The riparian woodlands also provide important nesting, migration, and wintering habitat for a variety of birds.

The recommended segment of the Frio River includes that portion of the river from the northern boundary of Region L in Uvalde County downstream to USGS gauge #08195000 at Concan, a distance of approximately 15 miles (within TCEQ classified stream segment 2113) (Exhibit 2).

The unique ecological value of this segment of the Frio River is based upon the following criteria:

- Biological Function - This segment is included in the National Park Service Nationwide Rivers Inventory for outstandingly remarkable wildlife value (NPS, 1995). It has also been recommended by the National Park Service for inclusion in the proposed Texas Natural Rivers System (NPS, 1995). (Photo #5 & Exhibit 2)
- Hydrologic Function - Numerous springs located along the Frio River provide a valuable hydrologic function relating to the discharge of the Edwards-Trinity (Plateau) Aquifer, and flow within the river provides recharge as it crosses the outcrop portion of the Edwards Balcones Fault Zone Aquifer (Brune, 1981). This recommended segment of the Frio River is located over the Edwards Aquifer Contributing Zone. The Contributing Zone is sometimes called the drainage area or the catchment area. Within this area, water falls on the land surface then runs off into streams or infiltrates into aquifers found under the Edwards Plateau. This runoff from the land surface, in addition to water table springs, feed streams that flow over relatively impermeable limestones until they reach the Edwards Aquifer Recharge zone (Eckhardt, 2009). Near the Uvalde/Real County line, Cold Springs discharge from the Glen Rose limestone on the east side of the Frio River. An Indian village once was located here as evidenced by middens, projectile points, and metates (Brune, 1981). (Photo #6 & Exhibit 2)
- Riparian Conservation Area- This recommended segment includes the 1,419.8-acre Garner State Park (TPWD, 2005). TPWD biologists have identified approximately forty-nine species of herpetofauna, forty-four species of mammals, and over 200 species of birds with ranges that include the park (Handbook of Texas Online). The park has an abundance of White-tailed and Axis deer, Rio Grande Turkey, Mourning Dove, Eastern Bluebirds, Golden-cheeked Warblers, Black Rocks Squirrels, Fox Squirrels, Raccoons, and many other animal species (TPWD, 2005). Widespread riparian habitat found within this area provide important habitat for numerous wildlife species. (Photo #7 & Exhibit 2)
- High Water Quality/Exceptional or High Aquatic Life Use/High Aesthetic Value - This segment of the Frio River is listed by the Texas Commission on Environmental Quality as having exceptional aquatic life use (TCEQ, 2000). An exceptional aquatic life use classification indicates attributes including outstanding natural habitat variability, exceptional or unusual species assemblage, abundant sensitive species, exceptionally high diversity, exceptionally high species richness, and/or balanced trophic structure. This segment is included in the National Park Service Nationwide Rivers Inventory for outstandingly remarkable scenery and recreation values (NPS, 1995). (Photo #8 & Exhibit 2)
- Threatened or Endangered Species/Unique Communities - This river segment is important due to the possible presence of one state threatened species, and several SOC as listed by TPWD. The state threatened blue sucker (*Cycleptus elongatus*) may potentially occur within Uvalde County. In addition, the Edwards Plateau shiner (*Cyprinella lepida*), Nueces roundnose minnow (*Dionda serena*), Nueces River shiner (*Cyprinella* sp. 2), and Guadalupe bass (*Micropterus treculi*), all SOC, may also occur within this segment. There also exist numerous springs along the Frio River and its tributaries which TPWD reports provide habitat for an undescribed species of salamander that belongs to the *Eurycea troglodytes* complex (TPWD, 2009). (Photo #9 & Exhibit 2).

Guadalupe Bass
Gary Garrett (TPWD)

Plateau shiner
Chad Norris (TPWD)

Nueces roundnose minnow
Chad Norris (TPWD)

Photo #5 – Frio River

Photo #6 – Frio River (Cold Springs)

Photo #7 – Frio River (Garner State Park)

Photo #8 – Frio River

Photo #9 – Frio River

I.4.3 Sabinal River

The spring-fed Sabinal River begins near Vanderpool in western Bandera County and flows south for approximately 58 miles into Uvalde County where it merges with the Frio River in the southeastern part of the county. The upper portion of the Sabinal River rises from the Edwards Plateau and flows through Hill Country canyons with walls up to 300 feet tall before entering the South Texas Brush Country (Belisle, 1974). Large bald cypress (*Taxodium distichum*) are interspersed along the banks of the river, along with green ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), pecan (*Carya illinoensis*), and sycamore (*Platanus occidentalis*) among other trees. The aquatic and riparian habitats associated with this segment support a diverse assemblage of invertebrates, fish, birds, and plants characteristic of the Edwards Plateau.

The Sabinal River crosses both the Contributing Zone and Recharge Zone of the Edwards Aquifer in northeastern Uvalde County. Like the Nueces River, the Frio River, and other streams to the northwest, the Sabinal River loses water when crossing the Balcones Fault Zone (Brune, 1981). Some of this lost water reappears in the Sabinal River at Sabinal Springs west of the city of Sabinal (Brune, 1981). The Sabinal River was included in the National Park Service Nationwide Rivers Inventory for outstandingly remarkable values in scenery, recreation, geology, wildlife, and other values (NPS, 1995).

This segment is important to TPWD stocking experiments involving Guadalupe bass (*Micropterus treculi*) as it is downstream of areas where pure strain Guadalupe bass were stocked in large numbers in an attempt to purify existing hybrid populations (TPWD, 2005).

The segment of the Sabinal River recommended for designation as having unique ecological value includes that portion of the river from the northern boundary of Region L downstream to the State Highway 187 crossing located approximately 2.7 miles upstream of USGS gauge #08198000 near Sabinal, a distance of approximately 12 miles (within TCEQ classified stream segment 2111) (Exhibit 3).

The unique ecological value of this segment of the Sabinal River is based upon the following criteria:

- Biological Function - This segment is included in the National Park Service Nationwide Rivers Inventory for outstandingly remarkable wildlife values (NPS, 1995). It has also been recommended by the National Park Service for inclusion in the proposed Texas Natural Rivers System (NPS, 1995). (Photo #10 & Exhibit 3)

- Hydrologic Function - Numerous springs located along the Sabinal River provide a valuable hydrologic function relating to the discharge of the Edwards-Trinity (Plateau) Aquifer, and flow within the river provides recharge as it crosses the outcrop portion of the Edwards Balcones Fault Zone Aquifer (Brune, 1981). This recommended segment of the Sabinal River is located over the Edwards Aquifer Contributing Zone. The Contributing Zone is sometimes called the drainage area or the catchment area. Within this area, water falls on the land surface then runs off into streams or infiltrates into aquifers found under the Edwards Plateau. This runoff from the land surface, in addition to water table springs, feed streams that flow over relatively impermeable limestones until they reach the Edwards Aquifer Recharge zone (Eckhardt, 2009). Ware Springs reportedly issue from Leona gravels in a small draw east of the Sabinal River just below Utopia (Brune, 1981). (Photo #11 & Exhibit 3)
- High Water Quality/Exceptional or High Aquatic Life Use/High Aesthetic Value – This segment of the Sabinal River is classified in the high aquatic life use category by the Texas Commission on Environmental Quality as its attributes include highly diverse habitat, regionally expected species assemblage, presence of sensitive species, high diversity and species richness, and/or balanced to slightly imbalanced trophic structure (TCEQ, 2000). This segment of the Sabinal River is also included in the National Park Service Nationwide Rivers Inventory for outstandingly remarkable scenery and recreation values (NPS, 1995). (Photo #12 & Exhibit 3)
- Threatened or Endangered Species/Unique Communities - This river segment is significant due to the possible presence of one state threatened species, and several SOC as listed by TPWD. The state threatened blue sucker (*Cycleptus elongatus*) may occur within Uvalde County. In addition, the Edwards Plateau shiner (*Cyprinella lepida*), Nueces roundnose minnow (*Dionda serena*), Nueces River shiner (*Cyprinella* sp. 2), and Guadalupe bass (*Micropterus treculi*), all SOC, may also occur within this segment. TPWD reports that springs along the Sabinal River and its tributaries provide habitat for an undescribed species of salamander that belongs to the *Eurycea troglodytes* complex (TPWD, 2009). (Photo #13 & Exhibit 3).

Photo #10 – Sabinal River

Photo #11 – Sabinal River

Photo #12 – Sabinal River

Photo #13 – Sabinal River

I.4.4 San Marcos River

The San Marcos River is formed by several major springs in the City of San Marcos and flows for approximately 80 miles before joining the Guadalupe River southwest of Gonzales. San Marcos Springs is the second largest spring system in Texas and has historically exhibited the greatest dependability and stability of any spring system in the southwestern Unites States (Brune, 1981) (USFWS, 1996). The San Marcos River is rated as the number one recreational river in the state, and the number two scenic river (NPS, 1995). In addition, a segment of the river was previously recommended as a Scenic Waterway (NPS, 1995). This area is heavily used by canoeists, kayakers, and tubers (NPS, 1995).

An estimated 200 springs issue from three large fissures and numerous smaller openings in the bottom of Spring Lake located at the head of the San Marcos River (Brune, 1981). The springs receive local recharge where the Blanco River, Guadalupe River, Sink Creek, Purgatory Creek, York Creek, and Alligator Creek cross the Balcones Fault Zone, but the majority of flow comes from the Edwards Aquifer to the west-southwest (Brune, 1981).

The Upper San Marcos River contains many shallow riffles with gravel and gravel/sand substrate that alternate with deep pools containing silt substrates. Like the Comal River system, the upper San Marcos River has one of the greatest known diversities of aquatic organisms in the southwestern United States (USFWS, 1996). The unique habitats and relatively constant thermal environment provided by these spring systems support many endemic species. It is the only known location of several species, such as the San Marcos salamander (*Eurycea nana*) and Texas wild rice (*Zizania texana*) (USFWS, 1996).

The segment of the San Marcos River recommended for designation as having unique ecological value includes that portion of the river extending from IH 35 up to a point 0.4 miles upstream of Loop 82 in San Marcos, a distance of approximately two miles (part of TCEQ classified stream segment 1814) (Exhibit 4).

The unique ecological value of this segment of the San Marcos River is based upon the following criteria:

- Biological Function - This segment of the San Marcos River contains significant overall habitat value based on the degree of biodiversity, age, and uniqueness observed in the aquatic habitat (USFWS, 1996). (Photo # 14 & Exhibit 4)
- Hydrologic Function - This recommended segment provides valuable hydrologic functions relating to groundwater discharge of the Edwards Aquifer (Brune, 1981). In terms of average annual discharge, San Marcos Springs are the second largest in Texas. (Photo #15 & Exhibit 4)
- Riparian Conservation Area - This recommended segment includes several city and Texas State University parks. (Photo #16 & Exhibit 4)
- High Water Quality/Exceptional or High Aquatic Life Use/High Aesthetic Value - Information provided by the Texas Commission on Environmental Quality, classifies this segment as having exceptional aquatic life use attributes (TCEQ, 2000). An exceptional aquatic life use classification indicates attributes including outstanding natural habitat variability, exceptional or unusual species assemblage, abundant sensitive species, exceptionally high diversity, exceptionally high species richness, and/or balanced trophic structure. (Photo #17 & Exhibit 4)
- Threatened or Endangered Species/Unique Communities - This segment of the San Marcos river is unique due to presence of three species which are listed as both federal and state endangered, the fountain darter (*Etheostoma fonticola*), Texas blind salamander (*Eurycea rathbuni*), and Texas wild rice (*Zizania texana*) (USFWS, 1996). Two additional species are also listed as present within this area, the San Marcos salamander (*Eurycea nana*) which is federal and state listed as threatened, and the American eel (*Anguilla rostrata*) which is considered by TPWD as a SOC (USFWS, 1996). Recently, the Comal Springs riffle beetle (*Heterelmis comalensis*), a species federally listed as endangered and a state SOC, which was once thought to only inhabit Comal Springs, was collected from spring orifices on the banks of Spring Lake at the head of the San Marcos River. (Photo #18 & Exhibit 4)

Photo #14 – San Marcos River

Photo #15 – San Marcos River (Spring Lake)

Photo #16 – San Marcos River (Wildlife Habitat Park)

Photo #17 – San Marcos River

Photo #18 – San Marcos River

I.4.5 Comal River

The Comal River is formed by the largest spring system in Texas, located about one mile northwest of New Braunfels, and flows southeast into the Guadalupe River (Brune, 1981). It is the shortest river in Texas, at only two and one half miles, and the shortest river in the U.S. carrying an equivalent amount of water (Belisle, 1974). In addition to providing municipal water supply, the Comal River supports a regional recreation and tourism industry and provides critical habitat for four federally endangered species.

Spring waters that flow up from the Edwards Aquifer create a thermally constant environment that supports one of the greatest known diversities of organisms of any aquatic ecosystem in the southwestern United States (USFWS, 1996). Because many of the plants and animals within this community depend upon the springs, most of this flora and fauna could disappear if the springs were to fail.

The Comal River, as recommended for designation as having unique ecological value, extends from the confluence with the Guadalupe River upstream to Klingemann Street in New

Braunfels, a distance of approximately three miles (TCEQ classified stream segment 1811) (Exhibit 5).

The unique ecological value of the Comal River is based upon the following criteria:

- Biological Function - The Comal River displays significant overall habitat value in both quantity and quality considering the degree of biodiversity and uniqueness observed in the aquatic habitat (USFWS, 1996). (Photo #19 & Exhibit 5)
- Hydrologic Function - The Comal River provides valuable hydrologic function relating to groundwater discharge of the Edwards Aquifer, as it is the largest spring system in the state (Brune, 1981). (Photo # 20 & Exhibit 5)
- Riparian Conservation Area - Landa Park and Prince Solms Park, popular recreation areas, are adjacent to the Comal River. (Photo # 21 & Exhibit 5)
- High Water Quality/Exceptional or High Aquatic Life Use/High Aesthetic Value - This segment includes the presence of unique habitats dependent on or associated with high water quality (USFWS, 1996). In addition, it is listed by the Texas Commission on Environmental Quality as having high aquatic life use attributes (TCEQ, 2000). High aquatic life use attributes include highly diverse habitat, regionally expected species assemblage, presence of sensitive species, high diversity and species richness, and/or balanced to slightly imbalanced trophic structure. (Photo #22 & Exhibit 5)
- Threatened or Endangered Species/Unique Communities – The Comal River provides habitat for eight species with a federal or state listing as endangered, threatened, or a SOC. The fountain darter (Etheostoma fonticola) and Peck's Cave amphipod (Stygobromus peckii) are both species which are federal and state listed as endangered. Two species, the Comal Springs riffle beetle (Heterelmis comalensis) and Comal Springs dryopid beetle (Stygoparnus comalensis) are federally listed as endangered and considered SOC by the TPWD. Three species, the Comal Springs diving beetle (Comaldessus stygius), Comal Springs salamander (Eurycea sp. 8), and Edwards Aquifer diving beetle (Haideoporus texanus) are considered SOC by TPWD (USFWS, 1996). (Photo #23 & Exhibit 5)

Photo #19 – Comal River (Spring Run #1)

Photo #20 - Comal River (Comal Springs)

Photo #21 – Comal River (Landa Lake)

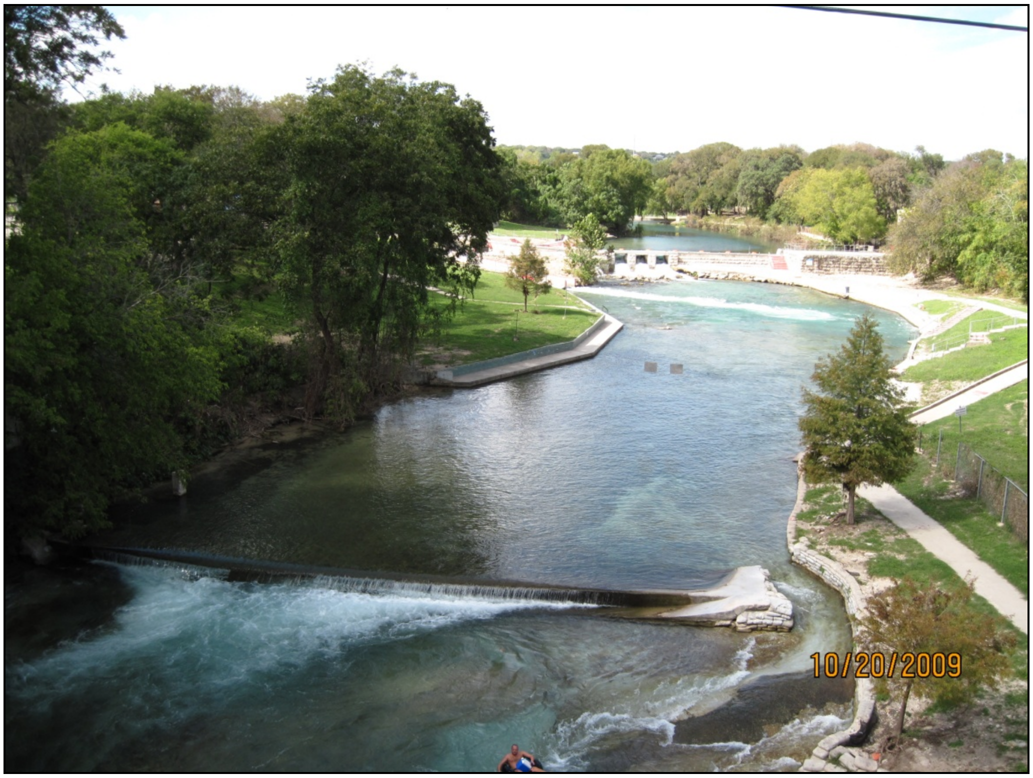

Photo #22 – Comal River

Photo #23 – Comal River (Spring Run #2)

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Exhibits

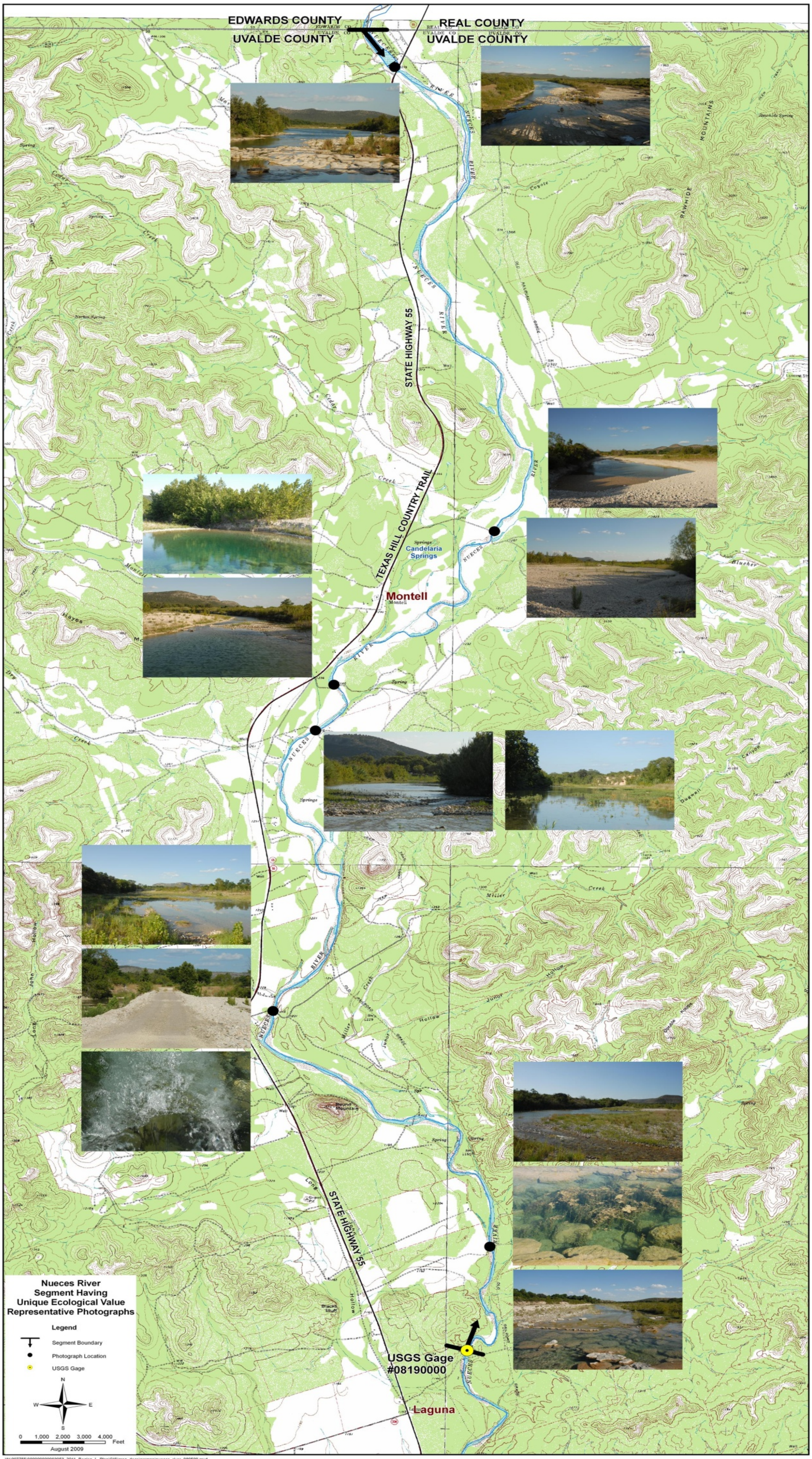
EDWARDS COUNTY
UVALDE COUNTY
REAL COUNTY
UVALDE COUNTY
STATE HIGHWAY 55
TEXAS HILL COUNTRY TRAIL
Candelaria Springs
Montell
STATE HIGHWAY 55
USGS Gage #08190000
Laguna
Nueces River Segment Having Unique Ecological Value Representative Photographs
Legend
Segment Boundary
Photograph Location
USGS Gage
N
W
E
S
0 1,000 2,000 3,000 4,000 Feet
August 2009

Exhibit 1

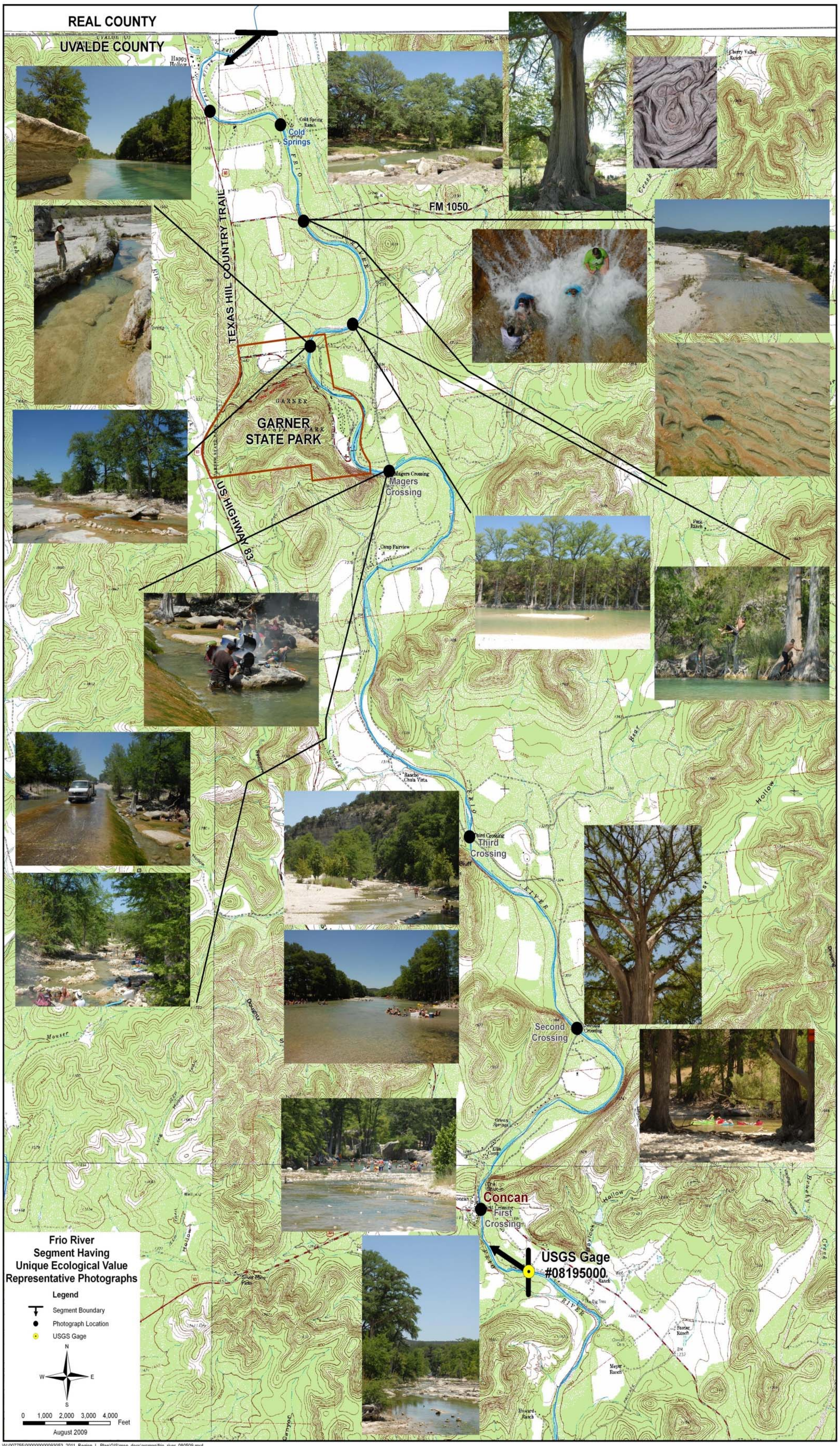
REAL COUNTY
UVALDE COUNTY
Cold Springs
FM 1050
TEXAS HILL COUNTRY TRAIL
GARNER STATE PARK
US HIGHWAY 83
Magers Crossing
Third Crossing
Second Crossing
Concan
First Crossing
USGS Gage #08195000
Frio River Segment Having Unique Ecological Value Representative Photographs
Legend
Segment Boundary
Photograph Location
USGS Gage
0 1,000 2,000 3,000 4,000 Feet
August 2009

Exhibit 2

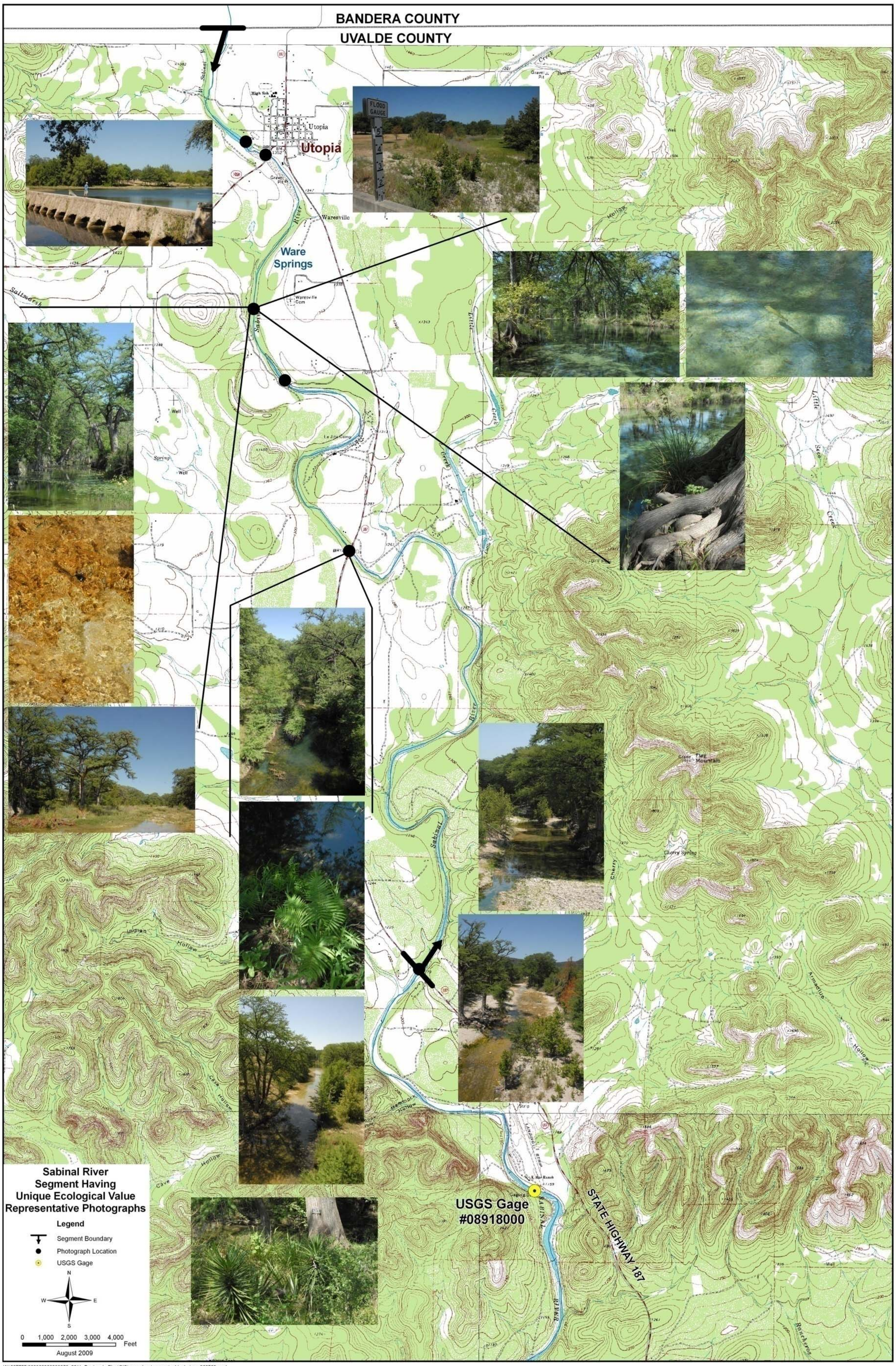
BANDERA COUNTY
UVALDE COUNTY
Utopia
Ware Springs
USGS Gage #08918000
STATE HIGHWAY 187
Sabinal River Segment Having Unique Ecological Value Representative Photographs
Legend
Segment Boundary
Photograph Location
USGS Gage
N
S
E
W
0 1,000 2,000 3,000 4,000 Feet
August 2009

Exhibit 3


San Marcos River
Segment Having
Unique Ecological Value
Representative Photographs
Legend
Segment Boundary
Photograph Location
August 2009
SAN MARCOS
INTERSTATE HIGHWAY 35
LOOP 82
Spring Lake
SOUTHWEST TEXAS STATE COLLEGE
State Fish Hatchery
HAYS CO
CALDWELL CO

Exhibit 4

W:\007755\000000000093053_2011_Region_L_Plan\GIS\map_docs\arcmap\san_marcos_river_080509.mxd

Exhibit 5

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