

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.

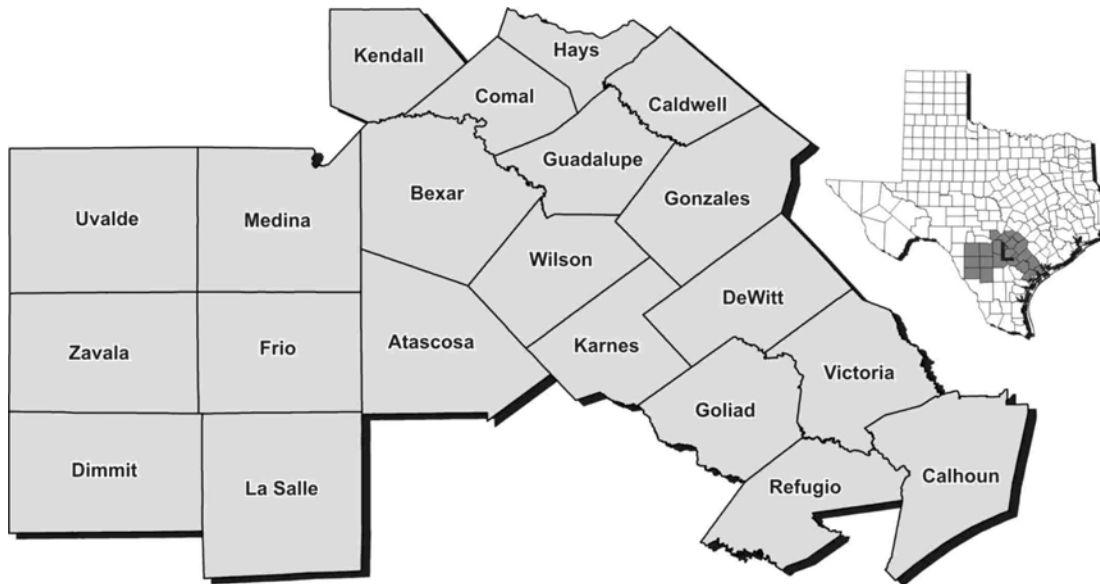


Figure ES-1. South Central Texas Planning Region (Region L)

**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).

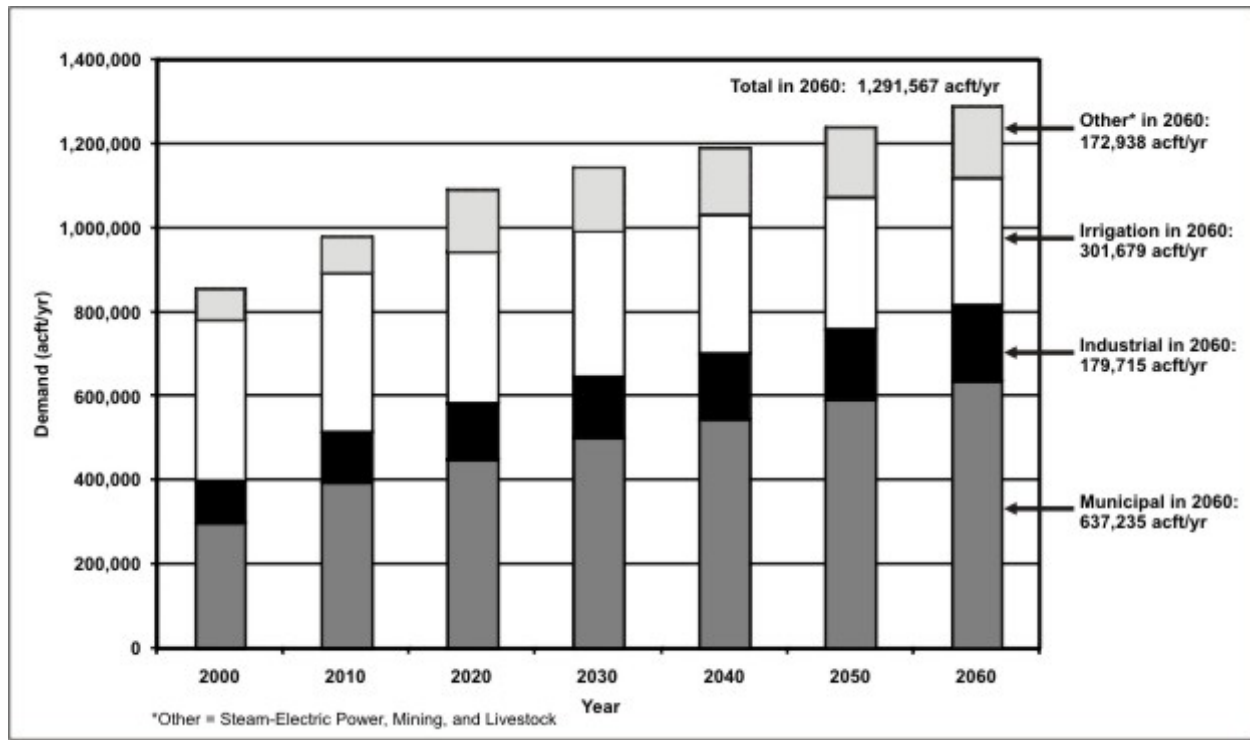


Figure ES-2. Projected Water Demands

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-Wilcox¹, 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.

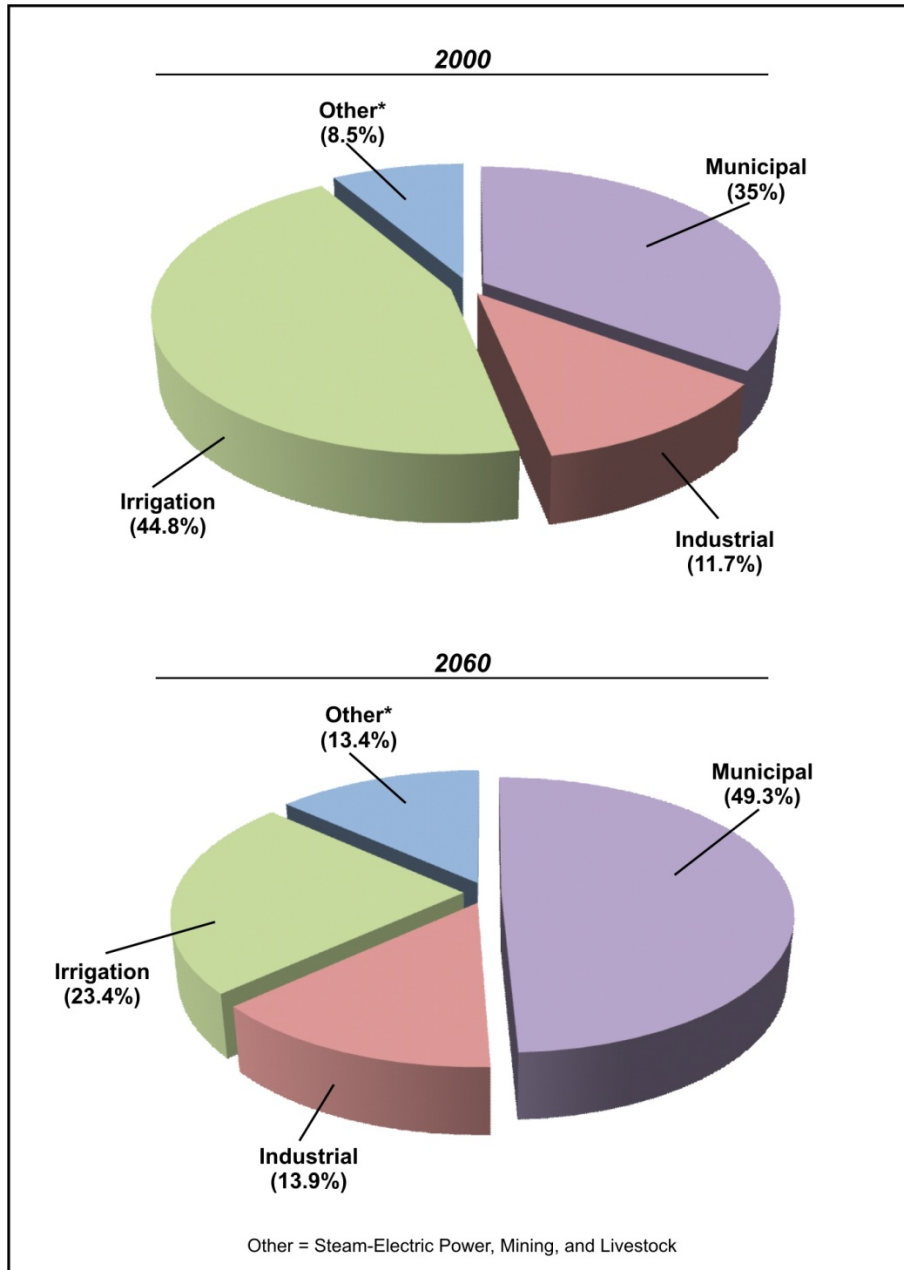


Figure ES-3. Distribution of Total Demand Among Uses

**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 Coletto Creek Power (Coletto 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 174,231 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).

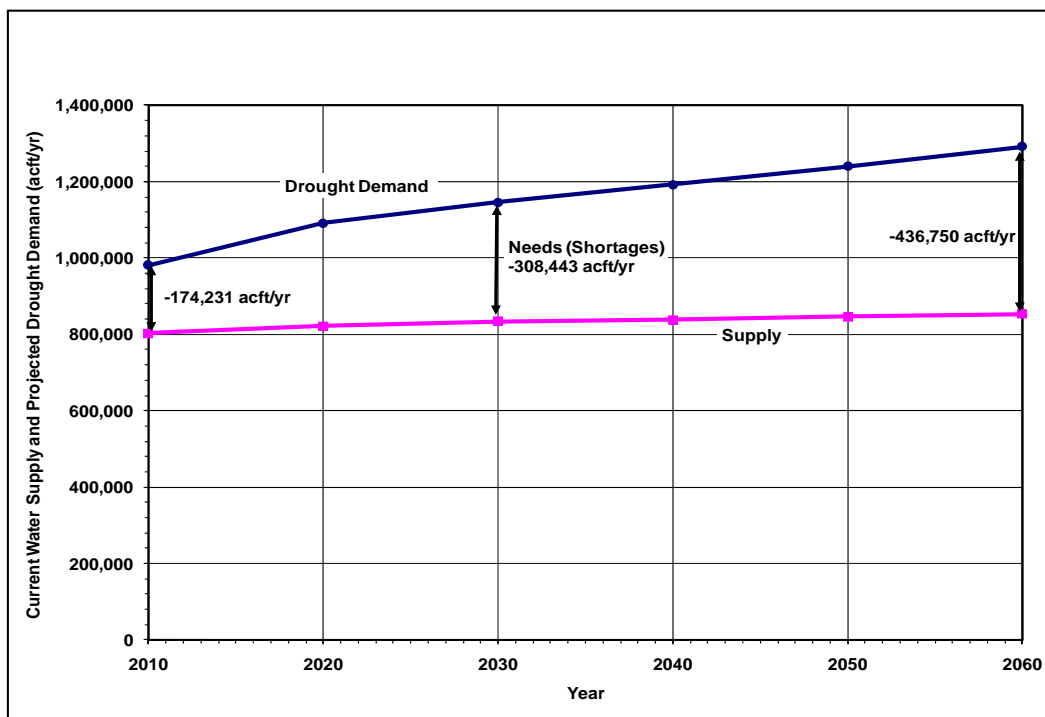


Figure ES-4. Supply, Demand, and Need (Shortage)

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.

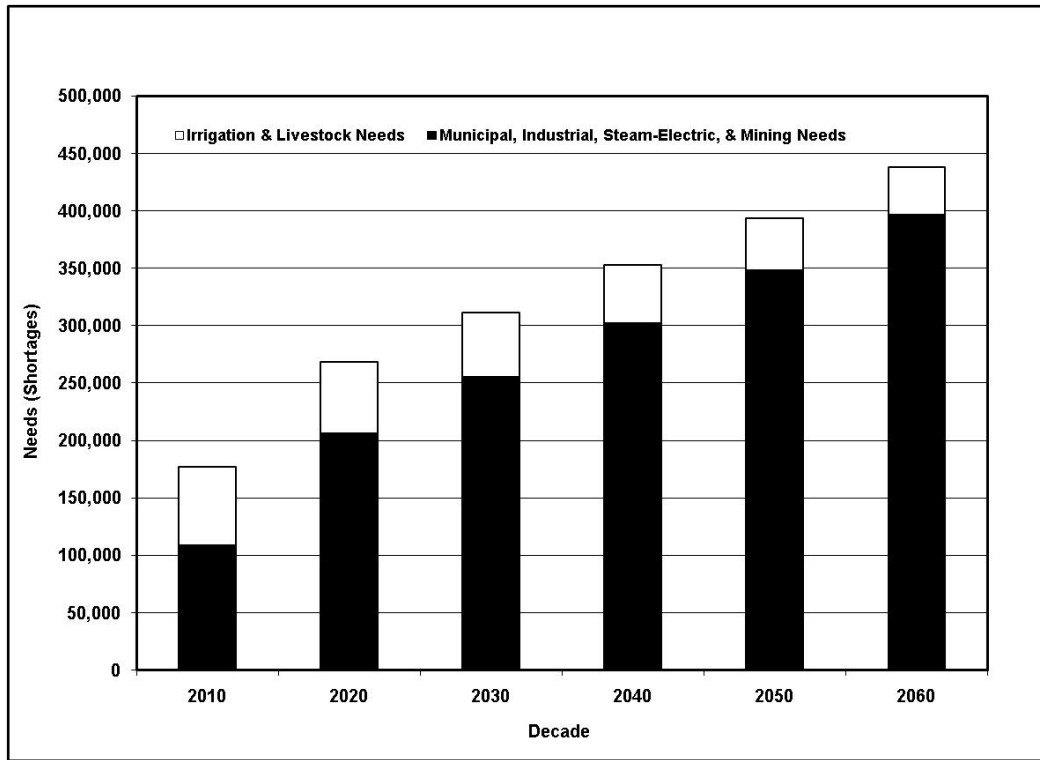


Figure ES-5. Projected Water Needs (Shortages)

ES.6 Social and Economic Impacts of Not Meeting Projected Water Needs²

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.**

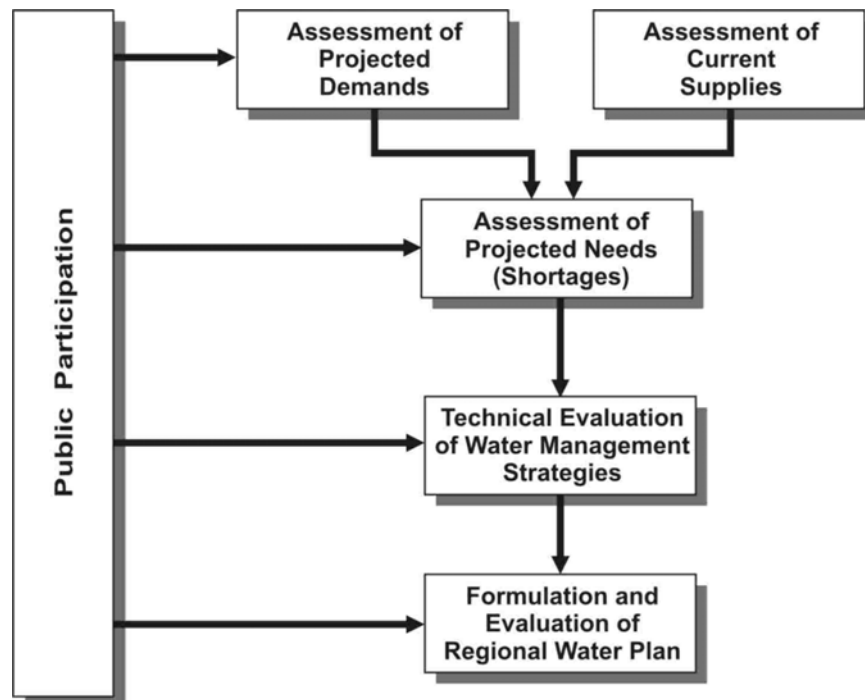


Figure ES-6. Regional Planning Process

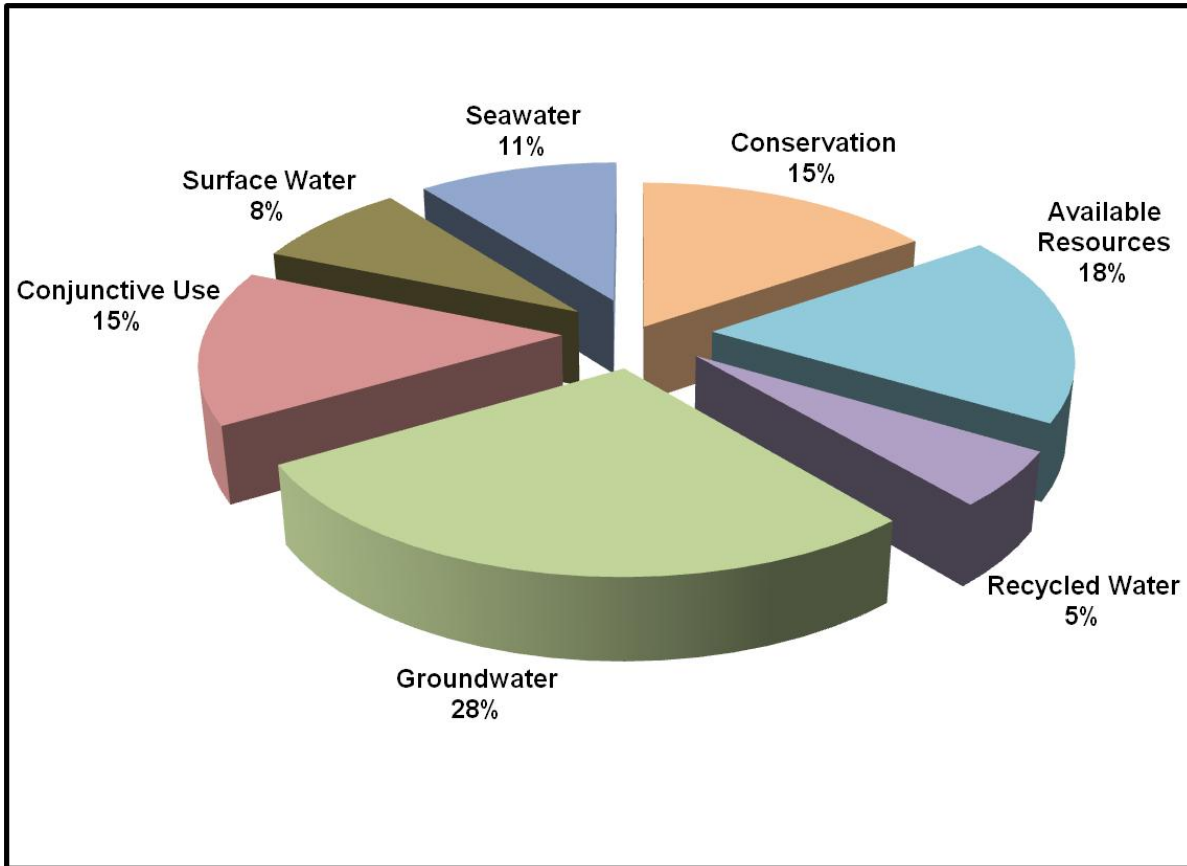


Figure ES-7. Sources of New Supply

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/yr³);
- 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.

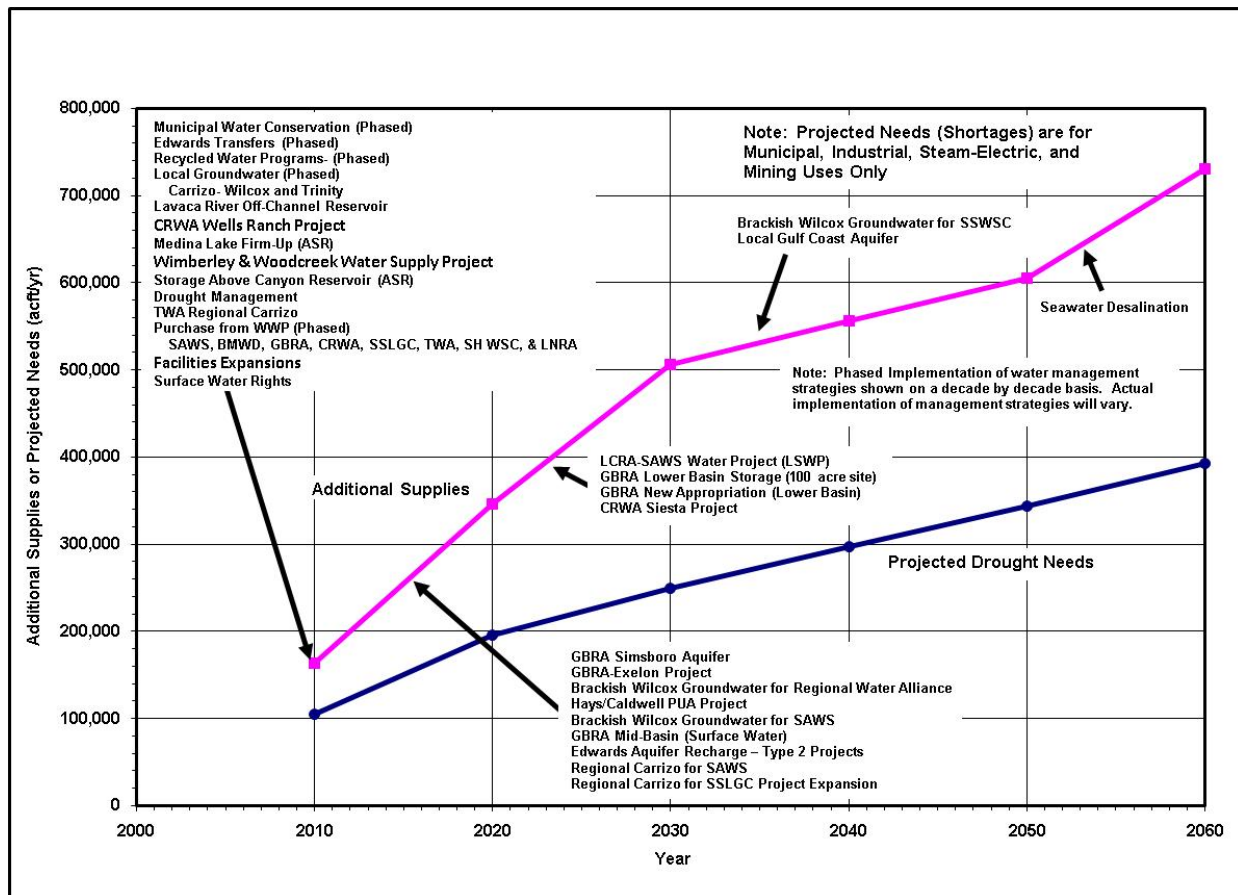


Figure ES-8. Phased Implementation of Water Management Strategies

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 Rights⁴; 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 (Carrizo⁶, 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 “temporary 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 SCTRWP 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		Need (Shortage)		Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS	
	2010 (acft)	2060 (acft)	2010 (acft)	2060 (acft)		2010 (acft)	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		Need (Shortage)		Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS	
	2010	2060	2010	2060		2010	2060
	(acft)	(acft)	(acft)	(acft)		(acft)	(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
					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
					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
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
					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
					Municipal Water Conservation	99	385
Windcrest	1,204	1,182	235	214	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
Martindale	125	158	0	0	Drought Management	53	
					Purchase from WWP (CRWA)	0	0
Martindale WSC	189	329	42	182	Drought Management	6	
					Purchase from WWP (CRWA)	396	896
Maxwell WSC	660	1,733	0	689	Drought Management	9	
					Municipal Water Conservation		55
Mustang Ridge	135	329	19	213	Purchase from WWP (CRWA)	0	2,000
					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		Need (Shortage)		Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS	
	2010 (acft)	2060 (acft)	2010 (acft)	2060 (acft)		2010 (acft)	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		
Garden Ridge	565	1,360	257	1,052	Purchase from WWP (TWA)		12,000
					Municipal Water Conservation	42	460
					Purchase from WWP (SSLGC)	257	1,052
New Braunfels	10,509	26,226	0	13,920	Drought Management	28	
					Municipal Water Conservation	815	8,152
					Purchase from WWP (GBRA)	525	
Rural	2,721	3,998	1,782	2,960	Purchase from WWP (GBRA)		13,920
					Municipal Water Conservation		85
					Purchase from WWP (GBRA)	891	1,480
					Purchase from NBU (term)	891	
Industrial	7,729	11,553	5,199	9,022	Purchase from WWP (TWA)		1,480
Steam-Electric	0	0	0	0	Recycled Water	5,199	9,022
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		Need (Shortage)		Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS	
	2010	2060	2010	2060		2010	2060
	(acft)	(acft)	(acft)	(acft)		(acft)	(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		Need (Shortage)		Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS	
	2010 (acft)	2060 (acft)	2010 (acft)	2060 (acft)		2010 (acft)	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		Need (Shortage)		Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS	
	2010	2060	2010	2060		2010	2060
	(acft)	(acft)	(acft)	(acft)		(acft)	(acft)
Irrigation	69	69	0	0			
Livestock	623	623	0	0			
Uvalde County	Table 2-12		Table 4A-1		Section 4B.2.18		
	407	389	127	109	Municipal Water Conservation	34	145
Sabinal					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
	4,052	53,178	1,791	51,076	Purchase from WWP (GBRA - Exelon)		49,126
Steam-Electric					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
	1,563	5,030	223	3,690	Municipal Water Conservation		221
SS WSC					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		
	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
	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		Need (Shortage)		Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS	
	2010	2060	2010	2060		2010	2060
	(acft)	(acft)	(acft)	(acft)		(acft)	(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
Lavaca-Navidad River Authority			10,046	10,489	Hays/Caldwell PUA Project		10,260
					Municipal Water Conservation ²		
Schertz-Seguin Local Government Corp.	12,704	21,071	0	4,935	Lavaca River Off-Channel Reservoir	26,242	26,242
					Municipal Water Conservation ²		
					Regional Carrizo for SSLGC Project Expansion		10,364
Springs Hill WSC	3,384	5,365	0	0	Brackish Wilcox Groundwater for RWA		2,000
					Municipal Water Conservation ²		
					Purchase from WWP (TWA)		3,000
Texas Water Alliance	0	18,480	0	18,480	Brackish Wilcox Groundwater for RWA		1,500
					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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