



EDWARDS AQUIFER
A U T H O R I T Y

Groundwater Management Plan

2003 - 2013

Revised
November 2003

Table of Contents

1.0 INTRODUCTION..... 1

 1.1 Purpose of the Edwards Aquifer Authority Groundwater Management Plan 1

 1.2 Edwards Aquifer Authority Mission and Function 1

2.0 EDWARDS AQUIFER AUTHORITY AREA 2

 2.1 Planning Area 2

 2.2 Planning Area Description..... 3

 2.2.1 Western Region (Medina, Uvalde and a portion of Atascosa counties) 3

 2.2.2 Central Region (Bexar County..... 3

 2.2.3 Eastern Region (portions of Comal, Hays, Guadalupe and Caldwell counties)..... 3

 2.2.4 Downstream Areas..... 4

 2.3 Edwards Aquifer Recharge 4

3.0 PLANNING AREA POPULATION PROJECTIONS 5

 3.1 Current and Project Population..... 5

4.0 AVAILABLE WATER SUPPLY 6

 4.1 Edwards Aquifer Groundwater Supply..... 6

 4.2 Non-Edwards Aquifer Groundwater and Surface Water Supplies..... 8

 4.3 Total Water Supply Available within the Planning Area..... 10

5.0 CURRENT WATER USE..... 12

 5.1 Categories of Water Use..... 12

 5.2 Summary of Current Water Use..... 13

6.0 WATER DEMAND PROJECTIONS 14

 6.1 Major Water Demand Center..... 16

 6.2 Municipal Water Demand..... 17

 6.3 Domestic Water Demand..... 17

 6.4 Industrial Water Demand..... 18

 6.5 Steam-Electric Water Demand 19

 6.6 Irrigation Water Demand..... 20

 6.7 Mining Water Demand 21

 6.8 Livestock Water Demand 22

 6.9 Total Water Demand Projections 23

7.0 GROUNDWATER MANAGEMENT PLAN 25

 7.1 Groundwater Management Plan Summary 26

 7.2 Groundwater Management Plan Activity Summary..... 29

 7.3 Groundwater Management Plan Description 31



8.0 CONCURRENT PLANNING.....49

Table of Contents (continued)

8.1 Comprehensive Water Management Plan.....49
8.2 State and Regional Water Supply Plans..... 51
8.3 30-Year Water Supply Plan..... 56
8.4 Habitat Conservation Plan..... 57

9.0 REVISIONS TO THE AUTHORITY GROUNDWATER MANAGEMENT PLAN 58



List of Exhibits

Exhibit 2.1 Average Historical Recharge to the Edwards Aquifer 4

Exhibit 2.2 Estimated Annual Enhanced Recharge from the Authority’s Edwards Aquifer Recharge Projects 5

Exhibit 3.1 Edwards Aquifer Authority Planning Area 1990 and 2000 Populations..... 6

Exhibit 4.1 Currently Available Edwards Aquifer Groundwater Supplies 8

Exhibit 4.2 Currently Available Non-Edwards Aquifer Groundwater Supplies 9

Exhibit 4.3 Currently Available Water Supply within the Eight counties of the Planning Area..... 11

Exhibit 4.4 Currently Available Water Supply by Source..... 11

Exhibit 5.1 10-Year Median Annual Groundwater Discharge Distribution within the Edwards Aquifer Authority Jurisdictional Area..... 14

Exhibit 6.1 Standards for New Plumbing Fixtures 15

Exhibit 6.2 Distribution of Water Demand by Use in the Edwards Aquifer Authority Jurisdictional Area 15

Exhibit 6.3 Cities with Populations Greater than 1,000 persons within the Edwards Aquifer Authority Jurisdictional Area..... 16

Exhibit 6.4 Municipal Water Demand Projections for the Edwards Aquifer Authority Jurisdictional Area 17

Exhibit 6.5 Domestic Water Demand Projections for the Edwards Aquifer Authority Jurisdictional Area 18

Exhibit 6.6 Industrial Water Demand Projections for the Edwards Aquifer Authority Jurisdictional Area 19

Exhibit 6.7 Steam-Electric Water Demand Projections the Edwards Aquifer Authority Jurisdictional Area..... 20

Exhibit 6.8 Mining Water Demand Projections the Edwards Aquifer Authority Jurisdictional Area 21

Exhibit 6.9 Municipal Water Demand Projections the Edwards Aquifer Authority Jurisdictional Area..... 22

Exhibit 6.10 Livestock Water Demand Projections the Edwards Aquifer Authority Jurisdictional Area..... 23

Exhibit 6.11 Total Water Demand Projections for the Planning Area..... 23

Exhibit 6.12 Distribution of Total Water Demand by County in the Planning Area 24

Exhibit 6.13 Water Demand and Projections Distribution for the Edwards Aquifer Jurisdictional Area..... 25

Exhibit 7.1 Management Plan Summary 27

Exhibit 7.2 Action Program Summary..... 29

Exhibit 8.1 Relationship of Planning Processes that affect the Edwards Aquifer Authority 51

Exhibit 8.2 Texas Water Development Board Designated Regional Water Planning Areas..... 53

Exhibit 8.3 South Central Texas Regional Water Planning Area (Region L)..... 54



List of Exhibits (continued)

Exhibit 8.4 Voting Membership of Region L 54

Exhibit 9.1 Groundwater Management Plan Revision and Review Timeline 59



1.0 INTRODUCTION

1.1 Purpose of the Edwards Aquifer Authority Groundwater Management Plan

In 1997, the 75th Texas Legislature enacted Senate Bill 1 (herein referred to as the Brown-Lewis Water Plan), providing a major overhaul of many long-standing state water laws and policies. Among its many provisions, the Brown-Lewis Water Plan amends Chapter 36 of the Texas Water Code to require all underground water conservation districts to develop a groundwater management plan within each district's jurisdiction. The initial groundwater management plans were to be submitted to the Texas Water Development Board (TWDB) for review and certification by September 1, 1998. The Authority adopted its initial GMP on August 11, 1998. The TWDB Executive Administrator subsequently certified the Authority's initial GMP as administratively complete on September 17, 1998.

In 2001, the 77th Texas Legislature enacted Senate Bill 2, significantly amending the Brown-Lewis Water Plan. Some of the amendments affecting groundwater management planning include new planning requirements for addressing drought conditions and conservation. Additionally, districts are required to use best available data in developing their GMPs, and are required to submit their GMP to the Chair of any Regional Water Planning Group (RWPG) in which any part of the district is located. The district must request that the RWPG review the GMP and specify any area(s) of conflict with the approved Regional Water Plan.

To comply with the initial five-year revision or readoption provision and the amendments to the Brown-Lewis Water Plan, the Authority's revised GMP, contained herein, includes the new planning requirements.

1.2 Edwards Aquifer Authority Mission and Function

Edwards Aquifer Authority Mission Statement:

The Edwards Aquifer Authority is committed to manage and protect the Edwards Aquifer system to ensure the entire region of a sustainable, adequate, high quality and cost effective supply of water, now and in the future.

The Edwards Aquifer Authority (Authority) began operations on June 28, 1996 as a "conservation and reclamation district" to manage the southern portion of the Edwards Aquifer as specified in the Authority's enabling legislation (the Act). The Act establishes the purposes and responsibilities of the Authority, specifies management functions and goals, and provides guidelines for the operation of the Authority. The Texas Legislature, in enacting the Act, directed the Edwards Authority to:

- protect the water quality of the aquifer;
- protect the water quality of the surface streams to which the aquifer provides streamflow;

- achieve water conservation;
- maximize the beneficial use of water available for withdrawal from the aquifer;
- protect aquatic and wildlife habitat;
- protect species that are designated as threatened or endangered under state or federal law;
- provide for instream uses, bays and estuaries;
- protect domestic and municipal water supplies;
- protect the operation of existing industries;
- protect the economic development of the State;
- prevent the waste of water from the aquifer; and
- increase recharge of water to the aquifer.

In order to meet these objectives, the Act directs that, unless increased by the board of directors based on the results of research, permitted withdrawals from the Edwards Aquifer are to be limited to no more than 450,000 acre-feet per calendar year through the year 2007. Afterwards, permitted withdrawals are to be reduced to 400,000 acre-feet per year unless increased by the board of directors. In addition to these requirements, the Act requires the Authority to develop and implement a “Critical Period Management Plan” to address aquifer usage during times of drought. In addition to its specific powers, the Authority is also granted, among other powers, the rule making and enforcement powers of other Texas groundwater districts created under Chapter 36 of the Texas Water Code. It should be noted that the Authority’s responsibilities only apply to the use and management of the Edwards Aquifer within the Authority’s boundaries. The Authority has no regulatory powers over portions of the Edwards Aquifer outside of its boundaries, other groundwater or any surface water resources.

The Act also gives the Authority responsibilities to conduct research on topics relevant to regional water resources management. This includes the ability to conduct or contract for research on topics such as the development of additional water supplies, water quality, water resources management and augmentation of aquifer springflow.

2.0 EDWARDS AQUIFER AUTHORITY AREA

2.1 Planning Area

The Authority’s jurisdiction is limited to the Edwards Aquifer within an area that includes all of Bexar, Medina, Uvalde and parts of Atascosa, Comal, Caldwell, Hays and Guadalupe counties. Although, the Authority’s regulatory jurisdiction is contained within these counties, the use and management of the Edwards Aquifer affect a much larger area. In addition to being the primary water source for 1.7 million users within the Authority’s boundaries, the Edwards Aquifer also supplies a significant portion of the flow in the Guadalupe River Basin downstream of Comal and San Marcos Springs. Consequently, the area of interest for water resources planning purposes includes the drainage area of the Edwards Aquifer and downstream areas in the Nueces, San Antonio and Guadalupe River Basins. This planning area encompasses all of the counties and cities represented on the South Central Texas Water Advisory Committee (SCTWAC).

2.2 Planning Area Description

The Edwards Aquifer is the primary water supply source for 1.7 million people that live within the Authority's boundaries. In terms of the socioeconomic characteristics of the planning area, the region can be divided into three sub-regions, each of which relies directly on the aquifer to support different economies and interests. The delineations of these sub-regions are neither exact nor static. For example, urbanization is spreading from metropolitan San Antonio into surrounding areas blurring the line distinctions between the economies of the regions.

2.2.1 Western Sub-region

Within the **Western Sub-Region** (Medina, Uvalde and a portion of Atascosa County), Medina and Uvalde counties together had approximately 51,000 residents in 1990, or about four percent of the population within the Authority's jurisdictional boundary. The economies of these counties are driven largely by farming, ranching, and related agricultural activities, of which irrigated farming is a significant component. From the years 1994 to 1997, Medina and Uvalde counties generated an average annual income of approximately \$68 million from crops alone. Of this value, roughly 90 percent was derived from crops that were grown in irrigated fields. Total irrigated acreage is estimated to be 41,600 and 49,800 acres (1994 statistics) for Medina and Uvalde counties respectively. Major crops include cotton, corn, milo, wheat, and vegetables.

2.2.2 San Antonio Sub-Region

The **San Antonio Sub-Region**, herein defined as Bexar County, encompasses the majority of the San Antonio metropolitan area. In 1990, the population of Bexar County was 1.18 million people, which represented approximately 87 percent of the population within the Authority's boundaries at that time. The economy in the San Antonio region is diverse, and is supported by strong trade and service sectors, tourism and the presence of large military bases. Other significant components of the San Antonio economy include medical research, biotechnology and higher education. In 1994, total sales from San Antonio's major industries were estimated at over \$29 billion. Total non-farm employment in the area was estimated at 644,100 in 1996, up nearly 15% from 1992. The presence of five local military bases serves as an anchor to the region and contributes roughly \$4 billion to the local economy. This will change somewhat given the upcoming closure and/or conversion of some bases. Because of its high degree of urbanization, water use in the San Antonio metropolitan area is predominantly municipal and industrial.

In addition to the urban economy of San Antonio, the western portion of Bexar County, relies on agricultural activity. From 1994 to 1997, approximately \$48 million was generated by revenue from crops. In 1994, the TWDB estimated that there are approximately 15,700 acres of irrigated cropland in Bexar County.

2.2.3 Eastern Sub-Region

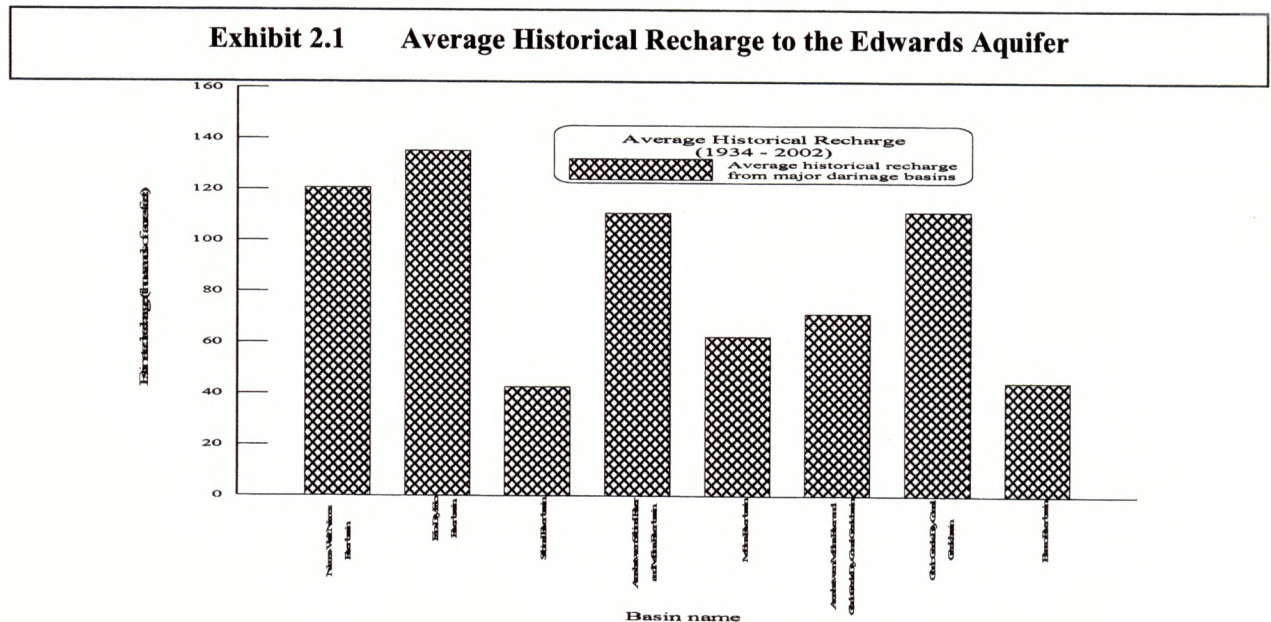
The **Eastern Sub-Region**, consists of the portions of Comal, Hays, Guadalupe, and Caldwell counties that fall within Authority’s jurisdictional boundaries. In 1990 the population of this sub-region was approximately 126,000, which represents approximately nine percent of the population within the Edwards Aquifer Authority’s boundaries. Unique to the eastern region is the significance of Comal and San Marcos springs to the local economy. Specifically, the springs are important attractions in the area’s water-oriented tourism industry. In addition to their economic value, Comal and San Marcos springs are also the exclusive home to several endangered and threatened plant and animal species, and provide an important source of freshwater for downstream users of the Guadalupe River, as well as freshwater inflows to coastal bays and estuaries.

2.2.4 Downstream Area

The **Downstream Area** refers to the cities and counties with SCTWAC representatives. Each of these communities shares a common bond with the Edwards Aquifer in that they are dependent to some degree on surface water flows into or out from the Edwards Aquifer. Surface water uses by these communities vary widely and include municipal, industrial, irrigation, and recreation. Instream flows and freshwater inflows to coastal bays and estuaries, some of which is derived from Edwards Aquifer springflows, is also an important environmental water use in the areas downstream of the Edwards Aquifer.

2.3 Edwards Aquifer Recharge

The United States Geological Survey (USGS) has been calculating groundwater recharge to the Edwards Aquifer since 1934. Exhibit 2.1 shows the average annual recharge for each drainage basin. 3



The USGS estimates of annual recharge for the period of record (1934-2002) ranges from a low of only 43,700 acre-feet at the height of the drought of record in 1956 to 2,486,000 acre-feet in 1992. Average annual recharge for the entire period of record is 698,900 acre-feet. However, since 1993, the annual recharge has averaged approximately 794,100 acre-feet.

Recharge directly affects water levels in the aquifer. Water levels rise during years of higher-than-normal recharge, and generally decline during periods of lower-than-normal recharge. Since recharge is a direct result of precipitation, water levels in the aquifer are greatly affected by rainfall. Due to the high transmissivity in the aquifer, water levels rise rapidly in response to rainfall events.

The Authority currently operates four recharge dams on the Edwards Aquifer Recharge Zone (see Exhibit 2.2). The Parker structure was built in 1974, Verde in 1978, San Geronimo in 1979, and Seco in 1982. These four projects have recharged approximately 103,000 acre-feet through 2002. The estimated average, annual recharge for each structure ranges from 622 acre-feet per year to 3,377 acre-feet per year.

Exhibit 2.2 Estimated Annual Enhanced Recharge from the Authority's Edwards Aquifer Recharge Projects Through 2002 (acre-feet)

Year	Parker	Verde	San Geronimo	Seco	Total - All
Total (# yrs)	(29) 16,229	(25) 19,589	(24) 15,143	(21) 52,065	103,026
Average(# yrs)	(29) 622	(25) 844	(24) 812	(21) 3,377	4,467
Median(# yrs)	(29) 217	(25) 371	(24) 603	(21) 643	1,028

3.0 PLANNING AREA POPULATION PROJECTIONS

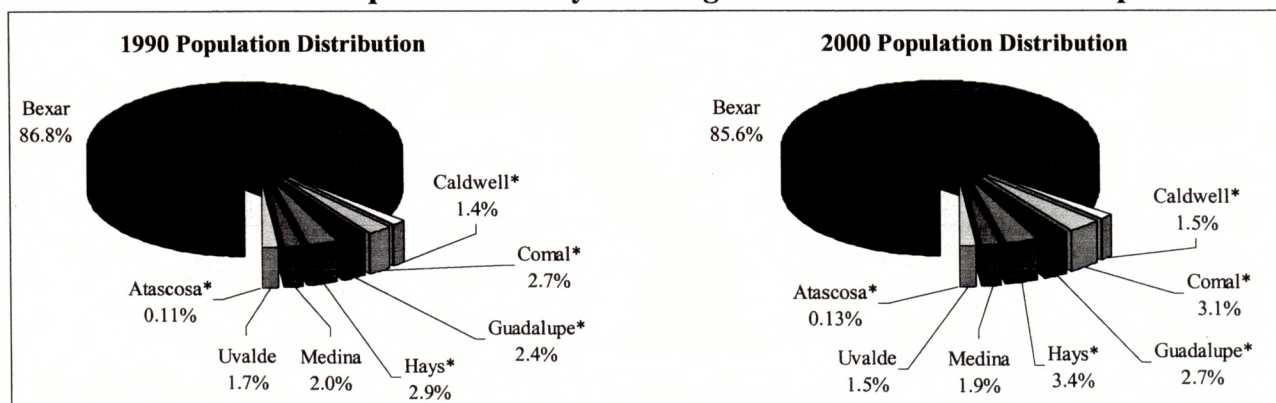
3.1 Current and Projected Population

Two sources of information were used for current population and population projections for the Edwards Aquifer Authority jurisdictional area (planning area). These are the Trans-Texas Water Program's March 1998 "*West Central Study Area Phase II Population, Water Demand, and Water Supply Projections*" report and the November 1998 "*South Central Texas Revisions to Population and Water Demand Projections*" report. Both sets of projections are based on projections developed by the Texas Water Development Board (TWDB) for the 1997 State Water Plan. The earliest set of projections for the planning area was prepared for the Trans-Texas studies. They were used as the basis for the Authority's water supply plan projections. These numbers were used to develop the current population estimations and population projections for the planning area. They were updated to reflect revisions to TWDB projections were made by the South Central Texas Regional Water Planning Group (Region L) and the Authority's Comprehensive Water Management Plan (CWMP) consultant. The Authority's board members approved the population estimations and projections. The Authority is currently using the approved TWDB 2000 population and water demand figures to determine the

population and demand within the Authority’s jurisdiction. These numbers have not been finalized as of the writing of this plan. They will be reviewed and incorporated in the next revision of this plan.

Population within the planning area has grown significantly. This trend is expected to continue well into the next century. The area’s 1990 population was reported to be more than 1.36 million. Year 2000 population is reported to be approximately 1.72 million.

Exhibit 3.1 Edwards Aquifer Authority Planning Area 1990 and Year 2000 Populations



*denotes portion of county within Edwards Aquifer Authority boundaries

The Exhibit above illustrates the vast majority of the planning area’s population is situated in Bexar County. Relative population proportions remained similar for Atascosa, Caldwell, Medina, and Uvalde counties for this 10-year period. Population projections beyond the year 2000 show significant increases in Bexar County, as well as the three surrounding counties. This population increase is expected to continue as the region’s economic development continues to increase.

4.0 AVAILABLE WATER SUPPLY

This section provides estimates of the amount of water supply available for use within the planning area. As with population and water demand projections, these estimates are derived from the Region L regional water supply plan, which were developed in accordance with TWDB rules for regional water planning. Specifically, the Regional Water Planning Groups (RWPGs) were required to prepare estimates of the amount of water available within each region under drought-of-record hydrologic conditions and with no new water source development.

4.1 Edwards Aquifer Groundwater Supply

For the development of the Region L regional water plan, the amount of water supply considered to be available from the Edwards Aquifer was set at 340,000 acre-feet per year. The following excerpt is from Region L’s regional water plan:

“Pursuant to 31 TAC Section 357.7(a)(3), the South Central Regional Water Planning Group (SCTRWPG) has evaluated the amount of water available under current conditions. At the present time, SCTRWPG is unable to define the amount of water available from the Edwards Aquifer for use during each year of a drought of record. SCTRWPG estimates the amount of water available under current conditions is approximately 340,000 acre-feet per year. This estimate is a “placeholder” used by SCTRWPG for the Senate Bill 1 planning process. SCTRWPG acknowledges that a continuous annual pumpage of 340,000 acre-feet per year during a drought of record, without implementation of other alternative management practices would result in Comal Springs going dry for a substantial period of time, and San Marcos Springs dropping below the currently published thresholds for both “take” and “jeopardy”, if not also going dry. However, pursuant to Section 1.14(h) of S.B. No. 1477, the Authority will be required to implement and enforce throughout the drought, water management practices, procedures, and methods to ensure “continuous minimum springflows of the Comal Springs and the San Marcos Springs are maintained to protect endangered and threatened species to the extent required by federal law.” The Authority is responsible for achieving protection for minimum springflows through pumpage reductions or other alternative management practices. The Authority’s Comprehensive Management Plan and the SCTRWPG Regional Plan should include whatever measures necessary to ensure the required level of protection to the endangered species at San Marcos Springs and Comal Springs will be maintained during a drought of record. The amounts and timing of the reductions that might be required during drought of record have not yet been defined. SCTRWPG recognizes the U.S. Fish and Wildlife Service may initiate enforcement proceedings if springflow at Comal Springs or San Marcos Springs falls below the current published threshold for “take” at either spring, unless USFWS approves a Habitat Conservation Plan and issues an incidental take permit.”

Exhibit 4.1 shows the estimated Edwards Aquifer groundwater supply available to each county or portion of a county within the planning area based on the “placeholder” estimate of 340,000 acre-feet per year that was adopted for Region L. Please note the projections have been made the technical consultant for Region L; therefore; they do not portray actual reductions or withdrawals that may be in place as a result of implementation of the Authority’s Demand Management/Critical Period Management rules.

Exhibit 4.1 - Currently Available Edwards Aquifer Groundwater Supplies

County	Available Water Supply (ac-ft/yr)			
	2000	2010	2020	2030
Atascosa*	2,543	2,543	2,543	2,543
Bexar	184,479	184,479	184,479	184,479
Caldwell*	161	161	161	161
Comal*	7,023	7,023	7,023	7,023
Guadalupe*	1,966	1,966	1,966	1,966
Hays*	5,748	5,748	5,748	5,748
Medina	59,357	59,357	59,357	59,357
Uvalde	78,694	78,694	78,694	78,694
Total Edwards Aquifer Water Supply	339,971	339,971	339,971	339,971

* denotes portion of county within Edwards Aquifer Authority boundaries

Source: SCTRWPG November 22, 1999 draft report: South Central Texas Region Water Management Plan Task 3-Water Supplies and Task 4-Needs Analysis (& Dec. 1999 updated tables)

4.2 Non-Edwards Aquifer Groundwater and Surface Water Supplies

Exhibit 4.2 provides estimates, by county, for all non-Edwards Aquifer groundwater, surface water, and reclaimed water supplies that are available within the planning area.

Exhibit 4.2 - Currently Available Non-Edwards Aquifer Water Supplies

County	Available Water Supply (ac-ft/yr)			
	2000	2010	2020	2030
Atascosa*	118	118	115	0
Bexar	110,612	110,612	110,612	103,214
Caldwell*	5,701	5,616	5,541	5,467
Comal*	10,732	10,732	10,732	10,732
Guadalupe*	35,394	35,394	35,394	33,718
Hays*	11,180	16,032	16,032	16,032
Medina	9,741	9,741	9,741	5,392
Uvalde	10,938	10,938	10,938	8,104
Total Non-Edwards Water Supply	194,416	199,183	199,105	182,659

* denotes portion of county within Edwards Aquifer Authority boundaries; non-Edwards Aquifer Supplies for these partial counties were estimated by applying the same percentage to the entire county non-Edwards supply that exists for water demand (WD) projections (EAA WD/SCT WD)

Source: SCTRWPG November 22, 1999 draft report: South Central Texas Region Water Management Plan Task 3-Water Supplies and Task 4-Needs Analysis (& Dec. 1999 updated tables)

In addition to the Edwards Aquifer, other groundwater resources are available in limited amounts throughout the planning area. This includes groundwater supplied from the Carrizo-Wilcox, Trinity, and Edwards-Trinity (Plateau) aquifers. Most of the non-Edwards Aquifer groundwater used within the planning area are from the Carrizo-Wilcox Aquifer. There are no minor aquifers located within the planning area's boundary. However, two minor aquifers – the Queen City and Sparta aquifers - supply water to portions of Atascosa and Caldwell counties that are outside the Authority's boundaries.

Five categories of surface water supply were considered in the development of estimates of surface water supplies that are currently available within the planning area. These categories are shown below:

- Reservoirs with a firm yield (i.e., the amount of water that can be withdrawn on an annual basis during a repeat of the drought-of-record);
- Storage reservoirs for steam-electric power cooling;
- Storage reservoirs for water supply management and recreation;
- Reclaimed water operations; and,
- Run-of-river water rights.

It should be noted that Medina Lake, located in the northeast corner of Medina County and owned by Bexar-Medina-Atascosa Counties WCID #1, has a permit of 66,750 acre-feet per year for irrigation, municipal, domestic, and livestock purposes. This reservoir and areas downstream on the Medina River are a major source of recharge to the Edwards Aquifer. During a repetition of drought of record conditions, the reservoir is expected to be empty. As there is no firm yield associated with Medina Lake, it was excluded from estimates of currently available water supply developed for the Region L regional water supply plan and reported herein.

Reclaimed water is a relatively new source of dependable water supply that is currently being developed for use within the planning area. At present, both the San Antonio Water System (SAWS) and the City of San Marcos are developing large-scale water reclamation and reuse projects. The SAWS reclaimed water project is operational and, when fully implemented, it will provide an estimated 35,000 acre-feet per year of additional water supply. Of the 35,000 acre-feet, about 24,941 acre-feet per year (71 percent) of this water supply will be used for consumptive purposes (e.g., golf course irrigation). This supply is included in estimates of water that is available during drought conditions. The remainder of SAWS' reclaimed water will be discharged directly into Salado Creek and the San Antonio River for maintenance of instream flows.

The City of San Marcos has an application pending before the Texas Commission on Environmental Quality (TCEQ) for a permit to reclaim water originating from the Edwards Aquifer. The City's reclaimed water program is expected to provide a firm water supply by the year 2010.

4.3 Total Water Supply Available within the Planning Area

Combining water supply data presented in Sections 4.1 and 4.2, total dependable water supply currently available for use within the planning area is estimated to be 534,387 acre-feet per year. The Edwards Aquifer provides approximately 64 percent of the total water supply available within the planning area, with 36 percent provided from non-Edwards Aquifer sources.

Because groundwater availability data is reported on a countywide basis, it is difficult to accurately estimate the amount of groundwater use from non-Edwards Aquifer sources within the planning area. The Authority's jurisdiction includes all of Uvalde, Medina, and Bexar counties, plus portions of Atascosa, Caldwell, Guadalupe, Comal, and Hays counties. Estimates of currently available water supply within the boundaries of all eight counties are provided in Exhibit 4.3. From all sources, the entire eight-county area has a current estimated firm annual water supply of 617,916 acre-feet.

Exhibit 4.3 - Currently Available Water Supply within the Eight Counties of the Planning Area

Water Source ^{1,2}	2000	% Supply	2010	2020	2030
Edwards Aquifer	339,971	55%	339,971	339,971	339,971
Surface Water	117,796	19%	120,260	120,260	120,260
Run of River	24,378	4%	24,378	24,378	24,378
Canyon Lake (GBRA)	46,199	7%	48,663	48,663	48,663
Calaveras Lake	36,911	6%	36,911	36,911	36,911
Victor Braunig Lake	10,308	2%	10,308	10,308	10,308
Reclaimed Water	24,941	4%	28,877	28,877	28,877
Other Groundwater	135,208	22%	135,062	134,930	97,866
Carrizo-Wilcox Aquifer	100,634	16%	100,493	100,364	63,295
Trinity	5,628	1%	5,628	5,629	5,628
ET Plateau	3,185	1%	3,185	3,185	3,185
Local	9,297	2%	9,297	9,297	9,297
Queen City Aquifer	4,063	1%	4,059	4,055	4,061
Sparta Aquifer	12,400	2%	12,400	12,400	12,401
Total 8 County Water Supply	617,916	100%	624,170	624,038	586,974

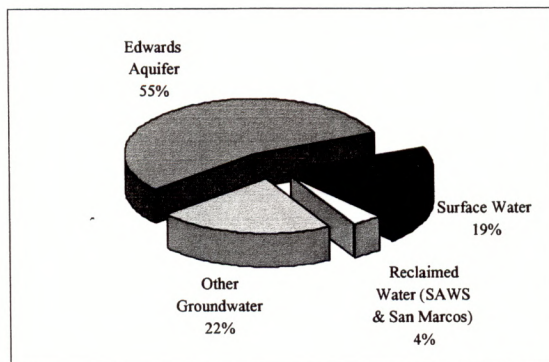
Source: SCTRWPG November 22, 1999 draft report: South Central Texas Region Water Management Plan Task 3-Water Supplies and Task 4-Needs Analysis (& Dec. 1999 updated tables)

¹ These available water supply estimates are inclusive of each entire county for which the Edwards Aquifer Authority has partial regulatory jurisdiction. The regulatory powers of the Authority are exclusive to the Edwards Aquifer and portions of those counties that utilize EA groundwater.

² The 2 minor aquifers (Queen City & Sparta) are located completely outside of the Authority's planning area boundary and are not utilized as water supplies within this planning area.

Exhibit 4.4 shows the relative magnitude of each major source category of water supply that is currently available within the eight-county area. As indicated, the Edwards Aquifer accounts for 55 percent of the total available water supplies, while other groundwater sources account for 22 percent and surface water accounts for 23 percent of the available water supply. As new supplies are developed in the future, the relative contribution of the Edwards Aquifer will decrease.

Exhibit 4.4 - Currently Available Water Supply by Source



5.0 CURRENT WATER USE

For consistency with the Region L's regional water supply plan, current water use estimates for the Edwards Aquifer Authority jurisdictional area (planning area) were based on the same data sources. The data sources are the 1998 Trans-Texas Water Program West-Central Study Area report titled *Population, Water Demand, and Water Supply Projections, West Central Study Area, Phase II* and the 1998 Region L report entitled *Revisions to Population and Water Demand Projections*. This information was derived from projections prepared by the Texas Water Development board (TWDB) for the 1997-State Water Plan. For estimates of current water use, 1990 is used as the base year. The current use estimations and use projections for the planning area were updated to reflect revisions to TWDB projections that were made by Region L and the Authority's Comprehensive Water Management Plan (CWMP) consultant. The Authority's board approved the current use estimations and projections. In addition to the TWDB water use information, data from the Edwards Aquifer Authority's publication, *Edwards Aquifer Hydrogeologic Report for 1998* were used to show 1998 reported water use by category and the 10-year average water use.

5.1 Categories of Water Use

Water use in the planning area can be categorized into six major types with a special category for springflow use. The following are descriptions of the water use categories as defined by the Authority and the Trans-Texas Water Program reports. The descriptions are consistent with the Brown-Lewis Water Plan and TWDB guidelines for reporting requirements.

Municipal Water Use – The water use within or outside of a municipality and its environs whether supplied by a person, privately owned utility, political subdivision, or other entity, including the use of treated effluent for certain purposes specified as follows. The term includes:

- A. the water use for domestic use, the watering of lawns and family gardens, fighting fires, sprinkling streets, flushing sewers and drains, water parks and parkways, and recreation, including public and private swimming pools;
- B. the water use in industrial and commercial enterprises supplied by a municipal distribution system without special construction to meet its demands; and
- C. the application of treated effluent on land under a permit issued under Chapter 26, Water Code, if:
 - (i) the primary purpose of the application is the treatment or necessary disposal of the effluent;
 - (ii) the application site is a park, parkway, golf course, or other landscaped area within the Authority's boundaries; or
 - (iii) the effluent applied to the site is generated within an area for which the commission has adopted a rule that prohibits the discharge of the effluent.

Industrial Water Use - The water use for, or in connection with, commercial or industrial activities, including manufacturing, bottling; brewing; food processing; scientific research and technology; recycling; production of concrete, asphalt, and cement; commercial water use for tourism, entertainment, and hotel or motel lodging; generation of power other than hydroelectric; and other business activities.

Steam-Electric Power Water Use – Includes freshwater used for steam-electric power generation plants for condenser cooling, boiler feed makeup, sanitation, grounds maintenance, and pollution control.

Irrigation Water Use – The water use for irrigation of pastures and commercial crops, including orchards.

Mining Water Use – Includes fresh water used in the recovery of petroleum, sand, gravel, clay, and stone.

Livestock Water Use – Animals, beasts or poultry collected or raised for pleasure, recreation use, or commercial use.

Springflow Use - While not explicitly defined by the TWDB, the Edwards Aquifer has a unique, additional use of supplying springflow for environmental and recreational use.

Domestic or Livestock Use. - water use for:

- A. drinking, washing, or culinary purposes;
- B. irrigation of a family garden or orchard the produce of which is for household consumption only, or

C. watering of animals

Note: The TWDB and the Authority include domestic water use within the municipal category. Domestic use is difficult to measure because water use data is generally unavailable for households using exempt water wells. There are currently no reporting or metering requirements for exempt water wells defined as water wells equipped to produce less than 25,000 gallons per day.

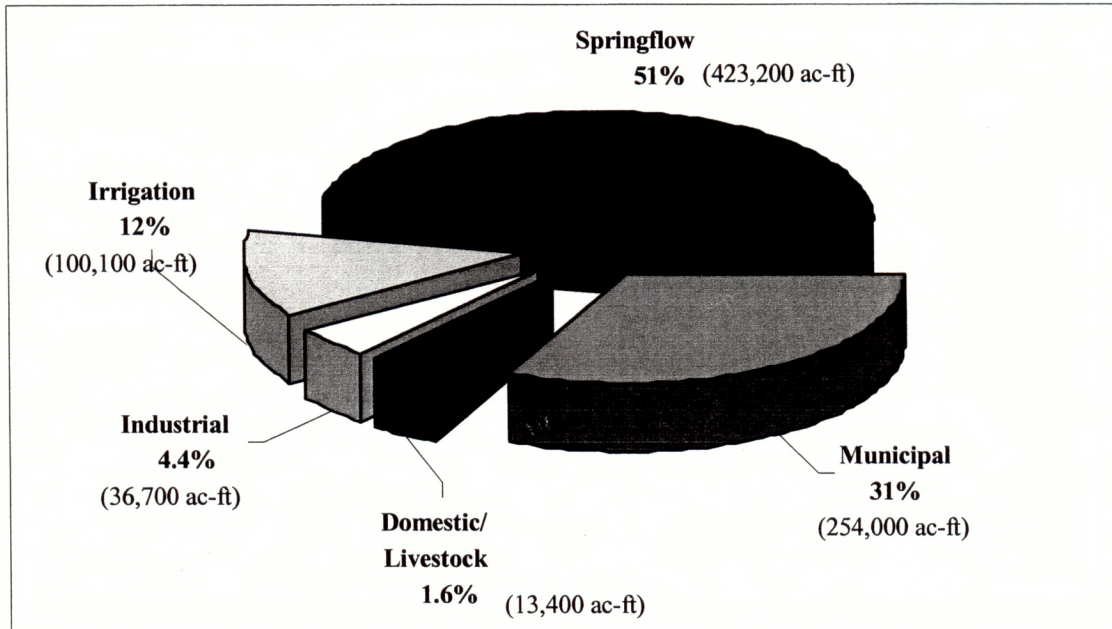
5.2 Summary of Current Water Use

In 1990, 648,185 acre-feet of water was used within the planning area. Approximately 75 percent of this demand was supplied by the Edwards Aquifer. The remaining 25 percent of the 1990 water demand was met by other groundwater and surface water resources.

In interpreting water use data, it is important to note that 1990 and 1996 were dryer than average years. During dry years, irrigation water demand typically increases significantly relative to irrigation demand during a year with “normal” rainfall. In particular, Medina and Uvalde counties, who rely heavily on irrigation to support their agricultural-based economies, water use for 1990 and 1996 was in excess of typical use for a “normal” precipitation year.

In 1990 and 1996 much of the state, including the planning area, experienced lower than normal annual precipitation totals. Because of the fluctuation in annual and seasonal rainfall and the impact on irrigation water use, it is appropriate to look at median water use. Median water use portrays a more accurate representation of water use in the planning area. Improvements in crop irrigation technology and practices have changed irrigation water use patterns over the past several years. According to the Edwards Aquifer Hydrogeologic Report for 2002, the 10-year median discharge (1993-2003) from the aquifer within the planning area was 852,400 ac-ft/year.

Exhibit 5.1: 10-Year Median Annual Edwards Groundwater Discharge Distribution within the Edwards Aquifer Authority Jurisdictional Area (Source: Edwards Aquifer Authority Hydrogeologic Report for 2002)



Note: Eastern Kinney County contains the western-most portion of the “San Antonio hydrologic region” of the Edwards Aquifer, which is outside of the Edwards Aquifer Authority’s jurisdiction. However, the Authority does compile groundwater use data for this area. Data show that the total 2002 water demand for Kinney County is 1900 ac-ft/yr.

6.0 WATER DEMAND PROJECTIONS

Water demand is defined as the total volume of water required to meet the needs of specified user groups located within the Authority's planning area. Water demand projections are based on the TWDB's most likely case of below normal rainfall and an "advanced water conservation" scenario. The "advanced conservation" scenario assumes levels of water savings likely to occur from both market forces and regulatory requirements. It assumes households will use more efficient plumbing fixtures and appliances already on the market, as well as employ more water efficient outdoor irrigation and landscape practices. Advanced conservation also assumes plumbing fixture standards required under the 1991 State Water Efficient Plumbing Act will be in place. This act became effective on January 1, 1992 and allowed for wholesalers and retailers to clear existing inventories of pre-standards plumbing fixtures by January 1, 1993. The standards for new plumbing fixtures as specified by the 1991 State Water Efficient Plumbing Act can be seen in Exhibit 6.1 below.

Exhibit 6.1: Standards for New Plumbing Fixtures

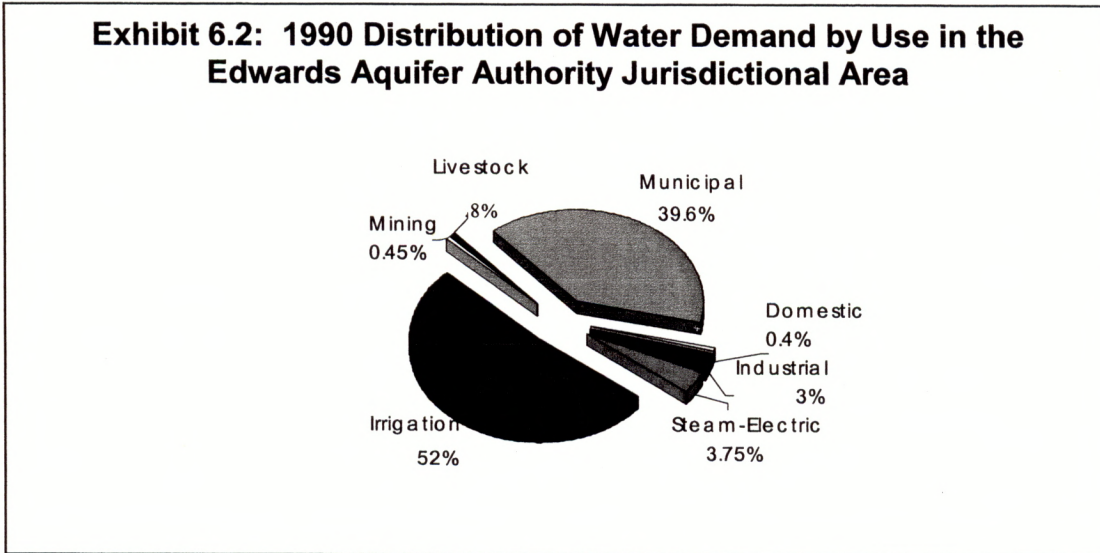
Fixture	Standard
Wall Mounted Flushometer Toilets	2.00 gallons per flush
All Other Toilets	1.60 gallons per flush
Shower Heads	2.75 gallons per minute at 80 psi
Urinals	1.00 gallon per flush
Faucet Aerators	2.20 gallons per minute at 80 psi
Drinking Water Fountains	Shall be self-closing

TWDB has estimated the effect of new plumbing fixtures in dwellings, offices, and public places will result in a reduction in per capita water use of 18 gallons per person per day in comparison to what would have occurred with previous generations of plumbing fixtures.

The advanced conservation represents feasible strategies for economically sound water conservation savings. The advanced case has the same criteria as the "expected conservation" scenario with the added assumption that municipal utilities and individuals will engage in these water conservation activities at an accelerated rate. "Advanced conservation" represents the maximum technical potential for water conservation savings. This scenario is required by TWDB for use by any entity/area that shows a projected deficit in water demand/supply during the next 50 years, with the expectations that said entity should be operating in that mode to help decrease the deficit.

For planning purposes, the water demand projections were separated into the following designated uses: municipal, industrial, steam and electric power generation, irrigation, mining,

and livestock. Exhibit 6.2 below shows the 1990 water use distribution percent by these designated user groups. Discounting springflow, irrigation accounted for over half of the total water demand for the planning area in 1990. However, 1990 was a relatively dry year and irrigation use was above normal. Together, with municipal demand, they account for approximately 92 percent of the planning area's water demand. These water demand categories as well as the domestic water demand, a subcategory of municipal, are discussed below.

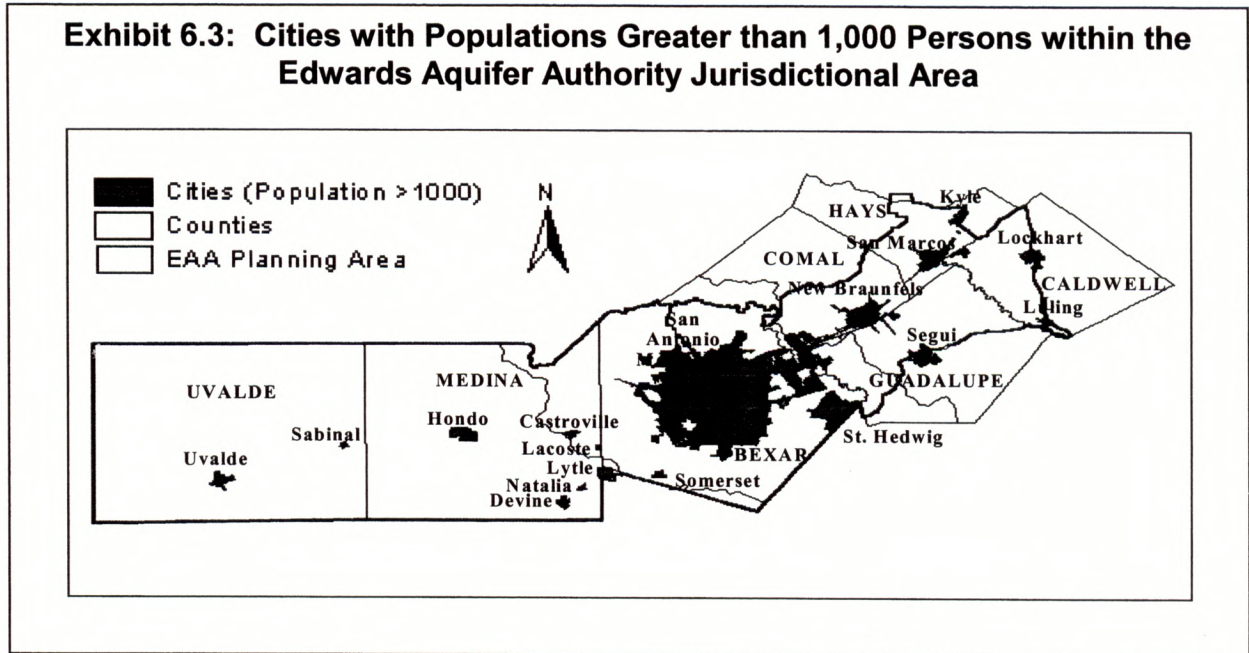


6.1 Major Water Demand Center

The major water demand center in Bexar County is the San Antonio Metroplex. The metroplex is comprised of the City of San Antonio and 20 surrounding suburb communities with populations greater than or equal to 1,000 persons:

Alamo Heights	Garden Ridge	Lackland AFB
Schertz	Balcones Heights	Helotes
Leon Valley	Hill Country Village	St. Hedwig
Castle Hill	Live Oak	Terrell Hills
Cibolo	Hollywood Park	Windcrest
Olmos Park	Converse	Kirby
Shavano Park		

Six of these metropolitan communities, including San Antonio, have populations of 5,000 or more. Within the entire planning area there are 17 cities, including the San Antonio Metroplex, with a population greater than 1,000 (Exhibit 6.3). Municipal use is the primary water use in the planning area and comprised 40.1 percent of the total water use within the planning area in 1990. It comprised 45.6 percent of total water use in 2000.



The Brown-Lewis Water Plan legislation requires the RWPG’s to designate certain water suppliers within the region as “major water providers”. This term is defined by the TWDB as “an entity, which delivers and sells a significant amount of raw or treated water for municipal and/or manufacturing use on a wholesale and/or retail basis.” There are several major water providers who serve the major demand centers within the planning area. These major water providers include San Antonio Water System (SAWS), Bexar Metropolitan Water District (BMWD), Canyon Regional Water Authority (CRWA), the Guadalupe-Blanco River Authority (GBRA), New Braunfels Utilities (NBU), and the City of San Marcos.

6.2 Municipal Water Demand

There has been a steady population increase in the planning area since the 1990 U.S. Census was taken. This trend is projected to continue through the planning period. The municipal water use category, in 1990, comprised approximately 40 percent of the planning area’s total water demand, including the domestic water use sub-category (Exhibit 6.2). It is projected to become the largest use category by the year 2030, comprising 57 percent of the total water demand for the planning area. Municipal water demand in all of the planning area counties is projected to increase. Overall, municipal use demands are projected to double between 1990 and 2030 (Exhibit 6.4). The major demand center for the planning area is the City of San Antonio. It is the largest major city in the United States to rely solely on an aquifer to meet its water supply

needs. Water demand in the City of San Antonio is projected to increase by an additional 146,079 acre-feet per year by the year 2030. This is 1.24 times more than the rest of the planning area combined.

Exhibit 6.4: Municipal Water Demand Projections for the Edwards Aquifer Authority Jurisdictional Area

Edwards Aquifer Area County	Municipal Water Demands and Projections (ac-ft)					Percent Increase** (%)
	1990	2000	2010	2020	2030	
Atascosa*	336	559	600	635	701	108.63
Bexar	225,626	306,064	338,626	381,015	439,753	94.90
Caldwell*	3,700	5,055	5,526	5,960	6,548	76.99
Comal*	7,613	13,501	16,407	20,263	25,676	237.24
Guadalupe*	4,375	8,187	9,038	10,215	12,630	188.69
Hays*	8,037	12,658	15,228	18,031	22,525	180.28
Medina	5,254	7,112	7,312	7,467	7,832	49.07
Uvalde	5,278	6,710	7,074	7,317	8,019	51.93
Edwards Aquifer Area TOTAL	260,219	359,846	399,810	450,903	523,684	101.25

* denotes portion of county within Edwards Aquifer Authority boundaries

**percent increase is calculated from the total projected change in water demand between 1990 and 2030

6.3 Domestic Water Demand

As stated in the Authority's Act: "A well that produces 25,000 gallons of water a day or less for domestic or livestock use is exempt from metering requirements. Exempt wells must register with the authority or within an underground water conservation district in which that well is located." Typically, a domestic well serves a single residence. There is a lack of water use data on these wells due to their exempt status. The TWDB has traditionally accounted for domestic water use within the "county-other" municipal category, which is based on census population data. The municipal water demand data, discussed above in the above section, includes this domestic user group as well. However, for the purposes of this planning document, additional information was collected from the USGS, TWDB, and the Authority, to estimate the current and projected domestic water demand through the year 2030.

As noted previously, anecdotal information suggests that growth is occurring in the rural areas outside the confines of municipalities. Many rural residents depend on water wells that produce less than 25,000 gallons per day. These types of wells are currently exempt from Authority regulation. There are few, if any, records for the amount of water used from these exempt wells. The fact that this water use segment appears to be growing necessitates an accounting of this water use in the final water balance.

Exhibit 6.5: Domestic Population Projections for the Edwards Aquifer Authority Jurisdictional Area

Year	Domestic Population	Domestic Water Demand (ac-ft)	Percent County-Other Population	Percent County-Other Water Demand	Percent Municipal Water Demand	Percent Total Water Demand
1990*	16686	2721	19.35	11.19	1.05	0.42
2000	21755	3955	14.53	9.70	1.10	0.50
2010	23479	4268	13.21	10.29	1.07	0.53
2020	25831	4696	11.86	9.45	1.04	0.55
2030	28516	5184	10.69	8.60	0.99	0.56

*1990 domestic population estimation was extrapolated using the 1993-1995 compound annual growth rate.

All domestic water demand projections make up less than one percent of the total water demand for the planning area, and while this may seem to be an insignificant contribution, it is of concern to the Authority. This use and growing demand is part of the water balance and should be included in the final plan.

6.4 Industrial Water Demand

Industrial water demand accounted for approximately three percent of the total water demand in the planning area for 1990 (Exhibit 6.2). The industrial category includes generation of electric power within manufacturing plants for facilities operation, which occurs primarily in cement plants. The majority of industrial water demand occurs in Bexar and Comal counties, as shown below in Exhibit 6.6. The portions of Atascosa and Caldwell counties that are within the planning area do not have any current or projected industrial water demand. Hays and Bexar counties are projected to have the largest percent increase in industrial water demand by the year 2030, with 92 percent and 77 percent, respectively.

Exhibit 6.6: Industrial Water Demand Projections for the Edwards Aquifer Authority Jurisdictional Area

Edwards Aquifer Area County/Use	Industrial Water Demands and Projections (ac-ft)					Percent Increase** (%)
	1990	2000	2010	2020	2030	
Atascosa*	0	0	0	0	0	0
Bexar	14,049	16,805	19,682	22,359	24,935	77
Caldwell*	0	0	0	0	0	0
Comal*	3,248	3,450	3,487	3,548	3,799	17
Guadalupe*	831	942	1,051	1,124	1,193	44
Hays*	57	93	105	118	129	126
Medina	286	302	319	339	361	26
Uvalde	557	600	643	675	700	26
Edwards Aquifer Area TOTAL	19,028	22,192	25,287	28,163	31,117	64

* denotes portion of county within Edwards Aquifer Authority boundaries

**percent increase is calculated from the total projected change in water demand between 1990 and 2030

5

6.5 Steam-Electric Water Demand

The steam-electric power generation water demand category includes production facilities that supply private and public customers, which will occur in Bexar, Guadalupe, and Hays counties between 1990 and 2030 (Exhibit 6.7). In 1990, steam-electric water demand accounted for 3.75 percent of the total water demand in the planning area (Exhibit 6.2). These existing facilities plus the addition of two new facilities in Guadalupe County and one new facility in Hays County are projected to increase the steam-electric water demand 156 percent by the year 2030. The new steam-electric power plants in Guadalupe County will be located near the towns of Marion (Panda Plant) and Sequin (Constellations Plant). No new electric power generation capacity is projected after 2030.

Exhibit 6.7: Steam-Electric Water Demand Projections for the Edwards Aquifer Authority Jurisdictional Area

Edwards Aquifer Area County/Use	Steam-Electric Water Demands and Projections (ac-ft)					Percent Increase** (%)
	1990	2000	2010	2020	2030	
Atascosa*	0	0	0	0	0	0
Bexar	24,263	36,000	36,000	40,000	45,000	85
Caldwell*	0	0	0	0	0	0
Comal*	0	0	0	0	0	0
Guadalupe*	0	10,760	10,760	10,760	10,760	1076000
Hays*	0	0	6,400	6,400	6,400	640000
Medina	0	0	0	0	0	0
Uvalde	0	0	0	0	0	0
Edwards Aquifer Area TOTAL	24,263	46,760	53,160	57,160	62,160	156

* denotes portion of county within Edwards Aquifer Authority boundaries

** percent increase is calculated from the total projected change in water demand between 1990 and 2030

6.6 Irrigation Water Demand

Large scale agricultural irrigation only occurs in half of the counties in the planning area. However, discounting springflow use, irrigation is the largest use category, accounting for 52 percent or 172,900 acre-feet of the area's total water demand in 1990 (Exhibit 6.2). However, rainfall for 1990, in the planning area, was below normal. The 10-year median irrigation use from 1988-1998 is 100,100 ac-ft. Irrigation water demand is highly dependent on meteorological conditions, which can vary seasonally as well as annually. Periods of low rainfall can impact the Edwards Aquifer in two ways: (1) aquifer recharge is totally dependent on rainfall, and thus the water levels in the aquifer will decrease during dry periods; (2) lack of precipitation requires more water be withdrawn to irrigate crops in the spring, summer, and/or fall, which further decreases the water levels in the Edwards Aquifer. In both 1990 and 1996, most of Texas experienced significantly lower than normal annual rainfall, including the planning area, while 1991 and 1997 were relatively wet years.

Nearly 90 percent of all irrigation demands are located in Medina and Uvalde counties, as shown below in Exhibit 6.8. The Edwards Aquifer, as well as the Nueces and Medina rivers, supply water for irrigation in the planning area. The irrigation category is the only designated water user group that has a projected decrease in water demand by the year 2030 (12 percent). This decrease is due to the projected implementation of more efficient irrigation technologies and methods and/or projected reductions in agricultural activity in the planning area from reduced farm support programs and water transfers.

Irrigation demand was the only demand not met in the Region L's regional water supply plan. Alternatives to provide water for irrigation proved too costly for the benefit rendered.

Exhibit 6.8: Irrigation Water Demand Projections for the Edwards Aquifer Authority Jurisdictional Area

Edwards Aquifer Area County/Use	Irrigation Water Demands Projections (ac-ft)					Percent Increase* (%)
	1990	2000	2010	2020	2030	
Atascosa*	1,464	1,442	1,341	1,287	1,235	-16
Bexar	37,012	40,003	36,879	35,320	33,827	-9
Caldwell*	0	0	0	0	0	0
Comal*	0	0	0	0	0	0
Guadalupe*	0	0	0	0	0	0
Hays*	0	0	0	0	0	0
Medina	157,380	144,413	138,582	132,804	127,270	-10
Uvalde	140,669	135,067	129,883	124,804	119,924	-15
Edwards Aquifer Area TOTAL	336,525	343,135	322,819	309,390	296,523	-12

* denotes portion of county within Edwards Aquifer Authority boundaries

**percent increase is calculated from the total projected change in water demand between 1990 and 2030

6.7 Mining Water Demand

Water use in mining operations comprises the smallest percentage total water demand by user group in the planning area and accounted for only 0.45 percent in 1990 (Exhibit 6.2). However, by the year 2030, mining water demand is projected to increase nearly four-fold and will comprise 1.3 percent of the area's total water demand. Mining activities in the eight county planning area are concentrated in Bexar and Comal counties, with the largest percent increase (84%) in water demand projected to occur in Comal County. Most mining operations in the planning area are quarries, which excavate stone, gravel, sand, and clay used in the local construction industry and elsewhere in the state. Thus, water demand associated with the mining industry is driven largely by regional economic conditions. This trend is shown below in Exhibit 4.8, where the economic slowdown of the 1980's was still suppressing the construction industry in 1990. Projections for mining water demand increase following the economic recovery that

occurred through the 1990's and the relative stabilization projected during the first few decades of this century.

Exhibit 6.9: Mining Water Demand Projections for the Edwards Aquifer Authority Jurisdictional Area

Edwards Aquifer Area County/Use	Mining Water Demands and Projections (ac-ft)					Percent Increase** (%)
	1990	2000	2010	2020	2030	
Atascosa*	0	0	0	0	0	0
Bexar	1,591	4,963	4,936	5,201	5,406	240
Caldwell*	0	0	0	0	0	0
Comal*	851	5,013	4,918	5,065	5,216	513
Guadalupe*	8	196	198	200	202	2425
Hays*	0	96	90	72	56	5600
Medina	120	143	128	128	129	8
Uvalde	399	444	428	499	576	44
Edwards Aquifer Area TOTAL	2,969	10,855	10,698	11,165	11,585	290

* denotes portion of county within Edwards Aquifer Authority boundaries

**percent increase is calculated from the total projected change in water demand between 1990 and 2030

6.8 Livestock Water Demand

Pumping water for livestock purposes is exempted from several requirements under the Act, including metering requirements. Therefore, the following water use data for 1990 is an estimation, based on TWDB methodology that estimates water consumption for each type of livestock and the total number of these animals that are located in the planning area. Livestock production in the planning area includes raising cattle for beef and dairy, goats, horses, and poultry. In 1990, it was estimated that these activities accounted for 0.8 percent of the area's total water demand (Exhibit 6.2), which is projected to decrease slightly by the year 2030. As shown in Exhibit 6.10 below, over half of the livestock water demand occurs in Medina and Bexar counties, which is projected to continue for the next several decades. However, Uvalde County is projected to have the largest percent increase (50%) by the year 2030 and Hays County is projected to experience the only decrease (28%) in livestock water demand during this same time period.

Exhibit 6.10: Livestock Water Demand Projections for the Edwards Aquifer Authority Jurisdictional Area

Edwards Aquifer Area County/Use	Livestock Water Demands and Projections (ac-ft)					Percent Increase** (%)
	1990	2000	2010	2020	2030	
Atascosa*	2	2	2	2	2	0
Bexar	1,376	1,487	1,487	1,487	1,487	8
Caldwell*	406	416	416	416	416	2
Comal*	158	178	178	178	178	13
Guadalupe*	516	566	566	566	566	10
Hays*	169	121	121	121	121	-28
Medina	1,560	1,914	1,914	1,914	1,914	23
Uvalde	994	1,494	1,494	1,494	1,494	50
Edwards Aquifer Area TOTAL	5,181	6,178	6,178	6,178	6,178	19

* denotes portion of county within Edwards Aquifer Authority boundaries

6.9 Total Water Demand Projections

As shown below in Exhibit 6.11, the planning area is projected to have an overall increase of approximately 44 percent in water demand from 1990 to 2030. However, on a county basis, this statistic varies dramatically. Medina and Uvalde counties are projected to have small overall decreases (less than 12%) in water demand while Guadalupe, Comal, and Hays counties are projecting dramatic increases (greater than 190%) by the year 2030. Bexar County accounted for almost 47 percent of the planning area's water demand in 1990, followed by Medina and Uvalde counties with 25 percent and 23 percent of the total water demand respectively. In 2030, these three counties are still projected to have the highest total water demands in the planning area with approximately 59, 16, and 14 percent, respectively.

Exhibit 6.11: Total Water Demand Projections for the Edwards Aquifer Authority Jurisdictional Area

Edwards Aquifer Area County	TOTAL Water Demands and Projections (ac-ft)					Percent Increase** (%)
	1990	2000	2010	2020	2030	
Atascosa*	1,802	2,003	1,943	1,924	1,938	7.55
Bexar	303,917	405,322	437,610	485,382	550,408	81.10
Caldwell*	4,106	5,471	5,942	6,376	6,964	69.62
Comal*	11,870	22,142	24,990	29,054	34,869	193.74
Guadalupe*	5,730	20,651	21,613	22,865	25,351	342.44
Hays*	8,263	12,968	21,944	24,742	29,231	253.78
Medina	164,600	176,094	164,583	158,107	152,131	-7.58
Uvalde	147,897	144,315	139,328	134,509	130,355	-11.86
Edwards Aquifer TOTAL	648,185	788,966	817,952	862,959	931,247	43.67

* denotes portion of county within Edwards Aquifer Authority boundaries

Exhibit 6.12 below shows the total water demand distribution by county for 1990, which clearly demonstrates where the major water demands are located – Bexar, Medina, and Uvalde counties, which together account for approximately 95 percent of the planning area’s total water demand. Bexar County attributes most of its water demand (74%) to municipal uses, while Medina and Uvalde counties attribute approximately 95 percent of their water demands to irrigation uses.

Exhibit 6.12: Distribution of Total Water Demand by County in the Edwards Aquifer Authority Jurisdictional Area

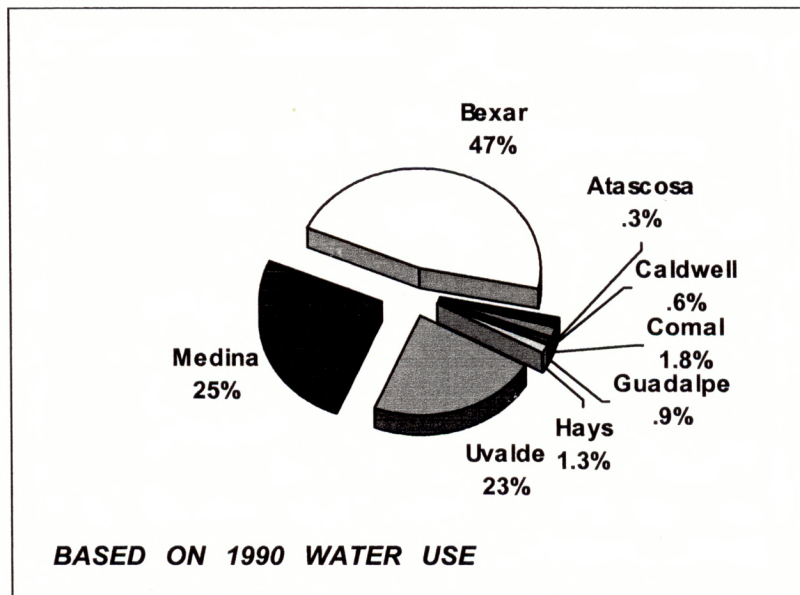
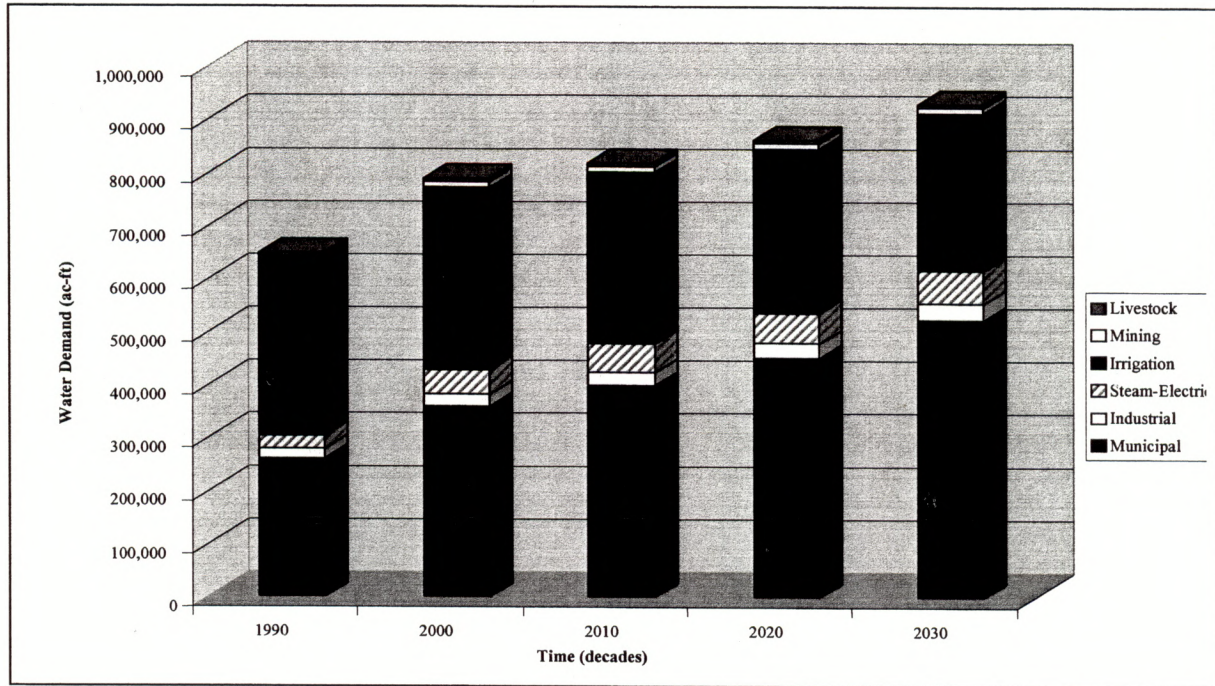


Exhibit 6.13 below shows the contributions of each water use category to the total water demand of the planning area over the 30-year planning period. The first and second highest water uses are projected to switch places from irrigation to municipal demand during the period from 1990 to 2030. The ranking for the other water use categories will remain the same with steam-electric power generation having the third highest use, followed by industrial, mining, and livestock.

Exhibit 6.13: Water Demand and Projections Distribution for the Edwards Aquifer Authority Jurisdictional Area



40 percent of the planning area’s total water demand, including the domestic water use sub-category (Exhibit 6.13 above). It is projected to become the largest use category by the year 2030, comprising 57 percent of the total water demand for the planning area. Municipal water demand in all of the planning area counties is projected to increase. Overall, municipal use demands are projected to double between 1990 and 2030. The major demand center for the planning area is the City of San Antonio. It is the largest major city in the United States to rely solely on an aquifer to meet its water supply needs. Water demand in the City of San Antonio is projected to increase by an additional 146,079 acre-feet per year by the year 2030. This is 1.24 times more than the rest of the planning area combined.

7.0 GROUNDWATER MANAGEMENT PLAN

The Edwards Aquifer Authority's basic management goals are derived from its Strategic Plan. Texas Water Code Section 36.1071 and associated TWDB administrative rules require that the Edwards Aquifer Authority's Groundwater Management Plan address the following management goals, as applicable:

Water Plan Goals

1. Providing the most efficient use of groundwater;
2. Controlling and preventing waste of groundwater;
3. Addressing conjunctive ground and surface water management issues; and
4. Addressing natural resource issues that affect the use and availability of groundwater, and that are affected by the use of groundwater.
5. Addressing drought conditions; and,
6. Addressing conservation.

Goals Not applicable

7. Controlling and preventing subsidence.

Each of the nine goals and functional program areas of the Authority address one or more of the Brown-Lewis Water Plan groundwater management goals, *except that the Edwards Aquifer region is not subject to land subsidence as a consequence of groundwater withdrawals*. In many instances, the Authority's policies and programs in one program area address more than one Brown-Lewis Water Plan groundwater management goal. For example, the Authority's policies regarding regulation of withdrawals from the Edwards Aquifer simultaneously serve to promote water use efficiency, discourage waste and maintain flows at Comal and San Marcos Springs, thereby protecting sensitive natural resources. Similarly, the Authority's water conservation programs, while intended primarily to improve water use efficiency and minimize waste in order to extend available water supplies, will also contribute to the maintenance of springflows and protection of natural resources.

7.1 Groundwater Management Plan Summary

The Authority's Groundwater Management Plan has been designed around the TWDB's template containing six goals identified by the TWDB. However, it is important to remember that the Authority has also developed a Comprehensive Water Management Plan (CWMP) and a Strategic Plan with similar goals. This similarity produces some overlap in the plans. The overlap in the Authority Strategic Plan goals and the TWDB goals is evident in Exhibit 7.1, Groundwater Management Plan Summary. Exhibit 7.1 lists the Authority's management

objectives, actions steps needed to achieve the objectives, performance standards, and the applicable Authority and TWDB goals.

The following Exhibit lists the steps and completion dates for each goal as identified by the Authority.

Exhibit 7.1 Groundwater Management Plan Summary

EDWARDS AQUIFER AUTHORITY MANAGEMENT OBJECTIVES***	EDWARDS AQUIFER AUTHORITY ACTION STEPS	PERFORMANCE MEASURES	TEXAS WATER DEVELOPMENT BOARD GOALS*	EDWARDS AQUIFER AUTHORITY GOALS**
Objective 1: Manage all withdrawals from the Edwards Aquifer	1.1: Issue all initial regular permits	1.1.1: All initial regular permits issued and approved by board by Dec. 31, 2004	1,2,6	1,6
	1.2: Register all points of withdrawal	1.2.1: Register all points of withdrawal from the Edwards Aquifer by Dec. 31, 2007	1,2,4,7	1,4,5
	1.3: Implement groundwater rights transfer program	1.3.1: Conduct annual program review beginning Dec. 31, 2002	1,2,4,7	1
	1.4: Develop a well construction permit program	1.4.1: Establish an effective construction permit program by Dec. 31, 2004, for all new wells, for modifying existing wells, or plugging wells.	1,2	1,4,5,6
	1.5: Develop a demand management/critical period management program	1.5.1: Adopt initial demand management/critical period management rules by Dec. 31, 2002	1,2,6	1,2,3,5,6,7
	1.6: Develop a groundwater conservation program	1.6.1: Adopt Edwards Aquifer Authority groundwater conservation and reuse rules by Jan 31, 2004	1,2,7	1,3,6,7
Objective 2: Monitor and protect the quality of groundwater in the Edwards Aquifer	2.1: Collect baseline water quality and water quantity data	2.1.1: Collect annual water quality data from 76 wells, eight streams, and four springs. Annually collect continuous water level data from 25 wells and collect monthly water level data from 17 wells.	1,2	1,2,4
	2.2: Annually receive and evaluate annual groundwater use information	2.2.1: Publish water data in annual Hydrogeologic Report	1,2	1,2,6
	2.3: Develop aboveground	2.3.1: Establish	2	1,4,5,6

EDWARDS AQUIFER AUTHORITY MANAGEMENT OBJECTIVES***	EDWARDS AQUIFER AUTHORITY ACTION STEPS	PERFORMANCE MEASURES	TEXAS WATER DEVELOPMENT BOARD GOALS*	EDWARDS AQUIFER AUTHORITY GOALS**
Objective 2: Monitor and protect the quality of groundwater in the Edwards Aquifer	storage tank (AST) and underground storage tank (UST) program	AST/UST regulation program by Oct. 30, 2002		
	2.4: Develop recharge zone protection program	2.4.1: Implement board-approved recharge zone protection program by Mar. 31, 2003	1,2	Strategic lists no goals
	3.1: Develop a comprehensive water management plan	3.1.1: Adopt comprehensive water management plan by Mar. 31, 2004	1,2,4,5,6,7	1,2,3,4,5,6,7
Objective 3: Address future water supply needs with the Edwards Aquifer	3.2: Develop recharge enhancement program	3.2.1: Establish a recharge enhancement program by Jan. 31, 2003	1,2,6	1,2,3,7
	3.3: Annually participation in Region L regional water supply planning process	3.3.1: Annual staff participation in the Region L water supply planning process and update the Authority's 30-year water supply plan with each update of the Region L plan	1,4,6	1,2,3,5,6,7
	4.1: Develop a habitat conservation plan	4.1.1: Submit approved habitat conservation plan and to the USFWS by Mar. 31, 2004	1,2,4,5,6	1,2,3,5,6,7
Objective 4: Develop plan to support threatened and endangered species dependent on the Edwards Aquifer	4.2: Annual research on water management strategies	4.2.1: Complete research on water management strategies by Sept. 30, 2006	1,4,6	1,2,3,5,6,7

***Texas Water Develop Board Groundwater Conservation District Management Plan Required Goals**

- 1 – Providing the most efficient use of groundwater
- 2 - Controlling and preventing waste of groundwater
- 3 – Controlling and preventing subsidence (not applicable)
- 4 - Addressing conjunctive surface water management issues
- 5 - Addressing natural resource issues which impact the use and availability of groundwater, and which are impacted by the use of groundwater
- 6 - Addressing drought conditions
- 7 – Addressing conservation

****Edwards Aquifer Authority Goals listed in the Authority's Strategic Plan**

- 1 – Fully implement the requirements of the Edwards Aquifer Authority Act
- 2 – Develop an effective, comprehensive management plan based on sound, consensus-based scientific research and technical data
- 3 – Maintain continuous springflow
- 4 – Protect and ensure the quality of ground to surface water in the Authority's jurisdiction
- 5 – Forge solutions that ensure public trust
- 6 – Promote healthy economies in all parts of the region
- 7 - Research and develop additional sources of water

***** Progress on Objectives Annually Reported to Board**

7.2 Groundwater Management Plan Activity Summary

The following Exhibit, Exhibit 7.2, presents an action plan summary for this plan. Following Exhibit 7.2 is a detailed description of the Authority's management objectives, the objectives to be accomplished, and the time-frame for completion.

Exhibit 7.2: ACTION PLAN SUMMARY

EDWARDS AQUIFER AUTHORITY ACTION STEPS	COMPLETION DATE	TEXAS WATER DEVELOPMENT BOARD GOALS*
1.1: Issue all initial regular permits	Dec. 31, 2004	1,2,6
1.2: Register all points of withdrawal	Dec. 31, 2007	1,2,4,7
1.3: Implement groundwater rights transfer program	annual review beginning Dec. 31, 2002	1,2,4,7
1.4: Develop a well construction permit program	Dec. 31, 2004	1,2
1.5: Develop a demand management/critical period management program	Adopt initial Demand Management/Critical Period Management Rules by December 2002	1,2,6
1.6: Develop a groundwater conservation program	Adopt Groundwater Conservation and Reuse rules by January 2004	1,2,7
2.1: Collect baseline water quality and water quantity data	Annually collect water quality data from 76 wells, eight streams, and four springs. Annually collect continuous water level data from 25 wells and collect monthly water level data from 17 wells.	1,2

EDWARDS AQUIFER AUTHORITY ACTION STEPS	COMPLETION DATE	TEXAS WATER DEVELOPMENT BOARD GOALS*
2.2: Annually receive and evaluate annual groundwater use information	Annually publish Hydrogeologic Report	1,2
2.3: Develop petroleum storage tank program	Oct. 30, 2002	2
2.4: Develop recharge zone protection program	Mar. 31, 2003	1,2
3.1: Develop a comprehensive water management plan	Adopt by March 2004	1,2,4,5,6,7
3.2: Develop recharge enhancement program	Jan. 31, 2003	1,2,6
3.3: Annual participation in Region L regional water supply planning process	Annual staff participation in the Region L water supply planning process and update the Authority's 30-year water supply plan with each update of the Region L plan	1,4,6
4.1: Develop a habitat conservation plan	Submit to U. S. Fish & Wildlife Service by March 2004	1,2,4,5,6
4.2: Annual research on water management strategies	Sept. 30, 2006	1,4,6

***Texas Water Develop Board Groundwater Conservation District Management Plan Required Goals**

- 1 – Providing the most efficient use of groundwater
- 2 - Controlling and preventing waste of groundwater
- 3 – Controlling and preventing subsidence (not applicable)
- 4 - Addressing conjunctive surface water management issues
- 5 - Addressing natural resource issues which impact the use and availability of groundwater, and which are impacted by the use of groundwater
- 6 - Addressing drought conditions
- 7 – Addressing conservation

7.3 Groundwater Management Plan Description

As previously stated in the Authority's mission statement, the Authority will manage the Edwards Aquifer within its jurisdiction to ensure the entire region of a sustainable, adequate, high quality, and cost effective supply of water, now and in the future.

As directed by the Authority's board of directors, the provisions of this plan will be implemented. When necessary, rules will be proposed and adopted to support the provisions of this plan.

The following objectives, action steps, and performance measures comprise the Authority's GMP. This GMP covers a ten-year planning horizon although some management objectives may span shorter timeframes.

MANAGEMENT OBJECTIVE 1.0: Manage all withdrawals from the Edwards Aquifer.

Action Step 1.1: Issue all initial regular permits.
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<i>Performance Measure 1.1.1: All initial regular permits issued and approved by board by December 31, 2004.</i>
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Program Description:

Municipal, industrial and irrigation well owners were required to apply to the Authority for an initial regular permit by filing a declaration of historical use of groundwater withdrawn from the aquifer during the historical period from June 1, 1972 through May 31, 1993.

The board granted initial regular permits to existing water users if they:

- timely file a declaration of historical use;
- pay all appropriate fees; and
- establish by convincing evidence a beneficial use of underground water from the aquifer during the historical period.

To the extent that water is available for permitting, the board will issue existing users permits to withdraw an amount of water equal to the user's maximum beneficial use of water without waste during any one calendar year of the historical period. If a water user does *not* have historical use for a full year, the Authority issued a permit for withdrawal based on an amount of water that would normally be beneficially used without waste for the intended purpose for a calendar year. If the total amount of water determined to have been beneficially used without waste exceeds the

amount of water available for permitting, the Authority will adjust the amount of water authorized for withdrawal under the permits proportionately to meet the amount available for permitting.

The Act provides that existing irrigation users receive a permit for not less than two acre-feet a year for each acre of land the user actually irrigated in any one calendar year during the historical period. An existing user who has operated a well for three or more years during the historical period will receive a permit for at least the average amount of water withdrawn annually during the historical period. The Authority will issue an initial regular permit without a time-limit that will remain in effect until it is abandoned, canceled, or retired.

On November 8, 2000, Authority staff mailed proposed permit actions for 1,084 initial regular permits. Staff proposed that 818 of the applicants receive permits (totaling 532,000 acre-feet), and that 266 permit applicants be denied permits. Protests were filed on 389 of these permit proposals, while the remaining 695 permit proposals were uncontested.

Throughout 2001, the board took action on 691 initial regular permit proposals by approving 530 permits, totaling 216,659 acre-feet, and denying 161 permit applications. The remaining 394 staff permit proposals include 326 contested proposals yet to be resolved and 68 uncontested proposals.

Additional regular permits were authorized by the Act, however, these type permits could only be issued once all initial regular permit amounts are satisfied and remaining groundwater was available below the 450,000 acre-feet cap. Staff anticipates that implementation of an additional regular permit program is highly unlikely since the proposed withdrawal amount for initial regular permits exceeds the 450,000 acre-feet cap and there should be no groundwater available for additional regular permitting.

Authority staff recommended hiring five firms so that each firm could handle one of the contested permit dockets developed to expedite completing these hearings and issuing all final permits. The special counsels' work began mid-December 2001. The contracts for these firms are proposed through December 31, 2002. The Authority approved a contract with the State Office of Administrative Hearings (SOAH) on December 11, 2001 to conduct contested permit hearings.

Action Step 1.2: Register all points of withdrawal.

Performance Measure 1.2.1: Register all points of withdrawal from the Edwards Aquifer by December 31, 2007.

Program Description:

Generally, two categories of wells withdraw groundwater from the aquifer: exempt wells and non-exempt wells. *Exempt* wells consist of domestic and livestock wells that withdraw less than 25,000 gallons per day, and do not require a groundwater withdrawal permit to pump from the aquifer. *Non-exempt* wells require a permit, and include municipal, industrial and irrigation wells.

The Authority's administers a well registration program, which collects information on both exempt and non-exempt wells. Well registration helps the Authority determine the amount of water withdrawn from the aquifer and protect well owners from groundwater contamination that result from hazardous chemical spills and other pollution. By tracking well ownership and location, the Authority can notify well owners in areas of potential contamination when contamination sources are identified.

Existing exempt wells pose the greatest challenge to Authority's well registration program. The Authority estimates that there may be as many as 10,000 to 15,000 existing exempt wells that require registration.

The Authority adopted rules for its Well Registration Program in 2000. The rules provide the regulatory framework for the registration of existing domestic and livestock wells. The rules require a well owner to complete an Authority-approved well registration form for each exempt well. The form includes information such as the name and address of the owner, location of the well, well production rates, well specifications, and purpose of use.

The Authority is planning to initiative a public information campaign to increase awareness about the well registration requirement and to increase the number of registrations. The public information campaign may consist of the following activities:

- Publishing program information in local newspapers;
- Providing positive incentives to register;
- Developing informational brochures; and
- Mailing registration information directly to well owners.

In addition to the public information campaign, the Authority is working with county health departments, county clerk offices, and local groundwater districts to analyze Geographic Information System (GIS) data to identify potentially unregistered wells. Once a potentially unregistered well is identified, the Authority conducts field surveys to determine if the wells withdraw groundwater from the aquifer and notifies the owner if the well must be registered.

Action Step 1.3: Implement groundwater rights transfer program.

Performance Measure 1.3.1: Conduct annual program review beginning December 31, 2002.

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Program Description:

The purpose of the water rights transfer program is to assign aquifer groundwater withdrawal rights from one user to another. The Authority approved its first transfer for groundwater withdrawal rights under interim authorization in March 1998. The transfer program has processed 450 transfers totaling 88,280 acre-feet of groundwater withdrawal rights since the program began.

The Authority's program addresses five types of transfers including changes in:

- Ownership,
- Withdrawal point,
- Place of use,
- Purpose of use, and
- Withdrawal amount.

The following rules apply to the transfers of groundwater withdrawal rights:

- Water withdrawn from the aquifer must be used within the boundaries of the Authority;
- Persons who install water conservation equipment may sell conserved water;
- An irrigation permit holder may not lease more than 50 percent of the irrigation rights initially permitted. The user's remaining irrigation water rights must be used in accordance with the original permit and must pass with transfer of the irrigated land; and
- Transfers of water rights that are from west of the Cibolo to east of the Cibolo Creek must be posted in the Texas Register before approval by the board.

The responsible parties initiating a groundwater withdrawal rights transfer are required to file a notice with the Authority. The Authority staff reviews the notice to determine if the transferor has the water available for transfer and that the transfer conforms to the requirements of Section 1.34 of the Act. The General Manager then issues a letter acknowledging the receipt of the notice and a statement concerning the transfer's disposition after review of the notice. Beginning in 2002, field representatives will confirm meter readings and well locations prior to approval of transfers.

39

All data regarding the change of ownership, place of use, purpose of use, point of withdrawal, and the addition of place of use of Edwards water rights are entered and recorded in the Authority database created and maintained by permitting staff. Staff recommends that the Authority secure professional assistance to help modify the Authority's transfer database. The transfer database can be improved by the development of date activated deposit and deduction type accounting software.

Action Step 1.4: Develop a well construction permit program.

Performance Measure 1.4.1: Establish an effective construction permit program by December 31, 2002, for all new wells, for modifying existing wells, or plugging wells.

Program Description:

Under the well construction program, persons must apply for well construction permits before constructing a new well, plugging an abandoned well, or significantly modifying an existing well. The board adopted well construction rules in 2000 to provide a framework for managing new well construction and ultimately new groundwater withdrawals from the aquifer. A well construction permit is not a groundwater withdrawal right from the aquifer. Rather, it is a license to conduct well construction activities, and is not transferable.

The General Manager reviews well construction applications and determines if the proposed well construction project conforms to the Act, Authority rules and other state regulations before authorizing the project and issuing the permit. Board approval is not required for well construction permits.

Since 1997, the Authority has issued approximately 470 well construction permits. Over 90 percent of the new wells being constructed are domestic wells that are exempt from groundwater withdrawal permitting. Currently, Authority staff performs a limited technical review on each application before recommending approval or denial. The technical review has not included site inspection during or after well construction. However, Authority staff believes that site

inspection is necessary to ensure that the well construction is completed as authorized by the permit.

In 2000, the board directed Authority staff not only to issue construction permits for wells that withdraw groundwater from the Edwards Aquifer, but also to issue permits for wells that may affect groundwater quality in the Edwards region. Staff anticipates that this policy directive will increase the number of permit applications to the Authority by 300 percent. Authority staff plans to inspect well sites during well construction activities starting in 2002.

Action Step 1.5: Develop a demand management/critical period management program.

Performance Measure 1.5.1: Adopt initial demand management/critical period management rules by December 31, 2002.

Program Description:

Article 1.26 of the Act requires the Authority to “prepare and coordinate implementation of a program for critical period management on or before September 1995.” The Act mandates the following requirements in the program:

- distinguish between discretionary and nondiscretionary water use;
- require reduction of discretionary uses as much as possible;
- require utility pricing that limits discretionary use as much as possible; and
- require reduction of nondiscretionary use by permitted or contractual users as much as possible.

The Act uses three terms to refer to aquifer reduction measures intended to slow the rate of decline of aquifer levels and springflows. Aquifer reductions are a necessary element of protection for federally protected species and habitats in Comal and San Marcos springs. The terms are *drought management*, *demand management* and *critical period management programs*. The Aquifer Management Planning Committee has recommended eliminating the term drought management and combining the terms demand management and critical period to reflect the general concept of the current aquifer reduction program.

The Authority has also been developing critical period rules to implement the program. To assist in that effort, Authority staff established a Critical Period Technical Advisory Group (CPTAG) in October 2000. The group was made up of Authority staff and technical consultants, and charged with:

- evaluating the relationship between precipitation, recharge, aquifer withdrawals, aquifer levels, and spring discharge for numerous low rainfall/low springflow periods for the aquifer; and
- evaluating various water management options using the GWSIM-IV computer simulation model developed by the TWDB.

Action Step 1.6: Develop a groundwater conservation program.

Performance Measure 1.6.1: Implement Authority's groundwater conservation program by March 1, 2006.

Program Description:

The Act requires the Authority to prepare and implement a regional Groundwater Conservation Plan (GCP). In addition to requiring a regional conservation plan, the Act authorizes the Authority to require permittees to submit individual conservation plans. The Authority's GCP will serve as a guidance document for applicants and permittees to use to develop and implement individual plans. The information obtained from individual conservation plans will be summarized into a report that will be supplied to the Texas Legislature at the beginning of each legislative session.

The purpose of the GCP is to encourage, promote, and document year-round conservation measures in the region. The development and implementation of regional and individual plans will assist the Authority and its applicants with successful management of groundwater consumption. Increasing water demands, extreme weather variability, and mandated water usage reductions that have been enacted in the past few years make year-round conservation a necessary component of regional and individual planning efforts.

Each municipal, industrial, and irrigation user within the Authority's jurisdictional boundaries must implement individual conservation programs to improve water use efficiency. These conservation programs will be documented through preparation of individual plans. Conservation will be achieved through the implementation of best management practices, which are defined as practices that have shown documented improvements in water use efficiency. All applicants will be expected to implement a minimum number of conservation practices within specified time frames.

Correlation of Edwards Aquifer Authority Action Steps to Texas Water Code, Section 36.1071 Management Goals

36.1071 Goals EAA Action Steps	Efficient use of Groundwater	Control and Prevent Waste	Conjunctive Management	Natural Resource Issues	Drought Conditions	Conservation
1.1 Issue all initial regular permits	•	•				•
1.2 Register all points of withdrawal	•	•			•	•
1.3 Implement groundwater rights transfer program	•	•			•	•
1.4 Develop a well construction permit program	•	•				
1.5 Develop a demand mgmt/critical period mgmt program	•	•			•	
1.6 Develop a groundwater conservation program	•	•				•

MANAGEMENT OBJECTIVE 2.0: Monitor and protect the quality of groundwater in the Edwards Aquifer.

Action Step 2.1: Annual basic water quality and water quantity data collection.

Performance Measure 2.1.1: Annual basic water quality and water quantity data collection.

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Program Description:

Authority staff collects surface water and groundwater quality data, groundwater level data, rainfall data, and geophysical well logs at a number of locations within the area of the aquifer. Staff collects water quality data annually from at least 76 wells and four springs to monitor aquifer water quality. Water quality data is also collected from eight stream locations to monitor quality of surface water recharged to the aquifer.

Authority staff collects data in a number of ways throughout the year. For example, the staff collects data by the following means:



- monitors groundwater levels with continuous water level monitoring equipment in 36 wells;
- takes monthly water level measurements from 18 wells;
- takes measurements three times annually from approximately 200 wells, taking “synoptic” water level measurements;
- collects rainfall at 63 locations using continuous recording rain gauges; and
- maintains geophysical logging equipment to obtain well construction information and geologic information from wells.

The hydrologic data is collected, validated, and compiled by the Authority; the results are reported in an annual report, The Hydrogeologic Report.

19

In addition to the basic data collection performed by Authority staff, the Authority contracts with the United States Geological Survey (USGS) to collect data to gauge streamflow. In the agreement between the Authority and the USGS for 2003-2004, the Authority cooperatively funds 11 continuous streamflow gauges, two springflow separation stations, and the monthly measurements at two spring-fed streams. Under the agreement, the USGS also calculates recharge to the aquifer, springflow from the aquifer, and collects stormwater quality samples at locations in New Braunfels and San Marcos.

Authority data collection improvements include the following items:

- **Groundwater quality monitoring plan.** Authority staff prepared a written groundwater quality monitoring plan that outlines groundwater sampling objectives and includes guidelines on selecting sampling locations, analytical parameters, sampling frequencies, and data quality objectives;
- **Groundwater level monitoring plan.** Authority staff prepared a written groundwater level monitoring plan that identifies specific wells that are to be monitored on a continuous or periodic basis and outlines specific areas where additional water level recorders are needed. The plan also includes data quality objectives for water level data;
- **Field equipment operations.** The Authority added manpower to field operations to ensure that each recording device is visited and preventive maintenance is performed on a regular basis. The additional manpower allows regular quality assurance checks on the rain gauges, and regular visits to all continuous water level recorders to ensure that data are not lost; and,

- **Hydrologic data review and storage.** Authority staff prepared a written hydrologic data management plan that will culminate in the implementation of the hydrologic data management system. The system will encompass methodologies for data quality assurance, data storage formats and data queries. The hydrologic data management plan and was developed in a format similar to that of the TWDB.

Action Step 2.2: Annually receive and evaluate annual groundwater information.

Performance Measure 2.2.1: Annually publish water data in Hydrogeologic Report.

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Program Description:

Well owners are required to submit a report documenting water usage by January 31 of each year. Authority staff uses this data to calculate the annual use of water by all users and to monitor overall water usage. This information is critically important since Authority staff use it to track water usage trends.

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Action Step 2.3: Develop an aboveground storage tank (AST) and an underground storage tank (UST) program.

Performance Measure 2.3.1: Establish AST/UST regulation program by Oct. 30, 2002

Program Description:

The Texas Commission on Environmental Quality (TCEQ) has historically regulated the installation of ASTs and USTs on the Edwards Aquifer Recharge Zone. In 2001, Authority staff prepared a rules development concept memorandum explaining the environmental hazards of placing ASTs and USTs on the recharge zone. The memorandum included a discussion of the vulnerability of the aquifer to spills of regulated materials that are routinely stored in ASTs and USTs. With direction from the board, staff developed rules to prohibit the installation of new ASTs and USTs on the recharge zone. The board approved the rules on October 8th, 2002.

Action Step 2.4: Develop recharge zone protection program.

Performance Measure 2.4.1: Implement board-approved recharge zone protection program by March 31, 2003.

Program Description:

Since the early 1980s, the TCEQ has regulated development activities over the recharge zone and certain activities over the transition and contributing zones. State rules regulating development over the recharge, transition, and contributing zones are codified in 30 Texas Administrative Code (TAC), Chapter 213. The 30 TAC Chapter 213 rules require that a Water Pollution Abatement Plan (WPAP) be prepared for all regulated development activities conducted over the recharge zone. The TCEQ must review and approve of each WPAP. In addition to the WPAP, organized sewage collection systems on the recharge zone, AST/UST facilities on the recharge or transition zone, and certain development activities on the contributing zone require additional plans and approvals.

TCEQ staff does an excellent job of administering the Chapter 213 rules with limited resources. Because of a lack of funding, the TCEQ does not have the resources to inspect all development activities to ensure compliance with their rules or compliance with approved WPAPs. The Authority believes that additional rules and additional resources are needed to better regulate development activities over the recharge, transition, and contributing zones of the aquifer.

The 30 TAC, Chapter 213 rules outline a process whereby the administration of the rules can be delegated to a local governmental agency. The rules also contain a provision that any fees collected from the regulated community by the TCEQ for administering the development regulations may not be assigned to the local governmental entity.

The Authority currently receives copies of WPAPs and related documents from the TCEQ and enters the information into a database. Authority staff also sends comment letters to the TCEQ on WPAPs whenever a deficiency is noted. The board is currently considering the development of Authority rules to further regulate development on or near the recharge zone. The board may also consider seeking delegation of the TCEQ's program pursuant to the 30 TAC Chapter 213 rules; however, the rule component that prohibits delegation of fees detracts from the Authority's interest in seeking the delegation.

Correlation of Edwards Aquifer Authority Action Steps to Texas Water Code, Section 36.1071 Management Goals

36.1071 Goals EAA Action Steps	Efficient use of Groundwater	Control and Prevent Waste	Conjunctive Management	Natural Resource Issues	Drought Conditions	Conservation
2.1 Continue basic water quality and water quantity data collection	•	•				
2.2 Continue to receive and evaluate groundwater information	•	•				
2.3 Develop AST/UST program		•				
2.4 Develop a recharge zone protection program	•	•				

MANAGEMENT OBJECTIVE 3.0: Address future water supply needs with the Edwards Aquifer

Action Step 3.1: Develop a comprehensive water management plan.

Performance Measure 3.1.1: Complete draft CWMP by December 31, 2004.

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Program Description:

The Authority's Act requires the development of a Comprehensive Water Management Plan (CWMP). The Act, though vague in describing the process, outlines some specifics to be included in the plan. For instance, the CWMP must include conservation, future supply, and demand management plans. Additionally, the Authority must work with the South Central Texas Water Advisory Committee (SCTWAC), the TWDB, and underground water conservation districts within the Authority's boundaries, to develop a 20-year plan that provides alternative water supplies to the region. The plan must be established with five-year goals and objectives to be implemented by the Authority. The Edwards Aquifer Legislative Oversight Committee and "appropriate" state agencies must annually review this program.

31

Finally, the Act delineates three general requirements that must be considered in developing the 20-year alternative supply plan component of the CWMP:

- the Authority must thoroughly investigate all alternative technologies;

- the Authority must investigate mechanisms for providing financial assistance for alternative water supplies through the Texas Water Development Board; and
- the Authority must perform a cost-benefit analysis and an environmental analysis.

Many sections of the CWMP are presently being drafted or internally reviewed. Several key sections of the CWMP are dependent upon the development and completion of other planning efforts being conducted by the Authority, such as the Demand Management/Critical Period Management Plan and the Habitat Conservation Plan. This GMP is major component of the CWMP. Staff anticipates presenting a draft CWMP, or a portion thereof, to the Authority's Legislative Oversight Committee in early 2004.

Action Step 3.2: Develop recharge enhancement program.

Performance Measure 3.2.1: Establish a recharge enhancement program by January 31, 2003.

Program Description:

The Authority may contract with any political subdivision of the state to provide for artificial recharge of the aquifer through injection wells or surface water projects for the subsequent recharged water recovery by the political subdivision or its authorized assignees. The Authority can enter into a cooperative contract if the political subdivision agrees to the following conditions:

- file with the Authority injection or artificial recharge records;
- protect Aquifer water quality; and
- protect other Aquifer users' rights in designating the injection well or recharge dam location, the injection or recharge method, and the retrieval well location and type.

The political subdivision is entitled to withdraw, during any 12-month period, the measured amount of water actually injected or artificially recharged during the preceding 12-month period, less the amount determined by the Authority to account for the artificially recharged water discharged through springs. It must also compensate the Authority in lieu of owners' fees. The amounts of water withdrawn under a cooperative contract are not subject to the maximum total permitted withdrawals provided by Section 1.14 of the Act.

The Authority also may build or operate recharge dams in the recharge area of the aquifer if the recharge is made to increase the yield of the aquifer and the recharge project does not impair senior water rights or vested riparian rights.

Artificial Recharge, Storage and Recovery Rules are in the draft proposed rule phase. Staff proposes the recharge rules be reviewed by a consultant with engineering experience to determine if the rules will be sufficient to develop recharge projects. Staff also proposed that an engineering consultant review applications as they are submitted, and make recommendations to the General Manager.

Action Step 3.3: Annual participation in the Region L regional water supply planning process.

Performance Measure 3.3.1: Annual staff participation in the Region L regional water supply planning process and update the Authority's 30-year water supply plan with each update of the Region L plan.

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Program Description:

On February 19, 1998, the TWDB adopted rules for state and regional water planning and grant assistance, designating 16 regional water planning areas to implement state and regional water planning aspects of Senate Bill 1 (SB 1). The overall goal of SB 1 is to:

"develop regional and state water plans that will 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 the planning area."

The South Central Texas Regional Water Planning Group (Region L) is one of the 16 regional planning groups established by the TWDB to develop a regional water plan as required by SB 1. The South Central Texas study area, also known as Region L, encompasses twenty and one-half (20 1/2) counties with a total 1990 population of 1,695,584 (1990 US Census Data). The Authority has three representatives on the eleven-member appointed board of the Region L. Numerous river basins, aquifers, and reservoirs are contained partially or completely within the study area.

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Region L is required to develop a regional water plan, establish policies, make decisions, and consider interest groups in the development of the regional water supply plan. The development of a regional water supply plan includes studies, decisions, and recommendations regarding the water supply needs, potential water supply options and strategies throughout the area. Recognizing the importance of public participation, Region L has established a public participation process to achieve stakeholder acceptance of the regional water plan.

In early 2001, Region L developed a regional water supply plan and submitted it to the TWDB for approval. The TWDB formally approved the Region L water supply plan on July 18, 2001. The total capital cost to develop the water management strategies in the Region L plan is \$4.72 billion. Region L estimated that the water needs for the region under drought of record conditions to be 494,874 acre-feet/year in 2000. Due to a population growth of 4.5 million people in 2050, the water needs in 2050 increase to 785,725 acre-feet/year.

The Region L plan includes water management strategies that could produce new supplies of up to 744,053 acre-feet/year in 2050. These strategies include municipal and irrigation water conservation, water reuse, transfer of irrigation rights, increased use of Canyon Reservoir, Lower Guadalupe River diversions, Colorado River diversions, Edwards recharge, and groundwater use from Carrizo and Simsboro aquifers.

The TWDB adopted the State Water Plan on January 5, 2002. Region L is currently working on the next round of planning, Round 2, of the regional water supply planning process. Round 2, entails reevaluating and refining the regional water supply plan to resubmit to the TWDB in 2006 for inclusion in the 2007 State Water Plan. The regional water supply planning cycle is expected continue in perpetuity.

Correlation of Edwards Aquifer Authority Action Steps to Water Code, Section 36.1071 Management Goals

36.1071 Goals EAA Action Steps	Efficient use of Groundwater	Control and Prevent Waste	Conjunctive Management	Natural Resource Issues	Drought Conditions	Conservation
3.1 Develop a comprehensive water management plan	•	•	•	•	•	•
3.2 Develop a recharge enhancement program	•	•			•	
3.3 Continue participation in Region L regional water supply planning process	•		•		•	

MANAGEMENT OBJECTIVE 4.0: Develop plan to support threatened and endangered species dependent on the Edwards Aquifer.

Action Step 4.1: Develop a habitat conservation plan.

Performance Measure 4.1.1: Implement approved habitat conservation plan and receive a Section 10A Incidental Take Permit from the USFWS by June 30, 2003.

Program Description:

The Authority is required by law to protect environmental resources while also protecting domestic and municipal water supplies, existing industries, and economic development in Texas. The Authority is required to implement and enforce water management procedures by the end of 2012 to ensure that continuous minimum springflows at Comal Springs and San Marcos Springs are maintained to protect endangered and threatened species as required by federal law. The U.S. Fish and Wildlife Service (USFWS) has established minimum flow limits necessary to protect the endangered species at Comal Springs and San Marcos Springs.

The Habitat Conservation Plan (HCP) would cover the destruction of endangered or threatened species associated with Comal and San Marcos Springs and associated ecosystems that is incidental to otherwise lawful activities. Therefore, the HCP must include measures that minimize and mitigate the effects of any incidental destruction of endangered or threatened species.

The Act provides the Authority with the ability to hold permits under the Endangered Species Act. The common permit issued related to endangered species is known as a Take Permit. A Take Permit is only issued if a habitat conservation plan is developed and approved by the USFWS that will provide adequate protection for listed species at Comal and San Marcos springs.

Action Step 4.2: Annual research on water management strategies.

Performance Measure 4.2.1: complete research on water management strategies by September 30, 2006.

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Program Description:

The Authority has researched or is currently researching five water management strategies: brush management, quarry utilization, precipitation enhancement, and water use from the bad water line.

Brush Management

The Edwards Aquifer Recharge Zone encompasses approximately 5,400 square miles and contains the drainage basins of streams that recharge the aquifer. Research conducted in the San Antonio area has shown that the removal of woody vegetation followed by the establishment of perennial grass cover will result in increased water yields from rangeland watersheds. The initial documented results indicate increased surface-water yield has ranged from 40,000 to 140,000 gallons per acre treated per year depending on the percentage of woody plants removed. This information is based on field scale studies. Additional research would determine if the field scale results are applicable on a watershed scale.

In October 1998, the Authority approved a cooperative agreement with the Natural Resources Conservation Service (NRCS) to support a research program to evaluate woody species best management practices relative to enhancing water quality and increasing aquifer recharge in rangeland watersheds. The primary practice evaluated in this study is cutting cedar, while a secondary practice will include periodic burning to control cedar re-growth. The study is being conducted in three watersheds in the aquifer region and contains watershed drainage areas from 260 acres to 400 acres. The study began in 1999 and is scheduled to be completed in September 2006.

In addition to the NRCS study, the Authority is preparing contract documents for board approval for a study by Texas A&M University (TAMU) to quantify the relationship between brush control and recharge. The TAMU study will measure the amount of recharge in shallow caves before, during, and after brush control over the caves. The study is scheduled to be completed in 2007.

35

Quarry Utilization

Quarries are steep-walled pits that offer large storage volumes for a relatively small surface area. Currently, several firms actively mine the Edwards limestone located in the Edwards Aquifer

Recharge Zone. The mined limestone is crushed and used to make several types of aggregate for construction purposes throughout Texas. As mines have no room to expand or are mined out, owners look for alternative uses for the quarry pit. In recent years, quarries in the San Antonio area have been used for a theme park, a shopping complex, and a golf course. Examples of alternative uses in other areas include parks, wildlife preserves, flood control and water storage.

Authority staff theorized it could be beneficial to utilize limestone quarry excavations for recharge and/or water storage facilities. The Authority initiated the first step in investigating the potential for quarry use by contracting with Earth Tech, Inc. to perform a feasibility study.

The Phase 1 feasibility study, completed in September 2002, concludes that the capacity, technology, and interest exist in the region to further study the use of quarries for water storage. The study identified approximately 70,000 acre-feet of potential water storage capacity in quarries that upon completion of mining could be converted into reservoir storage in the greater San Antonio area. This capacity possesses the potential to increase as quarrying activities continue through deepening and expansion, and as additional mining operations are developed in the area.

The Authority prepared a scope of work and solicited submissions for qualifications for Phase II of the quarry analysis. Late in 2002, at a request from SAWS, the Authority opted to allow SAWS to be responsible for the Phase II investigation. Phase II of the quarry analysis, conducted by HDR Engineering, Inc. under contract to SAWS, is scheduled to be completed in late September or early October 2003.

Precipitation Enhancement

The Authority initiated research in 2001 to determine the effectiveness of the Precipitation Enhancement Program (PEP) for the period 1999 – 2001. Woodley Weather Consultants, Inc. (WWC) began the analysis in 2001 and concluded the research in 2002. WWC evaluated all the data from the PEP program from 1999 – 2001 and concluded an additional 179,000 acre-feet of rainfall was created by the program (approximately 60,000 acre-feet annually). The authority's real time rain gauge network provided significant data and insights to the analysis by serving as a calibration tool for radar estimated rainfall.

Use of Water from the "Bad Water" portion of the Edwards Aquifer

Management of the Edwards Aquifer is concentrated on the recharge zone and freshwater portion of the artesian zone as those are the zones containing potable water. However, there is a significant area of the Edwards Aquifer south and east of the freshwater/saline water interface; a line where the total dissolved solids (TDS) concentration is 1,000 milligrams per liter (mg/L). There maybe a significant volume of groundwater that varies in quality from 1000 mg/L to 10,000 mg/L TDS that can be treated and used for a beneficial purpose.

This option would involve withdrawal of water from the saline water portion of the aquifer. The area selected for withdrawal of the water supply would need to be geologically isolated from the

freshwater portions of the aquifer to prevent induced migration of freshwater into the saline water zone. The water supply would also require advanced treatment using desalinization processes to reduce total dissolved solids to a level acceptable for specified uses.

Two advantages of this option are:

- large volumes of supply maybe available in relatively close proximity to demand centers;
- few institutional constraints to implementation; and
- environmental impacts would be relatively small.

This option would require additional geologic investigation to determine its technical feasibility as a water supply source and economic analyses to determine its costs relative to other water supply alternatives. The Edwards Aquifer Optimization Program (EAOP) has an ongoing project designed to understand the dynamics of the interface between the freshwater and saline water portion of the aquifer and to determine the affect of pumping on the location of the bad water line. Once technical and economic uncertainties are resolved, the option could be implemented within one to five years.

Correlation of Edwards Aquifer Authority Management Objectives to Water Code, Section 36.1071 Management Goals

36.1071 Goals EAA Mgmt. Objectives	Efficient use of Groundwater	Control and Prevent Waste	Conjunctive Management	Natural Resource Issues	Drought Conditions	Conservation
4.1 Develop a habitat conservation plan	•	•	•	•	•	•
4.2 Continue research on water management strategies	•		•		•	

8.0 CONCURRENT PLANNING

There are several concurrent planning processes that have been conducted by or with the active participation of the Authority. These are:

- Development of a Comprehensive Water Management Plan;
- State and regional water supply planning;
- Development of a water supply plan for the Authority’s jurisdictional area; and
- Development of a Habitat Conservation Plan (HCP) pursuant to the federal Endangered Species Act (ESA)

Each of these planning processes is described briefly below. The relationships between these processes are illustrated in Exhibit 5.1.

8.1 Comprehensive Water Management Plan

The authors of Authority's enabling legislation intended for the Authority to develop and implement a Comprehensive Water Management Plan (CWMP). Specifically, Section 1.25 of the Act requires the Authority to develop and implement a CWMP by September 1, 1995, or two years after the Authority's original establishment date of September 1, 1993. The development of the CWMP was delayed due to a legal challenge to the constitutionality of the Act, and to legislation passed in 1997.

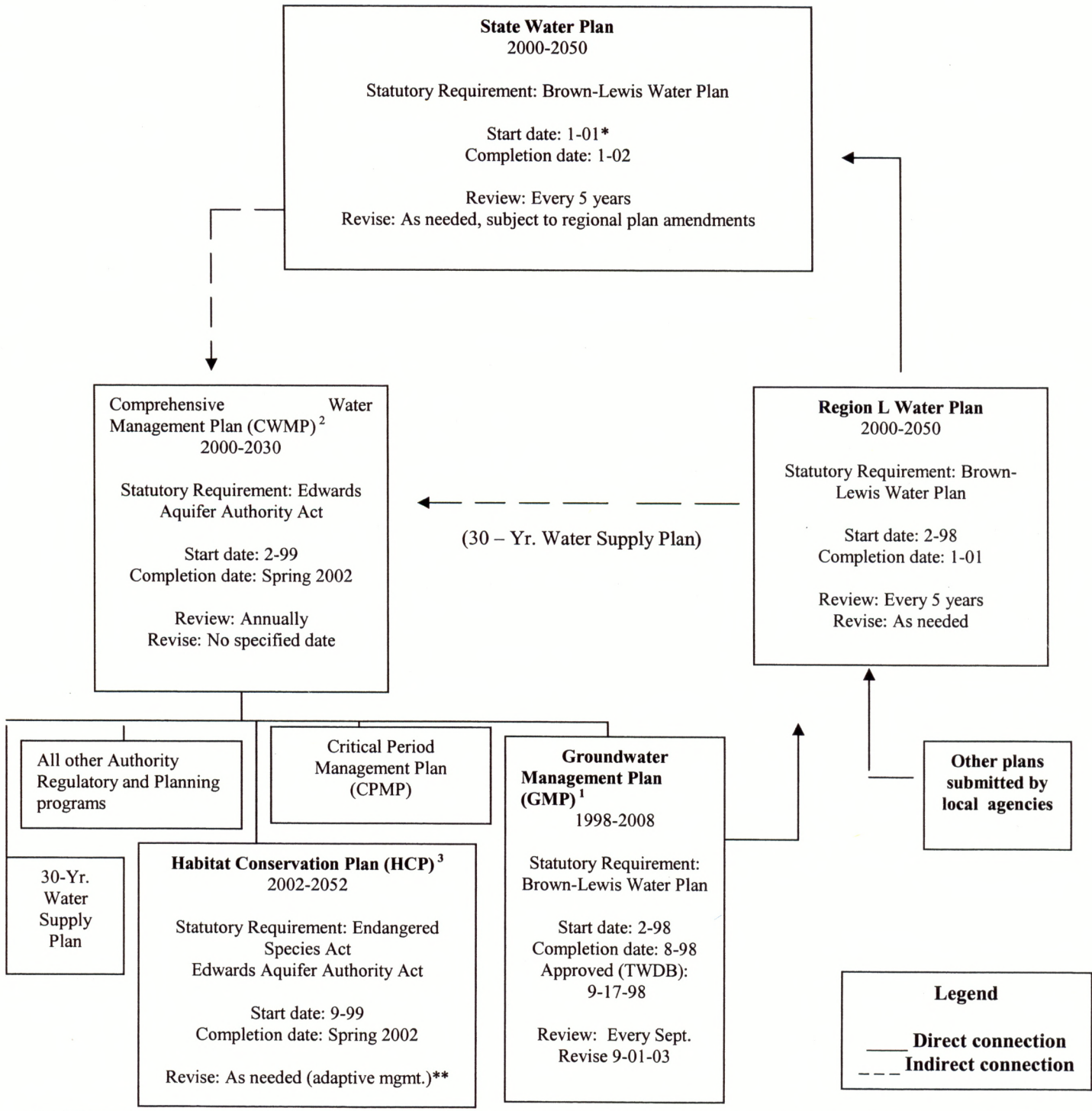
While the Act mandates the development and implementation of a CWMP, it is vague in describing the plan development process and its contents. The Act does, however, outline some of the key elements of the CWMP. For example, the CWMP must include conservation, future supply, and demand management plans.

More specifically, a key objective of this CWMP is to satisfy the Authority's statutory requirement to develop and adopt a regional water management plan. The CWMP is intended to serve as an "umbrella" plan that encompasses all of the Authority's plans, programs, and policies that are essential to managing the Edwards Aquifer. The CWMP therefore describes and outlines a coordinated operational plan that unifies all of the Authority's water management plans, programs, and policies into a cohesive aquifer management program that balances the needs and interests of all aquifer users.

The CWMP is also intended to be a flexible and dynamic management tool. It will be revisited and revised periodically to reflect changing conditions - changes in demographics, water uses, water law, technology, water supply availability, and environmental concerns, as well as any unforeseen issues that may arise and affect management of the aquifer.

The CWMP is built upon known and proven aquifer management strategies that are in turn based on sound, reproducible science. However, it is important to note that research into cutting-edge management concepts is an integral part of the Authority's on-going planning processes. As new ideas are explored and new technologies are developed and proven, they will be evaluated for possible inclusion in the CWMP. Specifically, the Authority is committed to a multi-year research program - the Edwards Aquifer Optimization Program (EAOP) - that could result in the development of new aquifer management strategies that would be incorporated into the CWMP in future updates and revisions of the plan. A draft CWMP is expected to be approved by the Authority in early 2004.

Exhibit 5.1: Relationship of Planning Efforts Affecting the Edwards Aquifer Authority



* Officially with submission of 16 regional plans; however, process began with completion of groundwater management plans.

** The USFWS broadly defines adaptive management as a method for examining alternative strategies for meeting measurable biological goals and objectives necessary, adjusting future conservation management actions according to what is learned.

1 – The GMP is the first step for regional water plans and State Water Plan. These plans are required to have quantifiable management objectives & performance goals: efficiency, prevention of waste, conjunctive use of surface & groundwater, natural resource issues and controlling subsidence. The Authority include 4 additional goals. The GMP provides initial input to the CWMP and the Regional Water Plan. When the GMP is revised, elements of the regional plan may be incorporated into the document.

2 – The CWMP is the Authority's most comprehensive planning effort and is the core of the Authority's management and regulatory responsibilities. The 30-year plan of the CWMP was completed on a parallel track as, and must be consistent with, the regional water plan. As the ultimate management plan, all GMP, CPMP, etc.) and regulatory activities (rules, administrative procedures, etc.) will be guided by and located within the CWMP.

3 – The HCP will receive from and provide input to, the CWMP and provide input to the regional water plan. The HCP is a component of the C

8.2 State and Regional Water Supply Plans

Sections 16.051 and 16.055 of the Texas Water Code direct the Executive Administrator of the TWDB to prepare and maintain a comprehensive State Water Plan, which is to serve as a flexible guide for the development and management of all water resources in Texas. The plan is to ensure that sufficient supplies of water are available at a reasonable cost to further the state's economic development. Section 16.056 requires the TWDB to amend the plan as needed in response to increased knowledge and changing conditions.

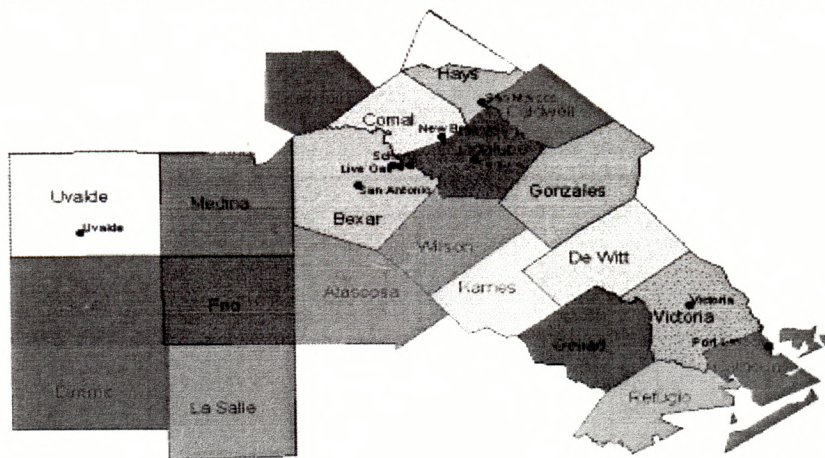
The Brown-Lewis Water Plan included a major overhaul of the state water planning process, which had its genesis with the creation of the TWDB in 1957. Specifically, the Brown-Lewis Water Plan established a bottom-up planning process whereby the State Water Plan would henceforth be based on regional water plans that are prepared by appointed Regional Water Planning Groups (RWPG).

In February 1998, the TWDB adopted rules for the implementation of the new state water planning process. This included designation of 16 regional water planning areas (see Exhibit 5.2) and appointment of the initial members of the RWPGs. With technical and financial assistance from the TWDB, and in accordance with planning guidelines set forth by TWDB, the RWPGs were directed to prepare consensus-based regional water plans by January 5, 2001. Subsequently, the TWDB assembled the regional water plans into a new State Water Plan, which was adopted by the TWDB on December 12, 2001. The regional water plans, as well as the State Water Plan, can be amended as necessary and are to be updated every five years.

Initially designated by the TWDB as "Region L", the South Central Texas Regional Water Planning Area (Region L) encompasses all or parts of 21 counties within the Guadalupe, Nueces, and San Antonio river basins. As depicted in Exhibit 8.2, the entire jurisdiction of the Authority lies within Region L.

Region L represents 11 interest groups categories specified in state law. Region L is responsible for the development, amendment, and periodic update of the regional water plan for the regional water supply plan. The current voting membership of Region L is provided in Exhibit 8.4. The Authority is represented in the regional water planning process by its general manager (Greg Ellis) and two directors (Susan Hughes and Doug Miller).

Exhibit 8.3 South Central Texas Regional Water Planning Area (Region L)



Source: SCTRWPG

Exhibit 8.4 Voting Membership of Region L

Interest	Name	Entity	County (Location of Interest)
Public	Evelyn Bonavita	League of Women Voters	Bexar and 3 other counties in the region
Counties	Jay Millikin	Comal County Commissioners Court	Comal
	John Kight	Kendall County Commissioners Court	Kendall
Municipalities	Mayor Gary Middleton	City of Victoria	Victoria
	Eugene Habiger	San Antonio Water System	Bexar
	Pedro Nieto	Attorney	Uvalde
Industries	vacant		
Agricultural	Richard Eppright	Graham Land & Cattle Co.	Gonzales and Atascosa
	Milton Stolte	Texas Farm Bureau	Medina
Environmental	Susan Hughes	Bexar Audubon	Bexar

Interest	Name	Entity	County (Location of Interest)
		Society	
Small Businesses	Darrell Travis Brownlow	Independent Consultant	Wilson
	Doug Miller	Miller & Miller	Comal and Guadalupe
	Gloria Rivera	Web Design	Guadalupe
Elec. Generating Utilities	Mike Fields	CPL Coletto Plant	Goliad
River Authorities	Bill West	Guadalupe-Blanco River Authority	Guadalupe and 9 other counties in the region
	Greg Rothe	San Antonio River Authority	Bexar and 3 other counties in the region
	Con Mims	Nueces River Authority	Uvalde and 6 other counties.
Water Districts	Greg Ellis	Edwards Aquifer Authority	Bexar, Medina, Uvalde and portions of 5 other counties in the region
	Mike Mahoney	Evergreen UWCD	Frio, Atascosa, and Wilson
	Tom Moreno	Bexar Metropolitan Water District	Bexar
Water Utilities	Ron Naumann	Spring Hill WSC	Guadalupe

For the inaugural regional water planning cycles, TWDB rules and guidelines required the RWPG to complete the following tasks:

1. Develop a description of the regional water planning area;
2. Adopt population and water demand projections;
3. Develop estimates of currently available water supplies under drought-of-record conditions;
4. Compare currently available water supplies with projected water demands to identify current and future water supply needs;
5. Identify and evaluate of alternative water management strategies to meet the identified needs; and

6. Develop a regional water plan that includes:
 - a. Specific strategies to meet near-term water needs (2000-2030);
 - b. Options for meeting long-term needs (2030-2050);
 - c. Identification of needs for which there is no feasible solution;
 - d. Recommendations for legislative designation of ecologically unique stream segments;
 - e. Recommendations for legislative designation of sites uniquely suited for reservoir construction;
 - f. Coordination with the RWPGs for adjacent planning areas concerning mutual interests and shared resources; and,
 - g. Regulatory, administrative, and/or legislative recommendations to improve water resources management in the region or the state as a whole.

Note: Items 5d through 5g may be included in a regional water plan at the discretion of the RWPG.

Texas is an extremely diverse state in terms of climate, water availability and use, and socio-economic characteristics. This diversity was recognized in the Brown-Lewis Water Plan and in the shift to a regional-based State Water Plan. It is also recognized in the requirements that RWPG evaluate a broad array of water management strategies including:

- **Expected/advanced water conservation for municipal user groups;**
- **Water reuse;**
- **Expanded use of existing supplies;**
- **Reallocation of reservoir storage;**
- **Water marketing and interbasin transfers;**
- **Subordination of water rights;**
- **Yield enhancement measures;**
- **Chloride control measures; and/or,**
- **New supply development.**

Water availability, economics, environmental concerns, and public acceptance were considered in the evaluation and selection of recommended water management strategies.

8.3 30-Year Water Supply Plan

A future water supply plan is referenced in Article 1, Section 1.25 of the Act. The Authority developed the water supply plan as a component of the CWMP. The water supply plan was developed consistent with the Texas Water Development Board's (TWDB) guidelines and requirements for regional water supply planning under the Brown-Lewis Water Plan.

The Authority worked with Region L to identify water supply sources for the area. The Authority agreed to develop a 30-year water supply plan to remain consistent with Region L's regional water supply plan. The Authority extracted the relevant Edwards Aquifer groundwater supply sources from Region L's regional water supply plan. The extracted strategies were used in developing the Authority's 30-year water supply plan

The Authority's water supply plan development concentrated on two efforts, the Edwards Aquifer groundwater supply portion of the CWMP and non-Edwards Aquifer groundwater supply sources.

The components of the water supply plan are:

- Population and water demand projections for the Edwards Aquifer Authority jurisdiction for a 30-year period (2000-2030);
- Estimates of currently available water supplies from both the Edwards Aquifer and from other surface and groundwater sources available to the region.
- A comparison of currently available water supplies to projected water demands to determine the future water supply needs of the Edwards Aquifer Authority jurisdiction;
- An evaluation of various alternative strategies for increasing the sustained yield of the Edwards Aquifer for water supply purposes; and
- A review of potentially feasible aquifer management strategies requiring further analysis.

Table 16 from the Authority's 30-year water supply plan (shown below) lists recommended water management strategies for meeting the planning area's future water supply needs.

"Table 16 - Recommended Water Management Strategies"

Strategy (SCTRWP Identifier)	2000	2010	2020	2030
Municipal Water Conservation (L-10 Municipal)	NA	44,669	43,660	38,291
Irrigation Conservation (L-10 Irrigation and L-15)	NA	27,314	27,314	27,314
Transfers of Edwards Irrigation Rights to Municipal Use (L-15)	NA	40,486	40,486	41,486
Edwards Aquifer Recharge Enhancement (L-18A)	NA	13,451	21,577	21,577
Canyon Reservoir – River Diversion (G-15C)	NA	10,500	15,700	15,700
Lower Guadalupe River Diversion (SCTN-16)	NA	94,500	94,500	94,500
Lower Colorado River Diversion (LCRA)	NA	0	66,000	138,000
Carrizo Aquifer – Wilson and Gonzales (CZ-10C)	NA	16,000	16,000	16,000

Strategy (SCTRWP Identifier)	2000	2010	2020	2030
Carrizo Aquifer – Gonzales and Bastrop (CZ-10D)	NA	900	4,950	13,450
Simsboro Aquifer (SCTN-3C)	NA	55,000	55,000	55,000
SAWS Recycled Water Program (SAWS)	NA	19,826	26,737	35,824
Purchase Water from a Major Water Provider	NA	10,000	10,500	12,500
TOTAL	NA	332,646	406,424	509,642

Table 28 from the Authority’s 30-year water supply plan (shown below) shows the water supply and water demand balance for the planning area.

“Table 28 – Water Supply and Demand Balance for the Edwards Aquifer Region with Strategies Recognized in the SCTRWP (ac-ft/yr)”

	2000	2010	2020	2030
Projected Water Demand	765,127	802,372	848,588	918,118
Currently Available Water Supply	523,604	522,244	521,055	505,495
Supply from Strategies in Progress	NA	38,390	33,190	33,190
Supply from Recommended Strategies	NA	345,672	435,396	509,642
Shortage/Surplus	-241,523	103,934	141,053	130,209

Note: Excludes irrigation water conservation applied to irrigation shortages.

The board approved the 30-year water supply plan in March 2001. The Act states that the alternative water supply plan is to be implemented and reviewed annually by the appropriate state agencies and the Edwards Aquifer Legislative Oversight Committee.

8.4 Habitat Conservation Plan

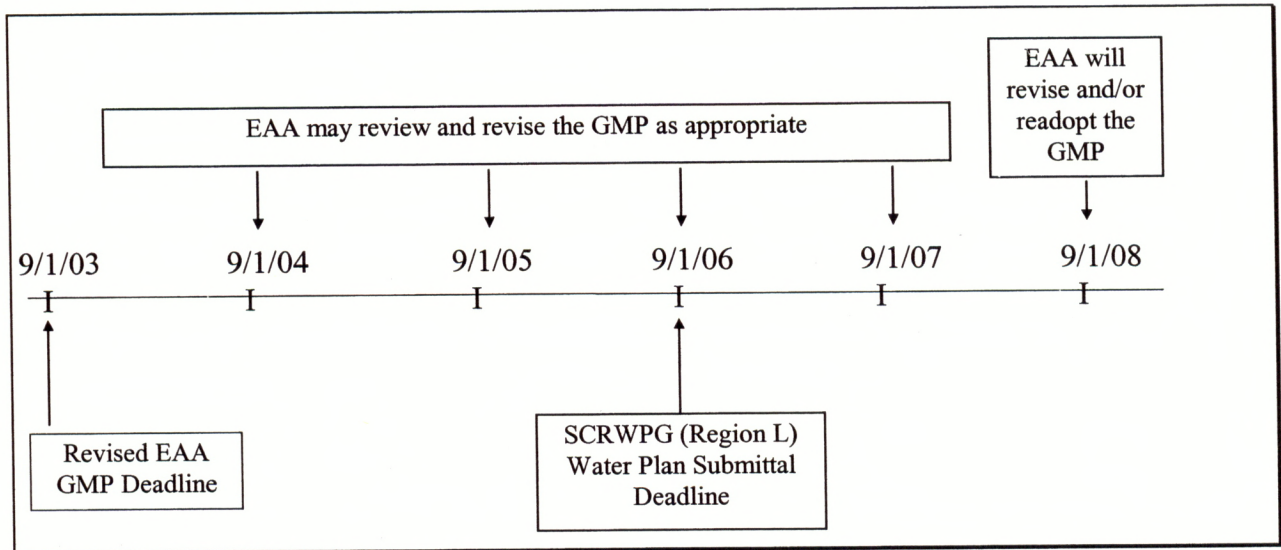
The U.S. Fish & Wildlife Service (USFWS) has listed one threatened and seven endangered species in the Comal and San Marcos springs and the Comal and San Marcos rivers. Federal and state laws require that the threatened and endangered species and their critical habitat be protected to prevent “take” or “jeopardy” of the species. The responsibility of maintaining the aquatic habitat that supports these threatened and endangered species falls on the Authority as the regional regulatory agency.

The Act allows the Authority to apply for and hold permits under the federal Endangered Species Act (ESA). The USFWS may issue permits that allow for the “incidental take” of endangered species if an HCP has been developed and approved by the USFWS. A HCP is a management plan that will ensure the continued survival of the covered threatened and endangered species in their natural habitat. The Authority has undertaken development of a regional HCP, which is scheduled for completion by June 30, 2004.

9.0 REVISIONS TO THE AUTHORITY GROUNDWATER MANAGEMENT PLAN

As directed under the Brown-Lewis Water Plan, the Authority will readopt the GMP, with or without revisions, at least once every five years (see Exhibit 9.1). Additionally, the Authority will continue to participate in the regional water planning process to ensure the GMP remains consistent with the approved regional water plan for Region L. The Authority's jurisdiction lies entirely within Region L; therefore, the Authority will submit the GMP to Region L for review.

Exhibit 9.1 Groundwater Management Plan Revision and Review Timeline



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Official Records of
BEXAR COUNTY
GERRY RICKHOFF
COUNTY CLERK
Fees \$2.00



EDWARDS AQUIFER
AUTHORITY

NOTICE OF OPEN MEETING

Available at www.edwardsaquifer.org

As required by Article VI, Sections 6.01, 6.04, and 6.05 of the Bylaws of the Edwards Aquifer Authority, a meeting of the Board of Directors will be held on **Tuesday, November 18, 2003, at 3:00 p.m. in the Conference Center of the Authority's office, 1615 N. St. Mary's, San Antonio, Texas.**

At this meeting, the following business may be considered and recommended for board action:

- A. Call to Order -- Roll Call -- Pledge of Allegiance -- Announcements.
- B. Public comment.

CONSENT ITEMS

- C. Approval of previous board meeting minutes.
 - Regular Board Meeting -- October 14, 2003
 - Special Board Meeting -- October 29, 2003
- D. Consider recommendation from the Research and Technology Committee to recommend the board approve the draft comment letter, dated November 19, 2003, on the Preliminary Proposal of the Joint Task Force for the City of San Antonio/Bexar County Tax Phase-In Guidelines, and authorize the General Manager to submit the comments to the City of San Antonio's Economic Development Manager.
- E. Consider recommendation from the Permits Committee to approve a one-year renewal option on the existing contract between the Edwards Aquifer Authority and AMEC Earth & Environmental, Inc., for technical support regarding evaluation of aquifer recharge, storage and recovery permit applications in an amount not to exceed \$50,000, for the period December 11, 2003 through December 10, 2004, and authorize the General Manager to sign the renewal letter.
- F. Consider recommendation from the Permits Committee to approve a one-year renewal option on the existing contract between the Edwards Aquifer Authority and LBG-Guyton, to provide technical support regarding evaluation of aquifer recharge, storage and recovery permit applications, in an amount not to exceed \$50,000, for the period December 11, 2003 through December 10, 2004, and authorize the General Manager to sign the renewal letter.

- G. Consider Authority staff request to postpone board consideration until February 2004 of the following requests for contested case hearings and the issuance of interim orders granting request and referring matter to the State Office of Administrative hearings:

Application #	Owner Name	Maximum Historical Use Claimed by Applicant	Proposed Initial Regular Permit Groundwater Withdrawal Amount
BE00013	Presentation Sister's Convent	18.210	7.674
BE00035	M M Schumann Investments, Ltd.	284.000	252.000
BE00045	Retama Partners, Ltd.	966.000	334.000
BE00045A	Selma Amphitheater, LLC	126.000	126.000
BE00092	Division Laundry & Cleaners, Inc.	192.930	72.663
BE00150	T-Slash-Bar Texas, Ltd.	3,748.830	1,200.000
BE00211	Richard Vogt	294.000	184.000
BE00219	San Antonio Water System	17.908	8.012
BE00226	William M. Menard, Sr.	40.000	40.000
BE00244	Delvin J. Bippert	9.000	0.000
BE00251	Henry D. Verstuyft and Juliana M. Verstuyft Revocable Trust of 2003	1,450.000	440.000
BE00266	Sophora, Ltd., d/b/a, Los Patios	123.339	87.884
CO00130	John F. Svoboda	23.209	1.468
ME00302	City of Lytle	672.000	477.510
ME00322	City of La Coste	259.330	184.631
ME00411	City of Devine	915.659	652.437
ME00479	San Antonio Water System	740.000	740.000
ME00519	Patrick J. Wurzbach	596.000	596.000
UV00454	Henry Bros, a Partnership	461.459	267.400
UV00471	City of Sabin	636.210	452.995
UV00480	J.E. Willingham, IV and M.K. Chandler	33.660	0.000
UV00504	George Ligocky	795.600	451.200
UV00558	Lawrence Wilde	613.350	326.423
UV00559	Lawrence Wilde	505.720	264.636
UV00565	Briscoe Ranch, Inc. and Archie A. McFadin, Jr.	101.650	30.178
UV00625	T. David Bishop	763.000	404.000
UV00625A	Shirley Bishop	763.000	404.000
UV00695	J.E. Willingham, IV and M.K. Chandler	600.000	0.000

- H. Consider recommendation from the Executive Committee to approve payment to Kemp Smith for legal services.
- I. Consider recommendation from the Executive Committee to approve payment to the following special counsel:
- Booth, Ahrens & Werkenthin, P.C.
 - Clark, Thomas & Winters
 - Gardere Wynne Sewell LLP
 - Hall & Klecman, PLLC

ITEMS FOR INDIVIDUAL CONSIDERATION

- J. Receive report from Director Bob Keith, South Central Texas Water Advisory Committee (SCTWAC) representative to the board, regarding downstream water conditions of the Guadalupe River Basin and current activities and issues of interest to SCTWAC.
- K. Consider recommendation from Authority staff on the Proposal for Decision issued by the Administrative Law Judge in SOAH Docket No. 004-03-1208 (EAA File No. UV00598) (Application for IRP of Danny McFadin).
- L. Public hearing and opportunity to comment on the proposed Groundwater Management Plan of the Edwards Aquifer Authority prepared under § 36.1071, Texas Water Code, and consider recommendation from the Aquifer Management Planning Committee to approve the proposed Groundwater Management Plan and authorize the General Manager to take all appropriate action to file it with the Texas Water Development Board, under § 36.1071-36.1072, Texas Water Code.
- M. Consider recommendation from Chairman Beldon and Director Hughes to approve the list of members to be appointed to the Water Quality Advisory Task Force.
- N. Consider recommendation from Authority staff to approve funding in the 2004 Budget for a Feasibility Analysis for an *In Situ* Refugia Pilot Project in the Comal Springs Ecosystem.
- O. Consider recommendation from Authority staff to adopt Agreed Final Orders Granting Application for Initial Regular Permit in the following matters and to issue Initial Regular Permits as follows:

Permit #	Owner Name	Maximum Historical Use Claimed by Applicant (acre-feet)	Initially Proposed Initial Regular Permit Groundwater Withdrawal Amount (acre-feet)	Agreed Proposed Initial Regular Permit Groundwater Withdrawal Amount (acre-feet)
HA00208	Robert C. Haney	27.750	0.000	0.356
ME00583	Melvin Zinsmeyer	96.038	54.000	64.000
UV00557	Bobby R. Horton	400.000	0.000	150.000

- P. Consider report and recommendation from Treasurer Doug Miller to accept the unaudited financial statement for the month of October 2003.
- Q. Consider Resolution and Order No. 11-03-475 of the Board of Directors of the Edwards Aquifer Authority adopting the annual operating budget for fiscal year 2004 with revisions incorporated from the October 29 board meeting, and assessing aquifer management fees for 2004.
- R. Consider recommendation from the Finance/Administrative Committee to approve Resolution and Order No. 11-03-476 of the Board of Directors of the Edwards Aquifer Authority defining the purpose and appropriate use of the Groundwater Rights Retirement Fund.
- S. Consider recommendation from the Executive Committee to adopt Resolution and Order No. 11-03-477 of the Edwards Aquifer Authority Board of Directors approving a contract between the Edwards Aquifer Authority and Frederic C. Warner, Jr., JD, Frank Santos, JD, and M. Edward Lopez for legislative consultant services for the period January 1, 2004 through September 30, 2005, in the amount of \$271,000, and authorizing the general manager to execute the contract.
- T. Receive report from Dr. Richard Lewis, Jr., Round Top Consulting Associates, on the 2003 Authority staff team building session.

U. Closed Session.

The Board of Directors of the Edwards Aquifer Authority may go into a closed session under the authority of the Government Code, Chapter 551, Texas Open Meetings Act, to discuss:

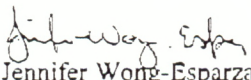
1. Consultation with Attorney - Pending Litigation (§ 551.071)
 - 1.1 Boerschig v. Kinney County Groundwater Cons. Dist., Cause No. 3299, 63rd Jud. Dist., Kinney County, Texas.
 - 1.2 Guitar Holding Co., L.P. v. Hudspeth Cty. Under. Wat. Cons. Dist. No. 1, Cause No. 2703-205, 205th Jud. Dist., Hudspeth County, Texas.
 - 1.3 Chemical Limc, Ltd. vs. Edwards Aquifer Authority, et al, Cause No. C2002-0547A, 22nd Jud. Dist. Ct., Comal County, Texas.
 - 1.4 Day and McDaniel vs. Edwards Aquifer Authority, Cause No. SA 03CA0429 FB, U.S. District Courts Western District of Texas, San Antonio Division.
 - 1.5 Edwards Aquifer Authority v. White, Individually, et al., Cause No. 2003-CI-01580, 150th Jud. Dist. Ct., Bexar County, Texas.
 - 1.6 Stockton v. McHugh *et al.*, Cause No. 01-04-22,351-CV, 38th Jud. Dist. Ct., Uvalde County, Texas.
 - 1.7 Herrmann, *et al.* v. Lindsey, Cause No. 04-02-00184-CV, in the Fourth Court of Appeals, San Antonio, Texas.
 - 1.8 Edwards Under. Water District v. Allen, *et al.*, Cause No. 95-0815, 274th Jud. Dist. Ct., Hays County, Texas.
 - 1.9 Conn v. Bandera Electric Cooperative, Inc., Cause No. 7772-99, 216th Jud. Dist. Ct., Bandera County, Texas.
 - 1.10 In Re: the Adjudication of Rights To Water In the Edwards Aquifer, Cause No. 89-0381, 22d Jud. Dist Ct., Hays County, Texas.
2. Consultation with Attorney - Contemplated Litigation (§ 551.071)
3. Consultation with Attorney – Settlement Offers (§ 551.071)
 - 3.1 Compromise and Settlement Agreements
 - 3.1.1 Exceed authorized groundwater withdrawal amount in 2001 and failure to submit transfer:
 - Samuel R. Lyle and Jerlene Y. Lyle
 - 3.1.2 Exceed authorized groundwater withdrawal amount in 2002 and failure to submit transfer:
 - Arthur and Adeline Weiblen
 - North East Independent School
 - City of Shavano Park
 - 3.2 Demand Letters
 - 3.2.1. Abandoned well:
 - Roger Boyd, Rocket Water Company
 - Tommy Keck
 - 3.2.2 No Groundwater withdrawal rights:
 - Roger Boyd, Rocket Water Company
 - Jack Brown Cleaners
4. Consultation with Attorney - Attorney/Client Privileged Consultations (§ 551.071)
5. Deliberations Regarding Real Property (§ 551.072)

6. Deliberations Regarding Personnel Matters (§ 551.074)

6.1 General Manager's performance evaluation.

- V. Consider recommendation(s) regarding matters discussed in closed session.
- W. Discuss items for future board meeting agendas.
- X. Adjournment.

November 13, 2003


Jennifer Wong-Esparza
Administrative Assistant

In this Notice of Open Meeting, the posting of an agenda item as a matter to be discussed in open session is not intended to limit or require discussion of that matter in open session if it is otherwise appropriate to discuss the matter in executive session. If, during the discussion of any agenda item, a matter is raised that is appropriate for discussion in executive session the board may, as permitted by law, adjourn into executive session to deliberate on the matter.

The posting of an agenda item as a matter to be discussed in executive session is not intended to limit or require discussion of that matter in executive session. The Board may discuss in open session any matter for which notice has been given in this notice of open meeting, including an agenda item posted for executive session. In no event, however, will the Board take action on any agenda item in executive session, whether it be posted for open or executive session discussion.

Edwards Irrigation Transfers (L-15)

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. Planned voluntary transfers of 50,219 acft/yr (about 53 percent of eligible proposed Edwards irrigation rights in Bexar, Medina, and Uvalde Counties totaling 95,430 acft/yr) could effectively increase municipal water supply by about 42,700 acft/yr (85 percent of 50,219 acft/yr), after consideration of Critical Period Management reductions during drought. Volume III, Section 1.3 includes a detailed discussion of this management strategy.

Edwards Recharge – Type 2 Projects (L-18a)

Management strategy 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 Environmental Criteria were applied in the technical evaluations of projects comprising this management strategy located on streams which typically flow. Summaries of applicable instream flow criteria are included in Volume III, Appendix F. 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 Regional Water Plan. Volume III, Section 2.2 includes a detailed discussion of this management strategy.

Canyon Reservoir – River Diversion (G-15C)

Management strategy involves the purchase of stored water from Canyon Reservoir made available by amendment of Certificate of Adjudication No. 18-2074 to authorize additional diversions. An application for this amendment has been submitted by the Guadalupe-Blanco River Authority (GBRA) and is presently under consideration by the Texas Natural Resource

References are to
 Vol I, regional plan
 see page 5-135 -

Edwards Irrigation Transfers

RWPG From	WUG	WUG County	River Basin	WMS	WMS Type	Source County	Source Name	2000	2010	2020	2030	2040	2050
L	Lytle	Atascosa	Nueces		Existing Wells Groundwater - Expanded Use	Bexar	Edwards-BFZ Aquifer	450	450	450	450	644	644
L	Lytle	Atascosa	Nueces	Conservation - Municipal	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	5	9	10	8	8	5
L	Castle Hills	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	6	24	19	19	13	13
L	Irrigation	Bexar	Nueces	Conservation - Irrigation	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	877	877	877	877	877	877
L	Fort Sam Houston	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	27	67	54	54	40	27
L	Hollywood Park	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	5	16	18	22	16	9
L	China Grove	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	4	8	7	6	8	3
L	Windcrest	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	13	28	22	22	23	8
L	Leon Valley	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	14	57	56	57	43	31
L	Helotes	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	2	9	7	9	10	5
L	Hill Country Village	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	1	4	5	5	4	2
L	Lackland Afb	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	31	52	42	31	31	10
L	Irrigation	Bexar	San Antonio	Conservation - Irrigation	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	1,028	1,028	1,028	1,028	1,028	1,028
L	Randolph Afb	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	13	22	13	18	13	4
L	Schertz (Outside City)	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	5	12	10	10	11	4
L	Alamo Heights	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	16	33	26	26	27	9
L	Balcones Heights	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	8	17	14	15	16	6
L	Universal City	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	36	65	53	62	70	40
L	Terrell Hills	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	11	24	20	20	20	7
L	Olmos Park	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	5	12	10	10	11	4
L	Shavano Park	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	2	11	6	9	7	3
L	Schertz	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	13	15	15	17	18	20
L	San Antonio	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	29,610	38,185	36,477	33,805	35,710	37,555
L	San Antonio	Bexar	San Antonio	Aquifer Storage and Recovery	Aquifer Storage and Recovery	Bexar	Edwards-BFZ Aquifer	0	0	0	0	0	0
L	Bmwd (Other Subdns)	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	141	187	233	275	319	345
L	New Braunfels	Comal	Guadalupe	Conservation - Municipal	Conservation - Irrigation	Comal	Edwards-BFZ Aquifer	0	112	146	186	214	246
L	Schertz	Comal	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	0	0	0	0	0	0
L	Garden Ridge	Comal	Guadalupe	Conservation - Municipal	Conservation - Irrigation	Comal	Edwards-BFZ Aquifer	0	7	4	11	11	6
L	Schertz	Guadalupe	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	12	14	15	16	18	20
L	San Marcos	Hays	Guadalupe	Conservation - Municipal	Conservation - Irrigation	Hays	Edwards-BFZ Aquifer	84	223	219	191	248	161
K	County-Other	Hays	Colorado		Existing Wells Groundwater - Expanded Use	Hays	Edwards-BFZ Aquifer	4,000	4,000	4,000	4,000	4,000	4,000
L	Devine	Medina	Nueces	Conservation - Municipal	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	5	22	18	19	19	7
L	Devine 5-271	Medina	Nueces	Edwards Irr. Transfers	Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	800	800	800	800	800	800
L	County-Other 5-275	Medina	San Antonio	Edwards Irr. Transfers	Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	100	100	100	100	100	100
L	Castroville 5-277	Medina	San Antonio	" " "	Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	400	400	400	400	400	400
L	Castroville	Medina	San Antonio	Conservation - Municipal	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	3	13	11	12	12	8
L	Hondo 5-272	Medina	Nueces	Edwards Irr. Transfers	Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	1,300	1,300	1,300	1,300	1,300	1,300
L	Hondo	Medina	Nueces	Conservation - Municipal	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	47	88	89	104	118	133
L	Irrigation	Medina	San Antonio	Conservation - Irrigation	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	510	510	510	510	510	510
L	Irrigation	Medina	Nueces	Conservation - Irrigation	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	4,490	4,490	4,490	4,490	4,490	4,490
L	Lacoste	Medina	San Antonio	Conservation - Municipal	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	2	6	5	5	6	3
L	Lytle	Medina	Nueces	Edwards Irr. Transfers	Existing Wells Groundwater - Expanded Use	Bexar	Edwards-BFZ Aquifer	50	50	50	50	56	56
L	Mining 5-279	Medina	San Antonio	Edwards Irr. Transfers	Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	100	100	100	100	100	100

Add?

L	Lacoste 5-273	Medina	San Antonio	Edwards Irr. Transfer	Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	300	300	300	300	300	300
L	Irrigation	Uvalde	Nueces	Conservation - Irrigation	Conservation - Irrigation	Uvalde	Edwards-BFZ Aquifer	5,958	5,958	5,958	5,958	5,958	5,958
L	Sabinal 5-284	Uvalde	Nueces	Edwards Irr. Transfer	Existing Wells Groundwater - Expanded Use	Uvalde	Edwards-BFZ Aquifer	500	500	500	500	500	500
L	Sabinal	Uvalde	Nueces	Conservation - Municipal	Conservation - Irrigation	Uvalde	Edwards-BFZ Aquifer	4	7	8	6	7	4
L	Uvalde 5-285	Uvalde	Nueces	Edwards Irr. Transfer	Existing Wells Groundwater - Expanded Use	Uvalde	Edwards-BFZ Aquifer	2,500	3,500	3,500	4,500	4,500	5,000
L	Uvalde	Uvalde	Nueces	Conservation - Municipal	Conservation - Irrigation	Uvalde	Edwards-BFZ Aquifer	19	91	52	87	64	35

Demand

BFZ Supply

Atascosa

RWPG	WUG	River Basin	Category	2000	2000
L	IRRIGATION	NUECES	IRR	49652	2009 ✓
L	MINING	NUECES	MIN	1558	
L	LYTLE	NUECES	MUN	559	234 ✓
L	LIVESTOCK	SAN ANTONIO	STK	66	
L	LIVESTOCK	NUECES	STK	1742	
L	JOURDANTON	NUECES	MUN	815	
L	PLEASANTON	NUECES	MUN	2486	
L	POTEET	NUECES	MUN	1285	
L	IRRIGATION	SAN ANTONIO	IRR	1363	300 ✓
L	COUNTY-OTHER	SAN ANTONIO	MUN	101	
L	CHARLOTTE	NUECES	MUN	409	
L	COUNTY-OTHER	NUECES	MUN	2138	
L	STEAM ELECTRIC POWER	NUECES	PWR	12000	
					2543

13
(a)

Bexar

RWPG	WUG	River Basin	Category	2000	2000
L	ALAMO HEIGHTS	SAN ANTONIO	MUN	2799	1500 ✓
L	MANUFACTURING	SAN ANTONIO	MFG	16805	16757 ✓
L	LYTLE	NUECES	MUN	1	1 ✓
L	BALCONES HEIGHTS	SAN ANTONIO	MUN	731	312 ✓
L	LIVESTOCK	NUECES	STK	26	
L	BMWD (OTHER SUBDNS)	SAN ANTONIO	MUN	27999	12572 ✓
L	CASTLE HILLS	SAN ANTONIO	MUN	1714	505 ✓
L	LIVE OAK	SAN ANTONIO	MUN	1101	1134 1101 ✓
L	LEON VALLEY	SAN ANTONIO	MUN	2288	1718 ✓
L	LACKLAND AFB	SAN ANTONIO	MUN	3960	2738 ✓
L	KIRBY	SAN ANTONIO	MUN	1586	623 ✓
L	HOLLYWOOD PARK	SAN ANTONIO	MUN	1885	552 ✓
L	CHINA GROVE	SAN ANTONIO	MUN	259	104 ✓
L	CONVERSE	SAN ANTONIO	MUN	2127	567 ✓
L	IRRIGATION	NUECES	IRR	3380	251 ✓
L	MINING	NUECES	MIN	182	
L	LIVESTOCK	SAN ANTONIO	STK	1461	
L	HILL COUNTRY VILLAGE	SAN ANTONIO	MUN	510	149 ✓
L	HELOTES	SAN ANTONIO	MUN	360	208 ✓
L	FORT SAM HOUSTON	SAN ANTONIO	MUN	4073	2620 ✓
L	FAIR OAKS RANCH	SAN ANTONIO	MUN	1365	
L	ELMENDORF	SAN ANTONIO	MUN	64	31 ✓
L	✓ COUNTY-OTHER	SAN ANTONIO	MUN	20711	3517 ✓
L	✓ COUNTY-OTHER	NUECES	MUN	1030	
L	IRRIGATION	SAN ANTONIO	IRR	36623	22547 ✓
L	SCHERTZ (OUTSIDE CITY)	SAN ANTONIO	MUN	819	145 ✓
L	WINDCREST	SAN ANTONIO	MUN	1675	1904 1675 ✓
L	UNIVERSAL CITY	SAN ANTONIO	MUN	3386	1374 ✓
L	TERRELL HILLS	SAN ANTONIO	MUN	1090	550 ✓
L	STEAM ELECTRIC POWER	SAN ANTONIO	PWR	36000	
L	ST. HEDWIG	SAN ANTONIO	MUN	200	404 200 ✓
L	SOMERSET	SAN ANTONIO	MUN	191	70 ✓
L	SHAVANO PARK	SAN ANTONIO	MUN	1088	413 ✓
L	MINING	SAN ANTONIO	MIN	4781	
L	SCHERTZ	SAN ANTONIO	MUN	251	44 ✓
L	SAN ANTONIO	SAN ANTONIO	MUN	220405	99818 ✓
L	RANDOLPH AFB	SAN ANTONIO	MUN	1877	971 ✓
L	OLMOS PARK	SAN ANTONIO	MUN	519	208 ✓
					173841

176,384

Caldwell					
RWPG	WUG	River Basin	Category	2000	2000
L	IRRIGATION	COLORADO	IRR	18	
L	LIVESTOCK	COLORADO	STK	139	
L	LIVESTOCK	GUADALUPE	STK	696	
L	COUNTY-OTHER	COLORADO	MUN	121	
L	IRRIGATION	GUADALUPE	IRR	1204	
L	COUNTY-OTHER	GUADALUPE	MUN	3000	161 ✓
L	MINING	GUADALUPE	MIN	8	
L	MINING	COLORADO	MIN	13	
L	MARTINDALE	GUADALUPE	MUN	109	
L	MANUFACTURING	GUADALUPE	MFG	62	
L	LULING	GUADALUPE	MUN	1532	
L	LOCKHART	GUADALUPE	MUN	2279	

161

Comal					
RWPG	WUG	River Basin	Category	2000	2000
L	MANUFACTURING	GUADALUPE	MFG	3450	793 ✓
L	COUNTY-OTHER	GUADALUPE	MUN	5531	207 ✓
L	COUNTY-OTHER	SAN ANTONIO	MUN	1897	
L	FAIR OAKS RANCH	SAN ANTONIO	MUN	58	
L	IRRIGATION	GUADALUPE	IRR	393	344 ✓
L	SCHERTZ	SAN ANTONIO	MUN	150	27 ✓
L	MINING	GUADALUPE	MIN	5570	
L	IRRIGATION	SAN ANTONIO	IRR	66	549 66 ✓
L	NEW BRAUNFELS	GUADALUPE	MUN	10335	4802 ✓
L	GARDEN RIDGE	GUADALUPE	MUN	616	294 ✓
L	LIVESTOCK	SAN ANTONIO	STK	50	
L	LIVESTOCK	GUADALUPE	STK	306	

6533

Guadalupe					
RWPG	WUG	River Basin	Category	2000	2000
L	SCHERTZ	SAN ANTONIO	MUN	4612	817 ✓
L	CIBOLO	SAN ANTONIO	MUN	441	500 441 ✓
L	MCQUEENEY	GUADALUPE	MUN	251	
L	SEGUIN	GUADALUPE	MUN	4566	
L	MINING	GUADALUPE	MIN	186	
L	STEAM ELECTRIC POWER	GUADALUPE	PWR	10760	
L	MARION	SAN ANTONIO	MUN	131	102 ✓
L	MINING	SAN ANTONIO	MIN	10	
L	IRRIGATION	GUADALUPE	IRR	2194	
L	LIVESTOCK	SAN ANTONIO	STK	284	
L	IRRIGATION	SAN ANTONIO	IRR	326	
L	COUNTY-OTHER	SAN ANTONIO	MUN	1125	527 ✓
L	COUNTY-OTHER	GUADALUPE	MUN	4279	441 ✓
L	NEW BRAUNFELS	GUADALUPE	MUN	75	35 ✓
L	LIVESTOCK	GUADALUPE	STK	848	
L	MANUFACTURING	GUADALUPE	MFG	1883	44 ✓

2407

9101

Hays					
RWPG	WUG	River Basin	Category	2000	2000
L	WOODCREEK	GUADALUPE	MUN	171	
L	COUNTY-OTHER	GUADALUPE	MUN	5569	357 ✓
K	MINING	COLORADO	MIN	12	9 ✓
L	KYLE	GUADALUPE	MUN	353	279 ✓
K	COUNTY-OTHER	COLORADO	MUN	2604	614 ✓
K	DRIPPING SPRINGS	COLORADO	MUN	371	
K	IRRIGATION	COLORADO	IRR	23	931 23
K	LIVESTOCK	COLORADO	STK	213	624 213
L	IRRIGATION	GUADALUPE	IRR	294	458 294
L	STEAM ELECTRIC POWER	GUADALUPE	PWR	0	
K	MANUFACTURING	COLORADO	MFG	288	922 288
K	BUDA	COLORADO	MUN	446	1855 446
L	LIVESTOCK	GUADALUPE	STK	271	
L	WIMBERLEY	GUADALUPE	MUN	615	
L	MINING	GUADALUPE	MIN	84	
L	SAN MARCOS	GUADALUPE	MUN	9393	3752 ✓
L	MANUFACTURING	GUADALUPE	MFG	93	902 93
					6368
Medina					
RWPG	WUG	River Basin	Category	2000	2000
L	CASTROVILLE	SAN ANTONIO	MUN	958	730 ✓
L	COUNTY-OTHER	SAN ANTONIO	MUN	441	316 ✓
L	MANUFACTURING	NUECES	MFG	302	825 302
L	MINING	NUECES	MIN	75	
L	LACOSTE	SAN ANTONIO	MUN	278	131 ✓
L	NATALIA	NUECES	MUN	397	
L	DEVINE	NUECES	MUN	953	287 ✓
L	LIVESTOCK	SAN ANTONIO	STK	276	
L	LIVESTOCK	NUECES	STK	1638	
L	HONDO	NUECES	MUN	2032	1109 ✓
L	LYTLE	NUECES	MUN	92	41 ✓
L	COUNTY-OTHER	NUECES	MUN	1961	668 ✓
L	IRRIGATION	SAN ANTONIO	IRR	24081	14244 ✓
L	MINING	SAN ANTONIO	MIN	68	
L	IRRIGATION	NUECES	IRR	120332	46624 ✓
					64452
Uvalde					
RWPG	WUG	River Basin	Category	2000	2000
L	IRRIGATION	NUECES	IRR	135168	78563 ✓
L	MINING	NUECES	MIN	444	
L	LIVESTOCK	NUECES	STK	1494	
L	COUNTY-OTHER	NUECES	MUN	1027	81 ✓
L	SABINAL	NUECES	MUN	510	263 ✓
L	MANUFACTURING	NUECES	MFG	600	1110 600
L	UVALDE	NUECES	MUN	5173	2738 ✓

82245

153,065

338,550

RWPG From	WUG	WUG County	River Basin	WMS	WMS Type	Source County	Source Name	2000	2010	2020	2030	2040	2050
L	Lytle	Atascosa	Nueces		Existing Wells Groundwater - Expanded Use	Bexar	Edwards-BFZ Aquifer	450	450	450	450	644	644
L	Lytle	Atascosa	Nueces	Conservation - Municipal	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	5	9	10	8	8	5
L	Castle Hills	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	6	24	19	19	13	13
L	Irrigation	Bexar	Nueces	Conservation - Irrigation	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	877	877	877	877	877	877
L	Fort Sam Houston	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	27	67	54	54	40	27
L	Hollywood Park	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	5	16	18	22	16	9
L	China Grove	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	4	8	7	6	8	3
L	Windcrest	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	13	28	22	22	23	8
L	Leon Valley	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	14	57	56	57	43	31
L	Helotes	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	2	9	7	9	10	5
L	Hill Country Village	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	1	4	5	5	4	2
L	Lackland Afb	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	31	52	42	31	31	10
L	Irrigation	Bexar	San Antonio	Conservation - Irrigation	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	1,028	1,028	1,028	1,028	1,028	1,028
L	Randolph Afb	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	13	22	13	18	13	4
L	Schertz (Outside City)	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	5	12	10	10	11	4
L	Alamo Heights	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	16	33	26	26	27	9
L	Balcones Heights	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	8	17	14	15	16	6
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L	Olmos Park	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	5	12	10	10	11	4
L	Shavano Park	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	2	11	6	9	7	3
L	Schertz	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	13	15	15	17	18	20
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L	Bmwd (Other Subdns)	Bexar	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	141	187	233	275	319	345
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L	Schertz	Comal	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	0	0	0	0	0	0
L	Garden Ridge	Comal	Guadalupe	Conservation - Municipal	Conservation - Irrigation	Comal	Edwards-BFZ Aquifer	0	7	4	11	11	6
L	Schertz	Guadalupe	San Antonio	Conservation - Municipal	Conservation - Irrigation	Bexar	Edwards-BFZ Aquifer	12	14	15	16	18	20
L	San Marcos	Hays	Guadalupe	Conservation - Municipal	Conservation - Irrigation	Hays	Edwards-BFZ Aquifer	84	223	219	191	248	161
K	County-Other	Hays	Colorado		Existing Wells Groundwater - Expanded Use	Hays	Edwards-BFZ Aquifer	4,000	4,000	4,000	4,000	4,000	4,000
L	Devine	Medina	Nueces	Conservation - Municipal	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	5	22	18	19	19	7
L	Devine	Medina	Nueces		Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	800	800	800	800	800	800
L	County-Other	Medina	San Antonio		Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	100	100	100	100	100	100
L	Castroville	Medina	San Antonio		Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	400	400	400	400	400	400
L	Castroville	Medina	San Antonio	Conservation - Municipal	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	3	13	11	12	12	8
L	Hondo	Medina	Nueces		Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	1,300	1,300	1,300	1,300	1,300	1,300
L	Hondo	Medina	Nueces	Conservation - Municipal	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	47	88	89	104	118	133
L	Irrigation	Medina	San Antonio	Conservation - Irrigation	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	510	510	510	510	510	510
L	Irrigation	Medina	Nueces	Conservation - Irrigation	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	4,490	4,490	4,490	4,490	4,490	4,490
L	Lacoste	Medina	San Antonio	Conservation - Municipal	Conservation - Irrigation	Medina	Edwards-BFZ Aquifer	2	6	5	5	6	3
L	Lytle	Medina	Nueces		Existing Wells Groundwater - Expanded Use	Bexar	Edwards-BFZ Aquifer	50	50	50	50	56	56
L	Mining	Medina	San Antonio		Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	100	100	100	100	100	100

L	Lacoste	Medina	San Antonio		Existing Wells Groundwater - Expanded Use	Medina	Edwards-BFZ Aquifer	300	300	300	300	300	300
L	Irrigation	Uvalde	Nueces	Conservation - Irrigation	Conservation - Irrigation	Uvalde	Edwards-BFZ Aquifer	5,958	5,958	5,958	5,958	5,958	5,958
L	Sabinal	Uvalde	Nueces		Existing Wells Groundwater - Expanded Use	Uvalde	Edwards-BFZ Aquifer	500	500	500	500	500	500
L	Sabinal	Uvalde	Nueces	Conservation - Municipal	Conservation - Irrigation	Uvalde	Edwards-BFZ Aquifer	4	7	8	6	7	4
L	Uvalde	Uvalde	Nueces		Existing Wells Groundwater - Expanded Use	Uvalde	Edwards-BFZ Aquifer	2,500	3,500	3,500	4,500	4,500	5,000
L	Uvalde	Uvalde	Nueces	Conservation - Municipal	Conservation - Irrigation	Uvalde	Edwards-BFZ Aquifer	19	91	52	87	64	35



4.18-1

December 11, 2003

Mr. Con Mims
Nueces River Authority
P.O. Box 349
Uvalde, Texas 78802-0349

Dear Mr. Mims:


On the November 18, 2003, the Edwards Aquifer Authority (Authority) approved the enclosed Revised Groundwater Management Plan (Revised GMP) for submission to the Texas Water Development Board pursuant to §36.1071 of the Texas Water Code.

31 TAC §356.6 (a)(4) directs the Authority to coordinate development of the Revised GMP with surface water entities within its region. The Authority purposely developed the Revised GMP with information approved by the South Central Texas Regional Water Planning Group in order to remain consistent with regional planning initiatives.

A copy of the Revised GMP has also been sent to Ms. Evelyn Bonavita, Region L Chair, with the request that Region L review the Revised GMP and identify any conflicts between the Revised GMP and the 2001 approved regional water plan.

If you have questions, please contact Mr. Ray Buck, Water Resource Coordinator, at (210) 477-5113 or me at (210) 222-2204.

Sincerely,


Gregory M. Ellis
General Manager

GME:RB/ns
Enclosure

cc: Texas Water Development Board





12

4.18-1

December 11, 2003

Mr. Bill West
Guadalupe Blanco River Authority
933 E. Court Street.
Seguin, TX 78155

Dear Mr. West:

On the November 18, 2003, the Edwards Aquifer Authority (Authority) approved the enclosed Revised Groundwater Management Plan (Revised GMP) for submission to the Texas Water Development Board pursuant to §36.1071 of the Texas Water Code.

31 TAC §356.6 (a)(4) directs the Authority to coordinate development of the Revised GMP with surface water entities within its region. The Authority purposely developed the Revised GMP with information approved by the South Central Texas Regional Water Planning Group in order to remain consistent with regional planning initiatives.

A copy of the Revised GMP has also been sent to Ms. Evelyn Bonavita, Region L Chair, with the request that Region L review the Revised GMP and identify any conflicts between the Revised GMP and the 2001 approved regional water plan.

If you have questions, please contact Mr. Ray Buck, Water Resource Coordinator, at (210) 477-5113 or me at (210) 222-2204.

Sincerely,

Gregory M. Ellis
General Manager

GME:RB/ns
Enclosure

cc: Texas Water Development Board





12

4.18-1

December 11, 2003

Mr. Greg Rothe
San Antonio River Authority
P.O. Box 839980
San Antonio, Texas 78283

Dear Mr. Rothe:


On the November 18, 2003, the Edwards Aquifer Authority (Authority) approved the enclosed Revised Groundwater Management Plan (Revised GMP) for submission to the Texas Water Development Board pursuant to §36.1071 of the Texas Water Code.

31 TAC §356.6 (a)(4) directs the Authority to coordinate development of the Revised GMP with surface water entities within its region. The Authority purposely developed the Revised GMP with information approved by the South Central Texas Regional Water Planning Group in order to remain consistent with regional planning initiatives.

A copy of the Revised GMP has also been sent to Ms. Evelyn Bonavita, Region L Chair, with the request that Region L review the Revised GMP and identify any conflicts between the Revised GMP and the 2001 approved regional water plan.

If you have questions, please contact Mr. Ray Buck, Water Resource Coordinator, at (210) 477-5113 or me at (210) 222-2204.

Sincerely,



Gregory M. Ellis
General Manager

GME:RB/ns
Enclosure

cc: Texas Water Development Board





EDWARDS AQUIFER
AUTHORITY

12

4.18-1

December 11, 2003

Ms. Evelyn Bonavita, Chair
South Central Texas Regional Water Planning Group
SARA's address

Dear Ms. Bonavita:


On the November 18, 2003, the Edwards Aquifer Authority (Authority) approved the enclosed Revised Groundwater Management Plan (Revised GMP) for submission to the Texas Water Development Board per TWC §36.1071.

31 TAC §356.6 (a)(5) directs the Authority to submit the Revised GMP to any Regional Water Planning Group in which the Authority is located.

Please review the enclosed Revised GMP and note any potential conflicts between this plan and the Texas Water board approved regional water plan. Note, the Authority purposely developed the Revised GMP with information approved by the South Central Texas Regional Water Planning Group in order to remain consistent with regional planning initiatives.

If you have questions, please contact Mr. Ray Buck, Water Resource Coordinator, at (210) 477-5113 or me at (210) 222-2204.

Sincerely,



Gregory M. Ellis
General Manager

GME:RB/ns
Enclosure

cc: Texas Water Development Board



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Ms. Evelyn Bonavita
 Region L. Chair
 San Antonio River Authority
 P.O. Box 839980
 San Antonio, Texas 78283

2. Article Number

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 Street or P.O. Box: San Antonio River Authority
 P.O. Box 839980
 City: San Antonio, Texas 78283

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 San Antonio River Authority
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1. Article Addressed to:

Mr. Con Mims
 Nueces River Authority
 P.O. Box 349
 Uvalde, Texas 78802-0349

2. Article Number

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To: Mr. Con Mims
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 P.O. Box 349
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1. Article Addressed to:

Mr. Bill West
 Guadalupe Blanco River Authority
 933 E. Court Street
 Seguin, Texas 78155

2. Article Number

7002 3150 0004 5396 7556

COMPLETE THIS SECTION ON DELIVERY

A. Signature Agent
 Addressee

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Mr. Bill West
 Guadalupe Blanco River Authority
 933 E. Court Street
 Seguin, Texas 78155

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EDWARDS AQUIFER AUTHORITY RULES

TABLE OF CONTENTS

CHAPTER 701. GENERAL PROVISIONS.....1

 § 701.1 Purpose of Rules 1

 § 701.3 Construction of Rules 1

 § 701.5 Business Office and Mailing Address of the Authority 1

CHAPTER 702. GENERAL DEFINITIONS2

 § 702.1 General Definitions2

CHAPTER 703. RULEMAKING PROCEDURES9

 § 703.1 Applicability9

 § 703.3 Public Hearings on Proposed Rules.....9

 § 703.5 Notice of Proposed Rules.....10

 § 703.7 Notice of Public Hearings on Proposed Rules10

 § 703.9 Written Comments and Responses.....10

 § 703.11 Posting of Rulemaking Information on the Internet11

 § 703.13 Effective Date of Rules 11

CHAPTER 705. JURISDICTION OF THE EDWARDS AQUIFER AUTHORITY12

 § 705.1 Groundwater12

 § 705.3 Surface Water.....12

CHAPTER 707. PROCEDURE BEFORE THE AUTHORITY.....13

 Subchapter A. Definitions.....16

 § 707.1 Definitions.....16

 Subchapter B. General Provisions17

 § 707.101 Purpose.....17

 § 707.102 Computation of Time17

 § 707.103 Document Filing17

 § 707.104 Service of Documents.....18

 § 707.105 Change of Address or Telephone Number.....19

 § 707.106 Use of Forms.....19

 Subchapter C. Meetings of the Board.....20

 § 707.201 Meetings.....20

 § 707.202 Conduct and Decorum at Board Meetings.....20

 § 707.203 Filing Comments on Matter Set for a Board Meeting21

 § 707.205 Orders or Resolutions Showing Board Action.....21