

# **GOLIAD COUNTY GROUNDWATER CONSERVATION DISTRICT MANAGEMENT PLAN**

**Adopted September 22, 2008**

## **DISTRICT MISSION**

The Goliad County Groundwater Conservation District (GCGCD) will provide, through the making and enforcement of rules, for the protection, preservation, and conservation of groundwater, and will prevent waste of groundwater from the Gulf Coast Aquifer to the extent of which the District has jurisdiction. The District will implement water conservation strategies and management strategies to maintain groundwater availability from the Gulf Coast Aquifer on a sustainable basis and work with other groundwater Districts in the groundwater management area to make this an achievable goal during the rulemaking process. The GCGCD Board will consider all groundwater uses and needs.

## **STATEMENT OF GUIDING PRINCIPLES**

Goliad County Groundwater Conservation District is dedicated to assure long-term availability of adequate good quality groundwater for Goliad and surrounding counties. Goliad and surrounding counties have a large agricultural based rural community, which relies heavily on groundwater. Therefore, groundwater resources are of vital importance to the continued vitality of the citizens, economy and environment within the District area.

Goliad County is located over the recharge area of the Evangeline and Chicot segment of the Gulf Coast Aquifer. It is imperative that the Gulf Coast Aquifer be managed on a sustainable basis to protect the many shallow domestic wells in the District and many more in surrounding counties. The preservation of the groundwater resources can be managed in the most prudent and cost-effective manner through the regulation of large capacity wells as affected by the District's well production and well spacing rules.

## **GENERAL DESCRIPTION**

The Goliad County Groundwater Conservation District was created in 2001 by authority of HB3651 of the 77<sup>th</sup> Texas Legislature. Goliad County voters approved the District on November 6, 2001. The original management plan was adopted on February 6, 2003, and approved by the Texas Water Development Board on May 12, 2003. The District has the same boundary as Goliad County, Texas containing 551,040 acres of land with 90 percent of this acreage being utilized as rangeland for livestock production. The District (County) bounded on the north by DeWitt County, on the east by Victoria County, on the South by Refugio County, and on the west by Bee County and Karnes County.

## **TIME PERIOD OF THIS PLAN**

This District Management Plan becomes effective immediately following adoption by the Goliad County Groundwater Conservation District Board of Directors and approval as administratively complete by the Texas Water Development Board. This plan will remain in effect for a period of 5 years or until a revised or amended plan may be approved, whichever comes first.

## **GROUNDWATER RESOURCES**

The outcrop region of the Evangeline Aquifer and the Chicot Aquifer, both components of the Gulf Coast Aquifer, is the source of water for Goliad County.

### **Gulf Coast Aquifer**

The Gulf Coast aquifer forms a wide belt along the Gulf of Mexico from Florida to Mexico. In Texas, the aquifer provides water to all or parts of 54 counties and extends from the Rio Grande northeastward to the Louisiana-Texas border. Municipal and irrigation uses account for 90 percent of the total pumpage from the aquifer. The Greater Houston metropolitan area is the largest municipal user, where well yields average about 1,600 gal/min.

The aquifer consists of complex interbedded clays, silts, sands, and gravels of Cenozoic age, which are hydrologically connected to form a large, leaky artesian aquifer system. This system comprises four major components consisting of the following generally recognized water-producing formations. The deepest is the Catahoula, which contains ground water near the outcrop in relatively restricted sand layers. Above the Catahoula is the Jasper aquifer, primarily contained within the Oakville Sandstone. The Burkeville confining layer separates the Jasper from the overlying Evangeline aquifer, which is contained within the Fleming and Goliad sands. The Chicot aquifer, or upper component of the Gulf Coast aquifer system, consists of the Lissie, Willis, Bentley, Montgomery, and Beaumont formations, and overlying alluvial deposits. Not all formations are present throughout the system, and nomenclature often differs from one end of the system to the other. Maximum total sand thickness ranges from 700 feet in the south to 1,300 feet in the northern extent.

Water quality is generally good in the shallower portion of the aquifer. Ground water containing less than 500 mg/l dissolved solids is usually encountered to a maximum depth of 3,200 feet in the aquifer from the San Antonio River Basin northeastward to Louisiana. From the San Antonio River Basin southwestward to Mexico, quality deterioration is evident in the form of increased chloride concentration and saltwater encroachment along the coast. Little of this ground water is suitable for prolonged irrigation due to either high salinity or alkalinity, or both. In several areas at or near the coast, including Galveston Island and the central and southern parts of Orange County, heavy municipal or industrial pumpage had previously caused an updip migration, or saltwater intrusion, of poor-quality water into the aquifer. Recent reductions in pumpage here have resulted in stabilization and, in some cases, even improvement of ground-water quality.

Years of heavy pumpage for municipal and manufacturing use in portions of the aquifer have resulted in areas of significant water-level decline. Declines of 200 feet to 300 feet have been measured in some areas of eastern and southeastern Harris and northern Galveston counties. Other areas of significant water-level declines include the Kingsville area in Kleberg County and portions of Jefferson, Orange, and Wharton counties. Some of these declines have resulted in compaction of dewatered clays and significant land surface subsidence. Subsidence is generally less than 0.5 foot over most of the Texas coast, but

has been as much as nine feet in Harris and surrounding counties. As a result, structural damage and flooding have occurred in many low-lying areas along Galveston Bay in Baytown, Texas City, and Houston. Conversion to surface-water use in many of the problem areas has reversed the decline trend.

The portion of the Gulf Coast Aquifer in the Goliad County area contains generally good quality water. The Aquifer depth ranges from approximately 450 feet in north Goliad County to approximately 1200 feet in south Goliad County.

## References

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Wesselman, J.B., 1967, Ground-water resources of Jasper and Newton counties, Texas: TWDB Rept. 59, 167 p.

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## GROUNDWATER RECHARGE

The following data is from the Texas Cooperative Extension for Goliad County. Goliad County's yearly rainfall has been recorded since 1913. The lowest rainfall year was 1917 and with 9.73 inches and the highest year was 1981 with 66.4 inches. The average annual rainfall from 1913 through 2007 was 35 inches. From a study conducted by GCGCD, sixty to seventy percent (60 to 70%) of the annual rainfall normally occurs in 4 to 5% of the days. The remaining 30 to 40% is in small amounts most of which will be utilized by vegetation or evaporated. Using the yearly average of 35 inches, 65% of rainfall equals 23 inches. Much of these 23 inches occurs during rainstorms and is therefore lost as surface water runoff to ditches, ravines, creeks, and rivers. The net result is that annually only a few net inches of rainfall actually can be applied as aquifer recharge. During drought periods, a significant negative recharge can occur.

### Recharge Rates for the Major Aquifers (from TWDB Website).

The main techniques for estimating recharge are Darcy's law, groundwater modeling, and base flow discharge. Darcy's Law is widely applied in the confined sections of the Carrizo-Wilcox and Gulf Coast Aquifers. Groundwater modeling is used in most aquifers.

Recharge rates in the Gulf Coast Aquifer range from 0.1 to 2 in/yr. The Gulf Coast Aquifer higher recharge rates are in upland areas with sandy soils.

The District (Goliad County) consists of 551,040 acres. Using TWDB published recharge rate of the Gulf Coast Aquifer of 0.0004 to 2 inches per year the annual recharge range calculates to range from 18.4 acre feet to 91,840 acre feet.

From the TWDB GAM Run 5-27 the recharge for the aquifers utilized, the Chicot and the Evangeline, is as follows:

Chicot average recharge =	10,612 AFY
Chicot drought of record recharge =	5,582 AFY
Evangeline average recharge =	7,468 AFY
Evangeline drought of record recharge =	3,928 AFY

Recharge is only one component of a water budget in determining the future condition of an aquifer. GAM run 5-27 is a good illustration. At a projected pumping rate of 6,605 AFY from the Chicot and Evangeline Aquifers, water is required to be taken from storage (reduction of aquifer volume) even though recharge is significantly greater than pumping.

GCGCD has monitored water levels in 50+ wells and plans to add additional wells to the monitor program. This monitoring program has been in place for 5 years and in another 5 years should be able to provide valuable information to the aquifer modeling program.

**Summary of Water Budget from TWDB GAM Run 08-09 Averaged for Years 1981-1999**

Table 1: Selected flow terms for each aquifer layer, into and out of the Goliad County Groundwater Conservation District, averaged for the years 1981 to 1999 from the groundwater availability model of the central part of the Gulf Coast Aquifer. Flows include fresh to slightly saline waters. Flows are reported in acre-feet per year. All numbers are rounded to the nearest 1 acre-foot. Note: a negative sign refers to flow out of the aquifer in the district. A positive sign refers to flow into the aquifer in the district.

Aquifer	Surface water inflow	Surface water outflow	Lateral inflow into district	Lateral outflow from district	Net inter-aquifer flow (upper)	Net inter-aquifer flow (lower)
Chicot (Layer 1)	3,360	-8,583	712	-4,586	0	-771
Evangeline (Layer 2)	11,441	-13,996	3,641	-9,299	771	369
Burkeville (Layer 3)	0	0	46	-50	-369	265
Jasper (Layer 4)	0	0	647	-503	-265	0

Table 2: Summarized information needed for the Goliad County Ground Water Conservation District's management plan. All values reported in acre-feet per year. All numbers are rounded to the nearest 1 acre-foot.

Management Plan requirement	Aquifer	Results
Estimated annual amount of recharge from precipitation to the district	Chicot (Layer 1)	9,437
	Evangeline (Layer 2)	7,139
	Burkeville (Layer 3)	0
	Jasper (Layer 4)	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Chicot (Layer 1)	8,583
	Evangeline (Layer 2)	13,996
	Burkeville (Layer 3)	0
	Jasper (Layer 4)	0
Estimated annual volume of flow into the district within each aquifer in the district	Chicot (Layer 1)	712
	Evangeline (Layer 2)	3,641
	Burkeville (Layer 3)	46
	Jasper (Layer 4)	647
Estimated annual volume of flow out of the district within each aquifer in the district	Chicot (Layer 1)	4,586
	Evangeline (Layer 2)	9,299
	Burkeville (Layer 3)	50
	Jasper (Layer 4)	503
Estimated annual net volume of flow between each aquifer in the district	Chicot into Evangeline	771
	Burkeville into Evangeline	369
	Burkeville into Jasper	265

## **Summary of Water Budget Using Current Pumping**

TWDB GAM 5-27 attached information for normal and drought of record 2005 pumpage of 4,304 AFY for Chicot and Evangeline Aquifers is projected out to a pumping of 6,605 AFY which is projected to occur prior to the year 2010.

The charts on next page show the annual flow, in acre-feet, of water into (Inflow) and out of (outflow) each aquifer in the GMA for the central part of the Gulf Coast aquifer in Goliad County. The components of the budgets are:

Lakes and Reservoirs – This is water that flows into an aquifer from a surface lake or reservoir.

Wetlands – This is water that drains from an aquifer if water levels are above the elevation of the wetlands.

Wells – This is water produced from wells in each aquifer.

Rivers and Streams – This is water that flows between streams and rivers and an aquifer.

Recharge – This component simulates areally distributed recharge due to precipitation falling on out crop areas of aquifers.

Evapotranspiration – This is water that flows out of an aquifer due to direct evaporation and plant transpiration.

Storage – This is water stored in the aquifer.

Flow between aquifers – This describes the vertical flow, or leakage, between two aquifers.

**Summary of Water Budget for Goliad County Using Drought-of-Record Recharge  
(flows in acre-feet/year)**

<b>Chicot Aquifer</b>		
	Inflow	Outflow
Lakes and Reservoirs*	1,543	0
Wetlands**	0	8
Well	0	1,049
Rivers and Streams***	3,238	6,705
Recharge	5,582	0
Evapotranspiration	0	1,058
Storage	2,247	0
Lateral inflow	926	4,162
Flow between Evangeline Aquifer	799	1,353
<b>Total Water Budget</b>	<b>14,334</b>	<b>14,334</b>
<b>Evangeline Aquifer</b>		
	Inflow	Outflow
Lakes and Reservoirs*	0	0
Wetlands**	0	1
Well	0	5,556
Rivers and Streams***	23,558	13,835
Recharge	3,928	0
Evapotranspiration	0	92
Storage	1,343	0
Lateral inflow	9,557	19,766
Flow between Chicot Aquifer	1,353	799
Flow between Burkeville Confining Unit	505	204
<b>Total Water Budget</b>	<b>40,244</b>	<b>40,253</b>
*Lakes and reservoirs were modeled using the MODFLOW river package		
**Wetlands were modeled using the MODFLOW drain package		
***Rivers and streams were modeled using the MODFLOW stream package		

**Summary of Water Budget for Goliad County Using Average Recharge  
(flows in acre-feet/year)**

<b>Chicot Aquifer</b>		
	Inflow	Outflow
Lakes and Reservoirs*	1,491	0
Wetlands**	0	12
Well	0	1,049
Rivers and Streams***	2,721	8,266
Recharge	10,612	0
Evapotranspiration	0	1,200
Storage	38	0
Lateral inflow	970	4,436
Flow between Evangeline Aquifer	799	1,659
<b>Total Water Budget</b>	<b>16,623</b>	<b>16,622</b>
<b>Evangeline Aquifer</b>		
	Inflow	Outflow
Lakes and Reservoirs*	0	0
Wetlands**	0	1
Well	0	5,556
Rivers and Streams***	22,987	15,603
Recharge	7,468	0
Evapotranspiration	0	104
Storage	96	0
Lateral inflow	9,649	19,992
Flow between Chicot Aquifer	1,659	791
Flow between Burkeville Confining Unit	442	245
<b>Total Water Budget</b>	<b>42,302</b>	<b>42,292</b>
*Lakes and reservoirs were modeled using the MODFLOW river package		
**Wetlands were modeled using the MODFLOW drain package		
***Rivers and streams were modeled using the MODFLOW stream package		



## GROUNDWATER RECHARGE ENHANCEMENT

60 to 70% of the District's annual rainfall occurs during large rainstorms and much of this rainfall is lost as surface water runoff. By installing small reservoirs on drainage gullies some of the runoff can be captured and will serve to recharge the Aquifer. An additional benefit of these reservoirs is water for livestock and wildlife, and erosion control. Annually landowners are installing new surface stock tanks. GCGCD is researching the possibility of enhancing this program as needed.

## GOLIAD COUNTY HISTORIC GROUNDWATER PUMPING USE

In acre feet

CATEGORY	2003 <sup>1</sup>	2004 <sup>1</sup>	2005 <sup>2</sup>	2006 <sup>2</sup>	2007 <sup>2</sup>
Municipal	885	659*	1023	1062	1087
Manufacturing	0	0	0	0	0
Steam - Electric	127	98	150	150	150
Irrigation	1894	1585	1007	2499	2500
Mining, Incl. (Oil and Gas)	13	7	398	1200	1200
Livestock	941	40**	1360	920	920
Recreation	0	0	110	192	192
Industrial	0	0	33	173	173
Miscellaneous Usages			221		
Fire Departments, not municipal	0	0	2	4	4
<b>Water use totals</b>	<b>3860</b>	<b>2389</b>	<b>4304</b>	<b>6200</b>	<b>6226</b>

<sup>1</sup> Source of 2003 and 2004 numbers is the TWDB Water Use Survey

\*State Water Plan numbers for 2004 are not consistent with Historic Population growth. The numbers used are being required by TWDB.

\*\* State Water Plan numbers are not consistent with State Livestock Inventory. The numbers used are being required by TWDB.

<sup>2</sup> Values shown are from GCGCD records.

Groundwater use values in the Region L Water Plan and subsequently in the State Water Plan may be lower than those provided by GCGCD for the following reasons:

1. The Region L Water Plan provides no usage numbers for oil and gas exploration.
2. The Region L Water Plan understates groundwater use for livestock during drought.
3. GCGCD has recently issued new permits for irrigation.
4. The Region L Plan does not provide groundwater use for ISL uranium mining.
5. The Region L Plan does not allocate groundwater use for the Coletto Creek Reservoir recreational activity.

November 20, 2007

GOLIAD COUNTY GROUNDWATER PUMPING AND USE  
2007

CATEGORY	1999	2005	2006	2007	Projected				
County/ Other Domestic	543	576	630	650	1000	Region L 2000 number, 543, pop. Growth adds to			
Municipal	365	447	375	380	450	number for 2006 pop. Growth			
Manufacturing	0	0	0	0	100				
Steam - Electric	150	150	150	150	275				
Irrigation	1524	1007	2499	2500	2500	1999 from HUAC's, 2006 number reflect new permits for Irrigation			
Mining, Incl (Oil and Gas)	387	398	1200	1200	1000				
Livestock	920	1360	920	920	920	Region L Plan numbers are consistent with our figures			
Recreation	192	110	192	192	200				
Industrial	18	33	173	173	200	1999 # from HUAC - new permits for 2006, includes 4.8 in water sales by Fannin WSC and 3 acft by Schroeder VFD in water sales permit			
Miscellaneous Usages		221				2005 #'s reflect information from HUAC's concerning springs, artesian wells, hunting leases and recreation associated with wildlife management			
Fire Departments, not municipal	2	2	4	4	10	Weasatche and Fannin in 1999, added Schroeder and Ander for 2006 numbers			
Uranium Mining & Exploration					2800	700 acft per mining area X 4			
Airpark Development					130	This includes the possible operation of a 1000 bed detention center at the Air Park			
<b>Water use totals</b>	<b>4101</b>	<b>4304</b>	<b>6143</b>	<b>6169</b>	<b>9585</b>				

### Historical Groundwater Pumpage Summary for Goliad County

Unit: Acre Feet (ACFT)

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Year	Aquifer	County	Municipal	Manufacturing	Power	Irrigation	Mining	Livestock	Total
1980	GULF COAST	Goliad	834	0	153	0	0	223	1,210
1984	GULF COAST	Goliad	876	0	132	23	540	110	1,681
1985	GULF COAST	Goliad	808	0	146	23	1	131	1,109
1986	GULF COAST	Goliad	836	0	173	26	1	105	1,141
1987	GULF COAST	Goliad	864	0	160	26	0	97	1,147
1988	GULF COAST	Goliad	892	0	145	21	0	85	1,143
1989	GULF COAST	Goliad	931	0	150	164	0	84	1,329
1990	GULF COAST	Goliad	915	0	136	205	0	87	1,343
1991	GULF COAST	Goliad	864	0	93	185	13	90	1,245
1992	GULF COAST	Goliad	861	0	113	185	13	121	1,293
1993	GULF COAST	Goliad	872	0	115	31	13	118	1,149
1994	GULF COAST	Goliad	858	0	108	59	13	118	1,156
1995	GULF COAST	Goliad	873	0	95	49	13	118	1,148
1996	GULF COAST	Goliad	957	0	115	53	13	87	1,225
1997	GULF COAST	Goliad	912	0	125	53	13	90	1,193
1998	GULF COAST	Goliad	936	0	140	53	13	103	1,245
1999	GULF COAST	Goliad	912	0	140	0	13	116	1,181
2000	GULF COAST	Goliad	915	0	156	147	13	92	1,323
2001	GULF COAST	Goliad	838	0	141	103	13	95	1,190
2002	GULF COAST	Goliad	917	0	138	251	13	90	1,409
2003	GULF COAST	Goliad	885	0	127	1,894	13	941	3,860

NOTE: All Pumpage reported in acre-feet

Source: TWDB Water Use Survey Database (<http://www.twdb.state.tx.us/wushistorical/DesktopDefault.aspx?PageID=2>)

TWDB: 03/16/2007

Disclaimer: The Water Use estimates posted are subject to revision as additional data and corrections are made available to the TWDB.

Page 1 of 1

Friday, March 16, 2007

**Historical Water Use Summary by Groundwater (GW) and Surface Water (SW)**

Unit: Acre Feet (ACFT)

<b>GOLIAD COUNTY</b>								
Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
2004	GW	659	0	98	1,585	7	40	2,389
2004	SW	0	0	2,055	0	0	1,100	3,155
<b>Total</b>		<b>659</b>	<b>0</b>	<b>2,153</b>	<b>1,585</b>	<b>7</b>	<b>1,140</b>	<b>5,544</b>

Disclaimer: The Water Use estimates posted are subject to revision as additional data and corrections are made available to the TWDB.

Wednesday, June 25, 2008

**Historical Water Use Summary by County/Basin**

Unit: Acre Feet (ACFT)

<b>GOLIAD COUNTY</b>								
Year	Basin	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
2004	GUADALUPE	242	0	2,153	285	3	253	2,936
2004	SAN ANTONIO	355	0	0	1,094	0	444	1,893
2004	SAN ANTONIO NUECES	62	0	0	206	4	443	715
		<b>659</b>	<b>0</b>	<b>2,153</b>	<b>1,585</b>	<b>7</b>	<b>1,140</b>	<b>5,544</b>

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Monday, June 09, 2008

**CURRENT AND PROJECTED GROUNDWATER PUMPAGE AND USE**  
**In acre feet**

<b>GOLIAD COUNTY GROUNDWATER PUMPING</b>							
<b>CATEGORY</b>	<b>2007</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>
County/Other Domestic	650	667	734	807	888	977	1075
Municipal – Goliad & WSC	437	473	480	527	553	577	594
Manufacturing	0	0	100	100	150	150	200
Steam – Electric	150	150	275	275	275	400	400
Irrigation	2500	2500	2500	2000	2000	1500	1500
Mining, Including Oil & Gas	1200	1200	1000	1000	500	500	500
Livestock	920	920	920	900	900	850	850
Recreation	192	200	250	250	300	300	350
Industrial	173	200	200	200	250	250	300
Fire Departments, Rural	4	4	6	6	8	8	10
Uranium Mining & Exploration	0	800	2400	2800	2400	800	0
Airpark Development	0	0	150	150	200	200	250
<b>Total Water Budget</b>	<b>6226</b>	<b>7114</b>	<b>9015</b>	<b>9015</b>	<b>8424</b>	<b>6512</b>	<b>6029</b>

Over the next 50 years the District projects that use of Gulf Coast Aquifer Groundwater for livestock will remain relatively constant. Irrigation use may decline as cropland continues to be converted to grassland. Domestic rural use of groundwater is projected to increase significantly due to continued rural population increase.

2007 State Water Plan Projected Water Needs

Goliad County

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RWPG	WUG	County	River Basin	2010	2020	2030	2040	2050	2060
L	Goliad	Goliad	San Antonio	0	0	0	0	0	0
L	County Other	Goliad	Guadalupe	0	0	0	0	0	0
L	County Other	Goliad	San Antonio	0	0	0	0	0	0
L	County Other	Goliad	San Antonio-Nueces	0	0	0	0	0	0
L	Steam Electric Power	Goliad	Guadalupe	0	0	0	0	-2,010	-4,842
L	Mining	Goliad	Guadalupe	0	0	0	0	0	0
L	Mining	Goliad	San Antonio-Nueces	0	0	0	0	0	0
L	Irrigation	Goliad	San Antonio	0	0	0	0	0	0
L	Livestock	Goliad	Guadalupe	0	0	0	0	0	0
L	Livestock	Goliad	San Antonio	0	0	0	0	0	0
L	Livestock	Goliad	San Antonio-Nueces	0	0	0	0	0	0
L	Manufacturing	Goliad	San Antonio	0	0	0	0	0	0
L	Irrigation	Goliad	Guadalupe	0	0	0	0	0	0
L	Irrigation	Goliad	San Antonio-Nueces	0	0	0	0	0	0
L	Mining	Goliad	San Antonio	0	0	0	0	0	0
<b>Total Projected Water Needs (acre-feet per year) =</b>				<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-2,010</b>	<b>-4,842</b>

Source: Volume 3, 2007 State Water Planning Database

4/13/2007

**2007 State Water Plan Projected Water Demands  
Goliad County  
Combined Surface and Groundwater**

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RWPG	Water User Group	County	River Basin	2000	2010	2020	2030	2040	2050	2060
L	Goliad	Goliad	San Antonio	365	426	501	561	600	630	649
L	County Other	Goliad	Guadalupe	256	299	351	393	421	442	455
L	County Other	Goliad	San Antonio	225	263	309	347	371	389	401
L	County Other	Goliad	San Antonio-Nueces	62	73	86	96	103	108	111
L	Steam Electric Power	Goliad	Guadalupe	9,027	9,136	9,245	10,808	12,714	15,038	17,870
L	Mining	Goliad	Guadalupe	9	137	98	73	51	30	20
L	Mining	Goliad	San Antonio-Nueces	4	132	93	68	46	25	15
L	Irrigation	Goliad	San Antonio	298	256	222	193	166	144	124
L	Livestock	Goliad	Guadalupe	202	202	202	202	202	202	202
L	Livestock	Goliad	San Antonio	359	359	359	359	359	359	359
L	Livestock	Goliad	San Antonio-Nueces	359	359	359	359	359	359	359
L	Manufacturing	Goliad	San Antonio	0	4	8	12	16	20	24
L	Irrigation	Goliad	Guadalupe	50	43	37	32	28	24	21
L	Irrigation	Goliad	San Antonio-Nueces	11	10	9	7	6	5	4
L	Mining	Goliad	San Antonio	0	129	91	64	43	21	11
<b>Total Projected Water Demands (acre-feet per year) =</b>				<b>11,227</b>	<b>11,828</b>	<b>11,970</b>	<b>13,574</b>	<b>15,485</b>	<b>17,796</b>	<b>20,625</b>

## **MANAGEMENT OF GROUNDWATER SUPPLIES**

The District will manage and conserve the supply of groundwater within the District in order to maintain the economic viability of the District, county, and region. This will be done through coordination with and cooperation with Groundwater Conservation Districts in GMA 15.

A monitor well observation network is established to track any changes in water level or quality. The District will make a regular assessment of conditions and report those conditions to the public.

The District will adopt rules to regulate groundwater withdrawals by means of well spacing and production limits. The District may deny a well construction permit or limit groundwater withdrawals in accordance with district rules.

Goliad County Groundwater Conservation District will manage groundwater availability from the Gulf Coast Aquifer on a sustainable basis to the extent possible. Any permitted pumping will be subject to curtailment based on water levels recorded by multiple monitor wells throughout the District.

The District is facing a new groundwater management issue with the introduction of uranium exploration and the potential for in-situ leach mining occurring in the District. Chapter 36 Texas Water Code does not address groundwater use and potential contamination associated with uranium exploration and mining. The District has implemented an extensive baseline water quality testing program which will continue as required. The District is also closely monitoring water levels and doing modeling to document the impact on water supplies based on proposed uranium in-situ leach mining activities.

## **SURFACE WATER SUPPLIES**

The San Antonio River runs through Goliad County. The only use of river water in the District is for irrigation.

There is one major surface water lake in the District. Coletto Creek Reservoir is located at the border of Victoria and Goliad counties in the lower Guadalupe River Basin, and is a cooling reservoir for steam-electric power generation. The reservoir supplies water for steam-electric power generation at Coletto Creek Power Station located in Goliad County. This constructed lake on Coletto Creek is to provide water to a coal-fired power plant. According to Table 3-3, page 3-9 of the 2006 Region L Water Plan, the annual authorized diversion of the Coletto Creek Reservoir is 12,500 ac. ft. Footnote 4 of this table states: "The reservoir and supplemental authorized diversions from the adjacent river could support a firm yield in excess of the authorized consumptive use, however, operations of steam-electric power generation facilities could be impaired." Footnote 7 states "Includes rights to divert up to 20,000 acft/yr from the Guadalupe River to Coletto Creek Reservoir and to consume up to 12,500 acft/yr."

Because the predominant agriculture product is the raising of livestock, there are numerous stock tanks located within the District. These stock tanks provide surface water for livestock and wildlife consumption and provide some aquifer recharge. Many of these stock tanks go dry during drought periods.

The District is participating in a continuing program with USGS to qualify and quantify interface between the Gulf Coast Aquifer and surface streams. The current study is evaluating the interface with the aquifer and the San Antonio River, and it is proposed to expand the studies to some of the major creeks in the District.



**2007 State Water Plan Projected Surface Water Supplies  
Goliad County**

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RWPG	Water User Group	County	River Basin	Source Name	2000	2010	2020	2030	2040	2050	2060
L	Steam Electric Power	Goliad	Guadalupe	Coletto Creek Lake/ Reservoir	14,848	12,500	12,500	12,500	12,500	12,500	12,500
L	Irrigation	Goliad	San Antonio	San Antonio River Combined Run-of-River Irrigation	0	3,016	3,016	3,016	3,016	3,016	3,016
L	Livestock	Goliad	Guadalupe	Livestock Local Supply	267	101	101	101	101	101	101
L	Livestock	Goliad	San Antonio	Livestock Local Supply	471	180	180	180	180	180	180
L	Livestock	Goliad	San Antonio-Nueces	Livestock Local Supply	470	180	180	180	180	180	180
<b>Total Projected Surface Water Supplies (acre-feet per year) =</b>					<b>16,056</b>	<b>15,977</b>	<b>15,977</b>	<b>15,977</b>	<b>15,977</b>	<b>15,977</b>	<b>15,977</b>

Source: Volume 3, 2007 State Water Planning Database

3/16/2007

## **DROUGHT CONTINGENCY PLAN**

A contingency plan to cope with the effects of water supply shortages due to climatic changes, use, or other conditions will be developed by the District and will be adopted by the Board after notice and hearing. In developing the contingency plan, the District will consider the economic effect on water users, the unique hydrogeologic conditions of the aquifer and the appropriate conditions under which to implement the contingency plan.

## **REGIONAL (L) WATER PLAN**

As required by Chapter of the Texas Water Code 36.1071(b) this management plan and any amendments thereon shall be considered in the development of the regional water plan. Considering this local management plan will meet the intent of Senate Bill #1 and therefore, result in a regional management plan, which is consistent with this local management plan, resulting in the protection of the local control of groundwater management by the local people who elected the Board of Directors to operate the District.

According to the 2007 State Water Plan, The City of Goliad will have adequate water supplies available from the Gulf Coast Aquifer to meet the city's projected demands during the planning period. They recommend that the City of Goliad implement a Municipal Water Conservation Program in the immediate future. GCGCD encourages the City of Goliad to follow through with this recommendation.

While the Plan projects that the rural area of the county will have adequate water supply, they also recommend that the Rural Water Supplies implement the Municipal Water Conservation strategy. GCGCD encourages the Goliad Water Supply Corporation to implement these programs. GCGCD will also continue education programs for the rural citizens of Goliad County not covered by a Rural Water Supply.

In the area of Steam-Electric Power, GCGCD will work with Coletto Creek Power in implementing the three strategies provided in the 2007 State Water Plan.

In the area of Mining the numbers listed for Goliad County do not reflect the possible uranium mining in the county and the water needs for that project. GCGCD projects a substantial new water use by 2010 in this area. GCGCD will enforce our rules to guarantee that the residents of Goliad County have abundant, good quality water from our Aquifer. This area will be addressed by GCGCD in the next regional planning cycle.

Please refer to the following 2007 State Water Plan Data title "Projected Water Management Strategies."

**Projected Water Management Strategies  
Goliad County**

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RWPG	WUG	WUG County	River Basin	Water Management Strategy	Source County	Source Name	2010	2020	2030	2040	2050	2060
L	Goliad	Goliad	San Antonio	Municipal Water Conservation	Goliad	Conservation	30	59	67	73	85	100
L	County Other	Goliad	San Antonio	Municipal Water Conservation	Goliad	Conservation	0	0	0	0	0	16
L	Steam Electric Power	Goliad	Guadalupe	Purchase from WWP (Guadalupe-Blanco River Authority)	Calhoun	Guadalupe River Run-of-River	0	0	0	0	1,347	3,244
L	Steam Electric Power	Goliad	Guadalupe	LGWSP for GBRA Needs	Calhoun	Guadalupe River Run-of-River	0	0	0	0	663	1,598
L	Steam Electric Power	Goliad	Guadalupe	LGWSP for GBRA Needs	Calhoun	Guadalupe River Run-of-River LGWSP	0	0	0	0	663	1,598
<b>Total Projected Water Management Strategies (acre-feet per year) =</b>							<b>30</b>	<b>59</b>	<b>67</b>	<b>73</b>	<b>2,758</b>	<b>6,556</b>

Source: Volume 3, 2007 State Water Planning Database

TWDB: 03/16/2007

## **ACTIONS, PROCEDURES, PERFORMANCE AND AVOIDANCE FOR PLAN IMPLEMENTATION**

The District will implement the provisions of this plan and will utilize the provisions of this plan as a guidepost for determining the direction of priority for District activities. Operations of the District, agreements entered into by the District and planning efforts in which the District may participate will be consistent with the provisions of this plan. A copy of the Rules of Goliad County Groundwater Conservation District may be found at [www.goliadcogcd.org](http://www.goliadcogcd.org).

The District will adopt rules relating to the permitting of wells and the production of groundwater. The rules adopted by the District shall be pursuant to the TWC Ch36 and the provisions of this plan. All rules will be adhered to and enforced. The promulgation and enforcement of the rules will be based on the best technical evidence available.

The District shall treat all citizens with equality. Citizens may apply to the District for discretion in enforcement of the rules on grounds of adverse economic effect or unique local conditions. In granting of discretion to any rule, the Board shall consider the potential for adverse effect on adjacent landowners. The exercise of said discretion by the Board shall not be construed as limiting the power of the Board.

The District will seek the cooperation of all interested parties in the implementation of this plan.

## **ESTABLISHMENT OF DESIRED FUTURE CONDITIONS**

This requirement under Chapter 36.1071(e) (3) (A) is very complex, and GCGCD has been gathering data for 5 years that will greatly assist in establishing the desired future conditions. GCGCD is participating in the GMA 15 process but the desired future conditions are not yet available.

The two primary aquifers of the Gulf Coast Aquifer that supply groundwater for the District are the Chicot and Evangeline Aquifers. The Evangeline Aquifer outcrops and covers approximately 2/3 of northern Goliad County. The southern 1/3 of Goliad County contains the Chicot Aquifer overlying the Evangeline Aquifer. The Evangeline Aquifer in the northern part of Goliad County dips rapidly to the southeast at a rate of ½ to 1 ½ degrees and is very shallow providing a small amount of storage compared to the storage contained in the southern part of Goliad County.

It is important to note that during the drought of the 1950's and thereafter, most of the shallow water sands especially in northern Goliad County have become nonproductive. Further the 5 wells in north Goliad County monitored by TWBD have shown a drop in water level of 6 feet to 30 feet since 1980. As noted previously, GCGCD is monitoring water levels in 50+ wells and this data will be valuable in identifying actual aquifer performance and changes.

Another critical component to consider in establishing desired future conditions of the aquifer is to maintain drinking quality groundwater. GCGCD is recording and verifying through water testing, occurrences where increased water usage has caused water quality degradation in localized applications in northern Goliad County. If excessive water level drawdown, which equates to increased flow rates in the aquifer, causes unacceptable water quality degradation, then availability becomes a function of maintaining good quality drinking water.

The Desired Future Conditions for the aquifers located within the District boundaries and within Groundwater Management Area 15 have not been established; therefore, an estimate of the managed available groundwater is not available at this time. The District is actively working with the other member districts within Groundwater Management Area 15 towards determining an estimate of the managed available groundwater.

### **METHODOLOGY FOR TRACKING DISTRICT PROGRESS IN ACHIEVING MANAGEMENT GOALS**

The District Manager or Board President will prepare and present an annual report to the Board of Directors on District performance in regards to achieving management goals and objectives. The presentation of the report will occur during a monthly Board meeting in the first quarter of the next fiscal year beginning October 1, 2008. The report will include the number of instances in which each of the activities specified in the District's management objectives was engaged in during the fiscal year. Each activity will be referenced to the estimated expenditure of staff time and budget in accomplishment of the activity. The notations of activity frequency, staff time and budget will be reference to the appropriate performance standard for each management objective describing the activity, so that the effectiveness and efficiency of the District's operations may be evaluated. The Board will maintain the report on file, for public inspection at the District's offices upon adoption. This methodology will apply to all management goals contained within this plan.

### **GOAL 1.0 PROVIDING THE MOST EFFICIENT USE OF GROUNDWATER**

#### **Management Objective**

The District will maintain an aquifer water level program monitoring a minimum of 20 wells in the District annually.

#### **Performance Standard**

By February 15 of each year, the District will furnish a public report of the wells monitored the previous year.

### **GOAL 2.0 CONTROLLING AND PREVENTING WASTE OF GROUNDWATER**

#### **Management Objective**

Each year, the District will sample the water quality in at least five (5) selected wells in order to monitor water quality trends and identify if contamination of groundwater is occurring. The District will also make available to well owners a sample service for well water quality analysis, to be paid for by the well owner.

**Performance Standard**

1. Annual report of wells sampled for water quality by the District.
2. Annual report of wells sampled by the District upon request.

**GOAL 3.0**  
**CONTROLLING AND PREVENTING SUBSIDENCE**

The Goliad County Groundwater Conservation District management plan designates that water use from the Gulf Coast Aquifer is to be limited to maintain a sustainable aquifer. Therefore, Goliad County Groundwater Conservation District finds that this goal is not applicable to our District.

**GOAL 4.0**  
**ADDRESSING CONJUNCTIVE SURFACE**  
**WATER MANAGEMENT ISSUES**

**Management Objectives**

Each year the District will confer at least on one occasion with the San Antonio River Authority (SARA) and the Guadalupe-Blanco River Authority (GBRA) on cooperative opportunities for conjunctive resource management.

**Performance Standard**

Report the number of conferences on the subject held with SARA each year.

**GOAL 5.0**  
**ADDRESSING NATURAL RESOURCE ISSUES THAT**  
**IMPACT THE USE AND AVAILABILITY OF GROUNDWATER**  
**AND WHICH ARE IMPACTED BY THE USE OF GROUNDWATER**

**Management Objectives**

Each year the District will locate all of the wells drilled that year for compliance of well spacing including minimum distance from septic systems or other defined potential contamination. This goal will also be accomplished by working through the GMA process.

**Performance Standard**

The District will issue one inspection report annually.

**GOAL 6.0**  
**ADDRESSING DROUGHT CONDITIONS**

**Management Objectives**

Semiannually the District will update the rainfall values for the District for the previous six months. An analysis will be made to predict possible changes in aquifer level. These predictions will be based on historic trends established by the water level monitoring program.

**Performance Standard**

The District will issue one report semiannually, listing the rainfall values for the county.

**GOAL 7.0**  
**ADDRESSING CONSERVATION, RECHARGE ENHANCEMENT, RAINWATER HARVESTING,  
PRECIPITATION ENHANCEMENT AND BRUSH CONTROL**

**CONSERVATION**

**Management Objective**

The District will at least on two occasions each year provide public information on water conservation and waste prevention through presentations at public schools and civic organizations or newspaper articles.

**Performance Standard**

The district will report the number of speaking appearances made by the District each year and the number of newspaper articles published in the local newspaper each year addressing conservation.

**RECHARGE ENHANCEMENT**

**Management Objective**

The District will evaluate the building or supplementing of the building of recharge enhancement ponds along the recharge zones for both the Evangeline and Chicot Aquifers.

**Performance Standard**

The number of evaluations of recharge enhancement pond projects and the progress of each project will be reported annually to the Board of Directors in the annual report.

## **RAINWATER HARVESTING**

### **Management Objectives**

The District will provide information to the public on rainwater harvesting through literature in the office and at least one newspaper article annually.

### **Performance Standard**

The District will report the number of persons receiving literature from the office on rainwater harvesting and the number of newspaper articles published in the local newspaper each year addressing rainwater harvesting.

## **PRECIPITATION ENHANCEMENT**

The District has evaluated a precipitation enhancement program and has determined that it is not appropriate or cost effective. Therefore, the District has determined that a precipitation enhancement goal is not applicable at this time.

## **BRUSH CONTROL**

### **Management Objective**

Brush control is extensively practiced in the county and the practice is encouraged by the Farm Service Program and the GCGCD. The District will develop an educational program to inform the stakeholders of the benefits of controlling brush on their property.

### **Performance Standard**

The District will publish one article annually in the local newspaper on the benefits to the water cycle of controlling the amount of brush on your property. A copy of this article will be included in the annual report to the District Board of Directors.

## **GOAL 8.0** **DESIRED FUTURE CONDITIONS**

The desired future conditions of the groundwater within the District have not yet been established in accordance with Chapter 36.108 of the Texas Water Code. The District is actively participating in the joint planning process and the development of a desired future condition for the portion of the aquifer within the District and the GMA area. Therefore, this goal is not applicable to the District at this time.