

# **SAN PATRICIO COUNTY**

## **Groundwater Management Plan**

**Prepared by**

**San Patricio County Groundwater Conservation District**

**April 10, 2012**

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# **San Patricio County Groundwater Conservation District**

## **Groundwater Management Plan**

### **I. Mission Statement**

The San Patricio County Groundwater Conservation District (SPCGCD) is committed to management and protection of the groundwater resources of San Patricio County. SPCGCD is committed to maintaining a sustainable, adequate, reliable, cost effective, high quality source of groundwater to promote the vitality, economy, and environment of the County. SPCGCD will work with and for the citizens and landowners of the County and cooperate with other local, regional, and state agencies involved in study and management of groundwater. SPCGCD will take no action without full consideration of the groundwater needs of the citizens of the County.

### **II. Purpose**

In 1997 the 75<sup>th</sup> Texas Legislature established a statewide comprehensive regional water planning initiative with enactment of Senate Bill 1 (SB1). Among the provisions of SB1 were amendments to Chapter 36 of the Texas Water Code (TWC) requiring groundwater conservation districts (GCDs) to develop groundwater management plans to be submitted to the Texas Water Development Board (TWDB) for approval as administratively complete. The management plan must contain estimates of groundwater availability in San Patricio GCD, details of how SPCGCD will manage groundwater and management goals for SPCGCD. In 2001 the 77<sup>th</sup> Texas Legislature further clarified water planning and management provisions of SB1 through Senate Bill 2 (SB2).

Administrative requirements of Chapter 36 TWC provisions for groundwater management plan development are specified in 31 Texas Administrative Code (TAC) Chapter 356 of TWDB Rules. The following SPCGCD plan fulfills all requirements for groundwater management plans in SB1, SB2, Chapter 36 TWC, and the administrative rules of TWDB.

### **III. Time Period of Plan**

This plan shall be in effect for a period of five (5) years from date of approval by TWDB unless a new or amended management plan is adopted by the SPCGCD Board of Directors (BOD) and approved by TWDB. This management plan will be readopted with or without changes by the District Board and submitted to the TWDB for approval every 5 years.

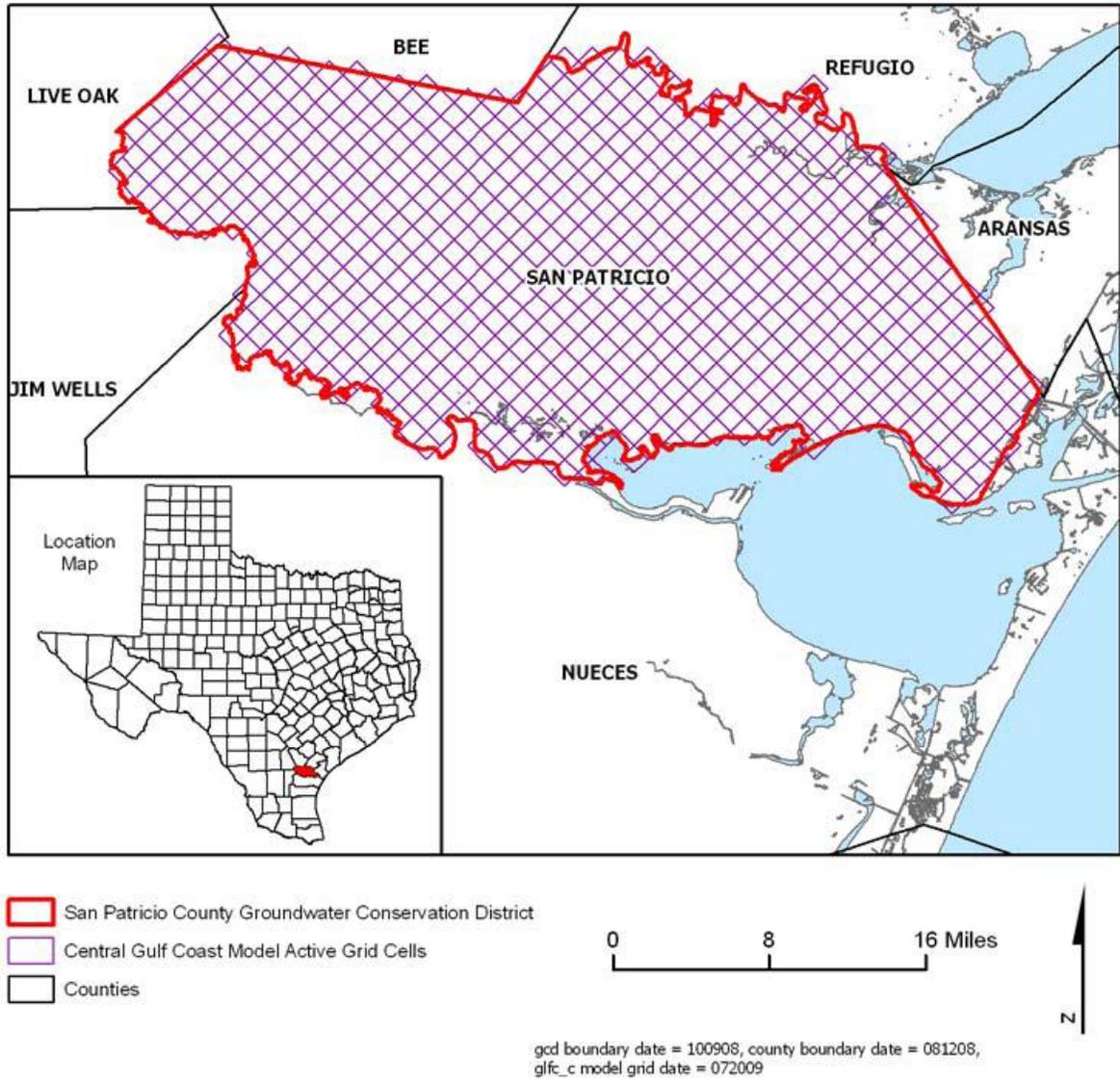
#### **IV. San Patricio County Groundwater Conservation District (SPCGCD)**

SPCGCD was created in 2005 by the 79th Texas Legislature enacting HB 3568 creating Chapter 8817, Special District Local Laws Code. This act is recorded in Chapter 1178, General Laws, Acts of the 79<sup>th</sup> Legislature, Regular Session, 2005. SPCGCD was confirmed by local election held in San Patricio County on May 12, 2007 with 60% of the voters in favor.

The SPCGCD Board of Directors (BOD) is comprised of seven (7) members elected to staggered four-year terms. Six directors are elected from county justice-of-the-peace precincts and one director is elected at-large. The current Board of Directors (BOD) consists of Brad Bickham, Collin Chopelas, Gordon Hatch, Al Pacheco, Joe Pullin, Jr., Charles Ring, and a vacant seat. The vacant seat is due to an untimely death of one of the board members.

The election process for SPCGCD directors was clarified by the Texas Legislature in 2007. The BOD holds regular meetings at the County Extension Office at 219 N. Vineyard Avenue in Sinton, Texas on the first Tuesday of each month unless otherwise posted. All official meetings of the Board of Directors are public meetings noticed and held in accordance with all public meeting requirements.

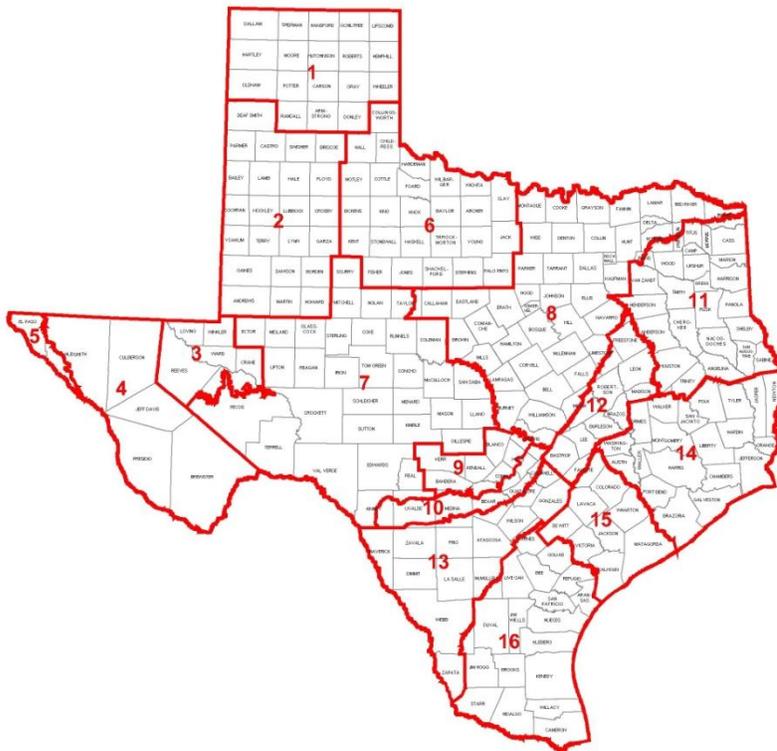
SPCGCD is located in San Patricio County, Texas. SPCGCD boundaries are the same as the political boundaries of San Patricio County, Texas. SPCGCD is bounded by Nueces, Jim Wells, Live Oak, Bee, Refugio, and Aransas counties. As of the plan date, confirmed GCDs exist in Bee, Live Oak, and Refugio counties. GCDs neighboring SPCGCD are: Corpus Christi Aquifer Storage and Recovery CD, Bee GCD, Live Oak GCD, and Refugio GCD (Figure 1).



**Figure 1:** Area of the groundwater availability model for the central portion of the Gulf Coast Aquifer from which the information in Table 1 was extracted (the aquifer extent within the San Patricio County Groundwater Conservation District boundary).

SPCGCD is located in Groundwater Management Area (GMA) 16 (Figure 2). Chapter 36 TWC authorizes SPCGCD to coordinate its management of groundwater with other GCDs in GMA 16. Other confirmed GCDs in GMA 16 are:

- Bee Groundwater Conservation District
- Brush Country Groundwater Conservation District
- Corpus Christi ASR Conservation District
- Duval County Groundwater Conservation District
- Kenedy County Groundwater Conservation District
- Live Oak Underground Water Conservation District
- McMullen Groundwater Conservation District
- Red Sands Groundwater Conservation District
- Starr County Groundwater Conservation District



**Figure 2.** Groundwater Management Areas in Texas.

## **V. Authority of San Patricio County Groundwater Conservation District**

SPCGCD derives its authority to manage groundwater through powers granted in Chapter 8817, Special District Local Laws Code. SPCGCD, acting under authority of the enabling legislation, assumes all rights and responsibilities of a groundwater conservation district specified in Chapter 36, Water Code. Upon adoption of SPCGCD rules by the BOD, authority to manage groundwater use in the County will be governed by the due process specified in SPCGCD rules. The BOD has not yet adopted rules and will not do so until this Groundwater Management Plan is approved by the Texas Water Development Board. Rules are ready to be proposed and a draft of these rules is included as Appendix B.

## **VI. Geology & Hydrologic Units of San Patricio County**

The aquifer layers described below (Jasper, Evangeline, and Chicot) are all part of the Gulf Coast Aquifer, which is recognized by the TWDB as a major aquifer.

Except for the Quaternary alluvium, the geologic formations crop out in belts nearly parallel to the Gulf of Mexico. Younger formations crop out nearer the Gulf and older formations crop out inland. The formations dip toward the coast and thicken causing the older formations to dip more steeply. Faults are common and some of them have displacements of up to several hundred feet. The displacements tend to decrease upward and may not appear at the surface. Faulting generally does not disrupt regional hydraulic continuity. (Loskot et. al, 1982)

**Jasper Aquifer** - The Jasper aquifer is a minor source of water that may be slightly or moderately saline (Figure 3). It consists mainly of the Oakville Sandstone, but may include the upper part of the Catahoula Sandstone. The Oakville Sandstone contains laterally discontinuous sand and gravel lenses inter-bedded with shale and clay. Massive sandstone beds at the base of the formation thin upward with greater amounts of shale and clay. The Jasper aquifer ranges in thickness from about 200 to 800 feet where fresh to slightly saline water is present, but may reach 2,500 feet of thickness down-dip in San Patricio County (adapted from Loskot et. al, 1982).

**Burkeville Confining Layer** - The Burkeville confining layer is mostly clay but contains some sand layers (Figure 3). Burkeville clay sequences are identified in the subsurface by electric logs and act as a regional impediment to vertical water flow. The Burkeville ranges from 300 to 500 feet in thickness (adapted from Loskot et. al, 1982).

**Evangeline Aquifer** - The Evangeline aquifer consists of sand and clay of the Goliad Sands and the upper part of the Fleming Formation (Figure 3). The Evangeline aquifer generally contains more sand than clay. Some of the sands and clays are continuous throughout much of the area. Individual sands may reach 100 feet in thickness in the area containing fresh to slightly saline water. Maximum thickness of the Evangeline aquifer is 1,380 feet and may have up to 470 feet of sand in aggregate thickness. Fresh water may occur as deep as 2,000 feet in east-central San Patricio County (adapted from Loskot et. al, 1982).

**Chicot Aquifer** - The Chicot aquifer is the main source of groundwater in San Patricio County and consists of discontinuous layers of sand and clay of about equal thickness. It is composed of water bearing units of the Willis Sand, Lissie Formation, Beaumont Clay, and Quaternary alluvium, which include all deposits from land surface to the top of the Evangeline aquifer. The Chicot aquifer contains all fresh water in San Patricio County. Individual sands may reach 500 feet in thickness. It is in hydrologic continuity with the Evangeline aquifer and the two units can be difficult to distinguish. The Chicot is delineated from the Evangeline in the subsurface mainly on higher sand to clay ratios that give the Chicot higher hydraulic conductivity (adapted from Loskot et. al, 1982).

System	Series	Geologic Unit		Hydrologic Unit
Quaternary	Holocene	Alluvium		Chicot aquifer
	Pleistocene	Beaumont Clay		
		Montgomery Formation	Lissie Formation	
		Bentley Formation		
		Willis Sand		
Tertiary	Pliocene	Goliad Sand		Evangeline aquifer
	Miocene	Fleming Formation		Burkeville Confining Zone
		Oakville Sandstone		Jasper aquifer
		Catahoula Sandstone (Tuff)		

**Figure 3.** Geologic and Hydrologic Units of the Gulf Coast aquifer in San Patricio County modified from Loskot et al. (1982).

## **VII. Geography of San Patricio County GCD**

SPCGCD is located in the Gulf Coastal Plains region of Texas. Topography ranges from gently rolling in the northwestern part of the County to flatlands in the eastern portion. Three major drainages occur in the county: the Nueces River drains the southern part, Chiltipin Creek drains the central part, and the Aransas River drains the northern part of the County.

Major north-south highways of the County are U.S. Highways 77 and 181, and IH 37. Major east-west routes include parts of U.S. 181 and all of State Highway 188.

Major population centers in SPCGCD occur in Sinton, Portland, Mathis, Odem, Taft, and Ingleside. Other population centers of the County are Edroy, Gregory, and St. Paul.

Agriculture is one of the principal economic activities in the County. Major crops produced in the County by acreage include grain sorghum (45%), cotton (45%), and corn (10%), with minor amounts of canola, sesame, sunflowers, and wheat. Beef cattle production is also a significant agricultural activity. Other economic activities in the County include production and refining of oil and gas, mining of caliche and gravel, waterfowl and big-game hunting, salt water fishing and shrimping, and various types of manufacturing.

## VIII. Estimate of Amount of Groundwater Used Annually in SPCGCD

### Estimated Historical Water Use TWDB Historical Water Use Survey (WUS) Data

Groundwater and surface water use estimates are currently unavailable for 2005, 2009 and 2010.  
TWDB staff anticipates the calculation and posting of such estimates during the first half of 2012.

#### **SAN PATRICIO COUNTY**

All values are in acre-feet/year

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	GW	2,518	328	0	5,926	259	252	9,283
	SW	3,062	12,547	0	60	153	567	16,389
1980	GW	2,400	6	0	1,398	64	223	4,091
	SW	4,863	14,299	0	119	84	353	19,718
1984	GW	1,779	2	0	3,543	100	124	5,548
	SW	5,382	10,517	0	13	525	1,124	17,561
1985	GW	1,704	2	0	1,664	55	120	3,545
	SW	5,049	6,757	0	69	43	1,081	12,999
1986	GW	1,722	2	0	2,000	0	97	3,821
	SW	5,032	7,269	0	0	0	887	13,188
1987	GW	1,588	2	0	1,666	37	81	3,374
	SW	4,865	6,979	0	0	45	741	12,630
1988	GW	1,301	0	0	2,050	61	72	3,484
	SW	6,260	7,313	0	0	24	660	14,257
1989	GW	1,331	2	0	1,233	57	72	2,695
	SW	6,560	9,675	0	0	0	651	16,886
1990	GW	1,920	2	0	1,110	57	74	3,163
	SW	6,011	7,433	0	0	0	673	14,117
1991	GW	1,868	2	0	1,110	85	77	3,142
	SW	5,175	10,078	0	0	16	688	15,957
1992	GW	1,922	2	0	0	83	77	2,084
	SW	5,978	8,683	0	0	15	694	15,370
1993	GW	1,968	2	0	242	83	90	2,385
	SW	6,161	9,772	0	0	15	815	16,763
1994	GW	1,913	2	0	302	84	66	2,367
	SW	6,273	9,589	0	0	2	599	16,463
1995	GW	1,652	2	0	302	84	75	2,115
	SW	6,357	9,728	0	0	2	676	16,763
1996	GW	1,976	2	0	302	84	65	2,429
	SW	6,400	11,490	0	0	2	587	18,479
1997	GW	1,951	2	0	204	84	87	2,328
	SW	6,146	11,012	0	0	2	781	17,941
1998	GW	1,954	1	0	1,154	83	81	3,273

1998	SW	6,739	10,885	0	0	2	736	18,362
1999	GW	2,123	1	0	654	83	113	2,974
	SW	6,377	11,641	0	0	2	1,015	19,035
2000	GW	2,077	2	0	4,565	83	57	6,784
	SW	7,379	12,713	0	0	2	508	20,602
2001	GW	1,202	2	0	4,389	50	26	5,669
	SW	6,793	9,936	0	0	25	450	17,204
2002	GW	1,084	2	0	4,492	50	26	5,654
	SW	6,129	10,884	0	0	25	448	17,486
2003	GW	1,167	2	0	7,891	115	20	9,195
	SW	6,598	10,886	0	128	57	340	18,009
2004	GW	1,449	3	0	8,937	114	24	10,527
	SW	8,190	14,453	0	223	57	403	23,326
2006	GW	3,293	1	0	9,968	0	280	13,542
	SW	7,883	13,206	0	0	0	280	21,369
2007	GW	3,292	3	0	5,838	0	136	9,269
	SW	7,302	13,200	1,797	557	0	135	22,991
2008	GW	4,557	2	0	13,921	0	237	18,717
	SW	7,920	12,244	1,903	0	0	237	22,304

**Table 2.****Historical Groundwater Pumpage Summary****TWDB - Water Use Survey****San Patricio County**

Unit: Acre Feet (ACFT)

Year	Aquifer	Municipal	Manufacturing	Steam			Livestock	Total
				Electric	Irrigation	Mining		
1980	GULF COAST	2,401	8	0	1,398	64	223	4,094
1984	GULF COAST	1,904	2	0	3,543	100	124	5,673
1985	GULF COAST	1,703	2	0	1,664	55	120	3,544
1986	GULF COAST	1,721	2	0	2,000	30	97	3,850
1987	GULF COAST	1,588	2	0	1,666	37	81	3,374
1988	GULF COAST	1,301	0	0	2,050	61	72	3,484
1989	GULF COAST	1,331	2	0	1,233	57	72	2,695
1990	GULF COAST	1,920	2	0	1,110	57	74	3,163
1991	GULF COAST	1,869	2	0	1,110	85	77	3,143
1992	GULF COAST	1,922	2	0	0	83	77	2,084
1993	GULF COAST	1,968	2	0	242	83	90	2,385
1994	GULF COAST	1,914	2	0	302	84	66	2,368
1995	GULF COAST	1,652	2	0	302	84	75	2,115
1996	GULF COAST	1,975	2	0	302	84	65	2,428
1997	GULF COAST	1,952	4	0	204	84	87	2,331
1998	GULF COAST	1,955	1	0	1,154	83	81	3,274
1999	GULF COAST	2,124	8	0	654	84	113	2,983
2000	GULF COAST	2,078	6	0	4,565	83	57	6,789
2001	GULF COAST	1,965	8	0	3,950	83	48	6,054
2002	GULF COAST	3,425	2	0	4,043	83	48	7,601
2003	GULF COAST	3,468	8	0	7,095	192	583	11,346

**NOTE:** All Pumpage reported in acre-feet

12/30/09

**Source:** TWDB Water Use Survey Database

(http://www.twdb.state.tx.us/wushistorical/DesktopDefault.aspx?PageID=2)

**IX. Modeled Available Groundwater in SPCGCD**

According to GAM run 10-047MAG by the TWDB the Modeled Available Groundwater is 18,367 AC/FT.

**X. Down-Gradient Movement (Lateral Underflow) in the Aquifer**

SPCGCD recognizes annual groundwater availability in the portion of the Gulf Coast Aquifer underlying the County is the sum of:

1. Recharge (amount of water annually entering the aquifer through infiltration of rainfall);
2. Net lateral underflow (amount of water annually entering SPCGCD through underground migration of water moving down-gradient in the aquifer after being recharged in aquifer outcrops lying beyond SPCGCD boundaries less the amount of water that may migrate in a similar fashion outside SPCGCD boundaries); and
3. Amount of water (if any) annually taken from storage in the aquifer within SPCGCD boundaries.

Net annual amount of lateral underflow received by the aquifer underlying SPCGCD and annual amount of water taken from storage in the aquifer in the County have yet to be determined. It is anticipated that these figures will be determined over the next biennium through employment of TWDB and other relevant studies, i.e., studies being conducted by TAMU-Kingsville, to develop sound, defensible methodologies related to this determination.

**XI. Summarized information needed for SPCGCD management plan. All values are reported in acre-feet per year and rounded to the nearest 1 acre-foot.**

**Table 3.** Estimates of annual natural and artificial recharge to groundwater for San Patricio County. (Data summarized by Texas Water Development Board 2009)

	<b>Aquifer or confining unit</b>	<b>Results</b>
Estimated annual amount of recharge from precipitation to the district	Chicot Aquifer	11,461
	Evangeline Aquifer	133
	Burkeville Confining Unit	0
	Jasper Aquifer	0
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Chicot Aquifer*	14,344
	Evangeline Aquifer	648
	Burkeville Confining Unit	0
	Jasper Aquifer	0
Estimated annual volume of flow into the district within each	Chicot Aquifer	7,381

aquifer in the district	Evangeline Aquifer	2,583
	Burkeville Confining Unit	16
	Jasper Aquifer	362
Estimated annual volume of flow out of the district within each aquifer in the district	Chicot Aquifer	3,709
	Evangeline Aquifer	1,245
	Burkeville Confining Unit	3
	Jasper Aquifer	33
Estimated net annual volume of flow between each aquifer in the district	Evangeline Aquifer to the Chicot Aquifer	521
	Burkeville Confining Unit to the Evangeline Aquifer	397
	Jasper Aquifer to the Burkeville Confining Unit	344

\* A portion of the flow from the Chicot Aquifer is discharging to the Gulf of Mexico based on the use of a General Head Boundary (GHB) in Layer 1 of the model. This table is from GAM run 09-015 and the data units are in Ac/Ft.

## **XII. How SPCGCD Might Increase Natural or Artificial Recharge**

Natural or artificial recharge in SPCGCD could theoretically be increased by building small retention structures on ephemeral streams to impound storm water runoff. This practice is not feasible at this time due to lack of funding.

The San Patricio County Drainage District (SPCDD) has constructed a number of small retainer dams on ephemeral streams over the years. These small dams were built primarily for erosion and flood control. They generally impound less than one surface acre of water. SPCGCD plans to cooperate with SPCDD in the planning and construction of additional small retainer dams.

Several ponds of approximately 30 acres in size have been constructed along U.S. Highway 77 and Bypass 89 during the construction of overpasses. Drainage has been constructed to funnel runoff waters into these ponds. Apparently there are significant sand lenses in these ponds, as they empty through percolation shortly after being filled by significant runoff events. **SPCGCD intends to encourage the use of these ponds as recharge basins and encourage the construction of additional similar ponds throughout the county.**

### XIII. Estimated Projected Water Demands in SPCGCD

#### Projected Water Demands TWDB 2012 State Water Plan Data

Please note that the demand numbers presented here do not include any plumbing code savings. Demand numbers used to calculate projected water supply needs in the Regional and State Water Plans include plumbing code savings.

#### SAN PATRICIO COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
N	ARANSAS PASS	SAN ANTONIO-NUECES	1,405	1,615	1,828	2,015	2,201	2,386
N	COUNTY-OTHER	NUECES	491	524	552	575	605	639
N	COUNTY-OTHER	SAN ANTONIO-NUECES	1,455	1,553	1,637	1,702	1,793	1,894
N	GREGORY	SAN ANTONIO-NUECES	239	231	223	216	210	210
N	INGLESIDE	SAN ANTONIO-NUECES	1,294	1,771	2,202	2,607	3,016	3,394
N	INGLESIDE ON THE BAY	SAN ANTONIO-NUECES	92	112	130	148	164	181
N	IRRIGATION	NUECES	346	383	424	467	515	567
N	IRRIGATION	SAN ANTONIO-NUECES	8,285	9,151	10,107	11,166	12,335	13,628
N	LAKE CITY	NUECES	79	89	99	107	116	125
N	LIVESTOCK	NUECES	186	186	186	186	186	186
N	LIVESTOCK	SAN ANTONIO-NUECES	378	378	378	378	378	378
N	MANUFACTURING	NUECES	8,491	9,393	10,187	10,971	11,662	12,534
N	MANUFACTURING	SAN ANTONIO-NUECES	6,605	7,306	7,924	8,534	9,071	9,749
N	MATHIS	NUECES	648	632	615	598	586	586
N	MINING	NUECES	24	26	27	27	28	29
N	MINING	SAN ANTONIO-NUECES	75	79	81	84	86	88
N	ODEM	SAN ANTONIO-NUECES	330	347	361	372	389	408
N	PORTLAND	SAN ANTONIO-NUECES	2,399	2,868	3,290	3,715	4,106	4,498
N	SINTON	SAN ANTONIO-NUECES	1,052	1,062	1,076	1,086	1,108	1,135
N	TAFT	SAN ANTONIO-NUECES	586	619	648	672	703	735
Sum of Projected Total Water Demands (acre-feet/year)			34,460	38,325	41,975	45,626	49,258	53,350

## XIV. Projected Surface Water Supplies of SPCGCD

The estimate of projected surface water in SPCGCD in the year 2010 is 23,701 acre-feet (SPCGCD was not operational during development of 2007 plans, thus we use this value as a placeholder until a value based on sound science can be derived. Projected surface water in SPCGCD for years 2010 through 2060 are presented below.

### Projected Surface Water Supplies TWDB 2012 State Water Plan Data

#### SAN PATRICIO COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
N	ARANSAS PASS	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	1,405	1,615	1,828	2,015	2,201	2,386
N	COUNTY-OTHER	NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	0	0	20	43	73	107
N	COUNTY-OTHER	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	1,033	1,103	1,143	1,166	1,201	1,238
N	GREGORY	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	239	231	223	216	210	210
N	INGLESIDE	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	1,294	1,771	2,202	2,607	3,016	3,394
N	INGLESIDE ON THE BAY	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	92	112	130	148	164	181
N	IRRIGATION	SAN ANTONIO-NUECES	SAN ANTONIO-NUECES RIVER COMBINED RUN-OF-RIVER IRRIGATION	83	83	83	83	83	83
N	LIVESTOCK	NUECES	LIVESTOCK LOCAL SUPPLY	167	167	167	167	167	167
N	LIVESTOCK	SAN ANTONIO-NUECES	LIVESTOCK LOCAL SUPPLY	340	340	340	340	340	340
N	MANUFACTURING	NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	8,491	9,393	10,187	8,890	8,309	6,079
N	MANUFACTURING	SAN ANTONIO-NUECES	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	6,594	7,294	7,911	8,520	9,056	9,733

RWPG	WUG	WUG Basin	Source Name	2010	2020	2030	2040	2050	2060
N	MATHIS	NUECES	CORPUS CHRISTI- CHOKE CANYON LAKE/RESERVOIR SYSTEM	648	632	615	598	586	586
N	ODEM	SAN ANTONIO- NUECES	CORPUS CHRISTI- CHOKE CANYON LAKE/RESERVOIR SYSTEM	330	347	361	372	389	408
N	PORTLAND	SAN ANTONIO- NUECES	CORPUS CHRISTI- CHOKE CANYON LAKE/RESERVOIR SYSTEM	2,399	2,868	3,290	3,715	4,106	4,498
N	TAFT	SAN ANTONIO- NUECES	CORPUS CHRISTI- CHOKE CANYON LAKE/RESERVOIR SYSTEM	586	619	648	672	703	736
<b>Sum of Projected Surface Water Supplies (acre-feet/year)</b>				<b>23,701</b>	<b>26,575</b>	<b>29,148</b>	<b>29,552</b>	<b>30,604</b>	<b>30,146</b>

## XV. Water Management Strategies to Meet Water User Group Needs

### Projected Water Management Strategies TWDB 2012 State Water Plan Data

#### SAN PATRICIO COUNTY

WUG, Basin (RWPG)

All values are in acre-feet/year

Water Management Strategy	Source Name [Origin]	2010	2020	2030	2040	2050	2060
<b>IRRIGATION, NUECES (N)</b>							
GULF COAST AQUIFER SUPPLIES	GULF COAST AQUIFER [SAN PATRICIO]	0	0	365	365	365	365
<b>IRRIGATION, SAN ANTONIO-NUECES (N)</b>							
GULF COAST AQUIFER SUPPLIES	GULF COAST AQUIFER [SAN PATRICIO]	0	0	8,635	8,635	8,635	8,635
<b>LAKE CITY, NUECES (N)</b>							
GULF COAST AQUIFER SUPPLIES	GULF COAST AQUIFER [SAN PATRICIO]	0	80	80	80	80	80
<b>MANUFACTURING, NUECES (N)</b>							
GARWOOD PIPELINE AND OFF-CHANNEL RESERVOIR STORAGE	COLORADO RIVER RUN-OF-RIVER [COLORADO]	0	5,498	5,498	5,498	5,498	5,498
GULF COAST AQUIFER SUPPLIES (REGIONAL)	GULF COAST AQUIFER [BEE]	0	0	5,500	5,500	5,500	9,000
GULF COAST AQUIFER SUPPLIES (REGIONAL)	GULF COAST AQUIFER [SAN PATRICIO]	0	0	5,500	5,500	5,500	9,000
O.N. STEVENS WATER TREATMENT PLANT IMPROVEMENTS	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM [RESERVOIR]	6,984	6,607	6,286	6,000	5,744	5,444
OFF-CHANNEL RESERVOIR NEAR LAKE CORPUS CHRISTI	NUECES OFF-CHANNEL LAKE/RESERVOIR [RESERVOIR]	0	0	5,056	5,056	5,056	5,056
<b>Sum of Projected Water Management Strategies (acre-feet/year)</b>		<b>6,984</b>	<b>12,185</b>	<b>36,920</b>	<b>36,634</b>	<b>36,378</b>	<b>43,078</b>

## Projected Water Supply Needs TWDB 2012 State Water Plan Data

Negative values (in red) reflect a projected water supply need, positive values a surplus.

### SAN PATRICIO COUNTY

All values are in acre-feet/year

RWPG	WUG	WUG Basin	2010	2020	2030	2040	2050	2060
N	ARANSAS PASS	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	COUNTY-OTHER	NUECES	0	0	0	0	0	0
N	COUNTY-OTHER	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	GREGORY	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	INGLESIDE	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	INGLESIDE ON THE BAY	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	IRRIGATION	NUECES	0	0	-36	-79	-127	-179
N	IRRIGATION	SAN ANTONIO-NUECES	83	83	-714	-1,773	-2,942	-4,235
N	LAKE CITY	NUECES	0	-1	-11	-19	-28	-37
N	LIVESTOCK	NUECES	0	0	0	0	0	0
N	LIVESTOCK	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	MANUFACTURING	NUECES	0	0	0	-2,081	-3,353	-6,455
N	MANUFACTURING	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	MATHIS	NUECES	0	0	0	0	0	0
N	MINING	NUECES	0	0	0	0	0	0
N	MINING	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	ODEM	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	PORTLAND	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	SINTON	SAN ANTONIO-NUECES	0	0	0	0	0	0
N	TAFT	SAN ANTONIO-NUECES	0	0	0	0	0	1
<b>Sum of Projected Water Supply Needs (acre-feet/year)</b>			<b>0</b>	<b>-1</b>	<b>-761</b>	<b>-3,952</b>	<b>-6,450</b>	<b>-10,906</b>

## **XVI. Desired Future Conditions**

The desired future condition (DFC) of the groundwater within the District has been established in accordance with Chapter 36.108 of the Texas Water Code. The District actively participated in the joint planning process with GMA 16 and development of a DFC for the portion of the aquifer(s) in the District.

GMA 16 adopted a DFC for the Gulf Coast Aquifer on August 30, 2010, and declared all of the other aquifers non-relevant. The adopted DFC for GMA 16 is 94 feet of drawdown as an average, thus automatically setting the DFC for San Patricio GCD at 46 feet of drawdown. The modeled available groundwater is 18,367 Ac/Ft according to GAM run 10-047.

District Directors have prepared a preliminary set of rules for addressing the DFC. The rules are attached in the appendix. SPCGCD Directors are currently reviewing these proposed rules following the recent setting of the DFC for GMA 16 and SPCGCD.

## **XVII. How SPCGCD Will Manage Groundwater**

SPCGCD will manage groundwater in the County to conserve the resource while seeking to maintain economic viability of all resource user groups, both public and private. In consideration of economic and cultural activities in the County, SPCGCD will identify and engage in activities and practices that if implemented would result in more efficient groundwater use. An observation network will be established and maintained to monitor changing storage conditions of groundwater supplies in SPCGCD. SPCGCD will make a regular assessment of water supply and groundwater storage conditions and will report those conditions to the BOD and the public. SPCGCD will undertake and cooperate with investigations of groundwater resources in the County and make results of investigations available to the public upon adoption by the BOD. All actions and rules of SPCGCD will adhere to TWC, Chapter 36.

SPCGCD may adopt rules to regulate groundwater withdrawals by means of well spacing and production limits. SPCGCD will issue permits and set production and spacing limitations in accordance with guidelines stated in SPCGCD Rules. A copy of the District's proposed rules is included in Appendix B.

Relevant factors to be considered in making a determination to issue a permit or groundwater withdrawal limitations or spacing limitations will include:

- 1) purpose of SPCGCD Rules
- 2) distribution of groundwater resources
- 3) economic hardship resulting from approval or denial of a permit or terms prescribed by the permit

SPCGCD is committed to maintaining a sustainable, adequate, reliable, cost effective, high quality source of groundwater to promote the vitality, economy, and environment of the County. In pursuit of SPCGCD's mission of protecting the resource, SPCGCD may require reduction of groundwater withdrawals to amounts that will not cause harm to the aquifer.

SPCGCD will enforce the terms and conditions of permits and SPCGCD Rules by enjoining the permit holder in a court of competent jurisdiction as provided for in TWC, Chapter 36.102.

SPCGCD will employ technical resources at its disposal to evaluate resources available in the County and determine the effectiveness of regulatory or conservation measures. A public or private user may appeal to the BOD for discretion in enforcement of provisions of the water

supply deficit contingency plan on grounds of adverse economic hardship or unique local conditions. Exercise of this discretion by the BOD shall not be construed as limiting the BOD's power.

### **XVIII. Actions, Procedures, Performance, & Avoidance Necessary to Put Plan into Effect**

SPCGCD will implement provisions of this management plan and will utilize plan objectives as a guide for BOD actions, operations, and decision-making. SPCGCD will ensure its planning efforts, activities, and operations are consistent with plan provisions.

SPCGCD will adopt rules in accordance with TWC, Chapter 36 and all rules will be followed and enforced. Rules development will be based on the best scientific information and technical evidence available.

SPCGCD will encourage cooperation and coordination in plan implementation. All operations and activities will be performed to encourage citizen cooperation in the County and with appropriate water management entities at state, regional, and local levels.

### **XIX. Tracking Progress in Achieving Management Goals**

SPCGCD will prepare and submit an annual report (Annual Report) to the BOD. The Annual Report will include an update on SPCGCD's performance in achieving management goals contained in this plan. The Annual Report will be presented to the BOD within ninety (90) days following completion of SPCGCD's Fiscal Year, beginning in the fiscal year starting 2010. A copy of the annual audit of SPCGCD financial records will be included in the Annual Report. SPCGCD will maintain a copy of the Annual Report on file for public inspection in the Records Section of the San Patricio County Courthouse following adoption by the BOD.

## **Literature Cited**

Dutton, A. R. and B. C. Richter. 1990. *Regional Geohydrology of the Gulf Coast Aquifer in Matagorda and Wharton Counties, TX*. University of Texas, Austin. Bureau of Economic Geology Final Report for Lower Colorado River Authority.

Loskot, Carole L., William M. Sandeen, and C. R. Follett. 1982. *Texas Water Development Board Report 270: Ground-water Resources of Colorado, Lavaca, & Wharton Counties, Texas*. 1982.

Ryder, P. D. 1988. *Hydrogeology and Predevelopment Flow in the Texas Gulf Coast Aquifer System*. USGS Water Resources Investigations Report 87-4248.

Scanlon, B. R., R. W. Healy, and P.G. Cook, Choosing appropriate techniques for quantifying groundwater recharge, *Hydrogeology J.*, 2002.

## **XX. Management Goals**

### **1) PROVIDING FOR MOST EFFICIENT GROUNDWATER USE**

**1.1 Objective – SPCGCD will register or permit wells constructed in the County in accordance with SPCGCD rules.**

**1.1 Performance Standard** – The number of exempt and permitted wells registered by SPCGCD for the year will be incorporated in the Annual Report to the BOD.

**1.2 Objective** –SPCGCD will regulate groundwater production by maintaining a system of meters for permitting groundwater use in the boundaries of SPCGCD in accordance with SPCGCD Rules.

**1.2 Performance Standard** –The amount of groundwater produced by permitted wells will be included in the Annual Report to the BOD.

**1.3 Objective** – SPCGCD will establish a monitor network to ensure compliance with the DFC.

**1.3.1 Performance Standard** –SPCGCD will establish a monitor well network and conduct regular measurements of water levels in the District’s aquifers. A report on water levels of the District’s aquifers will be included in Annual Report.

### **2) CONTROLLING AND PREVENTING WASTE**

**2.1 Objective** – SPCGCD will evaluate the Rules to determine whether amendments are necessary to decrease groundwater waste in SPCGCD.

**2.1 Performance Standard** – In the Annual Report to the BOD, SPCGCD will include a discussion of evaluation of the Rules and determination of whether amendments to the Rules to prevent groundwater waste are recommended.

**2.2 Objective** SPCGCD will provide information to the public on eliminating and reducing wasteful groundwater use practices.

**2.2 Performance Standard** – A copy of information provided on SPCGCD’s website regarding groundwater waste reduction will be included in Annual Report to the BOD.

**2.3 Objective** - The District will collect and will document each report of possibly-wasted groundwater.

**2.3 Performance Standard** - The District will investigate 100 percent of the reports to determine if any waste is occurring within a week of receiving the report of waste. The Board of Directors will receive a monthly report that includes the number of wasted groundwater reports made to the District and the number of investigations.

### **3) CONTROLLING AND PREVENTING SUBSIDENCE**

This goal is not applicable at this time.

### **4) NATURAL RESOURCE ISSUES AFFECTING AND AFFECTED BY GROUNDWATER USE AND AVAILABILITY**

**4.1 Objective** – SPCGCD will find the location of existing salt water or waste disposal injection wells permitted in SPCGCD by TRRC.

**4.1 Performance Standard** – A report will be given annually to the BOD.

**4.2 Objective** – SPCGCD will find any new salt water or waste disposal injection wells that have been permitted to operate in SPCGCD.

**4.2 Performance Standard** – A report will be included in the Annual Report to the BOD.

**4.3 Objective** – SPCGCD will request TRRC to provide a copy of results of integrity tests performed on salt water or waste disposal injection wells permitted to operate in the County by TRRC.

**4.3 Performance Standard** – A report will be included in the Annual Report to the BOD.

## 5) SURFACE WATER MANAGEMENT ISSUES

**5.1 Objective** – SPCGCD will participate in the regional planning process by attending at least 50% of the Region N Water Planning Group meetings to encourage development of surface water supplies to meet the needs of water user groups in the County.

**5.1 Performance Standard** – The attendance of a SPCGCD representative at Region N Water Planning Group meetings will be noted in the Annual Report to the BOD.

## 6) GROUNDWATER CONSERVATION

**6.1 Objective** – SPCGCD will provide articles discussing water conservation in the County.

**6.1 Performance Standard** – A copy of the article submitted by SPCGCD for publication to a newspaper of general circulation in the County discussing water conservation will be included in the Annual Report to the BOD.

**6.2 Objective** – SPCGCD will provide an educational program for use in public and private schools in the County to educate students on the importance of water conservation.

**6.2 Performance Standard** – A summary of the educational program provided by SPCGCD in the County will be included in the Annual Report to the BOD for (year), along with a list of the participating schools for the prior year.

**6.3 Objective** – SPCGCD will include an informative flier on water conservation with at least one mail out to groundwater use permit holders distributed in the normal course of business.

**6.3 Performance Standard** – SPCGCD's Annual Report will include a copy of the informative flier regarding water conservation distributed to groundwater use permit holders. Number of fliers distributed will be included in the Annual Report.

## 7) DROUGHT

**7.1 Objective** – The District will monitor the Palmer Drought Severity Index (PDSI) map and the TWDB drought link at [www.twdb.state.tx.us/data/drought/](http://www.twdb.state.tx.us/data/drought/)

**7.1 Performance Standard** – Quarterly, SPCGCD will assess the status of drought in the County and prepare a briefing to the BOD. Downloaded PDSI maps and Situation Reports will be included with the quarterly briefing in the Annual BOD Report.

## **8) RECHARGE ENHANCEMENT**

Goal 8 is not applicable at this time because of the associated cost.

## **9) RAINWATER HARVESTING**

Goal 9 is not applicable at this time because of the associated cost.

## **10) PRECIPITATION ENHANCEMENT**

Goal 10 is not applicable at this time because of the associated cost.

## **11) BRUSH CONTROL**

Goal 11 is not applicable at this time because of the associated cost.

## **12) ADDRESSING THE DESIRED FUTURE CONDITIONS QUANTITATIVELY**

**12.1 Objective** -- The District will review and calculate its permit and well registration totals in light of the Desired Future Condition (DFC) of the groundwater resources within the boundaries of the District to assess whether the District is on target to meet the DFC estimates submitted to the TWDB.

**12.1 Performance Standard** -- The District's Annual Report will include a discussion of the District's permit and well registration totals and will evaluate the District's progress in achieving the DFC of the groundwater resources within the District and whether the District is on track to maintain DFC estimates over the 50-year planning period.

**12.2 Objective** -- The District will measure water levels in monitoring wells **12.2 Performance Standard** -- The District's Annual Report will include the water level measurements taken from at least three monitor wells annually to assess the District's progress towards achieving its DFC. When the District has obtained water level measurements for five consecutive years and is able to calculate water level averages over five-year periods thereafter, the report will include a discussion of the comparison of water level averages to the corresponding five-year increment of its DFC to track its progress in achieving its DFC.

## **APPENDIX A**

# **EVIDENCE OF ADMINISTRATIVE PROCESSES REQUIRED FOR APPROVAL OF THE GROUNDWATER MANAGEMENT PLAN AS ADMINISTRATIVELY COMPLETE**

**RESOLUTION NO. 001-2012**

**Whereas, the San Patricio County Groundwater Conservation District has held the appropriate public hearings, and;**

**Whereas, the District has presented the management plan to the county officials and the Nueces River Authority.**

**Whereas, the District has followed the rules set forth by SB 1 and the TWDB.**

**Now, Therefore be it Resolved, that the San Patricio County Groundwater Conservation District voted to approve the District management plan.**

**In favor\_\_\_\_\_ Against\_\_\_\_\_**

**Passed and Approved this\_10<sup>th</sup> day of April, 2012**

\_\_\_\_\_ Attest by: \_\_\_\_\_  
Charles Ring, President , Secretary

**APPENDIX B**

**SAN PATRICIO COUNTY  
GROUNDWATER CONSERVATION  
DISTRICT**

**DRAFT RULES**

**NOTICE OF OPEN MEETING**  
**OF THE INITIAL DIRECTORS**  
**SAN PATRICIO GROUNDWATER CONSERVATION DISTRICT**

DATE OF MEETING:  
STREET LOCATION:  
CITY LOCATION:

COMPLETE AGENDA:

Call to order  
Date  
Time

Deliberate and consider action on the following items:

- 1.
  - 2.
  - 3.
- Etc

Public Comment (No discussion or action) (5 minutes per speaker)

Adjourn

CERTIFICATION

ATTEST:  
NAME OF AUTHORIZED OFFICIAL:  
TITLE:  
SIGNATURE OF CERTIFYING OFFICIAL:  
DATE:  
PHONE:

\*\*\*Posted at San Patricio County Courthouse and at San Patricio County Extension Office