SOUTHEAST TEXAS GROUNDWATER CONSERVATION DISTRICT

MANAGEMENT PLAN

ADOPTED:
November 8, 2007
(Rev 11-6-07)

TABLE OF CONTENTS

GROUNDWATER MANAGEMENT PLAN

1. INTRODUCTION/PURPOSE

The Southeast Texas Groundwater Conservation District was created to conserve, preserve, protect, recharge, and prevent waste of groundwater and control subsidence caused by withdraw of groundwater within its boundaries which are coextensive with the boundaries of Jasper, Newton, Hardin and Tyler Counties, Texas as shown on the attached map. As part of the process of accomplishing its purposes, the District is required to adopt a Management Plan, which after adoption, must be reviewed and approved by the Texas Water Development Board. The District is located in Groundwater Management Area 14 which covers the Upper Gulf Coast Aquifer.

2. DESCRIPTION OF THE DISTRICT

2.1 Creation and Organization. The 78th Texas Legislature, in its regular session of 2003, enacted Senate Bill 1888 which created the District in Jasper and Newton Counties, subject to approval of a confirmation election. On November 2, 2004, the voters of Jasper and Newton Counties confirmed the creation of the District. Subsequently, the Commissioners' Courts of Tyler and Hardin Counties, Texas, adopted resolutions requesting that Tyler County and Hardin County be added to the District. The voters of Tyler County and Hardin County confirmed the inclusion of the Counties into the District at an election held November 8, 2005.

GROUNDWATER CONSERVATION DISTRICTS*, (Confirmed and Pending Confirmation)

med Groundwater
ervation Districts

1. Anderson County UWCD
2. Bandera County River Authority & Groundwater District
3. Barton Springs/Edwards Aquifer CD
4. Bee GCD
5. Blanco-Pedernales GCD
6. Bluebonnet GCD
7. Brazoria County GCD
8. Brazos Valley GCD
9. Brewster County GCD
10. Central Texas GCD
11. Clear Fork GCD
12. Clearwater UWCD
13. Coastal Bend GCD
14. Coastal Plains GCD
15. Coke County UWCD
16. Collingsworth County UWCD
17. Corpus Christi ASRCD
18. Cow Creek GCD
19. Culberson County GCD
20. Edwards Aquifer Authority
21. Emerald UWCD
22. Evergreen UWCD
23. Fayette County GCD
24. Fox Crossing Water District
25. Garza County Underground and FWCD
26. Gateway GCD
27. Glasscock GCD
28. Goliad County GCD
29. Gonzales County UWCD
30. Guadalupe County GCD
31. Hays Trinity GCD
32. Headwaters UWCD
33. Hemphill County UWCD
34. Hickory UWCD No. 1
35. High Plains UWCD No.1
36. Hill Country UWCD
37. Hudspeth County UWCD No. 1
38. Irion County WCD
39. Jeff Davis County UWCD
40. Kenedy County GCD
41. Kimble County GCD
42. Kinney County GCD
43. Lipan-Kickapoo WCD
44. Live Oak UWCD
45. Llano Estacado UWCD
46. Lone Star GCD
47. Lone Wolf GCD
48. Lost Pines GCD
49. Lower Trinity GCD
50. McMullen GCD
51. Medina County GCD
52. Menard County UWCD
53. Mesa UWCD
54. Mid-East Texas GCD
55. Middle Pecos GCD
56. Middle Trinity GCD
57. Neches & Trinity Valleys GCD
58. North Plains GCD
59. Northern Trinity GCD
60. Panhandle GCD
61. Pecan Valley GCD
62. Permian Basin UWCD
63. Pineywoods GCD
64. Plateau UWC and Supply District
65. Plum Creek CD
66. Post Oak Savannah GCD
67. Presidio County UWCD
68. Real-Edwards C and R District
69. Red Sands GCD
70. Refugio GCD
71. Rolling Plains GCD
72. Rusk County GCD
73. Salt Fork UWCD
74. San Patricio County GCD
75. Sandy Land UWCD
76. Santa Rita UWCD
77. Saratoga UWCD
78. South Plains UWCD
79. Southeast Texas GCD
80. Sterling County UWCD
81. Sutton County UWCD
82. Texana GCD
83. Trinity Glen Rose GCD
84. Uvalde County UWCD
85. Victoria County GCD
86. Wes-Tex GCD

Pending Groundwater Conservation Districts

- 88. Colorado County GCD + #
- 89. Duval County GCD + &
- 90. Lavaca County GCD + #
- 91. McLennan County GCD + #
- 92. Panola County GCD + #
- 93. Starr County GCD + &
- 94. Tablerock GCD + #
- 95. Upper Trinity County GCD + #

Culberson County Annexation +

+ Pending Election Results
& Created by the 78th Legislature
# Created by the 80th Legislature
[NOTE: The GCD boundaries are provisional, pending TCEQ's completion of the official boundaries.]
§ "Gateway GCD" previously "Tri-County GCD"
X "Emerald UWCD" will be renamed "Crockett County GCD", effective Sept. 1, 2007

Subsidence Districts

- Harris-Galveston Subsidence District
- Fort Bend Subsidence District

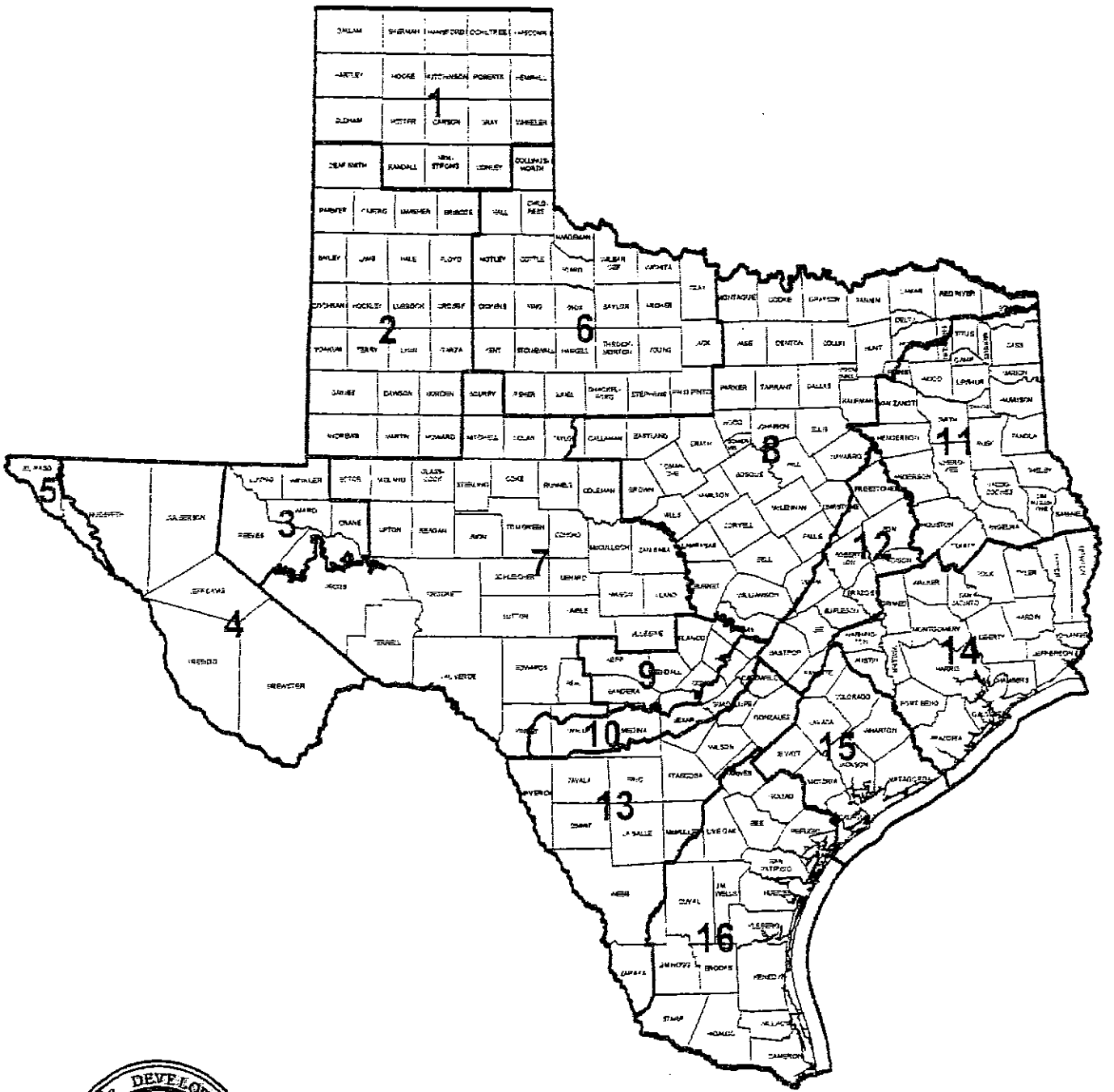
NOTE: These subsidence districts are not Groundwater Conservation Districts as defined under Chapter 36 of the Texas Water Code, but have the ability to regulate groundwater production to prevent land subsidence. (Refer to Senate Bill 1537 from the 79th Legislative Session)

0 25 50 75 100 Miles

Map updated by Mark Hayes, GISP
TWDB - GIS Mapping Coordinator
August 2007

* Districts that have, in whole or part, authority as assigned by Chapter 36 of the Texas Water Code. Please refer questions pertaining to individual districts to the district themselves.

Groundwater Management Areas in Texas



TEXAS WATER DEVELOPMENT BOARD

0 25 50 100 150 200 Miles

DISCLAIMER

This map was generated by the Texas Water Development Board using GIS (Geographical Information Systems) software. No claims are made to the accuracy or completeness of the information shown herein nor to its suitability for a particular use. The scale and location of all mapped data are approximate.

Map created by Mark Hayes, GISP
(Mark.Hayes@twdb.state.tx.us) 512-936-0828
January 2007

The District is governed by a thirteen (13) member board of directors. The Jasper County Commissioners' Court appoints two directors, one of whom represents rural water utilities and small water supply interests and one director represents the large industrial groundwater supply interests and large municipal utilities. The Newton County Commissioners' Court appoints two directors, one of whom represents rural water utilities and small municipal water supply interests and one director represents forestry or agricultural groundwater supply interests in the Counties. The Newton City Council appoints one director and the Jasper City Council appoints one director. The Tyler County Commissioners' Court appoints three directors, one representing rural water supply utilities and small municipal groundwater supply interests; one director representing forestry, industrial, agricultural or landowner groundwater supply interests; and one director representing large municipal groundwater supply interests. The Hardin County Commissioners' Court appoints three directors, one representing rural water utilities and small municipal groundwater supply interests; one director representing the forestry, industrial, agricultural or landowner groundwater supply interests; and one director to represent large municipal groundwater supply interests. The Hardin County Commissioners' Court, the Tyler County Commissioners' Court, together with the Jasper County

jointly appoint one director to represent the forestry, agriculture, or landowner groundwater supply interests. The jointly appointed director serves as the presiding officer of the Board.

2.2 Legal Authority. The Act creating the District, Senate Bill 1888, confers upon the District all of the powers of a groundwater conservation district under Texas Water Code Chapter 36, except as limited in the Act. The District was created under Texas Constitution Article 16, Section 59 and is a governmental agency and a political subdivision of the State. Senate Bill 1888 prohibits the District from imposing a tax, limits pumpage fee charged by the District to not exceed $0.01 per thousand gallons of groundwater withdrawn for any purpose. The Act further denies the District the power of eminent domain, the power to issue bonds or other obligations that pledge revenue derived from taxation, and the power to purchase groundwater lot rights unless the rights purchased are for conservation purposes and are permanently held in trust not to be produced.

2.3 Rules and Regulations. After public notice and public hearing, the District adopted its substantive rules which were effective July 1, 2005.The District also adopted Rules for Hearing which were effective July 1, 2005. A copy of the Rules can be found at the District's website: http://www.SETGCD.org.

3. GROUNDWATER RESOURCES IN THE DISTRICT

The Texas Gulf Coast Aquifer area includes the Gulf Coast, Yegua-Jackson, and the Brazos River Alluvium aquifers. Only the Chicot, Evangaline, Burkeville Confined, Yegua-Jackson, and the Jasper Aquifers are present within the District. The boundaries of these aquifers have been defined by the Texas Water Development Board (TWDB). See the TWDB GAM Run 06-20 and Run 06-06 attached as Appendix A.

3.1 Estimate of Managed Available Groundwater in the Southeast Texas Groundwater Conservation District by County.

The amount of managed available groundwater in the District has not been determined and is therefore not available. The District is participating in the process the desired future conditions. The amount of groundwater in the District according to the East Texas Region 2006 Water Plan by County is:

Values shown are acre-feet per year

County	Yegua-Jackson Aquifer	Gulf Coast Aquifer	Other
Hardin Co.		23,500	
Jasper Co.		52,000	6,000
Newton Co.		29,000	1,500
Tyler Co.	180	30,300	1,620
TOTAL	**180**	**134,800**	**9,120**

Source: Table 3.5 East Texas Region 2006 Water Plan

3.2 Estimate of Groundwater Being Used in the Southeast Texas Groundwater Conservation District on an Annual Basis by County.

The District maintains records showing the amount of groundwater pumped by well owners and operators who are not

exempt from the payment of production fees. For the year 2006, the District records show that 74,319 acre feet of water was pumped within the District by non-exempt users. The 2006 Regional Water Plan shows the amount of groundwater being pumped within the District for irrigation, livestock, mining, and "other" users, which are not included in the amounts reported to the District. The total for these unreported uses is 23,246 making the total amount of groundwater used within the District for 2006 to be 97,565 acre feet.

3.3 Estimate of the annual amount of recharge from precipitation.

Aquifer	Precipitation recharge (acft/yr)
Chicot aquifer	74,796
Evangeline acquifer	11,021
Burkeville Confining Unit	11
Jasper acquifer	13,610

Source: TWDB GAM Run 06-06 (Appendix A)

3.4 Estimate of the annual volume of water discharged to springs and surface water bodies.

Aquifer	Surface water outflow (act/yr)
Chicot aquifer	37,043
Evangeline acquifer	4,636
Burkeville Confining Unit	2
Jasper acquifer	10,774

Source: TWDB GAM RUN 06-06 (Appendix A)

3.5 Estimate of annual volume of flow into and out of the District. GAM Run 06-06, a copy of which is found in Appendix A, shows an estimate of the annual volume of flow into and out of the District within each aquifer and between aquifers in the District.

Aquifer	Inflow into District (act/yr)	Outflow from District (act/yr)
Chicot aquifer	51,203	60,365
Evangeline acquifer	51,984	55,372
Burkeville Confining Unit	78	89
Jasper acquifer	13,686	14,656

Source: TWDB GAM Run 06-06 (Appendix A)

3.6 Estimate of the projected surface water supply in the District.

See the excerpts from the 2006 East Texas Regional Water Plan attached as Appendix B.

3.7 Estimate of the projected total demand for water in the District.

See the 2007 State Water Plan Projected Water Demands in Appendix C.

3.8 Consideration of water supply needs and water management strategies included in adopted state water plans.

The strategies in the 2007 State Water Plan are in the attached Appendix C. The District considers these strategies to be adequate at this time.

4. MANAGEMENT GOALS, PERFORMANCE STANDARDS, AND MANAGEMENT OBJECTIVES

4.1 Providing the Most Efficient Use of Groundwater:

4.1.1 Objective - Each year, the District will require all new exempt or permitted wells that are constructed within the boundaries of the District to be registered or permitted with the District in accordance with the District Rules.

4.1.2 Performance Standard - The number of exempt and permitted wells registered or permitted by the District for the year will be incorporated into the Annual Report submitted to the Board of Directors of the District.

4.2 Controlling and Preventing the Waste of Groundwater in the District.

4.2.1 Objective - Each year, the District will make an evaluation of the District Rules to determine whether any amendments are recommended to decrease the amount of waste of groundwater within the District.

4.2.1 Performance Standard - The District will include a discussion of the annual evaluation of the District Rules and the determination of whether any amendments to the rules are recommended to prevent the waste of groundwater in the Annual Report of the District provided to the Board of Directors.

4.2.2 Objective - Each year, the District will provide information to the public on eliminating and reducing wasteful practices in the use of groundwater by an article on groundwater waste reduction on the District's website.

4.2.2 Performance Standard - Each year, a copy of the information provided in the groundwater waste reduction article on the District's website will be included in the District's Annual Report to be given to the District Board of Directors.

4.3 Controlling and Preventing Subsidence. This Management Goal is not Applicable to the District.

4.4 Addressing Conjunctive Surface Water Management Issues.

4.4.1 Objective - The District will coordinate conjunctive surface water issues with the Angelina and Neches River Authority, Lower Neches Valley Authority, and the Sabine River Authority through the East Texas Region Water Planning Group, Region I, by inviting officials from the Planning Group to attend a District meeting at least once a year.

4.4.2 Performance Standard - A copy of the letters to the surface water providers will be included in the annual report to the Board of Directors.

4.5 Natural Resource Issues Affecting the Use and Availability of Groundwater or affected by the Use of Groundwater. This Management Goal is not Applicable to the District.

4.6 Addressing Drought Conditions.

4.6.1 Objective - The District will post an article at least annually regarding drought conditions in the District on the District website.

4.6.2 Performance Standard - A copy of the article or articles posted on the District website regarding drought conditions will be included in the annual report to the Board of Directors.

4.7 Addressing Conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control. Conservation is the only practice which is practicable in the District. The District does not consider recharge enhancement, precipitation enhancement, or brush control to be either necessary or practical at this time. Rainwater harvesting is not necessary due to the very high rainfall rate in the District.

4.7.1 Objective - The District will annually submit an article regarding water conservation for publication to at least one newspaper of general circulation in Jasper, Newton, Tyler and Hardin Counties.

4.7.2 Performance Standard - A copy of the article submitted by the District for publication to a newspaper of general circulation in Jasper, Newton, Tyler and Hardin Counties regarding water conservation will be included in the Annual Report to the Board of Directors.

4.7.3 Objective - Each year, the District will include an informative flier on water conservation within at least one mail out to groundwater use permit holders distributed in the normal course of business for the District.

4.7.4 Performance Standard - The District's Annual Report will include a copy of the informative flier distributed to groundwater use permit holders regarding water conservation and the number of fliers distributed.

4.8 Addressing Future Conditions of Groundwater Resources in a Quantitative Manner. The desired future condition of the Gulf Coast aquifer has not been established in accordance with Chapter 36.108 of the Texas Water Code. In establishing the desired future conditions of the aquifers, the District shall consider uses or conditions of an aquifer within the management area that differ substantially from one geographic area to another. The District may establish different desired future

conditions for each aquifer, or each geographic area overlying an aquifer in whole or in part or subdivision of an aquifer within the boundaries of the management area.

4.8.1 Objective - The District will monitor groundwater conditions within the District boundaries.

4.7.2 Performance Standard - The District will continue monitoring the static water levels in at least fifteen (15) wells (with previous measurement history) annually.

5. ACTIONS, PROCEDURE, PERFORMANCE, AND AVOIDANCE FOR IMPLEMENTATION OF MANAGEMENT PLAN

The District will implement the goals and provisions of this management plan as a guideline in its decision-making. The District will ensure that its planning efforts, operations, and activities will be consistent with the provisions of this plan.

The District will adopt rules in accordance with Chapter 36 of the Texas Water Code, and all rules will be followed and enforced. The District may amend the District rules as necessary to comply with changes to Chapter 36 of the Texas Water Code, revised Management Plans and to insure the best management of groundwater within the District according to present aquifer conditions. The development and enforcement of the rules of the District will be based on the best scientific and technical evidence available to the District.

The District will encourage cooperation and coordination in the implementation of this plan. All operations and activities of the District will be performed in a manner that encourages cooperation with the appropriate state, regional or local water entity.

APPENDIX

A

GAM run 06-06

by Richard Smith, P.G.
Texas Water Development Board
Groundwater Availability Modeling Section
(512) 936-0877
April 20, 2006

REQUESTOR:

Mr. John Stover, Southeast Texas Groundwater Conservation District (GCD).

DESCRIPTION OF REQUEST:

Mr. Stover requested that we provide him with the required numbers for his district's management plan using the groundwater availability model (GAM) for the northern part of the Gulf Coast aquifer (Kasmarek and Robinson, 2004; Kasmarek and others, 2005).

METHODS:

We analyzed for average recharge from precipitation, average surface-water inflow, average surface-water outflow, average inflow into the district, average outflow from the district, average net inter-aquifer flow (upper), and average net inter-aquifer flow (lower) using the period 1980 to1999. MODFLOW's general head boundary (GHB) package was used to simulate recharge and discharge in the GAM for the northern part of the Gulf Coast aquifer. The GHB package simulates flow across the boundary using differences in water-level elevations at or beyond the boundary and the aquifer and conductance of the aquifer materials. The amount of water that recharges the aquifer from rainfall, irrigation return flow, and river leakage and naturally discharges in the form of baseflow to streams and evapotranspiration are all accounted for in the GHB. Evapotranspiration is the water that is lost out of the aquifer due to direct evaporation from the water table (when water table is shallow) and plant transpiration. To calculate surface water interaction, we assumed the uppermost block or GHB cell in the model with a river, stream, spring, lake, or reservoir represented groundwater/surface-water interactions. All other cells using the GHB package were assumed to represent net recharge from precipitation.

To address the request, we:

- ran the transient GAM for the northern part of the Gulf Coast aquifer and extracted water budgets for each year of the 1980 through 1999 period;
- averaged the twenty year period for recharge, surface water inflow, surface water outflow, inflow to the district, outflow from the district, net inter-aquifer flow (upper) and net inter-aquifer flow (lower);

PARAMETERS AND ASSUMPTIONS:

- For detailed discussion on assumptions and limitations of the northern part of the Gulf Coast aquifer GAM, refer to Kasmarek and Robinson (2004) and Kasmarek and others (2005).

- The model includes four layers, representing the Chicot aquifer (Layer 1), the Evangeline aquifer (Layer 2), the Burkeville confining unit (Layer 3), and the Jasper aquifer (Layer 4).

- Quality of model calibration can be estimated using root mean square (RMS) error. RMS error evaluates differences between measured and simulated water levels in the wells considered for calibration. The RMS error is 31 feet for the Chicot aquifer, 45 feet for the Evangeline aquifer, and 38 feet for the Jasper aquifer for the calibration year 2000.

RESULTS:

The Chicot, Evangeline, and Jasper are the principal aquifers in the Southeast Texas GCD with the Burkeville functioning as a confining unit. The components of the budgets shown in Table 1 include:

- Precipitation recharge—This component represents areally distributed recharge due to precipitation falling on the outcrop areas of aquifers. This value reflects the average precipitation from 1980 to 1999.

- Surface water inflow and outflow—This describes the interaction between the aquifer and streams, springs, lakes, wetlands, and possibly irrigation return flow.

- Net inter-aquifer flow upper and lower—This describes the vertical flow, or leakage, between two aquifers. This flow is controlled by the water levels in each aquifer and aquifer properties of each aquifer that define the amount of leakage that can occur. "Inflow" to an aquifer from an overlying or underlying aquifer will always equal the "Outflow" from the other aquifer.

- Inflow into and outflow from the district—This component describes the lateral flow of groundwater within the aquifer between the GCD and adjacent counties.

The water budgets for an individual cell containing a GCD boundary are assigned to either the GCD or the surrounding county.

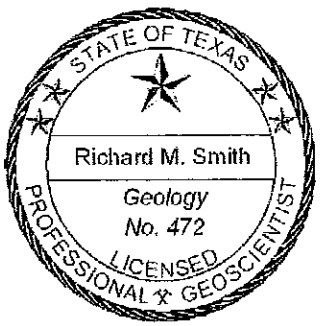
REFERENCES:

Kasmarek , M. C., and Robinson, J. L., 2004, Hydrogeology and simulation of groundwater flow and land-surface subsidence in the northern part of the Gulf Coast aquifer system, Texas: U.S. Geological Survey Scientific Investigations Report 2004-5102, 111p.

Kasmarek , M. C., Reece, B. D., and Houston, N. A., 2005, Evaluation of groundwater flow and land-surface subsidence caused by hypothetical withdrawals in the northern part of the northern part of the Gulf Coast aquifer system, Texas: U.S. Geological Survey Scientific Investigations Report 2005-5024, 70p.

Table 1: All values are averages of the 1980 to 1999 water budgets. All values are in acre-feet per year. Note: negative values mean flow out of the district and positive values mean flow into the district.

GCD	Model	Aquifer	Precipitation recharge (acft/yr)	Surface water inflow (acft/yr)	Surfac water outflow (acft/yr	Inflow into district (acft/yr	Outflow from district (acft/yr	Net inter-aquifer flow (upper(acft/yr	Av. Net inter-aquifer flow (lower) (acft/yr)
Southeast Texas GCD	Gulf Coast-North	Chicot aquifer	74,796	11,933	37,043	51,203	60,365	0	-24,850
Southeast Texas GCD	Gulf Coast-North	Evangeline aquifer	11,021	636	4,636	51,984	55,372	24,850	866
Southeast Texas GCD	Gulf Coast-North	Burkeville Confining Unit	11	1	2	78	89	-866	334
Southeast Texas GCD	Gulf Coast-North	Jasper aquifer	13,610	607	10,774	13,686	14,656	-334	0



GAM run 06-20

by Richard Smith, P.G.
Texas Water Development Board
Groundwater Availability Modeling Section
(512) 936-0877
October 12, 2006

EXECUTIVE SUMMARY:

A 51-year predictive model run was done with the groundwater availability model (GAM) for the northern part of the Gulf Coast Aquifer to evaluate the amount of pumpage that resulted in a desired future condition (DFC) of "sustainability", or zero water level declines, in the Southeast Texas Groundwater Conservation District (GCD). Using the 1999 estimated historic pumpage as the baseline pumpage, it was determined that even when only using this rate of pumpage, water levels declined in the aquifers of interest. Therefore, even with no additional pumpage above what was estimated to be produced from these aquifers in 1999, "sustainability" or zero water level declines, could not be achieved.

REQUESTOR:

Mr. John Stover, Southeast Texas Groundwater Conservation District (GCD), which is composed of Tyler, Hardin, Jasper, and Newton counties (Figure 1).

DESCRIPTION OF REQUEST:

Mr. Stover requested that we provide a model run with a desired future condition of "sustainability" in the district using the groundwater availability model (GAM) for the northern part of the Gulf Coast Aquifer (Kasmarek and Robinson, 2004; Kasmarek and others, 2005). Sustainability as defined by the district is maintaining present water levels.

METHODS:

To develop a baseline, we ran the model from 1999 to 2050 using 1999 pumping rates (Table 1) for each year. We are aware of the Harris-Galveston County Subsidence District's Regulatory Plan that has been developed through the year 2030 with an overall goal to reduce groundwater withdrawal to no more than 20 percent of total water demand. That scenario was not included in this model run. We produced maps of water levels and drawdowns in the Chicot, Evangeline and Jasper aquifers for the years 1999, 2010, 2030 and 2050 to evaluate how current pumpage rates affected the aquifers. Since the Burkeville Formation is considered a confining unit, we did not analyze this layer of the model. We calculated drawdowns by subtracting the simulated water levels from water levels that were calibrated to measured values in 1999.

PARAMETERS AND ASSUMPTIONS:

- For detailed discussion on assumptions and limitations of the northern part of the Gulf Coast Aquifer GAM, refer to Kasmarek and Robinson (2004) and Kasmarek and others (2005).

- We assumed pumping remained at 1999 levels and also used 1999 water levels as the sustainable target water levels . We are aware of the District's Regulatory Plan that has been developed for the period through the year 2030 with an overall goal to reduce groundwater withdrawal to no more than 20 percent of total water demand. However, that scenario was not included in this model run.

- The model includes four layers, representing the Chicot aquifer (Layer 1), the Evangeline aquifer (Layer 2), the Burkeville confining unit (Layer 3), and the Jasper aquifer (Layer 4).

- Quality of model calibration can be estimated using root mean square (RMS) error. RMS error evaluates differences between measured and simulated water levels in the wells considered for calibration. The RMS error is 31 feet for the Chicot aquifer, 45 feet for the Evangeline aquifer, and 38 feet for the Jasper aquifer for the calibration year 2000.

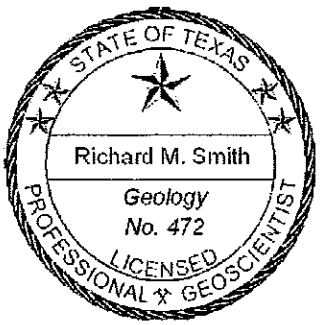
RESULTS:

The results of the model runs are illustrated in Figures 2 through 13. These figures show that groundwater levels will continue to slightly decline in Tyler, Hardin, Jasper and Newton counties during the 51-year predictive period and decline more rapidly in surrounding counties assuming 1999 pumping levels. In order to maintain present water levels, pumping will need to be decreased. This is further illustrated by Figures 14 through 22 which show the amounts of drawdown for 2010, 2030, and 2050 using 1999 as the base year.

REFERENCES:

Kasmarek , M. C., and Robinson, J. L., 2004, Hydrogeology and simulation of groundwater flow and land-surface subsidence in the northern part of the Gulf Coast aquifer system, Texas: U.S. Geological Survey Scientific Investigations Report 2004-5102, 111p.

Kasmarek , M. C., Reece, B. D., and Houston, N. A., 2005, Evaluation of groundwater flow and land-surface subsidence caused by hypothetical withdrawals in the northern part of the northern part of the Gulf Coast aquifer system, Texas: U.S. Geological Survey Scientific Investigations Report 2005-5024, 70p.



The seal appearing on this document was authorized by Richard M. Smith, P.G. on October 12, 2006

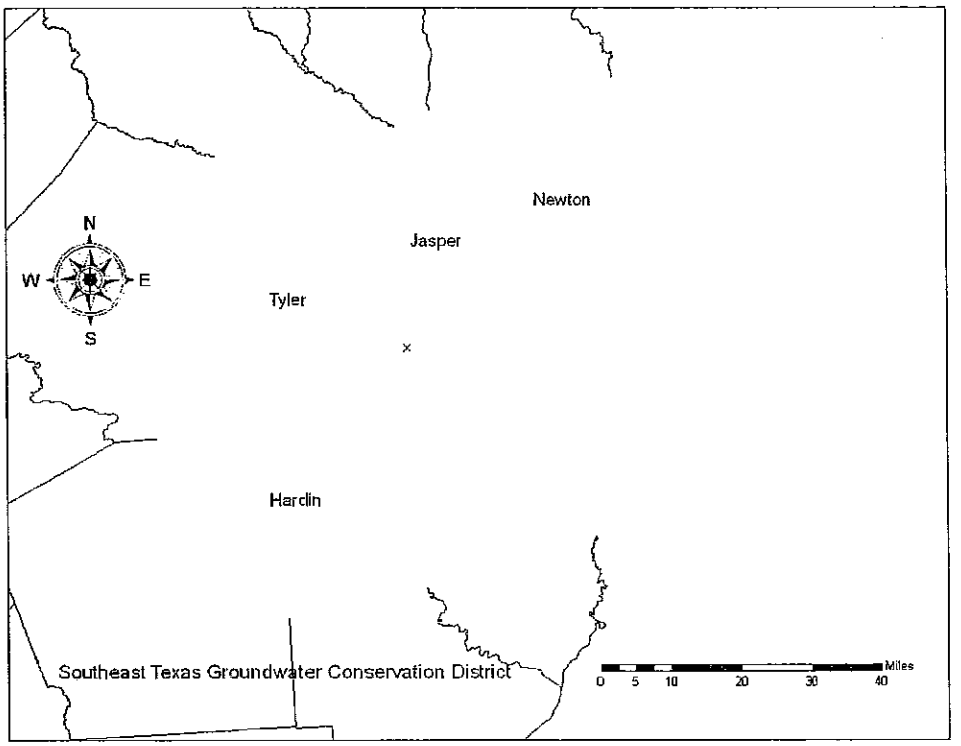


Figure 1: Location of the Southeast Texas GCD

Table 1: 1999 pumpage in acre-feet per year for the counties in the district and the surrounding counties

Aquifer	Newton	Jasper	Tyler	Hardin	Polk
Chicot	18	22,821	0	8,786	0
Evangeline	734	24,248	686	4,451	435
Burkville	0	0	11	174	42
Jasper	800	3,609	1,697	0	2,974

	Liberty	Jefferson	Orange	Angelina	
Chicot	864	2,700	19,392	0	
Evangeline	6,492	92	932	0	
Burkville	0	0	0	0	
Jasper	463	0	0	154	

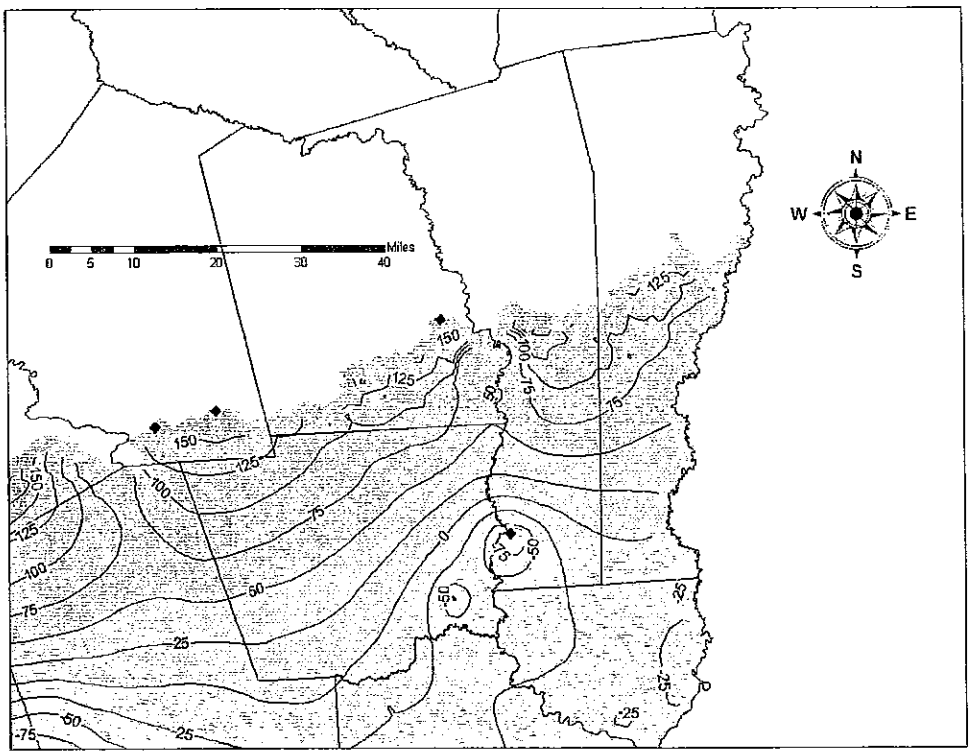


Figure 2: Water level map in 1999 for the Chicot aquifer (layer 1) in the Southeast Texas District. Contour interval is 25 feet.

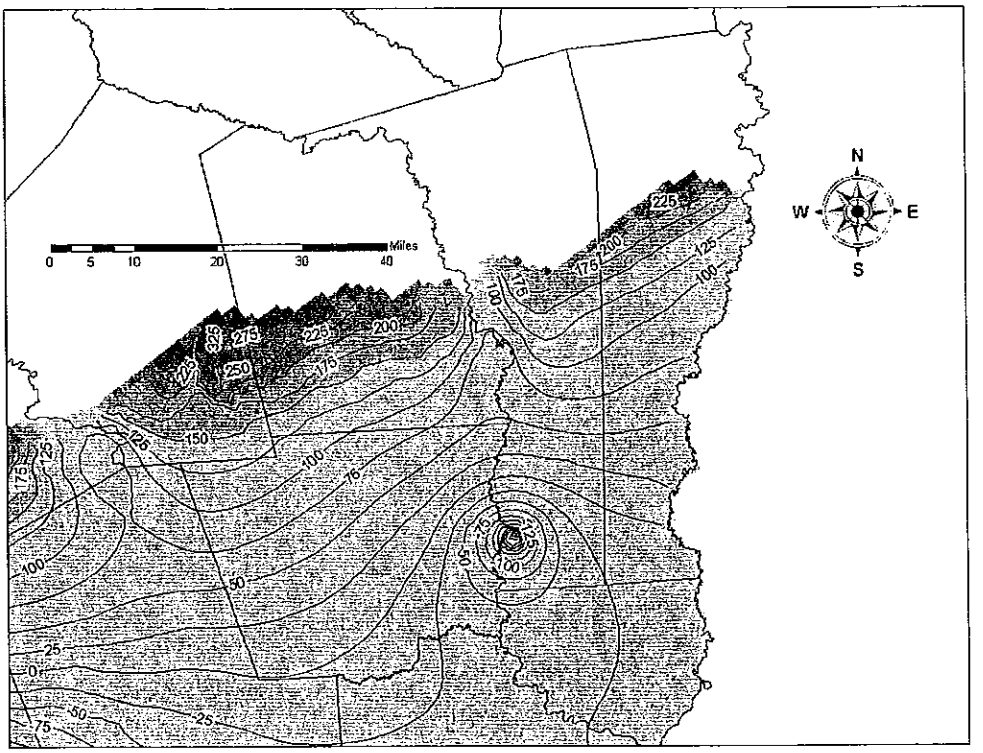


Figure 3: Water level map in 1999 for the Evangeline aquifer (layer 2). Contour interval is 25 feet.

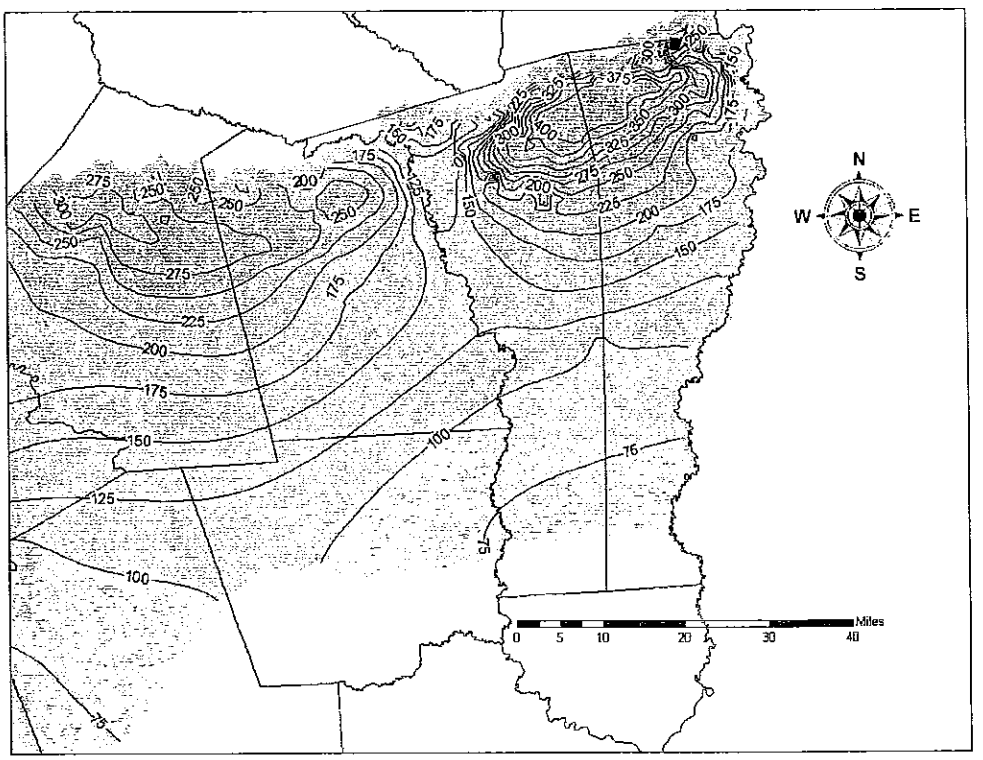


Figure 4: Water level map in 1999 for the Jasper aquifer (layer 4). Contour interval is 25 feet.

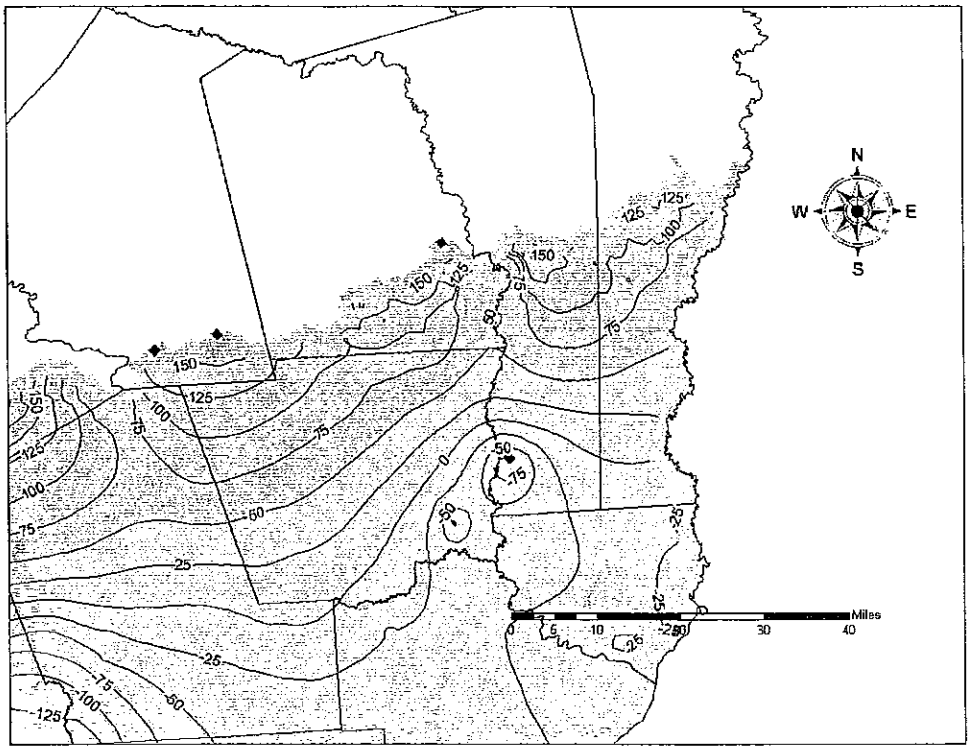


Figure5: Water level map in 2010 for the Chicot aquifer (layer 1) with 1999 pumping. Contour interval is 25 feet.

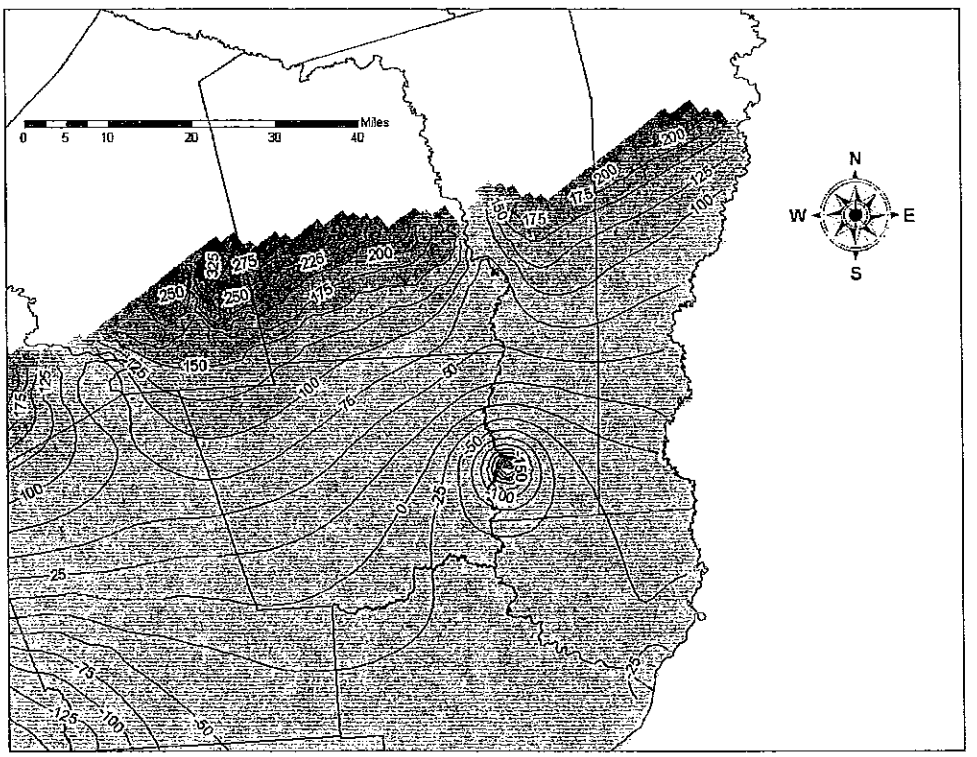


Figure 6: Water level map in 2010 for the Evangeline aquifer (layer2) with 1999 pumping. Contour interval is 25 feet.

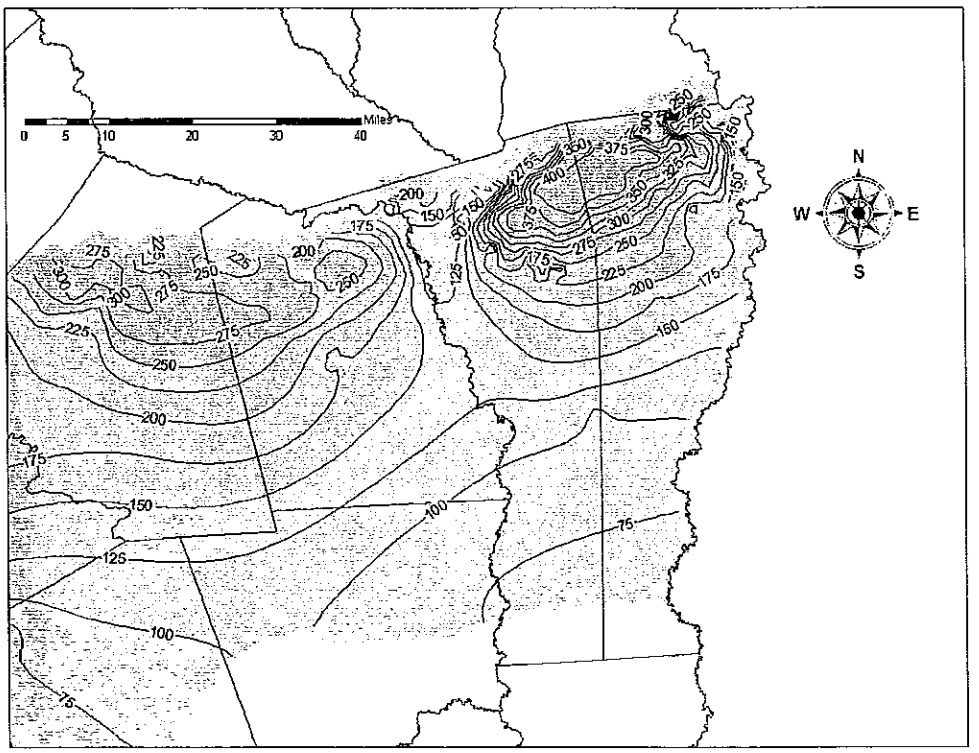


Figure 7: Water level map in 2010 for the Jasper aquifer (layer 4) with 1999 pumping. Contour interval is 25 feet.

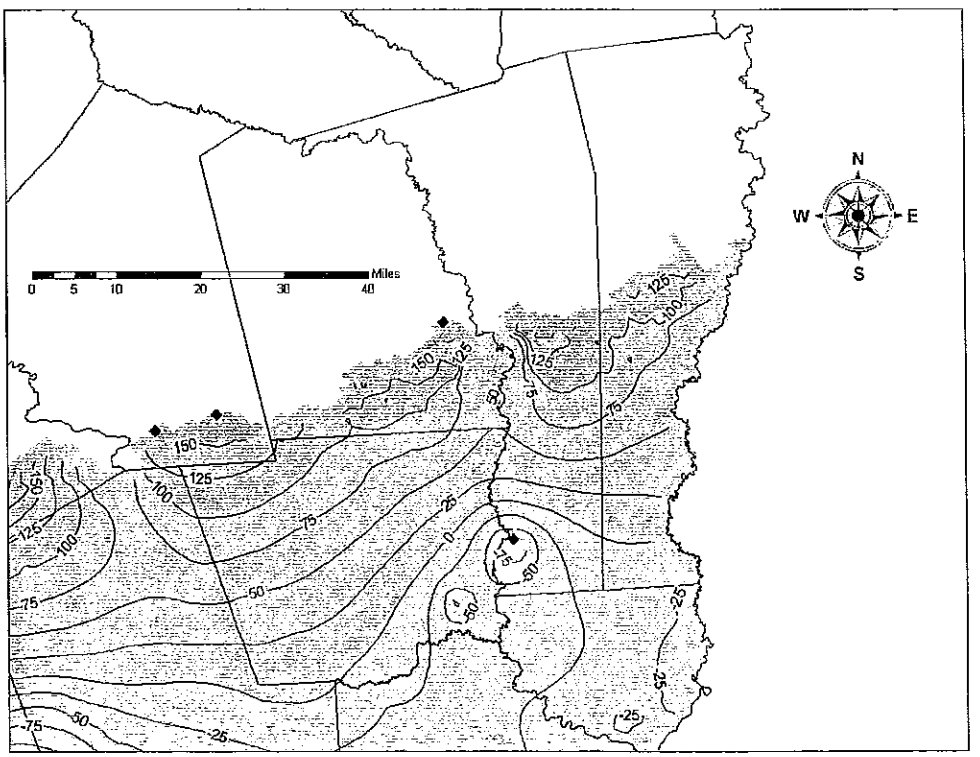


Figure 8: Water level map in 2030 for the Chicot aquifer (layer 1) with 1999 pumping. Contour interval is 25 feet.

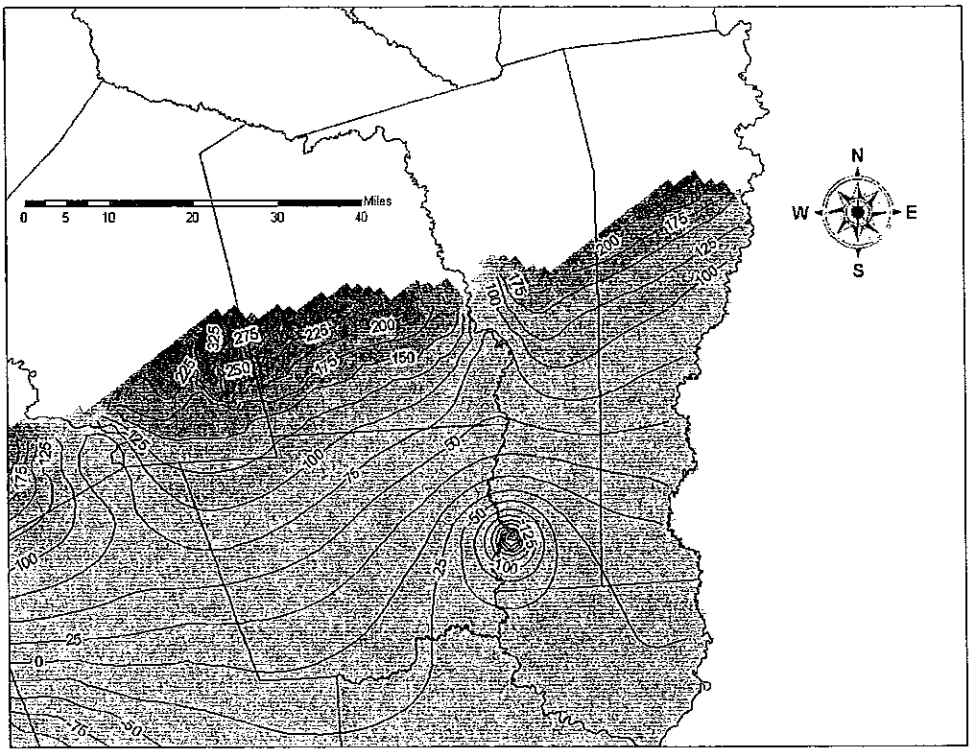


Figure 9: Water level map in 2030 for the Evangeline aquifer (layer 2) with 1999 pumping. Contour interval is 25 feet.

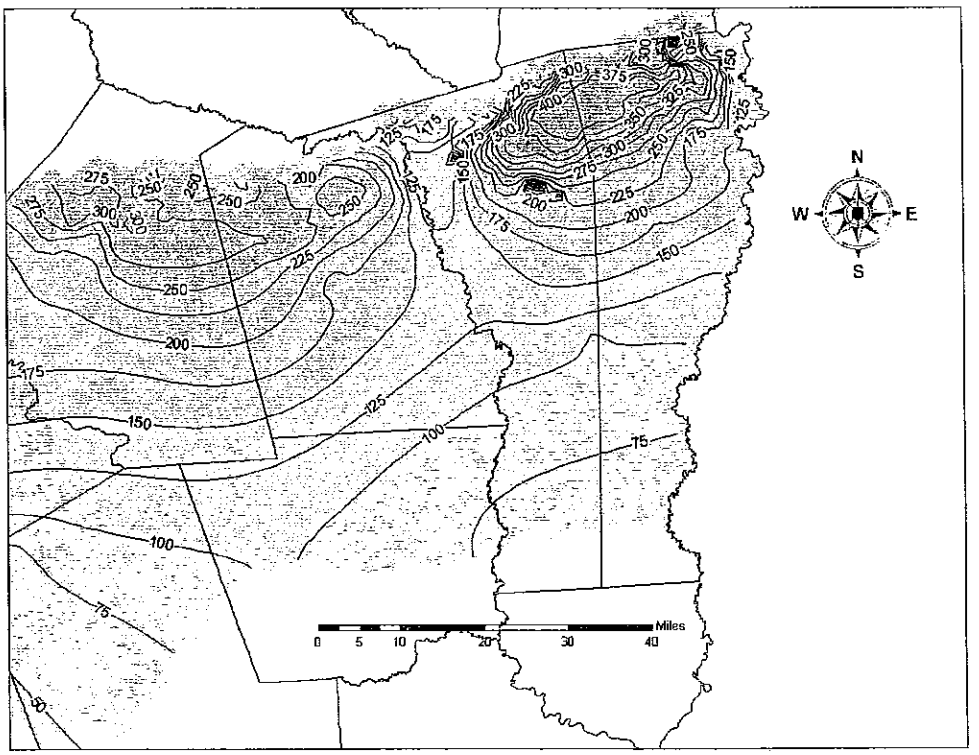


Figure 10: Water level map in 2030 for the Jasper aquifer (layer 4) with 1999 pumping. Contour interval is 25 feet.

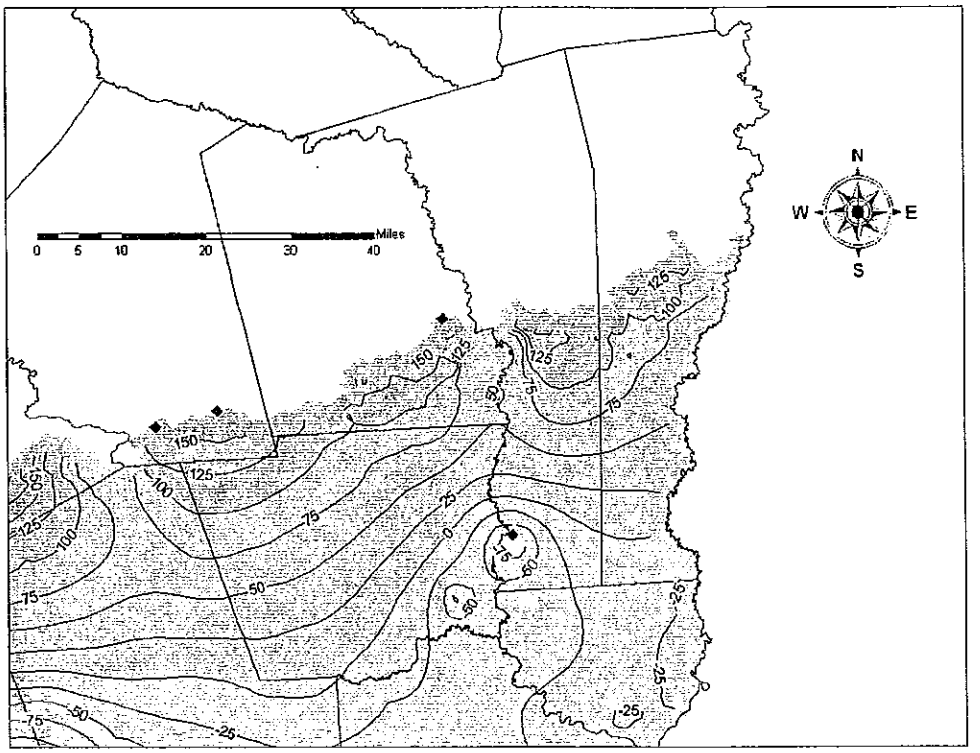


Figure 11: Water level map in 2050 for the Chicot aquifer (layer 1) with 1999 pumping. Contour interval is 25 feet.

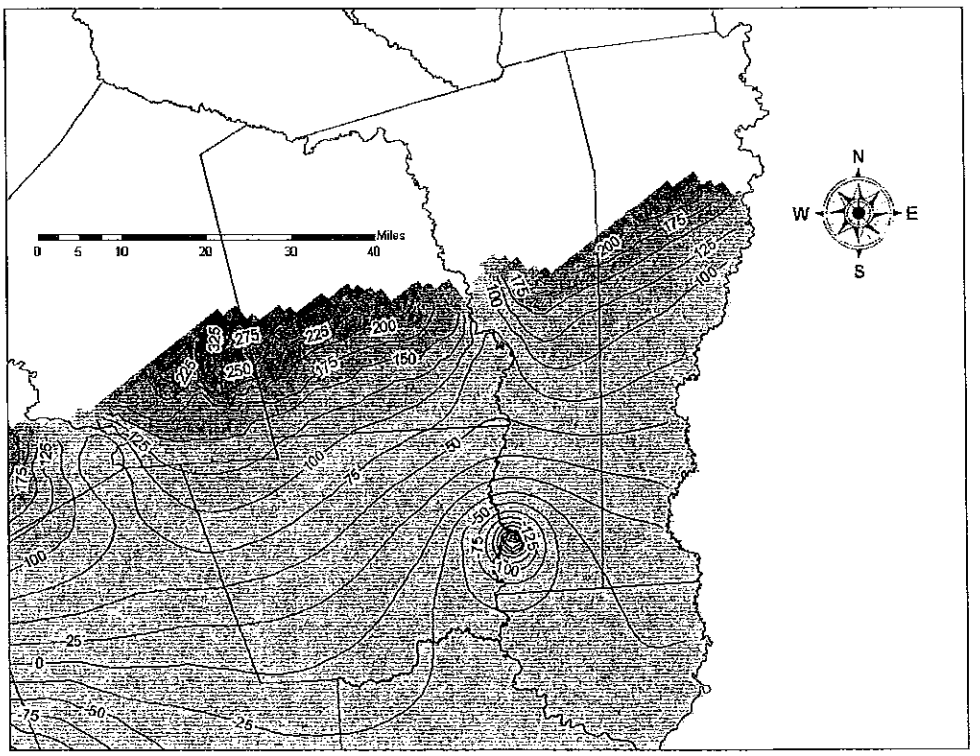


Figure 12: Water level map in 2050 for the Evangeline aquifer (layer 2) with 1999 pumping. Contour interval is 25 feet.

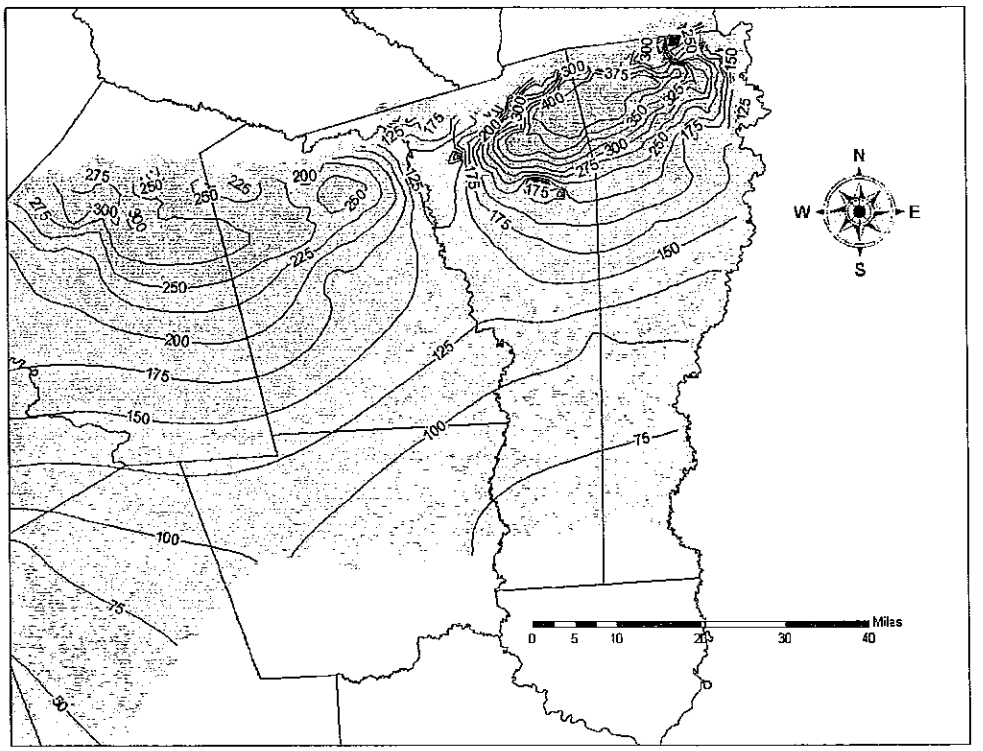


Figure 13: Water level map in 2050 for the Jasper aquifer (layer 4) with 1999 pumping. Contour interval is 25 feet.

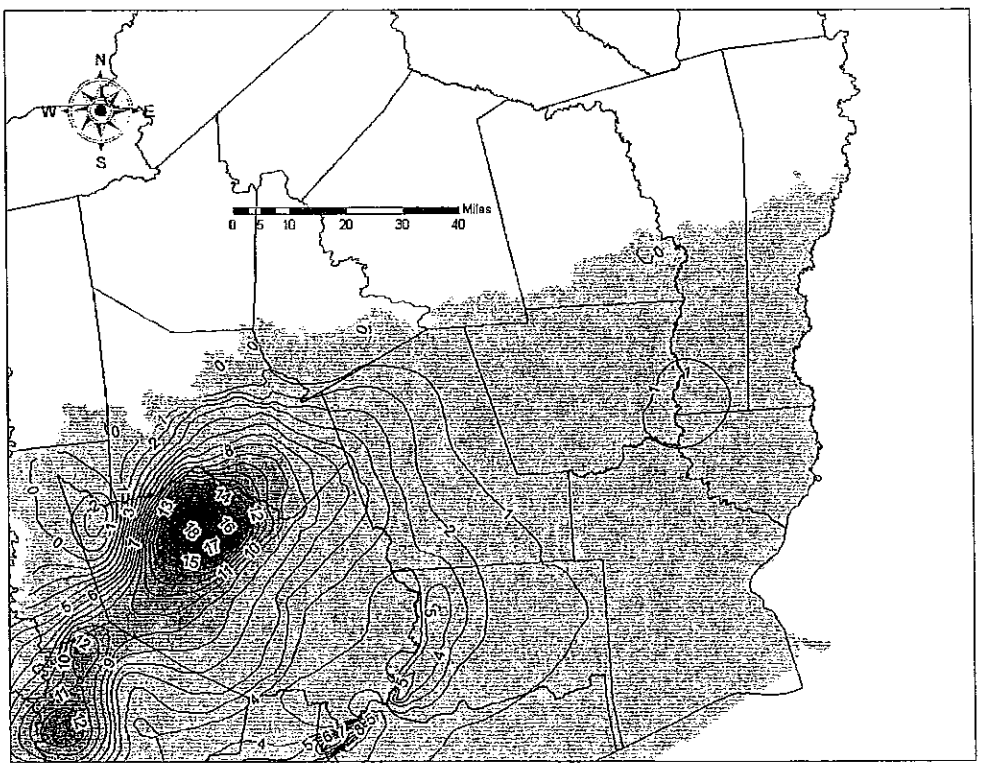


Figure 14: Drawdown in 2010 in the Chicot aquifer with continued 1999 pumping. Contour interval is 1 feet.

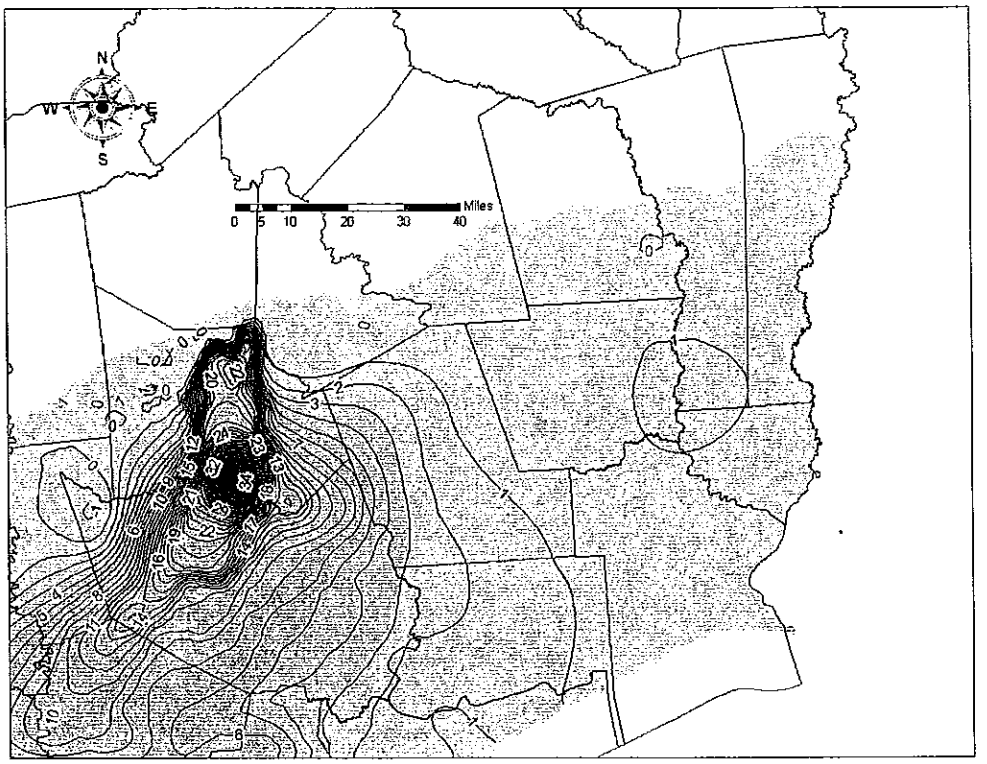


Figure 15: Drawdown in 2010 in the Evangeline aquifer with continued 1999 pumping. Contour interval is 1 feet.

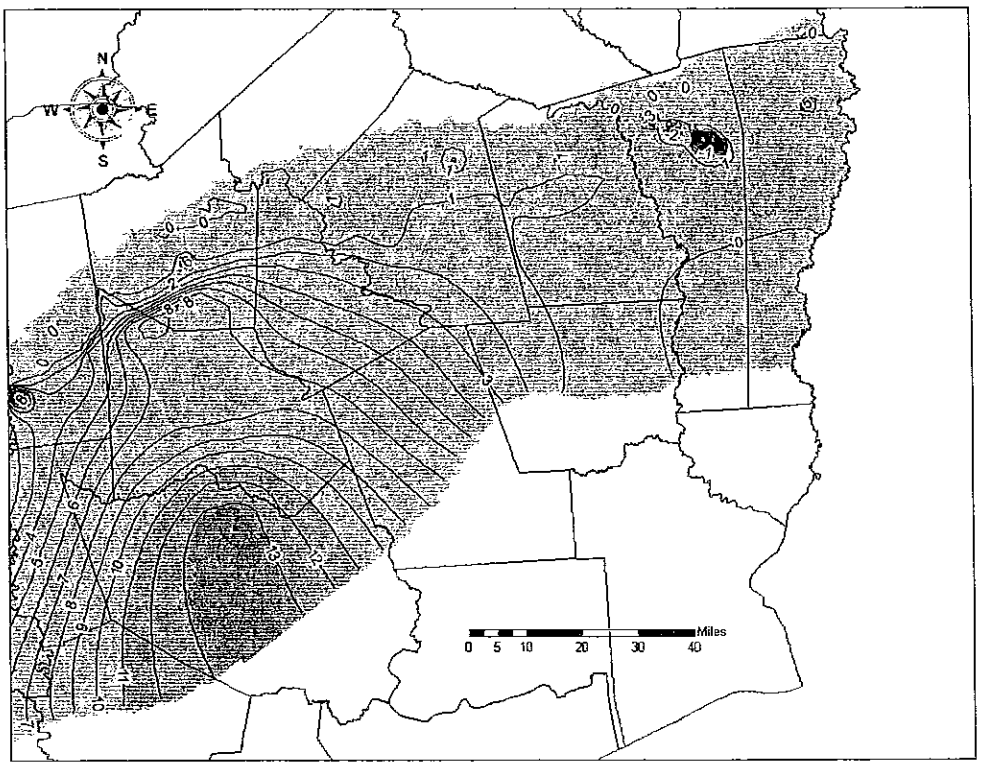


Figure 16: Drawdown in 2010 in the Jasper aquifer with continued 1999 pumping. Contour interval is 1 feet.

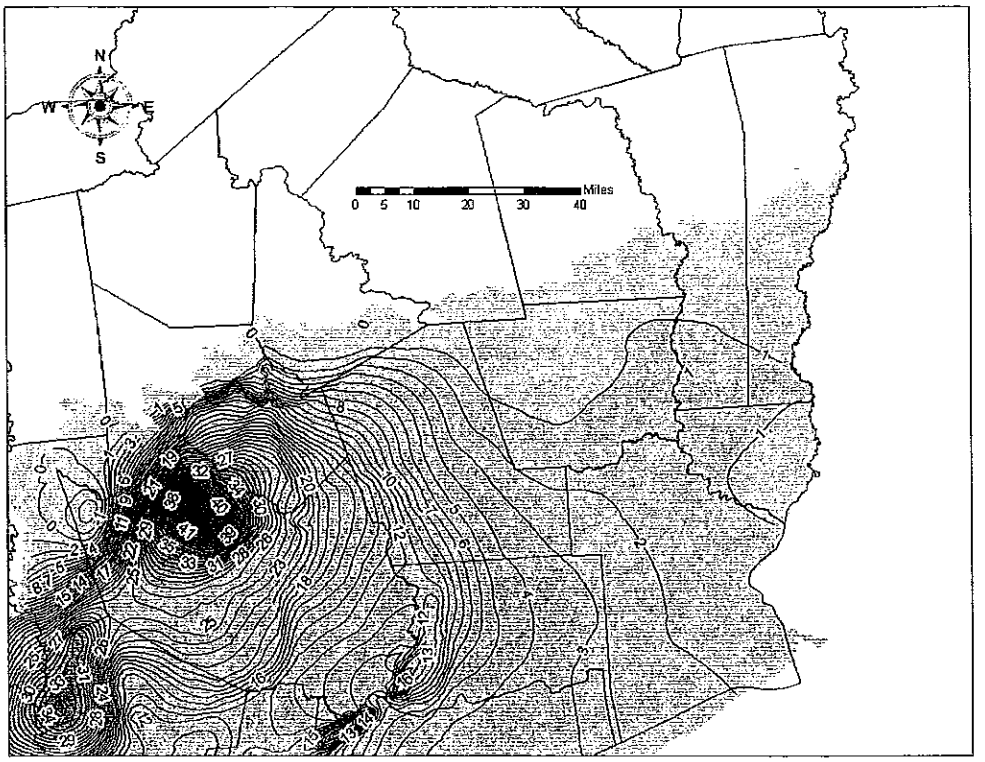


Figure 17: Drawdown in 2030 in the Chicot aquifer with continued 1999 pumping. Contour interval is 1 feet.

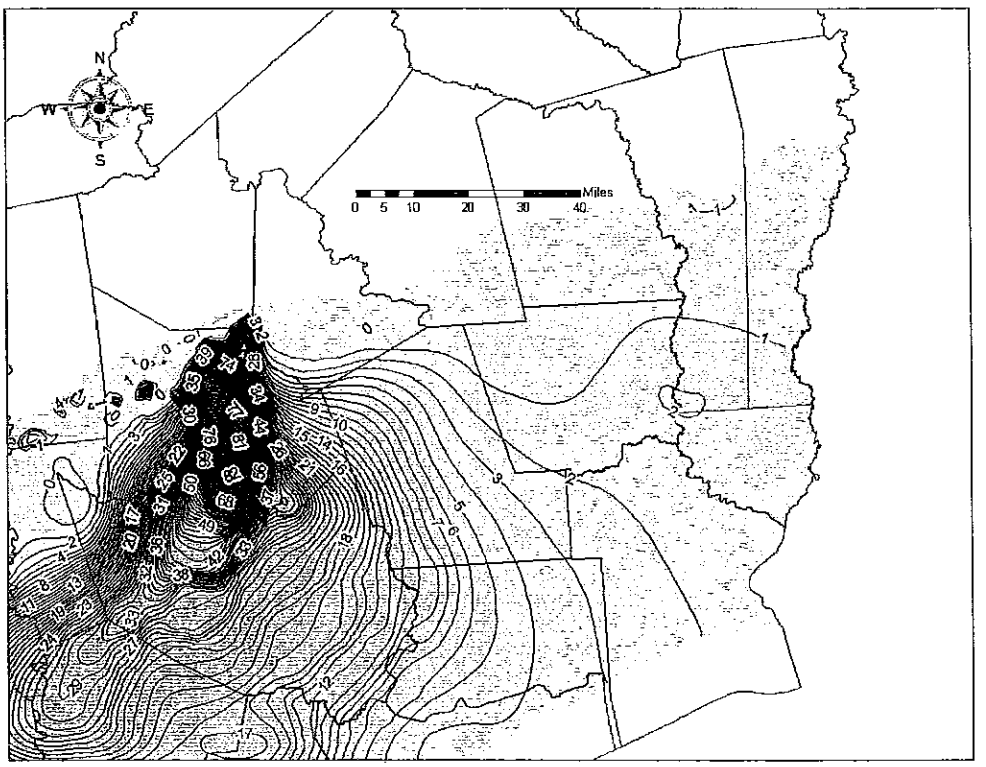


Figure 18: Drawdown in 2030 in the Evangeline aquifer with continued 1999 pumping. Contour interval is 1 feet.

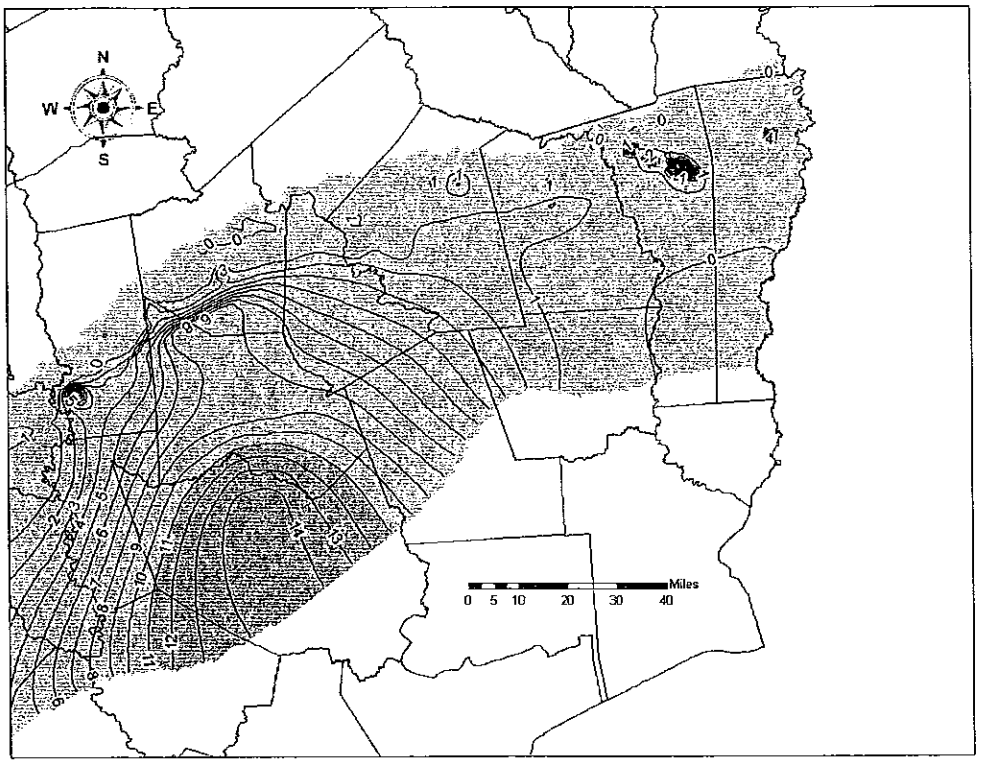


Figure 19: Drawdown in 2030 in the Jasper aquifer with continued 1999 pumping. Contour interval is 1 feet.

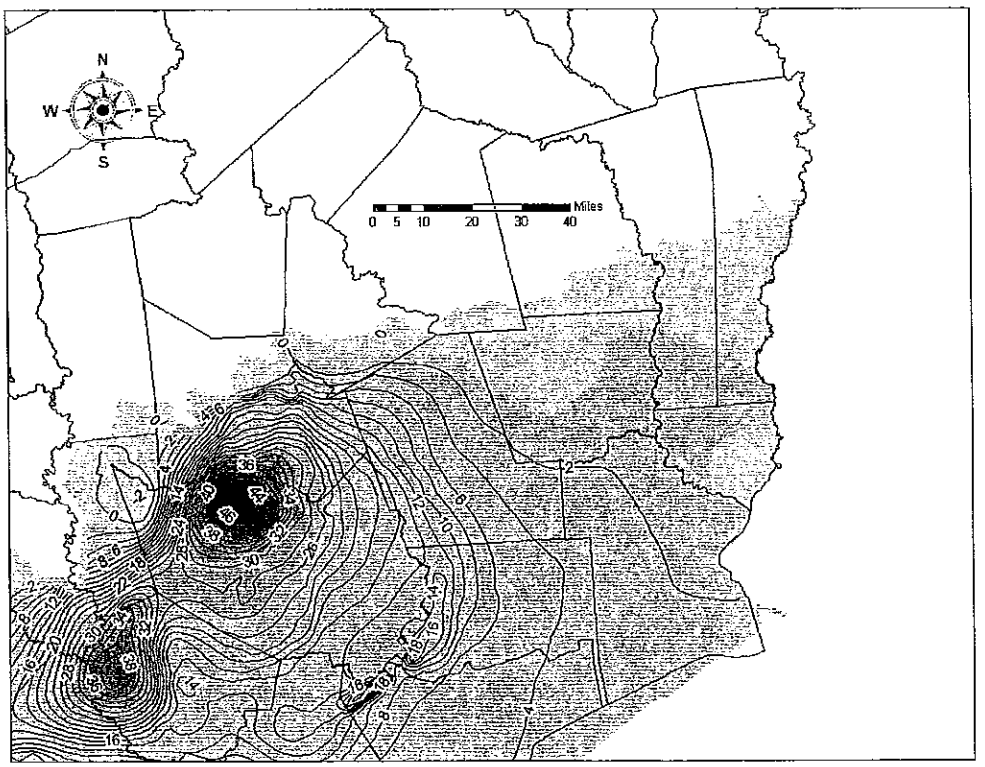


Figure 20: Drawdown in 2050 in the Chicot aquifer with continued 1999 pumping. Contour interval is 2 feet.

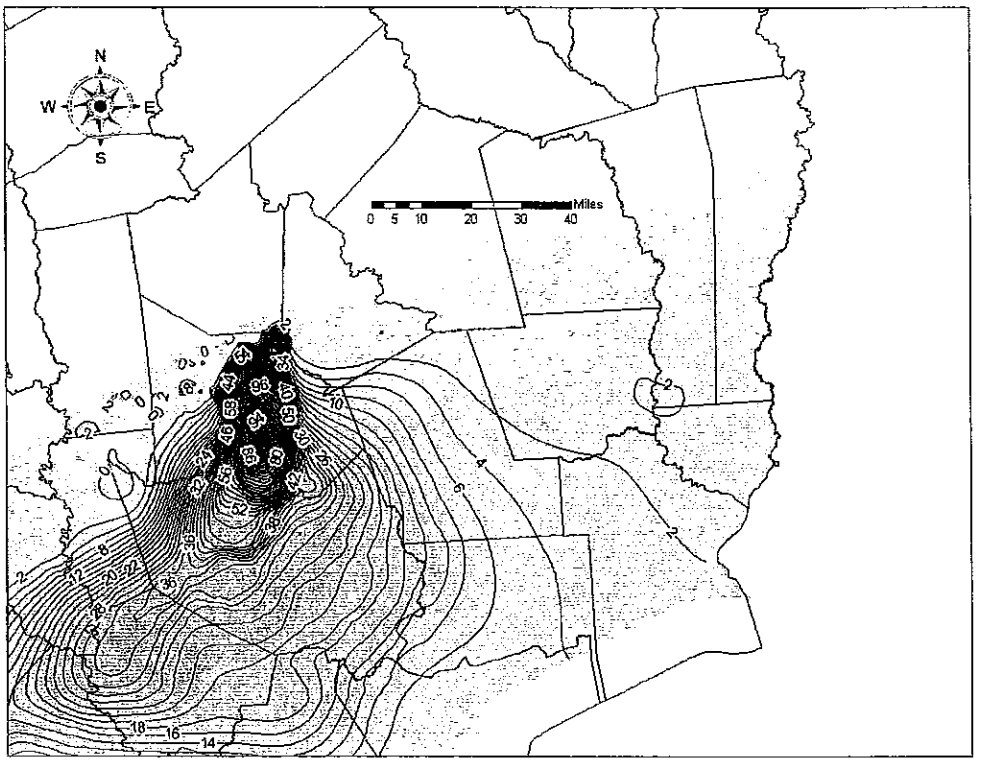


Figure 21: Drawdown in 2050 in the Evangeline aquifer with continued 1999 pumping. Contour interval is 2 feet.

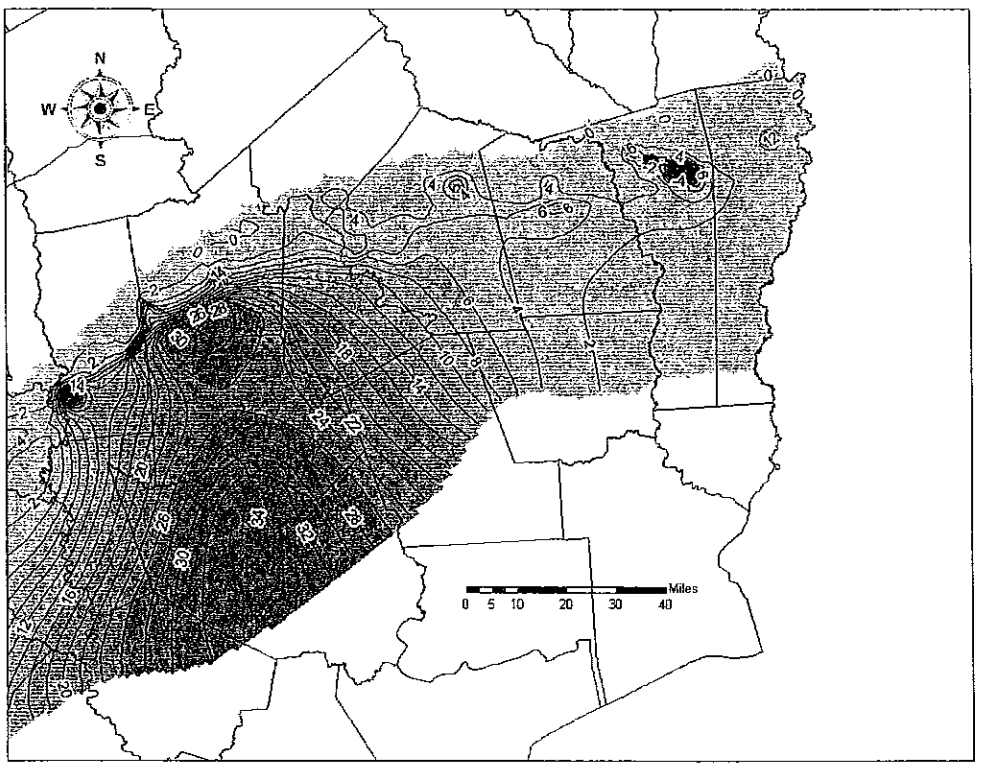


Figure 22: Drawdown in 2050 in the Jasper aquifer with continued 1999 pumping. Contour interval is 2 feet.

APPENDIX

B

2007 State Water Plan Projected Surface Water Supplies
Southeast Groundwater Conservation District
Hardin, Jasper, Newton, and Tyler Counties

Hardin County

RWPG	Water User Group	County	River Basin	Source Name	2000	2010	2020	2030	2040	2050	2060
I	Mining	Hardin	Neches	Sam Rayburn - Steinhagen Lake/Reservoir System	9,000	10,770	10,770	10,770	10,770	10,770	10,770
I	Livestock	Hardin	Neches	Livestock Local Supply	126	139	139	139	139	139	139
I	Livestock	Hardin	Trinity	Livestock Local Supply	1	2	2	2	2	2	2
	Total Projected Surface Water Supplies (acre-feet per year) =				**9,127**	**10,911**	**10,911**	**10,911**	**10,911**	**10,911**	**10,911**

Jasper County

RWPG	Water User Group	County	River Basin	Source Name	2000	2010	2020	2030	2040	2050	2060
I	Manufacturing	Jasper	Neches	Sam Rayburn - Steinhagen Lake/Reservoir System	12,828	29,991	29,991	29,991	29,991	29,991	29,991
I	Manufacturing	Jasper	Neches	Neches River Run-of-River Manufacturing	0	604	604	604	604	604	604
I	Manufacturing	Jasper	Neches	Neches River Run-of-River Manufacturing	0	12	12	12	12	12	12
I	Livestock	Jasper	Sabine	Livestock Local Supply	78	75	75	75	75	75	75
I	Livestock	Jasper	Neches	Livestock Local Supply	119	115	115	115	115	115	115
	Total Projected Surface Water Supplies (acre-feet per year) =				**13,025**	**30,797**	**30,797**	**30,797**	**30,797**	**30,797**	**30,797**

Newton County

RWPG	Water User Group	County	River Basin	Source Name	2000	2010	2020	2030	2040	2050	2060
I	Manufacturing	Newton	Sabine	Sabine River Run-of-River Manufacturing	0	135	135	135	135	135	135
I	Steam Electric Power	Newton	Sabine	Sabine River Run-of-River	0	13,442	13,442	13,442	13,442	13,442	13,442
I	Steam Electric Power	Newton	Sabine	Toledo Bend Lake/ Reservoir	0	17,929	17,929	17,929	17,929	17,929	17,929
I	Mining	Newton	Sabine	Other Local Supply	28	28	28	28	28	28	28
I	Irrigation	Newton	Sabine	Sabine River Run-of-River Irrigation	596	50	50	50	50	50	50
I	Livestock	Newton	Sabine	Livestock Local Supply	60	66	66	66	66	66	66
	Total Projected Surface Water Supplies (acre-feet per year) =				**684**	**31,650**	**31,650**	**31,650**	**31,650**	**31,650**	**31,650**

Tyler County

RWPG	Water User Group	County	River Basin	Source Name	2000	2010	2020	2030	2040	2050	2060
I	Irrigation	Tyler	Neches	Neches River Combined Run-of-River Irrigation	18	123	123	123	123	123	123
I	Livestock	Tyler	Neches	Livestock Local Supply	176	165	165	165	165	165	165
	Total Projected Surface Water Supplies (acre-feet per year) =				**194**	**288**	**288**	**288**	**288**	**288**	**288**

Source: Volume 3, 2007 State Water Planning Database

3/14/2007

APPENDIX

C

2007 State Water Plan Projected Water Demands
Southeast Groundwater Conservation District
Hardin, Jasper, Newton, and Tyler Counties

Hardin County

RWPG	Water User Group	County	River Basin	2000	2010	2020	2030	2040	2050	2060
I	Kountze	Hardin	Neches	282	320	347	359	372	385	399
I	Lumberton	Hardin	Neches	1,301	1,475	1,599	1,656	1,715	1,776	1,839
I	Silsbee	Hardin	Neches	974	1,104	1,198	1,240	1,284	1,330	1,377
I	Sour lake	Hardin	Neches	162	184	200	207	214	222	230
I	County Other	Hardin	Neches	1,668	1,891	2,051	2,124	2,199	2,277	2,358
I	County Other	Hardin	Trinity	17	20	21	22	23	24	24
I	Manufacturing	Hardin	Neches	119	146	165	182	200	216	233
I	Mining	Hardin	Neches	6,228	7,800	8,648	9,219	9,788	10,361	10,798
I	Irrigation	Hardin	Neches	3,502	7,213	7,213	7,213	7,213	7,213	7,213
I	Livestock	Hardin	Neches	154	154	154	154	154	154	154
I	Livestock	Hardin	Trinity	2	2	2	2	2	2	2
I	Lake Livingston Water Supply & Sewer Service Company	Hardin	Trinity	6	7	8	8	8	8	9
I	Lumberton Mud	Hardin	Neches	1,734	1,966	2,133	2,208	2,287	2,368	2,452
I	North Hardin WSC	Hardin	Neches	626	710	770	797	826	855	885
I	West Hardin WSC	Hardin	Neches	291	330	358	371	384	397	412
Total Projected Water Demands (acre-feet per year) =				**17,066**	**23,322**	**24,867**	**25,762**	**26,669**	**27,588**	**28,385**

Jasper County

RWPG	Water User Group	County	River Basin	2000	2010	2020	2030	2040	2050	2060
I	Jasper	Jasper	Neches	1,510	1,639	1,751	1,817	1,834	1,834	1,834

I	Kirbyville	Jasper	Sabine	446	482	512	531	535	535	535
I	County Other	Jasper	Sabine	941	1,016	1,081	1,119	1,129	1,129	1,129
I	County Other	Jasper	Neches	1,765	1,899	2,016	2,084	2,101	2,101	2,101
I	Manufacturing	Jasper	Neches	58,883	64,231	67,611	70,123	72,318	73,965	74,028
I	Mining	Jasper	Sabine	2	2	2	2	2	2	2
I	Mining	Jasper	Neches	2	2	2	2	2	2	2
I	Livestock	Jasper	Sabine	120	120	120	120	120	120	120
I	Livestock	Jasper	Neches	197	197	197	197	197	197	197
I	Jasper County WCID #1	Jasper	Sabine	318	343	365	378	382	382	382
I	Mauriceville SUD	Jasper	Sabine	98	106	113	117	118	118	118
I	Manufacturing	Jasper	Sabine	33	36	38	39	41	41	41
Total Projected Water Demands (acre-feet per year) =				**64,315**	**70,073**	**73,808**	**76,529**	**78,779**	**80,426**	**80,489**

Newton County

RWPG	Water User Group	County	River Basin	2000	2010	2020	2030	2040	2050	2060
I	Newton	Newton	Sabine	463	492	514	517	532	548	565
I	County Other	Newton	Sabine	1,104	1,172	1,225	1,232	1,269	1,307	1,346
I	Manufacturing	Newton	Sabine	551	678	793	899	1,006	1,103	1,196
I	Steam Electric Power	Newton	Sabine	0	5,924	14,132	16,522	19,436	22,987	27,317
I	Mining	Newton	Sabine	28	26	26	26	26	26	26
I	Mining	Newton	Neches	6	6	6	6	6	6	6
I	Irrigation	Newton	Sabine	367	367	367	367	367	367	367
I	Livestock	Newton	Sabine	110	110	110	110	110	110	110
I	Mauriceville SUD	Newton	Sabine	37	39	41	41	42	44	45
I	South Newton WSC	Newton	Sabine	255	270	283	284	293	301	311
Total Projected Water Demands (acre-feet per year) =				**2,921**	**9,084**	**17,497**	**20,004**	**23,087**	**26,799**	**31,289**

Tyler County

RWPG	Water User Group	County	River Basin	2000	2010	2020	2030	2040	2050	2060
I	Colmesneil	Tyler	Neches	64	76	88	95	98	98	98
I	Woodville	Tyler	Neches	571	677	780	846	871	871	871
I	County Other	Tyler	Neches	1,250	1,482	1,708	1,853	1,908	1,908	1,908
I	Manufacturing	Tyler	Neches	32	39	46	53	60	66	71
I	Irrigation	Tyler	Neches	29	29	29	29	29	29	29
I	Livestock	Tyler	Neches	274	274	274	274	274	274	274
I	Lake Livingston Water Supply & Sewer Service Company	Tyler	Neches	6	7	8	9	9	9	9
I	Tyler County WSC	Tyler	Neches	514	609	702	761	784	784	784
Total Projected Water Demands (acre-feet per year) =				**2,740**	**3,193**	**3,635**	**3,920**	**4,033**	**4,039**	**4,044**

Source: Volume 3, 2007 State Water Planning Database

3/14/2007

Projected Water Management Strategies
Southeast Groundwater Conservation District
Hardin, Jasper, Newton, and Tyler Counties

Hardin County

RWPG	WUG	WUG County	River Basin	Water Management Strategy	Source County	Source Name	2010	2020	2030	2040	2050	2060
I	Manufacturing	Hardin	Neches	New Wells - Gulf Coast Aquifer	Hardin	Gulf Coast Aquifer	114	114	114	114	114	114
I	Irrigation	Hardin	Neches	Purchase Water from Provider (1)	Hardin	Neches River Run-of-River Irrigation	3,711	3,711	3,711	3,711	3,711	3,711
I	County Other	Hardin	Trinity	New Wells - Gulf Coast Aquifer	Hardin	Gulf Coast Aquifer	0	0	0	1	1	2
I	County Other	Hardin	Neches	Overdraft Gulf Coast Aquifer	Hardin	Gulf Coast Aquifer	154	306	306	305	458	457
I	Lumberton	Hardin	Neches	Municipal Conservation	Hardin	Conservation	76	116	146	167	190	215
Total Projected Water Management Strategies (acre-feet per year) =							**4,055**	**4,247**	**4,277**	**4,298**	**4,474**	**4,499**

Source: Volume 3, 2007 State Water Planning Database

TWDB: 03/14/2007

Jasper County

RWPG	WUG	WUG County	River Basin	Water Management Strategy	Source County	Source Name	2010	2020	2030	2040	2050	2060
I	County Other	Jasper	Sabine	New Wells - Gulf Coast Aquifer	Jasper	Gulf Coast Aquifer	82	82	82	82	82	82
I	County Other	Jasper	Neches	New Wells - Gulf Coast Aquifer	Jasper	Gulf Coast Aquifer	70	141	141	141	141	141
I	Kirbyville	Jasper	Sabine	New Wells - Gulf Coast Aquifer	Jasper	Gulf Coast Aquifer	96	96	96	96	96	96
I	Kirbyville	Jasper	Sabine	Municipal Conservation	Jasper	Conservation	3	4	5	6	7	7
Total Projected Water Management Strategies (acre-feet per year) =							**251**	**323**	**324**	**325**	**326**	**326**

Newton County

RWPG	WUG	WUG County	River Basin	Water Management Strategy	Source County	Source Name	2010	2020	2030	2040	2050	2060
I	Manufacturing	Newton	Sabine	Purchase Water from Provider (2)	Reservoir	Toledo Bend Lake/ Reservoir	700	700	700	700	700	700
I	Manufacturing	Newton	Sabine	New Wells - Gulf Coast Aquifer	Newton	Gulf Coast Aquifer	400	400	400	700	700	700
Total Projected Water Management Strategies (acre-feet per year) =							**1,100**	**1,100**	**1,100**	**1,400**	**1,400**	**1,400**

Tyler County

RWPG	WUG	WUG County	River Basin	Water Management Strategy	Source County	Source Name	2010	2020	2030	2040	2050	2060
I	County Other	Tyler	Neches	New Wells - Gulf Coast Aquifer	Tyler	Gulf Coast Aquifer	0	205	274	274	274	274
Total Projected Water Management Strategies (acre-feet per year) =							**0**	**205**	**274**	**274**	**274**	**274**

2007 State Water Plan Projected Water Needs
Southeast Texas Groundwater Conservation District

Disclaimer: No claims are made to the accuracy or completeness of the information shown herein nor to its suitability for a particular use. District personnel must review these data and correct any discrepancies in order to ensure the approval of their management plans. These data are available on the internet from either the online 2007 State Water Plan, Volume 3, Regional Water Planning Group Database (http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp) or the online Historical Water Use Information-Groundwater Pumpage Estimates web page (http://www.twdb.state.tx.us/wushistorical/DesktopDefault.aspx?PageID=2). Please do not hesitate to call either Rima Petrossian (512-936-2420) or Lance Christian (512-463-9804) with questions concerning these datasets.

Tyler County

RWPG	WUG	County	River Basin	2010	2020	2030	2040	2050	2060
I	Colmesneil	Tyler	Neches	0	0	0	0	0	0
I	Woodville	Tyler	Neches	0	0	0	0	0	0
I	County Other	Tyler	Neches	0	-142	-239	-251	-232	-232
I	Manufacturing	Tyler	Neches	0	0	0	0	0	0
I	Irrigation	Tyler	Neches	0	0	0	0	0	0
I	Livestock	Tyler	Neches	0	0	0	0	0	0
I	Lake Livingston Water Supply and Sewer Service Company	Tyler	Neches	0	0	0	0	0	0
I	Tyler County WSC	Tyler	Neches	0	0	0	0	0	0
	Total Projected Water Needs (acre-feet per year) =			**0**	**-142**	**-239**	**-251**	**-232**	**-232**

Source:Volume 3, 2007 State Water Planning Database

4/13/2007

Hardin County

RWPG	WUG	County	River Basin	2010	2020	2030	2040	2050	2060
I	Kountze	Hardin	Neches	0	0	0	0	0	0
I	Lumberton	Hardin	Neches	0	0	0	0	0	0
I	Silsbee	Hardin	Neches	0	0	0	0	0	0
I	Sour Lake	Hardin	Neches	0	0	0	0	0	0
I	County Other	Hardin	Neches	-154	-263	-284	-304	-357	-429
I	County Other	Hardin	Trinity	0	0	0	-1	-1	-2
I	Manufacturing	Hardin	Neches	-27	-46	-63	-81	-97	-114
I	Mining	Hardin	Neches	0	0	0	0	0	0
I	Irrigation	Hardin	Neches	-3,711	-3,711	-3,711	-3,711	-3,711	-3,711
I	Livestock	Hardin	Neches	0	0	0	0	0	0
I	Livestock	Hardin	Trinity	0	0	0	0	0	0
I	Lake Livingston Water Supply and Sewer Service Company	Hardin	Trinity	0	0	0	0	0	0
I	Lumberton MUD	Hardin	Neches	0	0	0	0	0	0
I	North Hardin WSC	Hardin	Neches	0	0	0	0	0	0
I	West Hardin WSC	Hardin	Neches	0	0	0	0	0	0
			Total Projected Water Needs (acre-feet per year) =	**-3,892**	**-4,020**	**-4,058**	**-4,097**	**-4,166**	**-4,256**

Source:Volume 3, 2007 State Water Planning Database

4/13/2007

Jasper County

RWPG	WUG	County	River Basin	2010	2020	2030	2040	2050	2060
I	Jasper	Jasper	Neches	0	0	0	0	0	0
I	Kirbyville	Jasper	Sabine	-63	-83	-95	-90	-88	-88
I	County Other	Jasper	Sabine	-40	-75	-82	-62	-53	-53
I	County Other	Jasper	Neches	-69	-130	-141	-103	-85	-85
I	Manufacturing	Jasper	Neches	0	0	0	0	0	0
I	Mining	Jasper	Sabine	0	0	0	0	0	0
I	Mining	Jasper	Neches	0	0	0	0	0	0
I	Livestock	Jasper	Sabine	0	0	0	0	0	0
I	Livestock	Jasper	Neches	0	0	0	0	0	0
I	Jasper County WCID #1	Jasper	Sabine	0	0	0	0	0	0
I	Mauriceville SUD	Jasper	Sabine	0	0	0	0	0	0
I	Manufacturing	Jasper	Sabine	0	0	0	0	0	0
			Total Projected Water Needs (acre-feet per year) =	**-172**	**-288**	**-318**	**-255**	**-226**	**-226**

Source:Volume 3, 2007 State Water Planning Database

4/13/2007

Newton County

RWPG	WUG	County	River Basin	2010	2020	2030	2040	2050	2060
I	Newton	Newton	Sabine	0	0	0	0	0	0
I	County Other	Newton	Sabine	0	0	0	0	0	0
I	Manufacturing	Newton	Sabine	-149	-264	-370	-477	-574	-667
I	Steam Electric Power	Newton	Sabine	0	0	0	0	0	0
I	Mining	Newton	Sabine	0	0	0	0	0	0
I	Mining	Newton	Neches	0	0	0	0	0	0
I	Irrigation	Newton	Sabine	0	0	0	0	0	0
I	Livestock	Newton	Sabine	0	0	0	0	0	0
I	Mauriceville SUD	Newton	Sabine	0	0	0	0	0	0
I	South Newton WSC	Newton	Sabine	0	0	0	0	0	0
			Total Projected Water Needs (acre-feet per year) =	**-149**	**-264**	**-370**	**-477**	**-574**	**-667**

Source:Volume 3, 2007 State Water Planning Database

4/13/2007