Garza County Underground Water Conservation District

Revised

Water Management Plan

2009-2014

Index

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Garza County Underground Water Conservation District
District Mission

The overall objective of the district is the conservation, preservation, recharge and enhancement of the ground water supplies within the boundaries of the District; also to make wise and beneficial use of the resource for the benefit of the citizens and economy of the District. To accomplish these goals, the District plans to implement a program to monitor both the quantity & quality of these water supplies and also to promote a brush control program for the District.

Statement of Guiding Principles

The Garza County Underground Water Conservation District is created and organized under the term and provisions of Section 59, Article XVI, Texas Constitution, and Chapter 188 of the House Bill 846, including all amendments and additions, of the 74th Legislature. The District has all the rights, powers, privileges, authority, functions, and duties provided by the general law of the state, including Chapter 36 (formerly Chapter 52) of the Texas Water Code, Vernon's Texas Codes Annotated, applicable to underground water conservation districts created under Section 59, Article XVI, Texas Constitution.

The District recognizes that the groundwater resources of the region are vital importance to the residents of the District and that this resource must be managed and protected from contamination and waste. The rules and regulations of the District will be implemented and enforced to accomplish these objectives.

Location and Extent

The boundaries of the Garza County UWCD are coextensive with the boundaries of Garza County, Texas, which lies in the southern part of the High Plains of Texas. About ¼ of the District lies above the Caprock escarpment while the rest of the District, including the principal city of Post, lies below the Caprock.

Ground Water Resource

The Ogallala Aquifer is located in the western part of the District, extending from the northwestern corner to the southwest corner, mainly being in the area above the Caprock. Water from the aquifer is principally used for irrigation and rural domestic and livestock needs.

The Dockum Aquifer is located in the northern and northeastern parts of the District and extends along the eastern edge to the southeast corner. Water from the aquifer is used for mining, irrigation, livestock and household use.

The Edwards-Trinity High Plains Aquifer lies along the western edge of the District, extending from the northwest corner to the southwest corner. Water from the aquifer is used mainly for irrigation and domestic household needs.

The Seymour Aquifer is located in the northeast corner of the District and furnishes water for irrigation and livestock use.

Surface Water Resources of Garza County UWCD

There are no surface water impoundments in the District, except for livestock consumption, which could possibly require conjunctive management. At the present time, Garza County UWCD has no jurisdiction over any surface water projects. Likewise, no agency which regulates surface water, has the authority to manage groundwater within the territory of this District.

Lake Alan Henry and proposed Post Reservoir are within the boundaries of Garza County UWCD, but the District has no jurisdiction over these lakes.

Lake Alan Henry Water District was formed during the Texas 78th Legislature to manage the surface water of Lake Alan Henry.

Historical Water Use Estimate Summary

TWDB - Water Use Survey

Garza County

Unit: Acre Feet (ACFT)

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 the Historical Water Use Information-Historical Water Usage Estimates web page (http://www.twdb.state.tx.us/wushistorical/DesktopDefault.aspx?PageID=1). Please do not hesitate to call either Rima Petrossian (512-936-2420) or Lance Christian (512-463-9804) with questions concerning these datasets.

GW = groundwater; SW = surface water

Year	Source	Municipal	Manufacturing	Steam Electric	Irrigation	Mining	Livestock	Total
1974	GW	162	33	0	15,667	997	110	16,969
	SW	455	264	0	0	0	395	1,114
	Total	**617**	**297**	**0**	**15,667**	**997**	**505**	**18,083**
1980	GW	138	0	0	7,110	0	44	7,292
	SW	1,229	250	0	0	728	246	2,453
	Total	**1,367**	**250**	**0**	**7,110**	**728**	**290**	**9,745**
1984	GW	168	0	0	5,125	777	48	6,118
	SW	689	0	0	0	0	436	1,125
	Total	**857**	**0**	**0**	**5,125**	**777**	**484**	**7,243**
1985	GW	165	0	0	2,750	717	33	3,665
	SW	676	0	0	0	0	299	975
	Total	**841**	**0**	**0**	**2,750**	**717**	**332**	**4,640**
1986	GW	160	0	0	1,667	677	34	2,538
	SW	930	33	0	0	0	314	1,277
	Total	**1,090**	**33**	**0**	**1,667**	**677**	**348**	**3,815**
1987	GW	155	0	0	1,700	636	39	2,530
	SW	829	23	0	0	0	359	1,211
	Total	**984**	**23**	**0**	**1,700**	**636**	**398**	**3,741**
1988	GW	144	0	0	4,084	617	42	4,887

	SW	821	2	0	0	0	387	1,210
	Total	**965**	**2**	**0**	**4,084**	**617**	**429**	**6,097**
1989	GW	159	0	0	6,267	575	42	7,043
	SW	798	2	0	45	0	382	1,227
	Total	**957**	**2**	**0**	**6,312**	**575**	**424**	**8,270**
1990	GW	156	0	0	4,383	575	41	5,155
	SW	803	2	0	0	0	377	1,182
	Total	**959**	**2**	**0**	**4,383**	**575**	**418**	**6,337**
1991	GW	158	0	0	3,326	568	42	4,094
	SW	823	2	0	0	0	385	1,210
	Total	**981**	**2**	**0**	**3,326**	**568**	**427**	**5,304**
1992	GW	166	0	0	1,646	583	32	2,427
	SW	642	2	0	0	0	293	937
	Total	**808**	**2**	**0**	**1,646**	**583**	**325**	**3,364**
1993	GW	168	0	0	3,898	565	32	4,663
	SW	506	2	0	39	0	293	840
	Total	**674**	**2**	**0**	**3,937**	**565**	**325**	**5,503**
1994	GW	161	0	0	4,637	565	47	5,410
	SW	360	2	0	60	0	428	850
	Total	**521**	**2**	**0**	**4,697**	**565**	**475**	**6,260**
1995	GW	141	0	0	6,047	1,138	51	7,377
	SW	492	2	0	61	0	458	1,013
	Total	**633**	**2**	**0**	**6,108**	**1,138**	**509**	**8,390**
1996	GW	140	0	0	10,420	1,138	51	11,749
	SW	420	2	0	105	0	458	985
	Total	**560**	**2**	**0**	**10,525**	**1,138**	**509**	**12,734**
1997	GW	68	0	0	8,756	1,138	44	10,006
	SW	380	1	0	88	135	398	1,002
	Total	**448**	**1**	**0**	**8,844**	**1,273**	**442**	**11,008**
1998	GW	141	0	0	15,572	1,138	30	16,881
	SW	802	1	0	157	135	269	1,364
	Total	**943**	**1**	**0**	**15,729**	**1,273**	**299**	**18,245**
1999	GW	128	0	0	7,625	1,138	34	8,925
	SW	579	2	0	77	135	305	1,098
	Total	**707**	**2**	**0**	**7,702**	**1,273**	**339**	**10,023**
2000	GW	129	0	0	12,105	1,138	32	13,404
	SW	652	2	0	60	147	287	1,148
	Total	**781**	**2**	**0**	**12,165**	**1,285**	**319**	**14,552**
2001	GW	142	0	0	14,502	1,149	30	15,823
	SW	793	2	0	146	136	273	1,350
	Total	**935**	**2**	**0**	**14,648**	**1,285**	**303**	**17,173**
2002	GW	132	0	0	19,768	1,138	28	21,066
	SW	740	1	0	200	135	258	1,334
	Total	**872**	**1**	**0**	**19,968**	**1,273**	**286**	**22,400**
2003	GW	174	0	0	13,329	1,138	20	14,661
	SW	975	0	0	0	135	183	1,293
	Total	**1,149**	**0**	**0**	**13,329**	**1,273**	**203**	**15,954**

2004	GW	136	0	0	13,257	1,138	22	14,553
	SW	757	1	0	0	135	198	1,091
Total		**893**	**1**	**0**	**13,257**	**1,273**	**220**	**15,644**

NOTE: All Pumpage reported in acre-feet TWDB: 12/3/2008

Source: TWDB Water Use Survey Database (http://www.twdb.state.tx.us/wushistorical/DesktopDefault.aspx?PageID=1)

Estimate of the Managed Available Groundwater in the District

"The Desired Future Conditions for the aquifers located within the District boundaries and within Groundwater Management Area 2 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 2 towards determining the desired future conditions for each aquifer located within the district. Once these are established an estimate of the managed available groundwater will be determined. The District will amend the management plan at that time.

Historical Groundwater Pumpage Summary
TWDB - Water Use Survey
Garza County

Unit: Acre Feet (ACFT)

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 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.

Year	Aquifer	Municipal	Manufact-ring	Steam Electric	Irrigation	Mining	Livestock	Total
1980	DOCKUM	26	0	0	382	0	8	416
	OGALLALA	112	0	0	6,728	0	36	6,876
	Total	**138**	**0**	**0**	**7,110**	**0**	**44**	**7,292**
1984	DOCKUM	32	0	0	223	750	9	1,014
	OGALLALA	135	0	0	4,902	27	39	5,103
	Total	**167**	**0**	**0**	**5,125**	**777**	**48**	**6,117**
1985	DOCKUM	31	0	0	148	692	6	877
	OGALLALA	134	0	0	2,602	25	27	2,788
	Total	**165**	**0**	**0**	**2,750**	**717**	**33**	**3,665**
1986	DOCKUM	30	0	0	90	653	6	779
	OGALLALA	130	0	0	1,577	24	27	1,758
	Total	**160**	**0**	**0**	**1,667**	**677**	**33**	**2,537**
1987	DOCKUM	29	0	0	91	613	6	739
	OGALLALA	125	0	0	1,608	23	23	1,779
	Total	**154**	**0**	**0**	**1,699**	**636**	**29**	**2,518**
1988	DOCKUM	27	0	0	220	595	8	850
	OGALLALA	117	0	0	3,864	22	35	4,038
	Total	**144**	**0**	**0**	**4,084**	**617**	**43**	**4,888**
1989	DOCKUM	29	0	0	337	554	8	928

	OGALLALA	125	0	0	5,930	21	35	6,111
	Total	**154**	**0**	**0**	**6,267**	**575**	**43**	**7,039**
1990	DOCKUM	29	0	0	236	554	8	827
	OGALLALA	125	0	0	4,147	21	33	4,326
	Total	**154**	**0**	**0**	**4,383**	**575**	**41**	**5,153**
1991	DOCKUM	30	0	0	179	547	8	764
	OGALLALA	129	0	0	3,147	21	34	3,331
	Total	**159**	**0**	**0**	**3,326**	**568**	**42**	**4,095**
1992	DOCKUM	32	0	0	89	0	6	127
	OGALLALA	133	0	0	1,557	583	26	2,299
	Total	**165**	**0**	**0**	**1,646**	**583**	**32**	**2,426**
1993	DOCKUM	32	0	0	211	0	6	249
	OGALLALA	136	0	0	3,687	565	26	4,414
	Total	**168**	**0**	**0**	**3,898**	**565**	**32**	**4,663**
1994	DOCKUM	32	0	0	195	0	9	236
	OGALLALA	129	0	0	4,433	565	38	5,165
	SEYMOUR	0	0	0	10	0	0	10
	Total	**161**	**0**	**0**	**4,638**	**565**	**47**	**5,411**
1995	DOCKUM	28	0	0	254	0	10	292
	OGALLALA	112	0	0	5,780	1,138	41	7,071
	SEYMOUR	0	0	0	13	0	0	13
	Total	**140**	**0**	**0**	**6,047**	**1,138**	**51**	**7,376**
1996	DOCKUM	28	0	0	438	0	10	476
	OGALLALA	112	0	0	9,960	1,138	41	11,251
	SEYMOUR	0	0	0	22	0	0	22
	Total	**140**	**0**	**0**	**10,420**	**1,138**	**51**	**11,749**
1997	DOCKUM	13	0	0	368	0	9	390
	OGALLALA	56	0	0	8,369	1,138	35	9,598
	SEYMOUR	0	0	0	18	0	0	18
	Total	**69**	**0**	**0**	**8,755**	**1,138**	**44**	**10,006**
1998	DOCKUM	27	0	0	655	0	6	688
	OGALLALA	116	0	0	14,885	1,138	24	16,163
	SEYMOUR	0	0	0	32	0	0	32
	Total	**143**	**0**	**0**	**15,572**	**1,138**	**30**	**16,883**
1999	DOCKUM	24	0	0	321	0	7	352
	OGALLALA	105	0	0	7,288	1,138	27	8,558
	SEYMOUR	0	0	0	16	0	0	16
	Total	**129**	**0**	**0**	**7,625**	**1,138**	**34**	**8,926**
2000	DOCKUM	25	0	0	509	0	7	541
	OGALLALA	106	0	0	11,571	1,138	25	12,840
	SEYMOUR	0	0	0	25	0	0	25
	Total	**131**	**0**	**0**	**12,105**	**1,138**	**32**	**13,406**
2001	DOCKUM	0	0	0	609	0	6	615
	OGALLALA	56	0	0	13,861	1,138	24	15,079
	SEYMOUR	0	0	0	30	0	0	30
	Total	**56**	**0**	**0**	**14,500**	**1,138**	**30**	**15,724**
2002	DOCKUM	0	0	0	831	0	6	837
	OGALLALA	154	0	0	18,894	1,127	22	20,197
	SEYMOUR	0	0	0	41	0	0	41

	Total	**154**	**0**	**0**	**19,766**	**1,127**	**28**	**21,075**
2003	DOCKUM	0	0	0	560	0	11	571
	OGALLALA	168	0	0	12,740	1,127	41	14,076
	SEYMOUR	0	0	0	27	0	0	27
	Total	**168**	**0**	**0**	**13,327**	**1,127**	**52**	**14,674**

NOTE: All Pumpage reported in acre-feet 12/3/2008
Source: TWDB Water Use Survey Database
(http://www.twdb.state.tx.us/wushistorical/DesktopDefault.aspx?PageID=2)

GAM Run 08-55

by Mr. Wade Oliver
Texas Water Development Board
Groundwater Availability Modeling Section
(512)463-3132
August 1,2008

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h), states that, in developing its groundwater management plan, groundwater conservation districts shall use groundwater availability modeling information provided by the Executive Administrator of the Texas Water Development Board in conjunction with any available site-specific information provided by the district for review and comment to the Executive Administrator. Information derived from groundwater availability models that shall be included in groundwater management plans includes:

(1) the annual amount of recharge from precipitation to the groundwater resources within the district, if any;
(2) for each aquifer within the district, the annual volume of water that discharges from the aquifer to springs and any surface water bodies, including lakes, streams, and rivers; and
(3) the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

The purpose of this model run is to provide information to the Garza County Underground Water Conservation District for its groundwater management plan. The groundwater management plan for the Garza County Underground Water Conservation District is due for approval by the executive administrator of the Texas Water Development Board before April 27, 2009.

This report discusses the method, assumptions, and results from model runs using the groundwater availability model for the southern part of the Ogallala Aquifer. Table 1 summarizes the groundwater availability model data required by statute for the Garza County Underground Water Conservation District's groundwater management plan.

The Dockum and Edwards-Trinity (High Plains) aquifers also underlie the Garza County Underground Water Conservation District; however, groundwater availability models for these minor aquifers have not been completed at this time. If the district would like information for the Dockum or Edwards-Trinity (High Plains) aquifers, they may request it from the Groundwater Technical Assistance Section of the Texas Water Development Board.

METHODS:

We ran the groundwater availability model for the southern portion of the Ogallala Aquifer and (1) extracted water budgets for each month of the 1980 through 1999 period and (2) averaged the annual water budget values for recharge, surface water outflow, inflow to the district, outflow from the district, net inter-aquifer flow (upper), and net inter-aquifer flow (lower) for the southern portion of the Ogallala Aquifer groundwater availability model located within the district.

PARAMETERS AND ASSUMPTIONS:

☐We used version 1.01 of the groundwater availability model for the southern portion of the Ogallala Aquifer.

☐In the analysis, the pumpage distribution for each transient calibrated model is the same as described in Blandford and others (2003) for the southern portion of the Ogallala Aquifer.

☐Irrigation return flow was accounted for in the model by a reduction in agricultural pumping as described in Blandford and others (2003).

☐The groundwater availability model for the southern part of the Ogallala Aquifer has only one layer representing the Ogallala hydrostratigraphic unit in the district.

☐See Blandford and others (2003) for assumptions and limitations of the model for the southern part of the Ogallala Aquifer. Root mean squared error for this model is 47 feet for 1990 water levels. This error will have more of an effect on model results where the aquifer is thin.

☐We used Processing Modflow for Windows (PMWIN) version 5.3 (Chiang and Kinzelbach, 2001) as the interface to process model output for the groundwater availability model for the southern part of the Ogallala Aquifer.

RESULTS:

A groundwater budget summarizes the water entering and leaving the aquifer according to the groundwater availability model. Selected components were extracted from the groundwater budget for the aquifers located within the district and averaged over the duration of the calibrated portion of the model run (1980 to 1999) in the district, as shown in Table 1. The components of the modified budgets shown in Table 1 include:

☐Precipitation recharge—This is the areally distributed recharge sourced from precipitation falling on the outcrop areas of the aquifers (where the aquifer is

exposed at land surface) within the district.

- Surface water outflow—This is the total water exiting the aquifer (outflow) to surface water features such as streams, reservoirs, and drains (springs).

- Flow into and out of district—This component describes lateral flow within the aquifer between the district and adjacent counties.

- Flow between aquifers—This describes the vertical flow, or leakage, between aquifers or confining units. This flow is controlled by the relative water levels in each aquifer or confining unit and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs. "Inflow" to an aquifer from an overlying or underlying aquifer will always equal the "Outflow" from the other aquifer. Since this model is a single-layer, flow between aquifers was not included.

The information needed for the district's management plan is summarized in Table 1. It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as district or county boundaries, is assigned to one side of the boundary based on the location of the centroid of the model cell. For example, if a cell contains two counties, the cell is assigned to the county where the centroid of the cell is located.

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

Management Plan Requirement	**Aquifer or confining unit**	**Results**
Estimated annual amount of recharge from precipitation to the district	Ogallala Aquifer	8,605[a]
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Ogallala Aquifer	1,749
Estimated annual volume of flow into the district within each aquifer in the district	Ogallala Aquifer	2,540
Estimated annual volume of flow out of the district within each aquifer in the district	Ogallala Aquifer	0
Estimated net annual volume of flow between each aquifer in the district	Flow in or out of Ogallala Aquifer	0[b]

[a] Recharge does not include irrigation return flow. Irrigation return flow was accounted for in the model as described in Blandford and others (2003).

[b] The model does not consider flow into or out of the Ogallala Aquifer from other formations.

REFERENCES:

Blandford, T.N., Blazer, D.J., Calhoun, K.C., Dutton, A.R., Naing, T., Reedy, R.C., and Scanlon, B.R., 2003, Groundwater availability of the southern Ogallala aquifer in Texas and New Mexico—Numerical Simulations Through 2050: Final Report prepared for the Texas Water Development Board by Daniel B. Stephens & Associates, Inc., 158 p.

Chiang, W., and Kinzelbach, W., 2001, Groundwater modeling with PMWIN, 346 p.

Cynthia K. Ridgeway is Manager of the Groundwater Availability Modeling Section and is responsible for oversight of work performed by employees under her direct supervision. The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.G., on August 1, 2008.

GAM Run 09-02

by Mr. Wade Oliver

Texas Water Development Board
Groundwater Availability Modeling Section
(512) 463-3132
January 23, 2009

EXECUTIVE SUMMARY:

Texas State Water Code, Section 36.1071, Subsection (h), states that, in developing its groundwater management plan, a groundwater conservation district shall use groundwater availability modeling information provided by the Executive Administrator of the Texas Water Development Board in conjunction with any available site-specific information provided by the district for review and comment to the Executive Administrator. Information derived from groundwater availability models that shall be
included in the groundwater management plan includes:

(1) the annual amount of recharge from precipitation to the groundwater resources within the district, if any;
(2) for each aquifer within the district, the annual volume of water that discharges from the aquifer to springs and any surface water bodies, including lakes, streams, and rivers; and
(3) the annual volume of flow into and out of the district within each aquifer and between aquifers in the district.

The purpose of this model run is to provide additional information to Garza County Underground Water Conservation District for its groundwater management plan. This modeling information, based on the newly approved groundwater availability model for

the Dockum Aquifer, is to be used in addition to the results presented in Groundwater Availability Model Run 08-55 in development of the district's groundwater management plan. The groundwater management plan for Garza County Underground Water
Conservation District is due for approval by the Executive Administrator of the Texas Water Development Board before April 27, 2009. This report discusses the methods, assumptions, and results from model runs using the groundwater availability model for the Dockum Aquifer. Table 1 summarizes the groundwater availability model data required by statute for Garza County Underground
Water Conservation District's groundwater management plan. Figure 1 shows the area of the model from which the values in Table 1 were extracted.

METHODS:

We ran the groundwater availability model for the Dockum Aquifer and (1) extracted water budgets for each year of the 1980 through 1997 period and (2) averaged the annual water budget values for recharge, surface water outflow, inflow to the district, outflow
from the district, net inter-aquifer flow (upper), and net inter-aquifer flow (lower) for the portions of the Dockum Aquifer located within the district.

PARAMETERS AND ASSUMPTIONS:

- ☐ We used version 1.01 of the groundwater availability model for the Dockum Aquifer. See Ewing and others (2008) for assumptions and limitations of the groundwater availability model.
- ☐ The model includes three layers representing: geologic units overlying the Dockum Aquifer including the Ogallala, Edwards-Trinity (High Plains), Edwards-Trinity (Plateau), Pecos Valley, and Rita Blanca aquifers (Layer 1), the upper portion of the Dockum Aquifer (Layer 2), and the lower portion of the Dockum Aquifer (Layer 3).
- ☐ The aquifers represented in Layer 1 of the groundwater availability model are only included in the model for the purpose of more accurately representing flow between these units and the Dockum Aquifer. This model is not intended to explicitly simulate flow in these overlying units (Ewing and others, 2008).
- ☐ The upper portion of the Dockum Aquifer, represented by Layer 2 of the groundwater availability model, is not present within the district. Because of this, no results are presented for the upper portion of the Dockum Aquifer in Table 1.
- ☐ The mean absolute error (a measure of the difference between simulated and measured water levels during model calibration) in the entire model between 1980 and 1997 is 65.0 feet and 69.6 feet for the upper and lower portions of the Dockum Aquifer, respectively (Ewing and others, 2008). This represents 2.7 and 3.0 percent of the hydraulic head drop across the model area for these same aquifers, respectively.
- ☐ The MODFLOW Drain package was used to simulate both evapo transpiration and springs. However, only the results from model grid cells representing springs were incorporated into the surface water outflow values shown in Table 1.
- ☐ We used Groundwater Vistas version 5 (Environmental Simulations, Inc., 2007) as the interface to process model output.

RESULTS:

A groundwater budget summarizes the water entering and leaving the aquifer according to the groundwater availability model. Selected components were extracted from the groundwater budget for the aquifers located within the district and averaged over the duration of the calibrated portion of the model run (1980 to 1997) in the district, as shown in Table 1. The components of the modified budgets shown in Table 1 include:

- ☐ Precipitation recharge—This is the areally distributed recharge sourced from precipitation falling on the outcrop areas of the aquifers (where the aquifer is exposed at land surface) within the district.
- ☐ Surface water outflow—This is the total water exiting the aquifer (outflow) to surface water features such as streams, reservoirs, and drains (springs).
- ☐ Flow into and out of district—This component describes lateral flow within the aquifer between the district and adjacent counties.
- ☐ Flow between aquifers—This describes the vertical flow, or leakage, between aquifers or confining units. This flow is controlled by the relative water levels in each aquifer or confining unit and aquifer properties of each aquifer or confining unit that define the amount of leakage that occurs. "Inflow" to an aquifer from an overlying or underlying aquifer will always equal the "Outflow" from the other aquifer.

The information needed for the district's management plan is summarized in Table 1. It is important to note that sub-regional water budgets are not exact. This is due to the size of the model cells and the approach used to extract data from the model. To avoid double accounting, a model cell that straddles a political boundary, such as a district or county boundary, is assigned to one side of the boundary based on the location of the centroid of the model cell. For example, if a cell contains two counties, the cell is assigned to the county where the centroid of the cell is located.

Table 1: Summarized information needed for Garza County Underground Water Conservation District's groundwater management plan. All values are reported in acre-feet per year. All numbers are rounded to the nearest 1 acrefoot.

Management Plan requirement	**Aquifer or confining unit**	**Results**
Estimated annual amount of recharge from precipitation to the district	Lower portion of the Dockum Aquifer	3,760
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Lower portion of the Dockum Aquifer	2,801
Estimated annual volume of flow into the district within each aquifer in the district	Lower portion of the Dockum Aquifer	1,743
Estimated annual volume of flow out of the district within each aquifer in the district	Lower portion of the Dockum Aquifer	791

Estimated net annual volume of flow between each aquifer in the district	Between overlying units and the lower portion of the Dockum Aquifer	NA*

NA*—Not Applicable: The Dockum Aquifer outcrops (is exposed at the land surface) in all areas of the district represented by the groundwater availability model. This term is, therefore, not applicable due to the absence of any overlying units.

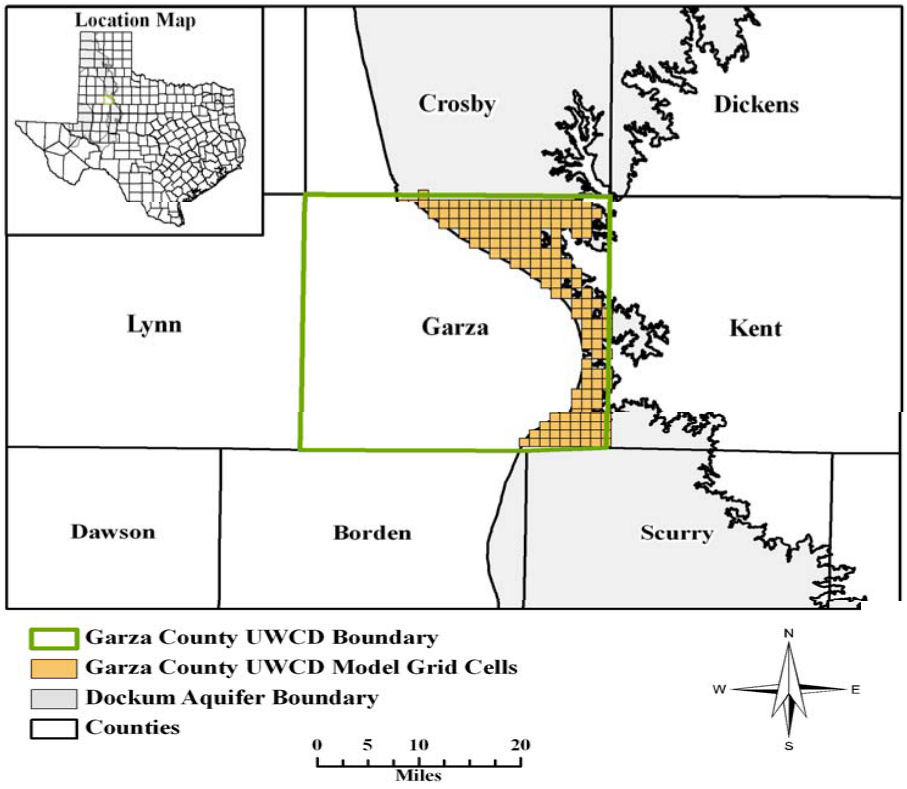

Figure 1: Area of the groundwater availability model for the Dockum Aquifer from which the information in Table 1 was extracted. Note that model grid cells that straddle a political boundary were assigned to one side of the boundary based on the centroid of the model cell as described above.

REFERENCES:

Environmental Simulations, Inc. 2007, Guide to Using Groundwater Vistas Version 5, 381 p.

Ewing, J.E., Jones, T.L., Yan, T., Vreugdenhil, A.M., Fryar, D.G., Pickens, J.F., Gordon, K., Nicot, J.P., Scanlon, B.R., Ashworth, J.B., and Beach, J., 2008, Groundwater Availability Model for the Dockum Aquifer – Final Report: contract report to the Texas Water Development Board, 510 p.

Cynthia K. Ridgeway is Manager of the Groundwater
Availability Modeling Section and is responsible for oversight of work performed by employees under her direct supervision. The seal appearing on this document was authorized by Cynthia K. Ridgeway, P.G., on January 23, 2009.

2007 State Water Plan
Projected Surface Water Supplies
Garza County

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 the online 2007 State Water Plan, Volume 3, Regional Water Planning Group Database (http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp). Please do not hesitate to call either Rima Petrossian (512-936-2420) or Lance Christian (512-463-9804) with questions concerning these datasets.

RWPG	Water User Group	County	River Basin	Source Name	2010	2020	2030	2040	2050	2060
O	Post	Garza	Brazos	Meredith Lake/Reservoir	306	306	306	306	306	306
O	Post	Garza	Brazos	White River Lake/Reservoir	1,021	973	493	12	0	0
O	Livestock	Garza	Brazos	Livestock Local Supply	363	423	432	442	453	465
Total Projected Surface Water Supplies (acre-feet per year) =					**1,690**	**1,702**	**1,231**	**760**	**759**	**771**

Source: Volume 3, 2007 State Water Planning Database (http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp) 12/3/2008

2007 State Water Plan
Projected Water Demands
Garza County

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RWPG	Water User Group	County	River Basin	2010	2020	2030	2040	2050	2060
O	Post	Garza	Brazos	631	642	616	579	549	512
O	County Other	Garza	Brazos	156	156	150	141	132	123
O	Manufacturing	Garza	Brazos	2	2	2	2	2	2
O	Mining	Garza	Brazos	752	361	211	90	0	0
O	Irrigation	Garza	Brazos	11,451	10,783	10,148	9,556	8,997	8,471
O	Livestock	Garza	Brazos	363	423	432	442	453	465
Total Projected Water Demands (acre-feet per year) =				**13,355**	**12,367**	**11,559**	**10,810**	**10,133**	**9,573**

Source: Volume 3, 2007 State Water Planning Database (http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp) 12/3/2008

2007 State Water Plan
Projected Water Needs
Garza County

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 the online 2007 State Water Plan, Volume 3, Regional Water Planning Group Database (http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp). Please do not hesitate to call either Rima Petrossian (512-936-2420) or Lance Christian (512-463-9804) with questions concerning these datasets.

Positive values reflect a water surplus; negative values reflect a water need.

RWPG	WUG	County	River Basin	2010	2020	2030	2040	2050	2060
O	Post	Garza	Brazos	696	637	183	-261	-243	-206
O	County Other	Garza	Brazos	14	14	14	14	14	14
O	Manufacturing	Garza	Brazos	0	0	0	0	0	0
O	Mining	Garza	Brazos	0	0	0	0	0	0
O	Irrigation	Garza	Brazos	-4712	-4301	-3995	-3721	-3455	-3212
O	Livestock	Garza	Brazos	0	0	0	0	0	0
Total Projected Water Needs (acre-feet per year) =				**-4,712**	**-4,301**	**-3,995**	**-3,982**	**-3,698**	**-3,418**

Source: Volume 3, 2007 State Water Planning Database 12/3/2008
(http://www.twdb.state.tx.us/DATA/db07/defaultReadOnly.asp)

2007 State Water Plan
Projected Water Management Strategies
Garza County

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RWPG	WUG	WUG County	River Basin	Water Management Strategy	Source Name	Source County	2010	2020	2030	2040	2050	2060
O	County Other	Garza	Brazos	Lake Alan Henry Supply for Lake Alan Henry WSC	Alan Henry Lake/Reservoir	Reservoir	270	270	270	270	270	270
O	Post	Garza	Brazos	Local Groundwater Development	Ogallala Aquifer	Crosby	400	400	400	400	400	400
O	Irrigation	Garza	Brazos	Irrigation Water Conservation	Conservation	Garza	5,535	4,982	4,483	4,035	3,632	3,268
Total Projected Water Management Strategies							**6,205**	**5,652**	**5,153**	**4,705**	**4,302**	**3,938**

(acre-feet per year) =

Source: Volume 3, 2007 State Water Planning Database 12/3/2008

Enhancement of Recharge and Availability

The District supports brush control as a management practice to maintain and improve ground water supplies in the District and region. Recharge of aquifers is achieved through rainfall and can be enhanced by the control of brush, mainly mesquite and juniper, which would decrease the demand of groundwater in the District and region. Benefits would include more groundwater availability, increase productivity of rangeland, increased spring flow, and increase amount of moisture available to infiltrate as recharge.

Mesquite

There are approximately 450,000 acres in GARZA County which are infested with mesquite. There are a total of 450,000 acres of rangeland in this county. Researchers estimate that a mesquite tree uses up to 15 gallons/day/tree during the growing season. This rate will vary based on the size of tree. Our counts have ranged from approximately 50 trees to 450 trees per acre where producers have signed up to control mesquite.

Redberry Juniper

There are approximately 73,000 acres in GARZA County which are infested with juniper. This estimate is based on the acres of Rough Breaks and Mobeeti-Potter (very shallow) soil types. Researchers estimate that a large redberry juniper uses up to 32 gallons of water per day. This also will vary based on the size of tree.

Salt Cedar

There are approximately 3800 acres in GARZA County which are infested with salt cedar. This estimate is based on measuring the lengths of the five major streams in the county and 100 feet on each side of the streams. Researchers estimate that a large salt cedar uses up to 200 gallons of water per day during the growing season.

Source of this data: National Resources Conservation Services (NRCS)

MANAGEMENT OF GROUND WATER SUPPLIES

The District will manage the supply of groundwater within the District in order to conserve the resource while seeking to maintain the economic viability of all resource user groups, public and private. In consideration of the economic and cultural activities occurring within the District, the District will identify and engage in such activities and practices, that if implemented would result in a reduction of groundwater use. The District will make a regular assessment of water supply and groundwater storage conditions and will report those conditions to the Board and to the Public. The District will undertake, as necessary and co-operate with investigations of the groundwater resources within the

District and will make the results of investigations available to the public upon adoption by the Board.

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 the guidelines stated in the rules of the District. In making a determination to deny a permit or limit groundwater withdrawals, the District will consider the public benefit against individual hardship after considering all appropriate testimony.

The relevant factors to be considered in making a determination to deny a permit or limit groundwater withdrawals will include:

(1) The purpose of the rules of the District
(2) The equitable distribution of the resource
(3) The economic hardship resulting from grant or denial of a permit or the terms prescribed by the permit

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 or priority for all District activities. All operations of the District, all agreements entered into by the District and any additional planning efforts in which the District may participate will be consistent with the provision of this plan.

The District will adopt and amend as necessary rules relating to the permitting of wells and the production of groundwater. The rules adopted by the District shall be pursuant to Texas Water Code (TWC) Chapter 36 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 character. In granting of discretion to any rules, 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 cooperation in the implementation of this plan and the management of groundwater supplies within the District. All activities of the District will be undertaken in cooperation and coordination with the appropriate state, regional or local water management entity.

TIME PERIOD FOR THIS PLAN 2009-2014

This plan becomes effective upon approval by the Texas Water Development Board after Adoption by the District Board of Directors and remains in effect until 2014, or for a period of ten years, whichever is later. The plan may be revised at any time, or after five years when the plan will be reviewed to insure that it is consistent with the applicable Regional Water Plan and the State Water Plan.

COORDINATION WITH REGIONAL WATER PLAN

The GARZA County Underground Water Conservation District Water Management Plan will coordinate with both the Regional and State Water Plans.

TRACKING METHODOLOGY

The District manager will prepare an annual report on District performance to insure that management goals and objectives are being achieved. This report will be presented yearly, to the Board of Directors during their regular business meeting in October and this report will be maintained on file at the District office.

GOALS, MANAGEMENT OBJECTIVES AND PERFORMANCE STANDARDS

Goal 1.0 - Providing for the most efficient use of groundwater within the District

Management Objective: Each year, the District will provide available educational information on water conservation to the public within the District by at least one of the following methods: articles in the District newsletter, local newspaper articles, NRCS and FSA newsletters Extension Service newsletters or any other publications available.

Performance Standard: Number of articles, newsletters or other publications on the efficient use of groundwater in various publications within the District, as information becomes available, will be reported in the annual report to the District Board.

Goal 2.0 - Controlling and Preventing the Waste of Groundwater within the District

Management Objective: Each year, the District will investigate 100 percent of reported wasteful irrigation practices within the District. The District will seek remediation on 100 Percent of sites deemed a wasteful practice. The District will make diligent searches to identify wasteful irrigation practice within the district annually.

Performance Standards:

(A) The District will investigate 100 percent of reported wasteful irrigation practices and seek remediation on 100 percent of wasteful practice sites occurring within the district.

(B) The number of wasteful irrigation practice reported to the District and the number of investigation by the District will be included in the annual report to the District Board.

(C) The number of diligent searches for wasteful irrigation practice in the District that were carried out by District personnel will be reported in the annual report to the District Board.

Goal 3.0 - Addressing Drought Conditions

Management Objective: Addressing the effects of drought due to climatic or other conditions upon all water resource user groups.

Performance Standards:

(A) The District will check water table levels in twenty (20) wells in January of each year, and monitor pumping rates to determine water supply availability.

(B) Publish change in water levels in at least one newsletter or at least one newspaper each year.

(C) Inform the public about water shortages and stress water saving techniques during peak water usage periods each year through at least one newspaper article or at least one newsletter.

Goal 4.0 - Addressing Conservation

Management Objective: Each year, at the beginning of the irrigation season and during the heavy irrigation period, we will provide information to the producers through (NRCS) newsletters and local media. The District will publish at least one article each year about water conservation techniques.

Performance Standard: The number of water conservation techniques articles published each year.

Goal 5.0 – Addressing Rainwater Harvesting

Management Objective: The District will publish at least one article each year about rainwater harvesting.

Performance Standard: The number of rainwater harvesting information articles published each year.

Goal 6.0 – Brush Control

Management Objective: The District will publish at least one article each year on the benefits of brush control.

Performance Standard: The number of brush control information articles published each year.

MANAGEMENT GOALS DETERMINED NOT APPLICABLE

Goal 1.0- Controlling and preventing subsidence within the District.

This management goal is not applicable to the operations of the District.

Goal 2.0 - Conjunctive surface water management issues within the District.

This management goal is not applicable to the operations of the District.

Goal 3.0 - Addressing natural resource issues which impact the use and availability of groundwater and which are impacted by the use of groundwater in the District.

This goal is not applicable to the operation of the District.

Goal 4.0 – Recharge Enhancement
This management is not cost effective to the District.

This goal is not applicable to the operation of the District.

Goal 5.0 – Precipitation Enhancement
This management is not cost effective to the District.

This goal is not applicable to the operation of the District.

Goal 6.0 - Addressing in a Quantitative Manner the Desired Future Conditions of the Groundwater Resources in the District

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 2 area. Therefore, this goal is not applicable to the District at this time.

SUMMARY DEFINITIONS:

"Abandoned Well" shall mean:
1) a well or borehole, the condition of which is causing or is likely to cause pollution of groundwater in the District.

A well is considered to be in use in the following cases:

a) a well which contains the casing, pump, and pump column in good condition; or
b) a well in good condition which has been capped

2) A well or borehole which is not in compliance with the applicable law, including the Rules and Regulations of the District, the Texas Water Driller's Act, Texas Commission on Environmental Quality or any other state or federal agency or political subdivision having jurisdiction, if presumed to be an abandoned or deteriorated well.

"Board" - The Board of Directors of the GARZA County U WCD

"District" - The GARZA County UWCD

“TCEQ" - Texas Commission on Environmental Quality

“TWDB" - Texas Water Development Board

“Waste" - as defined by Chapter 36 of the Texas Water Code

means any one or more of the following:

(1) withdrawal of ground water from a ground water reservoir at a rate and in an amount that causes or threatens to cause intrusion into the reservoir of water unsuitable for agricultural, gardening, domestic, or stock raising purposes;

(2) the flowing or producing of wells from a groundwater reservoir if the water produced is not used for a beneficial purpose;

(3) escape of groundwater from groundwater reservoir to any other reservoir or geologic strata that does not contain groundwater;

(4) pollution or harmful alteration of groundwater in a groundwater reservoir by saltwater or by other deleterious matter admitted from another stratum or from the surface of the ground;

(5) willfully or negligently causing, suffering, or allowing groundwater to escape into any river, creek, natural watercourse, depression, lake, reservoir, drain, sewer, street, highway, road, or road ditch, or onto any land other than that of the owner of the well unless such discharge is authorized by permit, rule, or order issued by the Commission under Chapter 26;

(6) groundwater pumped for irrigation that escapes as irrigation tailwater onto land other than that of the owner of the well unless permission has been granted by the occupant of the land receiving the discharge; or

(7) for water produced from an artesian well, "waste: has the meaning assigned by Section 11.205.

GARZA COUNTY
UNDERGROUND WATER
CONSERVATON DISTRICT

HEARING MINUTES
APRIL 9' 2009

Hearing
Directors Present:

Ferrel Wheeler, Chairman
Dicky Wallace
Ronnie Graves

Hearing on April 9th 2009 for Public Comment and to adopt the revised Water Management Plan for 2009-2014, from 1:00 p.m. to 2:00p.m.

With no Public Comment Ronnie Graves made a motion to adopt the 2009-2014 Water Management Plan. Motion was seconded by Dicky Wallace. Motion carried.

Meeting Adjourned

Ferrell Wheeler, Chairman

Dicky Wallace

John Boren

Ronnie Graves

Ronald Thuett

Dear Brazos River Authority,

Enclosed is a copy of our Water Management Plan for your review. If you have any comments, please contact our office at 300 West Main Street, Post, TX 79356
Tel: 806/495-4425.

Dear Lake Alan Henry Water District,

Enclosed is a copy of our Water Management Plan for your review. If you have any comments, please contact our office at 300 West Main Street, Post, TX 79356
Tel: 806/495-4425.

Dear Regional Water Planning Group – Region O High Plains,

Enclosed is a copy of our Water Management Plan for your review. If you have any comments, please contact our office at 300 West Main Street, Post, TX 79356
Tel: 806/495-4425.

Dear White River Municipal Water District,

Enclosed is a copy of our Water Management Plan for your review. If you have any comments, please contact our office at 300 West Main Street, Post, TX 79356
Tel: 806/495-4425.