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December 18, 2024

Mr. Tim Andruss
Victoria County Groundwater Conservation District
2805 N. Navarro Street, Suite 210
Victoria, TX 77901

RE: Application of Geostatistical Techniques to Interpret Measured 2023 Water Levels

Dear Mr. Andruss,

Attachment A provides INTERA's analysis of the 2023 water levels to support an assessment of compliance with GMA 15 DFCs.

As part of the transmission of this letter, INTERA has included separate presentations for Calhoun County GCD, Refugio GCD, Texana GCD and Victoria County GCD that summarize the results of the analysis of the 2023 water levels for their respective counties.

Please contact Steve Young or me if the District has any questions or comments on the final deliverables.

Sincerely,

Andrew Osborne
Hydrogeologist
INTERA, Incorporated
aosborne@intera.com

Cc: Steven C Young, PhD, PE, PG

Attachment A
Application of Geostatistical Techniques to Interpret Measured 2023 Water Levels

Background

In 2021, INTERA completed a study (Young and others, 2021) that accomplished the four tasks below for Calhoun County Groundwater Conservation District (GCD), Refugio GCD, Texana GCD, and Victoria County GCD:

1. Assembled measured groundwater elevations from GCD and Texas Water Development Board (TWDB) databases over the interval from 2000 to 2020 and integrated them into a single data set;
2. Employed geostatistical methods for interpolating annual groundwater for the Chicot and Evangeline aquifers from 2000 to 2020;
3. Evaluated the annual changes in the measured groundwater elevations across the four counties and in selected wells;
4. Provided recommendations for future work.

The geostatistical method used to develop the baseline set of results was an application of ordinary kriging. Kriging is a geostatistical interpolation technique that considers both the distance and the degree of variation between known data points when estimating values in unknown areas. Ordinary Kriging provides the best linear unbiased prediction at unsampled locations and reproduces the measured values at all sampled locations exactly. To meet underlying assumptions that were used to develop ordinary Kriging, the measured water levels were detrended prior to the application of ordinary Kriging. The measured water levels were detrended using water levels simulated by the central Gulf Coast Groundwater Availability Model (GAM) that were smoothed using an algorithm described by Young and others (2021). The method was given the acronym SSWL+KR, which stands for smoothed simulated water levels and Kriged residuals.

SSWL+KR was used to interpolate the water level residuals for the years 2000 through 2020 for both the Chicot Aquifer, the Evangeline Aquifer, and the Chicot and Evangeline Aquifer, which is created by combining the Chicot and Evangeline aquifers into single aquifer. The interpolation generated a continuous water level surface using square grid cells with a resolution of 500 ft. Using these surfaces, the average water levels were calculated by county and by year. In 2022 (Young, 2022) and in 2023 (Young, 2023) assembled the water levels measured across the Gulf Coast in 2021 and in 2022, respectively, and performed the SSLW+KR analysis for the four GCDs.

Analysis of Water Level Data

Two water level datasets were obtained from the TWDB Groundwater Database and the VCGCD. To reconcile any differences in the data from these sources, wells from previous analyses were compiled and used as a reference to identify corresponding wells in both the VCGCD and TWDB GWDB datasets. New wells were subsequently added to this dataset. Water level data for each

well from 2023 was then averaged to determine a representative water level for the year. One water level per well was used in the SSLW + KR process.

Table 1 lists the water levels. Figure 1 shows the location of the water levels that were used in the geostatistical analyses. Tables 2 through 5 provide the average value for the annual water levels for Calhoun County GCD, Refugio GCD, Texana GCD and Victoria County GCD from 2000 to 2023 for the Chicot Aquifer, the Evangeline Aquifer, and the combination of the Chicot and Evangeline aquifers. In addition, the tables also provide the difference in the annual water levels for each year and the year 2000. Hence, the values for water level change in the columns label 2023 represent the water level change from 2000 to 2023.

Figures 2 and 3 show water level contours for the Chicot Aquifer generated for the years 2000 and 2023, respectively. Figure 4 provides contours at 10-ft intervals that show the change in water levels from 2000 to 2023 for the Chicot Aquifer across Victoria, Jackson, Refugio, and Calhoun counties. Across these four GCDs, the contour intervals range between 10 ft (rebound) and -20 ft (decline).

Figures 5 and 6 show water level contours for the Evangeline Aquifer generated for the years 2000 and 2023, respectively. Figure 7 provides contours of the change in water levels from 2000 to 2023 for the Evangeline Aquifer. Across these four GCDs, the contour intervals range between 50 ft (rebound) and -20 ft (decline). In Figures 4 and 7, the areal extend of the Chicot and Evangeline Aquifers in all four counties is based on the representation of the Evangeline Aquifer in the current Groundwater Availability Model (GAM) for GMA 15 developed by Chowdhury and others (2004).

References

Chowdhury, A. H., S. Wade, R. E. Mace, and C. Ridgeway, 2004, Groundwater Availability Model of the Central Gulf Coast Aquifer System: Numerical Simulations through 1999 Model Report. Texas Water Development Board, 108 p.

Young, S.C., Kushnereit, R., Beal, L., Yan, T., and Pham, H. 2021. Application of Geostatistical Techniques to Quantify Changes in the Water Levels, prepared by INTERA Incorporated, prepared for the Calhoun County GCD, the Refugio GCD, the Texana GCD, and the Victory County GCD, May 2021

Young, S,C., 2022. Memorandum to Tim Andruss Titled: Application of Geostatistical Techniques to Interpret Measured 2021 Water Levels, dated June 29, 2022.
Young, S,C., 2023. Memorandum to Tim Andruss Titled: Application of Geostatistical Techniques to Interpret Measured 2022 Water Levels, dated December 18, 2023.

Table 1 List of Wells and Water Levels Used to Generate the Water Levels Surfaces for the Chicot and the Evangeline aquifers for the 2023 Analysis Year

GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County	Average Water Level (ft, msl)
Texana GCD - GW-00410	802904	52.5		Chicot	Jackson	19.1
	6541401	88.6	90	Chicot	Wharton	53.7
	6541402	82.0	338	Chicot	Wharton	32.0
	6541707	82.0	499	Chicot	Wharton	21.0
	6549901	55.8	375	Chicot	Matagorda	20.7
	6557802	49.2	315	Chicot	Matagorda	-15.6
	6612603	292.0	188	Evangeline	Colorado	200.6
	6614703	259.2	71	Chicot	Colorado	234.2
	6619804	347.8	140	Chicot	Colorado	277.1
	6620602	200.1	312	Evangeline	Colorado	145.1
	6621603	232.9	812	Evangeline	Colorado	164.1
	6622201	223.1	995	Evangeline	Colorado	181.9
	6626202	252.6	126	Evangeline	Colorado	198.6
	6631107	154.2	450	Chicot	Wharton	95.5
	6631504	137.8	178	Chicot	Wharton	94.3
	6632809	118.1	320	Chicot	Wharton	70.9
	6634201	193.6	48	Evangeline	Lavaca	169.1
	6634202	206.7	61	Evangeline	Lavaca	171.6
	6634207	226.4	120	Evangeline	Lavaca	175.0
	6635901	210.0	840	Evangeline	Lavaca	141.8
	6637607	160.8	318	Chicot	Colorado	122.8
	6637615	157.5		Chicot	Colorado	120.6
	6638202	150.9	65	Chicot	Wharton	117.5
	6638304	150.9	113	Chicot	Wharton	109.9
	6638801	124.7	116	Chicot	Wharton	95.8
	6639106	144.4		Chicot	Wharton	79.1
	6640401	111.5	442	Chicot	Wharton	55.0
	6640505	108.3		Chicot	Wharton	65.9

GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County	Average Water Level (ft, msl)
	6641203	223.1	80	Evangeline	Lavaca	175.5
	6641703	219.8	164	Evangeline	Lavaca	152.0
	6641903	206.7	335	Evangeline	Lavaca	119.5
	6643704	137.8	34	Chicot	Lavaca	109.6
	6643803	150.9	1023	Evangeline	Lavaca	56.0
	6644702	137.8	676	Evangeline	Colorado	41.4
	6645601	141.1	429	Chicot	Wharton	87.4
	6645916	128.0	125	Chicot	Wharton	74.6
	6646402	131.2	366	Chicot	Wharton	76.5
	6646601	128.0	186	Chicot	Wharton	79.5
	6647101	121.4	319	Chicot	Wharton	70.6
	6647201	114.8	244	Chicot	Wharton	62.4
	6647703	108.3	242	Chicot	Wharton	73.0
	6648502	91.9	70	Chicot	Wharton	71.3
	6648701	95.1	90	Chicot	Wharton	60.6
	6648802	91.9	564	Chicot	Wharton	51.1
	6648907	88.6	630	Chicot	Wharton	20.4
	6649701	170.6	1082	Evangeline	Lavaca	117.0
	6649901	170.6	272	Evangeline	Lavaca	108.4
Texana GCD - GW-00294	6651505	124.7	627	Evangeline	Jackson	44.2
	6653406	98.4	348	Chicot	Wharton	33.8
	6653503	91.9	338	Chicot	Wharton	42.8
	6653804	85.3	495	Chicot	Wharton	43.3
	6654108	98.4	360	Chicot	Wharton	48.9
	6654906	88.6	461	Chicot	Wharton	9.9
	6655603	82.0	100	Chicot	Wharton	62.7
	6656302	85.3	490	Chicot	Wharton	9.9
	6656304	88.6	356	Chicot	Wharton	27.3
	6656403	78.7	275	Chicot	Wharton	20.7

GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County	Average Water Level (ft, msl)
Victoria County GCD - GW-000339	6657406	180.4	270	Evangeline	Victoria	82.0
Victoria County GCD - GW-000021	6657801	124.7		Chicot	Victoria	80.3
	6658607	88.6	124	Chicot	Jackson	45.7
Texana GCD - GW-00278	6660613	62.3	850	Evangeline	Jackson	20.0
	6661302	82.0	528	Chicot	Wharton	26.1
Texana GCD - GW-00251	6661809	62.3		Chicot	Jackson	34.2
	6662104	85.3	371	Chicot	Wharton	33.9
	6662307	85.3	180	Chicot	Wharton	58.0
	6662309	82.0	421	Chicot	Wharton	45.5
	6662313	82.0	480	Chicot	Wharton	0.7
	6663105	78.7	342	Chicot	Wharton	60.5
	6663507	68.9	48	Chicot	Wharton	57.4
	6663509	62.3	688	Chicot	Wharton	-25.9
	6663610	68.9	857	Chicot	Wharton	-19.7
	6740504	351.0	155	Evangeline	Lavaca	278.3
	6760905	318.2		Evangeline	DeWitt	231.7
	6762404	262.5		Evangeline	DeWitt	210.3
	7905606	200.1	154	Evangeline	Goliad	178.2
	7905903	216.5	280	Evangeline	Goliad	164.2
	7905904	196.9	164	Evangeline	Goliad	169.5
	7905905	216.5	314	Evangeline	Goliad	163.7
	7905907	232.9	261	Evangeline	Goliad	164.6
	7905908	269.0	118	Evangeline	Goliad	188.2
	7905909	255.9	143	Evangeline	Goliad	182.8
	7906306	229.7	138	Evangeline	DeWitt	151.3
	7906706	219.8	152	Evangeline	Goliad	164.0
	7906707	200.1	260	Evangeline	DeWitt	150.1
	7906708	216.5	300	Evangeline	DeWitt	150.2

GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County	Average Water Level (ft, msl)
	7906714	200.1	136	Evangeline	DeWitt	152.4
	7906715	239.5	150	Evangeline	Goliad	176.2
	7907402	226.4	217	Evangeline	DeWitt	118.9
Victoria County GCD - NW-000426	7907404	229.7	360	Evangeline	Victoria	96.8
Victoria County GCD - NW-000016	7907503	170.6	250	Evangeline	Victoria	102.3
Victoria County GCD - GW-000158	7907504	183.7		Evangeline	Victoria	106.4
Victoria County GCD - GW-000552	7907505	157.5	112	Evangeline	Victoria	94.0
Victoria County GCD - GW-000606	7908201	183.7	350	Evangeline	Victoria	90.8
Victoria County GCD - GW-000577	7908404	144.4	100	Evangeline	Victoria	93.4
Victoria County GCD - GW-000607	7908805	108.3	169	Evangeline	Victoria	58.3
Victoria County GCD - GW-000589	7908807	108.3	220	Evangeline	Victoria	65.2
	7912305	301.8	166	Evangeline	Goliad	212.4
	7912602	285.4	350	Evangeline	Goliad	184.7
	7912704	265.7		Evangeline	Goliad	202.8
	7913223	236.2	93	Evangeline	Goliad	180.7
	7913224	232.9	24	Evangeline	Goliad	214.7
	7913225	229.7	65	Evangeline	Goliad	178.1
	7913229	229.7	152	Evangeline	Goliad	169.0
	7913230	249.3	282	Evangeline	Goliad	169.8
	7913231	232.9	28	Evangeline	Goliad	215.9
	7913304	242.8	317	Evangeline	Goliad	167.9
	7913507	282.2	250	Evangeline	Goliad	168.9
	7913510	282.2	250	Evangeline	Goliad	154.6
	7913512	269.0	263	Evangeline	Goliad	165.1

GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County	Average Water Level (ft, msl)
	7913513	292.0	230	Evangeline	Goliad	158.0
	7913803	255.9	188	Evangeline	Goliad	186.9
	7913804	242.8	291	Evangeline	Goliad	144.5
	7913805	288.7	197	Evangeline	Goliad	193.5
	7913806	236.2	222	Evangeline	Goliad	149.0
	7913807	269.0	222	Evangeline	Goliad	188.5
	7913808	255.9	331	Evangeline	Goliad	149.0
	7913809	252.6	183	Evangeline	Goliad	151.8
	7913810	265.7	186	Evangeline	Goliad	189.3
	7913811	229.7	143	Evangeline	Goliad	183.5
	7913813	272.3	210	Evangeline	Goliad	189.5
	7914203	170.6	380	Evangeline	Goliad	119.7
Victoria County GCD - GW-000494	7915305	177.2	190	Evangeline	Victoria	83.5
	7915401	177.2	145	Evangeline	Goliad	98.8
	7915702	141.1	174	Evangeline	Goliad	87.3
Victoria County GCD - GW-000608	7915903	121.4	112	Evangeline	Victoria	76.8
Victoria County GCD - GW-000047	7916102	124.7	227	Evangeline	Victoria	70.6
	7917801	498.7	150	Evangeline	Bee	434.0
	7920704	229.7		Evangeline	Goliad	164.9
	7920705	259.2		Evangeline	Goliad	170.3
	7921307	206.7	284	Evangeline	Goliad	129.1
	7922508	154.2	263	Evangeline	Goliad	93.6
Victoria County GCD - GW-000609	7923303	98.4	194	Evangeline	Victoria	60.8
Victoria County GCD - GW-000611	7924102	95.1	100	Chicot	Victoria	41.6
	7927202	305.1	150	Evangeline	Goliad	212.9
	7928302	213.3	235	Evangeline	Goliad	132.3

GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County	Average Water Level (ft, msl)
	7928303	223.1	95	Evangeline	Goliad	132.3
	7928304	236.2	320	Evangeline	Goliad	125.7
	7930301	114.8	300	Evangeline	Goliad	70.4
	7931502	108.3	204	Evangeline	Goliad	67.8
	7931702	98.4	218	Evangeline	Goliad	74.7
Refugio GCD - GW-00124	7931901	85.3	946	Evangeline	Refugio	43.6
Refugio GCD - GW-00234	7932802	72.2	165	Chicot	Refugio	22.8
	7935305	223.1	150	Evangeline	Bee	165.5
	7937911	82.0	146	Evangeline	Goliad	45.4
	7937912	85.3	61	Chicot	Goliad	55.7
	7937918	88.6	96	Chicot	Goliad	45.8
	7937919	85.3	160	Evangeline	Goliad	45.4
	7938201	118.1	106	Evangeline	Goliad	81.5
	7938202	101.7	60	Chicot	Goliad	71.7
	7938301	88.6	62	Chicot	Goliad	64.9
	7938303	101.7	80	Chicot	Goliad	75.4
	7938704	78.7		Chicot	Goliad	43.4
	7938706	75.5	325	Evangeline	Goliad	47.4
	7939104	88.6	110	Chicot	Goliad	63.1
	7944103	150.9	150	Evangeline	Bee	96.6
Refugio GCD - GW-00079	7954803	32.8	331	Chicot	Refugio	9.7
	7964701	3.3	130	Chicot	Aransas	-0.2
Victoria County GCD - GW-000614	8001301	118.1	670	Evangeline	Victoria	57.5
Victoria County GCD - GW-000366	8002102	91.9	366	Chicot	Victoria	34.6
Texana GCD - GW-00411	8002608	59.1		Chicot	Jackson	26.5

GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County	Average Water Level (ft, msl)
Victoria County GCD - GW-000377	8002804	62.3	92	Chicot	Victoria	31.7
	8003405	52.5	330	Chicot	Jackson	19.6
Texana GCD - GW-00320	8004101	65.6	383	Chicot	Jackson	36.7
Texana GCD - GW-00291	8004504	49.2	277	Chicot	Jackson	23.2
	8007102	55.8	1020	Evangeline	Matagorda	20.3
	8007203	52.5	453	Chicot	Matagorda	-44.6
	8007312	49.2	350	Chicot	Matagorda	-33.3
	8008106	49.2	64	Chicot	Matagorda	33.5
	8008505	45.9	100	Chicot	Matagorda	38.6
Victoria County GCD - GW-000150	8010502	55.8	140	Chicot	Victoria	26.6
Texana GCD - GW-00285	8011201	49.2	579	Chicot	Jackson	16.2
	8011502	39.4	300	Chicot	Jackson	11.4
	8014801	13.1	719	Chicot	Matagorda	-11.4
	8014903	9.8	320	Chicot	Matagorda	-56.8
	8015301	26.2	570	Chicot	Matagorda	-1.9
	8015405	29.5	270	Chicot	Matagorda	-38.2
	8015502	19.7	776	Chicot	Matagorda	-35.5
Victoria County GCD - GW-000321	8017502	65.6	1026	Evangeline	Victoria	32.5
Victoria County GCD - GW-000192	8018103	52.5	120	Chicot	Victoria	23.9
Victoria County GCD - GW-000489	8018402	55.8	336	Chicot	Victoria	21.0
Calhoun County GCD - GW-00014	8019503	26.2	265	Chicot	Calhoun	5.7
	8021616	9.8	204	Chicot	Jackson	-7.3
	8022410	9.8	185	Chicot	Jackson	-9.5
	8022412	6.6	208	Chicot	Jackson	-10.6
	8024201	6.6	490	Chicot	Matagorda	-3.2

GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County	Average Water Level (ft, msl)
	8024406	3.3	360	Chicot	Matagorda	-33.6
	8024802	3.3	380	Chicot	Matagorda	-28.8
	8025402	62.3	190	Chicot	Victoria	27.1
Calhoun County GCD - GW-00009	8026501	36.1	267	Chicot	Calhoun	2.9
	8027302	16.4	175	Chicot	Calhoun	-5.5
	8033611	29.5	300	Chicot	Refugio	4.1
Refugio GCD - GW-00439	8033901	19.7		Chicot	Refugio	5.3
	8034709	23.0	320	Chicot	Refugio	-3.0
	8049702	6.6	63	Chicot	Aransas	2.4
	8101102	49.2	1032	Evangeline	Matagorda	-38.5
	8101205	32.8	480	Chicot	Matagorda	-37.5
	8102404	29.5	450	Chicot	Matagorda	-26.7
	8102605	23.0	525	Chicot	Matagorda	-14.9
	8102901	13.1	294	Chicot	Matagorda	-20.2
	8103406	26.2	530	Chicot	Matagorda	-13.3
	8111901	3.3	527	Chicot	Matagorda	-17.4
	8117405	3.3	472	Chicot	Matagorda	-21.8
Calhoun County GCD - GW-00001		16.4		Chicot	Calhoun	-5.5
Calhoun County GCD - GW-00003		32.8		Chicot	Calhoun	18.2
Calhoun County GCD - GW-00005		16.4		Chicot	Calhoun	-14.8
Calhoun County GCD - NW-00024		16.4		Chicot	Calhoun	-15.5
Refugio GCD - NW-00539		29.5		Chicot	Refugio	4.1
Refugio GCD - NW-00570		23.0		Chicot	Refugio	-3.0
Texana GCD - GW-00119	8021214	23.0		Chicot	Jackson	-19.5

GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County	Average Water Level (ft, msl)
Texana GCD - GW-00123	8021213	19.7		Chicot	Jackson	-24.6
Texana GCD - GW-00284		39.4		Chicot	Jackson	11.4
Texana GCD - GW-00310		13.1		Chicot	Jackson	-29.0
Texana GCD - GW-00311		13.1		Chicot	Jackson	-25.7
Texana GCD - GW-00312		16.4		Chicot	Jackson	-21.8
Texana GCD - GW-00444		13.1		Chicot	Jackson	-33.3
Texana GCD - GW-00446		13.1		Chicot	Jackson	-44.9
Texana GCD - GW-00566		45.9		Chicot	Jackson	31.8
Texana GCD - NW-00195		52.5		Chicot	Jackson	19.6
Texana GCD - NW-00310		88.6		Chicot	Jackson	45.7
Texana GCD - NW-00487		9.8		Chicot	Jackson	-9.0
Texana GCD - NW-00489		6.6		Chicot	Jackson	-12.7
Texana GCD - NW-00490		6.6		Chicot	Jackson	-47.8
Texana GCD - NW-00491		9.8		Chicot	Jackson	-8.6
Texana GCD - NW-00492		9.8		Chicot	Jackson	-42.1
Victoria County GCD - GW-000735		118.1		Evangeline	Victoria	48.6
Victoria County GCD - GW-000778		91.9		Evangeline	Victoria	37.9
Victoria County GCD - NW-000097	7907707	190.3		Evangeline	Victoria	105.3
Victoria County GCD - NW-000779		62.3		Chicot	Victoria	15.5

Table 2 Average annual water level (ft, msl) and change in the average annual water level for Calhoun County for the Chicot Aquifer, the Evangeline Aquifer and the Chicot & Evangeline aquifers

Aquifer	Water Level/ Change	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Chicot	avg. WL (ft)	-7.0	-5.9	-4.9	-0.3	-1.8	1.9	-4.5	-1.0	0.8	-2.6	-2.6	-1.2	-7.6	-5.1	-6.8	-7.7	-7.8	-2.6	-4.2	-2.9	-2.6	-5.0	-1.8	-5.7
	change (ft)*	0.0	1.1	2.1	6.7	5.2	8.9	2.5	6.1	7.8	4.4	4.4	5.8	-0.6	2.0	0.2	-0.6	-0.8	4.4	2.8	4.1	4.5	2.0	5.2	1.3
Evangeline	avg. WL (ft)	17.7	11.3	8.1	25.2	13.7	13.3	21.8	28.0	15.1	16.5	18.1	14.6	18.7	10.3	1.2	3.6	3.6	11.6	-8.0	15.2	16.4	9.9	6.6	5.0
	change (ft)*	0.0	-6.4	-9.6	7.5	-4.0	-4.4	4.1	10.3	-2.6	-1.2	0.4	-3.1	1.0	-7.4	-16.5	-14.2	-14.1	-6.1	-25.8	-2.5	-1.3	-7.8	-11.1	-12.7
Chicot & Evangeline	avg. WL (ft)	-3.2	-3.7	-3.5	3.7	0.2	3.3	-0.2	3.7	3.1	0.2	0.4	1.0	-3.1	-2.8	-5.7	-6.1	-6.2	-0.4	-5.7	-0.1	0.5	-3.1	-1.3	-4.5
	change (ft)*	0.0	-0.5	-0.3	7.0	3.4	6.6	3.1	6.9	6.3	3.4	3.6	4.2	0.1	0.4	-2.5	-2.8	-3.0	2.8	-2.5	3.1	3.7	0.1	1.9	-1.3

* change is measured relative to the year 2000; avg WL is measured relative to mean sea level

Table 3 Average annual water level (ft, msl) and change in the average annual water level for Jackson County for the Chicot Aquifer, the Evangeline Aquifer and the Chicot & Evangeline aquifers

Aquifer	Water Level/ Change	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Chicot	avg. WL (ft)	21.3	19.3	23.4	26.5	26.5	29.3	23.0	29.9	30.7	26.4	27.1	28.1	20.2	23.6	20.3	22.1	20.6	25.9	25.7	26.2	28.0	25.4	29.5	23.6
	change (ft)*	0.0	-2.0	2.1	5.2	5.2	8.0	1.7	8.6	9.4	5.1	5.8	6.8	-1.1	2.2	-1.0	0.8	-0.7	4.6	4.4	4.9	6.7	4.1	8.2	2.3
Evangeline	avg. WL (ft)	17.0	19.2	21.8	21.0	22.0	22.0	21.5	32.6	27.5	20.9	17.1	19.6	6.2	20.4	1.7	12.0	21.0	17.4	-3.5	15.4	15.9	12.1	13.0	15.0
	change (ft)*	0.0	2.3	4.9	4.0	5.1	5.1	4.6	15.7	10.6	3.9	0.1	2.6	-10.7	3.4	-15.2	-4.9	4.1	0.4	-20.4	-1.5	-1.0	-4.9	-4.0	-2.0
Chicot & Evangeline	avg. WL (ft)	19.0	19.1	22.5	23.6	24.2	25.6	22.2	31.2	29.0	23.5	22.0	23.8	13.1	21.9	11.0	16.9	20.7	21.5	11.0	20.8	21.9	18.7	21.1	19.2
	change (ft)*	0.0	0.1	3.5	4.6	5.2	6.6	3.1	12.2	10.0	4.5	3.0	4.8	-5.9	2.8	-8.1	-2.1	1.7	2.5	-8.0	1.7	2.9	-0.3	2.1	0.2

* change is measured relative to the year 2000; avg WL is measured relative to mean sea level

Table 4 Average annual water level (ft, msl) and change in the average annual water level for Refugio County for the Chicot Aquifer, the Evangeline Aquifer and the Chicot & Evangeline aquifers

Aquifer	Water Level/ Change	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Chicot	avg. WL (ft)	24.8	23.6	28.3	27.2	24.5	28.3	24.6	27.4	29.0	24.3	22.7	23.5	23.0	19.4	4.5	14.5	19.6	19.2	19.0	20.0	18.4	14.9	19.6	17.3
	change (ft)*	0.0	-1.2	3.6	2.5	-0.2	3.5	-0.1	2.6	4.3	-0.5	-2.1	-1.2	-1.8	-5.4	-20.2	-10.3	-5.2	-5.6	-5.8	-4.8	-6.4	-9.9	-5.2	-7.5
Evangeline	avg. WL (ft)	32.5	31.7	34.2	39.8	37.9	40.7	38.3	35.4	31.2	31.7	21.7	31.6	33.1	27.0	23.9	22.3	24.6	30.4	20.5	28.2	30.9	24.6	28.3	24.1
	change (ft)*	0.0	-0.8	1.6	7.2	5.3	8.1	5.8	2.8	-1.3	-0.9	-10.8	-1.0	0.5	-5.5	-8.6	-10.3	-7.9	-2.2	-12.0	-4.3	-1.7	-7.9	-4.2	-8.4
Chicot & Evangeline	avg. WL (ft)	26.3	25.4	29.1	31.0	28.8	31.8	28.9	29.0	28.5	26.1	20.7	25.6	25.8	21.4	11.9	16.7	20.4	22.8	18.6	22.4	22.6	17.8	22.2	19.0
	change (ft)*	0.0	-0.9	2.8	4.7	2.5	5.6	2.6	2.7	2.2	-0.1	-5.5	-0.7	-0.5	-4.9	-14.4	-9.5	-5.8	-3.5	-7.7	-3.9	-3.7	-8.4	-4.1	-7.3

* change is measured relative to the year 2000; avg WL is measured relative to mean sea level

Table 5 Average annual water level (ft, msl) and change in the average annual water level for Victoria County for the Chicot Aquifer, the Evangeline Aquifer and the Chicot & Evangeline aquifers

Aquifer	Water Level/ Change	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Chicot	avg. WL (ft)	49.8	49.2	47.8	48.8	49.6	52.6	51.8	52.0	52.4	50.9	52.8	48.0	43.5	50.1	45.5	48.2	49.9	51.4	52.0	49.9	47.9	48.6	51	45.6
	change (ft)*	0.0	-0.6	-2.0	-1.0	-0.2	2.8	2.0	2.2	2.6	1.1	3.0	-1.7	-6.3	0.3	-4.3	-1.6	0.1	1.6	2.2	0.1	-1.9	-1.2	1.1	-4.2
Evangeline	avg. WL (ft)	29.8	32.0	40.6	48.8	51.0	48.9	47.6	53.4	53.0	47.7	44.8	41.3	32.4	45.3	40.9	41.4	45.6	46.1	30.6	38.0	39.1	42.7	43.3	44.6
	change (ft)*	0.0	2.2	10.8	19.0	21.2	19.1	17.7	23.5	23.1	17.8	15.0	11.5	2.5	15.4	11.0	11.5	15.7	16.3	0.7	8.2	9.3	12.9	13.5	14.8
Chicot & Evangeline	avg. WL (ft)	41.3	42.4	46.0	50.6	51.9	52.2	51.2	54.2	54.2	50.7	50.2	46.2	39.3	49.3	44.8	46.3	49.3	50.4	42.7	45.6	45.1	47.4	48.8	46.9
	change (ft)*	0.0	1.0	4.6	9.2	10.5	10.9	9.9	12.9	12.9	9.4	8.9	4.9	-2.0	7.9	3.4	5.0	7.9	9.0	1.4	4.2	3.8	6.1	7.5	5.6

* change is measured relative to the year 2000; avg WL is measured relative to mean sea level

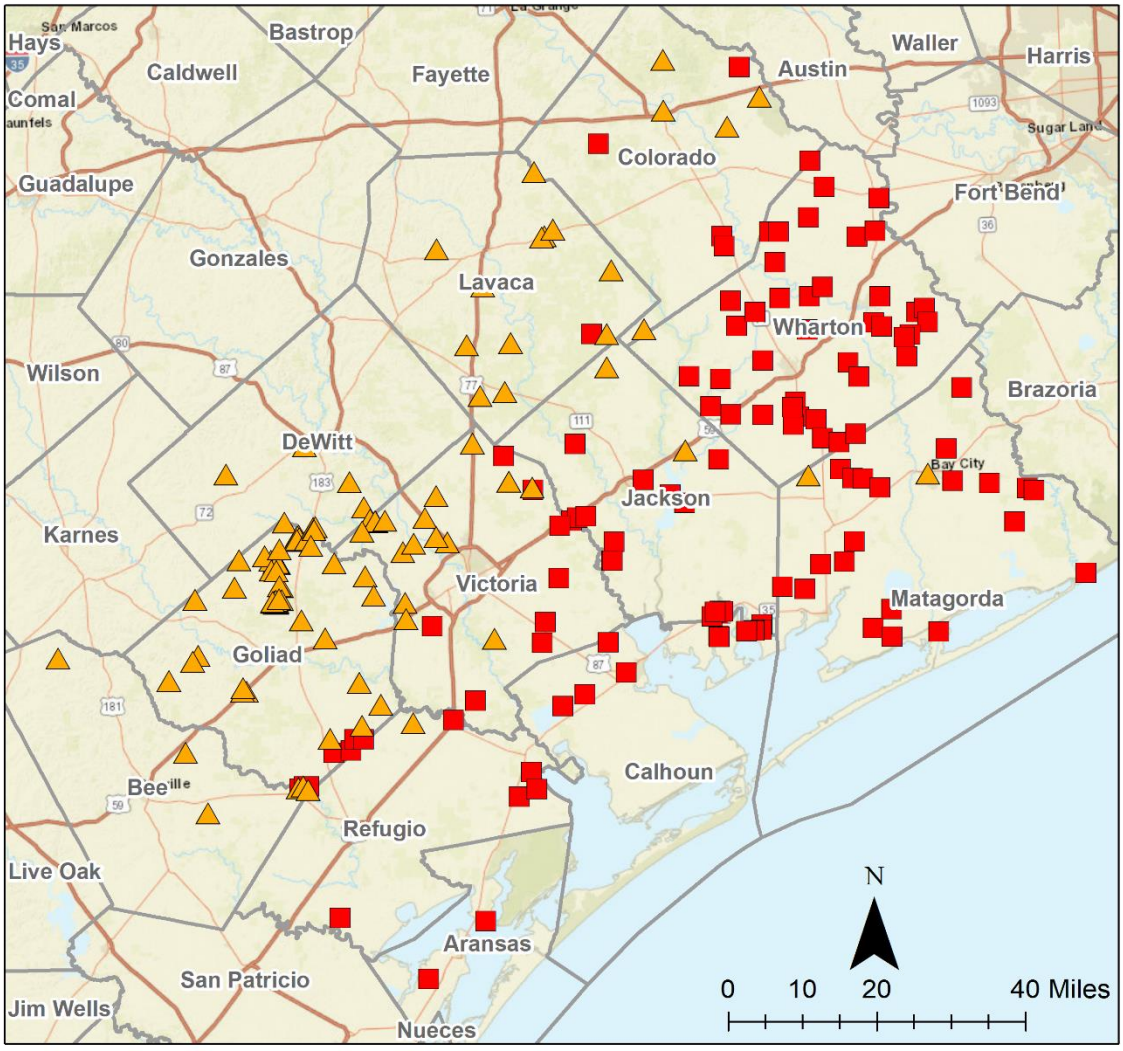

Figure 1 Location of Water Levels that were Interpolated to Generate the Water Levels Surfaces for the Chicot and the Evangeline aquifers

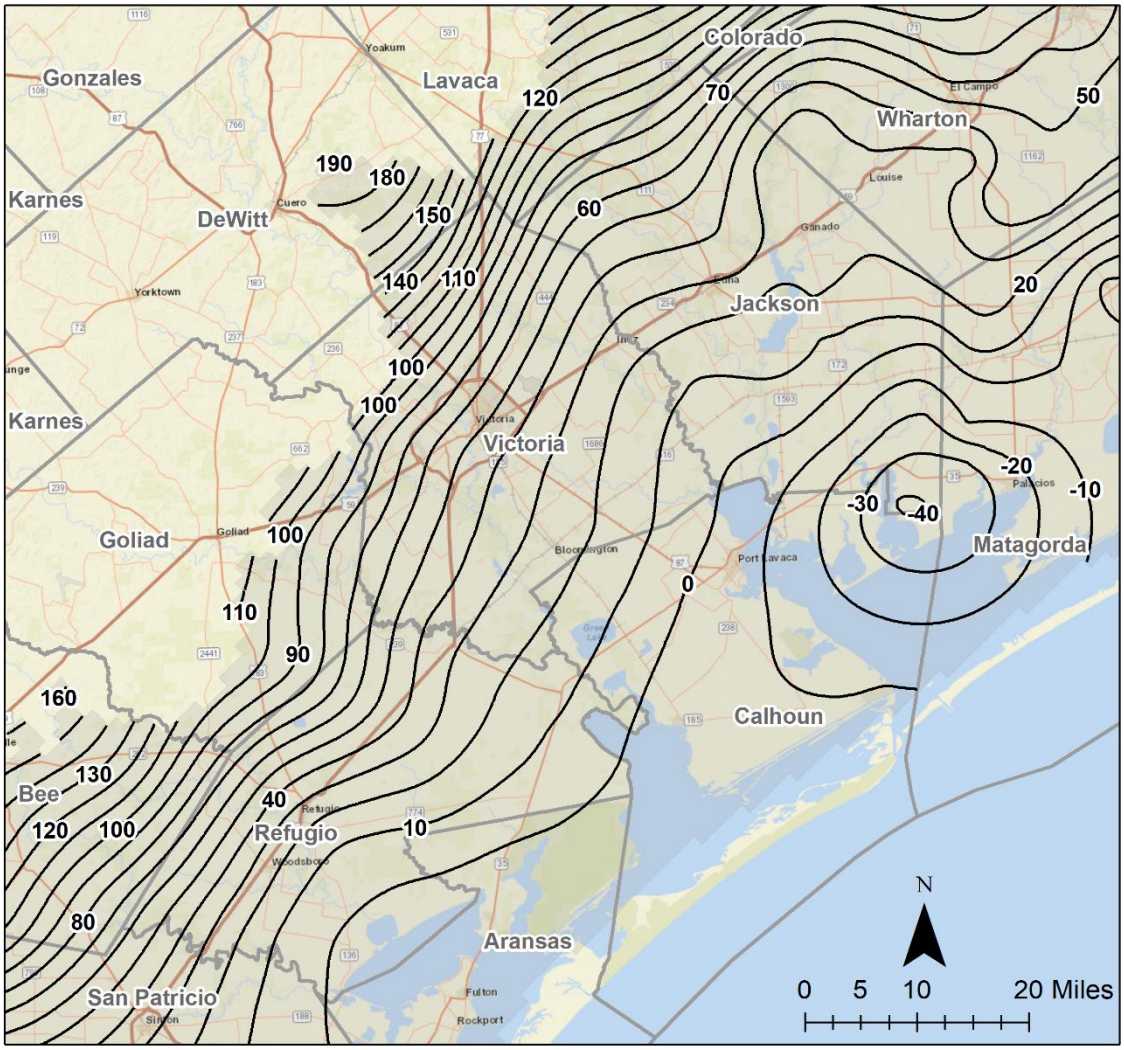

Figure 2 Contours of the Water Levels Generated for the Chicot Aquifer for the 2000 Analysis Year

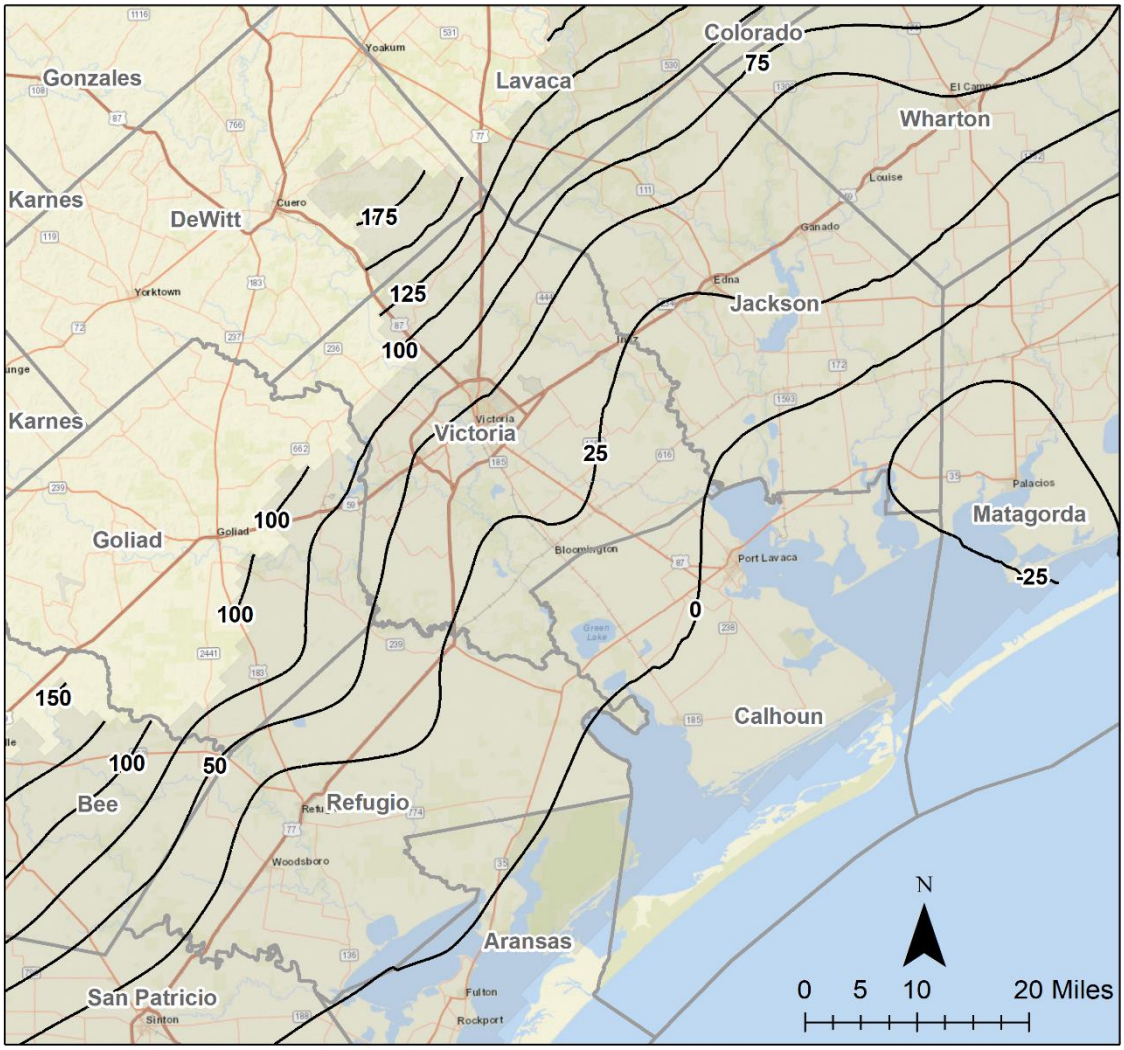

Figure 3 Contours of the Water Levels Generated for the Chicot Aquifer for the 2023 Analysis Year

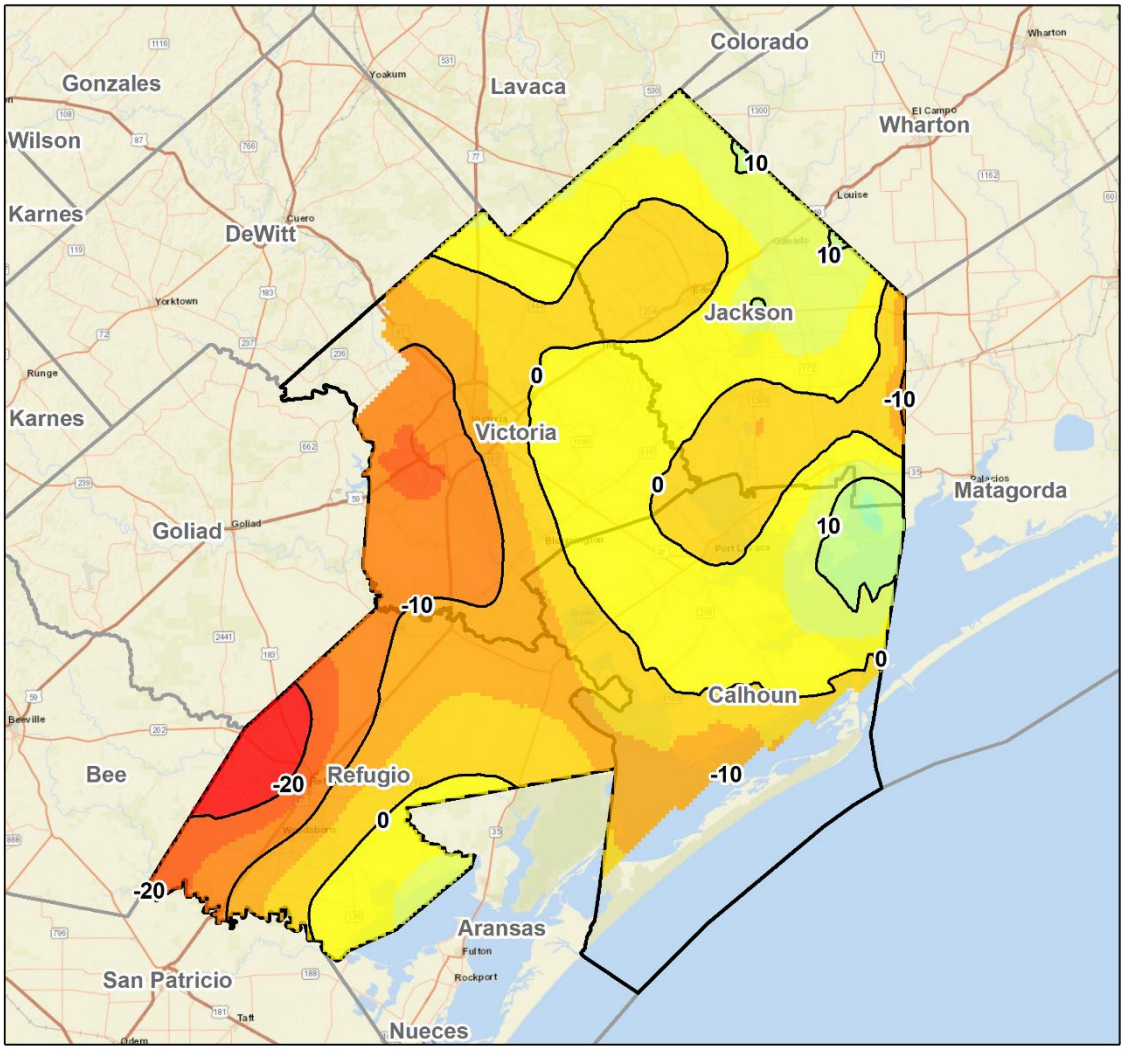

Figure 4 Contours of the change in water levels in the Chicot Aquifer from the 2000 Analysis Year to the 2023 Analysis Year

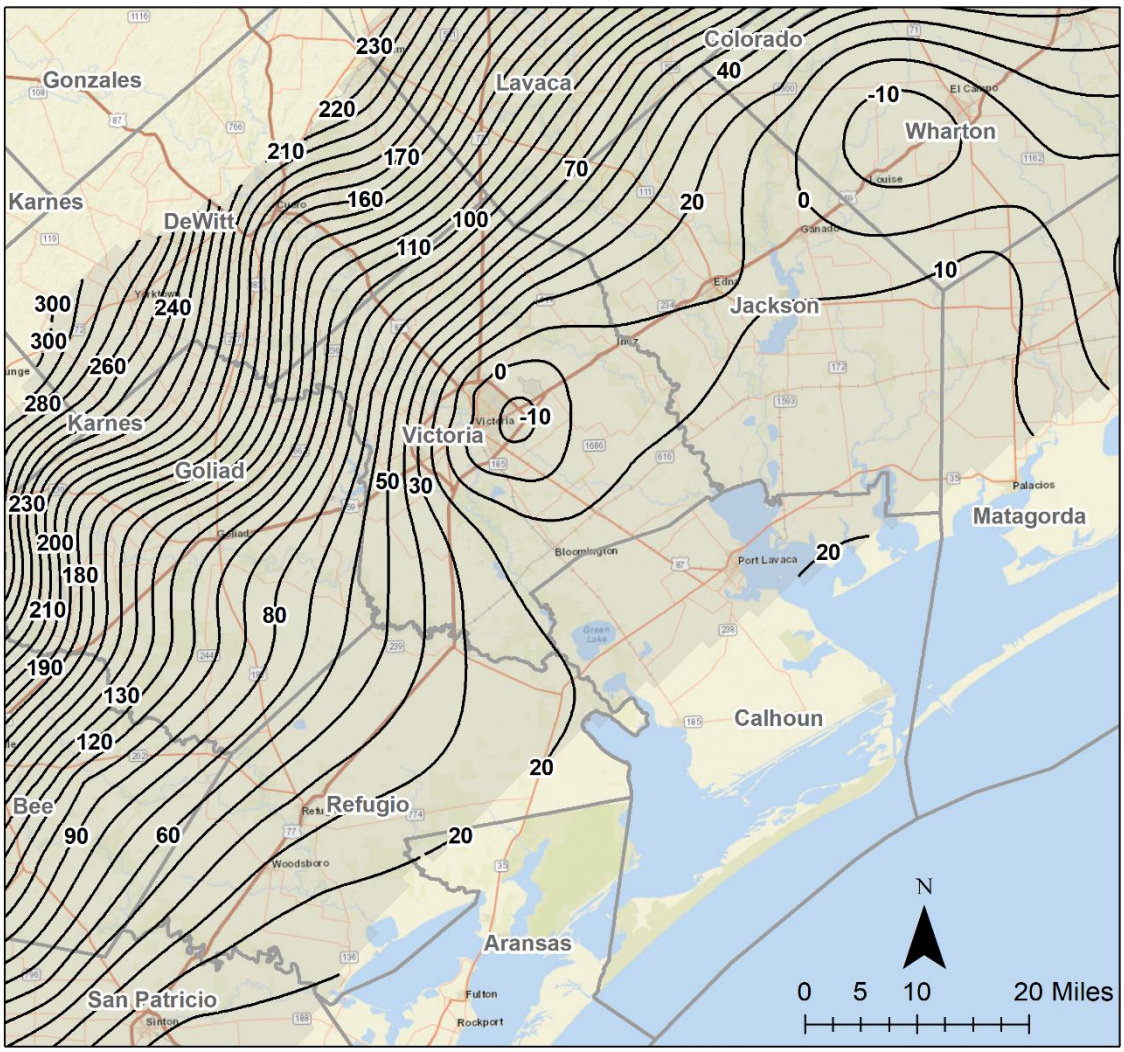

Figure 5 Contours of the Water Levels Generated for the Evangeline Aquifer for the 2000 Analysis Year

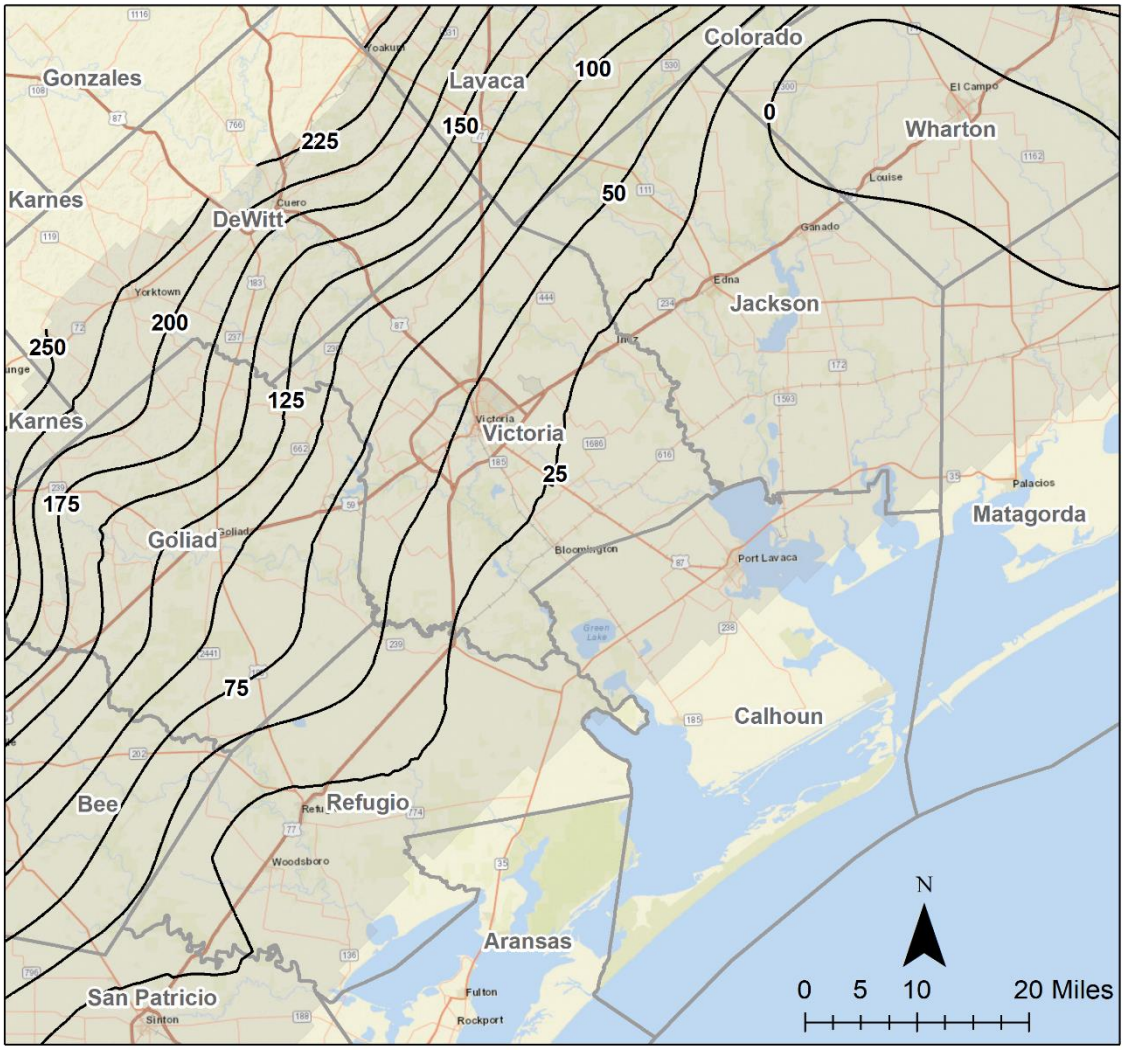

Figure 6 Contours of the Water Levels Generated for the Evangeline Aquifer for the 2023 Analysis Year

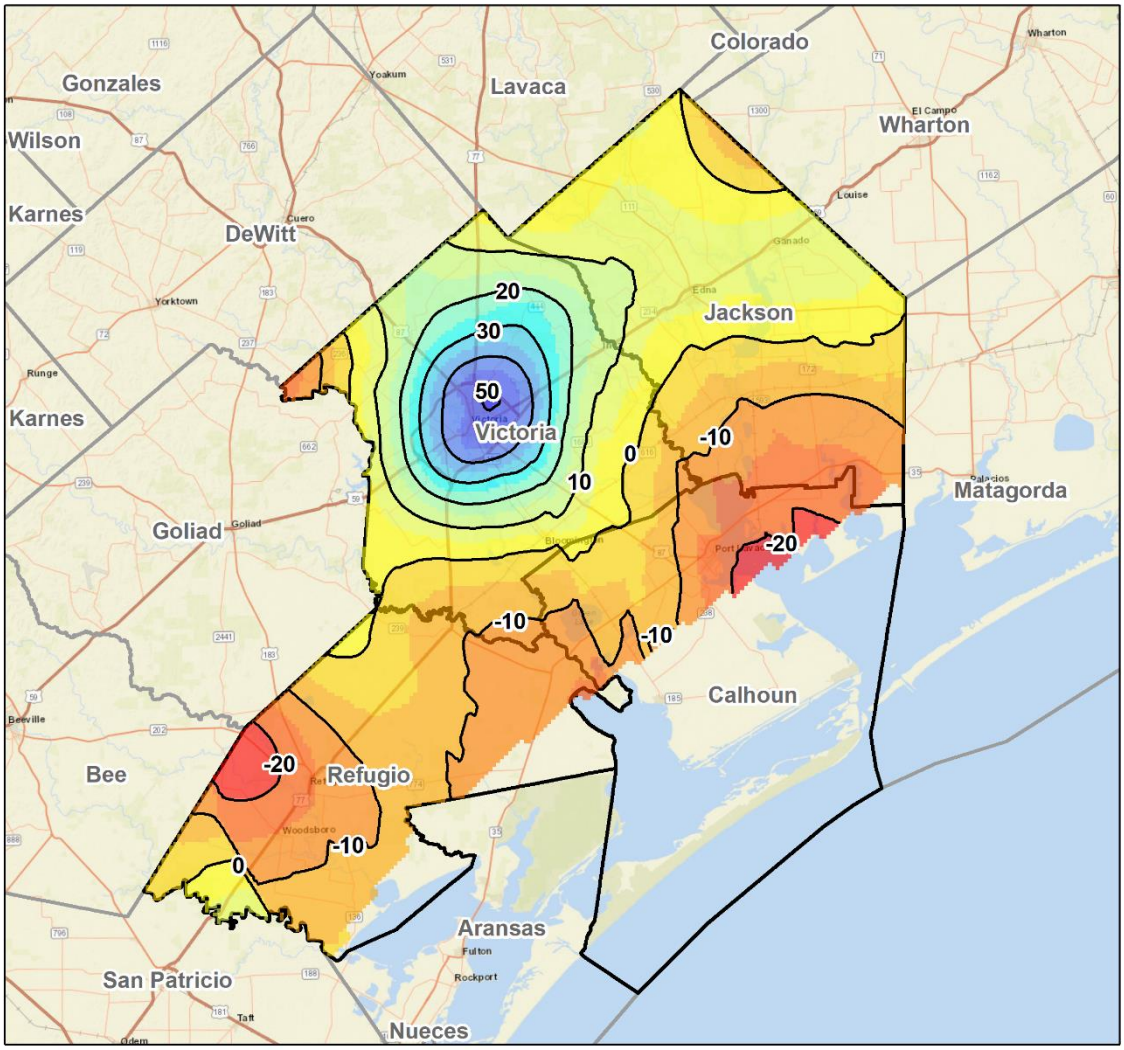

Figure 7 Contours of the change in water levels in the Evangeline Aquifer from the 2000 Analysis Year to the 2023 Analysis Year