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December 18, 2023

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 2022 Water Levels

Dear Mr. Andruss,

Attachment A provides INTERA's analysis of the 2022 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 2022 water levels for their respective counties.

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

Sincerely,

A handwritten signature in black ink that reads "Steven C Young".

Steven C Young, PhD, PE, PG
Principal Geoscientist
INTERA, Incorporated

Cc: Lakin Beal, INTERA



Attachment A

Application of Geostatistical Techniques to Interpret Measured 2022 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 1,000 ft. Using these surfaces, the average water levels were calculated by county and by year. In 2022, INTERA (Young, 2022) assembled the water levels measured in 2021 across the central Gulf Coast Aquifer and performed the SSWL+KR analysis for the four GCDs.

Analysis of 2022 Water Level Data

In 2023, INTERA assembled the measured water levels in 2022 and performed the SSWL+Kr analysis. 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 2022 for the Chicot Aquifer, the Evangeline Aquifer, and the combination of the Chicot and Evangeline aquifers. In addition, the average annual water levels, 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 2022 represent the water level change from 2000 to 2022.

Figures 2 and 3 show water level contours for the Chicot Aquifer generated for the years 2000 and 2022, respectively. Figure 4 provides contours at 10-ft intervals that show the change in water levels from 2000 to 2022 for the Chicot Aquifer across Victoria, Jackson, Refugio, and Calhoun counties. Across these four GCDs, the contour intervals range between 30 ft (decline) and -20 ft (rebound).

Figures 5 and 6 show water level contours for the Evangeline Aquifer generated for the years 2000 and 2022, respectively. Figure 7 provides contours of the change in water levels from 2000 to 2022 for the Evangeline Aquifer. Across these four GCDs, the contour intervals range between 20 ft (decline) and -40 ft (rebound). In Figure 4, the areal extent of the Evangeline Aquifer 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.

Table 1 List of Wells and Water Levels Used to Generate the Water Levels Surfaces for the Chicot and the Evangeline aquifers for 2022

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
1927	Victoria County GCD - GW-000021	6657801	128	100	85.8	Chicot	Victoria
1928	Calhoun County GCD - GW-00003	na	35	75	21.5	Chicot	Calhoun
1946	Calhoun County GCD - NW-00033	na	6.56	560	-25.04	Chicot	Calhoun
1949	Refugio GCD - NW-00340	na	45	150	9.15	Chicot	Refugio
1957	Texana GCD - GW-00292	8004403	59	681	29	Evangeline	Jackson
1975	Victoria County GCD - GW-000767	na	57	450	24.25	Chicot	Victoria
1978	Victoria County GCD - GW-000489	8018402	56	336	24.6	Chicot	Victoria
1987	Texana GCD - GW-00385	8012502	36	330	9.8	Chicot	Jackson
1995	Victoria County GCD - GW-000510	7916608	65	327	40.4	Evangeline	Victoria
2000	Calhoun County GCD - GW-00009	8026501	39	267	7	Chicot	Calhoun
2013	Calhoun County GCD - GW-00001	na	19	175	1.4	Chicot	Calhoun
2018	Victoria County GCD - GW-000102	8019105	22	170	2.15	Chicot	Victoria
2029	Victoria County GCD - GW-000552	7907505	161	112	98.7	Evangeline	Victoria
2031	Victoria County GCD - GW-000150	8010502	57	140	33	Chicot	Victoria
2038	Victoria County GCD - GW-000578	7908403	139	100	94	Evangeline	Victoria
2039	Victoria County GCD - GW-000589	7908807	88	220	79	Evangeline	Victoria
2046	Victoria County GCD - GW-000687	7908406	125	152	89	Evangeline	Victoria
2056	Texana GCD - NW-00195	na	56	330	25.35	Chicot	Jackson

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
2058	Victoria County GCD - GW-000609	7923303	100	194	62.645	Evangeline	Victoria
2060	Victoria County GCD - GW-000494	7915305	178	190	85.3	Evangeline	Victoria
2064	Victoria County GCD - GW-000047	7916102	129	227	75.1	Evangeline	Victoria
2071	Refugio GCD - GW-00234	7932802	72	165	25.43	Chicot	Refugio
2075	Victoria County GCD - GW-000611	7924102	98	100	45.36	Chicot	Victoria
2083	Victoria County GCD - GW-000577	7908404	147	100	95.25	Evangeline	Victoria
2095	Victoria County GCD - GW-000607	7908805	111	169	62.45	Evangeline	Victoria
2096	Victoria County GCD - GW-000608	7915903	125	112	80.35	Evangeline	Victoria
2100	Refugio GCD - GW-00124	7931901	91	946	54.5	Evangeline	Refugio
2108		8017502	67	1026	35.54247191	Evangeline	Victoria
2111	Victoria County GCD - GW-000601	7916702	103	588	56.9	Evangeline	Victoria
2114		6541401	86	90	56.11	Chicot	Wharton
2115		6541402	80	338	34.23	Chicot	Wharton
2116		6541707	88	499	30.05	Chicot	Wharton
2123		6549901	58	375	24.575	Chicot	Matagorda
2124		6557802	54	315	- 2.733333333	Chicot	Matagorda
2129		6612603	298	188	202.95	Evangeline	Colorado
2133		6614703	266	90	239.63	Chicot	Colorado
2137		6619804	349	140	280.16	Chicot	Colorado
2141	Texana GCD - NW-00310	na	90	124	49.9	Chicot	Jackson
2147		6621603	239	812	173.02	Evangeline	Colorado
2150		6622201	234	995	192.6	Evangeline	Colorado
2157		6626202	260	126	207.83	Evangeline	Colorado
2161		6628702	255	565	177.38	Evangeline	Colorado

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
2173		6631107	155	450	120.089375	Chicot	Wharton
2174		6631504	142	178	101.96	Chicot	Wharton
2177		6632809	121	320	72.86	Chicot	Wharton
2183		6634201	197	90	174.42	Evangelina	Lavaca
2185		6634207	227	120	177.45	Evangelina	Lavaca
2194		6637607	163	318	121.83	Chicot	Colorado
2198		6637615	160	90	122.35	Chicot	Colorado
2202		6638202	155	90	125.19	Chicot	Wharton
2205		6638304	150	113	112.45	Chicot	Wharton
2206		6638801	127	116	101.17	Chicot	Wharton
2207		6639106	146	90	94.02	Chicot	Wharton
2210		6639801	118	300	79.85	Chicot	Wharton
2211		6640401	110	442	64.11666667	Chicot	Wharton
2212		6640505	113	90	76.23333333	Chicot	Wharton
2216		6641203	234	90	184.67	Evangelina	Lavaca
2217		6641703	222	164	154.82	Evangelina	Lavaca
2219		6641903	205	335	118.76	Evangelina	Lavaca
2225		6643704	139	90	113.24	Chicot	Lavaca
2226		6643803	151	1023	68.48	Evangelina	Lavaca
2227		6644402	164	880	88.47	Evangelina	Lavaca
2228		6644702	139	676	56.79	Evangelina	Colorado
2231		6645601	143	429	95.54	Chicot	Wharton
2233		6645916	129	125	79.05	Chicot	Wharton
2234		6646201	144	200	97.09	Chicot	Wharton
2235		6646402	134	366	78.83	Chicot	Wharton
2236		6646601	131	186	85.56	Chicot	Wharton
2238		6647101	123	319	72.44	Chicot	Wharton
2239		6647201	120	244	70.25	Chicot	Wharton
2240	Calhoun County GCD - GW-00005	na	15	490	-16.8	Chicot	Calhoun

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
2242		6647703	111	242	77.92	Chicot	Wharton
2243		6647904	99	340	43.09	Chicot	Wharton
2246		6648502	95	90	77.26666667	Chicot	Wharton
2248		6648701	98	90	64.6	Chicot	Wharton
2249		6648802	94	564	54.74	Chicot	Wharton
2250		6648907	90	630	29.2	Chicot	Wharton
2251	Calhoun County GCD - NW-00024	na	15	490	-17.4	Chicot	Calhoun
2252		6648908	90	90	63.86	Chicot	Wharton
2254		6649701	173	1082	118.16	Evangelina	Lavaca
2256		6649901	168	272	105.2	Evangelina	Lavaca
2264		6652603	106	515	40.03	Chicot	Wharton
2267		6653406	108	348	48.44292857	Chicot	Wharton
2268		6653503	94	338	46.05	Chicot	Wharton
2269	Texana GCD - GW-00294	6651505	128	627	55.35	Evangelina	Jackson
2271		6653804	82	495	41.82	Chicot	Wharton
2273		6654108	105	360	55.59	Chicot	Wharton
2276		6654906	91	461	20.15	Chicot	Wharton
2278		6655603	90	100	73.58	Chicot	Wharton
2279		6656302	81	490	15.12	Chicot	Wharton
2280		6656304	91	356	38.3	Chicot	Wharton
2283		6656403	84	275	33.21666667	Chicot	Wharton
2288		6661302	82	528	33.12524194	Chicot	Wharton
2290		6661305	81	600	41.94	Chicot	Wharton
2293		6662104	87	371	39.25	Chicot	Wharton
2294		6662307	88	180	60.63	Chicot	Wharton
2295		6662309	84	421	50.12	Chicot	Wharton
2303		6663507	68	90	59.57	Chicot	Wharton
2305		6663509	68	688	-13.07	Chicot	Wharton
2309		6664401	71	1057	-13.08	Evangelina	Matagorda

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
2328		6740301	284	90	272.09	Evangeline	Lavaca
2330		6740504	362	155	289.86	Evangeline	Lavaca
2349		6748203	288	200	197.46	Evangeline	Lavaca
2367		6755803	221	90	210.5	Evangeline	DeWitt
2374		6760905	321	90	238.4	Evangeline	DeWitt
2380		6762404	270	90	217.45	Evangeline	DeWitt
2382	Texana GCD - GW-00291	8004504	51	280	14.75	Chicot	Jackson
2392	Refugio GCD - NW-00570	na	25	320	3.5	Chicot	Refugio
2400		7905606	200	154	181.12	Evangeline	Goliad
2403	Refugio GCD - NW-00539	na	30	300	5.9	Chicot	Refugio
2405		7905903	217	280	166.19	Evangeline	Goliad
2406		7905904	199	164	173.09	Evangeline	Goliad
2407		7905905	217	314	165.33	Evangeline	Goliad
2408		7905906	269	277	178.83	Evangeline	Goliad
2409		7905907	235	261	168.48	Evangeline	Goliad
2410		7905908	271	118	192.05	Evangeline	Goliad
2411		7905909	258	143	185.66	Evangeline	Goliad
2414	Calhoun County GCD - GW-00014	8019503	27	265	10	Chicot	Calhoun
2416		7906306	232	138	153.62	Evangeline	DeWitt
2422		7906706	221	152	165.6	Evangeline	Goliad
2423		7906707	202	260	154.24	Evangeline	DeWitt
2424		7906708	220	300	156.19	Evangeline	DeWitt
2429		7906714	199	136	152.8	Evangeline	DeWitt
2430		7906715	238	150	180.1	Evangeline	Goliad
2431		7906716	238	90	181.09	Evangeline	Goliad
2445		7912602	285	350	187.23	Evangeline	Goliad
2456		7913223	240	93	183.85	Evangeline	Goliad
2458		7913225	230	90	182.6	Evangeline	Goliad
2461		7913229	233	152	177.42	Evangeline	Goliad

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
2462		7913230	250	282	173.05	Evangeline	Goliad
2464		7913304	246	317	173.31	Evangeline	Goliad
2465	Refugio GCD - GW-00085	7947702	40	200	8.7	Chicot	Refugio
2476		7913512	270	263	171.21	Evangeline	Goliad
2484		7913803	253	188	186.28	Evangeline	Goliad
2487		7913805	285	197	191	Evangeline	Goliad
2489		7913807	262	222	183.07	Evangeline	Goliad
2492		7913810	259	186	183.26	Evangeline	Goliad
2493		7913811	225	143	180.29	Evangeline	Goliad
2495		7913813	271	210	189.64	Evangeline	Goliad
2501		7914203	172	380	124.06	Evangeline	Goliad
2508	Texana GCD - GW-00285	8011201	49	579	17.35	Chicot	Jackson
2514		7915401	170	145	91.9	Evangeline	Goliad
2516		7915702	142	174	88.8	Evangeline	Goliad
2532		7920704	229	90	163.96	Evangeline	Goliad
2533		7920705	262	90	171.17	Evangeline	Goliad
2534		7921307	210	284	135.39	Evangeline	Goliad
2541		7922206	167	226	108.04	Evangeline	Goliad
2550		7922508	155	263	95.72	Evangeline	Goliad
2565	Victoria County GCD - GW-000377	8002804	63	92	33.8	Chicot	Victoria
2577		7927306	264	280	172.5	Evangeline	Goliad
2579		7928302	216	235	135.99	Evangeline	Goliad
2580		7928303	217	95	126.54	Evangeline	Goliad
2581		7928304	236	320	126.64	Evangeline	Goliad
2589		7930201	150	302	103.8	Evangeline	Goliad
2590		7930301	113	300	69.84	Evangeline	Goliad
2595		7931502	105	204	65.55	Evangeline	Goliad
2597		7931702	99	218	75.47	Evangeline	Goliad
2606	Texana GCD - NW-00451	na	14	402	-32.25	Chicot	Jackson

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
2607		7935305	226	150	167.57	Evangeline	Bee
2623		7937911	89	146	51.92	Evangeline	Goliad
2624		7937912	86	90	57.25	Chicot	Goliad
2630		7937918	92	96	52.71	Chicot	Goliad
2631		7937919	88	160	45.13	Evangeline	Goliad
2632		7938201	115	106	79.36	Evangeline	Goliad
2633		7938202	100	90	69.18	Chicot	Goliad
2635		7938301	89	90	65.95	Chicot	Goliad
2636		7938303	102	90	76.29	Chicot	Goliad
2637		7938704	86	90	52.99	Chicot	Goliad
2640		7938706	75	325	48.76	Evangeline	Goliad
2643		7939104	91	110	65.96	Chicot	Goliad
2650	Victoria County GCD - GW-000311	8017905	55	1010	27.5	Evangeline	Victoria
2655		7944103	156	150	103.91	Evangeline	Bee
2695		7964701	9	130	7.12	Chicot	Aransas
2713		8007102	59	1020	25.5	Evangeline	Matagorda
2714		8007203	55	453	- 11.81666667	Chicot	Matagorda
2715		8007312	51	350	-22.2	Chicot	Matagorda
2725		8008504	51	690	-31.11	Chicot	Matagorda
2730	Victoria County GCD - GW-000339	6657406	185	270	90.3	Evangeline	Victoria
2740		8014801	16	719	-3.55	Chicot	Matagorda
2742		8014903	12	320	-31.55	Chicot	Matagorda
2744		8015301	31	570	6.15	Chicot	Matagorda
2746		8015502	27	776	-26.52	Chicot	Matagorda
2759		8022204	15	360	-32.36	Chicot	Matagorda
2765		8024201	11	490	3.79	Chicot	Matagorda
2766		8024406	7	360	-28.43	Chicot	Matagorda
2768		8024601	4	275	-3.2	Chicot	Matagorda

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
2769		8024802	2	380	-26.6	Chicot	Matagorda
2772		8033205	48	98	12.15	Chicot	Refugio
2779		8049702	8	90	3.67	Chicot	Aransas
2781	Victoria County GCD - GW-000602	7916701	103	578	60.2	Evangeline	Victoria
2782		8101102	50	1032	-34.27	Evangeline	Matagorda
2783		8101205	36	480	-23.95	Chicot	Matagorda
2785		8102404	31	450	-21.03	Chicot	Matagorda
2786		8102605	25	525	-9.98	Chicot	Matagorda
2787		8102901	19	294	-23.24	Chicot	Matagorda
2788		8103406	26	530	-14.15	Chicot	Matagorda
2794		8111901	3	527	-16.5	Chicot	Matagorda
2797		8117405	5	472	-18.48	Chicot	Matagorda
3018	Pecan Valley GCD - PV-04114	na	214	240	176.6	Evangeline	DeWitt
3038	Victoria County GCD - GW-001022	na	180.4462	180	93.3312	Evangeline	Victoria
3042	Texana GCD - GW-00444	na	13.1234	300	-33.39326667	Chicot	Jackson
3043	Texana GCD - GW-00446	na	13.1234	110	-33.96993333	Chicot	Jackson
3044	Texana GCD - GW-00562	na	9.8425	430	-29.1575	Chicot	Jackson
3046	Texana GCD - GW-00566	na	45.9318	150	34.6818	Chicot	Jackson

¹ Used 2020 Water Level Measurement in place of 2021

² Used Average of 2020 and 2022 Water Level Measurements in place of 2021



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
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
	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
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
	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
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
	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

* 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
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
	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
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
	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
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
	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

* 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

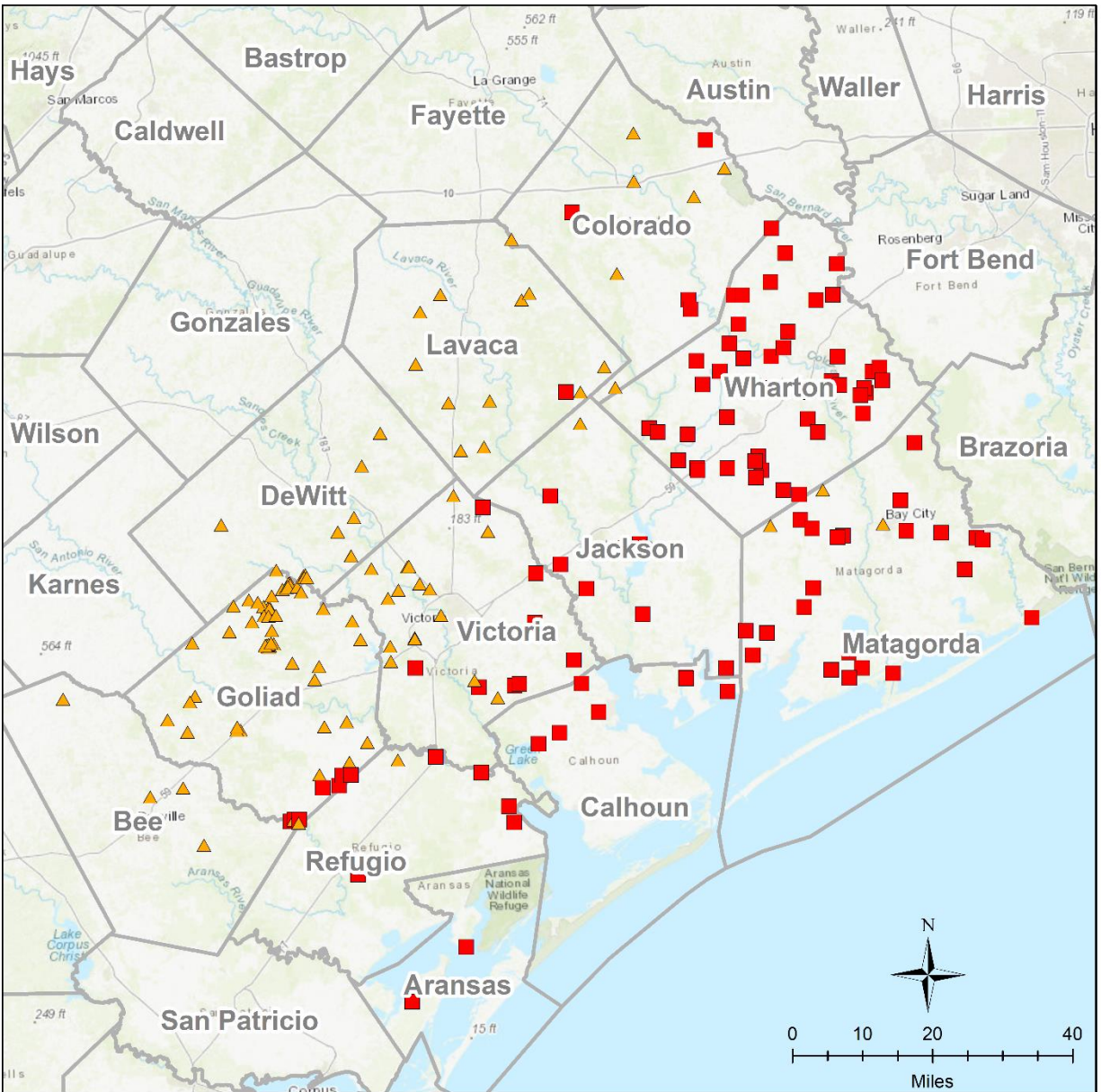
Aquifer	Water Level/ Change	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Chicot	avg. WL (ft)	24.8	23.6	28.3	27.2	24.5	28.3	24.6	27.4	29.0	24.3	22.7	23.5	23.0	19.4	4.5	14.5	19.6	19.2	19.0	20.0	18.4	14.9	19.6
	change (ft)*	0.0	-1.2	3.6	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
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
	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
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
	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

* 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
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
	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
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
	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
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
	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

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

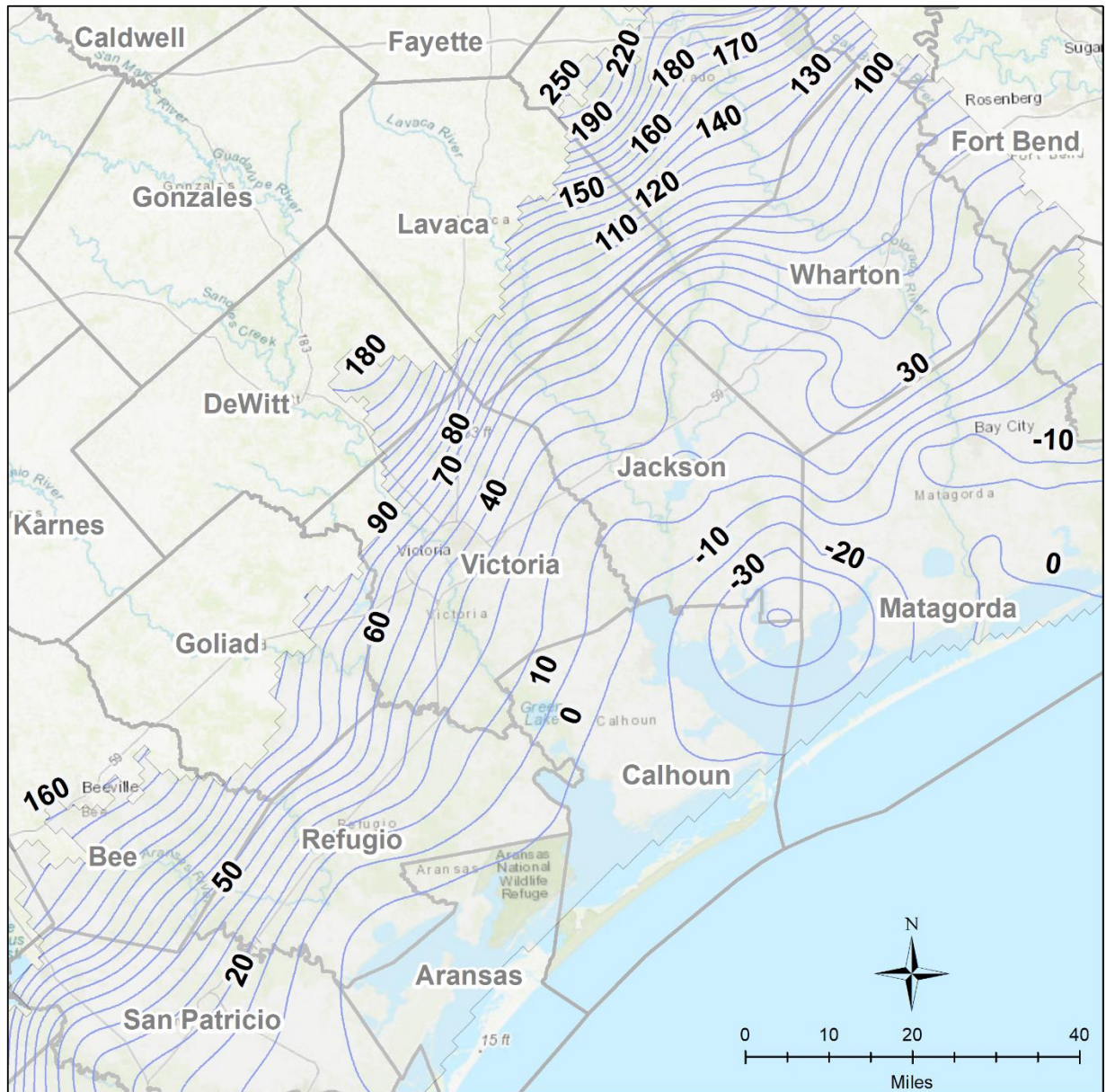


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Monitoring Well Network

- Chicot Aquifer
- ▲ Evangeline Aquifer
- County Line

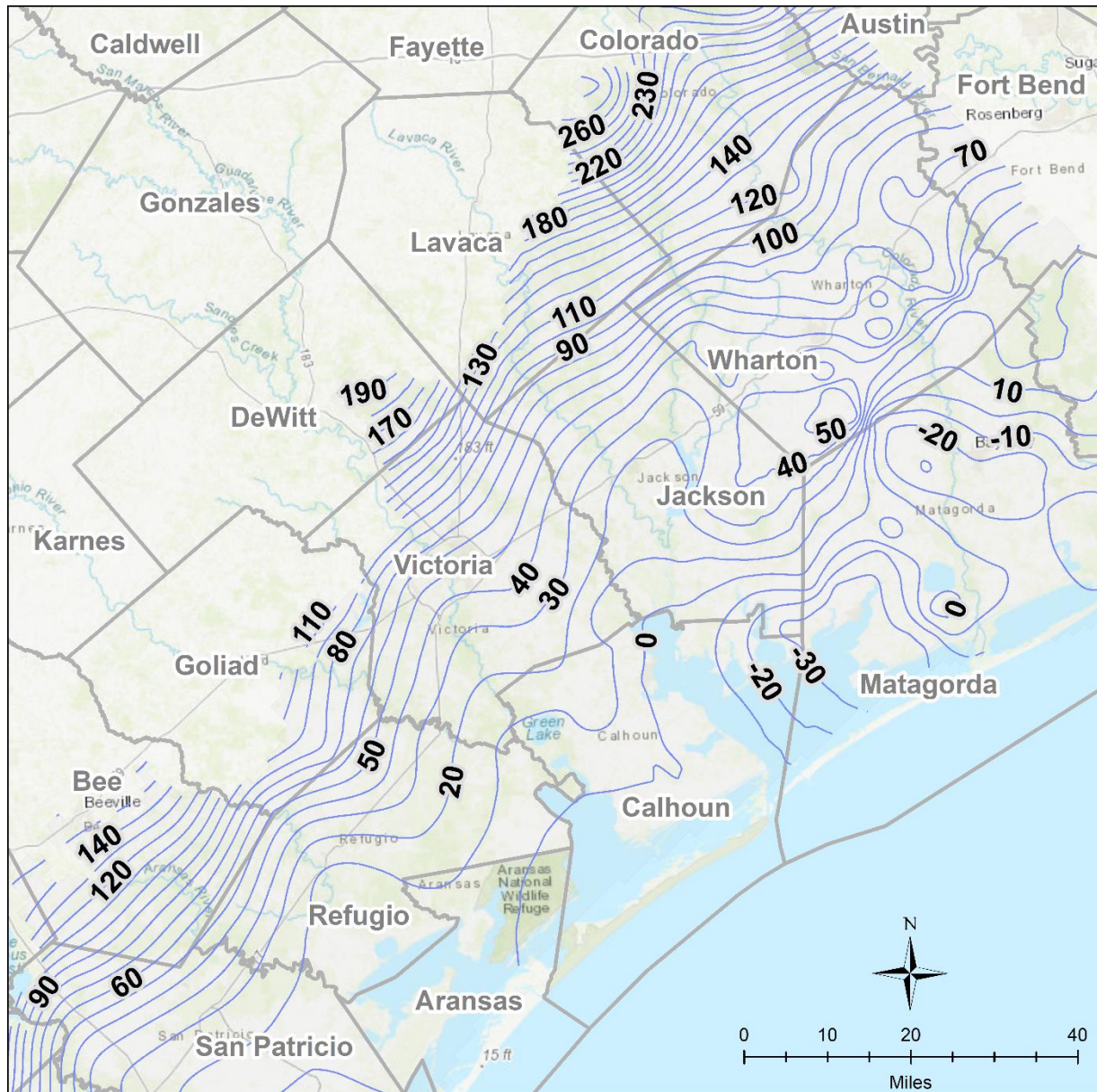
Figure 1 Location of Water Levels that were Interpolated to Generate the Water Levels Surfaces for the Chicot and the Evangeline aquifers



Chicot Water Level (2000)

- 10 ft Contour
- County Line

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

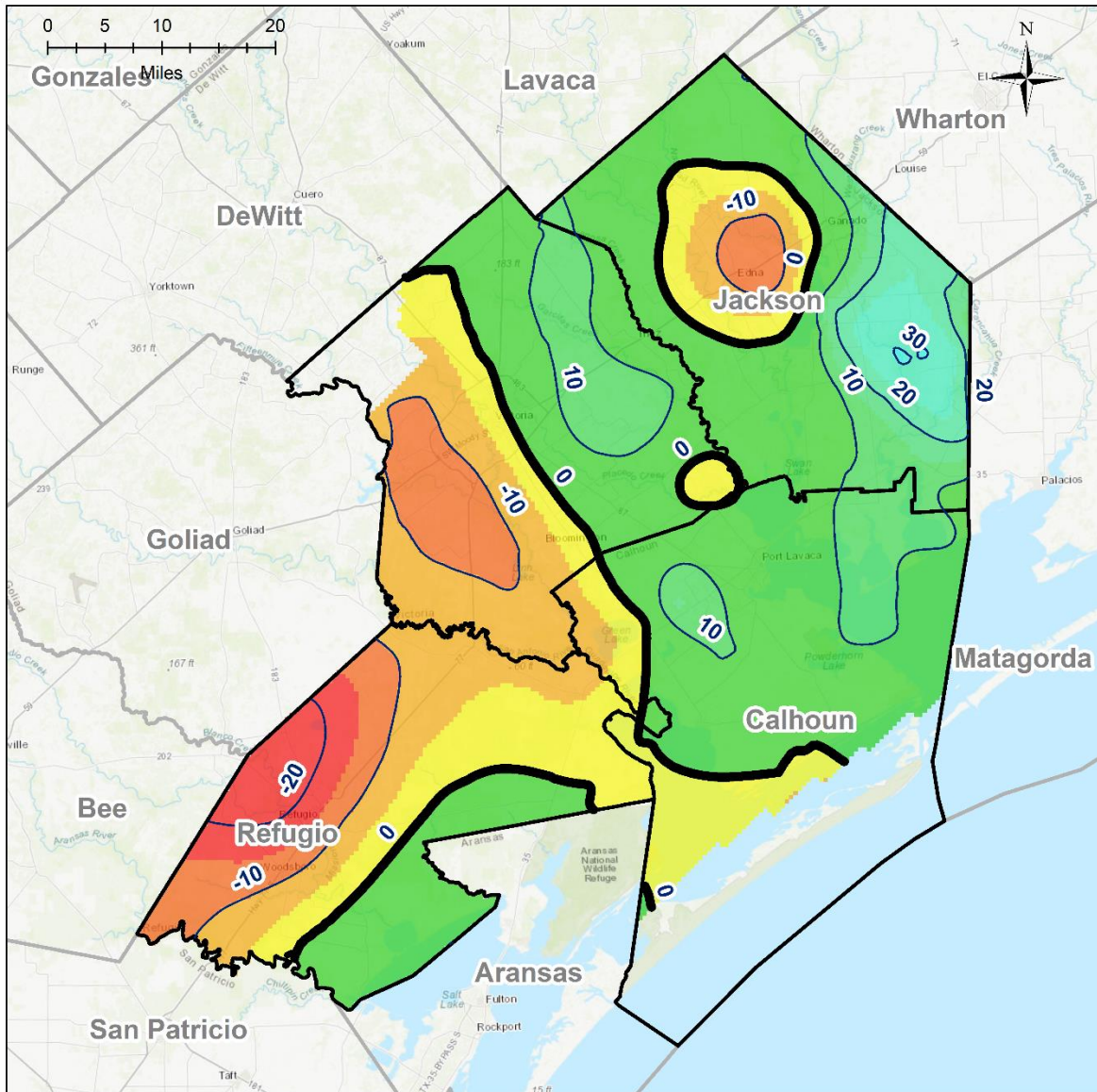


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Chicot Water Level (2022)

- 10 ft Contour
- County Line

Figure 3 Contours of the 2022 Water Levels Generated for the Chicot Aquifer from the Water Levels in Table 1.



Change in Water Level (ft): Chicot 2000-2022

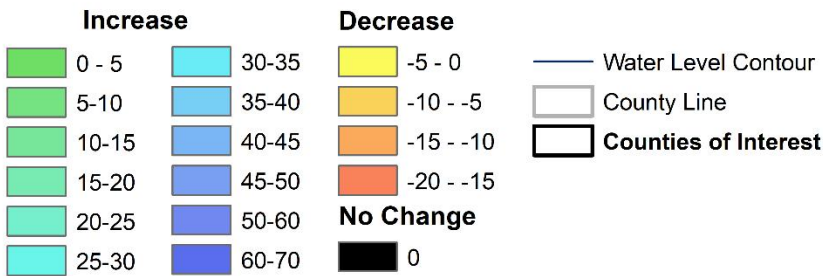
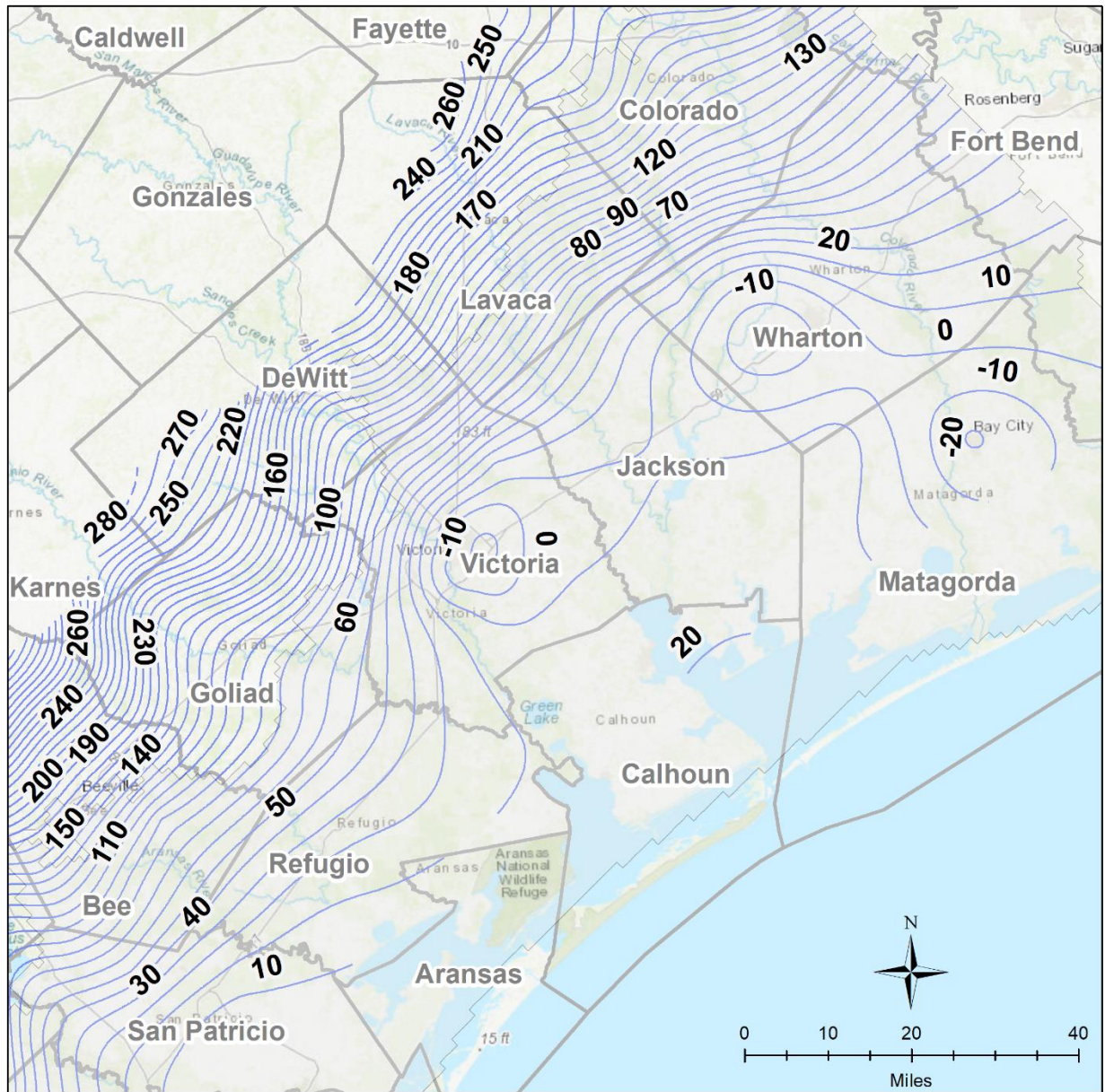


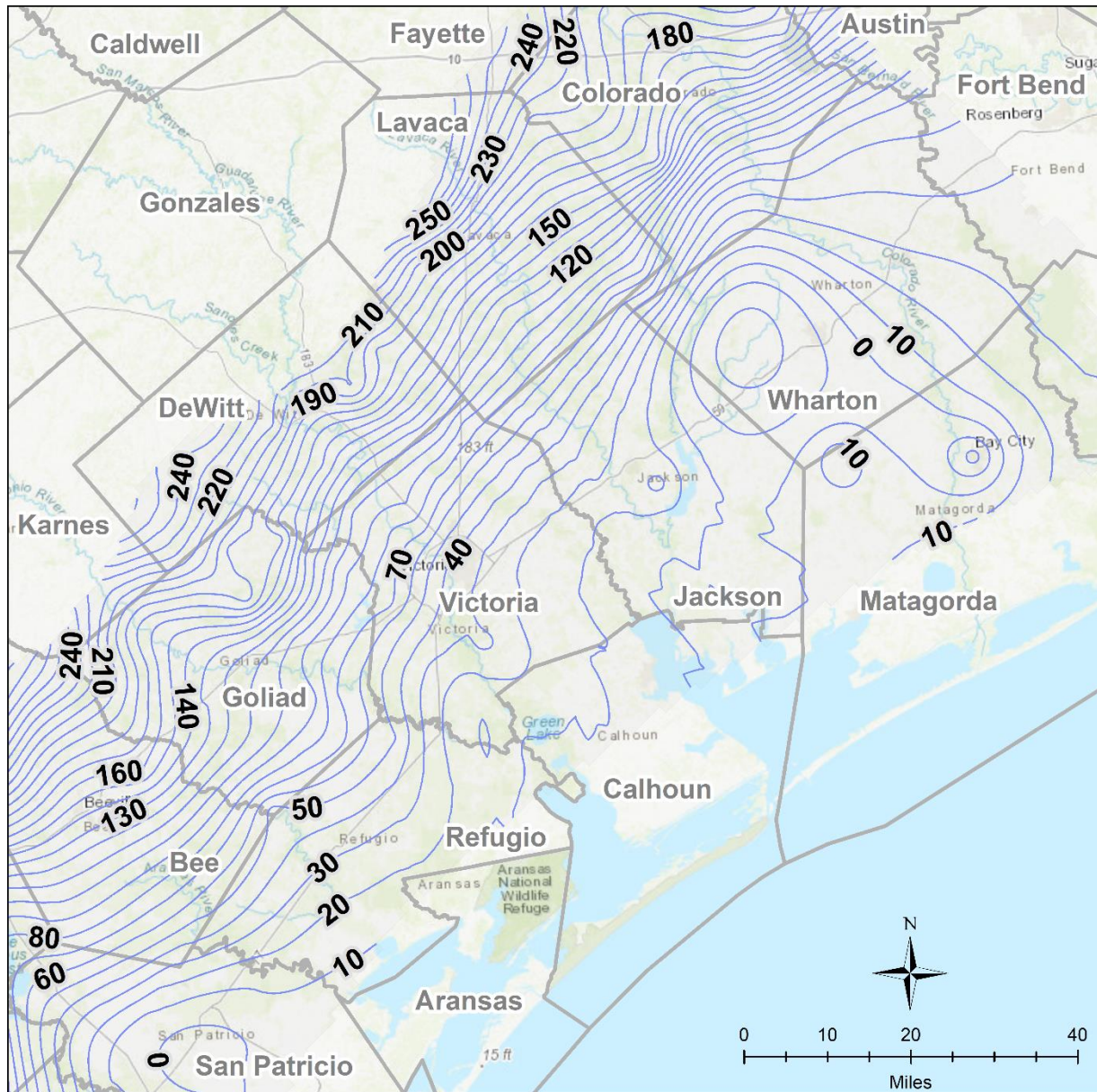
Figure 4 Contours of the change in water levels in the Chicot Aquifer from 2000 to 2022.



Evangeline Water Level (2000)

- 10 ft Contour
- County Line

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

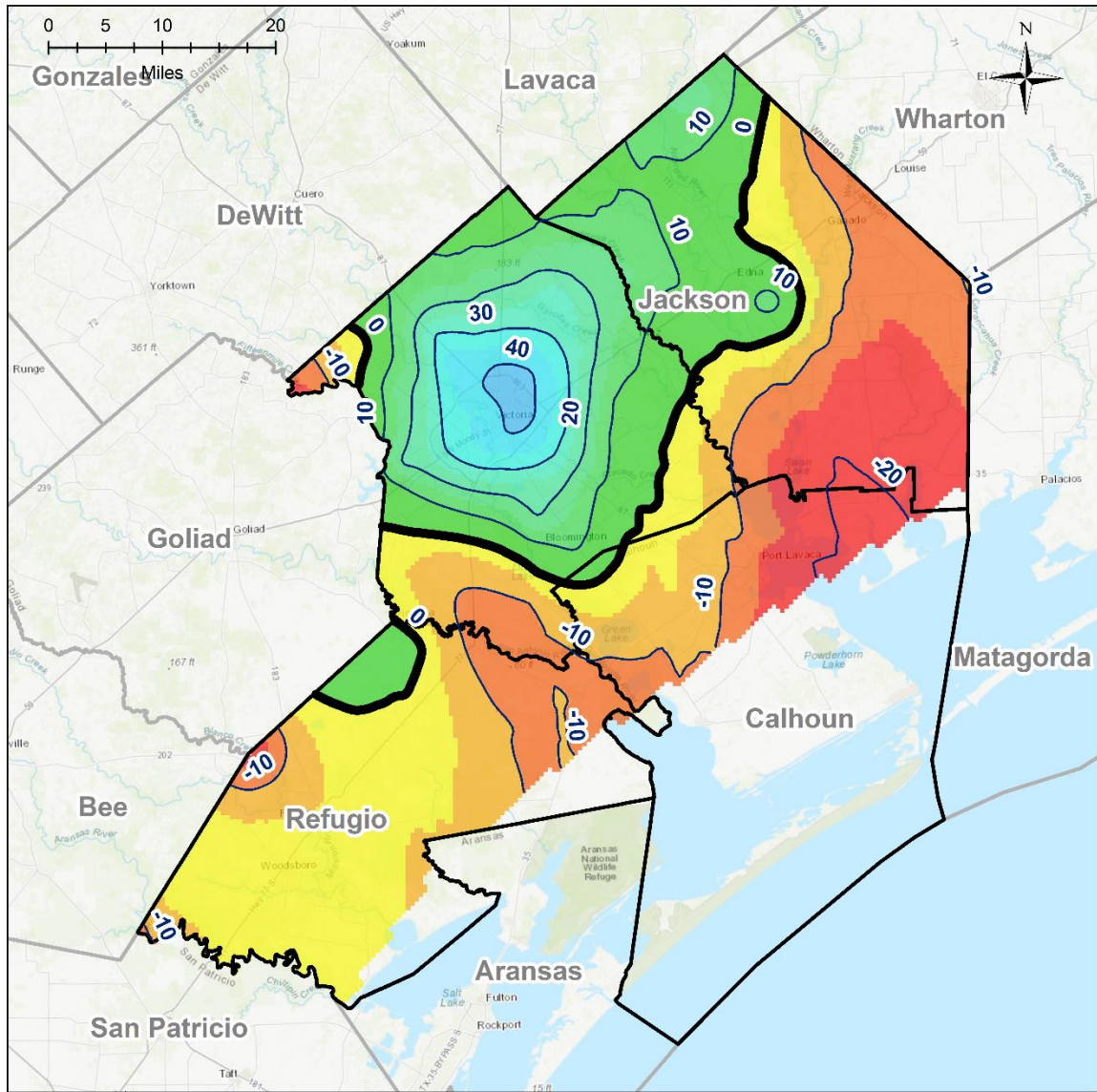


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Evangeline Water Level (2022)

- 10 ft Contour
- County Line

Figure 6 Contours of the 2022 Water Levels Generated for the Evangeline Aquifer from the Water Levels in Table 1



Change in Water Level (ft): Evangeline 2000-2022

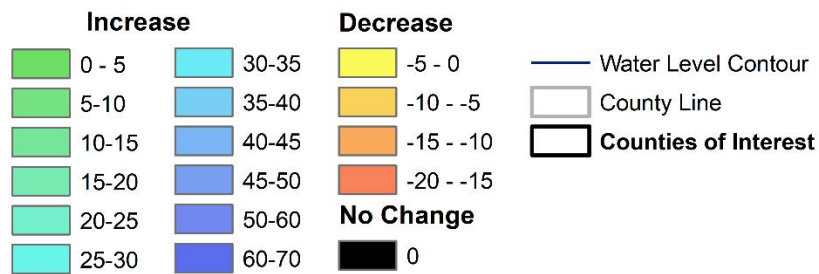


Figure7 Contours of the change in water levels in the Evangeline Aquifer from 2000 to 2022.