



INTERA Incorporated
9600 Great Hills Trail, Suite 300W
Austin, Texas 78759 USA
512.425.2000

June 29, 2022

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 2021 Water Levels

Dear Mr. Andruss,

Attachment A provides INTERA revised our analysis of the 2021 water based on comments submitted by the District to INTERA on June 15th.

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 2021 water levels for their respective counties. The figures in these presentations have been revised as requested.

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



Attachment A

Application of Geostatistical Techniques to Interpret Measured 2021 Water Levels

Background

In 2021, INTERA completed a study (Young and others, 2021) that accomplished the four tasks shown 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 interpolated surfaces with a resolution of 1,000 feet (ft) for each year. Using these surfaces, the average water levels were calculated by county and by year.

Analysis of 2021 Water Level Data

The 2021 water levels were assembled from data provided by the four previously mentioned GCDs and from data extracted from the TWDB Groundwater Database. Table 1 lists the 264 water levels and the wells used in the analysis. Figure 1 shows the location of the water levels that were used in the geostatistical analyses. The protocols used to assign an aquifer to a well and to check water levels are explained by Young and others (2021).

Figures 2 and 3 show water level contours for the Chicot Aquifer generated using SSWL+KR for the years 2000 and 2021, respectively. Figure 4 provides contours of the change in water levels from 2000 to 2021 for the Chicot Aquifer. Within the 14 county-area covered by the analysis, the region of lowest amount of water level change includes the four counties covered by Calhoun County GCD, Refugio GCD, Texana GCD, and Victoria County GCD. Across these four GCDs, the change in the water levels in the Chicot Aquifer from 2000 to 2021 is ranges between -25 ft and 15 feet. .

Figures 5 and 6 show water level contours for the Evangeline Aquifer generated using SSWL+KR for the years 2000 and 2021, respectively. Figure 7 provides contours of the change in water levels from 2000 to 2021 for the Evangeline Aquifer. Within the 14 county-area covered by the analysis, the greatest amount of change occurs in Victoria County where the Evangeline Aquifer experienced up to a 40 ft rise in water levels from 2000 to 2021. Across Jackson, Calhoun, and Refugio counties, the change in the Evangeline water levels ranged from about -10 feet to about 20 feet.

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 2021 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.

References

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

Table 1 List of Wells and Water Levels Used to Generate the Water Levels Surfaces for the Chicot and the Evangeline aquifers for 2021

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
1	Texana GCD - GW-00410	802904	56	200	18.5	Chicot	Jackson
4	Texana GCD - GW-00294	6651505	125	627	45.3	Evangeline	Jackson
9	Victoria County GCD - GW-000339	6657406	180	270	86.0	Evangeline	Victoria
14	Texana GCD - GW-00251	6661809	62	200	33.2	Chicot	Jackson
17	Texana GCD - GW-00274	6660708	52	38	31.5	Chicot	Jackson
28	Texana GCD - NW-00310	na	89	124	47.0	Chicot	Jackson
29	Texana GCD - GW-00276	6660401	79	286	36.1	Chicot	Jackson
31	Texana GCD - GW-00278	6660613	62	850	12.5	Evangeline	Jackson
37	Calhoun County GCD - GW-00005	na	16	490	-11.7	Chicot	Calhoun
38	Calhoun County GCD - NW-00024	na	16	490	-11.3	Chicot	Calhoun
52	Texana GCD - GW-00291	8004504	49	277	11.0	Chicot	Jackson
53	Refugio GCD - NW-00570	na	23	320	0.4	Chicot	Refugio
54	Refugio GCD - NW-00539	na	30	300	4.5	Chicot	Refugio
55	Calhoun County GCD - GW-00014	8019503	26	265	8.4	Chicot	Calhoun
61	Refugio GCD - GW-00085	7947702	36	200	3.8	Chicot	Refugio
65	Texana GCD - GW-00285	8011201	46	579	14.2	Chicot	Jackson
72	Victoria County GCD - GW-000377	8002804	62	92	39.9	Chicot	Victoria
76	Texana GCD - NW-00451	na	13	384	-33.0	Chicot	Jackson
78	Victoria County GCD - GW-000085	7915904	105	100	69.7	Evangeline	Victoria
80	Victoria County GCD - GW-000311	8017905	56	1010	27.4	Evangeline	Victoria
82	Victoria County GCD - GW-000606	7908201	184	350	92.2	Evangeline	Victoria
89	Texana GCD - GW-00283	8011202	43	500	8.6	Chicot	Jackson
91	Victoria County GCD - GW-000614	8001301	118	670	43.8	Evangeline	Victoria
92	Victoria County GCD - GW-000735	na	118	670	56.4	Evangeline	Victoria
98	Victoria County GCD - GW-000602	7916701	102	578	56.2	Evangeline	Victoria
99	Victoria County GCD - GW-000603	7916703	105	516	56.6	Evangeline	Victoria
100	Calhoun County GCD - GW-00003	na	33	75	16.3	Chicot	Calhoun
104	Refugio GCD - NW-00340	8033203	43	150	5.9	Chicot	Refugio

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
116	Texana GCD - GW-00284	na	39	400	11.4	Chicot	Jackson
124	Victoria County GCD - GW-000192	8018103	52	120	23.1	Chicot	Victoria
126	Victoria County GCD - GW-000612	7924702	105	180	52.4	Chicot	Victoria
127	Victoria County GCD - GW-000616	8018401	56	450	21.8	Chicot	Victoria
128	Victoria County GCD - GW-000767	na	56	450	21.8	Chicot	Victoria
130	Victoria County GCD - GW-000489	8018402	56	336	22.8	Chicot	Victoria
139	Texana GCD - GW-00385	na	33	330	5.3	Chicot	Jackson
142	Texana GCD - GW-00411	8002608	59	200	25.1	Chicot	Jackson
146	Victoria County GCD - GW-000510	7916608	62	327	38.7	Evangeline	Victoria
150	Calhoun County GCD - GW-00009	8026501	36	267	3.5	Chicot	Calhoun
153	Refugio GCD - GW-00439	8033901	20	200	5.5	Chicot	Refugio
162	Calhoun County GCD - GW-00001	na	16	175	-3.4	Chicot	Calhoun
167	Victoria County GCD - GW-000102	8019105	30	170	8.6	Chicot	Victoria
171	Victoria County GCD - NW-000426	7907404	230	360	101.2	Evangeline	Victoria
175	Victoria County GCD - NW-000122	8017602	59	140	17.2	Chicot	Victoria
176	Victoria County GCD - NW-000016	7907503	171	250	102.5	Evangeline	Victoria
177	Victoria County GCD - GW-000552	7907505	161	112	97.5	Evangeline	Victoria
179	Victoria County GCD - GW-000150	8010502	56	140	29.4	Chicot	Victoria
184	Victoria County GCD - NW-000779	na	62	190	17.7	Chicot	Victoria
185	Victoria County GCD - GW-000578	7908403	135	100	88.0	Evangeline	Victoria
186	Victoria County GCD - GW-000589	7908807	108	220	62.4	Evangeline	Victoria
190	Victoria County GCD - GW-000158	7907504	187	na	113.5	Evangeline	Victoria
192	Victoria County GCD - GW-000687	7908406	121	152	84.7	Evangeline	Victoria
200	Texana GCD - NW-00195	na	52	330	20.3	Chicot	Jackson
202	Victoria County GCD - GW-000609	7923303	98	194	63.7	Evangeline	Victoria
204	Victoria County GCD - GW-000494	7915305	174	190	71.9	Evangeline	Victoria
208	Victoria County GCD - GW-000047	7916102	125	227	68.7	Evangeline	Victoria
209	Victoria County GCD - NW-000333	7908903	118	105	81.2	Chicot	Victoria
214	Refugio GCD - GW-00234	7932802	72	165	24.7	Chicot	Refugio
216	Texana GCD - GW-00320	8004101	66	383	40.4	Chicot	Jackson

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
223	Victoria County GCD - GW-000595	8017801	59	305	9.7	Chicot	Victoria
225	Victoria County GCD - GW-000577	7908404	141	100	87.4	Evangeline	Victoria
236	Victoria County GCD - GW-000607	7908805	108	169	58.3	Evangeline	Victoria
237	Victoria County GCD - GW-000608	7915903	125	112	79.6	Evangeline	Victoria
240	Refugio GCD - GW-00124	7931901	85	946	46.6	Evangeline	Refugio
245	Victoria County GCD - GW-000366	8002102	92	366	35.4	Chicot	Victoria
248	Victoria County GCD - GW-000321	8017502	66	1026	33.2	Evangeline	Victoria
250	Victoria County GCD - GW-000601	7916702	102	588	55.7	Evangeline	Victoria
254	na	6541401	89	90	56.0	Chicot	Wharton
255	na	6541402	82	338	33.9	Chicot	Wharton
256	na	6541707	82	499	23.2	Chicot	Wharton
268	na	6612603	292	188	201.4	Evangeline	Colorado
271	na	6614703	259	71	234.5	Chicot	Colorado
276	na	6619804	348	140	278.7	Chicot	Colorado
279	na	6620602	200	312	152.7	Evangeline	Colorado
285	na	6621603	233	812	167.4	Evangeline	Colorado
288	na	6622201	223	995	182.6	Evangeline	Colorado
291	na	6625103	289	43	0.0	Evangeline	Lavaca
294	na	6626202	253	126	199.8	Evangeline	Colorado
298	na	6628702	249	565	171.0	Evangeline	Colorado
308	na	6631107	154	450	114.6	Chicot	Wharton
309	na	6631504	138	178	99.7	Chicot	Wharton
311	na	6632809	118	320	72.3	Chicot	Wharton
317	na	6634201	194	48	169.9	Evangeline	Lavaca
318	na	6634202	207	61	172.6	Evangeline	Lavaca
319	na	6634207	226	120	176.1	Evangeline	Lavaca
324	na	6635901	210	840	142.8	Evangeline	Lavaca
327	na	6637607	161	318	123.4	Chicot	Colorado
330	na	6637615	157	200	121.1	Chicot	Colorado
334	na	6638202	151	65	122.0	Chicot	Wharton

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
335	na	6638301	154	288	0.0	Chicot	Wharton
336	na	6638302	154	698	107.5	Evangeline	Wharton
337	na	6638304	151	113	110.9	Chicot	Wharton
338	na	6638801	125	116	98.0	Chicot	Wharton
339	na	6639106	144	200	91.5	Chicot	Wharton
341	na	6639801	112	300	72.0	Chicot	Wharton
342	na	6640401	112	442	65.1	Chicot	Wharton
343	na	6640505	108	200	70.2	Chicot	Wharton
348	na	6641203	223	80	176.2	Evangeline	Lavaca
349	na	6641703	220	164	152.7	Evangeline	Lavaca
350	na	6641903	207	335	120.2	Evangeline	Lavaca
352	na	6642902	164	576	0.0	Evangeline	Lavaca
356	na	6643704	138	34	109.7	Chicot	Lavaca
357	na	6643803	151	1023	58.2	Evangeline	Lavaca
358	na	6644402	161	880	71.8	Evangeline	Lavaca
359	na	6644702	138	676	42.2	Evangeline	Colorado
361	na	6645601	141	429	92.0	Chicot	Wharton
363	na	6645916	128	125	76.2	Chicot	Wharton
364	na	6646201	141	200	92.2	Chicot	Wharton
365	na	6646402	131	366	78.9	Chicot	Wharton
366	na	6646601	128	186	81.0	Chicot	Wharton
368	na	6647101	121	319	72.2	Chicot	Wharton
369	na	6647201	115	244	66.0	Chicot	Wharton
371	na	6647703	108	242	74.6	Chicot	Wharton
372	na	6647904	95	340	36.5	Chicot	Wharton
375	na	6648502	92	70	74.3	Chicot	Wharton
377	na	6648701	95	90	61.7	Chicot	Wharton
378	na	6648802	92	564	53.0	Chicot	Wharton
379	na	6648907	89	630	26.1	Chicot	Wharton
380	na	6648908	89	55	61.9	Chicot	Wharton

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
383	na	6649701	171	1082	117.1	Evangeline	Lavaca
385	na	6649901	167	272	105.1	Evangeline	Lavaca
394	na	6652603	105	515	39.2	Chicot	Wharton
398	na	6653406	98	348	36.0	Chicot	Wharton
399	na	6653503	92	338	43.3	Chicot	Wharton
400	na	6653804	85	495	37.7	Chicot	Wharton
402	na	6654108	98	360	51.0	Chicot	Wharton
405	na	6654906	89	461	18.4	Chicot	Wharton
407	na	6655603	82	100	65.4	Chicot	Wharton
408	na	6656302	85	490	0.0	Chicot	Wharton
411	na	6656403	79	275	29.3	Chicot	Wharton
429	na	6661302	82	528	28.6	Chicot	Wharton
430	na	6661305	79	600	36.0	Chicot	Wharton
437	na	6662104	85	371	33.3	Chicot	Wharton
438	na	6662307	85	180	57.2	Chicot	Wharton
439	na	6662309	82	421	47.1	Chicot	Wharton
440	na	6662313	82	480	3.7	Chicot	Wharton
442	na	6662603	79	310	0.0	Chicot	Wharton
444	na	6663105	79	342	0.0	Chicot	Wharton
447	na	6663507	69	48	60.0	Chicot	Wharton
449	na	6663509	62	688	-18.5	Chicot	Wharton
451	na	6663610	69	857	-19.2	Chicot	Wharton
452	na	6664401	69	1057	-10.0	Evangeline	Matagorda
470	na	6740301	279	45	264.4	Evangeline	Lavaca
472	na	6740504	351	155	279.0	Evangeline	Lavaca
490	na	6748203	282	200	191.0	Evangeline	Lavaca
505	na	6755601	233	240	220.6	Evangeline	DeWitt
506	na	6755803	220	75	208.2	Chicot	DeWitt
512	na	6760905	318	na	249.4	Evangeline	DeWitt
537	na	7905606	200	154	182.9	Evangeline	Goliad

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
542	na	7905904	197	164	171.0	Evangeline	Goliad
543	na	7905905	217	314	165.0	Evangeline	Goliad
545	na	7905907	233	261	165.5	Evangeline	Goliad
546	na	7905908	269	118	186.5	Evangeline	Goliad
547	na	7905909	256	143	183.8	Evangeline	Goliad
551	na	7906306	230	138	150.7	Evangeline	DeWitt
557	na	7906706	220	152	162.7	Evangeline	Goliad
558	na	7906707	200	260	150.7	Evangeline	DeWitt
559	na	7906708	217	300	151.1	Evangeline	DeWitt
564	na	7906715	240	150	182.4	Evangeline	Goliad
565	na	7906716	233	80	175.7	Evangeline	Goliad
591	na	7912305	302	166	215.5	Evangeline	Goliad
592	na	7912602	285	350	187.9	Evangeline	Goliad
593	na	7912704	266	na	204.7	Evangeline	Goliad
601	na	7913223	236	93	190.0	Evangeline	Goliad
602	na	7913224	233	24	220.3	Evangeline	Goliad
606	na	7913229	230	152	172.0	Evangeline	Goliad
609	na	7913304	243	317	170.6	Evangeline	Goliad
612	na	7913406	328	87	247.8	Evangeline	Goliad
615	na	7913507	279	250	169.4	Evangeline	Goliad
620	na	7913512	269	263	169.8	Evangeline	Goliad
621	na	7913513	292	230	161.5	Evangeline	Goliad
625	na	7913611	253	275	155.8	Evangeline	Goliad
630	na	7913805	289	197	195.5	Evangeline	Goliad
631	na	7913806	236	222	152.9	Evangeline	Goliad
633	na	7913808	256	331	152.5	Evangeline	Goliad
635	na	7913810	266	186	189.9	Evangeline	Goliad
636	na	7913811	230	143	184.9	Evangeline	Goliad
638	na	7913813	272	210	190.6	Evangeline	Goliad
643	na	7914203	171	380	122.6	Evangeline	Goliad

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
659	na	7915401	177	145	99.0	Evangeline	Goliad
660	na	7915702	141	174	89.4	Evangeline	Goliad
677	na	7917801	499	150	433.4	Evangeline	Bee
688	na	7921307	207	284	132.4	Evangeline	Goliad
701	na	7922508	154	263	96.9	Evangeline	Goliad
725	na	7925611	338	100	284.7	Evangeline	Bee
728	na	7927202	305	150	213.1	Evangeline	Goliad
730	na	7927306	262	280	173.0	Evangeline	Goliad
732	na	7928302	213	235	132.6	Evangeline	Goliad
733	na	7928303	223	95	133.5	Evangeline	Goliad
734	na	7928304	236	320	127.4	Evangeline	Goliad
741	na	7930201	148	302	101.8	Evangeline	Goliad
742	na	7930301	115	300	73.2	Evangeline	Goliad
747	na	7931502	108	204	68.7	Evangeline	Goliad
749	na	7931702	98	218	75.1	Evangeline	Goliad
755	na	7934202	367	175	230.6	Evangeline	Bee
756	na	7934409	338	145	205.1	Evangeline	Bee
759	na	7935101	259	130	194.3	Evangeline	Bee
760	na	7935305	223	150	163.5	Evangeline	Bee
775	na	7937911	82	146	45.4	Evangeline	Goliad
776	na	7937912	85	61	48.7	Chicot	Goliad
778	na	7937914	85	200	0.0	Chicot	Goliad
781	na	7937918	89	96	52.4	Chicot	Goliad
782	na	7937919	85	160	43.2	Evangeline	Goliad
783	na	7938201	118	106	87.6	Evangeline	Goliad
784	na	7938202	102	60	71.2	Chicot	Goliad
786	na	7938301	89	62	65.8	Chicot	Goliad
787	na	7938303	102	80	76.3	Chicot	Goliad
788	na	7938704	79	200	50.2	Chicot	Goliad
789	na	7938705	82	200	0.0	Chicot	Goliad

INTaID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
790	na	7938706	75	325	50.9	Evangeline	Goliad
793	na	7939104	89	110	63.1	Chicot	Goliad
798	na	7942703	243	230	174.5	Evangeline	Bee
803	na	7943903	135	260	84.0	Evangeline	Bee
804	na	7944103	151	150	94.7	Evangeline	Bee
880	na	8007102	56	1020	17.5	Evangeline	Matagorda
881	na	8007203	52	453	-17.2	Chicot	Matagorda
882	na	8007312	49	350	-29.8	Chicot	Matagorda
888	na	8008106	49	64	34.2	Chicot	Matagorda
891	na	8008504	49	690	0.0	Chicot	Matagorda
892	na	8008505	46	100	42.2	Chicot	Matagorda
905	na	8011502	39	300	11.4	Chicot	Jackson
907	na	8012502	33	330	5.3	Chicot	Jackson
912	na	8014801	13	719	-9.2	Chicot	Matagorda
918	na	8015405	30	270	-36.4	Chicot	Matagorda
919	na	8015502	20	776	-38.1	Chicot	Matagorda
952	na	8022204	10	360	-39.1	Chicot	Matagorda
958	na	8024201	7	490	-3.8	Chicot	Matagorda
959	na	8024406	3	360	-32.9	Chicot	Matagorda
960	na	8024601	3	275	-18.5	Chicot	Matagorda
961	na	8024802	3	380	-25.8	Chicot	Matagorda
968	na	8033205	43	98	5.9	Chicot	Refugio
980	na	8101102	49	1032	-39.7	Evangeline	Matagorda
983	na	8102404	30	450	-19.6	Chicot	Matagorda
985	na	8102901	13	294	-24.1	Chicot	Matagorda
986	na	8103406	26	530	-13.8	Chicot	Matagorda
991	na	8111901	3	527	-16.1	Chicot	Matagorda
994	na	8117405	3	472	-20.6	Chicot	Matagorda
996	na	8303506	92	267	23.9	Chicot	San Patricio
1030	Texana GCD - NW-00487	na	10	185	-6.9	Chicot	Jackson

INTalD	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Water Level (ft, msl)	Assigned Unit	County
1031	Texana GCD - NW-00489	na	7	208	-10.4	Chicot	Jackson
1032	Texana GCD - NW-00490	na	7	402	-39.7	Chicot	Jackson
1033	Texana GCD - NW-00491	na	10	204	-6.4	Chicot	Jackson
1034	Texana GCD - NW-00492	na	10	355	-34.0	Chicot	Jackson
1035	Victoria County GCD - GW-001022	na	180	180	91.1	Evangeline	Victoria
1037	Victoria County GCD - NW-000608	na	125	162	79.5	Evangeline	Victoria
1038	Victoria County GCD - NW-000612	na	105	160	52.1	Chicot	Victoria
1040	na	6557803	52	321	32.3	Chicot	Matagorda
1041	na	6638502	128	255	99.0	Chicot	Wharton
1042	na	6655412	95	450	41.6	Chicot	Wharton
1043	na	6658607	89	124	47.0	Chicot	Jackson
1054	na	7937916	85	200	0.0	Evangeline	Goliad
1059	na	8003405	52	330	20.3	Chicot	Jackson
1060	na	8008506	39	225	27.1	Chicot	Matagorda
1073	na	8021616	10	204	-5.8	Chicot	Jackson
1074	na	8021617	10	355	-33.2	Chicot	Jackson
1076	na	8022409	13	384	-33.0	Chicot	Jackson
1077	na	8022410	10	185	-5.9	Chicot	Jackson
1078	na	8022411	10	330	-36.8	Chicot	Jackson
1079	na	8022412	7	208	-9.2	Chicot	Jackson
1080	na	8022413	7	402	-38.2	Chicot	Jackson
1084	na	8025402	62	190	17.4	Chicot	Victoria
1086	na	8027302	16	175	-3.4	Chicot	Calhoun
1087	na	8033611	30	300	4.5	Chicot	Refugio
1088	na	8034709	23	320	0.4	Chicot	Refugio
1089	na	8036402	10	235	-9.5	Chicot	Calhoun

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
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
	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
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
	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
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
	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

* 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
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
	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
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
	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
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
	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

* 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

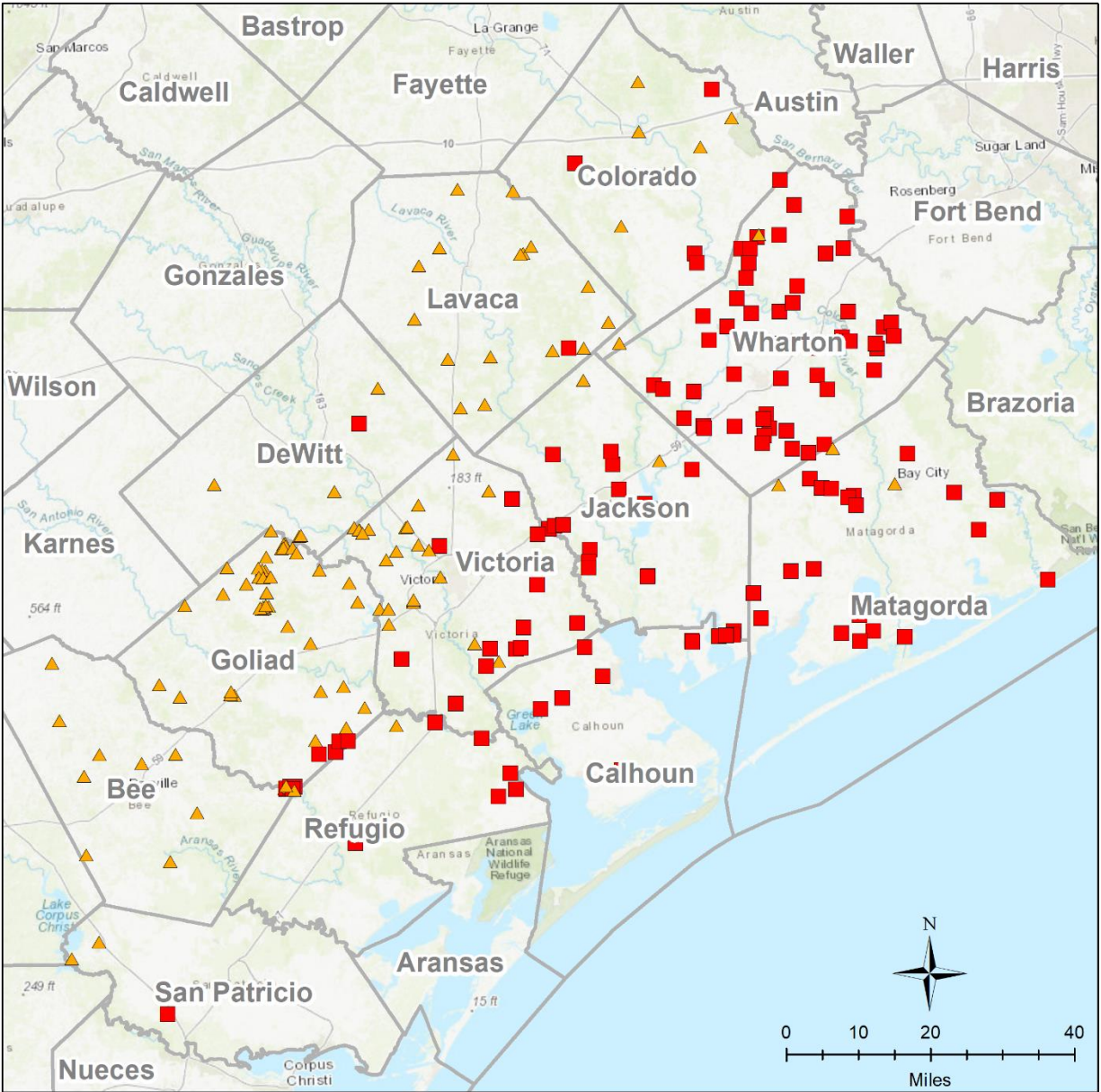
Aquifer	Water Level/ Change	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Chicot	avg. WL (ft)	24.8	23.6	28.3	27.2	24.5	28.3	24.6	27.4	29.0	24.3	22.7	23.5	23.0	19.4	4.5	14.5	19.6	19.2	19.0	20.0	18.4	14.9
	change (ft)*	0.0	-1.2	3.6	2.5	-0.2	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
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
	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
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
	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

* 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
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
	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
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
	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
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
	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

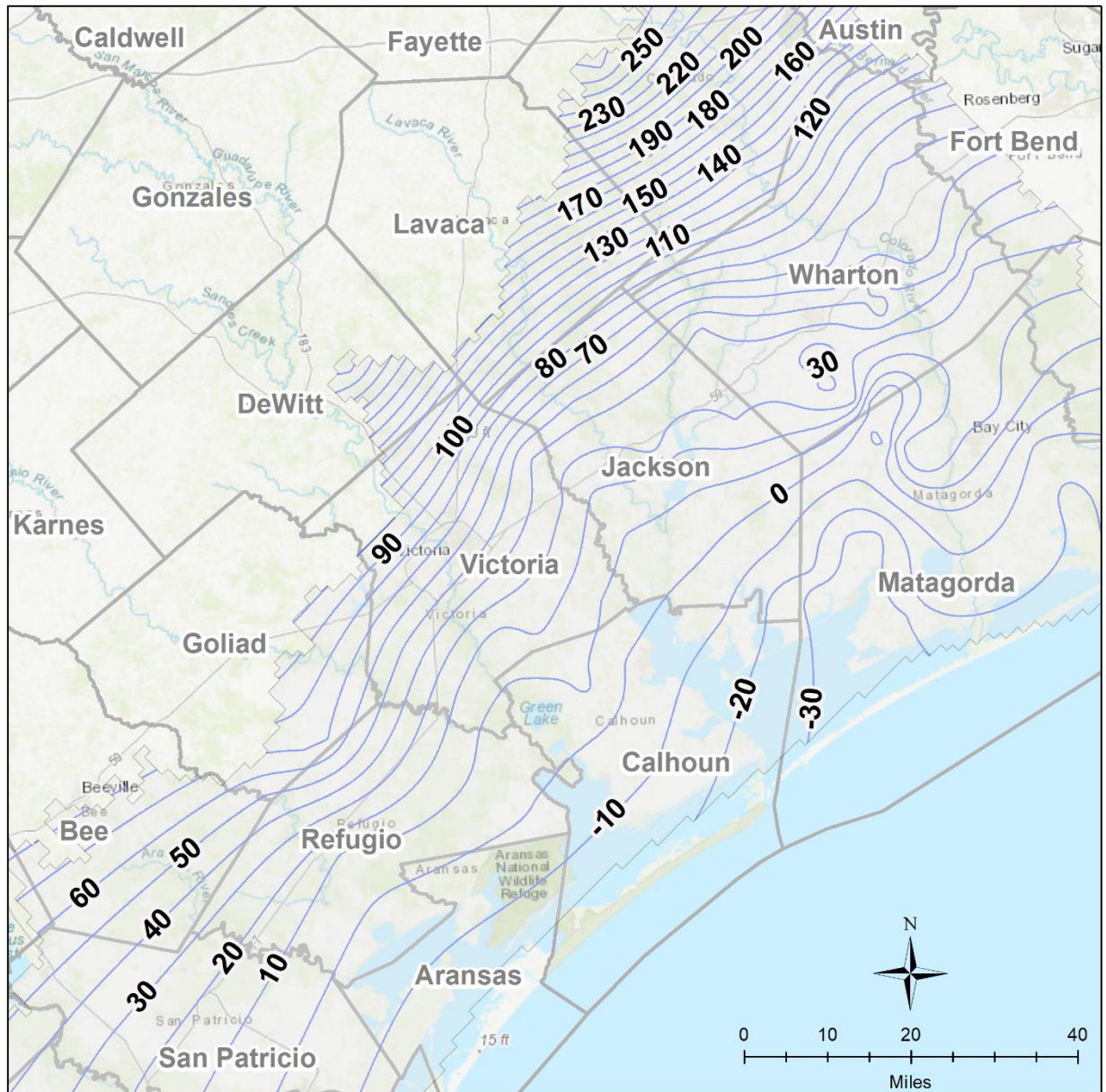
* change is measured relative to the year 2000; avg WL is measured relative to mean sea level



Monitoring Well Network

- Chicot Aquifer
- ▲ Evangeline Aquifer
- County Line

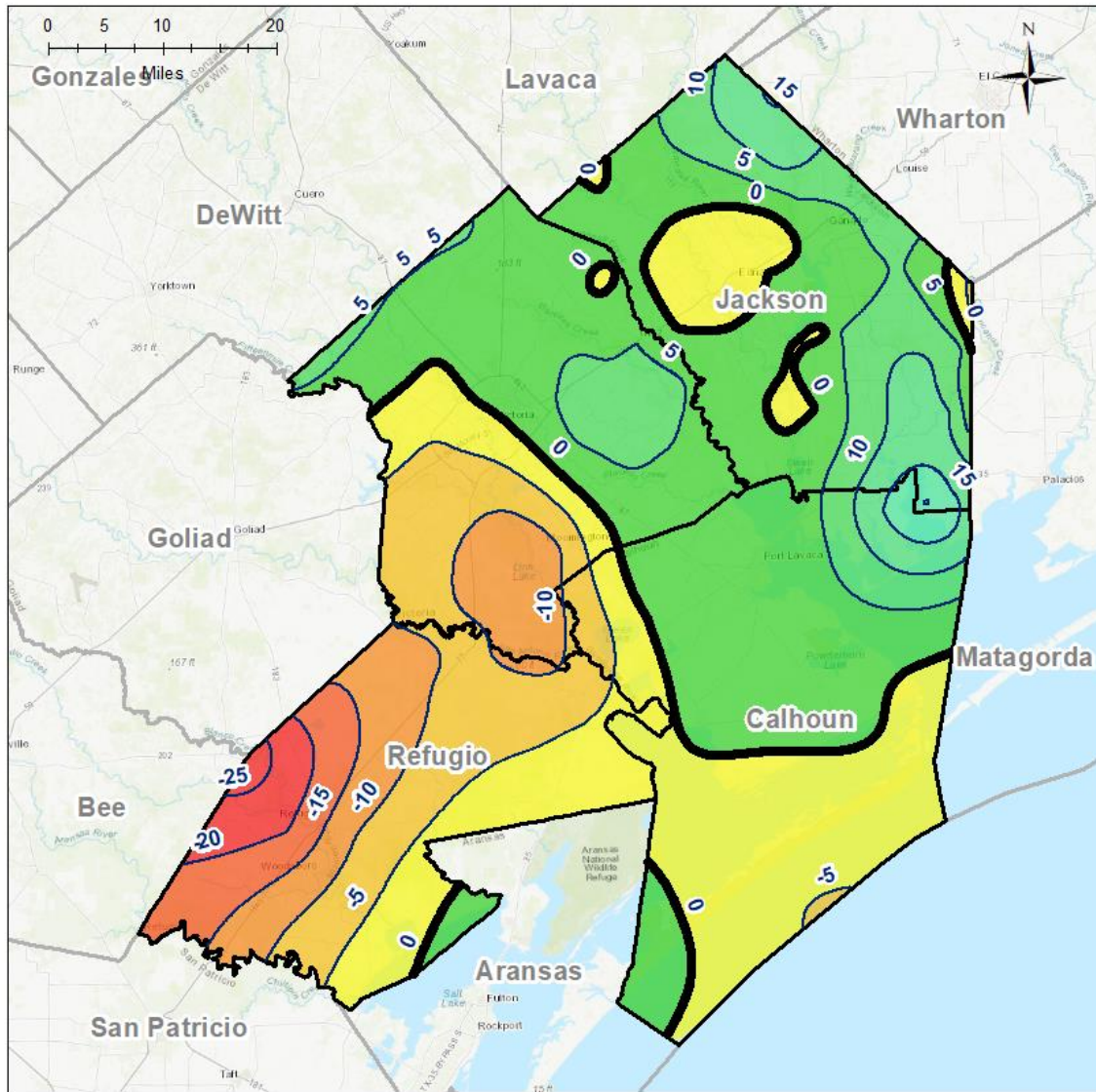
Figure 1 Location of Water Levels that were Interpolated to Generate the Water Levels Surfaces for the Chicot and the Evangeline aquifers



Chicot Water Level (2021)

- 10 ft Contour
- County Line

Figure 3 Contours of the 2021 Water Levels Generated for the Chicot Aquifer from the Water Levels in Table 1.



Change in Water Levels (ft) for Chicot: 2000-2021

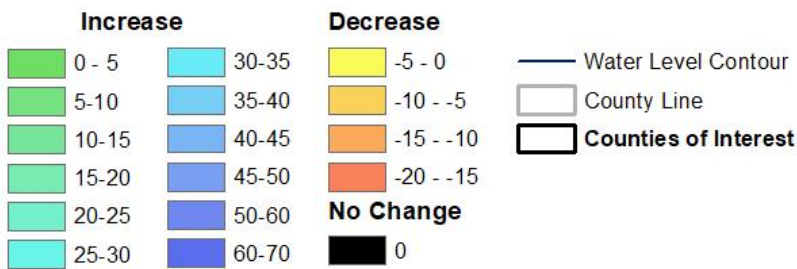
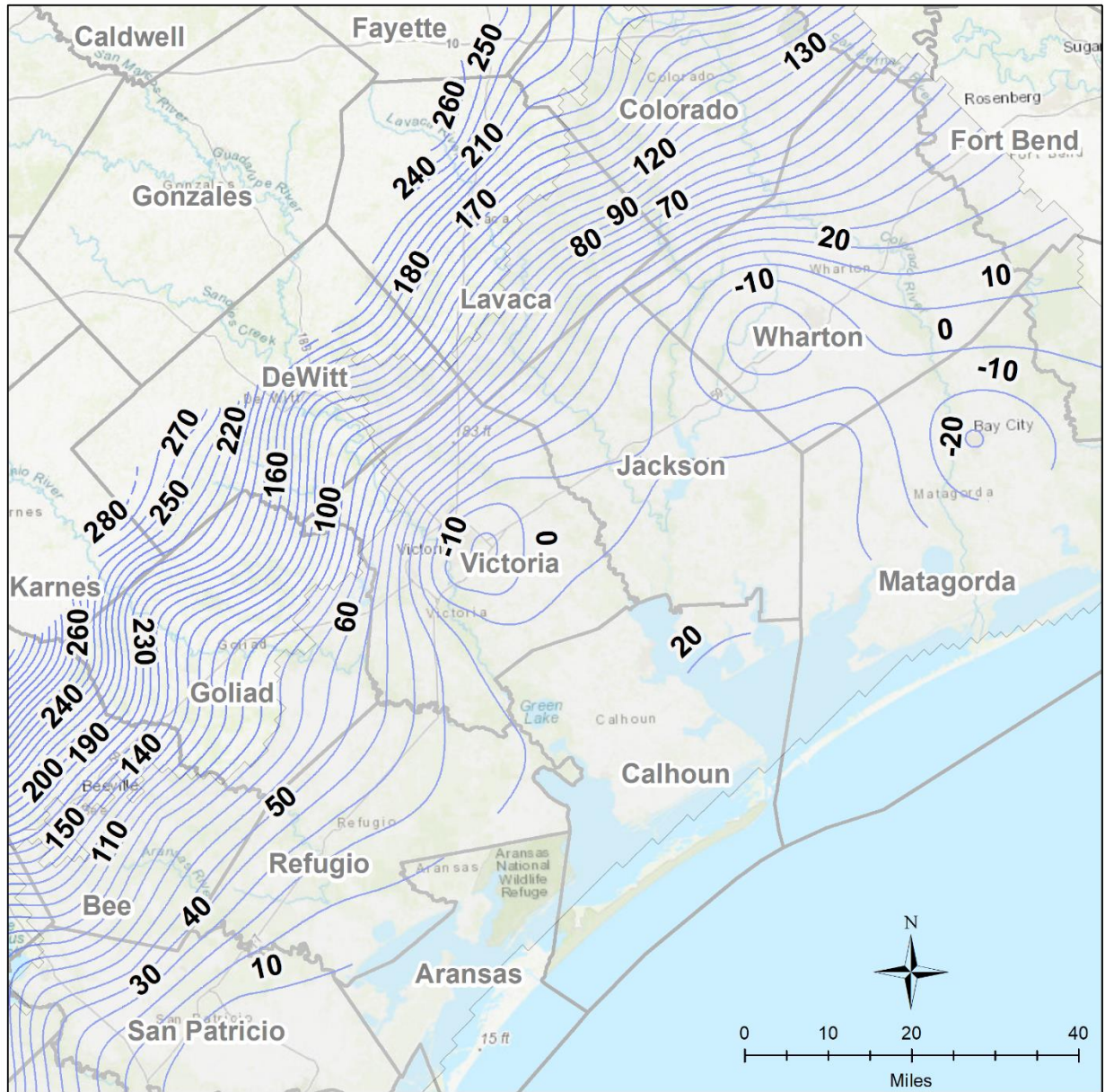


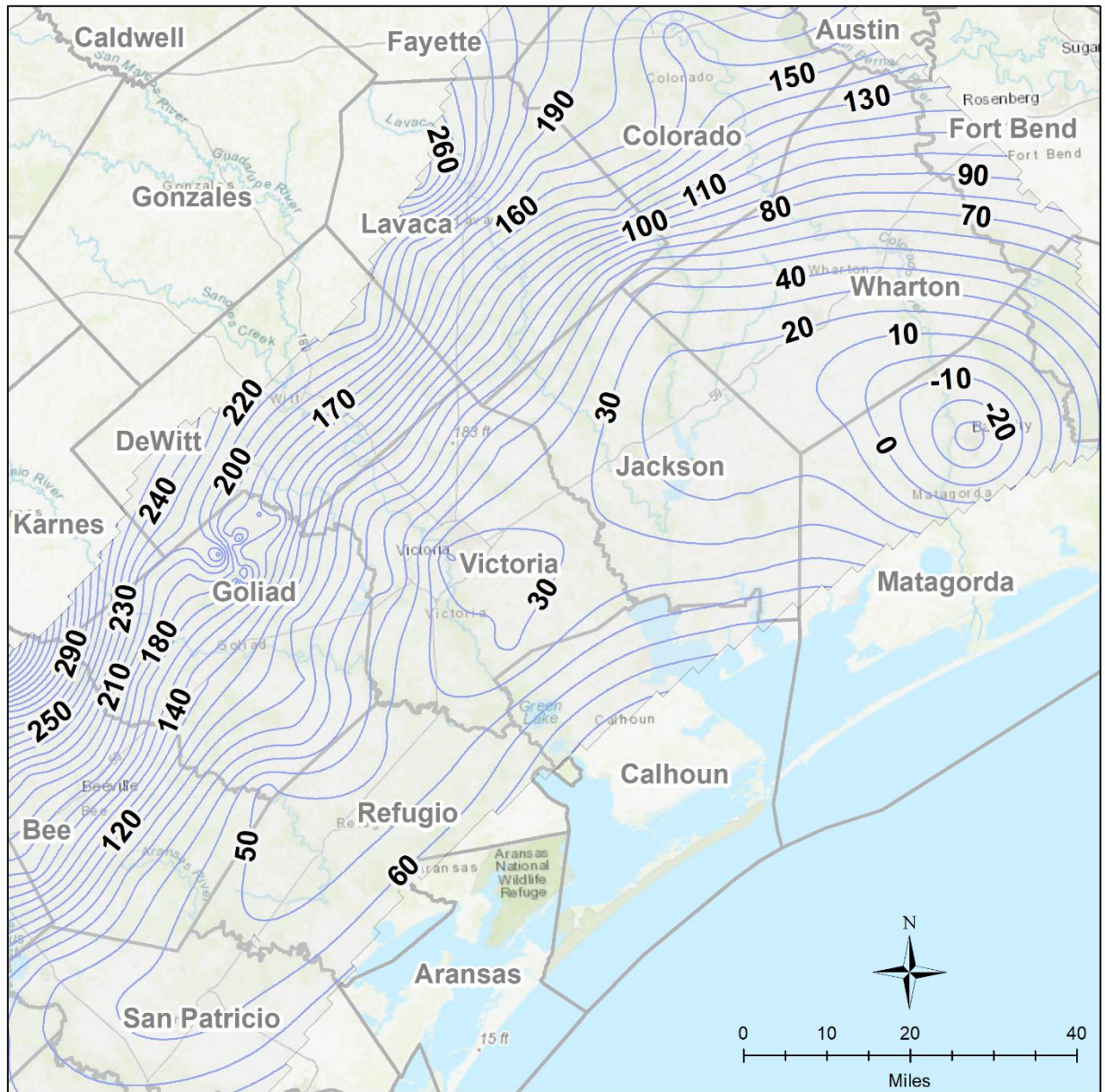
Figure 4 Contours of the change in water levels in the Chicot Aquifer from 2000 to 2021.



Evangeline Water Level (2000)

- 10 ft Contour
- County Line

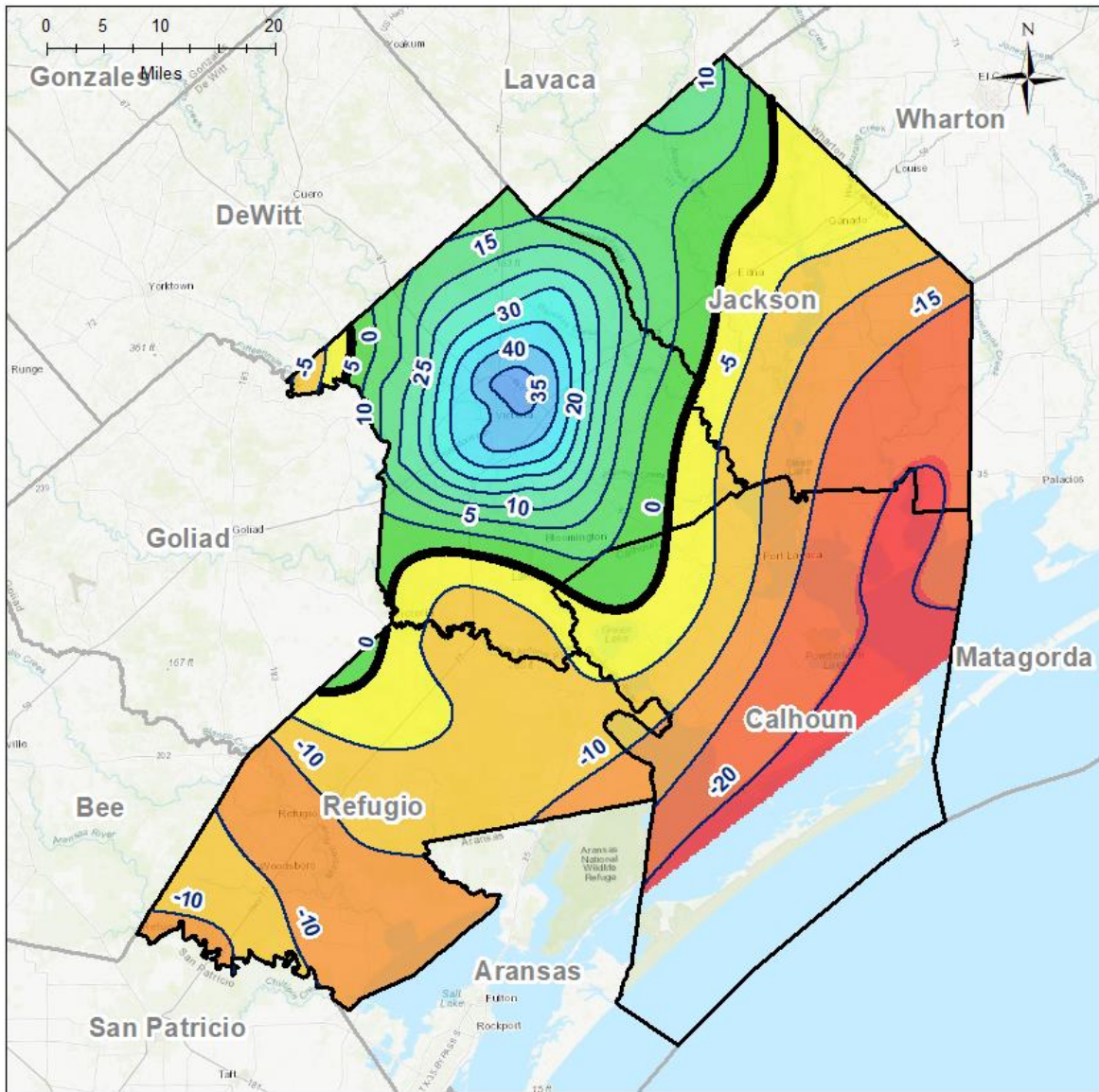
Figure 5 Contours of the 2000 Water Levels Generated for the Evangeline Aquifer.



Evangeline Water Level (2021)

- 10 ft Contour
- County Line

Figure 6 Contours of the 2021 Water Levels Generated for the Evangeline Aquifer from the Water Levels in Table 1



Change in Water Levels (ft) for Evangeline: 2000-2021

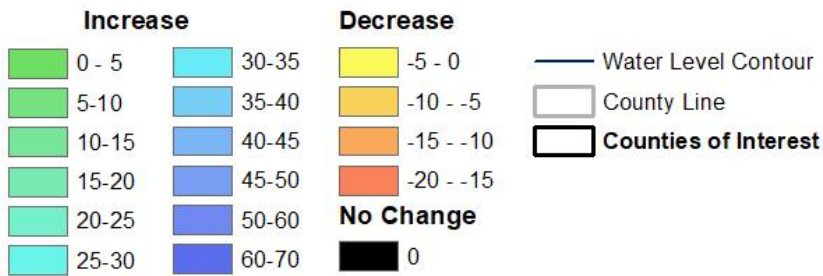


Figure7 Contours of the change in water levels in the Evangeline Aquifer from 2000 to 2021.