Calhoun County Groundwater Conservation District

Annual Report of the District

Fiscal Year 2020 – 2021
October 1, 2020 to September 30, 2021

Adopted: April 25, 2022

Section 1 - Review of management goals, objectives and performance standards of the District.

The Management Plan of the District, as adopted on July 18, 2017, specifies the method for tracking progress in achieving the goals of the District. The management plans states "staff of the DISTRICT will prepare and present an annual report to the Calhoun County Groundwater Conservation District Board of Directors regarding the DISTRICT's performance in achieving management goals and objectives for the fiscal year. The report will be presented within 120 days following the completion of the DISTRICT's fiscal year. The DISTRICT will maintain the report on file for public inspection at the District's offices upon adoption at a meeting of the Calhoun County Groundwater Conservation Board of Directors.."

Based on the review of the activities and projects of the Calhoun County Groundwater Conservation District Management Plan between October 1, 2020 and September 30, 2021 and an assessment of the performance standards, the District has determined that all of the goals and associated objectives have been fully achieved during the fiscal year ending September 30, 2021.

Goal 1: **Providing the most efficient use of groundwater** – TWC §36.1071(a)(1) and 31 TAC 356.52(a)(1)(A)

Objective 1: Develop and maintain a water well registration program for tracking well information for wells within Calhoun County.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the changes related to water well registration including the number of non-grandfathered and grandfathered wells registered.

The District provided for the efficient use of groundwater by maintaining a water well registration program for tracking well information for wells within Calhoun County. The District registered 22 non-grandfathered wells and 6 grandfathered wells during the fiscal year.

Achievement Level: FULL

Objective 2: Develop and maintain a water well permitting program for processing and tracking all permits authorizing groundwater production.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the changes related to water well permitting including the number of new applications and the disposition of the applications.

The District provided for the efficient use of groundwater by maintaining a water well permitting program for processing and tracking all permits authorizing groundwater production within Calhoun County.

The District received 12 requests for production permits during the fiscal year; the District received no requests to amend existing production permits during the fiscal year; the District received 1 request for production permit renewal during the fiscal year; the District issued 10 production permits during the fiscal year; the District issued no production permit amendments during the fiscal year; and the District issued 1production permit renewals during the fiscal year.

The total volume of permitted groundwater production for the permits totals 6,527.624 acre-feet per year for non-aggregate production permits. The total volume of permitted groundwater production for the permits totals 0 acre-feet per year for aggregate production permits.

Achievement Level: FULL

Goal 2: Controlling and preventing waste of groundwater - TWC §36.1071(a)(2) and 31 TAC 356.52(a)(1)(B)

Objective 1: Develop and maintain a water well inspection program for non-exempt wells.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the findings of the inspection activities including information regarding the number of wells that require improvement to control or prevent waste of groundwater.

The District addressed controlling and preventing waste of groundwater by maintaining a water well inspection program during the fiscal year. The District has performed 5 well inspections during the fiscal year. Of those wells inspected, none of wells require improvement to control or prevent waste of groundwater.

The District issued 33 Notices of Intent to Place Casing Receipts (NIPCRs) and observed casing placement for 3 wells.

Achievement Level: FULL

Goal 3: Addressing conjunctive surface water management issues - TWC §36.1071(a)(4) and 31 TAC 356.52(a)(1)(D)

Objective 1: Participate in the regional water planning process by attending at least one South Central Texas Regional Water Planning Group (Region L) meeting per year.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the representatives of the DISTRICT, dates, and the number of meetings of the South Central Texas Regional Water Planning Group attended.

The District addressed conjunctive surface water management issues through the attendance of meetings by district directors and the general manager, participating in the regional water planning process by attending at least one South Central Texas Regional Water Planning Group (Region L) meeting during the fiscal year. District representatives attended meetings of the

South Central Texas Regional Water Planning Group (Region L) on the following dates: February 4, 2021; May 6, 2021; August 5, 2021; September 21, 2021.

Achievement Level: FULL

Goal 4: Addressing natural resource issues which impact the use and availability of groundwater, and which are impacted by the use of groundwater – TWC §36.1071(a)(5) and 31 TAC §356.52(a)(1)(E)

Objective 1: Develop and maintain a water quality monitoring program.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the monitoring activities including the number of wells monitored and the year-to-year change of water quality.

The District addressed natural resource issues which impact the use and availability of groundwater by maintaining a water quality monitoring program during the fiscal year. The District processed 35 water quality field measurements and no water quality lab measurements in the fiscal year. The District continues to collect valuable aquifer measurement to support the future assessment of water quality change; based on a review of the water quality information a significant change in water quality was not identified.

The District collected field measurements for total dissolved solids from 1 well during 2020. The total dissolved solids field measurement in year 2020 was 1.700 g/L. The District collected field measurements for total dissolved solids from 5 wells during 2021. The average total dissolved solids field measurement in year 2021 was 1.054 g/L. The change in total dissolved solids in wells measured in year 2020 and wells measured in year 2021 was -0.646 g/L. The change in total dissolved solids in wells measured in year 2019 and 2021 was -0.082 g/L.

Achievement Level: FULL

Goal 5: Addressing drought conditions - TWC §36.1071(a)(6) and 31 TAC 356.52(a)(1)(F)

Objective 1: Collect and review drought condition information related to Calhoun County and the surrounding region of Texas.

Performance Standard: Each year, the District will summarize within the annual report the drought condition information collected and reviewed.

The District addressed drought conditions by collecting and reviewing drought condition information related to Calhoun County and the surrounding region of Texas by considering drought monitoring index information during meetings of the Board of Directors during the fiscal year. Drought condition information was reviewed at the meetings held in the following dates: April 19, 2021; May 24, 2021; July 26, 2021; and September 23, 2021.

Achievement Level: FULL

Goal 6: Addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost-effective - TWC §36.1071(a)(7) and 31 TAC 356.52(a)(1)(G)

Objective 1: Promote conservation, rainwater harvesting or brush control within Calhoun County.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the activities directly related to conservation, rainwater harvesting or brush control including

participation in scientific investigations and studies, educational materials developed and delivered to local schools, cooperative educational contributions and grants, public speaking events and presentations, community event participation, and educational publications.

The District addressed and promoted conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control by updating the website of the District to include links to resources promoting rainwater harvesting, efficient use of groundwater, conjunctive use, subsidence prevention, brush management, and recharge enhancement.

Achievement Level: FULL

Goal 7: Addressing the desired future conditions adopted by the district under Section 36.108 - TWC §36.1071(a)(8) and 31 TAC 356.52(a)(1)(H)

Objective 1: Develop and maintain a water level monitoring program.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the water level monitoring activities including the number of wells monitored and the year-to-year change of water level.

The District addressed the desired future conditions adopted by the District by maintaining a water level monitoring program during the fiscal year. The District collected 14 water level measurement from water wells within Calhoun County during the fiscal year.

Based on the data collected for water levels within the District, the water levels appear to have decreased with an increase of 0.6 feet in depth to water from year 2020 to 2021. The average change in depth to water level for wells measured in year 2020 to year 2021 was 0.1 feet (i.e., a drawdown of water levels).

Achievement Level: FULL

Objective 2: Analyze water level monitoring information to evaluate water level trends and determine the degree to which the DISTRICT is complying with the desired future conditions of Gulf Coast Aquifer in Calhoun County.

Performance Standard: Each year, the DISTRICT will summarize within the annual report the water level trends and the conclusions regarding the DISTRICT's compliance with the desired future condition of the Gulf Coast Aquifer in Calhoun County.

The water level data analyzed by the District does not indicate that the Desired Future Condition of the Gulf Coast Aquifer is not being achieved. The comparison of year 2000 water level measurements to year 2020 water level measurements, conducted by Intera, Inc., indicates a water levels have recovered by approximately 2.5 feet in the depth to water from year 2000 to year 2020.

Achievement Level: FULL

Calhoun County Groundwater Conservation District

Annual Report of the District

Fiscal Year 2020 – 2021
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Section 2 - Evidence of Achievement

Goal 1: **Providing the most efficient use of groundwater -** TWC §36.1071(a)(1) and 31 TAC 356.52(a)(1)(A)

Objective 1: Develop and maintain a water well registration program for tracking well information for wells within Calhoun County.

Evidence of Achievement: Water Well Registration Certificates created during FY2021.

Last Well Registration Certificate Create in FY2020

1. Non-Grandfathered Well: CCGCD - GMa - Pe - Well Registration Certificates - WRC - NW-00047 - 20200825
2. Grandfathered Well: CCGCD - GMa - Pe - Well Registration Certificates - WRC - GW-00034 - 20200618

Last Well Registration Certificates Created in FY2021

1. Non-Grandfathered Well: CCGCD - GMa - Pe - Well Registration Certificates - WRC - NW-00069 - 20210910
2. Grandfathered Well: CCGCD - GMa - Pe - Well Registration Certificates - WRC - GW-00040 - 20210824

Links to Well Registration Certificate Atlas Notes:

1. CCGCD - GMa - Pe - Well Registration Certificate Atlas - WRC Atlas - 20211011.1117 - FY2021 GW-000001 to R1GW-00020
2. CCGCD - GMa - Pe - Well Registration Certificate Atlas - WRC Atlas - 20211011.1117 - FY2021 NW-000001 to NW-00069

Objective 2: Develop and maintain a water well permitting program for processing and tracking all permits authorizing groundwater production.

Evidence of Achievement: Production permit requests received in FY2021.

1. CCGCD - GMa - PR - Production Permit Requests - AOW-20201218-02 - Justin B. Boyd - Administratively Complete
2. CCGCD - GMa - PR - Production Permit Requests - AOW-20210312-02 - Calhoun Coastal Ranch, LP - Administratively Complete
3. CCGCD - GMa - PR - Production Permit Requests - AOW-20210312-04 - Calhoun Coastal Ranch, LP - Administratively Complete

4. CCGCD - GMa - PR - Production Permit Requests - AOW-20210412-03 - Brandon Nam Van Nguyen - Administratively Complete
5. CCGCD - GMa - PR - Production Permit Requests - AOW-20210412-05 - Brandon Nam Van Nguyen - Administratively Complete
6. CCGCD - GMa - PR - Production Permit Requests - AOW-20210518-01 - R2 Investments, LLC - Administratively Complete
7. CCGCD - GMa - PR - Production Permit Requests - AOW-20210526-02 - Mark Dietzel - Administratively Complete
8. CCGCD - GMa - PR - Production Permit Requests - AOW-20210617-02 - Texas Parks and Wildlife Department - Administratively Complete
9. CCGCD - GMa - PR - Production Permit Requests - AOW-20210713-02 - Antonio Santos - Administratively Complete
10. CCGCD - GMa - PR - Production Permit Requests - AOW-20210913-01 - Calhoun Port Authority - Administratively Complete
11. CCGCD - GMa - PR - Production Permit Requests - AOW-20210914-02 - Juan Cruz Cervantes-Vega - Administratively Complete
12. CCGCD - GMa - PR - Production Permit Requests - AVW-20210524-01 - Calhoun Port Authority - Administratively Complete

Evidence of Achievement: Production permit amendment requests received in FY2021.

1. none.

Evidence of Achievement: Production permit renewal requests received in FY2021.

1. CCGCD - GMa - PR - Production Permit Renewal Requests - ARPP-20210722-01 - OPW-20171016-02 - Robert J. and Samantha L. Penland - Administratively Complete

Evidence of Achievement: Production permits approved in FY2021.

1. CCGCD - GMa - Pe - Production Permits - OPW-20210119-02 - Justin B. Boyd - Approve/Incomplete
2. CCGCD - GMa - Pe - Production Permits - OPW-20210419-03 - Calhoun Coastal Ranch, LP - Approved/Unexecuted
3. CCGCD - GMa - Pe - Production Permits - OPW-20210419-04 - Calhoun Coastal Ranch, LP - Approved/Unexecuted
4. CCGCD - GMa - Pe - Production Permits - OPW-20210524-03 - Son Thanh Nguyen - Approved
5. CCGCD - GMa - Pe - Production Permits - OPW-20210524-04 - Son Thanh Nguyen - Approved
6. CCGCD - GMa - Pe - Production Permits - OPW-20210701-02 - Texas Parks and Wildlife Department - Approved/Unexecuted
7. CCGCD - GMa - Pe - Production Permits - OPW-20210726-02 - Big Bear Shrimp and Seafood - Approved
8. CCGCD - GMa - Pe - Production Permits - OPW-20210726-04 - R2 Investments LLC - Approved
9. CCGCD - GMa - Pe - Production Permits - OPW-20210823-02 - Antonio Santos - Approved
10. CCGCD - GMa - Pe - Production Permits - VPW-20210726-04 - Calhoun Port Authority - Executed

Evidence of Achievement: Production permit amendments approved in FY2021.

1. none.

Evidence of Achievement: Production permits renewals approved in FY2021.

1. CCGCD - GMa - Pe - Production Permit Renewal - OPWR-20210726-05 - OPW-20171016-02 - Robert J. and Samantha L. Penland - Approved/Unexecuted

Goal 2: Controlling and preventing waste of groundwater - TWC §36.1071(a)(2) and 31 TAC 356.52(a)(1)(B)

Objective 1: Develop and maintain a water well inspection program for non-exempt wells.

Evidence of Achievement: Well Inspections completed in FY2021.

1. CCGCD - GP - Insp - Well Inspections - WIF-20210311-01 - NW-00033 - John Hudson
2. CCGCD - GP - Insp - Well Inspections - WIF-20210311-02 - NW-00024 - Olivia Community Center
3. CCGCD - GP - Insp - Well Inspections - WIF-20210311-03 - NW-00009 - James Williams
4. CCGCD - GP - Insp - Well Inspections - WIF-20210311-04 - GW-00003 - Michael Hahn
5. CCGCD - GP - Insp - Well Inspections - WIF-20210311-05 - GW-00001 - Danny May

Evidence of Achievement: Notices of Intent to Place Casing (NIPCRs) issued in FY2021.

1. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000125 - DP-20200625-01 - Robert J. Penland - Inspected: No
2. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000126 - DP-20200925-01 - Arturo Perez - Inspected: No
3. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000127 - DP-20200824-01 - Jeff and Rondalin Key - Inspected: No
4. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000128 - DP-20200803-01 - Monterrey Cove, LLC - Inspected: No
5. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000129 - DP-20200803-02 - Monterrey Cove, LLC - Inspected: No
6. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000130 - DP-20200924-01 - Bryan R. Arriola and Mercedes M. Lopez-Arriola - Inspected: No
7. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000131 - DP-20200929-01 - Willet G. Parker - Inspected: No
8. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000132 - DP-20200818-01 - Alex R. Hernandez - Inspected: No
9. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000133 - DP-20201012-01 - John Morton - Inspected: Yes
10. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000134 - DP-20201109-03 - Jesse Wood - Inspected: No
11. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000135 - DP-20201019-02 - Hector Zamorano - Inspected: No
12. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000136 - DP-20201116-04 - Clark Builders - Inspected: No
13. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000137 - DP-20201109-01 - M. D. Matthew Boyd - Inspected: No
14. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000138 - DP-20201228-01 - Edward Reese - Inspected: No
15. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000139 - DP-20210106-01 - Ricky McKinney - Inspected: No
16. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000140 - DP-20210304-01 - Juan Rubio, Jr. - Inspected: No
17. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000141 - DP-20210312-02 - Eugene M. Purcell - Inspected: No

18. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000142- DP-20201211-01 - Brent L. Marek and Haley E. Marek - Inspected: No
19. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000143 - DP-20210210-01 - Victoriano Perez-Cruces - Inspected: No
20. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000144 - DP-20210317-01 - Lionel and Amy L. Carabajal - Inspected: No
21. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000145 - DP-20210226-01 - William D. Wooldridge - Inspected: No
22. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000146 - DP-20210312-01 - Roger M. Odem - Inspected: No
23. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000147 - DP-20210325-01 - William L. and Cynthia G. Whiddon - Inspected: No
24. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000148 - DP-20210121-01 - Knute L. Dietze, II - Inspected: No
25. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000149 - DP-20210325-03 - Mason A. Miller and Rika S. Williams - Inspected: No
26. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000150 - DP-20201116-02 - Fabian Balboa - Inspected: Yes
27. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000151 - DP-20210222-01 - Keith Ryen - Inspected: No
28. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000152 - DP-20210428-01 - Christopher J. Brewer and Kelsey A. Brewer - Inspected: No
29. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000153 - DP-20210824-01 - Joseph W. Carpenter - Inspected: No
30. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000154 - DP-20210630-01 - Maricela Narvaez Rodriguez - Inspected: Yes
31. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000155 - DP-20210419-01 - Calhoun Coastal Ranch, LP - Inspected: No
32. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000156- DP-20210419-02 - Calhoun Coastal Ranch, LP - Inspected: No
33. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000157 - DP-20210618-01 - Stacy A. Mueller - Inspected: No

Evidence of Achievement: Notices of Intent to Place Casing (NIPCRs) issued in FY2021 and site visited.

1. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000133 - DP-20201012-01 - John Morton - Inspected: Yes
2. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000150 - DP-20201116-02 - Fabian Balboa - Inspected: Yes
3. CCGCD - GP - Insp - Permitting Receipts - NIPCR-000154 - DP-20210630-01 - Maricela Narvaez Rodriguez - Inspected: Yes

Goal 3: Controlling and preventing waste of groundwater - TWC §36.1071(a)(2) and 31 TAC 356.52(a)(1)(B)

Objective 1: Participate in the regional water planning process by attending at least one South Central Texas Regional Water Planning Group (Region L) meeting per year.

Evidence of Achievement: Minutes of Meetings of the South Central Texas Regional Water Planning Group

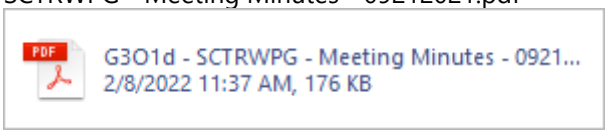
Source: https://www.regionltexas.org/current-planning-effort/6th-cycle-2026-rwp/2021-rwpg-materials/

PDFs of Minutes:
SCTRWPG - Meeting Minutes - 02042021.pdf

SCTRWPG - Meeting Minutes - 05062021.pdf

SCTRWPG - Meeting Minutes - 08052021.pdf

SCTRWPG - Meeting Minutes - 09212021.pdf



Goal 4: Addressing natural resource issues which impact the use and availability of groundwater, and which are impacted by the use of groundwater - TWC §36.1071(a)(5) and 31 TAC §356.52(a)(1)(E)

Objective 1: Develop and maintain a water quality monitoring program.

Evidence of Achievement: Water Quality Field Measurements collected in FY2021.

1. CCGCD - GMo - Mea - Water Quality Field Measurement - WQFM-20210811.1523 - NW-00033
2. CCGCD - GMo - Mea - Water Quality Field Measurement - WQFM-20210812.0936 - GW-00004
3. CCGCD - GMo - Mea - Water Quality Field Measurement - WQFM-20210812.1048 - GW-00014
4. CCGCD - GMo - Mea - Water Quality Field Measurement - WQFM-20210812.1208 - GW-00003
5. CCGCD - GMo - Mea - Water Quality Field Measurement - WQFM-20210812.1251 - GW-00001

Evidence of Achievement: Water Quality Lab Reports received in FY2021.

1. none.

Evidence of Achievement: Water Quality Lab Measurements recorded in FY2021.

1. none.

Summary Reports on Water Quality:

CCGCD - Field TDS Measurements - 20220208.pdf

Goal 5: Addressing drought conditions - TWC §36.1071(a)(6) and 31 TAC 356.52(a)(1)(F)

Objective 1: Collect and review drought condition information related to Calhoun County and the surrounding region of Texas.

Evidence of Achievement: Meeting Minutes with drought condition considered in FY2021.

1. CCGCD - Adm - MM - Meeting Minutes - 20210125
2. CCGCD - Adm - MM - Meeting Minutes - 20210419
3. CCGCD - Adm - MM - Meeting Minutes - 20210524
4. CCGCD - Adm - MM - Meeting Minutes - 20210726
5. CCGCD - Adm - MM - Meeting Minutes - 20210923

Goal 6: Addressing conservation, recharge enhancement, rainwater harvesting, precipitation enhancement, or brush control, where appropriate and cost-effective - TWC §36.1071(a)(7) and 31 TAC 356.52(a)(1)(G)

Objective 1: Promote conservation, rainwater harvesting or brush control within Calhoun County.

Evidence of Achievement: Meeting Minutes with promotion of groundwater conservation considered and website promotion of groundwater conservation in FY2021.

1. CCGCD - Adm - MM - Meeting Minutes - 20210125
2. CCGCD - Adm - MM - Meeting Minutes - 20210419

CCGCD - Webpage Conservation - Calhoun County Groundwater Conservation District - 20220208.pdf

Goal 7: Addressing the desired future conditions adopted by the district under Section 36.108 - TWC §36.1071(a)(8) and 31 TAC 356.52(a)(1)(H)

Objective 1: Develop and maintain a water level monitoring program.

Evidence of Achievement: Water Level Measurements collected during FY2021.

1. CCGCD - GMo - Mea - Water Level - WLM-20210311-01 - NW-00033 - John Hudson
2. CCGCD - GMo - Mea - Water Level - WLM-20210311-02 - NW-00024 - Olivia Community Center
3. CCGCD - GMo - Mea - Water Level - WLM-20210311-03 - GW-00005 - Calhoun County PCT#3
4. CCGCD - GMo - Mea - Water Level - WLM-20210311-04 - NW-00009 - James Williams
5. CCGCD - GMo - Mea - Water Level - WLM-20210311-05 - GW-00009 - Westside Nav District
6. CCGCD - GMo - Mea - Water Level - WLM-20210311-06 - GW-00003 - Michael Hahn
7. CCGCD - GMo - Mea - Water Level - WLM-20210311-07 - GW-00001 - Danny May
8. CCGCD - GMo - Mea - Water Level - WLM-20210811-01 - NW-00033

9. CCGCD - GMo - Mea - Water Level - WLM-20210812-01 - NW-00024
10. CCGCD - GMo - Mea - Water Level - WLM-20210812-02 - GW-00005
11. CCGCD - GMo - Mea - Water Level - WLM-20210812-03 - GW-00014
12. CCGCD - GMo - Mea - Water Level - WLM-20210812-04 - GW-00009
13. CCGCD - GMo - Mea - Water Level - WLM-20210812-05 - GW-00003
14. CCGCD - GMo - Mea - Water Level - WLM-20210812-06 - GW-00001

Evidence of Achievement: Minutes of Meeting with Board consideration of water levels in FY2021.

1. CCGCD - Adm - MM - Meeting Minutes - 20210125
2. CCGCD - Adm - MM - Meeting Minutes - 20210419
3. CCGCD - Adm - MM - Meeting Minutes - 20210923

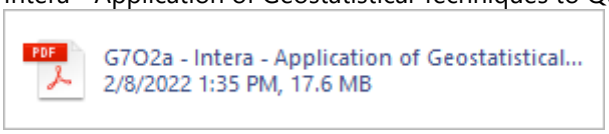
Summary Reports on Water Levels:
CCGCD - Field WLM Measurements - 20220208.pdf

Objective 2: Analyze water level monitoring information to evaluate water level trends and determine the degree to which the DISTRICT is complying with the desired future conditions of Gulf Coast Aquifer in Calhoun County.

Evidence of Achievement: Minutes of Meeting with Board consideration of water levels and DFC compliance.

1. CCGCD - Adm - MM - Meeting Minutes - 20210125
2. CCGCD - Adm - MM - Meeting Minutes - 20210419
3. CCGCD - Adm - MM - Meeting Minutes - 20210524
4. CCGCD - Adm - MM - Meeting Minutes - 20210726
5. CCGCD - Adm - MM - Meeting Minutes - 20210923

Intera - Application of Geostatistical Techniques to Quantify Changes in Water Levels.pdf



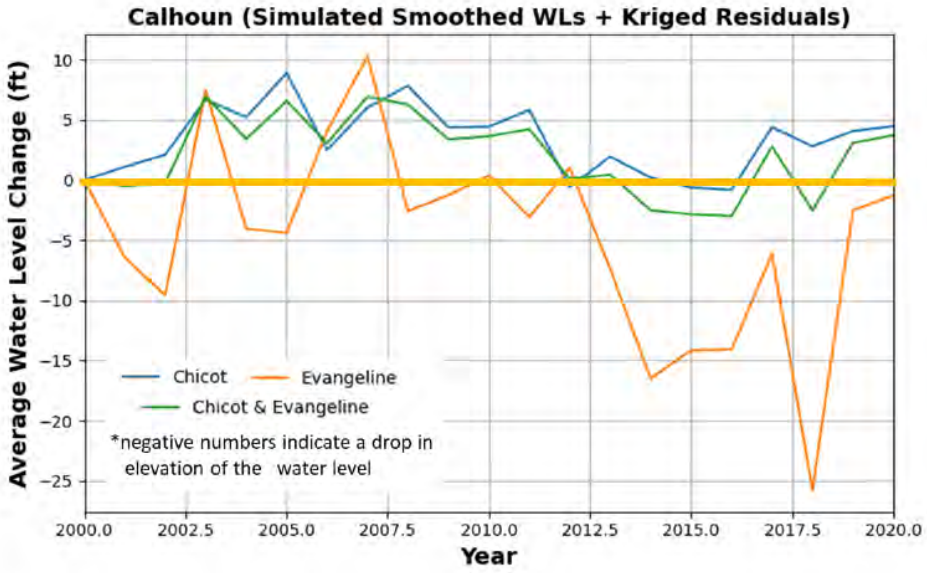


Figure 5-1 Change in the average annual water level calculated in Calhoun County for the Chicot Aquifer, the Evangeline Aquifer, and the combination of Chicot and Evangeline aquifers based on the analysis of aquifer levels determined using GAM simulated smoothed water levels and Kriged residual for the measured water levels.

Calhoun County Groundwater Conservation District

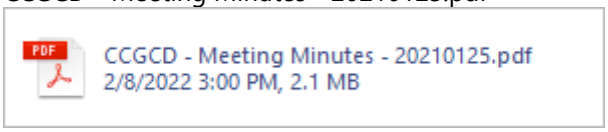
Annual Report of the District

Fiscal Year 2020 – 2021
October 1, 2020 to September 30, 2021

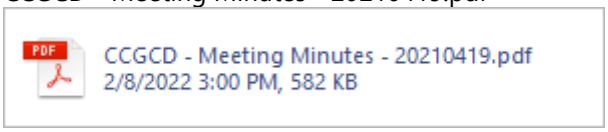
Section 3 - Minutes of the Meetings of the Board of Directors held during FY2021

1. CCGCD - Adm - MM - Meeting Minutes - 20210125
2. CCGCD - Adm - MM - Meeting Minutes - 20210419
3. CCGCD - Adm - MM - Meeting Minutes - 20210524
4. CCGCD - Adm - MM - Meeting Minutes - 20210726
5. CCGCD - Adm - MM - Meeting Minutes - 20210823
6. CCGCD - Adm - MM - Meeting Minutes - 20210923

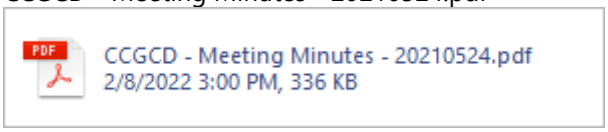
PDF Files of Minutes of the Meetings of the Board of Directors held during FY2021:
CCGCD - Meeting Minutes - 20210125.pdf



CCGCD - Meeting Minutes - 20210419.pdf



CCGCD - Meeting Minutes - 20210524.pdf



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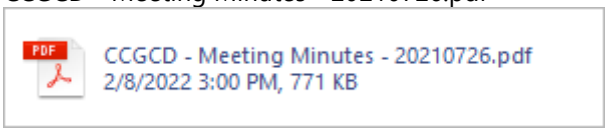

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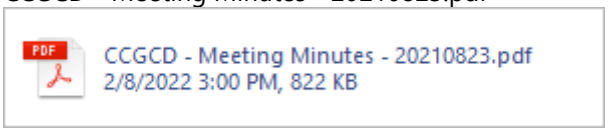

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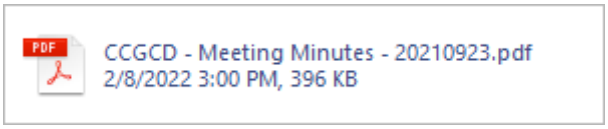
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Minutes of the South Central Texas Regional Water Planning Group
February 4, 2021

Chair Scott called the virtual meeting to order at 9:30 a.m., held through the GoToMeeting online platform.

24 of the 31 voting members, or their alternates, were present.

Voting Members Present:
Tim Andruss
John Byrum
Curt Campbell
Patrick Garcia for Rey Chavez
Alan Cockerell
Charlie Flatten
Tom Jungman
Russel Labus
Glenn Lord
Gary Middleton
Dan Meyer
Robert Puente
Jonathan Stinson for Kevin Patteson
Iliana Pena
Humberto Ramos
Roland Ruiz
Dianne Savage
Steve Graham
Greg Sengelmann
Mitchell Sowards
Heather Sumpter
Thomas Taggart
Ian Taylor
Dianne Wassenich
Adam Yablonski

Voting Members Absent:
Pat Calhoun
Will Conley
Vic Hilderbran
Kevin Janak
Steve Ramsey
Weldon Riggs

Non-Voting Members Present:
Iliana Delgado, TCEQ
Elizabeth McCoy, Texas Water Development Board (TWDB)
Marty Kelly, TX Department of Parks and Wildlife
Joseph McDaniel, Region J Liaison
Rusty Ray, Texas Soil & Water Cons. Board

Non-Voting Members Absent:
Ronald Fieseler, Region K Liaison
Jami McCool, TX Dept. of Agriculture
Don McGhee, Region M Liaison
Joseph McDaniel, Region J Liaison
Carl Crull, Region N Liaison

Beginning with the February 11, 2016, meeting of the South Central Texas Regional Water Planning Group, all recordings are available for the public at www.regionltexas.org.

AGENDA ITEM NO. 1: (9:30 AM) ROLL CALL

Caitlin Heller, San Antonio River Authority, called the role, and confirmed a quorum.

AGENDA ITEM NO. 2: PUBLIC COMMENT

No public comment.

AGENDA ITEM NO. 3: APPROVAL OF THE MINUTES FROM NOVMBER 5, 2020 MEETING OF THE SOUTH CENTRAL TEXAS REGIONAL WATER PLANNING GROUP (SCTRWPG)

Mr. Byrum motioned to approve the minutes. Mr. Middleton seconded, and the motion was passed

AGENDA ITEM NO. 4: STATUS OF EDWARSAQUIFER HABITAT CONSERVATION PLAN (EAHCP), SCOTT STORMENT

Mr. Storment gave a brief update on the San Marcos River and the call for a condition M and the curb of habitat restoration activities due to the decrease of flows.

AGENDA ITEM NO. 5: STATUS OF GUADALUPE, SAN ANTONIO, MISSION, AND ARANSAS RIVERS AND MISSION, COPANO, ARANSAS, AND SAN ANTONIO BAYS BASIN AND BAY STAKEHOLDER COMMITTEE (BBASC) AND EXPERT SCIENCE TEAM (BBEST)

Mr. Mast gave an update on the internal review by the Texas Water Development Board statewide synthesis of environmental blow studies. The review has taken longer then anticipated and the Board anticipate providing the BBASC and BBEST committee members that want to review the report to get in touch with them this month. The members will have a month to review and respond to the report. We would be looking at scheduling a stakeholders meeting following that process so the stakeholder community can view the report and ask questions.

AGENDA ITEM NO. 6: TEXAS WATER DEVELOPMENT BOARD (TWDB) COMMUNICATIONS.

Ms. McCoy updated the planning group on the submittal of the Interregional Planning Council's report and the Regional Water Planning Group's Boundary Review process. She informed the group that the TWDB is contracting with the UT Bureau of Economic Geology for updates to Mining Water Demand Projections the 2026 Regional Water Plan.

Ms. McCoy reviewed a tentative timeline for the RFA for Sith Cycle Planning Grant Funds and the Regional water planning rulemaking.

AGENDA ITEM NO. 7: CHAIR'S REPORT

Chair Andruss gave an update on the discrepancy in adopted Regional Water Plan and how TWDB plans to move forward with the correct values

AGENDA ITEM NO. 8: DISCUSSION AND APPROPRIATE ACTION AUTHORIZING THE ADMINISTRATOR TO SOLICIT NOMINATIONS TO FILL VACANCIES OF SCTRWPG

Chair Andruss reviewed the positions that will vacant.
Mr. Lord motioned to authorize the administrator to solicit. Mr. Ramos seconded, and the motion was passed

AGENDA ITEM NO. 9: DISCUSSION REGARDING POTENTIAL 2026 PLAN ENHANCEMENT PROCESS

Chair Andruss provide a brief update on the enhancement process.

AGENDA ITEM NO. 10: DISCUSSION AND APPROPRIATE ACTION REGARDING LIAISON NOMINATIONS FOR REGIONS N, J, K, M, AND P

Chair Andruss the requirement of having planning group members serve as liaisons in other region. He opened the meeting up for nominations and discussions.
The nominations are Mr. Yablonski for Region J, Mr. Byrum for Region M, Mr. Andurss for Region P, and Ms. Wassenich for Region K.

Mr. Lord motioned for the approval of the nominations. Mr. Riggs seconded, and the motion was passed.

AGENDA ITEM NO. 11: STATUS OF REGION 12, SAN ANTONIO REGIONAL FLOOD PLANNING GROUP, AND REGION 11, GUADALUPE FLOOD PLANNING GROUP

Ms. Heller gave an update on the Region 12 San Antonio Regional Flood planning group. Ms. Heller is the administrator for Region 12 and Nefi Garza is the Chair. Region 12 has submitted their application for grant funds and is moving forward with the RFA process.

Ms. Willis gave an update on the Region 11 Guadalupe Flood planning group. Ms. Willis is the administrator for Region 11 and Dean Miller is the Chair. Region 11 added three additional voting members bringing their voting members to fifteen. They also added one non-voting member. Region 11 also submitted their application for grant funds and is working through the process with the Board. The Request for qualifications for technical consultant will be release in the newspaper February 4th.

AGENDA ITEM NO. 12: POTENTIAL AGENDA ITEMS FOR NEXT MEETING

Ms. Heller informed the group of the next meeting date of May 6, 2021 with the following agenda items to be discussed:

1. Preplanning public meetings
2. Voting on the nominations for vacancies
3. Update on the solicitation for the technical consultant.

AGENDA ITEM NO. 13: PUBLIC COMMENT

No public comments.

Chair Andruss thanked all members that are leaving the group for their service.

Agenda Item NO. 14: ADJOURN

Approved by the South Central Texas Regional Water Planning Group at a meeting held on February 4, 2020.

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GARY MIDDLETON, SECRETARY

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TIM ANDRUSS, CHAIR

Minutes of the South Central Texas Regional Water Planning Group
May 6, 2021

Chair Andruss called the virtual meeting to order at 9:30 a.m., held through the GoToMeeting online platform.

24 of the 31 voting members, or their alternates, were present.

Voting Members Present:
Tim Andruss
John Byrum
Curt Campbell
Rey Chavez
Charlie Flatten
Tom Jungman
Russel Labus
Glenn Lord
Gary Middleton
Dan Meyer
Darren Thompson for Robert Puente
Jonathan Stinson for Kevin Patteson
Humberto Ramos
Weldon Riggs
Roland Ruiz
Dianne Savage
Steve Graham
Greg Sengelmann
Mitchell Sowards
Heather Sumpter
Ian Taylor
Dianne Wassenich
Adam Yablonski

Voting Members Absent:
Pat Calhoun
Will Conley
Vic Hilderbran
Steve Ramsey
Thomas Taggart

Non-Voting Members Present:
Elizabeth McCoy, Texas Water Development Board (TWDB)

Non-Voting Members Absent:
Iliana Delgado, TCEQ
Ronald Fieseler, Region K Liaison
Marty Kelly, TX Department of Parks and Wildlife
Jami McCool, TX Dept. of Agriculture
Don McGhee, Region M Liaison
Joseph McDaniel, Region J Liaison
Carl Crull, Region N Liaison
Rusty Ray, Texas Soil & Water Cons. Board

Beginning with the February 11, 2016, meeting of the South Central Texas Regional Water Planning Group, all recordings are available for the public at www.regionltexas.org.

AGENDA ITEM NO. 1: (9:30 AM) ROLL CALL

Kendall Hayes, San Antonio River Authority, called the role, and confirmed a quorum.

AGENDA ITEM NO. 2: PUBLIC COMMENT

No public comment.

AGENDA ITEM NO. 3: APPROVAL OF THE MINUTES FROM NOVMBER 5, 2020 MEETING OF THE SOUTH CENTRAL TEXAS REGIONAL WATER PLANNING GROUP (SCTRWPG)

Mr. Lord motioned to approve the minutes. Mr. Graham seconded, and the motion was passed

AGENDA ITEM NO. 4: STATUS OF EDWARDS AQUIFER HABITAT CONSERVATION PLAN (EAHCP), SCOTT STORMENT

Mr. Storment gave a brief update on the San Marcos River. The River went into Condition M, the flow has dropped below 120 CFS, which impacts downstream flow. They notified US Fish and Wildlife that the river has reached Condition M. Anticipate that the numbers will return to normal soon, but for now the condition is active. Condition M will not be lifted until CFS returns to 120.

AGENDA ITEM NO. 5: STATUS OF GUADALUPE, SAN ANTONIO, MISSION, AND ARANSAS RIVERS AND MISSION, COPANO, ARANSAS, AND SAN ANTONIO BAYS BASIN AND BAY STAKEHOLDER COMMITTEE (BBASC) AND EXPERT SCIENCE TEAM (BBEST)

Mr. Mast, San Antonio River Authority, provided an update on BBASC. On April 1st, TWDB distributed a draft statewide synthesis available for public comment. SARA distributed to BBASC to request public comments. Comments were accumulated and submitted on May 3rd for TWDB review. TWDB will distribute a final report in the summer.

AGENDA ITEM NO. 6: TEXAS WATER DEVELOPMENT BOARD (TWDB) COMMUNICATIONS.

Ms. McCoy, TWDB, provided an update. Amendments were made to TAC Chapters and will be considered for adoption on May 6th. TWDB is in the process of drafting the 2022 State Water Plan. TWDB's Surface Water Division is conducting a study on the reservoir firm yield. Results will be submitted to the Planning Group for consideration. TWDB's website has been updated to include Sixth Cycle documents and resources as well as previous cycles' information.

Chair Andruss requested an update on TWDB's pending requirements for Regional Liaisons. Ms. McCoy will research further and provide an update.

Mr. Daniel Collazo, TWDB, presented on Statewide Survey of Aquifer Suitability for Aquifer Storage and Recovery (ASR) and Aquifer Recharge (AR). Texas Legislature directed TWDB to

survey ASR and AR potential statewide. TWDB used these surveys to create a Public Data Display and interactive map.

AGENDA ITEM NO. 7: CHAIR'S REPORT

Chair Andruss informed the group that Alan Cockerell has resigned from the Planning Group.

AGENDA ITEM NO. 8: DISCUSSION AND APPROPRIATE ACTION REGARDING POTENTIAL AMENDMENT TO THE REGION L BYLAWS ARTICLE V, SECTION 4

Ms. Heller, San Antonio River Authority, proposed an amendment to Article V, Section 4. This bylaw currently states that when replacing a voting member, public notice must be posted in a newspaper. Ms. Heller recommended an amendment to instead require public notice on websites and through county clerk's offices.

Mr. Byrum motioned to approve the amendment. Mr. Chavez seconded, and the motion was passed.

AGENDA ITEM NO. 9: DISCUSSION AND APPROPRIATE ACTION REGARDING REPRESENTATIVE VACANCIES OF SCTRWPG

Ms. Heller notified the Planning Group that the list of vacancies includes those under the categories of: Counties, Industries, Environmental, Electric Generation, Water Distribution, Water Utilities, Water Authorities, Municipalities, Agricultural.

Chair Andruss requested that a list be sent to members for their distribution. Mr. Middleton supported this request and requested further information on the number of nominations already received. Ms. Wassenich requested information on which existing positions will not be re-upped.

AGENDA ITEM NO. 10: SOLICITATION FOR TECHNICAL CONSULTANT UPDATE BY POLITICAL SUBDIVISION, SAN ANTONIO RIVER AUTHORITY

Ms. Heller provided information on the new procurement process for the Technical Consultant opening. Holding this process in open meetings would be subject to the Open Meetings Act, if a quorum was present, thereby making the process public for contractors' rivals' review. The procurement process will be coordinated by the San Antonio River Authority. A Scoring Committee will be created with 2 members of the San Antonio River Authority and 2-3 members from the Planning Group. Therefore, the process will not be subject to the Open Meetings Act.

Chair Andruss confirmed that the Scoring Committee would only make a recommendation to the Planning Group and not a decision. He also noted that the San Antonio River Authority is comfortable with this process and should therefore be adhered to. Chair Andruss confirmed that the information from the procurement process will be confidential until the recommendation is presented to the Planning Group.

Ms. Heller notified the Group that the Regional Flood Planning Group is under an identical process and has seen success with this process.

Mr. Thompson asked for confirmation that the Scoring Committee will only be scoring the RFQ's and making a final recommendation to the Planning Group and not making a decision itself.

Mr. Byrum shared concerns with the number of representatives in the Scoring Committee not reflecting the size of the Planning Groups. He proposed a Committee of 7 and not 5.

Ms. Wassenich noted that historically there have been a low number of applicants and that the proposed plan would benefit the Planning Group by bringing additional applicants.

AGENDA ITEM NO. 11: DISCUSSION AND APPROPRIATE ACTION REGARDING THE SELECTION OF PARTICIPANTS FOR THE TECHNICAL CONSULTANT PROCUREMENT

Mr. Ramos nominated himself to serve. Mr. Flatten nominated himself to serve. Mr. Byrum nominated himself to serve.

Mr. Thompson requested that the Committee provide 5 members to the Scoring Committee and not 3.

Ms. Heller reminded the Planning Group that over 3 members would qualify as a quorum and would violate the Open Meetings Act. Chair Andruss requested consensus that the Planning Group move forward with only supplying 3 members to the Scoring Committee. Mr. Lord supported the movement.

Mr. Byrum motioned to approve the nominations. Mr. Lord seconded, and the motion passed.

AGENDA ITEM NO. 12: DISCUSSION AND APPROPRIATE ACTION REGARDING PRE-PLANNING PUBLIC MEETINGS

Ms. Heller spoke to TWDB's requirement to hold a pre-planning meeting. It requires a presentation by the TWDB. Ms. Heller proposed that this presentation and pre-planning meeting be held during the regularly scheduled August quarterly Planning Group meeting.

AGENDA ITEM NO. 13: DISCUSSION AND APPROPRIATE ACTION REGARDING REGIONAL LIAISON NOMINATIONS FOR REGION N

Ms. Heller explained that the planning group needed to formally nominate Mr. Byrum, who has been informally serving as the Region N liaison.

Mr. Thompson motioned to approve the nominations. Mr. Yablonski seconded, and the motion passed.

AGENDA ITEM NO. 14: REGIONAL LIAISON UPDATES

Chair Andruss, Region P liaison, stated that their next meeting is to be determined.

Ms. Wassenich, Region K liaison, stated that their next meeting is in July. Mr. Flatten also covers Region K.

Mr. Yablonski, Region J liaison, stated that Region J is in a similar process to procure a technical consultant. They will meet next week.

AGENDA ITEM NO. 15: STATUS OF REGION 12, SAN ANTONIO REGIONAL FLOOD PLANNING GROUP, AND REGION 11, GUADLUPE FLOOD PLANNING GROUP

Ms. Heller provided an update on Region 12. Region 12 using the same process to procure a technical consultant. They are focusing on flood mitigation in the region.

Ms. Willis provided an update on Region 11. Their technical consultant has been chosen. They will return to in-person meetings in July. The website is up and running at guadaluperfpg.org

AGENDA ITEM NO. 16: PUBLIC AGENDA ITEMS FOR NEXT MEETING

Ms. Heller stated that the next meeting will be August 5th at 9:30 AM. Agenda items will include the formal technical consultant recommendation, TWDB's pre-planning meeting, and formal nominations for the vacancies.

Chair Andruss requested that individuals make their preferences clear on in-person versus virtual meetings.

AGENDA ITEM NO. 17: PUBLIC COMMENT

No public comments.

AGENDA ITEM NO. 18: ADJOURN

Meeting adjourned at 10:50 AM.

Minutes of the South Central Texas Regional Water Planning Group
August 05, 2021

Chair Andruss called the virtual meeting to order at 9:30 a.m., held through the GoToMeeting online platform.

23 of the 26 voting members, or their alternates, were present.

Voting Members Present:
Tim Andruss
John Byrum
Rey Chavez
Curt Campbell
Charlie Flatten
Steve Graham
Vic Hilderbran
Thomas Jungman
Russell Labus
Glenn Lord
Daniel Meyer
Jonathan Stinson for Kevin Patteson
Robert Puente
Humberto Ramos
Weldon Riggs
Roland Ruiz
Blaine Schorp for Diane Savage
Mitchell Sowards
Heather Sumpter
Thomas Taggart
Ian Taylor
Dianne Wassenich
Adam Yablonski

Voting Members Absent:
Will Conley
Gary Middleton
Steve Ramsey

Non-Voting Members Present:
Kelley Kowal for Marty Kelly, TX Department of Parks and Wildlife
Elizabeth McCoy, Texas Water Development Board (TWDB)

Non-Voting Members Absent:
Iliana Delgado, TCEQ
Ronald Fieseler, Region K Liaison
Jami McCool, TX Dept. of Agriculture
Don McGhee, Region M Liaison
Charles Wiedenfeld, Region J Liaison
Carl Crull, Region N Liaison
Rusty Ray, Texas Soil & Water Cons. Board

Beginning with the February 11, 2016, meeting of the South Central Texas Regional Water Planning Group, all recordings are available for the public at www.regionltexas.org.

AGENDA ITEM NO. 1: (9:30 AM) ROLL CALL

Ms. Kendall Hayes, San Antonio River Authority, called the role, and confirmed a quorum.

AGENDA ITEM NO. 2: PUBLIC COMMENT

No public comments.

AGENDA ITEM NO. 3: APPROVAL OF THE MINUTES FROM MAY 06, 2021, MEETING OF THE SOUTH CENTRAL TEXAS REGIONAL WATER PLANNING GROUP (SCTRWPG)

Mr. Puente noted that the second sentence under Agenda Item No.10 is incorrect, "Holding this process in open meetings would be subject to the Open Meetings Act, thereby making the process public for contractors' rivals' review". With the recorded understanding that this statement is incorrect, Mr. Puente would approve the minutes.

Mr. Taggart abstained from voting on minutes, as he was not present at the last meeting.

Chair Andruss suggested that the group identify the sentence as an inaccuracy and proceed with the adoption of the minutes.

Ms. Heller asked for clarification on the inaccuracy. Mr. Puente explained that the meeting would only be subject to the Open Meetings Act if a certain number of planning group members were present.

Mr. Yablonski remembered that this clarification was made during the meeting.

Chair Andrus asked for objections to amending the minutes. Mr. Byrum moved that the minutes from May's meeting be amended to fix the inaccuracy and under that condition, adopt the amended minutes. Mr. Riggs seconded the motion as amended, and the motion was adopted by consensus.

AGENDA ITEM NO. 4: STATUS REPORTS AND COMMUNICATIONS BY TEXAS WATER DEVELOPMENT BOARD

Ms. McCoy, TWDB, noted that the Regional Water Planning rules pamphlet and public notice have been updated with newly revised rules and are now available online. The 6th Cycle planning contracts has been sent and Region L's has been fully executed.

The 2022 State Water plan has been adopted as of July 7 and has an interactive feature online. The inaugural Interregional Planning Council dissolved and TWDB will need nominations for those to serve on the next council. This council will serve until the 2027 state water plan is adopted.

Ms. McCoy provided a legislative update. House Bill 1907 relieves the RWPGs from assessing financing needs to implement water management strategies and no longer requires an Infrastructure Financing Report. The bill relieves SWIFT Applicants from submitting an

Infrastructure Financing Survey for financial assistance and also relieves the RWPGs from prioritizing projects within the regional water plans. This will go into effect on September 1st.

Chair Andruss asked to confirm that they are not going to have to prioritize projects from lowest to highest priority. Ms. McCoy confirmed that they will not.

AGENDA ITEM NO. 5: STATUS REPORTS AND COMMUNICATIONS RELATED TO REGIONAL WATER PLANNING INCLUDING REPORTS BY THE CHAIR, REGIONAL LIAISONS, GROUNDWATER MANAGEMENT AREA REPRESENTATIVES, AND MEMBERS OF THE PLANNING GROUP

Chair Andruss provided his Chair Report. He encouraged members of the RWPG to explore TWDB's interactive statewide water plan online. He reminded the committee that Greg Sengelmann has resigned from the planning group. He encouraged RWPG members to contact Ms. Hayes if they are not receiving TWDB's newsletters.

Chair Andruss provided an update on Region P. They have not selected a technical consultant at this time. Their next meeting will be August 23rd. He provided an update on GMA 15. On April 8th, the representatives proposed a desired future condition for adoption and the public comment period opened on May 4th for 90 days. Their next meeting will be in October.

Ms. Dianne Wassenich, Liaison for Region K, provided an update on Region K. She noted that they had a long discussion regarding filling the vacancy of the public interest category. She was asked to provide an explanation on how Region L fills their vacancies. Ms. Wassenich asked that the planning group discuss today how it conducts public outreach to notify the public of a vacancy on the planning group.

AGENDA ITEM NO. 6: PRE-PLANNING PUBLIC INPUT

Ms. Hayes presented the Pre-Planning Public Input presentation. She provided a brief overview of the foundation and responsibilities of the SCTRWPG and the Regional Water Planning process. She then opened the floor to the public and asked if there are specific issues that should be addressed or provisions that should be included in the 2026 Regional Water Plan and the 2027 State Water Plan. There were no public comments.

Ms. Hayes invited the planning group to participate in a deliberate discussion on interregional cooperation strategies. Chair Andruss noted that technical consultants have historically played a large role in coordinating with other regions. He asked if there will be additional funding provided by TWDB for these efforts. Ms. McCoy stated that this would be accomplished with the funds currently available. Chair Andruss confirmed with Ms. Hayes that Region L's current use of interregional liaisons fulfills TWDB's expectations for this effort.

Mr. Taggart asked Ms. McCoy if there have been any issues or deficiencies in coordination in forming this past cycle's water plan. Ms. McCoy explained that they haven't evaluated any such issues, but the Interregional Council identified a need for planning groups to coordinate with other regions earlier in the planning cycle.

Chair Andruss suggested that an agenda item be added on each future meeting related to Interregional Coordination. He requested documentation of strategies from the 2021 Regional Water Plan that rely on water from another region as well as other regions' plans that rely on water from Region L. Ms. Wassenich supported Chair Andruss' suggestion. Ms. McCoy stated that TWDB has that information available and will provide it to Chair Andruss. Ms. Wassenich asked where that information can be located. Ms. McCoy stated that it is available online.

AGENDA ITEM NO. 7: DISCUSSION AND APPROPRIATE ACTION REGARDING RECOMMMENDATION BY THE EXECUTIVE COMMITTEE ON VACANCIES OF SCTRWPG VOTING MEMBER TERMS EXPIRING AUGUST 2021

Chair Andruss stated that the Executive Committee met on July 29 to review and discuss the nominations. The Executive Committee's recommendation is to fill the uncontested seats with the nominees. With regard to the Municipalities interest category, the Executive Committee recommends that the incumbents fill vacancies: Tom Taggart, Robert Puente, and Gary Middleton.

Mr. Riggs moved to accept the Executive Committee's recommendation in full.

The planning group requested future agenda items specify the Region L vacancies and who the Executive Committee is suggesting fill them.

Ms. Wassenich suggested that term limits be added to the website.

The Committee asked how certain applications were categorized if they had not selected a box at the top of the application. Some applicants expressed their interest group directly to the Region L Administrator and that's how applications were categorized.

Mr. Taggart abstained from voting on the Municipalities category.

Hearing no other comments, Mr. Ramos seconded Mr. Riggs' original motion.

Chair Andruss separated the vote by interest groups and adopt the Executive Committee's recommendation by consensus.

Chair Andruss asked for any objections to adopting the Executive Committee's recommendation for the Agricultural interest group vacancies to be filled by Weldon Riggs and Adam Yablonski. Hearing no objections, the motion was adopted by consensus.

Chair Andruss asked for any objections to adopting the Executive Committee's recommendation for the Environmental interest group vacancies to be filled by Charlie Flatten and Vanessa Puig-Williams. Hearing no objections, the motion was adopted by consensus.

Chair Andruss asked for any objections to adopting the Executive Committee's recommendation for the Industries interest group vacancy to be filled by Rey Chavez. Hearing no objections, the motion was adopted by consensus.

Chair Andruss asked for any objections to adopting the Executive Committee's recommendation for the Municipalities interest group vacancies to be filled by Thomas Taggart, Robert Puente, and Gary Middleton. Mr. Byrum objected. Ms. Wassenich told Chair Andruss that this interest group was not part of the original motion; however, Mr. Riggs, the one who made the original motion, stated that this interest group was in the intention of his motion. Knowing this clarification, Chair Andruss asked again for any objections. Mr. Byrum objected, stating that the smaller cities need a voice in this interest group.

Chair Andruss moved on and asked for any objections to adopting the Executive Committee's recommendation for the River Authorities interest group vacancy to be filled by Jonathan Stinson. Hearing no objections, the motion was adopted by consensus.

Chair Andruss asked for any objections to adopting the Executive Committee's recommendation for the Small Business interest group vacancy to be filled by Darren Simmons. Hearing no objections, the motion was adopted by consensus.

Chair Andruss asked for any objections to adopting the Executive Committee's recommendation for the Water Districts interest group vacancies to be filled by Russell Labus and Debbie Farmer. Hearing no objections, the motion was adopted by consensus.

Chair Andruss asked for any objections to adopting the Executive Committee's recommendation for the Water Utilities interest group vacancy to be filled by Amber Beard. Hearing no objections, the motion was adopted by consensus.

Chair Andruss returned to the Municipalities interest group. Mr. Byrum stated that he will move forward with the hope that the SCTRWPG will conduct deliberate public outreach to smaller, rural communities. Ms. Wassenich stated that she personally reached out to the Goliad County Judge to request that someone apply.

Chair Andruss asked for any objections to adopting the Executive Committee's recommendation for the Municipalities interest group vacancies to be filled by Thomas Taggart, Robert Puente, and Gary Middleton. Hearing no objections, the motion was adopted by consensus.

AGENDA ITEM NO. 8: DISCUSSION AND APPROPRIATE ACTION REGARDING THE RECOMMENDATION OF A TECHNICAL CONSULTANT FIRM TO THE SCTRWPG FOR THE 2026 REGIONAL WATER PLAN

Ms. Heller explained that per their contract with TWDB, SARA had to stick to its own procurement process. This process was voted on in the last SCTRWPG meeting, where three members were selected to represent the planning group on a scoring committee. Those committee members were Charlie Flatten, John Byrum, and Humberto Ramos.

Mr. Flatten spoke to the technical consultant procurement process. The committee met multiple times. Applicants submitted proposals and gave presentations virtually. The margin of the final vote was slim. The committee unanimously recommended Black & Veatch.

Several members of the RWPG expressed concern with the amount of information available to the full committee for it to be comfortable supporting the evaluation committee's recommendation. Mr. Puente moved that the planning group postpone this decision until the applicants can be interviewed by the group. Mr. Ramos seconded this motion. Discussion of the information needed for the RWPG to make an informed recommendation of which respondent technical consultant SARA should commence contracting with ensued.

Based on the committee discussion, Mr. Taylor recommended that the planning group allow SARA to review its solicitation. He is in favor of giving the entire group access to the Statements of Qualification and evaluation criteria. He then proposed having the respondent consultant firms present at the next meeting so that the planning group may ask questions of the firms.

Mr. Taggart asked that the planning group adopt Mr. Taylor's suggestion and allow the responsive consultant firms to give presentations.

Mr. Taylor moved that SARA review the solicitation, that all members of the planning group receive Statements of Qualification and evaluation criteria, and that in the next Planning Group meeting, the responsive consultant firms be present to respond to questions. Mr. Graham seconded the motion.

Ms. Allison Elder, Director of Legal Services at the San Antonio River Authority, reminded Chair Andruss that there is an existing motion made by Mr. Puente. Mr. Puente withdrew his motion.

Chair Andruss asked for additional discussion on the motion made by Mr. Taylor and seconded by Mr. Graham. There was no additional discussion. The motion was adopted by consensus.

Chair Andruss asked if there is a scheduling requirement for placing this item on the next meeting's agenda. Ms. Heller explained that the SCTRWPG can call a special meeting with at least 2 weeks' notice. Chair Andruss stated his preference to conduct this agenda item at the next scheduled meeting in November. Ms. McCoy stated that TWDB will provide the RWPG's with data for the next step in the planning process in December. Chair Andruss stated that this agenda item will be placed on the agenda of the next regularly scheduled meeting in November, pending the River Authority's review of procurement documents. There were no objections and no additional discussion on the matter.

AGENDA ITEM NO. 9: PUBLIC AGENDA ITEMS FOR NEXT MEETING

Mr. Yablonski stated that he currently serves as the planning group's liaison for Region J. He has spoken with Mr. Byrum and would like to nominate Mr. Byrum to serve as Region J's liaison and name this as an agenda item for the November meeting.

Ms. Heller stated that filling the remaining vacancies under the Counties and Electric Generating Utilities interest groups will be added to November's agenda with the requested specific language.

AGENDA ITEM NO. 10: PUBLIC COMMENT

No public comments.

AGENDA ITEM NO. 11: ADJOURN

Chair Andruss called the meeting to adjourn at 11:20 AM.

Minutes of the South Central Texas Regional Water Planning Group
September 21, 2021

Chair Andruss called the virtual meeting to order at 9:30 a.m., held both in person and through GoToMeeting online platform.

23 of the 30 voting members, or their alternates, were present.

Voting Members Present:

Tim Andruss
Amber Beard
John Byrum
Curt Campbell
Debbie Farmer
Charlie Flatten
Melissa Bryant for Steve Graham
Tom Jungman
Russell Labus
Glenn Lord
Daniel Meyer
Gary Middleton
Robert Puente
Vanessa Puig-Williams
Humberto Ramos
Weldon Riggs
Roland Ruiz
Darren Simmons
Jonathan Stinson
Heather Sumpter
Thomas Taggart
Ian Taylor
Adam Yablonski

Voting Members Absent:

Rey Chavez
Will Conley
Vic Hilderbran
Steve Ramsey
Dianne Savage
Mitchell Sowards
Dianne Wassenich

Non-Voting Members Present:

Marty Kelly, TX Department of Parks and Wildlife
Elizabeth McCoy, Texas Water Development Board (TWDB)

Non-Voting Members Absent:

Iliana Delgado, TCEQ
Ronald Fieseler, Region K Liaison
Jami McCool, TX Dept. of Agriculture
Don McGhee, Region M Liaison
Charles Wiedenfeld, Region J Liaison
Carl Crull, Region N Liaison
Rusty Ray, Texas Soil & Water Cons. Board

Beginning with the February 11, 2016, meeting of the South Central Texas Regional Water Planning Group, all recordings are available for the public at www.regionltexas.org.

AGENDA ITEM NO. 1: (9:30 AM) ROLL CALL

Ms. Kendall Hayes, San Antonio River Authority, called the role, and confirmed a quorum.

AGENDA ITEM NO. 2: PUBLIC COMMENT

No public comments.

AGENDA ITEM NO. 3: APPROVAL OF THE MINUTES FROM MAY 06, 2021, MEETING OF THE SOUTH CENTRAL TEXAS REGIONAL WATER PLANNING GROUP (SCTRWPG)

Ms. Bryant motioned to approve the minutes. Mr. Jungman seconded the motion, motion passed.

AGENDA ITEM 4: PRESENTATION 1

Black & Veatch presented and answered questions from the planning group.

AGENDA ITEM 5: PRESENTATION 2

Plummer presented and answered questions from the planning group.

AGENDA ITEM 6: IF NECESSARY, ADDITIONAL QUESTIONS FROM PLANNING GROUP

The Planning Group did not have additional questions for Black & Veatch.

AGENDA ITEM 7: PROCUREMENT PROCESS PRESENTATION

Ms. Karen Smith, San Antonio River Authority, presented on the details and timeline of SARA's procurement process.

AGENDA ITEM 8: SCORING COMMITTEE REPORT

Mr. Byrum presented his experience on the scoring committee along with a summary of the committee's findings. Ms. Erin Cavazos, San Antonio River Authority, provided additional information on her experience on the scoring committee. The Planning Group asked questions regarding the scoring document and Mr. Byrum answered the questions.

AGENDA ITEM 9: DISCUSSION AND APPROPRIATE ACTION REGARDING A MOTION RECOMMENDING THE SAN ANTONIO RIVER AUTHORITY INITIATE CONTRACTING WITH ONE OF THE RESPONDENT FIRMS FOR THE POSITION OF REGION L TECHNICAL CONSULTANT

Discussion of the merits and drawbacks of each of the two consultant firms ensued.

Mr. Ramos motioned to select Black & Veatch to be engaged in contract through the San Antonio River Authority. Ms. Bryant seconded the motion. Mr. Taylor voiced his support for the motion during time for comments. Mr. Taggart requested to take the motion to a vote.

The motion passed 13 to 9.

AGENDA ITEM 10: PUBLIC COMMENT

No public comments.

AGENDA ITEM 11: ADJOURN

Meeting adjourned at 12:02 PM.

Parameter	Solids, Total Dissolved (g/L)

	Count of Parameter Measurement	Average of Parameter Measurement
2017	4	1.146
2018	8	1.338
2019	7	1.270
2020	1	1.700
2021	5	1.054
Grand Total	**25**	**1.246**

Average of Parameter Measurement	2017	2018	2019	2020	2021
(Calhoun County GCD - GW-00001)	2.198	2.186	2.260		2.200
(Calhoun County GCD - GW-00002)	0.791	0.776			
(Calhoun County GCD - GW-00003)	0.578	0.571	0.603		0.601
(Calhoun County GCD - GW-00004)	1.017	1.017	1.051		1.030
(Calhoun County GCD - GW-00014)					0.766
(Calhoun County GCD - GW-00016)		2.171			
(Calhoun County GCD - NW-00024)			1.061		
(Calhoun County GCD - NW-00033)					0.671
(Calhoun County GCD - NW-00043)				1.700	

fid	GCD	GCD Source Document ID	GCD Water Well ID	Measurement Date	Measurement Method	Parameter	Parameter Measurement	Non Detection YN
2441	Calhoun County GCD	Calhoun County GCD - WQM-20170929-01	(Calhoun County GCD - GW-00001)	9/29/2017	Conductivity Conversion	Solids, Total Dissolved (g/L)	2.198	
2447	Calhoun County GCD	Calhoun County GCD - WQM-20170929-04	(Calhoun County GCD - GW-00002)	9/29/2017	Conductivity Conversion	Solids, Total Dissolved (g/L)	0.791	
2455	Calhoun County GCD	Calhoun County GCD - WQM-20170929-02	(Calhoun County GCD - GW-00003)	9/29/2017	Conductivity Conversion	Solids, Total Dissolved (g/L)	0.578	
2463	Calhoun County GCD	Calhoun County GCD - WQM-20170929-03	(Calhoun County GCD - GW-00004)	9/29/2017	Conductivity Conversion	Solids, Total Dissolved (g/L)	1.017	
2850	Calhoun County GCD	Calhoun County GCD - WQM-20180424-01	(Calhoun County GCD - GW-00001)	4/24/2018	Conductivity Conversion	Solids, Total Dissolved (g/L)	2.178	
2857	Calhoun County GCD	Calhoun County GCD - WQM-20180424-05	(Calhoun County GCD - GW-00002)	4/24/2018	Conductivity Conversion	Solids, Total Dissolved (g/L)	0.775	
2864	Calhoun County GCD	Calhoun County GCD - WQM-20180424-03	(Calhoun County GCD - GW-00004)	4/24/2018	Conductivity Conversion	Solids, Total Dissolved (g/L)	1.01	
2872	Calhoun County GCD	Calhoun County GCD - WQM-20180424-02	(Calhoun County GCD - GW-00016)	4/24/2018	Conductivity Conversion	Solids, Total Dissolved (g/L)	2.171	
3096	Calhoun County GCD	Calhoun County GCD - WQM-20180813-01	(Calhoun County GCD - GW-00001)	8/13/2018	Conductivity Conversion	Solids, Total Dissolved (g/L)	2.194	
3103	Calhoun County GCD	Calhoun County GCD - WQM-20180813-03	(Calhoun County GCD - GW-00002)	8/13/2018	Conductivity Conversion	Solids, Total Dissolved (g/L)	0.777	
3109	Calhoun County GCD	Calhoun County GCD - WQM-20180813-04	(Calhoun County GCD - GW-00003)	8/13/2018	Conductivity Conversion	Solids, Total Dissolved (g/L)	0.571	
3116	Calhoun County GCD	Calhoun County GCD - WQM-20180813-02	(Calhoun County GCD - GW-00004)	8/13/2018	Conductivity Conversion	Solids, Total Dissolved (g/L)	1.024	
3387	Calhoun County GCD	Calhoun County GCD - WQM-20190219-01	(Calhoun County GCD - GW-00001)	2/19/2019	Conductivity Conversion	Solids, Total Dissolved (g/L)	2.178	
3395	Calhoun County GCD	Calhoun County GCD - WQM-20190219-05	(Calhoun County GCD - GW-00003)	2/19/2019	Conductivity Conversion	Solids, Total Dissolved (g/L)	0.58	
3402	Calhoun County GCD	Calhoun County GCD - WQM-20190219-04	(Calhoun County GCD - GW-00004)	2/19/2019	Conductivity Conversion	Solids, Total Dissolved (g/L)	1.023	
4130	Calhoun County GCD	Calhoun County GCD - WQM-20190820-01	(Calhoun County GCD - NW-00024)	8/20/2019	(Calibrated Probe)	Solids, Total Dissolved (g/L)	1.061	
4139	Calhoun County GCD	Calhoun County GCD - WQM-20190820-04	(Calhoun County GCD - GW-00001)	8/20/2019	(Calibrated Probe)	Solids, Total Dissolved (g/L)	2.342	
4140	Calhoun County GCD	Calhoun County GCD-WQFM-20200131.1100	(Calhoun County GCD - NW-00043)	1/31/2020	Conductivity Conversion	Solids, Total Dissolved (g/L)	1.7	No
4141	Calhoun County GCD	Calhoun County GCD-WQFM-20190820-03	(Calhoun County GCD - GW-00003)	8/20/2019	Conductivity Conversion	Solids, Total Dissolved (g/L)	0.626	No
4142	Calhoun County GCD	Calhoun County GCD-WQFM-201908-02	(Calhoun County GCD - GW-00004)	8/20/2019	Conductivity Conversion	Solids, Total Dissolved (g/L)	1.078	No
4143	Calhoun County GCD	Calhoun County GCD-WQFM-20210811.1523	(Calhoun County GCD - NW-00033)	8/11/2021	Conductivity Conversion	Solids, Total Dissolved (g/L)	0.671	No
4144	Calhoun County GCD	Calhoun County GCD-WQFM-20210812.1251	(Calhoun County GCD - GW-00001)	8/12/2021	Conductivity Conversion	Solids, Total Dissolved (g/L)	2.2	No
4145	Calhoun County GCD	Calhoun County GCD-WQFM-20210812.0936	(Calhoun County GCD - GW-00004)	8/12/2021	Conductivity Conversion	Solids, Total Dissolved (g/L)	1.03	No
4146	Calhoun County GCD	Calhoun County GCD-WQFM-20210812.1208	(Calhoun County GCD - GW-00003)	8/12/2021	Conductivity Conversion	Solids, Total Dissolved (g/L)	0.601	No
4147	Calhoun County GCD	Calhoun County GCD-WQFM-20210812.1048	(Calhoun County GCD - GW-00014)	8/12/2021	Conductivity Conversion	Solids, Total Dissolved (g/L)	0.766	No

Groundwater Conservation Program

The program enables the District to promote activities that conserve and preserve the water resources of Calhoun County. The District promotes activities su rainwater harvesting, efficient use of groundwater, conjunctive use of groundwater and surface water, prevention of subsidence, prevention of waste, brush m recharge enhancement.

Contact Tim Andruss, General Manager to discuss matters related to groundwater conservation at:

- phone: (361) 579-6863
- email: tim.andruss@vcgcd.org

The Management Plan of the District defines groundwater conservation as "the activity and practice of seeking to use a groundwater resource in a manner tha appropriately balances the impacts associated with consuming the resource and preserving the resource for the future." The District under takes many activiti achieve the "appropriate balance" between groundwater use and groundwater preservation including 1) establishing conservative desired future conditions fo County, 2) adopting rules that allow for limited groundwater production, 3) monitoring water levels and water quality of groundwater resources in Calhoun Cou evaluating aquifer conditions using scientifically-credible methods.

Promotion of Rainwater Harvesting: the District encourages all water users to investigate rainwater harvesting as a means of developing alternate water s Additional information regarding rainwater harvesting can be viewed at the following website of the Texas A&M Agrilife Extension: rainwaterharvesting.tamu.edu/rainwater-basics/.

Promotion of Efficient Use of Groundwater: the District encourages all users of groundwater to investigate methods of increasing water usage efficiency. information regarding water efficiency opportunities can be viewed at the following website of the Office of Energy Efficiency and Renewable Energy: www.energy.gov/eere/femp/water-efficient-technology-opportunity-sprinkler-automatic-shut-devices.

Promotion of Conjunctive Use of Groundwater and Surface Water: the District encourages water users to examine conjunctive use practices when consi development of water supply projects that involve groundwater resources. The combined use of groundwater resources with surface water may optimize the characteristics of each source and conserve and preserve groundwater resources. Additional information regarding innovative water technologies related to c use can be viewed at the following website of the Texas Water Development Board: www.twdb.texas.gov/innovativewater/

Promotion of Subsidence Prevention: the District encourages groundwater producers to investigate causes of subsidence, the vulnerability of areas within to subsidence caused by groundwater production, and methods of developing groundwater resources to prevent subsidence caused by or contributed to by th groundwater production. Additional information regarding subsidence can be viewed at the following website of the Texas Water Development Board: www.twdb.texas.gov/groundwater/models/research/subsidence/subsidence.asp

Promotion of Brush Management: the District encourages landowners to investigate the brush management as a means of potentially enhancing recharge groundwater resources. Additional information regarding brush management and the effect on water resources can be viewed at the following site of the Unit Geological Survey: www.usgs.gov/centers/ot-water/science/effects-huisache-removal-evapotranspiration?qt-science_center_objects=0#qt-science_center_o

Promotion of Recharge Enhancement: the District encourages large-scale groundwater producers to investigate strategies to enhance recharge, including storage and recovery projects, as a means of conserving and preserving groundwater resources through conjunctive use. Additional information regarding ac storage and recovery can be viewed at the following website of the Texas Water Development Board: www.twdb.texas.gov/innovativewater/asr/index.asp

Parameter	Water Level Depth Below Surface (ft)

	Count of Parameter Measurement	Average of Parameter Measurement
2000	8	20.4
2010	4	21.4
2017	2	23.6
2018	4	24.8
2019	9	26.0
2020	14	25.7
2021	13	26.3
Grand Total	**54**	**24.6**

Parameter	Water Level Depth Below Surface (ft)

Average of Parameter Measurement2								
	2000	**2010**	**2017**	**2018**	**2019**	**2020**	**2021**	
(Calhoun County GCD - GW-00009)	31.9	30.8			25.6	32.4	32.6	0.2
(Calhoun County GCD - NW-00033)						31.5	35.7	4.2
(Calhoun County GCD - NW-00024)					29.9	28.9	27.7	-1.1
(Calhoun County GCD - GW-00005)			30.6	30.4	29.8	28.8	28.1	-0.7
(Calhoun County GCD - GW-00001)				23.3	19.7	21.2	19.9	-1.3
(Calhoun County GCD - NW-00009)						19.6	19.3	-0.3
(Calhoun County GCD - NW-00043)						19.0		
(Calhoun County GCD - GW-00003)			16.6	15.4	23.8	16.5	16.5	0.0
(Calhoun County GCD - GW-00007)	18.4	14.2						
(Calhoun County GCD - GW-00014)	20.7	17.6					17.8	
(Calhoun County GCD - GW-00012)	20.0							
(Calhoun County GCD - GW-00008)	24.5	23.0						
(Calhoun County GCD - GW-00013)	9.4							
(Calhoun County GCD - GW-00010)	20.9							
(Calhoun County GCD - GW-00011)	17.5							
	Water Level Change from CY2020 to CY2021:							**0.1**

fid	GCD	GCD Source Document ID	GCD Water Well ID	Measurement Date	Measurement Method	Parameter	Parameter Measurement	Non Detection YN
22	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00007)	2/22/2000	Steel Tape	Water Level Depth Below Surface (ft)	18.39	
23	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00008)	2/22/2000	Steel Tape	Water Level Depth Below Surface (ft)	24.48	
24	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00009)	2/22/2000	Steel Tape	Water Level Depth Below Surface (ft)	31.86	
25	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00010)	2/22/2000	Steel Tape	Water Level Depth Below Surface (ft)	20.92	
26	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00011)	2/22/2000	Steel Tape	Water Level Depth Below Surface (ft)	17.54	
27	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00012)	2/22/2000	Steel Tape	Water Level Depth Below Surface (ft)	20	
28	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00013)	2/22/2000	Steel Tape	Water Level Depth Below Surface (ft)	9.39	
29	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00014)	2/22/2000	Steel Tape	Water Level Depth Below Surface (ft)	20.69	
131	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00007)	2/9/2010	Steel Tape	Water Level Depth Below Surface (ft)	14.21	
132	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00008)	2/9/2010	Steel Tape	Water Level Depth Below Surface (ft)	23.01	
133	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00009)	2/9/2010	Steel Tape	Water Level Depth Below Surface (ft)	30.76	
134	Calhoun County GCD	Calhoun County GCD - WLM-20180206-01	(Calhoun County GCD - GW-00014)	2/9/2010	Steel Tape	Water Level Depth Below Surface (ft)	17.61	
2458	Calhoun County GCD	Calhoun County GCD - WLM-20170929-01	(Calhoun County GCD - GW-00003)	9/29/2017	Steel Tape	Water Level Depth Below Surface (ft)	16.6	
2465	Calhoun County GCD	Calhoun County GCD - WLM-20170929-02	(Calhoun County GCD - GW-00005)	9/29/2017	Steel Tape	Water Level Depth Below Surface (ft)	30.55	
2867	Calhoun County GCD	Calhoun County GCD - WLM-20180424-04	(Calhoun County GCD - GW-00005)	4/24/2018	Steel Tape	Water Level Depth Below Surface (ft)	30.05	
3098	Calhoun County GCD	Calhoun County GCD - WLM-20180813-01	(Calhoun County GCD - GW-00001)	8/13/2018	Steel Tape	Water Level Depth Below Surface (ft)	23.28	
3111	Calhoun County GCD	Calhoun County GCD - WLM-20180813-03	(Calhoun County GCD - GW-00003)	8/13/2018	Steel Tape	Water Level Depth Below Surface (ft)	15.4	
3118	Calhoun County GCD	Calhoun County GCD - WLM-20180813-02	(Calhoun County GCD - GW-00005)	8/13/2018	Steel Tape	Water Level Depth Below Surface (ft)	30.66	
3390	Calhoun County GCD	Calhoun County GCD - WLM-20190219-01	(Calhoun County GCD - GW-00001)	2/19/2019	Steel Tape	Water Level Depth Below Surface (ft)	18.13	
3405	Calhoun County GCD	Calhoun County GCD - WLM-20190219-04	(Calhoun County GCD - GW-00005)	2/19/2019	Steel Tape	Water Level Depth Below Surface (ft)	29.15	
3406	Calhoun County GCD	Calhoun County GCD - WLM-20190219-06	(Calhoun County GCD - GW-00009)	2/19/2019	Steel Tape	Water Level Depth Below Surface (ft)	24.5	
3407	Calhoun County GCD	Calhoun County GCD - WLM-20190219-03	(Calhoun County GCD - NW-00024)	2/19/2019	Steel Tape	Water Level Depth Below Surface (ft)	29.1	
3591	Calhoun County GCD	Calhoun County GCD - WLM-20190812-04	(Calhoun County GCD - GW-00003)	8/12/2019	Steel Tape	Water Level Depth Below Surface (ft)	23.75	
3592	Calhoun County GCD	Calhoun County GCD - WLM-20190812-03	(Calhoun County GCD - GW-00009)	8/12/2019	Steel Tape	Water Level Depth Below Surface (ft)	26.7	
3593	Calhoun County GCD	Calhoun County GCD - WLM-20190812-02	(Calhoun County GCD - GW-00005)	8/12/2019	Steel Tape	Water Level Depth Below Surface (ft)	30.5	
3607	Calhoun County GCD	Calhoun County GCD - WLM-20190812-05	(Calhoun County GCD - GW-00001)	8/12/2019	Steel Tape	Water Level Depth Below Surface (ft)	21.28	
3608	Calhoun County GCD	Calhoun County GCD - WLM-20190812-01	(Calhoun County GCD - NW-00024)	8/12/2019	Steel Tape	Water Level Depth Below Surface (ft)	30.78	
4121	Calhoun County GCD	Calhoun County GCD - WLM-20200211-05	(Calhoun County GCD - GW-00009)	2/11/2020	Steel Tape	Water Level Depth Below Surface (ft)	31.6	
4122	Calhoun County GCD	Calhoun County GCD - WLM-20200211-07	(Calhoun County GCD - GW-00001)	2/11/2020	Steel Tape	Water Level Depth Below Surface (ft)	19	
4123	Calhoun County GCD	Calhoun County GCD - WLM-20200211-04	(Calhoun County GCD - NW-00033)	2/11/2020	Steel Tape	Water Level Depth Below Surface (ft)	32.54	
4124	Calhoun County GCD	Calhoun County GCD - WLM-20200211-03	(Calhoun County GCD - NW-00009)	2/11/2020	Steel Tape	Water Level Depth Below Surface (ft)	17.9	
4132	Calhoun County GCD	Calhoun County GCD - WLM-20200211-01	(Calhoun County GCD - NW-00024)	2/11/2020	Steel Tape	Water Level Depth Below Surface (ft)	29.64	
4133	Calhoun County GCD	Calhoun County GCD - WLM-20200211-02	(Calhoun County GCD - GW-00005)	2/11/2020	Steel Tape	Water Level Depth Below Surface (ft)	28.86	
4212	Calhoun County GCD	Calhoun County GCD - WLM-20200131-01	(Calhoun County GCD - NW-00043)	1/31/2020	Steel Tape	Water Level Depth Below Surface (ft)	19	
4213	Calhoun County GCD	Calhoun County GCD - WL-20200827-01	(Calhoun County GCD - NW-00033)	8/27/2020	Steel Tape	Water Level Depth Below Surface (ft)	30.48	
4214	Calhoun County GCD	Calhoun County GCD - WLM-20200827-02	(Calhoun County GCD - NW-00024)	8/27/2020	Steel Tape	Water Level Depth Below Surface (ft)	28.1	
4215	Calhoun County GCD	Calhoun County GCD - WLM-20200827-03	(Calhoun County GCD - GW-00005)	8/27/2020	Steel Tape	Water Level Depth Below Surface (ft)	28.8	
4216	Calhoun County GCD	Calhoun County GCD - WLM-20200827-04	(Calhoun County GCD - NW-00009)	8/27/2020	Steel Tape	Water Level Depth Below Surface (ft)	21.25	
4217	Calhoun County GCD	Calhoun County GCD - WLM-20200827-05	(Calhoun County GCD - GW-00009)	8/27/2020	Steel Tape	Water Level Depth Below Surface (ft)	33.18	
4218	Calhoun County GCD	Calhoun County GCD - WLM-20200827-06	(Calhoun County GCD - GW-00003)	8/27/2020	Steel Tape	Water Level Depth Below Surface (ft)	16.5	
4219	Calhoun County GCD	Calhoun County GCD - WLM-20200827-07	(Calhoun County GCD - GW-00001)	8/27/2020	Steel Tape	Water Level Depth Below Surface (ft)	23.3	
4220	Calhoun County GCD	Calhoun County GCD - WLM-20210311-07	(Calhoun County GCD - GW-00001)	3/11/2021	Steel Tape	Water Level Depth Below Surface (ft)	19.6	No
4221	Calhoun County GCD	Calhoun County GCD - WLM-20210311-06	(Calhoun County GCD - GW-00003)	3/11/2021	Steel Tape	Water Level Depth Below Surface (ft)	16.5	No
4222	Calhoun County GCD	Calhoun County GCD - WLM-20210311-05	(Calhoun County GCD - GW-00009)	3/11/2021	Steel Tape	Water Level Depth Below Surface (ft)	32.5	No
4223	Calhoun County GCD	Calhoun County GCD - WLM-20210311-04	(Calhoun County GCD - NW-00009)	3/11/2021	Steel Tape	Water Level Depth Below Surface (ft)	19.3	No
4224	Calhoun County GCD	Calhoun County GCD - WLM-20210311-03	(Calhoun County GCD - GW-00005)	3/11/2021	Steel Tape	Water Level Depth Below Surface (ft)	29	No
4225	Calhoun County GCD	Calhoun County GCD - WLM-20210311-02	(Calhoun County GCD - NW-00024)	3/11/2021	Steel Tape	Water Level Depth Below Surface (ft)	27.8	No
4226	Calhoun County GCD	Calhoun County GCD - WLM-20210311-01	(Calhoun County GCD - NW-00033)	3/11/2021	Steel Tape	Water Level Depth Below Surface (ft)	33.65	No
4227	Calhoun County GCD	Calhoun County GCD - WLM-20210811-01	(Calhoun County GCD - NW-00033)	8/11/2021	Steel Tape	Water Level Depth Below Surface (ft)	37.8	No
4228	Calhoun County GCD	Calhoun County GCD - WLM-20210812-01	(Calhoun County GCD - NW-00024)	8/12/2021	Steel Tape	Water Level Depth Below Surface (ft)	27.65	No
4229	Calhoun County GCD	Calhoun County GCD - WLM-20210812-02	(Calhoun County GCD - GW-00005)	8/12/2021	Steel Tape	Water Level Depth Below Surface (ft)	27.2	No
4230	Calhoun County GCD	Calhoun County GCD - WLM-20210812-03	(Calhoun County GCD - GW-00014)	8/12/2021	Steel Tape	Water Level Depth Below Surface (ft)	17.8	No
4231	Calhoun County GCD	Calhoun County GCD - WLM-20210812-04	(Calhoun County GCD - GW-00009)	8/12/2021	Steel Tape	Water Level Depth Below Surface (ft)	32.6	No
4232	Calhoun County GCD	Calhoun County GCD - WLM-20210812-05	(Calhoun County GCD - GW-00001)	8/12/2021	Steel Tape	Water Level Depth Below Surface (ft)	20.1	No

Draft: Application of Geostatistical Techniques to Quantify Changes in Water Levels

Prepared for:

Calhoun County Groundwater Conservation District
Refugio Groundwater Conservation District
Texana Groundwater Conservation District
Victoria County Groundwater Conservation District

Prepared by:

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

April 2021

Draft: Application of Geostatistical Techniques to Quantify Changes in Water Levels

Prepared by:

Steven C. Young, Ph.D., P.E., P.G.
Ross Kushnereit, GIT
Lakin Beal
Tingting Yan
Hai Pham, Ph.D.,

INTERA Incorporated
Austin, Texas 78754

EXECUTIVE SUMMARY

The study accomplished the following tasks 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.

Dataset of Measured Water Levels

Water level data were assembled from 658 wells from the TWDB groundwater database for Calhoun, Jackson, Refugio, and Victoria counties and for nine surrounding counties. Groundwater data were also assembled from 258 wells from the four GCDs that manage groundwater in Calhoun, Jackson, Refugio, and Victoria counties. The integration of the two data sets included identifying wells that were shared in both data sets but were assigned different names. One hundred twenty-seven wells were matched between the two data sets based on well depths, well location, and measured water levels. Annual water levels were determined for each year using measured water levels over a 6-month period. A total of 6,081 annual water levels were created from 2000 through 2020 at 801 wells for the 13 counties. Out of the 801 wells, 253 of the wells were located in Calhoun, Jackson, Refugio, and Victoria counties.

Spatial Interpolation of Measured Groundwater Elevations

Ordinary Kriging was used to interpolate the annual water levels. 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 to apply Kriging, the measured water levels were detrended prior to the application of Kriging using water levels simulated by the central Gulf Coast Groundwater Availability Model (GAM). Ordinary Kriging was implemented using a six-step process described below:

Step #1 - Assemble and inspect the data for evidence of a trend.

Step #2 – Develop a trend surface based on a smoothing the water levels simulated by the GAM.

Step #3 – Calculate the residual at each well location -- a residual is the difference between the measured value and value produced by the trend. Check whether the set of calculated residuals are normally distributed. If the residuals do not resemble a normal distribution, then repeat Step #2.

Step #4 – Construct an experimental and a theoretical semivariogram for the set of residuals for the Chicot Aquifer and for the Evangeline Aquifer.

Step #5 – Krige the residuals to produce a continuous surface across the area of interest.

Step #6 – Combine the trend surface and the Kriged surface to generate the final surface.

The residuals calculated in Step #3 were shown to approximate a normal distribution based on visual comparisons of the theoretical and actual distribution function and by statistical comparison using Liffiefors test for normality based on the Kolmogorov-Smirnov test. All of the experimental semivariograms generated from the analysis were fitted to spherical theoretical variogram models.

Ordinary Kriging 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 combing the Chicot and Evangeline aquifers into single aquifer. The interpolation generated interpolated surfaces with a resolution of 1,000 feet (ft) for each year from 2000 to 2020. Using these surfaces, the average water levels were calculated by county and by year. The tabulation below shows results for the results at five-year intervals.

County	Aquifer	Water Level Metric	2000	2005	2010	2015	2020
Calhoun County	Chicot	avg. WL (ft, msl)	-7.0	1.9	-2.6	-7.7	-2.6
		WL change (ft)*	0.0	8.9	4.4	-0.6	4.5
	Evangeline	avg. WL (ft, msl)	17.7	13.3	18.1	3.6	16.4
		WL change (ft)*	0.0	-4.4	0.4	-14.2	-1.3
	Chicot & Evangeline	avg. WL (ft, msl)	-3.2	3.3	0.4	-6.1	0.5
		WL change (ft)*	0.0	6.6	3.6	-2.8	3.7
Jackson County	Chicot	avg. WL (ft, msl)	21.3	29.3	27.1	22.1	28.0
		WL change (ft)*	0.0	8.0	5.8	0.8	6.7
	Evangeline	avg. WL (ft, msl)	17.0	22.0	17.1	12.0	15.9
		WL change (ft)*	0.0	5.1	0.1	-4.9	-1.0
	Chicot & Evangeline	avg. WL (ft, msl)	19.0	25.6	22.0	16.9	21.9
		WL change (ft)*	19.1	6.6	3.0	-2.1	2.9
Refugio County	Chicot	avg. WL (ft, msl)	24.8	28.3	22.7	14.5	18.4
		WL change (ft)*	0.0	3.5	-2.1	-10.3	-6.4
	Evangeline	avg. WL (ft, msl)	32.5	40.7	21.7	22.3	30.9
		WL change (ft)*	0.0	8.1	-10.8	-10.3	-1.7
	Chicot & Evangeline	avg. WL (ft, msl)	26.3	31.8	20.7	16.7	22.6
		WL change (ft)*	0.0	5.6	-5.5	-9.5	-3.7
Victoria County	Chicot	avg. WL (ft, msl)	49.8	52.6	52.8	48.2	47.9
		WL change (ft)*	0.0	2.8	3.0	-1.6	-1.9
	Evangeline	avg. WL (ft, msl)	29.8	48.9	44.8	41.4	39.1
		WL change (ft)*	0.0	19.1	15.0	11.5	9.3
	Chicot & Evangeline	avg. WL (ft, msl)	41.3	52.2	50.2	46.3	45.1
		WL change (ft)*	0.0	10.9	8.9	5.0	3.8

Note: WL=water level elevation, change is measured relative to 2000; ft = feet; msl = mean sea level
negative numbers indicate a decline in groundwater elevation over time

Alternative Water Level Maps

Because the method used to detrend and Krige the measured water levels has not been used in Texas prior to this study, the method was compared to several alternative methods for constructing water level maps to investigate the sensitivity of the results to changes in the method's implementation and to compare the results produced by alternative methods. Among some of the notable observations are:

- The Kriged values results are not very sensitive to the amount the GAM-simulated water levels are smoothed to generate the trend surface used for detrending.
- The Kriged results can be very sensitive if the trend surface is updated to account for annual differences in the GAM simulations that account for different pumping rates.
- The Kriging of water levels without detrending can produce significantly different results than Kriging with detrending.
- The results for the Evangeline Aquifer are more sensitive to changes in how Kriging is performed than results for the Chicot Aquifer.

Spatial and Temporal Changes in Water Levels

The surfaces generated by Kriging the measured water levels were used to generate maps showing the spatial distribution of water level change across Calhoun, Jackson, Refugio, and Victoria counties. The maps were generated for the Chicot Aquifer and the Evangeline Aquifer for 20-, 10-, and 5-year intervals. Notable changes from 2000 to 2020 are:

Calhoun County

- Chicot Aquifer: Water levels rose across about 80% of the county. The largest increase of about 20 ft occurred in northeast. Areas of decrease occurred in northwest and north regions.
- Evangeline Aquifer: Water levels dropped across about 70% of the county. The largest decrease of about 7 ft occurred in the northeast.

Jackson County

- Chicot Aquifer: Water levels rose across about 90% of the county. Increases of about 25 ft occurred in northeast and of about 20 ft occurred in south. In the remaining areas, water levels dropped less than 5 ft.
- Evangeline Aquifer: Water levels increased across about 50% of the county with the largest increase of about 12 ft occurring in the northern region. Water levels dropped across the remaining county with the greatest decline of 10 ft occurring in the southern region.

Refugio County

- Chicot Aquifer: Water levels dropped across about 70% of the county and in the northwest region where the largest decrease of about 27 ft occurred near the Goliad county line. An increase of less than 5 ft occurred across most of the southeastern portion of the county.
- Evangeline Aquifer: Water levels decreased across about 75% of the county with the largest decline of 15 ft in the north-central region of the county.

Victoria County

- Chicot Aquifer: Water levels increased across about 50% of the county and primarily in the northeast region. The largest increase of about 25 ft occurred at the center of the county. Water levels dropped in the southwest region where the largest decrease was about 15 ft.

- Evangeline Aquifer: Water levels rose across about 60% of the county and primarily in the northwest portion of the county. The largest increase of about 70 ft occurred at the center of the county. In southwest region of the county, changes in the groundwater levels ranged from about a 10 ft increase to a 20 ft decrease.

Hydrographs were generated for wells with annual water levels that are located in Calhoun, Jackson, Refugio, and Victoria counties. Hydrographs with more than four measured water level are presented and discussed in Section 6. In about half of the wells, the changes in the measured water levels over time are relatively flat (stable) over time. At about 60% of these wells, the GAM simulated water levels also were characterized as being relatively flat over time. For the wells, where there was a recognizable increase or decrease in the measured water levels over time, only about 30% of GAM -simulated water levels matched the temporal trend associated with measured water levels.

Recommendations for Future Work

Recommendations for future work were grouped into three general categories: (1) coordinating with the TWDB to integrate the GCD well information into the TWDB groundwater database; (2) expanding the monitoring well network and monitoring programs; and (3) expanding and improving on the geostatistical analysis provided in this study.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACROYNMS AND ABBREVIATIONS

CDF cumulative density function

DFC desired future condition
DEM digital elevation model

ft feet

GAM groundwater availability model
GCD groundwater conservation district
GMA groundwater management area

TWC Texas Water Code
TWDB Texas Water Development Board

1.0 INTRODUCTION

As stated in §36.1005 of the Texas Water Code (TWC), groundwater conservation districts (GCDs) are the state's preferred method of groundwater management. The responsibilities of GCDs include the monitoring and analysis of groundwater levels to assess the conditions of the groundwater resource. In recognizing the value of using best science available to develop and implement their rule-making, four GCDs in Groundwater Management Area (GMA) 15 funded this study to use geostatistical techniques to interpret measured water levels for the purpose of quantifying change across an aquifer and evaluating compliance with Desired Future Conditions (DFCs). The four GCDs are: Calhoun County GCD, Refugio GCD, Texana GCD, and Victoria County GCD.

1.1 Project Overview

The project overview provides a brief introduction to the study area and lists the project objectives.

1.1.1 Study Area

Figure 1-1 shows the location of Calhoun County GCD, Refugio GCD, Texana GCD, and Victoria County GCD. The four GCDs are part of GMA 15. Figure 1-1 shows the boundary for GMA 15, which includes all or parts of fourteen counties. GMAs were created by the Texas legislature "in order to provide for the conservation, preservation, protection, recharging, and prevention of waste of the groundwater, and of groundwater reservoirs or their subdivisions, and to control subsidence caused by withdrawal of water from those groundwater reservoirs or their subdivisions" (TWC §35.001).

The primary groundwater reservoir in GMA 15 is the Gulf Coast Aquifer System. GMA 15 is currently using the central Gulf Coast Groundwater Availability Model (GAM) (Chowdhury and others, 2004) for assessing impacts of pumping on groundwater levels in the Gulf Coast Aquifer System. The central Gulf Coast GAM represents the Gulf Coast Aquifer System as four major hydrogeologic units. These four units are, from youngest to oldest, the Chicot Aquifer, the Evangeline Aquifer, the Burkeville Confining Unit, and the Jasper Aquifer. As a general rule, the Burkeville Confining Unit is considered as a clay-rich unit with low potential for producing groundwater.

Figure 1-2 shows three vertical cross-sections through the GMA 15 GAM. The cross-sections show the upper and lower boundaries for the four units. As shown in Figure 1-2, all four units dip to the coast. Along the coastline, there are few water wells that penetrate below the lower portion of the Evangeline Aquifer because of relatively saline groundwater and because the depth is greater than 1000 feet (ft).

1.1.2 Study Objectives

This study has the three study objectives for Calhoun County GCD, Refugio GCD, Texana GCD, and Victoria County GCD:

- Employ appropriate geostatistical methods for interpolating water level conditions across the Chicot and Evangeline aquifers from each year from 2000 to 2020;

- Employ appropriate geostatistical methods for interpolating water level conditions over time for the Chicot and Evangeline aquifers;
- Develop technical reports documenting condition assessments and evaluations, data sources, methods, assumptions and rationale for selected methods and assumptions.

1.2 Report Outline

The report contains seven sections after this introduction (Section one). Section two describes the methods used to assemble the measured water levels for evaluating groundwater level conditions in the Chicot and Evangeline aquifers. Section three introduces geostatistical techniques, explains how geostatistical methods can be used to interpolate water levels, and discusses several potential benefits offered by geostatistics over conventional interpolation methods. Section four documents the application of detrending and ordinary Kriging to interpolate measured water levels and generate maps of contoured groundwater elevations for the Chicot and the Evangeline aquifers. Section five provides the change in annual average in water levels per county and measured water levels using well hydrographs. Section seven provides suggestions for future work. Section eight provides the references.

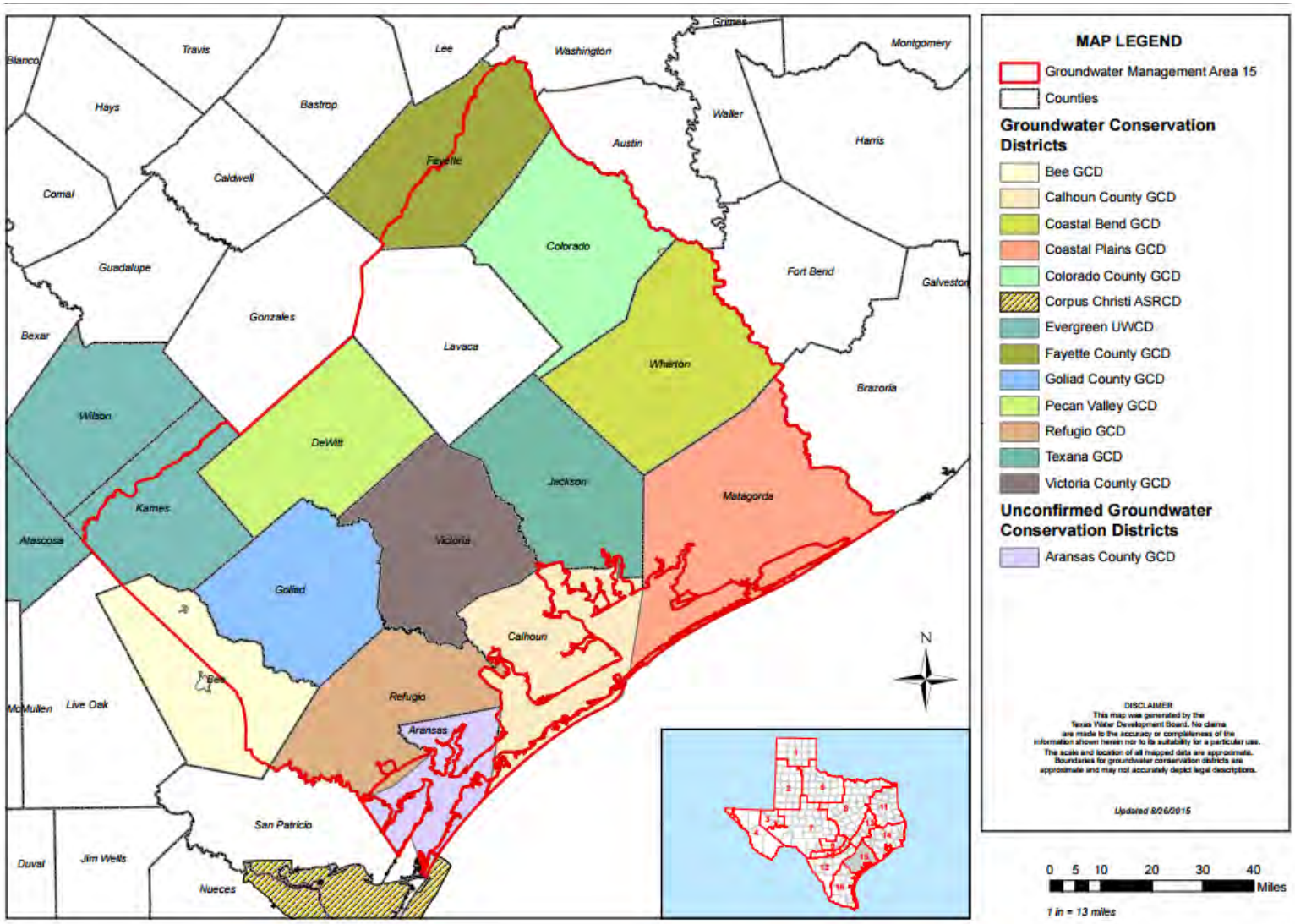


Figure 1-1 Delineation of GMA 15 showing locations of GCDs (obtained from http://www.twdb.texas.gov/groundwater/management_areas/gma15.asp)

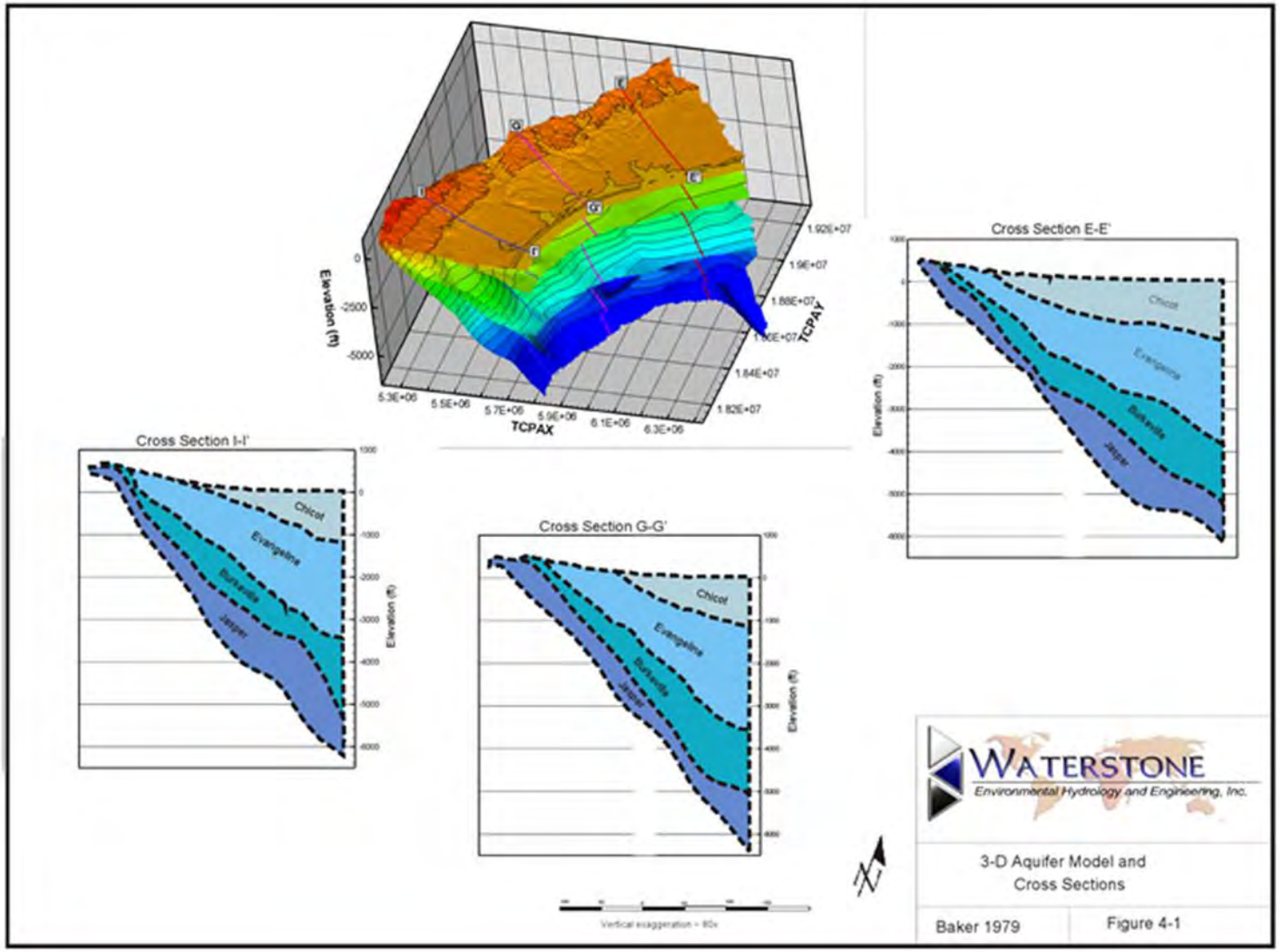


Figure 1-2 Vertical cross-sections through GMA 15 showing the four geological units that comprise the Gulf Coast Aquifer System: Chicot Aquifer, Evangeline Aquifer, Burkeville Unit, and the Jasper Aquifer (Waterstone and Parsons, 2003)

2.0 MEASURED WATER LEVELS

This section discusses the development of the measured water levels database used for the groundwater analysis.

2.1 Data Sources

Two sources of measured water levels were used for this study. Both data sets contained measured water levels for the period from 2000 to 2020. One data set was obtained from Calhoun County GCD, Refugio GCD, Texana GCD, and Victoria County GCD. The GCD data set consisted of 1,809 depth to water measurements at 256 wells for Calhoun, Jackson, Refugio, and Victoria counties. The second data set was the Texas Water Development Board (TWDB) groundwater data set. The TWDB data set consisted of 13,800 depth to water measurements at 658 wells. The TWDB data set was filtered to remove water levels that may have been affected by pumping by using appropriate flags in the TWDB data set. **Figure 2-1** shows the location of the wells associated with the GCD and TWDB data sets.

2.2 Merging of TWDB and GCD Datasets

As shown in Figure 2-1, the TWDB and GCD data sets include several of the same wells but with different names. INTERA's investigation method to verify 96 well pairs identified in the GCD data set was based on comparing well location, well depth, and water level data. Based on a comparison of these three attributes, INTERA identified 127 well pairs between the two data sets.

Appendix A lists the names and locations for the GCD and TWDB wells that are matched. Except for one well pair, the GCD and the TWDB data sets have different values for the location of the matched wells. Appendix A provides the distance calculated between the two well locations in the TWDB and the GCD data sets for each of the 127 well pairs. The locations of the matched wells in the GCD and TWDB are within 100 ft of each other for 105 of the 127 well pairs. For eight of the well pairs, the locations in the GCD and TWDB data sets are greater than 200 ft apart.

An important part of the process of identifying well pairs was the comparison of water levels in the GCD and the TWDB data sets. This comparison was performed visually using the type of plots shown in **Figure 2-2**. Figure 2-2 shows plots of water levels for four well pairs. Each plot shows measured water levels over time using the same datum. The TWDB water levels are shown using blue dots and the GCD water levels are shown using red dots that are slightly smaller than the blue dots. Potential well pairs were identified using information provided by the GCDs and a comparison of well locations and well depths in the two data sets. The final decision on whether two wells were determined to be a well pair was based on whether or not red dots plotted inside the blue dots for water levels measured on the same date. Merging of the two data water level data sets was achieved by augmenting the TWDB data set with any new data provided in the GCD data set.

The 127 well pairs include 88 of the 96 well pairs identified in the GCD database. **Table 2-1** shows the eight well pairs that were not confirmed based on the INTERA analysis. For four of the eight well pairs,

INTERA did not have sufficient information to confirm or reject the GCD well pair because the matched wells did not have measured water levels for the same date. For the other four well pairs identified by the GCD, INTERA had matched the GCD well with different TWDB well than the well provided in the GCD data set.

Table 2-1 List of eight well pairs in the GCD data set that were not confirmed by INTERA

GCD Well ID	TWDB Well ID	
	Paired by INTERA	Paired in GCD Data Set
Refugio GCD - NW-00475	7946803	7946810
Victoria County GCD - GW-000950	8018601	8016601
Victoria County GCD - GW-000603	7916703	7916603
Refugio GCD - NW-00340	8033203	8033205
Texana GCD - GW-00284	NA	8011502
Victoria County GCD - GW-000310	NA	8018404
Texana GCD - GW-00385	NA	8012502
Victoria County GCD - GW-000189	NA	7915306

The data set generated by merging the GCD and the TWDB data used the GCD-provided location and well depth instead of the TWDB-provided information where possible. The data used for land surface elevations for each well were obtained from three sources. The order of priority used for selecting the land surface elevation were: the GCD data set (if available), the TWDB data set (if available), and then the 30-meter Digital Elevation Model (DEM) for the Texas Gulf Coast.

The merging of the GCD and the TWDB data sets generated 889 unique wells. Each of the 889 wells were assigned a unique INTERA ID. **Appendix B** lists the 889 wells in the numerical order of their INTERA ID. For each well, Appendix B lists the GCD name (if assigned), the TWDB State well number (if assigned), the land surface elevation, the well depth, and the assigned aquifer.

Each well was assigned to a geologic unit based on the elevation of the bottom of the well. The bottom elevation was determined by subtracting the well depth from the ground surface elevation. The aquifer assignment was determined by where the well's bottom elevation is located in the three-dimensional numerical grid of the central Gulf Coast GAM (Chowdhury and others 2004). Wells with no well depth information were not assigned to a geologic unit and were instead assigned the category of "Shallow". Conversely, wells whose bottom elevation plotted below the lowest layer in the GAM were also not assigned to a geologic unit and were instead assigned the category of "Deep".

2.3 Average annual water level

A single annual water level average was calculated each year using measurements that were made over a 6-month period that spanned from October through December of the year before and from January through March of the current year. A total of 6,081 average winter water level averages are available from 2000 through 2020 at 801 wells. **Appendix C** lists the number of water level measurements that are available for the 6-month period from the TWDB data set and the GCD data set for 127 well pairs.

For 80 of these well pairs, the addition of the GCD data set increased the number of annual water level measurements.

2.4 Average annual water level

Table 2-2 lists the number of wells in Calhoun, Jackson, Refugio, and Victoria counties that were used in the study. These wells were assigned to an aquifer and have at least one annual water level calculated from 2000 to 2020. The locations of these wells are shown in **Figures 2-3** through **2-6**.

Table 2-2 Number of wells with measured water levels in Calhoun, Jackson, Refugio, and Victoria counties that were used in the study

County	Number of Wells		
	Chicot	Evangeline	Total
Calhoun	19	0	19
Jackson	68	8	76
Refugio	26	9	35
Victoria	53	70	123
Total	166	87	253

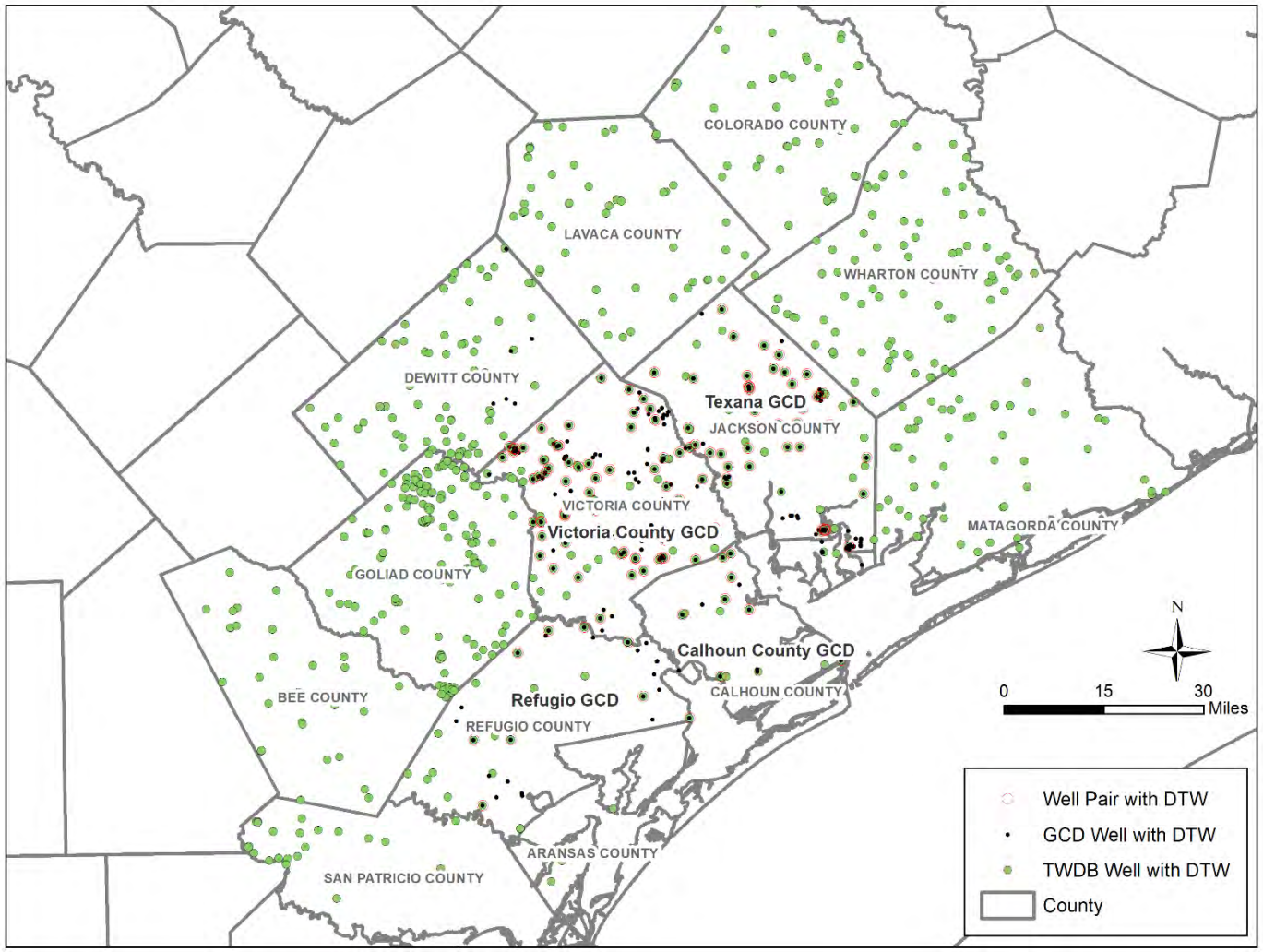


Figure 2-1 Location of the wells with measured depth to water (DTW) that were evaluated for this study

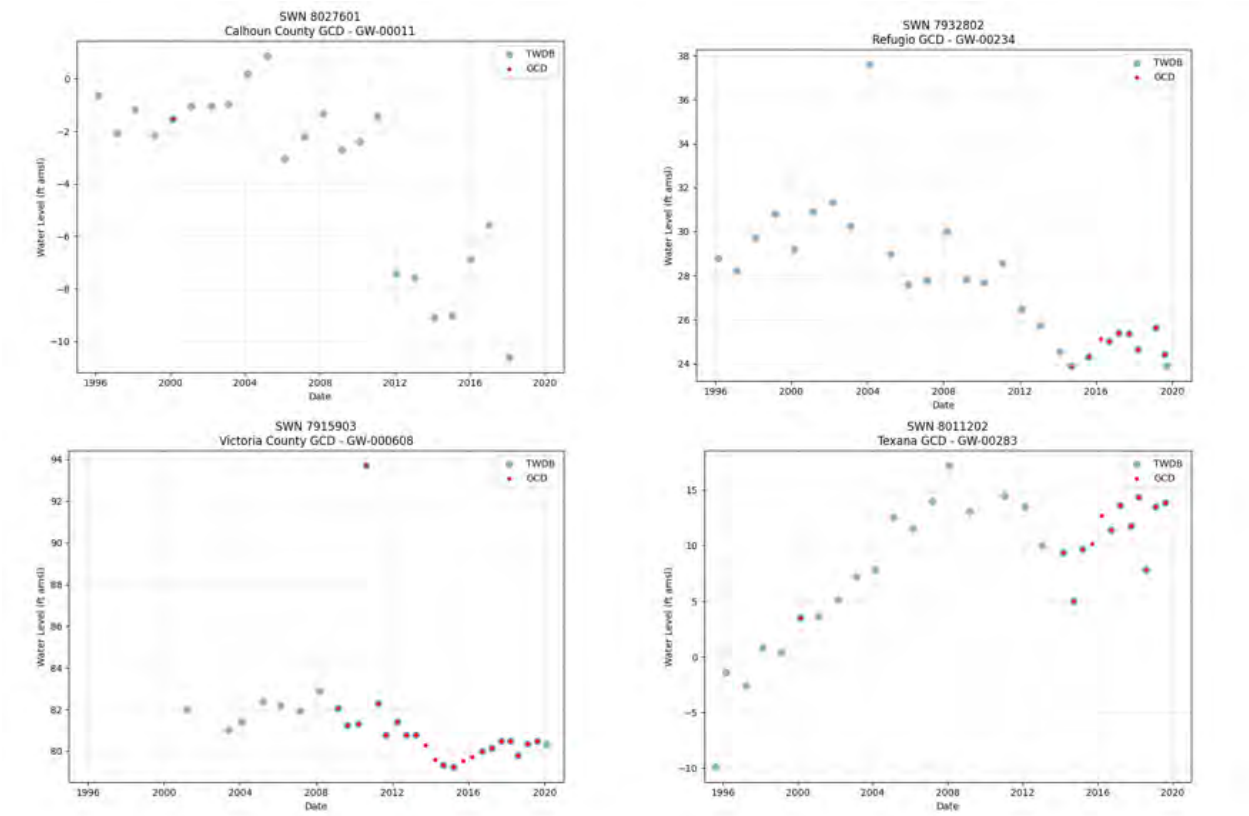


Figure 2-2 Comparison of measured water levels from the GCD and the TWDB data sets for four well pairs

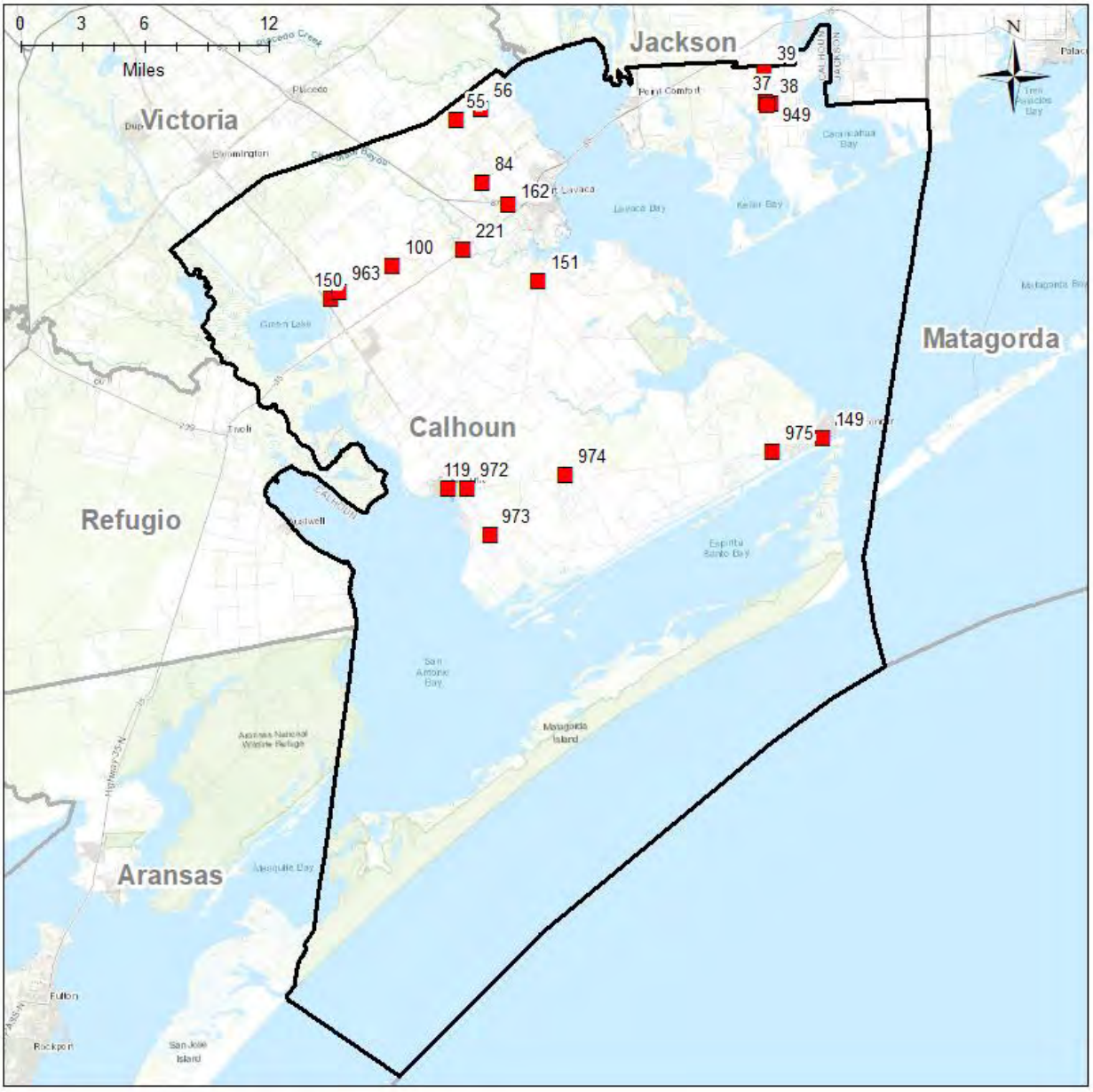


Figure 2-3 Location and INTERA IDs for water wells in Calhoun County used for this study

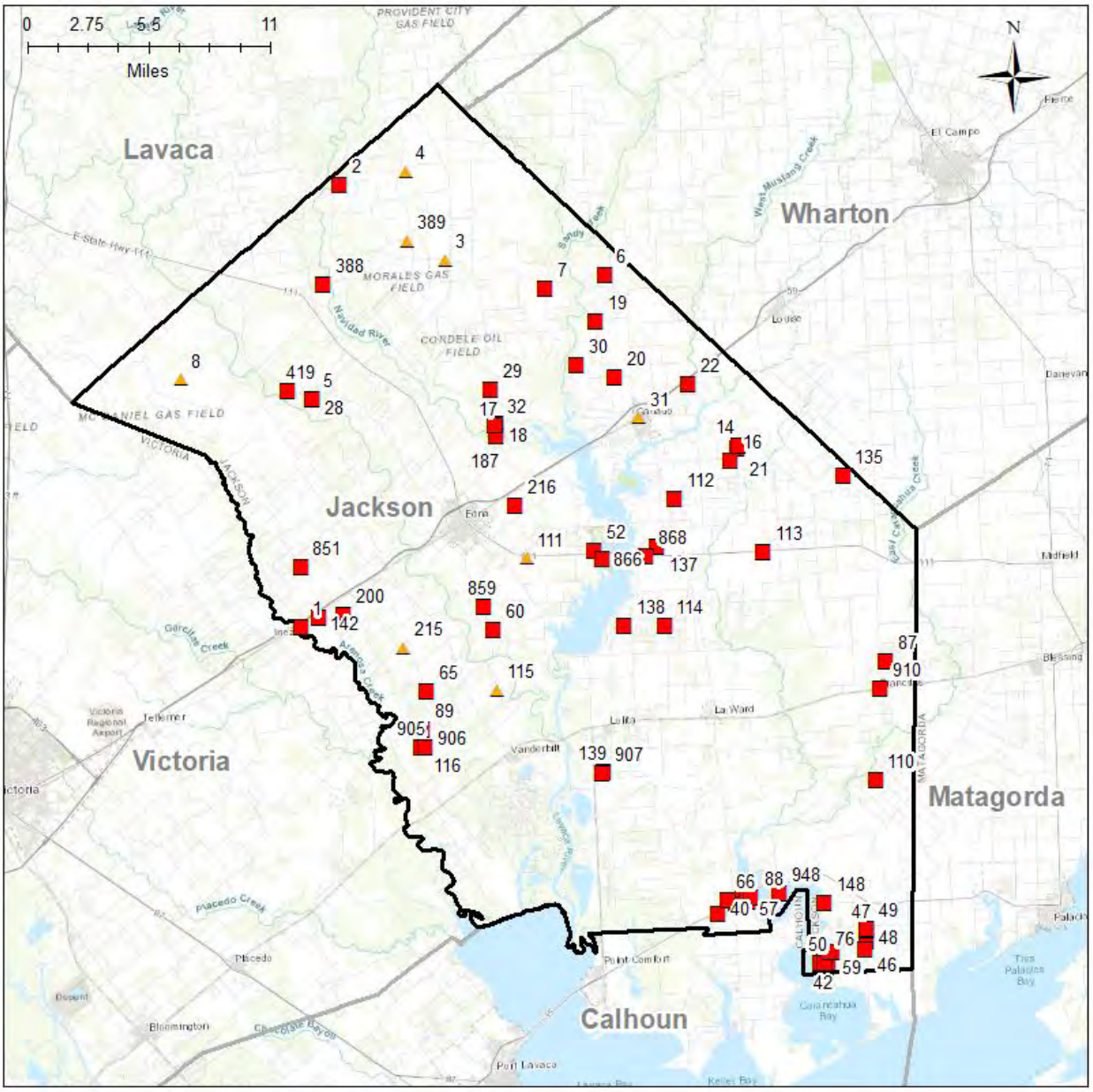


Figure 2-4 Location and INTERA IDs for water wells in Jackson County used for this study

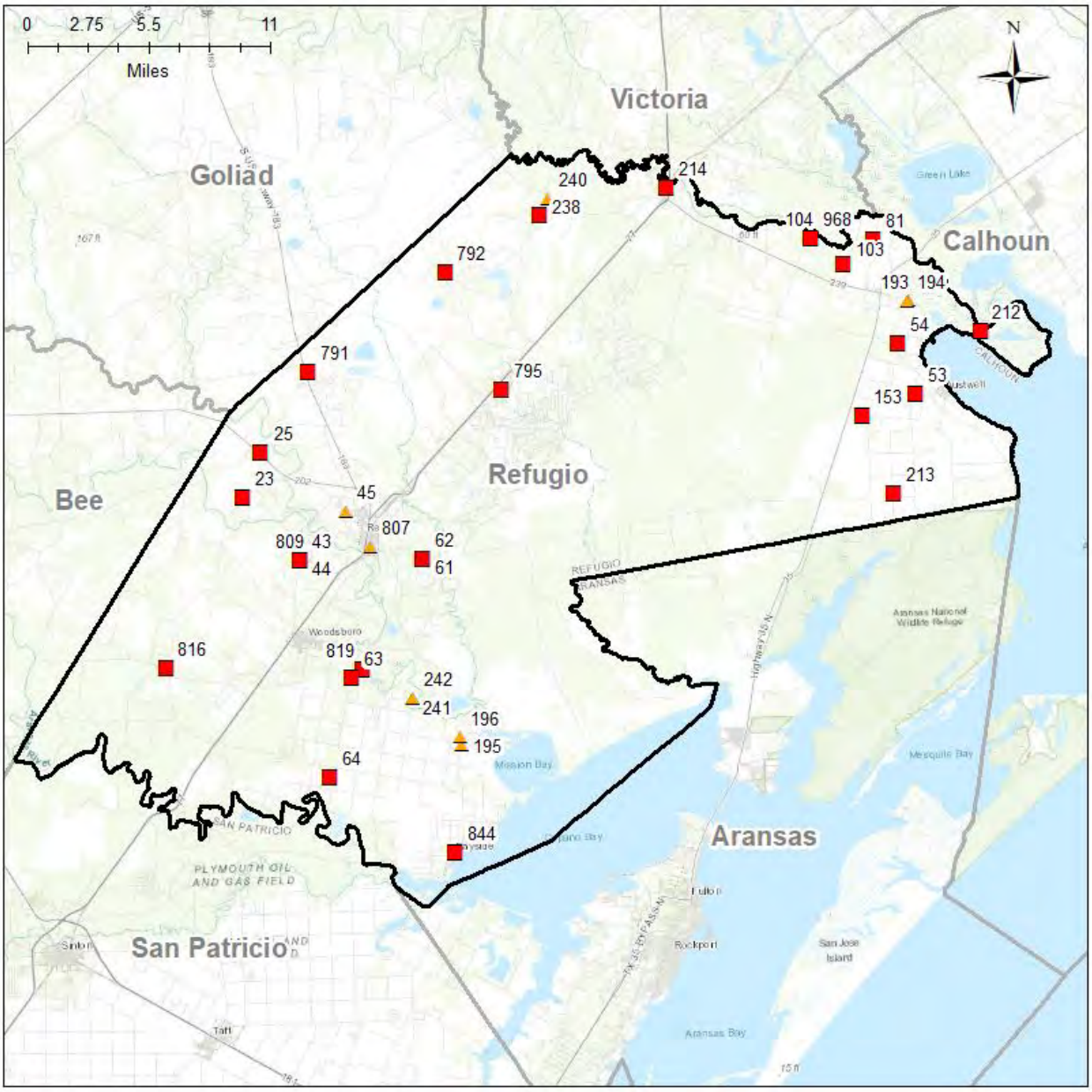


Figure 2-5 Location and INTERA IDs for water wells in Refugio County used for this study

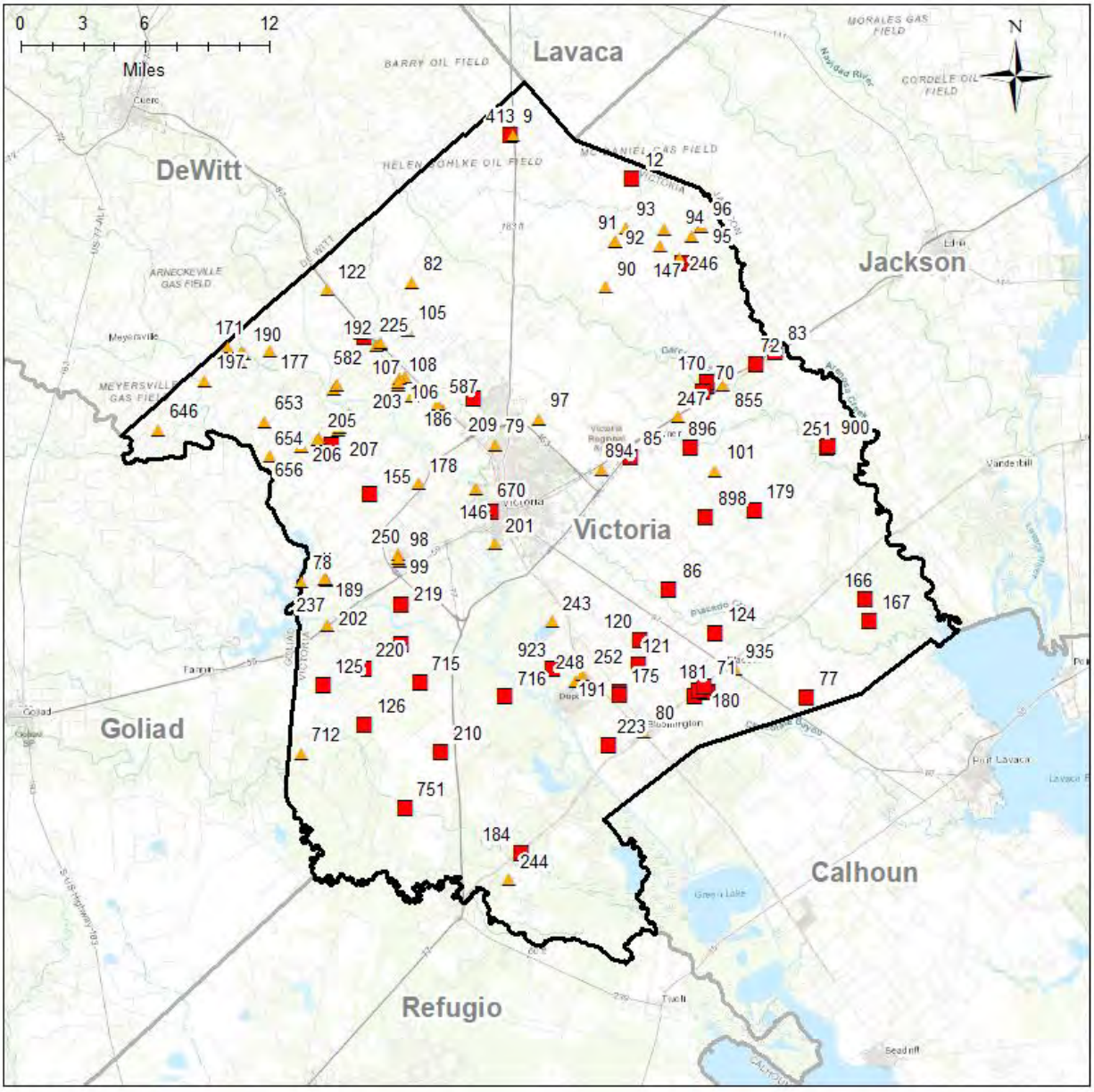


Figure 2-6 Location and INTERA IDs for water wells in Victoria County used for this study

3.0 GEOSTATISTICAL APPROACH FOR INTERPOLATION

3.1 Spatial Interpolation

When making decisions involving aquifer data across one or more counties, GCDs generally lack the resources to establish a robust monitoring network of adequate spatial and temporal resolution. As a result, there is a need for GCDs to find reliable and technically defensible approaches to interpolate water levels to answer questions associated with changes in aquifer conditions over time. Interpolation techniques can be classified as one of two types: deterministic or geostatistical. Deterministic methods rely on using mathematical equations with fitting parameters to generate values at unsampled locations. Examples of deterministic functions are spline interpolation routines, which apply smoothing and inverse distance routines based on the extent of data set similarity. Geostatistical methods rely on using both statistical correlations and mathematical methods to generate values an unsampled locations. The most common geostatistical interpolation method is Kriging. Kriging algorithms are rooted in the principles of spatial autocorrelation, which quantifies the correlation between variables relative to varying spatial extents (distance). As a general rule, if the variable of interest does exhibit spatial correlation, then application of geostatistical methods would provide a relatively robust and viable option for interpolation compared to deterministic methods.

3.2 Geostatistical Techniques

Statistics is the science of collecting, pooling, and making inferences from quantitative data. Geostatistics is the branch of science that focuses on geoscientific data. Geostatistics attempts to quantify the spatial relationship between data and the uncertainty in that relationship. The first notable papers on geostatistics were generated in the 1950s by Georges Matheron, who was working for the French Geological Survey on estimating ore resources.

3.2.1 Semivariogram

The semivariogram plays a central role in the analysis of geostatistical analysis and Kriging, which is the most common geostatistical interpolation method. The semi-variogram is a measure of the spatial continuity of the data and how quickly the data values change on the average. **Figure 3-1** provides a schematic of a semivariogram.

Conceptually, a semivariogram shows how the semivariance (i.e. half of the variance) of the data changes with an increase in the distance between the paired data values. In geostatistics, the distances between paired data at which the semivariance is calculated are called lags. For instance, if the lag is set at 100 ft, then the bins for which semivariances would be calculated at 100 ft, 200 ft, 300 ft, 400 ft, etc., Because points may not be spaced exactly at distances at intervals of 100 ft apart, the lag settings include a lag tolerance value that is typically set to half of the distance between lags. For the previous example, that would mean that the first lag of 100 ft would include all pairs of points that are between 50 and 150 ft from each other.

In general, two observations closer together are more similar than two observations further apart. The underlying reason for generating a semivariogram is to characterize the spatial correlation between data points. There are two types of semivariogram: experimental and theoretical. The experimental semivariogram is constructed based on the analysis of the field data, which is expressed by the dots in Figure 3-1. The theoretical semivariogram is generated by fitting a semivariogram model to the data, which is shown by the black line in Figure 3-1.

Introductions to semivariogram modeling and geostatistics are found in literature such as Isaaks and Srivastava (1989), American Society of Civil Engineers (1990), and Kitanidis (1997). The mathematical foundation and derivation of the semivariogram are beyond the scope of this report. The experimental variograms that will be calculated later in this report for water elevations is based on **Equation 3-1**.

$$\Upsilon(\boldsymbol{h}) = \frac{1}{2N(\boldsymbol{h})} \sum_{i=1}^{N(\boldsymbol{h})} [\boldsymbol{z}(\boldsymbol{u}_\mathrm{i}) - \boldsymbol{z}(\boldsymbol{u}_\mathrm{i} + \boldsymbol{h})]^2 \qquad \textit{Eq 3-1}$$

Where:

- $\Upsilon(\mathbf{h})$ = semivariance as a function of lag distance h, (ft^2)
- $\mathbf{h}$ = the lag spacing vector (ft)
- $\boldsymbol{z}(\boldsymbol{u}_\mathrm{i})$ = the elevation water level (ft) at spatial location $\boldsymbol{u}_\mathrm{i}$,
- $\boldsymbol{u}_\mathrm{i}$ = a vector of spatial coordinates (x,y) for the sample locations of each measured water level

The experimental variogram must be modeled for two reasons: (1) there is a need to interpolate the variogram function for h values where too few or no experimental data pairs are available, and (2) the variogram measure γ(h) must have the mathematical property of "positive definiteness" for the corresponding covariance model. The three most commonly used theoretical variogram models are Gaussian, exponential, and spherical. The theoretical variogram has three attributes that summarize important aspects of the spatial data. These three attributes are described in Figure 3-1 and below.

- **Range –** the maximum distance between points up to which there is information on the correlation/spatial relationship between two data points.
- **Sill –** the sample variance, which is a measure of the spread or variability in the data points that are not correlated.
- **Nugget Effect –** reflects measurement error and the discontinuity in the variogram at distances below the minimum lag distance

3.2.2 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. Kriging accounts for the degree of variation, or spatial correlation, among the data points through a semivariogram model. The basic idea of Kriging is to predict the value of a function at a given point by computing a weighted average of the known values of the function in the neighborhood of the point.

Kriging is named for Dr. Krige, who published an early (Krige, 1951) application of kriging to the estimation of the extent and volume of a mineral ore body. Kriging methods have been studied and applied extensively since 1970 and have been adapted, extended, and generalized. There are many forms of Kriging. The different forms of Kriging are detailed in Goovaerts (1997). The most commonly used forms of Kriging include: simple Kriging, ordinary Kriging, universal Kriging, cokriging, and Kriging

with external drift. Ordinary Kriging is among the most commonly used types of Kriging and is the basis of geostatistics (Ryu and others, 2002). Ordinary Kriging gives the optimal prediction under the assumption of second-order stationary, a normal distribution for the modeled variable, and the absence of any trend in the data. By optimal prediction, what is meant is that Kriging provides the best linear unbiased prediction at unsampled locations and reproduces the measured values at all sampled locations exactly.

A concern with using ordinary Kriging to interpolate water level data is how best to account for the trends in the water level data. The existence of trends is evident in **Figure 3-2**, which shows contours of groundwater levels simulated by the GMA 15 GAM for the Chicot Aquifer. Among the causes for trends in the water level data is large regional effects associated with flow toward the ocean and moderate regional effects associated hydraulic impacts from rivers, lakes, and large well fields. The process to account for a trend in the data consists of six steps which are described below and are illustrated in **Figure 3-3**. The example application described in Figure 3-3 is for annual precipitation amounts measured across Texas (Gimond, 2021).

Step #1 - Assemble and inspect the data for evidence of a trend.

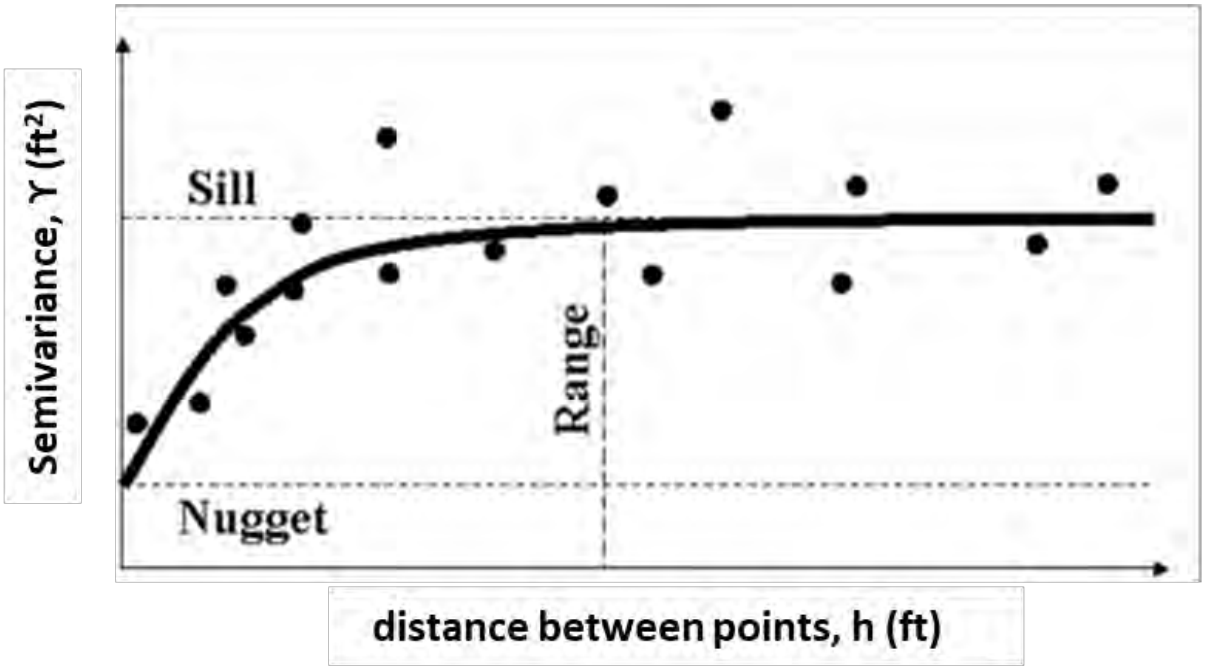
Step #2 – Develop a trend surface based on fitting the data and a conceptual understanding of the factors responsible for the trend.

Step #3 – Calculate the residual at each data location. A residual is the difference between the measured value and value produced by the trend at the location of the measured data. Check whether the set of calculated residuals are normally distributed. If the residuals do not resemble a normal distribution, then repeat Step #2.

Step #4 – Construct an experimental and a theoretical semivariogram for the set of residuals.

Step #5 – Krige the residuals to produce a continuous surface across the area of interest.

Step #6 – Combine the trend surface and the Kriged surface to generate the final surface.



● values calculated from the data points and used to construct the experimental semivariogram

▬ theoretical variogram

Range – the maximum distance between points up to which there is information on the correlation/spatial relationship between two data points

Sill – the sample variance, which is a measure of the spread or variability in the data points that are not correlated

Nugget Effect – reflects measurement error and the discontinuity in the variogram at distances below the minimum lag distance

Figure 3-1 Schematic of a experimental and theoretical semivariogram

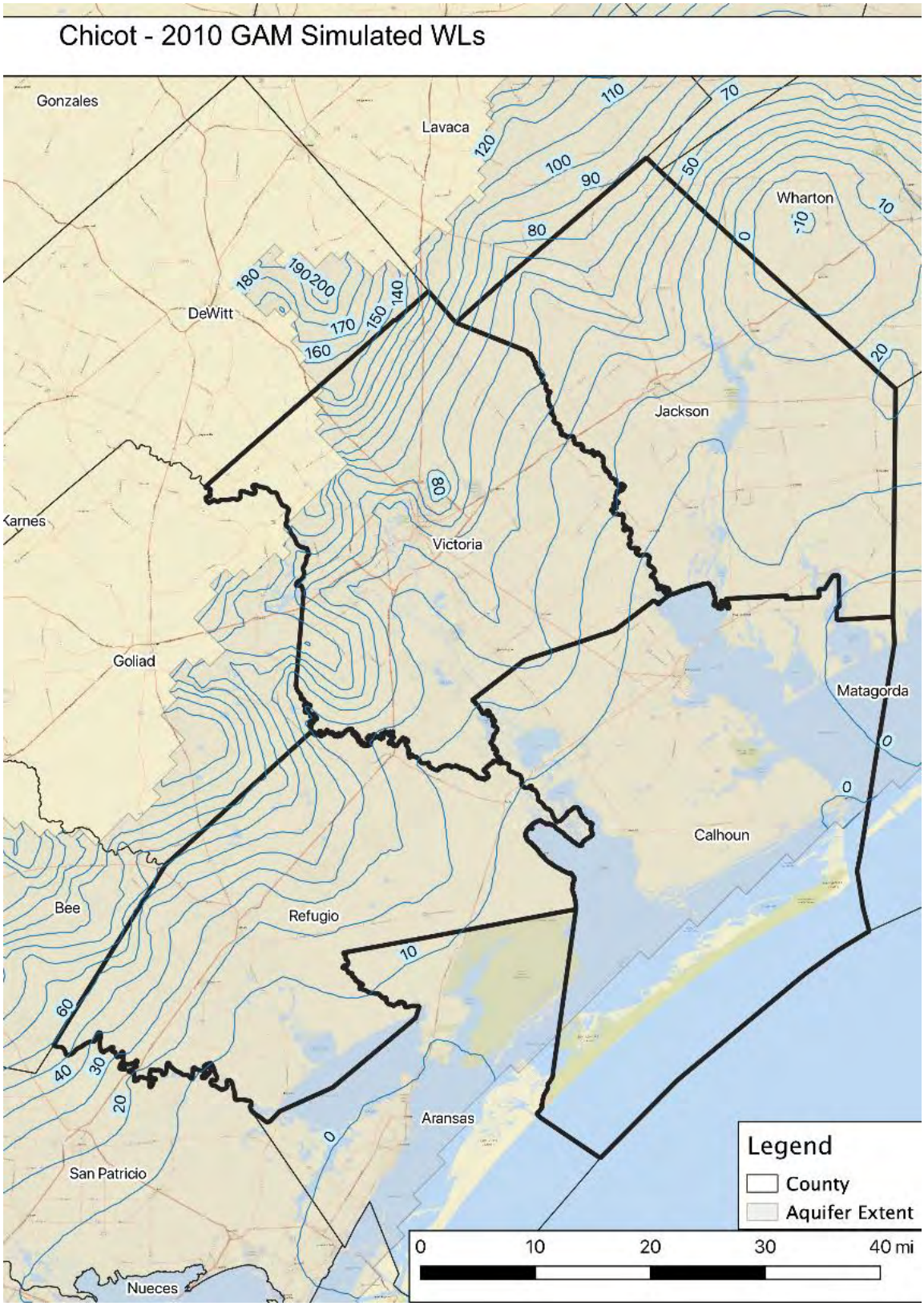


Figure 3-2 Contours of 2010 groundwater levels simulated by the GMA 15 GAM for the Chicot Aquifer

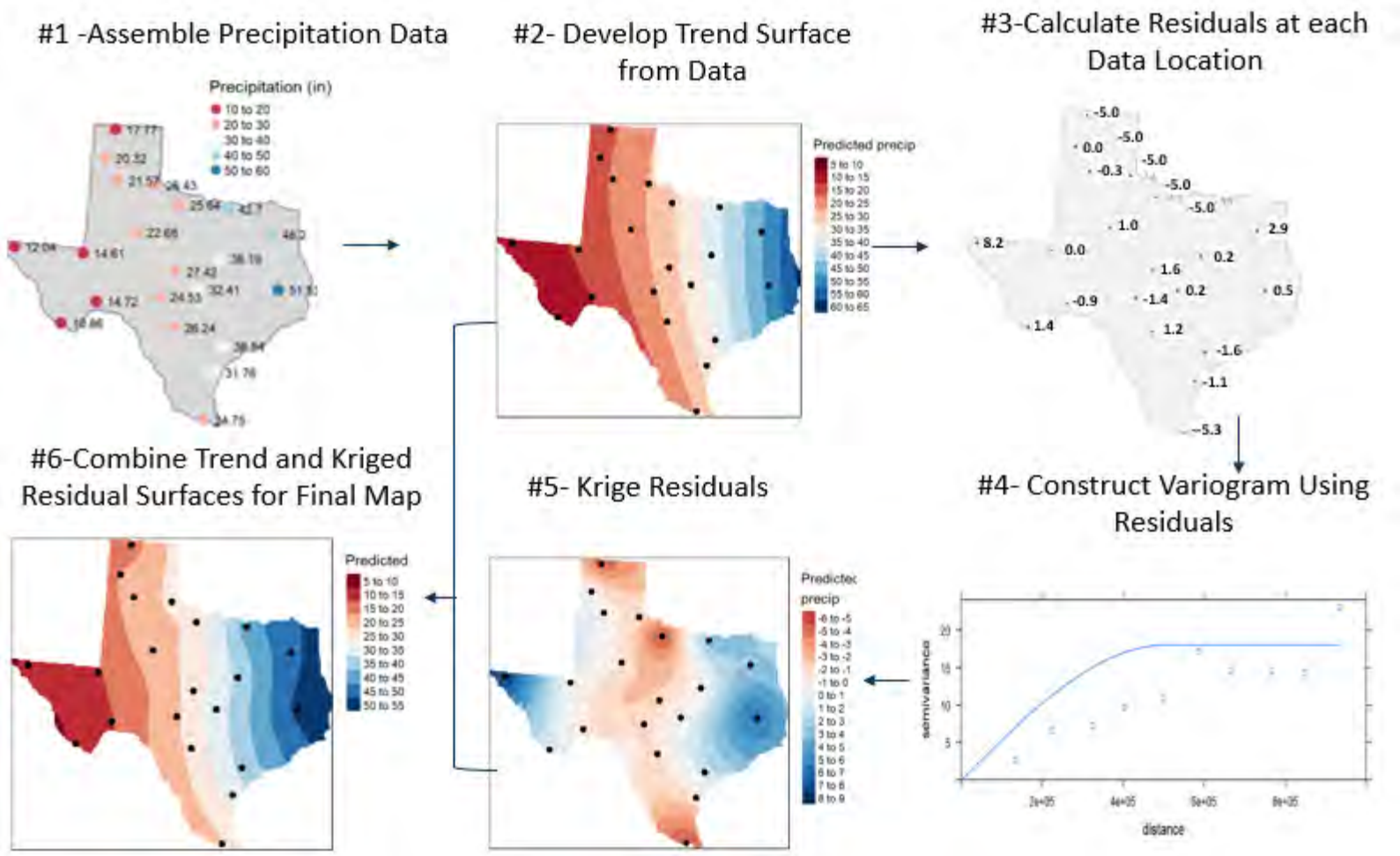


Figure 3-3 Workflow showing the a six-step process for using ordinary Kriging in develop a continuous surface for a data set that contains a trend

4.0 APPLICATION OF KRIGING WITH DETRENDING TO GENERATE WATER LEVEL MAPS

This section presents application of detrending and ordinary Kriging to interpolate measured water levels and to generate yearly water level maps for 2000 to 2020. The section documents the process of detrending the measured water levels, calculating the water level residuals, creating experimental variograms and fitting them to theoretical variogram models, Kriging the water level residuals, and constructing the final water level maps.

4.1 Detrending Approach

An inspection of Figure 3-2 shows evidence that the water levels simulated by the GAM contains trends at several different spatial scales. The trends are evident in the gradual decrease in elevation of the contours in the southeast direction toward the ocean, the distortion in water levels contours near large rivers such as the Guadalupe River in Victoria County and Lavaca River in Jackson County, and the cones of depression (i.e. circular contours) caused by pumping from large well fields near the City of Victoria and in southeast Wharton County.

Our review of the simulated waters for multiple years indicates that there are mathematical equations that can be used to detrend the data. Among the concerns associated with detrending the water levels using an inappropriate surface is that biases would be introduce into the residuals because the equations are not properly capturing the physics responsible for the underlying trends. Our assessment of the water level data found that the best tool for generating possible surfaces to detrend the measured water levels was the central Gulf Coast GAM (Chowdhury and others, 2004). The version of the GAM used for the study was obtained from Mr. Mike Keester from LRE Water, who is the consultant for GMA 15 that is developing GAM runs for the joint planning process. Because the GAM is known not to be the perfect predictor of the impacts of surface water features and pumping on water levels, there is a concern of introducing biases into the detrending process if the GAM-simulated water levels were used without some tempering to help to minimize bias into the water level residuals. Several options were investigated for spatially smoothing the simulated water levels.

The software selected for smoothing the GAM simulated water is part of SciPy (Virtanen and others, 2021). SciPy is a free and open-source Python library used for scientific computing and technical computing. The smoothing function is call “ndimage” and part of the class called “uniform_filter”. Ndimage is a type of moving average filter that smooths in two dimensions (northing and easting). After multiple iterations using Ndimage, a smoothing interval of 64,000 ft was selected. **Figures 4-1** and **4-2** shows the effect of this smoothing interval on the GAM simulated water levels for 2015 in the Chicot and Evangeline aquifers. The criteria used to select the interval of 64,000 ft include visual changes in the water level contours and a statistical evaluation of the residual for normality.

4.2 Water Level Residuals

Figures 4-3 and **4-4** illustrate the process of detrending the measured water levels to create the water level residuals. Figure 4-3a shows the location of the 2015 measured water levels superimposed onto the smoothed GAM simulated water levels for 2015. Figure 4-3b shows the calculated water level residuals at each of the well locations. Figure 4-4 shows the similar data sets for the smoothed GAM simulated water levels and measured water levels for the Evangeline Aquifer in 2015.

The method used to generate the water level residuals in **Figures 4-3** and **4-4** was used to calculate water level residuals for the years 2000 to 2020. Each set of annual water level residuals by aquifer was checked for normality using three criteria. One criterion was visual inspection of the histograms of water levels; residuals are compared to a normal distribution based on the mean and standard deviation of the water level residuals. The visual inspection was to assess whether or not the histogram mimics the shape and magnitude of the bell-shaped curve. **Figure 4-5** shows an example of this comparison using the 2015 water levels residuals. These figures provided useful information for identifying outliers that could impact a quantitative analysis of normality. Another criterion was visual inspection of the probability plots of the empirical cumulative density function (CDF) to the theoretical CDF for the water level residuals. The visual inspection was to assess whether or not the plotted points approximated a straight line, where the empirical and theoretical CDFs are equal. These figures provide useful information on whether there were any meaningful shifts in the distribution away from normality. **Figure 4-6** shows an example of this visual test for normality using the 2015 water levels residuals. The last criterion was to use the Liffiefors test (Liffiefors, 1967) for normality based on the Kolmogorov-Smirnov test.

The Liffiefors test provides a quantitative assessment of normality. The test evaluates the null hypothesis that data derive from a normally distributed population, when the null hypothesis does not specify the expected value and variance of the distribution. The Liffiefors test evaluated the likelihood that the data set was generated from a random distribution at the 95% confidence limit. The majority of both the Chicot and the Evangeline residual data sets passed the Liffiefors test for normality at the 95% confidence limit without any adjustments. All of the residual data sets passed the Liffiefors test at the 95% confidence limit after several of the largest residuals were removed. The average of one residual value needed to be removed per data set for all 42 data sets to pass the Liffiefors test for normality at the 95% confidence limit. The 42 data sets are comprised of 21 data sets for the Chicot Aquifer and 21 data sets for the Evangeline Aquifer. Based on results from both the visual inspections and from the Liffiefors tests, the water level residuals data sets were considered to approximate a normal distribution.

4.3 Semivariogram analysis

Semivariogram analyses were performed on all 42 water level residual data sets. The lag distance was set to 25,000 ft (4.7 miles) and the maximum distance was set to 450,000 ft (85.2 miles). The total number of bins was 18. All the experimental semivariograms were fitted to a spherical theoretical variogram. **Figures 4-7** and **4-8** show the experimental (points) and theoretical (lines) variograms water level residuals for the Chicot and Evangeline aquifers for six of the 21 annual data sets (e.g., 2000 through 2020). The median value for the range, which is the maximum distance at which the residuals

are no longer spatially correlated, for the 21 variograms for the Chicot Aquifer is about 190,000 ft (36.0 miles). The media value for the range for the 21 variograms for the Evangeline Aquifer is about 430,000 ft (81.4 miles).

4.4 Final Map of the Water Levels

Ordinary Kriging was used to interpolate the water level residuals for the years 2000 through 2020 for both the Chicot and the Evangeline aquifers. The semivariograms developed in section 4.3 were used to determine the weight assigned to the sampled locations. The Kriging was implemented in **R**. **R** is a programming language and free software environment for statistical computing and graphics supported by the R Foundation for Statistical Computing. The interpolation generated a raster composed of pixels measuring 1,000 by 1,000 ft. **Figures 4-9** and **4-10** show examples of the Kriged surfaces. Figure 4-9 shows contours of the Kriged values and the location of the water level residuals at the sampled locations for the Chicot Aquifer in 2015. Figure 4-10 shows contours of the Kriged values and the location of the water level residuals at the sampled locations for the Evangeline Aquifer in 2015.

The final map of for the Kriged water levels were constructed by combining the surface of the Kriged residuals with the trend surface, which is the smoothed GAM simulated water levels. **Figure 4-11** shows the process of adding together the surfaces for the Kriged water levels and the trend surface to create the final map of the 2015 Chicot water levels. **Figure 4-12** shows the process of adding together the surfaces for the Kriged water levels and the trend surface to create the final map of the 2015 Evangeline water levels.

Figures 4-13 through **4-17** shows the final maps of the Kriged water levels for the years 2000, 2005, 2010, 2015, and 2020 for the Chicot and the Evangeline aquifers. Interpolated water levels are truncated at the boundaries of the aquifers defined in the GAM 15 GAM. The extent of the Chicot and the Evangeline aquifers are marked by shading the area corresponding to each aquifer. Although the interpolated water levels cover the 13 counties in Figure 2-1, the figures focused on an area containing Calhoun, Jackson, Refugio, and Victoria counties.

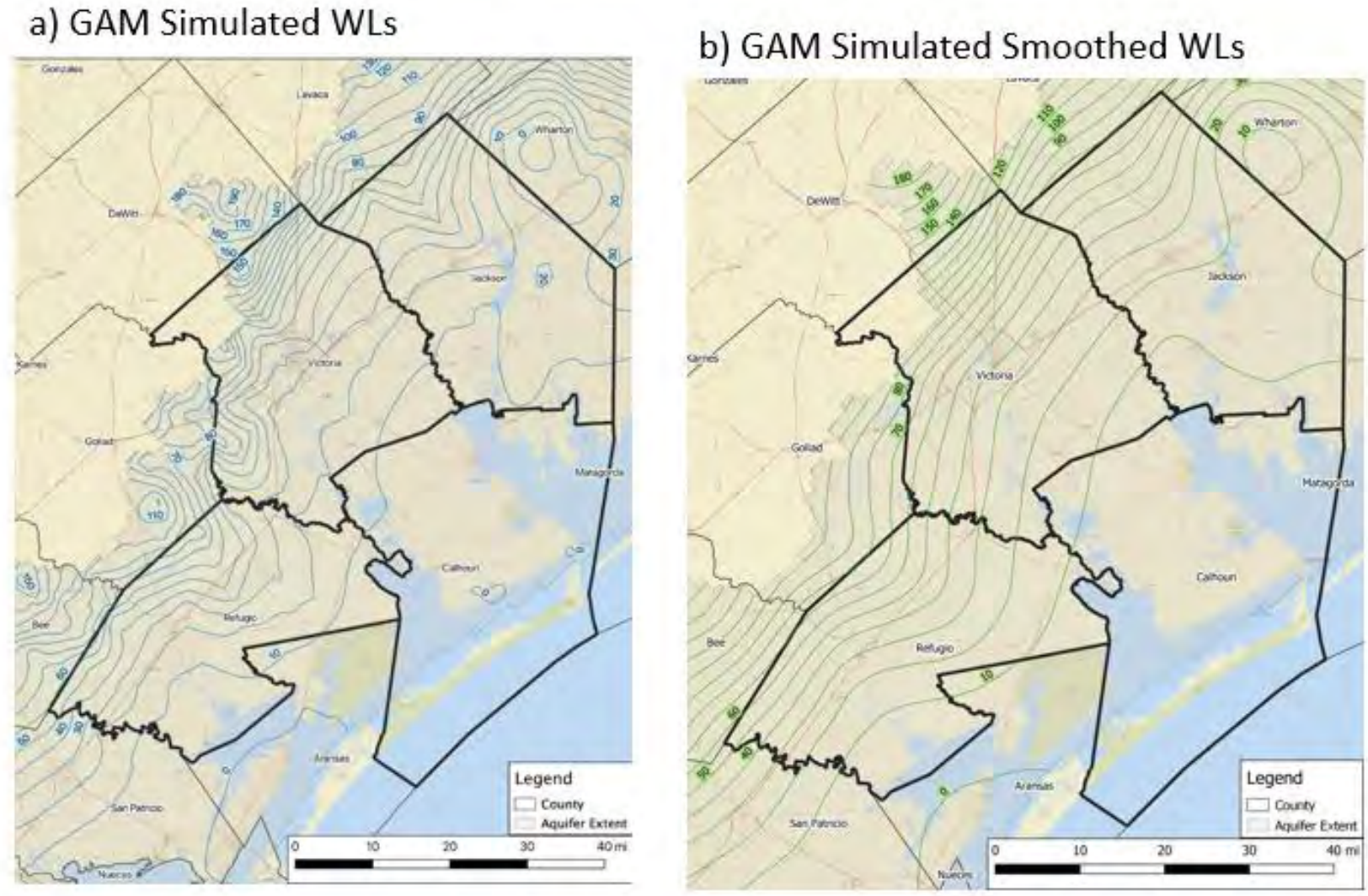


Figure 4-1 GMA simulated 2015 water levels for the Chicot Aquifer, a) actual values; b) smoothed using SciPy function ndimage with a distance of 64,000 feet

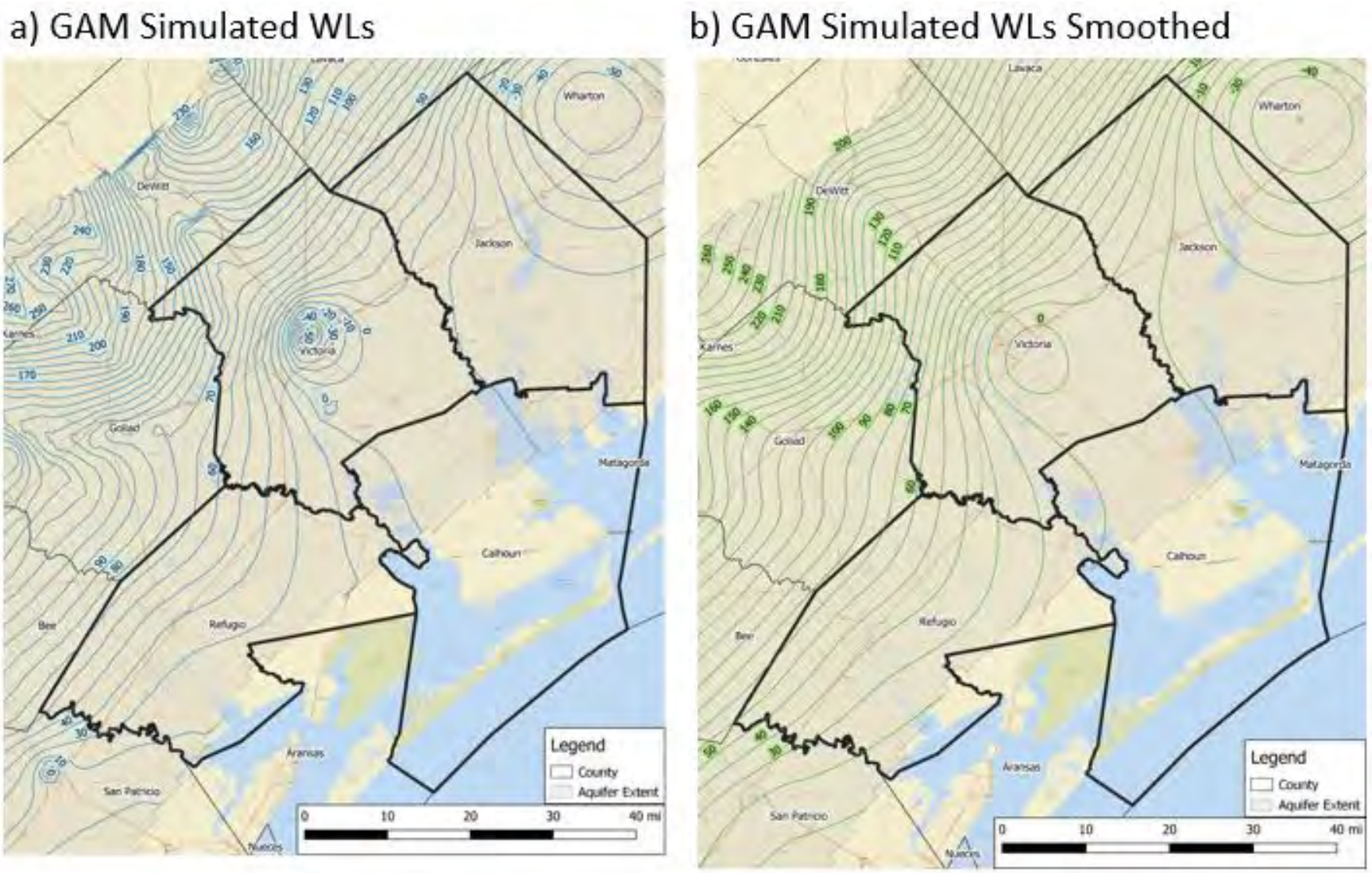


Figure 4-2 GMA simulated 2015 water levels for the Evangeline Aquifer, a) actual values; b) smoothed using SciPy function ndimage with a distance of 64,000 feet

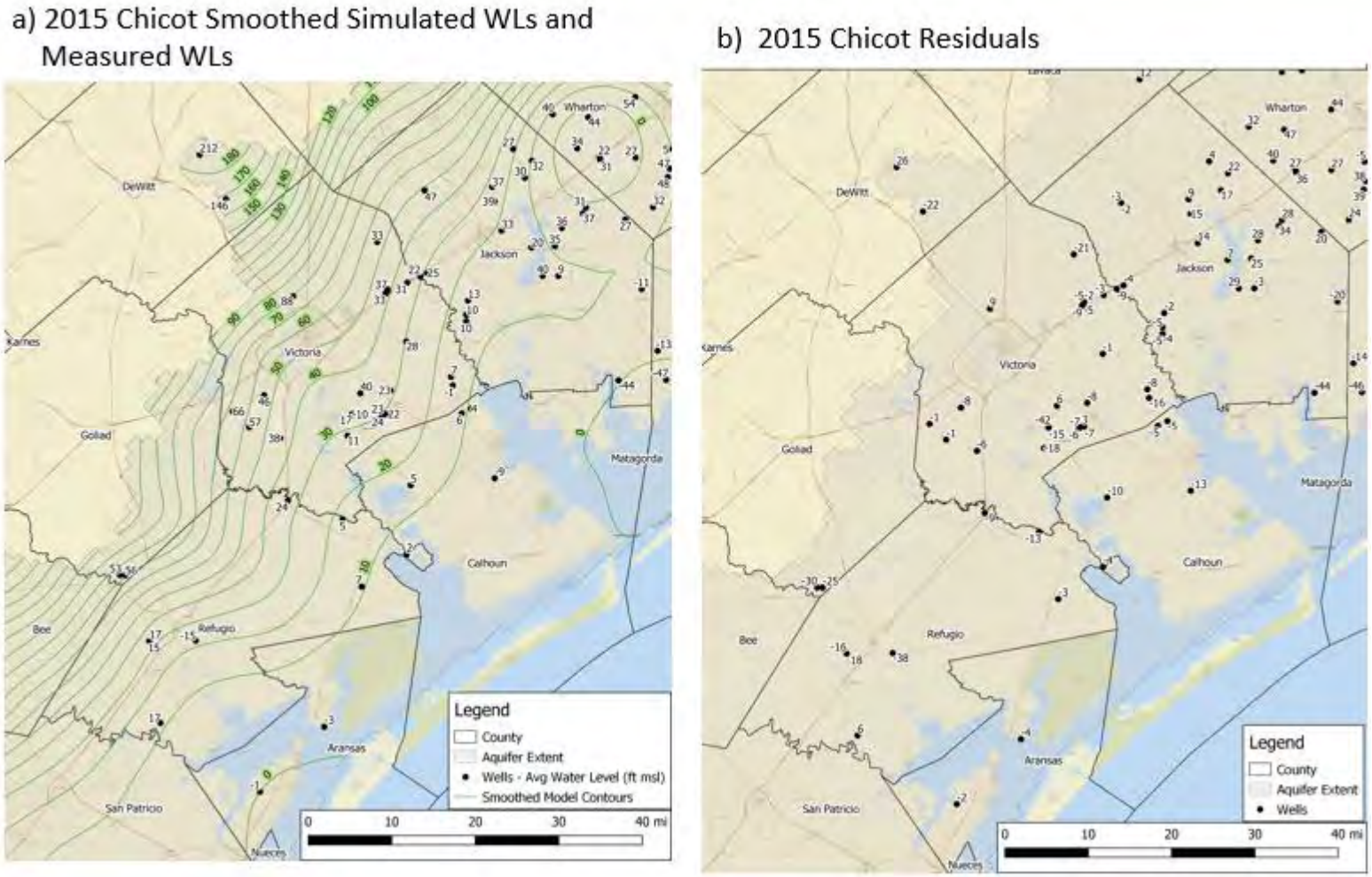


Figure 4-3 Example calculation of residuals Chicot Aquifer, a) 2015 smoothed simulated water levels and 2015 measured Chicot water levels; b) calculated 2015 Chicot residuals posted at well locations

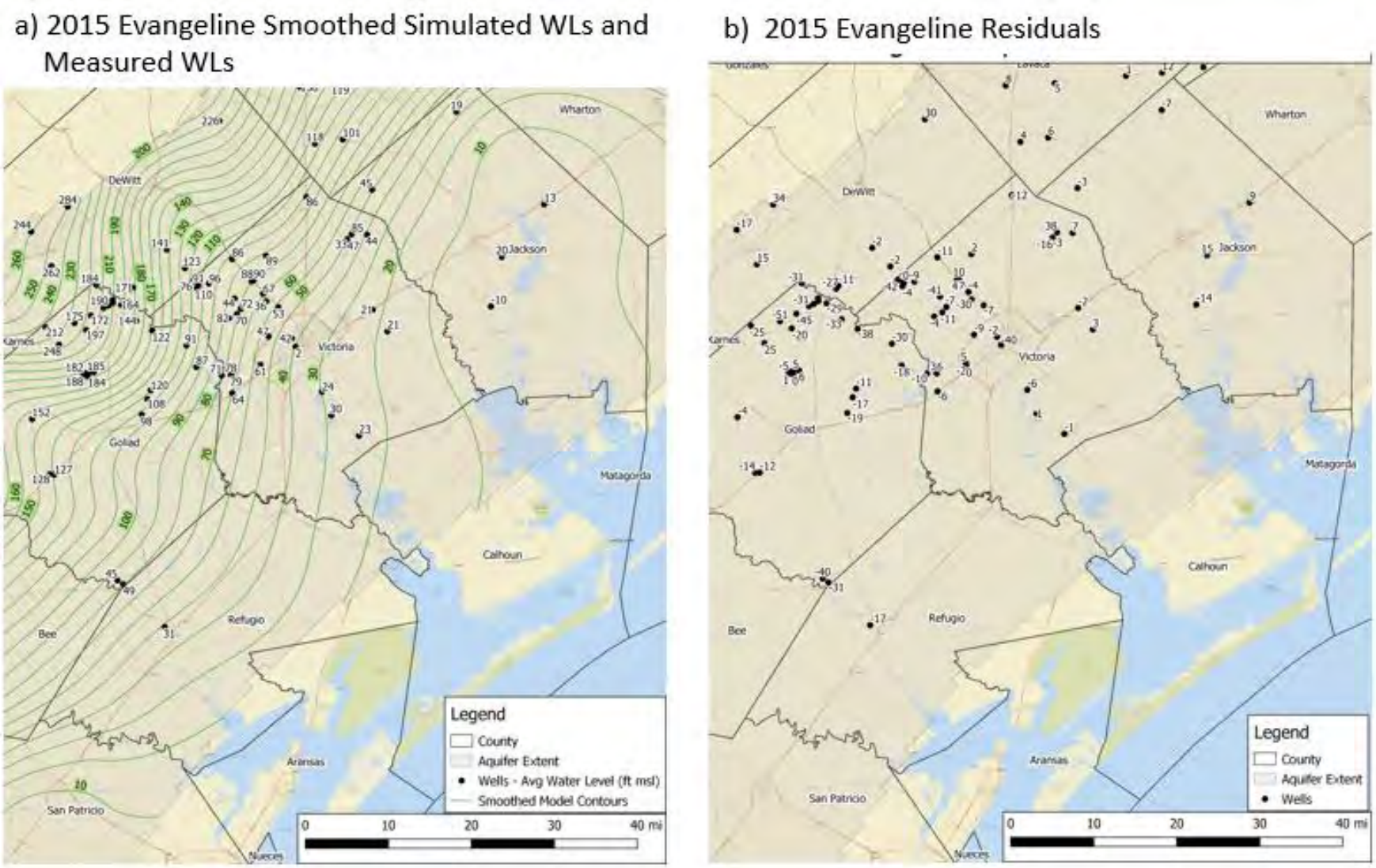


Figure 4-4 Example calculation of residuals Evangeline Aquifer, a) 2015 smoothed simulated water levels and 2015 measured Evangeline water levels; b) calculated 2015 Evangeline residuals posted at well locations

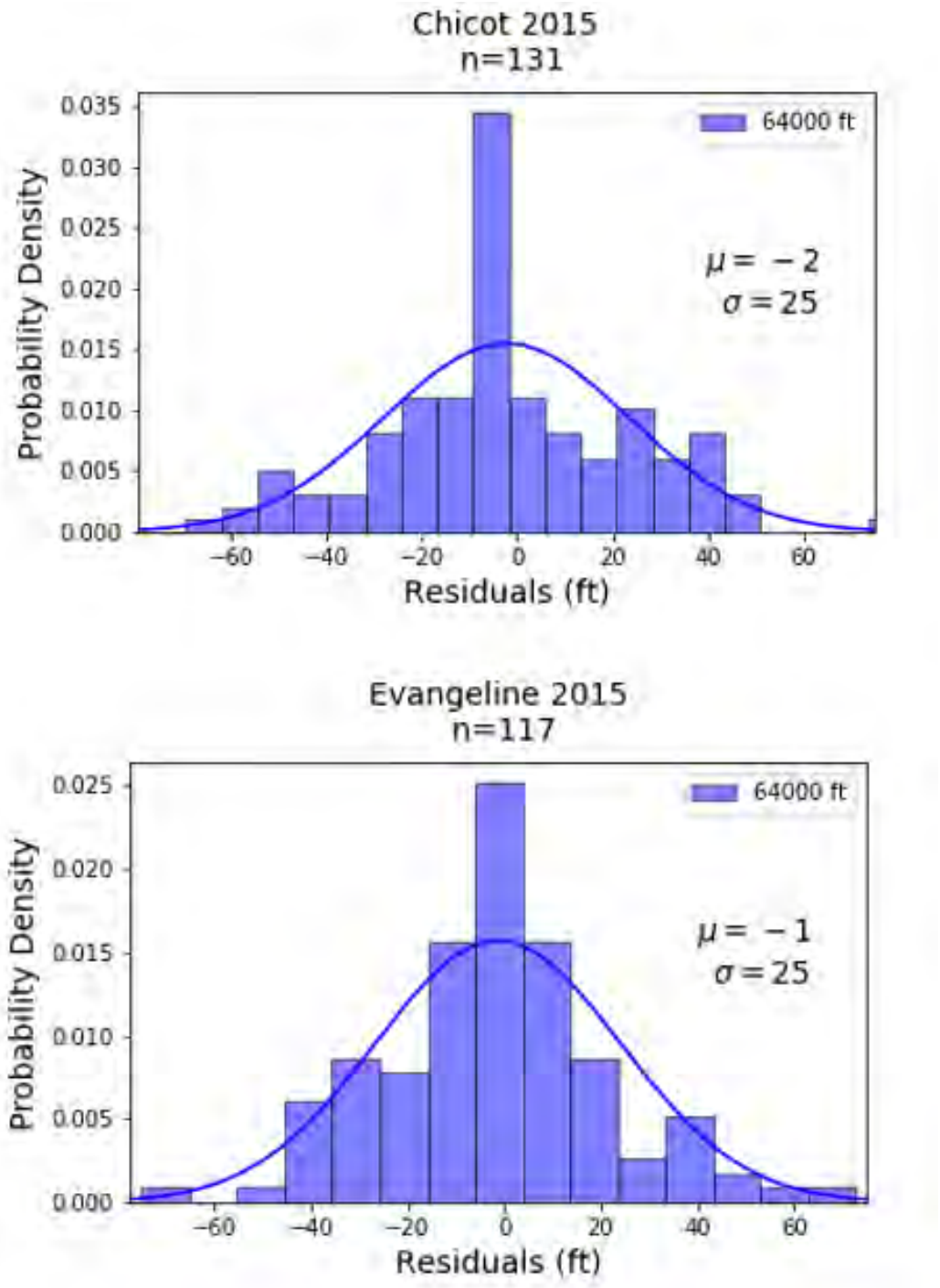


Figure 4-5 Histograms of 2015 water levels residuals for the Chicot and the Evangeline aquifers that are compared to a normal distribution based on the mean and standard deviation of the water level residuals

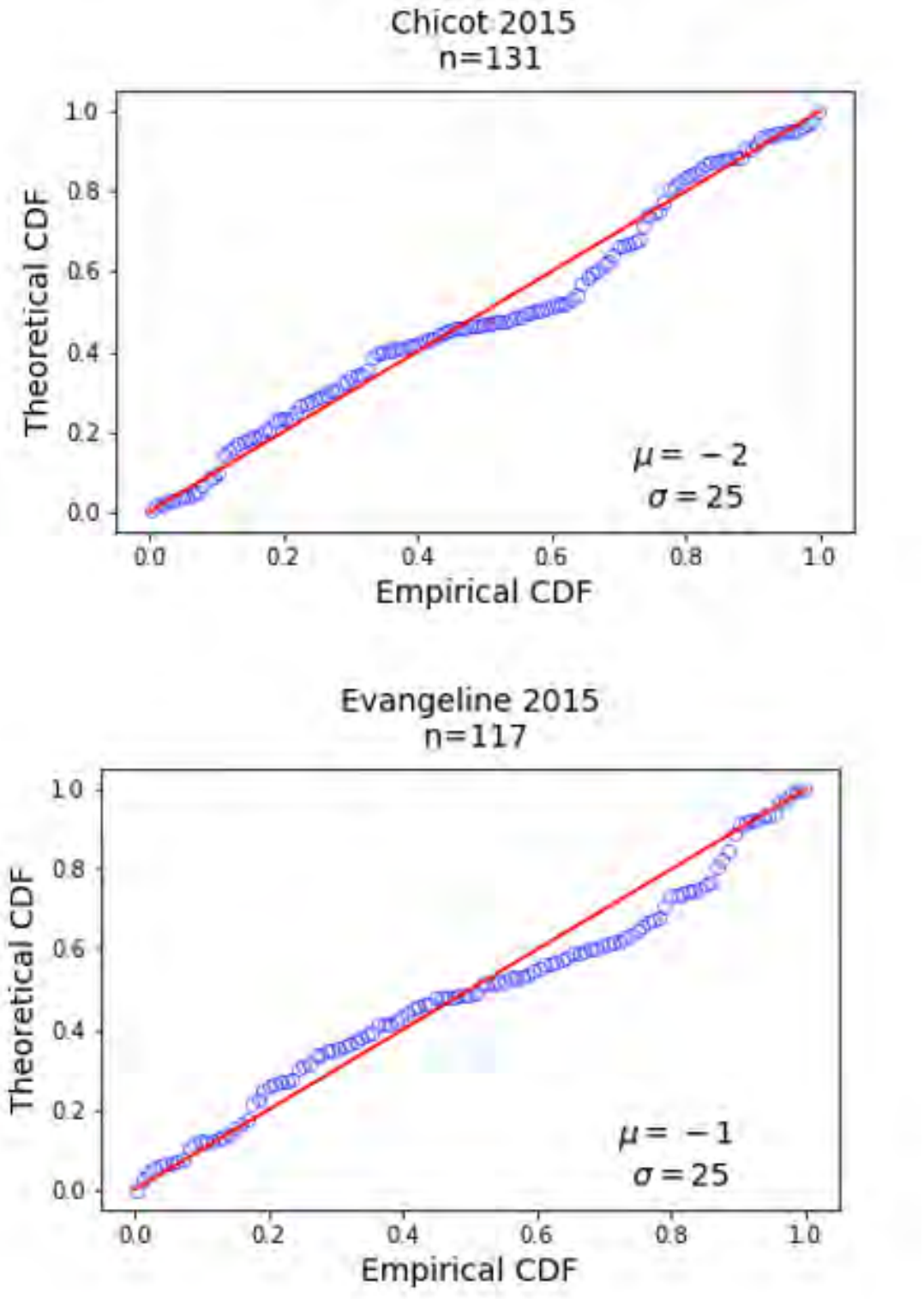


Figure 4-6 Probability plots of the 2015 water levels residuals for the Chicot and the Evangeline aquifers that compares the empirical cumulative density function (CDF) to the theoretical CDF

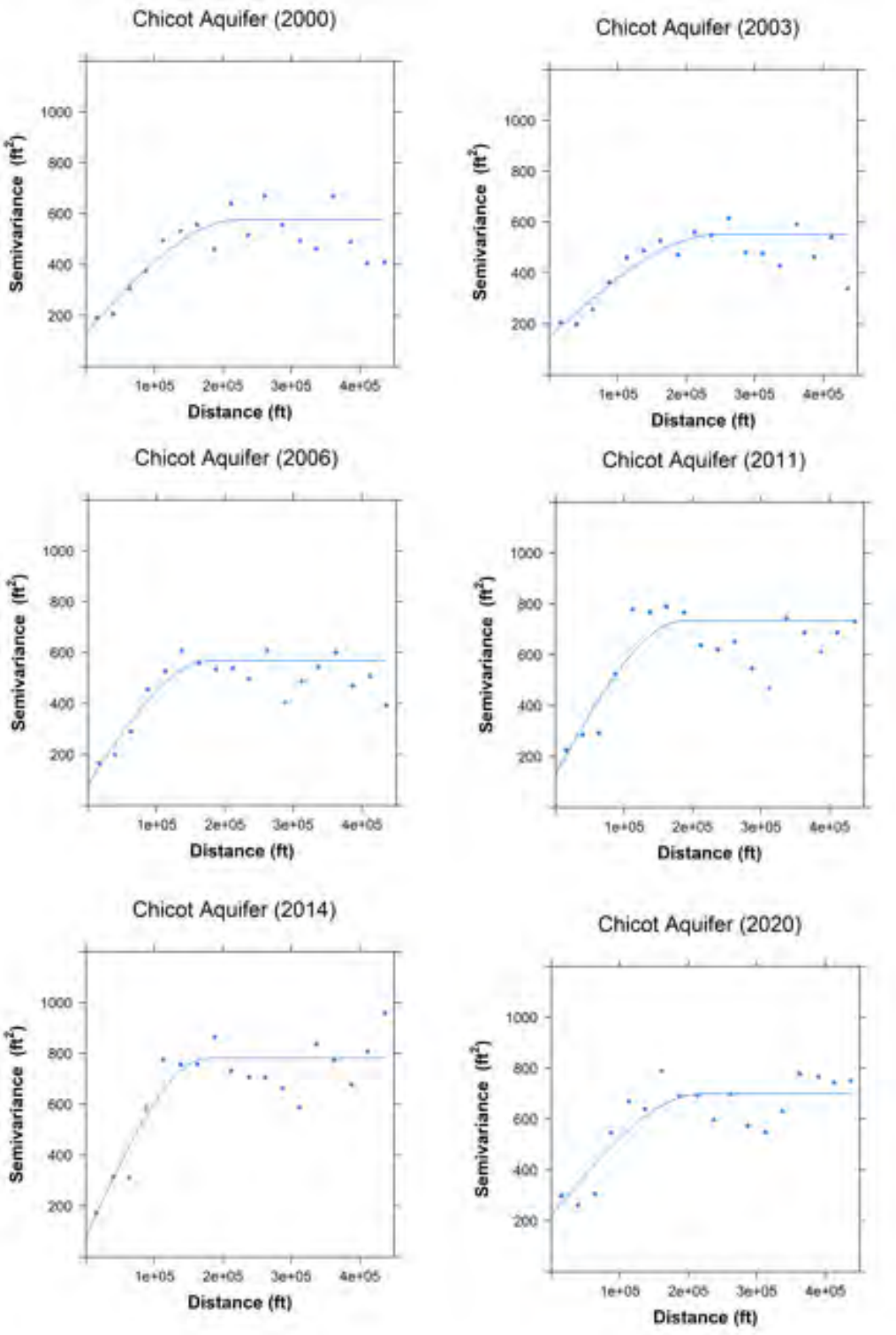


Figure 4-7 Experimental and theoretical spherical semivariogams for the residuals for 2000, 2003, 2006, 2011, 2014, and 2015 generated by detrending the measured groundwater levels in the Chicot Aquifer

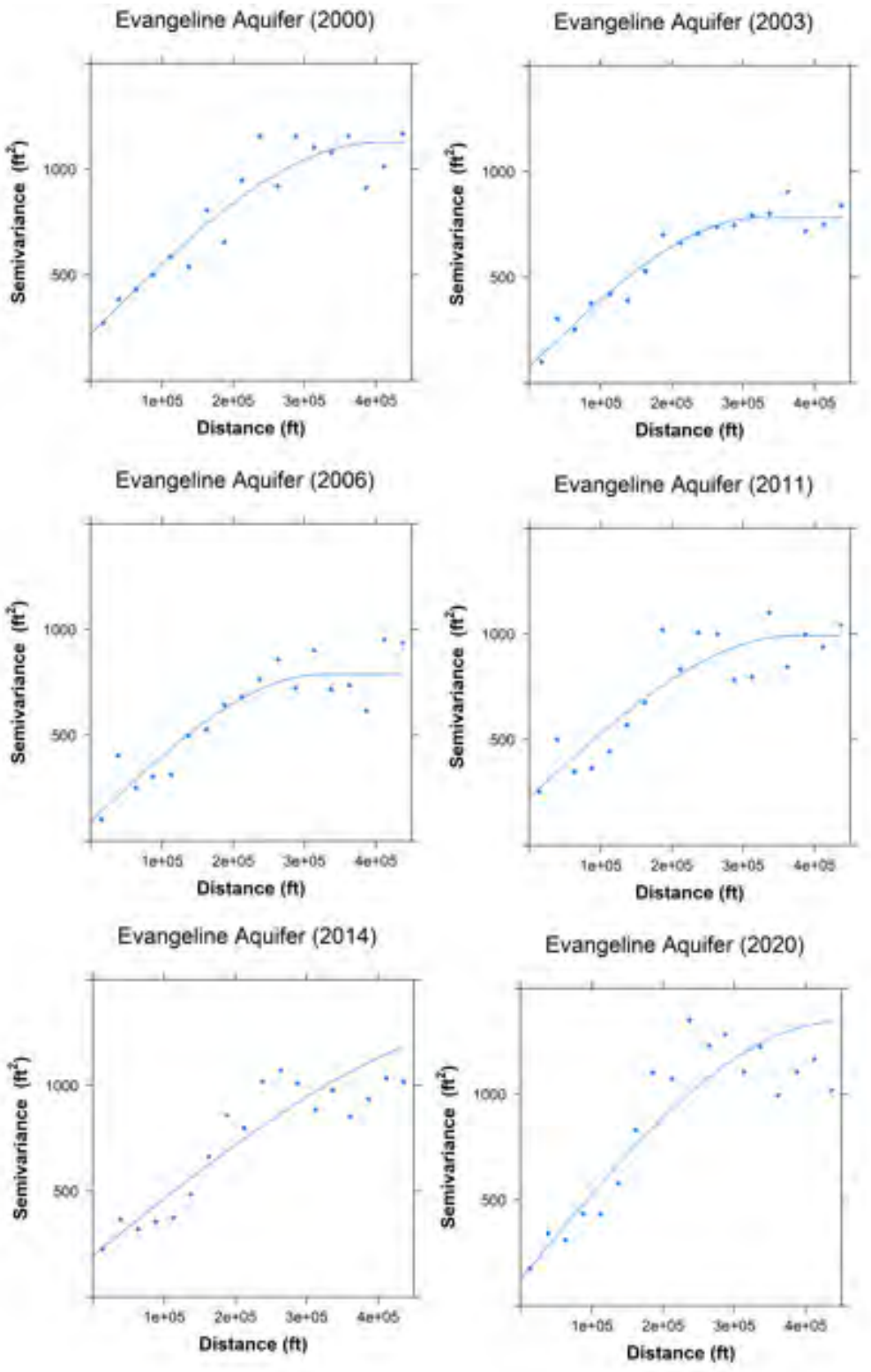


Figure 4-8 Experimental and theoretical spherical semivariogams for the residuals for 2000, 2003, 2006, 2011, 2014, and 2015 generated by detrending the measured groundwater levels in the Evangeline Aquifer

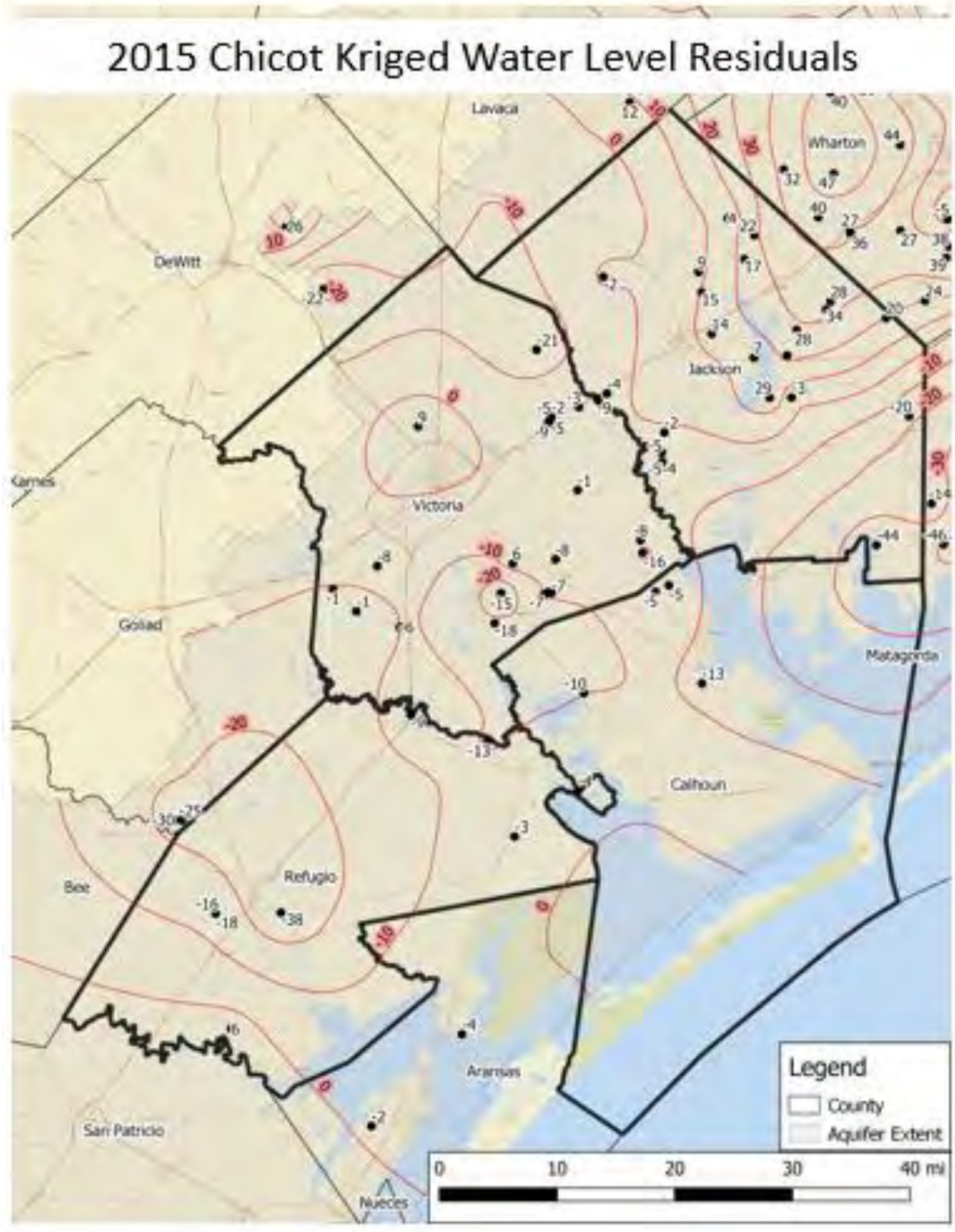


Figure 4-9 Contours for the Kriged 2015 water level residuals for the Chicot Aquifer

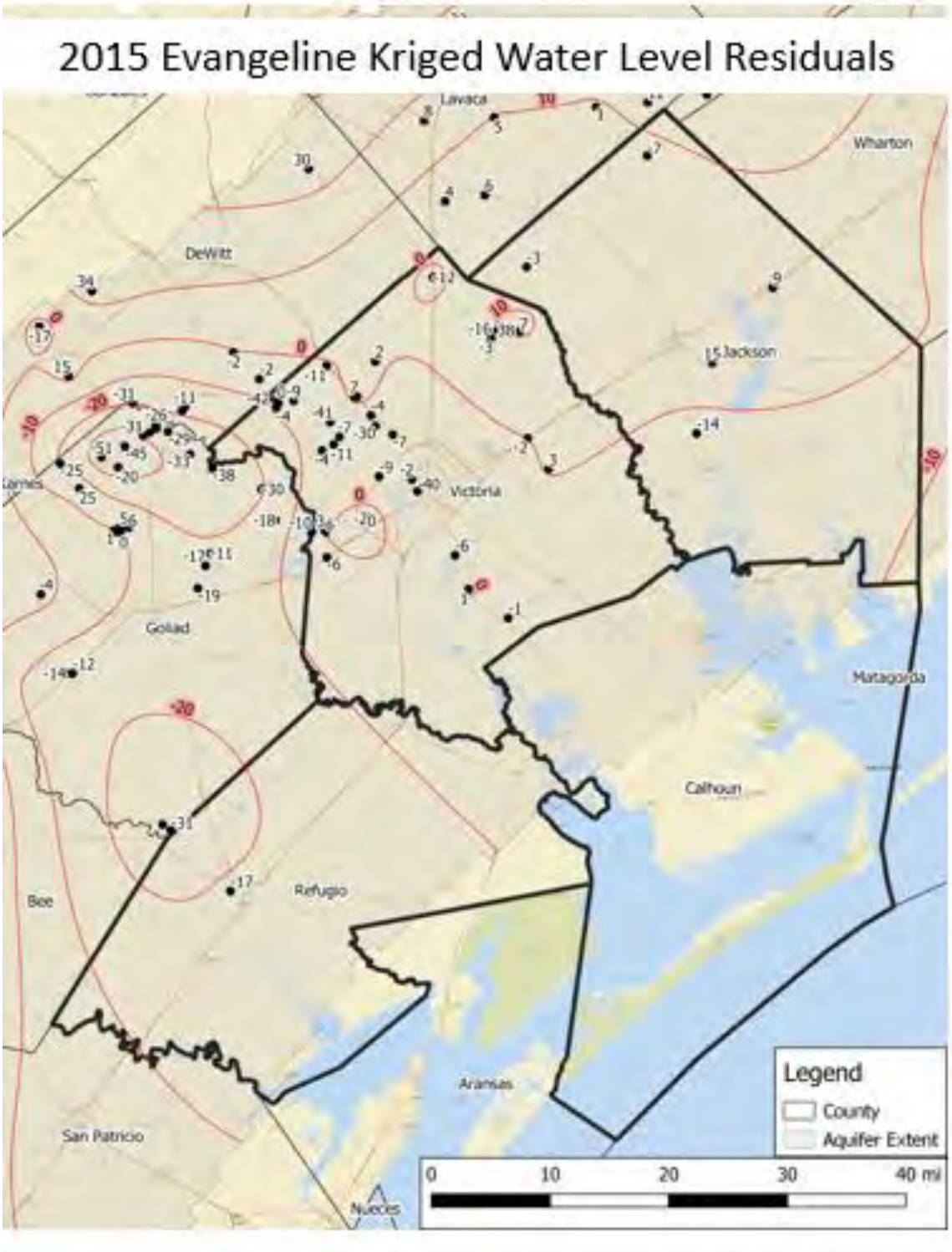


Figure 4-10 Contours for the Kriged 2015 water level residuals for the Evangeline Aquifer

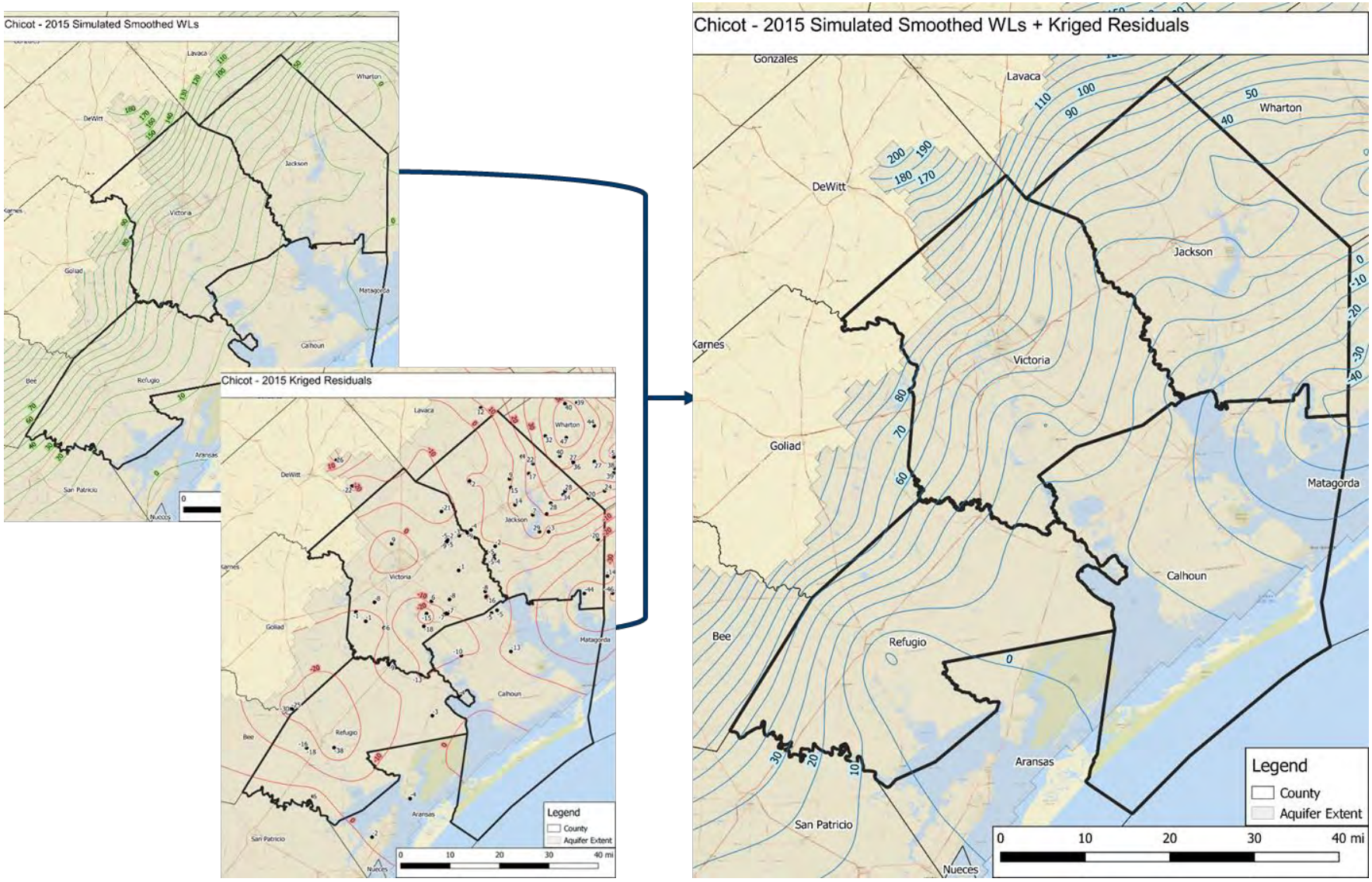


Figure 4-11 Combining the trend water level surface and the Kriged water level residual surface to produce the final surface for the 2015 Chicot water levels

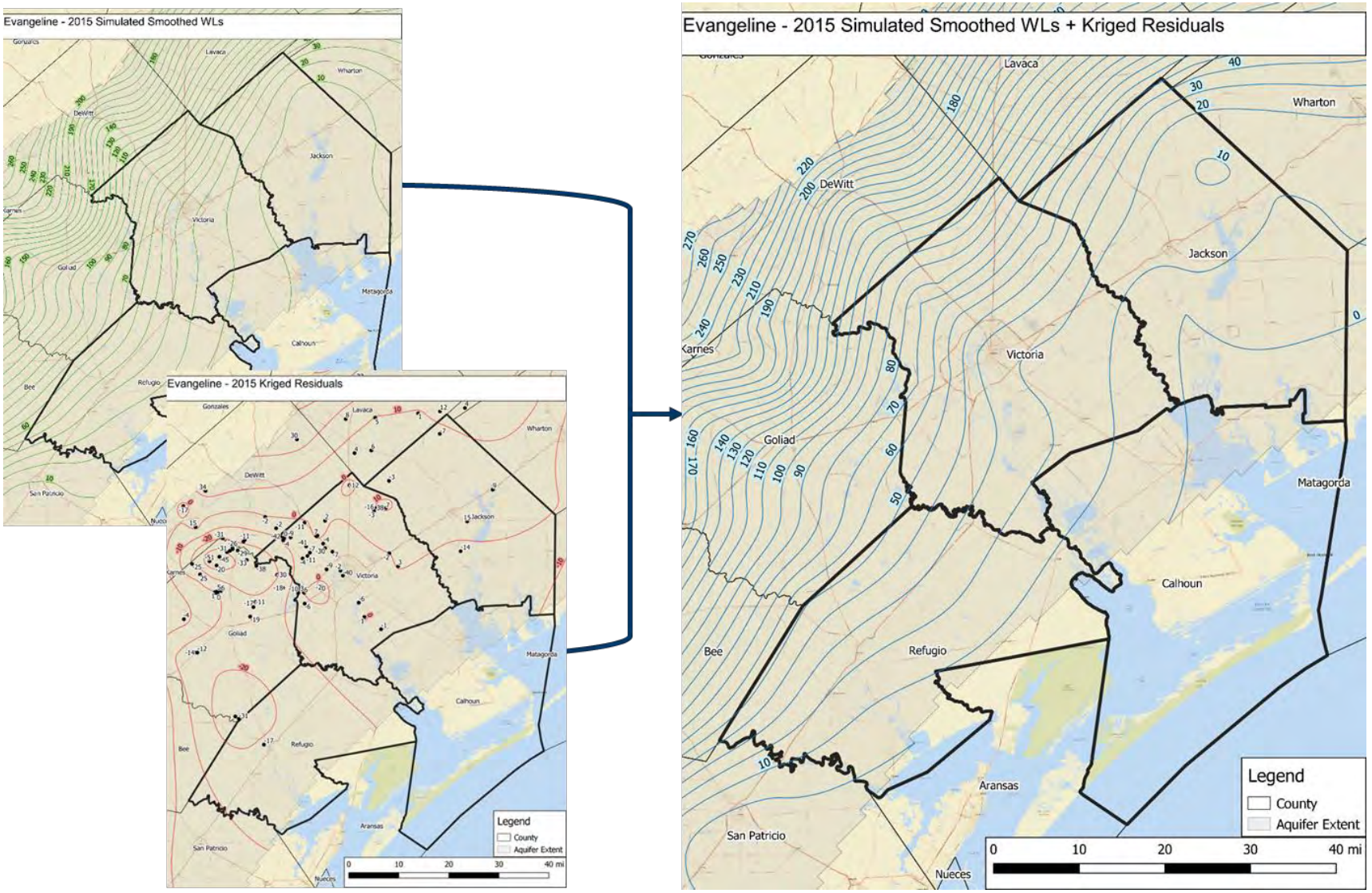


Figure 4-12 Combining the trend water level surface and the Kriged water level residual surface to produce the final surface for the 2015 Evangeline water levels

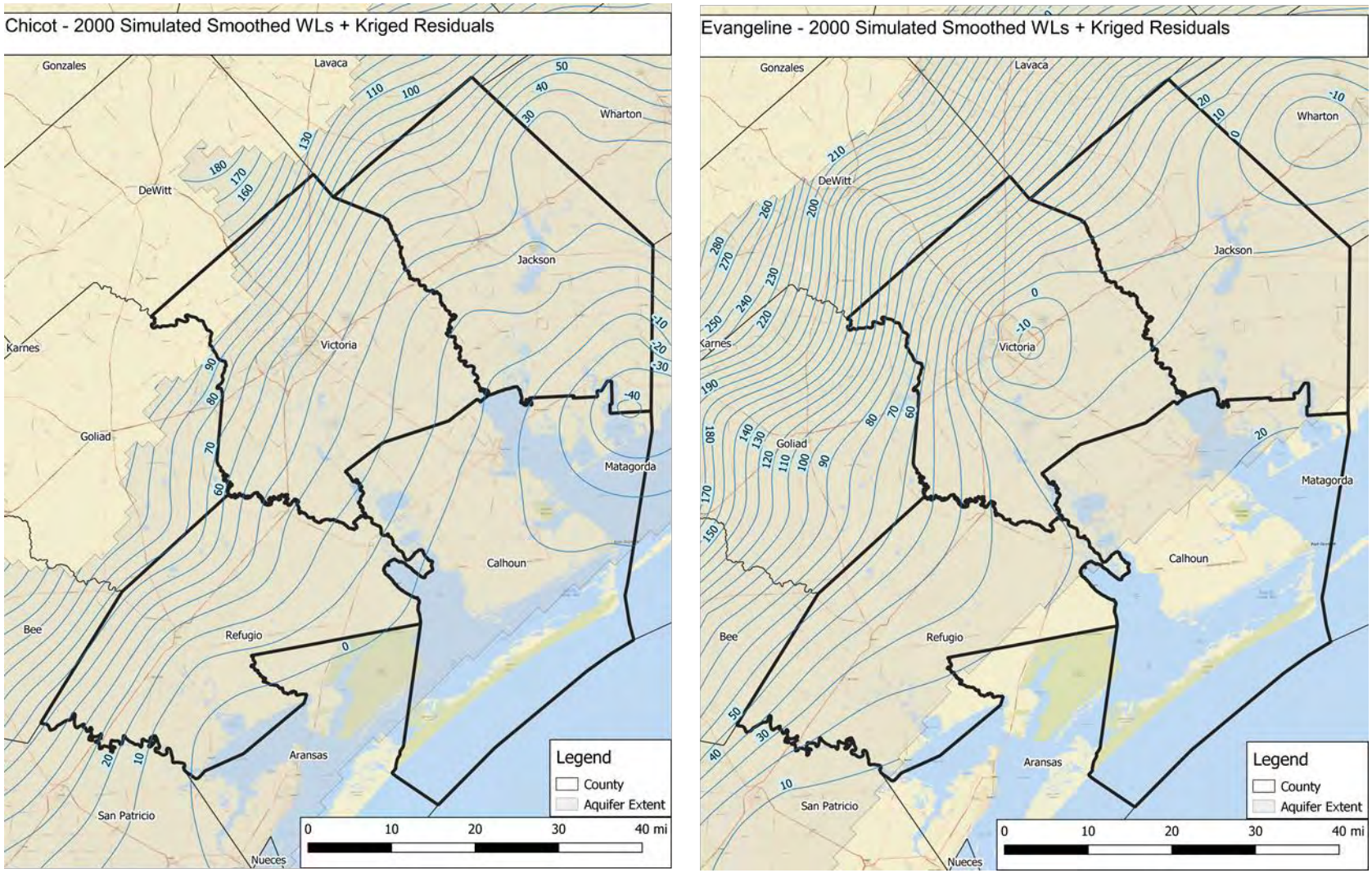


Figure 4-13 Contours of water levels for the Chicot and the Evangeline Aquifer in 2000 based on combining GAM simulated smoothed water levels and Kriged residual for the measured water levels.

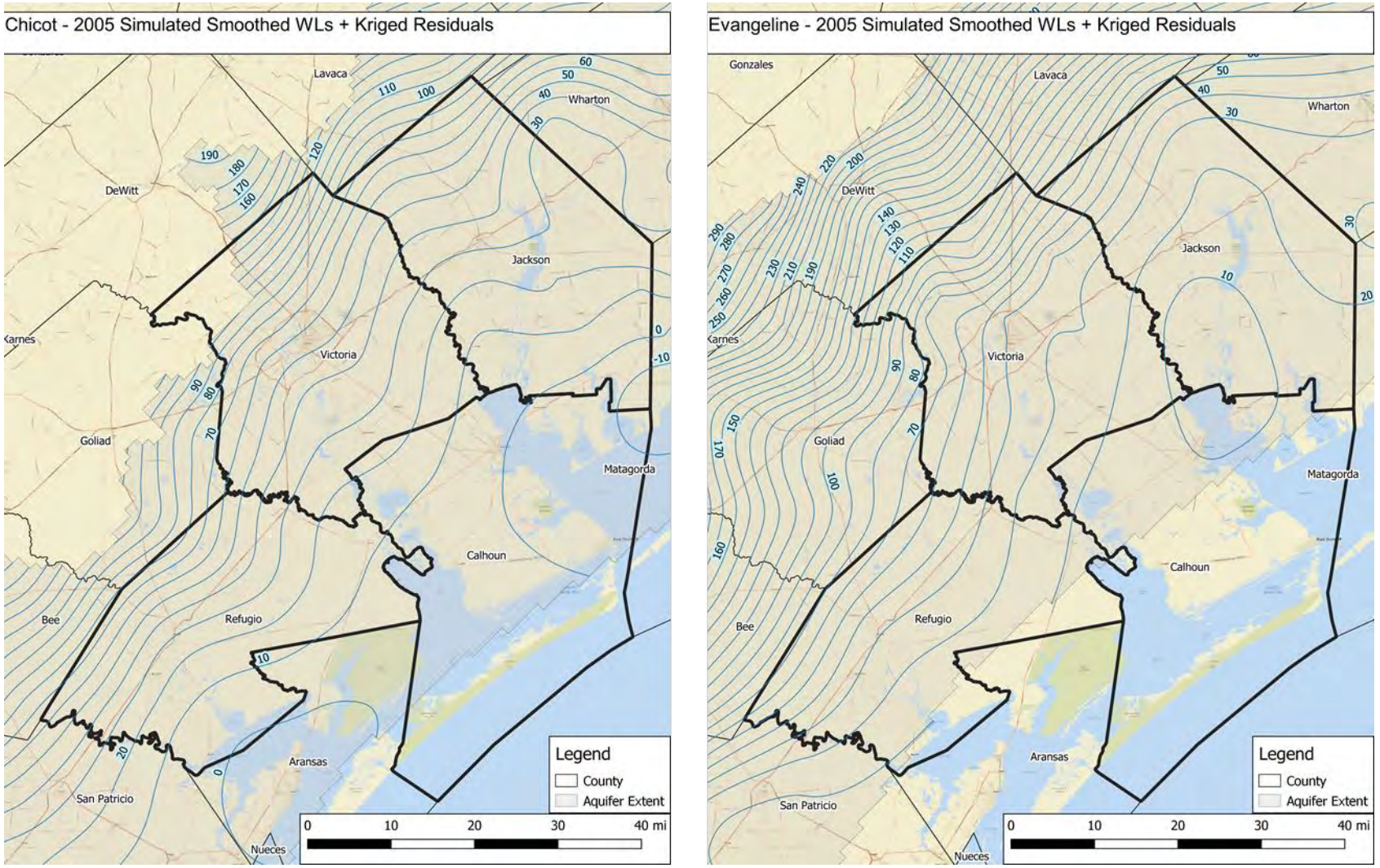


Figure 4-14 Contours of water levels for the Chicot and the Evangeline Aquifer in 2005 based on combining GAM simulated smoothed water levels and Kriged residual for the measured water levels.

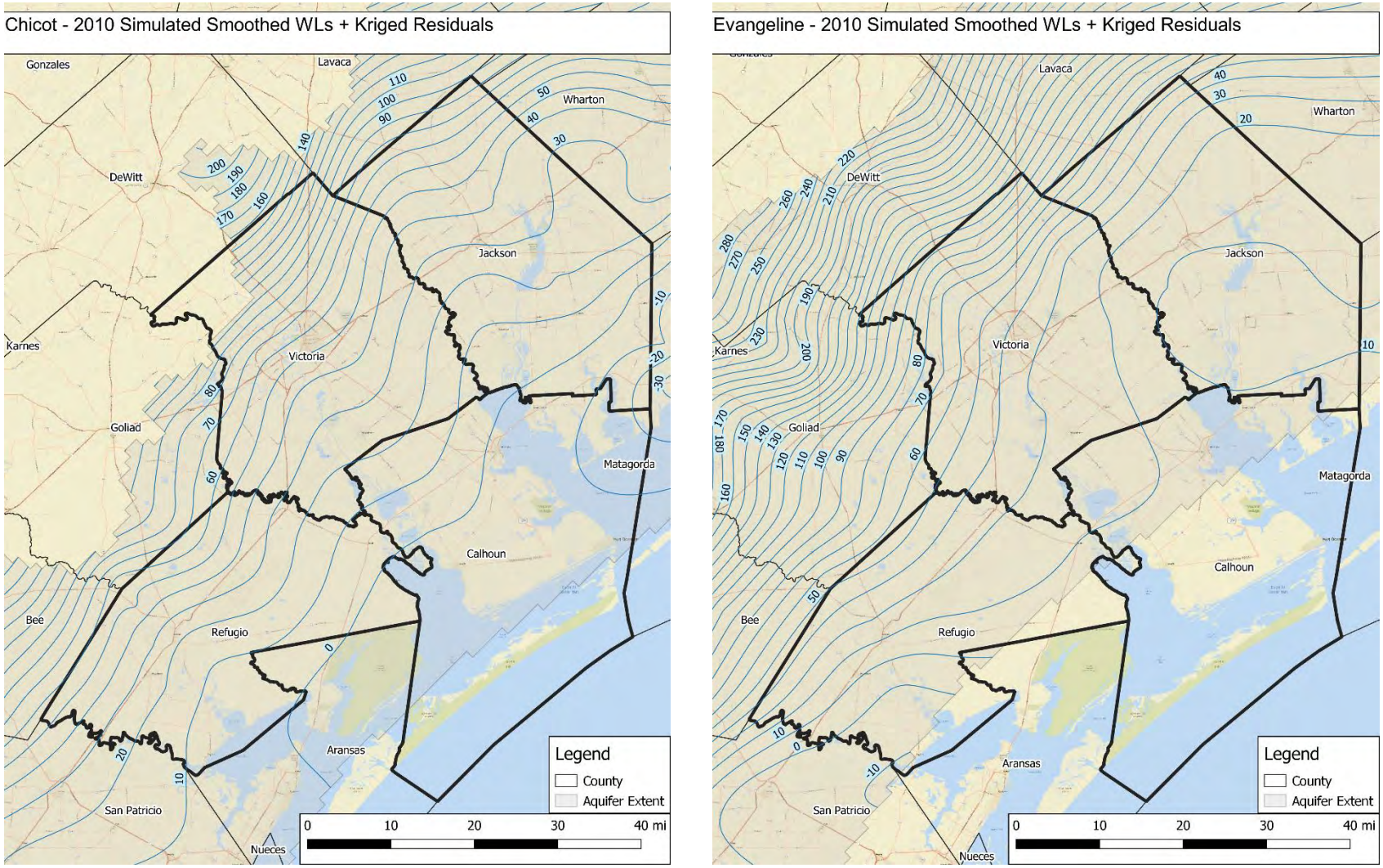


Figure 4-15 Contours of water levels for the Chicot and the Evangeline Aquifer in 2010 based on combining GAM simulated smoothed water levels and Kriged residual for the measured water levels.

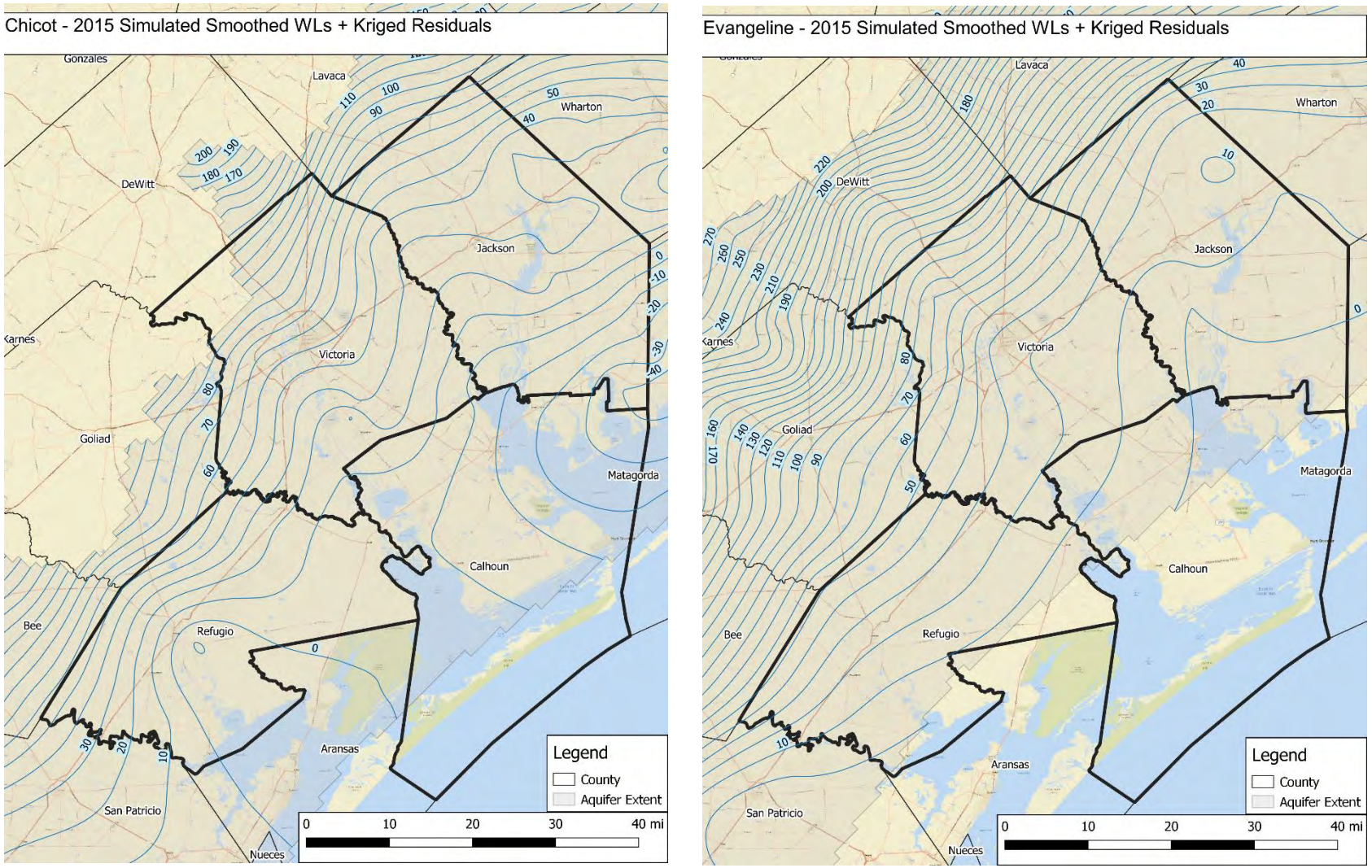


Figure 4-16 Contours of water levels for the Chicot and the Evangeline Aquifer in 2015 based on combining GAM simulated smoothed water levels and Kriged residual for the measured water levels.

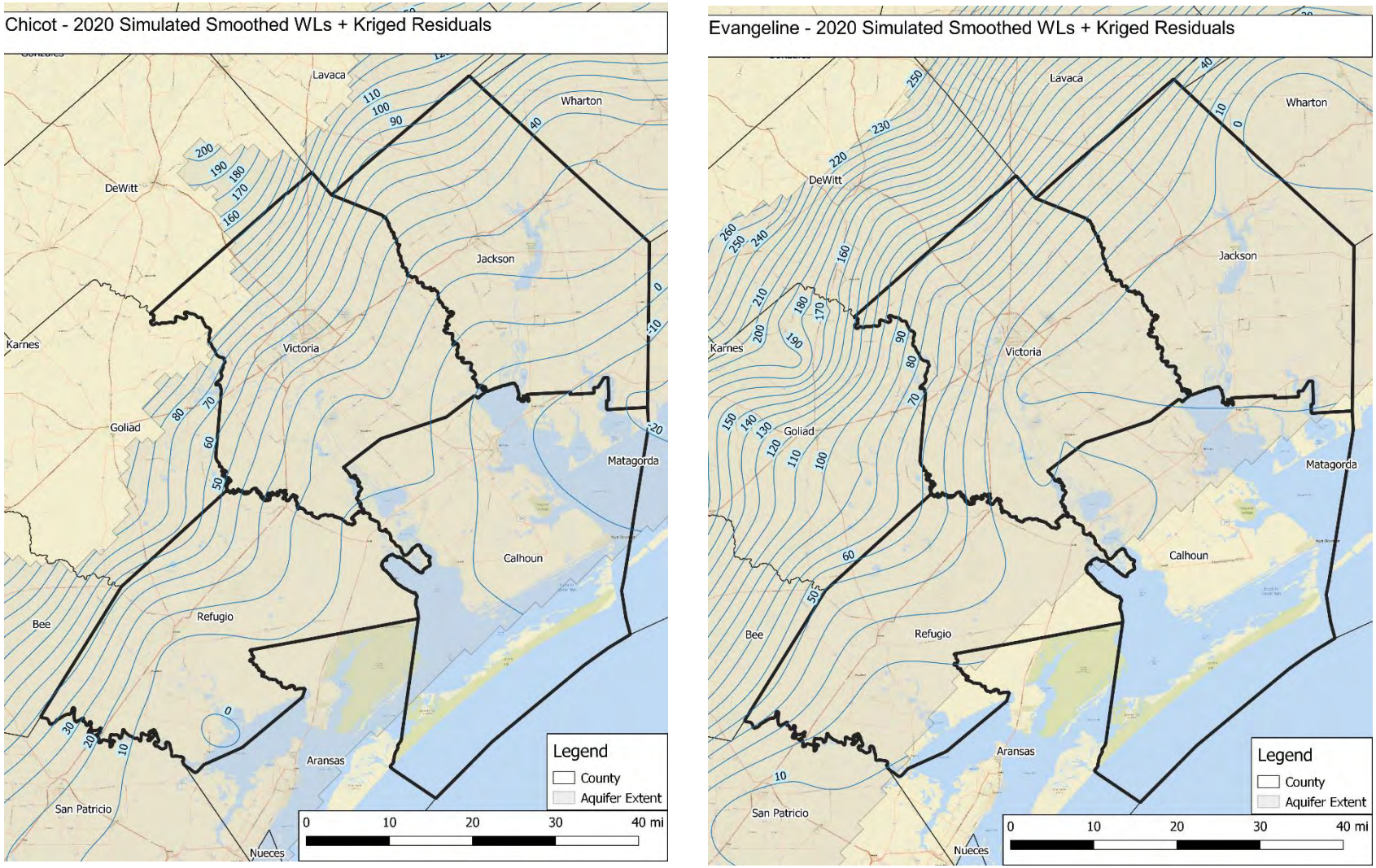


Figure 4-17 Contours of water levels for the Chicot and the Evangeline Aquifer in 2020 based on combining GAM simulated smoothed water levels and Kriged residual for the measured water levels.

5.0 CHANGE IN ANNUAL AVERAGE WATER LEVELS

This section presents provides graphs and tables that show how the average annual water level changes in Calhoun, Jackson, Refugio, and Victoria counties from 2000 to 2020. A useful metric for assessing changes in water levels across a county is a single number that represents the average water level elevation for the entire county. For this study, all water level maps are generated using grid cells that measure 1,000 by 1,000 ft. Therefore, each grid cell has an area of 1 million ft^2, which is the equivalent to about 23 acres or 0.36 $mile^2$. To determine the average water level for an area, one averages the water levels associated with the grid cells that comprise the area.

Tables 5-1 through **5-4** provide the average annual water levels calculated for the Chicot Aquifer, Evangeline Aquifer, and for a Chicot & Evangeline Aquifer from 2000 to 2020 for Calhoun, Jackson, Refugio, and Victoria counties using the SSWL+KR method. The average for the Chicot & Evangeline aquifers is calculated as if the Chicot and Evangeline aquifers were fused into a single aquifer. Tables 5-1 through 5-4 also provide the change in the average annual water levels relative to 2000. **Figures 5-1** through **5-4** plot the annual change in for the Chicot Aquifer, the Evangeline Aquifer, and the Chicot & Evangeline Aquifer. For all four counties, the Evangeline Aquifer has greater variability in the average water level change than does the Chicot Aquifer. From 2000 to 2020, the net changes in water level elevation that occurred in the Chicot Aquifer, the Evangeline Aquifer, and the Chicot & Evangeline Aquifer are:

- 4.5, -1.3, and 3.7 ft, respectively, for Calhoun County;
- 6.7, -1.0, and -2.9 ft, respectively, for Jackson County;
- -6.4, -1.7, and -3.7 ft, respectively, for Refugio County;
- -1.9, 9.3, and 3.8 ft, respectively, for Victoria County

Appendix D provides a sensitivity analysis of how changes in the method for constructing the water level maps impacts the amount of the average annual water levels. Among the notable observations from this sensitivity analysis are:

- The Kriged values results are not very sensitive to the amount the GAM simulated water level are smoothed to generate the trend surface used for detrending.
- The Kriged results can be very sensitive if the trend surface trend surface is updated to account for annual differences in the GAM simulations that account for different pumping rates.
- The Kriging of water levels without detrending can produce significantly different results than Kriging with detrending.
- The results for the Evangeline Aquifer are more sensitive to changes how Kriging is performed than results for the Chicot Aquifer.

Table 5-1 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
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
	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
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
	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
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
	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

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

Table 5-2 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
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
	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
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
	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
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
	change (ft)*	19.1	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

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

Table 5-3 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
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
	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
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
	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
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
	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

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

Table 5-4 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
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
	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
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
	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
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
	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

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

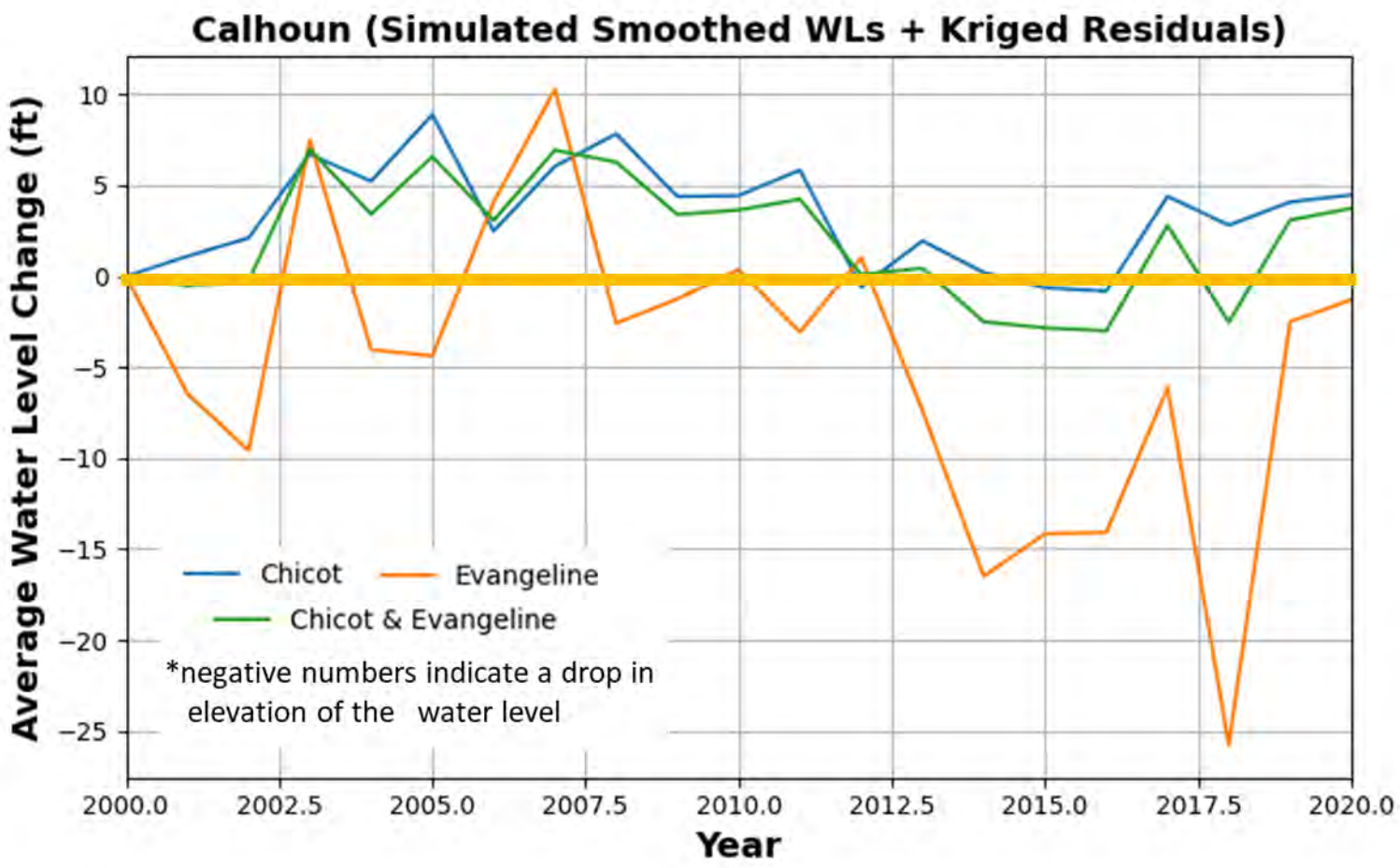


Figure 5-1 Change in the average annual water level calculated in Calhoun County for the Chicot Aquifer, the Evangeline Aquifer, and the combination of Chicot and Evangeline aquifers based on the analysis of aquifer levels determined using GAM simulated smoothed water levels and Kriged residual for the measured water levels.

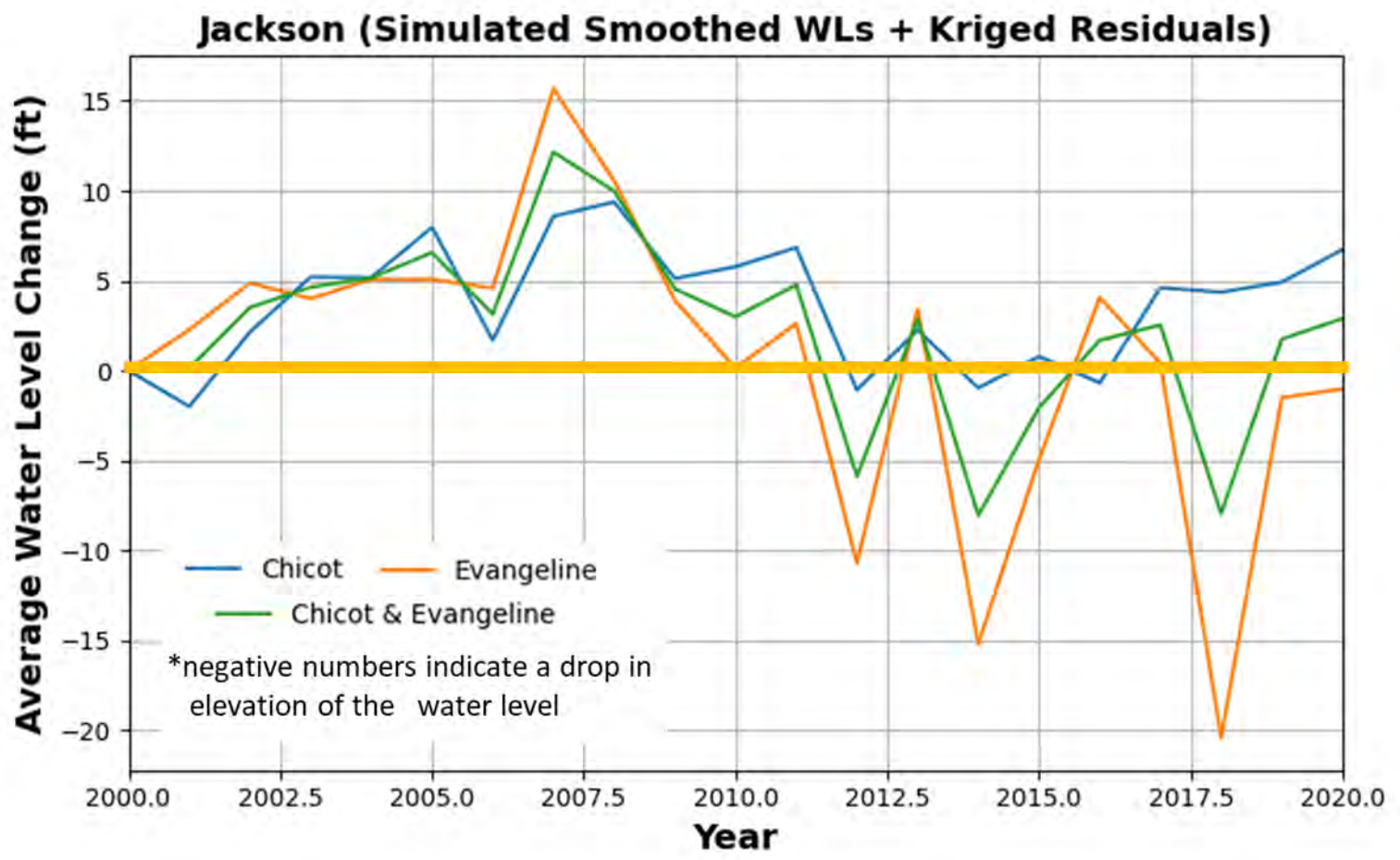


Figure 5-2 Change in the average annual water level calculated in Jackson County for the Chicot Aquifer, the Evangeline Aquifer, and the combination of Chicot and Evangeline aquifers based on the analysis of aquifer levels determined using GAM simulated smoothed water levels and Kriged residual for the measured water levels.

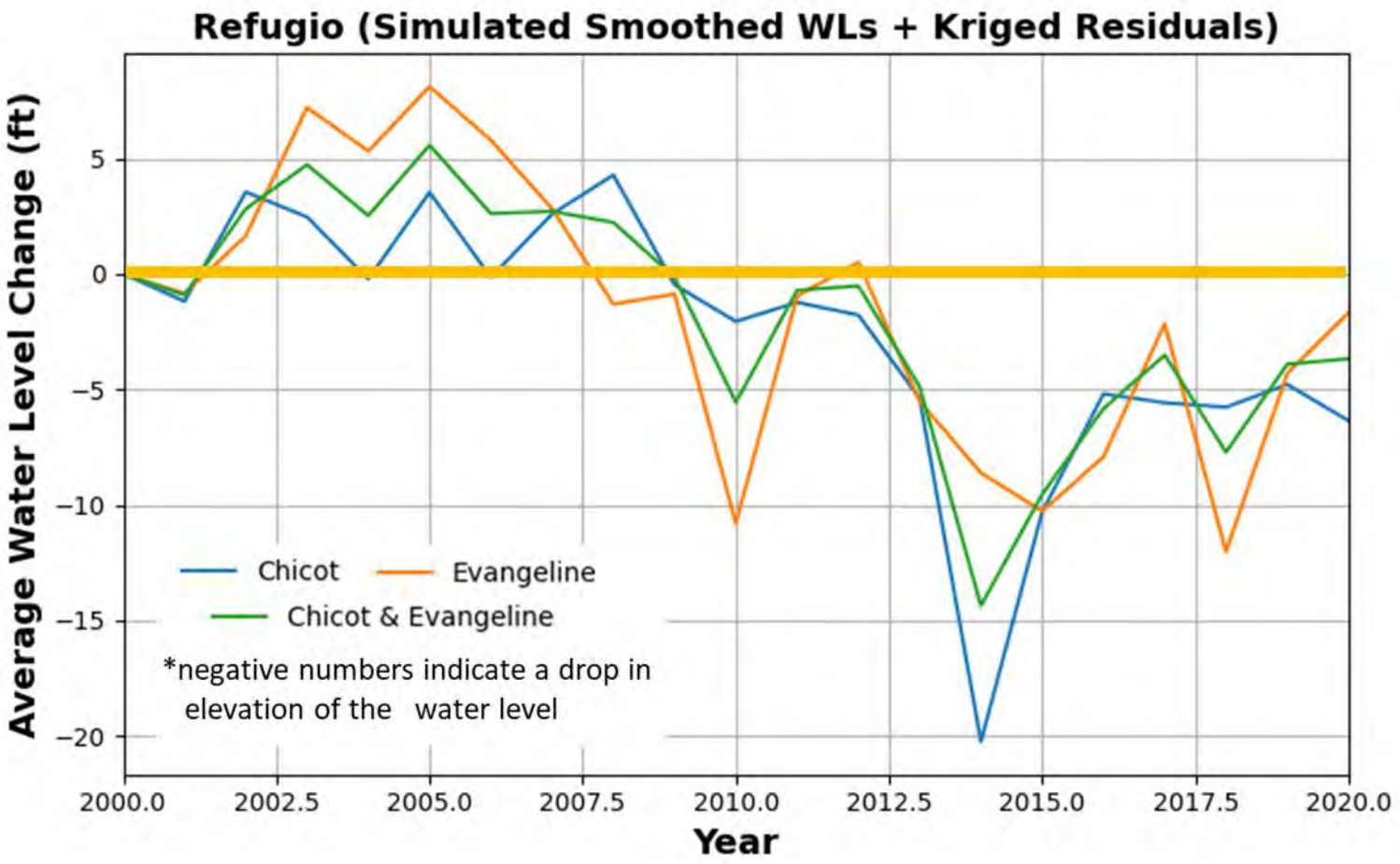


Figure 5-3 Change in the average annual water level calculated in Refugio County for the Chicot Aquifer, the Evangeline Aquifer, and the combination of Chicot and Evangeline aquifers based on the analysis of aquifer levels determined using GAM simulated smoothed water levels and Kriged residual for the measured water levels.

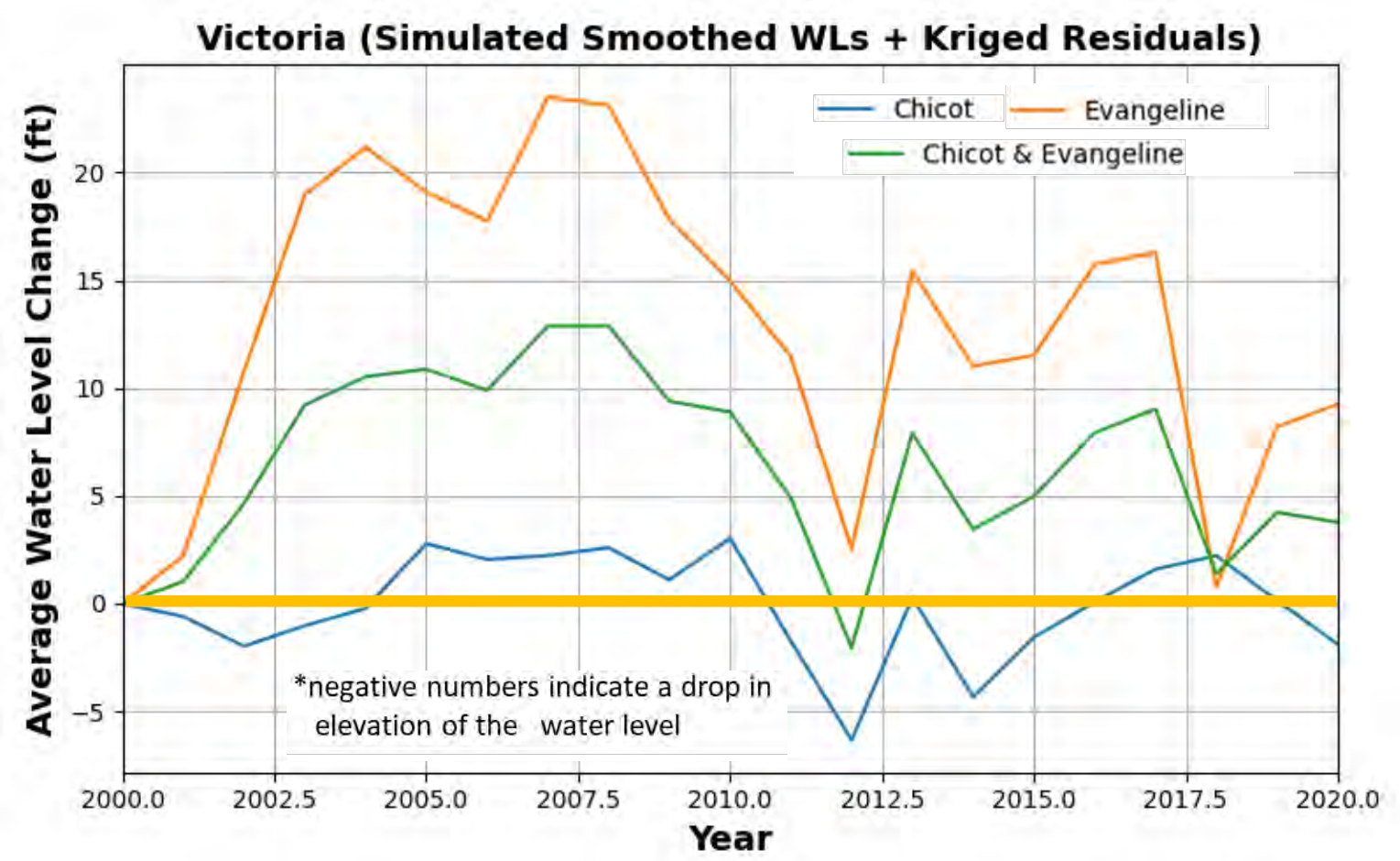


Figure 5-4 Change in the average annual water level calculated in Victoria County for the Chicot Aquifer, the Evangeline Aquifer, and the combination of Chicot and Evangeline aquifers based on the analysis of aquifer levels determined using GAM simulated smoothed water levels and Kriged residual for the measured water levels.

6.0 SPATIAL AND TEMPORAL CHANGES IN WATER LEVELS

This section presents tables and figures that illustrate changes in the water levels across the counties and at wells. The maps showing contours of water level change across counties are based on the differences in the mapped annual water levels determined for the Chicot Aquifer, Evangeline Aquifer, and the Chicot & Evangeline Aquifer in Section 5. The groundwater elevation changes at wells are based on hydrographs of the measured water levels.

6.1 Water Level Changes Across Counties

Figures 6-1 through **6-4** show the net change in water levels in from 2000 to 2020 in Calhoun, Jackson, Refugio, and Victoria counties. Maps are provided for both the Chicot and the Evangeline aquifers. The coverages for both aquifers are truncated to the aquifer boundaries delineated in the central Gulf Coast GAM (Chowdhury and others, 2004). The water level changes are delineated using contours and color floods. Positive numbers and blue and green colors show where water level elevations increased over time. Negative numbers and yellow and orange colors indicate where water level elevations have decreased over time. **Appendix E** provides figures that divides the twenty-year interval into 10-year and 5-year periods. Several notable observations made from Figures 6-1 through 6-4 and Appendix E are listed below.

<u>Calhoun County</u>

- Chicot Aquifer
  - 2000-2020: Water levels increased across about 80% of the county. The largest increase of about 20 ft occurred in northeast region. Areas of decrease occurred in northwest and north regions.
  - 2000-2010: Water levels increased across about 80% of the county. The largest increase was of 23 ft in water levels with greatest increase occurring in northeast. Areas of decreased water levels occurred in southwest with maximum declines of about 5 ft.
  - 2010-2020: Water levels decreased in about 60% of the county. The decreases occurred primarily in the northeast. The largest decrease of about 12 ft occurred in northeast. Areas of decreased water levels occurred in southwest with maximum declines of about 5 ft.
- Evangeline Aquifer
  - 2000-2020: Water levels decreased across about 70% of the county. The largest decrease of about 7 ft occurred in the northeast.
  - 2000-2010: Water levels decreased across the county except for about 10% of the county in the northwest corner of the county. Decreased water levels were generally less than 5 ft and the increased water levels were generally less than 2.5 ft.
  - 2010-2020: Water levels increased in about 90% of the county. The largest increase was about 5 ft. Water levels decreased along the Jackson county line. The largest decrease was 2.5 ft.

Jackson County

- Chicot Aquifer
  - 2000-2020: Water levels increased across about 90% of the county. Increases of about 25 ft occurred in the northeast and of about 20 ft occurred in south. In the remaining areas, water levels decreased less than 5 ft.
  - 2000-2010: Water levels increased across about 90% of county. Increased water levels of 20 ft occurred in the northeast and southwest corners of the county.
  - 2010-2020: Water levels across most of the county changed less than 5 ft. The largest increase in water levels of 10 ft occurred in southeast; the largest decrease in water levels of about 15 ft occurred in southwest.
- Evangeline Aquifer
  - 2000-2020: Water levels increased across about 50% of the county with the largest increase of about 12 ft occurring in the northern region. Water levels decreased across the remaining county with the greatest decline of 10 ft occurring in the southern region.
  - 2000-2010: Water levels increased 5 ft across most of the central and northern part of the county. In the southeast part of the county, the water levels decreased averaged about 5 ft also.
  - 2010-2020: Across about 90% of the county, the water levels changed less than 5 ft.

Refugio County

- Chicot Aquifer
  - 2000-2020: Water levels decreased across about 70% of the county and in the northwest region where the largest decrease of about 27 feet occurred near the Goliad county line. An increase of less than 5 ft occurred across most of the remaining southeastern portion of the county.
  - 2000-2010: Water levels in northeast that cover about 60% decreased. The largest groundwater elevation decrease of 17 ft occurred along the Goliad county line. Water levels increased between 0 to 10 ft in southwestern region of the county.
  - 2010-2020: Water levels decreased across about 80% of the county with greatest decrease of about 18 ft near center of the county. Water levels in the remaining portion of the county increased 2 to 7 ft.
- Evangeline Aquifer
  - 2000-2020: Water levels decreased across about 75% of the county with the largest decline of 15 ft in the north-central region of the county.
  - 2000-2010: Water levels decreased across the entire county. The declines ranged from about 5 ft in the northeast to about 25 ft in the southeast.
  - 2010-2020: Water levels increased across 95% of the county. Most of the increases were between 7 and 17 ft. The largest increase of about 22 ft occurred in the southwest corner of the county.

Victoria County

- Chicot Aquifer
  - 2000-2020: Water levels increased across about 50% of the county and primarily in the northeast region. The largest increase of about 25 ft occurred at the center of the county. Water levels decreased in the southwest region where the largest decrease was about 15 ft.

  - 2000-2010: Water levels increased across about 65% of the county and primarily in the northeast and east regions. The largest increase in water levels of about 25 ft occurred at center of the county. In southwest portion of the county, the water levels decreased. The declines range between 5 and 10 ft.
  - 2010-2020: Water levels decreased across about 60% of the county and primarily in the southeast portion of the county. The groundwater level declines were primary between 2 and 10 ft. In the northeast corner of the county, the groundwater levels increased about 5 to 10 ft.

- Evangeline Aquifer
  - 2000-2020: Water levels increased across about 60% of the county and primarily in the northwest portion of the county. The largest increase of about 70 ft occurred at the center of the county. In southwest region of the county, changes in the groundwater levels ranged from about a 10 ft increase to a 20 ft decrease.
  - 2000-2010: Water levels increased across about 85% of the county. The largest increase of about 80 ft occurred at the center of the county and lessen radially outward.
  - 2010-2020: Water levels decreased across about 80% of county. The largest declines of 20 to 25 ft occurred near the center and near the southwest corner of the county. Groundwater levels increased about 5 to 10 ft in northwest region of the county.

6.2 Water Level Changes at Wells

Appendices F and **G** provide hydrographs for wells located in Calhoun, Jackson, Refugio, and Victoria counties. Appendix F shows hydrographs for the Chicot Aquifer. Appendix G shows hydrographs for the Evangeline Aquifer. Each hydrograph shows the measured water level as blue dots and the corresponding water levels associated with the trend surface created using the smoothed GAM simulated water levels as red dots. The blue lines were constructed by performing a linear regression on the measured water levels. **Figures 6-5** through **6-11** show selected hydrographs by aquifer and by county. Only wells with at least four annual measurements were considered. Each hydrograph is assigned a color dot to indicate whether the water levels were increasing, relatively flat, or decreasing over time. Also, simulated water levels were rated from 1 to 10 based on their similarity to the measured water levels. A score of 10 indicates the simulated water level accurately reflects both the values and the temporal trend in the measured water levels. Notable observations are listed below by county.

<u>Calhoun County</u>

- Chicot Aquifer
  - Six hydrographs are provided. They are located in the half of the county closest to Victoria county. Four of the hydrographs show a relatively flat trend over time for the measured groundwater elevations.
  - The smoothed simulated water levels are within 10 ft of the measured water levels. However, for five out of the six wells, the simulated water levels exhibit increases of 5 to 10 ft from 2000 to 2020 whereas the measured groundwater levels indicate a change of less than a few feet. The GAM-simulated water levels are rated an 8 out of 10.

- Evangeline Aquifer
  - No hydrographs are available for review.

Jackson County

- Chicot Aquifer
  - Twelve hydrographs are provided. They are located across the county except for near the Calhoun County line. Eight of the hydrographs show a relatively flat trend over time for the measured water levels. The remaining four hydrographs show an increase in the measured water levels.
  - A comparison between simulated and measured water levels at the twelve well locations produced mixed results. For several wells, such as wells #907 and #5, the simulated elevations are within a few feet and have a similar temporal trend as the measured elevations but there are other wells such as wells #137 and #112 where, the simulated elevations are differed by as much as 40 ft and have a dissimilar temporal trend than do the measured elevations. The GAM-simulated water levels are rated a 4 out of 10.
- Evangeline Aquifer
  - Seven hydrographs are provided. They are located across the county. Three hydrographs indicate nearly flat temporal trends in the measured water levels, and three hydrographs indicate an increase in the measured water levels. The GAM-simulated water levels are rated a 5 out of 10.
  - A comparison between simulated and measured water levels at the twelve well locations produce mixed results. The comparisons are generally better for years closer to 2000 than for the years closer to 2020. For 2020, four of the wells have differences between 20 and 40 ft between the measured and simulated water levels. The GAM-simulated water levels are rated a 6 out of 10.

Refugio County

- Chicot Aquifer
  - Eight hydrographs are provided. They are located across the county. Four of the hydrographs show a relatively flat temporal trend in the measured water levels and three hydrographs show a decreasing trend in the measured elevations. Wells # 44 and #61 may have unrepresentative measured water levels. The shift of about 20 ft in 2014 at Well #44 may have occurred because of a change in the datum used in the field.
  - A comparison between simulated and measured water levels at the twelve well locations produce mixed results. The GAM-simulated water levels are rated a 5 out of 10.
- Evangeline Aquifer
  - Two hydrographs are provided. One shows a relatively flat trend in the measured water levels and the other shows a decreasing trend in the measured water levels.
  - The simulated and measured water levels are similar for the one well but are notably different for the other well. The GAM simulated water levels are rated a 6 out of 10.

Victoria County

- Chicot Aquifer
  - Twelve hydrographs are provided. They are located across the county except in the center of the county. Seven of the hydrographs show a relatively flat temporal trend in the measured water levels. Three hydrographs show an increasing trend in the measured water levels.
  - The measured and simulated water levels compare favorably at four wells. At five other wells, the simulated and measured water levels have similar trends but the data sets are

offset by 10 to 30 ft. At three wells, notable trends of increasing water levels with the measured data are not provided in the simulated values. The GAM-simulated water levels are rated a 5 out of 10.

- Evangeline Aquifer
  - Twelve hydrographs are provided. They are located across the county. Seven of the hydrographs show a relatively flat temporal trend in the measured water levels. Three hydrographs show an increasing trend in the measured water levels.
  - The measured and simulated water levels compare favorably at five wells. At four other wells, the simulated and measured water levels have similar trends but the data sets are offset by 10 to 30 ft. At two wells, notable trends in the measured water levels are not reproduced in the simulated values. The GAM-simulated water levels are rated a 6 out of 10.

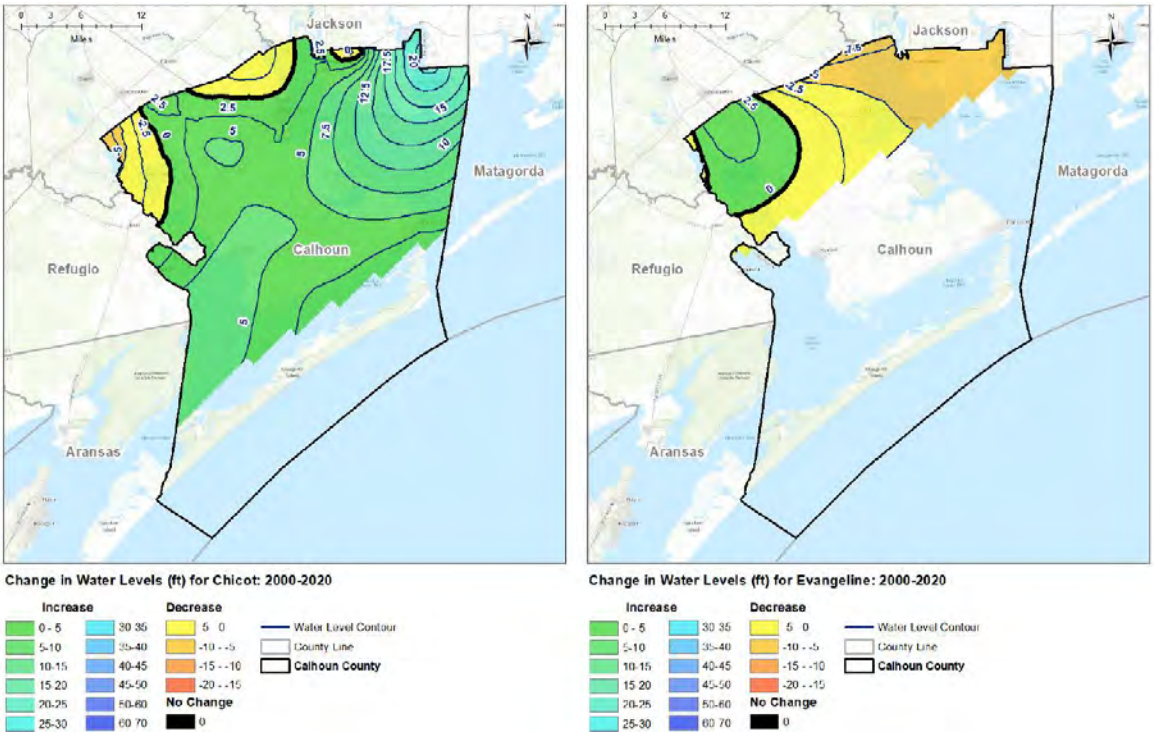


Figure 6-1 Water level elevation change in Chicot and Evangeline Aquifers across Calhoun County for 2000 - 2020

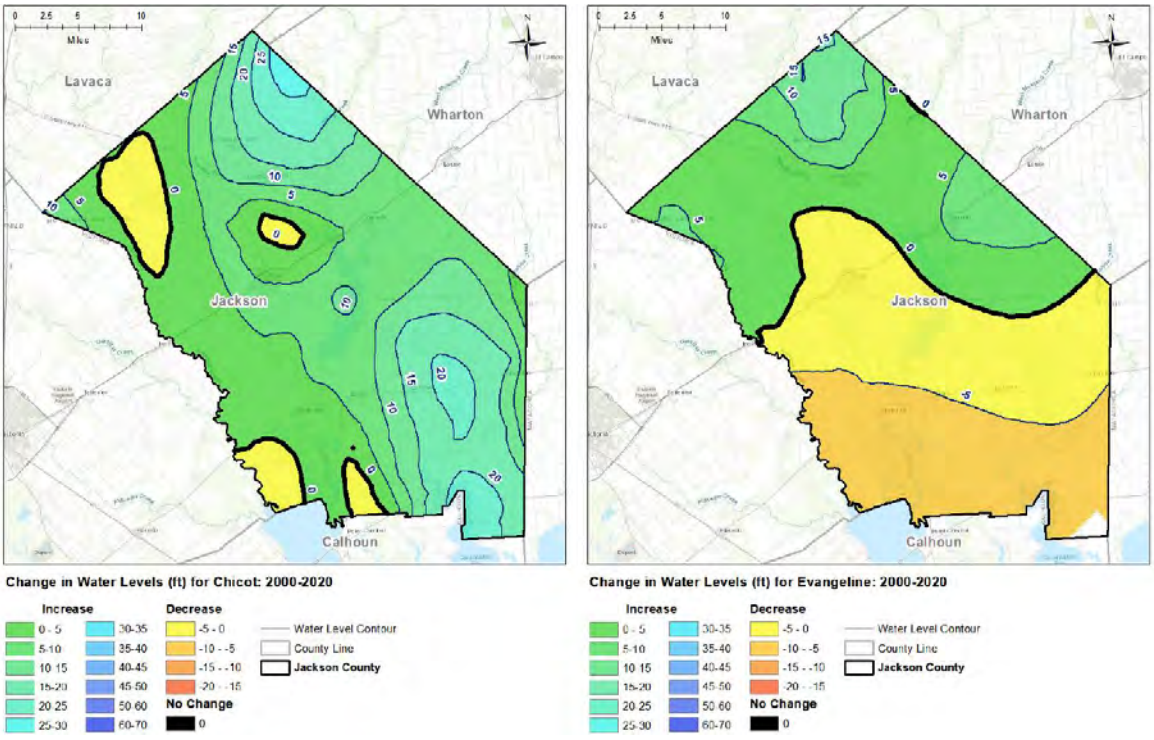


Figure 6-2 Water level elevation change in Chicot and Evangeline Aquifers across Jackson County for 2000 - 2020

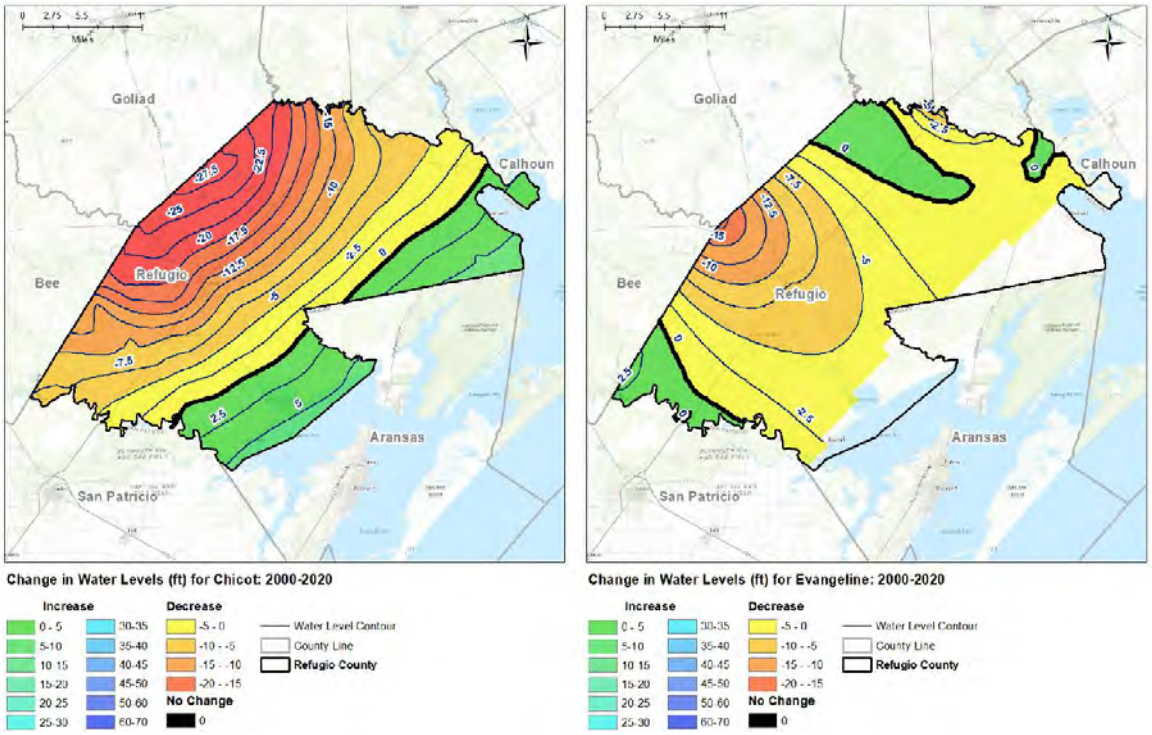


Figure 6-3 Water level elevation change in Chicot and Evangeline Aquifers across Refugio County for 2000 - 2020

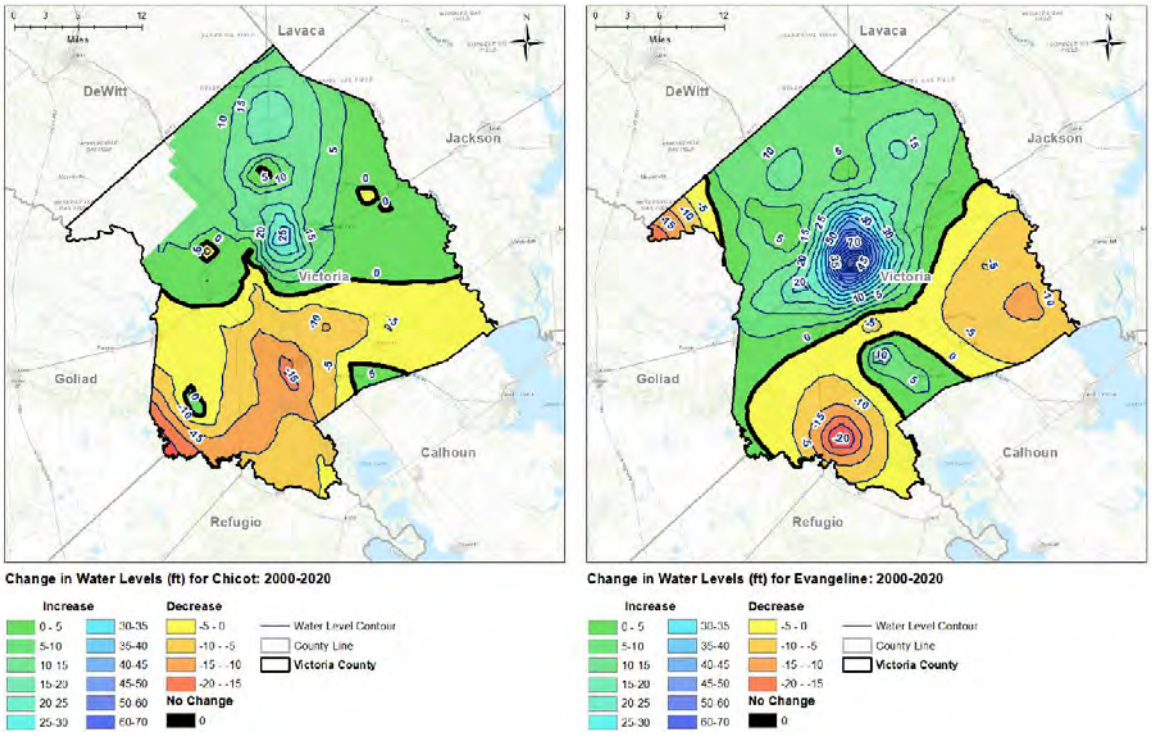


Figure 6-4 Water level elevation change in Chicot and Evangeline Aquifers across Victoria County for 2000 - 2020

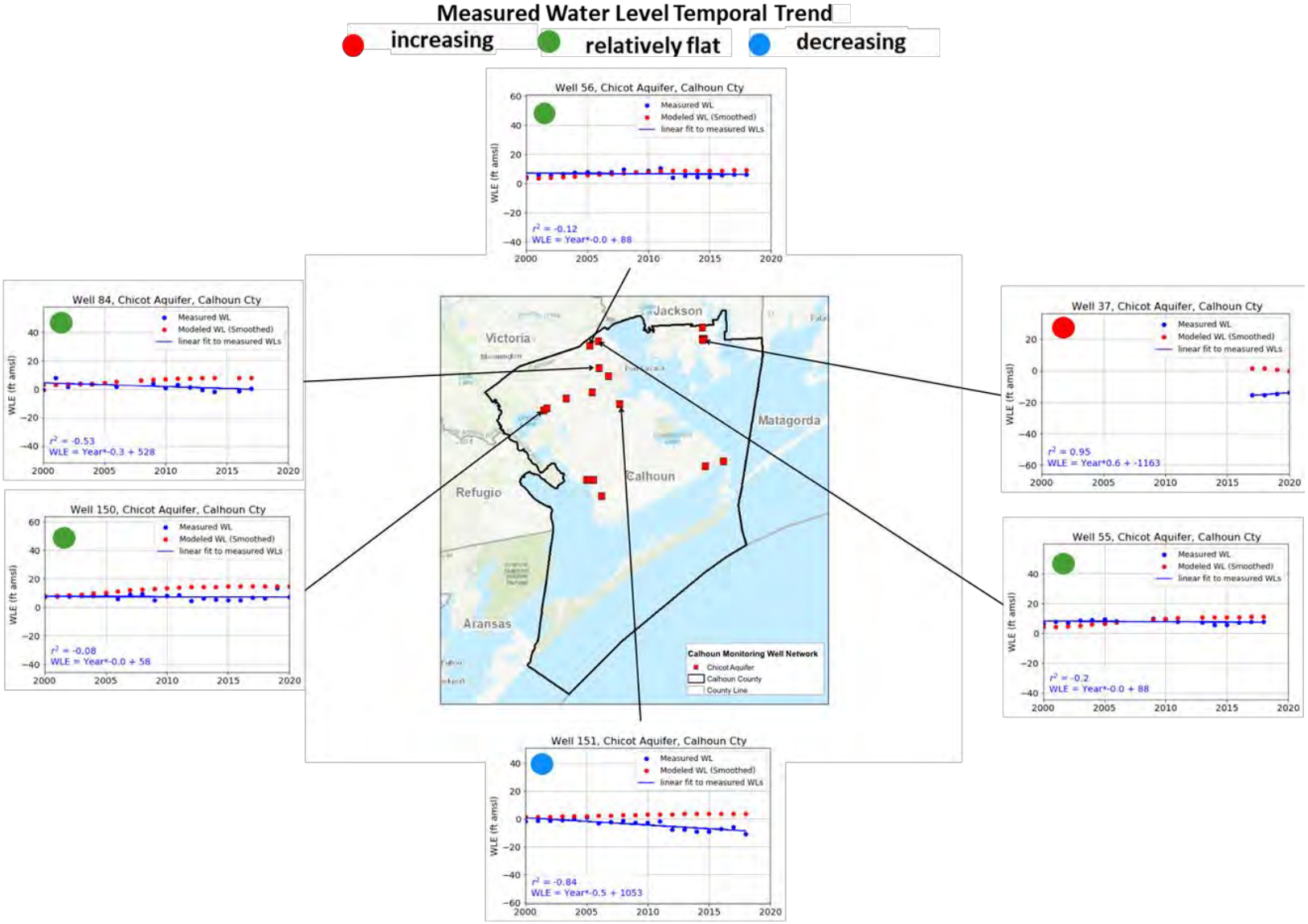


Figure 6-5 Hydrographs for Chicot wells with four or more measured water levels in Calhoun County

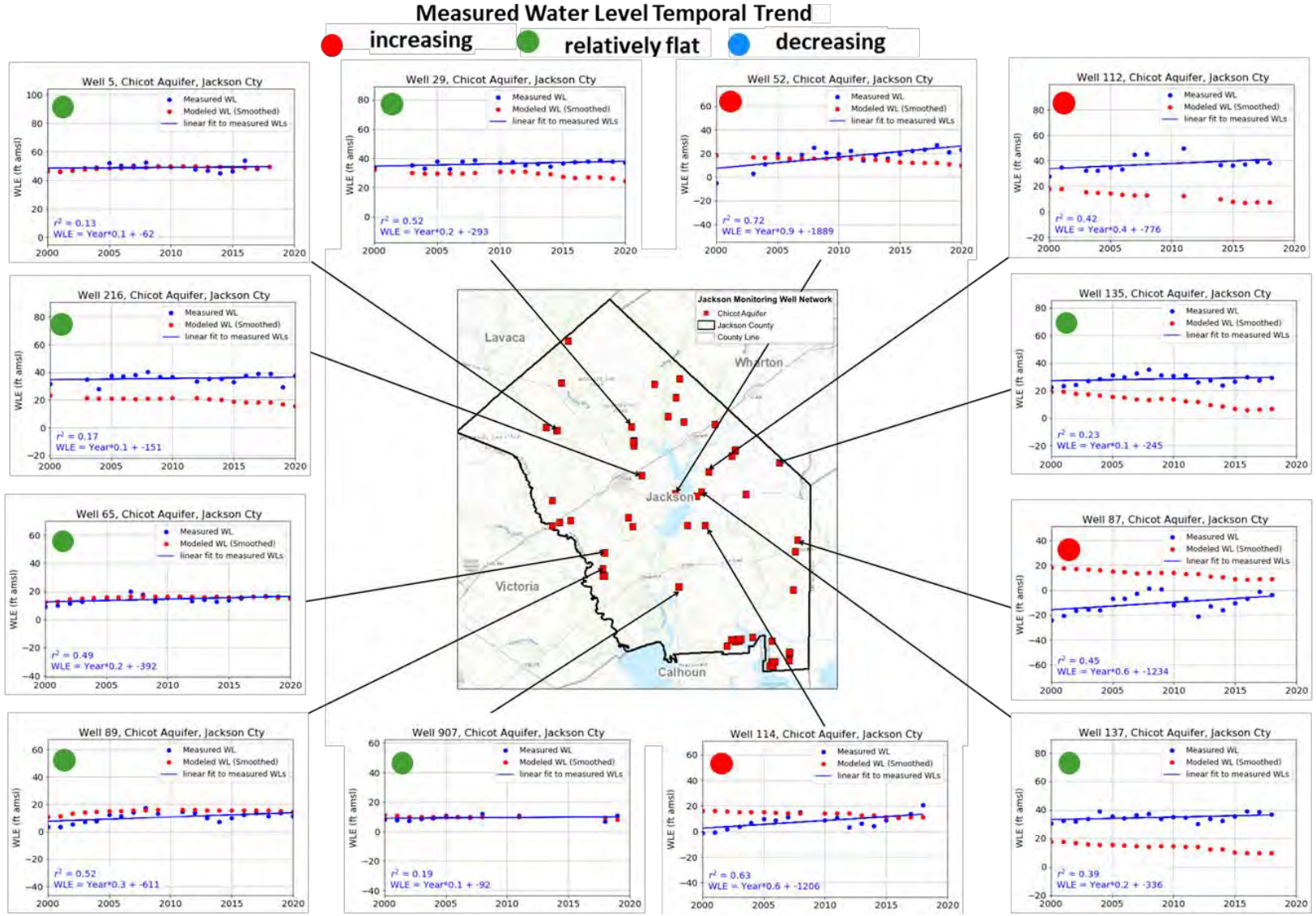


Figure 6-6 Hydrographs for Chicot wells with four or more measured water levels in Jackson County

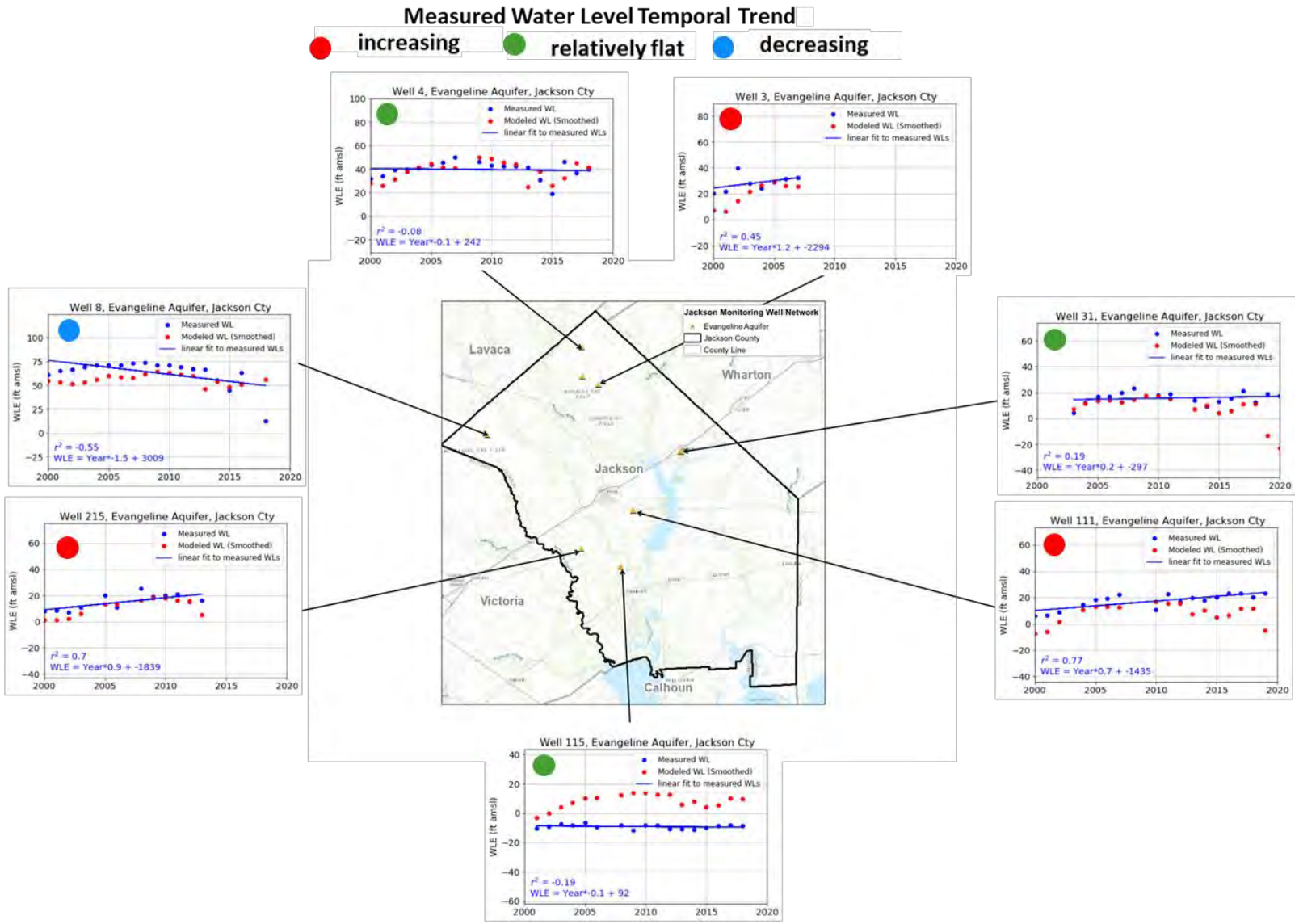


Figure 6-7 Hydrographs for Evangeline wells with four or more measured water levels in Jackson County

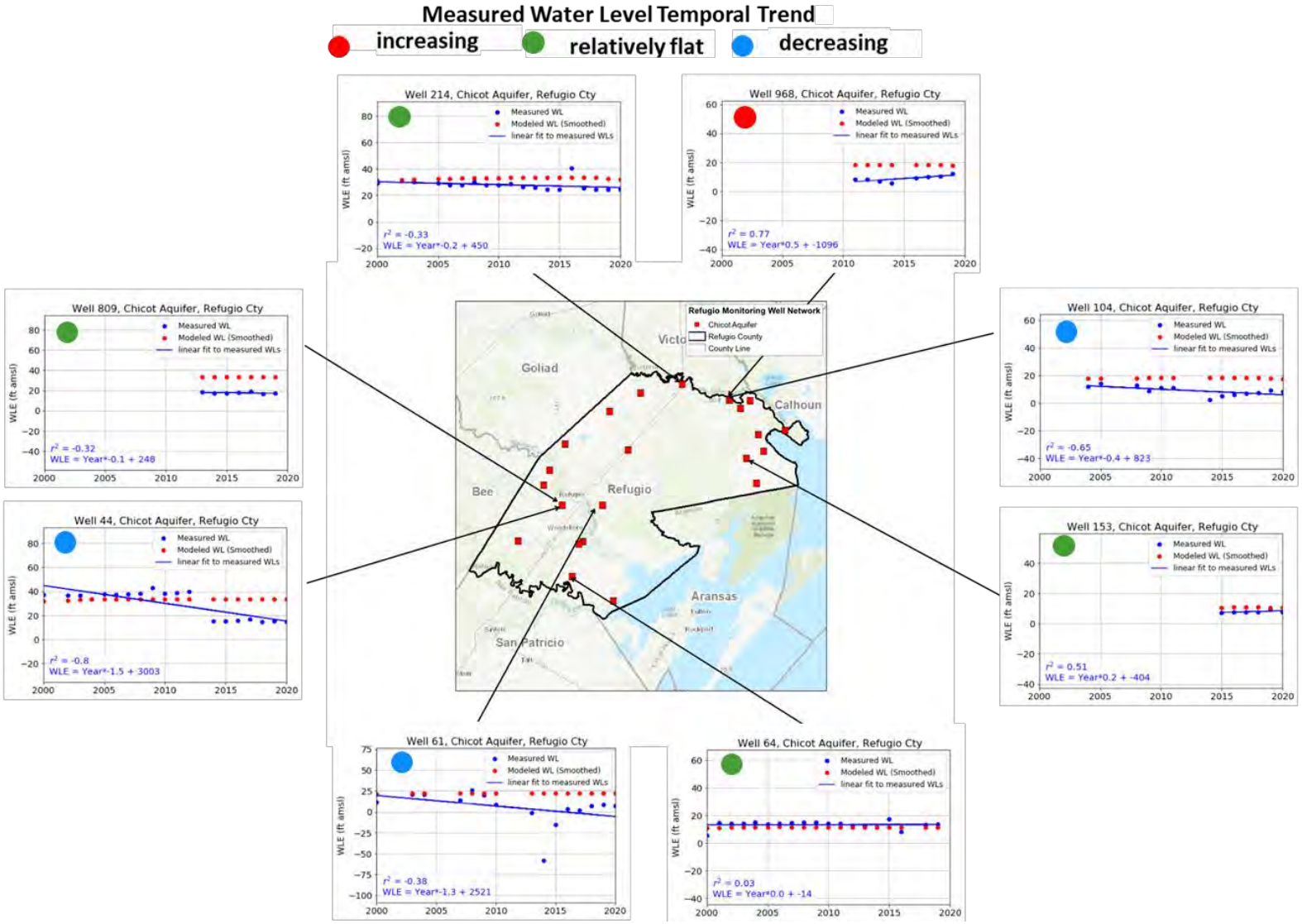


Figure 6-8 Hydrographs for Chicot wells with four or more measured water levels in Refugio County

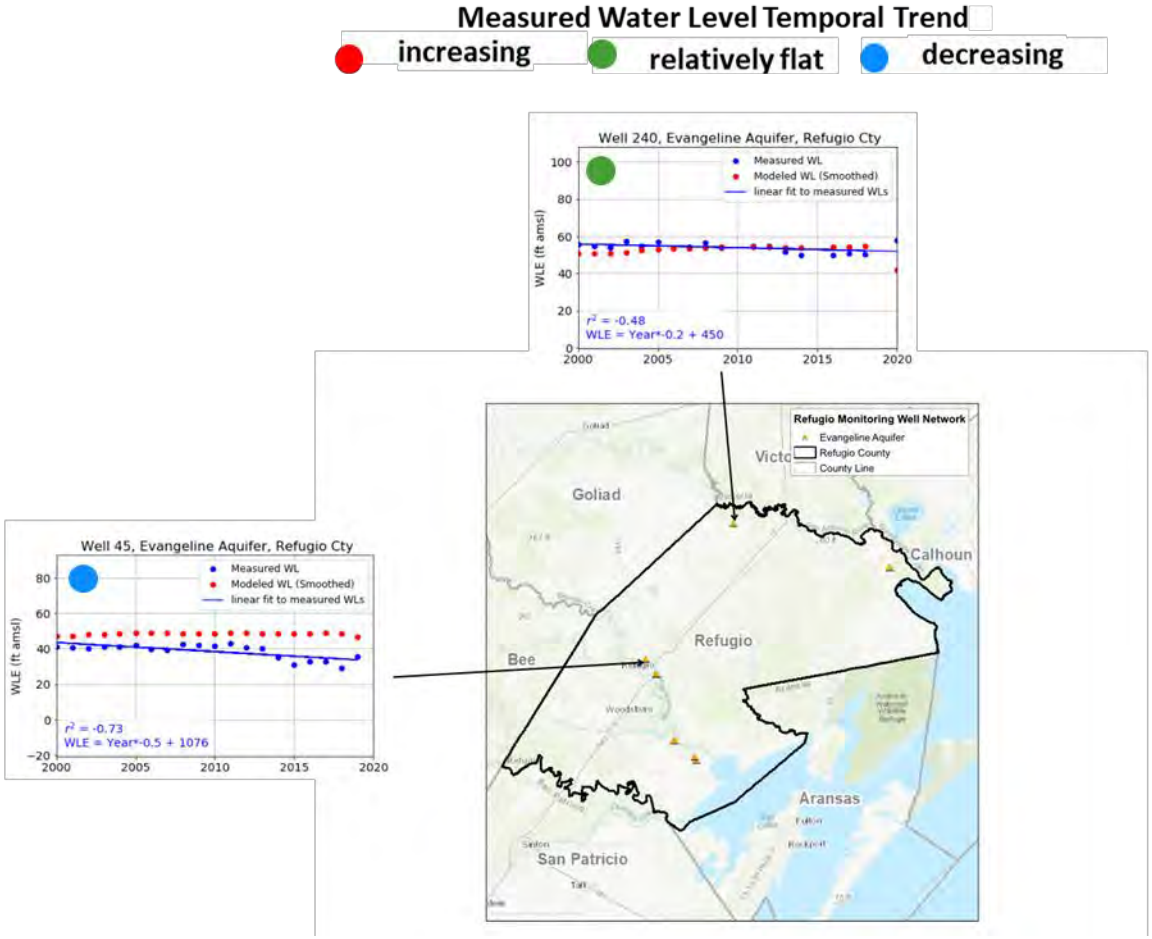


Figure 6-9 Hydrographs for Evangeline wells with four or more measured water levels in Refugio County

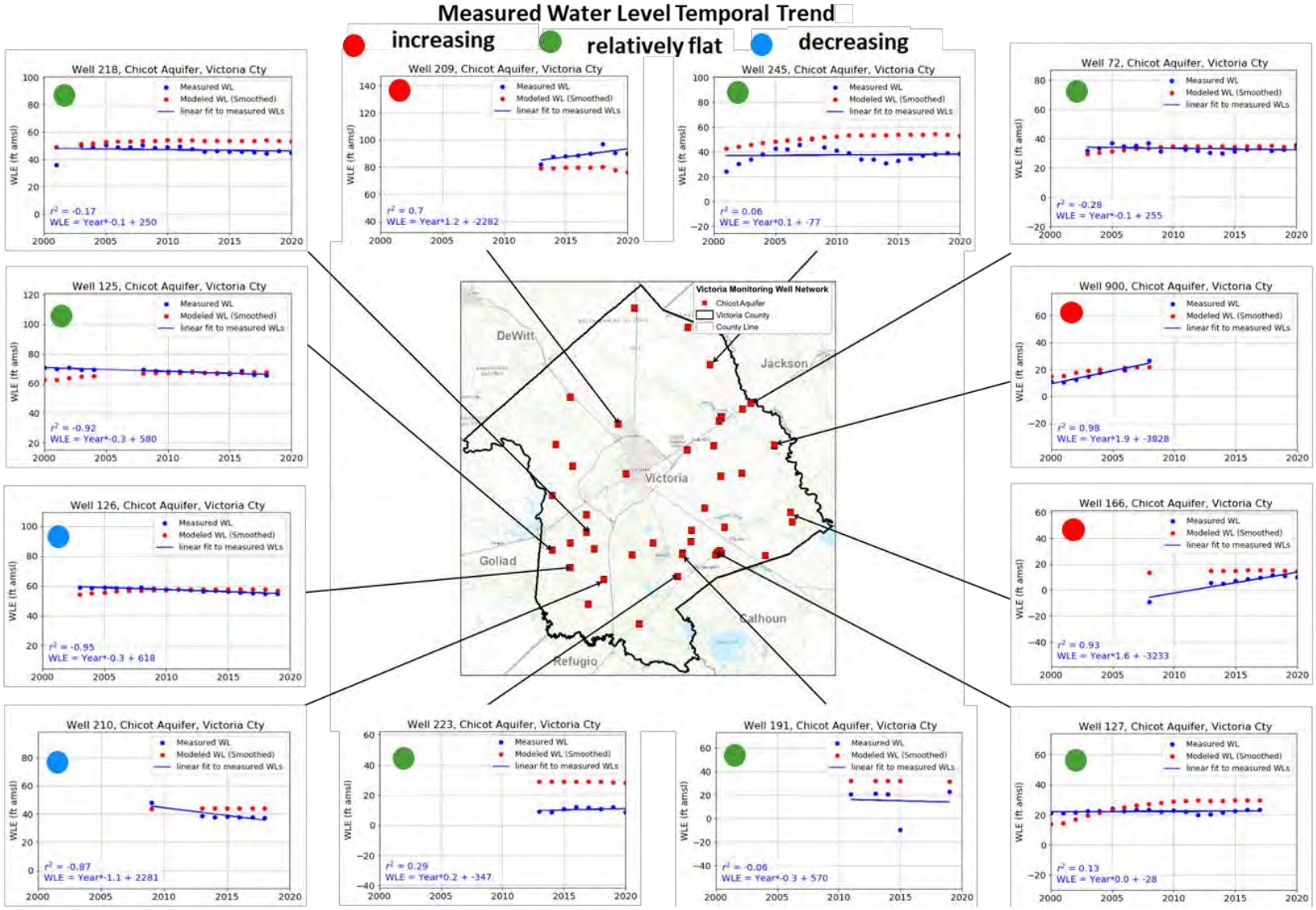


Figure 6-10 Hydrographs for Chicot wells with four or more measured water levels in Victoria County

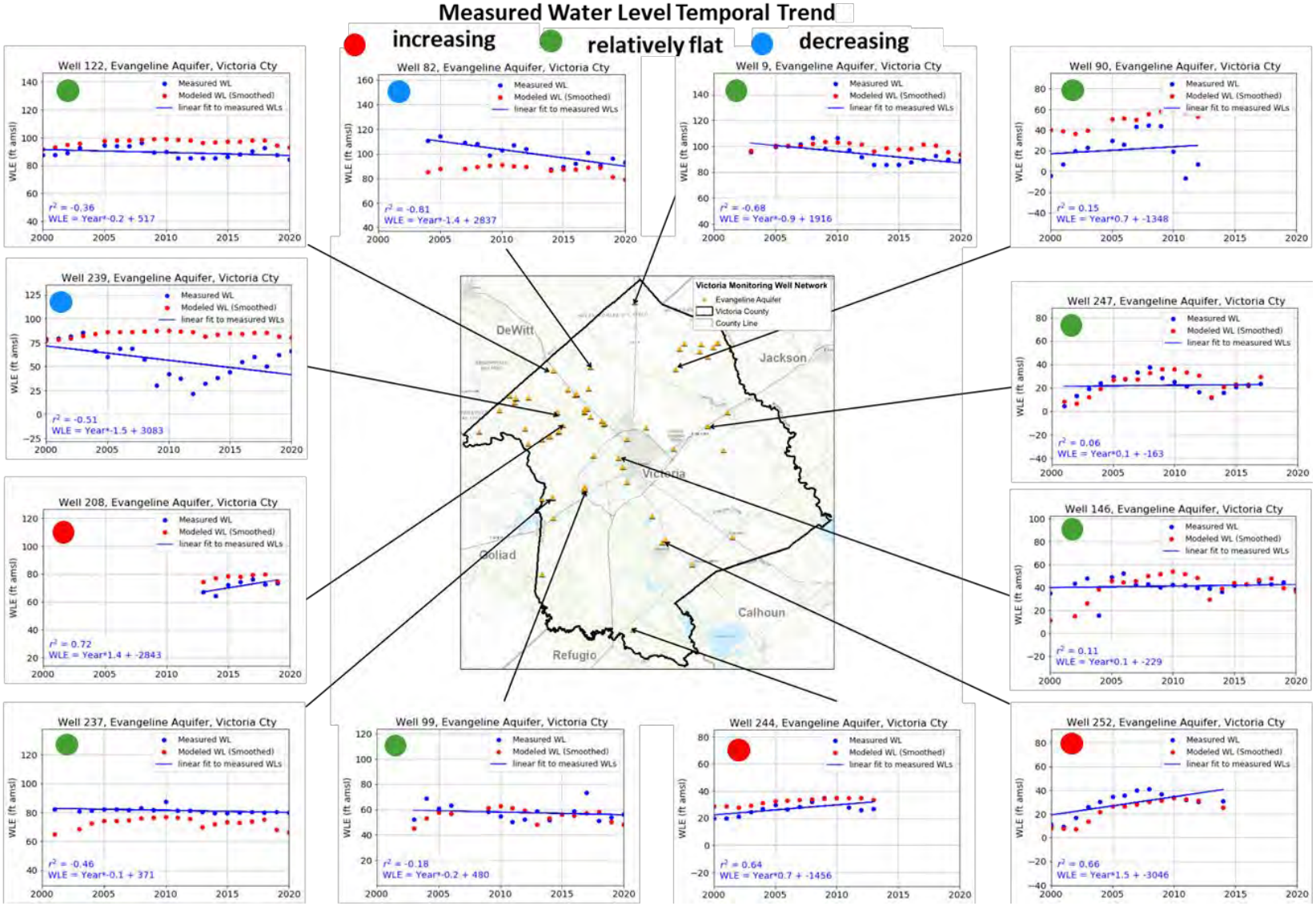


Figure 6-11 Hydrographs for Evangeline wells with four or more measured water levels in Victoria County

7.0 RECOMMENDATIONS FOR FUTURE WORK

This section presents recommendations for future work that includes coordinating with the TWDB to integrate the GCD well information into the TWDB groundwater database, expanding and improving the monitoring well network and monitoring programs, and performing additional geostatistical analysis.

7.1 Incorporation of GCD well information into the TWDB Groundwater Database

The data mining and analysis performed in Section 2 documents two points. One point is that there is a considerable amount of water level data in the GCD data sets that is not included in the TWDB groundwater database. The second point is that, for most of the 127 wells identified in both the GCD and the TWDB data sets, the two data sets have different locations. Recommendations for future work with coordinating with the TWDB on the well information include:

- Select a common set of latitude and longitude for the 127 wells that shared between the GCD data set and the TWDB groundwater database.
- Survey the location of wells whose locations are in question after a review of the existing data
- Compare well depth and screen information between the GCD data set and the TWDB groundwater database for the purpose of making the two sets of values consistent
- Agree on a methodology with the TWDB for assigning an aquifer to a well and implement it for all wells located in Calhoun, Jackson, Refugio, and Victoria counties.

7.2 Expand the Monitoring Well Network and Monitoring Program

There are not studies that have evaluated whether the GCD monitoring well programs are measuring sufficient water level data to provide the resolution and accuracy that the GCDs need to adequately determine average water level conditions and how these water levels change over time. However, it is evident from Figures 2-3 to 2-6 there are areas where the monitoring well density appears sparse and likely too few wells to provide a clear picture of how pumping is affecting water levels over time. Recommendations for future work with expanding and improving the GCD monitoring well network include:

- Establish criteria for assessing the adequacy of well coverage in the Chicot and Evangeline aquifers to address the needs of the GCDs. Possible criteria include well density, spatial distribution of historical and future pumping, and reducing the uncertainty with the interpolated water levels.
- Priority-rank the existing wells for as candidate to augment the existing well network.
- Develop a program of expanding the monitoring network over time.
- Develop protocols for measuring water levels and for establishing criteria for develop protocols for flagging measured water levels that appear to be unrepresentative of actual aquifer conditions.

7.3 Expand and Build on the Geostatistical Analysis

Geostatistical techniques include a robust set of algorithms that extend beyond the interpolation of water levels using Kriging. A primary benefit of geostatistical techniques is that they can provide quantification of uncertainty. As illustrated in **Figure 7-1**, the quantification of uncertainty supports two types of analyses that are important to groundwater monitoring. One analysis is estimating the uncertainty associated with the Kriged values calculated for unsampled location. Knowledge of the predictive uncertainty provides useful information regarding: (1) the potential benefits of gathering additional monitoring data, and (2) the likelihood that the interpolated water level at a location (or many locations) exceeds a specified value. The other analysis that geostatistics can provide is determining the best location for a future monitoring well for reducing the predictive uncertainty associated with the interpolation. Knowledge of the optimum monitoring locations to reduce predictive uncertainty is useful information regarding: (1) deciding on the where to add new locations to the monitoring well network, and (2) determining how to expand the monitoring well network to achieve a specific level of confidence associated with the predicted water levels. Recommendations for future work coordinating with the TWDB on the well information include:

- Identify and evaluate potential benefits to groundwater monitoring of quantifying the predictive uncertainty with the Kriged interpolation values in Section 4 and the average annual water levels provided in Section 5.
    - Pending results from the previous task, quantify the predictive uncertainty of the Kriged interpolation values in Section 4 and the average annual water levels provided in Section 5 to best achieve the GCD monitoring goals.
- Develop an approach for determining the best locations for adding new wells to the groundwater monitoring networks and determine there are potential benefits for incorporating geostatistics into the decision-making process.
    - Pending results from the previous task, use geostatistics to help determine the future monitoring well locations that provide the most cost-effective approach for achieve the GCD goals for the monitoring well network.

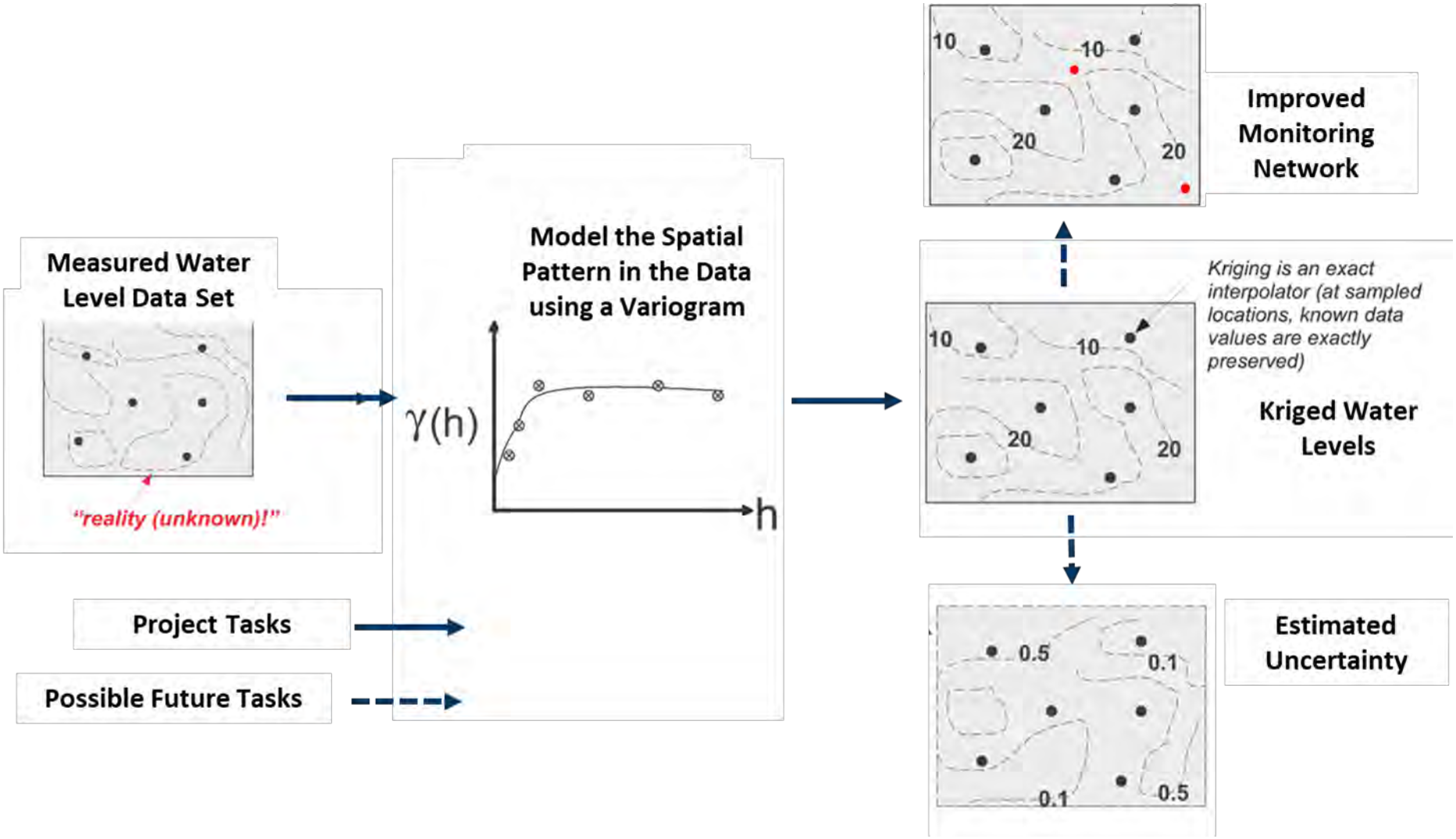


Figure 7-1 Schematic showing the application of geostatistical technial to interpolate water levels, to estimated uncertianity associated with the interpolated water levels, and to improve the design of monitoring well networks

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APPENDIX A
NAMES AND LOCATIONS FROM THE GCD AND TWDB WELL DATA SETS FOR 127 WELL PAIRS

Table A-1 Names and Location Wells that have been Paired

GCD Well ID	TWDB Well ID	from TWDB		from GCD		Distance (ft)
		Latitude	Longitude	Latitude	Longitude	
Calhoun County GCD - GW-00007	8019506	28.6788	-96.6787	28.6789	-96.6789	49.7
Calhoun County GCD - GW-00008	8019802	28.6270	-96.6790	28.6269	-96.6792	69.1
Calhoun County GCD - GW-00009	8026501	28.5491	-96.8023	28.5492	-96.8025	68.1
Calhoun County GCD - GW-00010	8027501	28.5808	-96.6958	28.5808	-96.6958	0.0
Calhoun County GCD - GW-00011	8027601	28.5566	-96.6363	28.5567	-96.6369	183.6
Calhoun County GCD - GW-00012	8035704	28.4133	-96.7133	28.4133	-96.7133	0.8
Calhoun County GCD - GW-00013	8037601	28.4406	-96.4144	28.4406	-96.4145	26.8
Calhoun County GCD - GW-00014	8019503	28.6712	-96.6978	28.6711	-96.6978	33.8
Refugio GCD - GW-00079	7954803	28.1472	-97.3072	28.1472	-97.3072	0.5
Refugio GCD - GW-00085	7947702	28.2889	-97.2339	28.2889	-97.2339	0.5
Refugio GCD - GW-00124	7931901	28.5236	-97.1339	28.5236	-97.1339	0.5
Refugio GCD - GW-00234	7932802	28.5281	-97.0453	28.5281	-97.0453	0.5
Refugio GCD - GW-00235	7946601	28.3219	-97.2900	28.3219	-97.2900	0.6
Refugio GCD - GW-00370	8042507	28.3253	-96.7922	28.3253	-96.7922	0.5
Refugio GCD - GW-00439	8033901	28.3750	-96.9047	28.3751	-96.9047	35.5
Refugio GCD - NW-00340	8033203	28.4931	-96.9389	28.4931	-96.9389	0.5
Refugio GCD - NW-00474	7939105	28.4764	-97.2117	28.4764	-97.2117	0.4
Refugio GCD - NW-00475	7946803	28.2900	-97.3250	28.2900	-97.3250	0.5
Texana GCD - GW-00112	8021601	28.6861	-96.3853	28.6863	-96.3855	84.8
Texana GCD - GW-00119	8021214	28.7211	-96.4522	28.7212	-96.4524	73.0
Texana GCD - GW-00120	8021204	28.7222	-96.4444	28.7223	-96.4439	180.9
Texana GCD - GW-00121	8021203	28.7250	-96.4411	28.7249	-96.4410	50.1
Texana GCD - GW-00122	8021201	28.7250	-96.4444	28.7251	-96.4445	44.8
Texana GCD - GW-00123	8021213	28.7253	-96.4481	28.7255	-96.4477	138.9
Texana GCD - GW-00247	6661808	29.0133	-96.4525	29.0133	-96.4525	0.4
Texana GCD - GW-00251	6661809	29.0219	-96.4397	29.0219	-96.4397	0.2
Texana GCD - GW-00274	6660708	29.0389	-96.6211	29.0379	-96.6206	396.3
Texana GCD - GW-00275	6660701	29.0394	-96.6225	29.0396	-96.6224	67.8
Texana GCD - GW-00276	6660401	29.0628	-96.6239	29.0633	-96.6241	194.4
Texana GCD - GW-00277	6660601	29.0683	-96.5308	29.0684	-96.5309	34.4
Texana GCD - GW-00278	6660613	29.0419	-96.5131	29.0420	-96.5131	36.7
Texana GCD - GW-00279	6661407	29.0622	-96.4756	29.0628	-96.4756	195.5
Texana GCD - GW-00280	6660501	29.0769	-96.5589	29.0772	-96.5589	87.0
Texana GCD - GW-00281	6660205	29.1061	-96.5436	29.1061	-96.5439	89.0
Texana GCD - GW-00283	8011202	28.8419	-96.6833	28.8423	-96.6831	150.0
Texana GCD - GW-00285	8011201	28.8669	-96.6783	28.8670	-96.6789	170.4
Texana GCD - GW-00286	8003909	28.9061	-96.6272	28.9061	-96.6273	41.5
Texana GCD - GW-00287	8004908	28.9053	-96.5300	28.9058	-96.5296	232.8
Texana GCD - GW-00288	8004601	28.9567	-96.5036	28.9572	-96.5035	182.6
Texana GCD - GW-00289	8006101	28.9978	-96.3636	28.9992	-96.3623	665.3
Texana GCD - GW-00290	8005102	28.9878	-96.4892	28.9882	-96.4887	224.3
Texana GCD - GW-00291	8004504	28.9556	-96.5500	28.9558	-96.5501	88.0
Texana GCD - GW-00292	8004403	28.9525	-96.6006	28.9523	-96.6007	96.4
Texana GCD - GW-00293	8006703	28.8778	-96.3350	28.8775	-96.3348	108.8

GCD Well ID	TWDB Well ID	from TWDB		from GCD		Distance (ft)
		Latitude	Longitude	Latitude	Longitude	
Texana GCD - GW-00294	6651505	29.2083	-96.6825	29.2083	-96.6825	7.5
Texana GCD - GW-00295	6658402	29.0764	-96.8553	29.0764	-96.8553	7.3
Texana GCD - GW-00296	6652801	29.1281	-96.5806	29.1281	-96.5806	7.5
Texana GCD - GW-00297	6658601	29.0608	-96.7581	29.0608	-96.7581	7.1
Texana GCD - GW-00298	8003803	28.8961	-96.6947	28.8962	-96.6947	15.6
Texana GCD - GW-00299	8011301	28.8664	-96.6253	28.8665	-96.6255	94.4
Texana GCD - GW-00320	8004101	28.9867	-96.6083	28.9866	-96.6083	29.6
Texana GCD - GW-00323	8005701	28.9053	-96.4989	28.9050	-96.4989	101.2
Texana GCD - GW-00340	8002607	28.9536	-96.7744	28.9536	-96.7744	4.3
Texana GCD - GW-00354	8005502	28.9514	-96.4239	28.9516	-96.4236	133.1
Texana GCD - GW-00366	6651903	29.1494	-96.6544	29.1494	-96.6551	213.8
Texana GCD - GW-00409	8003704	28.8992	-96.7225	28.8992	-96.7224	21.7
Texana GCD - GW-00410	802904	28.9111	-96.7717	28.9112	-96.7716	31.9
Texana GCD - GW-00411	8002608	28.9169	-96.7581	28.9169	-96.7580	18.8
Texana GCD - GW-00412	6661810	29.0122	-96.4461	29.0122	-96.4462	43.8
Texana GCD - GW-00415	6660707	29.0331	-96.6208	29.0330	-96.6208	4.2
Texana GCD - GW-00416	6660709	29.0406	-96.6211	29.0405	-96.6211	18.8
Texana GCD - GW-00417	8014405	28.7997	-96.3453	28.7997	-96.3453	12.5
Victoria County GCD - GW-000021	6657801	29.0408	-96.9181	29.0410	-96.9181	54.1
Victoria County GCD - GW-000028	8010401	28.8283	-96.8333	28.8284	-96.8328	159.7
Victoria County GCD - GW-000047	7916102	28.8747	-97.1228	28.8748	-97.1229	45.1
Victoria County GCD - GW-000085	7915904	28.7597	-97.1642	28.7590	-97.1646	287.5
Victoria County GCD - GW-000101	8019104	28.7353	-96.7167	28.7353	-96.7167	24.9
Victoria County GCD - GW-000102	8019105	28.7203	-96.7139	28.7202	-96.7138	33.5
Victoria County GCD - GW-000150	8010502	28.7992	-96.8031	28.7992	-96.8029	47.3
Victoria County GCD - GW-000158	7907504	28.9200	-97.2075	28.9199	-97.2075	23.3
Victoria County GCD - GW-000181	8018105	28.7119	-96.8400	28.7119	-96.8400	21.7
Victoria County GCD - GW-000192	8018103	28.7142	-96.8361	28.7146	-96.8367	244.5
Victoria County GCD - GW-000239	8010101	28.8667	-96.8608	28.8667	-96.8608	29.9
Victoria County GCD - GW-000244	7916903	28.7817	-97.0097	28.7815	-97.0095	77.5
Victoria County GCD - GW-000271	7916203	28.8456	-97.0814	28.8455	-97.0814	38.5
Victoria County GCD - GW-000308	7916302	28.8506	-97.0075	28.8505	-97.0076	48.3
Victoria County GCD - GW-000311	8017905	28.6475	-96.8953	28.6474	-96.8951	54.8
Victoria County GCD - GW-000320	8017501	28.6883	-96.9425	28.6884	-96.9427	50.4
Victoria County GCD - GW-000321	8017502	28.6842	-96.9489	28.6842	-96.9490	13.4
Victoria County GCD - GW-000339	6657406	29.0669	-96.9867	29.0670	-96.9865	43.2
Victoria County GCD - GW-000364	8002101	28.9981	-96.8675	28.9981	-96.8676	38.1
Victoria County GCD - GW-000366	8002102	28.9733	-96.8550	28.9734	-96.8549	40.3
Victoria County GCD - GW-000375	8017101	28.7261	-96.9664	28.7261	-96.9663	43.9
Victoria County GCD - GW-000377	8002804	28.9014	-96.7978	28.9013	-96.7978	34.6
Victoria County GCD - GW-000489	8018402	28.6739	-96.8436	28.6737	-96.8437	83.2
Victoria County GCD - GW-000494	7915305	28.8586	-97.1472	28.8585	-97.1473	49.4
Victoria County GCD - GW-000510	7916608	28.8208	-97.0236	28.8206	-97.0236	102.4
Victoria County GCD - GW-000544	7907902	28.8936	-97.1353	28.8931	-97.1350	221.6
Victoria County GCD - GW-000552	7907505	28.9203	-97.1853	28.9204	-97.1852	50.6
Victoria County GCD - GW-000576	8002701	28.8900	-96.8375	28.8901	-96.8374	46.4

GCD Well ID	TWDB Well ID	from TWDB		from GCD		Distance (ft)
		Latitude	Longitude	Latitude	Longitude	
Victoria County GCD - GW-000577	7908404	28.9239	-97.0964	28.9238	-97.0965	67.0
Victoria County GCD - GW-000578	7908403	28.9233	-97.0967	28.9232	-97.0967	50.5
Victoria County GCD - GW-000589	7908807	28.8867	-97.0722	28.8868	-97.0723	40.3
Victoria County GCD - GW-000592	8011105	28.8419	-96.7431	28.8419	-96.7431	28.0
Victoria County GCD - GW-000595	8017801	28.6381	-96.9244	28.6382	-96.9244	60.3
Victoria County GCD - GW-000599	7907703	28.9128	-97.2094	28.9130	-97.2095	69.9
Victoria County GCD - GW-000601	7916702	28.7756	-97.0867	28.7757	-97.0867	70.3
Victoria County GCD - GW-000602	7916701	28.7733	-97.0867	28.7735	-97.0867	62.3
Victoria County GCD - GW-000603	7916703	28.7708	-97.0867	28.7709	-97.0866	37.1
Victoria County GCD - GW-000606	7908201	28.9658	-97.0700	28.9659	-97.0701	43.7
Victoria County GCD - GW-000607	7908805	28.8758	-97.0483	28.8758	-97.0483	13.4
Victoria County GCD - GW-000608	7915903	28.7589	-97.1450	28.7590	-97.1451	59.3
Victoria County GCD - GW-000609	7923303	28.7278	-97.1444	28.7278	-97.1444	3.3
Victoria County GCD - GW-000610	7923601	28.6856	-97.1497	28.6855	-97.1497	2.4
Victoria County GCD - GW-000611	7924102	28.7125	-97.0869	28.7125	-97.0867	90.2
Victoria County GCD - GW-000612	7924702	28.6575	-97.1178	28.6575	-97.1178	4.3
Victoria County GCD - GW-000613	7932602	28.5467	-97.0056	28.5466	-97.0055	17.5
Victoria County GCD - GW-000614	8001301	28.9908	-96.9078	28.9908	-96.9078	7.1
Victoria County GCD - GW-000615	8001302	28.9592	-96.9161	28.9590	-96.9160	52.8
Victoria County GCD - GW-000616	8018401	28.6711	-96.8550	28.6711	-96.8550	2.4
Victoria County GCD - GW-000617	7907305	28.9619	-97.1381	28.9619	-97.1380	5.7
Victoria County GCD - GW-000620	6657903	29.0194	-96.8831	29.0196	-96.8829	52.4
Victoria County GCD - GW-000687	7908406	28.9222	-97.1003	28.9222	-97.1002	38.9
Victoria County GCD - GW-000713	7915902	28.7597	-97.1456	28.7597	-97.1455	28.7
Victoria County GCD - GW-000722	7915905	28.7600	-97.1464	28.7599	-97.1464	25.6
Victoria County GCD - GW-000948	7915301	28.8533	-97.1617	28.8530	-97.1618	134.6
Victoria County GCD - GW-000949	8009101	28.8681	-96.9719	28.8681	-96.9719	1.5
Victoria County GCD - GW-000950	8018601	28.6675	-96.7653	28.6675	-96.7653	13.2
Victoria County GCD - NW-000016	7907503	28.9186	-97.2061	28.9186	-97.2061	0.3
Victoria County GCD - NW-000030	7924802	28.6367	-97.0572	28.6367	-97.0572	0.3
Victoria County GCD - NW-000097	7907707	28.9011	-97.2372	28.9010	-97.2372	49.0
Victoria County GCD - NW-000122	8017602	28.6736	-96.9144	28.6738	-96.9145	55.5
Victoria County GCD - NW-000165	7915306	28.8656	-97.1311	28.8656	-97.1311	4.0
Victoria County GCD - NW-000310	8018404	28.6744	-96.8483	28.6745	-96.8484	17.7
Victoria County GCD - NW-000333	7908903	28.8831	-97.0242	28.8831	-97.0242	1.0
Victoria County GCD - NW-000425	8017603	28.6753	-96.9142	28.6752	-96.9143	48.0
Victoria County GCD - NW-000426	7907404	28.9242	-97.2186	28.9241	-97.2186	15.0

APPENDIX B
LISTING OF 890 WELLS THAT COMPRISED THE INTEGRATED WELL DATABASE

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
1	Texana GCD - GW-00410	802904	55	200	Chicot	Jackson
2	Texana GCD - GW-00394		137	400	Chicot	Jackson
3	Texana GCD - GW-00366	6651903	109	618	Evangeline	Jackson
4	Texana GCD - GW-00294	6651505	128	627	Evangeline	Jackson
5	Texana GCD - GW-00297	6658601	90	76	Chicot	Jackson
6	Texana GCD - GW-00301		89	214	Chicot	Jackson
7	Texana GCD - GW-00296	6652801	91	620	Chicot	Jackson
8	Texana GCD - GW-00295	6658402	116	702	Evangeline	Jackson
9	Victoria County GCD - GW-000339	6657406	185	270	Evangeline	Victoria
10	Victoria County GCD - GW-000021	6657801	128	na	Shallow	Victoria
11	Victoria County GCD - GW-000620	6657903	111	na	Shallow	Victoria
12	Victoria County GCD - GW-000212		110	137	Chicot	Victoria
13	Texana GCD - GW-00195		54	na	Shallow	Jackson
14	Texana GCD - GW-00251	6661809	64	200	Chicot	Jackson
15	Texana GCD - GW-00247	6661808	65	na	Shallow	Jackson
16	Texana GCD - GW-00412	6661810	64	200	Chicot	Jackson
17	Texana GCD - GW-00274	6660708	61	38	Chicot	Jackson
18	Texana GCD - GW-00416	6660709	62	42	Chicot	Jackson
19	Texana GCD - GW-00281	6660205	83	224	Chicot	Jackson
20	Texana GCD - GW-00277	6660601	72	61	Chicot	Jackson
21	Texana GCD - GW-00300		65	527	Chicot	Jackson
22	Texana GCD - GW-00279	6661407	66	175	Chicot	Jackson
23	Refugio GCD - GW-00424		86	55	Chicot	Refugio
24	Refugio GCD - GW-00434		35	6520	Jasper	Refugio
25	Refugio GCD - GW-00430		87	108	Chicot	Refugio
26	Texana GCD - GW-00077		30	na	Shallow	Jackson
27	Texana GCD - GW-00082		29	na	Shallow	Jackson
28	Texana GCD - NW-00310		90	124	Chicot	Jackson
29	Texana GCD - GW-00276	6660401	81	286	Chicot	Jackson
30	Texana GCD - GW-00280	6660501	77	200	Chicot	Jackson
31	Texana GCD - GW-00278	6660613	64	850	Evangeline	Jackson
32	Texana GCD - GW-00275	6660701	73	63	Chicot	Jackson
33	Texana GCD - GW-00244		60	na	Shallow	Jackson
34	Texana GCD - NW-00144		10	190	Chicot	Jackson
35	Texana GCD - GW-00110		13	120	Chicot	Jackson
36	Texana GCD - GW-00117		10	na	Shallow	Jackson
37	Calhoun County GCD - GW-00005		15	490	Chicot	Calhoun
38	Calhoun County GCD - NW-00024		15	490	Chicot	Calhoun
39	Texana GCD - GW-00310		15	490	Chicot	Jackson
40	Texana GCD - GW-00311		15	490	Chicot	Jackson
41	Texana GCD - NW-00143		11	210	Chicot	Jackson
42	Texana GCD - NW-00147		11	160	Chicot	Jackson
43	Refugio GCD - GW-00180	7946803	53	365	Chicot	Refugio
44	Refugio GCD - NW-00475		53	365	Chicot	Refugio
45	Refugio GCD - GW-00235	7946601	64	525	Evangeline	Refugio

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
46	Texana GCD - GW-00452		10	630	Chicot	Jackson
47	Texana GCD - GW-00140		12	520	Chicot	Jackson
48	Texana GCD - NW-00075		12	520	Chicot	Jackson
49	Texana GCD - NW-00141		12	520	Chicot	Jackson
50	Texana GCD - GW-00111		10	120	Chicot	Jackson
51	Texana GCD - GW-00340	8002607	74	na	Shallow	Jackson
52	Texana GCD - GW-00291	8004504	51	277	Chicot	Jackson
53	Refugio GCD - NW-00570		25	320	Chicot	Refugio
54	Refugio GCD - NW-00539		30	300	Chicot	Refugio
55	Calhoun County GCD - GW-00014	8019503	27	265	Chicot	Calhoun
56	Calhoun County GCD - GW-00007	8019506	23	280	Chicot	Calhoun
57	Texana GCD - GW-00122	8021201	20	468	Chicot	Jackson
58	Texana GCD - GW-00112	8021601	12	635	Chicot	Jackson
59	Texana GCD - NW-00146		12	635	Chicot	Jackson
60	Texana GCD - GW-00286	8003909	49	61	Chicot	Jackson
61	Refugio GCD - GW-00085	7947702	40	200	Chicot	Refugio
62	Refugio GCD - GW-0085		40	200	Chicot	Refugio
63	Refugio GCD - GW-00423		25	260	Chicot	Refugio
64	Refugio GCD - GW-00079	7954803	35	331	Chicot	Refugio
65	Texana GCD - GW-00285	8011201	49	579	Chicot	Jackson
66	Texana GCD - GW-00312		20	590	Chicot	Jackson
67	Victoria County GCD - GW-000980		76	na	Shallow	Victoria
68	Victoria County GCD - GW-000562		84	na	Shallow	Victoria
69	Victoria County GCD - GW-000195		85	na	Shallow	Victoria
70	Victoria County GCD - GW-000717		71	80	Chicot	Victoria
71	Victoria County GCD - NW-001349		58	51	Chicot	Victoria
72	Victoria County GCD - GW-000377	8002804	63	92	Chicot	Victoria
73	Texana GCD - GW-00253		65	na	Shallow	Jackson
74	Texana GCD - GW-00076		28	na	Shallow	Jackson
75	Texana GCD - GW-00090		13	na	Shallow	Jackson
76	Texana GCD - NW-00451		14	384	Chicot	Jackson
77	Victoria County GCD - GW-000950	8018601	42	300	Chicot	Victoria
78	Victoria County GCD - GW-000085	7915904	107	100	Evangeline	Victoria
79	Victoria County GCD - GW-000308	7916302	85	772	Evangeline	Victoria
80	Victoria County GCD - GW-000311	8017905	55	1010	Evangeline	Victoria
81	Refugio GCD - GW-00418		38	55	Chicot	Refugio
82	Victoria County GCD - GW-000606	7908201	185	350	Evangeline	Victoria
83	Victoria County GCD - GW-000734		62	100	Chicot	Victoria
84	Calhoun County GCD - GW-00008	8019802	24	243	Chicot	Calhoun
85	Victoria County GCD - GW-000971		95	60	Chicot	Victoria
86	Victoria County GCD - GW-000732		57	40	Chicot	Victoria
87	Texana GCD - GW-00293	8006703	35	590	Chicot	Jackson
88	Texana GCD - GW-00121	8021203	17	482	Chicot	Jackson
89	Texana GCD - GW-00283	8011202	44	500	Chicot	Jackson
90	Victoria County GCD - GW-000615	8001302	115	752	Evangeline	Victoria

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
91	Victoria County GCD - GW-000614	8001301	119	670	Evangeline	Victoria
92	Victoria County GCD - GW-000735		119	670	Evangeline	Victoria
93	Victoria County GCD - R1GW-000738		119	670	Evangeline	Victoria
94	Victoria County GCD - GW-000934		92	600	Evangeline	Victoria
95	Victoria County GCD - GW-000938		92	600	Evangeline	Victoria
96	Victoria County GCD - GW-000939		92	600	Evangeline	Victoria
97	Victoria County GCD - GW-000949	8009101	115	851	Evangeline	Victoria
98	Victoria County GCD - GW-000602	7916701	103	578	Evangeline	Victoria
99	Victoria County GCD - GW-000603	7916703	107	516	Evangeline	Victoria
100	Calhoun County GCD - GW-00003		35	75	Chicot	Calhoun
101	Victoria County GCD - GW-000028	8010401	66	654	Evangeline	Victoria
102	Victoria County GCD - GW-000713	7915902	128	298	Evangeline	Victoria
103	Refugio GCD - GW-00419		40	60	Chicot	Refugio
104	Refugio GCD - NW-00340	8033203	45	150	Chicot	Refugio
105	Victoria County GCD - GW-000484		135	109	Evangeline	Victoria
106	Victoria County GCD - GW-000789		122	287	Evangeline	Victoria
107	Victoria County GCD - GW-000791		122	287	Evangeline	Victoria
108	Victoria County GCD - GW-000803		122	287	Evangeline	Victoria
109	Victoria County GCD - GW-000190		187	65	Chicot	Victoria
110	Texana GCD - GW-00417	8014405	25	370	Chicot	Jackson
111	Texana GCD - GW-00292	8004403	59	681	Evangeline	Jackson
112	Texana GCD - GW-00290	8005102	60	410	Chicot	Jackson
113	Texana GCD - GW-00354	8005502	56	345	Chicot	Jackson
114	Texana GCD - GW-00323	8005701	49	429	Chicot	Jackson
115	Texana GCD - GW-00299	8011301	33	1050	Evangeline	Jackson
116	Texana GCD - GW-00284		41	400	Chicot	Jackson
117	Refugio GCD - GW-00417		78	2343	Burkeville	Refugio
118	Texana GCD - GW-00120	8021204	20	590	Chicot	Jackson
119	Calhoun County GCD - GW-00012	8035704	10	341	Chicot	Calhoun
120	Victoria County GCD - GW-000310		64	305	Chicot	Victoria
121	Victoria County GCD - NW-000116		64	305	Chicot	Victoria
122	Victoria County GCD - GW-000617	7907305	163	419	Evangeline	Victoria
123	Victoria County GCD - GW-000700		145	80	Chicot	Victoria
124	Victoria County GCD - GW-000192	8018103	52	120	Chicot	Victoria
125	Victoria County GCD - GW-000610	7923601	114	115	Chicot	Victoria
126	Victoria County GCD - GW-000612	7924702	107	180	Chicot	Victoria
127	Victoria County GCD - GW-000616	8018401	57	450	Chicot	Victoria
128	Victoria County GCD - GW-000767		57	450	Chicot	Victoria
129	Refugio GCD - GW-00370	8042507	18	na	Shallow	Refugio
130	Victoria County GCD - GW-000489	8018402	56	336	Chicot	Victoria
131	Victoria County GCD - GW-000824		56	336	Chicot	Victoria
132	Victoria County GCD - NW-000944		56	336	Chicot	Victoria
133	Victoria County GCD - NW-001006		56	336	Chicot	Victoria
134	Victoria County GCD - NW-001007		56	336	Chicot	Victoria
135	Texana GCD - GW-00289	8006101	65	550	Chicot	Jackson

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
136	Texana GCD - GW-00123	8021213	22	490	Chicot	Jackson
137	Texana GCD - GW-00288	8004601	54	378	Chicot	Jackson
138	Texana GCD - GW-00287	8004908	49	82	Chicot	Jackson
139	Texana GCD - GW-00385		36	330	Chicot	Jackson
140	Texana GCD - GW-00075		27	na	Shallow	Jackson
141	Texana GCD - GW-00114		11	140	Chicot	Jackson
142	Texana GCD - GW-00411	8002608	61	200	Chicot	Jackson
143	Texana GCD - GW-00172		44	na	Shallow	Jackson
144	Texana GCD - GW-00171		44	na	Shallow	Jackson
145	Texana GCD - GW-00409	8003704	53	na	Shallow	Jackson
146	Victoria County GCD - GW-000510	7916608	65	327	Evangeline	Victoria
147	Victoria County GCD - GW-000927		101	783	Evangeline	Victoria
148	Texana GCD - GW-00305		5	520	Chicot	Jackson
149	Calhoun County GCD - GW-00013	8037601	4	228	Chicot	Calhoun
150	Calhoun County GCD - GW-00009	8026501	39	267	Chicot	Calhoun
151	Calhoun County GCD - GW-00011	8027601	16	273	Chicot	Calhoun
152	Refugio GCD - GW-00422		22	na	Shallow	Refugio
153	Refugio GCD - GW-00439	8033901	22	200	Chicot	Refugio
154	Victoria County GCD - GW-000948	7915301	150	150	Evangeline	Victoria
155	Victoria County GCD - NW-001014		147	55	Chicot	Victoria
156	Victoria County GCD - GW-000395		80	na	Shallow	Victoria
157	Victoria County GCD - GW-000779		85	na	Shallow	Victoria
158	Victoria County GCD - GW-000780		85	na	Shallow	Victoria
159	Victoria County GCD - GW-000942		85	na	Shallow	Victoria
160	Victoria County GCD - GW-000943		85	na	Shallow	Victoria
161	Victoria County GCD - GW-000944		85	na	Shallow	Victoria
162	Calhoun County GCD - GW-00001		19	175	Chicot	Calhoun
163	Victoria County GCD - GW-000989		59	na	Shallow	Victoria
164	Victoria County GCD - GW-000682		115	na	Shallow	Victoria
165	Victoria County GCD - GW-000590		103	na	Shallow	Victoria
166	Victoria County GCD - GW-000101	8019104	31	180	Chicot	Victoria
167	Victoria County GCD - GW-000102	8019105	22	170	Chicot	Victoria
168	Victoria County GCD - GW-000576	8002701	71	100	Chicot	Victoria
169	Victoria County GCD - NW-000438		71	100	Chicot	Victoria
170	Victoria County GCD - NW-000550		71	100	Chicot	Victoria
171	Victoria County GCD - NW-000426	7907404	205	360	Evangeline	Victoria
172	Victoria County GCD - GW-000587		138	na	Shallow	Victoria
173	Victoria County GCD - GW-000271	7916203	87	na	Shallow	Victoria
174	Victoria County GCD - GW-000591		101	na	Shallow	Victoria
175	Victoria County GCD - NW-000122	8017602	61	140	Chicot	Victoria
176	Victoria County GCD - NW-000016	7907503	160	250	Evangeline	Victoria
177	Victoria County GCD - GW-000552	7907505	161	112	Evangeline	Victoria
178	Victoria County GCD - GW-000723		103	205	Evangeline	Victoria
179	Victoria County GCD - GW-000150	8010502	57	140	Chicot	Victoria
180	Victoria County GCD - GW-000967		56	185	Chicot	Victoria

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
181	Victoria County GCD - GW-000970		56	185	Chicot	Victoria
182	Victoria County GCD - NW-000310	8018404	56	185	Chicot	Victoria
183	Victoria County GCD - GW-000227		57	na	Shallow	Victoria
184	Victoria County GCD - NW-000779		65	190	Chicot	Victoria
185	Victoria County GCD - GW-000578	7908403	139	100	Evangeline	Victoria
186	Victoria County GCD - GW-000589	7908807	88	220	Evangeline	Victoria
187	Texana GCD - GW-00415	6660707	56	24	Chicot	Jackson
188	Victoria County GCD - GW-000588		201	na	Shallow	Victoria
189	Victoria County GCD - GW-000722	7915905	128	120	Evangeline	Victoria
190	Victoria County GCD - GW-000158	7907504	189	na	Evangeline	Victoria
191	Victoria County GCD - NW-000425	8017603	63	100	Chicot	Victoria
192	Victoria County GCD - GW-000687	7908406	125	152	Evangeline	Victoria
193	Refugio GCD - GW-00420		33	907	Evangeline	Refugio
194	Refugio GCD - GW-00421		33	907	Evangeline	Refugio
195	Refugio GCD - GW-00426		7	900	Evangeline	Refugio
196	Refugio GCD - NW-00277		7	900	Evangeline	Refugio
197	Victoria County GCD - NW-000097	7907707	189	208	Evangeline	Victoria
198	Texana GCD - GW-00073		29	na	Shallow	Jackson
199	Texana GCD - GW-00113		10	120	Chicot	Jackson
200	Texana GCD - NW-00195		56	330	Chicot	Jackson
201	Victoria County GCD - GW-000244	7916903	50	770	Evangeline	Victoria
202	Victoria County GCD - GW-000609	7923303	100	194	Evangeline	Victoria
203	Victoria County GCD - GW-000718		122	200	Evangeline	Victoria
204	Victoria County GCD - GW-000494	7915305	178	190	Evangeline	Victoria
205	Victoria County GCD - GW-000955		178	190	Evangeline	Victoria
206	Victoria County GCD - GW-000189		138	180	Evangeline	Victoria
207	Victoria County GCD - NW-000165	7915306	138	180	Evangeline	Victoria
208	Victoria County GCD - GW-000047	7916102	129	227	Evangeline	Victoria
209	Victoria County GCD - NW-000333	7908903	127	105	Chicot	Victoria
210	Victoria County GCD - NW-000030	7924802	88	120	Chicot	Victoria
211	Refugio GCD - NW-00474	7939105	87	na	Shallow	Refugio
212	Refugio GCD - GW-00438		2	429	Chicot	Refugio
213	Refugio GCD - NW-00176		14	503	Chicot	Refugio
214	Refugio GCD - GW-00234	7932802	72	165	Chicot	Refugio
215	Texana GCD - GW-00298	8003803	55	919	Evangeline	Jackson
216	Texana GCD - GW-00320	8004101	67	383	Chicot	Jackson
217	Victoria County GCD - GW-000599	7907703	220	170	Evangeline	Victoria
218	Victoria County GCD - GW-000611	7924102	98	100	Chicot	Victoria
219	Victoria County GCD - NW-000681		88	83	Chicot	Victoria
220	Victoria County GCD - NW-001050		109	64	Chicot	Victoria
221	Calhoun County GCD - GW-00010	8027501	17	258	Chicot	Calhoun
222	Texana GCD - GW-00119	8021214	24	470	Chicot	Jackson
223	Victoria County GCD - GW-000595	8017801	60	305	Chicot	Victoria
224	Victoria County GCD - GW-000159		177	na	Shallow	Victoria
225	Victoria County GCD - GW-000577	7908404	147	100	Evangeline	Victoria

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
226	Victoria County GCD - GW-000138		137	na	Shallow	Victoria
227	Victoria County GCD - GW-000728		137	na	Shallow	Victoria
228	Victoria County GCD - GW-000729		137	na	Shallow	Victoria
229	Victoria County GCD - NW-000580		137	na	Shallow	Victoria
230	Victoria County GCD - GW-000030		64	na	Shallow	Victoria
231	Victoria County GCD - GW-000533		45	na	Shallow	Victoria
232	Victoria County GCD - GW-000716		437	na	Shallow	Victoria
233	Victoria County GCD - GW-000181	8018105	57	na	Shallow	Victoria
234	Victoria County GCD - GW-000492		56	na	Shallow	Victoria
235	Victoria County GCD - GW-000583		24	na	Shallow	Victoria
236	Victoria County GCD - GW-000607	7908805	111	169	Evangeline	Victoria
237	Victoria County GCD - GW-000608	7915903	125	112	Evangeline	Victoria
238	Refugio GCD - GW-00375		85	200	Chicot	Refugio
239	Victoria County GCD - GW-000544	7907902	105	853	Evangeline	Victoria
240	Refugio GCD - GW-00124	7931901	91	946	Evangeline	Refugio
241	Refugio GCD - GW-00427		5	900	Evangeline	Refugio
242	Refugio GCD - GW-00428		5	900	Evangeline	Refugio
243	Victoria County GCD - GW-000375	8017101	37	703	Evangeline	Victoria
244	Victoria County GCD - GW-000613	7932602	63	798	Evangeline	Victoria
245	Victoria County GCD - GW-000366	8002102	95	366	Chicot	Victoria
246	Victoria County GCD - GW-000778		95	366	Evangeline	Victoria
247	Victoria County GCD - GW-000239	8010101	78	880	Evangeline	Victoria
248	Victoria County GCD - GW-000321	8017502	67	1026	Evangeline	Victoria
249	Victoria County GCD - GW-000364	8002101	104	600	Evangeline	Victoria
250	Victoria County GCD - GW-000601	7916702	103	588	Evangeline	Victoria
251	Victoria County GCD - GW-000592	8011105	49	200	Chicot	Victoria
252	Victoria County GCD - GW-000320	8017501	68	1026	Evangeline	Victoria
254		6541401	86	90	Chicot	Wharton
255		6541402	80	338	Chicot	Wharton
256		6541707	88	499	Chicot	Wharton
257		6541805	75	50	Chicot	Wharton
258		6541807	83	612	Chicot	Wharton
259		6541920	75	475	Chicot	Wharton
260		6549110	79	525	Chicot	Wharton
261		6549111	79	525	Chicot	Wharton
262		6549901	58	375	Chicot	Matagorda
263		6557802	54	315	Chicot	Matagorda
264		6604504	389	184	Shallow	Colorado
265		6611509	275	856	Deep	Colorado
266		6611903	297	92	Evangeline	Colorado
267		6612204	317	140	Shallow	Colorado
268		6612603	298	188	Evangeline	Colorado
269		6613805	302	285	Chicot	Colorado
270		6614403	279	153	Chicot	Colorado
271		6614703	266	71	Chicot	Colorado

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
272		6618601	411	602	Jasper	Colorado
273		6618609	403	803	Jasper	Colorado
274		6618611	403	822	Jasper	Colorado
275		6618612	392	868	Jasper	Colorado
276		6619804	349	140	Chicot	Colorado
277		6620307	217	142	Chicot	Colorado
278		6620412	248	202	Evangeline	Colorado
279		6620602	203	312	Evangeline	Colorado
280		6620608	200	325	Evangeline	Colorado
281		6620901	246	800	Burkeville	Colorado
282		6621201	300	304	Evangeline	Colorado
283		6621206	279	318	Evangeline	Colorado
284		6621404	190	598	Evangeline	Colorado
285		6621603	239	812	Evangeline	Colorado
286		6621902	216	800	Evangeline	Colorado
287		6621903	220	504	Evangeline	Colorado
288		6622201	234	995	Evangeline	Colorado
289		6622203	225	216	Chicot	Colorado
290		6622401	231	812	Evangeline	Colorado
291		6625103	294	43	Evangeline	Lavaca
292		6625203	325	287	Jasper	Lavaca
293		6626102	223	120	Evangeline	Colorado
294		6626202	260	126	Evangeline	Colorado
295		6627905	273	617	Evangeline	Colorado
296		6628607	210	604	Evangeline	Colorado
297		6628608	208	530	Evangeline	Colorado
298		6628702	255	565	Evangeline	Colorado
299		6628804	245	650	Evangeline	Colorado
300		6628902	207	850	Evangeline	Colorado
301		6629101	222	608	Evangeline	Colorado
302		6629401	210	382	Chicot	Colorado
303		6629501	181	na	Shallow	Colorado
304		6630101	168	527	Evangeline	Colorado
305		6630103	187	490	Evangeline	Colorado
306		6630104	186	400	Chicot	Colorado
307		6631106	160	900	Evangeline	Colorado
308		6631107	155	450	Chicot	Wharton
309		6631504	142	178	Chicot	Wharton
310		6632402	127	222	Chicot	Wharton
311		6632809	121	320	Chicot	Wharton
312		6633407	282	182	Evangeline	Lavaca
313		6633507	273	620	Jasper	Lavaca
314		6633510	272	636	Jasper	Lavaca
315		6633512	260	644	Jasper	Lavaca
316		6633513	280	998	Jasper	Lavaca

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
317		6634201	197	48	Evangeline	Lavaca
318		6634202	210	61	Evangeline	Lavaca
319		6634207	227	120	Evangeline	Lavaca
320		6634803	272	230	Evangeline	Lavaca
321		6634902	160	30	Chicot	Lavaca
322		6634903	179	41	Chicot	Lavaca
323		6635210	280	237	Chicot	Colorado
324		6635901	211	840	Evangeline	Lavaca
325		6636902	158	100	Chicot	Colorado
326		6637601	166	200	Chicot	Colorado
327		6637607	163	318	Chicot	Colorado
328		6637608	151	336	Chicot	Colorado
329		6637614	157	360	Chicot	Colorado
330		6637615	160	200	Chicot	Colorado
331		6638105	148	320	Chicot	Colorado
332		6638106	156	250	Chicot	Colorado
333		6638201	155	408	Chicot	Wharton
334		6638202	155	65	Chicot	Wharton
335		6638301	154	288	Chicot	Wharton
336		6638302	157	698	Evangeline	Wharton
337		6638304	150	113	Chicot	Wharton
338		6638801	127	116	Chicot	Wharton
339		6639106	146	200	Chicot	Wharton
340		6639701	119	214	Chicot	Wharton
341		6639801	118	300	Chicot	Wharton
342		6640401	110	442	Chicot	Wharton
343		6640505	113	200	Chicot	Wharton
344		6640803	101	312	Chicot	Wharton
345		6640804	105	303	Chicot	Wharton
346		6640902	98	94	Chicot	Wharton
347		6641202	219	333	Evangeline	Lavaca
348		6641203	234	80	Evangeline	Lavaca
349		6641703	222	164	Evangeline	Lavaca
350		6641903	205	335	Evangeline	Lavaca
351		6642205	211	210	Evangeline	Lavaca
352		6642902	165	576	Evangeline	Lavaca
353		6642904	152	210	Chicot	Lavaca
354		6643201	172	856	Evangeline	Lavaca
355		6643703	135	31	Chicot	Lavaca
356		6643704	139	34	Chicot	Lavaca
357		6643803	151	1023	Evangeline	Lavaca
358		6644402	164	880	Evangeline	Lavaca
359		6644702	139	676	Evangeline	Colorado
360		6645201	152	257	Chicot	Wharton
361		6645601	143	429	Chicot	Wharton

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
362		6645802	126	188	Chicot	Wharton
363		6645916	129	125	Chicot	Wharton
364		6646201	144	200	Chicot	Wharton
365		6646402	134	366	Chicot	Wharton
366		6646601	131	186	Chicot	Wharton
367		6646802	124	203	Chicot	Wharton
368		6647101	123	319	Chicot	Wharton
369		6647201	120	244	Chicot	Wharton
370		6647414	114	350	Chicot	Wharton
371		6647703	111	242	Chicot	Wharton
372		6647904	99	340	Chicot	Wharton
373		6648402	100	537	Chicot	Wharton
374		6648404	100	760	Evangeline	Wharton
375		6648502	95	70	Chicot	Wharton
376		6648601	90	255	Chicot	Wharton
377		6648701	98	90	Chicot	Wharton
378		6648802	94	564	Chicot	Wharton
379		6648907	90	630	Chicot	Wharton
380		6648908	90	55	Chicot	Wharton
381		6648909	90	300	Chicot	Wharton
382		6649103	177	174	Evangeline	Lavaca
383		6649701	173	1082	Evangeline	Lavaca
384		6649803	150	260	Evangeline	Lavaca
385		6649901	168	272	Evangeline	Lavaca
386		6650207	165	142	Chicot	Lavaca
388		6651704	106	120	Chicot	Jackson
389		6651801	117	616	Evangeline	Jackson
391		6652207	114	242	Chicot	Wharton
392		6652304	113	650	Evangeline	Wharton
393		6652504	98	98	Chicot	Wharton
394		6652603	106	515	Chicot	Wharton
395		6652604	103	275	Chicot	Wharton
397		6653307	109	282	Chicot	Wharton
398		6653406	108	348	Chicot	Wharton
399		6653503	94	338	Chicot	Wharton
400		6653804	82	495	Chicot	Wharton
401		6653903	88	304	Chicot	Wharton
402		6654108	105	360	Chicot	Wharton
403		6654202	115	200	Chicot	Wharton
404		6654306	115	90	Chicot	Wharton
405		6654906	91	461	Chicot	Wharton
406		6655104	106	114	Chicot	Wharton
407		6655603	90	100	Chicot	Wharton
408		6656302	81	490	Chicot	Wharton
409		6656304	91	356	Chicot	Wharton

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
410		6656401	80	229	Chicot	Wharton
411		6656403	84	275	Chicot	Wharton
412		6656901	75	194	Chicot	Wharton
413		6657403	182	87	Chicot	Victoria
419		6658606	96	165	Chicot	Jackson
429		6661302	82	528	Chicot	Wharton
430		6661305	81	600	Chicot	Wharton
431		6661309	82	410	Chicot	Wharton
433		6661803	63	317	Chicot	Jackson
437		6662104	87	371	Chicot	Wharton
438		6662307	88	180	Chicot	Wharton
439		6662309	84	421	Chicot	Wharton
440		6662313	88	480	Chicot	Wharton
441		6662415	72	458	Chicot	Wharton
442		6662603	82	310	Chicot	Wharton
443		6662805	62	398	Chicot	Wharton
444		6663105	80	342	Chicot	Wharton
445		6663112	84	60	Chicot	Wharton
446		6663504	68	687	Chicot	Wharton
447		6663507	68	48	Chicot	Wharton
448		6663508	69	140	Chicot	Wharton
449		6663509	68	688	Chicot	Wharton
450		6663605	77	209	Chicot	Wharton
451		6663610	70	857	Chicot	Wharton
452		6664401	71	1057	Evangeline	Matagorda
453		6731601	403	364	Deep	Lavaca
454		6731602	401	320	Deep	Lavaca
455		6731604	371	380	Deep	Lavaca
456		6731606	384	350	Deep	Lavaca
457		6731610	382	1051	Deep	Lavaca
458		6731612	416	na	Shallow	Lavaca
459		6732105	452	265	Deep	Lavaca
460		6732106	434	275	Deep	Lavaca
461		6732201	440	170	Jasper	Lavaca
462		6732704	424	130	Jasper	Lavaca
463		6732903	340	45	Shallow	Lavaca
464		6739306	418	100	Jasper	Lavaca
465		6739507	389	245	Jasper	Lavaca
466		6739517	360	988	Deep	Lavaca
467		6739518	357	90	Jasper	Lavaca
468		6739603	303	150	Jasper	Lavaca
469		6739605	331	844	Deep	Lavaca
470		6740301	284	45	Evangeline	Lavaca
471		6740503	360	320	Jasper	Lavaca
472		6740504	362	155	Evangeline	Lavaca

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
473		6740702	340	52	Burkeville	Lavaca
474		6746409	261	130	Jasper	DeWitt
475		6746502	215	132	Jasper	DeWitt
476		6746510	214	na	Shallow	DeWitt
477		6746605	334	80	Jasper	DeWitt
478		6746606	347	140	Jasper	DeWitt
479		6746607	347	140	Jasper	DeWitt
480		6746704	260	146	Jasper	DeWitt
481		6746705	260	260	Jasper	DeWitt
482		6746706	263	na	Shallow	DeWitt
483		6747103	372	na	Shallow	DeWitt
484		6747403	380	180	Jasper	DeWitt
485		6747606	325	641	Jasper	Lavaca
486		6747607	293	708	Jasper	Lavaca
487		6747608	331	1050	Jasper	Lavaca
488		6747911	282	819	Jasper	DeWitt
489		6747912	268	592	Jasper	DeWitt
490		6748203	288	200	Evangeline	Lavaca
491		6752904	321	350	Deep	DeWitt
492		6753401	260	62	Jasper	DeWitt
493		6753706	319	230	Jasper	DeWitt
494		6753707	372	240	Jasper	DeWitt
495		6753803	285	160	Burkeville	DeWitt
496		6753902	302	180	Burkeville	DeWitt
497		6754205	227	205	Jasper	DeWitt
498		6754406	210	na	Jasper	DeWitt
499		6754701	230	136	Burkeville	DeWitt
500		6754811	267	220	Jasper	DeWitt
501		6754812	251	na	Shallow	DeWitt
502		6754813	206	215	Jasper	DeWitt
503		6754814	191	610	Jasper	DeWitt
504		6755404	340	420	Jasper	DeWitt
505		6755601	235	240	Evangeline	DeWitt
506		6755803	221	75	Chicot	DeWitt
507		6756601	207	87	Evangeline	Lavaca
508		6756605	199	246	Evangeline	Lavaca
509		6759702	409	505	Deep	DeWitt
510		6760903	320	570	Jasper	DeWitt
511		6760904	326	252	Jasper	DeWitt
512		6760905	321	na	Evangeline	DeWitt
513		6761402	388	142	Evangeline	DeWitt
514		6761804	320	60	Evangeline	DeWitt
515		6762217	171	838	Jasper	DeWitt
516		6762304	214	1353	Deep	DeWitt
517		6762308	214	510	Jasper	DeWitt

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
518		6762404	270	na	Shallow	DeWitt
519		6762704	282	350	Burkeville	DeWitt
520		6762905	232	138	Evangeline	DeWitt
521		6763605	245	125	Chicot	DeWitt
522		7903204	421	160	Burkeville	DeWitt
523		7903302	403	160	Burkeville	DeWitt
524		7903603	377	200	Jasper	DeWitt
525		7903905	331	260	Burkeville	DeWitt
526		7904103	307	220	Jasper	DeWitt
527		7904104	307	235	Jasper	DeWitt
528		7904202	311	130	Burkeville	DeWitt
529		7904307	278	954	Deep	DeWitt
530		7905303	244	140	Evangeline	DeWitt
531		7905304	247	44	Evangeline	DeWitt
532		7905305	298	200	Evangeline	DeWitt
533		7905406	277	160	Evangeline	DeWitt
534		7905407	279	130	Evangeline	DeWitt
535		7905408	252	187	Evangeline	DeWitt
536		7905502	225	200	Evangeline	DeWitt
537		7905606	200	154	Evangeline	Goliad
538		7905801	272	466	Evangeline	Goliad
539		7905802	262	895	Jasper	Goliad
540		7905803	245	na	Shallow	Goliad
541		7905903	217	280	Evangeline	Goliad
542		7905904	199	164	Evangeline	Goliad
543		7905905	217	314	Evangeline	Goliad
544		7905906	269	277	Evangeline	Goliad
545		7905907	235	261	Evangeline	Goliad
546		7905908	271	118	Evangeline	Goliad
547		7905909	258	143	Evangeline	Goliad
548		7906101	288	585	Burkeville	DeWitt
549		7906102	301	73	Evangeline	DeWitt
550		7906303	219	55	Evangeline	DeWitt
551		7906306	232	138	Evangeline	DeWitt
552		7906407	260	315	Evangeline	DeWitt
553		7906411	271	230	Evangeline	DeWitt
554		7906506	219	120	Evangeline	DeWitt
555		7906508	239	170	Evangeline	DeWitt
556		7906703	232	73	Evangeline	DeWitt
557		7906706	221	152	Evangeline	Goliad
558		7906707	202	260	Evangeline	DeWitt
559		7906708	220	300	Evangeline	DeWitt
560		7906709	219	120	Evangeline	DeWitt
561		7906710	230	135	Evangeline	DeWitt
562		7906712	212	103	Evangeline	Goliad

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
563		7906714	199	136	Evangeline	DeWitt
564		7906715	238	150	Evangeline	Goliad
565		7906716	238	80	Evangeline	Goliad
566		7906807	241	113	Evangeline	DeWitt
567		7906808	201	140	Evangeline	DeWitt
568		7906809	199	125	Evangeline	DeWitt
569		7906810	193	180	Evangeline	Goliad
571		7907402	229	217	Evangeline	DeWitt
579		7907904	101	307	Evangeline	Victoria
580		7907906	104	870	Evangeline	Victoria
582		7908402	151	250	Evangeline	Victoria
587		7908806	109	220	Evangeline	Victoria
590		7912304	330	239	Evangeline	DeWitt
591		7912305	299	166	Evangeline	Goliad
592		7912602	285	350	Evangeline	Goliad
593		7912704	265	na	Evangeline	Goliad
594		7912902	314	850	Burkeville	Goliad
595		7913109	266	200	Evangeline	Goliad
596		7913110	281	na	Shallow	Goliad
597		7913111	283	300	Evangeline	Goliad
598		7913112	278	240	Evangeline	Goliad
599		7913202	291	137	Evangeline	Goliad
600		7913212	246	50	Evangeline	Goliad
601		7913223	240	93	Evangeline	Goliad
602		7913224	230	24	Evangeline	Goliad
603		7913225	230	65	Evangeline	Goliad
604		7913226	290	210	Evangeline	Goliad
605		7913227	242	30	Evangeline	Goliad
606		7913229	233	152	Evangeline	Goliad
607		7913230	250	282	Evangeline	Goliad
608		7913231	235	28	Evangeline	Goliad
609		7913304	246	317	Evangeline	Goliad
610		7913404	271	126	Evangeline	Goliad
611		7913405	313	324	Evangeline	Goliad
612		7913406	329	87	Evangeline	Goliad
613		7913407	300	176	Evangeline	Goliad
614		7913501	303	390	Evangeline	Goliad
615		7913507	270	250	Evangeline	Goliad
616		7913508	310	250	Evangeline	Goliad
617		7913509	287	76	Evangeline	Goliad
618		7913510	285	250	Evangeline	Goliad
619		7913511	305	na	Evangeline	Goliad
620		7913512	270	263	Evangeline	Goliad
621		7913513	229	230	Evangeline	Goliad
622		7913608	228	180	Evangeline	Goliad

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
623		7913609	264	200	Evangeline	Goliad
624		7913610	250	120	Evangeline	Goliad
625		7913611	254	275	Evangeline	Goliad
626		7913612	265	180	Evangeline	Goliad
627		7913802	305	99	Evangeline	Goliad
628		7913803	253	188	Evangeline	Goliad
629		7913804	245	291	Evangeline	Goliad
630		7913805	285	197	Evangeline	Goliad
631		7913806	233	222	Evangeline	Goliad
632		7913807	262	222	Evangeline	Goliad
633		7913808	252	331	Evangeline	Goliad
634		7913809	249	183	Evangeline	Goliad
635		7913810	259	186	Evangeline	Goliad
636		7913811	225	143	Evangeline	Goliad
637		7913812	271	105	Evangeline	Goliad
638		7913813	271	210	Evangeline	Goliad
639		7913901	232	101	Evangeline	Goliad
640		7914102	209	108	Evangeline	Goliad
641		7914201	167	450	Evangeline	Goliad
642		7914202	182	88	Evangeline	Goliad
643		7914203	172	380	Evangeline	Goliad
644		7914204	230	122	Evangeline	Goliad
645		7914205	169	346	Evangeline	Goliad
646		7914303	204	222	Evangeline	Victoria
647		7914603	195	na	Shallow	Goliad
648		7914702	242	320	Evangeline	Goliad
649		7914703	209	300	Evangeline	Goliad
650		7914804	169	270	Evangeline	Goliad
651		7915101	127	133	Evangeline	Goliad
652		7915102	125	132	Evangeline	Goliad
653		7915205	189	300	Evangeline	Victoria
654		7915206	147	110	Evangeline	Victoria
656		7915302	188	157	Evangeline	Victoria
659		7915401	170	145	Evangeline	Goliad
660		7915702	142	174	Evangeline	Goliad
661		7915901	126	70	Chicot	Victoria
667		7916202	104	240	Evangeline	Victoria
670		7916603	53	612	Evangeline	Victoria
671		7916607	75	110	Chicot	Victoria
677		7917801	506	150	Evangeline	Bee
678		7919305	232	na	Evangeline	Goliad
679		7920203	252	na	Evangeline	Goliad
680		7920204	257	na	Evangeline	Goliad
681		7920205	285	na	Shallow	Goliad
682		7920304	300	na	Shallow	Goliad

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
683		7920502	192	187	Evangeline	Goliad
684		7920602	254	120	Evangeline	Goliad
685		7920603	254	150	Evangeline	Goliad
686		7920704	229	na	Shallow	Goliad
687		7920705	262	na	Shallow	Goliad
688		7921307	210	284	Evangeline	Goliad
689		7921605	207	578	Evangeline	Goliad
690		7921705	152	563	Evangeline	Goliad
691		7921706	141	243	Evangeline	Goliad
692		7921912	197	260	Evangeline	Goliad
693		7922201	170	550	Evangeline	Goliad
694		7922206	167	226	Evangeline	Goliad
695		7922207	151	226	Evangeline	Goliad
696		7922208	163	na	Evangeline	Goliad
697		7922210	188	160	Evangeline	Goliad
698		7922211	205	225	Evangeline	Goliad
699		7922302	131	200	Chicot	Goliad
700		7922505	150	92	Evangeline	Goliad
701		7922508	155	263	Evangeline	Goliad
702		7922509	157	160	Evangeline	Goliad
703		7922510	152	na	Evangeline	Goliad
704		7922511	133	na	Evangeline	Goliad
705		7922701	150	259	Evangeline	Goliad
706		7922703	141	192	Evangeline	Goliad
707		7922805	160	na	Shallow	Goliad
708		7922806	155	na	Shallow	Goliad
709		7922903	130	52	Evangeline	Goliad
712		7923803	114	170	Evangeline	Victoria
713		7924101	102	260	Evangeline	Victoria
715		7924502	75	80	Chicot	Victoria
716		7924601	25	40	Chicot	Victoria
719		7924902	86	125	Chicot	Victoria
720		7925103	356	90	Burkeville	Bee
721		7925303	383	55	Evangeline	Bee
722		7925505	366	297	Burkeville	Bee
723		7925506	366	52	Evangeline	Bee
724		7925608	426	252	Burkeville	Bee
725		7925611	339	100	Evangeline	Bee
726		7926207	318	483	Jasper	Bee
727		7926804	325	295	Evangeline	Bee
728		7927202	310	150	Evangeline	Goliad
729		7927301	308	150	Evangeline	Goliad
730		7927306	264	280	Evangeline	Goliad
731		7928110	265	295	Evangeline	Goliad
732		7928302	216	235	Evangeline	Goliad

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
733		7928303	217	95	Evangeline	Goliad
734		7928304	236	320	Evangeline	Goliad
735		7928501	237	163	Evangeline	Goliad
736		7928503	171	294	Evangeline	Goliad
737		7928721	188	na	Evangeline	Goliad
738		7928722	201	195	Evangeline	Goliad
739		7929701	185	198	Evangeline	Goliad
740		7929903	145	192	Evangeline	Goliad
741		7930201	150	302	Evangeline	Goliad
742		7930301	113	300	Evangeline	Goliad
743		7930701	128	235	Evangeline	Goliad
744		7931103	115	150	Evangeline	Goliad
745		7931302	107	113	Chicot	Victoria
746		7931501	96	125	Chicot	Goliad
747		7931502	105	204	Evangeline	Goliad
748		7931701	105	60	Chicot	Goliad
749		7931702	99	218	Evangeline	Goliad
751		7932103	90	142	Chicot	Victoria
754		7933501	350	153	Evangeline	Bee
755		7934202	371	175	Evangeline	Bee
756		7934409	347	145	Evangeline	Bee
757		7934811	295	282	Evangeline	Bee
758		7934903	210	1554	Jasper	Bee
759		7935101	267	130	Evangeline	Bee
760		7935305	226	150	Evangeline	Bee
761		7935609	190	300	Evangeline	Bee
762		7935912	189	555	Evangeline	Bee
763		7936906	117	na	Shallow	Bee
764		7937305	126	na	Shallow	Goliad
765		7937306	105	na	Evangeline	Goliad
766		7937307	111	na	Evangeline	Goliad
767		7937308	95	na	Evangeline	Goliad
768		7937309	118	na	Evangeline	Goliad
769		7937310	109	na	Evangeline	Goliad
770		7937607	103	260	Evangeline	Goliad
771		7937901	87	105	Evangeline	Goliad
772		7937905	85	811	Evangeline	Goliad
773		7937909	67	200	Chicot	Goliad
774		7937910	75	na	Shallow	Bee
775		7937911	89	146	Evangeline	Goliad
776		7937912	86	61	Chicot	Goliad
777		7937913	91	na	Shallow	Goliad
778		7937914	87	200	Chicot	Goliad
779		7937915	85	186	Evangeline	Goliad
780		7937917	65	124	Evangeline	Bee

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
781		7937918	92	96	Chicot	Goliad
782		7937919	88	160	Evangeline	Goliad
783		7938201	115	106	Evangeline	Goliad
784		7938202	100	60	Chicot	Goliad
785		7938203	103	200	Chicot	Goliad
786		7938301	89	62	Chicot	Goliad
787		7938303	102	80	Chicot	Goliad
788		7938704	86	200	Chicot	Goliad
789		7938705	81	200	Chicot	Goliad
790		7938706	75	325	Evangeline	Goliad
791		7938806	86	160	Chicot	Refugio
792		7939101	83	200	Chicot	Refugio
793		7939104	91	110	Chicot	Goliad
795		7939803	62	170	Chicot	Refugio
796		7940502	56	295	Chicot	Refugio
797		7942702	245	110	Chicot	Bee
798		7942703	255	230	Evangeline	Bee
799		7943102	188	715	Evangeline	Bee
800		7943334	193	558	Evangeline	Bee
801		7943401	208	840	Evangeline	Bee
802		7943821	150	188	Evangeline	Bee
803		7943903	141	260	Evangeline	Bee
804		7944103	156	150	Evangeline	Bee
805		7945601	75	120	Chicot	Refugio
807		7946612	51	890	Evangeline	Refugio
809		7946810	55	173	Chicot	Refugio
811		7950606	163	650	Evangeline	Bee
812		7950909	148	701	Evangeline	San Patricio
813		7952405	87	63	Chicot	Bee
814		7952407	78	220	Chicot	Bee
815		7953103	78	100	Chicot	Refugio
816		7953205	56	245	Chicot	Refugio
817		7953504	61	1150	Evangeline	Refugio
818		7953602	45	255	Chicot	Refugio
819		7954303	25	260	Chicot	Refugio
821		7957605	133	198	Evangeline	San Patricio
822		7957606	102	410	Evangeline	San Patricio
823		7958105	100	na	Evangeline	San Patricio
824		7958106	110	na	Evangeline	San Patricio
825		7958107	110	270	Evangeline	San Patricio
826		7958108	80	na	Evangeline	San Patricio
827		7958201	162	521	Evangeline	San Patricio
828		7958302	137	610	Evangeline	San Patricio
829		7958407	110	570	Evangeline	San Patricio
830		7958505	82	698	Evangeline	San Patricio

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
831		7958602	75	701	Evangeline	San Patricio
832		7958603	100	637	Evangeline	San Patricio
833		7958708	73	694	Evangeline	San Patricio
834		7958812	82	700	Evangeline	San Patricio
835		7959103	121	372	Evangeline	San Patricio
836		7959304	109	356	Evangeline	San Patricio
837		7959402	131	600	Evangeline	San Patricio
838		7960401	85	497	Evangeline	San Patricio
839		7960503	65	457	Evangeline	San Patricio
840		7960802	58	325	Chicot	San Patricio
841		7961901	49	294	Chicot	San Patricio
842		7962114	40	320	Chicot	San Patricio
843		7963107	12	568	Chicot	Refugio
844		7963108	17	630	Chicot	Refugio
845		7964701	9	130	Chicot	Aransas
850		8002605	64	175	Chicot	Jackson
851		8002606	70	85	Chicot	Jackson
855		8002801	65	610	Evangeline	Victoria
856		8002802	62	711	Evangeline	Victoria
858		8003206	71	126	Chicot	Jackson
859		8003603	55	135	Chicot	Jackson
866		8004505	50	310	Chicot	Jackson
868		8004612	49	240	Chicot	Jackson
869		8004710	50	300	Chicot	Jackson
872		8005311	62	na	Shallow	Jackson
876		8006407	47	925	Chicot	Jackson
878		8006903	40	421	Chicot	Matagorda
879		8006906	37	765	Chicot	Matagorda
880		8007102	59	1020	Evangeline	Matagorda
881		8007203	55	453	Chicot	Matagorda
882		8007312	51	350	Chicot	Matagorda
883		8007404	50	510	Chicot	Matagorda
884		8007415	47	710	Chicot	Matagorda
885		8007501	50	820	Chicot	Matagorda
886		8007901	40	106	Chicot	Matagorda
887		8008105	54	406	Chicot	Matagorda
888		8008106	50	64	Chicot	Matagorda
889		8008302	50	630	Chicot	Matagorda
890		8008306	52	365	Chicot	Matagorda
891		8008504	51	690	Chicot	Matagorda
892		8008505	49	100	Chicot	Matagorda
894		8009506	94	525	Evangeline	Victoria
896		8010104	62	67	Chicot	Victoria
898		8010402	66	80	Chicot	Victoria
900		8011101	49	470	Chicot	Victoria

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
905		8011502	40	300	Chicot	Jackson
906		8011504	41	282	Chicot	Jackson
907		8012502	36	330	Chicot	Jackson
908		8013814	25	2550	Jasper	Jackson
909		8014102	32	560	Chicot	Jackson
910		8014104	36	200	Chicot	Jackson
912		8014801	16	719	Chicot	Matagorda
913		8014901	25	460	Chicot	Matagorda
914		8014903	12	320	Chicot	Matagorda
915		8015102	40	645	Chicot	Matagorda
916		8015301	31	570	Chicot	Matagorda
917		8015402	31	295	Chicot	Matagorda
918		8015405	31	270	Chicot	Matagorda
919		8015502	27	776	Chicot	Matagorda
920		8016301	34	823	Chicot	Matagorda
921		8016904	15	430	Chicot	Matagorda
923		8017401	36	260	Chicot	Victoria
935		8018501	51	1100	Evangeline	Victoria
939		8019404	27	na	Shallow	Victoria
948		8021216	16	616	Chicot	Jackson
949		8021501	18	269	Chicot	Calhoun
950		8021502	8	185	Chicot	Calhoun
952		8022204	15	360	Chicot	Matagorda
953		8022501	16	370	Chicot	Jackson
954		8023101	21	776	Chicot	Matagorda
955		8023202	16	70	Chicot	Matagorda
956		8023301	15	770	Chicot	Matagorda
957		8023401	13	590	Chicot	Matagorda
958		8024201	11	490	Chicot	Matagorda
959		8024406	7	360	Chicot	Matagorda
960		8024601	4	275	Chicot	Matagorda
961		8024802	2	380	Chicot	Matagorda
963		8026502	36	80	Chicot	Calhoun
964		8027401	25	110	Chicot	Calhoun
968		8033205	48	98	Chicot	Refugio
970		8035703	7	340	Chicot	Calhoun
972		8035811	10	225	Chicot	Calhoun
973		8035812	14	80	Chicot	Calhoun
974		8036401	14	250	Chicot	Calhoun
975		8037509	8	780	Chicot	Calhoun
978		8049702	8	63	Chicot	Aransas
979		8101101	51	768	Chicot	Matagorda
980		8101102	50	1032	Evangeline	Matagorda
981		8101205	36	480	Chicot	Matagorda
982		8101701	43	400	Chicot	Matagorda

INTERA Master ID	GCD Well ID	TWDB Well ID	Land Surface Elevation (ft)	Well Depth (ft)	Assigned Unit	County
983		8102404	31	450	Chicot	Matagorda
984		8102605	25	525	Chicot	Matagorda
985		8102901	19	294	Chicot	Matagorda
986		8103406	26	530	Chicot	Matagorda
987		8109204	35	120	Chicot	Matagorda
988		8109504	28	721	Chicot	Matagorda
989		8109701	15	800	Chicot	Matagorda
990		8111604	6	560	Chicot	Matagorda
991		8111901	3	527	Chicot	Matagorda
992		8111902	4	535	Chicot	Matagorda
993		8112705	13	290	Chicot	Matagorda
994		8117405	5	472	Chicot	Matagorda
995		8117408	6	802	Chicot	Matagorda
996		8303506	98	267	Chicot	San Patricio
997		8305301	53	343	Chicot	San Patricio
998		8307319	10	140	Chicot	Aransas
999	Calhoun County GCD - NW-00033		4	226	Deep	Calhoun
1000	Calhoun County GCD - NW-00009		9	235	Deep	Calhoun
1001	Calhoun County GCD - NW-00043		9	240	Deep	Calhoun
1002	Texana GCD - NW-00487 - East UB - DAMW		11	185	Deep	Jackson
1003	Texana GCD - NW-00488 - East LF - DAMW		11	330	Deep	Jackson
1004	Texana GCD - NW-00489 - Center UB - DAMW		11	208	Deep	Jackson
1005	Texana GCD - NW-00490 - Center LF - DAMW		11	402	Deep	Jackson
1006	Texana GCD - NW-00491 - West UB - DAMW		13	204	Deep	Jackson
1007	Texana GCD - NW-00492 - West LF - DAMW		13	355	Deep	Jackson
1008	Texana GCD - NW-00488		11	330	Deep	Jackson
1009	Victoria County GCD - GW-001016		186	na	Deep	Victoria
1010	Victoria County GCD - GW-001010		178	190	Deep	Victoria
1011	Pecan Valley GCD - INTERA-1011		405	na	Deep	Pecan
1012	Pecan Valley GCD - INTERA-1012		278	na	Deep	Pecan
1013	Pecan Valley GCD - INTERA-1013		224	na	Deep	Pecan
1014	Pecan Valley GCD - INTERA-1014		233	na	Deep	Pecan
1015	Pecan Valley GCD - INTERA-1015		171	na	Deep	Pecan
1016	Pecan Valley GCD - INTERA-1016		151	na	Deep	Pecan

APPENDIX C
THE NUMBER OF MEASURED WATER LEVELS IN THE TWDB, THE GCD, AND THE MERGED DATA SETS FOR WINTER MONTHS

GCD Well ID	TWDB Well ID	Number (#) of Depth to Water Measurements over the 6-month averaging period		
		TWDB data set	GCD data set	Merged data set
Calhoun County GCD - GW-00007	8019506	19	2	19
Calhoun County GCD - GW-00008	8019802	16	2	16
Calhoun County GCD - GW-00009	8026501	21	4	21
Calhoun County GCD - GW-00010	8027501	2	1	2
Calhoun County GCD - GW-00011	8027601	19	1	19
Calhoun County GCD - GW-00012	8035704	1	1	2
Calhoun County GCD - GW-00013	8037601	3	1	3
Calhoun County GCD - GW-00014	8019503	16	2	16
Refugio GCD - GW-00079	7954803	17	5	18
Refugio GCD - GW-00085	7947702	9	7	13
Refugio GCD - GW-00124	7931901	16	4	17
Refugio GCD - GW-00234	7932802	16	5	18
Refugio GCD - GW-00235	7946601	17	5	18
Refugio GCD - GW-00370	8042507	10	1	10
Refugio GCD - GW-00439	8033901	3	4	4
Refugio GCD - NW-00340	8033203	6	6	11
Refugio GCD - NW-00474	7939105	9	4	10
Refugio GCD - NW-00475	7946803	12	5	16
Texana GCD - GW-00112	8021601	3	1	3
Texana GCD - GW-00119	8021214	0	0	0
Texana GCD - GW-00120	8021204	0	0	0
Texana GCD - GW-00121	8021203	0	0	0
Texana GCD - GW-00122	8021201	0	0	0
Texana GCD - GW-00123	8021213	0	0	0
Texana GCD - GW-00247	6661808	1	2	2
Texana GCD - GW-00251	6661809	1	2	2
Texana GCD - GW-00274	6660708	20	10	22
Texana GCD - GW-00275	6660701	14	3	14
Texana GCD - GW-00276	6660401	15	10	19
Texana GCD - GW-00277	6660601	14	3	14
Texana GCD - GW-00278	6660613	15	9	17
Texana GCD - GW-00279	6661407	14	2	14
Texana GCD - GW-00280	6660501	16	4	16
Texana GCD - GW-00281	6660205	19	8	21
Texana GCD - GW-00283	8011202	19	9	21
Texana GCD - GW-00285	8011201	20	10	22
Texana GCD - GW-00286	8003909	14	3	14

GCD Well ID	TWDB Well ID	Number (#) of Depth to Water Measurements over the 6-month averaging period		
		TWDB data set	GCD data set	Merged data set
Texana GCD - GW-00287	8004908	14	6	15
Texana GCD - GW-00288	8004601	19	8	20
Texana GCD - GW-00289	8006101	18	7	19
Texana GCD - GW-00290	8005102	14	7	15
Texana GCD - GW-00291	8004504	15	9	18
Texana GCD - GW-00292	8004403	17	9	18
Texana GCD - GW-00293	8006703	19	8	20
Texana GCD - GW-00294	6651505	17	7	18
Texana GCD - GW-00295	6658402	16	6	19
Texana GCD - GW-00296	6652801	16	5	16
Texana GCD - GW-00297	6658601	18	8	20
Texana GCD - GW-00298	8003803	12	2	12
Texana GCD - GW-00299	8011301	16	6	17
Texana GCD - GW-00320	8004101	16	10	21
Texana GCD - GW-00323	8005701	16	6	17
Texana GCD - GW-00340	8002607	1	1	1
Texana GCD - GW-00354	8005502	13	2	13
Texana GCD - GW-00366	6651903	8	1	8
Texana GCD - GW-00409	8003704	0	0	0
Texana GCD - GW-00410	802904	1	2	2
Texana GCD - GW-00411	8002608	1	2	2
Texana GCD - GW-00412	6661810	0	0	0
Texana GCD - GW-00415	6660707	13	2	13
Texana GCD - GW-00416	6660709	4	1	4
Texana GCD - GW-00417	8014405	3	1	3
Victoria County GCD - GW-000021	6657801	7	10	10
Victoria County GCD - GW-000028	8010401	15	8	16
Victoria County GCD - GW-000047	7916102	4	3	4
Victoria County GCD - GW-000085	7915904	6	7	8
Victoria County GCD - GW-000101	8019104	5	6	6
Victoria County GCD - GW-000102	8019105	4	5	5
Victoria County GCD - GW-000150	8010502	6	7	7
Victoria County GCD - GW-000158	7907504	6	8	8
Victoria County GCD - GW-000181	8018105	4	5	5
Victoria County GCD - GW-000192	8018103	4	4	4
Victoria County GCD - GW-000239	8010101	13	6	14
Victoria County GCD - GW-000244	7916903	3	1	3

GCD Well ID	TWDB Well ID	Number (#) of Depth to Water Measurements over the 6-month averaging period		
		TWDB data set	GCD data set	Merged data set
Victoria County GCD - GW-000271	7916203	3	3	3
Victoria County GCD - GW-000308	7916302	8	1	8
Victoria County GCD - GW-000311	8017905	12	7	12
Victoria County GCD - GW-000320	8017501	11	2	11
Victoria County GCD - GW-000321	8017502	691	1	691
Victoria County GCD - GW-000339	6657406	12	9	13
Victoria County GCD - GW-000364	8002101	3	4	4
Victoria County GCD - GW-000366	8002102	18	14	22
Victoria County GCD - GW-000375	8017101	13	9	16
Victoria County GCD - GW-000377	8002804	12	8	13
Victoria County GCD - GW-000489	8018402	17	10	18
Victoria County GCD - GW-000494	7915305	5	8	8
Victoria County GCD - GW-000510	7916608	13	7	14
Victoria County GCD - GW-000544	7907902	15	9	17
Victoria County GCD - GW-000552	7907505	6	8	8
Victoria County GCD - GW-000576	8002701	3	5	4
Victoria County GCD - GW-000577	7908404	6	7	7
Victoria County GCD - GW-000578	7908403	6	7	7
Victoria County GCD - GW-000589	7908807	6	7	7
Victoria County GCD - GW-000592	8011105	1	2	2
Victoria County GCD - GW-000595	8017801	5	7	7
Victoria County GCD - GW-000599	7907703	12	8	13
Victoria County GCD - GW-000601	7916702	9	8	10
Victoria County GCD - GW-000602	7916701	8	7	9
Victoria County GCD - GW-000603	7916703	6	8	11
Victoria County GCD - GW-000606	7908201	12	9	13
Victoria County GCD - GW-000607	7908805	14	10	15
Victoria County GCD - GW-000608	7915903	13	9	15
Victoria County GCD - GW-000609	7923303	13	9	14
Victoria County GCD - GW-000610	7923601	11	7	12
Victoria County GCD - GW-000611	7924102	13	9	14
Victoria County GCD - GW-000612	7924702	12	8	13
Victoria County GCD - GW-000613	7932602	11	3	11
Victoria County GCD - GW-000614	8001301	15	10	18
Victoria County GCD - GW-000615	8001302	10	5	12
Victoria County GCD - GW-000616	8018401	14	5	14
Victoria County GCD - GW-000617	7907305	15	9	16

GCD Well ID	TWDB Well ID	Number (#) of Depth to Water Measurements over the 6-month averaging period		
		TWDB data set	GCD data set	Merged data set
Victoria County GCD - GW-000620	6657903	2	2	2
Victoria County GCD - GW-000687	7908406	4	6	6
Victoria County GCD - GW-000713	7915902	1	1	1
Victoria County GCD - GW-000722	7915905	3	8	8
Victoria County GCD - GW-000948	7915301	9	1	9
Victoria County GCD - GW-000949	8009101	5	1	5
Victoria County GCD - GW-000950	8018601	9	1	9
Victoria County GCD - NW-000016	7907503	6	7	7
Victoria County GCD - NW-000030	7924802	3	4	4
Victoria County GCD - NW-000097	7907707	0	0	0
Victoria County GCD - NW-000122	8017602	9	9	10
Victoria County GCD - NW-000165	7915306	3	3	3
Victoria County GCD - NW-000310	8018404	5	4	6
Victoria County GCD - NW-000333	7908903	5	6	6
Victoria County GCD - NW-000425	8017603	3	3	3
Victoria County GCD - NW-000426	7907404	7	9	10

APPENDIX D
SENSITIVITY ANALYSIS

Appendix D provides a sensitivity analysis of how changes in the method for constructing the water level maps impacts the amount of the average annual water levels.

D.1 Alternative Water Level Maps

The authors are unaware of any previous application of the smoothed simulated water levels and Kriged residuals (SSWL+KR) method for interpolating measured water levels. Because of the SSWL+KR method has not been used in Texas prior to this study, the method was compared to several alternative methods for constructing water level maps in order to investigate the sensitivity of the results to changes in the method's implementation and to compare the results produced by alternative methods. These alternative methods are listed in **Table D-1**.

Table D-1 Methods used to Generate Water Level Maps other than the SSWL+KR Method

Method		Reason for Consideration / (How it was Implemented)
#	Name /(Alias)	
1	Simulated smoothed WLs + Kriged residuals (SSWL+KR)	• Considered Best Science Available • (Detrended annual measured WLs using smoothed GAM simulated WLs for each year and Kriged the residuals)
2	Simulated smoothed 2000 WLs + Kriged residuals (SSWL2000+KR)	• Evaluate the sensitivity trend selection • (Same as SSWL+KR but used the GAM simulated 2000 WLs to detrend all measured WLs from 2000 to 2020)
3	Simulated WLs + Kriged WLs residuals (SWLs+KR)	• Evaluate sensitivity of using smoothed or actual the GAM simulated WLs • (Same as SSWL+KR but GAM simulated WLs were not smoothed)
4	Kriged Measured WLs (KWL)	• Evaluate sensitivity of detrending and not detrending WLs • (Kriged measured water levels using ordinary Kriging)
5	Smoothed Simulated WLs from GAM (GAM_SSWL)	• Determine the results from the trend surface used in SSWL+KR and to determine the impact of smoothing on the trend in the GAM simulated WLs • (Only account for the trend surface; do not consider the Kriged residuals)
6	Simulated WLs from GAM (GAM_SWL)	• Determine the results from the GAM simulation • (Linearly interpolated GAM results from 1 mile to 1000 ft resolution)

Like the SSWL+KR method, methods #2 (SSWL2000+KR) and #3 (SWLs+KR) involve detrending and semivariogram analyses of water levels residuals. In practice, methods #2 and #3 are variants of method #1 and therefore serve as a type of sensitivity analysis for method #1 (SSWL+KR). **Figures D-1** and **D-2** provide examples of the experimental and theoretical semivariograms for Chicot and Evangeline aquifers for 2000, 2013, and 2020 for methods #2 and #3. The spherical theoretical model provided a relatively good fit through to the data and the values for the range are similar to those obtained for method #1 (SSWL+KR). Analysis of the residuals indicates that their distribution approximates a normal distribution. As a result, the application of methods #2 and #3 are technically justified. Method #4 (KWL) does not involve any detrending of the water levels, so Kriging is performed directly on the measured water levels, which are known to contain trends. As a result, the underlying assumptions for ordinary Kriging are not fully met. Nonetheless, the method #4 is presented because it provides useful information regarding whether or not detrending affects the final map of water levels. The impact of ignoring the trend with method #4 (KWL) is evident in the semivariogram analysis for the measured

water levels in Chicot Aquifer in **Figure D-3**. That is, despite fitting a spherical variogram model to the experiment variogram, the portion of the theoretical variogram shown in the plots is nearly linear. The line is a result of the trend in the data, which cause the semivariance to continual increase with an increase in the distance between two data points. Method #5 (GAM_SWL) and Method #6 (GAM_SSWL) use simulated water levels values from the GAM. Results from these two methods are provided primarily for reference.

Figure D-4 compares the 2015 water level contours generated for the Chicot Aquifer by the six methods. All six images provide similar patterns to the contours. **Figure D-5** compares the 2015 water level contours generated for the Evangeline Aquifer by the six methods. All six images provide similar patterns to the contours. In both Figures D-1 and D-2, the plots with contours that have the most bends and irregularities are for methods #5 (GAM_SSWL) and #6 (GAM_SWL), which are the only two methods that incorporate the GAM simulated water levels without any smoothing. The water level contours with the least bends and irregularities occur in the plots for methods #1 (SSWL+KR), #2 (SSWL2000+KR) and #3 (SWLs+KR), all three of which that incorporate the GAM smooth simulated water levels; and the plots with contours with the moderate bends and irregularities are for the method #4 (KWL) that incorporates the Kriged water levels.

D.2 Sensitivity of Annual Change in Water Levels

Figures D-6 through **D-9** provide the change in average annual water levels measurements for the Chicot Aquifer, Evangeline Aquifer, and the Chicot & Evangeline Aquifer from 2000 to 2020 for Calhoun, Jackson, Refugio, and Victoria counties for the six methods for generating water levels surfaces. The difference among the methods varied considerably in regard to county and to the year. Two conclusions deduced from the three figures are:

- All of the method that involved Kriging had similar patterns in the direction of the fluctuations but the magnitude of those fluctuations greatly varied.
- The average annual water levels determined for (GAM_SSWL) (Method #5) and the GAM simulated water levels (GAM_SWL) were consistently very similar for all counties and aquifers – their lines usually differed by less than 1 foot and they exhibited considerably less fluctuations than the other methods.

Table D-2 was assembled to assess the sensitivity of the annual changes in the average water levels against the annual changes for the SSWL+KR (Method #1), which are provided in Tables 5-1 to 5-4. The average differences in Table D-2 were determined by averaging the absolute value of the difference the annual change between a method and Method #1. Among some of the notable observations from Table D-2 are:

- The Kriged values results are not very sensitive to the amount the GAM simulated water level are smoothed to generate the trend surface used for detrending.
- The Kriged results can be very sensitive if the trend surface trend surface is updated to account for annual differences in the GAM simulations that account for different pumping rates.
- The Kriging of water levels without detrending can produce significantly different results than Kriging with detrending.
- The results for the Evangeline Aquifer are more sensitive to changes how Kriging is performed than results for the Chicot Aquifer.

Table D-2 Average difference between Methods #2 through #6 with Method #1 (SSWL+KR) for the change in annual average water level from 2000 to 2020.

	#2 Simulated smoothed 2000 WLs + Kriged WL residuals	#3 Simulated WLs + Kriged WL residuals	#4 Kriged Measured WLs	#5 Simulated WLs from GAM	#6 Smoothed simulated WLs from GAM	Average of the Five Alternative Methods
County	**Chicot Aquifer**					
Calhoun	1.1	0.8	3.4	3.3	3.2	2.3
Jackson	1.0	1.4	2.2	5.5	5.3	3.1
Refugio	0.9	1.5	4.3	4.7	4.8	3.3
Victoria	6.7	1.2	2.9	8.4	7.9	5.4
Average	**2.4**	**1.2**	**3.2**	**5.5**	**5.3**	**3.5**
County	**Evangeline Aquifer**					
Calhoun	15.4	4.3	16.6	11.2	11.5	11.8
Jackson	17.3	1.4	5.0	13.6	14.0	10.2
Refugio	4.9	2.3	8.0	5.0	5.0	5.0
Victoria	12.0	3.4	3.5	4.4	4.4	5.5
Average	**12.4**	**2.9**	**8.3**	**8.5**	**8.7**	**8.2**
County	**Chicot & Evangeline Aquifer**					
Calhoun	3.4	1.0	2.8	2.9	2.9	2.6
Jackson	8.4	1.2	2.9	5.3	5.6	4.7
Refugio	2.4	1.7	5.0	4.2	4.2	3.5
Victoria	9.3	1.4	2.8	3.3	3.1	3.9
Average	**5.9**	**1.3**	**3.4**	**3.9**	**3.9**	**3.7**

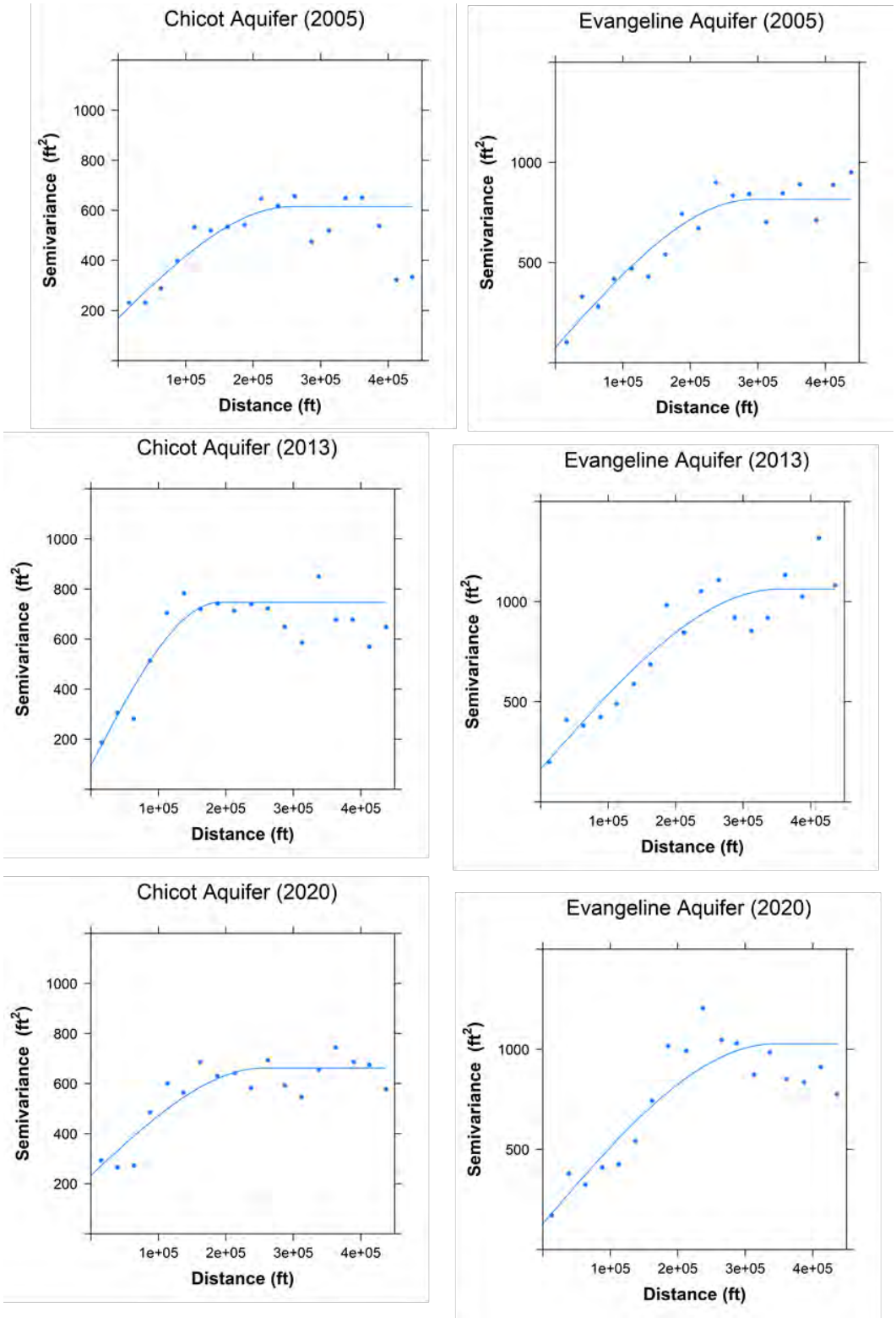


Figure D-1 Example experimental and theoretical semivariograms for the Simulated smoothed 2000 WLs + Kriged residuals (SWSL2000+KR)

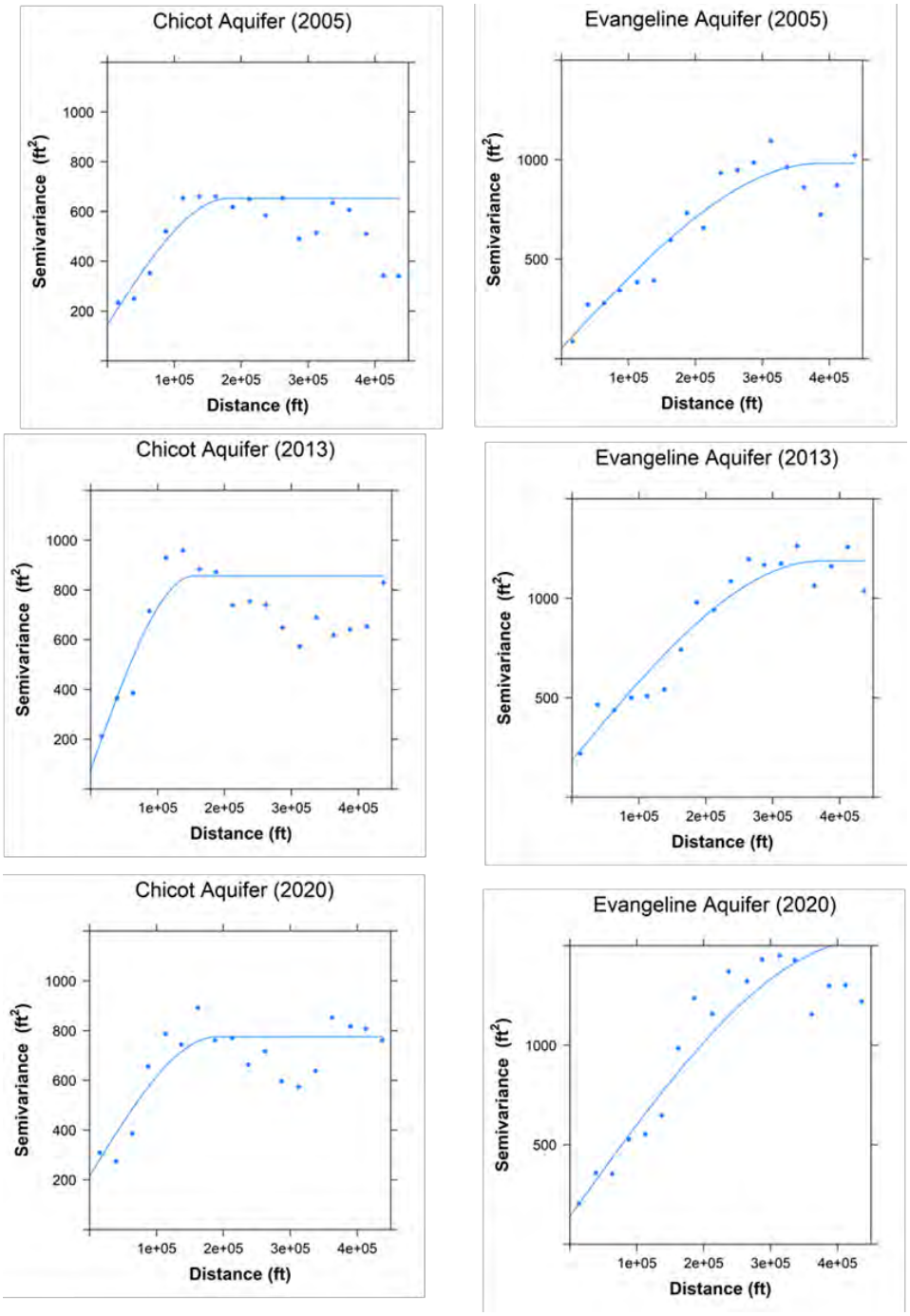


Figure D-2 Example experimental and theoretical semivariograms for the Simulated WLs + Kriged WLs residuals (SWLs+KR) method

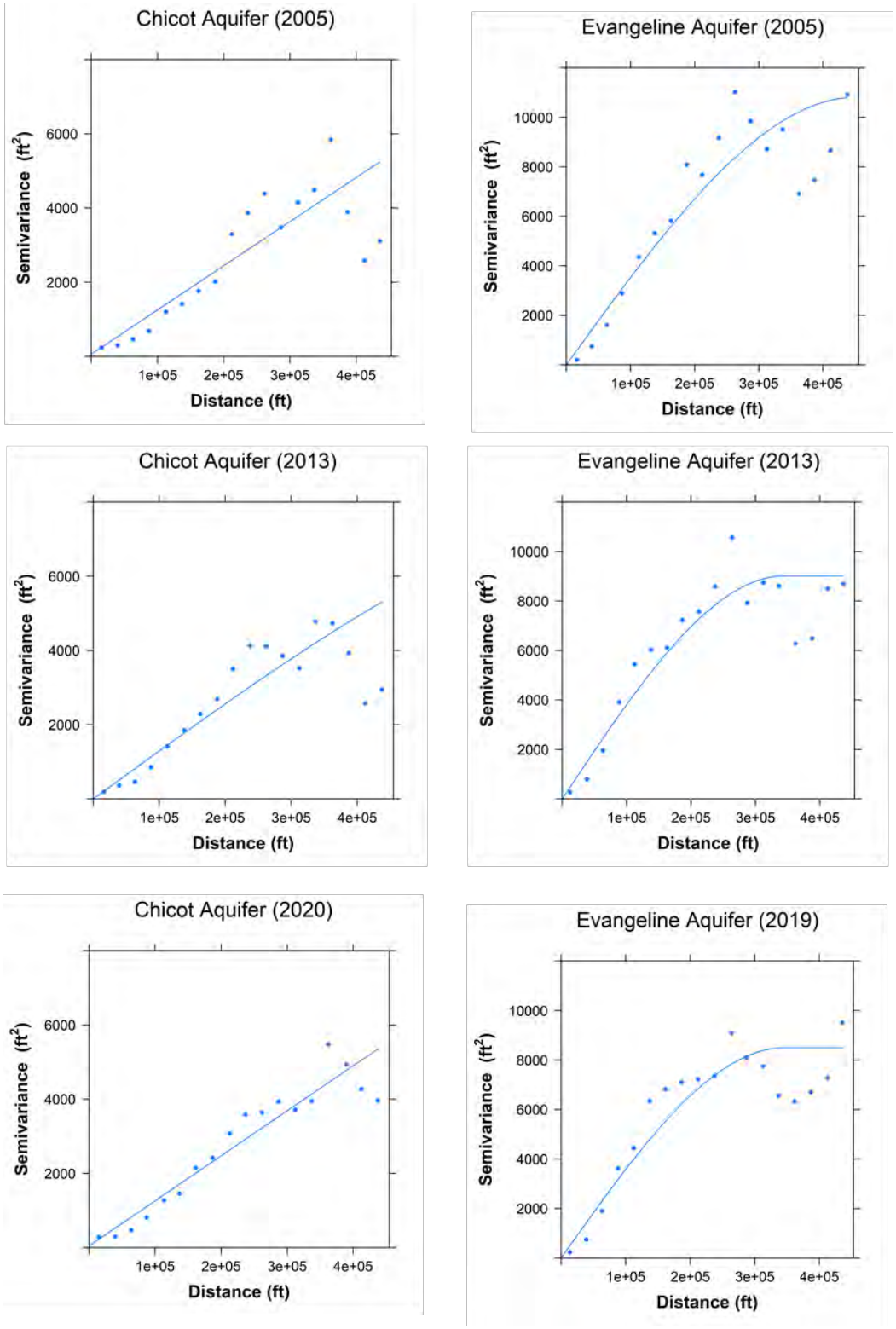


Figure D-3 Example experimental and theoretical semivariograms for the Kriged Measured WLs (KWL) method

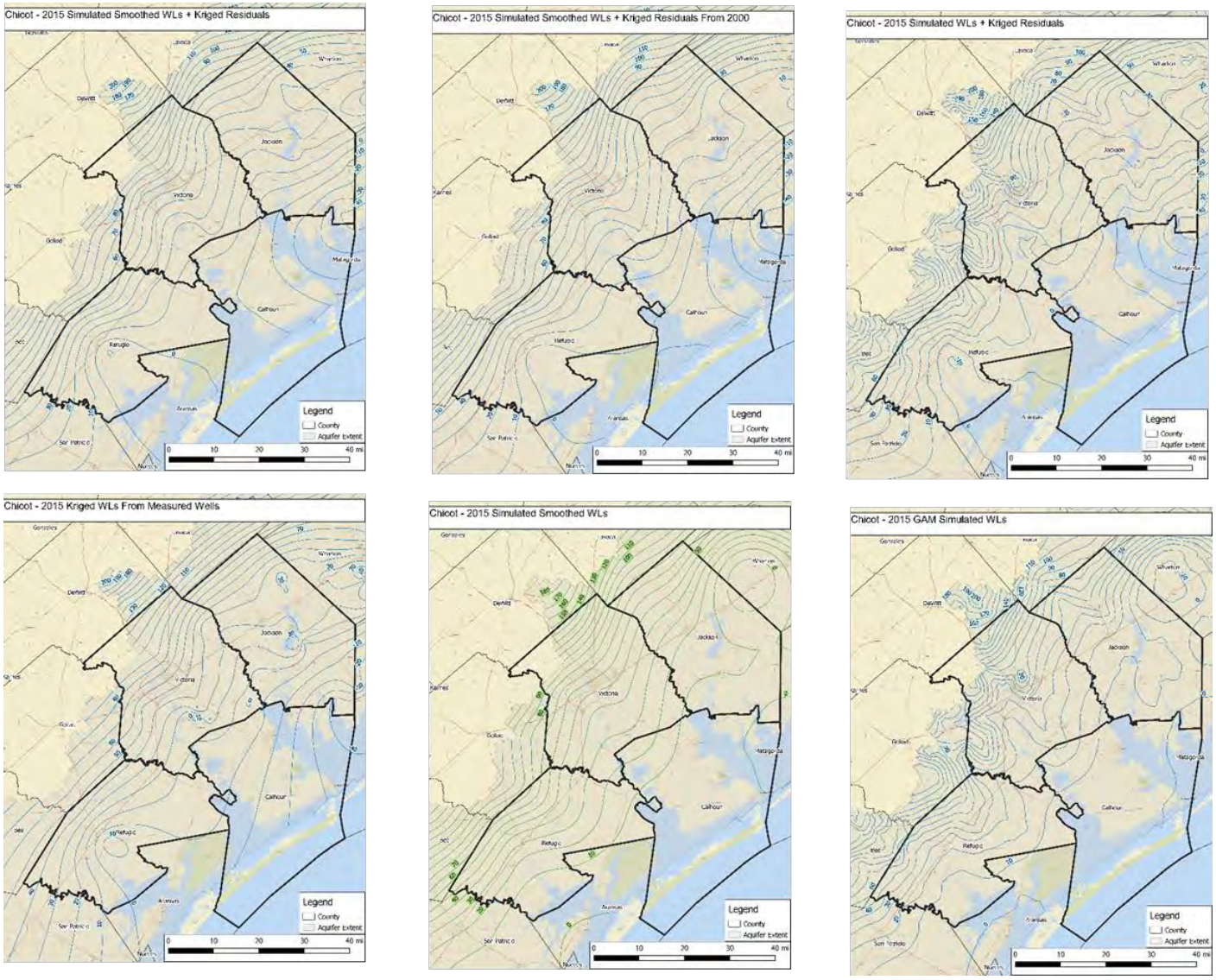


Figure D-4 Comparison of 2015 water level contours for Chicot Aquifer produced by the six methods described in Table 5-5. 1) SSWL+KR, 2) SSWO2000+KR, 3) SWLs+KR, 4) KWL, 5) GAM_SSWL, and 6) GMA_SWL

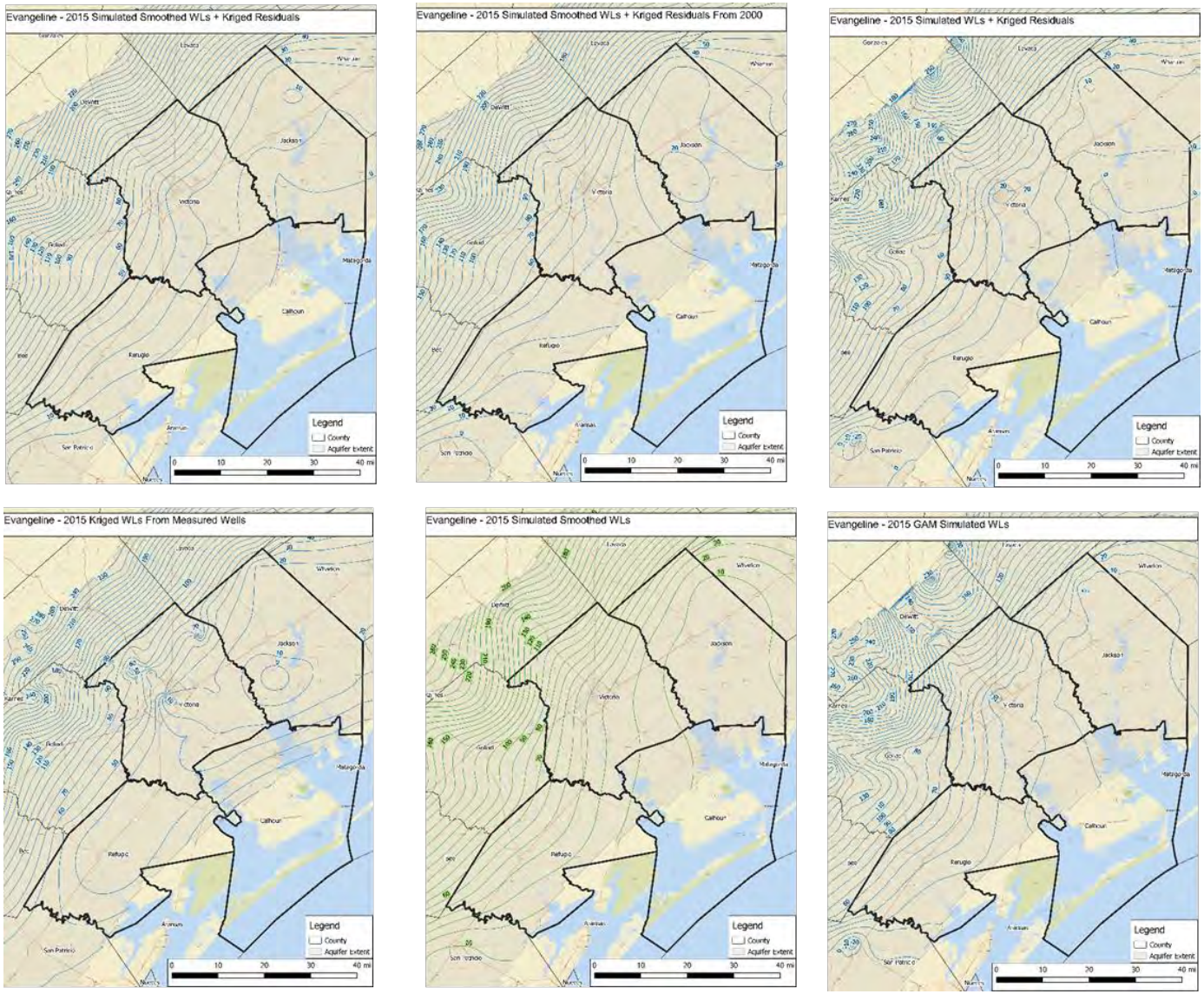


Figure D-5 Comparison of 2015 water level contours for Evangeline Aquifer produced by the six methods described in Table 5-5. 1) SSWL+KR, 2) SSWO2000+KR, 3) SWLs+KR, 4) KWL, 5) GAM_SSWL, and 6) GMA_SWL

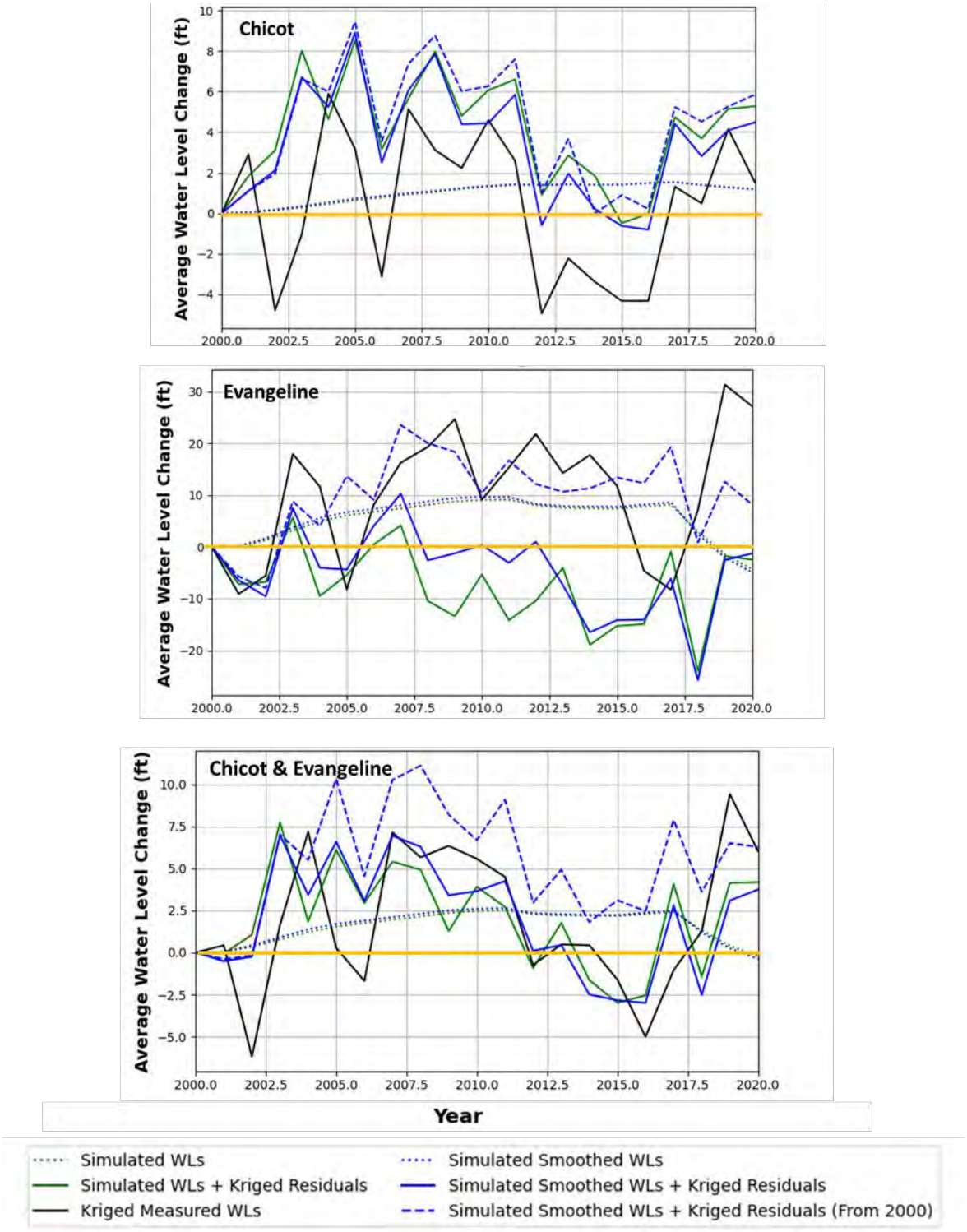


Figure D-6 Changes in the annual average water levels from five alternative methods and Simulated Smoothed WLs + Kriged residuals (SSWL+KR), which is considered to be Best Science Available for Calhoun County

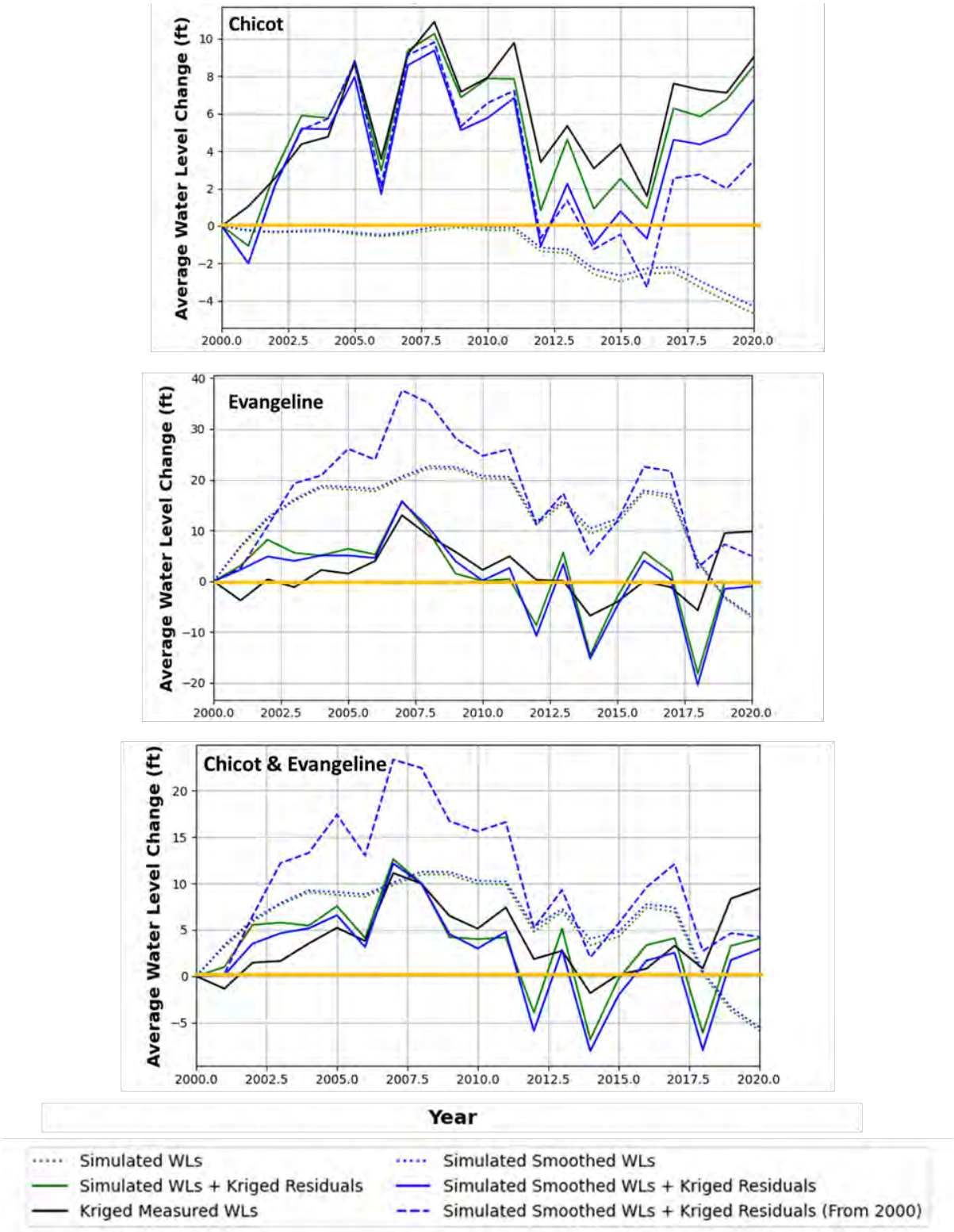


Figure D-7 Changes in the annual average water levels from five alternative methods and Simulated Smoothed WLs + Kriged residuals (SSWL+KR), which is considered to be Best Science Available for Jackson County

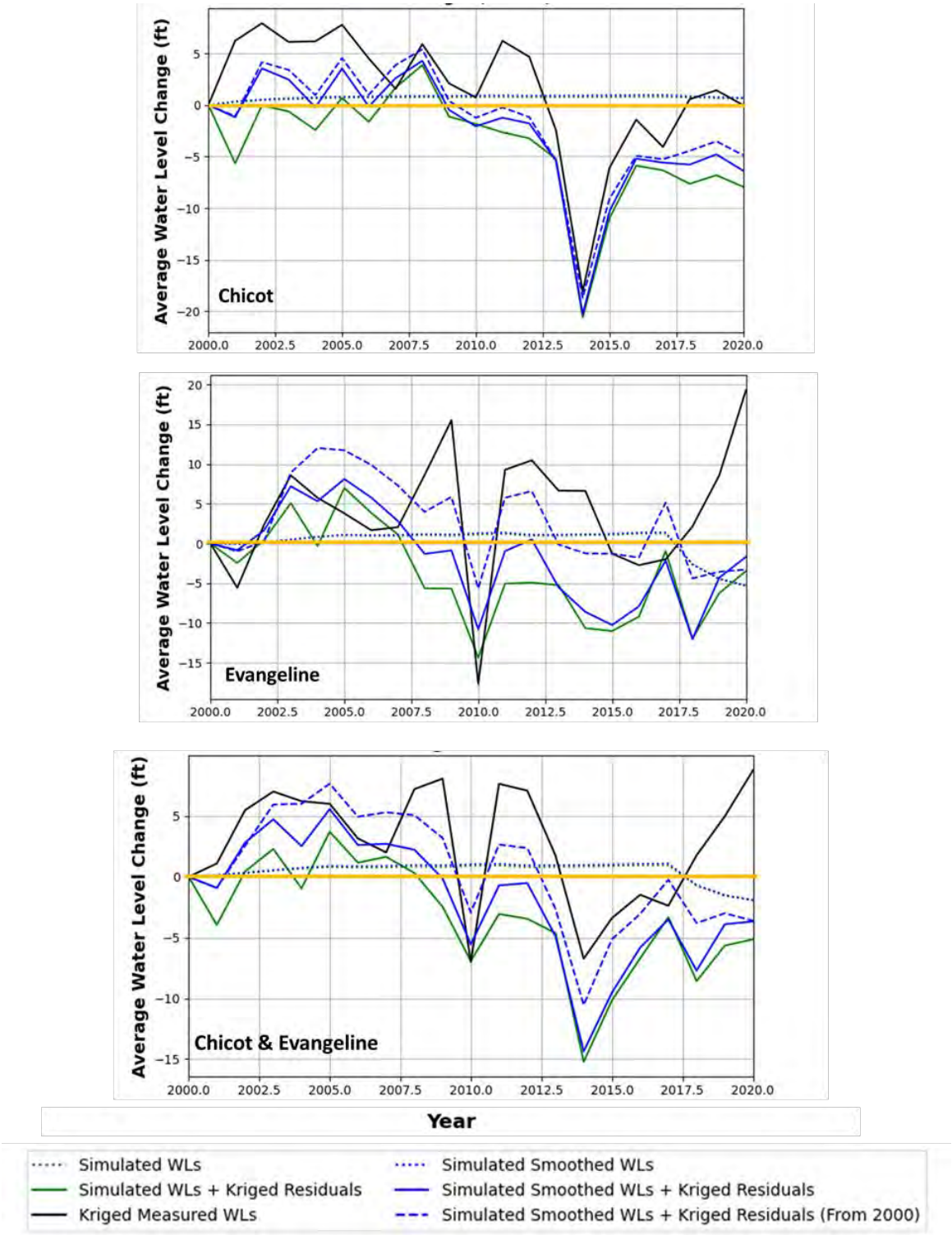


Figure D-8 Changes in the annual average water levels from five alternative methods and Simulated Smoothed WLs + Kriged residuals (SSWL+KR), which is considered to be Best Science Available for Refugio County

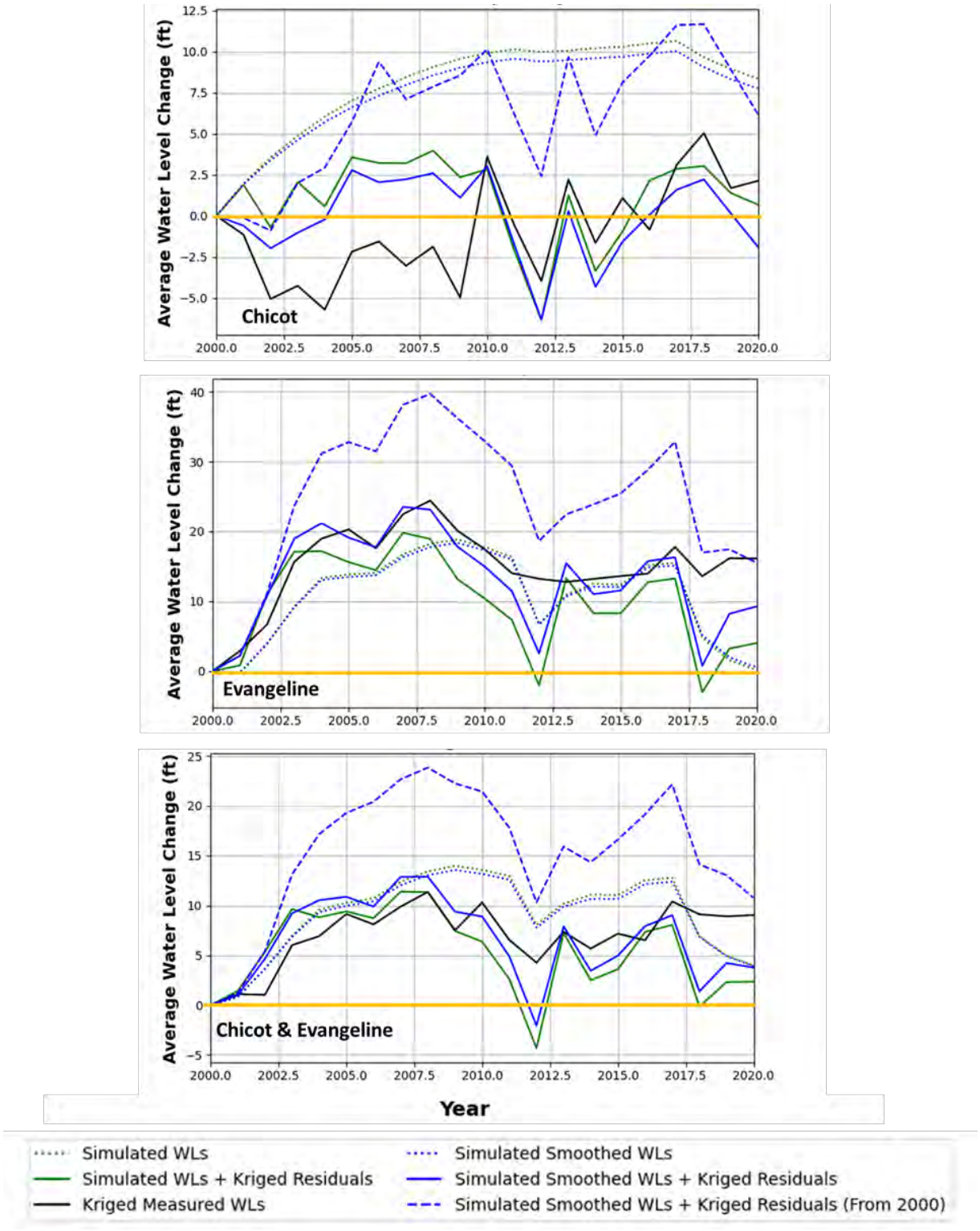


Figure D-9 Changes in the annual average water levels from five alternative methods and Simulated Smoothed WLs + Kriged residuals (SSWL+KR), which is considered to be Best Science Available for Victoria County

APPENDIX E
CHANGES IN WATER LEVEL ELEVATIONS IN THE CHICOT AQUIFER AND THE EVANGELINE AQUIFER ACROSS CALHOUN, JACKSON, REFUGIO, AND VICTORIA COUNTIES FROM 2000 TO 2020 IN 10-YEAR AND 5-YEAR INTERVALS

Changes in Water Level Elevations in the Chicot Aquifer and the Evangeline Aquifer across Calhoun, Jackson, Refugio, and Victoria Counties for the time periods in 10-year increments: 2000-2010 and 2010-2020, and 5-year increments: 2000-2005, 2005-2010, 2010-2015, and 2015 -2020

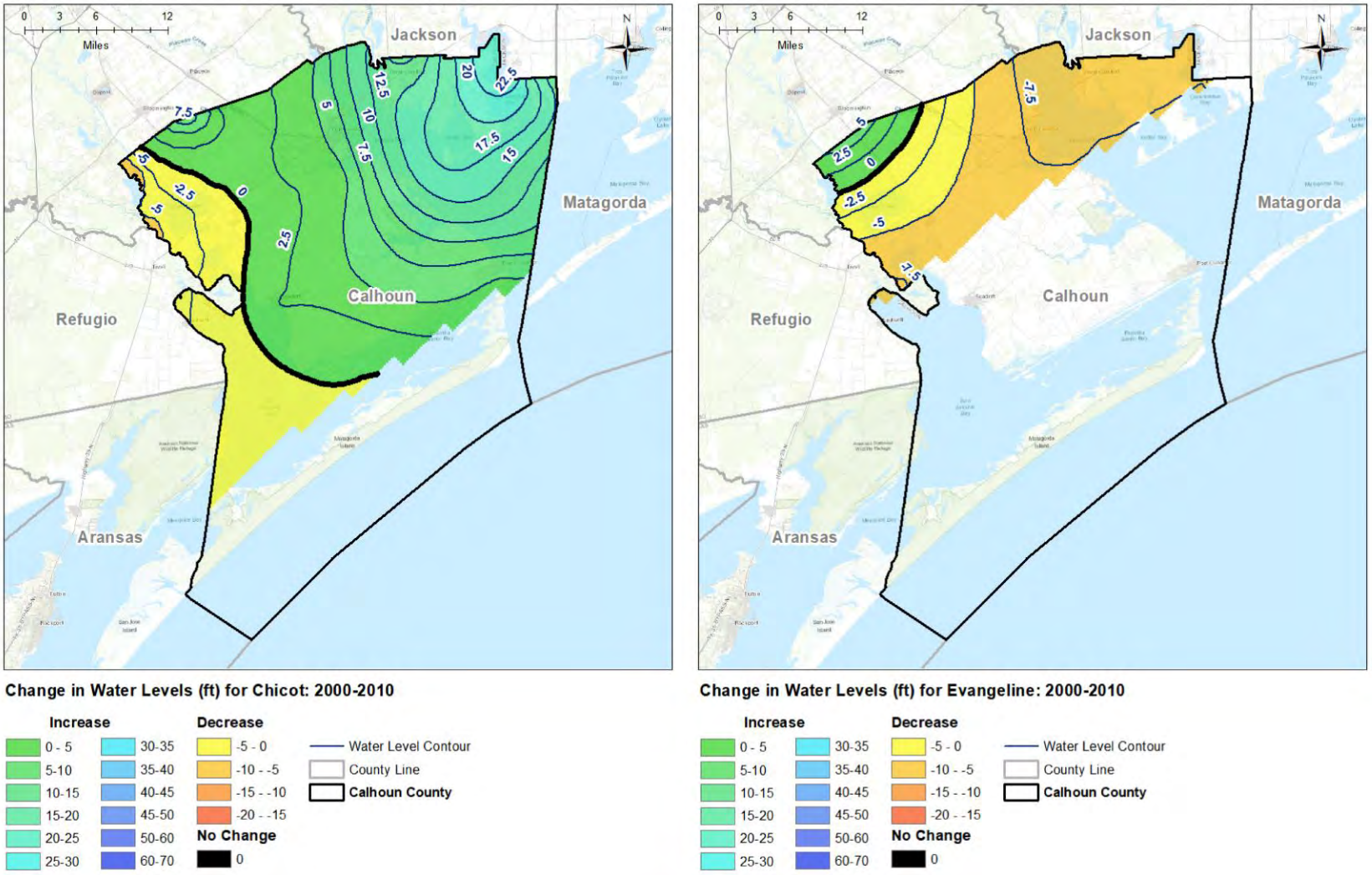


Figure E-1 Change in water level elevation in the Chicot and Evangeline aquifers across Calhoun County for 2000-2010

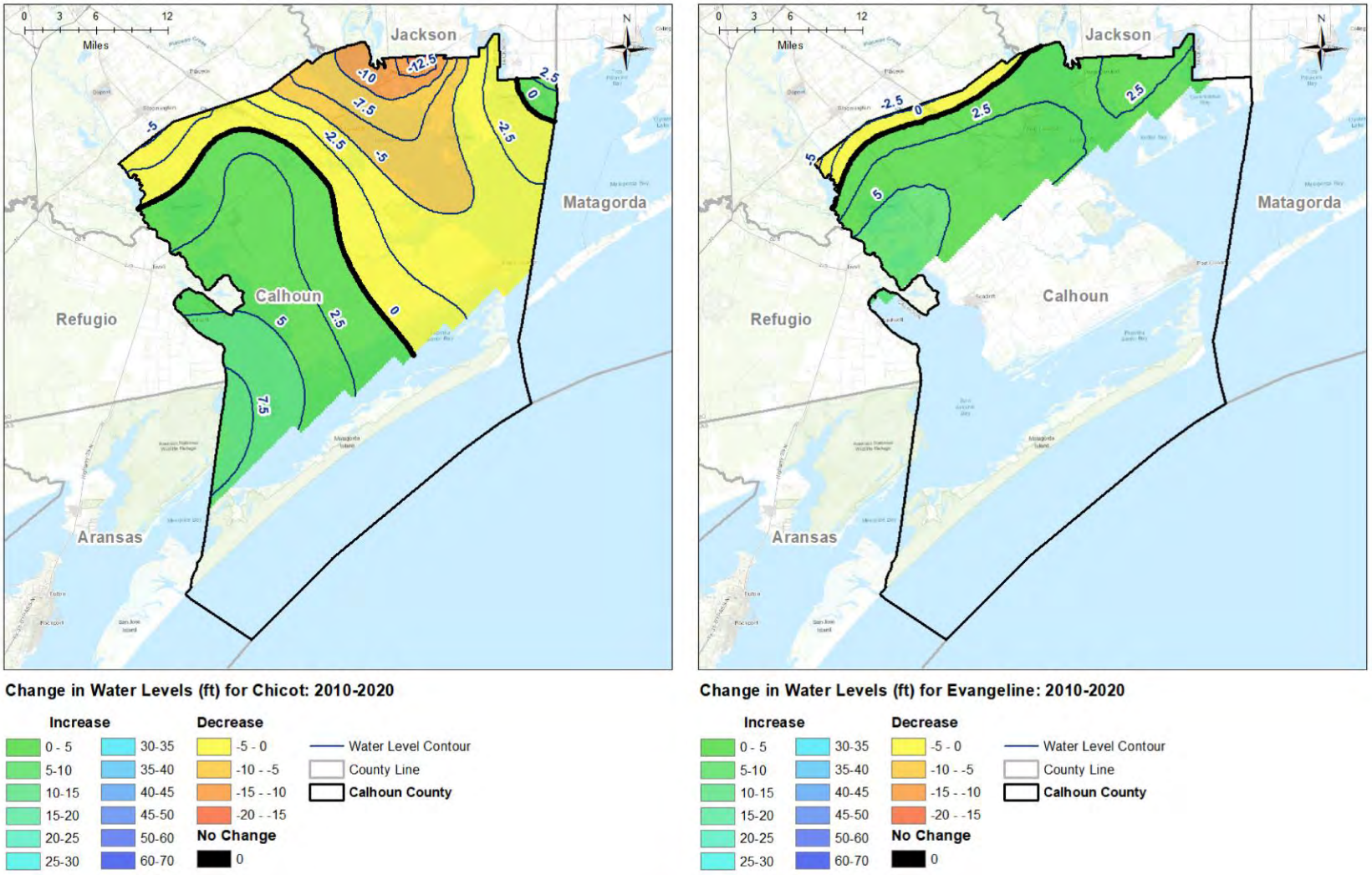


Figure E-2 Change in water level elevation in the Chicot and Evangeline aquifers across Calhoun County for 2010-2020

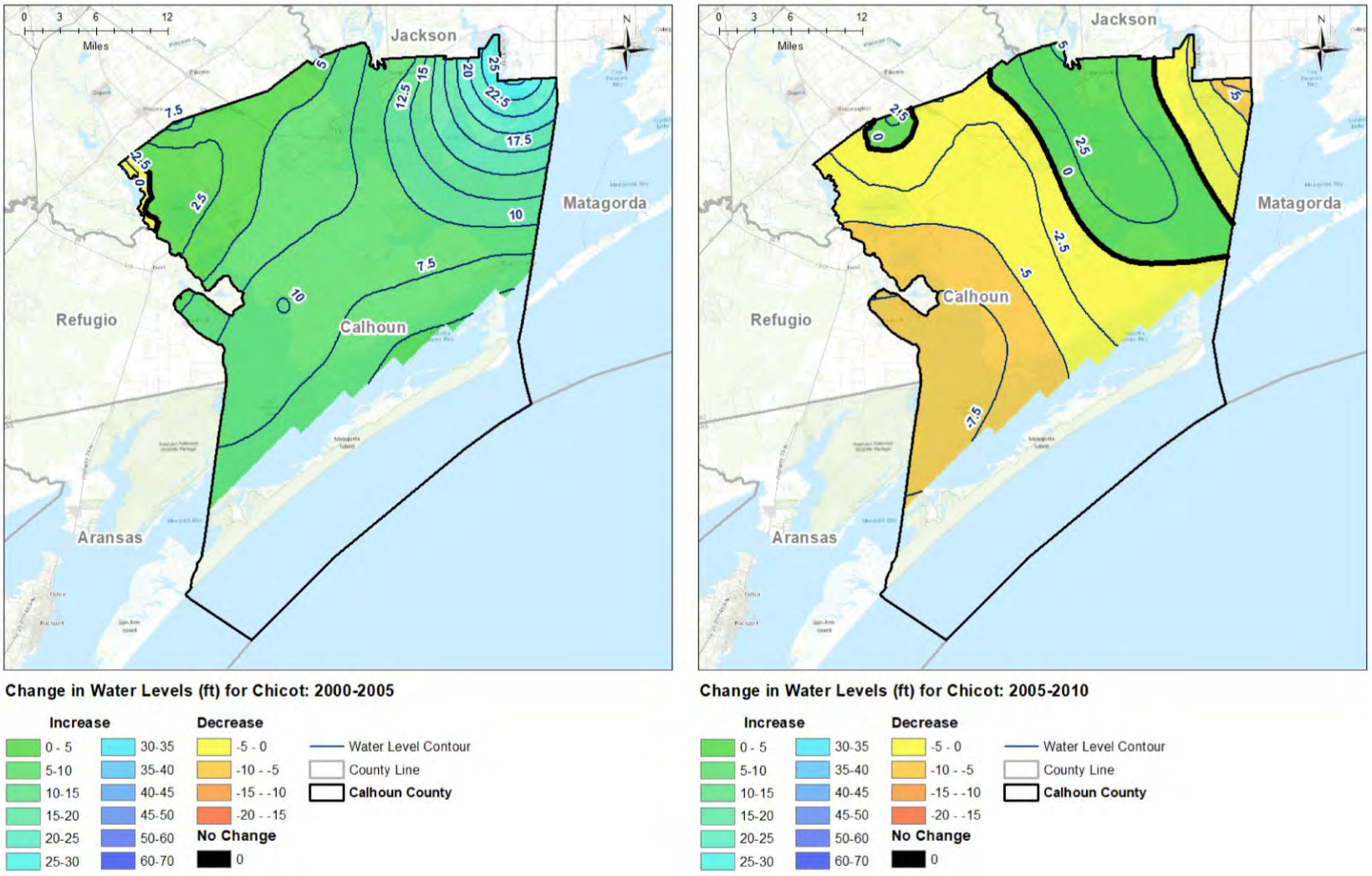


Figure E-3 Change in water level elevation in the Chicot Aquifer across Calhoun County for 2000-2005 and for 2005-2010

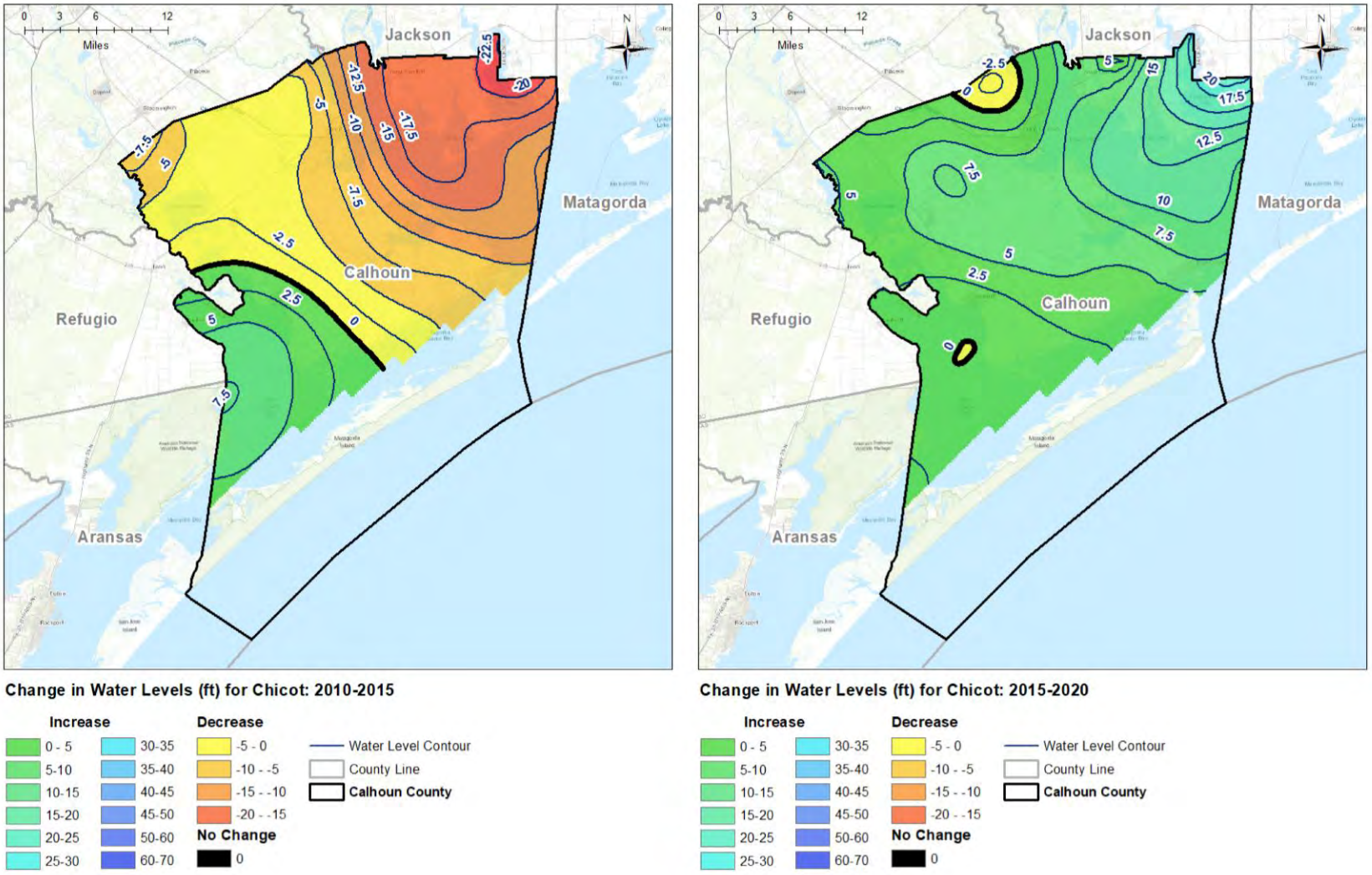


Figure E-4 Change in water level elevation in the Chicot Aquifer across Calhoun County for 2010-2015 and for 2015-2020

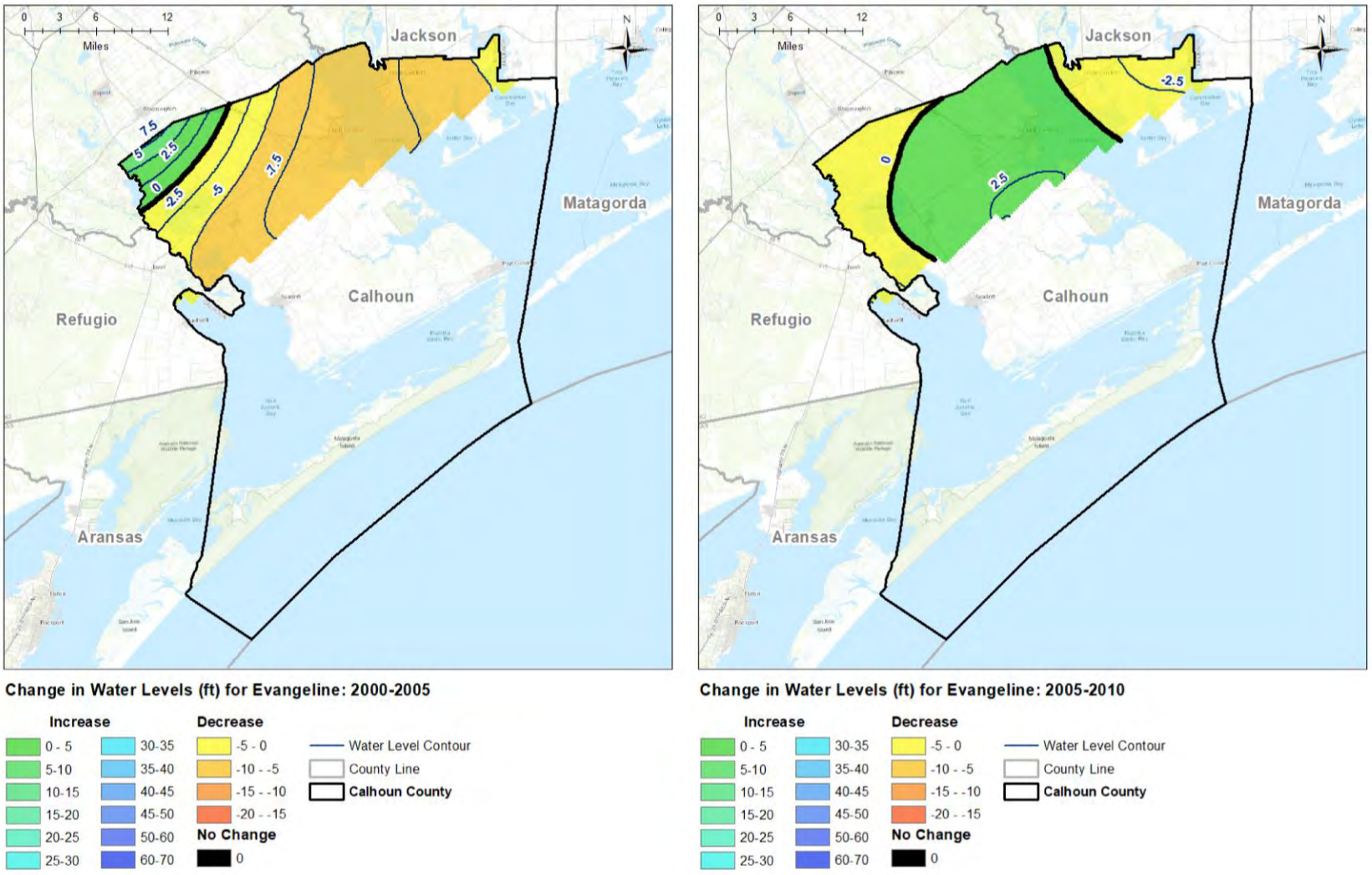


Figure E-5 Change in water level elevation in the Evangeline Aquifer across Calhoun County for 2000-2005 and for 2005-2010

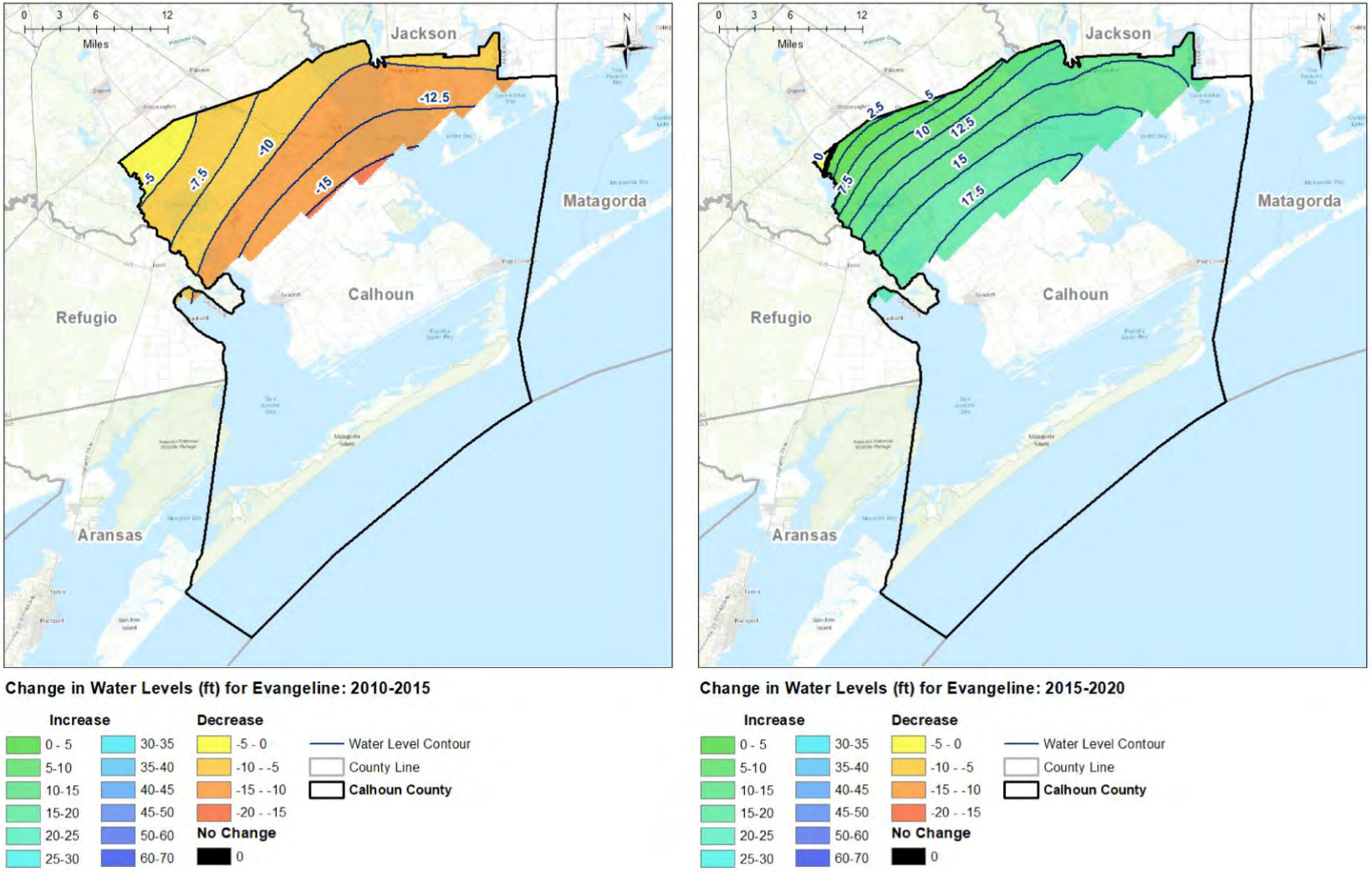


Figure E-6 Change in water level elevation in the Evangeline Aquifer across Calhoun County for 2010-2015 and for 2015-2020

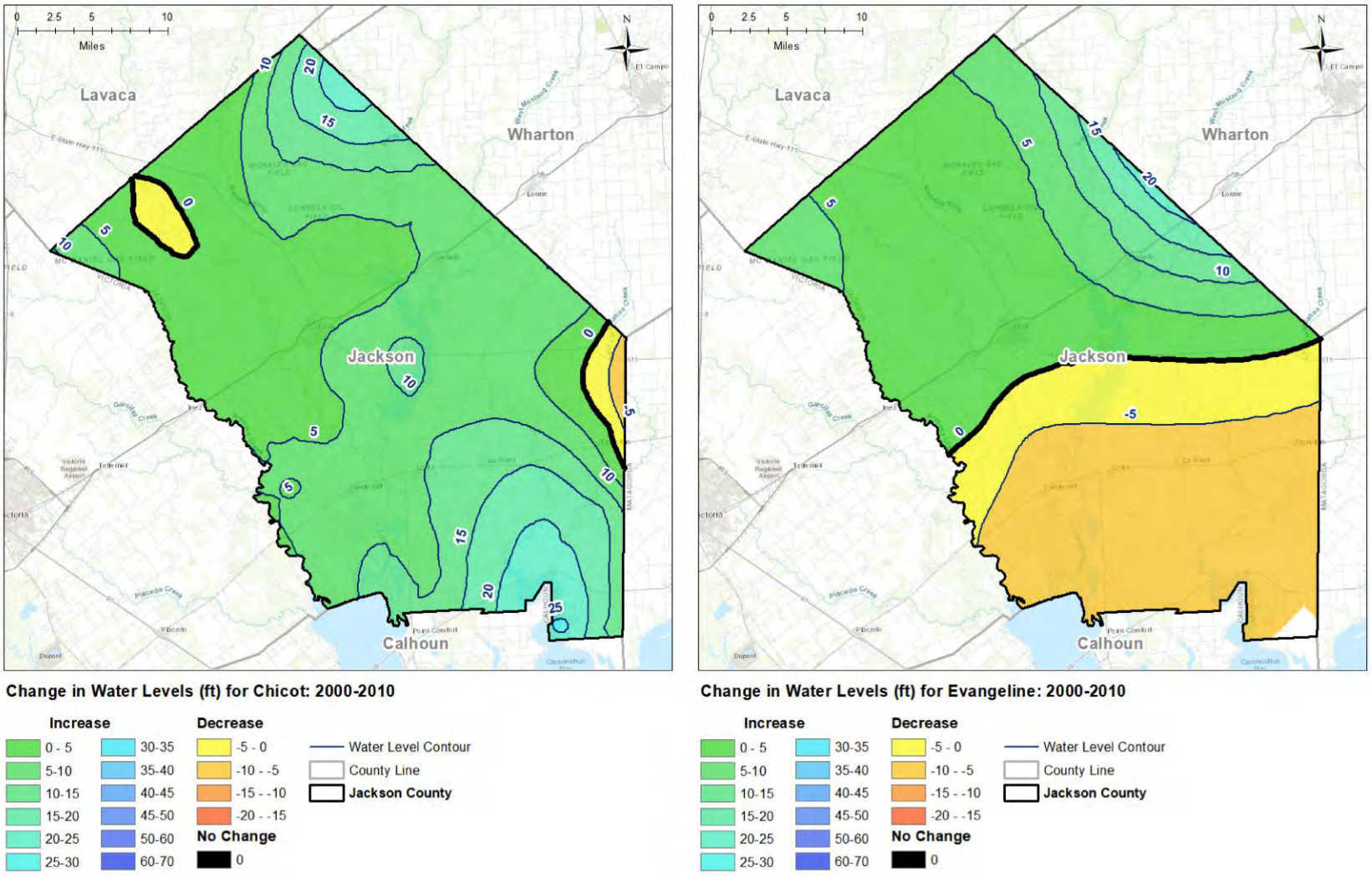


Figure E-7 Change in water level elevation in the Chicot and Evangeline aquifers across Jackson County for 2000-2010

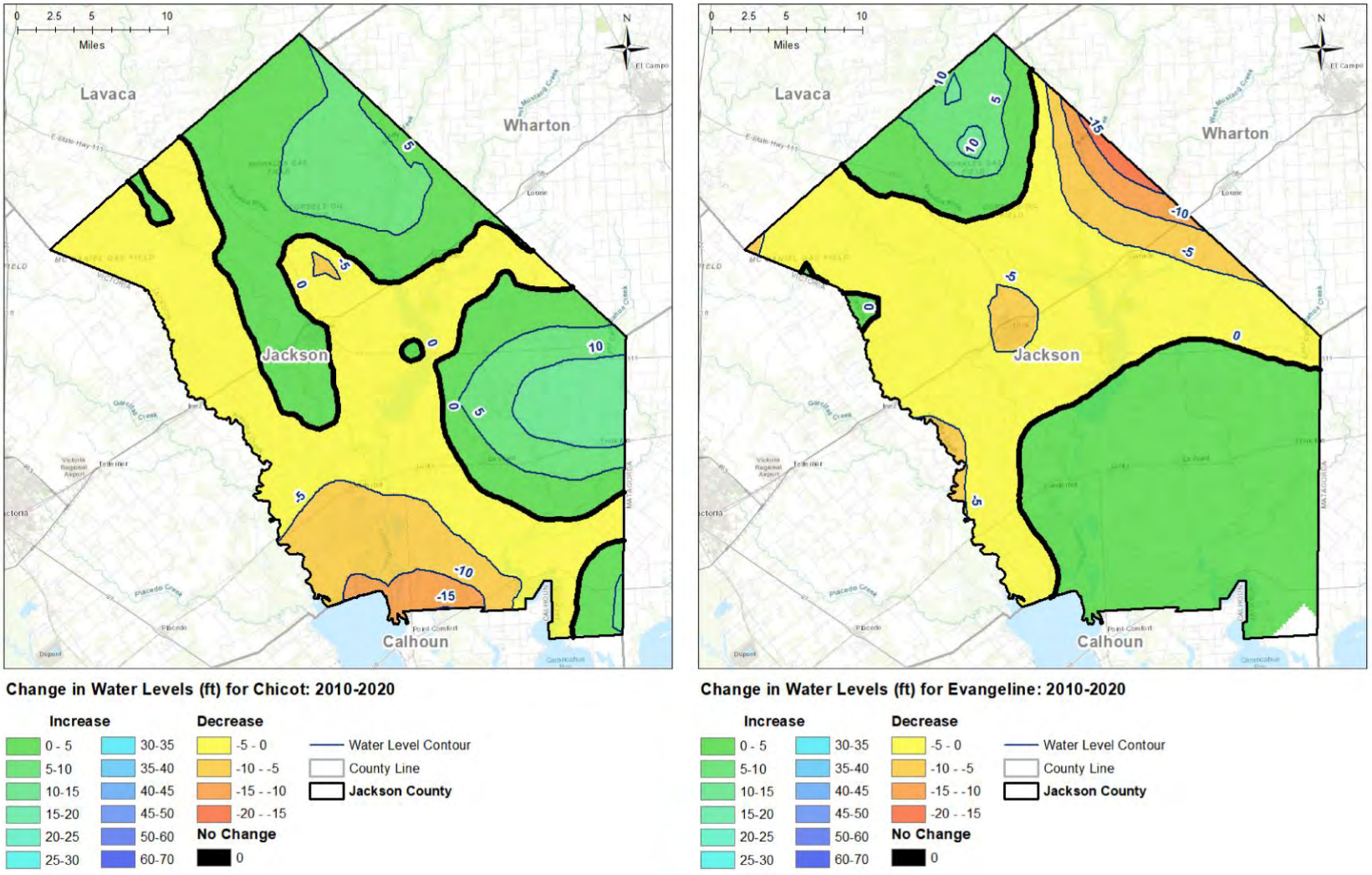


Figure E-8 Change in water level elevation in the Chicot and Evangeline aquifers across Jackson County for 2010-2020

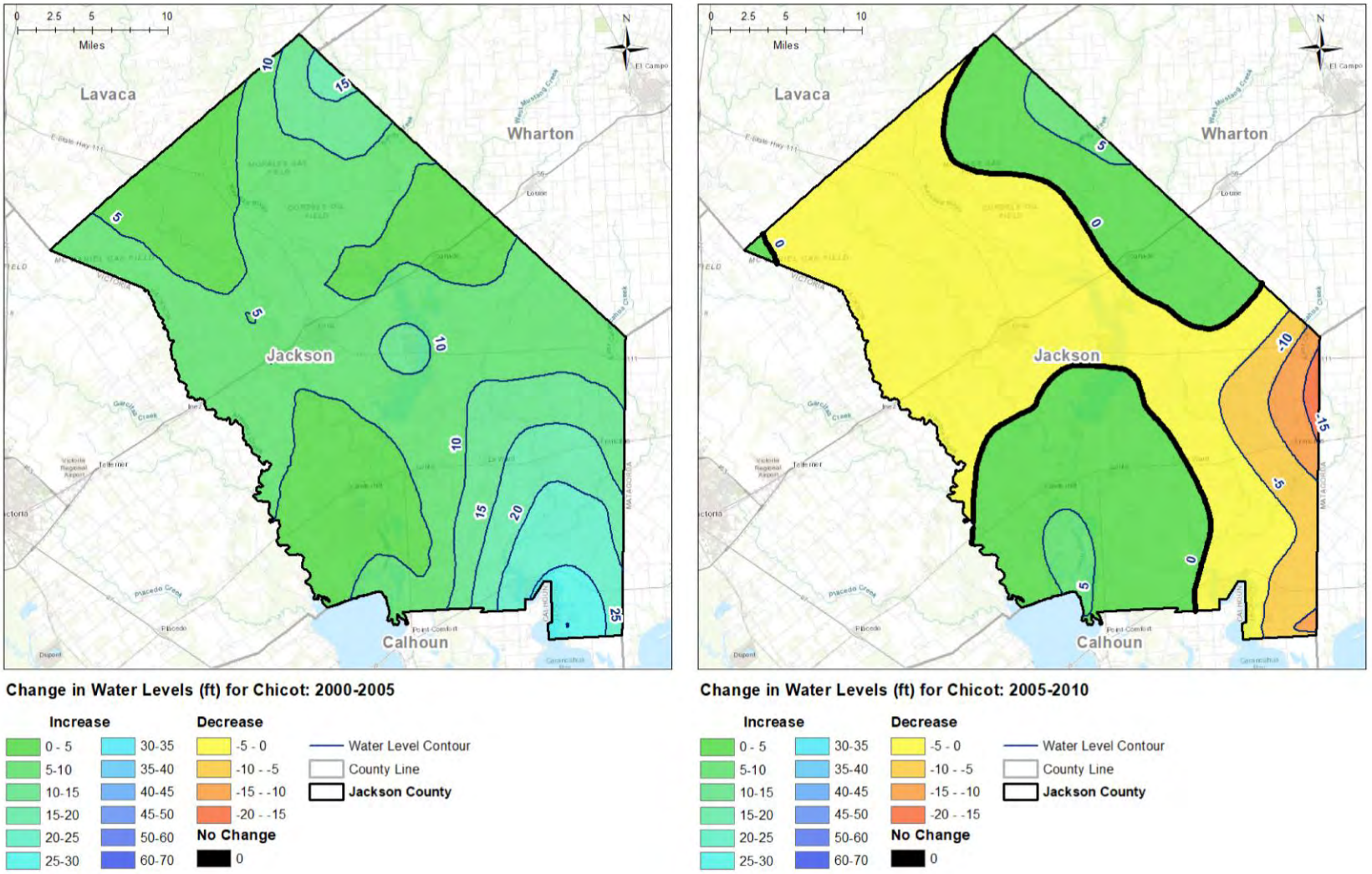


Figure E-9 Change in water level elevation in the Chicot Aquifer across Jackson County for 2000-2005 and for 2005-2010

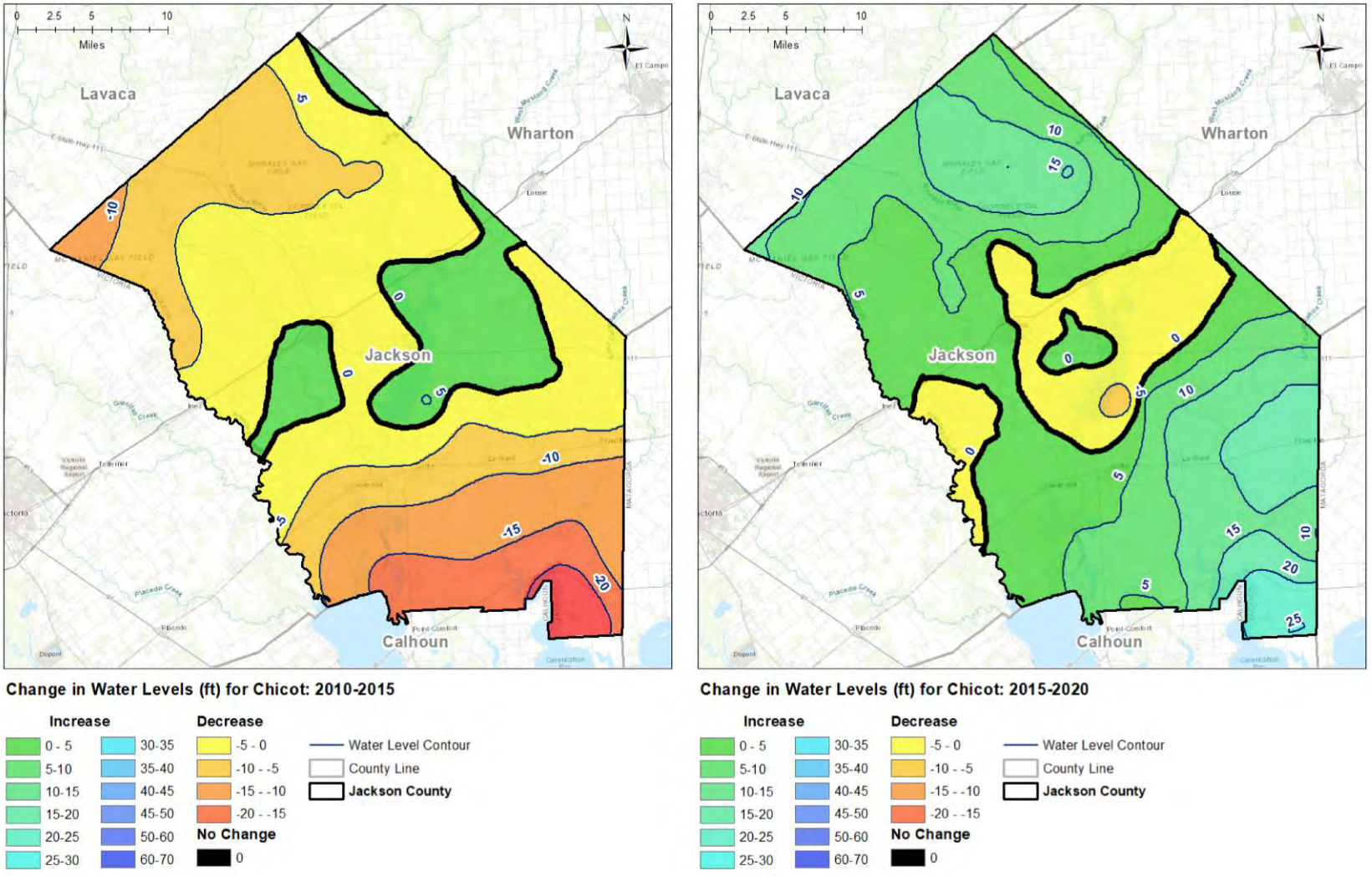


Figure E-10 Change in water level elevation in the Chicot Aquifer across Jackson County for 2010-2015 and for 2015-2020

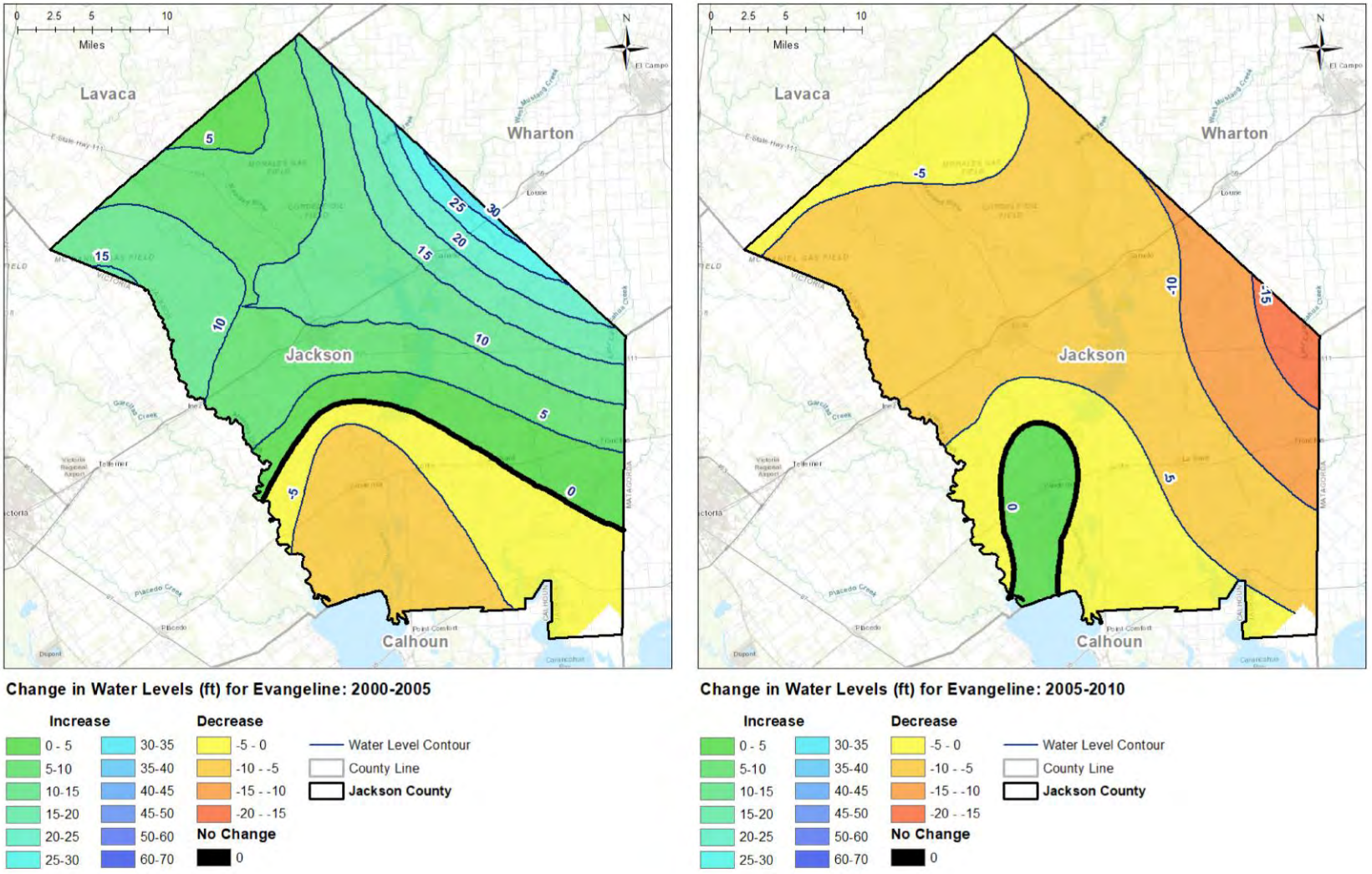


Figure E-11 Change in water level elevation in the Evangeline Aquifer across Jackson County for 2000-2005 and for 2005-2010

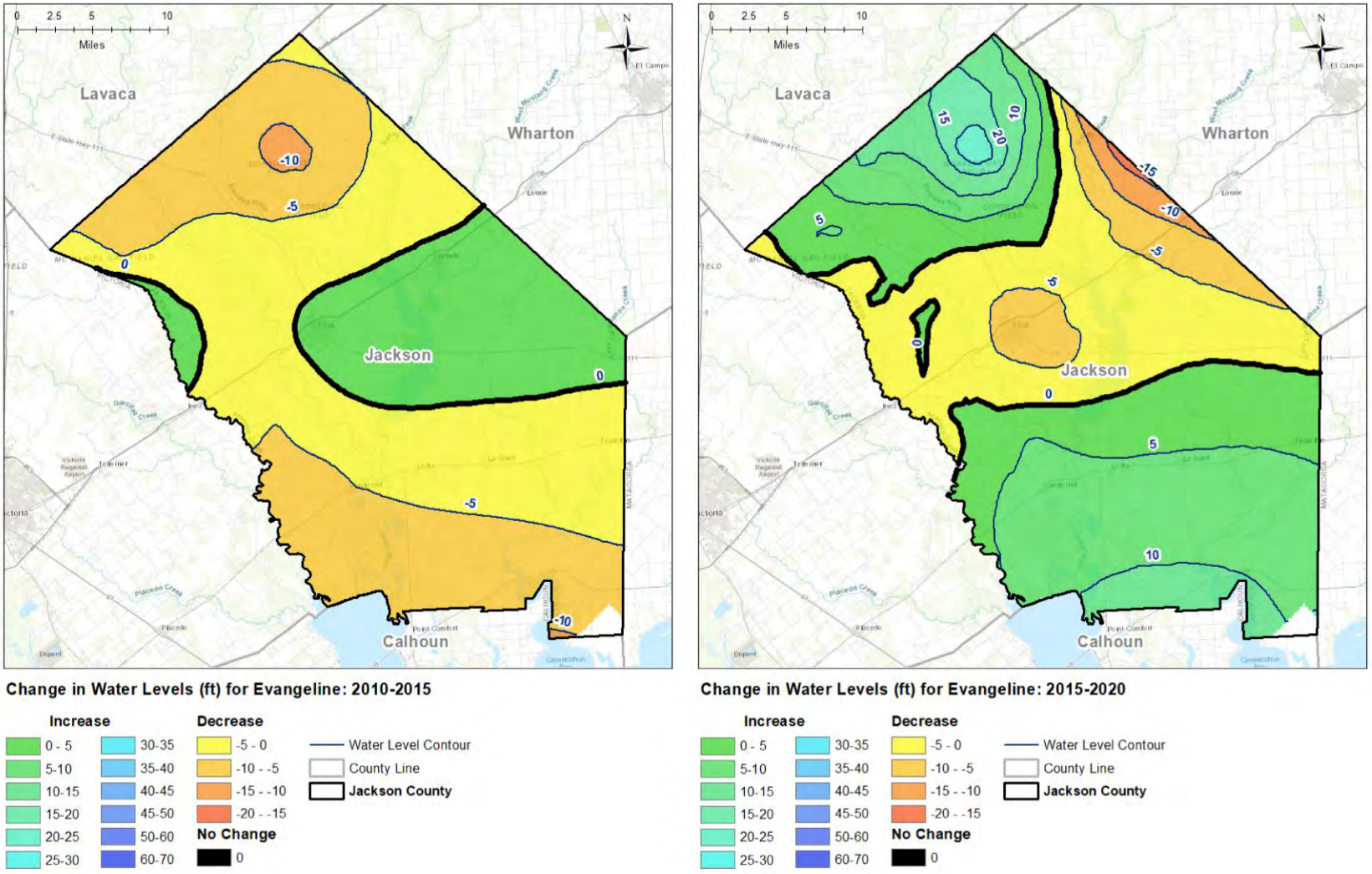


Figure E-12 Change in water level elevation in the Evangeline Aquifer across Jackson County for 2010-2015 and for 2015-2020

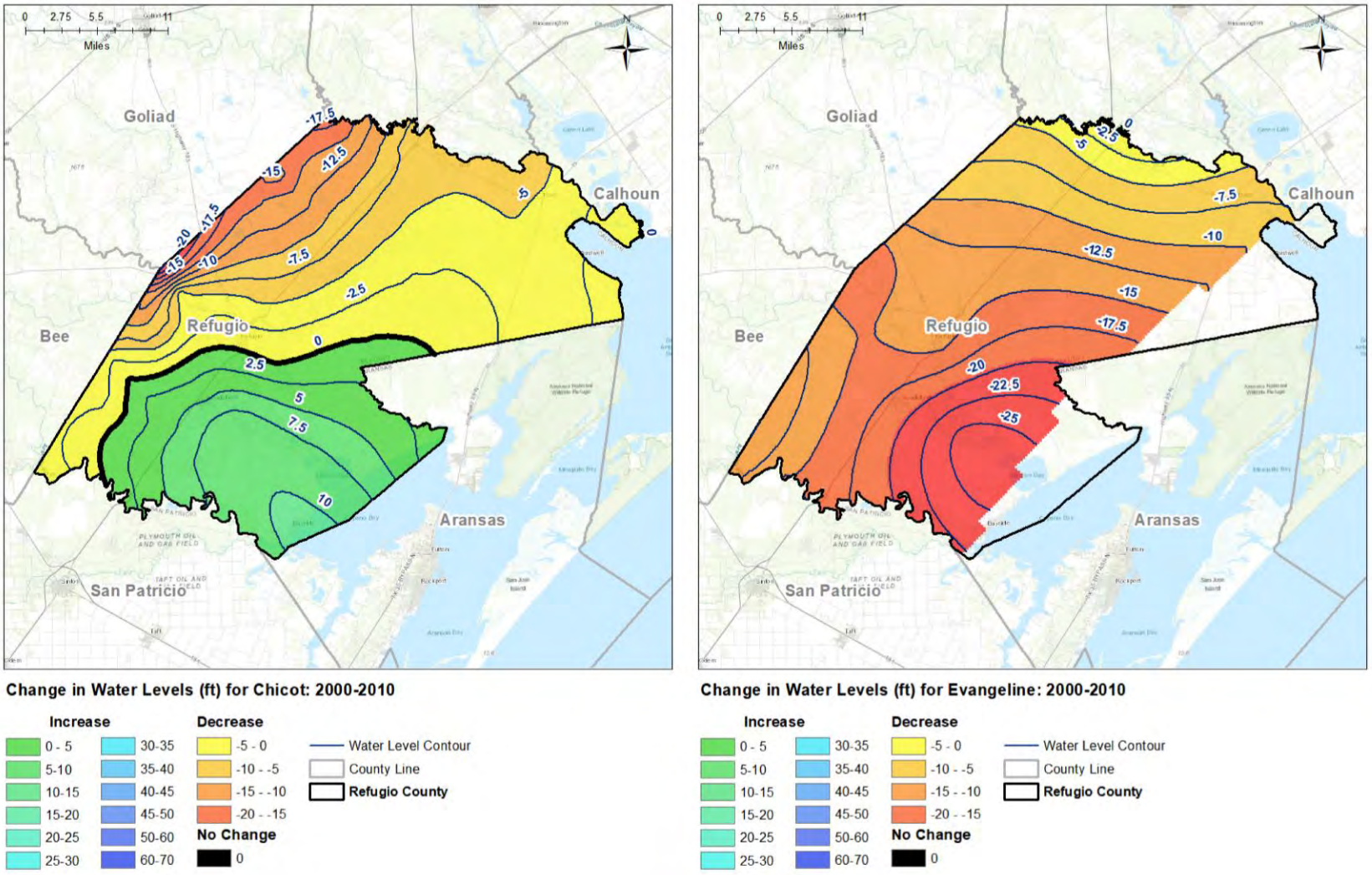


Figure E-13 Change in water level elevation in the Chicot and Evangeline aquifers across Refugio County for 2000-2010

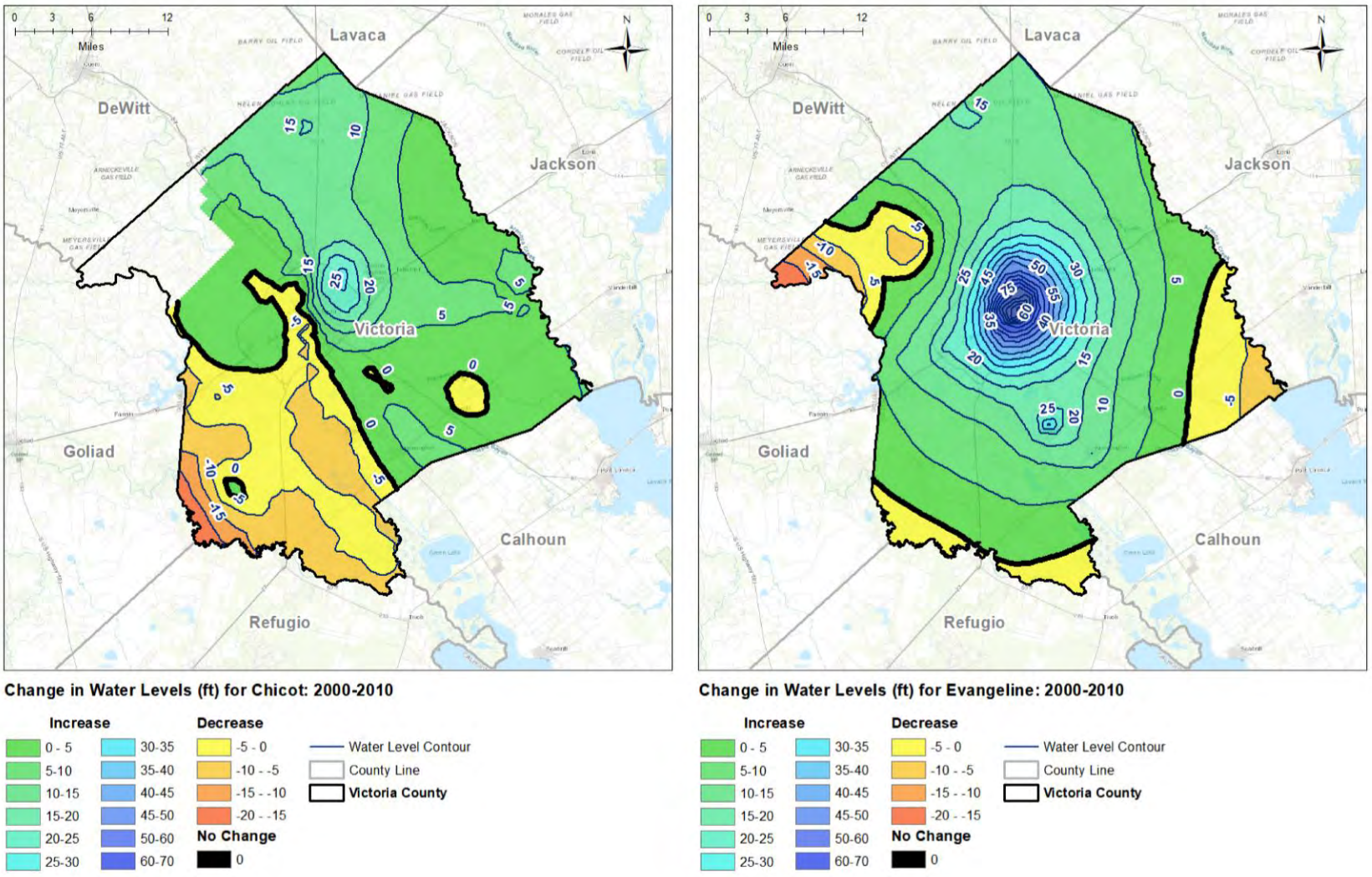


Figure E-14 Change in water level elevation in the Chicot and Evangeline aquifers across Refugio County for 2010-2020

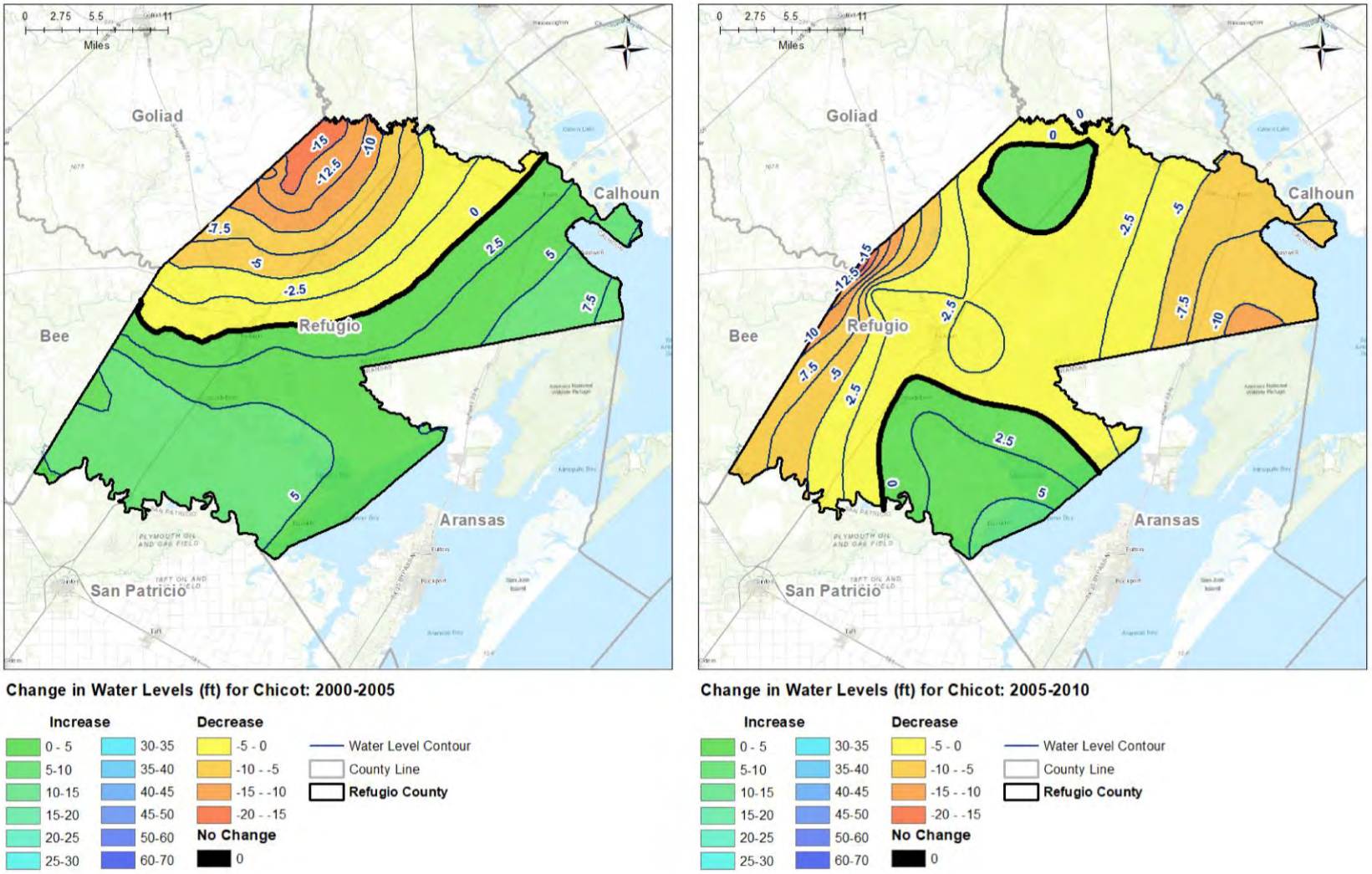


Figure E-15 Change in water level elevation in the Chicot Aquifer across Refugio County for 2000-2005 and for 2005-2010

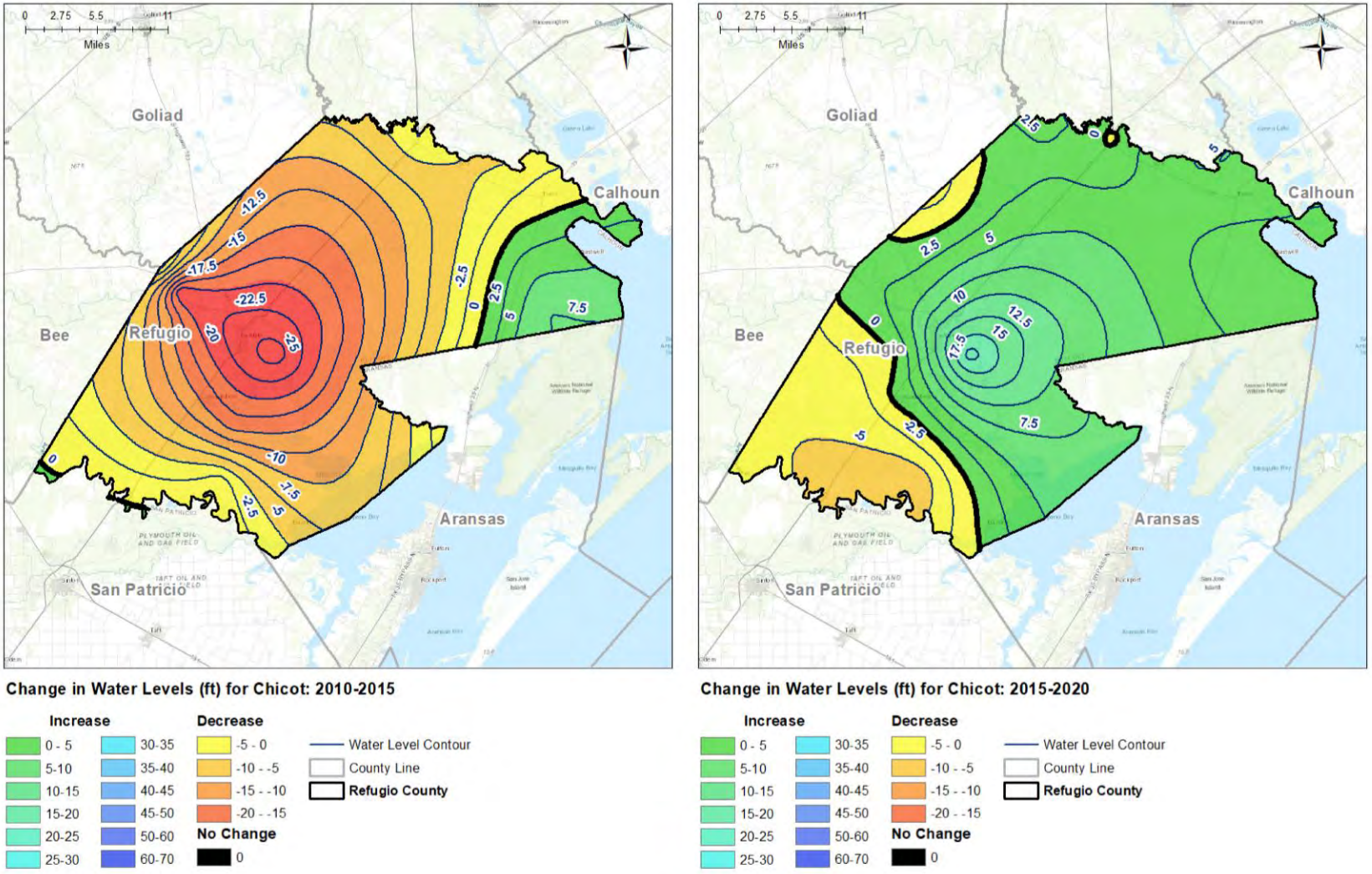


Figure E-16 Change in water level elevation in the Chicot Aquifer across Refugio County for 2010-2015 and for 2015-2020

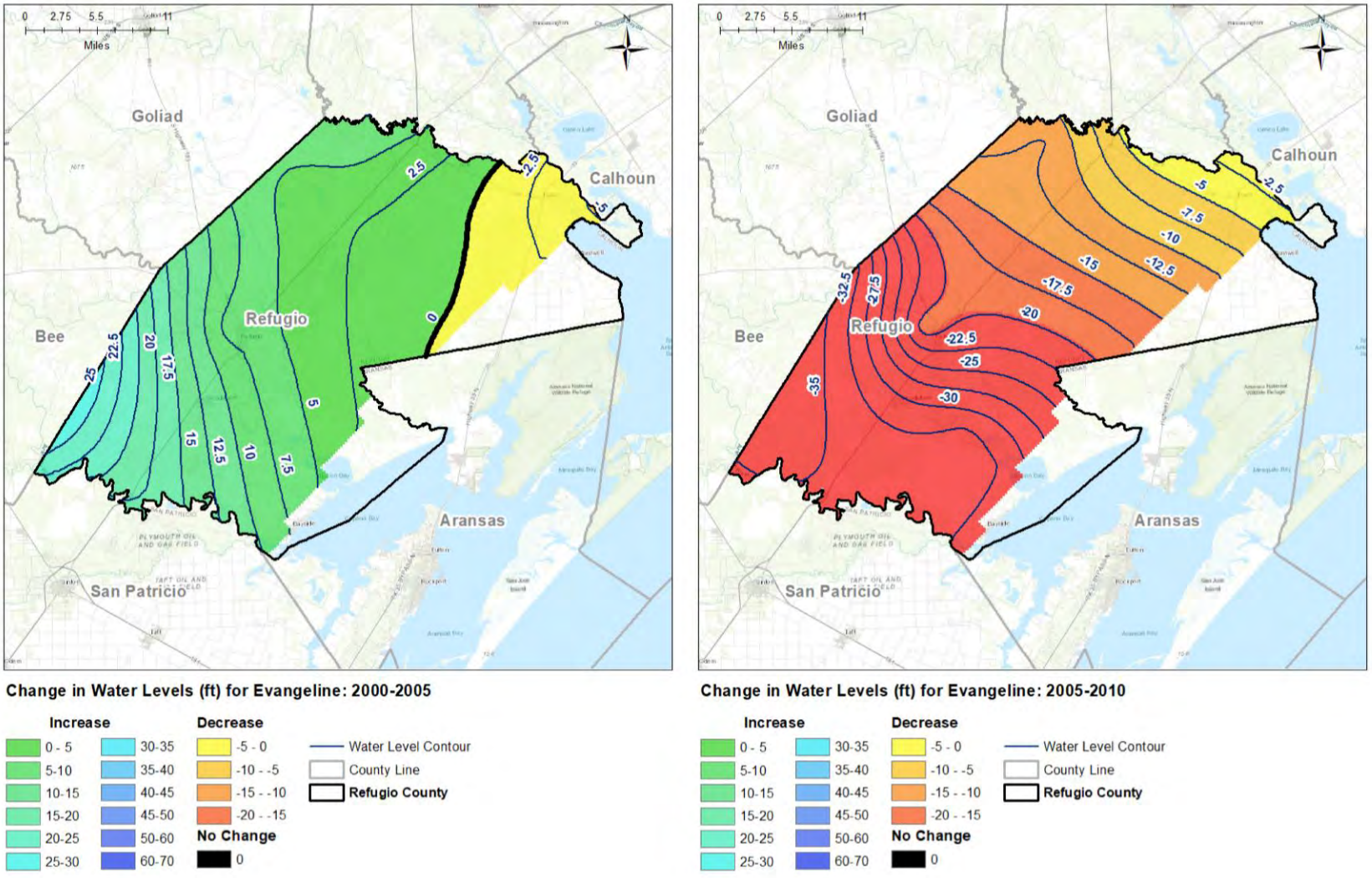


Figure E-17 Change in water level elevation in the Evangeline Aquifer across Refugio County for 2000-2005 and for 2005-2010

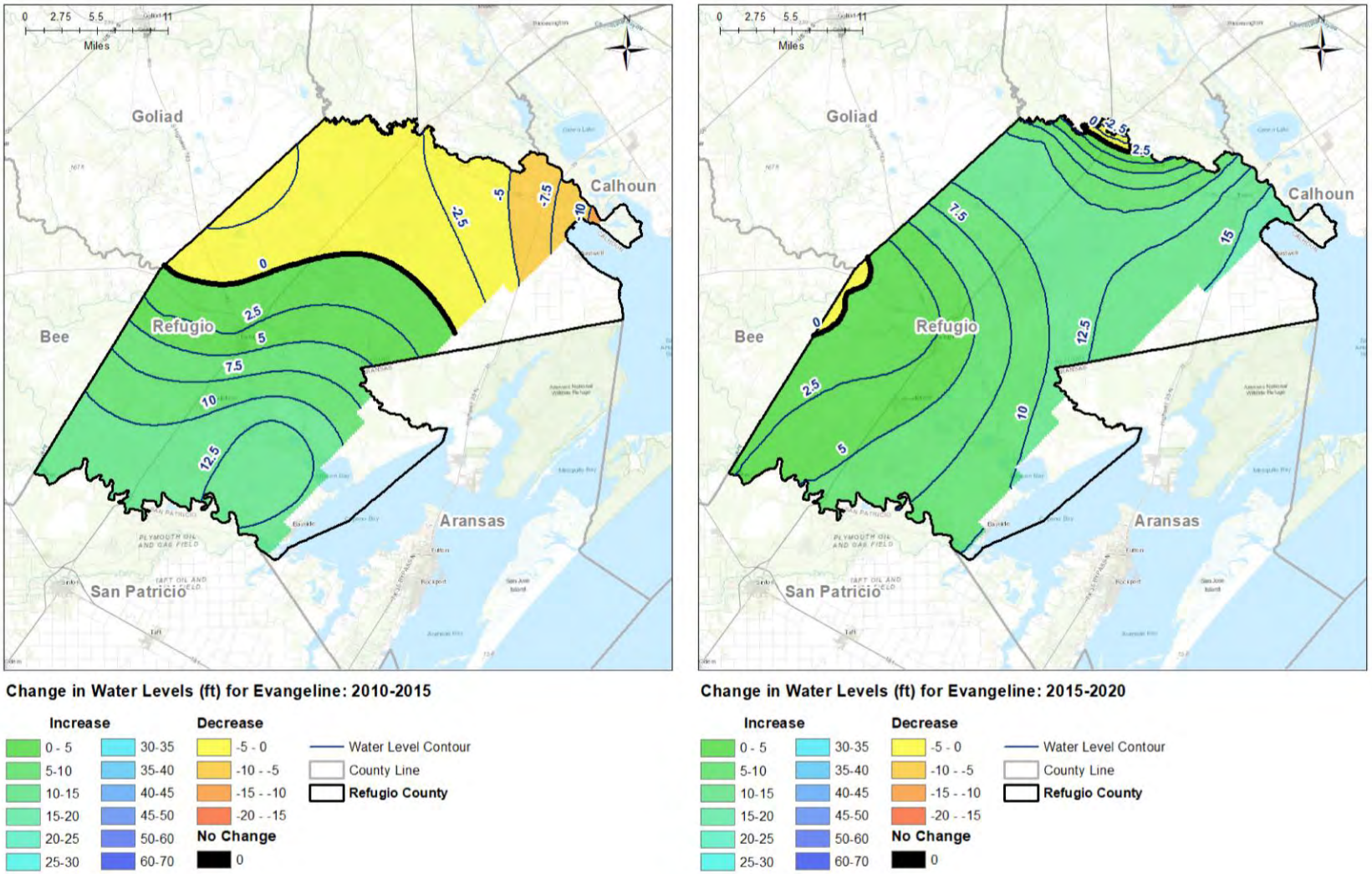


Figure E-18 Change in water level elevation in the Evangeline Aquifer across Refugio County for 2010-2015 and for 2015-2020

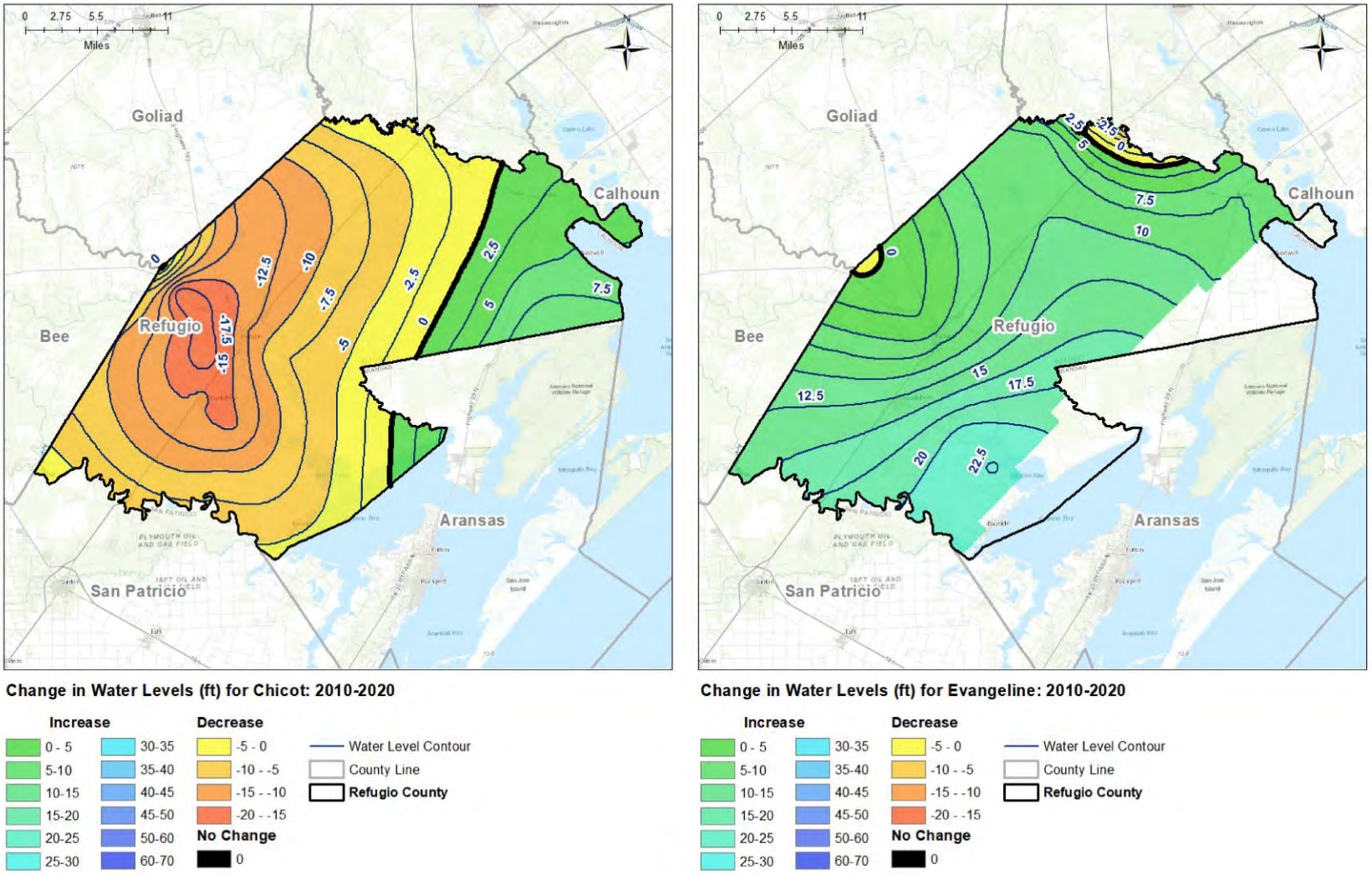


Figure E-19 Change in water level elevation in the Chicot and Evangeline aquifers across Victoria County for 2000-2010

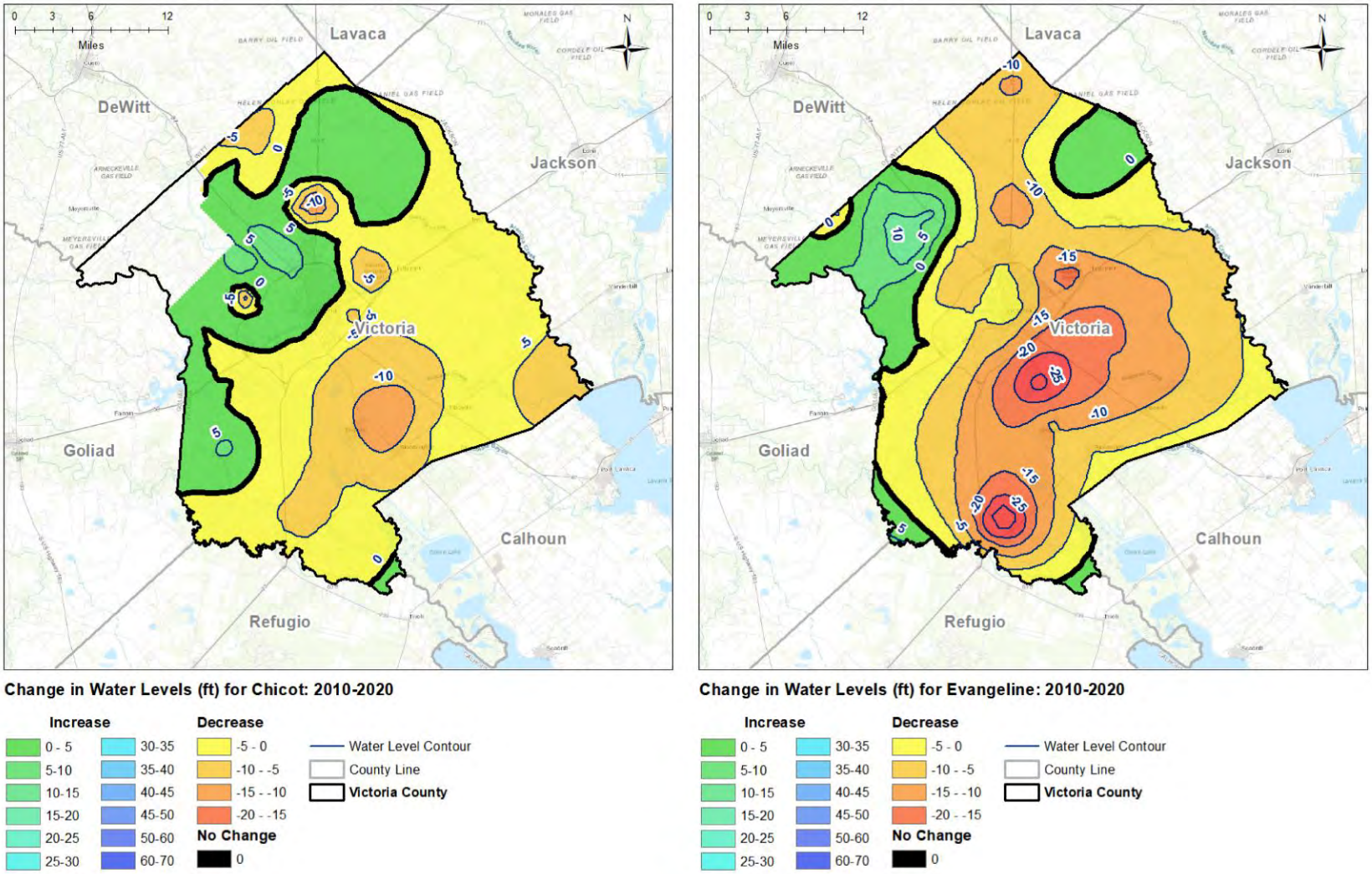


Figure E-20 Change in water level elevation in the Chicot and Evangeline aquifers across Victoria County for 2010-2020

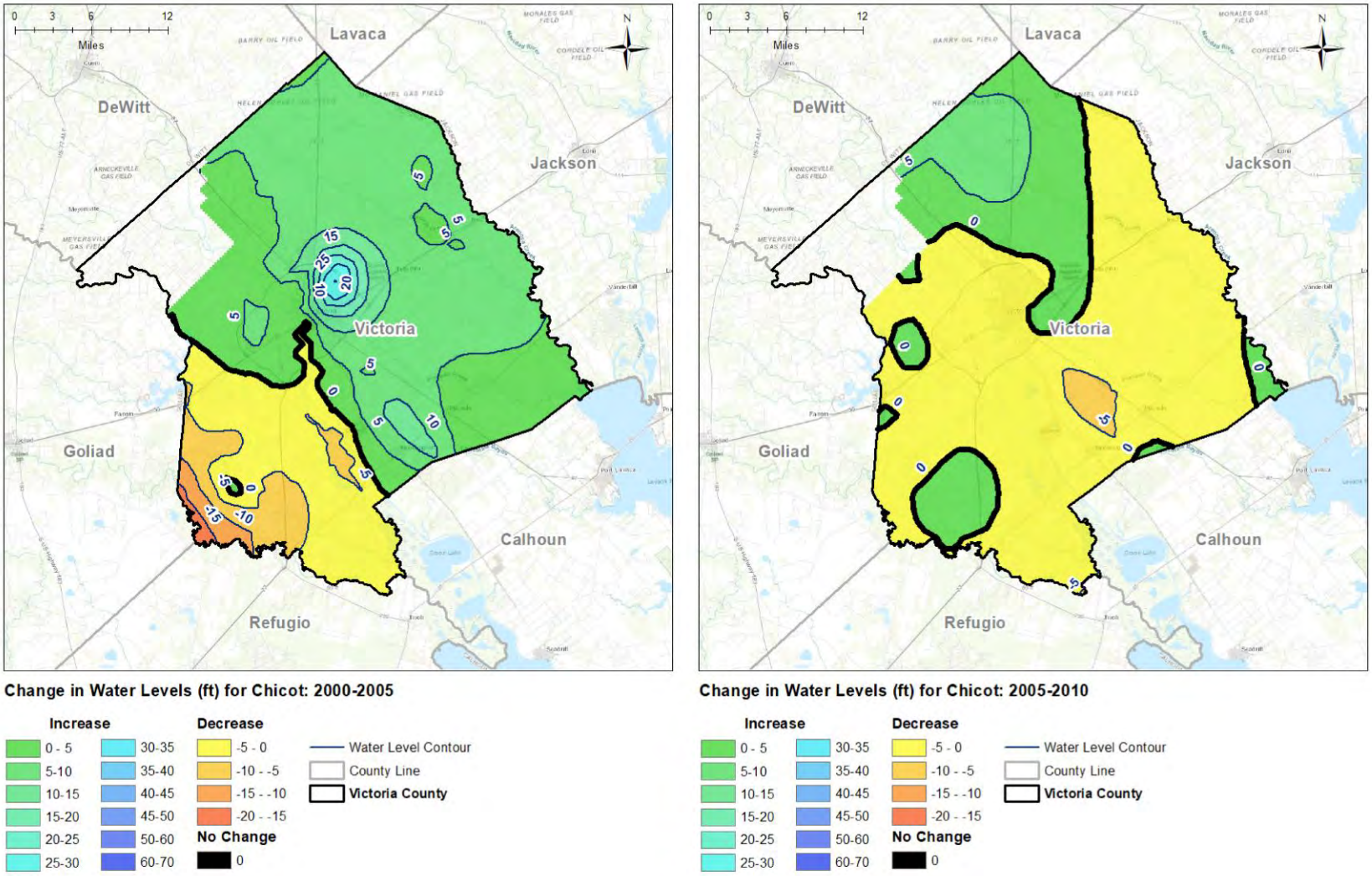


Figure E-21 Change in water level elevation in the Chicot Aquifer across Victoria County for 2000-2005 and for 2005-2010

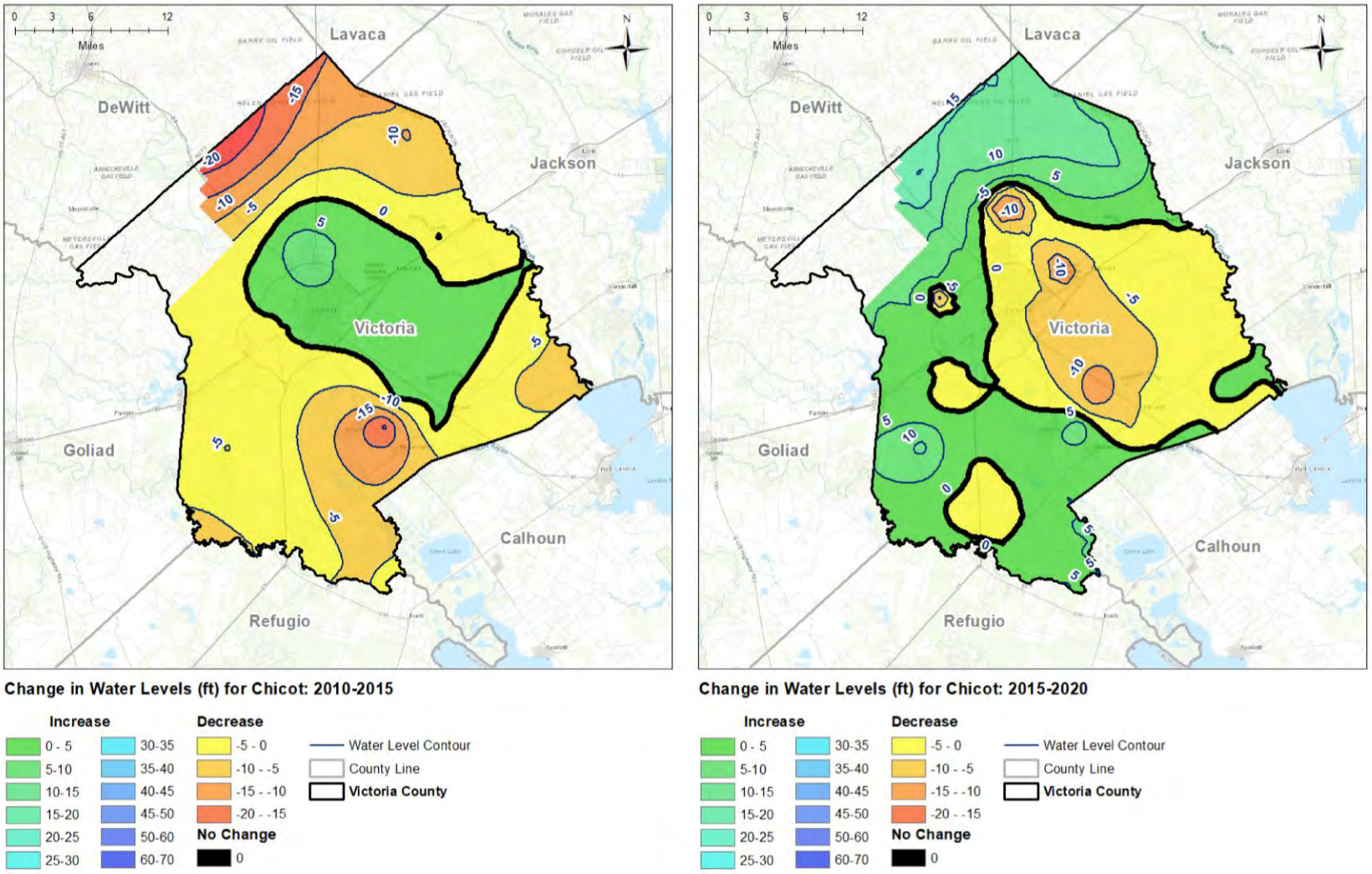


Figure E-22 Change in water level elevation in the Chicot Aquifer across Victoria County for 2010-2015 and for 2015-2020

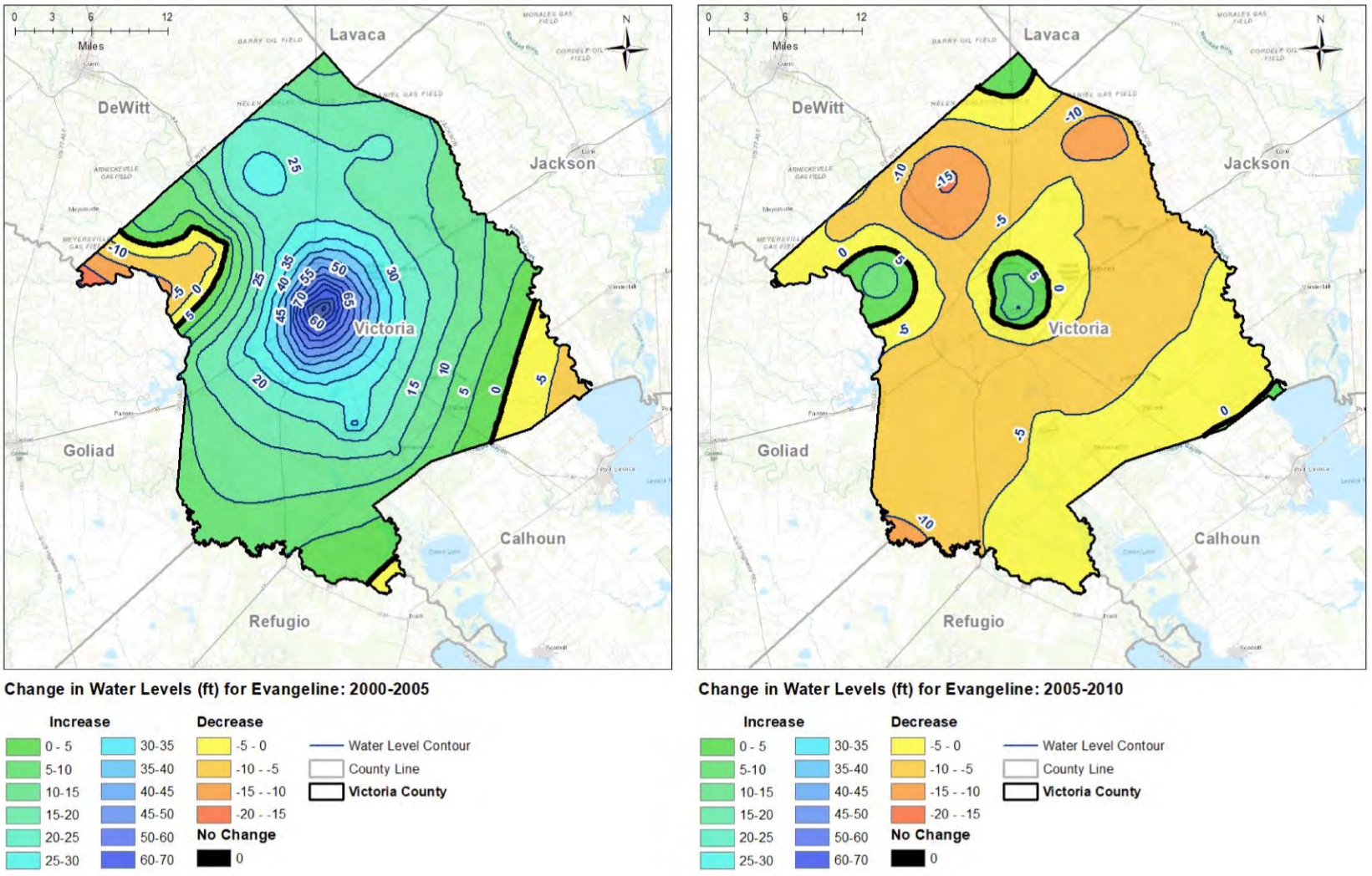


Figure E-23 Change in water level elevation in the Evangeline Aquifer across Victoria County for 2000-2005 and for 2005-2010

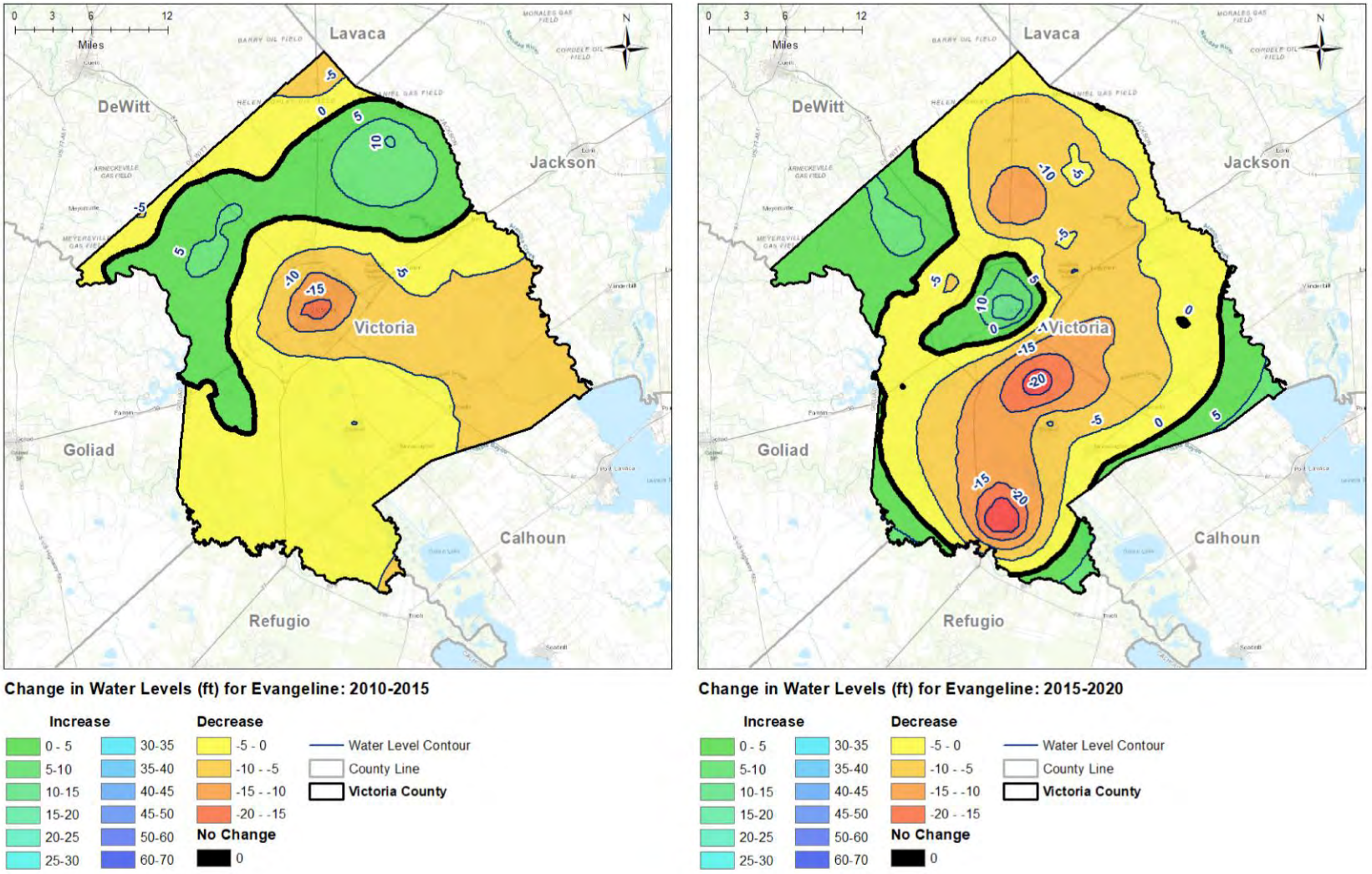
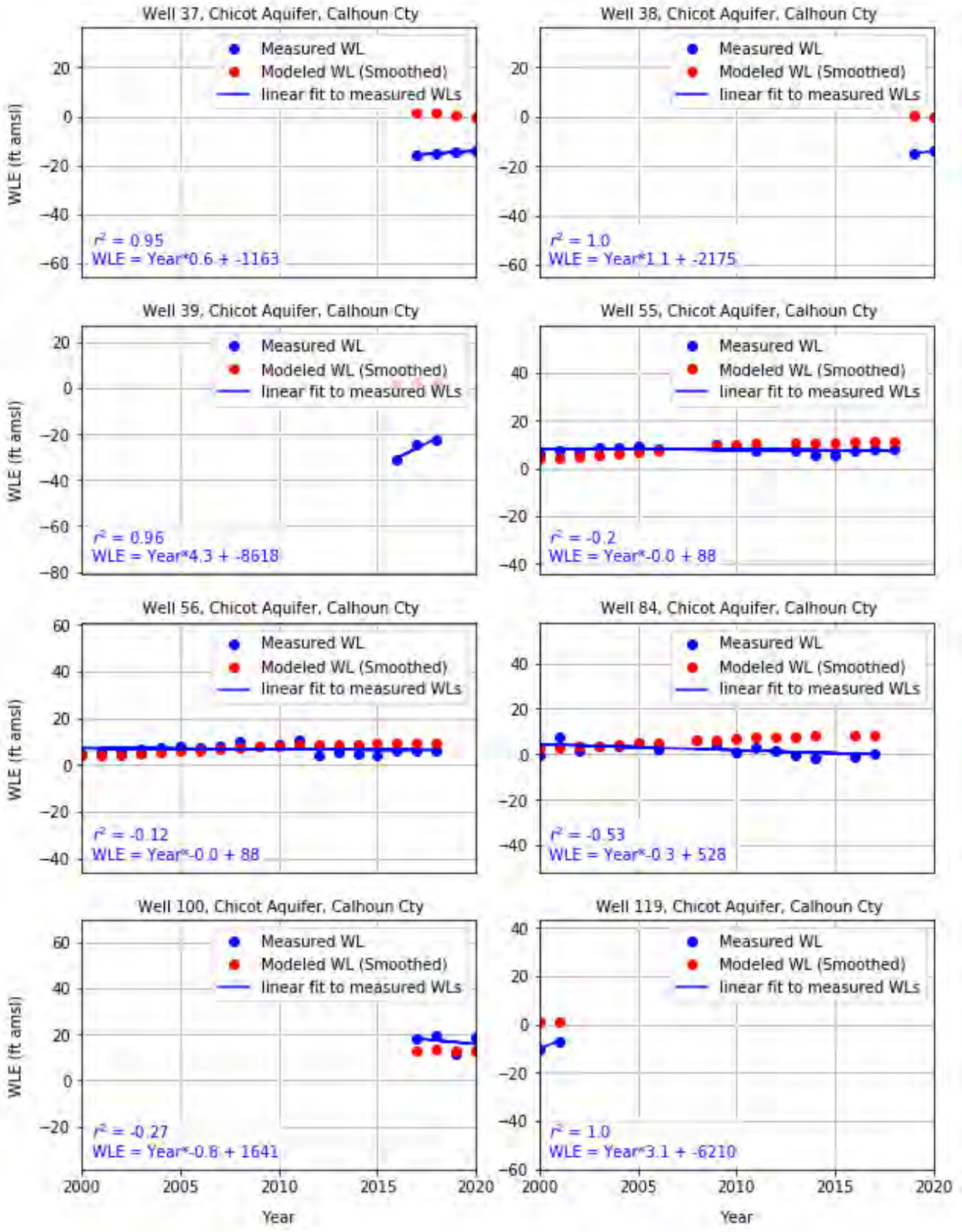
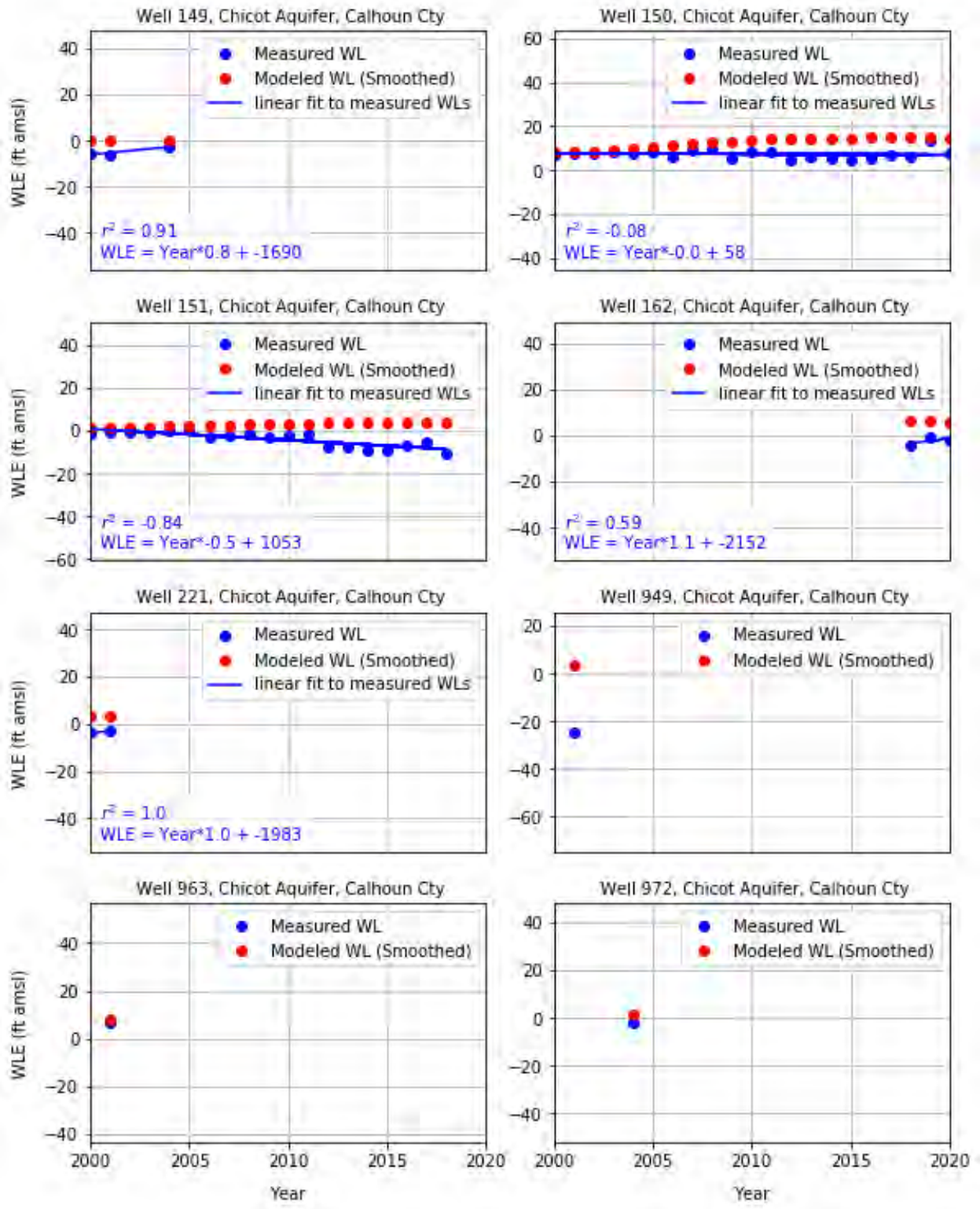


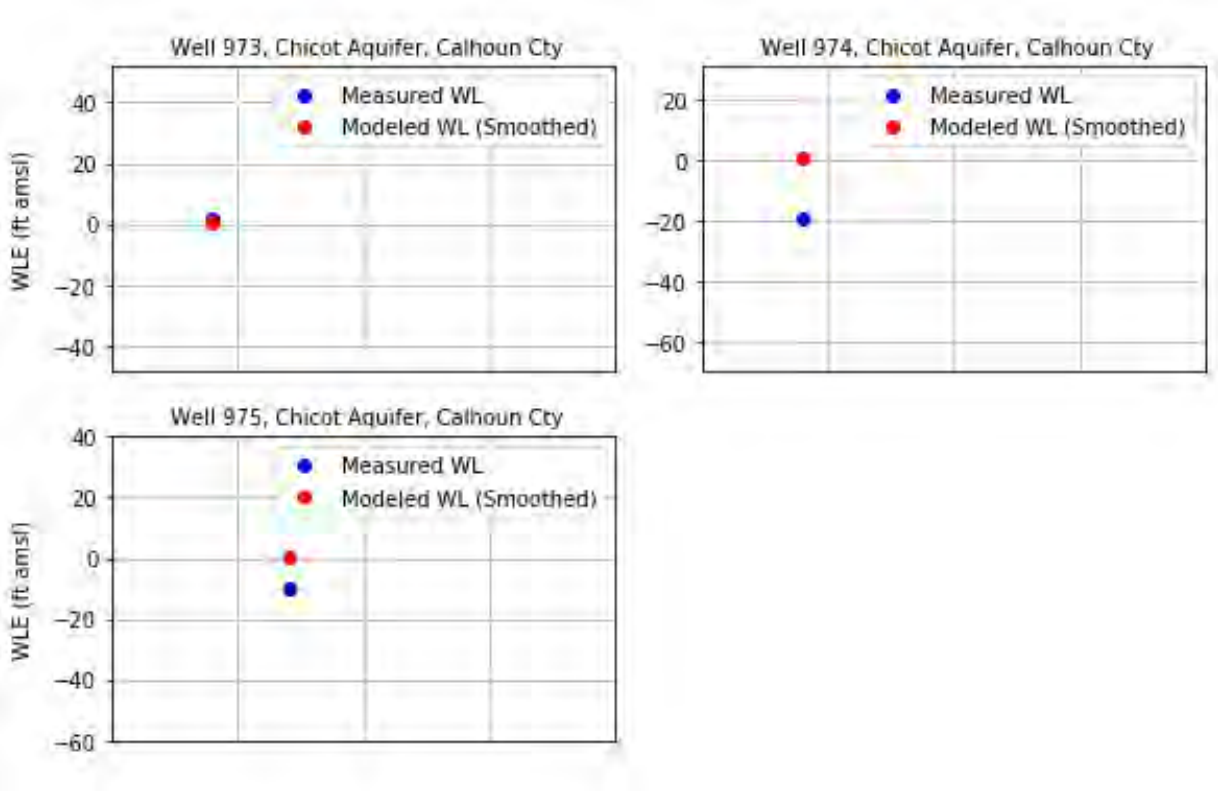
Figure E-24 Change in water level elevation in the Evangeline Aquifer across Victoria County for 2010-2015 and for 2015-2020

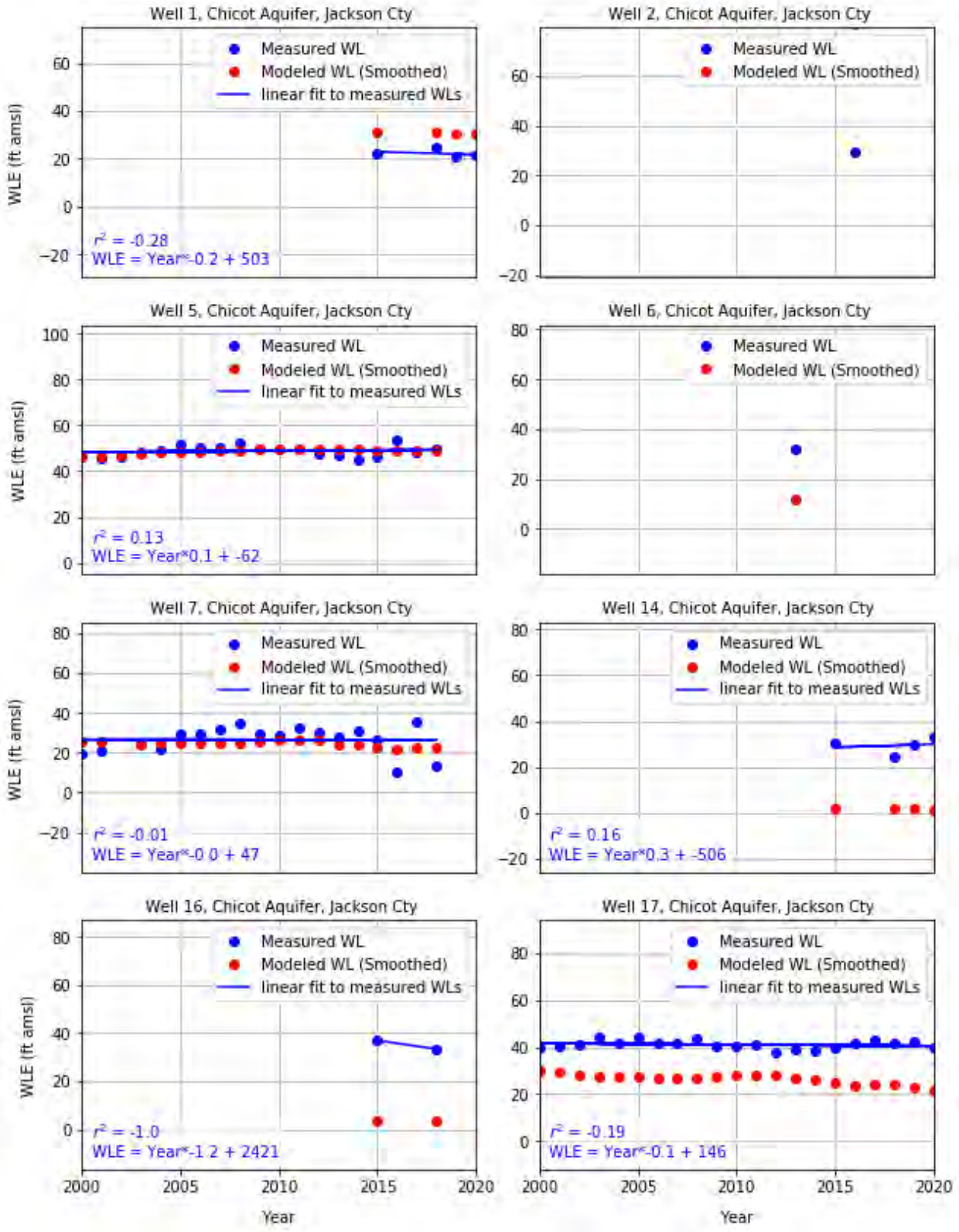
APPENDIX F
WELL HYDROGRAPHS FOR THE CHICOT AQUIFER IN CALHOUN, JACKSON, REFUGIO, AND VICTORIA COUNTIES

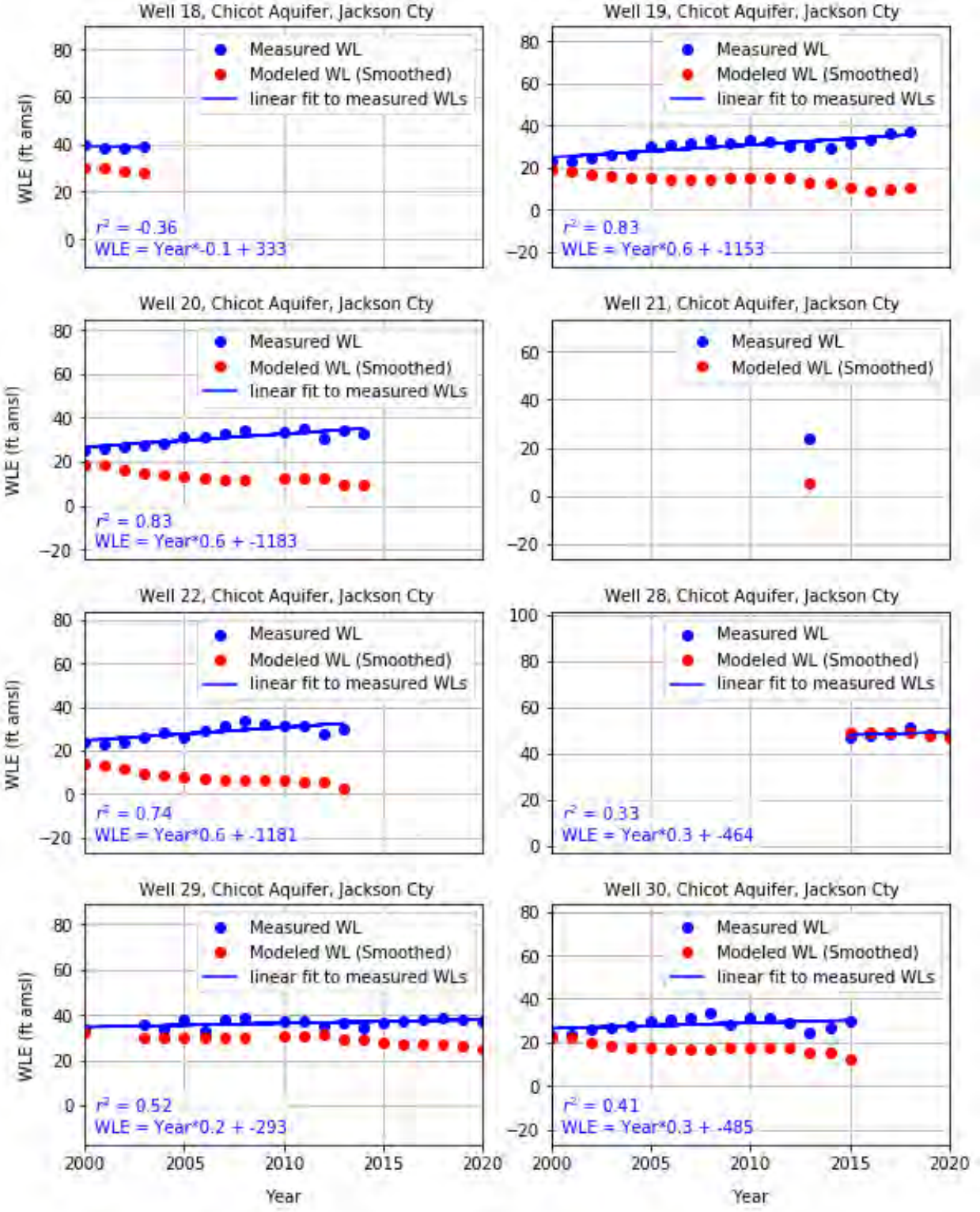

Well 37, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.95
WLE = Year*0.6 + -1163
Well 38, Chicot Aquifer, Calhoun Cty
r² = 1.0
WLE = Year*1.1 + -2175
Well 39, Chicot Aquifer, Calhoun Cty
r² = 0.96
WLE = Year*4.3 + -8618
Well 55, Chicot Aquifer, Calhoun Cty
r² = -0.2
WLE = Year*-0.0 + 88
Well 56, Chicot Aquifer, Calhoun Cty
r² = -0.12
WLE = Year*-0.0 + 88
Well 84, Chicot Aquifer, Calhoun Cty
r² = -0.53
WLE = Year*-0.3 + 528
Well 100, Chicot Aquifer, Calhoun Cty
r² = -0.27
WLE = Year*-0.8 + 1641
Well 119, Chicot Aquifer, Calhoun Cty
r² = 1.0
WLE = Year*3.1 + -6210
WLE (ft amsl)
Year

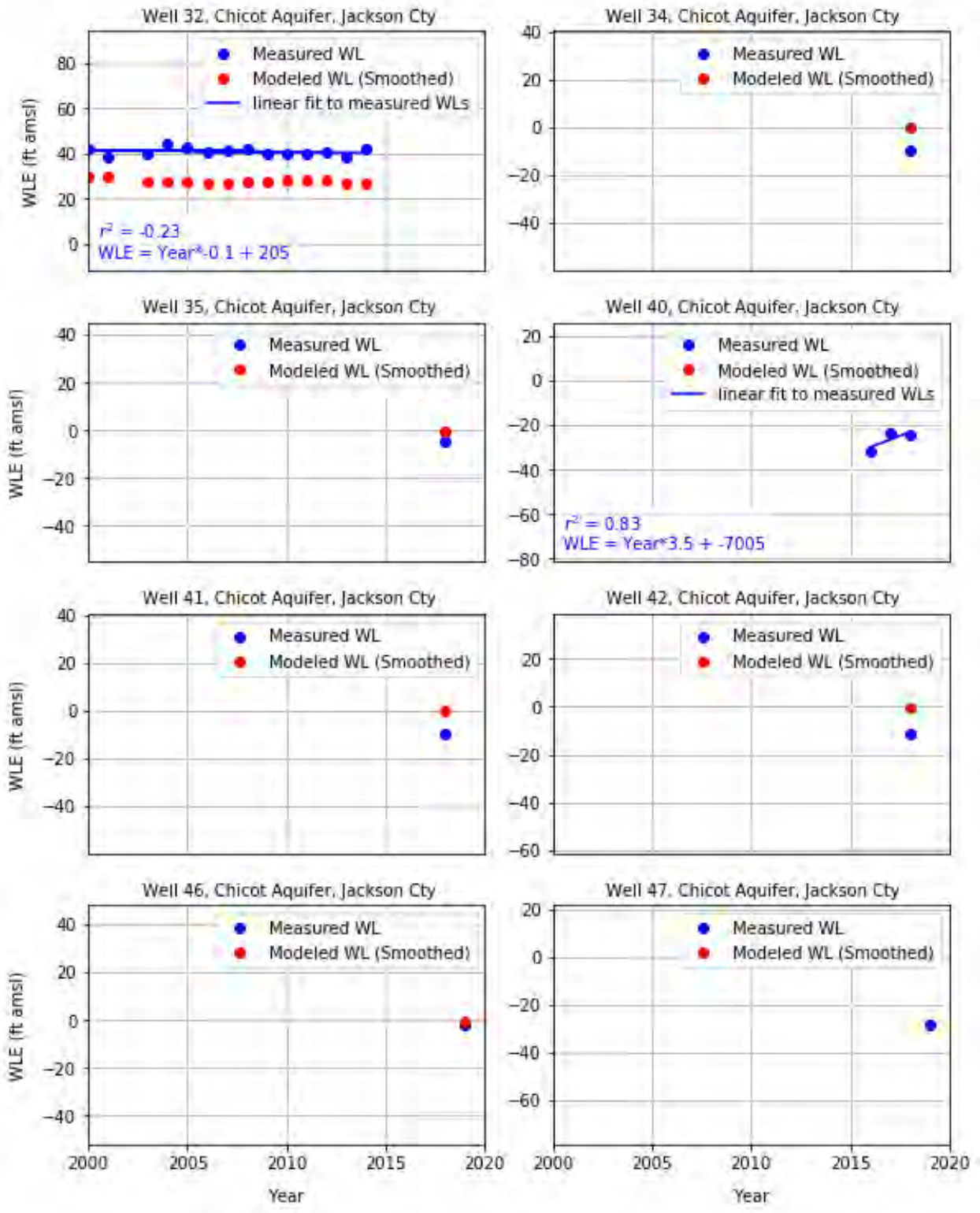

Well 149, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 0.91
WLE = Year*0.8 + -1690
Well 150, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = -0.08
WLE = Year*-0.0 + 58
Well 151, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = -0.84
WLE = Year*-0.5 + 1053
Well 162, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 0.59
WLE = Year*1.1 + -2152
Well 221, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 1.0
WLE = Year*1.0 + -1983
Well 949, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
Well 963, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
Well 972, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Year

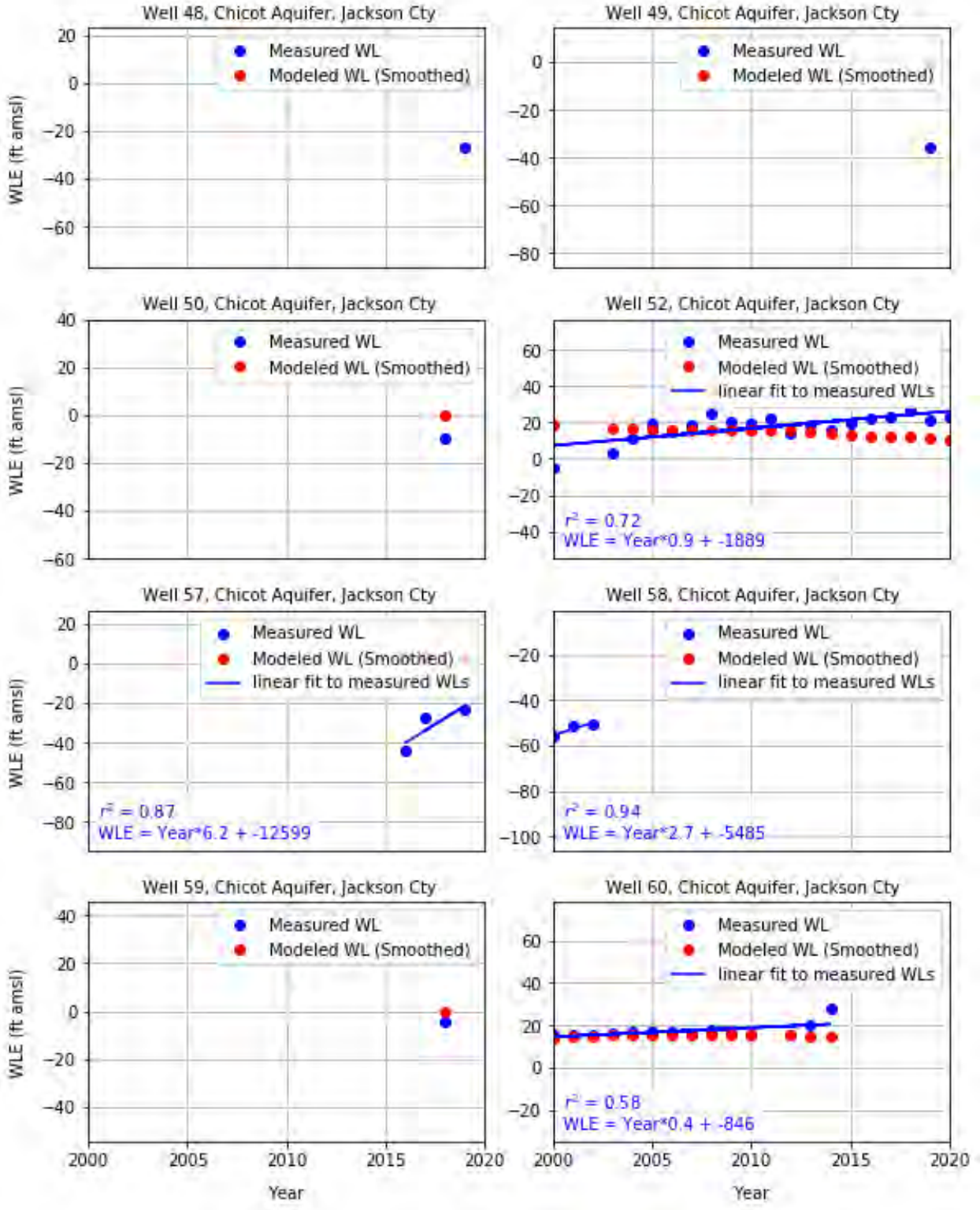
F-3

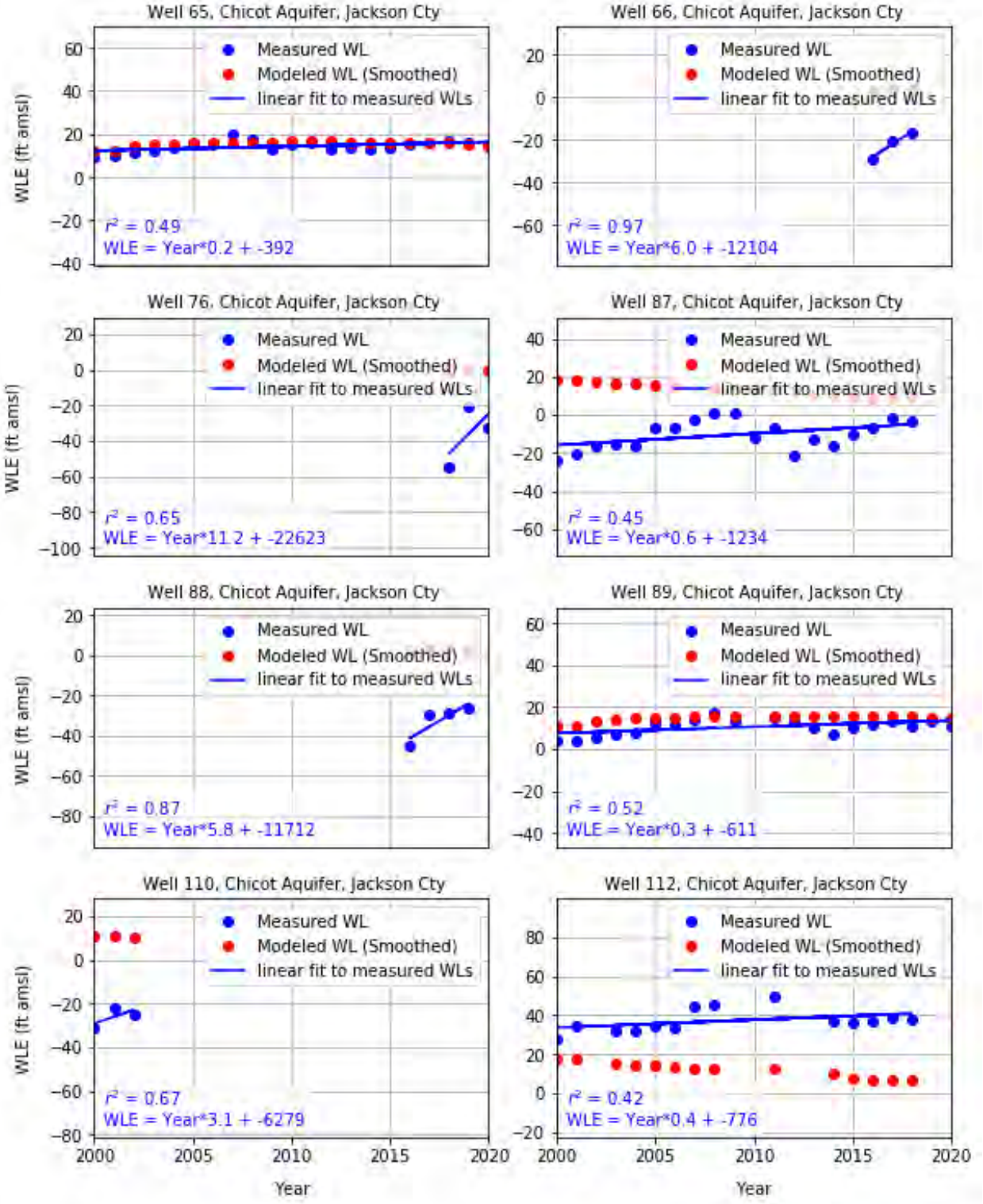

Well 973, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
40
20
0
−20
−40
Well 974, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
20
0
−20
−40
−60
Well 975, Chicot Aquifer, Calhoun Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
40
20
0
−20
−40
−60

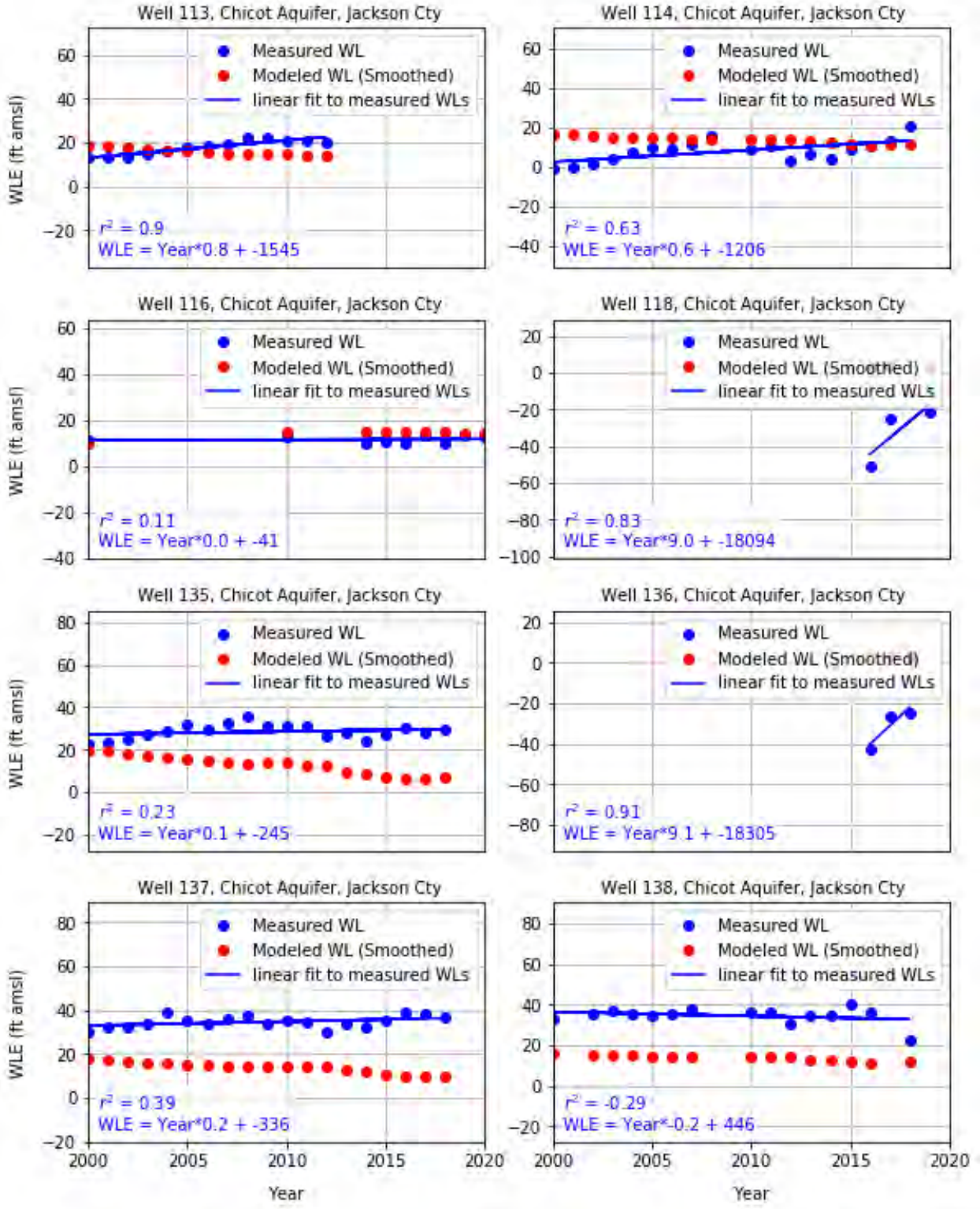

Well 1, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
WLE (ft amsl)
r² = -0.28
WLE = Year*-0.2 + 503
Well 2, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 5, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
WLE (ft amsl)
r² = 0.13
WLE = Year*0.1 + -62
Well 6, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 7, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
WLE (ft amsl)
r² = -0.01
WLE = Year*-0.0 + 47
Well 14, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.16
WLE = Year*0.3 + -506
Well 16, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
WLE (ft amsl)
r² = -1.0
WLE = Year*-1.2 + 2421
Year
Well 17, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.19
WLE = Year*-0.1 + 146
Year

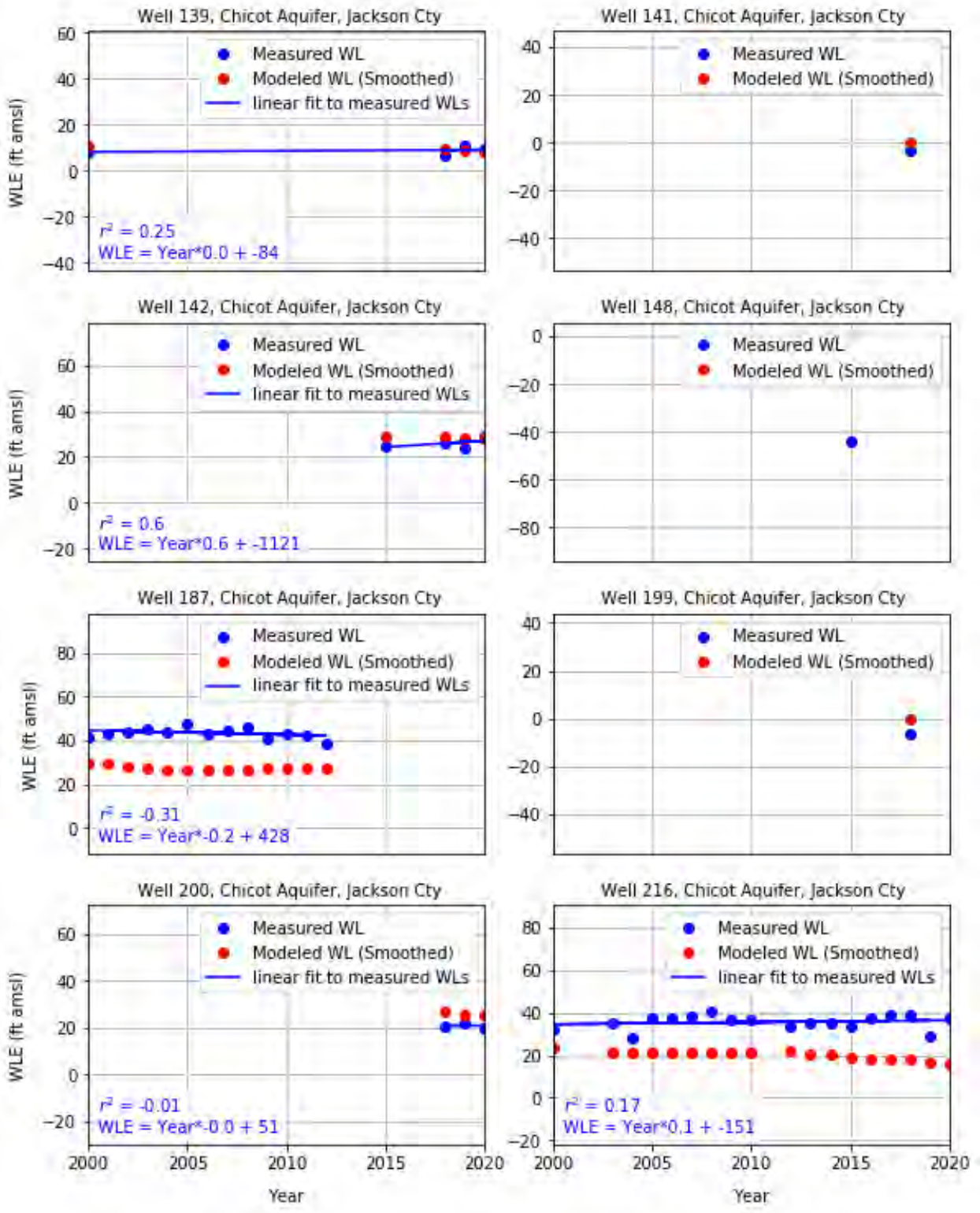

Well 18, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = -0.36
WLE = Year*-0.1 + 333
Well 19, Chicot Aquifer, Jackson Cty
r^2 = 0.83
WLE = Year*0.6 + -1153
Well 20, Chicot Aquifer, Jackson Cty
r^2 = 0.83
WLE = Year*0.6 + -1183
Well 21, Chicot Aquifer, Jackson Cty
Well 22, Chicot Aquifer, Jackson Cty
r^2 = 0.74
WLE = Year*0.6 + -1181
Well 28, Chicot Aquifer, Jackson Cty
r^2 = 0.33
WLE = Year*0.3 + -464
Well 29, Chicot Aquifer, Jackson Cty
r^2 = 0.52
WLE = Year*0.2 + -293
Well 30, Chicot Aquifer, Jackson Cty
r^2 = 0.41
WLE = Year*0.3 + -485
WLE (ft amsl)
Year

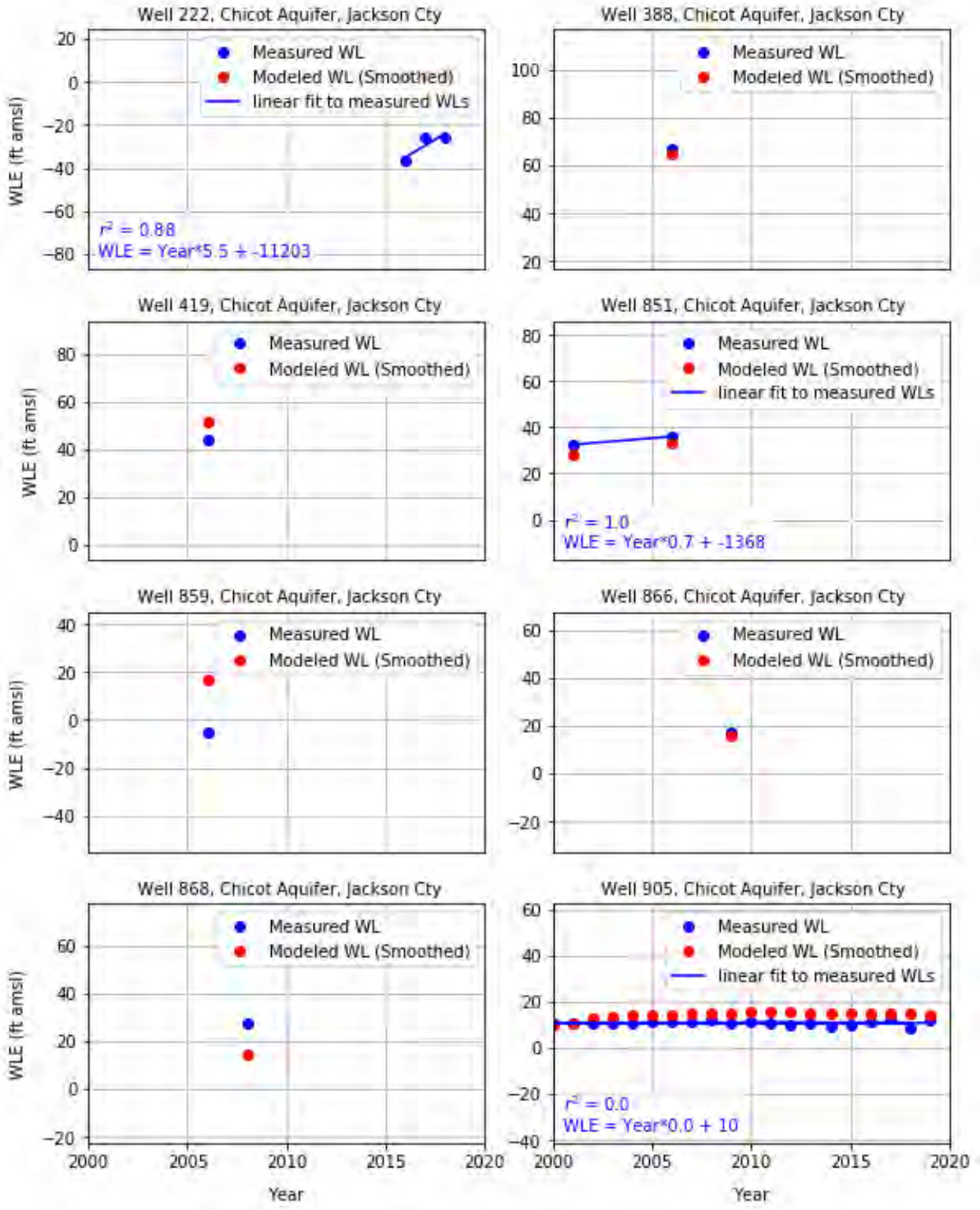

Well 32, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = -0.23
WLE = Year*-0.1 + 205
Well 34, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 35, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 40, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 0.83
WLE = Year*3.5 + -7005
Well 41, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 42, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 46, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 47, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Year

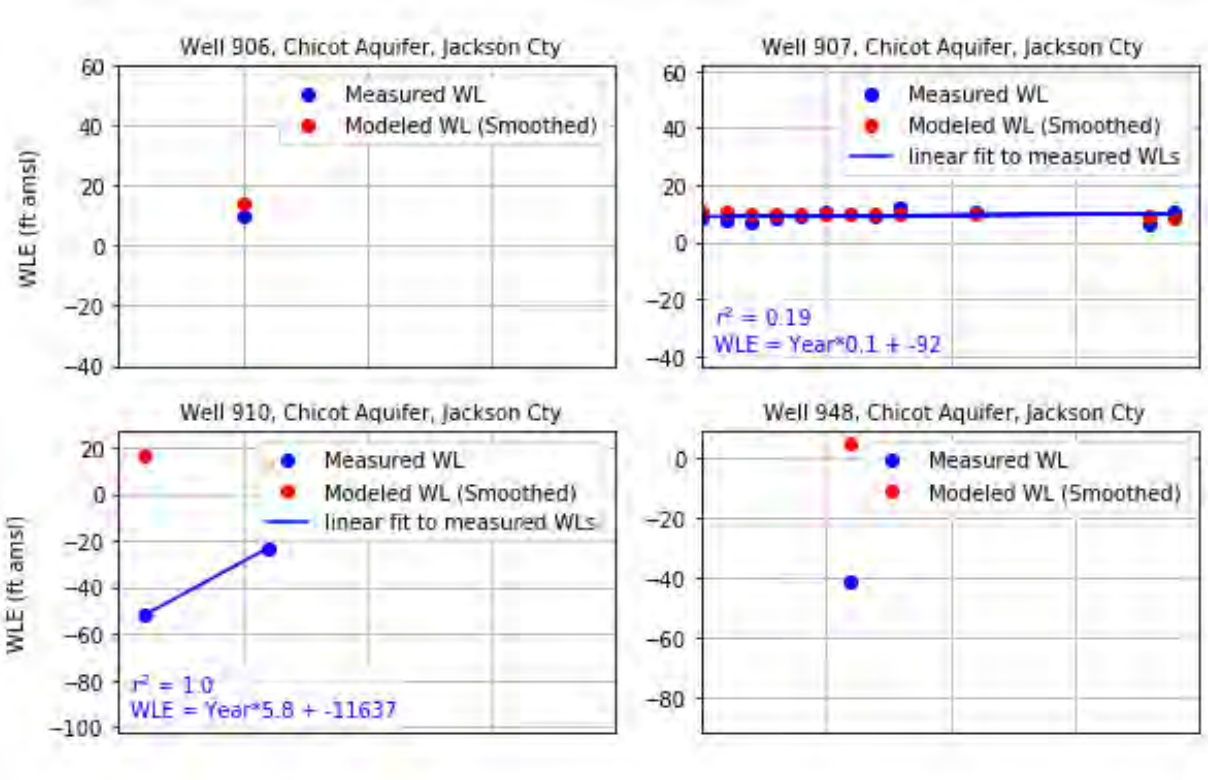

Well 48, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 49, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 50, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 52, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.72
WLE = Year*0.9 + -1889
Well 57, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.87
WLE = Year*6.2 + -12599
Well 58, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.94
WLE = Year*2.7 + -5485
Well 59, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 60, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.58
WLE = Year*0.4 + -846
WLE (ft amsl)
Year

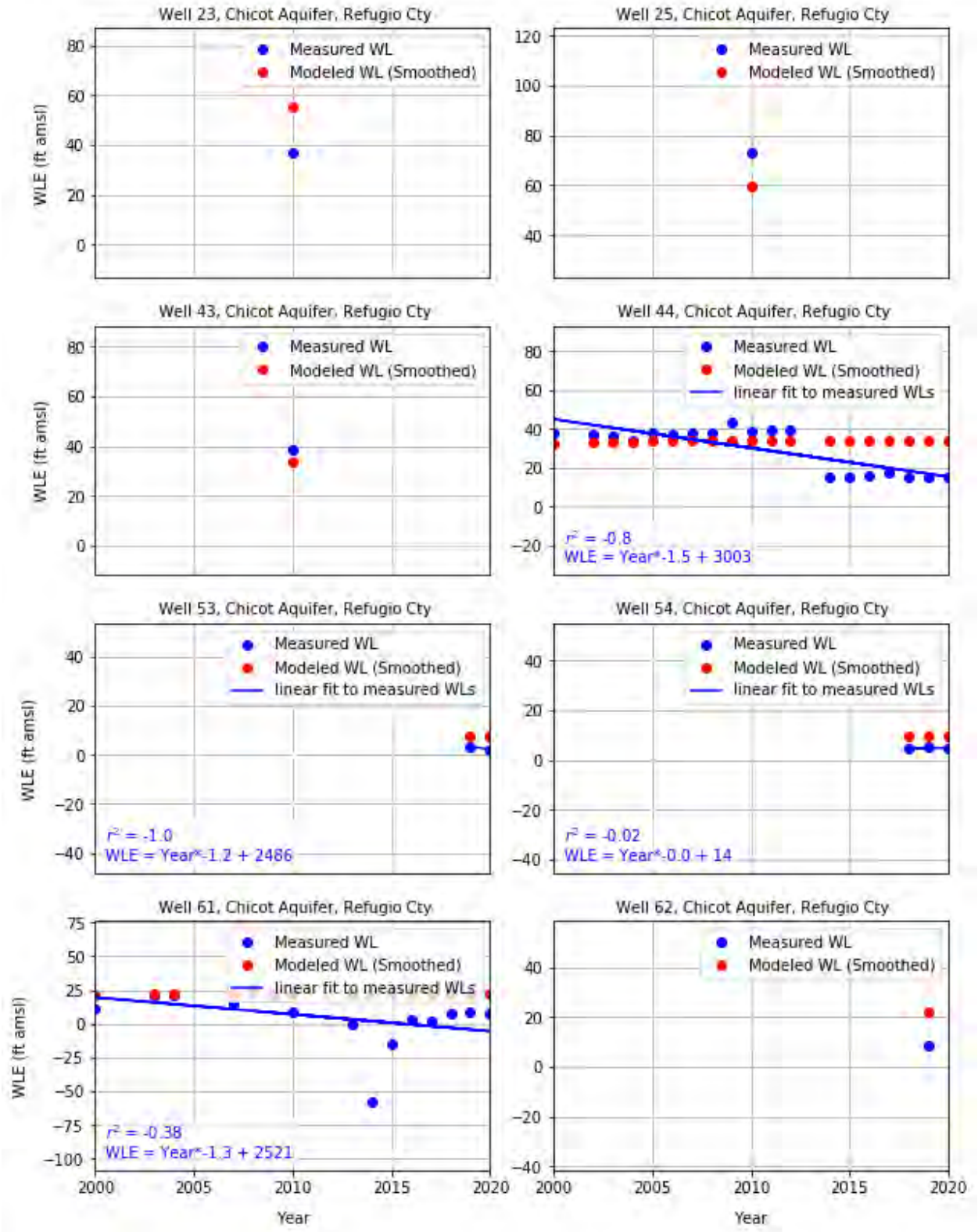

Well 65, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.49
WLE = Year*0.2 + -392
Well 66, Chicot Aquifer, Jackson Cty
r² = 0.97
WLE = Year*6.0 + -12104
Well 76, Chicot Aquifer, Jackson Cty
r² = 0.65
WLE = Year*11.2 + -22623
Well 87, Chicot Aquifer, Jackson Cty
r² = 0.45
WLE = Year*0.6 + -1234
Well 88, Chicot Aquifer, Jackson Cty
r² = 0.87
WLE = Year*5.8 + -11712
Well 89, Chicot Aquifer, Jackson Cty
r² = 0.52
WLE = Year*0.3 + -611
Well 110, Chicot Aquifer, Jackson Cty
r² = 0.67
WLE = Year*3.1 + -6279
Well 112, Chicot Aquifer, Jackson Cty
r² = 0.42
WLE = Year*0.4 + -776
WLE (ft amsl)
Year

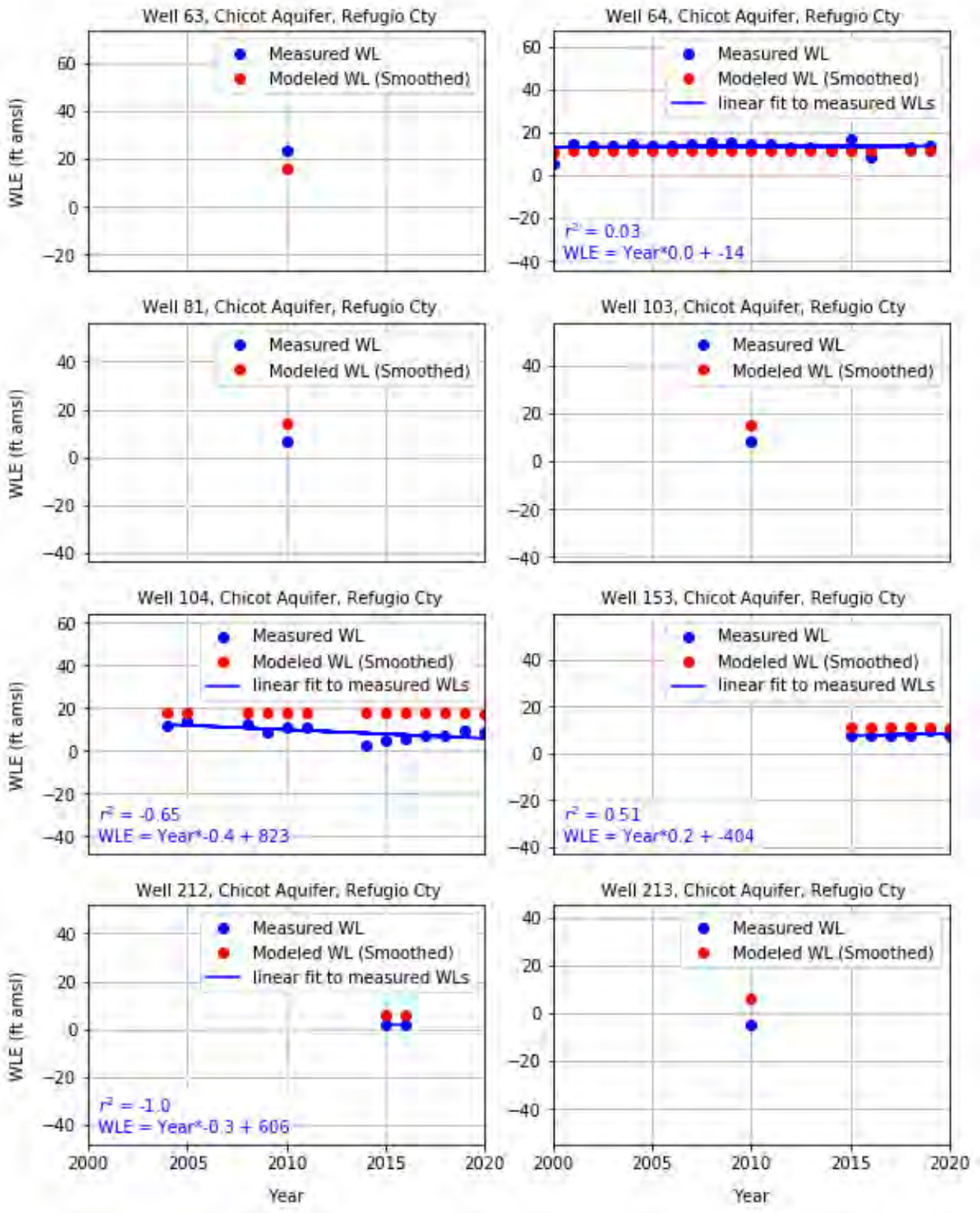

Well 113, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 0.9
WLE = Year*0.8 + -1545
Well 114, Chicot Aquifer, Jackson Cty
r^2 = 0.63
WLE = Year*0.6 + -1206
Well 116, Chicot Aquifer, Jackson Cty
r^2 = 0.11
WLE = Year*0.0 + -41
Well 118, Chicot Aquifer, Jackson Cty
r^2 = 0.83
WLE = Year*9.0 + -18094
Well 135, Chicot Aquifer, Jackson Cty
r^2 = 0.23
WLE = Year*0.1 + -245
Well 136, Chicot Aquifer, Jackson Cty
r^2 = 0.91
WLE = Year*9.1 + -18305
Well 137, Chicot Aquifer, Jackson Cty
r^2 = 0.39
WLE = Year*0.2 + -336
Well 138, Chicot Aquifer, Jackson Cty
r^2 = -0.29
WLE = Year*-0.2 + 446
WLE (ft amsl)
Year

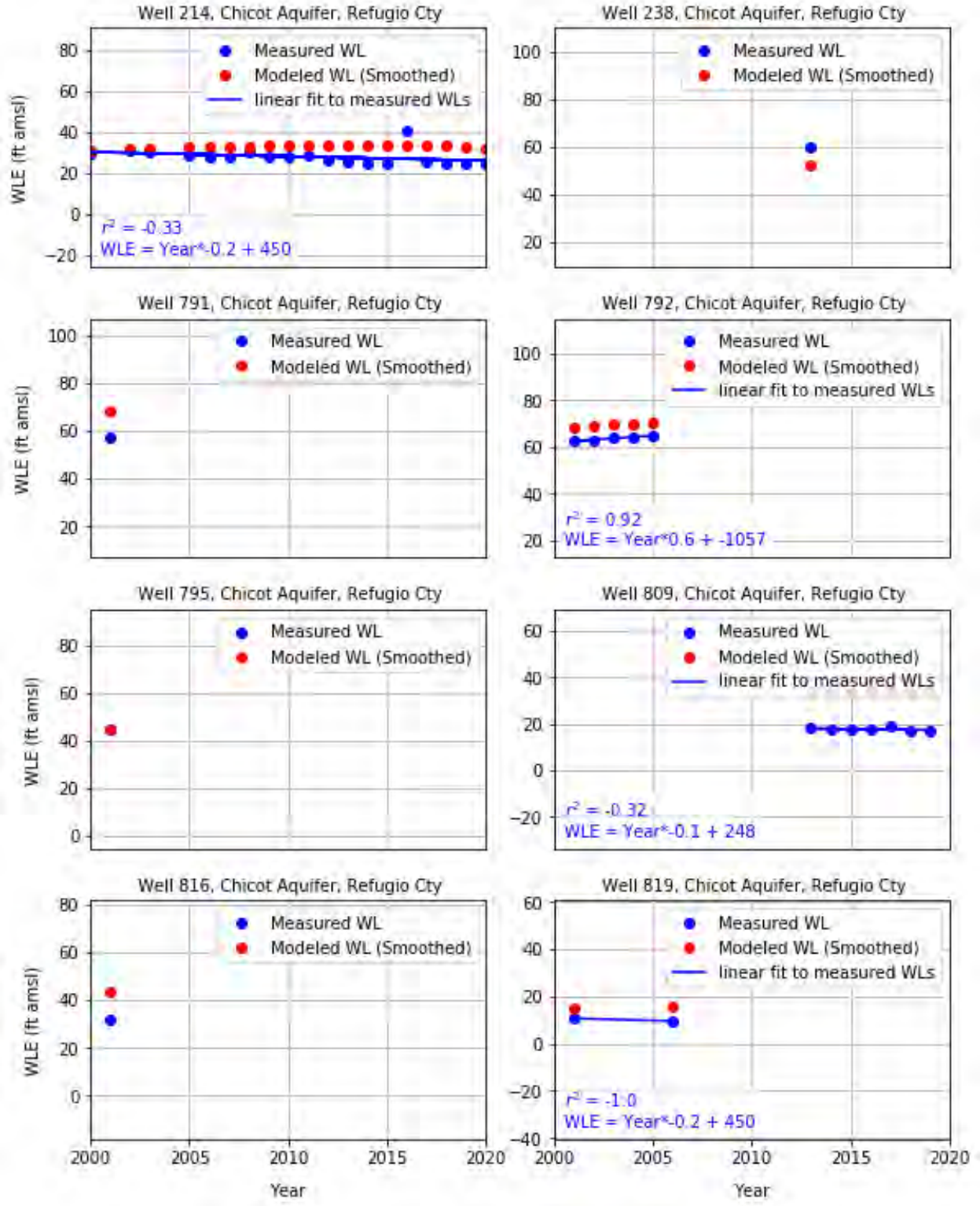

Well 139, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.25
WLE = Year*0.0 + -84
Well 141, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 142, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.6
WLE = Year*0.6 + -1121
Well 148, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 187, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.31
WLE = Year*-0.2 + 428
Well 199, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 200, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.01
WLE = Year*-0.0 + 51
Well 216, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.17
WLE = Year*0.1 + -151
WLE (ft amsl)
Year

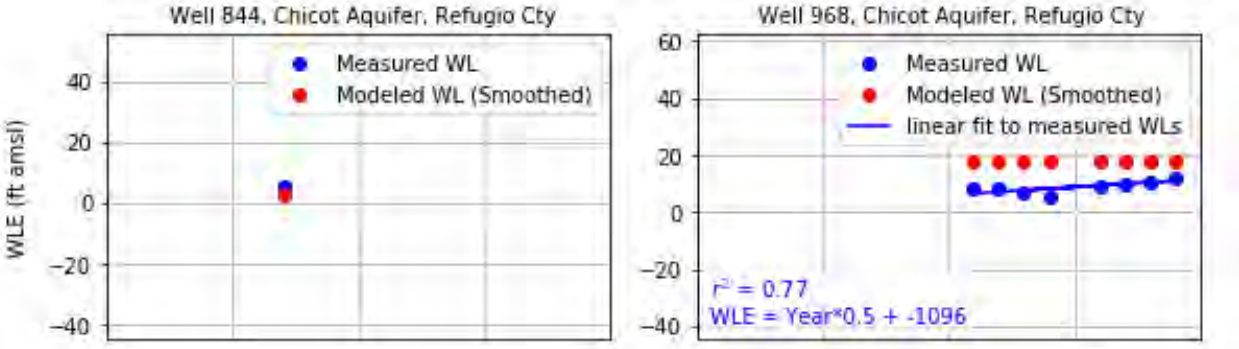

Well 222, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 0.88
WLE = Year*5.5 + -11203
Well 388, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 419, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 851, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 1.0
WLE = Year*0.7 + -1368
Well 859, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 866, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 868, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
Well 905, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 0.0
WLE = Year*0.0 + 10
WLE (ft amsl)
Year

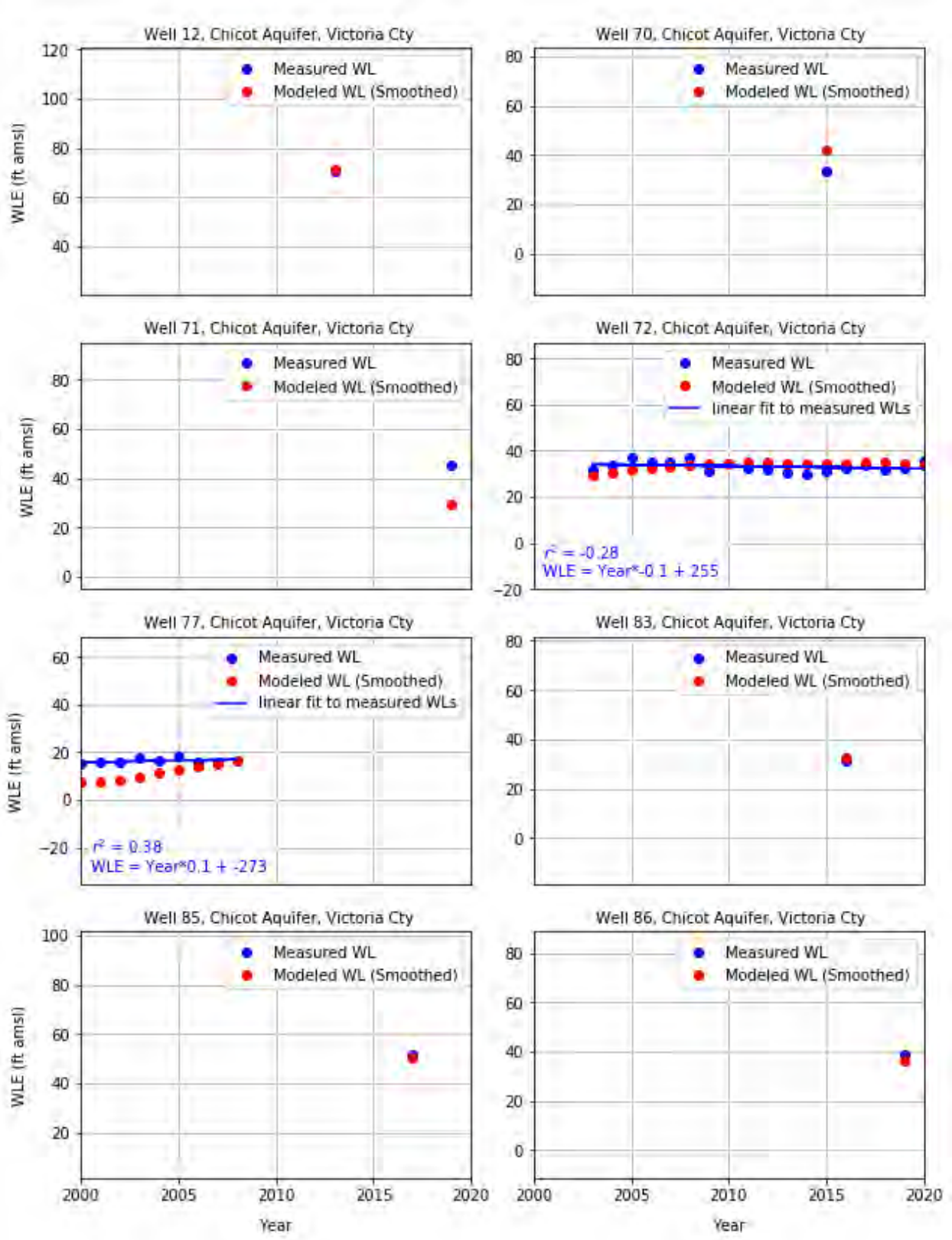

Well 906, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Well 907, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.19
WLE = Year*0.1 + -92
Well 910, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
WLE (ft amsl)
r² = 1.0
WLE = Year*5.8 + -11637
Well 948, Chicot Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)

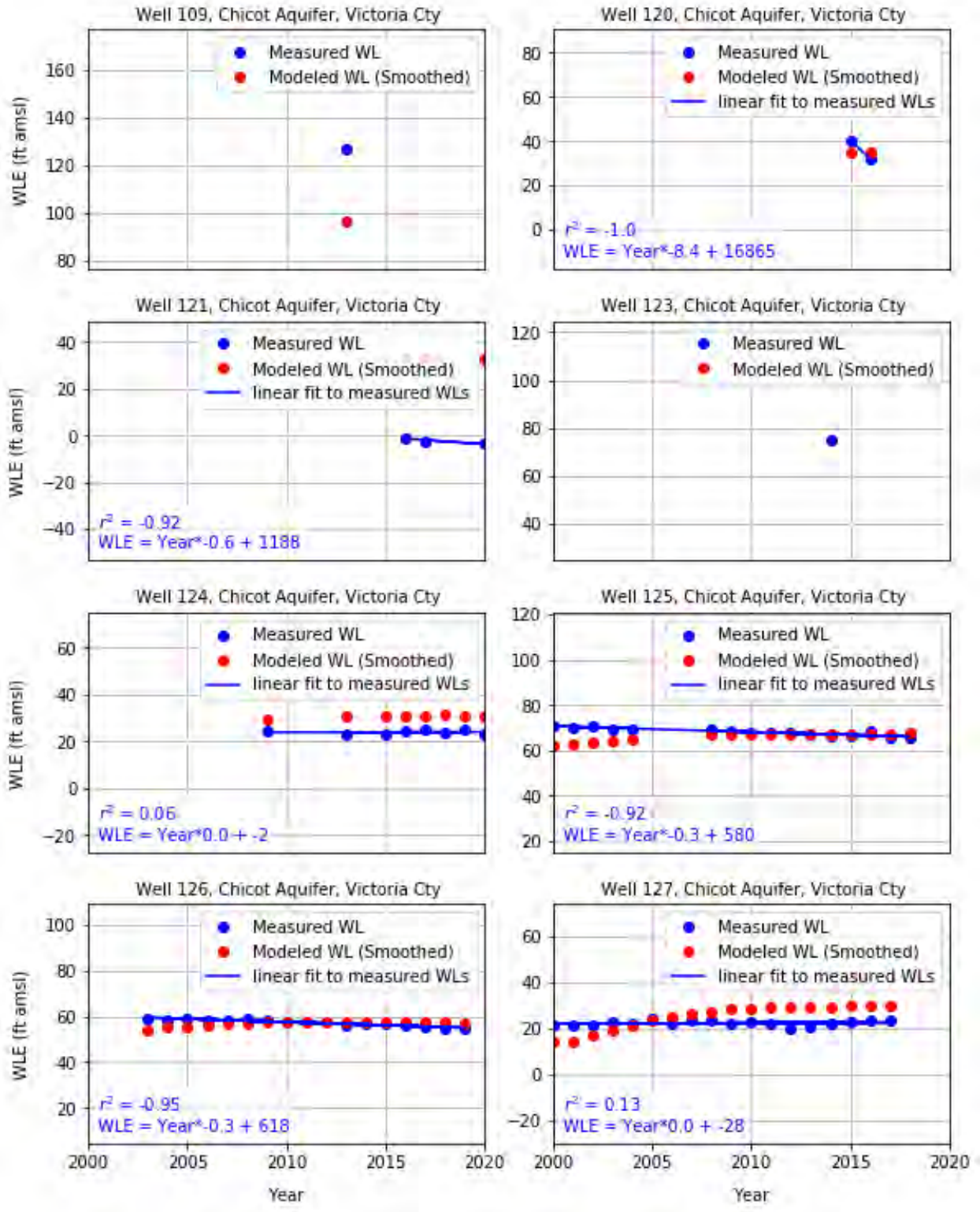

Well 23, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Well 25, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 43, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Well 44, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.8
WLE = Year*-1.5 + 3003
Well 53, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
WLE (ft amsl)
r² = -1.0
WLE = Year*-1.2 + 2486
Well 54, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.02
WLE = Year*-0.0 + 14
Well 61, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
WLE (ft amsl)
r² = -0.38
WLE = Year*-1.3 + 2521
Year
Well 62, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Year

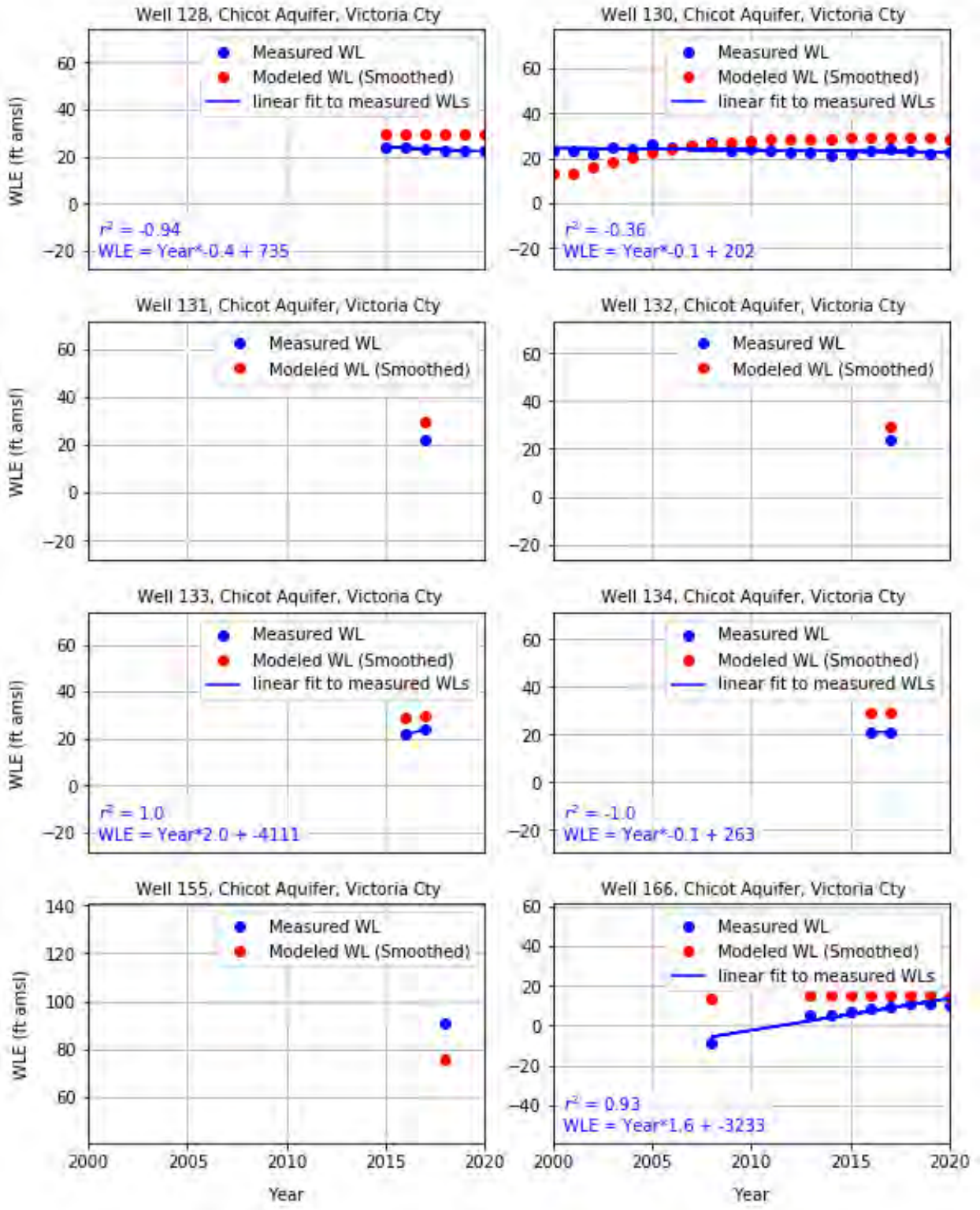

Well 63, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 64, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.03
WLE = Year*0.0 + -14
Well 81, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 103, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 104, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.65
WLE = Year*-0.4 + 823
Well 153, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.51
WLE = Year*0.2 + -404
Well 212, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -1.0
WLE = Year*-0.3 + 606
Well 213, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Year

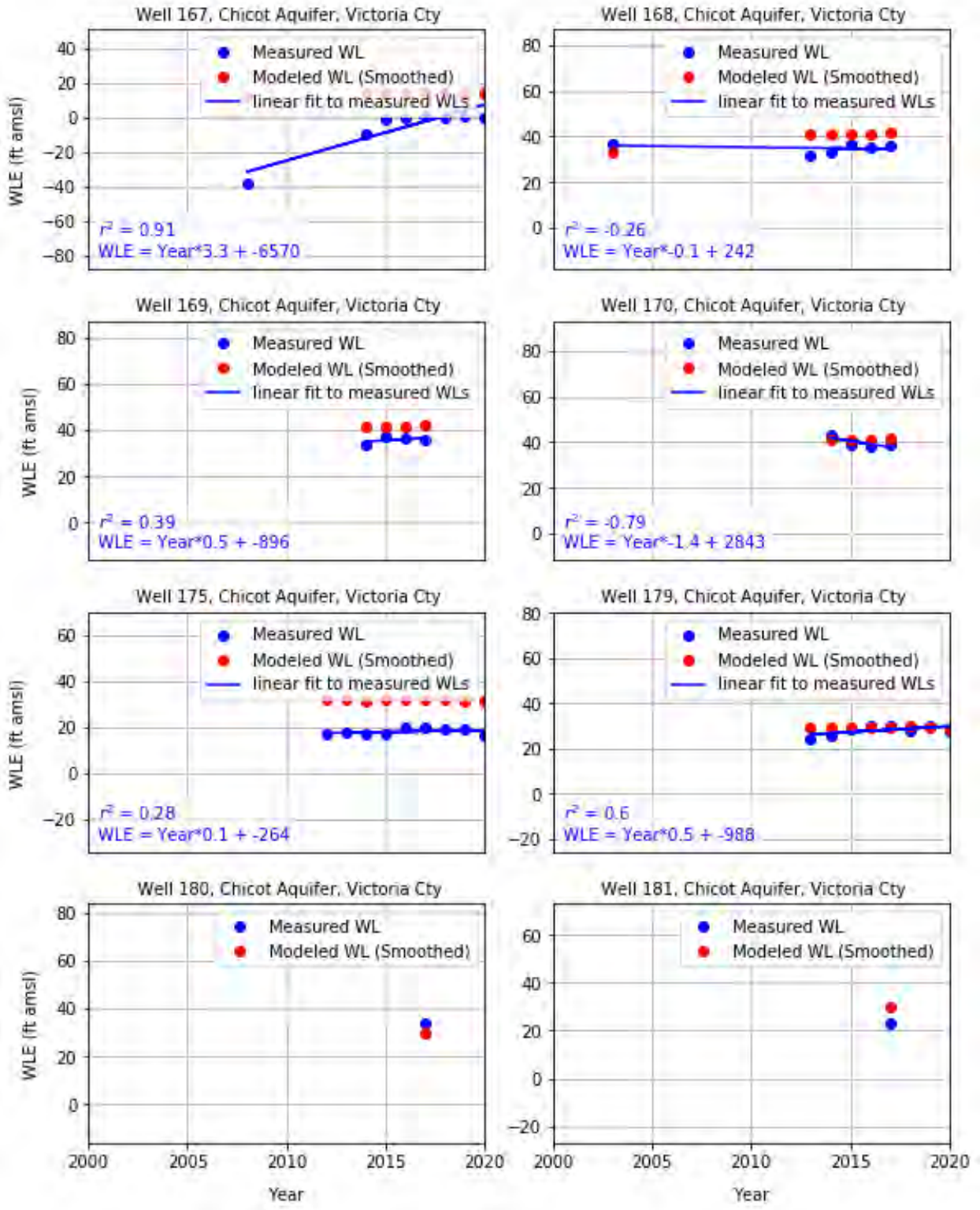

Well 214, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.33
WLE = Year*-0.2 + 450
Well 238, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 791, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 792, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.92
WLE = Year*0.6 + -1057
Well 795, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 809, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.32
WLE = Year*-0.1 + 248
Well 816, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 819, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -1.0
WLE = Year*-0.2 + 450
WLE (ft amsl)
Year

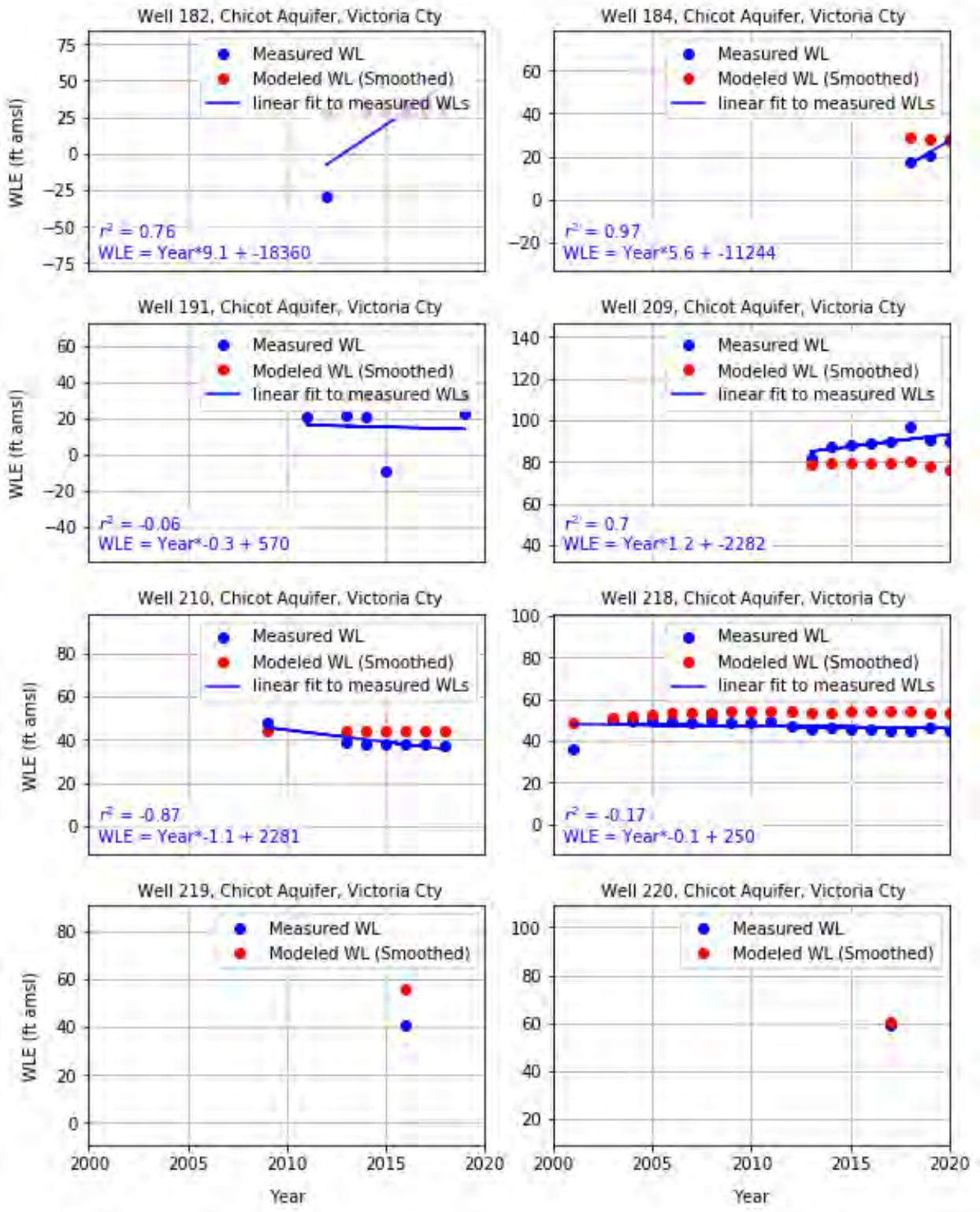

Well 844, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
40
20
0
−20
−40
Well 968, Chicot Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
60
40
20
0
−20
−40
r² = 0.77
WLE = Year*0.5 + -1096

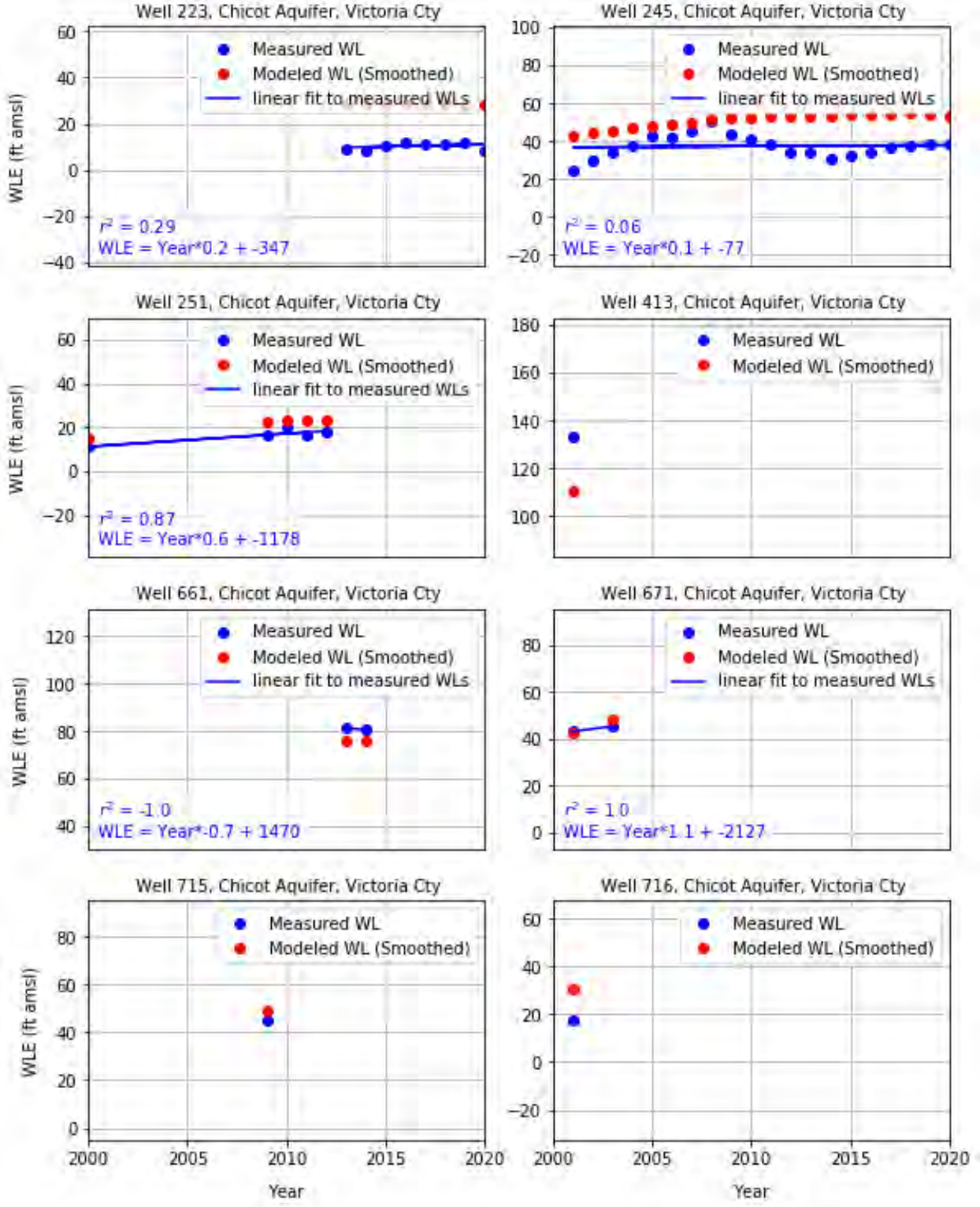

Well 12, Chicot Aquifer, Victoria Cty
Well 70, Chicot Aquifer, Victoria Cty
Well 71, Chicot Aquifer, Victoria Cty
Well 72, Chicot Aquifer, Victoria Cty
Well 77, Chicot Aquifer, Victoria Cty
Well 83, Chicot Aquifer, Victoria Cty
Well 85, Chicot Aquifer, Victoria Cty
Well 86, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
WLE (ft amsl)
Year
r² = -0.28
WLE = Year*-0.1 + 255
r² = 0.38
WLE = Year*0.1 + -273

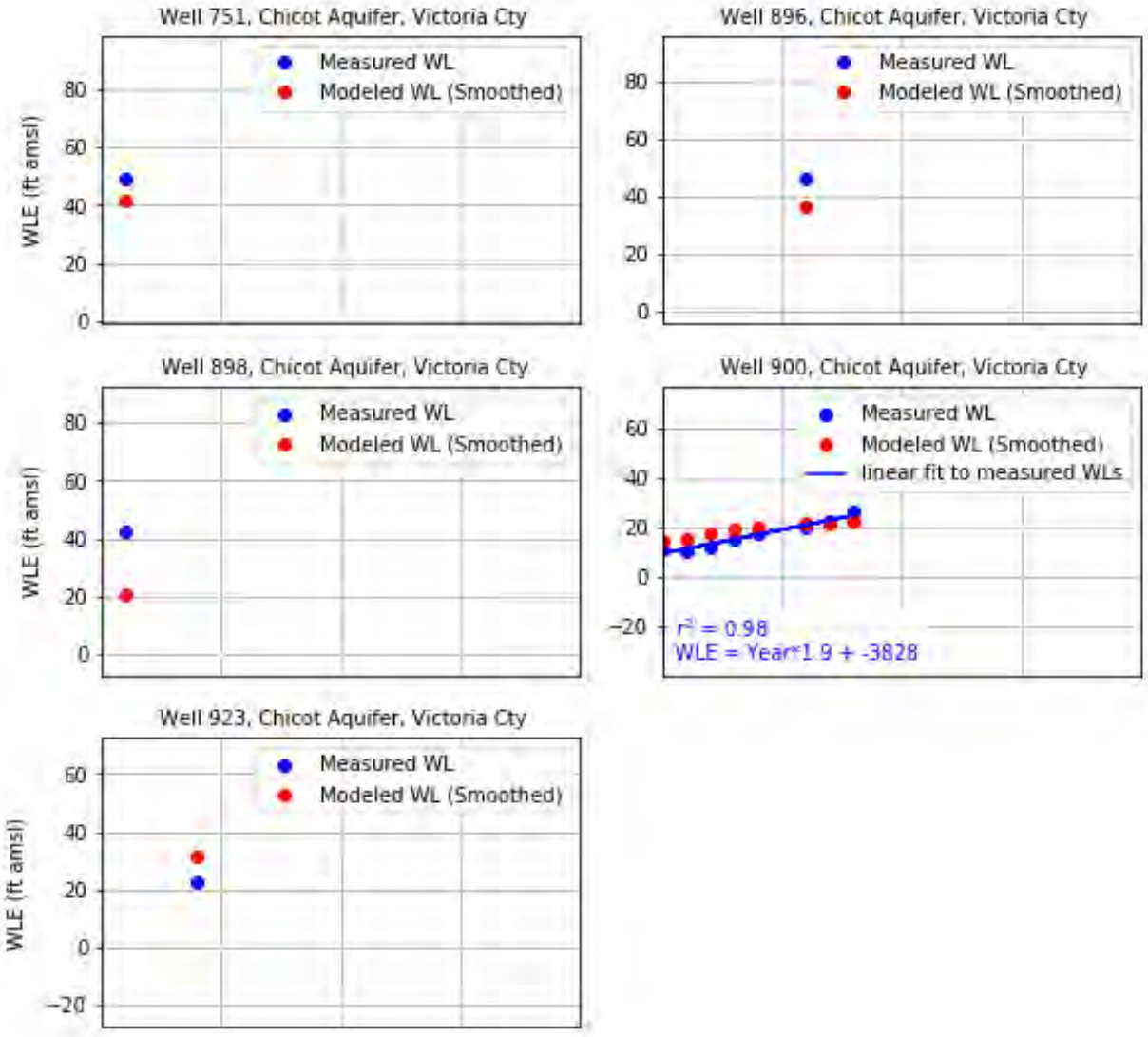

Well 109, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Well 120, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -1.0
WLE = Year*-8.4 + 16865
Well 121, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.92
WLE = Year*-0.6 + 1188
Well 123, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
Well 124, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.06
WLE = Year*0.0 + -2
Well 125, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.92
WLE = Year*-0.3 + 580
Well 126, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.95
WLE = Year*-0.3 + 618
Well 127, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.13
WLE = Year*0.0 + -28
Year
Year


Well 128, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = -0.94
WLE = Year*-0.4 + 735
Well 130, Chicot Aquifer, Victoria Cty
r^2 = -0.36
WLE = Year*-0.1 + 202
Well 131, Chicot Aquifer, Victoria Cty
Well 132, Chicot Aquifer, Victoria Cty
Well 133, Chicot Aquifer, Victoria Cty
r^2 = 1.0
WLE = Year*2.0 + -4111
Well 134, Chicot Aquifer, Victoria Cty
r^2 = -1.0
WLE = Year*-0.1 + 263
Well 155, Chicot Aquifer, Victoria Cty
Well 166, Chicot Aquifer, Victoria Cty
r^2 = 0.93
WLE = Year*1.6 + -3233
WLE (ft amsl)
Year

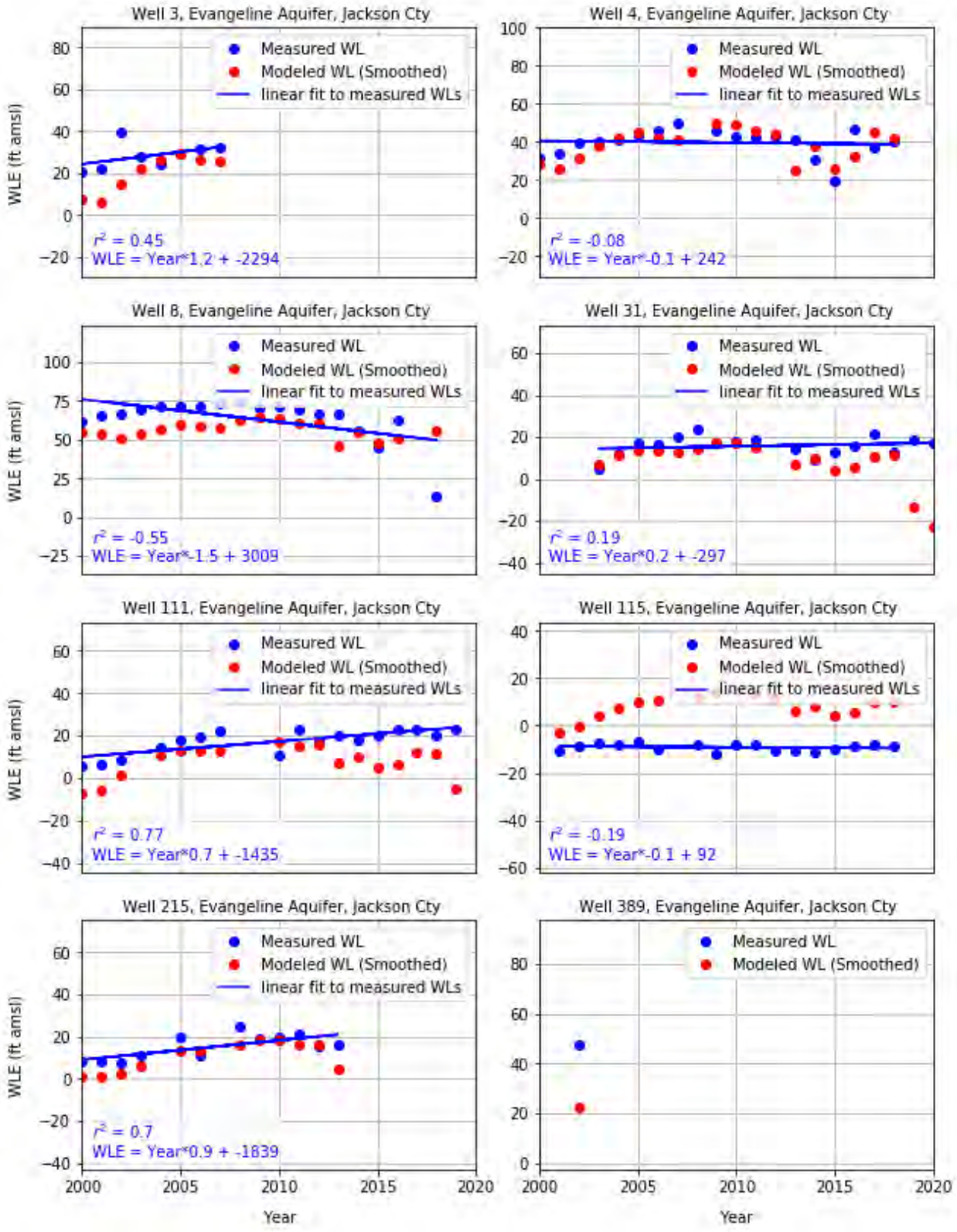

Well 167, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.91
WLE = Year*3.3 + -6570
Well 168, Chicot Aquifer, Victoria Cty
r² = -0.26
WLE = Year*-0.1 + 242
Well 169, Chicot Aquifer, Victoria Cty
r² = 0.39
WLE = Year*0.5 + -896
Well 170, Chicot Aquifer, Victoria Cty
r² = -0.79
WLE = Year*-1.4 + 2843
Well 175, Chicot Aquifer, Victoria Cty
r² = 0.28
WLE = Year*0.1 + -264
Well 179, Chicot Aquifer, Victoria Cty
r² = 0.6
WLE = Year*0.5 + -988
Well 180, Chicot Aquifer, Victoria Cty
Well 181, Chicot Aquifer, Victoria Cty
WLE (ft amsl)
Year

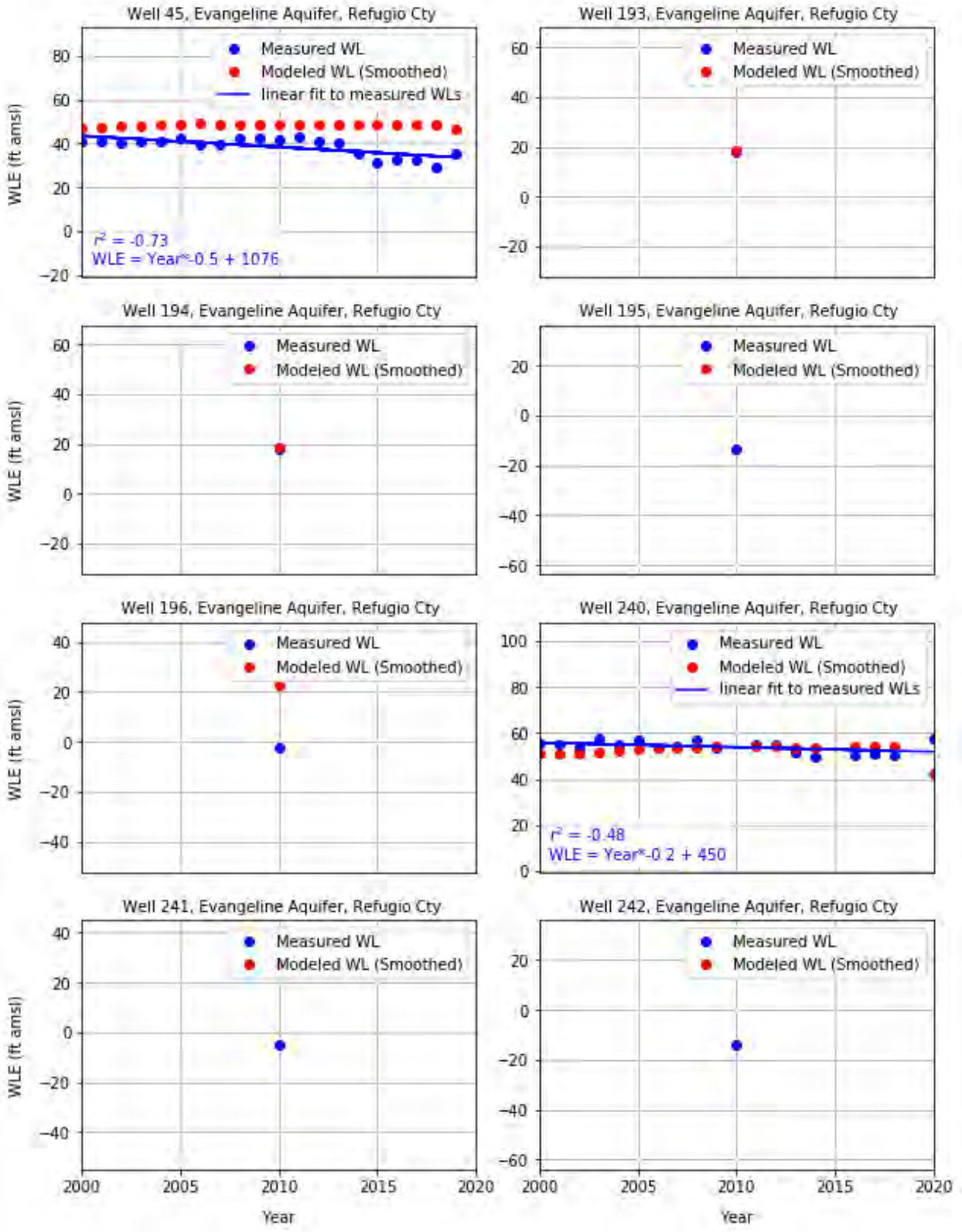

Well 182, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 0.76
WLE = Year*9.1 + -18360
Well 184, Chicot Aquifer, Victoria Cty
r^2 = 0.97
WLE = Year*5.6 + -11244
Well 191, Chicot Aquifer, Victoria Cty
r^2 = -0.06
WLE = Year*-0.3 + 570
Well 209, Chicot Aquifer, Victoria Cty
r^2 = 0.7
WLE = Year*1.2 + -2282
Well 210, Chicot Aquifer, Victoria Cty
r^2 = -0.87
WLE = Year*-1.1 + 2281
Well 218, Chicot Aquifer, Victoria Cty
r^2 = -0.17
WLE = Year*-0.1 + 250
Well 219, Chicot Aquifer, Victoria Cty
Well 220, Chicot Aquifer, Victoria Cty
WLE (ft amsl)
Year

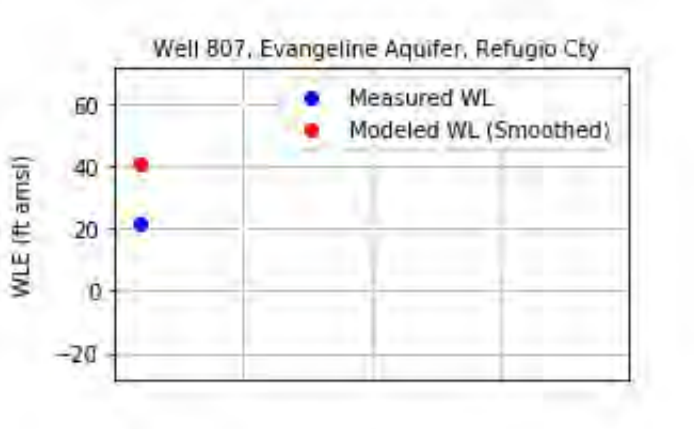

Well 223, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.29
WLE = Year*0.2 + -347
Well 245, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.06
WLE = Year*0.1 + -77
Well 251, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.87
WLE = Year*0.6 + -1178
Well 413, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
Well 661, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -1.0
WLE = Year*-0.7 + 1470
Well 671, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 1.0
WLE = Year*1.1 + -2127
Well 715, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
Well 716, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Year

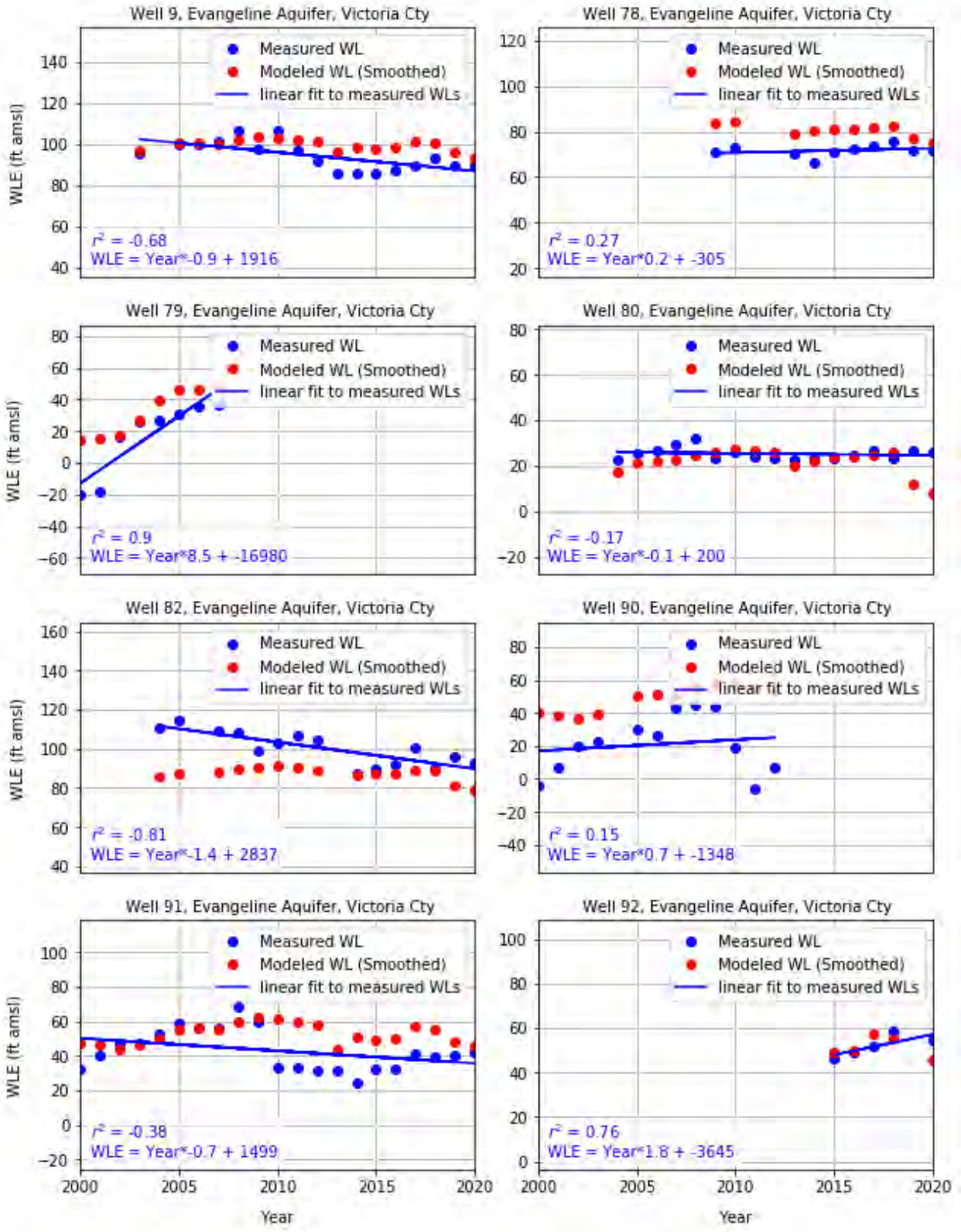

Well 751, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Well 896, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
Well 898, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Well 900, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.98
WLE = Year*1.9 + -3828
Well 923, Chicot Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)

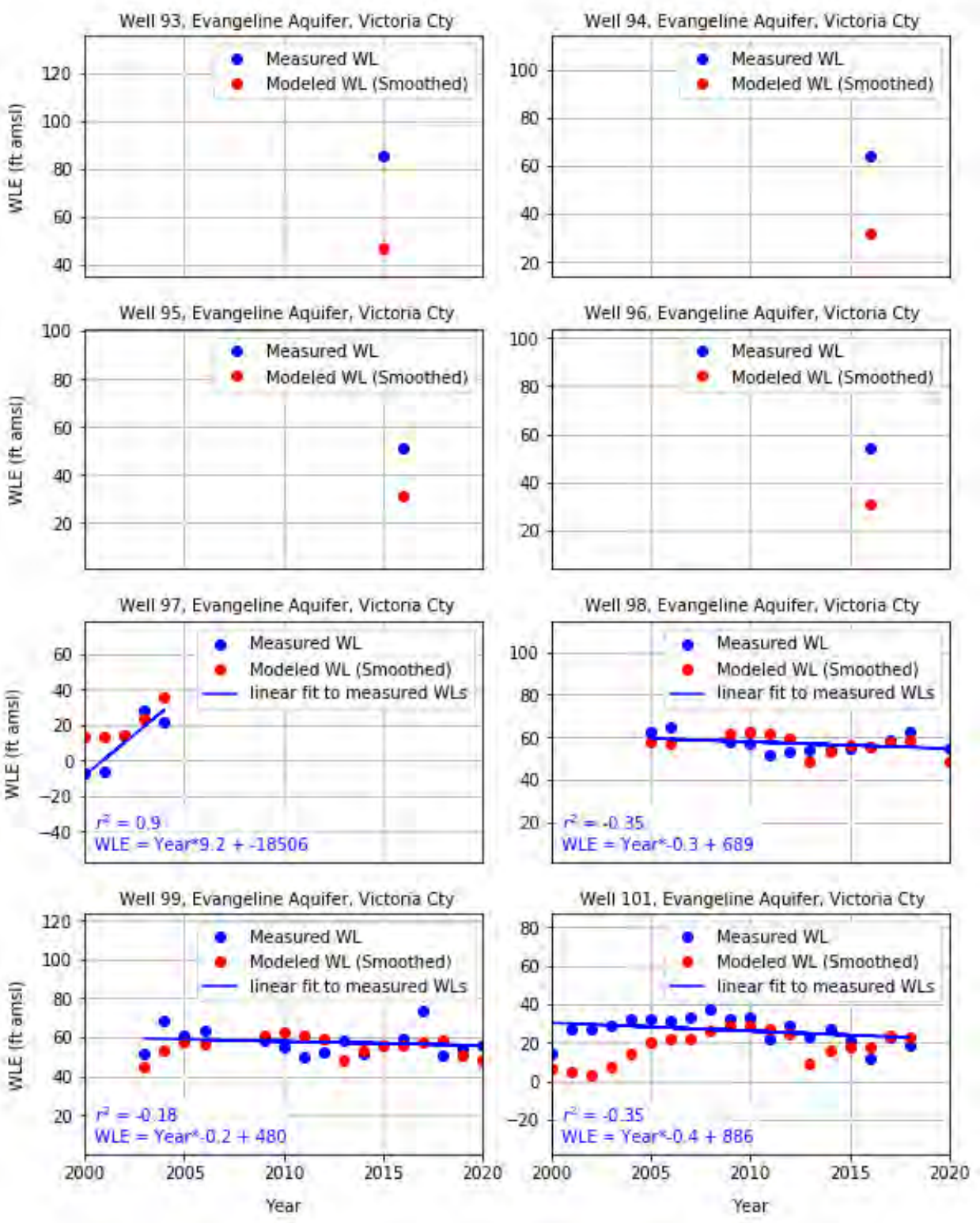
APPENDIX G
WELL HYDROGRAPHS FOR THE EVANGELINE AQUIFER IN CALHOUN, JACKSON, REFUGIO, AND VICTORIA COUNTIES

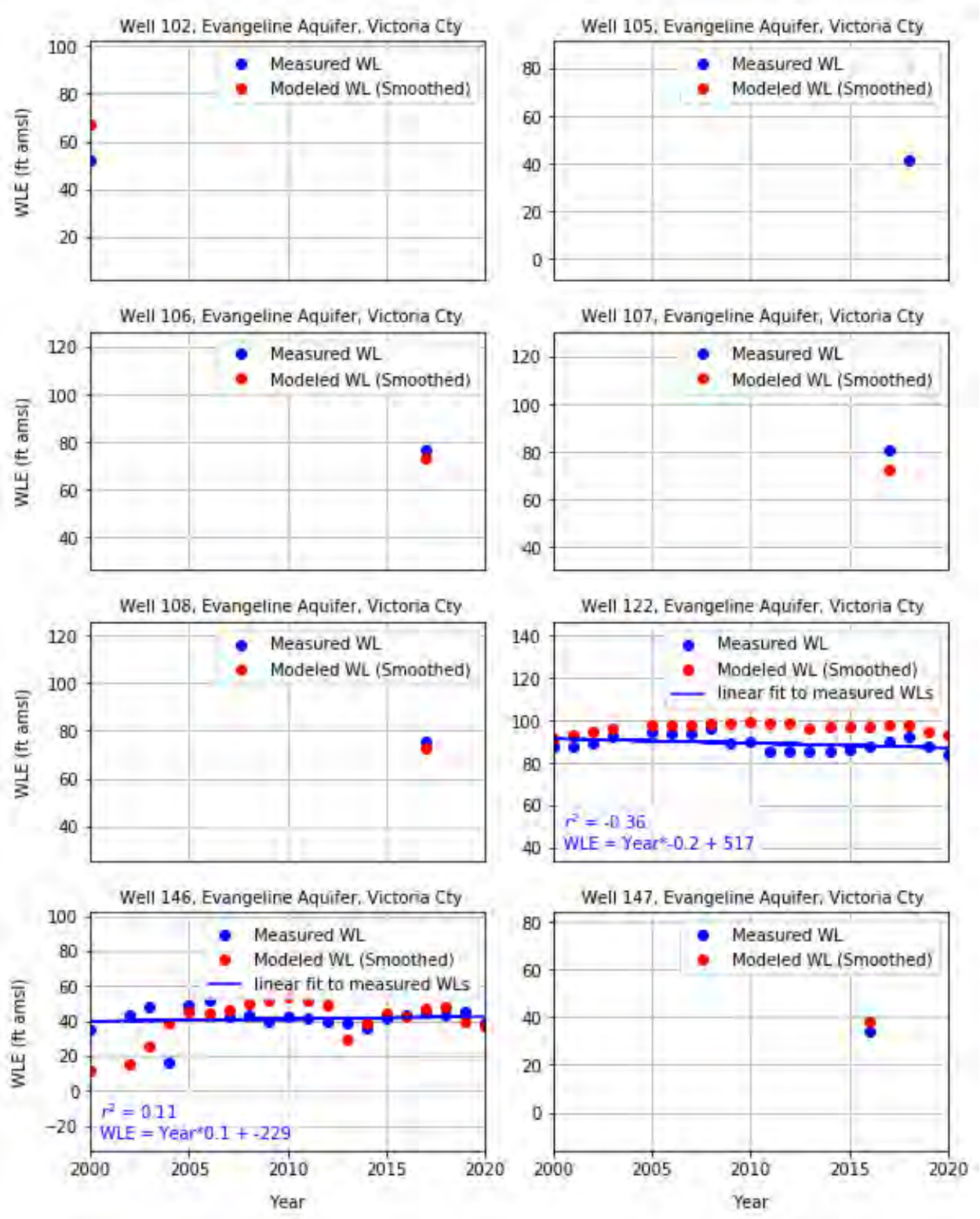

Well 3, Evangeline Aquifer, Jackson Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 0.45
WLE = Year*1.2 + -2294
Well 4, Evangeline Aquifer, Jackson Cty
r^2 = -0.08
WLE = Year*-0.1 + 242
Well 8, Evangeline Aquifer, Jackson Cty
r^2 = -0.55
WLE = Year*-1.5 + 3009
Well 31, Evangeline Aquifer, Jackson Cty
r^2 = 0.19
WLE = Year*0.2 + -297
Well 111, Evangeline Aquifer, Jackson Cty
r^2 = 0.77
WLE = Year*0.7 + -1435
Well 115, Evangeline Aquifer, Jackson Cty
r^2 = -0.19
WLE = Year*-0.1 + 92
Well 215, Evangeline Aquifer, Jackson Cty
r^2 = 0.7
WLE = Year*0.9 + -1839
Well 389, Evangeline Aquifer, Jackson Cty
WLE (ft amsl)
Year

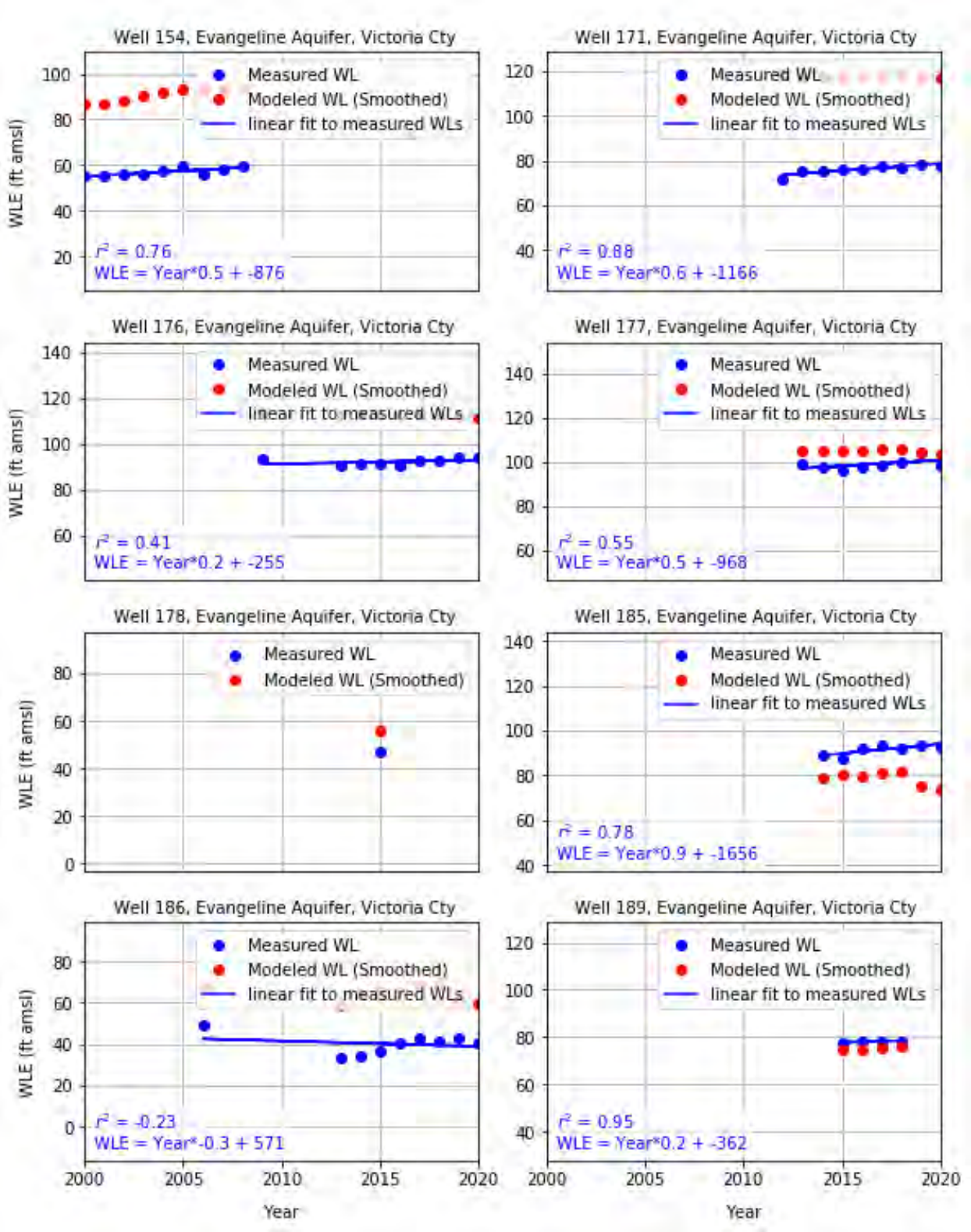

Well 45, Evangeline Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.73
WLE = Year*-0.5 + 1076
Well 193, Evangeline Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 194, Evangeline Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 195, Evangeline Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 196, Evangeline Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 240, Evangeline Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.48
WLE = Year*-0.2 + 450
Well 241, Evangeline Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
Well 242, Evangeline Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Year
2000
2005
2010
2015
2020

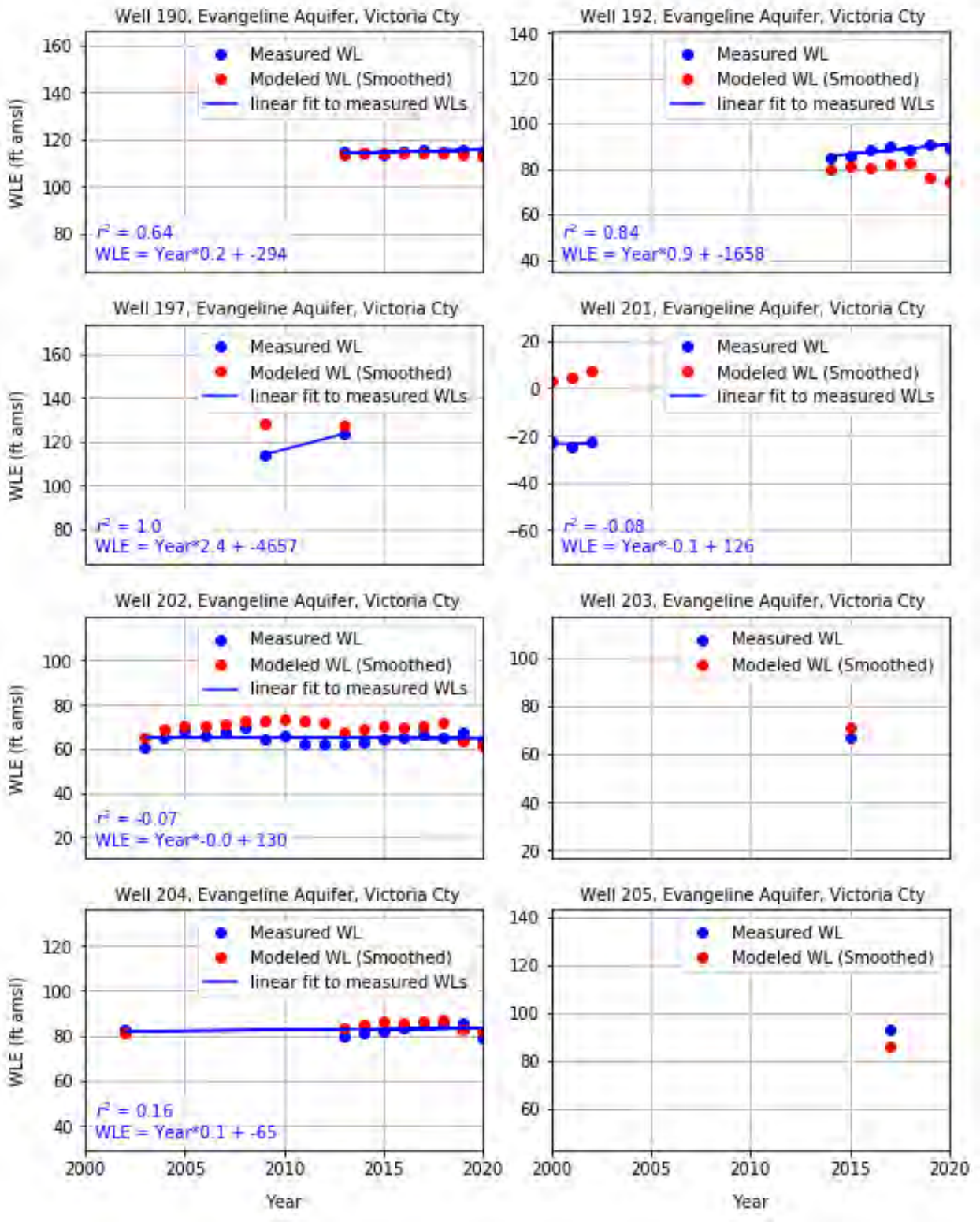

Well 807, Evangeline Aquifer, Refugio Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
60
40
20
0
-20

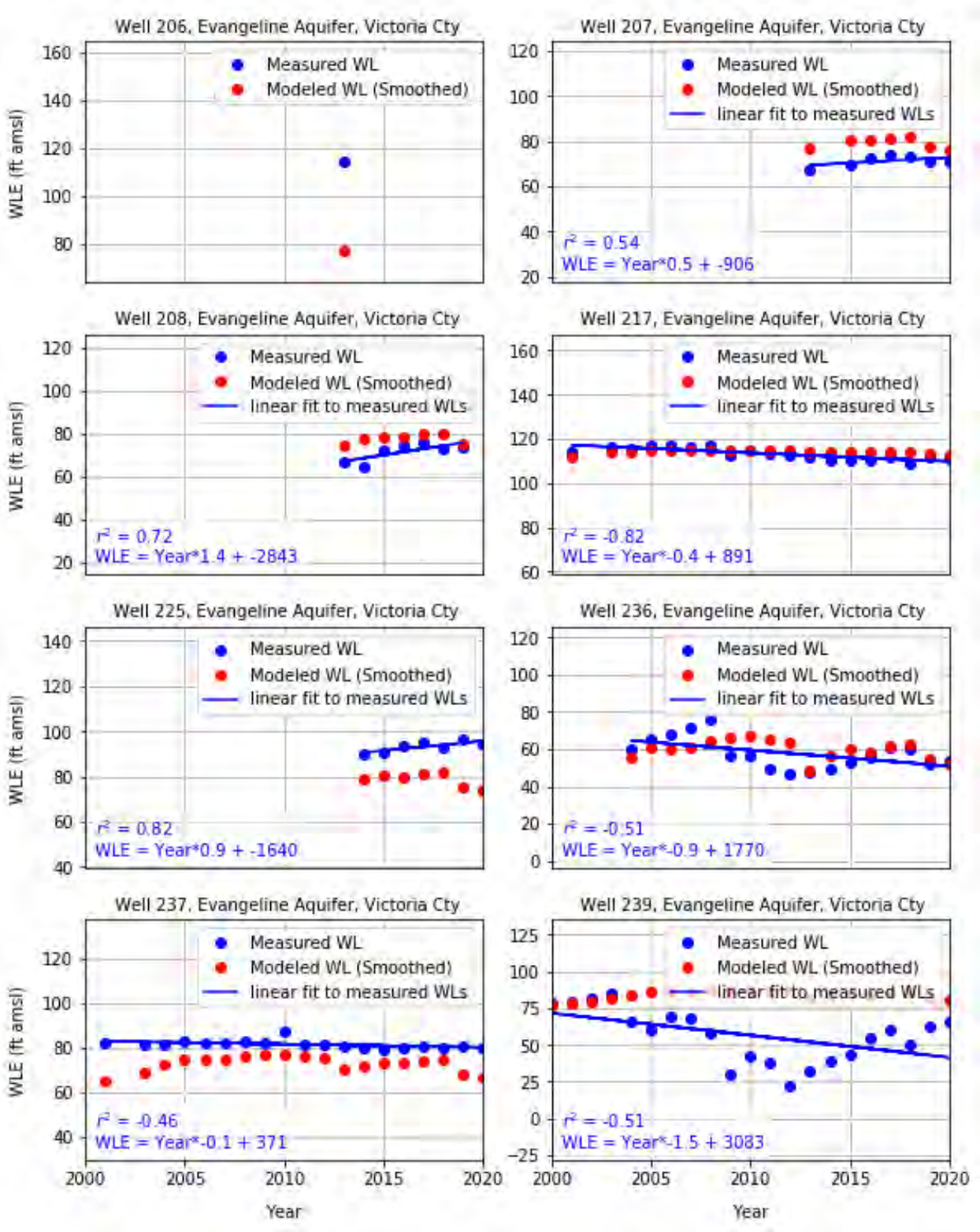

Well 9, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.68
WLE = Year*-0.9 + 1916
Well 78, Evangeline Aquifer, Victoria Cty
r² = 0.27
WLE = Year*0.2 + -305
Well 79, Evangeline Aquifer, Victoria Cty
r² = 0.9
WLE = Year*8.5 + -16980
Well 80, Evangeline Aquifer, Victoria Cty
r² = -0.17
WLE = Year*-0.1 + 200
Well 82, Evangeline Aquifer, Victoria Cty
r² = -0.81
WLE = Year*-1.4 + 2837
Well 90, Evangeline Aquifer, Victoria Cty
r² = 0.15
WLE = Year*0.7 + -1348
Well 91, Evangeline Aquifer, Victoria Cty
r² = -0.38
WLE = Year*-0.7 + 1499
Well 92, Evangeline Aquifer, Victoria Cty
r² = 0.76
WLE = Year*1.8 + -3645
WLE (ft amsl)
Year

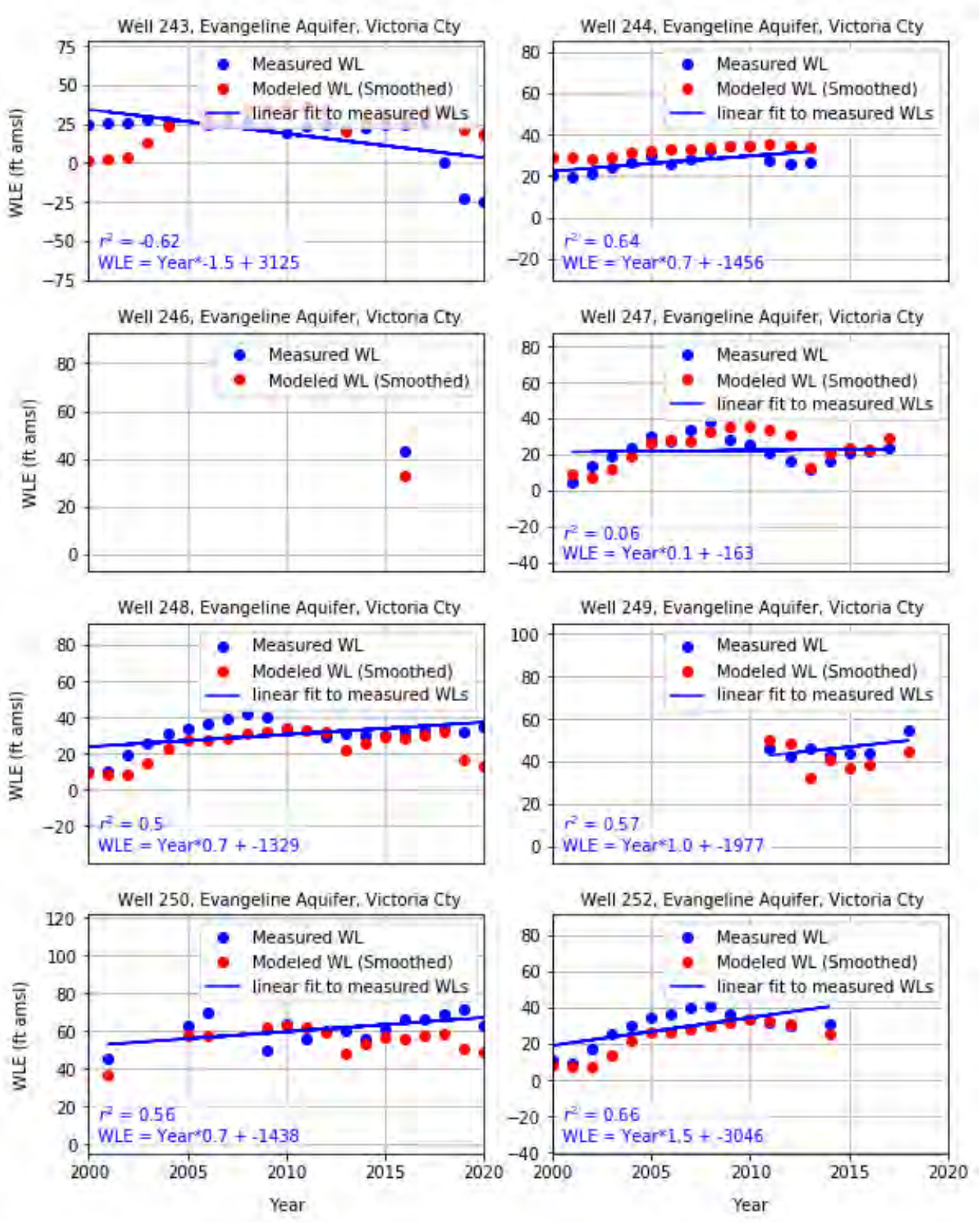

Well 93, Evangeline Aquifer, Victoria Cty
Well 94, Evangeline Aquifer, Victoria Cty
Well 95, Evangeline Aquifer, Victoria Cty
Well 96, Evangeline Aquifer, Victoria Cty
Well 97, Evangeline Aquifer, Victoria Cty
Well 98, Evangeline Aquifer, Victoria Cty
Well 99, Evangeline Aquifer, Victoria Cty
Well 101, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
WLE (ft amsl)
Year
r² = 0.9
WLE = Year*9.2 + -18506
r² = -0.35
WLE = Year*-0.3 + 689
r² = -0.18
WLE = Year*-0.2 + 480
r² = -0.35
WLE = Year*-0.4 + 886

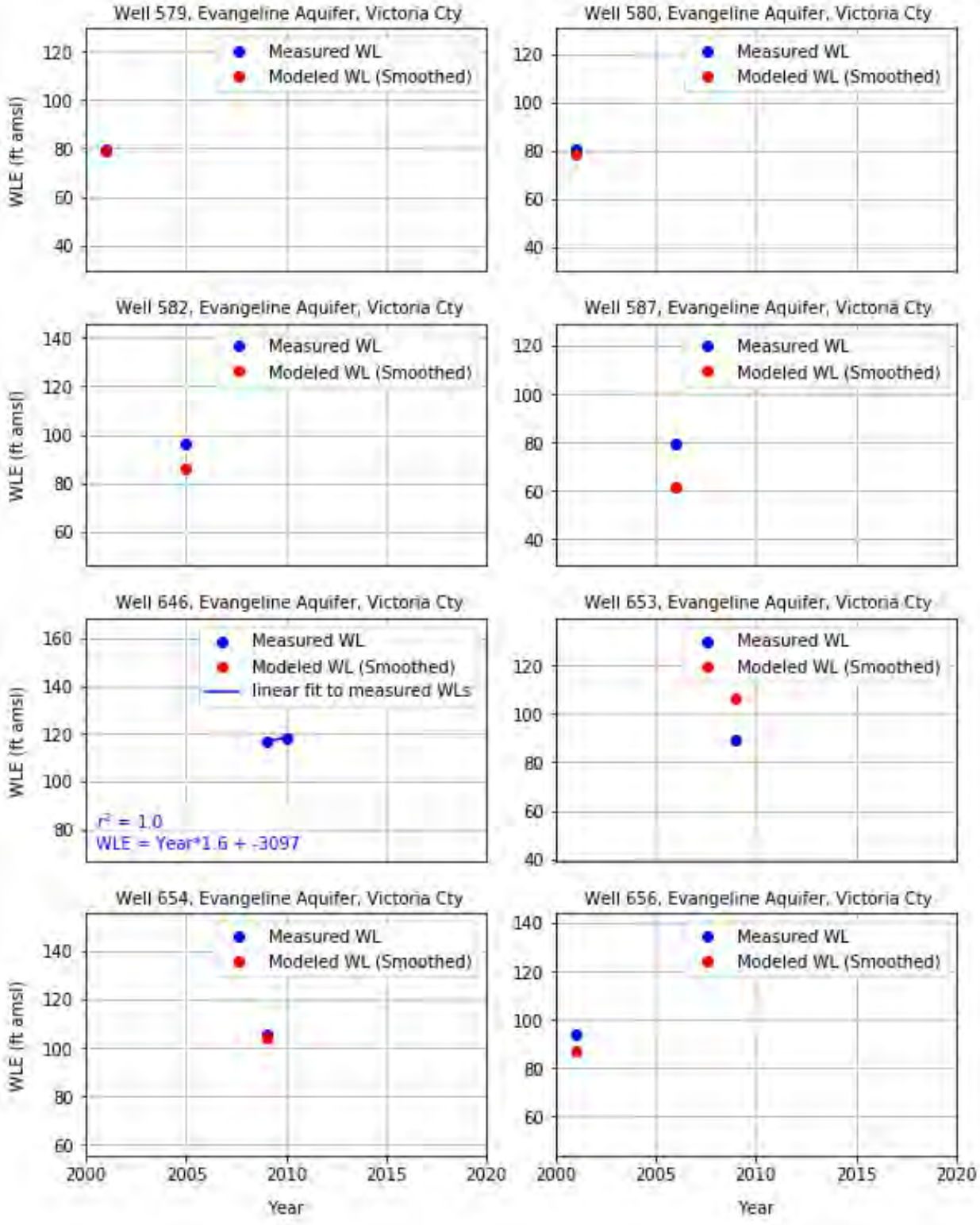

Well 102, Evangeline Aquifer, Victoria Cty
Well 105, Evangeline Aquifer, Victoria Cty
Well 106, Evangeline Aquifer, Victoria Cty
Well 107, Evangeline Aquifer, Victoria Cty
Well 108, Evangeline Aquifer, Victoria Cty
Well 122, Evangeline Aquifer, Victoria Cty
Well 146, Evangeline Aquifer, Victoria Cty
Well 147, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
WLE (ft amsl)
Year
r² = 0.11
WLE = Year*0.1 + -229
r² = -0.36
WLE = Year*-0.2 + 517

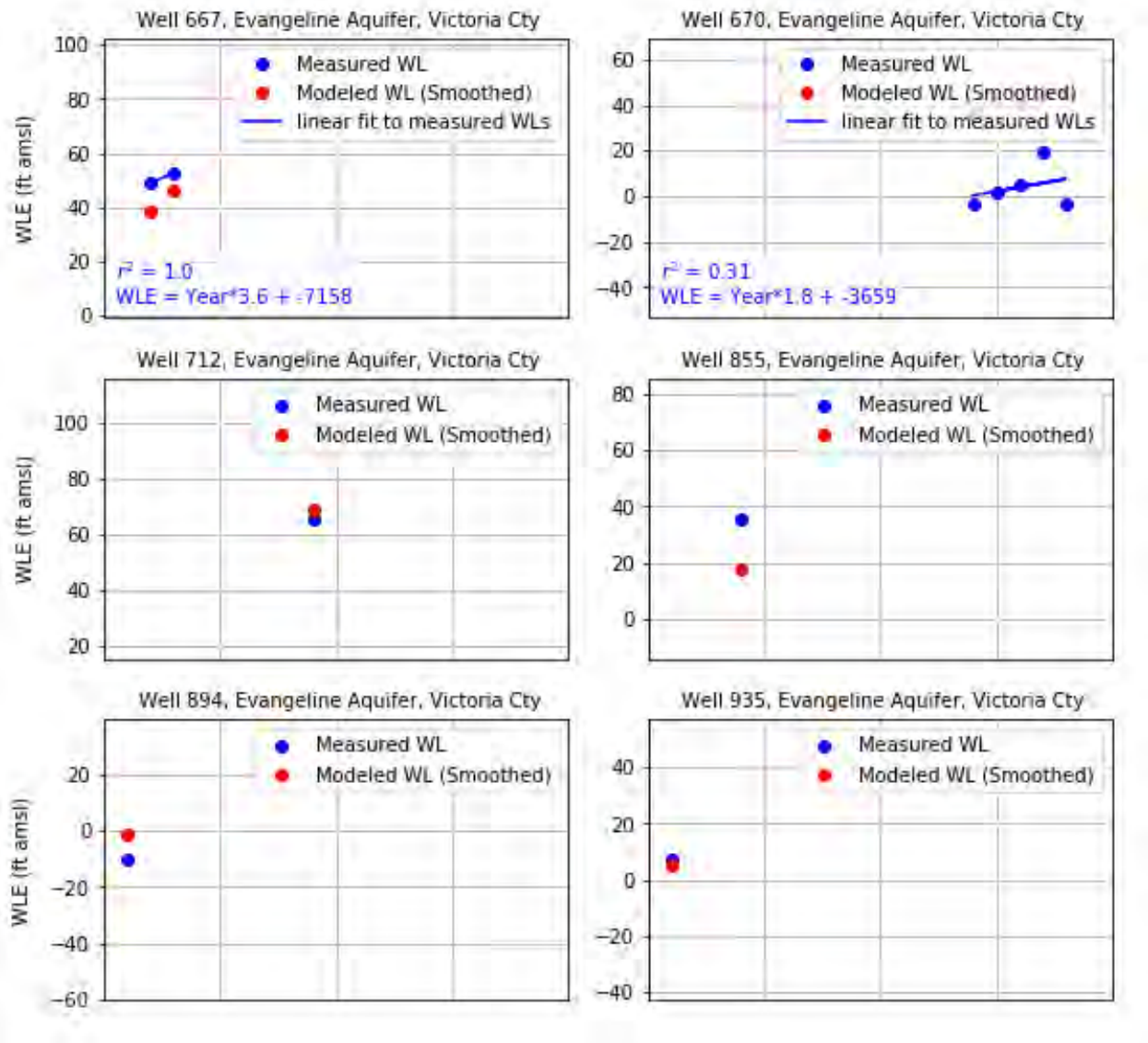

Well 154, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 0.76
WLE = Year*0.5 + -876
Well 171, Evangeline Aquifer, Victoria Cty
r^2 = 0.88
WLE = Year*0.6 + -1166
Well 176, Evangeline Aquifer, Victoria Cty
r^2 = 0.41
WLE = Year*0.2 + -255
Well 177, Evangeline Aquifer, Victoria Cty
r^2 = 0.55
WLE = Year*0.5 + -968
Well 178, Evangeline Aquifer, Victoria Cty
Well 185, Evangeline Aquifer, Victoria Cty
r^2 = 0.78
WLE = Year*0.9 + -1656
Well 186, Evangeline Aquifer, Victoria Cty
r^2 = -0.23
WLE = Year*-0.3 + 571
Well 189, Evangeline Aquifer, Victoria Cty
r^2 = 0.95
WLE = Year*0.2 + -362
WLE (ft amsl)
Year


Well 190, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = 0.64
WLE = Year*0.2 + -294
Well 192, Evangeline Aquifer, Victoria Cty
r^2 = 0.84
WLE = Year*0.9 + -1658
Well 197, Evangeline Aquifer, Victoria Cty
r^2 = 1.0
WLE = Year*2.4 + -4657
Well 201, Evangeline Aquifer, Victoria Cty
r^2 = -0.08
WLE = Year*-0.1 + 126
Well 202, Evangeline Aquifer, Victoria Cty
r^2 = -0.07
WLE = Year*-0.0 + 130
Well 203, Evangeline Aquifer, Victoria Cty
Well 204, Evangeline Aquifer, Victoria Cty
r^2 = 0.16
WLE = Year*0.1 + -65
Well 205, Evangeline Aquifer, Victoria Cty
WLE (ft amsl)
Year


Well 206, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
Well 207, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.54
WLE = Year*0.5 + -906
Well 208, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.72
WLE = Year*1.4 + -2843
Well 217, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.82
WLE = Year*-0.4 + 891
Well 225, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.82
WLE = Year*0.9 + -1640
Well 236, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.51
WLE = Year*-0.9 + 1770
Well 237, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.46
WLE = Year*-0.1 + 371
Well 239, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = -0.51
WLE = Year*-1.5 + 3083
WLE (ft amsl)
Year


Well 243, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r^2 = -0.62
WLE = Year*-1.5 + 3125
Well 244, Evangeline Aquifer, Victoria Cty
r^2 = 0.64
WLE = Year*0.7 + -1456
Well 246, Evangeline Aquifer, Victoria Cty
Well 247, Evangeline Aquifer, Victoria Cty
r^2 = 0.06
WLE = Year*0.1 + -163
Well 248, Evangeline Aquifer, Victoria Cty
r^2 = 0.5
WLE = Year*0.7 + -1329
Well 249, Evangeline Aquifer, Victoria Cty
r^2 = 0.57
WLE = Year*1.0 + -1977
Well 250, Evangeline Aquifer, Victoria Cty
r^2 = 0.56
WLE = Year*0.7 + -1438
Well 252, Evangeline Aquifer, Victoria Cty
r^2 = 0.66
WLE = Year*1.5 + -3046
WLE (ft amsl)
Year


Well 579, Evangeline Aquifer, Victoria Cty
Well 580, Evangeline Aquifer, Victoria Cty
Well 582, Evangeline Aquifer, Victoria Cty
Well 587, Evangeline Aquifer, Victoria Cty
Well 646, Evangeline Aquifer, Victoria Cty
Well 653, Evangeline Aquifer, Victoria Cty
Well 654, Evangeline Aquifer, Victoria Cty
Well 656, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 1.0
WLE = Year*1.6 + -3097
WLE (ft amsl)
Year


Well 667, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
WLE (ft amsl)
r² = 1.0
WLE = Year*3.6 + -7158
Well 670, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
linear fit to measured WLs
r² = 0.31
WLE = Year*1.8 + -3659
Well 712, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Well 855, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
Well 894, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)
WLE (ft amsl)
Well 935, Evangeline Aquifer, Victoria Cty
Measured WL
Modeled WL (Smoothed)

Calhoun County Groundwater Conservation District

131 A. Virginia St, Port Lavaca TX 77979
Phone: 361-482-0357 Fax: 361-482-0303
calhouncountygcd.org

THE STATE OF TEXAS
CALHOUN COUNTY
The Board of Directors of the Calhoun County Groundwater Conservation District convened a meeting at the Coastal Center, 131-A N. Virginia St, Port Lavaca TX 77979, Calhoun County, on January 25, 2021 at 5:30 PM.

Meeting Attendance:

Precinct 1:	Mr. Steven Dierschke, Director	Present
Precinct 2:	Mr. Wesley Brett, Vice-President	Present
Precinct 3:	Mr. Galen Johnson, Secretary	Absent
Precinct 4:	Mr. Michael Hahn, Treasurer	Present
At Large:	Mr. Harold May, President	Present
General Manager:	Mr. Timothy Andruss	Present
Legal Counsel:	Mr. James Allison	Absent

Agenda Items -

1. Call the meeting to order and welcome guests.

Meeting Discussion: Mr. May called the meeting to order at 5:30 PM.

Board Action: None.

2. Receive public comments.

Meeting Discussion: None.

Board Action: None.

3. Consideration of and possible action on matters related to Groundwater Management including the permitting efforts and activities of the District regarding permitting as well as complaints, investigations, and enforcement cases associated with permitting.

3.1 - Report regarding Groundwater Management

Meeting Discussion: Mr. Andruss explained that the District is assisting Consolidated Asset Management Services (CAMS) with the registration and application for production permits for two, grandfathered water wells located at the Calhoun Port Authority (CPA)/ Calhoun County Navigation District (CCND). Furthermore, the District is attempting to renew its coordination with the Port O'Connor Improvement District (POCID) regarding plans to develop new water wells.

The District has initiated 21 permitting request cases (PRCs) since October 1, 2020 .

As of January 25, 2021, the following permitting requests and applications are pending with the District:

Administratively Incomplete Permitting Applications requiring coordination with Applicant:
CCGCD - GMa - PR - Drilling Permit Requests - ADW-20190916-01 - Kevin Koliba - Administratively Incomplete
CCGCD - GMa - PR - Drilling Permit Requests - ADW-20201217-01 - Mike McGary - Administratively Incomplete

Permitting Cases awaiting final completion and close-out:
CCGCD - GMa - Pe - Permitting Request Cases - PRC-20200602-01 - AAPC-20200529-01 - LaSalle #1A - Pending
CCGCD - GMa - Pe - Permitting Request Cases - PRC-20191126-01 - ADW-20191126-01/03/AOW-20191126-02/04 - LaSalle WCID # 1A - Pending
CCGCD - GMa - Pe - Permitting Request Cases - PRC-20200310-02 - ADW-20200207-01/03/05/07/AOW-20200207-02/04/06/08 - Alan Roberts, Roberts Ranch and Investments-Pending
CCGCD - GMa - Pe - Permitting Request Cases - PRC-20200401-01 - ADW-20200401-01/03/05/07/AOW-20200401-02/04/06/08 - Trull Service - Pending
CCGCD - GMa - Pe - Permitting Request Cases - PRC-20200710-01 - ADW-20200707-01/03/05/ AOW-2020070702/04/06 - Monterrey Cove, LLC - Pending
CCGCD - GMa - Pe - Permitting Request Cases - PRC-20201228-01 - ADW-20201218-01/AOW-20201218-02 - Justin B. Boyd - Pending

Board Action: None.

4. Consideration of and possible action on matters related to Groundwater Protection including complaints, investigations, violations and enforcement related to groundwater contamination and waste.

Meeting Discussion: None.

Board Action: None.

5. Consideration of and possible action on matters related to Groundwater Monitoring.

5.1 - Report regarding Groundwater Level Analysis

Meeting Discussion: Mr. Andruss explained that on October 2, 2020, the District provided notice to Dr. Young of Intera to proceed with the geostatistics project as described in the proposal with a geographic scope of Victoria, Jackson, Calhoun, and Refugio Counties.

On January 18, 2021, Dr. Young provided a presentation of the certain results to be included in the final report related to the computed changes to water levels since year 2000. Slide 3 of the presentation illustrates the best estimate of water level change within Calhoun County between Year 2000 and Year 2020. The slide illustrates a positive change (recovery/rebound) of

approximately 4 feet in water levels in the Chicot Aquifer, a positive change (recovery/rebound) of approximately 0.5 feet in the Evangeline Aquifer, and a positive change (recovery/rebound) of the Chicot and Evangeline Aquifers (combined) of approximately 2.5 feet which represents a reasonable assessment of water level change of the Gulf Coast Aquifer System within Jackson County. A technical workshop led by Dr. Young has been tentatively scheduled for February 19, 2021 for the purposes of more closely reviewing the technical work and results.

The desired future conditions of Gulf Coast Aquifer System within GMA 15 is: drawdown shall not exceed 13 feet at December 2069.

The desired future conditions of Gulf Coast Aquifer System within Calhoun County is: drawdown shall not exceed 5 feet at December 2069.

This information provided by Intera supports a conclusion that the District is fully complying with the desired future conditions of Gulf Coast Aquifer in Calhoun County.

This information will be incorporated in the annual report for the District for fiscal year 2020 under Goal 7: Addressing the desired future conditions adopted by the district under Section 36.108; Objective G7O2: Analyze water level monitoring information to evaluate water level trends and determine the degree to which the DISTRICT is complying with the desired future conditions of Gulf Coast Aquifer in Refugio County.

Board Action: None.

5.2 - Drought Monitoring

Meeting Discussion: Mr. Andruss explained that the U.S. Drought Monitor, produced through a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration, indicates that no portion of Calhoun County was experiencing dry or drought conditions as of January 19, 2021

Board Action: None.

6. Consideration of and possible action on matters related to Groundwater Conservation.

6.1 - Report regarding Groundwater Conservation

Meeting Discussion: Mr. Andruss explained that the District has identified an objective within its management plan to "[p]romote conservation, rainwater harvesting or brush control within Jackson County." This objective has been achieved in previous years by developing news releases promoting conservation and participating in the annual South Texas Farm and Ranch Show. Due to complications created by the COVID 19 Pandemic and other operational issues, these approaches to achieving the the objective are either no longer available or advisable. Therefore, the District will develop and maintain a webpage focusing on promoting

water conservation, rainwater harvesting or brush control as a means of achieving the stated objective the District.
Board Action: None.

7. Consideration of and possible action on matters related to Groundwater Resource Planning including Groundwater Management Area 15 Joint Planning and regional water planning, DFC Proposals, and regional water planning.

7.1 - Report regarding Groundwater Resource Planning

Meeting Discussion: Mr. Andruss explained that the District will participate in the Region L Regional Water Planning Group Meeting on February 4, 2021.

On December 29, 2020, the District requested that Dr. Uddameri develop and submit a letter with his presentation related to his review of the TWDB conceptual model for GMA 15 and 16 to TWDB.

The District participated in the Management Area 15 Meeting on January 14, 2021, at the Goliad County GCD Office. The committee is concluding the technical tasks associated with the 3rd DFC Development Cycle. Prior to the next meeting of the GMA 15 Committee, the District will consider options for proposing a DFC for GMA 15 based on the relevant technical information.

The District will participate in the Management Area 15 Meeting on April 8, 2021.

Board Action: None.

8. Consideration of and possible action on matters related to Groundwater Policy including the Management Plan of the District and the Rules of the District.

8.1 - Report regarding Groundwater Policy

Meeting Discussion: Mr. Andruss explained that On January 12, 2021, Mr. Ellis provided the District with lists of bills filed for the 87th Legislature related to Chapter 36 of the Water Code, Local Government, Open Government, and Groundwater. The 87th Legislative Session began on January 12, 2021 and is scheduled to reconvene on January 26, 2021.

Board Action: None.

9. Consideration of and possible action on matters related to Groundwater Research.

Meeting Discussion: None.

Board Action: None.

10. Consideration of and possible action on matters related to Performance Management including management goals and objectives of the District.

Meeting Discussion: None.

Board Action: None.

11. Consideration of and possible action on matters related to Meeting Management including minutes of previous meetings.

11.1 - Report regarding Meeting Management

Meeting Discussion: Mr. Andruss explained that the next meeting of the Board of Directors is scheduled for March 22, 2021, at 5:30 PM at the District Office.

Board Action: None.

11.2 - Minutes of Previous Meeting

Meeting Discussion: Mr. Andruss explained that the minutes for the meeting held on September 14, 2020 , were sent the board members prior to the meeting.

Board Action: Mr. Brett moved to accept and approved the meeting minutes for September 14, 2020, as drafted. Mr. Dierschke seconded the motion. The motion passed unanimously.

12. Consideration of and possible action on matters related to Financial Management including the annual budget of the district, financial reports of the district, bills and invoices of the district.

12.1 - Financial Reports and Records

Meeting Discussion: Mr. Andruss explained that the financial records for December 2020 have been compiled, reviewed, and sent to the board members prior to the meeting. All expenditures are related to business of the District and properly authorized.

Board Action: Mr. Dierschke moved to accept and approve the financial records for December 2020. Mr. Hahn seconded the motion. The motion passed unanimously.

13. Consideration of and possible action on matters related to office administration and management including personnel and staffing, employment agreements. Consultant agreements, interlocal cooperation agreements, support services provided to and from other groundwater conservation district, administrative policies, by-laws of the District, and election of officers.

13.1 - Report regarding Administration and Management

Meeting Discussion: Mr. Andruss explained that the employment of Ms. Trevino, RGCD Office Assistant, with the District ended on December 11, 2020. Since this date, the District has operated the RGCD Office by assigning staff (typically Mr. Benavides) to work at the RGCD Office from time to time. The duties of this position have been completed by other staff members. The RGCD Board postponed any decisions regarding the vacancy until the next meeting of the Board.

On January 19, 2021, the RGCD Board of Directors passed a resolution authorizing the payment of Fees of Office at a rate of $250.00 per day and motion authorizing reimbursement of expenses associated with traveling to board meeting between October 1, 2019 and September 30, 2021. The RGCD Board is considering changes to the operation of their office in response to a recent employee resignation and the potential to reduce expenses. Sec. 8860.055 of the SPECIAL DISTRICT LOCAL LAWS CODE related to governance of the District specifies "(a) A director is not entitled to receive compensation for performing the duties of a director. (b) The board may authorize a director to receive reimbursement for the director's reasonable expenses incurred while engaging in activities on behalf of the district."

Board Action: None.

13.2 - Review of Administrative Policies

Meeting Discussion: Mr. Andruss explained that the administrative policies of the district should be reviewed annually.

Board Action: Mr. Hahn moved to re-adopt each policy and authorize the General Manager to prepare a draft consolidation of the policies with recommended revisions for future consideration by the Board. Mr. Brett seconded the motion. The motion passed unanimously.

13.3 - Election of Officers of the Board

Meeting Discussion: Mr. Andruss explained that the By-Laws of the District require the election of four officers, President, Vice-President, Secretary, and Treasurer, each January. Currently, Mr. May serve as President; Mr. Brett serves as Vice-President; Mrs. Johnson serves as Secretary; Mr. Hahn serves as Treasurer.

Board Action: Mr. Hahn moved to re-elect existing officers. Mr. Dierschke seconded the motion. The motion passed unanimously.

14. Consideration of and possible action on matters related to legal counsel report.

Meeting Discussion: None.

Board Action: None.

15. Adjourn.

Calhoun County Groundwater Conservation District
131 A. Virginia St, Port Lavaca TX 77979
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calhouncountygcd.org

Board Action: Mr. Hahn moved to adjourn the meeting after concluding all business of the District. Mr. Dierschke seconded the motion. The motion passed unanimously.

THE ABOVE AND FOREGOING MINUTES WERE READ AND APPROVED ON THIS

THE 19th DAY OF April A.D. 2021.

Director of the Calhoun County Groundwater Conservation District

ATTEST:

Director of the Calhoun County Groundwater Conservation District

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | Fax (361) 482-0303 | www.calhouncountygcd.org

THE STATE OF TEXAS
CALHOUN COUNTY
The Board of Directors of the Calhoun County Groundwater Conservation District convened a meeting a meeting on April 19, 2021 at 5:30 PM at the 131-A N. Virginia St., Port Lavaca, Texas.

Meeting Attendance:

Precinct 1:	Mr. Steven Dierschke, Director	Present
Precinct 2:	Mr. Wesley Brett, Vice-President	Present
Precinct 3:	Mr. Galen Johnson, Secretary	Present
Precinct 4:	Mr. Michael Hahn, Treasurer	Present
At Large:	Mr. Harold May, President	Present
General Manager:	Mr. Timothy Andruss	Present
Legal Counsel:	Mr. James Allison	Absent

Agenda Items -

1. Call the meeting to order and welcome guests.

   Board Action: Mr. May called the meeting to order at 5:30 PM.

2. Receive public comments.

   Discussion: None.

   Board Action: None.

3. Discussion and presentation regarding Port O'Connor Improvement District's plan to develop groundwater resources and associated permitting.

   Discussion: Mr. Andruss explained that on or about March 11, 2020, the District met with Mr. Mercer (consulting engineer) and Ms. Grafe-Tucker (legal counsel) regarding POCID's plan to drill and operate a series of water wells to supply water to the public water system servicing Port O'Connor Community. Between April 2020 and March 2021, the District attempted to support POCID in its efforts to develop permitting applications for water wells to be used as part of the Improvement District's water supply.

   On March 16, 2021, the District met with Mr. Mercer regarding current plans to develop wells for POCID water supply.

   Presently, the District understands the POCID's plan includes the use of six water wells as a well system (1 existing, 5 proposed) to produce up to 1,104 acre-feet of groundwater per year (based on future demand estimations for year 2046) at a maximum rate of 1,800 GPM for public water system uses. The subject wells are located on properties owned by POCID, Calhoun County, and Cordell Family LP.

   On April 7, 2021, the District provided draft applications to Mr. Mercer and Ms. Grafe-Tucker. The draft applications consist of:

- an application to register POCID's existing well;
- five applications to drill a water well at a production capacity of 300 GPM;
- an application to operate a well system for public water supply purposes at 1,800 GPM and 1,104 AFY;
- a waiver application to address rules that POCID does not appear to be able to satisfy.

The specific limitations and requirements from which relief will likely be needed by POCID and have been incorporated into the draft waiver document:
1) Item 14 of RULE 4.1: GENERAL PERMITTING POLICIES AND PROCEDURES which reads "A public water supply entity may consider all contiguous land within the boundary of its certificate of convenience and necessity (CCN) that is located within the District to be under its control for the purposes of evaluating the spacing and production limitations and application performance conditions of the District."
2) Item 16.f of RULE 4.1: GENERAL PERMITTING POLICIES AND which reads "Identification of water wells known to be located within an area surrounding the proposed well location with a radius, measured in feet, equal to the amount of groundwater to be produced in gallons per minute;"
3) Item 9 of RULE 4.3: PERMITTING POLICIES AND PROCEDURES RELATED PRODUCTION PERMITS which reads "An application for a production permit for a non-grandfathered well with a proposed groundwater production capacity of 360,000 gallons per day or more, an application for a production permit for a non-grandfathered well field with a proposed aggregate capacity of 360,000 gallons per day or more, or an application for a production permit for a non-grandfathered well system with a proposed aggregate capacity of 360,000 gallons per day or more shall contain the following information: ...";
4) Item 10 of RULE 4.3: PERMITTING POLICIES AND PROCEDURES RELATED PRODUCTION PERMITS which reads "Applications for production permits for a non-grandfathered well with a proposed groundwater production capacity of 360,000 gallons per day or more, production permits for a non-grandfathered well field with a proposed aggregate capacity of 360,000 gallons per day or more, or production permits for a non-grandfathered well system with a proposed aggregate capacity of 360,000 gallons per day or more shall contain the information demonstrating achievement of the following performance conditions: ...";
5) Item 5 of RULE 4.5: AGGREGATION OF WELL PRODUCTION which reads "The aggregate authorized groundwater production amount of a production permit for a non-grandfathered well field or a non-grandfathered well system shall not exceed the sum of the groundwater production that the wells of the field or system would be eligible for individually under the Rules of the District."
6) Item 7 of RULE 4.5: AGGREGATION OF WELL PRODUCTION which reads "The District shall issue a production permit with aggregate authorized production conditions for non-grandfathered well systems that authorizes the authorized operator to produce from a single non-exempt-use well up to 150% of the annual authorized groundwater production amount of that specific non-exempt-use well of the non-grandfathered non-exempt-use well so long as the sum of all groundwater production from non-exempt-use wells of the non-grandfathered well system does not exceed the aggregated authorized production conditions."
7) Item 4 of RULE 6.4: GROUNDWATER PRODUCTION LIMITATIONS OF NON-GRANDFATHERED NON-EXEMPT-USE WELLS, NONGRANDFATHERED WELL FIELDS, AND NON-GRANDFATHERED WELL SYSTEMS which reads "The District shall limit the authorized groundwater production amount of a production permit of a non-grandfathered well system to an amount that does not exceed one-half acre-foot per year per surface acre owned

or controlled by the permit applicant and associated with the subject application for a production permit."

Mr. Mercer has also expressed an interest in exploring options to permit the drilling and operation of a subset of wells initially to address short-term, urgent needs considering recent weather events that represent a risk to their system's operations.

Board Action: None.

4. Consideration of and possible action on matters related to groundwater management including the efforts and activities of the District regarding permitting as well as complaints, investigations, and enforcement cases associated with permitting.

4.1.1 - Permitting Request Case - PRC-20210401-01 - Calhoun Coastal Ranch LP

Discussion: Mr. Andruss explained that Mr. Leigh Pender for Calhoun Coastal Ranch, LP seeks, under permitting request case PRC-20210401-01, drilling permits and production permits authorizing construction and operation of two proposed wells; a well operated to produce groundwater for livestock and wildlife uses at rates not to exceed 245 gallons per minute or 1,250 acre-feet per year; and a well operated to produce groundwater for livestock and wildlife uses at rates not to exceed 125 gallons per minute or 1,250 acre-feet per year. The proposed wells will be located on a 8,300 acre tract of land near the intersection of FM 2143 and Highway 35 in Calhoun County, Texas.

The applications and supplemental information associated with this permitting request case are considered administratively complete and contain sufficient information evaluate the request relative to the Rules of the District. Provided the resulting permits are properly conditioned, the drilling and operation of the proposed well would satisfy the requirements as established within the Rules of the District without a waiver or variance.

On April 10, 2021, the public notice related to the consideration of the permit case was completed.

As of April 19, 2021, the District had not received notice of intent to contest the permitting request.

Board Action: Mr. Hahn moved to 1) cancel the permit hearing and proceed with the permitting case as an uncontested matter; 2) issue a drilling permit to Calhoun Coastal Ranch, LP under application ADW-20210312-01 with the requirement that the proposed well be offset from the nearest property line by 50 feet; and 3) issue a production permit to Calhoun Coastal Ranch, LP under application AOW-20210312-02 with the following conditions in accordance with the Rules of the District: Authorized Purpose of Use: livestock and wildlife uses; Authorized Maximum Rate of Production per Minute: 245 gallons per minute; Authorized Maximum Rate of Production per Year: 1,250 acre-feet per year; and Expiration Date: July 31, 2025; 4) issue a drilling permit to Calhoun Coastal Ranch, LP under application ADW-20210312-03 with the requirement that the proposed well be offset from the nearest property line by 50 feet; and 5) issue a production permit to Calhoun Coastal Ranch, LP under application AOW-20210312-04 with the following conditions in accordance with the Rules of the District: Authorized Purpose of

Use: livestock and wildlife uses; Authorized Maximum Rate of Production per Minute: 125 gallons per minute; Authorized Maximum Rate of Production per Year: 1,250 acre-feet per year; and Expiration Date: July 31, 2025. Mr. Johnson seconded the motion. The motion passed unanimously.

5. Consideration of and possible action on matters related to groundwater protection including complaints, investigations, violations, and enforcement cases related to disposal and injection wells as well as contamination and waste.

   Discussion: None.

   Board Action: None.

6. Consideration of and possible action on matters related to groundwater monitoring.

   6.1 - Report regarding Groundwater Level Analysis

   Discussion: Mr. Andruss explained that Dr. Young of Intera submitted a draft report for the project proposed by Intera titled Proposal to Use Geostatistical Techniques to Assess Water Levels and to Evaluate Water Level Changes in Victoria County which was modified to incorporate Calhoun County at the request of the Board. After completing the technical work of the project, the District held a workshop (posted as a public meeting of the participating GCDs) during which Dr. Young presented details on the methodology used to develop the water level data and analysis.

   The report includes the following passages of particular importance to the District:
   On page ES-3, "Notable changes from 2000 to 2020 are:...
   Calhoun County
   ▪ Chicot Aquifer: Water levels rose across about 80% of the county. The largest increase of about 20 ft occurred in northeast. Areas of decrease occurred in northwest and north regions.
   ▪ Evangeline Aquifer: Water levels dropped across about 70% of the county. The largest decrease of about 7 ft occurred in the northeast.

   On page 49, the following comments were provided:
   Calhoun County
   ▪ Chicot Aquifer
   – Six hydrographs are provided. They are located in the half of the county closest to Victoria county. Four of the hydrographs show a relatively flat trend over time for the measured groundwater elevations.
   – The smoothed simulated water levels are within 10 ft of the measured water levels. However, for five out of the six wells, the simulated water levels exhibit increases of 5 to 10 ft from 2000 to 2020 whereas the measured groundwater levels indicate a change of less than a few feet. The GAM-simulated water levels are rated an 8 out of 10.
   ▪ Evangeline Aquifer
   – No hydrographs are available for review.

   Board Action: Mr. Johnson moved to 1) accept the report developed by Dr. Young of Intera titled Application of Geostatistical Techniques to Quantify Changes in Water Levels and 2)

authorize the General Manager to pay the associated invoices in an amount of $17,500. Mr. Brett seconded the motion. The motion passed unanimously.

6.2 - Drought Monitoring

Discussion: Mr. Andruss explained that the U.S. Drought Monitor, produced through a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration, indicates that all portions of Calhoun County were experiencing moderate drought conditions as of April 13, 2021.

Board Action: None.

7. Consideration of and possible action on matters related to groundwater conservation.

   7.1 - Report regarding Groundwater Conservation

   Discussion: Mr. Andruss explained that in order to address conservation as required by the Management Plan of the District and TWC §36.1071(a)(7) and 31 TAC 356.52(a)(1)(G), the District has revised its website to include information and links to websites related to the District's conservation efforts. The website will continue to be updated, revised and maintained to ensure the District is addressing conservation goals and objectives.

   Board Action: None.

8. Consideration of and possible action on matters related to groundwater resource planning including Groundwater Management Area 15 Joint Planning and regional water planning.

   8.1 - Report regarding Groundwater Resource Planning

   Discussion: Mr. Andruss explained that the District will participate in the next Region L Regional Water Planning Group Meeting scheduled for May 6, 2021.

   The District participated in the Management Area 15 Meeting convened on April 8, 2021. The representatives of GMA 15 proposed for adoption a GMA-Wide DFC and County-Specific DFCs. The proposed DFCs and supporting information will be mailed to member districts soon to begin the public comment period (at least 90 days) on the proposed DFCs. The District will be required to conduct a public hearing, likely to be scheduled for July 2021, regarding the proposed DFCs during the comment period.

   Board Action: None.

9. Consideration of and possible action on matters related to groundwater policy including the Management Plan of the District and the Rules of the District.

   Agenda Topic - 9.1 - Report regarding Groundwater Policy

Discussion: Mr. Andruss explained that the District continues its efforts to support the District's consultants to address legislation being proposed during the legislative sessions. Mr. Ellis has provided a list of bills being monitored that could have an effect on the District if passed.

Board Action: None.

10. Consideration of and possible action on matters related to groundwater research.

    Discussion: None.

    Board Action: None.

11. Consideration of and possible action on matters related to performance management including management goals and objectives of the District.

    11.1 - Report regarding Performance Management of the District

    Discussion: Mr. Andruss explained that the Annual Report for Fiscal Year 2019 - 2020 was sent to the directors prior to the meeting. Based on the review of the activities and projects of the Calhoun County Groundwater Conservation District Management Plan between October 1, 2019 and September 30, 2020 and an assessment of the performance standards, the District has determined that all the goals and associated objectives have been fully achieved during the fiscal year ending September 30, 2020.

    Board Action: Mr. Hahn moved to accept and approve the Annual Report for Fiscal Year 2019 - 2020. Mr. Dierschke seconded the motion. The motion passed unanimously.

12. Consideration of and possible action on matters related to meeting management including minutes of previous meetings.

    12.1 - Report regarding Meeting Management

    Discussion: Mr. Andruss explained that the next meeting of the Board of Directors is scheduled for May 24, 2021, at 5:30 PM at the District Office.

    Board Action: None.

    12.2 - Minutes of Previous Meeting

    Discussion: Mrs. Amaimo explained that the minutes for the meeting held on January 25, 2021, were sent the board members prior to the meeting.

    Board Action: Mr. Johnson moved to accept and approved the meeting minutes for January 25, 2021, as drafted. Mr. Brett seconded the motion. The motion passed unanimously.

13. Consideration of and possible action on matters related to financial management including the annual budget of the district, financial reports of the district, bills, and invoices of the district.

13.1 - Financial Reports and Records

Discussion: Mrs. Amaimo explained that the financial reports for February and March 2021 have been compiled, reviewed, and sent to the board members prior to the meeting. All accounts reconcile with internal records. All expenditures are related to business of the District and properly authorized.

Board Action: Mr. Hahn moved to accept and approve the financial records for February and March 2021. Mr. Dierschke seconded the motion. The motion passed unanimously.

13.2 - Unpaid Accounts Payable

Discussion: Mr. Andruss explained that the District has outstanding accounts payable invoices that are not considered regular and routine for which the District has received the goods and services billed for under the invoices.

Board Action: Mr. Hahn moved to authorize the general manager to pay the following items: CCGCD - Adm - FM - Accounts Payable - ACCTP-20210410-01 - $860.44 - Prosperity Visa - Open; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210409-01 - $86.09 - McCreary Veselka Bragg and Allen; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210401-01 - $2,106.50 - Allison Bass and Magee - Open. Mr. Brett seconded the motion. The motion passed unanimously.

14. Consideration of and possible action on matters related to office administration and management including personnel, staffing, employment agreements, consultant agreements, interlocal cooperation agreements, and support services provided to and from other groundwater conservation districts.

    Discussion: None.

    Board Action: None.

15. Consideration of and possible action on matters related to legal counsel report.

    Discussion: None.

    Board Action: None.

16. Adjourn.

    Board Action: Mr. Johnson moved to adjourn the meeting at 6:40, after concluding all business of the District. Mr. Brett seconded the motion. The motion passed unanimously.

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | Fax (361) 482-0303 | www.calhouncountygcd.org

THE ABOVE AND FOREGOING MINUTES WERE READ AND APPROVED ON THIS

THE 24th DAY OF May A.D. 2021.

Director of the Calhoun County Groundwater Conservation District

ATTEST:

Director of the Calhoun County Groundwater Conservation District

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
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THE STATE OF TEXAS
CALHOUN COUNTY
The Board of Directors of the Calhoun County Groundwater Conservation District convened a meeting on May 24, 2021, at 5:30 PM at 131-A N. Virginia St., Port Lavaca, TX.

Meeting Attendance:

Precinct 1:	Mr. Steven Dierschke, Director	Present
Precinct 2:	Mr. Wesley Brett, Vice-President	Present
Precinct 3:	Mr. Galen Johnson, Secretary	Present
Precinct 4:	Mr. Michael Hahn, Treasurer	Present
At Large:	Mr. Harold May, President	Present
General Manager:	Mr. Timothy Andruss	Present
Legal Counsel:	Mr. James Allison	Absent

Agenda Items -

1. Call the meeting to order and welcome guests.

   Board Action: Mr. May called the meeting to order at 5:30 PM.

2. Receive public comments.

   Meeting Discussion: None.

   Board Action: None.

3. Consideration of and possible action on matters related to groundwater management including the efforts and activities of the District regarding permitting as well as complaints, investigations, and enforcement cases associated with permitting.

   3.1.1 - Permitting Request Case - PRC-20210416-02 - Son Thanh Nguyen

   Meeting Discussion: Mr. Andruss explained that Van's Aquafarm for Son Thanh Nguyen seeks, under permitting request case PRC-20210416-02, drilling permits and production permits authorizing construction of two proposed wells and the production of groundwater for commercial fish farm at rates not to exceed 200 gallons per minute or 52.25 acre-feet per year. The subject wells will be located on a 209.77-acre tract of land near the intersection of FM 3280 and CR 476 in Calhoun County, Texas.

   The applications and supplemental information associated with this permitting request case are considered administratively complete and contain sufficient information evaluate the request relative to the Rules of the District. Provided the resulting permits are properly conditioned, the drilling and operation of the subject wells would satisfy the requirements as established within the Rules of the District without a waiver or variance.

   On May 9, 2021, the public notice related to the consideration of the permit case was completed.

As of May 21, 2021, the District had not received notice of intent to contest the permitting request.

Board Action: Mr. Brett moved to 1) cancel the permit hearing and proceed with the permitting case as an uncontested matter; 2) issue a drilling permit to Son Thanh Nguyen under application ADW-20210412-02 with the requirement that the subject wells be offset from the nearest property line by 50 feet; and 3) issue a production permit to Son Thanh Nguyen under application AOW-20210412-03 with the following conditions in accordance with the Rules of the District: Authorized Purpose of Use: commercial fish farm uses; Authorized Maximum Rate of Production per Minute: 200 gallons per minute; Authorized Maximum Rate of Production per Year: 52.25 acre-feet per year; and Expiration Date: July 31, 2025; 4) issue a drilling permit to Son Thanh Nguyen under application ADW-20210412-04 with the requirement that the proposed well be offset from the nearest property line by 50 feet; and 5) issue a production permit to Son Thanh Nguyen under application AOW-20210412-05 with the following conditions in accordance with the Rules of the District: Authorized Purpose of Use: commercial fish farm uses; Authorized Maximum Rate of Production per Minute: 200 gallons per minute; Authorized Maximum Rate of Production per Year: 52.25 acre-feet per year; and Expiration Date: July 31, 2025. Mr. Dierschke seconded the motion. The motion passed unanimously.

3.1.2 - Permitting Request Case - PRC-20210428-02 - LaSalle WCID No. 1A

Meeting Discussion: Mr. Andruss explained that Ms. Sandra Witte for LaSalle WCID No. 1A seeks, under permitting request case PRC-20210428-02, an amendment to drilling permits, DP-20191209-01 and DP-20191209-02 to extend the expiration date from June 6, 2021, to June 6, 2022. The subject wells are associated with 575.11 acres of a 613-acre tract of land near the intersection of State Highway 185 and Costa Grande Drive in Calhoun County, Texas.

The application and supplemental information associated with this permitting request case are considered administratively complete and contain sufficient information evaluate the request relative to the Rules of the District.

On May 9, 2021, the public notice related to the consideration of the permit case was completed.

As of May 21, 2021, the District had not received notice of intent to contest the permitting request.

Board Action: Mr. Hahn moved to 1) cancel the permit hearing and proceed with the permitting case as an uncontested matter; 2) amend the expiration dates of drilling permits DP-20191209-01 and DP-20191209-02 to June 6, 2022. Mr. Brett seconded the motion. The motion passed unanimously.

4. Consideration of and possible action on matters related to groundwater protection including complaints, investigations, violations, and enforcement cases related to disposal and injection wells as well as contamination and waste.

Meeting Discussion: None.

Board Action: None.

5. Consideration of and possible action on matters related to groundwater monitoring.

   Meeting Discussion: None.

   Board Action: None.

6. Consideration of and possible action on matters related to groundwater conservation.

   6.2 - Drought Monitoring

   Meeting Discussion: Mr. Andruss explained that the U.S. Drought Monitor, produced through a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration, indicates that no portion of Calhoun County was experiencing drought conditions as of May 18, 2021.

   Board Action: None.

7. Consideration of and possible action on matters related to groundwater resource planning including Groundwater Management Area 15 Joint Planning and regional water planning.

   7.1 - Report regarding Groundwater Resource Planning

   Meeting Discussion: Mr. Andruss explained that the District will participate in the Region L Regional Water Planning Group Meeting on August 5, 2021.

   The District participated in the Management Area 15 Meeting convened on April 8, 2021. The representatives of GMA 15 proposed for adoption a GMA-Wide DFC and County-Specific DFCs. The proposed DFCs and supporting information were mailed to member districts beginning the public comment period (at least 90 days) on the proposed DFCs. The District will conduct a public hearing regarding the proposed DFCs. The hearing is planned for July 26, 2021.

   Board Action: None.

8. Consideration of and possible action on matters related to groundwater policy including the Management Plan of the District and the Rules of the District.

   Meeting Discussion: None.

   Board Action: None.

9. Consideration of and possible action on matters related to groundwater research.

Meeting Discussion: None.

Board Action: None.

10. Consideration of and possible action on matters related to performance management including management goals and objectives of the District.

    Meeting Discussion: None.

    Board Action: None.

11. Consideration of and possible action on matters related to meeting management including minutes of previous meetings.

    11.1 - Report regarding Meeting Management

    Meeting Discussion: Mr. Andruss explained that the next meeting of the Board of Directors is scheduled for July 26, 2021, at 5:30 PM at the District Office.

    Board Action: None.

    11.2 - Minutes of Previous Meeting

    Meeting Discussion: Mr. Andruss explained that the minutes for the meeting held on April 19, 2021, were sent the board members prior to the meeting.

    Board Action: Mr. Brett moved to accept and approved the meeting minutes for April 19, 2021, as drafted. Mr. Johnson seconded the motion. The motion passed unanimously.

12. Consideration of and possible action on matters related to financial management including the annual budget of the district, financial reports of the district, bills and invoices of the district.

    12.1 - Financial Reports and Records

    Meeting Discussion: Mr. Andruss explained that the financial reports for April 2021 have been compiled, reviewed, and sent to the board members prior to the meeting. All accounts reconcile with internal records. All expenditures are related to business of the District and properly authorized.

    Board Action: Mr. Johnson moved to accept the financial records for April 2021. Mr. Dierschke seconded the motion. The motion passed unanimously.

    12.3 - Financial Audit for FY2020

    Meeting Discussion: Mr. Andruss explained that Mr. Cox of Goldman, Hunt and Notz LLP notified the District that the financial audit of the District for the fiscal year ending September 30, 2020, is complete and presented the report during the meeting.

Board Action: Mr. Johnson moved to accept and approve the Financial Audit for the fiscal year ending September 30, 2020. Mr. Dierschke seconded the motion. The motion passed unanimously.

13. Consideration of and possible action on matters related to office administration and management including personnel, staffing, employment agreements, consultant agreements, interlocal cooperation agreements, and support services provided to and from other groundwater conservation districts.

    Meeting Discussion: None.

    Board Action: None.

14. Consideration of and possible action on matters related to legal counsel report.

    Meeting Discussion: None.

    Board Action: None.

15. Adjourn.

    Board Action: Mr. Johnson moved to adjourn the meeting at 6:17 PM. Mr. Brett seconded the motion. The motion passed unanimously.

THE ABOVE AND FOREGOING MINUTES WERE READ AND APPROVED ON THIS

THE 27th DAY OF July A.D. 2021.

Galen Johnson
Director of the Calhoun County Groundwater Conservation District

ATTEST:
Harold D. Mau
Director of the Calhoun County Groundwater Conservation District

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
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THE STATE OF TEXAS
CALHOUN COUNTY

The Board of Directors of the Calhoun County Groundwater Conservation District convened a meeting on July 26, 2021, at 5:30 PM at the 131-A N. Virginia St., Port Lavaca, Texas.

Meeting Attendance:

Precinct 1:	Mr. Steven Dierschke, Director	Present
Precinct 2:	Mr. Wesley Brett, Vice-President	Absent
Precinct 3:	Mr. Galen Johnson, Secretary	Present
Precinct 4:	Mr. Michael Hahn, Treasurer	Absent
At Large:	Mr. Harold May, President	Present
General Manager:	Mr. Timothy Andruss	Present
Legal Counsel:	Mr. James Allison	Present

Agenda Items -

1. Call the meeting to order and welcome guests.

Mr. May called the meeting to order at 5:30 PM.

2. Receive public comments.

Meeting Discussion: None.

Board Action: None.

3. Consideration of and possible action on matters related to groundwater management including the efforts and activities of the District regarding permitting as well as complaints, investigations, and enforcement cases associated with permitting.

3.1 - Report regarding Groundwater Management

Meeting Discussion: Mr. Andruss explained that the District has 4 permitting cases related to production permits pending and 14 well logs to be processed.

Board Action: None.

3.2 - Permitted Groundwater Production

Meeting Discussion: Mr. Andruss explained that as of July 26, 2021, the District has issued production permits with a total amount of authorized groundwater production of 6,459.193 acre-feet per year.

Board Action: None.

3.3 - Reported Groundwater Production

Meeting Discussion: Mr. Andruss explained that as of July 26, 2021, the District has recorded groundwater production of 119.05 acre-feet during calendar year 2020.

Board Action: None.

3.4 - Production Permit Renewals

Meeting Discussion: Mr. Andruss explained that the District has received a number of Applications to Renew a Production Permit. In order for the District to approve the request to renew a production permit, the Rules of the District require the permit holder to a) be current in paying any fee required by the district; b) not be subject to a pending enforcement action for a substantive violation of a district permit, order, or rule that has not been settled by agreement with the district or a final adjudication; or c) be current in paying any civil penalty or otherwise comply with any order resulting from a final adjudication of a violation of a district permit, order, or rule.

The following applications are administratively complete and satisfy the requirements related to production permit renewal established by the Rules of the District: CCGCD - GMa - Pe - Permitting Request Cases - PRC-20210722-01 - ARPP-20210722-01 - Robert J. and Samantha L. Penland - Pending.

Board Action: Mr. Johnson moved to authorize the general manager to issue production permit renewals for the permits associated with the following renewal requests: CCGCD - GMa - Pe - Permitting Request Cases - PRC-20210722-01 - ARPP-20210722-01 - Robert J. and Samantha L. Penland - Pending. Mr. Dierschke seconded the motion. The motion passed unanimously.

3.5.1 - Permitting Request Case - PRC-20210617-02 - R2 Investments LLC

Meeting Discussion: Mr. Andruss explained that Mr. Ramon R. Hernandez for R2 Investments, LLC seeks, under permitting request case PRC-20210617-02, a drilling permit and production permit authorizing construction of a well and the production of groundwater for public water supply uses at rates not to exceed 150 gallons per minute or 1.911 acre-feet per year. The proposed well will be located on a 3.8223-acre tract of land near the intersection of Margie Tewmey and La Lucia Street in Calhoun County, Texas.

The applications and supplemental information associated with this permitting request case are considered administratively complete and contain sufficient information to evaluate the request relative to the Rules of the District. Provided the resulting permits

are properly conditioned, the drilling and operation of the proposed well would satisfy the requirements as established within the Rules of the District without a waiver or variance.

On June 30, 2021, the public notice related to the consideration of the permit case was completed.

As of July 26, 2021, the District had not received notice of intent to contest the permitting request.

Board Action: Mr. Johnson moved to 1) cancel the permit hearing and proceed with the permitting case as an uncontested matter; 2) issue a drilling permit to R2 Investments, LLC under application ADW-20210518-01; and 3) issue a production permit to R2 Investments, LLC under application AOW-20210518-01with the following conditions in accordance with the Rules of the District: Authorized Purpose of Use: public water supply; Authorized Maximum Rate of Production per Minute: 150 gallons per minute; Authorized Maximum Rate of Production per Year: 1.911 acre-feet per year; and Expiration Date: July 31, 2026. Mr. Dierschke seconded the motion. The motion passed unanimously.

3.5.2 - Permitting Request Case - PRC-20210524-01 - Calhoun Port Authority

Meeting Discussion: Mr. Andruss explained that Mr. Charles Hausmann for Calhoun Port Authority seeks, under permitting request case PRC-20210524-01, a historic use production permit authorizing the production of groundwater for power generation uses at rates not to exceed 27.93 acre-feet per year from grandfathered well GW-00035. The subject well is located on a 261-acre tract of land near the intersection of Diebel Lane and FM 1593 in Calhoun County, Texas

The application and supplemental information associated with this permitting request case are considered administratively complete and contain sufficient information to evaluate the request relative to the Rules of the District. Provided the resulting permit is properly conditioned, the operation of the existing well would satisfy the requirements established within the Rules of the District without a waiver or variance.

The application is supported by historic water use records submitted to TWDB (Water Use Survey) for year 1999 related to subject well and the power generation activities occurring on a 1.95-acre parcel of the 261-acre tract of contiguous land owned by the Calhoun Port Authority. Approximately 259.05 acres remain eligible for groundwater production permitting notwithstanding other historic use requests submitted at a future date.

On June 30, 2021, the public notice related to the consideration of the permit case was completed.

As of July 26, 2021, the District had not received notice of intent to contest the permitting request.

Board Action: Mr. Dierschke moved to 1) cancel the permit hearing and proceed with the permitting case as an uncontested matter; 2) issue a historic use validation permit to Calhoun Port Authority under application AVW-20210524-01 with the following conditions in accordance with the Rules of the District: Authorized Purpose of Use: power generation uses; Authorized Maximum Rate of Production per Year: 27.93 acre-feet per year. Mr. Johnson seconded the motion. The motion passed unanimously.

3.5.3 - Permitting Request Case - PRC-20210701-01 - Mark Dietzel

Meeting Discussion: Mr. Andruss explained that Mr. Mark R. Dietzel for Big Bear Shrimp and Seafood seeks, under permitting request case PRC-20210701-01, a drilling permit and production permit authorizing construction of a well and the production of groundwater for bait tanks uses at rates not to exceed 20 gallons per minute or 1.868 acre-feet per year. The proposed well will be located on a 3.736-acre tract of land near the intersection of North Highway 35 and Smith Road in Calhoun County, Texas.

The applications and supplemental information associated with this permitting request case are considered administratively complete and contain sufficient information to evaluate the request relative to the Rules of the District. Provided the resulting permits are properly conditioned, the drilling and operation of the proposed well would satisfy the requirements as established within the Rules of the District without a waiver or variance.

On July 8, 2021, the public notice related to the consideration of the permit case was completed.

As of July 26, 2021, the District had not received notice of intent to contest the permitting request.

Board Action: Mr. Dierschke moved to 1) cancel the permit hearing and proceed with the permitting case as an uncontested matter; 2) issue a drilling permit to Mr. Dietzel under application ADW-20210526-01; and 3) issue a production permit to Mr. Dietzel under application AOW-20210526-02 with the following conditions in accordance with the Rules of the District: Authorized Purpose of Use: bait tanks; Authorized Maximum Rate of Production per Minute: 20 gallons per minute; Authorized Maximum Rate of Production per Year: 1.868 acre-feet per year; and Expiration Date: July 31, 2025. Mr. Johnson seconded the motion. The motion passed unanimously.

4. Consideration of and possible action on matters related to groundwater protection including complaints, investigations, violations and enforcement cases.

Meeting Discussion: None.

Board Action: None.

5. Consideration of and possible action on matters related to groundwater monitoring.

Meeting Discussion: Mr. Andruss explained that the U.S. Drought Monitor, produced through a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration, indicates that no portions of Calhoun County were experiencing dry or drought conditions as of July 22, 2021.

Board Action: None.

6. Consideration of and possible action on matters related to groundwater conservation.

Meeting Discussion: None.

Board Action: None.

7. Consideration of and possible action on matters related to groundwater resource planning including Groundwater Management Area 15 Joint Planning, regional water planning, and the Desired Future Conditions Proposed for Adoption by Groundwater Management Area 15.

7.1 - Report regarding Groundwater Resource Planning

Meeting Discussion: Mr. Andruss explained that the District will participate in the Region L Regional Water Planning Group Meeting on August 5, 2021, at 9:00 AM at SAWS offices in San Antonio.

The District will participate in the Management Area 15 Meeting on October 14, 2021, at 9:30 AM at District's office building in Victoria.

Board Action: None.

7.2 - Public Hearing regarding DFCs Proposed for Adoption by GMA 15

Meeting Discussion: Mr. Andruss explained that on May 4, 2021, the desired future conditions proposed for Groundwater Management Area 15 were mailed to the member districts initiating the public comment period (period of not less than 90 days) for the desired future conditions proposed for adoption by the representatives of GMA 15.

The representatives of Groundwater Management Area 15 proposed the following Desired Future Conditions for Adoption on April 8, 2021:

1. The Desired Future Condition for the counties in the groundwater management area (gma-specific DFC) shall not exceed an average drawdown of 13 feet for the Gulf Coast Aquifer System at December 2080; and
2. The Desired Future Conditions for each county within the groundwater management area (county-specific DFCs) shall not exceed the values specified in Table A at December 2080:

Table A. Desired Future Conditions for Counties of GMA 15 expressed as an Average Drawdown between January 2000 and December 2080.

- Aransas County: 0 feet of drawdown of the Gulf Coast Aquifer System.
- Bee County: 7 feet of drawdown of the Gulf Coast Aquifer System.
- **Calhoun County: 5 feet of drawdown of the Gulf Coast Aquifer System.**
- Colorado County: 17 feet of drawdown of the Chicot and Evangeline Aquifers; and 25 feet of drawdown of the Jasper Aquifer.
- DeWitt County: 17 feet of drawdown of the Gulf Coast Aquifer System.
- Fayette County: 44 feet of drawdown of the Gulf Coast Aquifer System.
- Goliad County: 4 feet of recovery of the Chicot Aquifer; 2 feet of recovery of the Evangeline Aquifer; 7 feet of drawdown of the Burkeville Aquifer; and 14 feet of drawdown of the Jasper Aquifer.
- Jackson County: 15 feet of drawdown of the Gulf Coast Aquifer System.
- Karnes County: 22 feet of drawdown of the Gulf Coast Aquifer System.
- Lavaca County: 18 feet of drawdown of the Gulf Coast Aquifer System.
- Matagorda County: 11 feet of drawdown of the Chicot and Evangeline Aquifers.
- Refugio County: 5 feet of drawdown of the Gulf Coast Aquifer System.
- Victoria County: 5 feet of drawdown of the Gulf Coast Aquifer System.
- Wharton County: 15 feet of drawdown of the Chicot and Evangeline Aquifers.

During this period, the District has made available in its office a copy of the proposed desired future conditions and supporting materials, such as the documentation of factors considered under Subsection (d) and groundwater availability model run results.

On June 11, 2021, the District completed the posting requirements established for the public hearing on the proposed desired future conditions.

While the District has been informed that public comments may be submitted to the District or other GCDs with GMA 15, as of July 13, 2021, the District had not received any public comments on the DFCs proposed for adoption by GMA 15.

Board Action: Mr. Johnson moved to open the public hearing at 6:14 PM and to accept any public comments regarding the DFC's proposed for adoption by GMA 15. Mr. Dierschke seconded the motion. The motion passed unanimously.

Public Comments: None.

Mr. Johnson moved to close the public hearing at 6:15 PM, after receiving public comments regarding the DFCs proposed for adoption by GMA 15 and moved to terminate the public comment period on September 1, 2021, and authorize the General Manager to compile and submit for consideration at the next joint planning meeting a summary of relevant comments received, any suggested revisions to the proposed desired future conditions, and the basis for the revisions. Mr. Dierschke seconded the motion. The motion passed unanimously.

8. Consideration of and possible action on matters related to groundwater policy including the Management Plan of the District and the Rules of the District.

8.1 - Report regarding Groundwater Policy

Meeting Discussion: Mr. Andruss explained that the regular session of the 87th Legislature concluded without the passage of any legislation that would have a negative and direct impact on the ability of the District to manage groundwater resources in Calhoun County.

Board Action: None.

9. Consideration of and possible action on matters related to groundwater research.

Meeting Discussion: None.

Board Action: None.

10. Consideration of and possible action on matters related to performance management including management goals and objectives of the District.

Meeting Discussion: None.

Board Action: None.

11. Consideration of and possible action on matters related to meeting management including minutes of previous meetings.

11.1 - Report regarding Meeting Management

Meeting Discussion: Mr. Andruss explained that the next meeting of the Board of Directors is scheduled for August 23, 2021, at 5:30 PM at the District Office.

Board Action: None.

11.2 - Minutes of Previous Meeting

Meeting Discussion: Mr. Dierschke moved to accept and approved the meeting minutes for May 24, 2021, as drafted. Mr. Johnson seconded the motion. The motion passed unanimously.

12. Consideration of and possible action on matters related to financial management including the annual budget of the district, financial reports of the district, bills and invoices of the district.

12.1 - Financial Reports and Records

Meeting Discussion: Mr. Andruss explained that the financial reports for June 2021have been compiled, reviewed, and sent to the board members prior to the meeting. All accounts reconcile with internal records. All expenditures are related to business of the District and properly authorized.

Board Action: Mr. Dierschke moved to accept the financial records for June 2021. Mr. Johnson seconded the motion. The motion passed unanimously.

12.2 - Unpaid Accounts Payable

Meeting Discussion: Mr. Andruss explained that the District has 13 outstanding accounts payable invoices totaling $60,676.85 for which the District has received the goods and services billed for under the invoices.

1. Board Action: Mr. Johnson moved to authorize the general manager to pay the outstanding bills and invoices, as presented. CCGCD - Adm - FM - Accounts Payable - ACCTP-20210715-11 - $6,500.00 - ILA-202106-02-C - VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210715-10 - $6,500.00 - ILA-202105-02-C - VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210715-09 - $6,542.92 - ILA-202104-02-C - VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210715-08 - $6,634.56 - ILA-202103-02-C - VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210715-07 - $6,500.00 - ILA-202102-02-C - VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210715-06 - $17,500.00 - ILA-202104-01-C - Intera - VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210715-05 - $450.00 - ILA-202105-02-C-LS - Greg Ellis - VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210715-04 - $450.00 - ILA-202104-02-C-LS - Greg Ellis - VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210715-03 - $450.00 - ILA-202103-02-C-LS - Greg Ellis -

VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210715-02 - $450.00 - ILA-202102-02-C-LS - Greg Ellis - VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210715-01 - $150.00 - ILA-202106-02-C-LS - Greg Ellis - VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210723-02 - $49.37 - Attorney Fees- McCreary Veselka Bragg and Allen - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-202107213-01 - $8,500.00 - Inv47564 - Goldman Hunt and Notz - OPEN. Mr. Dierschke seconded the motion. The motion passed unanimously.

13. Consideration of and possible action on matters related to office administration and management including personnel, staffing, employment agreements, consultant agreements, interlocal cooperation agreements, and support services provided to and from other groundwater conservation districts.

13.1 - Report regarding Administration and Management

Meeting Discussion: Mr. Andruss explained that in order to improve and expand the efforts of the District and our cooperating districts regarding rule compliance and enforcement, a proposal to revise the personnel schedule has been developed and presented to the Board of Directors of the Victoria County Groundwater Conservation District. The revised schedule will be used in the development of the FY2022 budget for VCGCD.

The proposal changes VCGCD's staffing schedule by increasing the number of technicians from 2 to 3 and reducing the number of administrative assistants from 2 to 1. The total count of employees would remain at 7 full-time employees.

With the changes implemented, the District will have the benefit of a staff member dedicated to compliance and enforcement as well as have administrative staff schedule to work at the the District offices.

The costs associated with the implementing the revised personnel schedule will increase the VCGCD budget related to employee wages by $33,501. In order to properly share the costs, the VCGCD will submit revised interlocal cooperation agreements that 1) increase the fees charged to TGCD, RGCD, and CCGCD by 5% increase and 2) changes to the provisions related to fee credits.

The current agreement between the District and VCGCD (INTERLOCAL AGREEMENT FOR SERVICES RELATED TO GENERAL MANAGEMENT AND ADMINISTRATIVE ACTIVITIES) state "[t]his agreement will automatically renew for an additional one (1) year period on October 1 of each year unless either party provides 90-day written notice of their intent to not renew the agreement." The agreement presently costs the District a minimum of $6,500 per month (i.e., $78,000 per year) unless a qualifying event occurs

resulting in a credit by the VCGCD. This provision of the agreement (as well as the agreements between VCGCD and TGCD and RGCD) will be revised to increase the monthly minimum fee to $6,825, resulting in an annual fee of $81,900.

The current agreement between the District and VCGCD (INTERLOCAL AGREEMENT FOR SERVICES RELATED TO GENERAL MANAGEMENT AND ADMINISTRATIVE ACTIVITIES) state "[t]he VCGCD shall credit the COOPERATING DISTRICT $1,000.00 for each calendar week during which the office of the COOPERATING DISTRICT is closed for more than twelve (12) hours during normal business hours excluding office closures associate with observing federal, state, and county holidays. " This provision of the agreements (as well as the agreements between VCGCD and TGCD and CCGCD) will be revised to increase the closure period from twelve (12) hours to twenty four (24) hours. This amendment would enable the VCGCD to rotate staff between offices to ensure all offices are open with significant regularity as well as allow for the efficient use of staff.

Board Action: None.

13.2 - Appointment of Official to Calculate Tax Rates

Meeting Discussion: Mr. Andruss explained that Mr. Hubbell, the Chief Appraiser of the Calhoun County Appraisal District, has asked the District to pass a resolution or order appointing him the official designated by the Board to calculate the no-new-revenue tax rate and the voter-approval tax rate for the District.

Board Action: Mr. Dierschke moved to appoint Mr. Hubbell, Chief Appraiser of the Calhoun County Appraisal District as the official designated by the Board to calculate the no-new-revenue tax rate and the voter-approval tax rate for the District. Mr. Johnson seconded the motion. The motion passed unanimously.

14. Consideration of and possible action on matters related to legal counsel report.

Meeting Discussion: None.

Board Action: None.

15. Adjourn.

Mr. Dierschke moved to adjourn the meeting. Mr. Johnson seconded the motion. The motion passed unanimously.

Calhoun County Groundwater Conservation District
131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | Fax (361) 482-0303 | www.calhouncountygcd.org

THE ABOVE AND FOREGOING MINUTES WERE READ AND APPROVED ON THIS

THE 23rd DAY OF August A.D. 2021.

Director of the Calhoun County Groundwater Conservation District

ATTEST:

Director of the Calhoun County Groundwater Conservation District

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | Fax (361) 482-0303 | www.calhouncountygcd.org

THE STATE OF TEXAS
CALHOUN COUNTY
The Board of Directors of the Calhoun County Groundwater Conservation District convened a meeting on August 23, 2021, at 5:30 PM at 131-A N. Virginia St., Port Lavaca, Texas.

Meeting Attendance:

Precinct 1:	Mr. Steven Dierschke, Director	Absent
Precinct 2:	Mr. Wesley Brett, Vice-President	Absent
Precinct 3:	Mr. Galen Johnson, Secretary	Present
Precinct 4:	Mr. Michael Hahn, Treasurer	Present
At Large:	Mr. Harold May, President	Present
General Manager:	Mr. Timothy Andruss	Present
Legal Counsel:	Mr. James Allison	Present

Agenda Items -

1. Call the meeting to order and welcome guests.

Mr. May called the meeting to order at 5:30 PM.

2. Receive public comments.

Meeting Discussion: None.

Board Action: None.

3. Consideration of and possible action on matters related to Groundwater Management including the efforts and activities of the District regarding permitting as well as complaints, investigations, and enforcement cases associated with permitting.

3.5.1 - Permitting Request Case - PRC-20210713-01 - Antonio Santos

Meeting Discussion: Mr. Andruss explained that Mr. Antonio Santos seeks, under permitting request case PRC-20210713-01, a drilling permit and production permit authorizing construction of a well and the production of groundwater for RV park uses at rates not to exceed 50 gallons per minute or 5.9725 acre-feet per year. The proposed well will be located on a 11.945-acre tract of land near the intersection of Margie Tewney Road and Tap Road in Calhoun County, Texas.

The applications and supplemental information associated with this permitting request case are considered administratively complete and contain sufficient information evaluate the request relative to the Rules of the District. Provided the resulting permits are properly conditioned, the drilling and operation of the proposed well would satisfy the requirements as established within the Rules of the District without a waiver or variance.

On August 13, 2021, the public notice related to the consideration of the permit case was completed.

As of August 20, 2021, the District had not received notice of intent to contest the permitting request.

Board Action: Mr. Hahn moved to 1) cancel the permit hearing and proceed with the permitting case as an uncontested matter; 2) issue a drilling permit to Mr. Santos under application ADW-20210713-01 with the requirement that the proposed well be offset from the nearest property line by 50 feet; and 3) issue a production permit to Mr. Santos under application AOW-20210713-02 with the following conditions in accordance with the Rules of the District: Authorized Purpose of Use: RV Park Uses; Authorized Maximum Rate of Production per Minute: 50 gallons per minute; Authorized Maximum Rate of Production per Year: 5.9725 acre-feet per year; and Expiration Date: July 31, 2026. Mr. Johnson seconded the motion. The motion passed unanimously.

4. Consideration of and possible action on matters related to Groundwater Protection including complaints, investigations, violations and enforcement related to groundwater contamination and waste.

Meeting Discussion: None.

Board Action: None.

5. Consideration of and possible action on matters related to Groundwater Monitoring.

Meeting Discussion: None.

Board Action: None.

6. Consideration of and possible action on matters related to Groundwater Conservation.

Meeting Discussion: None.

Board Action: None.

7. Consideration of and possible action on matters related to Groundwater Resource Planning including Groundwater Management Area 15 Joint Planning and regional water planning.

Meeting Discussion: None.

Board Action: None.

8. Consideration of and possible action on matters related to Groundwater Policy including the Management Plan of the District and the Rules of the District.

Meeting Discussion: None.

Board Action: None.

9. Consideration of and possible action on matters related to Groundwater Research.

Meeting Discussion: None.

Board Action: None.

10. Consideration of and possible action on matters related to Performance Management including management goals and objectives of the District.

Meeting Discussion: None.

Board Action: None.

11. Consideration of and possible action on matters related to Meeting Management including minutes of previous meetings.

11.1 - Report Regarding Meeting Management

Meeting Discussion: Mr. Andruss explained that the next meeting of the Board of Directors is scheduled for September 13, at 5:30 PM.

Board Action: None.

11.2 - Minutes of Previous Meeting

Meeting Discussion: Mr. Andruss explained that the minutes for the meeting held on July 26, 2021, were sent the board members prior to the meeting.

Board Action: Mr. Johnson moved to accept and approved the meeting minutes for July 26, 2021, as drafted. Mr. Hahn seconded the motion. The motion passed unanimously.

12. Consideration of and possible action on matters related to Financial Management including the annual budget of the district, budget recommendation FY2022 of the district, Tax Rate for tax year 2021, bank accounts, investments, financial reports of the district, bills, and invoices of the district.

12.1 - Financial Reports and Records

Meeting Discussion: Mr. Andruss explained that the financial reports for July 2021 have been compiled, reviewed, and sent to the board members prior to the meeting. All accounts reconcile with internal records. All expenditures are related to business of the District and properly authorized.

Board Action: Mr. Hahn moved to accept and approve the financial records for July 2021. Mr. Johnson seconded the motion. The motion passed unanimously.

12.3 - Budget Recommendation for FY2022

Meeting Discussion: Mr. Andruss explained that a recommended budget for fiscal year 2022 for the District has been developed that, if adopted, would fund the operations of the District in a manner that should provide for 1) the accomplishment of the management plan goals and objectives and 2) the completion of certain projects and tasks associated with the administration of the district, groundwater conservation, groundwater management and permitting, groundwater monitoring, groundwater policy development, groundwater protection, groundwater research, and groundwater resource planning, and 3) avoid a budget deficit in Fiscal Year 2021-2022.

The recommended budget anticipates the continued cooperation with and support of the staff of the Victoria County Groundwater Conservation to be achieved through the approval of a revised interlocal cooperation agreement. The significant revisions provide for 1) an increase to the monthly fees for service from $6,500.00 to $6850.00 and 2) a decrease to the credit provided for office closure. The revised agreement includes the following changes:

7. The COOPERATING DISTRICT shall pay VCGCD a monthly fee of ~~$6,500.00~~6,825.00for services provided under this agreement. The amount of the monthly fee will be subjected to an annual review by the parties.

8. The VCGCD shall credit the COOPERATING DISTRICT ~~$1,000.00~~500.00 for each calendar week ~~during~~ for those weeks in which the office of the COOPERATING DISTRICT is closed for more than ~~twelve~~ twenty-eight(~~12~~28) hours during of normal business hours excluding weeks with office closures ~~associate~~ associated with observing federal, state, and county holidays.

Based on calculations completed by the Jackson County Tax Assessor-Collector, the following tax rates exist for the District for Tax Year 2021:

- No-New-Revenue Tax Rate: $0.008400/$100
- Voter-Approved Tax Rate: $0.009000/$100

Based on District's budget information as of June 30, 2021, the Texana Groundwater Conservation District anticipates the following fund balances at the End of the Fiscal Year: Operating Fund Balance of $122,716 and Reserve Fund Balance of $1,392,960.

The recommended budget includes and is based on the following:

- estimation of total fund balance of $1,515,676 at the end of Fiscal Year 2020-2021;
- anticipation of expenditures of $313,880 during Fiscal Year 2021-2022;
- allocation of $313,880 of the total fund balance to the Operating Fund effective October 1, 2021;
- allocation of the remainder of the total fund balance to the Reserve Fund effective October 1, 2021;
- commitment of the monies of the Reserve Fund in equal portions to groundwater conservation, groundwater management, groundwater monitoring, groundwater protection, groundwater research, groundwater resource planning, and legal contingencies with the adoption of this budget;
- anticipation of revenue from sources other than tax-related sources to be $3,000;
- adoption of a Tax Year 2021 tax rate of $0.00800/$100 of taxable value;
- anticipation of revenue from tax-related sources to be $414,144; and
- anticipation of an increase of the reserve fund by $103,264 at the conclusion of the fiscal year.

The District adopted a tax rate of $0.008280/$100 for Tax Year 2020.

The recommended tax rate for Tax Year 2021 ($0.00800/$100), if adopted, would decrease the tax rate and produce an additional $3,091 of tax revenue.

Board Action: Mr. Hahn moved to: 1. designate the budget for FY2022 recommended by the General Manager as the Proposed Budget of the District for FY2022; 2. propose a tax rate of $0.00800/$100 of taxable value for Tax Year 2021; and 3. authorize the General Manager to complete all public notice requirements to facilitate the required public hearings and action by the Board to adopt the budget for FY2022, the tax rate for Tax Year 2021, and the acceptance of the certified tax roll for Tax Year 2021 on September 13, 2021. Mr. Johnson seconded the motion. The motion passed unanimously.

13. Consideration of and possible action on matters related to office administration and management including staffing, consultant agreements, interlocal cooperation agreements, and support services provided to and from other groundwater conservation districts.

13.1 - Interlocal Cooperation Agreements for FY2022

Meeting Discussion: Mr. Andruss explained that on August 6, 2021, Mrs. Amaimo resigned her employment with the VCGCD. Her last day as an employee will be August 31, 2021.

On August 20, 2021, Mrs. Amaimo and the VCGCD entered into an agreement for her to provide services generally performed by and Administrative Coordinator to the VCGCD as an independent contractor.

On July 16, 2021, the VCGCD Board expressed interest in continuing the cooperative arrangement with RGCD, TGCD, and CCGCD, as well as adjusting the staffing schedule to reduce administrative staffing and increase technical staffing to support increase efforts related to compliance and enforcement of the rules of the district. The revised interlocal cooperation agreement used to develop the recommended budget for FY2022 was accepted and approved by the RGCD Board on August 16, 2021, the TGCD Board on August 19, 2021, and the VCGCD Board on August 20, all contingent upon the ultimate acceptance and approval by the other cooperating districts.

Board Action: Mr. Johnson moved to accept and approve the revised interlocal cooperation agreement and authorize the execution of the revised agreement by the President of the Board upon acceptance and approval by the boards of the VCGCD and the CCGCD. Mr. Hahn seconded the motion. The motion passed unanimously.

14. Consideration of and possible action on matters related to legal counsel report.

Meeting Discussion: None.

Board Action: None.

15. Adjourn.

Mr. Hahn moved to adjourn the meeting at 6:00 PM. Mr. Johnson seconded the motion. The motion passed unanimously.

THE ABOVE AND FOREGOING MINUTES WERE READ AND APPROVED ON THIS

THE 23rd DAY OF Sept. A.D. 2021.

Director of the Calhoun County Groundwater Conservation District

ATTEST:

Director of the Calhoun County Groundwater Conservation District

Calhoun County Groundwater Conservation District

131-A N. Virginia St., Port Lavaca, Texas 77979
P.O. Box 1395, Port Lavaca, Texas 77979
Phone (361) 482-0357 | Fax (361) 482-0303 | www.calhouncountygcd.org

THE STATE OF TEXAS
CALHOUN COUNTY
The Board of Directors of the Calhoun County Groundwater Conservation District convened a meeting on September 23, 2021, at 5:30 PM at the 131-A N. Virginia St., Port Lavaca, Texas.

Meeting Attendance:

Precinct 1:	Mr. Steven Dierschke, Director	Present
Precinct 2:	Mr. Wesley Brett, Vice-President	Absent
Precinct 3:	Mr. Galen Johnson, Secretary	Present
Precinct 4:	Mr. Michael Hahn, Treasurer	Present
At Large:	Mr. Harold May, President	Absent
General Manager:	Mr. Timothy Andruss	Present
Legal Counsel:	Mr. James Allison	Absent

Agenda Items -

1. Call the meeting to order and welcome guests.

   Mr. Hahn called the meeting to order at 5:30 PM.

2. Receive public comments.

   Meeting Discussion:

   Board Action:

3. Consideration of and possible action on matters related to groundwater management including the efforts and activities of the District regarding permitting as well as complaints, investigations, and enforcement cases associated with permitting.

   3.1 - Report regarding Groundwater Management

   Meeting Discussion: Mr. Andruss explained that the District has initiated 74 permitting request cases (PRCs) since October 1, 2020.

   Board Action: None.

4. Consideration of and possible action on matters related to groundwater protection including complaints, investigations, violations, and enforcement cases.

   Meeting Discussion: None.

   Board Action: None.

5. Consideration of and possible action on matters related to groundwater monitoring.

   5.1 - Intera Proposals re Groundwater Monitoring

Meeting Discussion: Mr. Andruss explained that in response to the recommendations made by Dr. Young in the Water Level Assessment Report, the District requested a proposal from Intera to improve and expand the District's effort to monitor groundwater levels. Dr. Young provided a proposal for:

1. Assignment of aquifers to water wells recorded in the District's database;
2. Development of protocols for flagging measured water levels that appear to be unrepresentative of actual aquifer conditions;
3. Establishment of criteria for assessing the adequacy of the monitoring well coverage in the Chicot and Evangeline aquifers to assess water level changes over time within Calhoun, Jackson, Refugio, and Victoria Counties;
4. Identification and evaluation of the potential benefits to groundwater monitoring to be obtained by quantifying the predictive uncertainty of the Kriged interpolation values and the average annual water levels within the report;
5. Development of an approach for identifying the most beneficial locations for adding monitoring wells (purpose-built, new monitoring wells) to the groundwater monitoring network and determination of the benefits resulting from the incorporation of the identified locations in the use of geostatistics to evaluate aquifer conditions; and
6. Design and construction specifications for dedicated aquifer monitoring wells.

The Technical Support for Monitoring project cost is $55,000 and has a spatial scope of Victoria, Calhoun, Refugio, and Jackson Counties ($13,750 per GCD).

The Board of VCGCD accepted the proposal and authorize the General Manage to initiate the project upon approval to equally share costs for the project by the boards of CCGCD, RGCD, and TGCD.

The District has also requested a proposal from Intera for updating the Water Level Assessment Report with CY2021 water level. The cost of the Update Water Level Analysis project is $10,000 ($2,500 per GCD).

Board Action: Mr. Johnson moved to 1) accept the proposals, 2) authorize the General Manage to initiate the projects upon approval to equally share costs for the project by the boards of VCGCD, RGCD, and TGCD. Mr. Hahn seconded the motion. The motion passed unanimously.

5.2 - Drought Monitoring

Meeting Discussion: Mr. Andruss explained that the U.S. Drought Monitor, produced through a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration, indicates that no portion of Calhoun County were experiencing dry or drought conditions as of August 31, 2021.

Board Action: None.

6. Consideration of and possible action on matters related to groundwater conservation.

Meeting Discussion: None.

Board Action: None.

7. Consideration of and possible action on matters related to groundwater resource planning including Groundwater Management Area 15 Joint Planning and regional water planning.

   7.1 - Report regarding Groundwater Resource Planning

   Meeting Discussion: Mr. Andruss explained that the District will participate in the next Region L Regional Water Planning Group Meeting to be held in November 2021.

   The District will participate in the Management Area 15 Meeting on October 14, 2021, at 9:30 AM at Jackson County Services Building in Edna.

   Board Action: None.

   7.2 - Summary of Public Comment Period re Proposed DFC

   Meeting Discussion: Mr. Andruss explained that on July 26, 2021, the District conducted a public hearing regarding the desired future condition proposed for adoption on April 8, 2021, for GMA 15. The proposed DFC specifies the following relevant to Calhoun County GCD:

   1. The Desired Future Condition for the counties in the groundwater management area (gma-specific DFC) shall not exceed an average drawdown of 13 feet for the Gulf Coast Aquifer System at December 2080; and
   2. Calhoun County: 5 feet of drawdown of the Gulf Coast Aquifer System.

   During the public comment period, the District did not receive comments regarding the desired future condition proposed for adoption on April 8, 2021, for GMA 15.

   Board Action: None.

8. Consideration of and possible action on matters related to groundwater policy including the Management Plan of the District and the Rules of the District.

   Meeting Discussion: None.

   Board Action: None.

9. Consideration of and possible action on matters related to groundwater research.

   Meeting Discussion: None.

   Board Action: None.

10. Consideration of and possible action on matters related to performance management including management goals and objectives of the District.

Meeting Discussion: None.

Board Action: None.

11. Consideration of and possible action on matters related to meeting management including minutes of previous meetings.

11.1 - Report regarding Meeting Management

Meeting Discussion: Mr. Andruss explained that the next meeting of the Board of Directors is scheduled for the 4th Monday, October 25, 2021, at 5:30 PM at the District Office.

Board Action: None.

11.2 - Minutes of Previous Meeting

Meeting Discussion: Mr. Andruss explained that the minutes for the meeting held on August 23, 2021, were sent the board members prior to the meeting.

Board Action: Mr. Hahn moved to accept and approved the meeting minutes for August 23, 2021, as drafted. Mr. Dierschke seconded the motion. The motion passed unanimously.

12. Consideration of and possible action on matters related to financial management including the annual budget of the district, the adoption of the annual budget for Fiscal Year 2022, adoption of the tax rate for Tax Year 2021, approval of the appraisal roll for Tax Year 2021, financial reports of the district, bills and invoices of the district.

12.1 - Proposed Budget for FY2022

Meeting Discussion: Mr. Andruss explained that the proposed budget was published on the home page of the website of the District on August 27, 2021. The District has received no comments on the proposed budget as of September 8, 2021.

Board Action: Mr. Johnson moved to approve and adopt the proposed budget for FY2022 by order. Mr. Dierschke seconded the motion. The motion passed unanimously.

12.2 - Tax Rate for TY2021

Meeting Discussion: Mr. Andruss explained that the District completed the public notice requirements related the required public hearing regarding the proposed tax rate for tax year 2021. The District has received no comments on the proposed tax rate for tax year 2021 as of September 23, 2021.

Board Action: Mr. Johnson moved to approve and adopt the proposed tax rate of $0.00800/$100 value as the tax rate for tax year 2021 and adopt the Order Adopting Tax Rate for Tax Year 2021. Mr. Dierschke seconded the motion. The motion passed unanimously.

12.3 - Appraisal Roll for TY0221

Meeting Discussion: None.

Board Action: Mr. Johnson moved to accept and approve the appraisal roll for Tax Year 2021 adopt the Order Approving the 2021 Appraisal Roll. Mr. Dierschke seconded the motion. The motion passed unanimously.

12.4 - Financial Reports and Records

Meeting Discussion: Mr. Andruss the financial reports for August 2021 have been compiled, reviewed, and sent to the board members prior to the meeting.

Board Action: Mr. Dierschke moved to accept and approve the financial records for August 2021. Mr. Johnson seconded the motion. The motion passed unanimously.

12.5 - Unpaid Accounts Payable

Meeting Discussion: Mr. Andruss explained that the District has outstanding accounts payable invoices for which the District has received the goods and services billed for under the invoices.

Board Action: Mr. Johnson moved to authorize the general manager to pay the following items: CCGCD - Adm - FM - Accounts Payable - ACCTP-20210831-01 - $252.50 - 345906-0821 - Victoria Advocate - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210831-02 - $433.69 - 8049-20210831 - Prosperity Visa - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210831-03 - $6.88 - 3070-20210831 - Prosperity Visa - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210920-01 - $6,500.00 - ILA-202107-01-C - VCGCD - OPEN; CCGCD - Adm - FM - Accounts Payable - ACCTP-20210920-02 - $6,500.00 - ILA-202108-01-C - VCGCD - OPEN. Mr. Hahn seconded the motion. The motion passed unanimously.

12.6 - Money Market Account

Meeting Discussion: Mr. Andruss explained that the District has opened a money market account for the purposes of accepting deposits of tax revenue and increasing the return on the District cash reserves.

Board Action: Mr. Johnson moved to 1) ratify the opening of the money market account on the District behalf, 2) authorize each director and the General Manager to have full authority regarding the account on the account signature card, and 3) authorize the Administrative Coordinator to have administrative permissions regarding the account to request and obtain reports regarding the account. Mr. Dierschke seconded the motion. The motion passed unanimously.

13. Consideration of and possible action on matters related to office administration and management including staffing, consultant agreements, interlocal cooperation agreements, and support services provided to and from other groundwater conservation districts.

13.1 - Report regarding Administration and Management

Meeting Discussion: Mr. Andruss explained that the VCGCD has extended an offer of employment to Caitlynn Davenport for the position of Administrative Coordinator with her first day of employment schedule for October 5, 2021. Ms. Davenport will share time between the offices of VCGCD, RGCD, and CCGCD.

Board Action: None.

14. Consideration of and possible action on matters related to legal counsel report.

Meeting Discussion: None.

Board Action: None.

15. Adjourn.

Mr. Dierschke move to adjourn the meeting at 5:42 PM, after concluding all business of the District. Mr. Johnson seconded the motion. The motion passed unanimously.

THE ABOVE AND FOREGOING MINUTES WERE READ AND APPROVED ON THIS

THE 25 DAY OF October A.D. 2021

Director of the Calhoun County Groundwater Conservation District

ATTEST:

Director of the Calhoun County Groundwater Conservation District