

Middle Pecos Groundwater
Conservation District
2024- Annual Report

General Manager: Ty Edwards



Submitted by Ty Edwards, General Manager
02/18/2025

Middle Pecos Groundwater Conservation District 2024 Annual Report

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Middle Pecos Groundwater Conservation District 2024

| Directors | | |
|--------------------------|---|--|
| Jerry McGuairt | President: Director Since February 19, 2013 | Precinct 1 |
| Janet Groth | Vice President: Director Since June 15, 2010 | Precinct 1 |
| M. R. Gonzalez | Secretary/Treasurer: Director Since December 11, 2000 | Precinct 2 |
| Puja Boinpally | Director Since April 18, 2017 | Precinct 2 |
| Weldon Blackwelder | Director Since August 16, 2011 | Precinct 3 |
| Larry Drgac | Director Since August 13, 2019 | Precinct 3 |
| Alvaro Mandujano, Jr. | Director Since November 5, 2002 | Precinct 4 |
| Ronnie Cooper | Director Since September 15, 2009 | Precinct 4 |
| Vanessa Cardwell | Director Since July 21, 2009 | City of Fort Stockton |
| Jeff Sims | Director Since November 8, 2016 | City of Iraan |
| Billy Jackson | Director Since November 5, 2024 | At Large |
| | | |
| Current Employees | | |
| Ty Edwards | General Manager: Since January 17, 2017 | Assistant Manager: Since December 2, 2013 |
| Gail Reeves | Office Secretary: Since June 3, 2013 | |
| Anthony Bodnar | Field Technician: Since May 7, 2018 | |
| | | |
| | | |

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MIDDLE PECOS GROUNDWATER CONSERVATION DISTRICT

P.O. Box 1644 Fort Stockton, TX 79735 Phone (432)336-0698 Fax (432)336-3407

405 North Spring Drive Fort Stockton, Texas 79735

Email: mpgcd@mpgcd.org

Website: www.middlepecosgcd.org

Directors

Jerry McGuairt, President Janet Groth, Vice President M. R. Gonzalez, Secretary/Treasurer

Alvaro Mandujano, Jr. Vanessa Cardwell Ronald Cooper

Weldon Blackwelder Billy Jackson Jeff Sims Puja Boinpally Larry Drgac

Employees

Ty Edwards, General Manager

Office: Gail Reeves Field Technician: Anthony Bodnar

2024 Annual Manager's Report MPGCD Board of Directors

2024 has been an extremely busy and successful year for MPGCD Board Members and staff. The District continues its commitment to manage and protect the groundwater resources of Pecos County and help maintain a sustainable, adequate, reliable, cost effective and high-quality source of groundwater to promote the vitality, economy and environment of the District.

The District held three Rule Petition hearings filed by Cockrell Investment Partners and Belding Farms. We spent a significant amount of time reviewing and addressing the comments and concerns in the Rule Petitions. At the end of the day the District felt comfortable with its current permitting program in place. A petition was filed by Cockrell Investment Partners, LP. at TCEQ on December 30, 2024. Cockrell is an affected person as defined in Texas Water Code Section 36.3011 (as a local landowner and permit holder) and submitted its Petition for Inquiry pursuant to that statute and 30 Texas Administrative Code Section 293.23.

The District continued efforts at the State level have progressed after HB 4256 passed the Texas 88th Legislature providing \$10 Million dollars to plug "Leaking Water Wells" in Pecos County. The District has met with TCEQ senior management and program staff concerning the new plugging program and awaits rulemaking.

A prehearing conference with the Railroad Commission was held on September 26, 2023, in accordance with Tex. Nat. Res. Code § 89.041 to Determine the Proper Plugging of Twelve Wells in Pecos County, Texas; District 08. The conference was continued to allow for more briefing and introduction of evidence regarding jurisdiction. A second prehearing conference was held on February 6, 2024, which required extensive argument, witness testimony, and examination and questioning by the Judge and accompanying Technical Examiner. The Judge ruled in favor of the RRC and denied the District's request to hold a hearing on the merits. This RRC position is not a surprise, and the procedure was required to exhaust administrative remedies before seeking a judicial opinion about RRC's jurisdiction and duty to plug wells. The District filed an original petition for judicial review, declaratory relief, and mandamus relief in the Travis County District Court on August 16, 2024, and a second cause filed on October 11, 2024. On September 13, 2024, the Railroad Commission filed Defendants Original Answer denying all allegations.

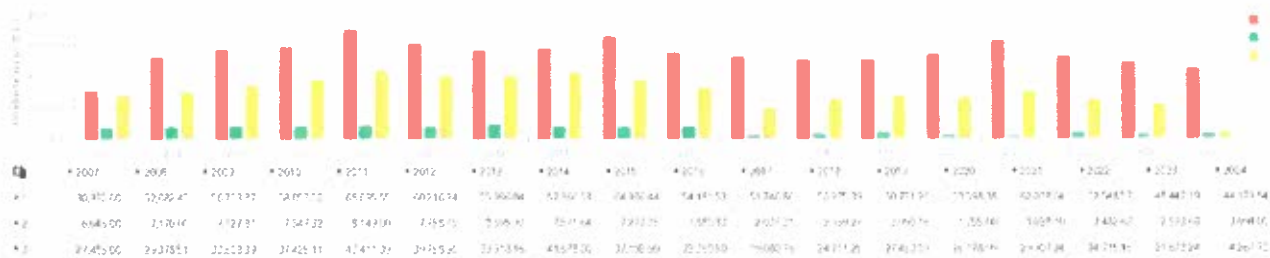
This Annual Report is an update on the District's performance in achieving the management goals contained in the District's management plan and a review of this year's work is outlined below.

NUMBER OF WELLS
 3,896 Total
 2,912 Exempt
 974 Non-Exempt

Production Explorer



Management Zone Production Explorer



Wells

Annual Production Reporting by Management Zone and Aquifer

• **2024 Rainfall**

According to the United States Drought Monitor for Pecos County, TX, the year began with less than 40% of Pecos County experiencing drought conditions (Figure 1, Water Data for Texas, 2025). By the end of 2024, however, 100% of the County was under a drought declaration, with nearly 90% facing severe or extreme drought. Throughout the County and surrounding areas, most TexMesonet stations recorded a decline in annual rainfall (Figure 2). At the Fort Stockton Pecos County Airport station, the 2024 rainfall total was nearly 70% below its historic annual rainfall average (Figure 3).

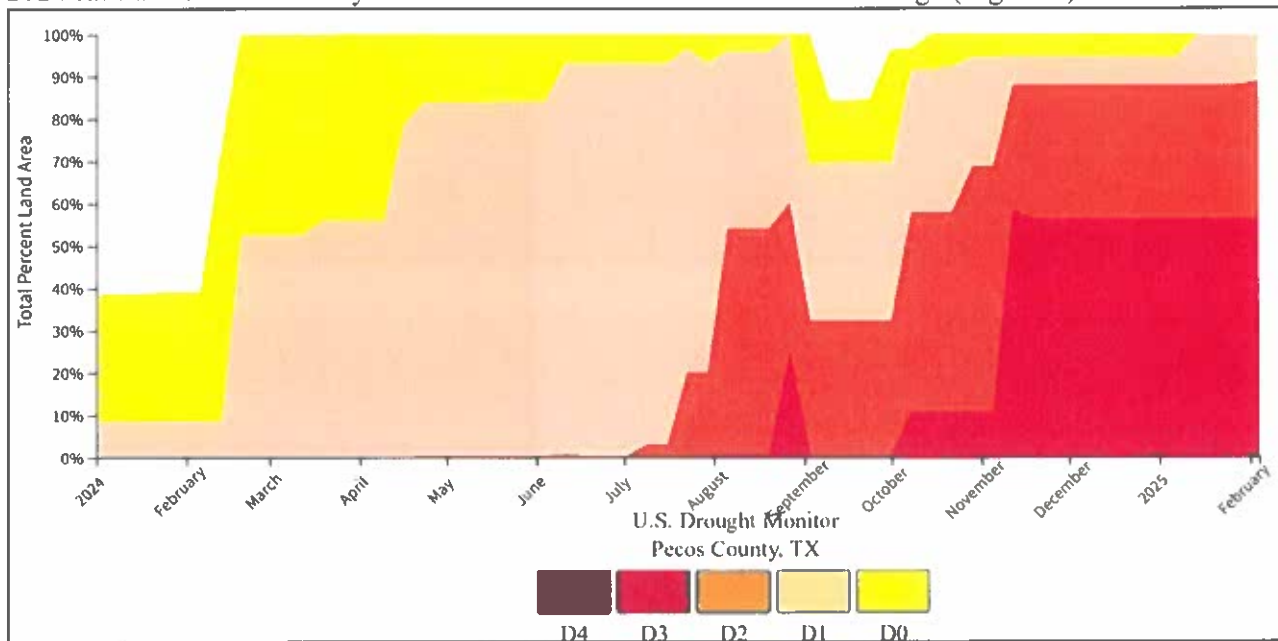


Figure 1 – United States Drought Monitor for Pecos County, Texas from 1/1/2024 to 2/1/2025. D0 = Abnormally Dry, D1 = Moderate Drought, D2 = Severe Drought, D3 = Extreme Drought, D4 = Exceptional Drought.

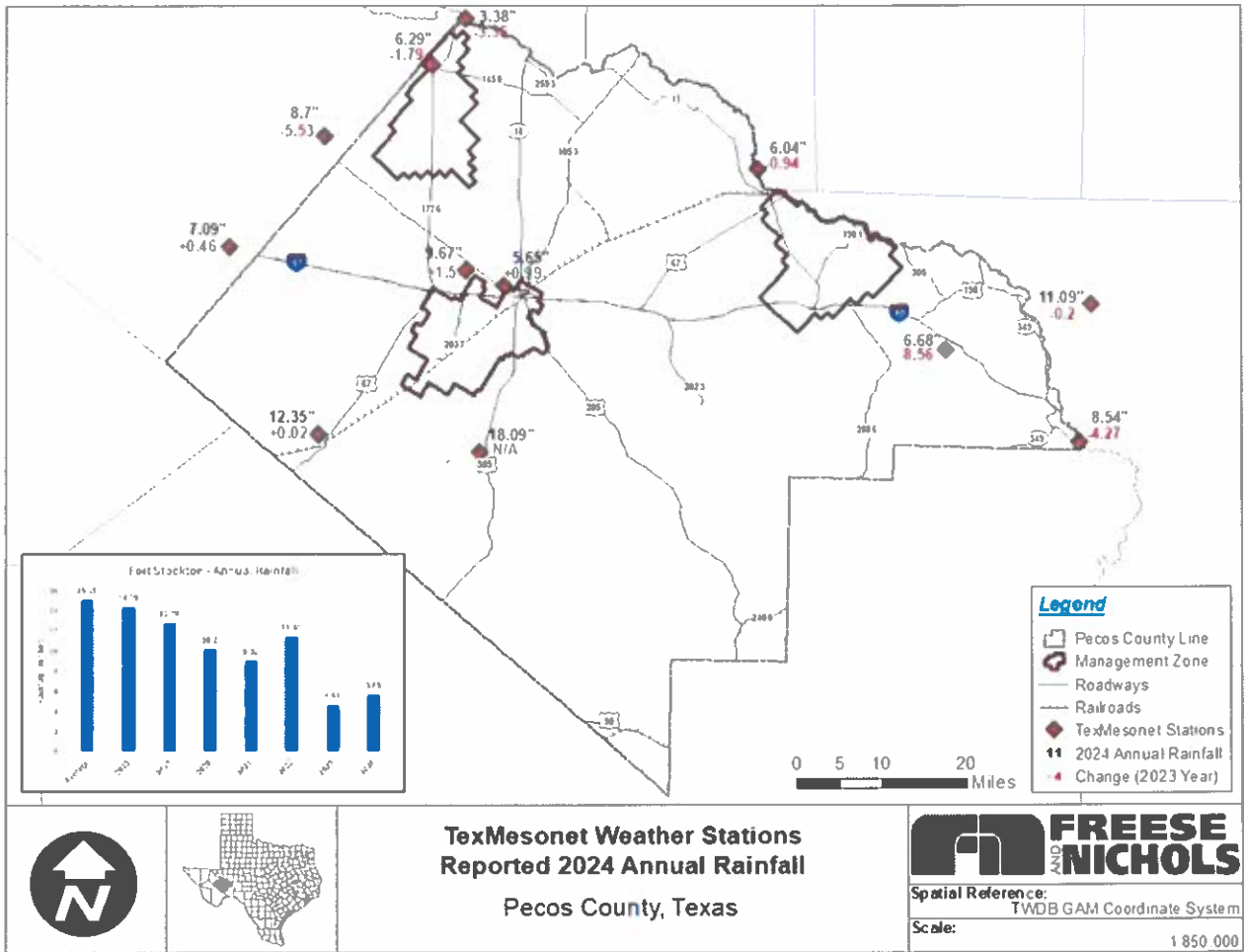


Figure 2 – TexMesonet weather stations across Pecos County, TX and surrounding areas with reported rainfall totals and change from prior year.

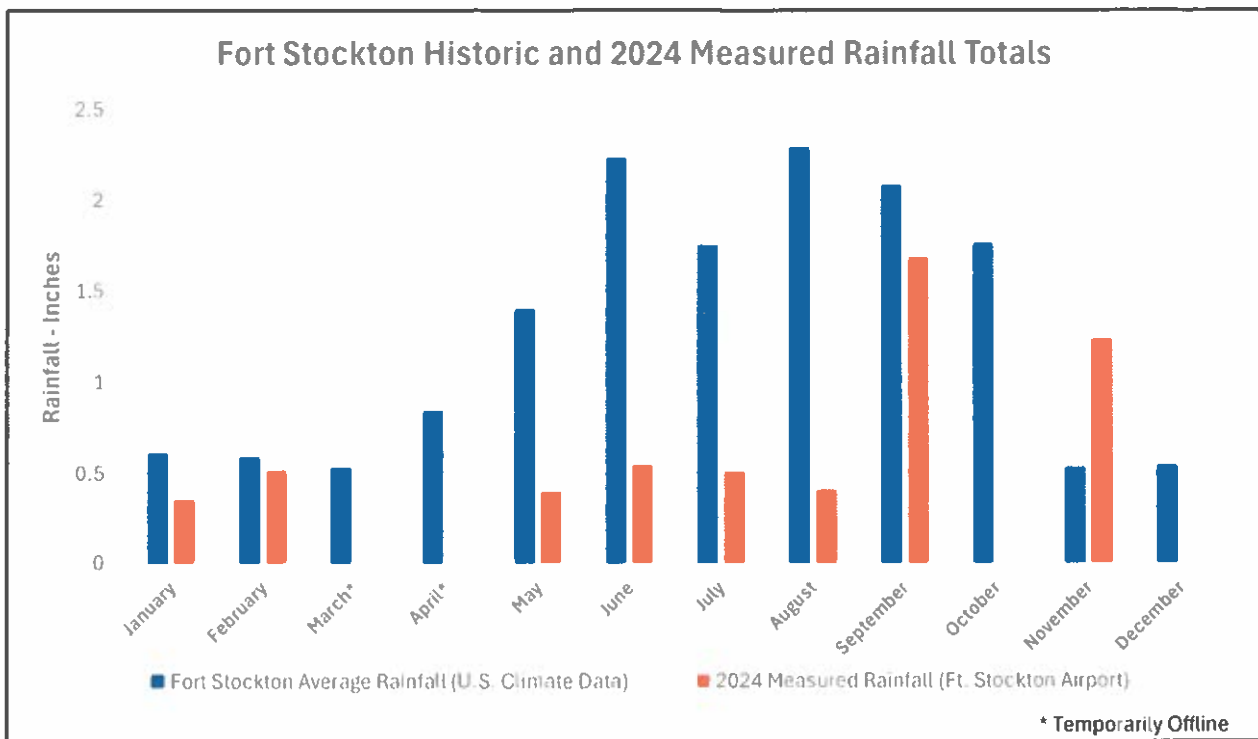


Figure 3 – Fort Stockton, Pecos County, TX Historic and 2024 Measured Rainfall Totals. Historic rainfall data according to the U.S. Climate Data and Center and measured rainfall according to TexMesonet KFST station data.

- **2024 Water Levels**

Steady water level declines and seasonal fluctuations consistent with drought were observed across the County (Figure 4). In areas with minimal pumping, water levels remained relatively constant. Whereas areas with irrigated croplands (Management Zone 1 and 3) showed relatively mild drawdowns.

Currently, 139 water wells are monitored in Pecos County, with 58% (81 of 139) remaining stable or showing a gain (recovery) when compared to their 2024 winter measurement (Figure 4). Of the 58 wells experiencing drawdowns, 52 demonstrated less than 10 feet of decline while only two wells had declines over 20 feet.

When comparing 2012 to 2025 water level measurements, the general trend is flat to slightly downward, with most drawdown observed in Management Zone 3 and along the Reeves County Line (Figure 5). Monitor well #230 (“Allison Ranch Generator Well”) in southern Pecos County has shown the most significant decline over the period. This has been previously discussed in prior General Manager Reports, and more recently has shown signs of stability.

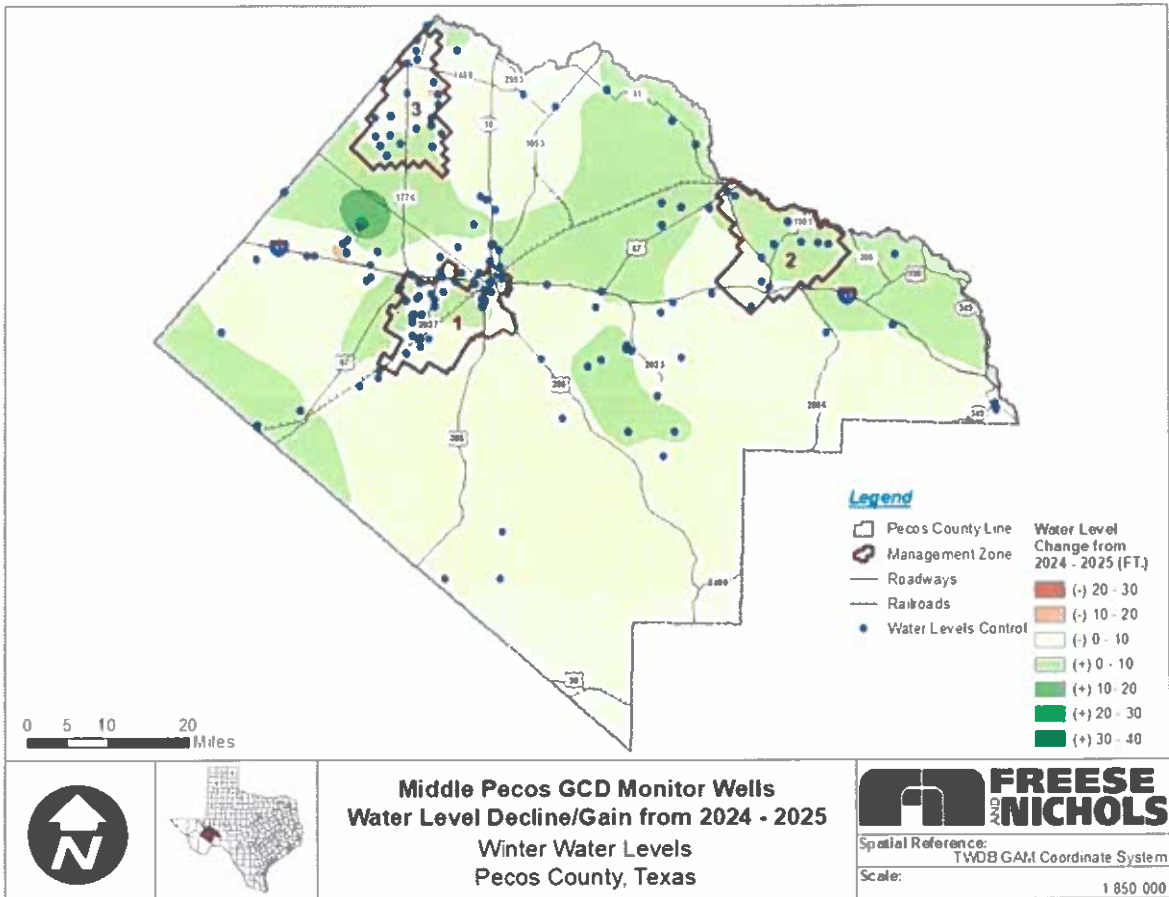


Figure 3 – Pecos County, TX Water Level Decline/Gain from 2023 – 2024. Gains are visible as shades of green while declines are illustrated as yellow to shades of red.

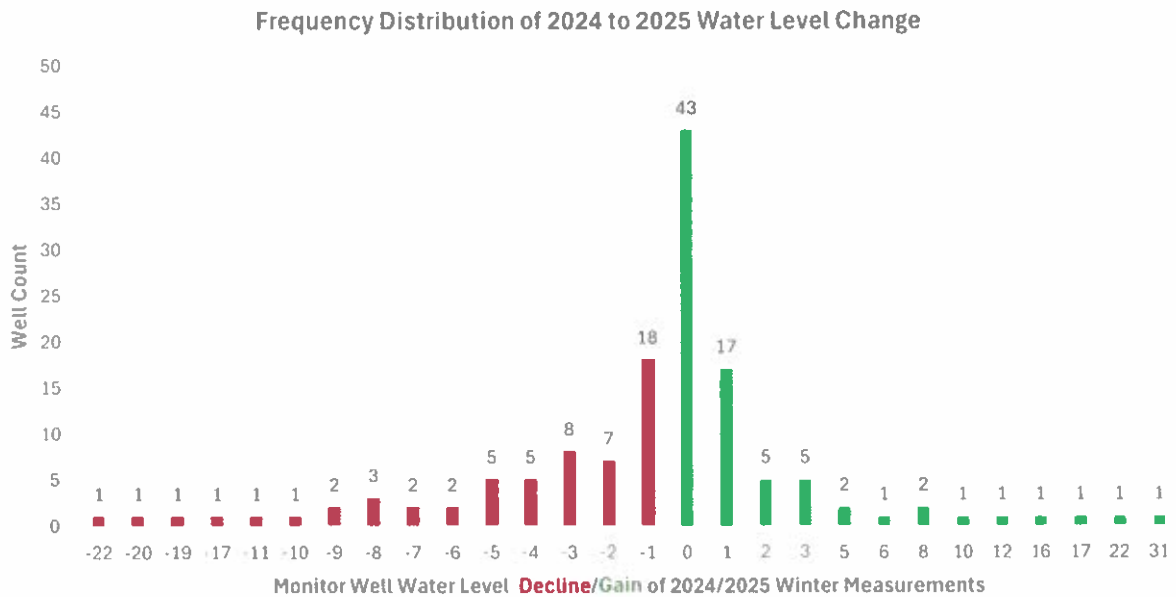


Figure 4 – Monitor well winter water level change from 2024 to 2025. Red illustrates a year-over-year decline while green illustrates a water level gain (recovery). This chart includes data from the monitor wells where 2024 and 2025 winter measurements were available.

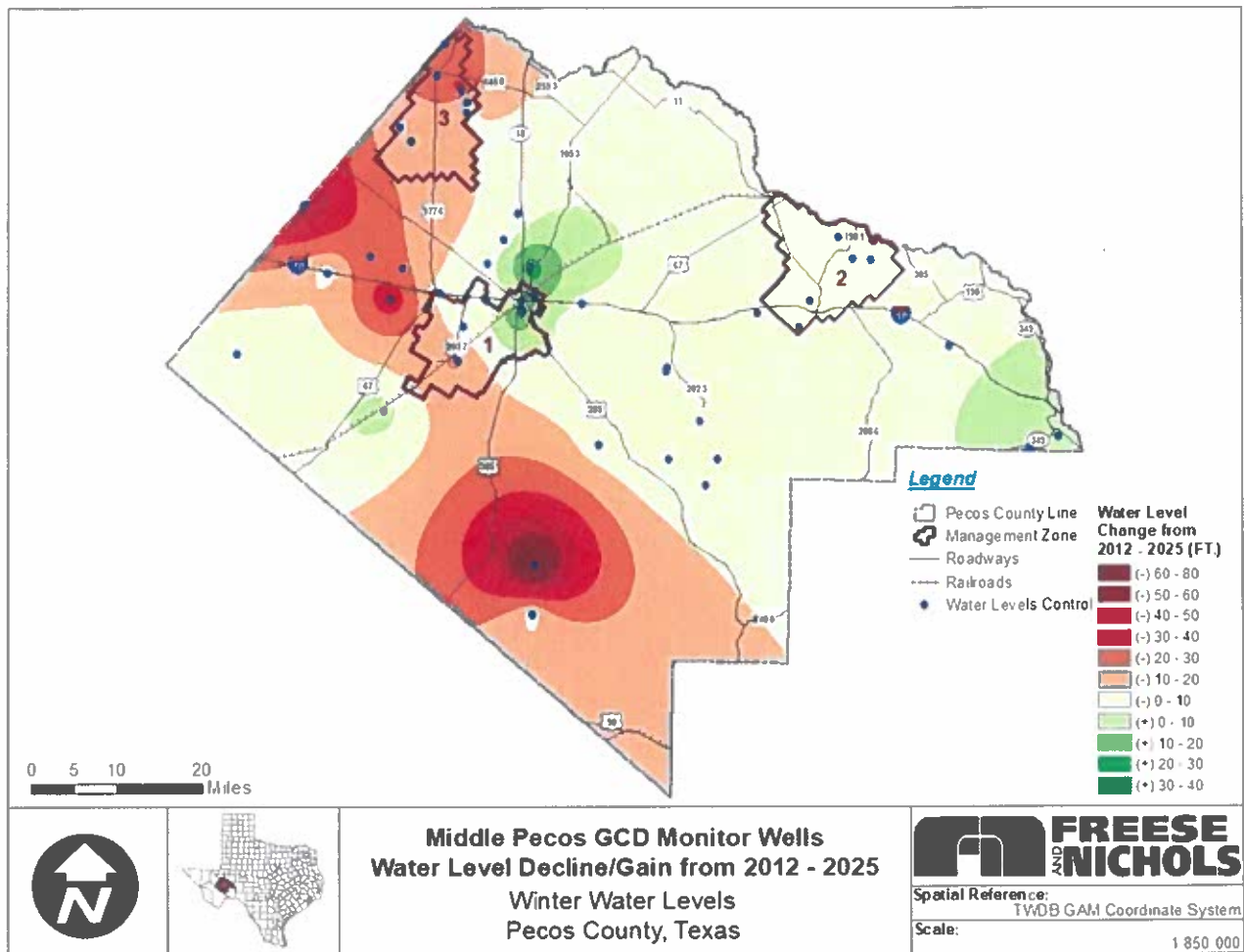


Figure 5 - Pecos County, TX Water Level Decline/Gain from 2012 - 2025. Gains are visible as shades of green while declines are illustrated as yellow to shade of red.

- In Corporation with local landowners 50 water samples have been collected across Pecos County in 2024.
- **Diamond Y Spring**-The Nature Conservancy has installed Telemetry in Diamond Y Springs. The Conservancy has created an extensive groundwater monitoring program to track spring flows, water quality, and the health of the pupfish and other species. Over the last few years, we have seen a decrease in flows during the summer months and a recovery in winter months. Diamond Y Spring Preserve protects one of the largest and last remaining Cienega systems in West Texas. The District updated the geologic model in 2021 and 2023, around the Diamond Y Spring area and was able to map several faults. The District has installed 6 full time monitoring wells equipped with In-Situ Transducers recording water level and water quality in real time. This equipment is installed in 5 Edwards Trinity Wells and 1 Rustler Well around the spring area.

- **Santa Rosa Spring-** continues to remain dry. The spring bed is being monitored and we are tracking changes in pressure during rain fall events.
- **Comanche Spring-** is continually monitored for flow, pressure, and conductivity during the Winter Spring Season. No Flow at Comanche Spring was measured in Winter of 2024.
- The District drilled a **Monitor Well at the MPGCD Office located at 405 North Spring Drive**. The purpose of the well is for an educational monitoring site outside the office. An 8ft Aeromotor windmill has been installed over the well with full time In-Situ monitoring equipment downhole. A full exhibit has been erected at the site.
- **San Andres Abandoned Wells-** Progress has been made on the abandoned well problems in 2024. HB 4256 passed the Texas Legislature with overwhelming support in 2023 and made available \$10 Million Dollars to start a program to plug some of the wells that qualify. The District has met with TCEQ staff multiple times and await TCEQ rulemaking.

An official complaint has been filed at the RRC to plug 12 of the abandoned wells. The regulatory hearings activity from last fall through this summer at the Railroad Commission, and ultimately the Commissioners' final action on our request that wells be added to RRC's plugging list and prioritized for plugging. The RRC denied all our requests, which is not a surprise. This procedure was required to exhaust administrative remedies before seeking a judicial opinion about RRC's jurisdiction and duty to plug. The next step was for the District to file an original petition for judicial review, declaratory relief, and mandamus relief in the Travis County District Court, which was accomplished on August 16, 2024. Because RRC undertook additional procedural steps, we were conservative to ensure that we exhausted administrative remedies and then filed a second original petition on October 11, 2024, Cause No. D-1-GN-24-005222 (200th District Court, Travis County).

- **PECOS COUTNY GROUNDWATER MODEL Phase 1** of building a groundwater flow model has begun with completion of the model anticipated for 2025. The objective is to develop a tool that would assist the District in groundwater management. The google link for the tech memos is available at:

<https://drive.google.com/drive/folders/1HYj8JRV4omAgKPJWBta-T20hZUbtyaPS>.

Specific uses that are contemplated include:

- DFC development without the need to use regional GAM's.
- Provide a quantitative basis for future updates to the District's rules that set a threshold on well size/pumping amount for requiring permit applicants to prepare hydrologic reports.
- Provide a tool that can be used to review permit applications by quantifying the potential impacts of new pumping for any formation/aquifer in the District on a regional scale.
- Assess the relationship between groundwater pumping and spring flow at Comanche Springs on a monthly time scale.
- The **third round of joint planning** for Groundwater Management Areas 3 and 7 is complete and the fourth round of joint planning is underway. For this round, the statutory deadline to propose desired future conditions (DFC's) is May 1, 2026, and the deadline to submit final DFC's to the Texas Water

Development Board is January 5, 2027. I attended 100% of all the GMA 3 and GMA 7 meetings held in 2024.

https://www.twdb.texas.gov/groundwater/management_areas/gma3.asp

https://www.twdb.texas.gov/groundwater/management_areas/gma7.asp

- The **Region F Water Planning Group** is tasked with developing and adopting a regional water plan in accordance with Texas Senate Bill 1 and Texas Senate Bill 2. The 2021 Region F Plan was submitted to the Texas Water Development Board, and we held our last meeting to adopt the 2021 plan on September 17, 2020. The sixth cycle of regional planning is underway for the 2026 State Water Plan. I am a voting member of Region F representing Groundwater Management Area 3 and have attended 100 percent of the scheduled meetings for Region F in 2024.

<https://www.twdb.texas.gov/waterplanning/rwp/plans/2021/index.asp>

- **Fort Stockton Holdings** 28,400 ac/ft export permit was renewed for a 3-year permit term effective July 18, 2023-2026, in accordance with District Rule 11.8(f) and Texas Water Code 36.1145. FSH and MPGCD approved a Joint Study to be proactive, to develop scientific data that will provide FSH, the District, and other stakeholders with more certainty about conditions in the Edwards-Trinity Aquifer. FSH agreed to pay \$250,000 to contribute to the study. As of this date the District has installed transducers, which record pressure, temperature, and conductivity at the 11 Threshold monitor well sites.

FSH Threshold Well Dashboard is available at <https://mpgcd.half.com/Dashboard>.

As contemplated in the joint study agreement FSH and the District began work on Rustler Monitor Well Recommendations and beginning scope of work on drilling of well and bid specs for same. The District met on site with Jeff Williams and Raymond Straub to decide on a preliminary drilling location and source water.

- **Management Zone 1 Threshold Wells**
Management Zone 1 Threshold Wells are continuously monitored, and data is provided by telemetry in HydroVu (Figure 6). Water levels demonstrate relative year-over-year consistency as they are mostly in line with 2022 and 2023 measurements. All threshold wells will be evaluated on April 1st for Winter 1 – 4 water level threshold trigger levels.



Figure 6 – HydroVu Threshold Well Dashboard. The HydroVu dashboard provides continuous reporting of water level depth, temperature, pressure, conductivity, and total dissolved solids.

Cockrell vs MPGCD

A. Cockrell Investment Partners, L.P. v. MPGCD and its Board President in his official capacity, FSH and Republic Water Company of Texas, L.P., Case No. 23-0742 (Texas Supreme Court)(Cockrell I);

In Cockrell I, the El Paso Court of Appeals on July 13th denied Cockrell’s motion for rehearing after further briefing thereby affirming the trial court’s ruling in favor of the District’s decision. A new deadline to appeal to the Texas Supreme Court is September 27th by petition for review. A 2nd new deadline to appeal has been approved for October 27th. On November 9th, the District and FSH filed brief responses with the Court advising that in accordance with Rule 53, each party will respond if the court is interested in responses. A Petition for Review is under review by the Court.

B. Cockrell Investment Partners, L.P. v. MPGCD and its General Manager in his official capacity, and FSH, Case No. 23-0593 (Texas Supreme Court)(Cockrell II);

In Cockrell II, the El Paso Court of Appeals on July 10th denied Cockrell’s motion for rehearing after further briefing thereby affirming the trial court’s ruling in favor of the District’s decision. The Court of Appeals issued a substitute opinion and judgment with its reasoning that there is no jurisdiction in the courts for Cockrell to pursue its claim, including the reason that Cockrell prematurely filed its lawsuit by not waiting for its motion for rehearing filed at the District to expire. On August 2nd, the Court of Appeals issued a revised opinion and judgment correcting typographical errors. September 18 Cockrell requests extension to file appeal with Texas Supreme Court. On October 25th Cockrell timely filed Petition for Review. On November 9th the District and FSH filed brief responses with the Court advising Rule 53. On November 28 Petition for Review is “under review” by the Court.

C. **Cockrell Investment Partners, L.P. v. Ty Edwards, In His Capacity as General Manager, and FSH**, Case No. 08-23-00178-CV (El Paso Court of Appeals)(Cockrell III);

In Cockrell III, a hearing in front of Judge Ables occurred on May 30, 2023. The Court ruled in favor of FSH and MPGCD by granting their Pleas to the Jurisdiction. There was a disagreement with Cockrell over the finality of the trial court's judgment and fee reimbursement, which Judge Ables cleared up by signing a modified order on July 19. August 14th is the deadline for Cockrell to file its appellate brief at the Court of Appeals. Cockrell timely filed and the District and FSH's appellate briefs were timely filed September 26. On October 13th Cockrell filed a reply brief.

D. **Cockrell Investment Partners, L.P. v. Middle Pecos Groundwater Conservation District**, Cause No. P-8626-83-CV (83rd District Court)(Cockrell IV); and

In Cockrell IV, the lawsuit was filed on August 17th and served on September 13th by agreement. The District's answer and counterclaim was timely filed October 9th. FSH has advised that it will intervene and file plea to the jurisdiction.

E. **Cockrell Investment Partners, L.P. v. Middle Pecos Groundwater Conservation District**, Cause No. P-13031-112-CV (112th District Court)(Cockrell V).

In Cockrell V, the lawsuit was filed on August 23rd and served on September 13th by agreement. The District's answer and counterclaim was timely filed October 9th. FSH has advised that it will intervene and file plea to the jurisdiction.

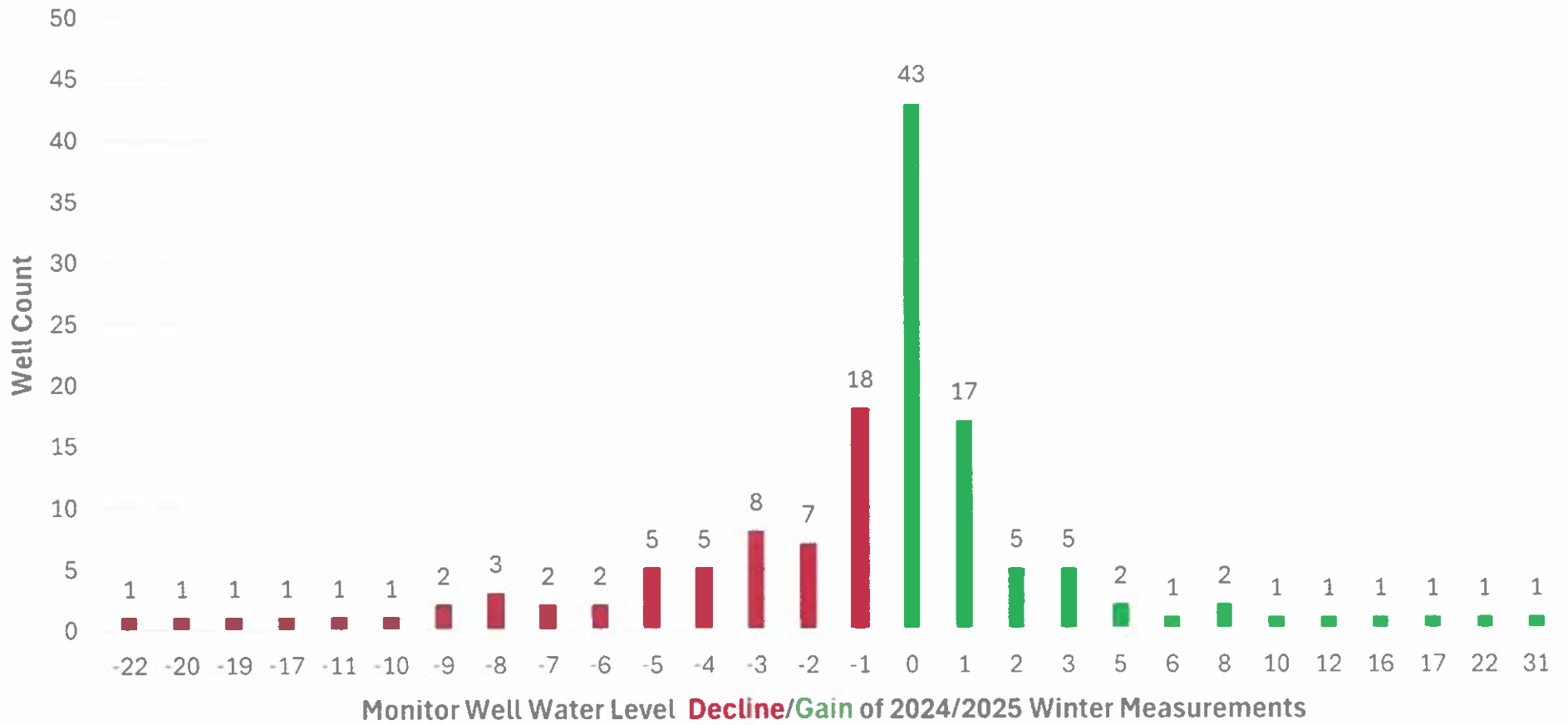
- The 89th Texas Legislature is underway. Lawmakers will convene in Austin on January 14, 2025 and have already filed nearly 2,000 bills since November 12, 2024. Of particular interest to the GCD community, Rep. Mark Dorazio has filed an attorney's fees bill (HB 1050) and Rep. Harris has filed a bill establishing a groundwater science fund at the TWDB (HB 1400).
- As General Manager of the District, I would like to thank MPGCD Directors for all the hard work and time you dedicated to 2024.



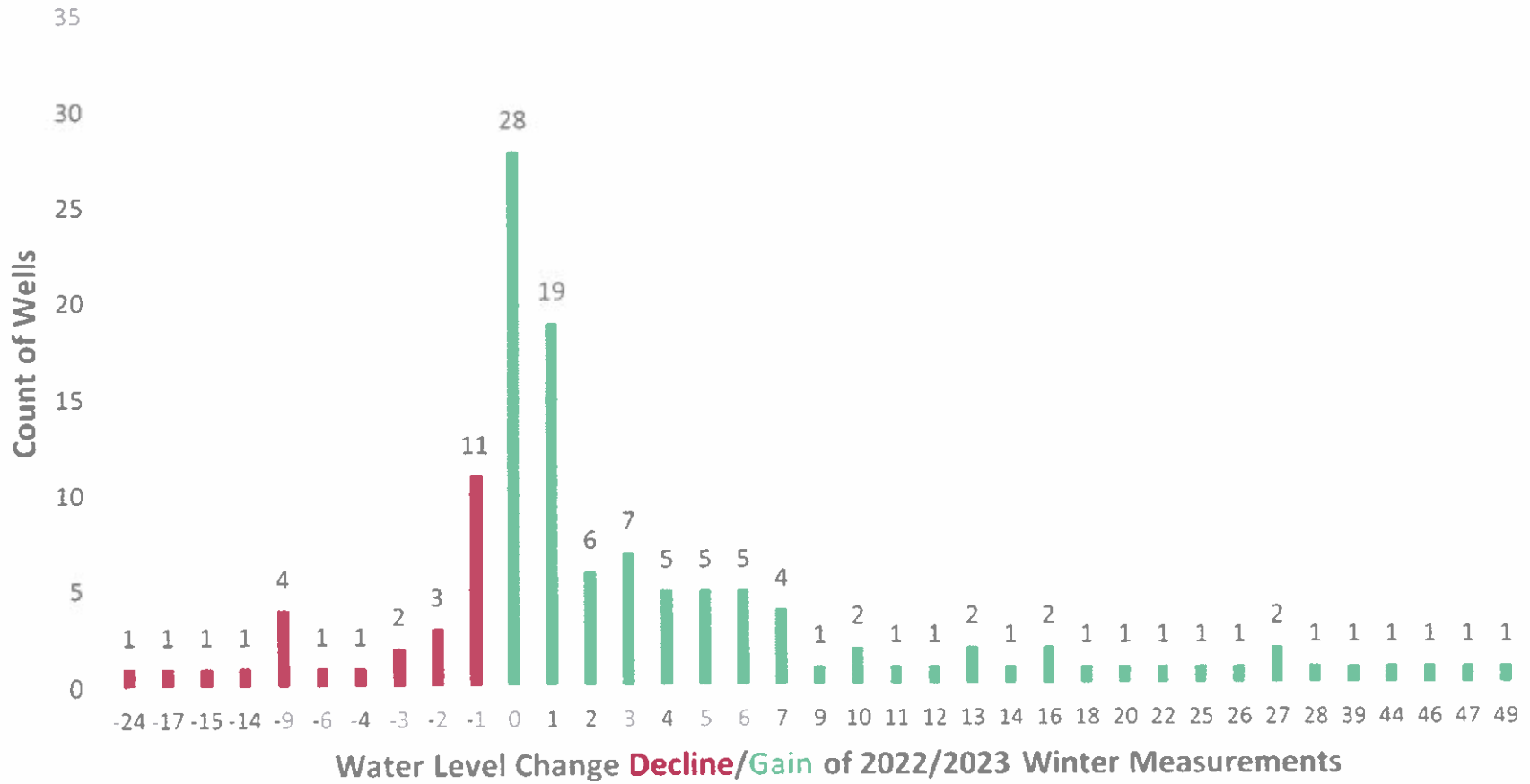
Ty Edwards, General Manager

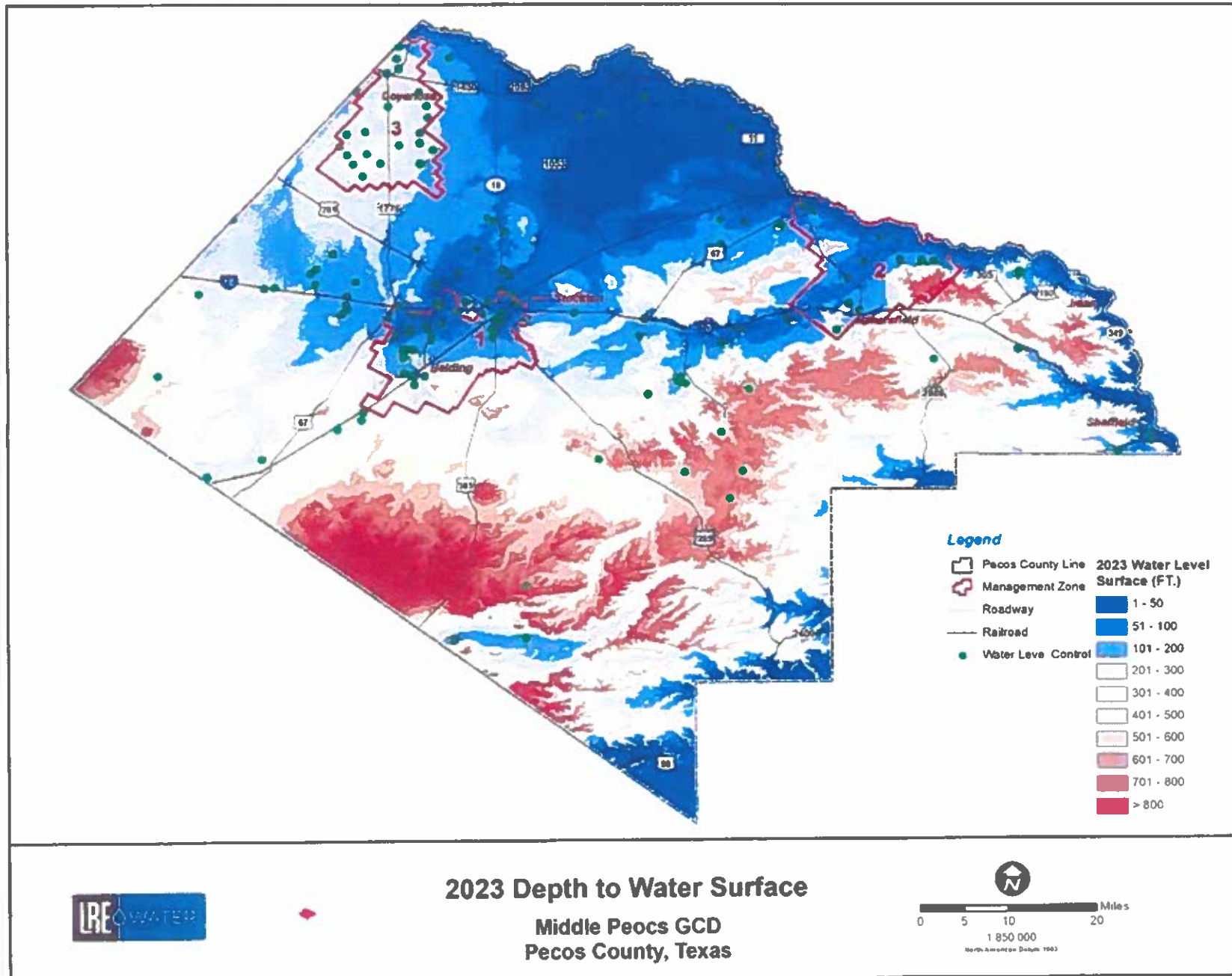
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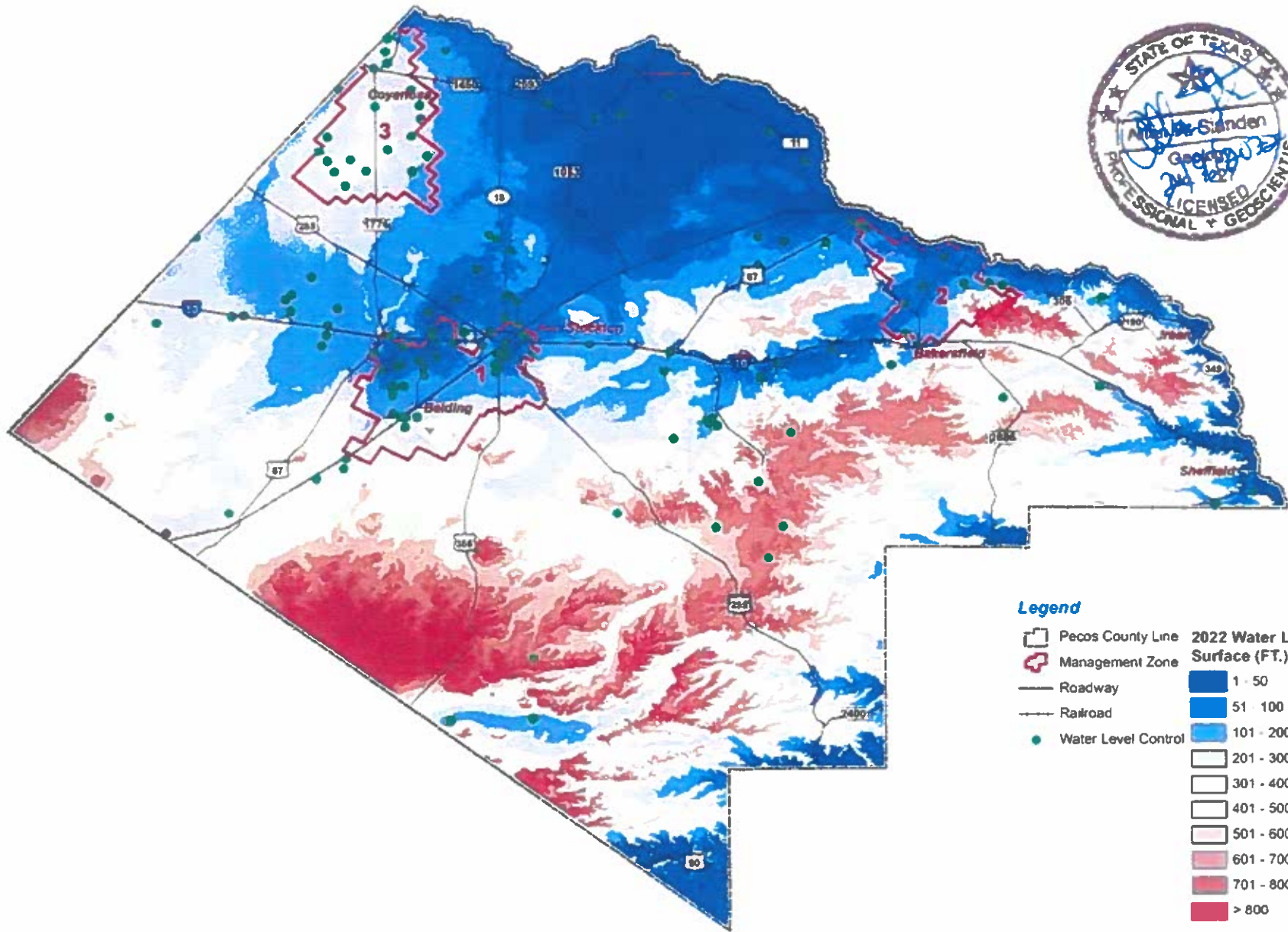
Frequency Distribution of 2024 to 2025 Water Level Change



Frequency Distribution of 2022/2023 Water Level Change







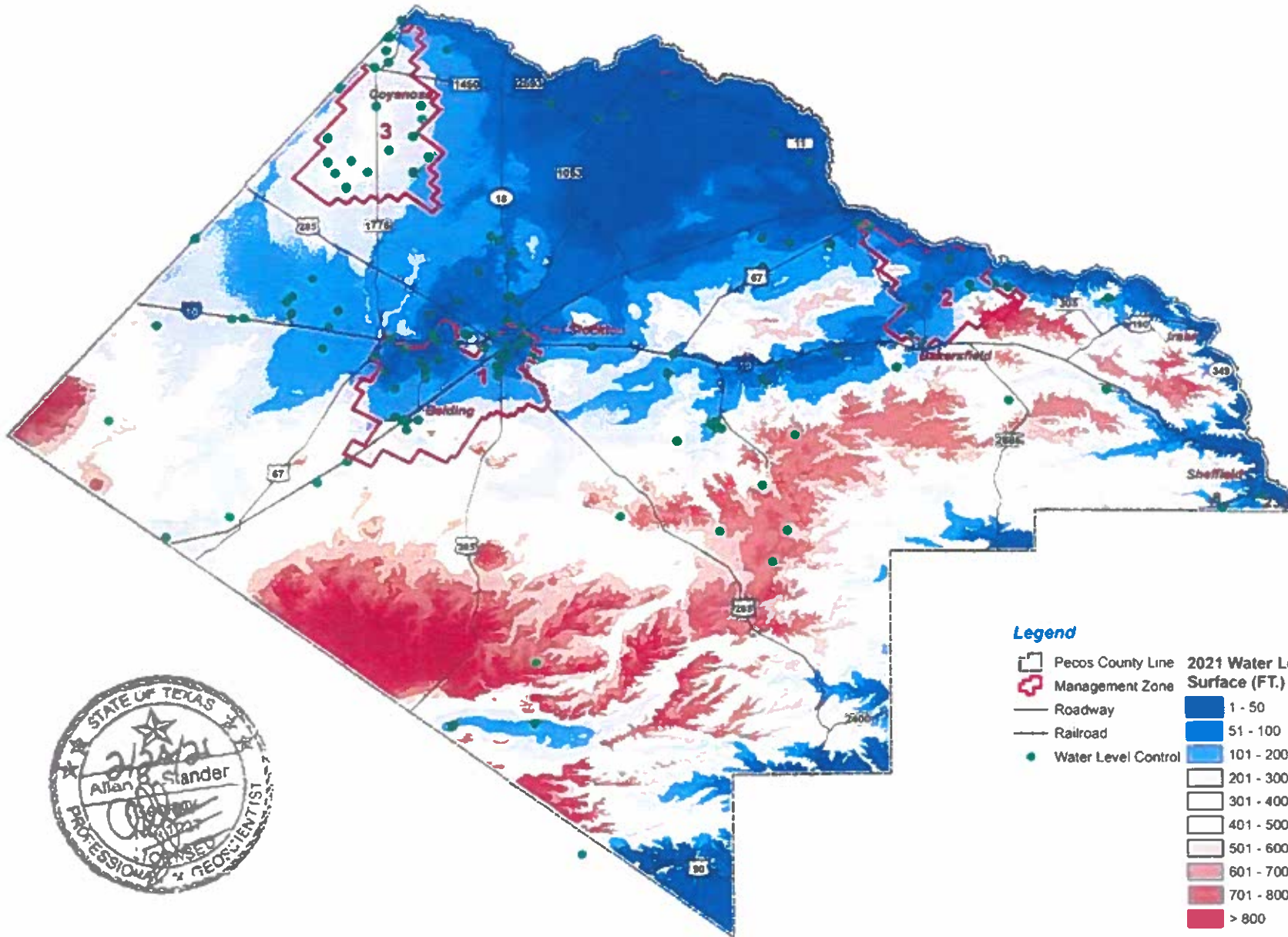
Legend

- Pecos County Line
 - Management Zone
 - Roadway
 - Railroad
 - Water Level Control
- | 2022 Water Level Surface (FT.) | |
|--------------------------------|-----------|
| | 1 - 50 |
| | 51 - 100 |
| | 101 - 200 |
| | 201 - 300 |
| | 301 - 400 |
| | 401 - 500 |
| | 501 - 600 |
| | 601 - 700 |
| | 701 - 800 |
| | > 800 |



2022 Depth to Water Surface Pecos County, Texas





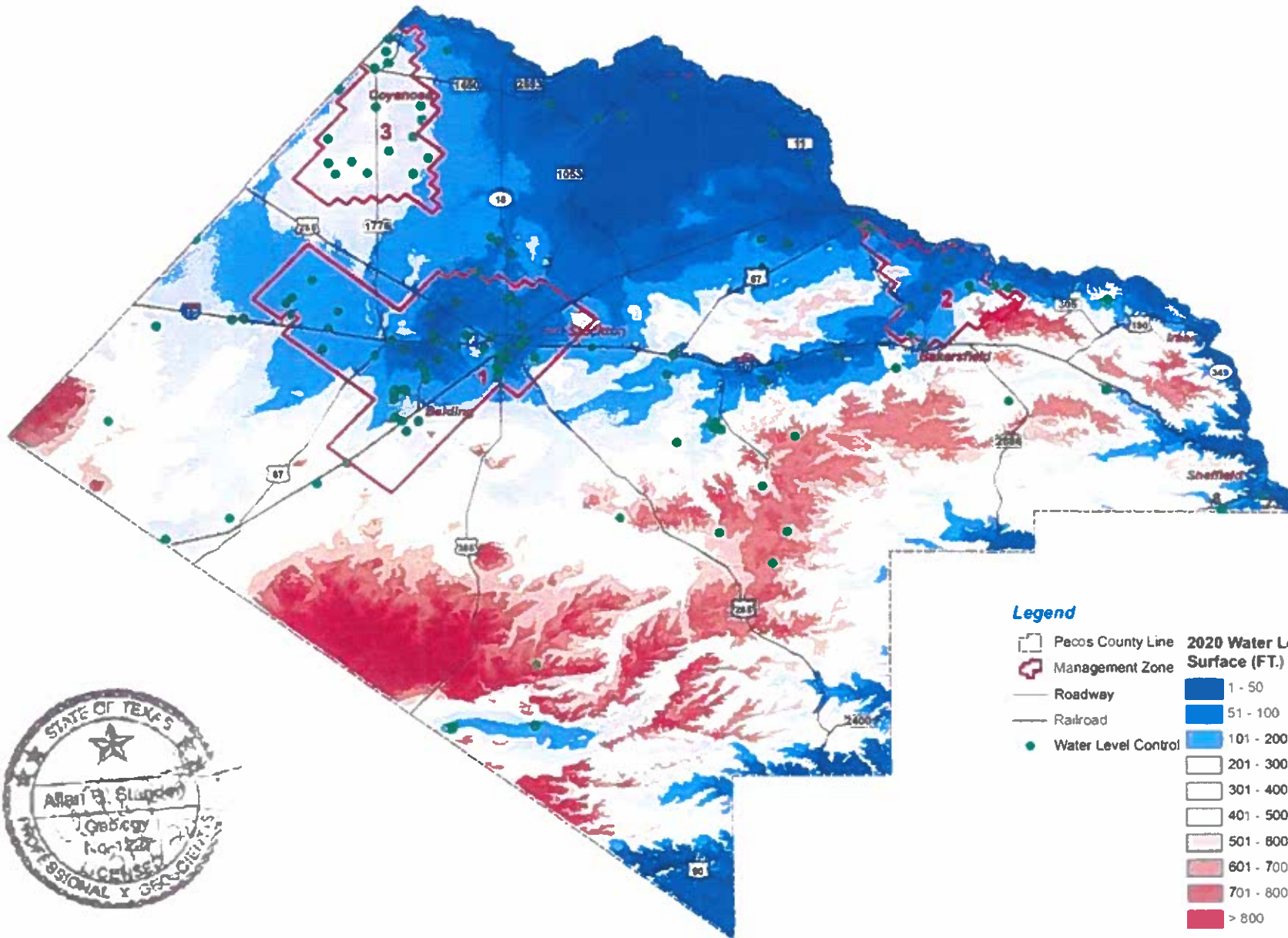
Legend

- Pecos County Line
 - Management Zone
 - Roadway
 - Railroad
 - Water Level Control
- 2021 Water Level Surface (FT.)**
- 1 - 50
 - 51 - 100
 - 101 - 200
 - 201 - 300
 - 301 - 400
 - 401 - 500
 - 501 - 600
 - 601 - 700
 - 701 - 800
 - > 800



**2021 Depth to Water Level
Pecos County, Texas**





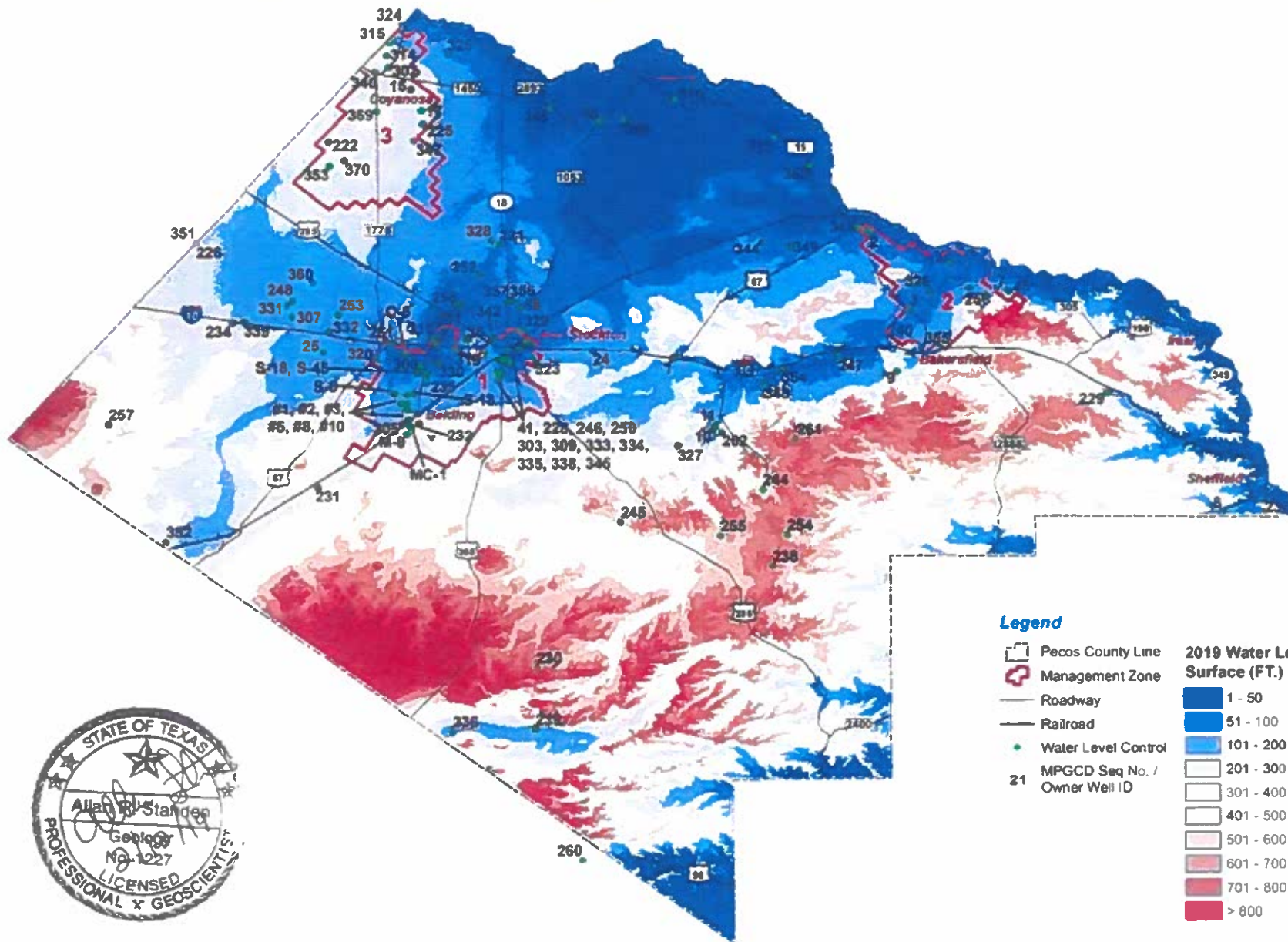
Legend

- | | | |
|--|---------------------|---------------------------------------|
| | Pecos County Line | 2020 Water Level Surface (FT.) |
| | Management Zone | |
| | Roadway | |
| | Railroad | |
| | Water Level Control | |
| | | |
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| | | > 800 FT color swatch"/> |



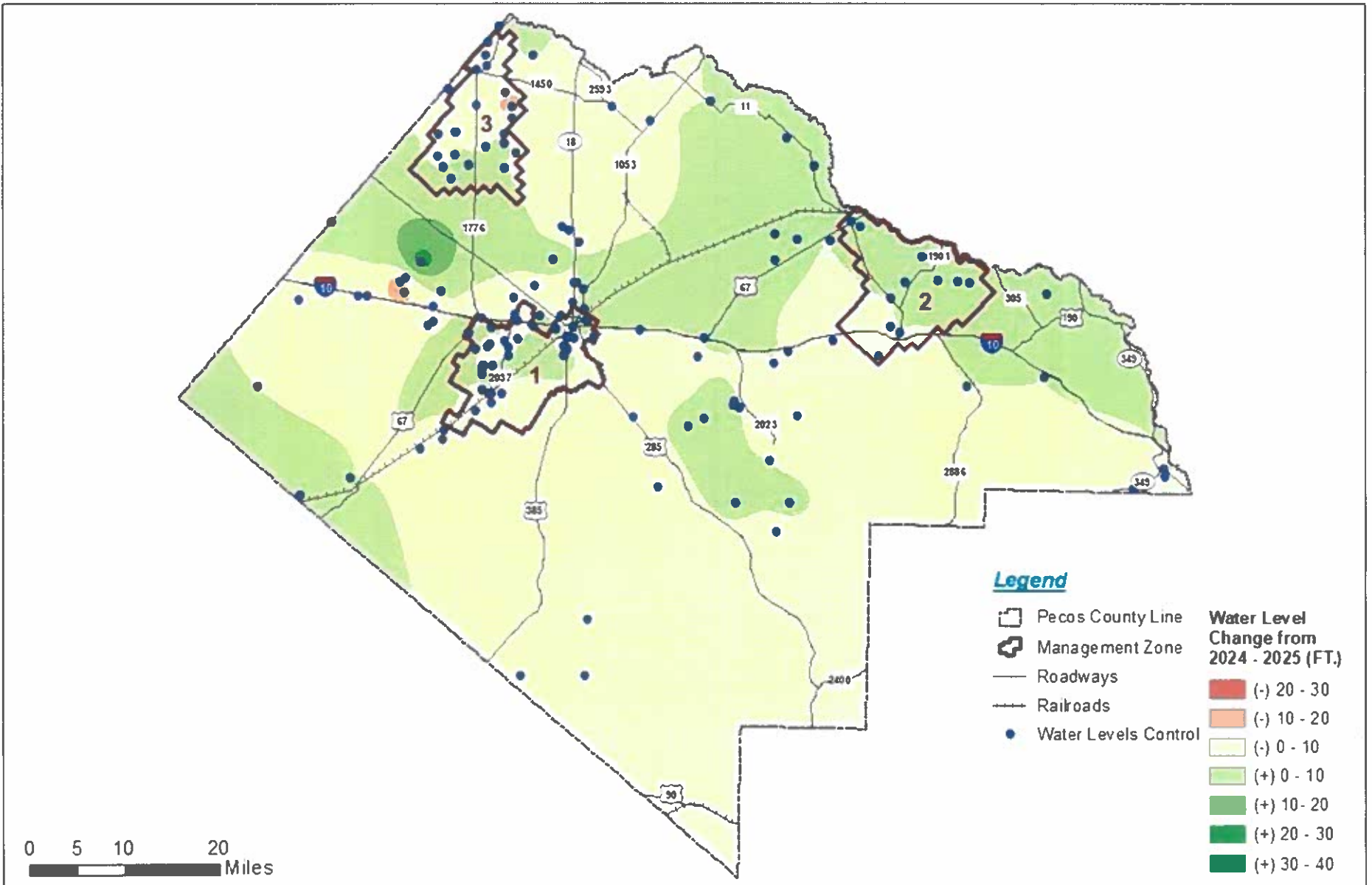
**2020 Depth to Water Level
Pecos County, Texas**





2019 Depth to Water Level Pecos County, Texas



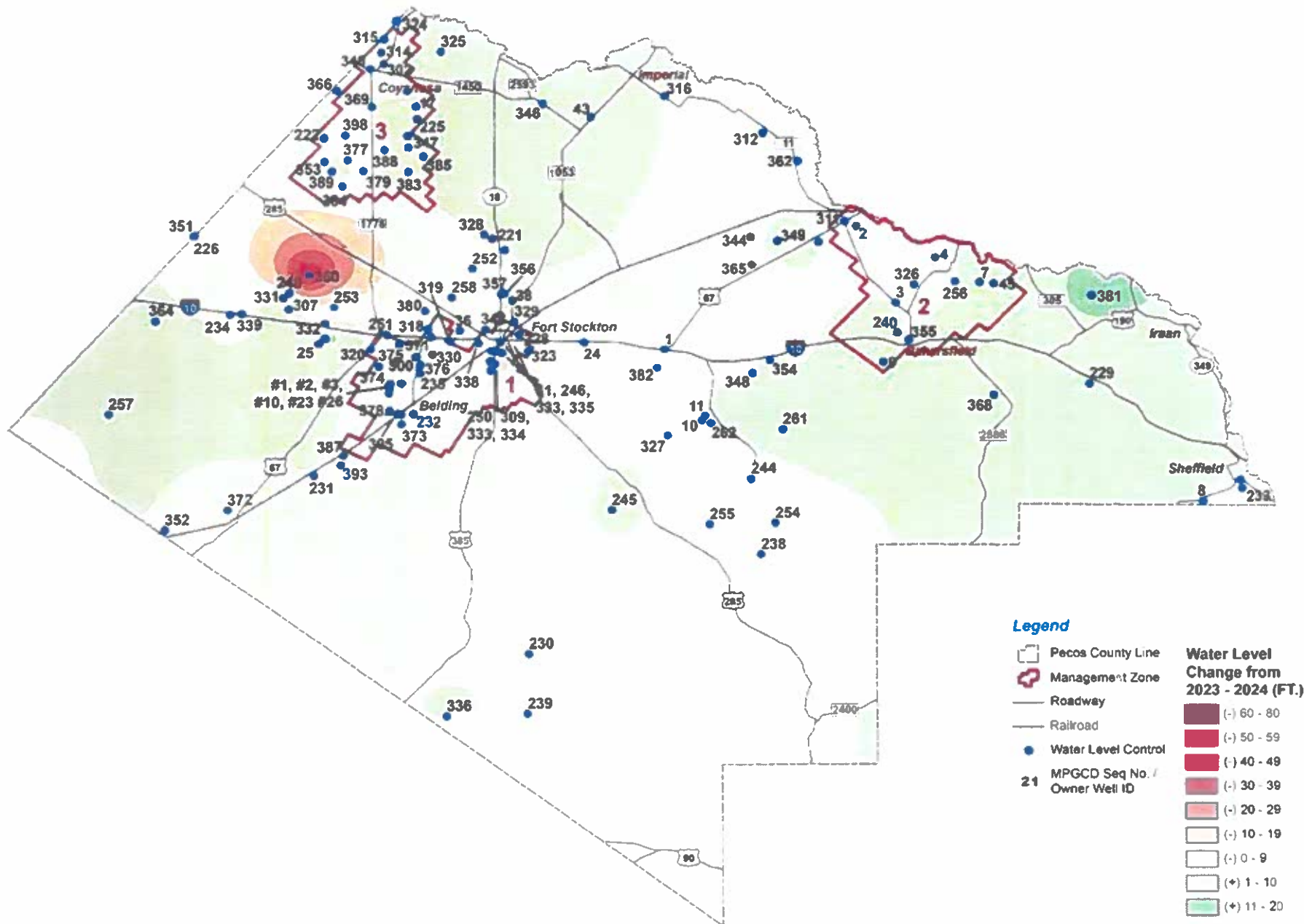


Middle Pecos GCD Monitor Wells
Water Level Decline/Gain from 2024 - 2025
 Winter Water Levels
 Pecos County, Texas

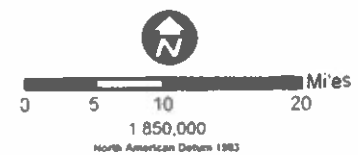


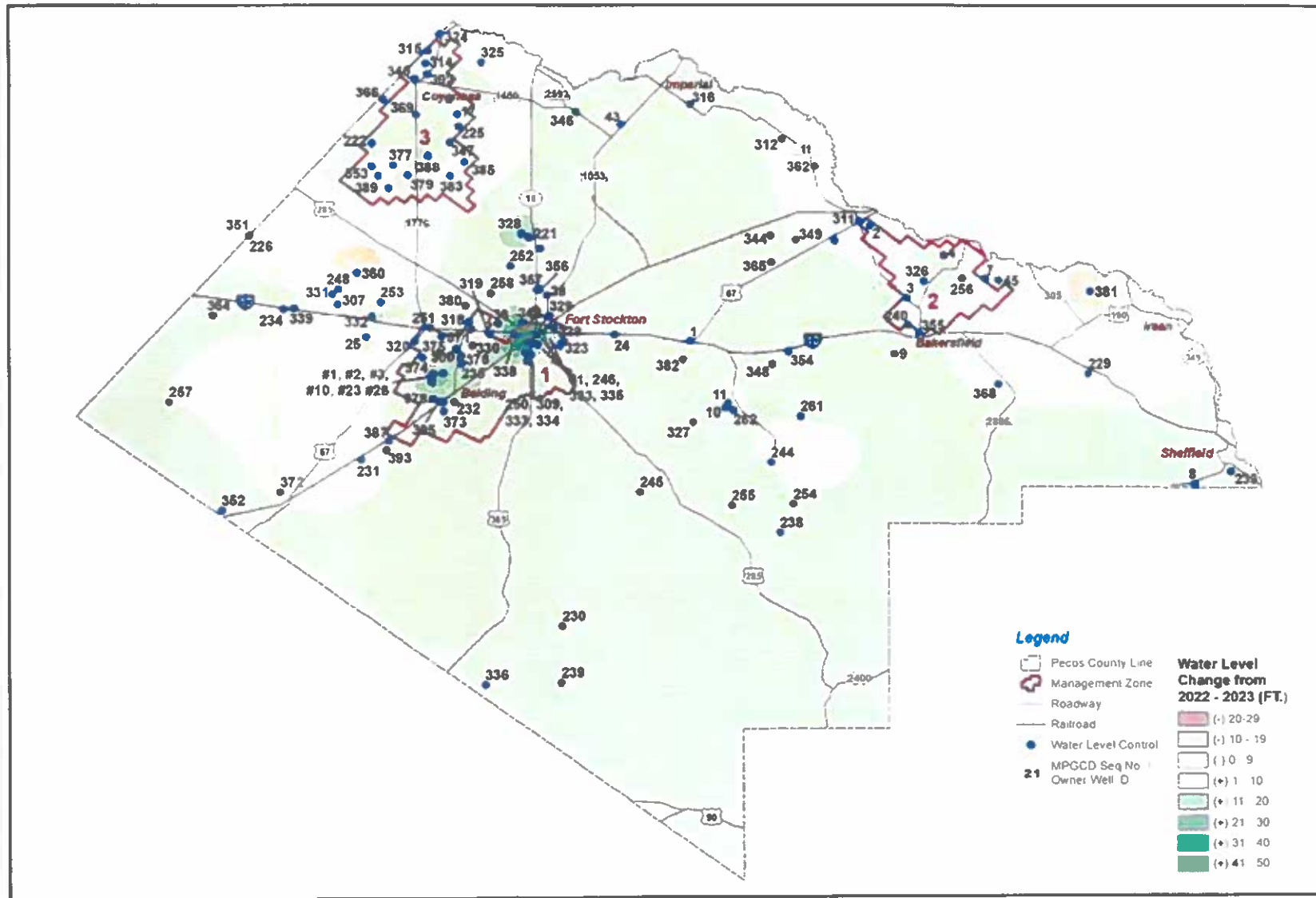
Spatial Reference:
 TWDB GAM Coordinate System

Scale:
 1 850 000

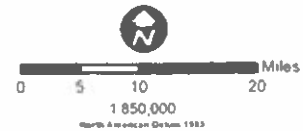


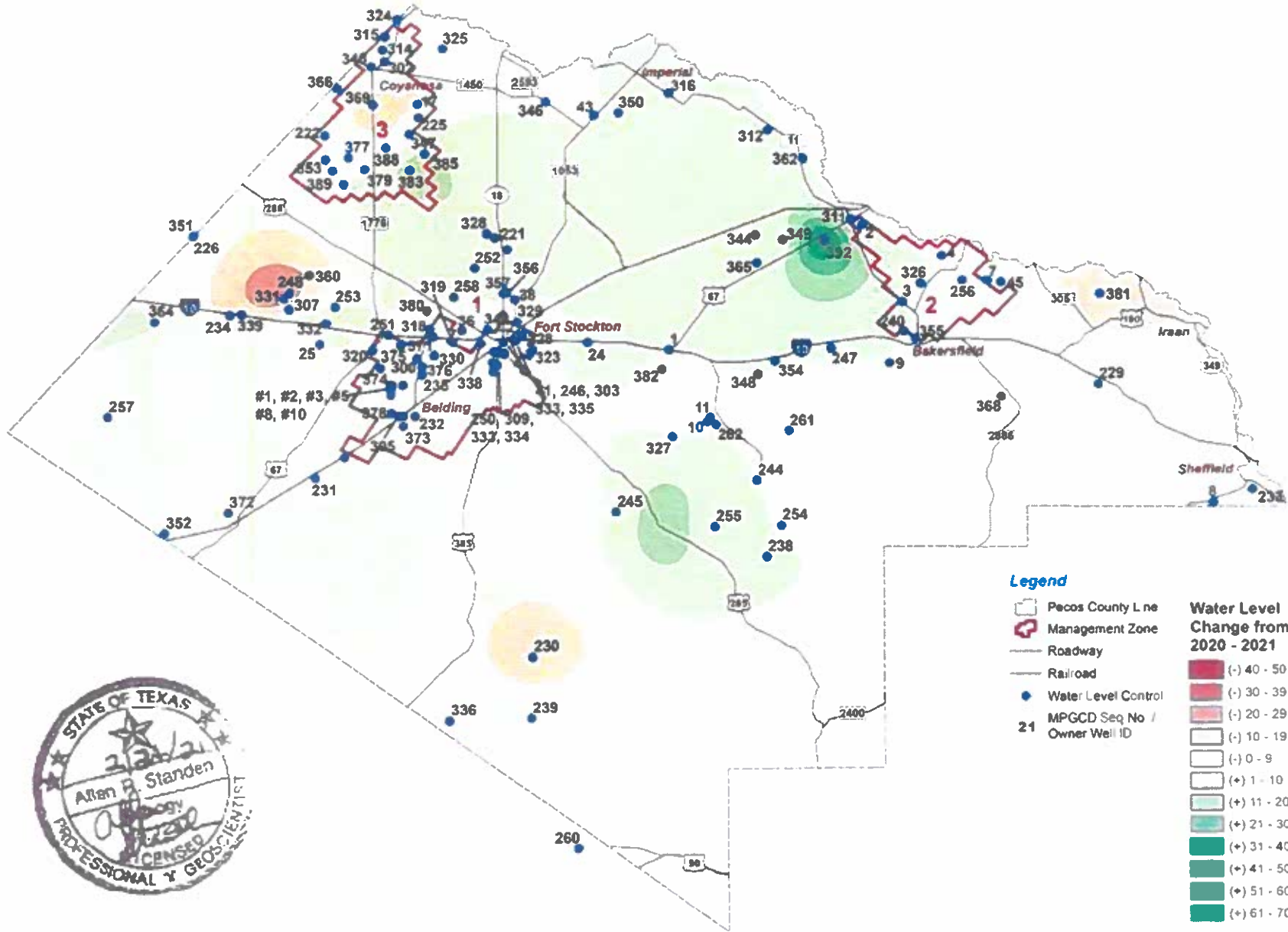
**Water Level Decline/Gain
from 2023 - 2024
Middle Pecos GCD
Pecos County, Texas**



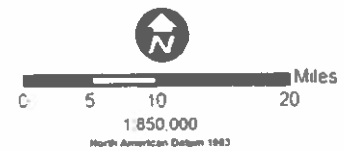


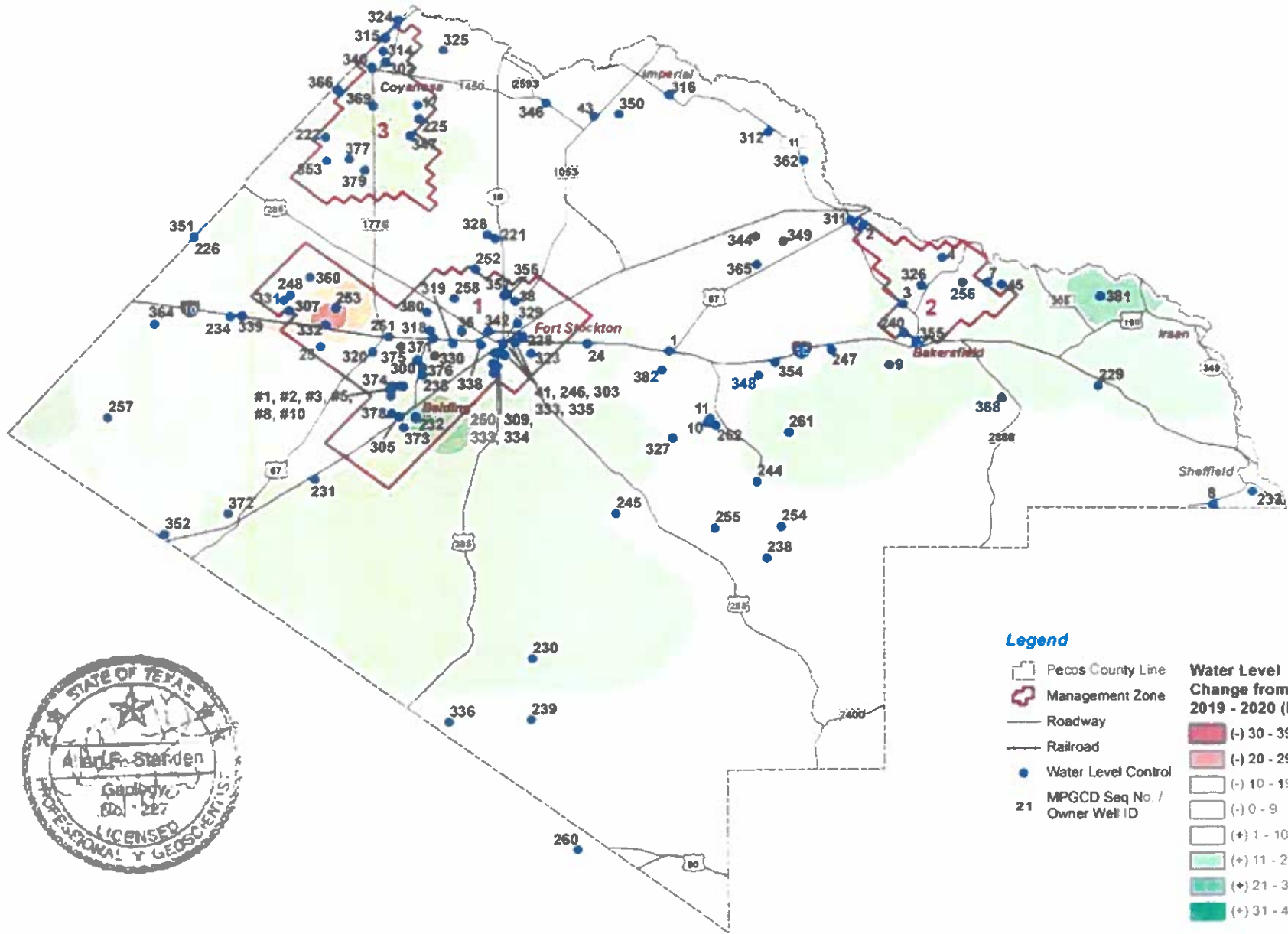
**Water Level Decline/Gain
from 2022 - 2023
Middle Pecos GCD
Pecos County, Texas**





Water Level Decline/Gain from 2020 - 2021 Pecos County, Texas





Legend

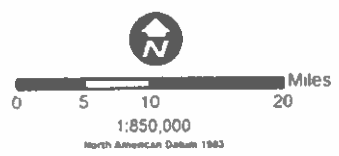
- Pecos County Line
- Management Zone
- Roadway
- Railroad
- Water Level Control
- 21** MPGCD Seq No. / Owner Well ID

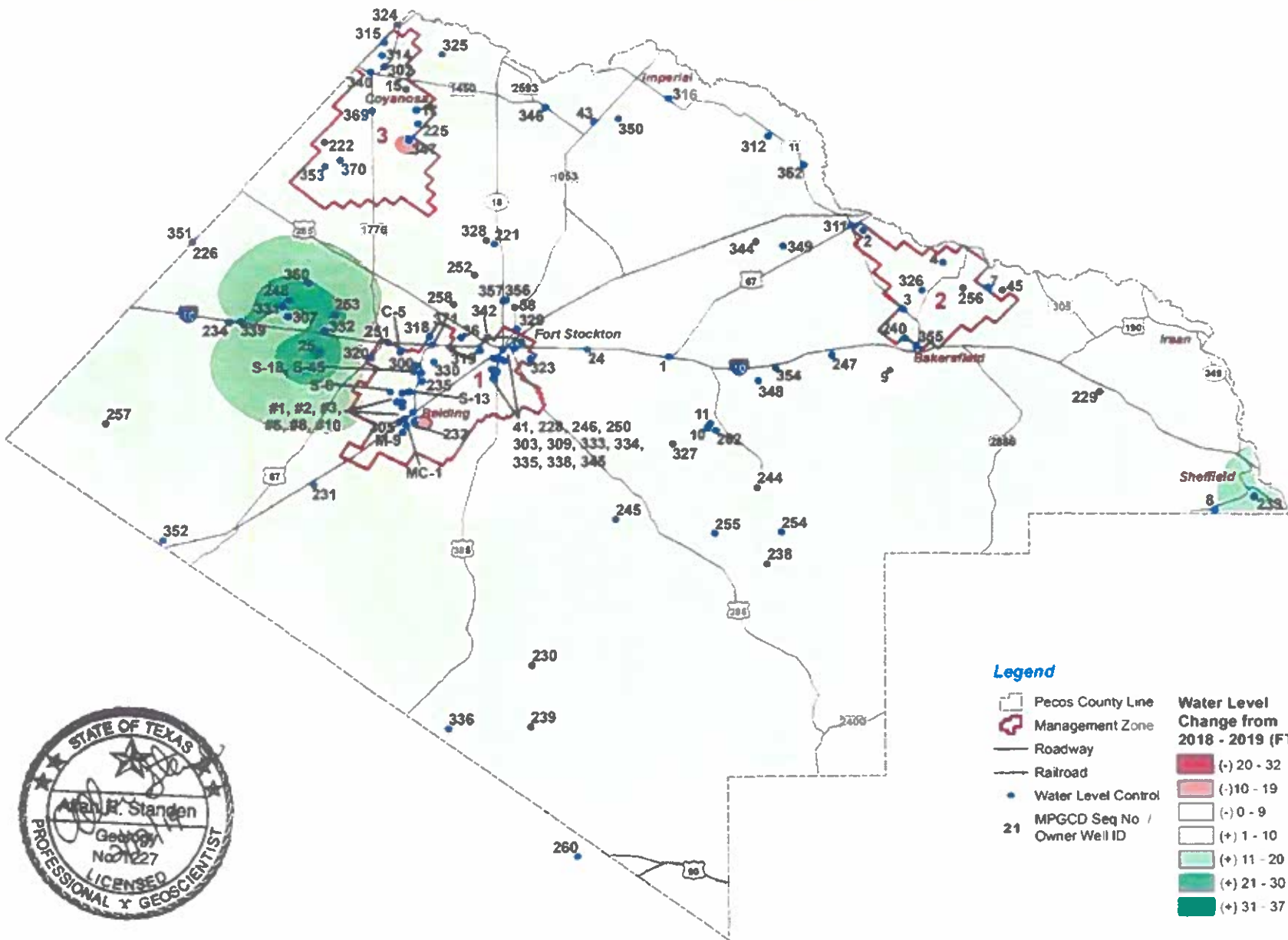
Water Level Change from 2019 - 2020 (FT.)

- (-) 30 - 39
- (-) 20 - 29
- (-) 10 - 19
- (-) 0 - 9
- (+) 1 - 10
- (+) 11 - 20
- (+) 21 - 30
- (+) 31 - 40



Water Level Decline/Gain from 2019 - 2020 Pecos County, Texas



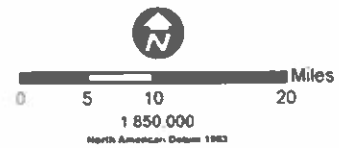


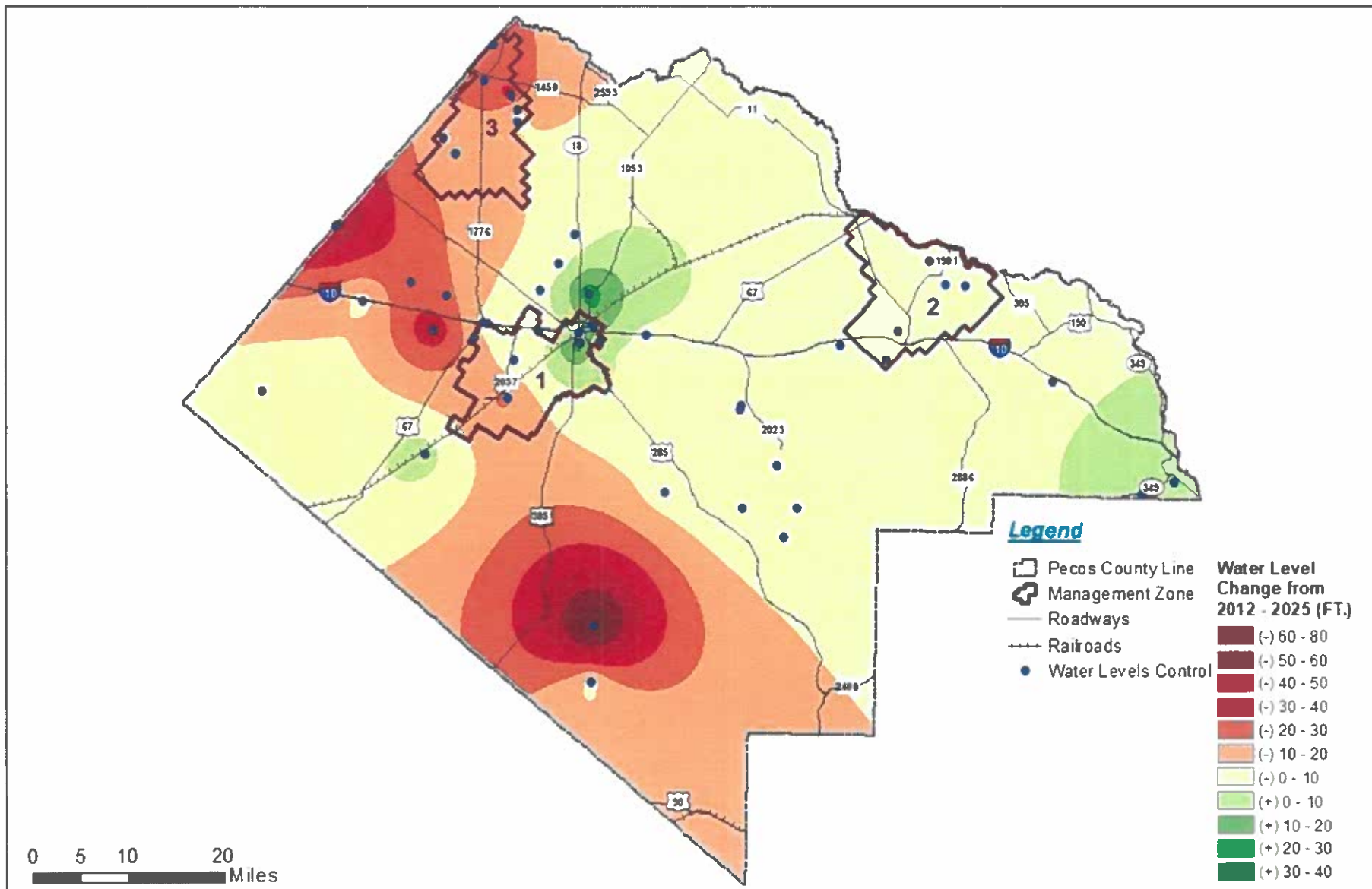
Legend

- Pecos County Line
 - Management Zone
 - Roadway
 - Railroad
 - Water Level Control
 - MPGCD Seq No / Owner Well ID
- | | |
|--|--|
| | Water Level Change from 2018 - 2019 (FT.) |
| | (-) 20 - 32 |
| | (-) 10 - 19 |
| | (-) 0 - 9 |
| | (+) 1 - 10 |
| | (+) 11 - 20 |
| | (+) 21 - 30 |
| | (+) 31 - 37 |

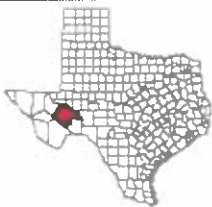


**Water Level Decline/Gain
from 2018 - 2019
Pecos County, Texas**





0 5 10 20 Miles

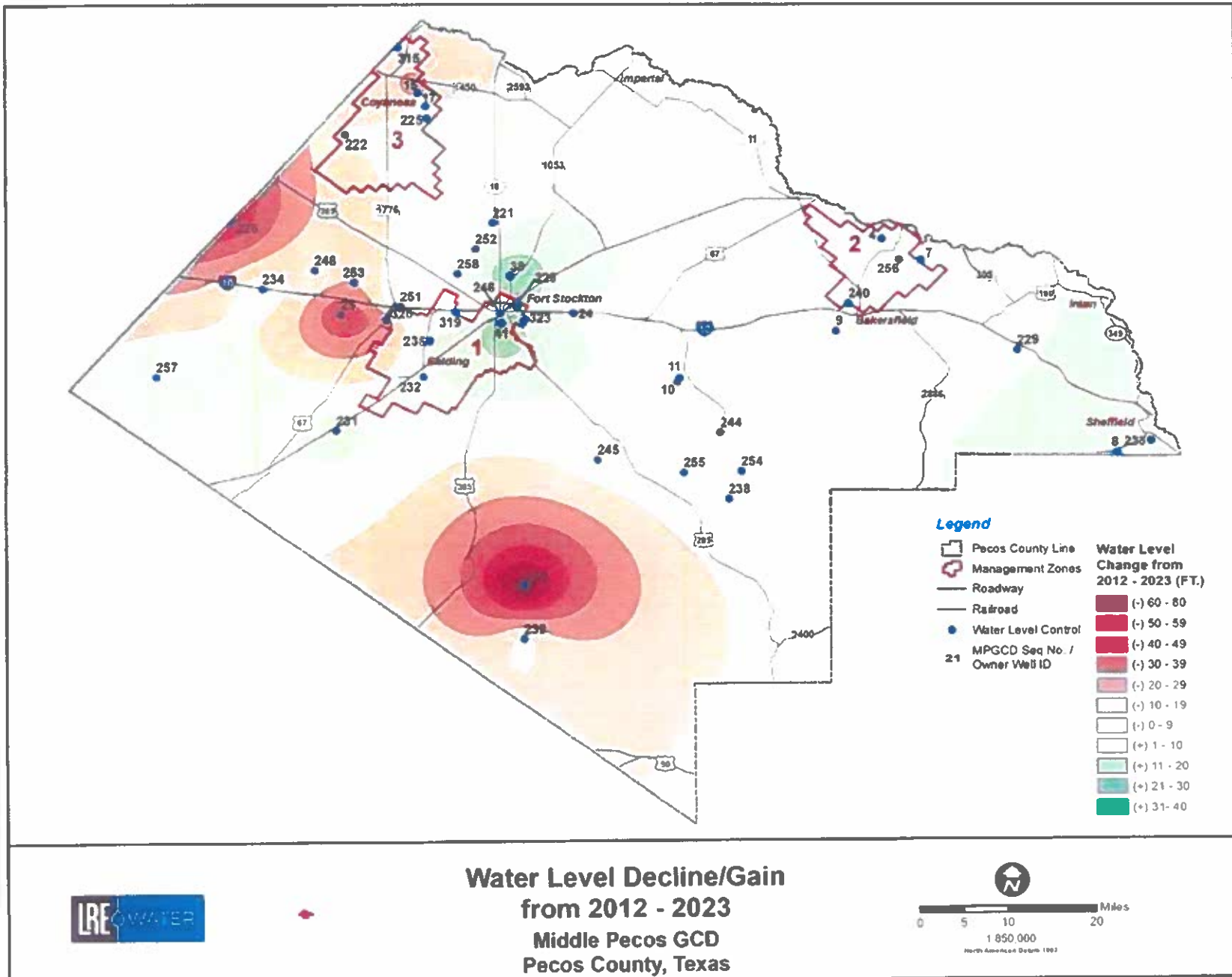


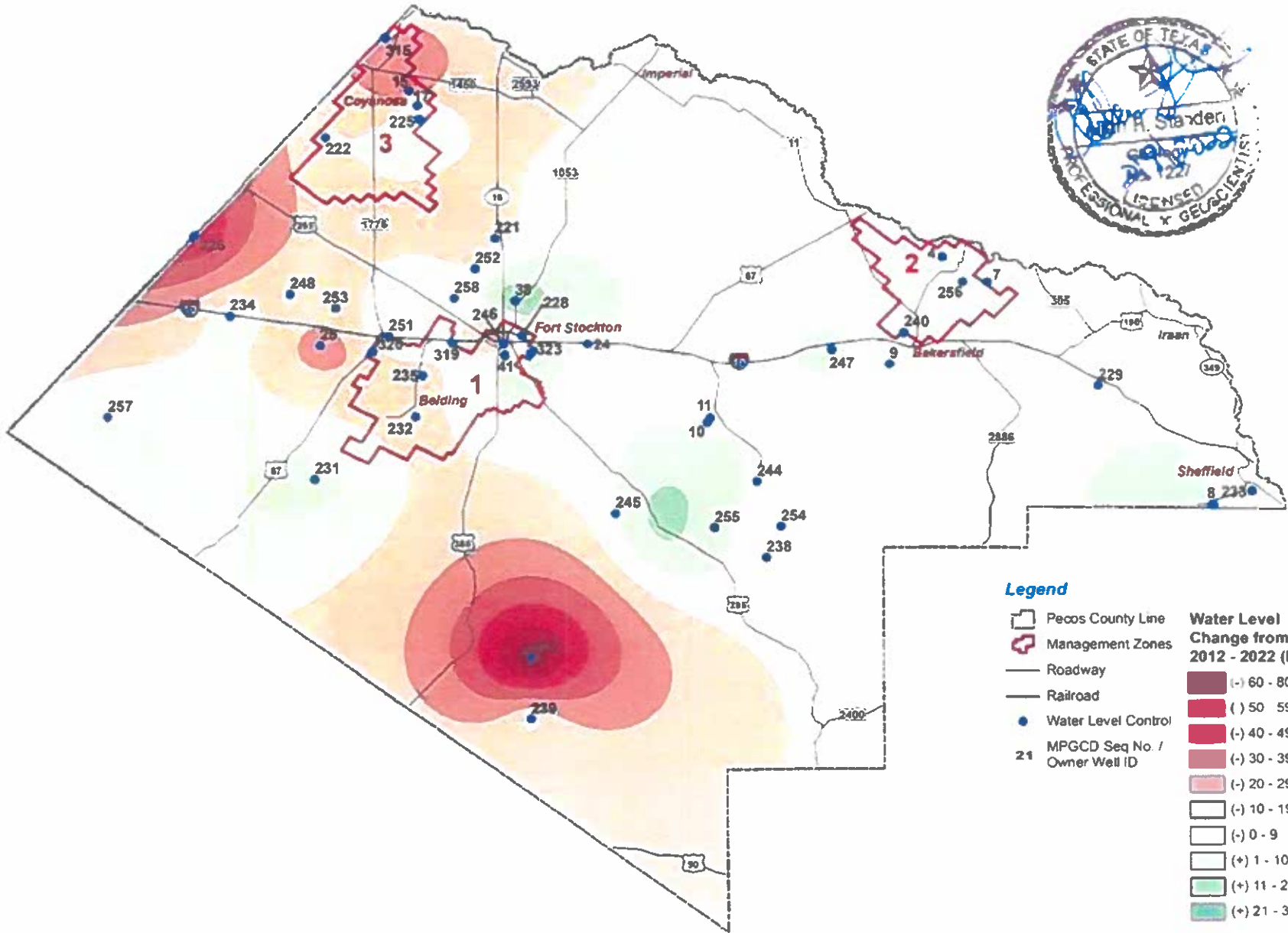
**Middle Pecos GCD Monitor Wells
Water Level Decline/Gain from 2012 - 2025**
Winter Water Levels
Pecos County, Texas



Spatial Reference: TWDB GAM Coordinate System

Scale: 1 850 000





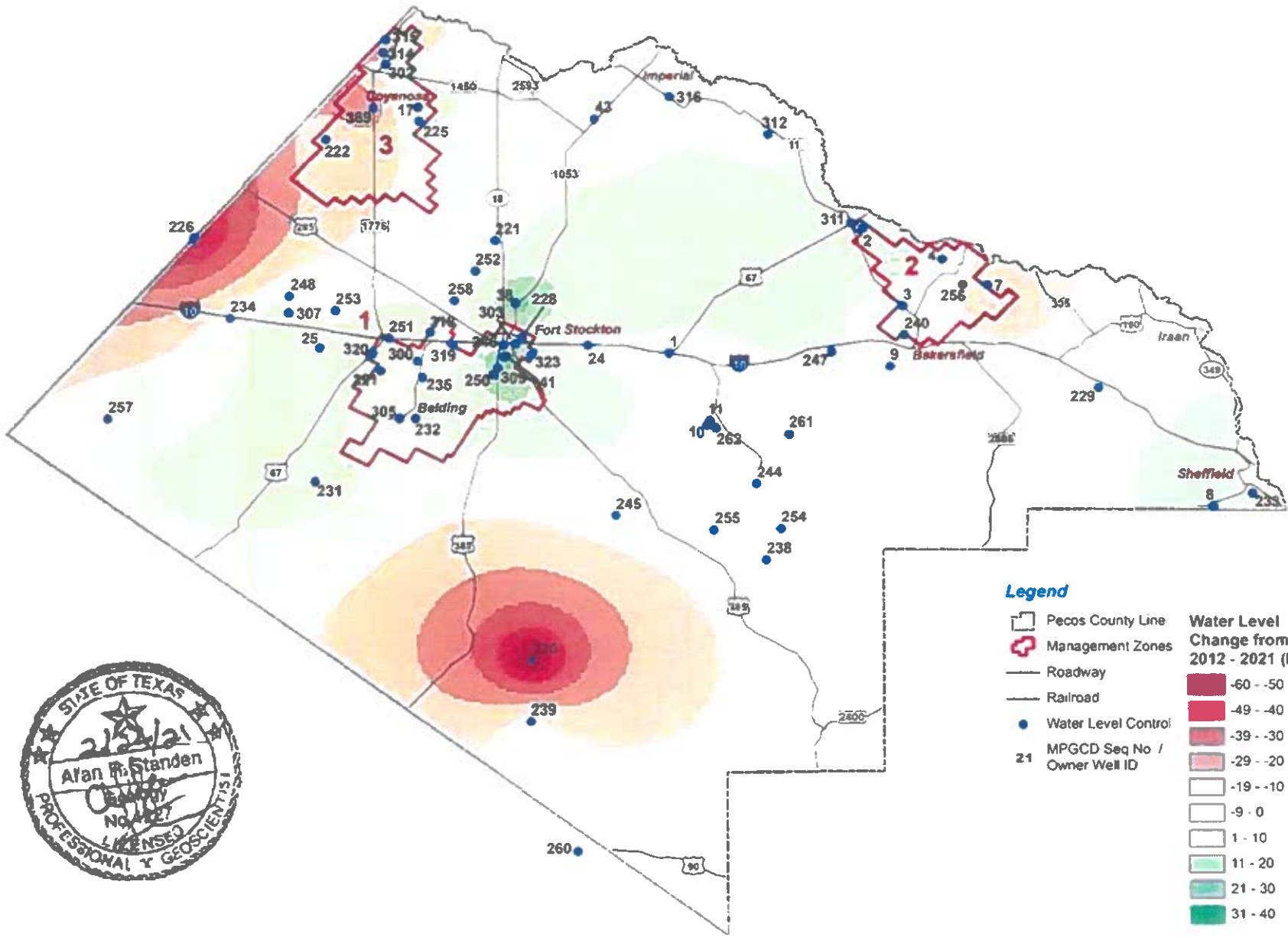
Legend

- Pecos County Line
 - Management Zones
 - Roadway
 - Railroad
 - Water Level Control
 - MPGCD Seq No. / Owner Well ID
- | Water Level Change from 2012 - 2022 (FT.) | |
|---|-------------|
| | (-) 60 - 80 |
| | (-) 50 - 59 |
| | (-) 40 - 49 |
| | (-) 30 - 39 |
| | (-) 20 - 29 |
| | (-) 10 - 19 |
| | (-) 0 - 9 |
| | (+) 1 - 10 |
| | (+) 11 - 20 |
| | (+) 21 - 30 |



**Water Level Decline/Gain
from 2012 - 2022
Pecos County, Texas**





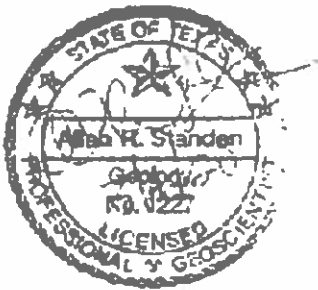
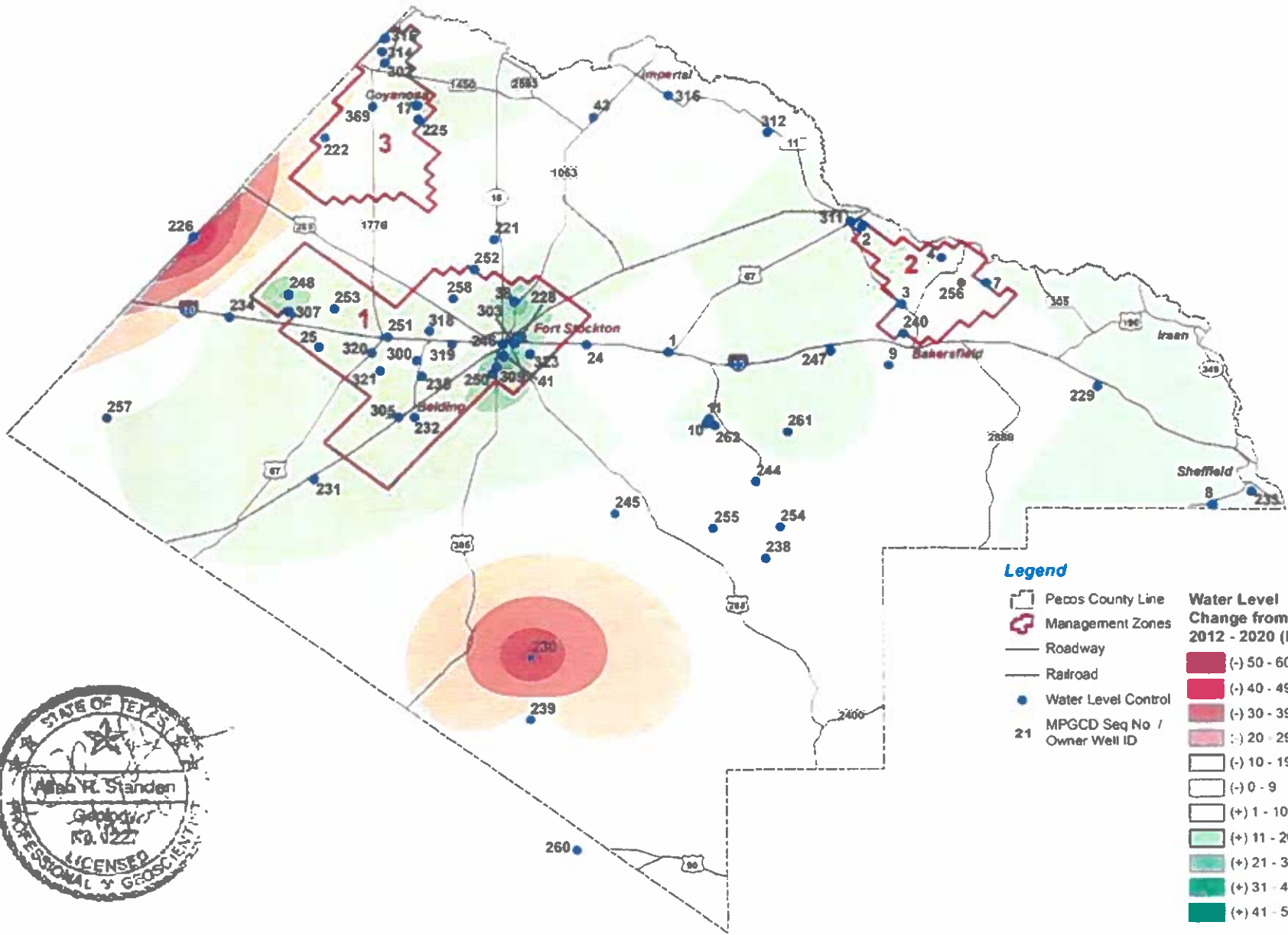
Legend

- Pecos County Line
 - Management Zones
 - Roadway
 - Railroad
 - Water Level Control
 - MPGCD Seq No / Owner Well ID
- | Water Level Change from 2012 - 2021 (FT.) | |
|---|-----------|
| | -60 - -50 |
| | -49 - -40 |
| | -39 - -30 |
| | -29 - -20 |
| | -19 - -10 |
| | -9 - 0 |
| | 1 - 10 |
| | 11 - 20 |
| | 21 - 30 |
| | 31 - 40 |



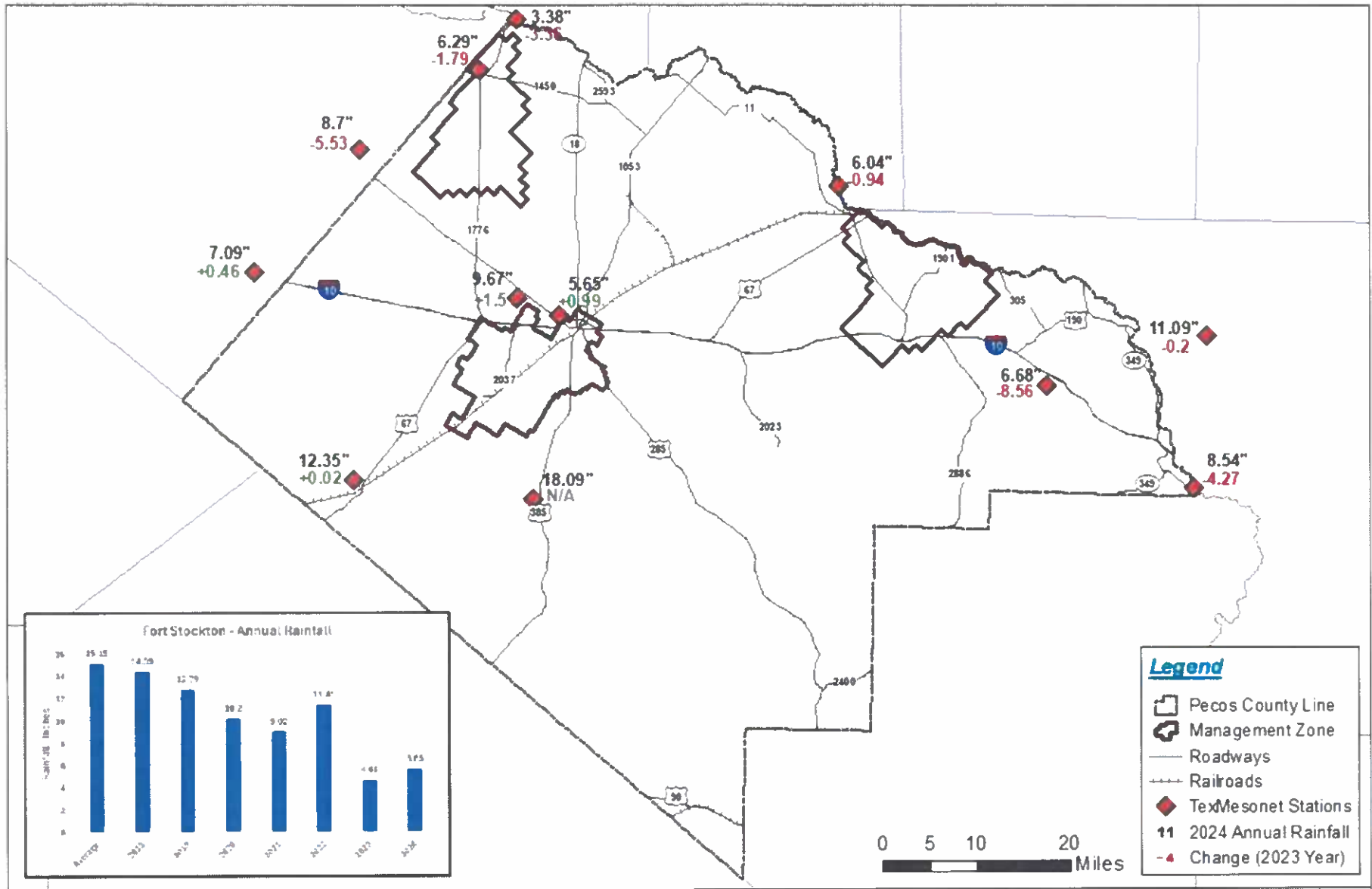
**Water Level Decline/Gain
from 2012 - 2021
Pecos County, Texas**





Water Level Decline/Gain from 2012 - 2020 Pecos County, Texas





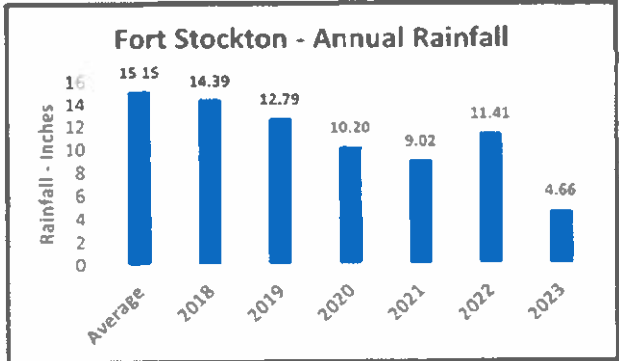
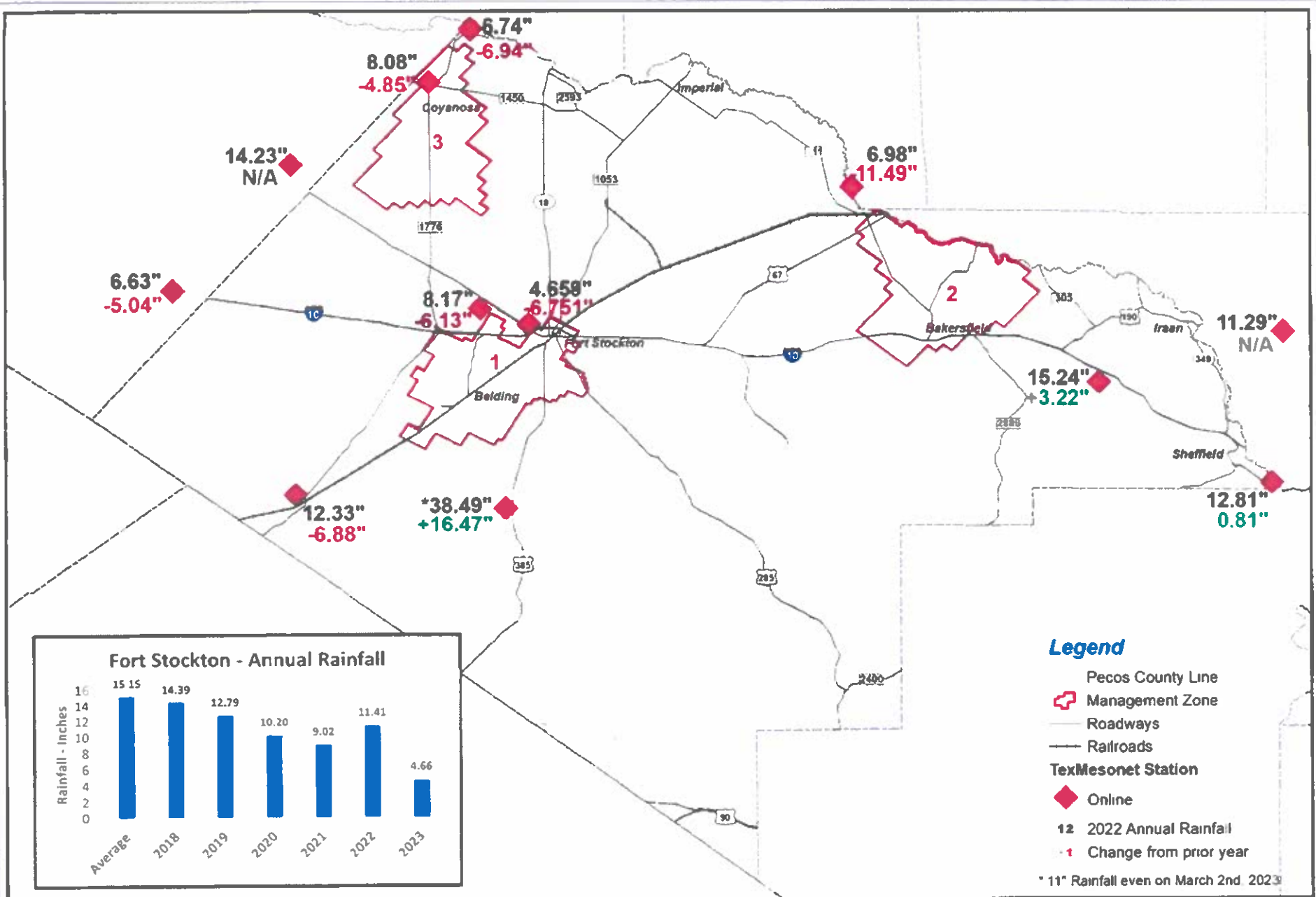
TexMesonet Weather Stations Reported 2024 Annual Rainfall

Pecos County, Texas



Spatial Reference: TWDB GAM Coordinate System

Scale: 1:850,000



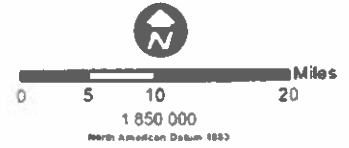
Legend

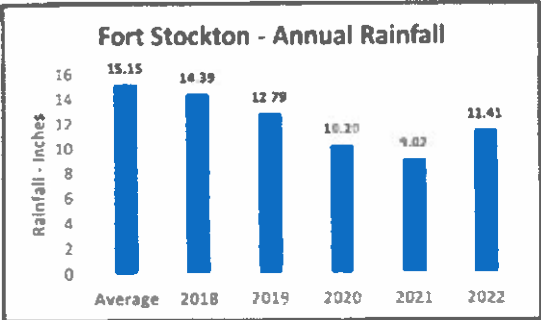
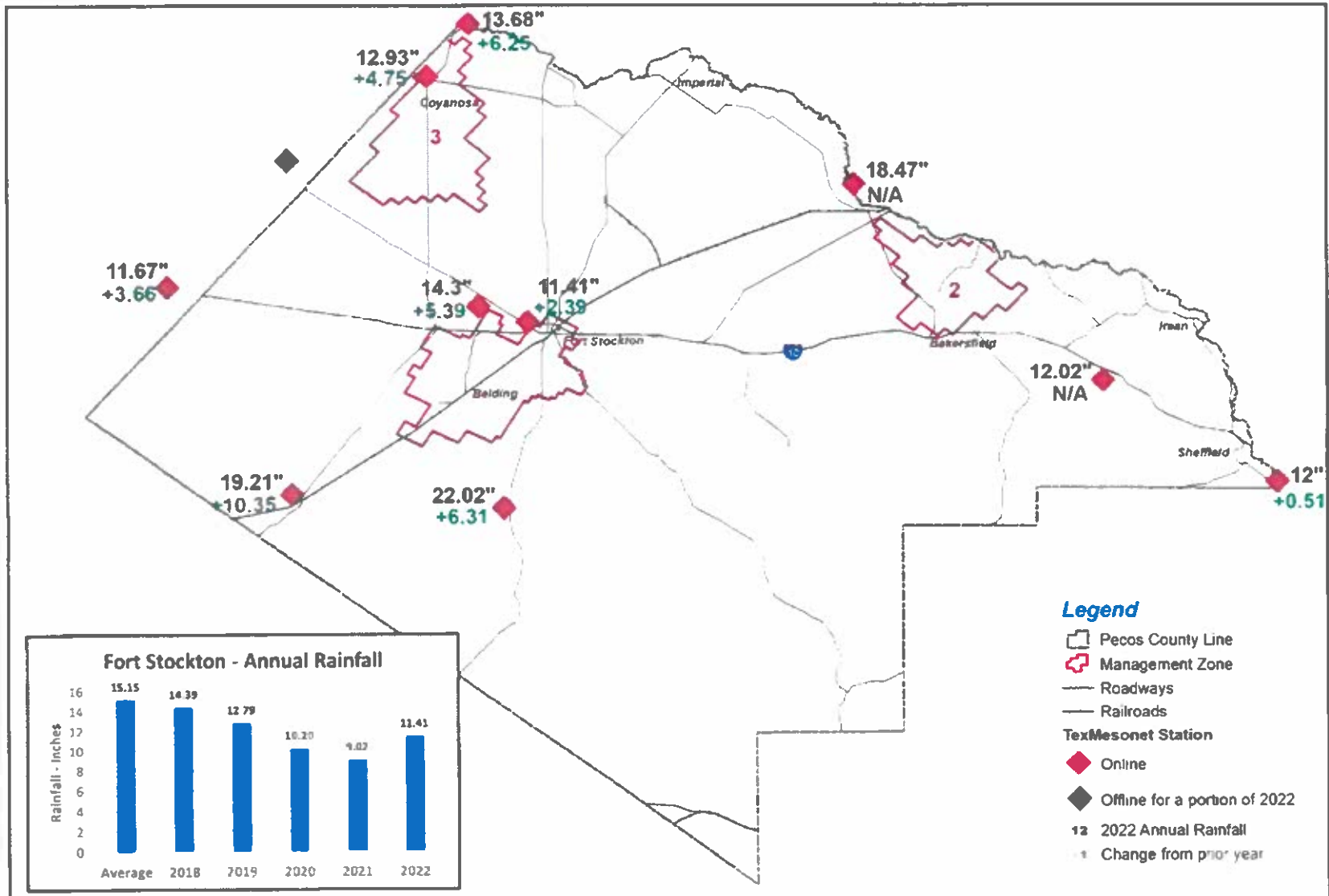
- Pecos County Line
- Management Zone
- Roadways
- Railroads
- TexMesonet Station
- ◆ Online
- 12 2022 Annual Rainfall
- 1 Change from prior year

* 11" Rainfall even on March 2nd 2023



**TexMesonet Weather Stations
Reported 2023 Annual Rainfall**
Middle Pecos GCD
Pecos County, Texas





Legend

- Pecos County Line
- Management Zone
- Roadways
- Railroads
- TexMesonet Station**
- Online
- Offline for a portion of 2022
- 2022 Annual Rainfall
- Change from prior year



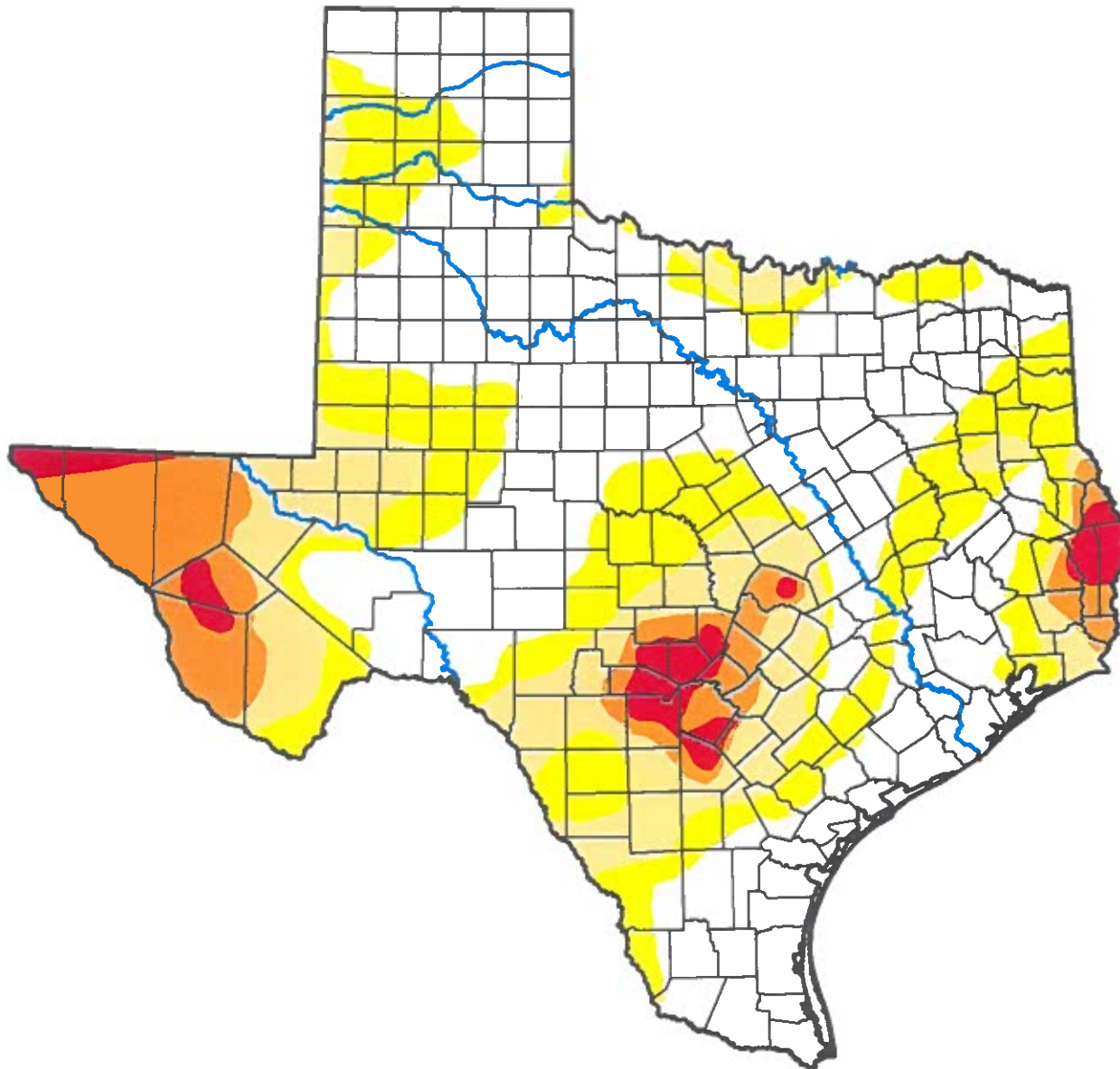
**TexMesonet Weather Stations
with 2022 Annual Rainfall**
Middle Pecos GCD
Pecos County, Texas









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U.S. Drought Monitor Texas

January 23, 2024
(Released Thursday, Jan. 25, 2024)
Valid 7 a.m. EST



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

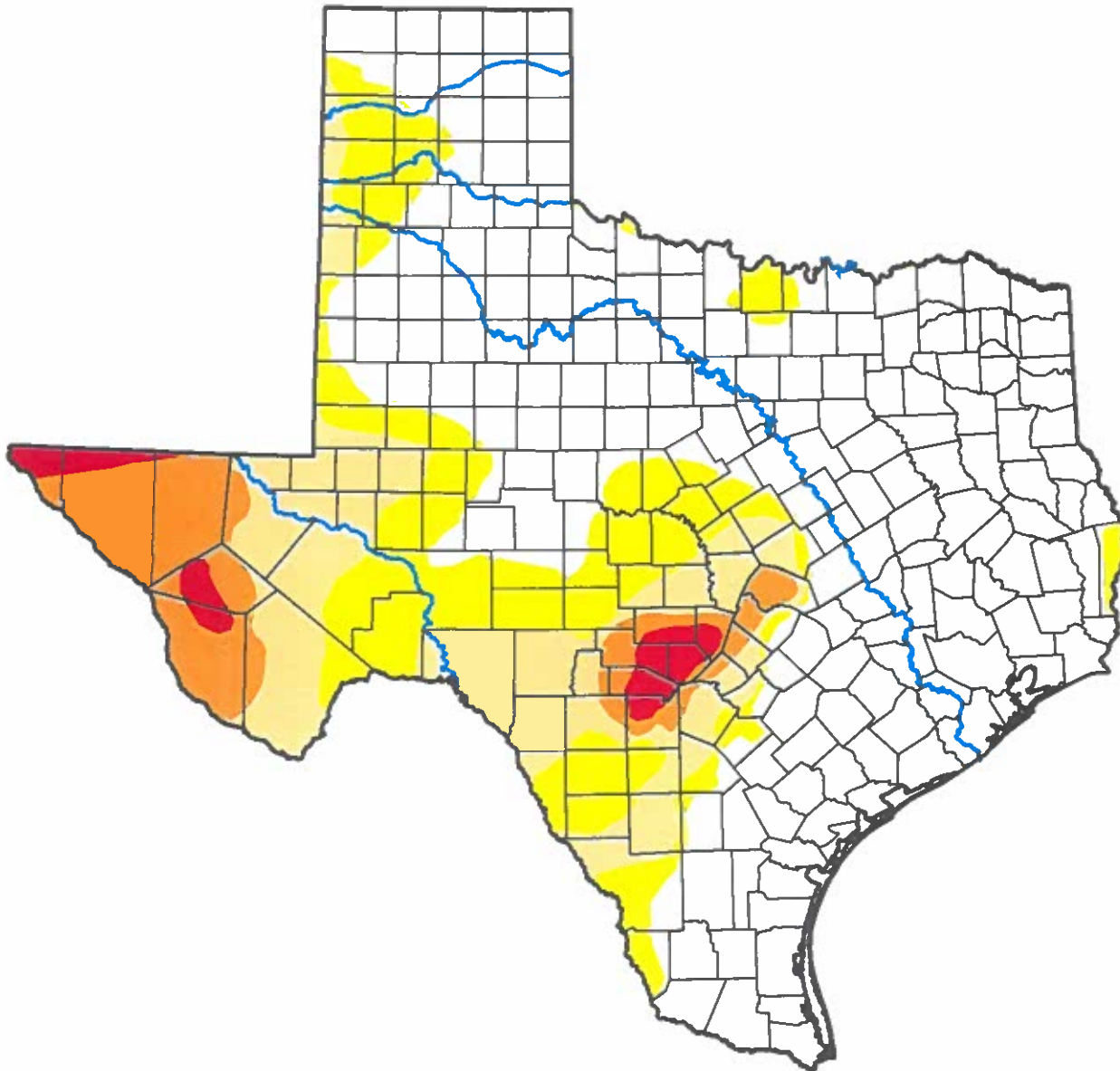
Brian Fuchs
National Drought Mitigation Center









droughtmonitor.unl.edu

U.S. Drought Monitor Texas

February 20, 2024
(Released Thursday, Feb. 22, 2024)
Valid 7 a.m. EST



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

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Author:

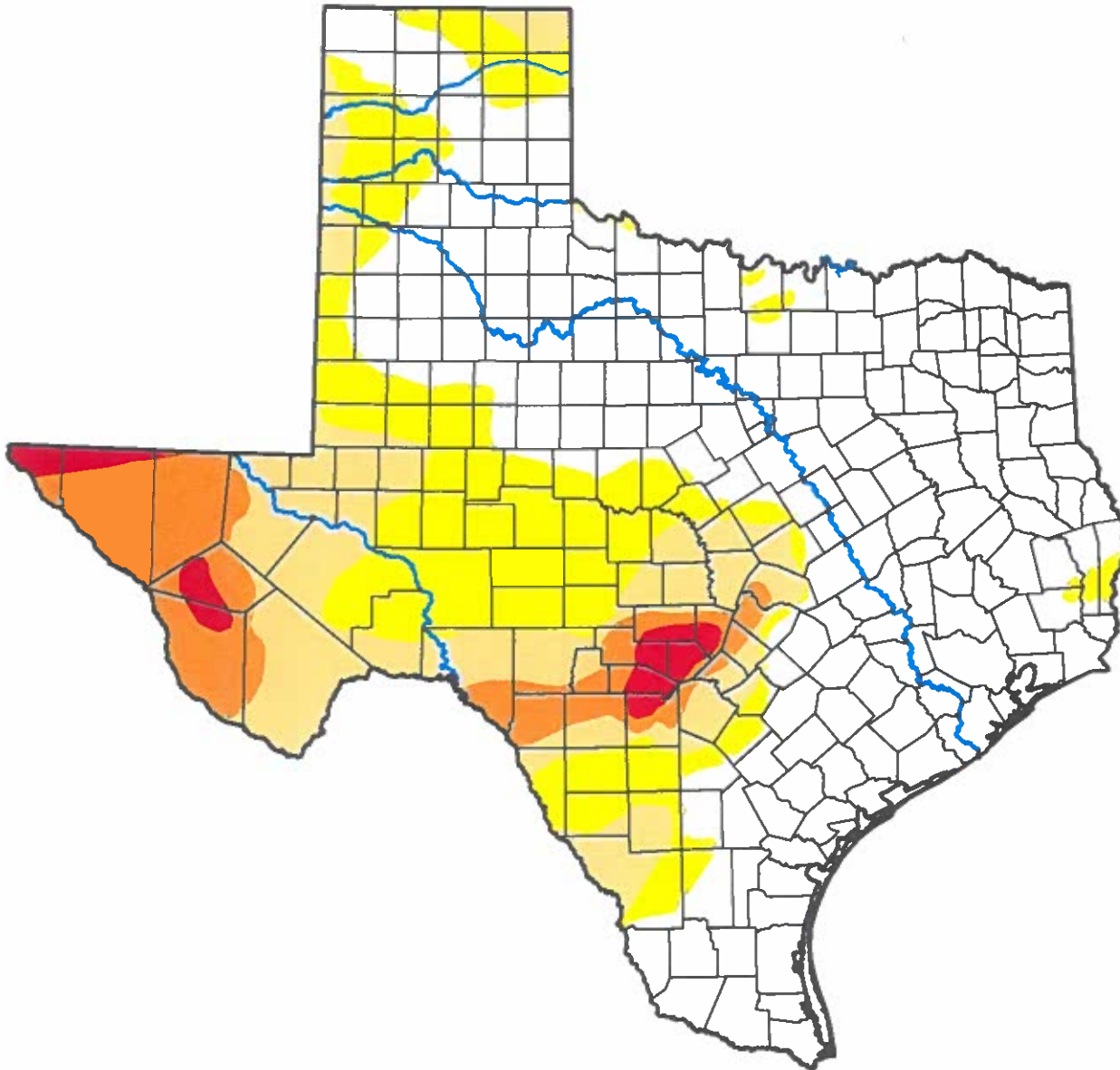
Richard Heim
NCEI/NOAA









droughtmonitor.unl.edu

U.S. Drought Monitor Texas

March 26, 2024
(Released Thursday, Mar. 28, 2024)
Valid 8 a.m. EDT



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

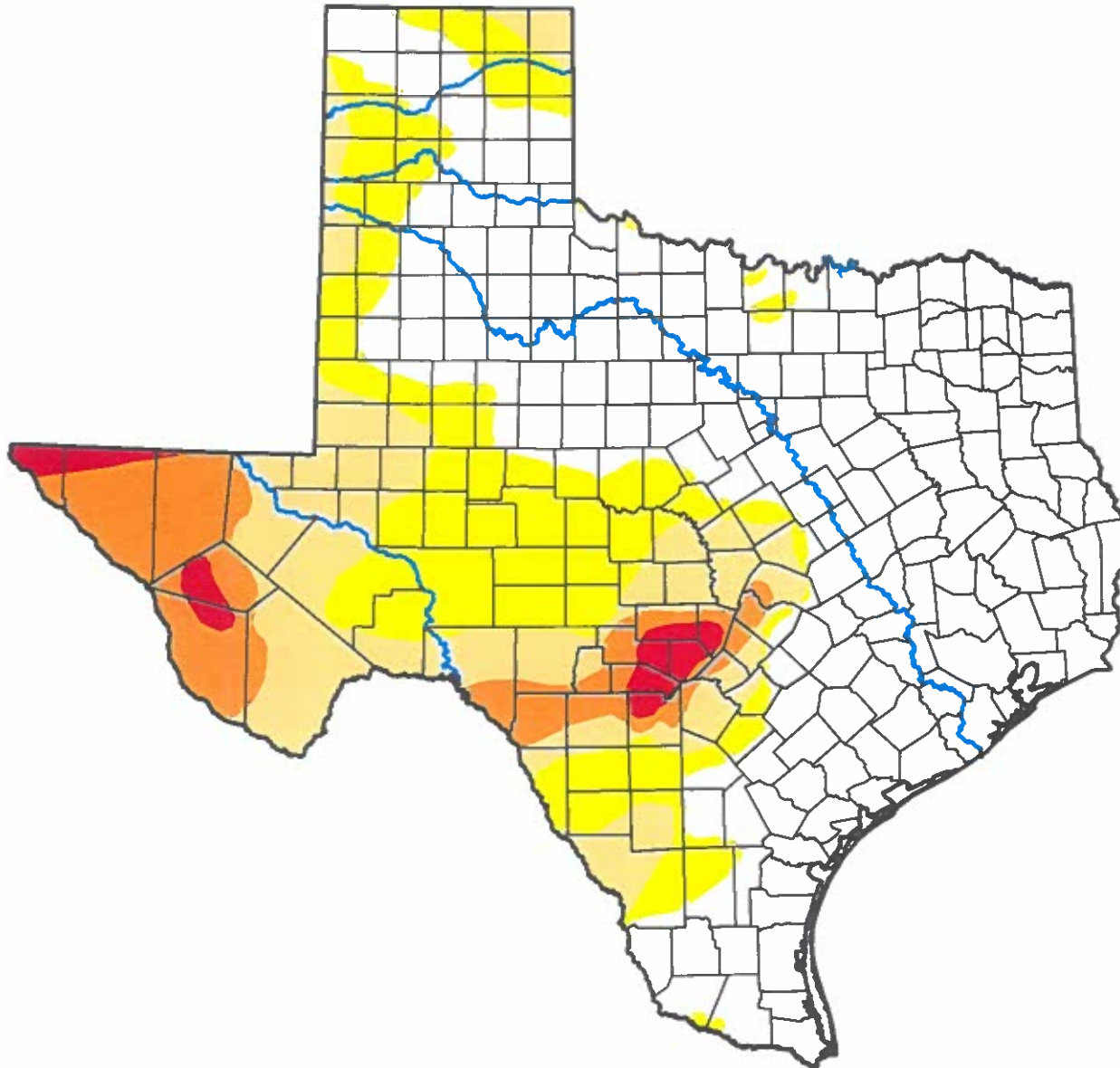
Brad Rippey
U.S. Department of Agriculture









droughtmonitor.unl.edu

U.S. Drought Monitor Texas

April 9, 2024
(Released Thursday, Apr. 11, 2024)
Valid 8 a.m. EDT



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

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Author:

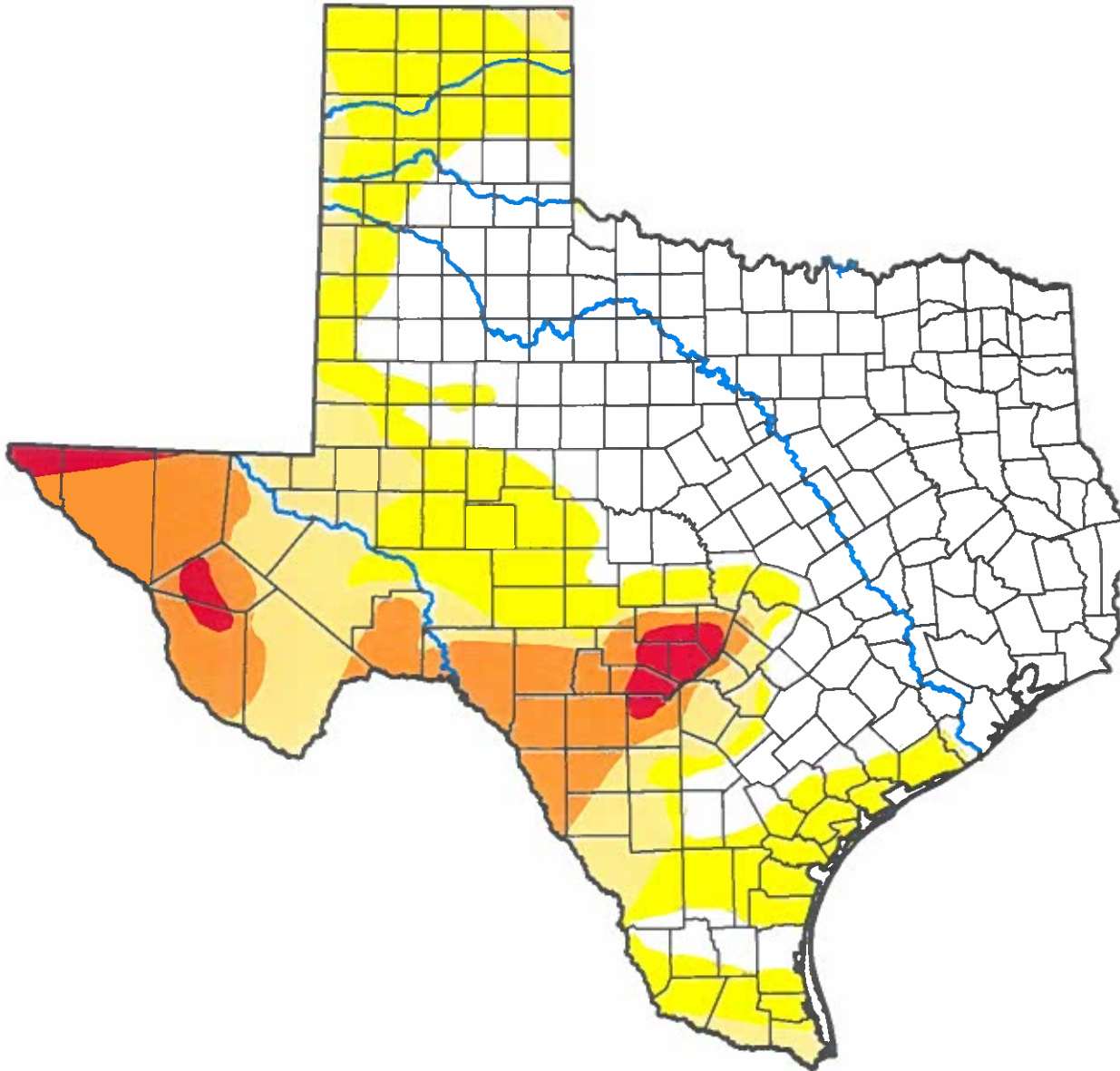
Brad Pugh
CPC/NOAA









droughtmonitor.unl.edu

U.S. Drought Monitor Texas

May 14, 2024
(Released Thursday, May. 16, 2024)
Valid 8 a.m. EDT



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

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Author:

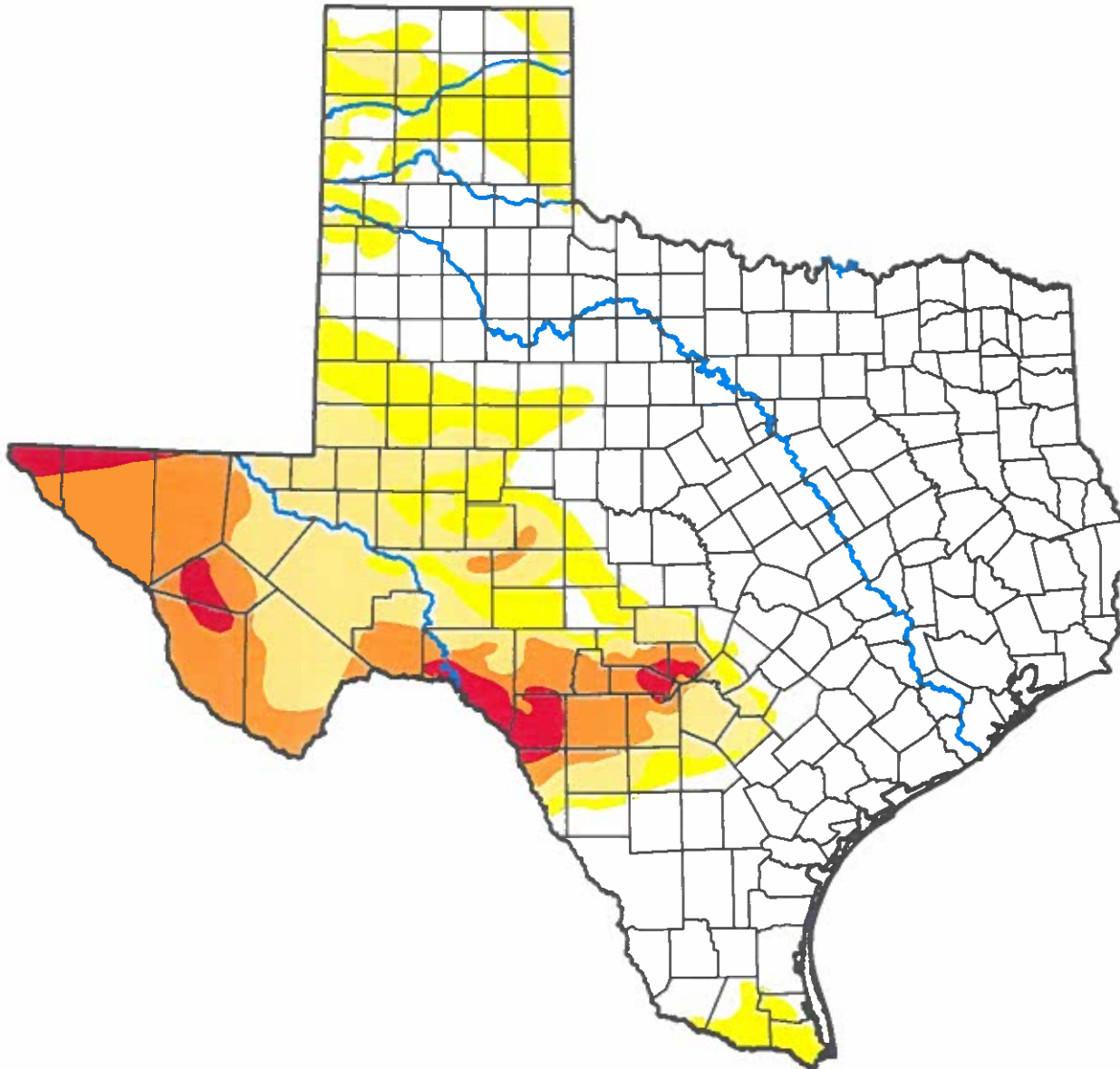
Lindsay Johnson
National Drought Mitigation Center









droughtmonitor.unl.edu

U.S. Drought Monitor Texas

June 25, 2024
(Released Thursday, Jun. 27, 2024)
Valid 8 a.m. EDT



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

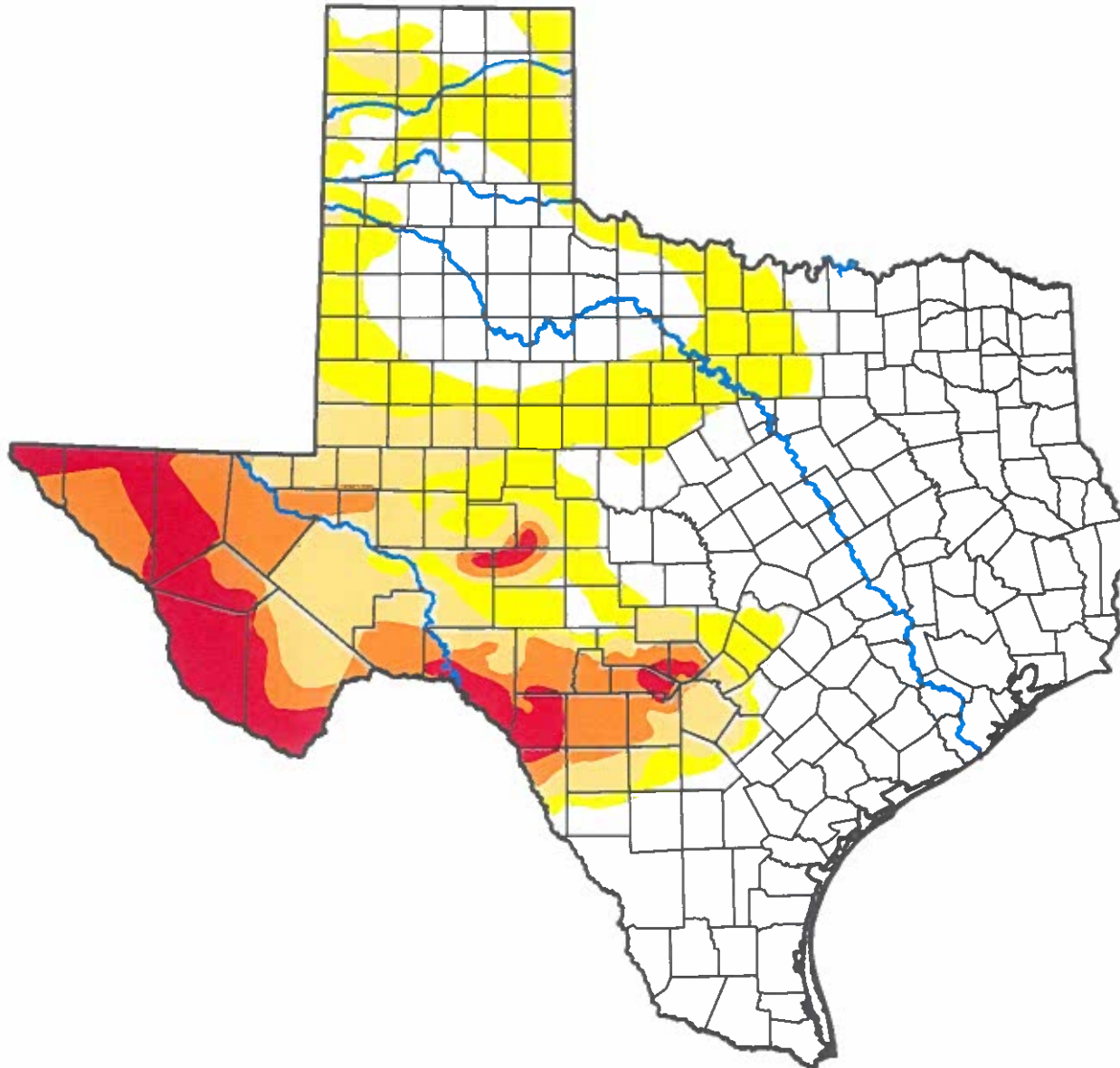
Adam Hartman
NOAA/NWS/NCEP/CPC









droughtmonitor.unl.edu

U.S. Drought Monitor Texas

July 9, 2024
(Released Thursday, Jul. 11, 2024)
Valid 8 a.m. EDT



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

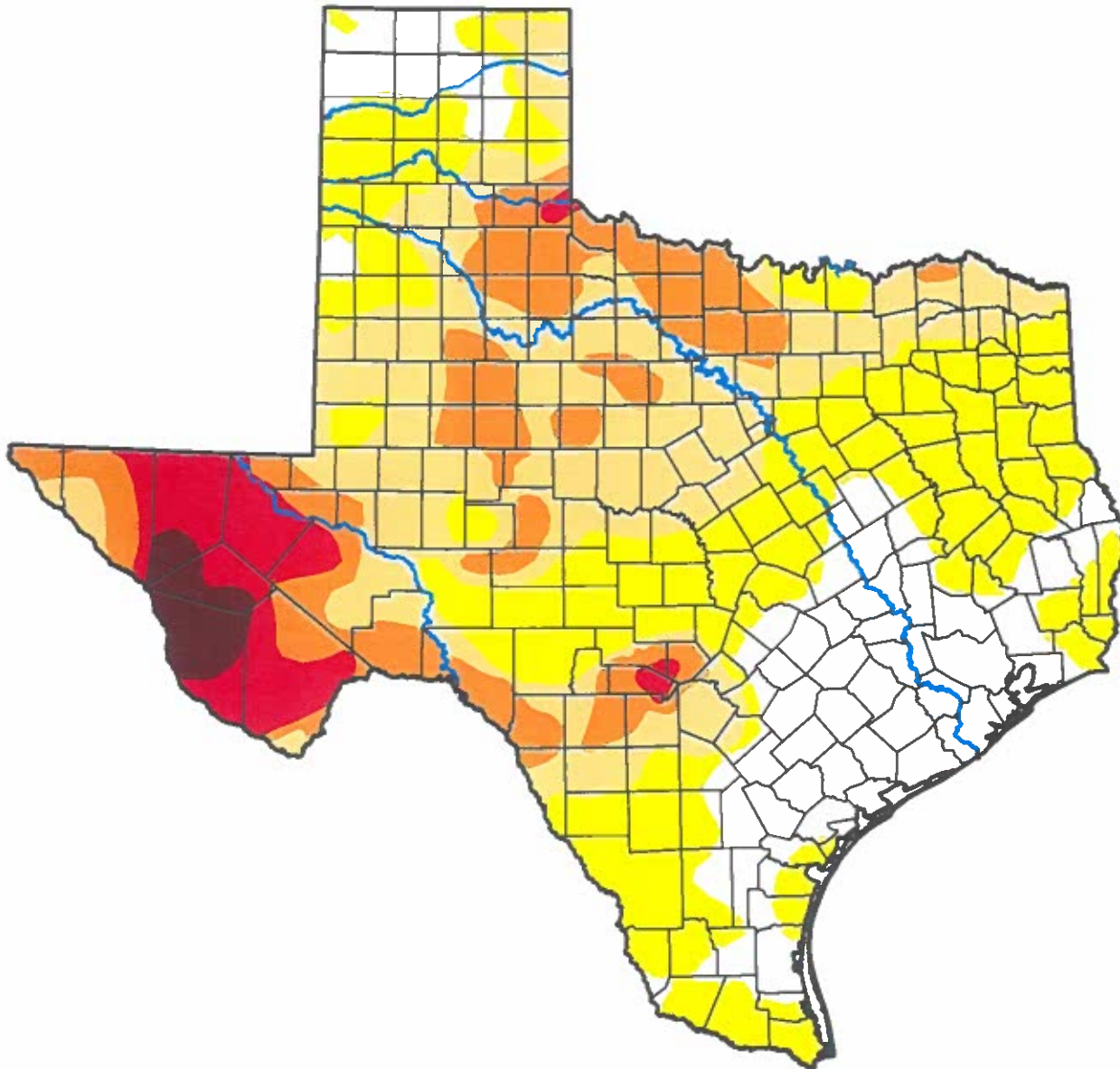
Brian Fuchs
National Drought Mitigation Center









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U.S. Drought Monitor Texas

August 27, 2024
(Released Thursday, Aug. 29, 2024)
Valid 8 a.m. EDT



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

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Author:

Richard Heim
NCEI/NOAA

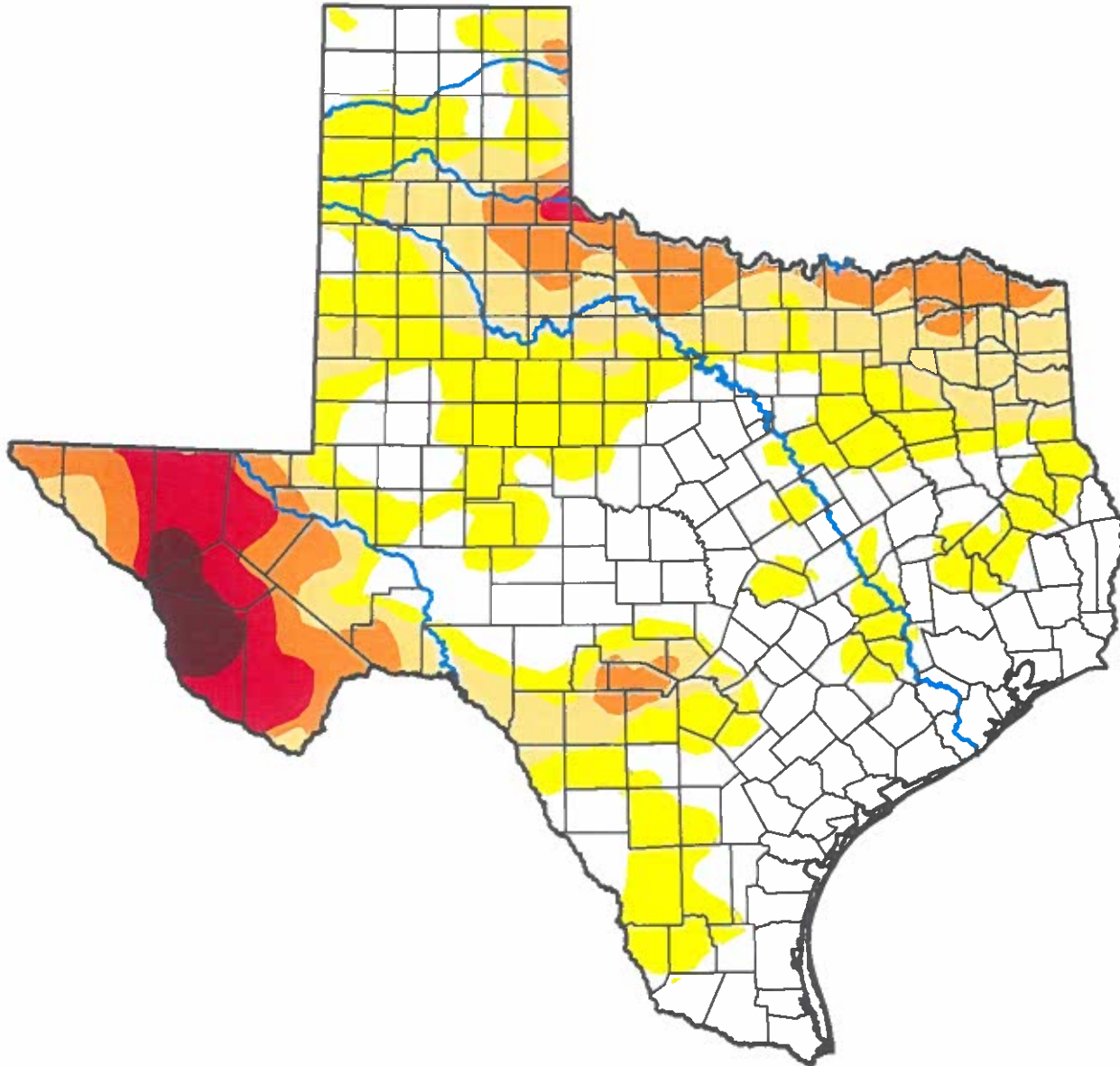


droughtmonitor.unl.edu







U.S. Drought Monitor

Texas

September 10, 2024
(Released Thursday, Sep. 12, 2024)
Valid 8 a.m. EDT



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

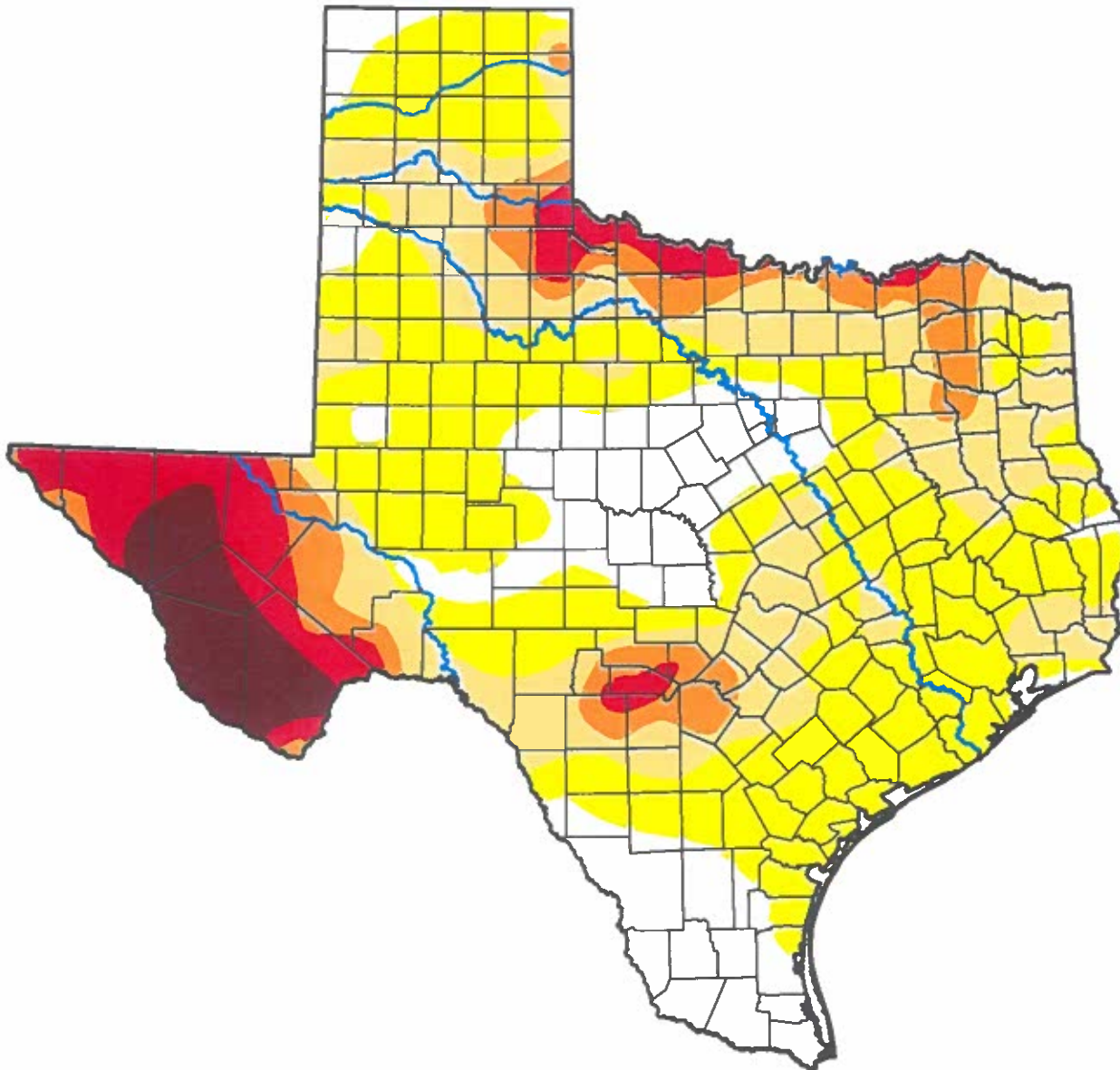
Lindsay Johnson
National Drought Mitigation Center









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U.S. Drought Monitor Texas

October 8, 2024
(Released Thursday, Oct. 10, 2024)
Valid 8 a.m. EDT



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

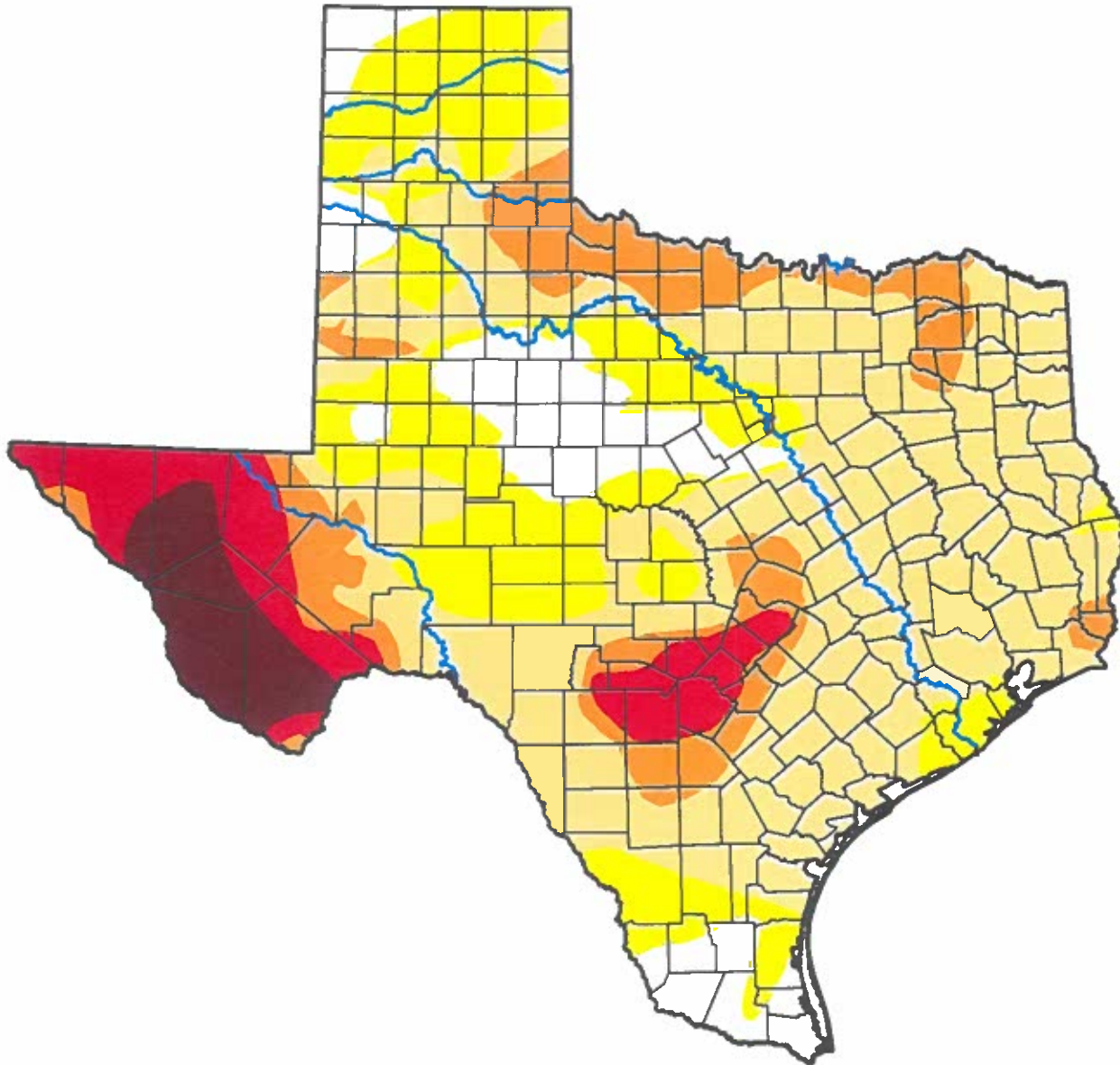
Richard Tinker
CPC/NOAA/NWS/NCEP









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U.S. Drought Monitor Texas

November 5, 2024
(Released Thursday, Nov. 7, 2024)
Valid 7 a.m. EST



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

Brian Fuchs
National Drought Mitigation Center

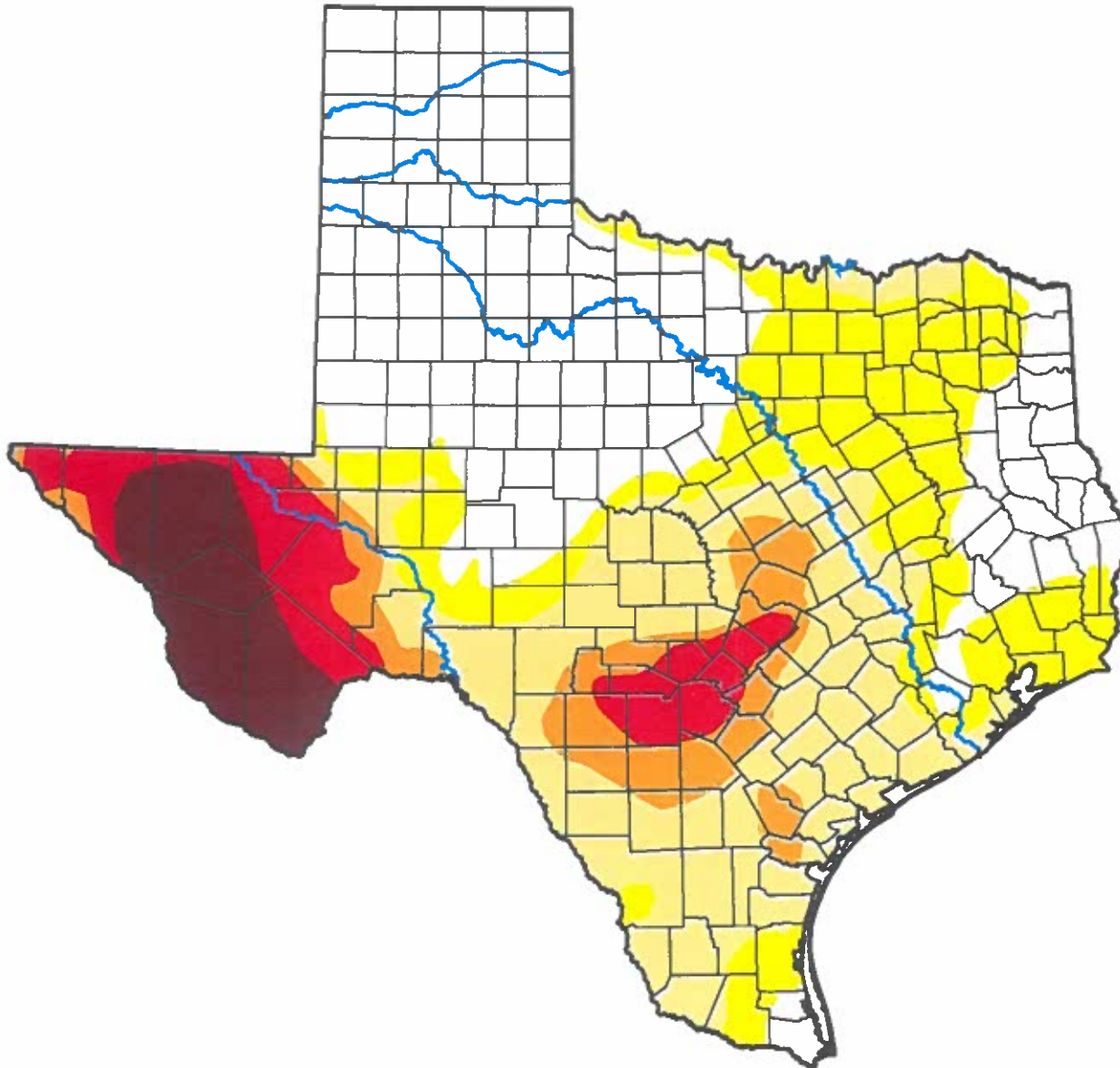


droughtmonitor.unl.edu







U.S. Drought Monitor

Texas

December 31, 2024
(Released Wednesday, Jan. 1, 2025)
Valid 7 a.m. EST



Intensity:

-  None
-  D0 Abnormally Dry
-  D1 Moderate Drought
-  D2 Severe Drought
-  D3 Extreme Drought
-  D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

Rocky Bilotta
NCEI/NOAA

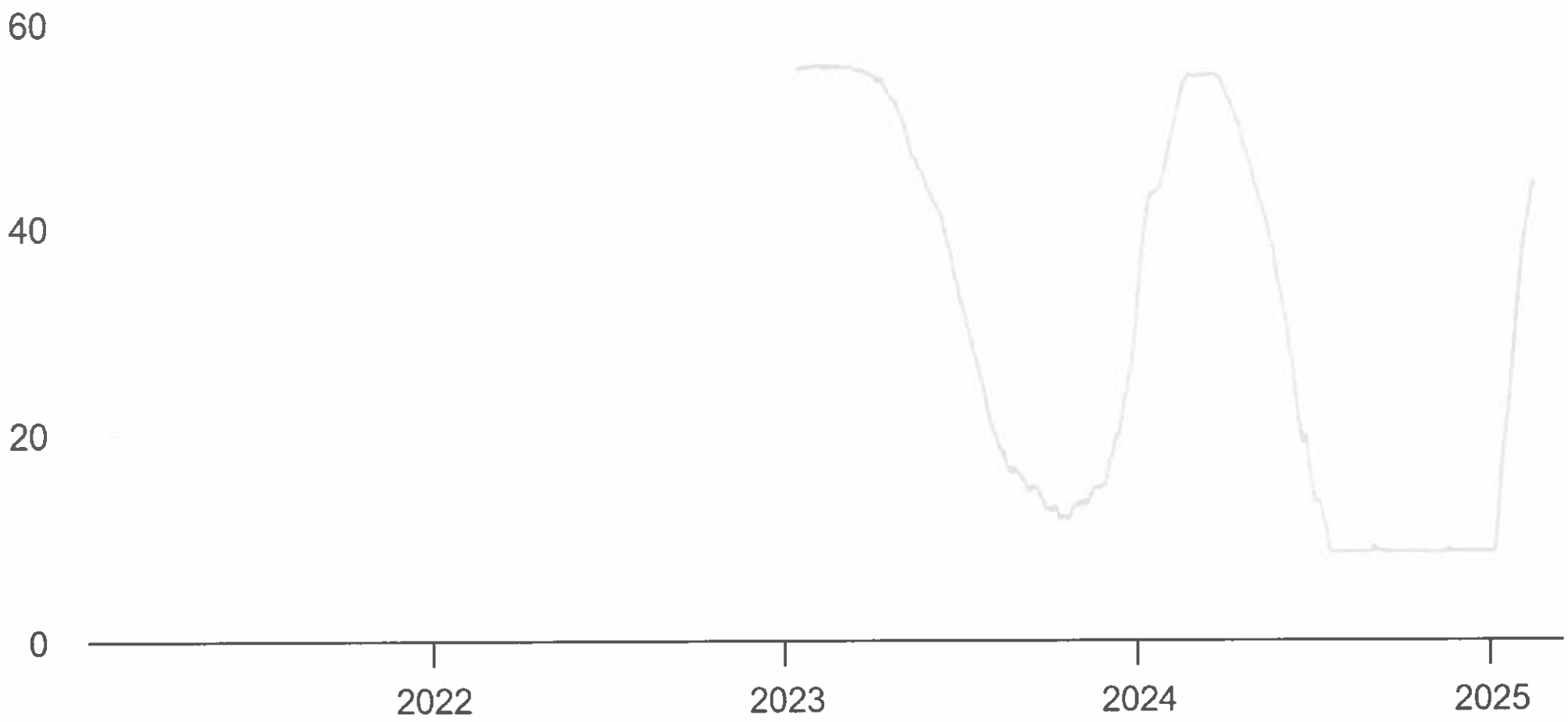


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Depth (ft)

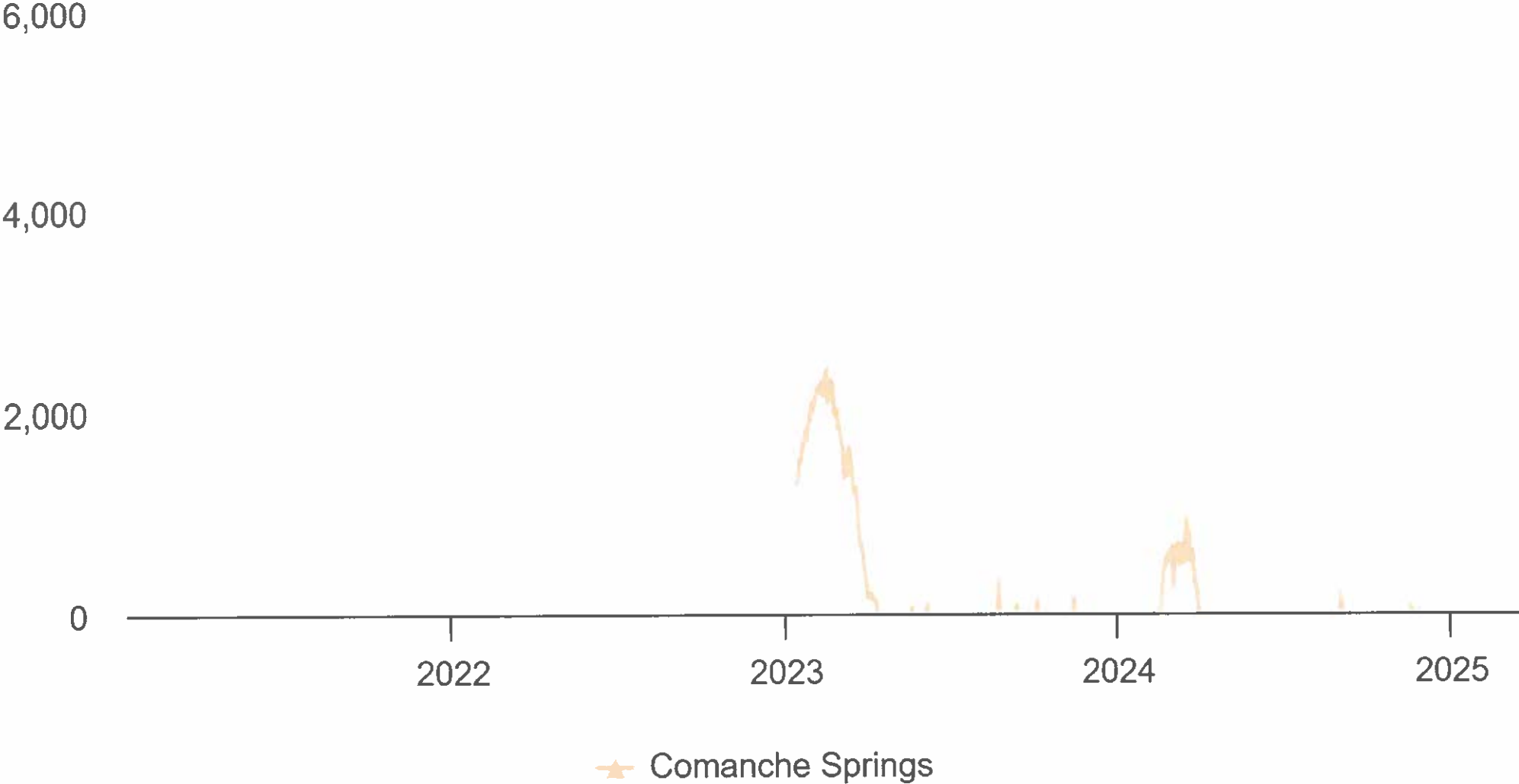
Feb 8, 2021 8:16 AM - Feb 15, 2025 12:16 AM



★ Comanche Springs

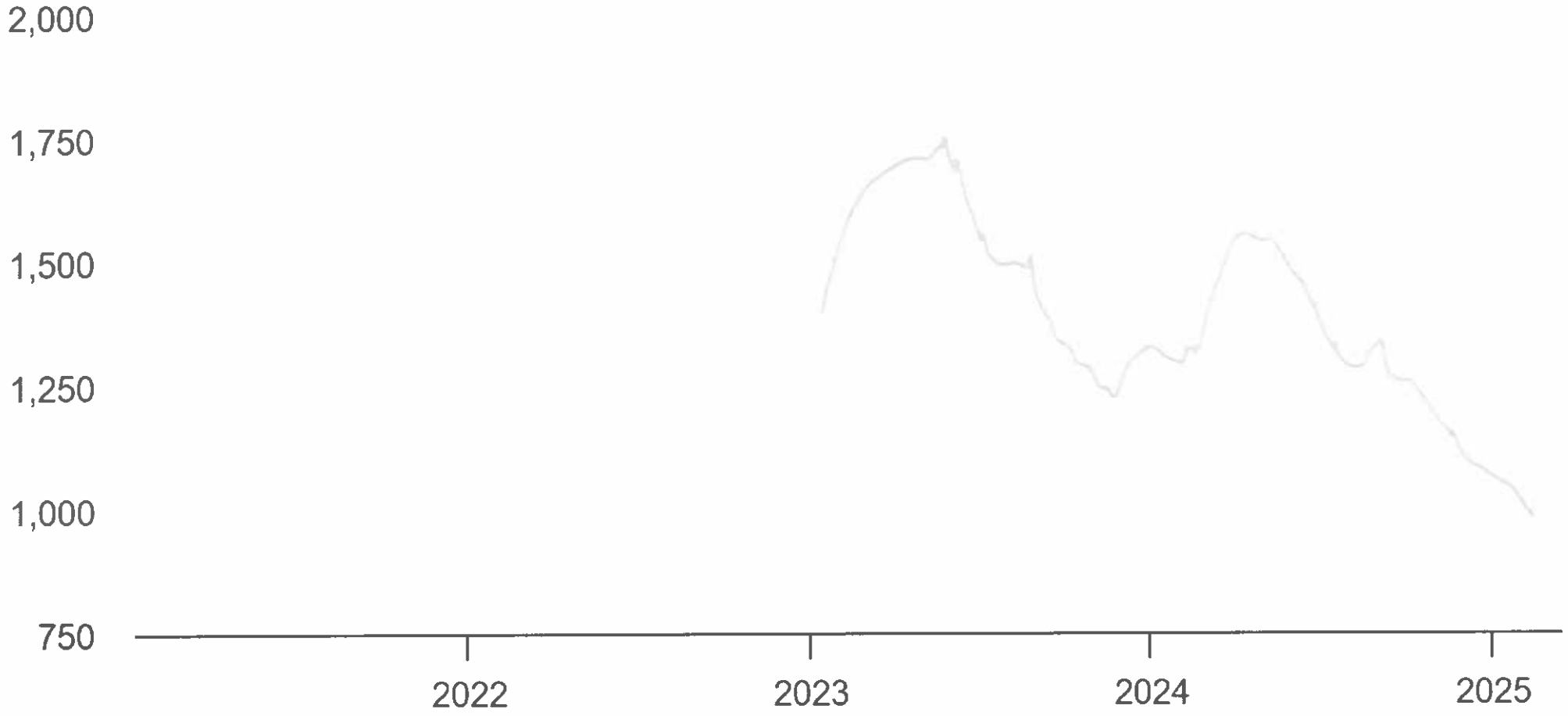
Flow Rate (gal/min)

Feb 8, 2021 8:16 AM - Feb 15, 2025 12:16 AM



TDS (ppm)

Feb 8, 2021 8:16 AM - Feb 15, 2025 12:16 AM

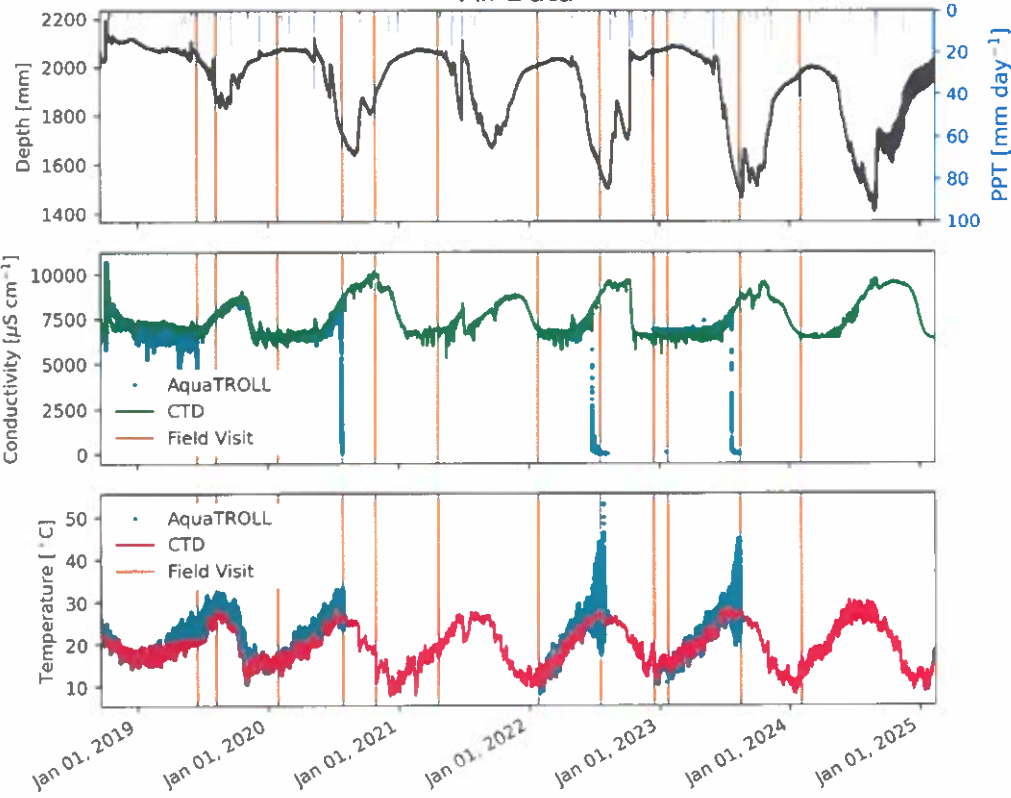


★ Comanche Springs

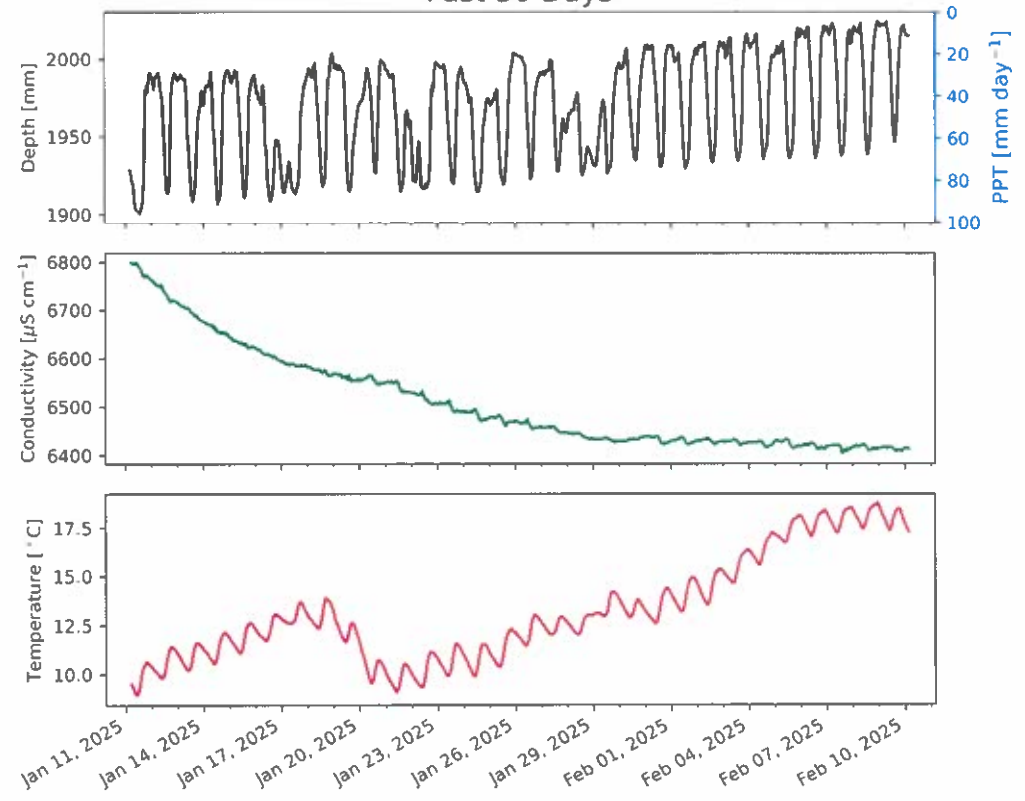
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Diamond Y Spring (DMY1)

All Data

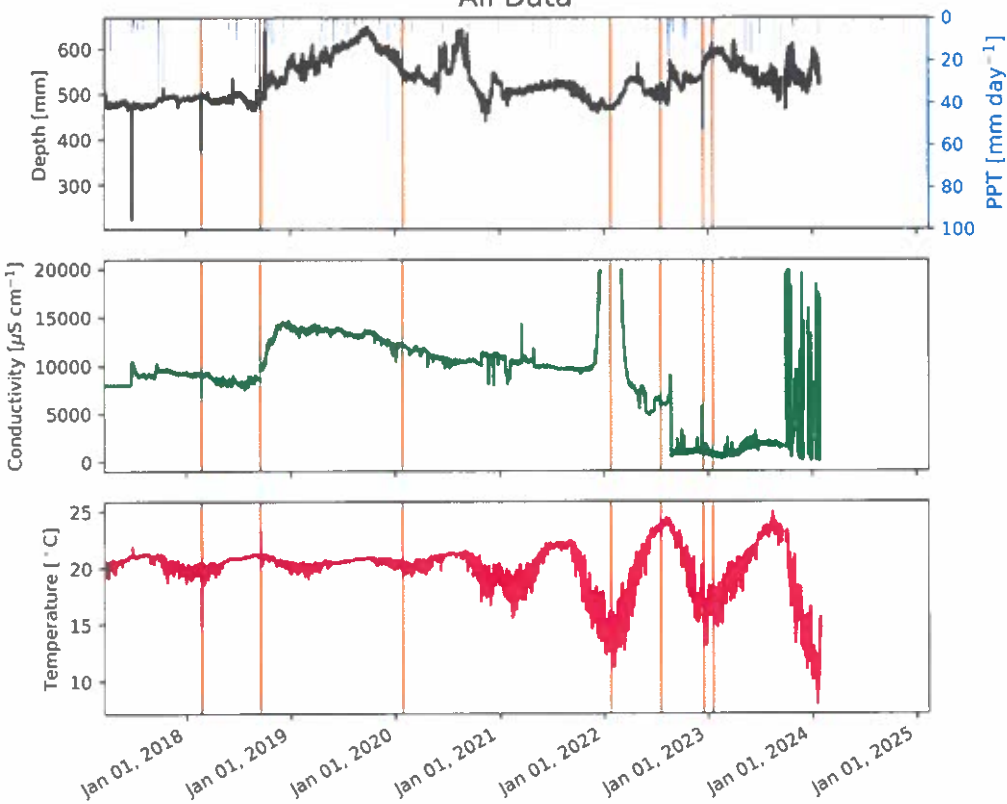


Past 30 Days

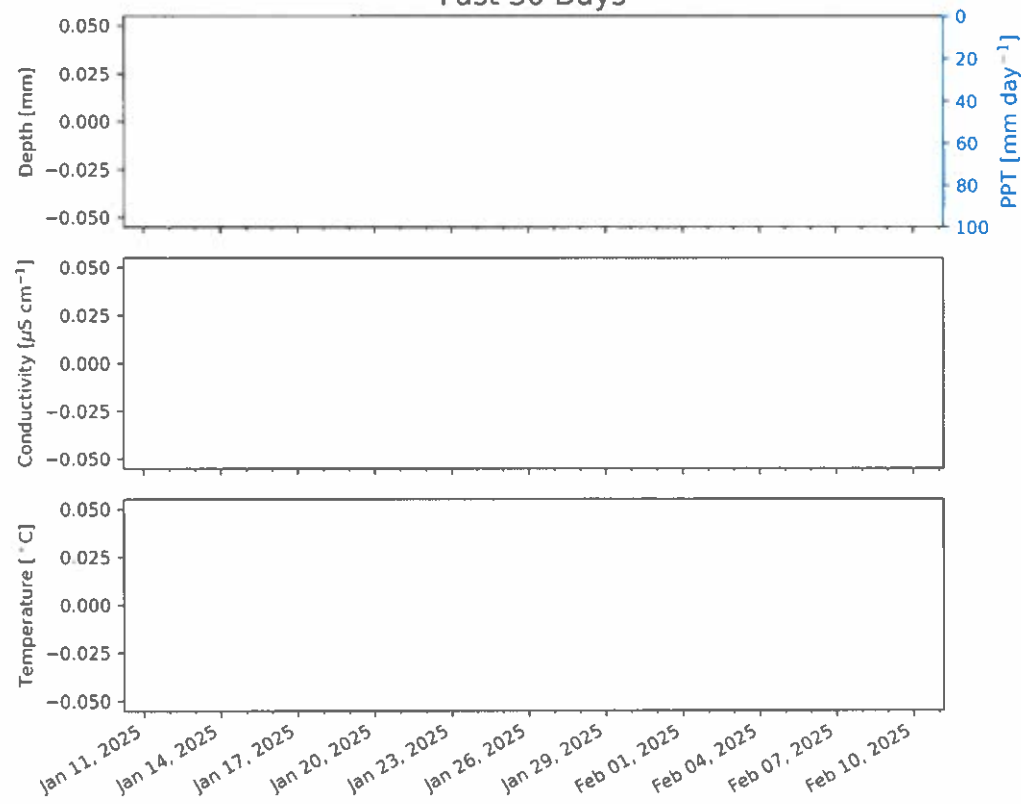


Euphrasia Spring (EUP1)

All Data

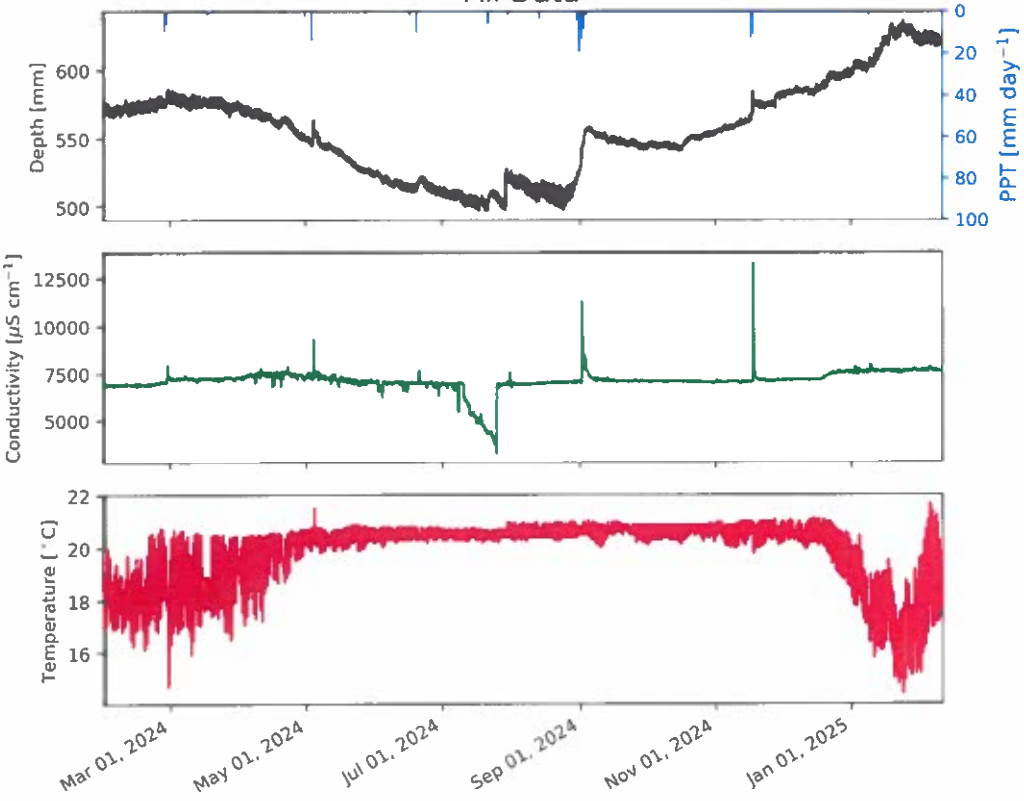


Past 30 Days

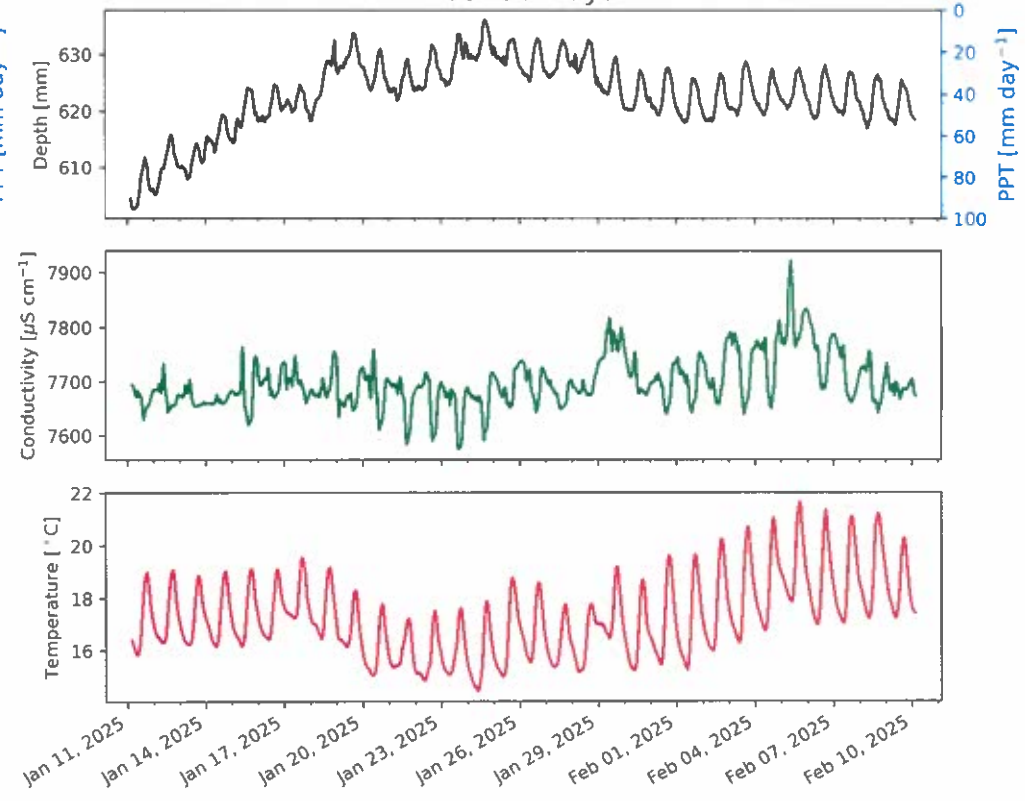


Karges Spring (KRG1)

All Data

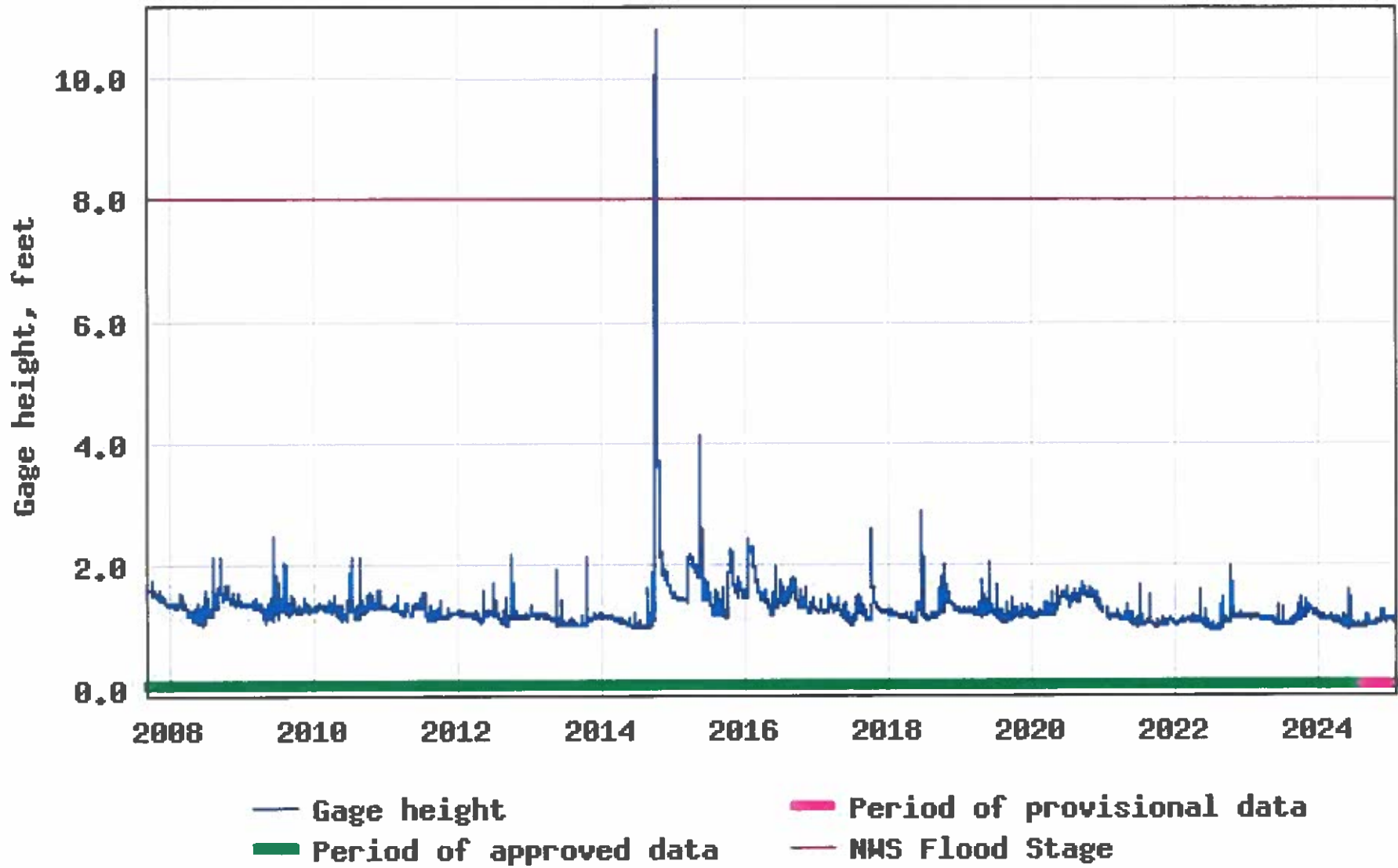


Past 30 Days

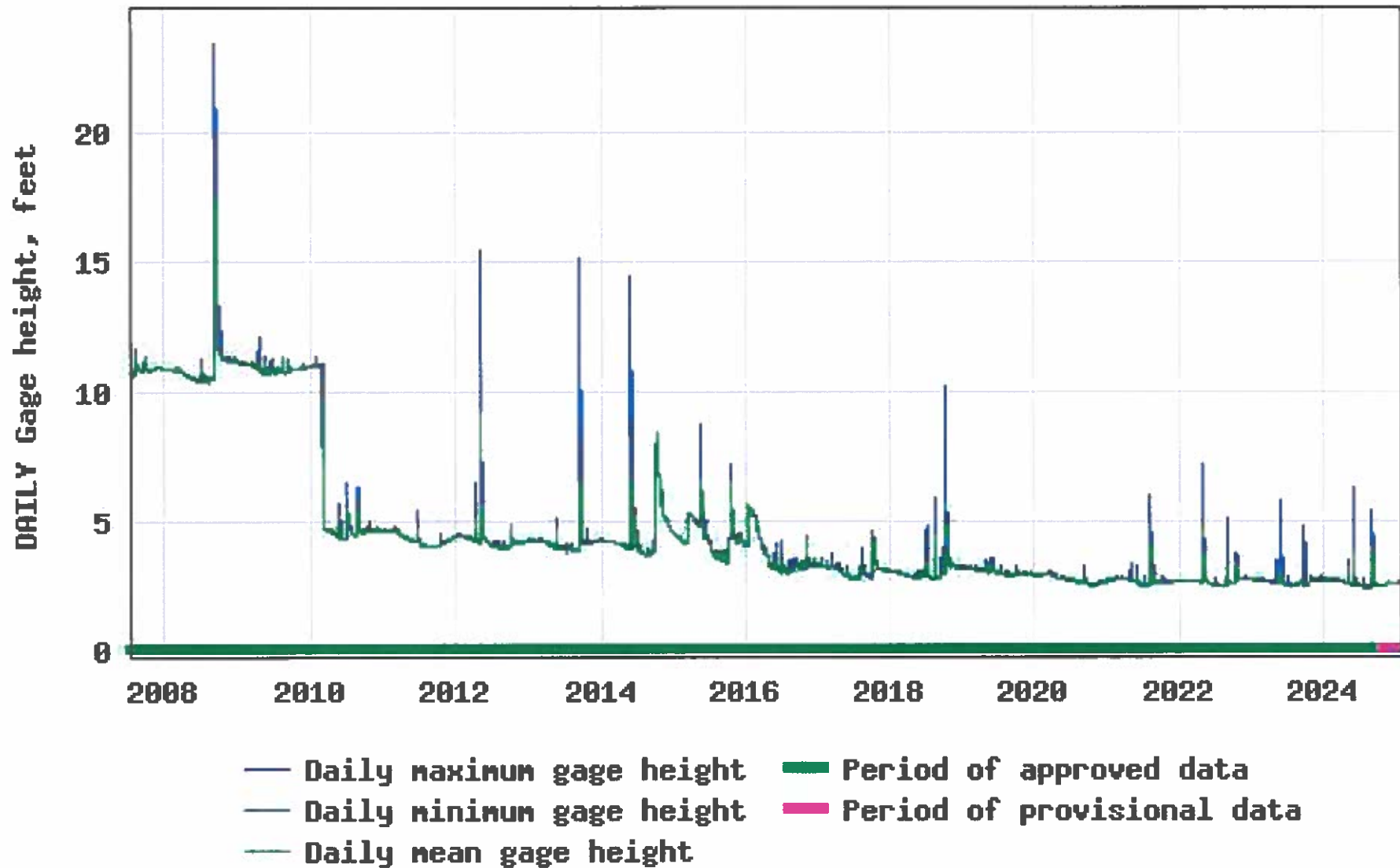


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USGS 08446500 Pecos Rv nr Girvin, TX



USGS 08447000 Pecos Rv nr Sheffield, TX



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Protect, Conserve and Prevent Waste of Groundwater

Our mission at *Middle Pecos Groundwater Conservation District (MPGCD)* is to develop and implement an efficient, economical and environmentally sound groundwater management program to protect, maintain and enhance the groundwater resources of the District, and to communicate and administer to the needs and concerns of the citizens of Pecos County associated with these groundwater resources.

We have an 11-member Board of Directors that is elected by the citizens of Pecos County. There are two directors representing each county precinct, one representing the City of Fort Stockton, one representing the City of Iraan, and one representing Pecos County at large. Your current Directors are: Jerry McQuairt, Janet Groth, Weldon Blackwelder, Puja Boinpally, Vanessa Cardwell, Billy Jackson., Ronnie Cooper, Larry Drgac, M. R. Gonzalez, Alvaro Mandujano, Jr., and Jeff Sims.

In keeping an eye on Pecos County groundwater, the District monitors 139 water wells that are scattered throughout Pecos County. We check water quality analysis and depth of water levels monthly.

The public is invited to join us at our monthly Board Meetings that are normally held on the 3rd Tuesday of each month at our office located at 405 North Spring Drive in Fort Stockton, Texas. Our agendas are posted on our website 72 hours before our meetings and can be reviewed at: <https://www.middlepecosgcd.org/>.

MPGCD requires water well owners to register all water well(s) with in Pecos County. A non-potable analysis can be provided by the District at no cost. MPGCD can carry out the overall responsibility of protecting our water supply by knowing where and how many wells we have in Pecos County. Examples of protection are oil/gas activity, excessive water production, monitoring water levels/analysis, and contamination.

Our office is willing to discuss any concerns, issues, etc., pertaining to our most precious natural resource – GROUNDWATER. You may contact us at 432-336-0698 or come by 405 North Spring Drive, Fort Stockton, Texas.

Efforts to Control and Prevent Waste of Groundwater and Promote Conservation

To promote conservation and prevent waste of groundwater related to agricultural, the following are the best management practices as stated by the Texas Water Development Board Conservation Division : * Irrigation water use management - irrigation scheduling, measurement of irrigation water use, crop residue management and conservation tillage, irrigation audit; * land management systems – furrow dikes, land leveling, contour farming, conversion of supplemental irrigated farm land to dry land, brush management; * on-farm water delivery systems – lining of on-farm irrigation ditches, replacement of on-farm irrigation ditches and pipelines, low-pressure center pivot sprinkler irrigation systems, drip/micro-irrigation systems, gated and flexible pipe for field water distribution systems, surge flow for field water distribution systems, and linear move sprinkler irrigation systems; * Water district delivery systems – lining of district delivery systems, replacement of irrigation district canals and lateral canals with pipelines; * Miscellaneous systems – tailwater recovery and reuse system, nursery production systems.

Other ways to promote conservation and prevent waste of groundwater: Sweep rather than hose driveways and other areas; use drip irrigation rather than spray irrigation; wash your car at a car wash; downsize your lawn area and/or Xeriscape; irrigate during the coolest part of the day; never water on windy days; protect plants with mulch and compost to reduce water loss; install low flow shower heads; insulate hot water pipes; reduce showering time; operate dishwasher and washing machine on full loads; install an aerator on kitchen faucet; and turn the water off while brushing teeth and on to rinse. If you see signs of contaminating substances on the surface, remember it could end up contaminating the water source below, so please report to us if you find signs of contamination that need to be checked out.

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Threshold Table

Show more threshold data 

| Well | | Winter Threshold 1 | | Winter Threshold 2 (Historic Minimum) | | Winter Threshold 3 | | Winter Threshold 4 | | Most recent Depth to Water | |
|------------|-----------------------------|--------------------|----------------|--|----------------|--------------------|----------------|--------------------|--------------------|----------------------------|--|
| Short Name | Long Name | Depth to Water | Depth to Water | Depth to Water | Depth to Water | Depth to Water | Depth to Water | Depth to water | Measure... Date | | |
| Mpgcd320 | King, Woodward, #320 | 205 | 200 | 195 | 190 | 137.68 | 02/05/2025 | | | | |
| Mpgcd323 | Ft Stockton, Cemetery, #323 | 198 | 193 | 188 | 183 | 155.98 | 02/05/2025 | | | | |
| C-5 | C-5, FSH Well | 110 | 105 | 100 | 95 | 40.45 | 02/05/2025 | | | | |
| M-9 | M-9, FSH Well | 313 | 308 | 303 | 298 | 259.14 | 02/05/2025 | | | | |
| S-45 | S-45, FSH Well | 165 | 160 | 155 | 150 | 101.29 | 02/05/2025 | | | | |
| S-6 | S-6, FSH Well | 205 | 200 | 195 | 190 | 130.88 | 02/05/2025 | | | | |
| Mpgcd305 | Cockrell_Belding, #305 | 292 | 287 | 282 | 277 | 222 | 02/05/2025 | | | | |
| Mpgcd318 | Goldman Ranch, Well 1 | 72 | 67 | 62 | 57 | 40.39 | 02/05/2025 | | | | |
| Mpgcd334 | Carpenter, #334 | 140 | 135 | 130 | 125 | 113.4 | 02/05/2025 | | | | |
| Interstate | Interstate Well, FSH Well | 96 | 91 | 86 | 81 | 58.09 | 02/05/2025 | | | | |
| Prison | TDCJ, Prison Well | 258 | 253 | 248 | 243 | 202.5 | 01/15/2025 | | | | |

HydroVu Water Levels

Table 6. Monitor Well Threshold Recommendations

| Well | | Reference Point Elevation (ft MSL) | Winter Threshold 1 | | Winter Threshold 2 (Historic Minimum) | | Winter Threshold 3 | | Winter Threshold 4 | | Maximum Recent Drawdown (Winter to Summer) | Summer Threshold | | Recent Depth to Water | |
|------------|-----------------------------|------------------------------------|---------------------|--------|---------------------------------------|-------------|---------------------|--------|---------------------|---------|--|---------------------|-------------|-----------------------|--------|
| Short Name | Long Name | | Depth to Water (ft) | Basis | Depth to Water (ft) | Basis | Depth to Water (ft) | Basis | Depth to Water (ft) | Basis | | Depth to Water (ft) | Basis | Winter | Summer |
| Mpgcd320 | King, Woodward, #320 | 3068 | 205 | Win2+5 | 200 | Data 1/1999 | 195 | Win2-5 | 190 | Win2-10 | 45 | 245 | Win2+Max DD | 113 | 148 |
| Mpgcd323 | Ft Stockton, Cemetery, #323 | 3031 | 198 | Win2+5 | 193 | Data 1/2000 | 188 | Win2-5 | 183 | Win2-10 | 15 | 208 | Win2+Max DD | 146 | 148 |
| C-5 | C-5, FSH Well | 3009 | 110 | Win2+5 | 105 | WPC 1973 | 100 | Win2-5 | 95 | Win2-10 | 72 | 177 | Win2+Max DD | 60 | 107 |
| M-9 | M-9, FSH Well | 3261 | 313 | Win2+5 | 308 | WPC 1973 | 303 | Win2-5 | 298 | Win2-10 | 48 | 356 | Win2+Max DD | 246 | 283 |
| S-45 | S-45, FSH Well | 3067 | 165 | Win2+5 | 160 | WPC 1973 | 155 | Win2-5 | 150 | Win2-10 | 56 | 216 | Win2+Max DD | 92 | 115 |
| S-6 | S-6, FSH Well | 3123 | 205 | Win2+5 | 200 | WPC 1973 | 195 | Win2-5 | 190 | Win2-10 | 62 | 262 | Win2+Max DD | 118 | 159 |
| Mpgcd305 | Cockrell_Belding, #305 | 3233 | 292 | Win2+5 | 287 | WPC 1973 | 282 | Win2-5 | 277 | Win2-10 | 75 | 362 | Win2+Max DD | 206 | 250 |
| Mpgcd318 | Goldman Ranch, Well 1 | 2957 | 72 | Win2+5 | 67 | WPC 1975 | 62 | Win2-5 | 57 | Win2-10 | 33 | 100 | Win2+Max DD | 30 | 49 |
| Mpgcd334 | Carpenter, #334 | 3051 | 140 | Win2+5 | 135 | WPC 1975 | 130 | Win2-5 | 125 | Win2-10 | 36 | 171 | Win2+Max DD | 104 | 126 |
| Interstate | Interstate Well, FSH Well | 2988 | 96 | Win2+5 | 91 | WPC 1975 | 86 | Win2-5 | 81 | Win2-10 | 40 | 131 | Win2+Max DD | 49 | 71 |
| Prison | TDCJ, Prison Well | 3199 | 258 | Win2+5 | 253 | WPC 1973 | 248 | Win2-5 | 243 | Win2-10 | 50 | 303 | Win2+Max DD | 184 | 224 |

Threshold
 Winter Threshold 1 If 6 of 11 are below threshold, 100% reduction in FSH non-historical use pumping
 Winter Threshold 2 If 6 of 11 are below threshold, 50% reduction in FSH non-historical use pumping
 Winter Threshold 3 If 6 of 11 are below threshold, 30% reduction in FSH non-historical use pumping
 Winter Threshold 4 If 6 of 11 are below threshold, 10% reduction in FSH non-historical use pumping
 Summer Threshold If 6 of 11 are below threshold, meeting in 60 days between FSH and MPGCD to discuss data

Notes
 Maximum Recent Drawdown (Winter to Summer) based on evaluation of recent data (~2010 to 2016)
 Summer Thresholds derived by adding maximum recent drawdown (from historic data) to Winter 1 Threshold
 Recent Depth to Water are from actual data maximum (summer) and minimum (winter) from spring 2016 to winter 2017

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Final Report

**2024 Update:
Comparison of Groundwater Elevations and Drawdowns:
GAM DFC Simulation and Measured Data from TWDB**



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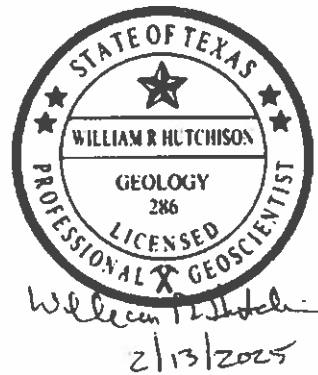
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Professional Engineer and Professional Geoscientist Seals

This report was prepared by William R. Hutchison, Ph.D., P.E., P.G., who is licensed in the State of Texas as follows:

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1.0 Introduction

One of the required goals (Goal 8) of the Middle Pecos Groundwater Conservation District Management Plan is a how the District addresses the desired future conditions in a quantitative manner. This report:

- Summarizes the available data from the TWDB Groundwater Database
- Describes the analyses that were completed to select monitoring wells for the comparison with the simulations that are the basis for the desired future condition
- Provides a comparison of model simulated groundwater elevations and drawdowns with actual data and provides some context to the results with an analysis of precipitation in the area.

The 2020 management plan included an appendix providing documentation of this comparison (Hutchison, 2020). An update was completed as documented in Hutchison (2023). This report contains an update through 2023 for inclusion in the 2025 management plan. The analysis ends in 2023 because complete groundwater level and precipitation data for 2024 are not yet available on the TWDB website.

2.0 TWDB Data

2.1 Groundwater Level Data

The TWDB groundwater database includes a site for water levels by county:

<https://www3.twdb.texas.gov/apps/reports/GWDB/WaterLevelsByCounty>

Data for Pecos County were downloaded on January 21, 2025 for use in this report. The raw data were filtered to only include records with water level data after 2005 (the base year for the desired future condition). Sorting the data by date resulted in the identification of 38 wells that could be used for this analysis.

The Fortran program *TWDBData.exe* was written to read the list of wells, read the water level data, and return end-of-year water levels. For purposes of this selection, the monthly priority of groundwater levels to assign an end-of-year groundwater level was:

1. December of the current year
2. January of the next year
3. November of the current year
4. February of the next year

This effort yielded 503 groundwater level records for the 38 wells. As noted in Hutchison (2020 and 2023), the water level data in the TWDB database can only be used to compare the DFCs in the Edwards-Trinity (Plateau) and Pecos Valley Alluvium. Data are not available to evaluate the DFCs for the Capitan Reef Complex, Dockum, and Rustler aquifers.

The Fortran program *etppvrowcol.exe* was written to locate each well on the grid of the Groundwater Availability Model used as the basis for the desired future conditions (DFC) in GAM 3 and GAM 7. The results are expressed in terms of the model row and column.

Table 1 summarizes information on the 38 wells, and Figure 1 presents their locations. Please note that the Well ID from Table 1 is used to identify each well location in Figure 1.

Table 1. Summary of Well Information

| WellID | TWDB Well Number | Number of Records (2005 to 2022) | GAMx | GAMy | Well Depth (ft) | Reference Point Elevation (ft MSL) | GAM Row | GAM Col | Distance to Nearest Cell Center (ft) |
|--------|------------------|----------------------------------|-----------|----------|-----------------|------------------------------------|---------|---------|--------------------------------------|
| 1 | 4562402 | 14 | 4180198 | 19622464 | 120 | 2,533 | 169 | 141 | 1,198 |
| 2 | 4562901 | 16 | 4215270.5 | 19605324 | 190 | 2,302 | 167 | 148 | 1,794 |
| 3 | 4563701 | 5 | 4221824 | 19602964 | 138 | 2,298 | 166 | 150 | 3,170 |
| 4 | 4648502 | 17 | 3969727 | 19718908 | 724 | 2,525 | 182 | 99 | 2,007 |
| 5 | 4648503 | 17 | 3971253.8 | 19725630 | 625 | 2,513 | 181 | 99 | 1,570 |
| 6 | 4648604 | 7 | 3975771 | 19716692 | 425 | 2,528 | 182 | 100 | 3,498 |
| 7 | 4648801 | 3 | 3968880.3 | 19702396 | 400 | 2,578 | 184 | 101 | 2,971 |
| 8 | 4655603 | 16 | 3943139.8 | 19674652 | 600 | 2,694 | 192 | 101 | 2,374 |
| 9 | 4656201 | 16 | 3964642.3 | 19690156 | 865 | 2,623 | 187 | 102 | 2,188 |
| 10 | 4656301 | 8 | 3974916.3 | 19685516 | 568 | 2,618 | 186 | 104 | 1,762 |
| 11 | 4656306 | 17 | 3984143.3 | 19690126 | 615 | 2,594 | 184 | 105 | 1,293 |
| 12 | 4656401 | 5 | 3947945.8 | 19675934 | 400 | 2,686 | 191 | 102 | 1,623 |
| 13 | 5206501 | 12 | 3881571 | 19588218 | 351 | 3,077 | 212 | 104 | 3,353 |
| 14 | 5206701 | 10 | 3871409.3 | 19565630 | 510 | 3,237 | 216 | 105 | 363 |
| 15 | 5207302 | 4 | 3938322.8 | 19599728 | 501 | 2,964 | 203 | 110 | 1,237 |
| 16 | 5207502 | 12 | 3924182.8 | 19585546 | 280 | 3,020 | 207 | 110 | 2,446 |
| 17 | 5207901 | 17 | 3937220.5 | 19567040 | 612 | 3,081 | 208 | 114 | 2,586 |
| 18 | 5208302 | 9 | 3975494.3 | 19595652 | 310 | 3,018 | 199 | 116 | 2,206 |
| 19 | 5208801 | 16 | 3959985.3 | 19562958 | 200 | 3,086 | 205 | 118 | 1,659 |
| 20 | 5216202 | 14 | 3963653.8 | 19554044 | 666 | 3,098 | 206 | 119 | 2,137 |
| 21 | 5216302 | 4 | 3973889.5 | 19552850 | 320 | 3,080 | 205 | 121 | 730 |
| 22 | 5216505 | 9 | 3962363.8 | 19545166 | 246 | 3,141 | 207 | 120 | 2,815 |
| 23 | 5216609 | 5 | 3973211.8 | 19534436 | 1,975 | 3,192 | 208 | 123 | 2,730 |
| 24 | 5216802 | 18 | 3967842.3 | 19530824 | 448 | 3,201 | 209 | 123 | 1,474 |
| 25 | 5221301 | 11 | 3853462.8 | 19511174 | 350 | 3,512 | 226 | 109 | 1,735 |
| 26 | 5301707 | 14 | 3986188.8 | 19573280 | 98 | 2,969 | 200 | 120 | 2,374 |
| 27 | 5301805 | 14 | 4000338.3 | 19572294 | 341 | 3,029 | 199 | 122 | 1,802 |
| 28 | 5301902 | 16 | 4018509.5 | 19565434 | 180 | 2,981 | 197 | 126 | 2,849 |
| 29 | 5302708 | 17 | 4030551.5 | 19560160 | 227 | 3,025 | 197 | 128 | 1,853 |
| 30 | 5303901 | 17 | 4092037 | 19559444 | 462 | 2,876 | 189 | 137 | 1,129 |
| 31 | 5306501 | 17 | 4196969.5 | 19581700 | 425 | 2,410 | 173 | 149 | 2,839 |
| 32 | 5307202 | 14 | 4234979 | 19591762 | Unknown | 2,425 | 166 | 153 | 1,855 |
| 33 | 5307203 | 11 | 4241304 | 19590826 | Unknown | 2,354 | 166 | 154 | 2,181 |
| 34 | 5307601 | 6 | 4243929 | 19582876 | 931 | 2,978 | 166 | 155 | 2,422 |
| 35 | 5309105 | 3 | 3982084.3 | 19550196 | 200 | 3,087 | 204 | 122 | 2,770 |
| 36 | 5309301 | 18 | 4015507.3 | 19553902 | 210 | 3,012 | 199 | 127 | 2,749 |
| 37 | 5309306 | 13 | 4018967.8 | 19559648 | 235 | 2,971 | 198 | 126 | 2,728 |
| 38 | 5312702 | 15 | 4108293.3 | 19521890 | Unknown | 2,916 | 192 | 144 | 1,307 |

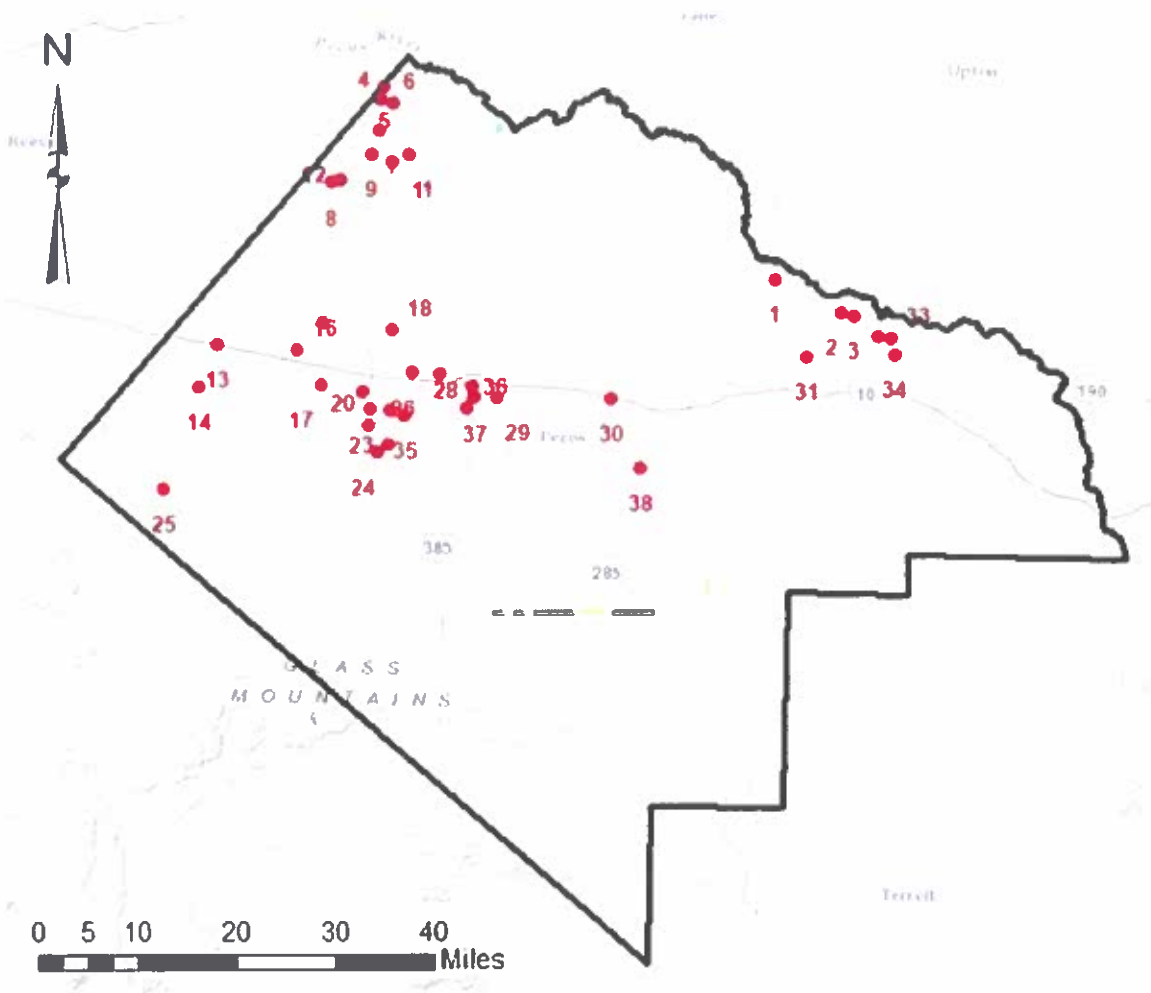


Figure 1. Well Locations

2.2 Precipitation Data

Precipitation data were downloaded from the TWDB website:

<https://waterdatafortexas.org/lake-evaporation-rainfall>

As seen in Figure 2, Pecos County is in parts of four quadrangles (604, 605, 704, and 705). The available data for the four quadrangles include monthly totals of precipitation from 1940 to 2023. Data for 2024 are limited to the first quarter (January, February, and March). These data were saved to the file *MPGCD Pcp.xlsx*. The monthly data were averaged across all four quadrangles, the annual totals for each year were calculated and presented in Column M. The annual rainfall was also expressed in terms of a percent average for the entire period in Column N. The average rainfall from 1940 to 2023 was 13.36 inches. Annual departures from the average are presented in Column O. The pertinent data for the years of interest (2005 to 2023) are summarized in Table 2.

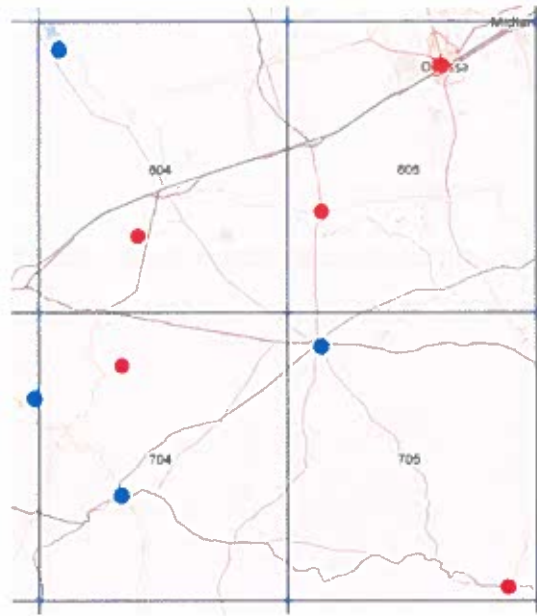


Figure 2. Location of Precipitation Quads

Table 2. Precipitation for Quadrangles 604, 605, 704, and 705: 2005 to 2023

| Year | Annual Precipitation (in) | Annual Precipitation (% of Average) | Annual Difference from Average (in) |
|------|---------------------------|-------------------------------------|-------------------------------------|
| 2005 | 15.60 | 116.75 | 2.24 |
| 2006 | 11.17 | 83.59 | -2.19 |
| 2007 | 18.79 | 140.66 | 5.43 |
| 2008 | 12.02 | 89.99 | -1.34 |
| 2009 | 12.00 | 89.82 | -1.36 |
| 2010 | 16.60 | 124.27 | 3.24 |
| 2011 | 3.08 | 23.07 | -10.28 |
| 2012 | 12.32 | 92.18 | -1.05 |
| 2013 | 10.53 | 78.80 | -2.83 |
| 2014 | 11.58 | 86.70 | -1.78 |
| 2015 | 19.41 | 145.30 | 6.05 |
| 2016 | 13.32 | 99.70 | -0.04 |
| 2017 | 13.39 | 100.24 | 0.03 |
| 2018 | 14.85 | 111.13 | 1.49 |
| 2019 | 14.30 | 107.04 | 0.94 |
| 2020 | 7.76 | 58.07 | -5.60 |
| 2021 | 10.37 | 77.62 | -2.99 |
| 2022 | 12.50 | 93.53 | -0.87 |
| 2023 | 9.26 | 69.27 | -4.11 |

Annual departures from the long term mean precipitation is presented in Figure 3 and highlights the current drought (2020 to 2023). Please note that the last wet year was 2015. Since then, there were three near-average years (2016, 2017, and 2018) followed by four dry years (2020, 2021, 2022, and 2023).

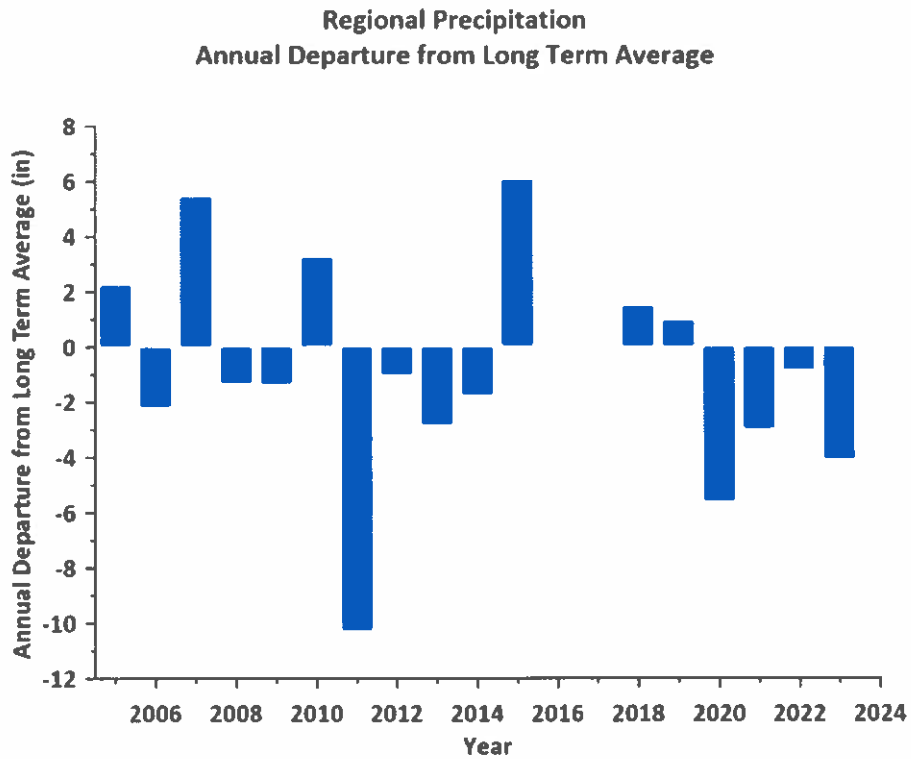


Figure 3. Regional Precipitation Annual Departures from Average

3.0 GAM Results and Comparison to Actual Data

The Fortran program *getDFCdd.exe* reads the actual drawdown data described above (503 records) and extract the groundwater elevations from those same points and years from the calibrated model (2005) and the DFC simulation (2006 to 2070). The results are saved in the Excel spreadsheet *ActualDD Sim DD 2005 to 2024.xlsx*. Also included in these results are the precipitation data for the years 2005 to 2023. Table 3 presents the annual summary included in the Excel file.

Table 3. Summary of Annual Drawdown Comparison

| Year | Record Count | Average Actual Drawdown (ft) | Average Simulated Drawdown (ft) | Precipitation (in) | Precipitation (% of Average) |
|-------------|---------------------|-------------------------------------|--|---------------------------|-------------------------------------|
| 2005 | 38 | 0.00 | 0.00 | 15.60 | 116.75 |
| 2006 | 27 | -0.05 | 2.18 | 11.17 | 83.59 |
| 2007 | 26 | -1.25 | 3.32 | 18.79 | 140.66 |
| 2008 | 22 | 5.28 | 4.21 | 12.02 | 89.99 |
| 2009 | 31 | -0.24 | 4.71 | 12.00 | 89.82 |
| 2010 | 25 | 2.16 | 4.93 | 16.60 | 124.27 |
| 2011 | 30 | 8.93 | 5.46 | 3.08 | 23.07 |
| 2012 | 29 | 13.39 | 5.99 | 12.32 | 92.18 |
| 2013 | 29 | 15.37 | 6.45 | 10.53 | 78.80 |
| 2014 | 29 | 12.56 | 6.91 | 11.58 | 86.70 |
| 2015 | 28 | 4.25 | 7.32 | 19.41 | 145.30 |
| 2016 | 27 | 4.13 | 7.80 | 13.32 | 99.70 |
| 2017 | 22 | 6.17 | 8.57 | 13.39 | 100.24 |
| 2018 | 23 | 4.83 | 9.00 | 14.85 | 111.13 |
| 2019 | 23 | 17.13 | 9.41 | 14.30 | 107.04 |
| 2020 | 23 | 15.39 | 9.82 | 7.76 | 58.07 |
| 2021 | 23 | 14.46 | 10.22 | 10.37 | 77.62 |
| 2022 | 23 | 12.24 | 10.62 | 12.50 | 93.53 |
| 2023 | 23 | 13.46 | 11.02 | 9.26 | 69.27 |
| 2024 | 2 | 25.23 | 18.42 | NA | NA |

Figure 4 presents a hydrograph of actual average drawdown and simulated average drawdown from 2005 to 2023. Please note that the blue numbers represent the annual precipitation for each year expressed as a percentage of long-term average, and the red numbers represent the numbers of records that were compared in each year.

Please note that the simulated drawdown is declining from 2005 to 2021 with only slight variations from a linear trend. The linear trend is expected because the simulation assumed constant and average rainfall and recharge conditions.

Based on the last few years, it is expected that the TWDB precipitation data for 2024 will be posted in April or May 2025. The groundwater level data for 2024 does not yet appear complete. This may suggest that this analysis be completed later in the calendar year in the future to get a more complete picture in the annual assessment.

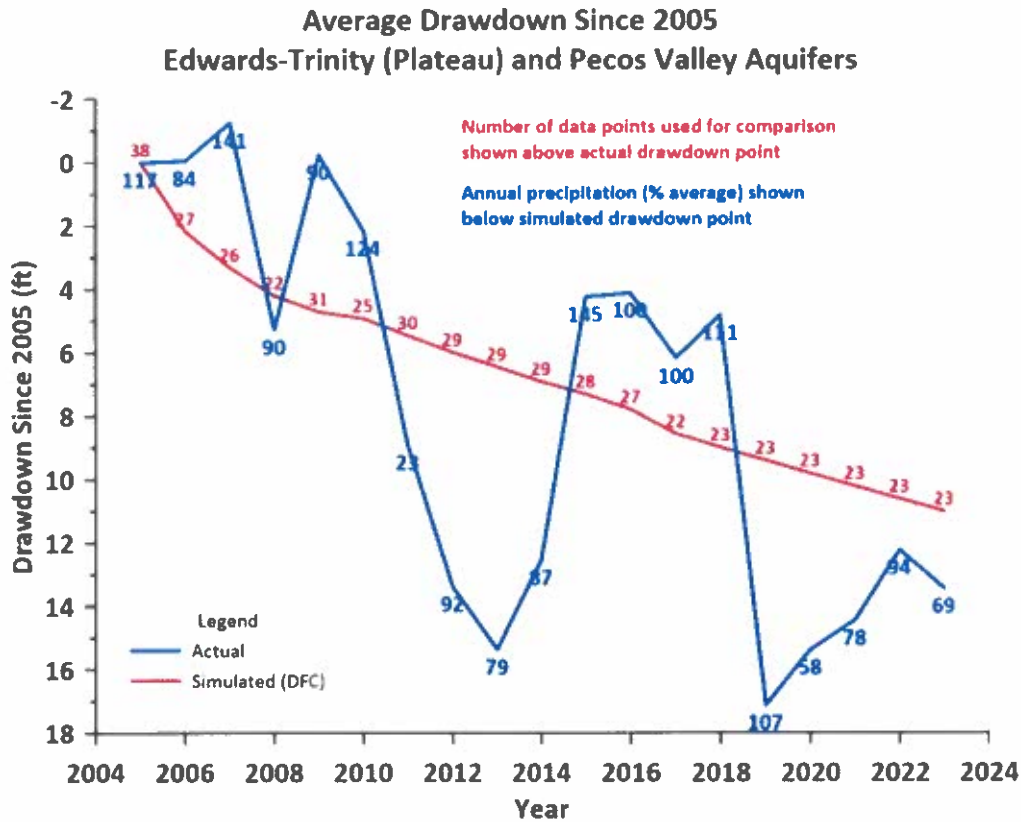


Figure 4. Average Drawdown Comparison (2005 to 2023)

The actual drawdown appears to rise and fall generally with precipitation (wet years yield low drawdowns and dry years yield higher drawdowns). This is expected since pumping generally increases during drought years as irrigation demands are higher.

A more complete analysis of this observation is presented in Figure 5, which presents a plot of annual precipitation vs. measured average drawdown, along with the best-fit line based on a second-order polynomial regression of drawdown in feet (DD) and annual precipitation in inches (PCP):

$$DD = 9.86 + (0.70*PCP) - 0.063*PCP^2$$

The 98% confidence of the linear regression is also shown.

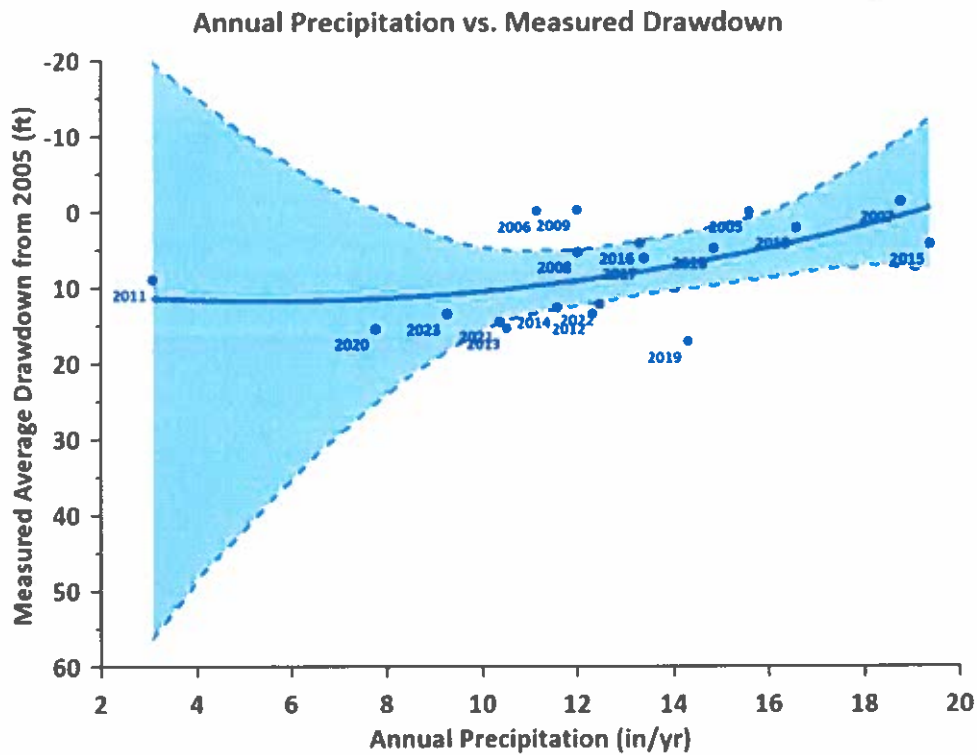


Figure 5. Annual Precipitation vs. Measured Drawdown

Please note that the year is also shown on each data point. As expected, the higher the rainfall, the lower the drawdown. However, the plot shows considerable scatter. During dry years, the confidence band is wider due to that general lack of data (2011 was an exceptionally dry year with only about 3 inches of precipitation).

The correlation is not particularly strong, which means that there are several influences and factors that are not considered in this simple analysis. A cursory review of the figure also shows that 2019 is anomalous. In 2019, the average drawdown is greater than expected given the precipitation that year. Pumping from exempt oil and gas operations was unusually high in 2019 (about 11,000 AF/yr), which could explain the high drawdown in 2019 compared to the other years if the monitoring wells that were used for this analysis were located near the pumping. Please note that since the subsequent years generally fall within the confidence band, there is little need to delve into this issue further for purposes of comparing actual and simulated drawdowns.

4.0 Discussion and Recommendations

The TWDB database was sampled to find wells with groundwater elevation measurements in Pecos County. The analysis showed that the TWDB database did not have sufficient groundwater elevation data to complete a comparison with simulated drawdowns for the Capitan Reef Complex, Dockum, and Rustler aquifers. It is recommended that monitoring of wells completed in these aquifers be identified and data collection from these wells improved, or the aquifers be classified as not relevant for purposes of joint planning. Such a classification would result in no desired

future condition for that aquifer in Pecos County and would result in no modeled available groundwater calculation by the Texas Water Development Board. The Regional Planning Group (Region F) would be responsible for establishing groundwater availability if an aquifer is classified as not relevant for purposes of joint planning.

The analysis showed that the TWDB database had sufficient groundwater elevation data to complete a comparison with simulated drawdown for the Edwards-Trinity (Plateau) and Pecos Valley aquifers. The database was sampled to find wells in Pecos County with groundwater elevation measurements in 2005 to compare with simulated drawdowns from the GAM simulation that was the basis for the desired future condition.

The comparison of measured drawdowns with simulated drawdowns showed that, in general, when annual precipitation is higher than average, measured drawdown is less than simulated drawdown and when annual precipitation is less than average, measured drawdown is higher than simulated drawdown. In general, lower than average precipitation correlates with lower-than-average recharge and higher than average pumping. However, this relationship is complex and other factors are important. This analysis shows a weak correlation between annual precipitation and measured drawdown, but the analysis also shows that the measured drawdowns are consistent with the simulation that was the basis for the desired future condition.

Based on this analysis, it is recommended that the future annual updates to this analysis be delayed until later in the year to provide more groundwater level data. If the analysis were completed in the fall, more data from the end of the previous year will be available for analysis.

5.0 References

Hutchison, W.R., 2020. Comparison of Groundwater Elevations and Drawdowns: GAM DFC Simulation and Measured Data from TWDB. Report to Middle Pecos Groundwater Conservation District, Fort Stockton, Texas. June 8, 2020, 50p.

Hutchison, W.R., 2023. 2024 Update: Comparison of Groundwater Elevations and Drawdowns: GAM DFC Simulation and Measured Data from TWDB. Report to Middle Pecos Groundwater Conservation District, Fort Stockton, Texas. May 11, 2023, 11p.