

## MIDDLE PECOS GROUNDWATER CONSERVATION DISTRICT

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### Directors

Jerry McGuairt, President John D. Dorris, Vice President M. R. Gonzalez, Secretary/Treasurer  
Alvaro Mandujano, Jr. Vanessa Cardwell Ronald Cooper Janet Groth  
Weldon Blackwelder Allan Childs Jeff Sims Puja Boinpally

### Employees

Ty Edwards, General Manager  
Melissa Mills, Office Manager Gail Reeves, Office Assistant

## Minutes of June 20, 2017

On this the 20<sup>th</sup> of June, 2017, a regular board meeting and public hearings were held by the Middle Pecos Groundwater Conservation District in the office located at 405 North Spring Drive, Fort Stockton, Texas, with the following members present, to-wit:

Jerry McGuairt	President, Precinct 1
John Dorris	Vice President, Precinct 3
M. R. Gonzalez	Secretary/Treasurer, Precinct 2
Janet Groth	Precinct 1
Puja Boinpally	Precinct 2
Alvaro Mandujano, Jr.	Precinct 4
Ronald Cooper	Precinct 4
Vanessa Cardwell	City of Fort Stockton

Quorum Present.

Board members absent: Weldon Blackwelder, Jeff Sims, and Allan Childs, Jr.

Others present: Ty Edwards, Mike Gershon, Allan Standen, Dr. Bill Hutchison, Gail Reeves, Harvey Gray, Melissa Mills, Brock Thompson, Eddie McCarthy III, Ed McCarthy, Jr., Mike Thornhill, Paula McGuairt, Oscar Hernandez, Glenn Honaker, Buck Benson, Dennis Braden, Schuyler Wight, Hayden Halfmann, Mark Harral, and Bob Beal/Fort Stockton Pioneer.

### PUBLIC HEARING AND BOARD ACTION ON PROPOSED RULES

- I Call to order at 10:01 a.m. by President Jerry McGuairt.
- II The Board will receive public input at a hearing on proposed amendments to the District's rules intended to (1) change Management Zone 1 boundaries and operating conditions to recognize hydrogeological differences between South Coyanosa and Belding areas; and (2) establish (A) acceptable aquifer level fluctuations and (B) thresholds for pro rata cutbacks when aquifer level declines in certain monitoring wells.

As part of the record, it was reported that on Monday, June 19, 2017 a meeting was held at the MPGCD office at 2 p.m. The meeting lasted approximately 1.5 hours. In attendance on behalf of Fort Stockton Holdings, LP were: Mike Thornhill, Ed and Eddie McCarthy, Brock Thompson, James Beach, Bob Harden, and Darrell Peckham. In attendance on behalf of Middle Pecos GCD was Ty Edwards, Mike Gershon, Allan Standen, Dr. Bill Hutchison, and Jerry McGuairt. The purpose of this meeting was to discuss upcoming changes to the Middle Pecos GCD rules regarding re-defining management zone one containing the Leon-Belding area, and the water level management criteria that is part of the settlement proposal between Fort Stockton Holdings, L.P. and Middle Pecos GCD.

Dr. Bill Hutchison gave a power point presentation entitled "*Proposed Changes to Management Zone 1 and Proposed Monitor Well Data and Comparisons with Model Simulations (Draft 1)*". A copy of the presentation is attached to the minutes as Attachment "A". Dr. Hutchison explained that this is a first cut at Management Zone 1 boundaries, Desired Future Conditions, and Special Permit Conditions for the upcoming Fort Stockton Holdings, LP permit application.

Note: John Dorris arrived at 10:34 a.m.

Buck Benson with Cockrell Investment Partners, L.P. asked several questions of Dr. Hutchison. MPGCD attorney Mike Gershon explained that the District will have one more hearing and maybe two more hearings and questions can be submitted. Action on the rule amendments will take place within the next 60 days as outlined in the settlement proposal between Fort Stockton Holdings, L.P. and Middle Pecos GCD.

III Adjourn hearing and consider and/or act on proposed rules.

President McGuairt adjourned the hearing at 10:38 a.m.  
No action.

**PRODUCTION PERMIT HEARING for BRENT BRADEN**

I Call to order at 10:38 a.m. by President McGuairt.

Party representing application: Dennis Braden

Protestant to application: None

Public Comment: None.

Manager Ty Edwards presented the application to the Board. The application requests a production permit for Brent Braden for 1 well located on T&P RR CO Block 48-8 Section 11 approximately 2 miles West of FM 1776 and ½ mile North of Weatherby Rd, in Pecos County, Texas. The purpose of this well is for irrigation use and request 400 acre-feet a year from the Pecos Valley and Edwards Trinity Aquifers. Dennis Braden has the farm leased. The farm previously belonged to Clarence Hoelscher. The application was declared administratively complete.

Mr. Dennis Braden said that he thought the farm had an Historic and Existing Use Permit because he applied for the permits on the farms that he managed including this farm. The matter has been researched by the MPGCD office, including the minutes and recording of the hearing, and evidence of a permit could not be found.

**II Adjourn hearing and consider and/or act on Application for a Production Permit for Brent Braden.**

Jerry McGuairt adjourned the hearing at 10:50 a.m.

Alvaro Mandujano, Jr. made a motion to approve the application as presented. Motion seconded by John Dorris. Motion Carried Unanimously.

**PRODUCTION PERMIT HEARING for HAY FARMS, INC.**

**I Call to order at 10:50 a.m. by President McGuairt.**

Party representing application: Hayden Halfmann

Protestant to application: None

Public Comment: None.

Manager Ty Edwards presented the application to the Board. The application requests a production permit for a 2 well system located on Survey H&GN NE ¼ of Block 8 Section 38 approximately 2 miles South of Cayanosa and 3 miles East of FM 1776, in Pecos County, Texas. The purpose of this well system is for Irrigation Use and request 900 acre-feet a year from the Pecos Valley Aquifers. Mr. Halfmann purchased the property from Clifford Hoelscher in January 2017. He has planted 150 acres of pecan trees. The application is administratively complete.

- II Adjourn hearing and consider and/or act on **Application for a Production Permit for Hay Farms, Inc.**

Jerry McGuairt adjourned the hearing at 10:57 a.m.

Janet Groth made a motion to approve the application as presented. Motion seconded by Vanessa Cardwell. Motion Carried Unanimously.

**CONSOLIDATED DRILLING AND PRODUCTION PERMIT HEARING  
for BERKSHIRE HOLDINGS, LLC.**

- I Public Hearing on **Application for a Consolidated Drilling and Production Permit for Berkshire Holdings, LLC.**

Hearing not called to order. Hearing will be moved to July.

- II Adjourn hearing and consider and/or act on **Application for a Consolidated Drilling and Production Permit for Berkshire Holdings, LLC.**

Hearing not called to order. Hearing will be moved to July.

**REGULAR BOARD MEETING**

- I Call to order regular Board meeting at 10:59 a.m. by President Jerry McGuairt.

- II Comments from **public and media**. No public comment.

**III Consider and/or act upon Minutes of Regular Meeting and Public Hearings on April 18, 2017.**

Janet Groth had a correction to make to the minutes. On page 4 in the middle of the page, it states that Janet Groth was present as part of the Settlement Committee. She was indeed present, but as a Director and not part of the settlement committee.

Janet Groth made a motion to approve the minutes with the correction as stated. Motion seconded by Alvaro Mandujano, Jr. Motion Carried Unanimously.

**IV Consider and/or act upon Minutes of Special Meeting April 26, 2017.**

Vanessa Cardwell made a motion to approve the minutes for April 26, 2017. Motion seconded by Ronnie Cooper. Motion Carried Unanimously.

**V Consider and/or act upon Accounts Payable and Treasurer's Report and Line Item Transfers for the Month Ending April 30, 2017.**

Janet Groth made a motion to approve the Treasurer's Report and Line Item Transfers and Accounts Payable. Motion seconded by Vanessa Cardwell. Motion Carried Unanimously.

**VI Consider and/or act upon Accounts Payable and Treasurer's Report and Line Item Transfers for the Month Ending May 31, 2017.**

Vanessa Cardwell made a motion to approve the Treasurer's Report and Line Item Transfers and Accounts Payable. Motion seconded by Alvaro Mandujano, Jr. Motion Carried Unanimously.

**VII Consider and/or act upon an Engagement Letter with Smith & Rives, PC for the Audit for the Year Ending September 30, 2017.**

Ronnie Cooper made a motion to enter upon the engagement letter with Smith & Rives, PC to conduct the audit for the year ending September 30, 2017. Motion seconded by John Dorris. Motion Carried Unanimously.

- VIII Briefing and take action as necessary on matters involving Fort Stockton Holdings, LP (FSHLP), Republic Water Co. of Texas, LLC (Republic LLC) and Clayton Williams Farms, Inc.'s settlement and following, related pending lawsuits and contested hearing: **Republic LLC's state-court lawsuit**, Court of Appeals Case No. 08-17-00001-CV; **FSHLP v. Pecos County, MPGCD, et al.**, Court of Appeals Case No. 08-15-00382-CV; **In re the Application of Republic LLC**, State Office of Administrative Hearings Docket No. 959-17-3195.

On 05-31-2017 the Eighth District Court of Appeals of Texas in El Paso, TX Remanded the case back to MPGCD. The Settlement Agreement states that MPGCD will immediately within 20 calendar days post a notice of a hearing. Our next regularly scheduled Board Meeting is June 18<sup>th</sup> and if Mr. McCarthy agrees we will proceed at that time.

No action required. No action taken.

- IX Briefing and take action as necessary on matters regarding **Fort Stockton City Council's Special-Called Meeting on May 30, 2017 (Agenda Items A & B) and June 2, and June 13, 2017 (Agenda Item C)**, including FSHLP litigation; groundwater-related activity at Blue Ridge Farms; recommended policies regarding metering and use of City property; and City's contemplated litigation regarding the surface-use of Blue Ridge Farms (reference Schuyler Wight, Jay Cleo Thompson, Samson Exploration, LLC, & Halcón Resources).

Manager Edwards: There has been a lot of activity at Blue Ridge Farms. The City personnel have found wells that need to be registered.

Fort Stockton Attorney Mark Harral:

- Schuyler Wight: The City has a farming and grazing lease with Schuyler Wight for irrigation purposes only. He utilizes water wells on Blue Ridge that are in Pecos County and in Reeves County. The water use is not metered. He has a water tie to provide water to Halcon and formerly Samson.
- Halcon: They have a surface use agreement in Reeves County. They do not meter their water use. They rely on Schuyler Wight to produce water for their oil and gas purposes.
- OXY: They have a surface use agreement that was purchased from Jay Cleo Thompson. They install temporary water meters when they use the property. They have been very open to working with the City to comply with the Water Code rules.

No action needed or taken.

X **Briefing and take action as necessary on matters regarding 85<sup>th</sup> Texas Legislature's Regular and Special Sessions, and upcoming interim session.**

No significant legislation passed this session that affected groundwater. The special session called for July will not have many water issues.

No action needed or taken.

XI **Discuss and/or act upon the General Manager's Semi-Annual Report.**

Schuyler Wight said that several years ago there was a monitor well at the Santa Rosa Springs, and he asked if MPGCD could put another monitor on the Springs. There was no answer from the Board.

The General Manager's Semi-Annual report was handed out. No action taken. Tabled until the July meeting.

XII **Progress Reports: Well Registrations, Production Permits, Drilling Permits, Data Loggers, Drought Monitor Map and ongoing Water Quality Analysis.**

- Well Registrations: Several registrations have been received from the City of Fort Stockton, and from oil and gas companies.
- Drought Monitor Map: The current drought monitor map presented.
- Production Permits: We will have a permit hearing for Berkshire Holdings and for the City of Fort Stockton next month.
- Permit Report: A report showing the Historic and Existing Use permits that were issued, and the production permits that have been approved.

XIII **Consider and/or act upon General Manager's Correspondence.**

- Pecos County Appraisal District has sent an estimated tax levy for the 2018 Budget for your review.
- Deep Borehole Field Test: All contracts were terminated by the U. S. Department of Energy. Budget priority changes were cited.
- The Texas Groundwater Summit has several MPGCD representatives attending this year.

XIV **Directors' comments.**  
No Directors' comments.

XV Consider and/or act upon **agenda for next meeting.**  
Drilling/Production Permit for Berkshire Holdings, LLC. Production Permit for the City of Fort Stockton. Remand Hearing for Fort Stockton Holdings, LP. Hearing to retire Fort Stockton Holdings, LP.

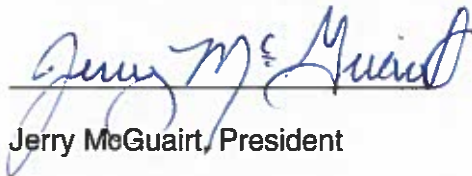
Note: The Employee Manual that has been updated was handed out to the Directors. The manual will be considered in August.

XVI **Adjourn Board meeting.**

Alvaro Mandujano, Jr. made a motion to adjourn the meeting. Seconded by John Dorris. Motion carried unanimously. The meeting adjourned at 11:49 a.m.



M. R. Gonzalez, Secretary/Treasurer

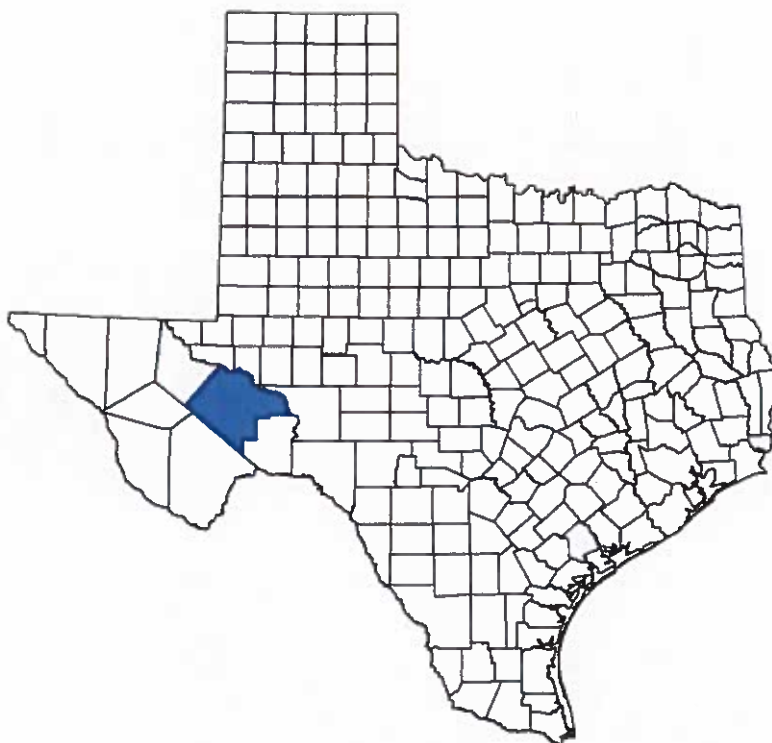


Jerry McGuairt, President

Date Approved 7-18-2017



**Proposed Changes to Management Zone 1 and Proposed Monitor  
Well Data and Comparisons with Model Simulations  
(Draft 1)**



*Prepared for:*  
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**June 16, 2017**

**Proposed Changes to Management Zone 1 and Proposed Monitor Well Data and Comparisons with Model Simulations (Draft 1)**

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**Proposed Changes to Management Zone 1 and Proposed Monitor Well Data and Comparisons with Model Simulations (Draft 1)**

## **1.0 Introduction**

In support of a settlement proposal dated April 28, 2017 between Middle Pecos Groundwater Conservation District, Fort Stockton Holdings, LP and Clayton Williams Farms, Inc., and Republic Water of Texas LLC, this report summarizes the results of analyses to:

- Support changes in the boundaries of Management Zone 1.
- Evaluate data and simulations results for individual monitor well locations in the proposed Management Zone 1 related to regulatory thresholds that could be included as special permit conditions and data and information related to planning-level desired future conditions.

For purposes of this analysis, Comanche Springs is designated as the primary hydrogeologic feature of the proposed Management Zone 1. The Western Pecos Groundwater Model (WPC Model) was used to identify the area that contributed significantly to Comanche Springs. The WPC Model was completed and documented in 2011 by R.W. Harden & Associates, Inc., LBG-Guyton Associates, and Thornhill Group, Inc. in support of Fort Stockton Holdings, L.P. permit application seeking a new production permit from Middle Pecos GCD to produce groundwater for municipal and/or industrial use, referenced as R.W. Harden & Associates and others (2011).

In addition, monitor well data for wells located within the proposed Management Zone 1 were reviewed and compared with model simulations. The monitoring data and model simulation results were used to:

1. Identify appropriate wells within the proposed Management Zone 1 that can be used to compare desired future conditions and establish threshold groundwater elevations.
2. Develop updated estimates of desired future conditions based on the proposed Management Zone 1 using the regional alternative Groundwater Availability Model (GAM)
3. Provide specific well drawdown estimates of desired future conditions for proposed monitor wells within the proposed Management Zone 1.
4. Recommend thresholds for each well that can be used as special permit conditions for Fort Stockton Holdings non-historic use pumping.

**Proposed Changes to Management Zone 1 and Proposed Monitor Well Data and Comparisons with Model Simulations (Draft 1)**

## 2.0 WPC Model Analysis

The WPC Model domain includes the western part of Pecos County, nearly all of Reeves County, and parts of Loving, Ward, Crane, Brewster, Jeff Davis, and Culberson counties. There are 22,635 model cells in Pecos County, with each cell covering an area of 2,000 ft by 2,000 ft (about 92 acres). The simulations were designed to simulate the effect of pumping on Comanche Springs flow in each of the cells in Pecos County. Thus, a total of 22,636 simulations were completed: a base case where no pumping occurred and 22,635 simulations where pumping occurred in a single model cell. If pumping in a cell resulted in a significant impact to the flow at Comanche Springs, the cell was considered part of the proposed Management Zone 1.

For each of the 22,635 pumping simulations, pumping in a single cell at a rate of 1,500 gallons per minute for 10 years was simulated. The flow from Comanche Springs was then compared with the flow from the spring for the base case (no pumping). Results were tabulated by individual cell and used to construct maps showing the impact of pumping in each cell on Comanche Springs.

Pumping of 1,500 gpm translates to a flow of about 3.43 cfs. The spring flow reduction when pumping occurred in the cell where Comanche Springs is located was 3.43 cfs after 10 years, which means that the pumping was 100 percent spring flow capture. Overall, areas that would result in 90 percent or greater capture was about 0.06 percent of the model area. In about 43 percent of the cells, the pumping had no impact on spring flow (i.e. the pumping in these areas does not result in any capture of spring flow). A summary of the percentage of captured spring flow for all 22,635 simulations is shown in Table 1.

**Table 1. Summary of Spring Flow Capture Analysis**

Spring Flow Capture (Percent)	Percent of Model Domain
0	43.2
< 10	35.1
10 to 20	11.5
20 to 30	7.06
30 to 40	2.15
40 to 50	0.42
50 to 60	0.28
60 to 70	0.11
70 to 80	0.08
80 to 90	0.07
90 to 100	0.06

After evaluation of the results, a threshold capture of 35 percent was used to construct the map shown as Figure 1 that delineates the proposed area of Management Zone 1, along with the present outline of Management Zone 1.



**Proposed Changes to Management Zone 1 and Proposed Monitor Well Data and Comparisons with Model Simulations (Draft 1)**

### 3.0 Monitor Well Selection

Potential monitor wells within the proposed Management Zone 1 were identified. A key objective of this effort was to identify the historic minimum groundwater elevation for use in establishing thresholds. The following factors were considered when reviewing the historical data and calibration period estimates from the WPC Model and the Regional Alternative GAM:

- Length of historical record
- Frequency of historic data (annual versus seasonal)
- Agreement between calibrated model estimates and historic data

Preference was given to actual data rather than model estimates. When historic data were not available and model estimates and the limited historic data showed good agreement, model estimates were considered useful to extend the historic record.

Based on this analysis, eleven wells were selected for use as monitor wells. A summary of the selected wells is presented in Table 2. As noted, two of these wells were selected based on the historic data. Also, as noted, nine of the wells were selected based on reasonable agreement between WPC model predictions and actual data. Wells that were rejected because of this evaluation included wells that had short historical records and poor agreement with model estimates which prevented extrapolating the historic data with model estimates with any reasonable degree of confidence.

**Table 2. Summary of Selected Monitoring Wells**

Well		Data or Model?	WPC Column	WPC Row
Short Name	Long Name			
Mpgcd320	King, Woodward, #320	Data	199	106
Mpgcd323	Ft Stockton, Cemetery, #323	Data	230	89
C-5	C-5, FSH Well	Model	204	102
M-9	M-9, FSH Well	Model	215	119
S-45	S-45, FSH Well	Model	211	104
S-6	S-6, FSH Well	Model	207	111
Mpgcd305	Cockrell Belding, #305	Model	213	118
Mpgcd318	Goldman Ranch, Well 1	Model	208	95
Mpgcd334	Carpenter, #334	Model	224	95
Interstate	Interstate Well, FSH Well	Model	209	96
Prison	TDCJ, Prison Well	Model	211	118

**Proposed Changes to Management Zone 1 and Proposed Monitor Well Data and Comparisons with Model Simulations (Draft 1)**

Hydrographs of these eleven wells are presented in Appendix A. The hydrographs include plots of historic groundwater elevation data (blue line), simulated groundwater elevation estimates at the location of the well from the WPC Model for the calibration period (red line), simulation groundwater elevation estimates at the location of the well from the Regional Alternative GAM (black line), and predicted groundwater elevation estimates from the desired future condition simulation (purple line) from Hutchison (2016).

### **3.1 Comparison of Model Results and Actual Data**

An inspection of the hydrographs in Appendix A reveal the following observations:

- The historic data include both summer and winter readings, so the data can be used to evaluate groundwater levels during the irrigation season (summer) and the non-irrigation season (winter).
- The model estimates include estimates of end-of-year conditions only since both models simulated annual stress periods.
- Based on the above, the models are not suitable to simulate groundwater elevations during the irrigation season.
- Typically, the WPC Model simulates the groundwater elevations of these eleven wells better than the regional alternative GAM.
- The rate of decline in the WPC and the alternative GAM are similar, and, thus, regional GAM estimates of drawdown could be used for broad planning purposes.
- Use of the regional GAM results for individual predictions of groundwater elevations in a regulatory sense is not recommended.

As a final check on the comparison between models, Figure 2 summarizes the estimates of pumping in proposed Management Zone 1 from the WPC Model and from the regional alternative GAM. Note that after about 1970, the WPC model and the regional alternative GAM provide pumping estimates that are reasonably consistent.

Also, please note that the DFC simulation assumes pumping that is higher than recent years, but lower than the historic maxima estimated from the 1970s to the late 1990s. If the management approach in the proposed Management Zone 1 is to provide for the opportunity to reduce groundwater levels to their historic minima, the DFC simulation should be updated to reflect a higher level of assumed pumping.

Proposed Changes to Management Zone 1 and Proposed Monitor Well Data and Comparisons with Model Simulations (Draft 1)

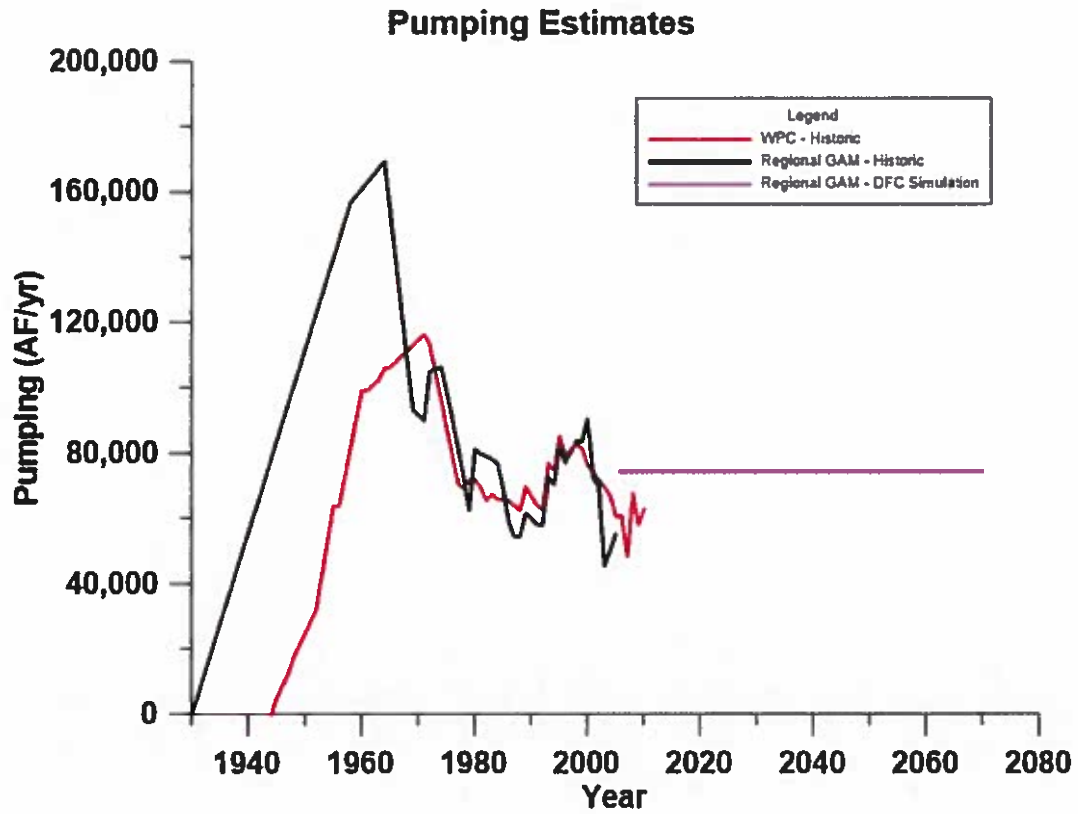


Figure 2. Pumping Comparisons for Proposed Management Zone 1: WPC Model and Regional GAM



**Proposed Changes to Management Zone 1 and Proposed Monitor Well Data and Comparisons with Model Simulations (Draft 1)**

## 4.0 Desired Future Conditions in Proposed Management Zone 1

Rule 10.5 of the Middle Pecos GCD covers the management zones of Pecos County. Management Zone 1 is described in Rule 10.5(a), but the description provides no basis of how the zone was delineated. Based on this analysis, the proposed Management Zone 1 is delineated based on a hydrogeologic analysis of potential pumping impacts to Comanche Springs.

Rule 10.5(b) summarizes average drawdown for each of the three management zones for every five-year period from 2015 to 2060. These estimates are derived from TWDB Task Report 10-033, and are based on simulations with the regional alternative GAM, and essentially represent the desired future condition that was adopted for Pecos County broken down by smaller management areas. The resulting estimates are still averages, but over a smaller area.

Table 3 summarizes the current average drawdowns for the current Management Zone 1 (taken from the Rules), and compares them with the updated average drawdown for the proposed Management Zone 1 using the current desired future conditions simulation.

**Table 3. Summary of Drawdowns for Management Zone 1 (Current and Proposed)**

Year	Drawdown (ft) from 2010 Conditions	
	Current Management Zone 1	Proposed Management Zone 1
2015	3	4
2020	7	8
2025	10	12
2030	13	16
2035	17	20
2040	20	24
2045	23	27
2050	26	31
2055	29	35
2060	32	38
2065	N/A	42
2070	N/A	45

The practical administration of average drawdown is difficult given the fact that the desired future condition is a planning goal and incorporated into the average drawdowns are many assumptions related to timing and location of pumping. More importantly, the average drawdown includes a calculation of an entire area. Within any of these areas, there are a limited number of monitoring wells. Thus, there is an inherent difficulty in comparing a few locations where actual data exist to an overall average drawdown that was based on an idealized model simulation with several

**Proposed Changes to Management Zone 1 and Proposed Monitor Well Data and Comparisons with Model Simulations (Draft 1)**

assumptions that may or may not be realistic over a defined time period (timing and location of pumping, average recharge conditions).

An alternative way to compare desired future conditions and actual data is on a well-by-well basis. The output from the DFC simulations was used to plot groundwater elevation estimates as shown on each of the eleven hydrographs in Appendix A. As discussed earlier, the actual groundwater elevation estimates are not as reliable as drawdown estimates for these eleven wells. These data were processed to develop Table 4, a summary of the drawdowns in individual wells.

**Table 4. Summary of Drawdown for Individual Wells in Proposed Management Zone 1**

Year	Mpgcd120	Mpgcd323	C-5	M-9	S-45	S-6	Mpgcd305	Mpgcd318	Mpgcd334	Interstate	Prison
2015	4	2	4	6	5	5	6	4	4	4	6
2020	8	4	9	13	9	9	12	8	7	8	12
2025	11	6	13	19	14	14	18	13	11	12	18
2030	15	8	17	25	18	18	24	17	15	16	23
2035	19	11	21	30	22	23	30	20	18	20	29
2040	23	13	25	36	26	27	35	24	21	23	34
2045	26	16	29	41	30	31	40	28	25	27	39
2050	30	18	33	47	34	35	46	32	28	31	44
2055	33	21	37	52	38	40	51	36	32	34	49
2060	37	23	41	57	41	44	56	39	35	38	54
2065	40	26	44	62	45	48	61	43	38	42	59
2070	43	28	48	67	49	51	66	46	41	45	63

Because the drawdown estimates are based on a calculation of groundwater elevations in 2010 and the year of interest, and because the eleven proposed monitor wells have records that generally begin in 2010, it is possible to compare the actual drawdown to the desired future condition. Table 5 presents this comparison for the eleven proposed monitoring wells for the period end-of-2010 to end-of-2016.

Please note that two of the eleven wells have drawdowns that are greater than the DFC drawdown, and nine of the wells have drawdowns that are less than the DFC drawdown. Also, please note that seven of the wells have groundwater elevation recoveries (negative drawdowns) from 2010 to 2016.

The DFC simulations assumed an idealized case where recharge was average for the entire period from 2005 to 2070, and pumping did not vary from year to year. Actual data suggest that there is considerable variation in groundwater elevations from year to year based on a combination of variations in recharge conditions and variations in pumping. Thus, it would be inappropriate to conclude that there was a problem with meeting the DFC in Well C-5 despite the data showing a 19.5 ft drawdown from 2010 to 2016 and the idealized DFC simulation estimated a 5.3 ft drawdown. The overall results suggest that, as of 2016, there is an overall consistency between the actual data and the overall planning goal (DFC).

It is recommended that Rule 10.5 be updated and that Middle Pecos GCD implement a well-by-well comparison between DFCs and actual data. The concept of average drawdown is appropriate as a planning goal and is useful to compare and contrast alternative DFCs, but the practical implementation of the planning goal should be based on more tangible and reproducible data and analyses.

Proposed Changes to Management Zone 1 and Proposed Monitor Well Data and Comparisons with Model Simulations (Draft 1)

Table 5. Comparison of DFC Drawdown and Actual Data for Eleven Proposed Monitoring Wells (2010 to 2016)

Well	One-Layer Model			Measured Data		
	End of 2010 Groundwater Elevation (ft MSL)	End of 2016 Groundwater Elevation (ft MSL)	Partial DFC - Drawdown from 2010 to 2016 (ft)	End of 2010 Groundwater Elevation (ft MSL)	End of 2016 Groundwater Elevation (ft MSL)	Actual Drawdown from 2010 to 2016 (ft)
Mpgcd320	2901.13	2896.54	4.59	2952.00	2950.25	1.75
Mpgcd323	2814.13	2811.69	2.44	2888.17	2882.30	5.87
C-5	2855.36	2850.08	5.28	2972.30	2952.80	19.50
M-9	2969.94	2962.2	7.74	3009.70	3015.00	-5.30
S-45	2831.22	2825.51	5.71	2970.80	2975.40	-4.60
S-6	2946.34	2940.85	5.49	2993.20	3005.10	-11.90
Mpgcd305	2966.42	2958.85	7.57	3019.63	3027.10	-7.47
Mpgcd318	2833.19	2828.05	5.14	2924.70	2926.75	-2.05
Mpgcd334	2821.93	2817.39	4.54	2948.50	2947.10	1.40
Interstate	2892.69	2887.81	4.88	2940.20	2938.80	1.40
Prison	2965.61	2958.35	7.26	3007.60	3014.94	-7.34
Average	2890.72	2885.21	5.51	2966.07	2966.87	-0.79

Notes:

MPGCD 305 - no measured data at end of 2010, data shown is for end of 2011

MPGCD 318 - no measured data at end of 2010, data shown is for end of 2012

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## **5.0 Proposed Thresholds for Individual Monitor Wells**

As part of the analysis, recommendations for establishing threshold values for the individual monitor wells were developed. Conceptually, these recommendations were based on discussions with FSH representatives in Fort Stockton on April 17, 2017 and with the Middle Pecos GCD Board of Directors on April 18, 2017. Table 5 summarizes these recommendations.

Each of the eleven proposed monitoring wells is listed along with the reference point elevation for measuring groundwater levels. The "Winter Threshold 1" is the minimum historic level. For Wells MPGCD 320 and MPGCD 323, these were developed on actual data. For the other nine wells, they were based on the historic minimum elevation from the WPC Model. As noted at the bottom of Table 5, the proposed action if 6 of the 11 wells fall below the listed threshold is a 100 percent reduction in FSH non-historical use pumping.

"Winter Threshold 2" is 5 feet above "Winter Threshold 1", and, if 6 of the 11 wells fall below the listed threshold, there would be a 30 percent reduction in FSH non-historical use pumping as a means to reduce the rate of decline.

"Winter Threshold 3" is 10 feet above "Winter Threshold 1", and, if 6 of the 11 wells fall below the listed threshold, there would be a 10 percent reduction in FSH non-historical use pumping as a means to reduce the rate of decline.

The monitor well data were used to establish a recent maximum drawdown between winter and summer depth to water data. This maximum drawdown was added to the Winter Threshold 1 to establish a recommended Summer Threshold that would be considered an early warning trigger that groundwater levels may not recover to above the winter thresholds. If 6 of the 11 wells falls below the summer threshold, the "action" would be to have the technical representatives of MPGCD and FSH to meet within 60 days to review pumping and groundwater level data.

The final two columns of Table 5 show the minimum (winter) and maximum (summer) depth to water data in each well from spring 2016 to winter 2017. These are provided for context and to facilitate comparison of current conditions and the recommended thresholds.

Table 6. Monitor Well Threshold Recommendations

Well		Reference Point Elevation (ft MSL)	Winter Threshold 1		Winter Threshold 2		Winter Threshold 3		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	Winter	Summer
Mpgcd320	King, Woodward, #320	3068	200	Data 1/1999	195	Win1-5	190	Win1-10	43	245	Win1+Max DD	113	148
Mpgcd323	Fi Stockton, Cemetery, #323	3031	193	Data 1/2000	188	Win1-5	183	Win1-10	15	208	Win1+Max DD	146	148
C-5	C-5, FSH Well	3009	185	WPC 1973	100	Win1-5	95	Win1-10	72	177	Win1+Max DD	60	107
M-9	M-9, FSH Well	3261	308	WPC 1973	303	Win1-5	298	Win1-10	48	356	Win1+Max DD	246	283
S-45	S-45, FSH Well	3067	160	WPC 1973	155	Win1-5	150	Win1-10	56	216	Win1+Max DD	92	115
S-6	S-6, FSH Well	3123	200	WPC 1973	195	Win1-5	190	Win1-10	62	262	Win1+Max DD	118	159
Mpgcd305	Cockrell_Belding, #305	3233	287	WPC 1973	282	Win1-5	277	Win1-10	75	362	Win1+Max DD	206	250
Mpgcd318	Goldman Ranch, Well 1	2957	67	WPC 1973	62	Win1-5	57	Win1-10	33	100	Win1+Max DD	30	49
Mpgcd334	Carpenter, #334	3051	135	WPC 1973	130	Win1-5	125	Win1-10	36	171	Win1+Max DD	104	126
Interstate	Interstate Well, FSH Well	2988	91	WPC 1973	86	Win1-5	81	Win1-10	40	131	Win1+Max DD	49	71
Prison	TDCJ, Prison Well	3199	253	WPC 1973	248	Win1-5	243	Win1-10	50	303	Win1+Max DD	184	224

Threshold	Action
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, 30% reduction in FSH non-historical use pumping
Winter Threshold 3	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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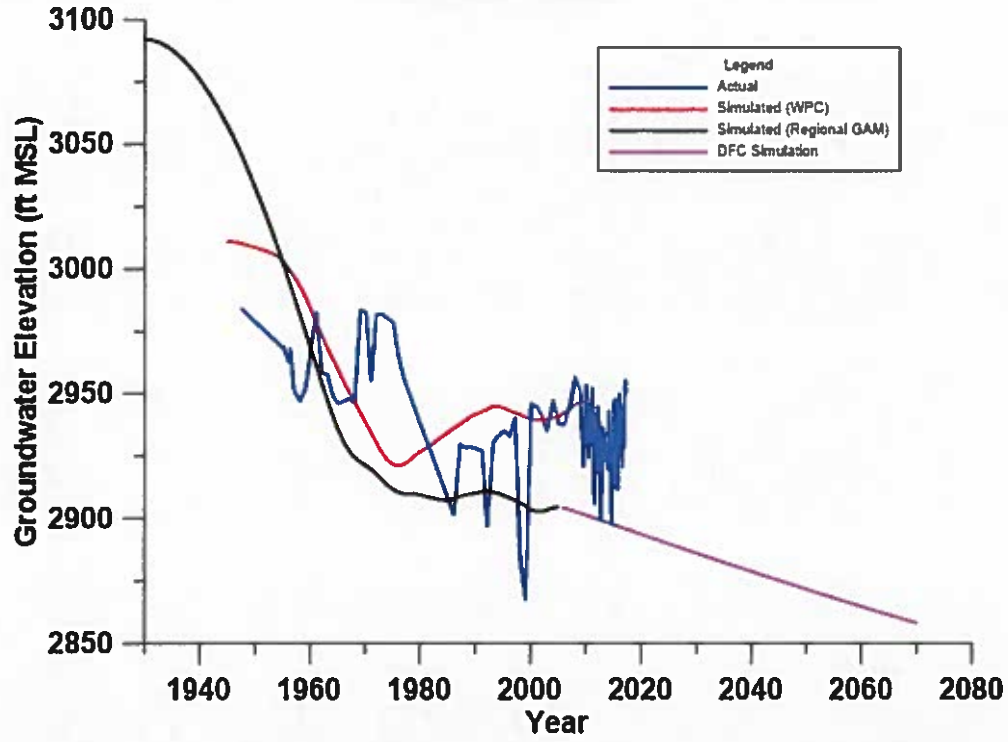
## **6.0 References**

Hutchison, W.R., 2016. Edwards-Trinity (Plateau), Pecos Valley and Trinity Aquifers: Nine Factor Documentation and Predictive Simulations. GMA 7 Technical Memorandum 15-06 (Draft 2), May 24, 2016, 16p.

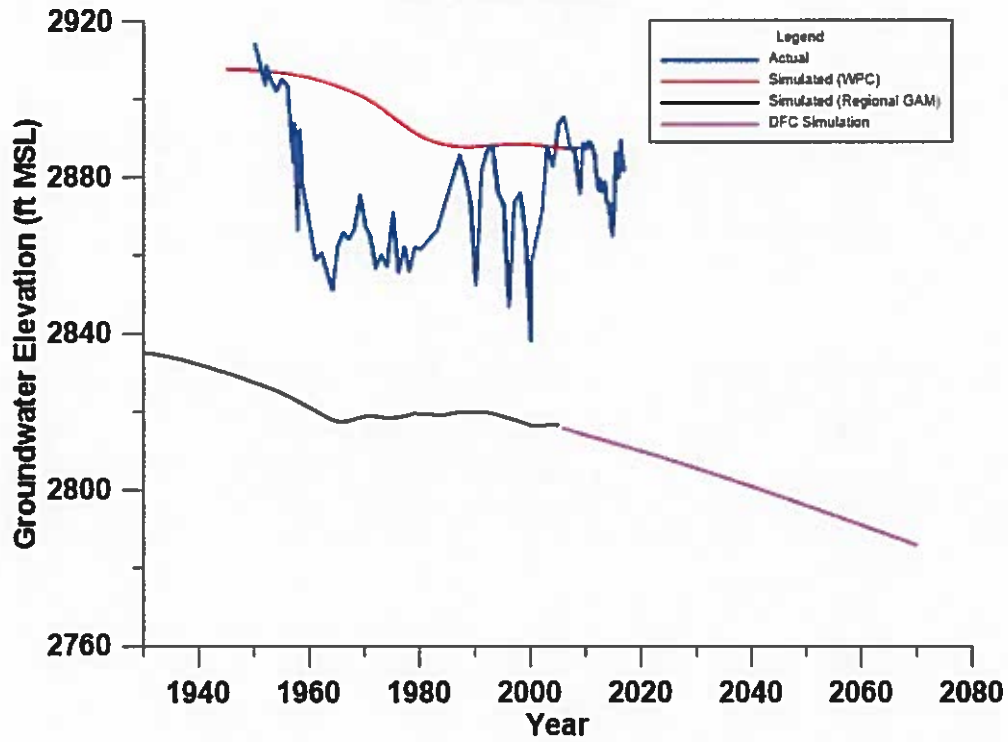
R.W. Harden & Associates, Inc., LBG-Guyton Associates, and Thornhill Group, Inc., 2011. Hydrogeologic, Geochemical and Groundwater Modeling Evaluation of the Leon-Belding Area in Pecos County. Report prepared for Fort Stockton Holdings, L.P. April 14, 2011, 95p.

**Appendix A**  
**Hydrographs of Eleven Selected Monitoring Wells**

### 52-08-801(320) MPGCD Well

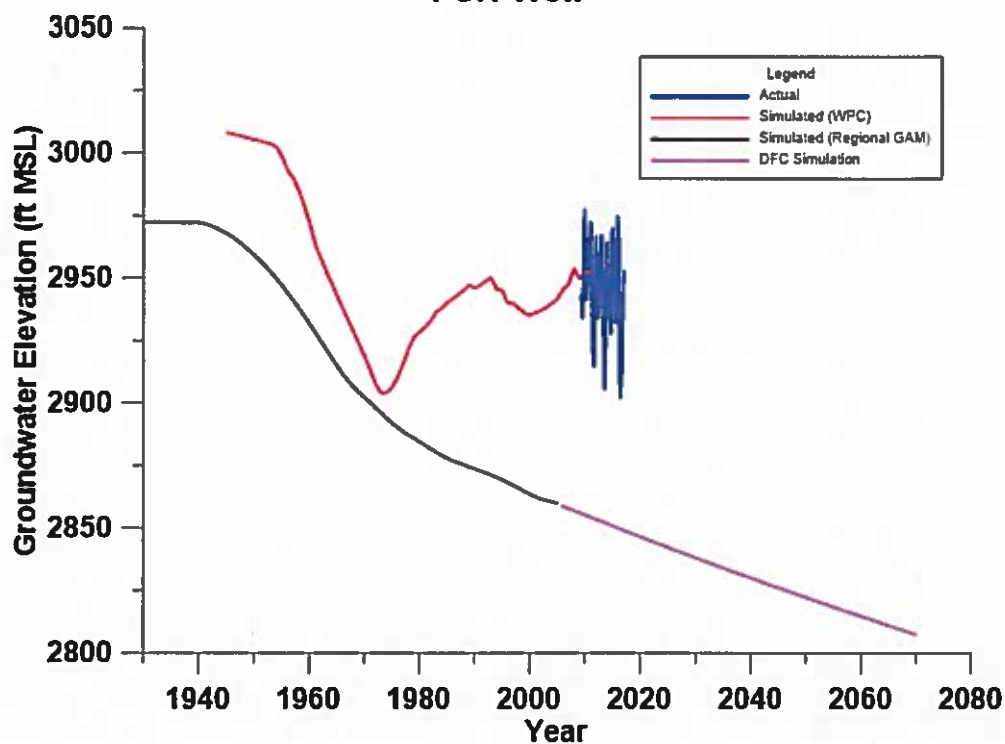


### 53-02-708(323) MPGCD Well

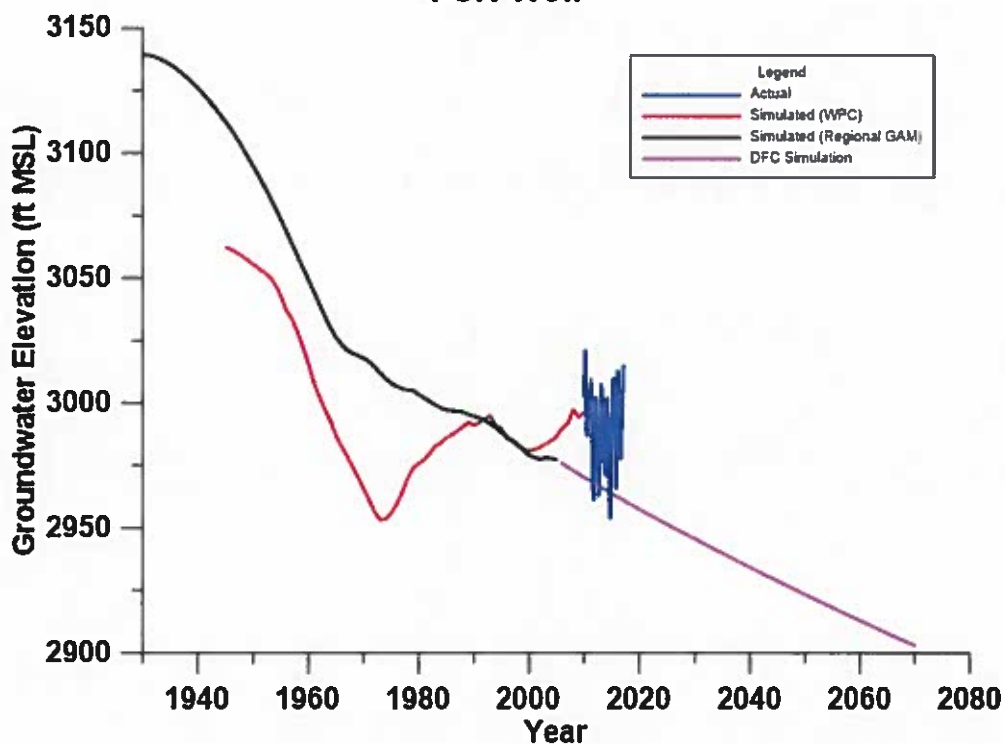




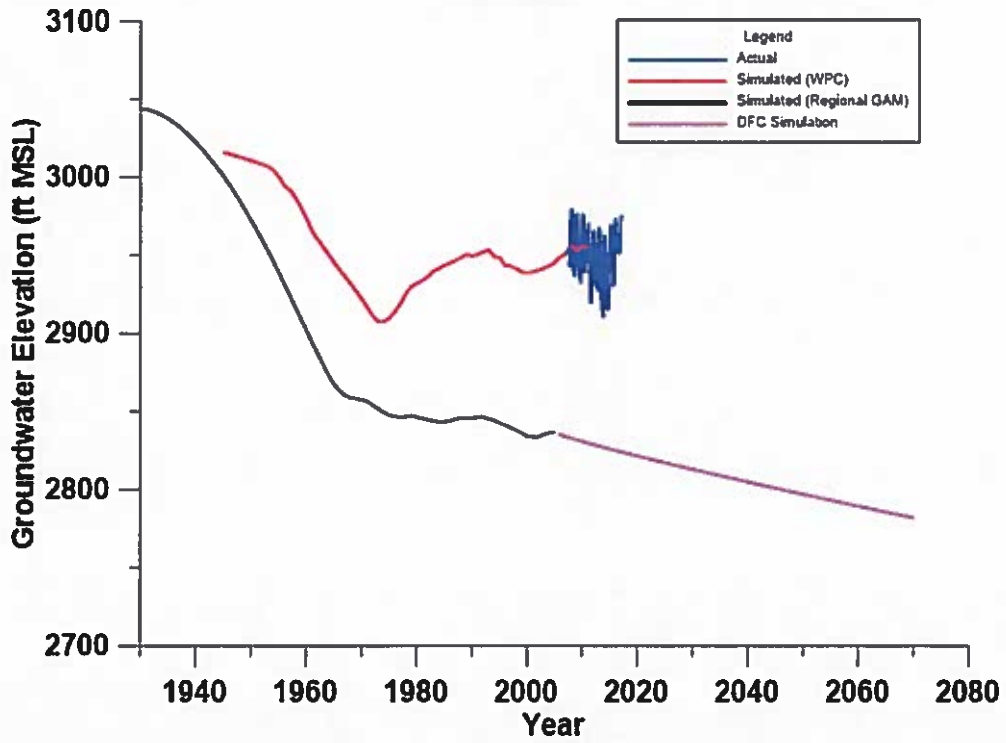
### C-5 FSH Well



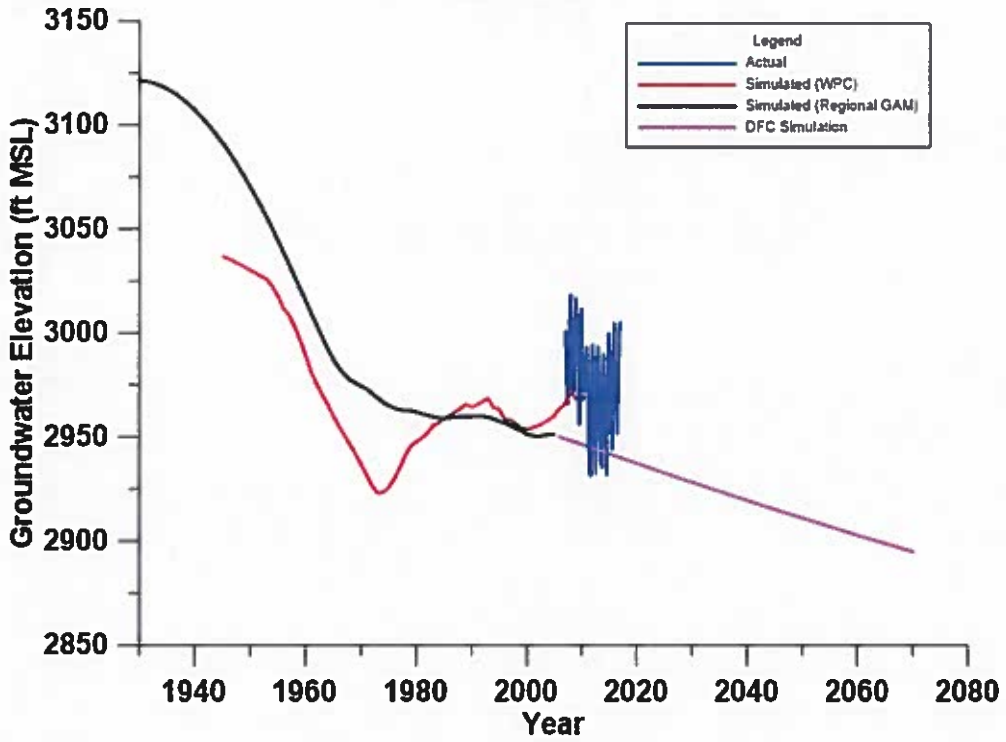
### M-9 FSH Well



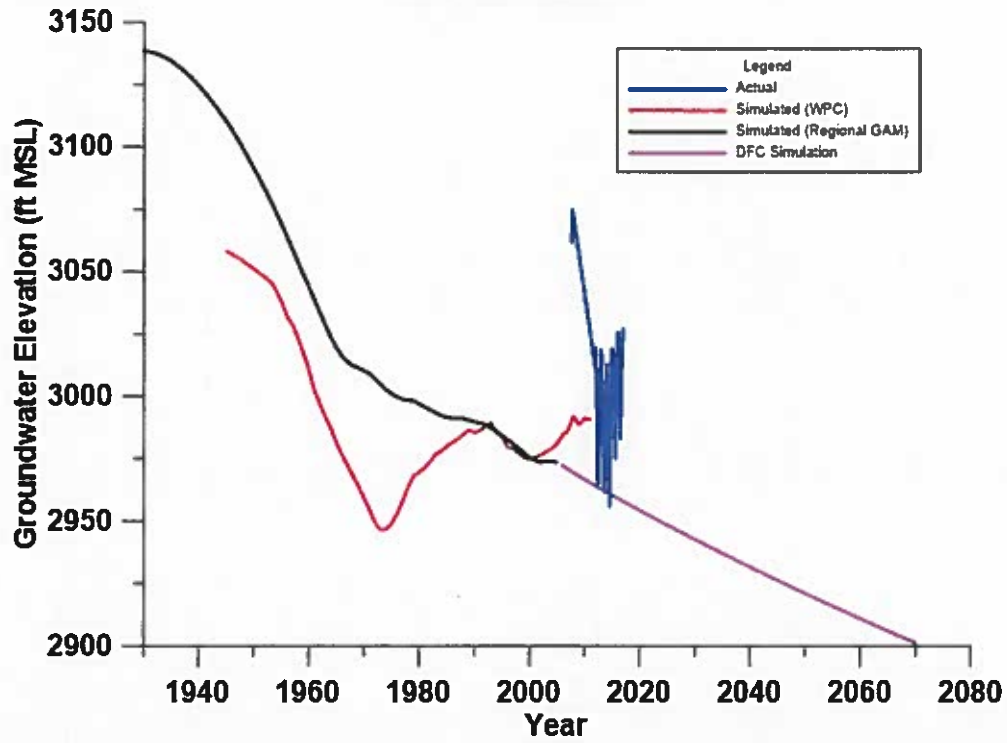
### S-45 FSH Well



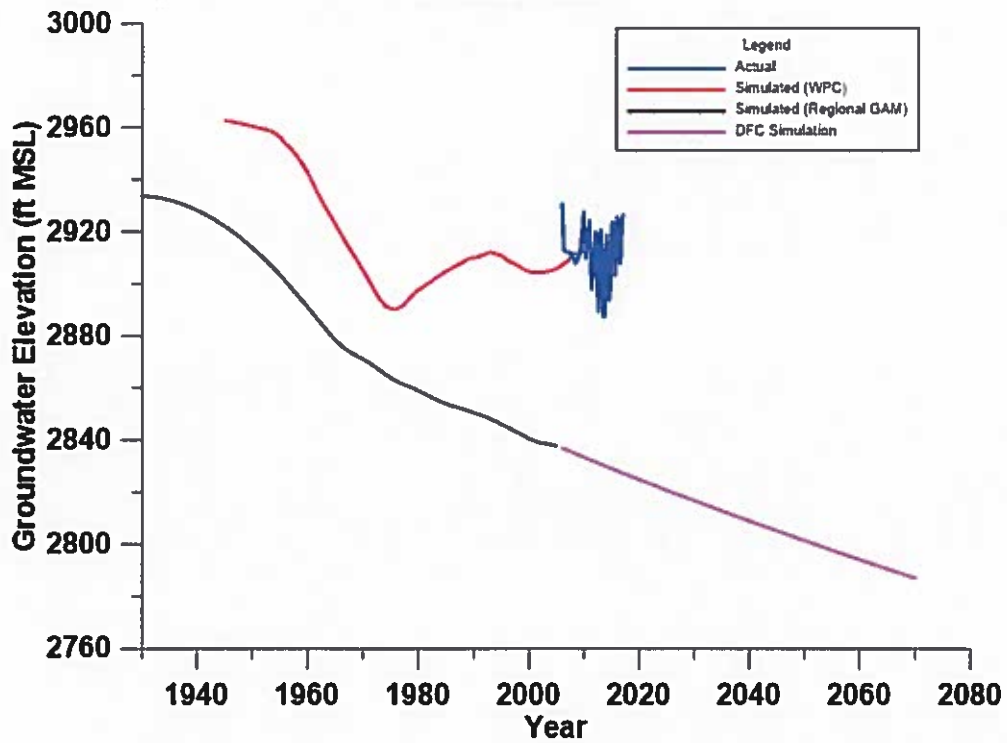
### S-6 FSH Well



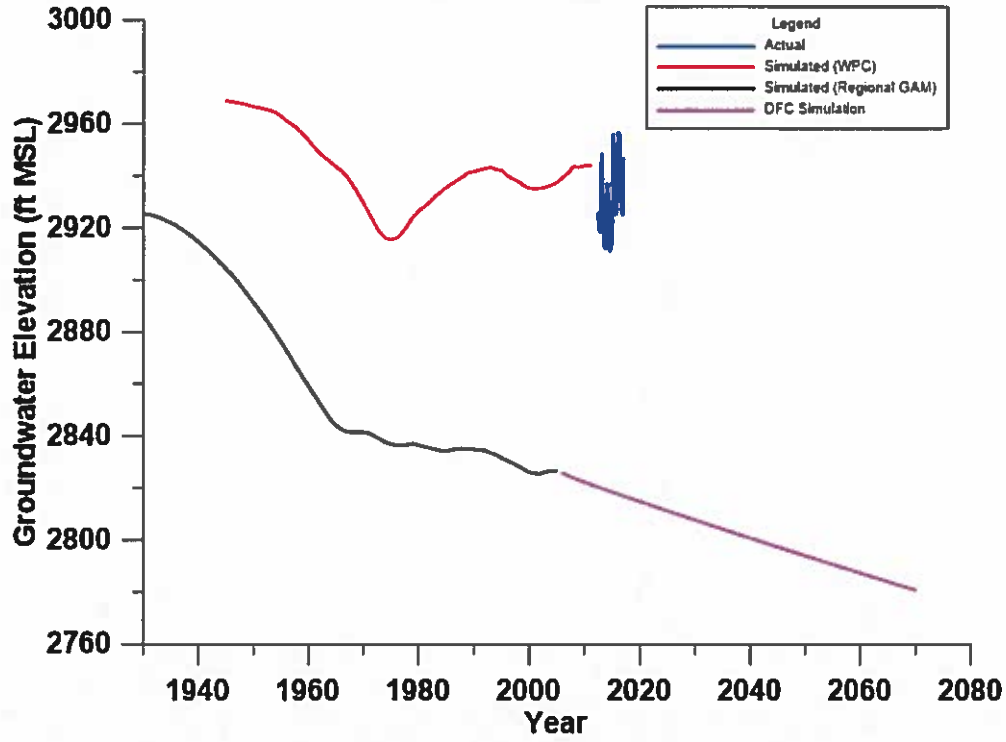
### 52-16-911(305) MPGCD Well



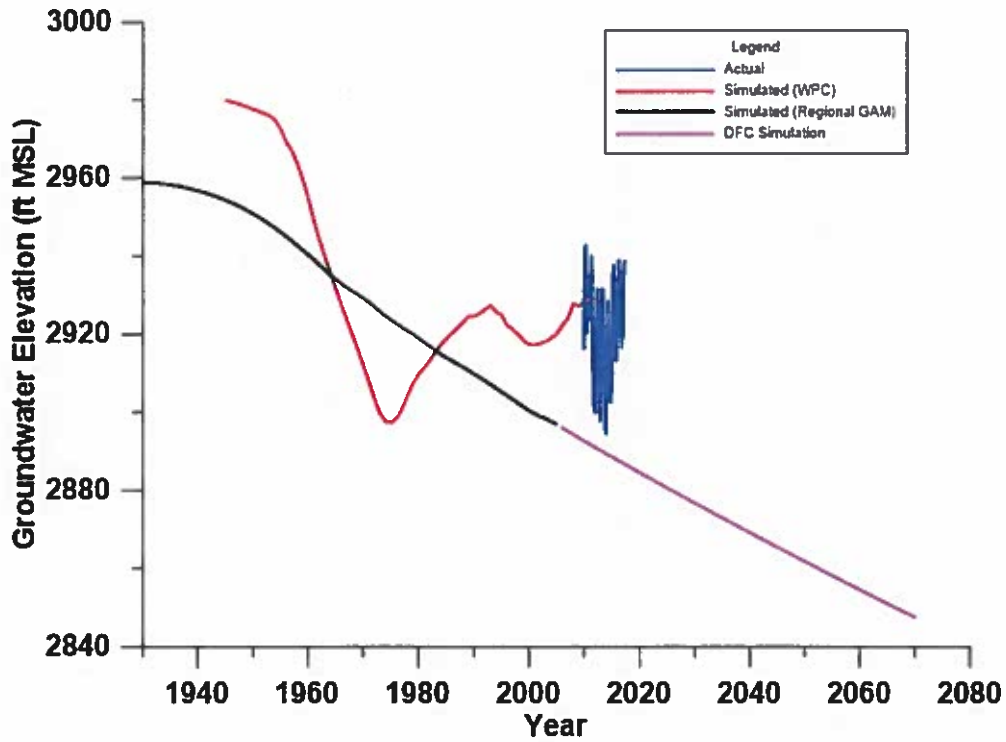
### 53-01-707(318) MPGCD Well



### 53-09-309(334) MPGCD Well



### Interstate FSH Well



### Well 52-16-802 Prison Well

