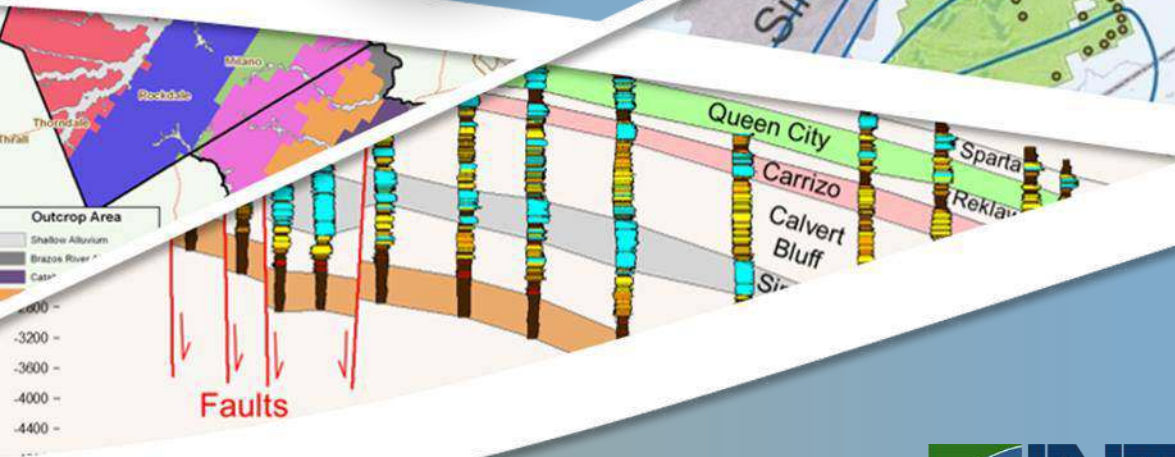


# Desired Future Committee Update

Presented To: DFC  
Committee



Presented By:

Steve Young

Ross Kushnereit

Lakin Beal



January 12, 2021

# Outline

- Draft Amendments to Groundwater Well Assistance Program
- Draft Compliance Report
- GMA 12 GAM Runs Including Proposed S-8 Run
- Desired Future Conditions
- Approach to Management Strategies Report

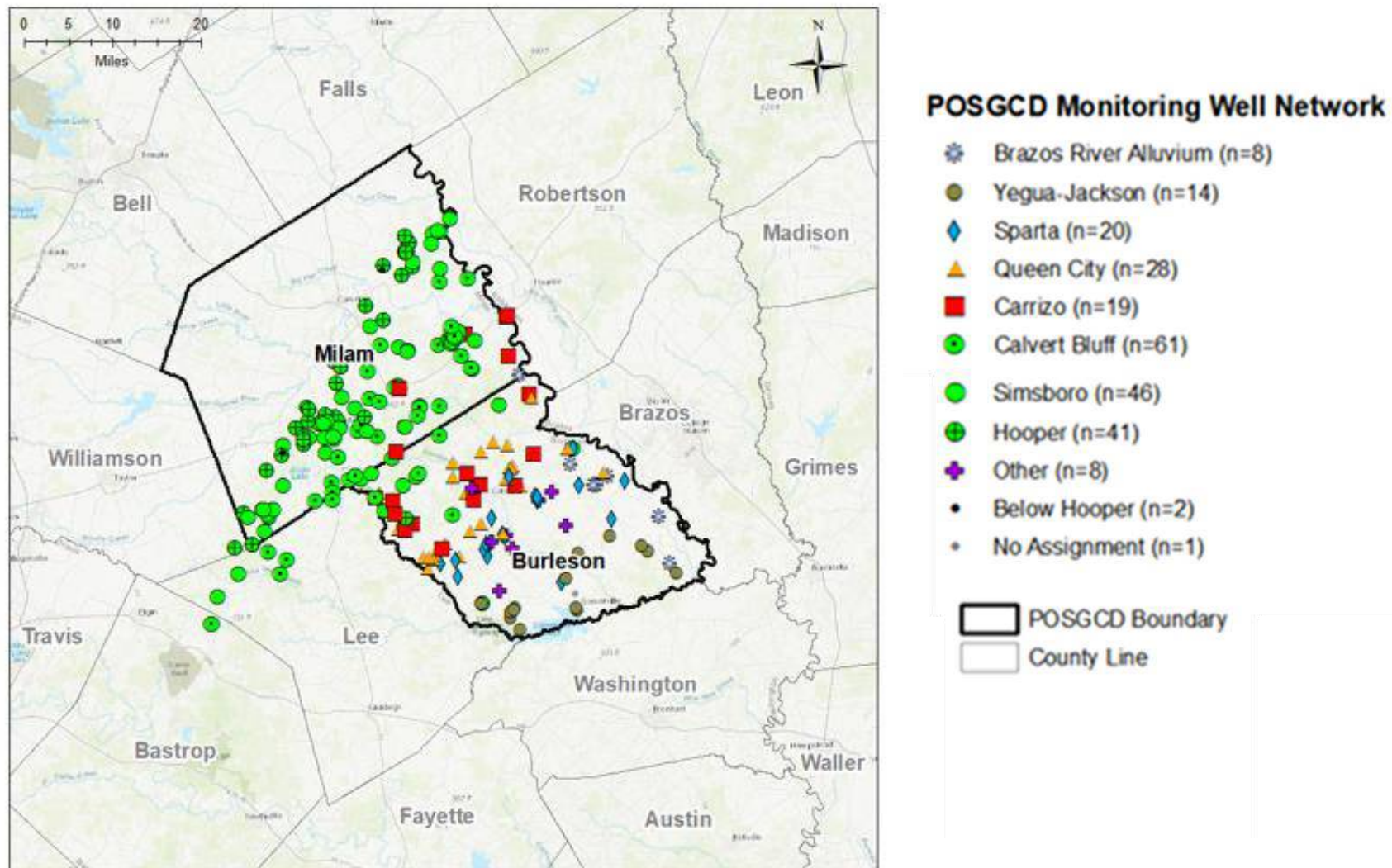
# Draft Compliance Report

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# Monitoring Well Network

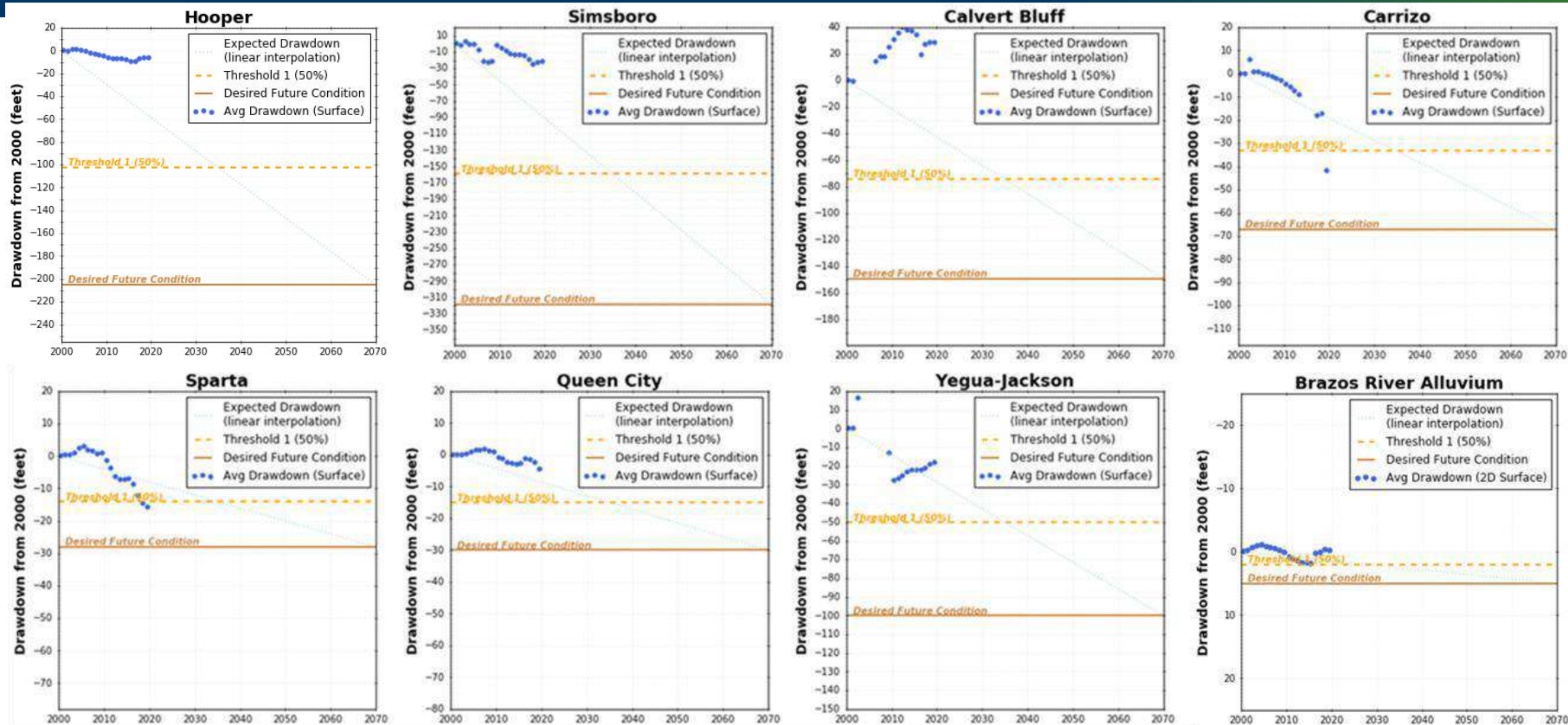


# Tabulated DFC Compliance

Management Zone	DFC (ft)	Drawdown from 2000 to 2012	Drawdown from 2000 to 2013	Drawdown from 2000 to 2014	Drawdown from 2000 to 2015	Drawdown from 2000 to 2016	Drawdown from 2000 to 2017	Drawdown from 2000 to 2018	Drawdown from 2000 to 2019
		Calculated Drawdown (% of DFC)	Calculated Drawdown (% of DFC)	Calculated Drawdown (% of DFC)	Calculated Drawdown (% of DFC)	Calculated Drawdown (% of DFC)	Calculated Drawdown (% of DFC)	Calculated Drawdown (% of DFC)	Calculated Drawdown (% of DFC)
Brazos River Alluvium	5	1.4 28%	1.7 34%	1.7 34%	1.8 37%	0.2 4%	0.0 0%	-0.4 -7%	-0.2 -3%
Yegua Jackson	100	25.4 25%	23.0 23%	22.3 22%	22.3 22%	22.2 22%	21.0 21%	19.2 19%	18.0 18%
Sparta	28	6.3 23%	7.2 26%	7.3 26%	6.9 25%	8.6 31%	12.3 44%	14.5 52%	15.6 56%
Queen City	30	2.4 8%	2.7 9%	2.9 10%	2.7 9%	1.3 4%	1.6 5%	2.4 8%	4.6 15%
Carrizo	67	7.3 11%	9.0 13%	NR NR	38.4 57%	33.8 50%	18.1 27%	17.3 26%	41.7 62%
Calvert Bluff (Upper Wilcox)	149	-40.2 -27%	-37.6 -25%	-36.8 -25%	-34.6 -23%	-19.0 -13%	-27.0 -18%	-28.3 -19%	-28.8 -19%
Simsboro (Middle Wilcox)	318	12.2 4%	13.7 4%	13.8 4%	14.9 5%	19.0 6%	24.7 8%	22.4 7%	22.1 7%
Hooper (Lower Wilcox)	205	7.1 3%	7.3 4%	8.0 4%	9.1 4%	8.6 4%	6.0 3%	6.6 3%	6.5 3%



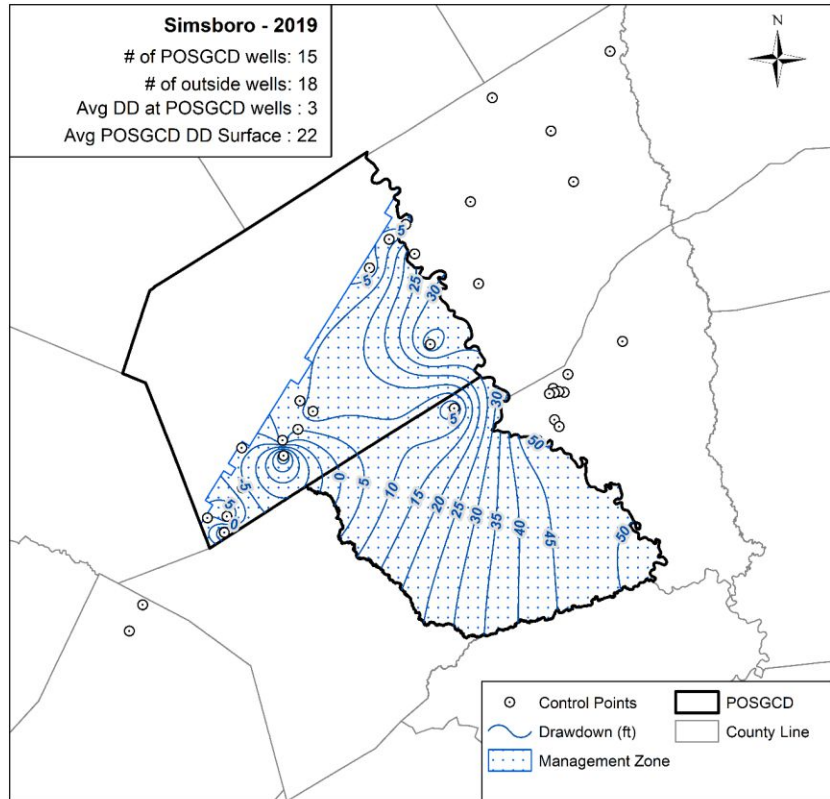
# Graphed DFC Compliance



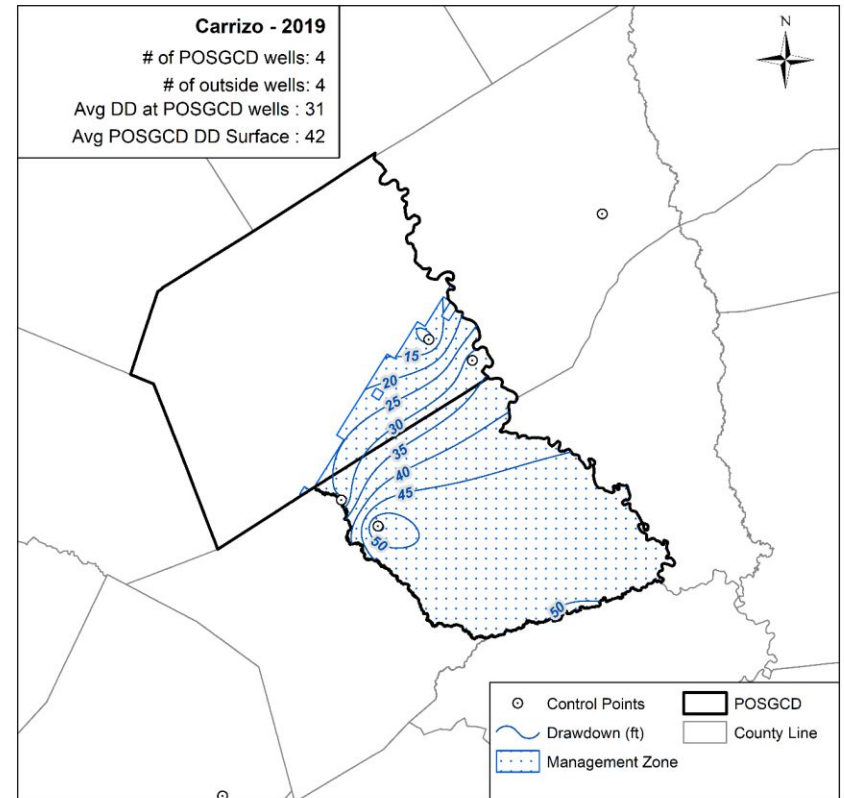
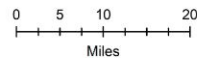
	Current DFC (feet)	Current MAG in 2070
Sparta	28	6,735
Queen City	30	504
Carrizo	67	7,058
Calvert Bluff	149	1,036
Simsboro	318	48,503
Hooper	205	4,422

- Expected Drawdown (linear interpolation)
- Threshold 1 (50%)
- Desired Future Condition
- Avg Drawdown (2D Surface)

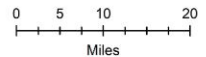
# Examples of Drawdown Surfaces for DFC Compliance Evaluation



Drawdown (feet) from 2000 to 2019 :Simsboro



Drawdown (feet) from 2000 to 2019 :Carrizo

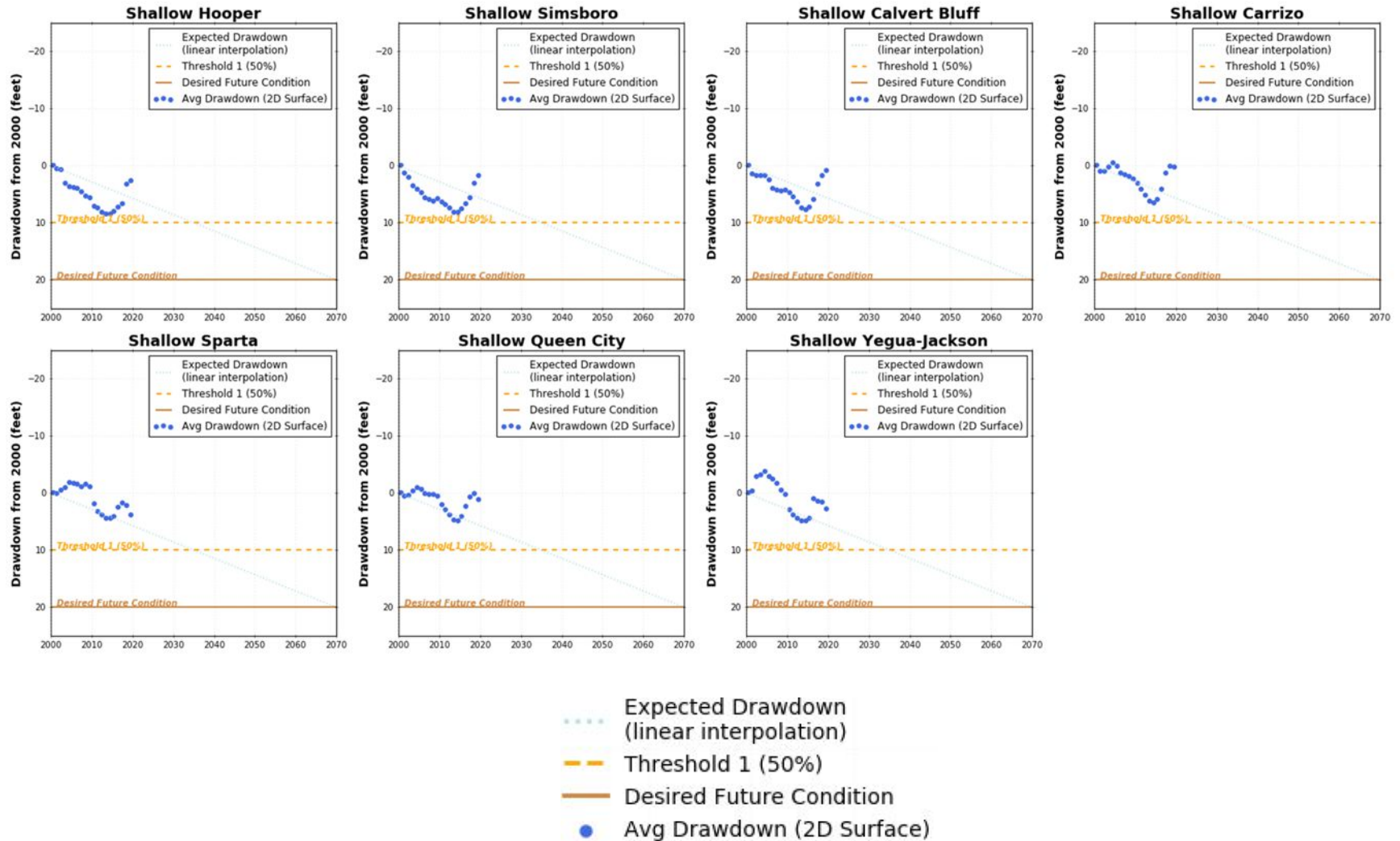




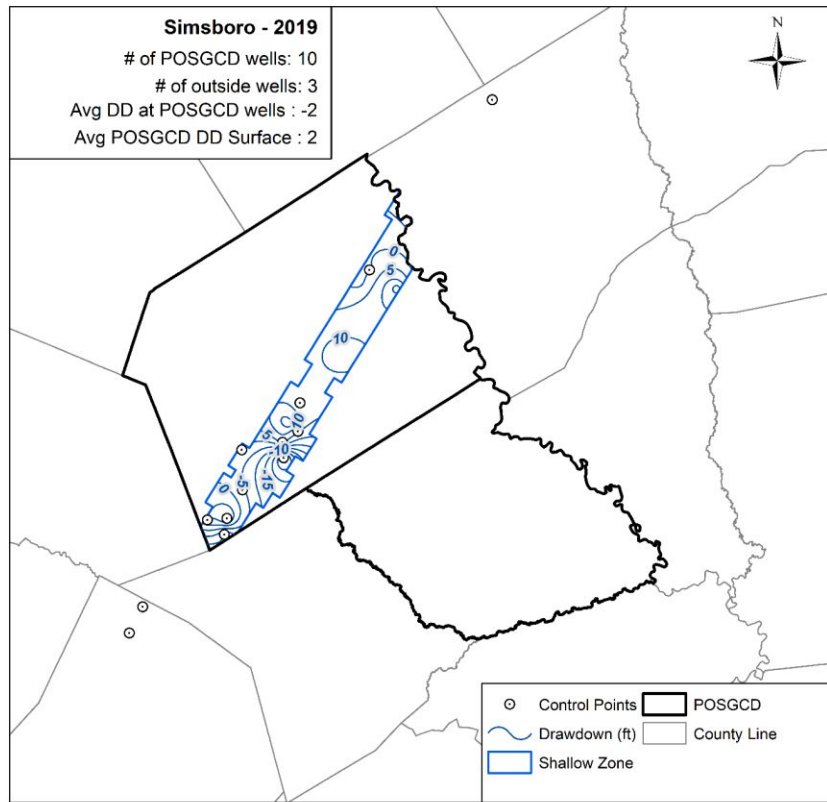
# Tabulated PDL Compliance

Management Zone	PDL	Drawdown from 2000 to 2012	Drawdown from 2000 to 2013	Drawdown from 2000 to 2014	Drawdown from 2000 to 2015	Drawdown from 2000 to 2016	Drawdown from 2000 to 2017	Drawdown from 2000 to 2018	Drawdown from 2000 to 2019
		Calculated Drawdown (% of PDL)	Calculated Drawdown (% of PDL)	Calculated Drawdown (% of PDL)	Calculated Drawdown (% of PDL)	Calculated Drawdown (% of PDL)	Calculated Drawdown (% of PDL)	Calculated Drawdown (% of PDL)	Calculated Drawdown (% of PDL)
<del>Yegua</del> Jackson	20	4.4 22%	4.9 24%	4.8 24%	4.5 22%	1.0 5%	1.4 7%	1.5 8%	2.8 14%
Sparta	20	3.8 19%	4.4 22%	4.5 22%	4.1 21%	2.4 12%	1.7 9%	2.2 11%	3.9 19%
Queen City	20	3.9 19%	4.7 23%	4.8 24%	4.1 21%	2.3 11%	0.8 4%	0.2 1%	1.2 6%
Carrizo	20	5.1 26%	6.2 31%	6.5 33%	5.9 29%	4.0 20%	1.3 6%	0.1 0%	0.2 1%
Calvert Bluff (Upper Wilcox)	20	6.4 32%	7.4 37%	7.7 38%	7.2 36%	6.0 30%	3.2 16%	1.8 9%	0.9 4%
<del>Simsboro</del> (Middle Wilcox)	20	7.5 37%	8.1 41%	8.2 41%	7.6 38%	6.6 33%	5.7 28%	3.0 15%	1.8 9%
Hooper (Lower Wilcox)	20	8.2 41%	8.5 42%	8.5 43%	8.0 40%	7.2 36%	6.7 33%	3.3 16%	2.6 13%

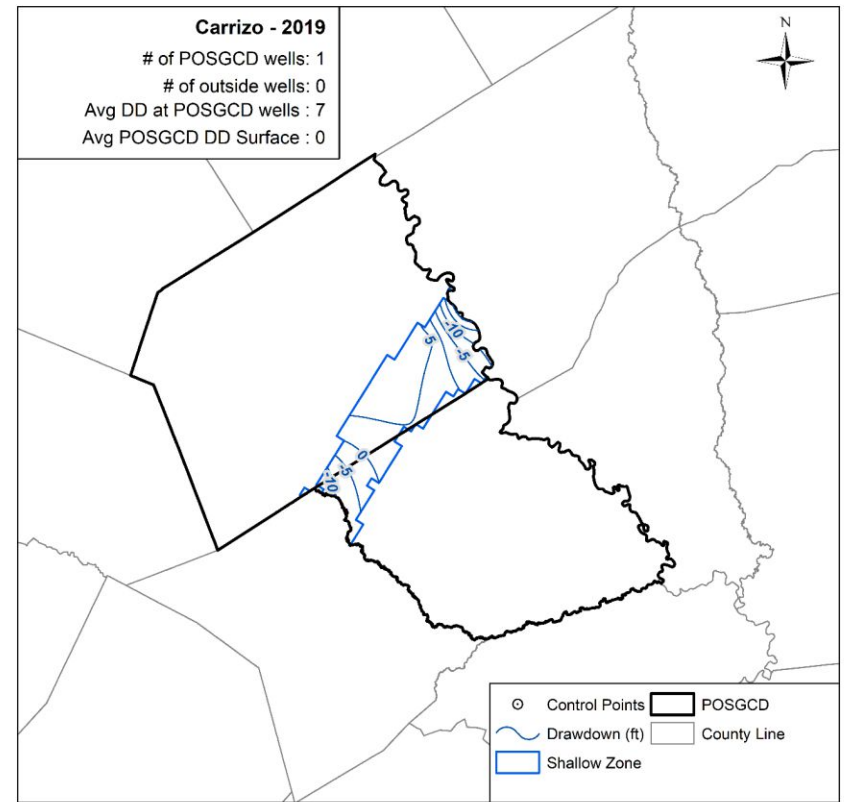
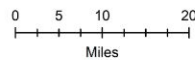
# Graphed PDL Compliance



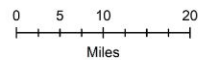
# Examples of Drawdown Surfaces for PDL Compliance Evaluation



Drawdown (feet) from 2000 to 2019 :Simsboro



Drawdown (feet) from 2000 to 2019 :Carrizo



# Consideration for Improvement in Data Collection and Analysis

- Monitoring Well Network
- Water Level Calculations
- Groundwater Availability Models

# GM A 12 GAM Runs Including Proposed S-8 Run



# Comparison Between S-7 & S-8 for POSGCD

## POSGCD Average Drawdowns

Aquifer	Current DFC	Average Drawdown (ft) (2010 - 2070)		Range for DFC* (10% Uncertainty)
		PS-7	PS-8	
Sparta	28	17	31	28 - 34
Queen City	30	18	29	26 - 32
Carrizo	67	173	145	130 - 159
Calvert Bluff	149	184	169	152 - 186
Simsboro	318	352	330	297 - 363
Hooper	205	223	213	191 - 233

\* Current DFC is from 2000 to 2070; Revised DFC is from 2010 to 2070

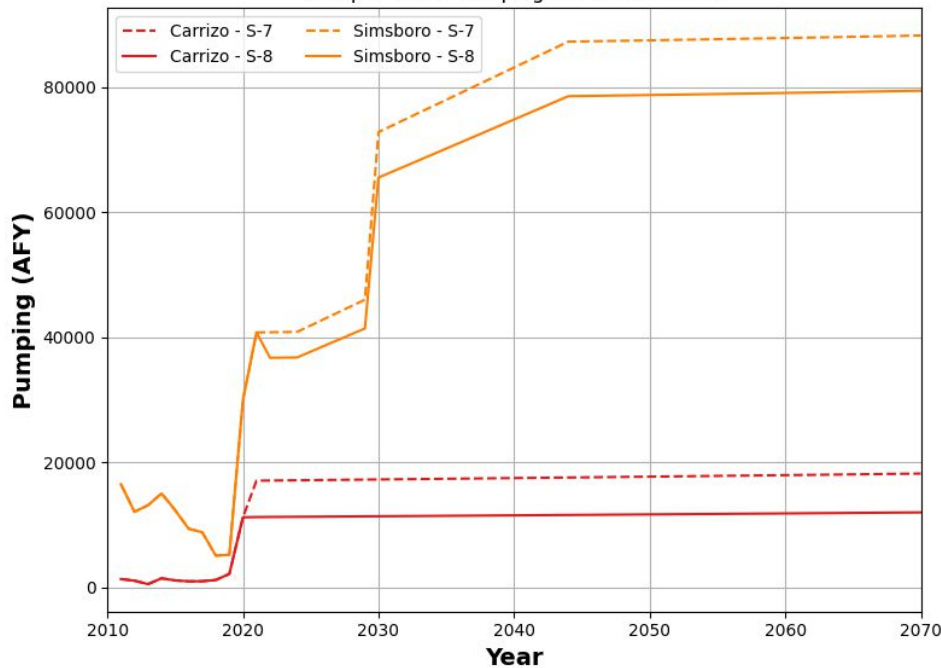
## POSGCD Production

Aquifer	MAG	2070 Production (AFY)		Permitted Amount (AFY)*
		PS-7	PS-8	
Sparta	6,735	1,983	4,070	4,115
Queen City	504	1,045	7,725	1,600
Carrizo	7,058	18,205	12,000	21,600
Calvert Bluff	1,036	4,761	4,701	2,285
Simsboro	48,503	85,855	79,396	104,147
Hooper	4,422	3,126	3,093	2,080

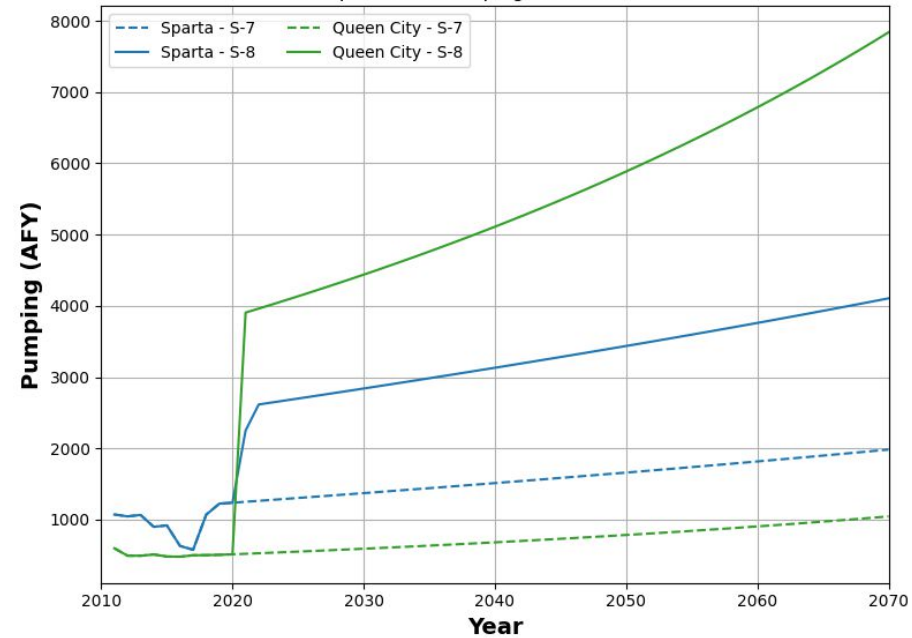
\* permitted amount based on Half database

# Comparison of Production Rates for POSGCD

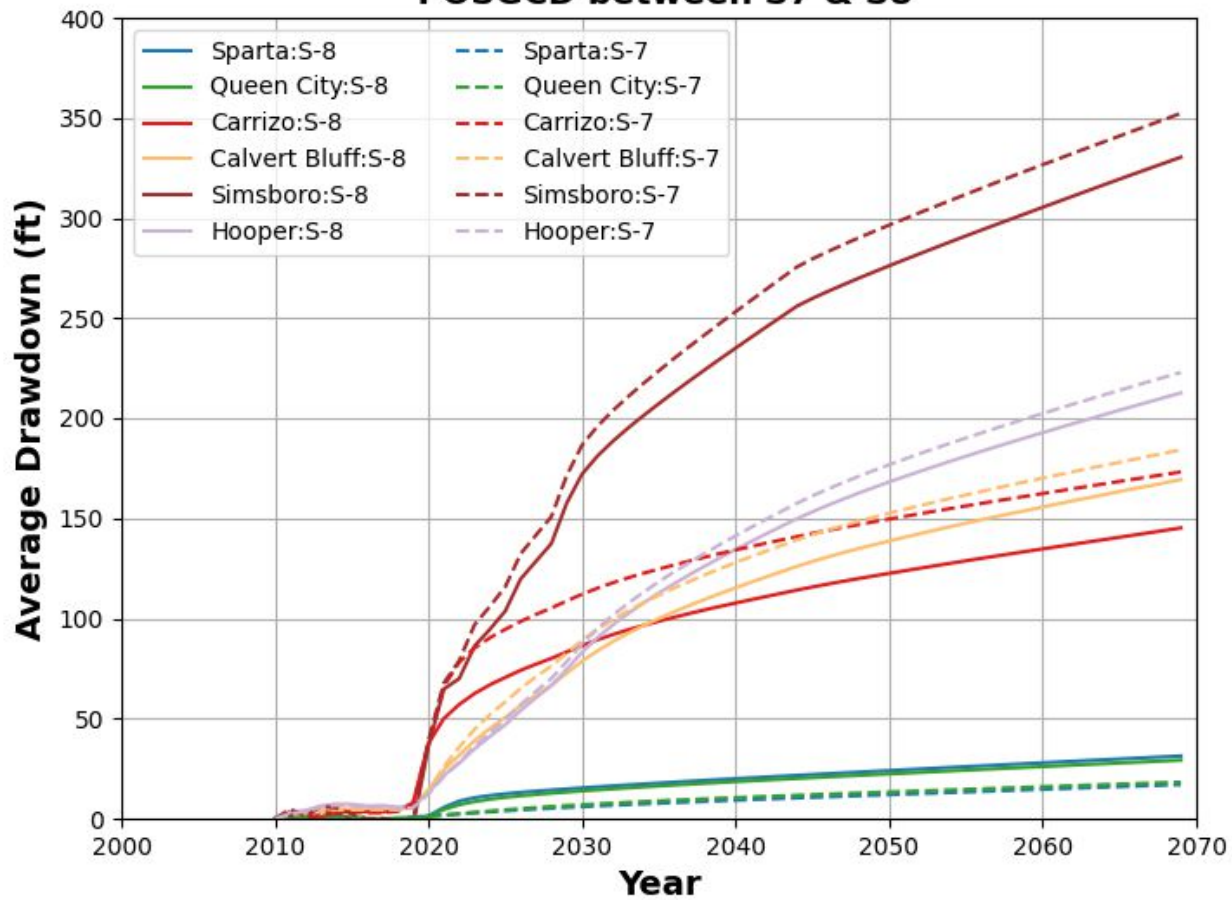
Comparison of Pumping between S7 & S8



Comparison of Pumping between S7 & S8



**Comparison of Drawdown in  
POSGCD between S7 & S8**



# Comparison Between S-7 & S-8 for Adjacent Districts

## LPGCD Average Drawdowns

Aquifer	Current DFC	Average Drawdown		Range for DFC* (10% Uncertainty)
		PS-7	PS-8	
Sparta	5	20	21	19 - 23
Queen City	15	26	26	23 - 28
Carrizo	62	139	124	111 - 136
Calvert Bluff	100	158	150	134 - 164
Simsboro	240	322	313	281 - 344
Hooper	165	178	173	155 - 190

## BVGCD Average Drawdowns

Aquifer	Current DFC	Average Drawdown		Range for DFC* (10% Uncertainty)
		PS-7	PS-8	
Sparta	12	46	46	41 - 50
Queen City	12	39	39	34 - 42
Carrizo	61	76	70	62 - 76
Calvert Bluff	125	98	92	82 - 101
Simsboro	295	219	208	186 - 228
Hooper	207	155	148	133 - 162

\* Current DFC is from 2000 to 2070; Revised DFC is from 2020 to 2070

# Summary for S-8

- Sparta DFC set to about 30 ft
  - Decrease MAG about 2,000 AFY
  - MAG and permitted pumping about 4,000 AFY
  - Relative to S-7, decrease 2070 drawdowns < 1 ft change in LPGCD and BVGCD
- Queen City DFC set to about 30 ft
  - Increase MAG about 7,000 AFY
  - MAG would be about 6,000 AFY greater than permitted pumping
  - Relative to S-7, decrease 2070 drawdowns < 1 ft change in LPGCD and BVGCD
- Carrizo pumping set to 12,000 AFY after 2021
  - Increase existing DFC about 80 ft
  - Increase existing MAG about 5,000 AFY
  - About 9,000 AFY less than permitted pumping
  - Relative to S-7, decrease 2070 drawdowns in LPGCD (15 ft) and BVGCD (6 ft)



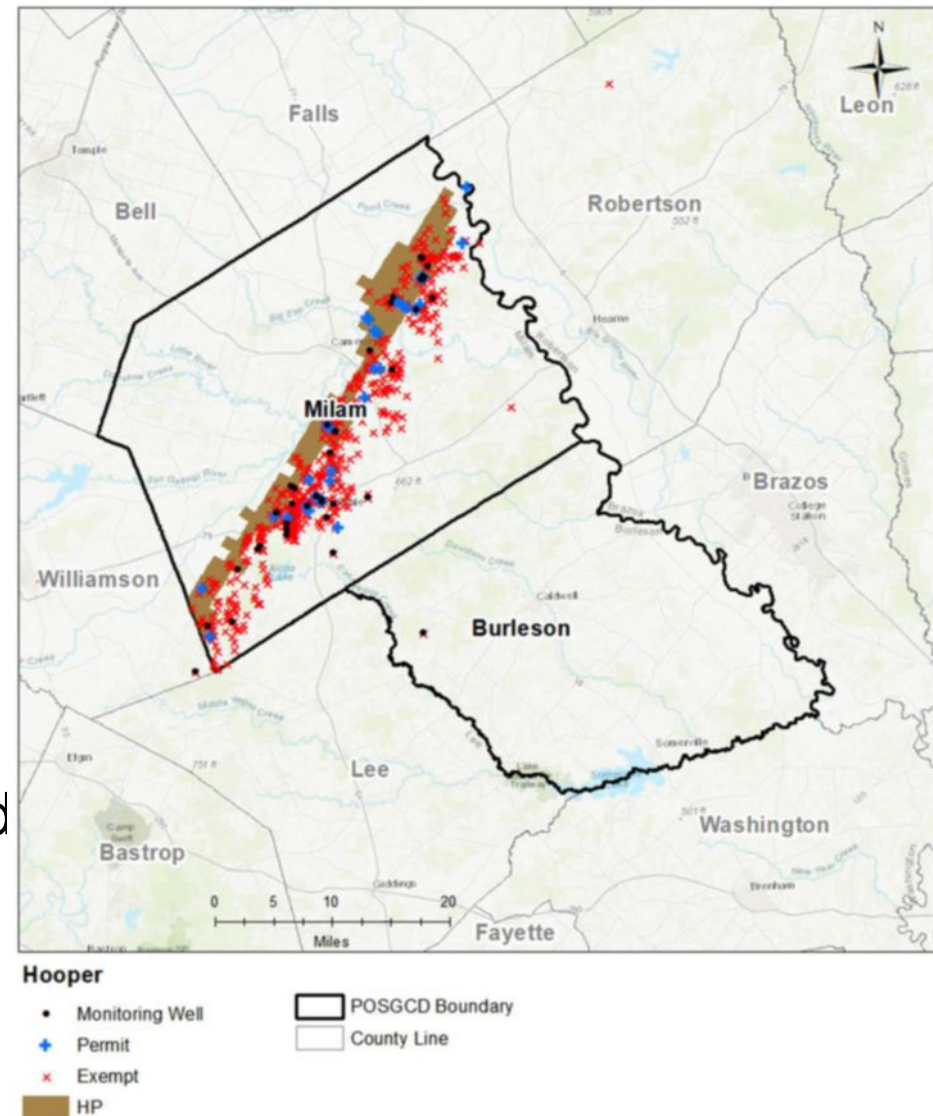
# Summary for S-8 (con't)

- Calvert Bluff was not changed from S-7
  - 2070 drawdown decreased about 15 ft
  - Production is about 1,500 above permitted pumping
  - Relative to S-7, decrease 2070 drawdowns in LPGCD (8 ft) and BVGCD (6 ft)
- Simsboro DFC set to about 320 ft
  - Increase MAG about 20,000 AFY
  - MAG would be about 24,000 AFY less than permitted pumping
  - Relative to S-7, decrease 2070 drawdowns in LPGCD (9 ft) and BVGCD (11 ft)
- Hooper was not changed from S-7
  - 2070 drawdown decreased about 6 ft
  - Production is about 1,000 above permitted pumping
  - Relative to S-7, decrease 2070 drawdowns in LPGCD (5 ft) and BVGCD (7 ft)

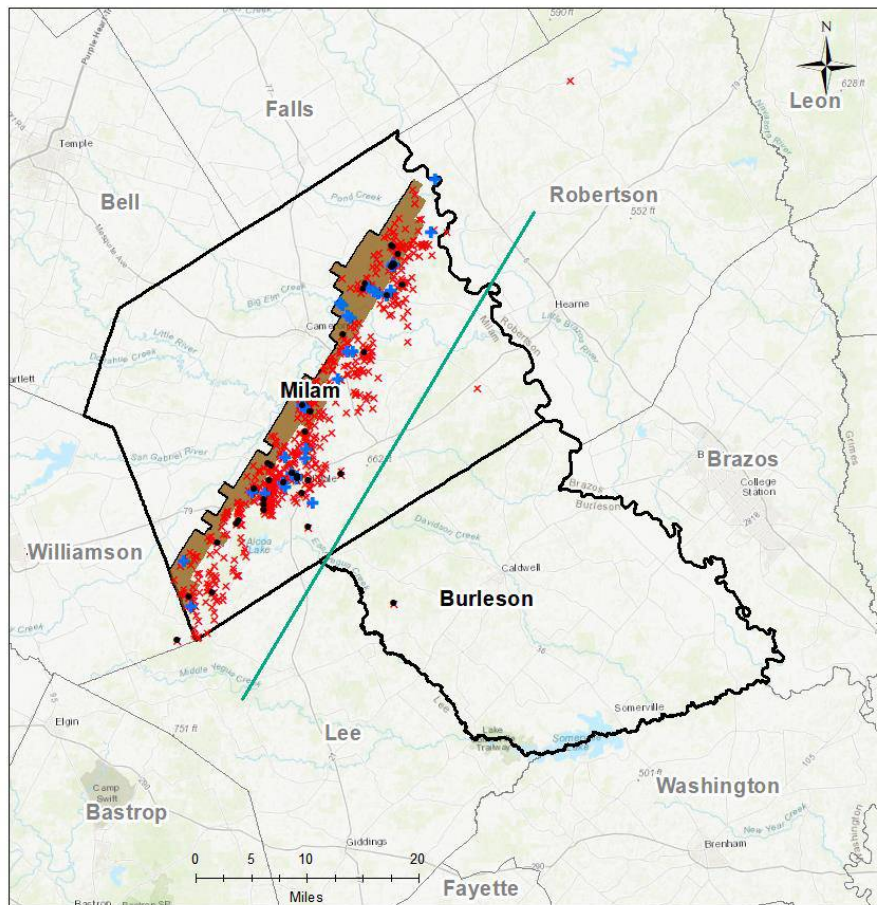
# Desired Future Conditions

# Management Area for Desired Future Condition

- DFC Management Zones are currently set for the entire aquifer
- Current monitoring network does not provide uniform coverage across the entire aquifer
- Hooper illustrated the problem with limited coverage
- Options are to reduce the size of the management zone based on location of permitted pumping wells and monitoring wells

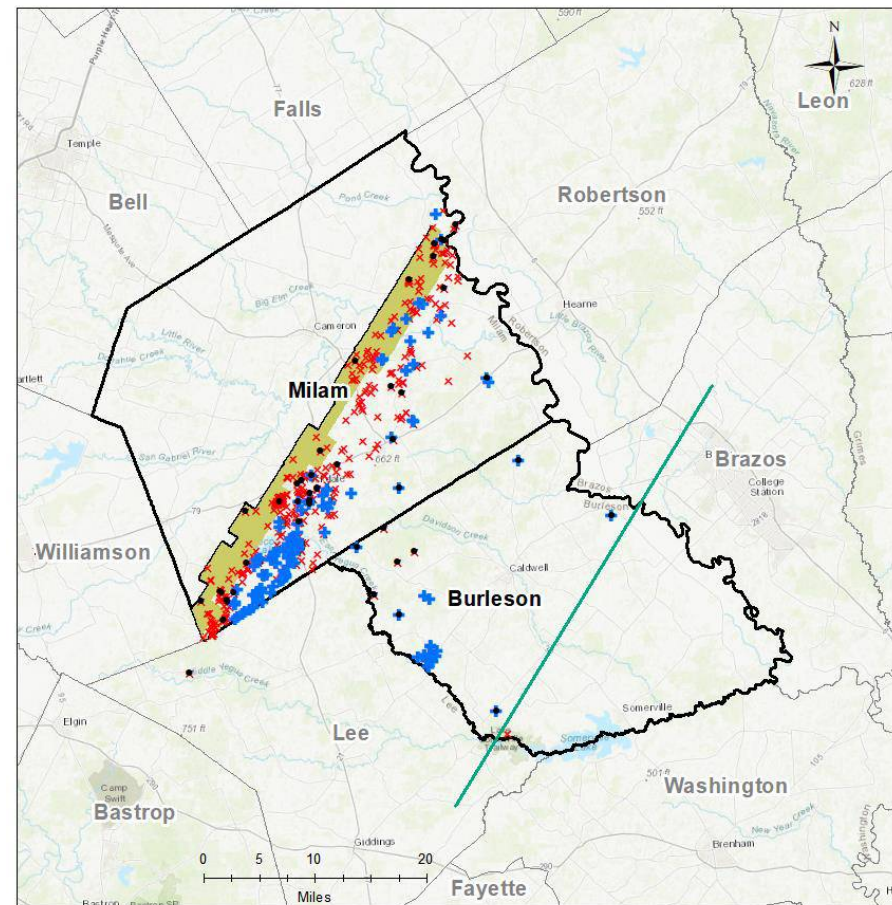


# Option for Alternative DFC Management Zone: Hooper & Simsboro



## Hooper

- Monitoring Well (n=41)
- + Permitted Well (n=32)
- × Exempt Well (n=661)
- Upper Extent of HP Aquifer
- Proposed Extent of Lower HP DFC Boundary
- HP Outcrop

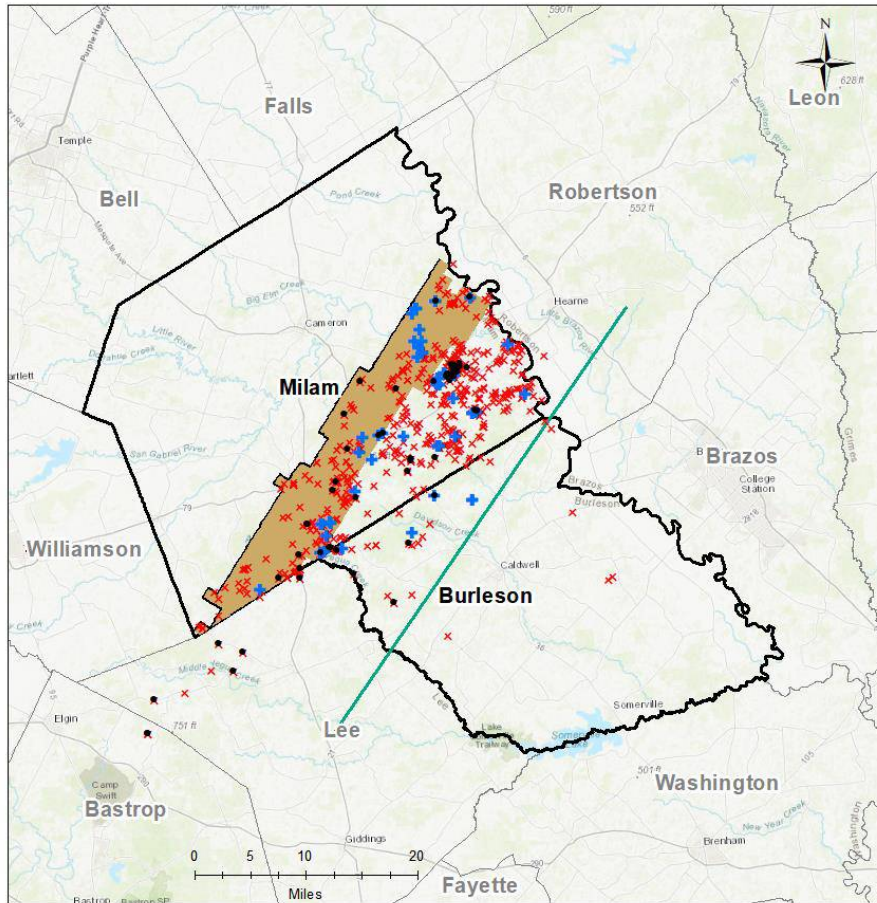


## Simsboro

- Monitoring Well (n=46)
- + Permitted Well (n=144)
- × Exempt Well (n=365)
- Upper Extent of SB Aquifer
- Proposed Extent of Lower SB DFC Boundary
- SB Outcrop

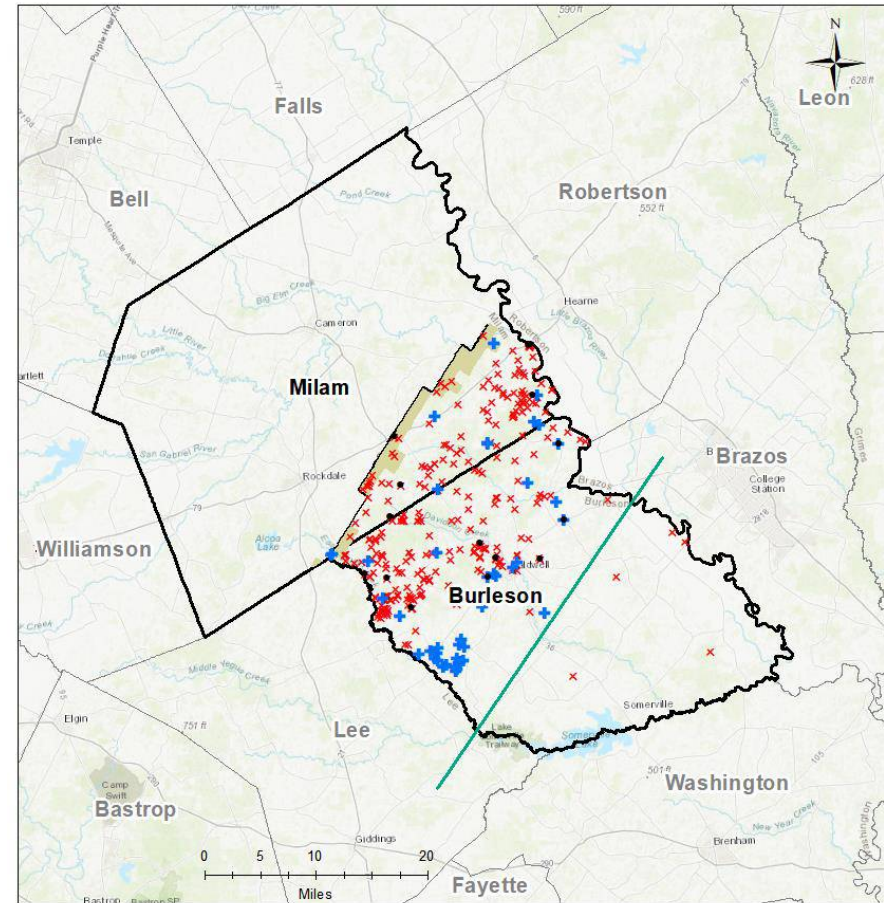


# Option for Alternative DFC Management Zone: Calvert Bluff and Carrizo



## Calvert Bluff

- Monitoring Well (n=57)
  - + Permitted Well (n=48)
  - × Exempt Well (n=523)
  - Upper Extent of CB Aquifer
  - Proposed Extent of Lower CB DFC Boundary
  - CB Outcrop
- POSGCD Boundary  
 County Line

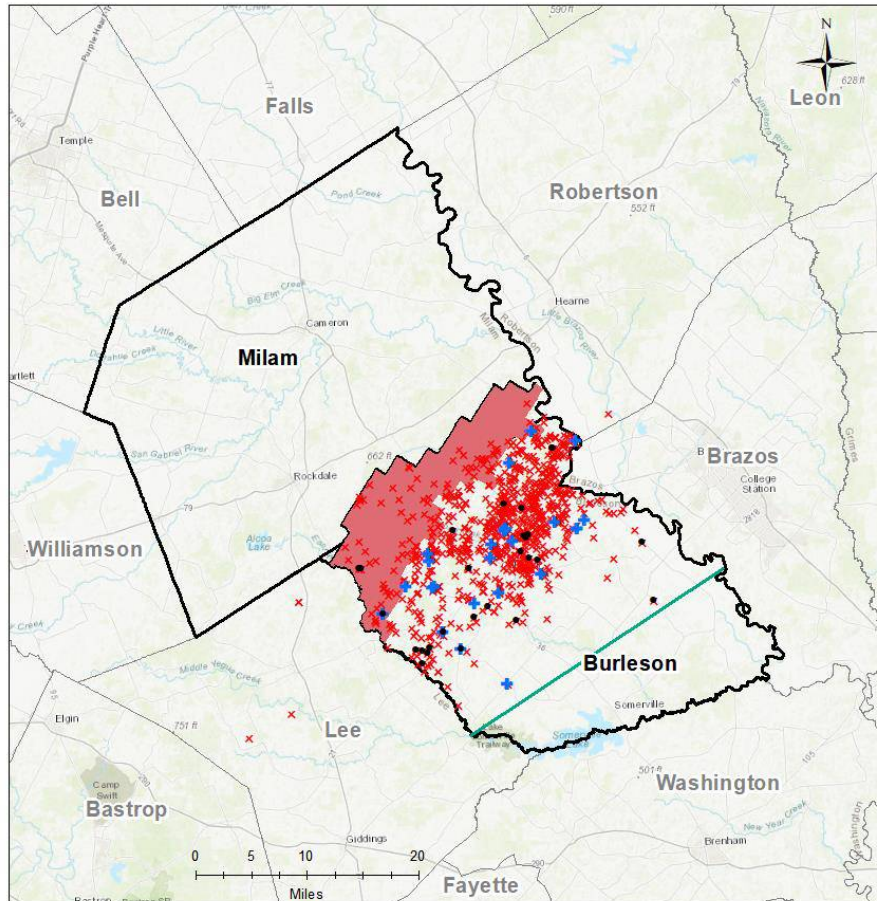


## Carrizo

- Monitoring Well (n=15)
  - + Permitted Well (n=43)
  - × Exempt Well (n=282)
  - Upper Extent of CZ Aquifer
  - Proposed Extent of Lower CZ DFC Boundary
  - CZ Outcrop
- POSGCD Boundary  
 County Line

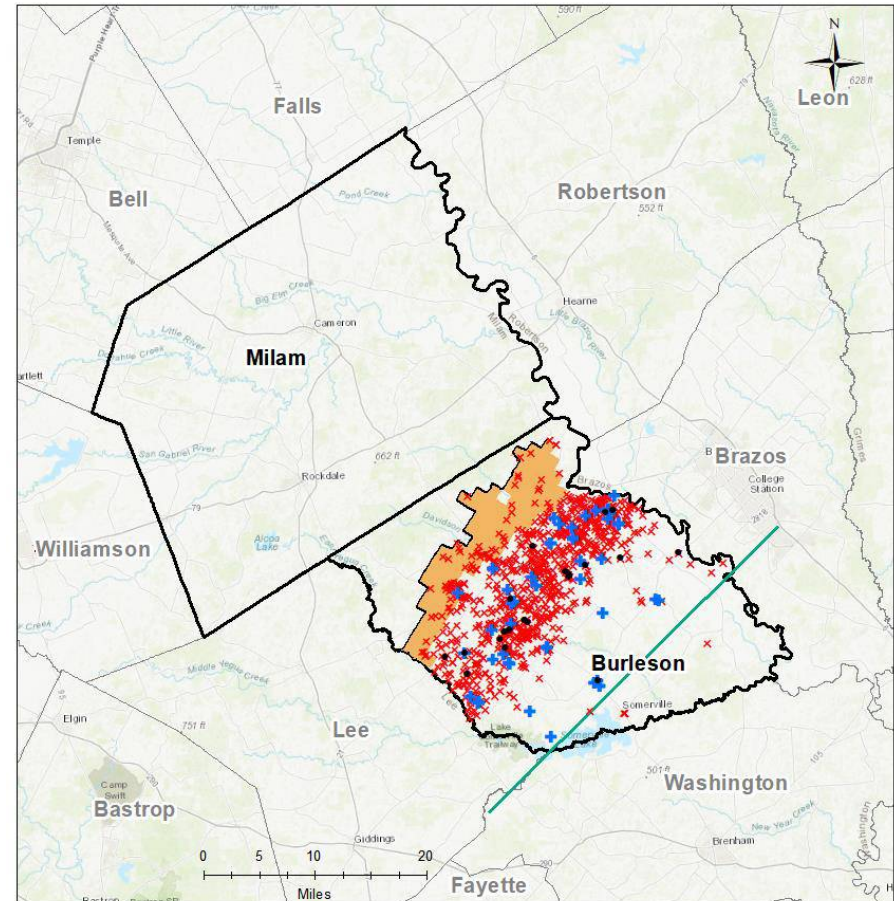


# Option for Alternative DFC Management Zone: Queen City and Sparta



## Queen City

- Monitoring Well (n=27)
  - + Permitted Well (n=25)
  - × Exempt Well (n=835)
  - Upper Extent of QC Aquifer
  - Proposed Extent of Lower QC DFC Boundary
  - QC Outcrop
- POSGCD Boundary  
 □ County Line



## Sparta

- Monitoring Well (n=23)
  - + Permitted Well (n=52)
  - × Exempt Well (n=936)
  - Upper Extent of SP Aquifer
  - Proposed Extent of Lower SP DFC Boundary
  - SP Outcrop
- POSGCD Boundary  
 □ County Line

# Approach to Management Strategies Report

# General Approach

- Identify Management Goals
- Identify Management Strategies
- Identify Rules and Documents used to Implement the Management Strategies
- Discussion Role for Science and Analyses to Guide Development and Implementation/ Enforcement of Management Strategies

# Example Matrix

Management Strategy	Example Rules/Guidance	Potential Role for Science
1. Application of Aquifer Management Zones	Rules Sec 16/ MP Sec 5	Aquifer Boundaries
2. Conservation of Groundwater	Rules Sec 8, 13; MP Sec 16,	Applicant conservation measures; Rainfall harvesting, Conservancy Program
3. Production Limitations on Wells	Rules Sec 5	Universal application of 2 AF/ acre, Definition of Fair Share
4. Permitting Requirements (Local GW Impacts)	Rules Sec 5, 12	Well Spacing, Well Construction
5. Limitations on Regional Drawdowns	Rules Sec 16/ MP Sec 7,	Evaluation of DFCs & PDLs, GAM evaluation and updates, Impact Analyses
6. Monitoring Water Levels & Production	Rules Sec 4, 11 / MP Sec-10/ Compliance Monitoring Document	Analysis of WLs, Well Network Design, Uncertainty Analysis, Aquifer Assignment,
7. Use Triggers to Guide Evaluation & Action to Reduce Production based on Aquifer Conditions	Rules Sec 16 /MP 11	Type of studies to conduct, select trigger levels, assess cause of drawdowns, interaction between management zones
8. Reduce Permitted Production to Achieve Management Goals	Rules Sec 16 /MP 11	Evaluation of curtailment options, prediction of impacts,
9. Well Assistance Program to Impaired Wells	MP Sec 16/ GWAP	Evaluate cause of reduced well production, resetting of pump location



A scenic landscape photograph. In the foreground on the left, a large, dark green evergreen tree stands prominently. To its right, a calm body of water reflects the sky. A small wooden dock or pier extends into the water from the shore. The background is filled with a dense line of trees and shrubs. The sky is filled with soft, white and grey clouds, suggesting an overcast day.

Questions ?