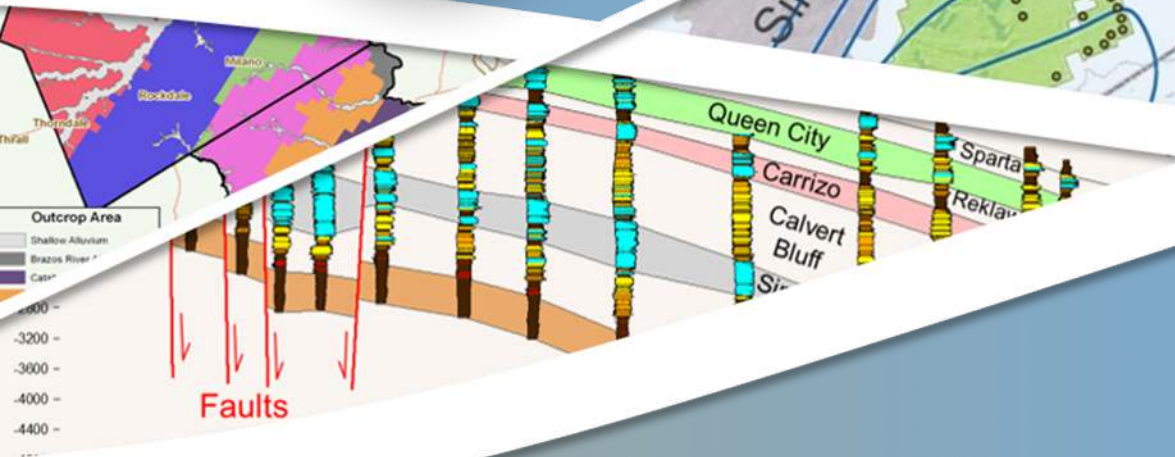


Presentation to DFC Committee: GMA 12 Update

Presented To:



Presented By:

Steve Young

Jevon Harding

Ross Kushnereit



January 14, 2020

Agenda

- Yegua Jackson Update
- Brazos River Alluvium Update
- Sparta/Queen City/Carrizo Wilcox Update
- Monitoring \Compliance\Impact Assessment Activities

Yegua-Jackson

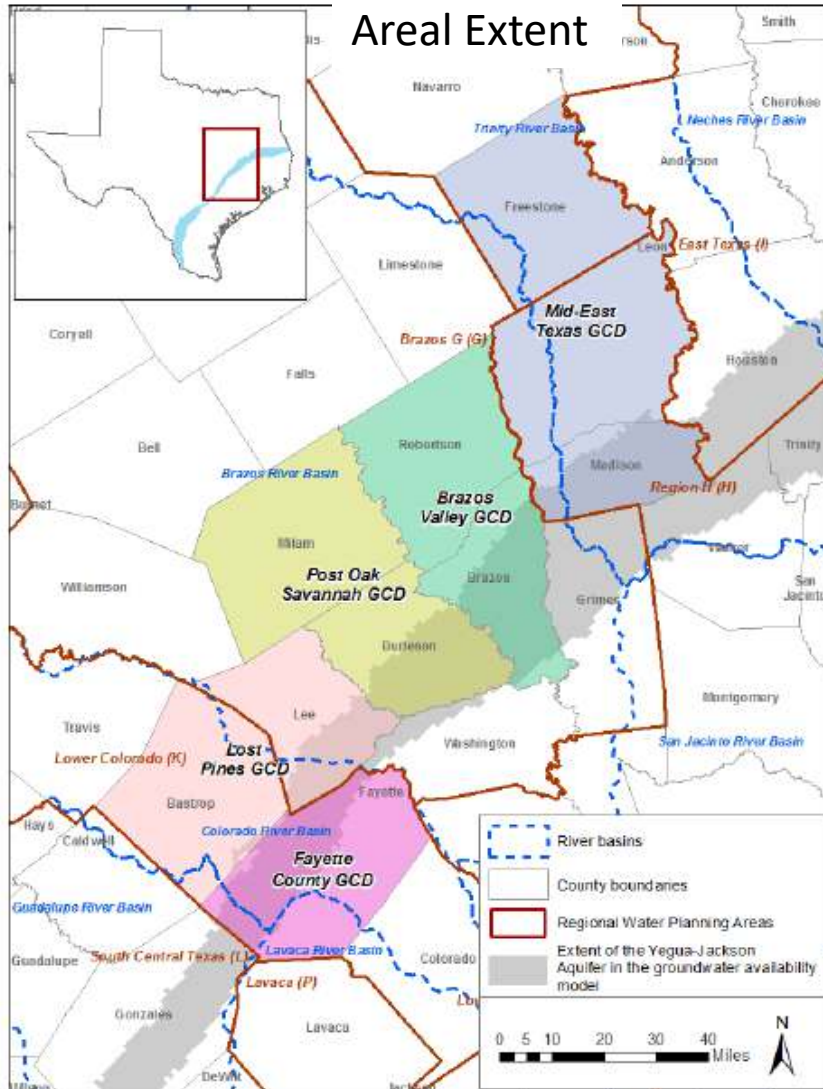
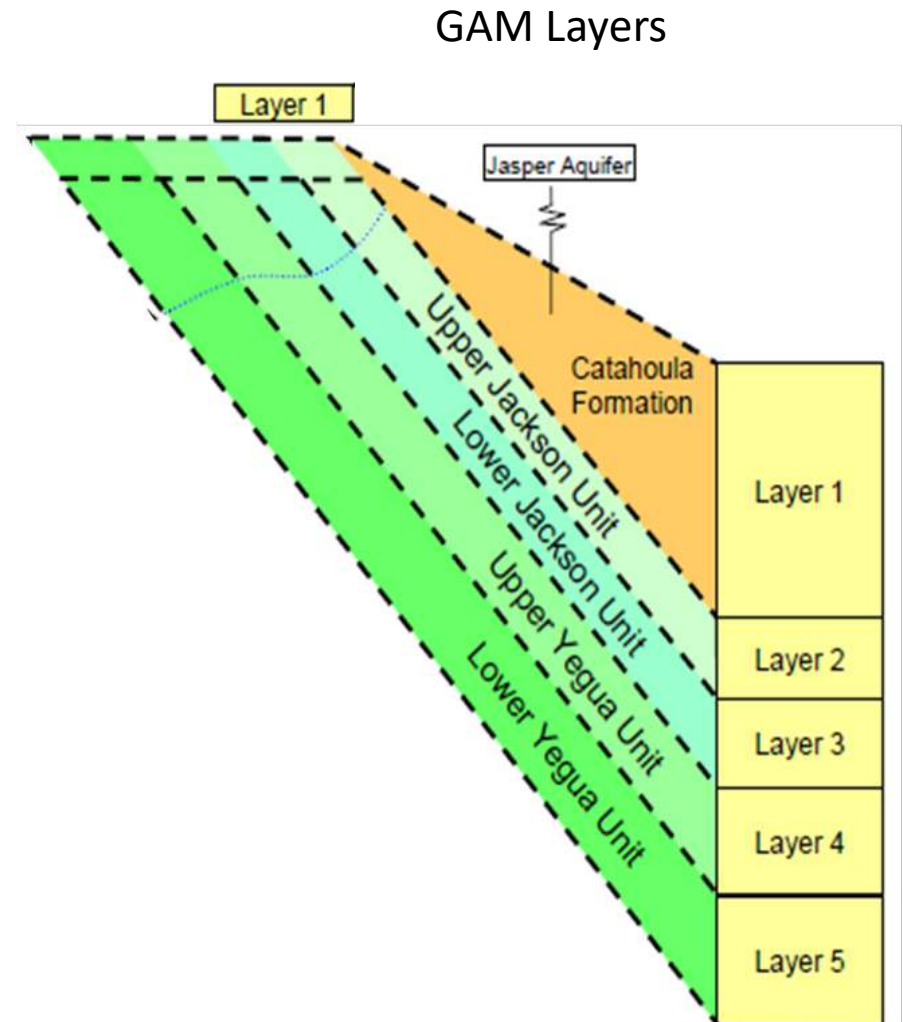


Image from Wade and Ballew (2017)



Current DFCs for Yegua-Jackson

Table 2-2 Adopted DFCs for the Yegua and Jackson Aquifers

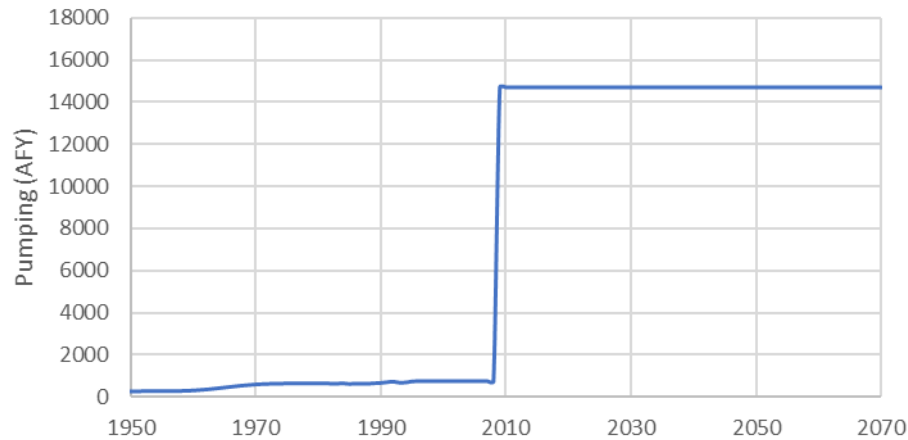
GCD	Average Aquifer Drawdown (ft) measured from January 2010 through December 2069		
	Yegua	Jackson	Yegua-Jackson
Brazos Valley GCD	70	114	--
Fayette County GCD	--	--	77
Lost Pines GCD	--	--	--
Mid-East Texas GCD	--	--	7
Post Oak Savannah GCD	--	--	100
<i>GMA-12</i>	--	--	65

Lost Pines GCD will declare Yegua-Jackson as a non-relevant aquifer.

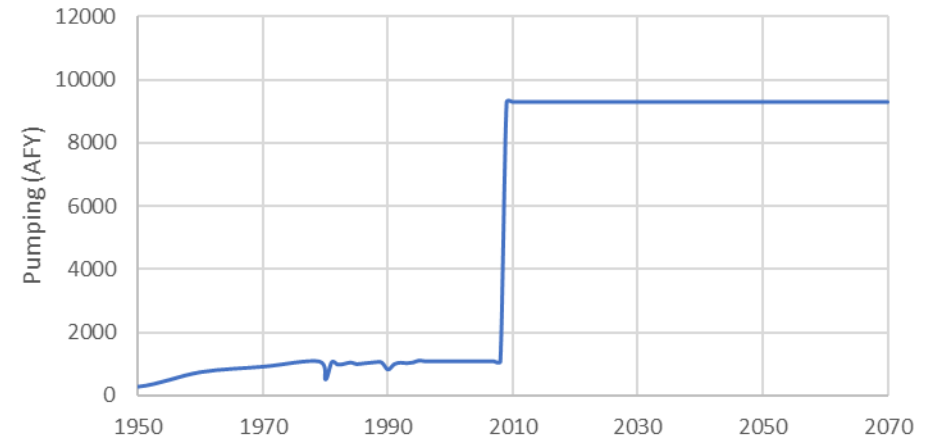
Bravos Valley GCD will move to a single value for Yegua-Jackson (73 ft for DFC run)

Yegua-Jackson DFC Run

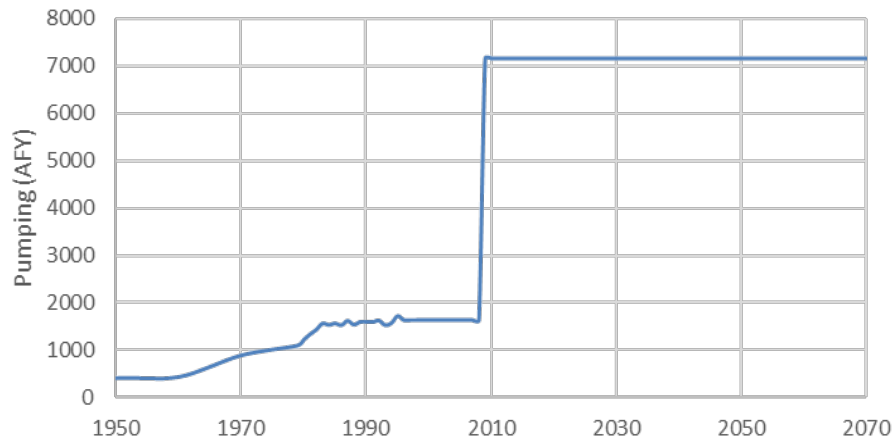
PostOak



Fayette



BrazosValley



Mid-East

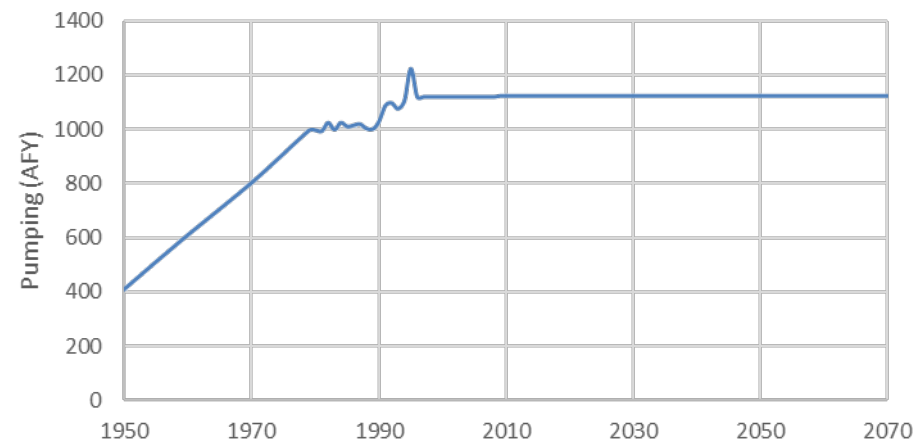


Image from Wade and Bailew (2017)

Current MAGs for Yegua Jackson

TABLE 10 **MODELED AVAILABLE GROUNDWATER FOR THE YEGUA-JACKSON AQUIFER IN GROUNDWATER MANAGEMENT AREA 12**
SUMMARIZED BY GROUNDWATER CONSERVATION DISTRICT (GCD) AND COUNTY FOR EACH DECADE BETWEEN 2010 AND
2069. VALUES ARE IN ACRE-FEET PER YEAR.

Groundwater Conservation District	County	Aquifer	2010	2020	2030	2040	2050	2060	2069
Brazos Valley GCD	Brazos	Jackson	4,411	4,404	4,402	4,402	4,402	4,402	4,402
Brazos Valley GCD	Brazos	Yegua	2,452	2,452	2,452	2,452	2,452	2,452	2,452
Brazos Valley GCD Total¹		Yegua-Jackson	6,863	6,856	6,854	6,854	6,854	6,854	6,854
Fayette County GCD¹	Fayette³	Yegua-Jackson	9,262	9,262	9,262	9,262	9,262	9,261	9,261
Lost Pines GCD ²	Bastrop	Yegua-Jackson	NR	NR	NR	NR	NR	NR	NR
Lost Pines GCD ²	Lee	Yegua-Jackson	NR	NR	NR	NR	NR	NR	NR
Lost Pines GCD Total^{1,2}		Yegua-Jackson	NR	NR	NR	NR	NR	NR	NR
Mid-East Texas GCD	Leon	Yegua-Jackson	0	0	0	0	0	0	0
Mid-East Texas GCD	Madison	Yegua-Jackson	809	809	809	809	809	809	809
Mid-East Texas GCD Total¹		Yegua-Jackson	809	809	809	809	809	809	809
Post Oak Savannah GCD¹	Burleson	Yegua-Jackson	14,544	14,544	12,576	12,564	12,478	12,326	10,200
GMA 12 Total¹		Yegua-Jackson	31,478	31,471	29,501	29,489	29,403	29,250	27,124

1. Individual estimates are rounded and may not always sum up to the total value displayed.

2. NR: Groundwater Management Area 12 declared the Yegua-Jackson Aquifer not relevant in these areas .

3. Modeled available groundwater values for Fayette County include all of the county (GMA 12 and GMA 15 portions)

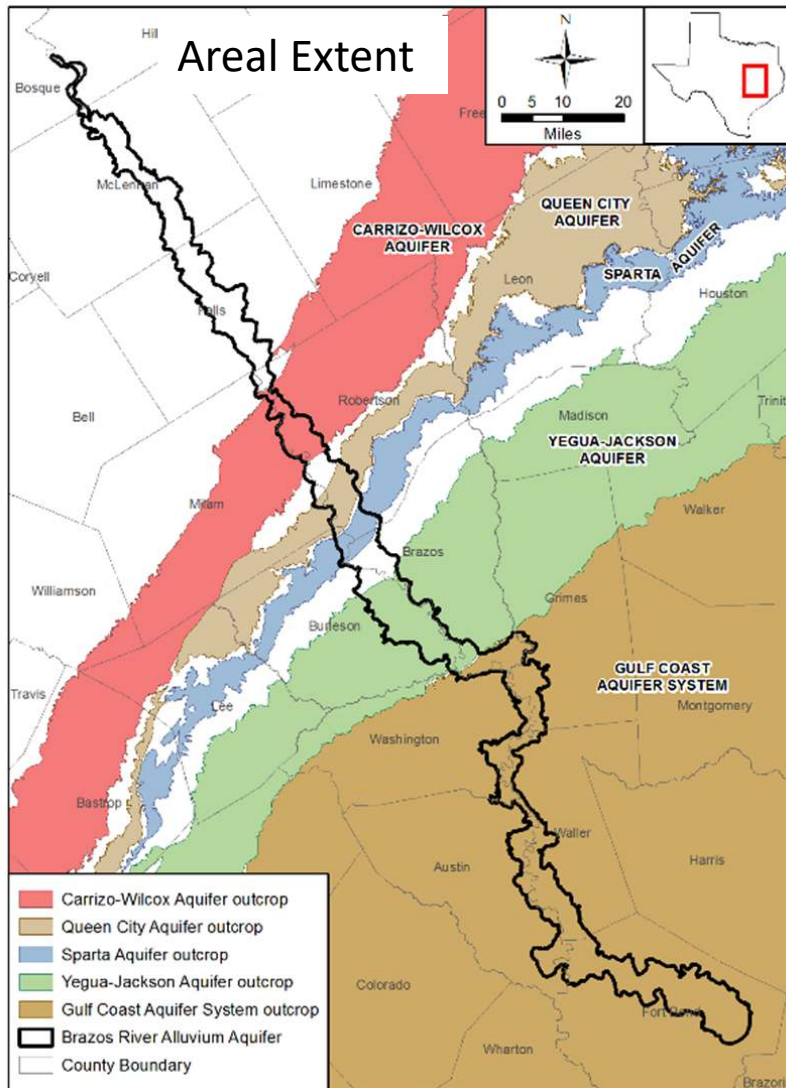
Revised Pumping Rates for Next GAM Run

GCD	Pumping (AFY)	
	2010 to 2018	~2035 to 2070
Brazos Valley GCD	1,600 to 2,200	7,000
Post Oak Savannah GCD	200 to 1000	7,000
Fayette County GCD	700 to 1,300	10,000
Mid-East Texas GCD	1,000 to 1,000	1,100

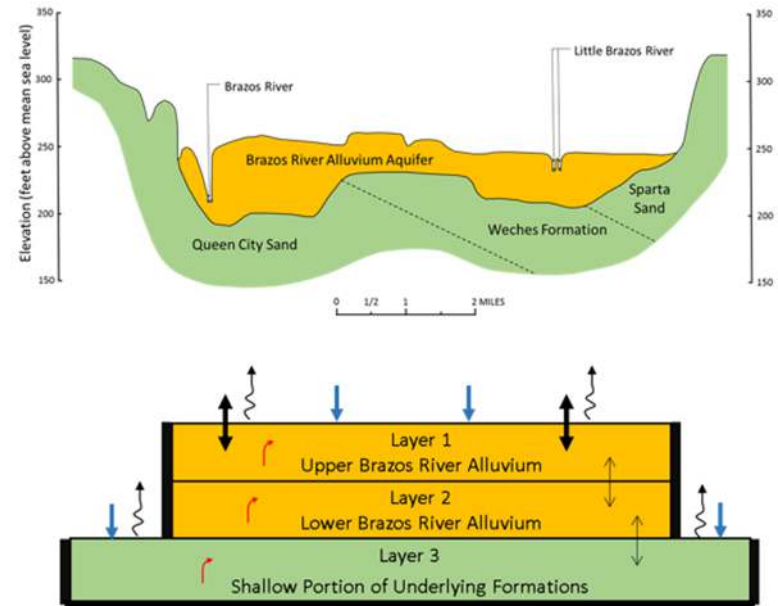
Yegua Jackson: Next Steps

- Complete next GAM Run in January 2020
- Minor pumping adjustments may occur over next few GMA 12 meetings
- Propose GAM Run for GMA 12 consideration and evaluation in Spring
- Possible DFC adoption in Fall 2020

Brazos River Alluvium



GAM Layers



BRAA GAM Report (Ewing and others, 2016)

Brazos Valley GCD Pumping in Alluvium

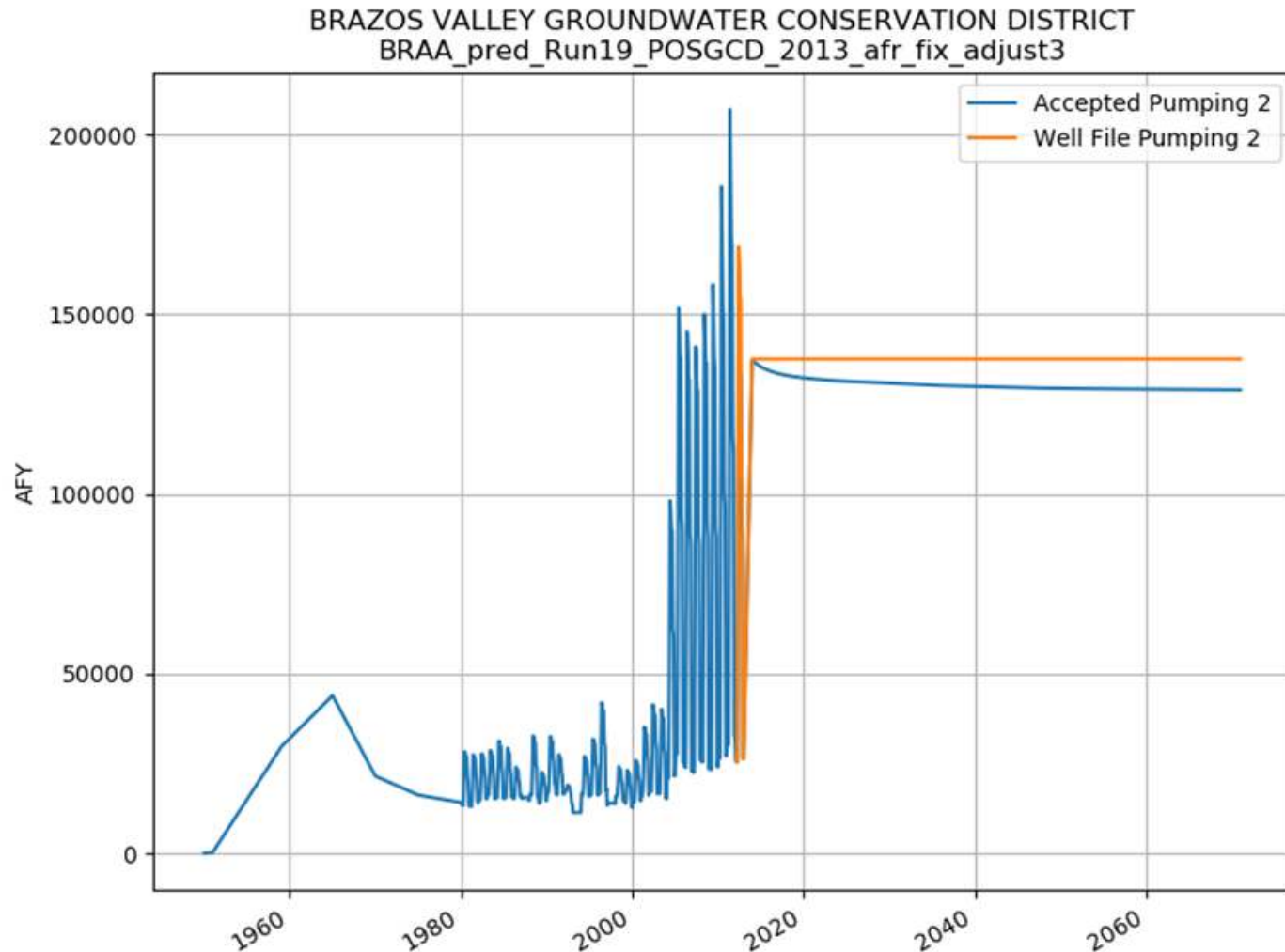
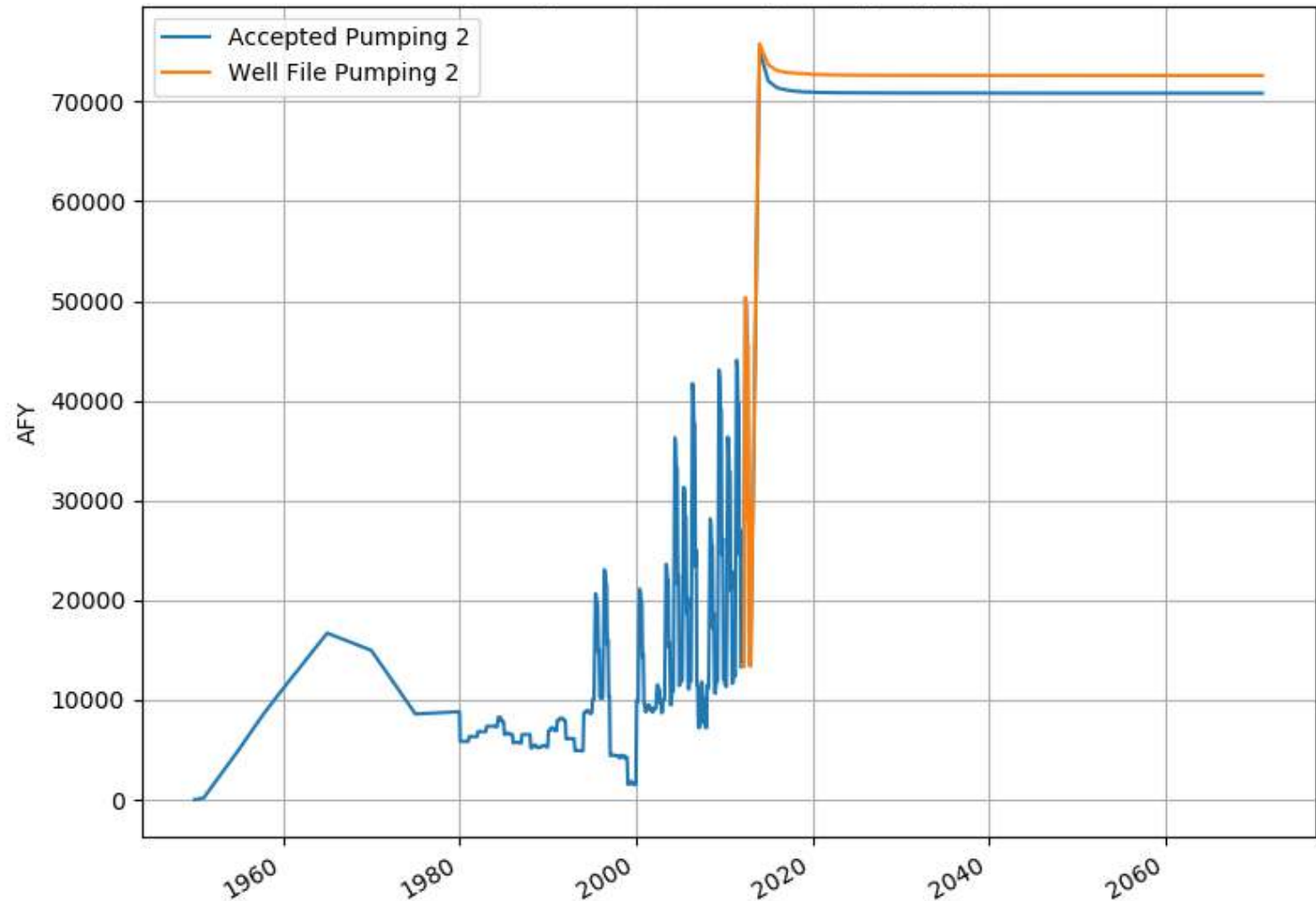
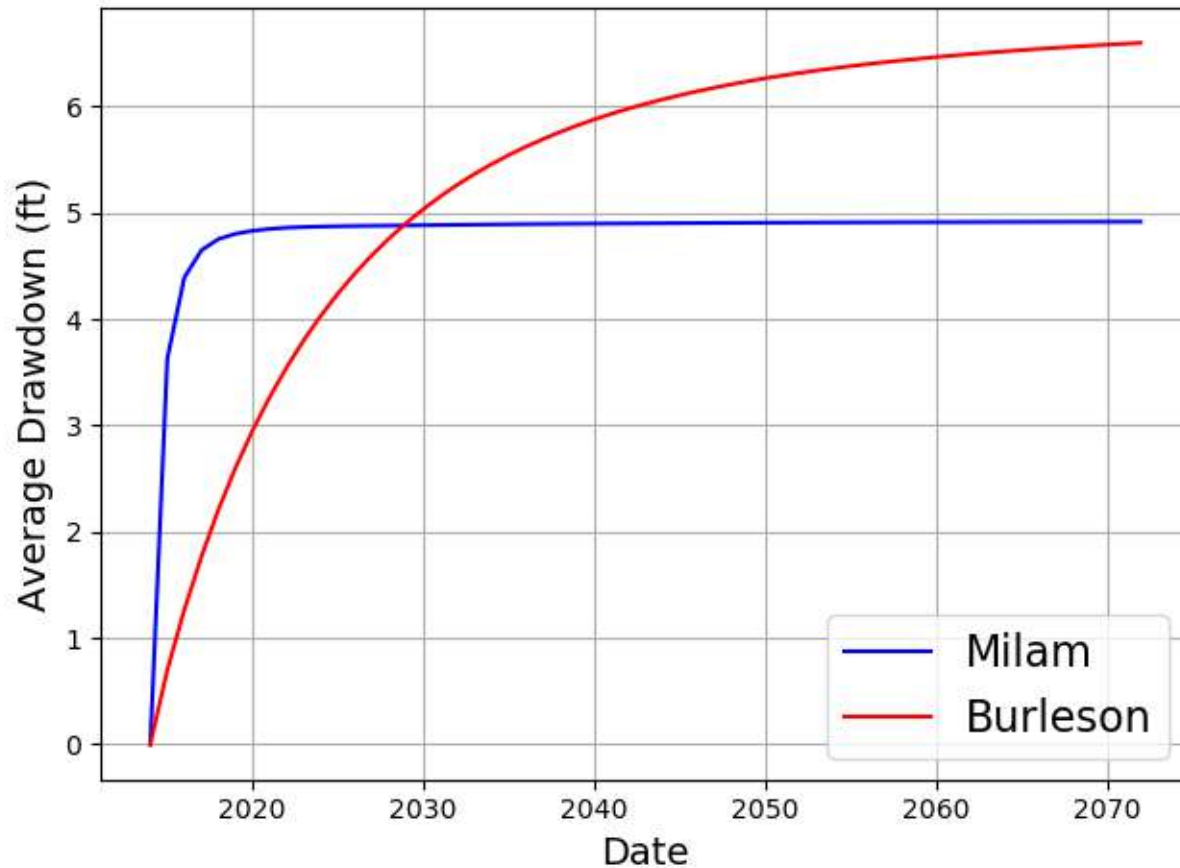


Image from Wade and Bailey (2017)

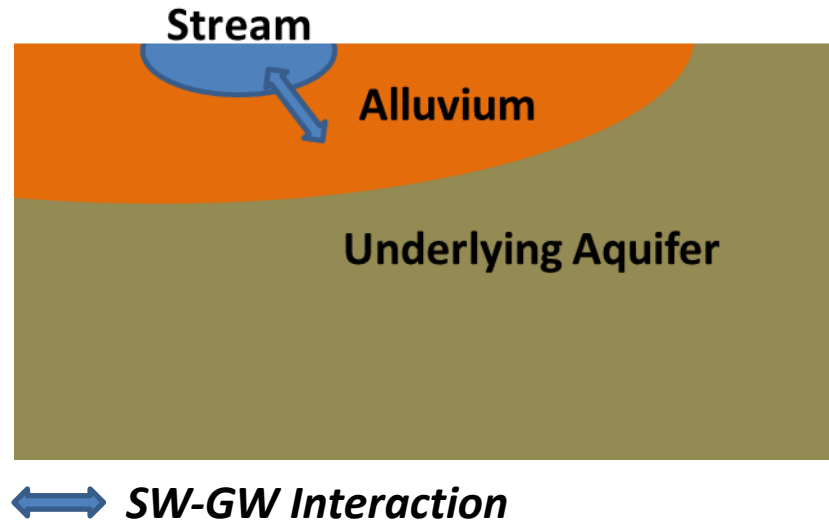
Post Oak Savannah GCD Pumping in Alluvium



Average Drawdown in Alluvium: POSGCD



Water Budget For BRAA GAM Simulation



County	Net Flow (AFY)		Reduction in GW Contribution to River Flow (AFY) from 2013 to 2070
	2013	2070	
Milam	27,518	32,494	4,976
Robertson	21,240	26,534	5,294
Brazos	19,433	33,728	14,295
Burleson	19,391	32,355	12,964

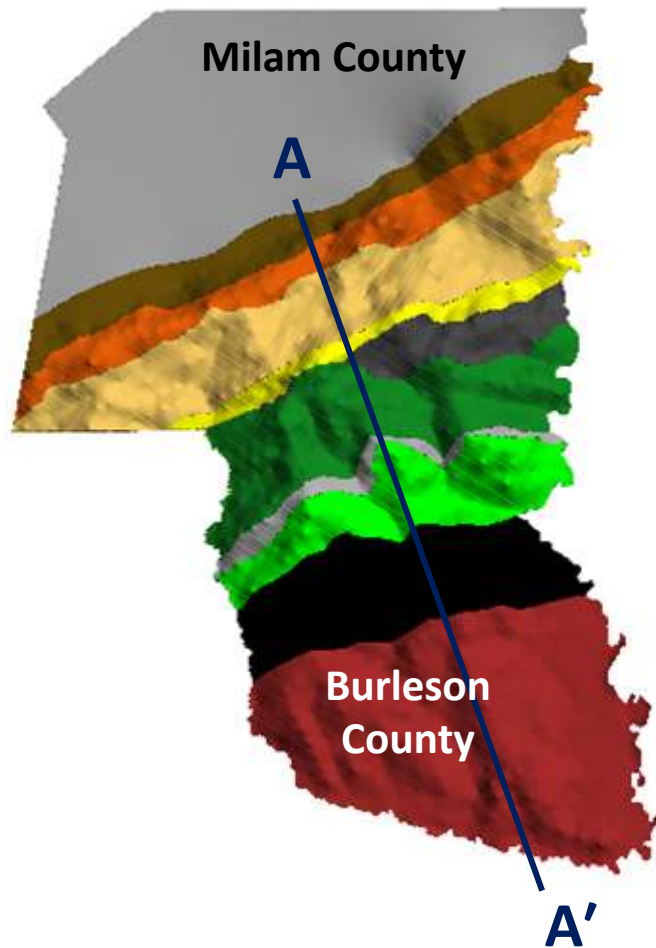
*Net flow is flow into the aquifer

Brazos River Alluvium Aquifer: Next Steps

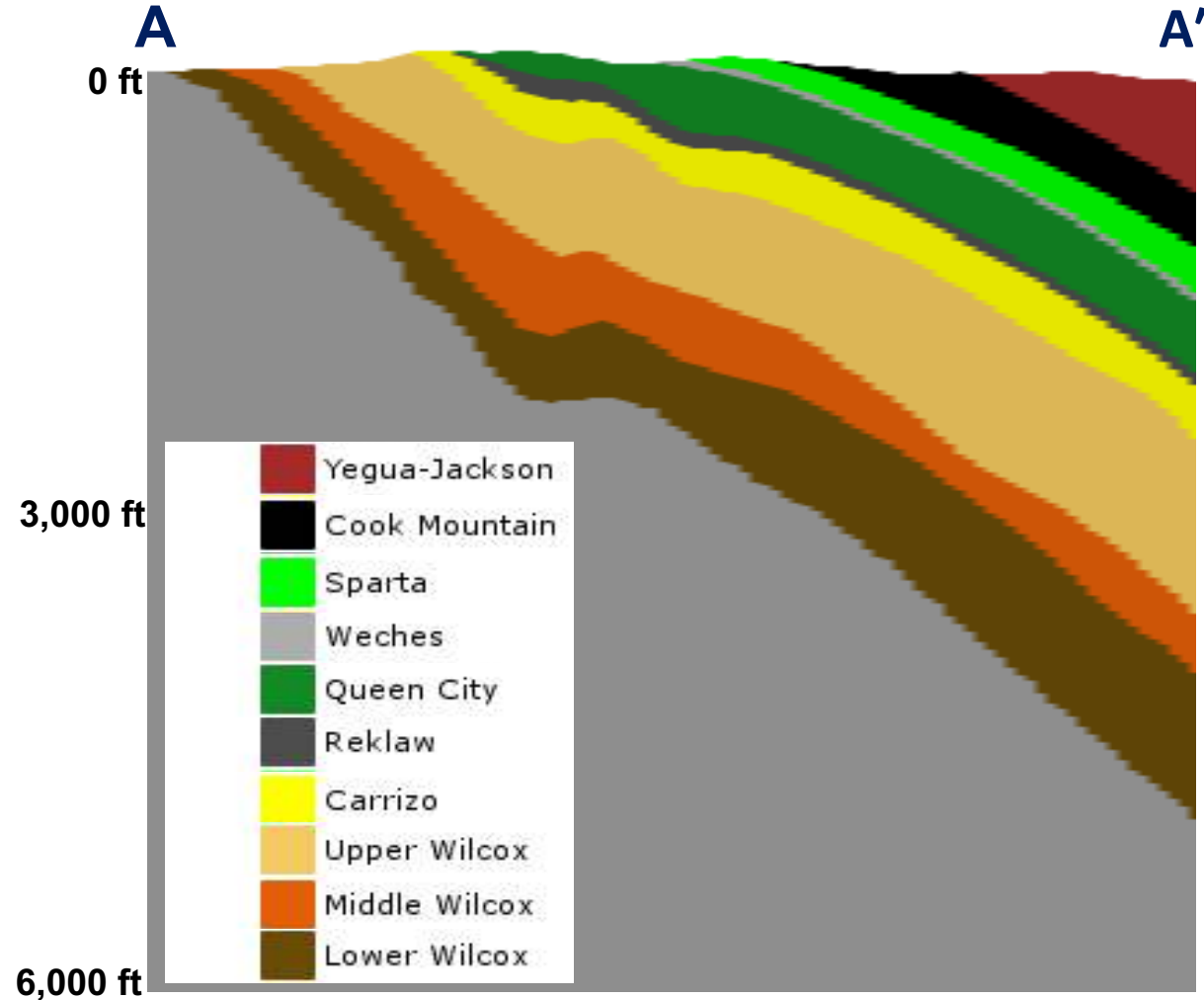
- Propose GAM Run for GMA 12 consideration and evaluation in Spring
- Possible DFC adoption in Fall 2020
- POSGCD and BVGCD believes
 - that the GAM overestimates groundwater availability and that high-pumping rates are not sustainable
 - aquifer is self-regulating
- POSGCD is currently supporting TWDB Surface water-groundwater interaction study on Colorado River

Sparta/Queen City/Carrizo Wilcox

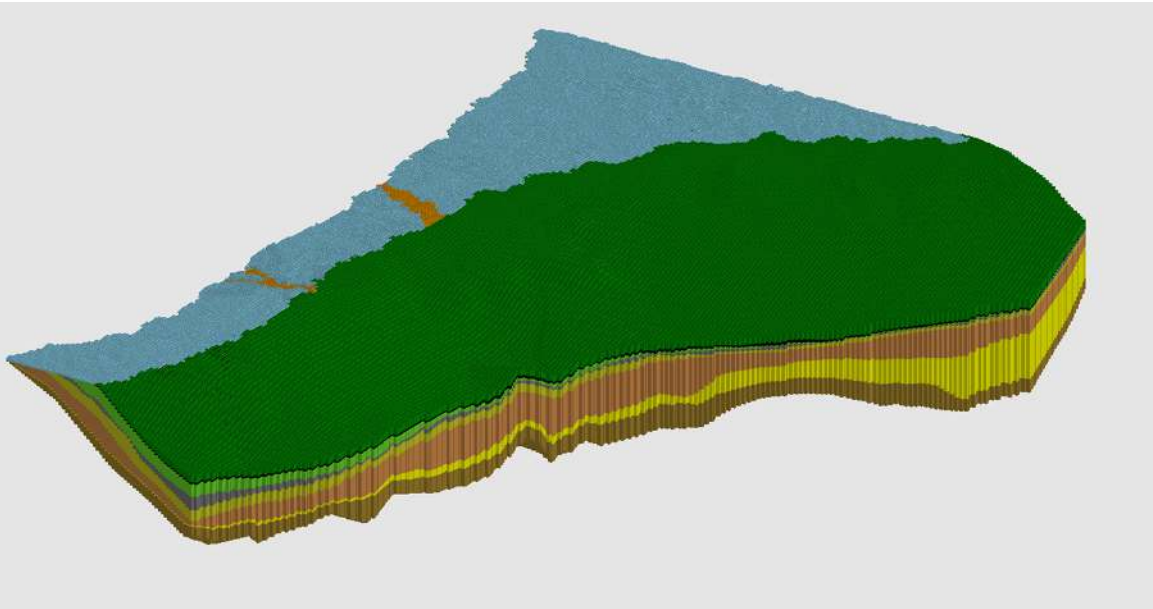
Aerial View



Vertical Cross-Section View Looking From Side



SP/QC/C-W Aquifers GAM



Layer 1- Colorado and Brazos
River Alluvium

Layer 2- Shallow flow systems

Layer 3- Sparta Aquifer

Layer 4- Weches Formation

Layer 5- Queen City Aquifer

Layer 6- Reklaw Formation

Layer 7- Carrizo Aquifer

Layer 8- Calvert Bluff Aquifer

Layer 9- Simsboro Aquifer

Layer 10- Hooper Aquifer

GAM Simulations

Number	Description
PS -1	Permitted pumpage from 2020 to 2070
PS-2	Ramp to permitted pumpage (or best estimate) from 2020 to 2070
PS-3	Ramp to half permitted pumpage (or best estimate) from 2020 to 2070
PS-4	PS-1 with reduced recharge from 2026 to 2030 and from 2051 to 2060
PS-5	PS-2 with reduced recharge from 2026 to 2030 and from 2051 to 2060
PS-6	PS-3 with reduced recharge from 2026 to 2030 and from 2051 to 2060
PS-7	Similar to PS-2, refinements to permitted pumpage (or best estimate)
PS-8	Modification to PS-7 to reduce pumping so GCDs will meet existing DFCs
PS-9	Modification to PS-7 to reduce pumping to achieve GMA-12 wide DFC

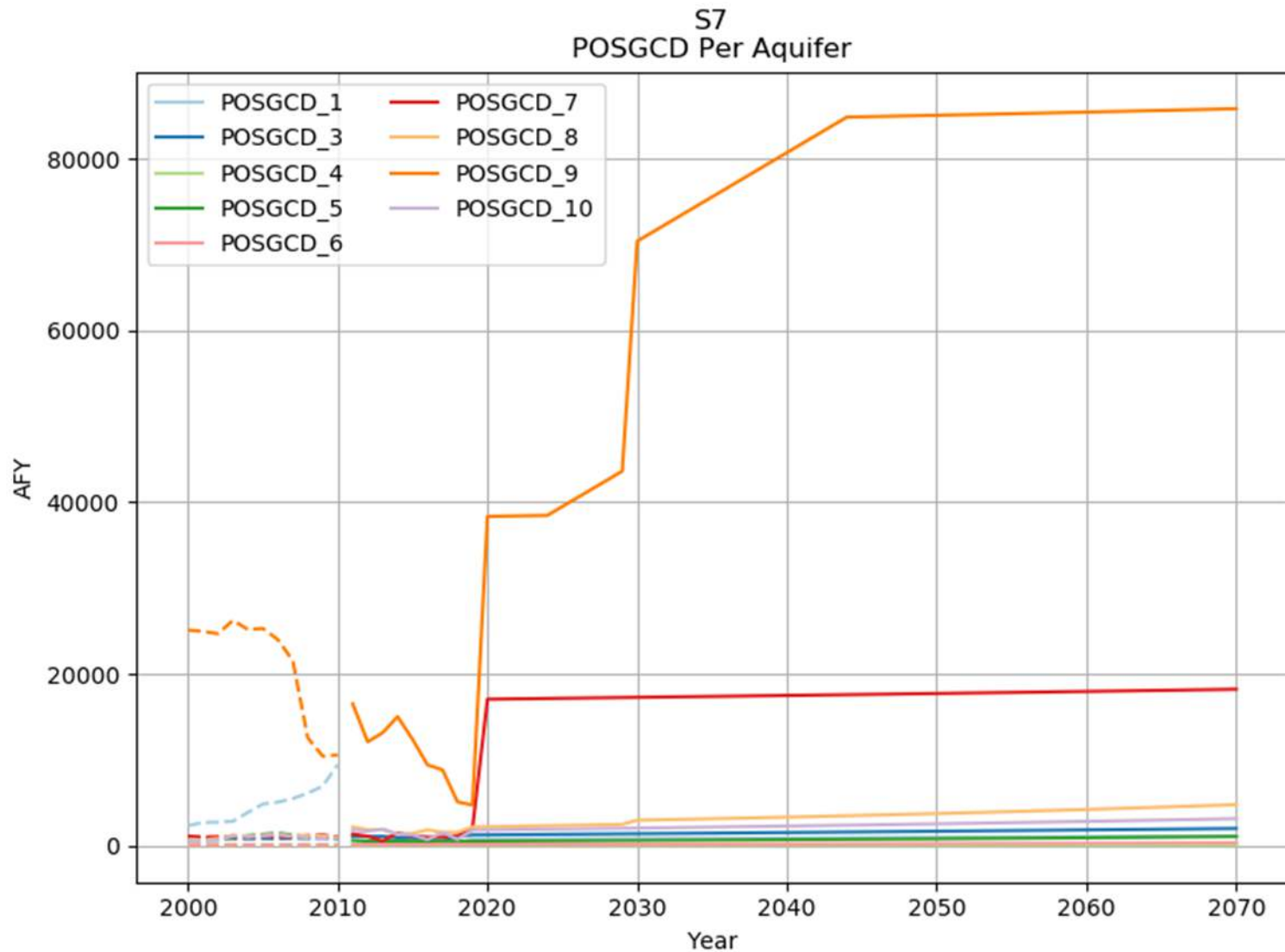
Results from S-2 for POSGCD

	Current DFC (feet)	Current MAG in 2070	S-2 Drawdown in 2070 (feet)	S-2 Pumpage in 2070 (acre-feet)
Sparta	28	6,735	23	2,764
Queen City	30	504	21	691
Carrizo	67	7,058	172	19,734
Calvert Bluff	149	1,036	176	3,420
Simsboro	318	48,503	342	76,450
Hooper	205	4,422	207	3,563

Results from S-7 for POSGCD

	Current DFC (feet)	Current MAG in 2070	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Pumpage in 2070 (acre-feet)
Sparta	28	6,735	17	1,983
Queen City	30	504	19	1,045
Carrizo	67	7,058	177	18,205
Calvert Bluff	149	1,036	183	4,761
Simsboro	318	48,503	355	85,855
Hooper	205	4,422	222	3,126

POSGCD Pumping for PS-7



Key Findings from Simulations

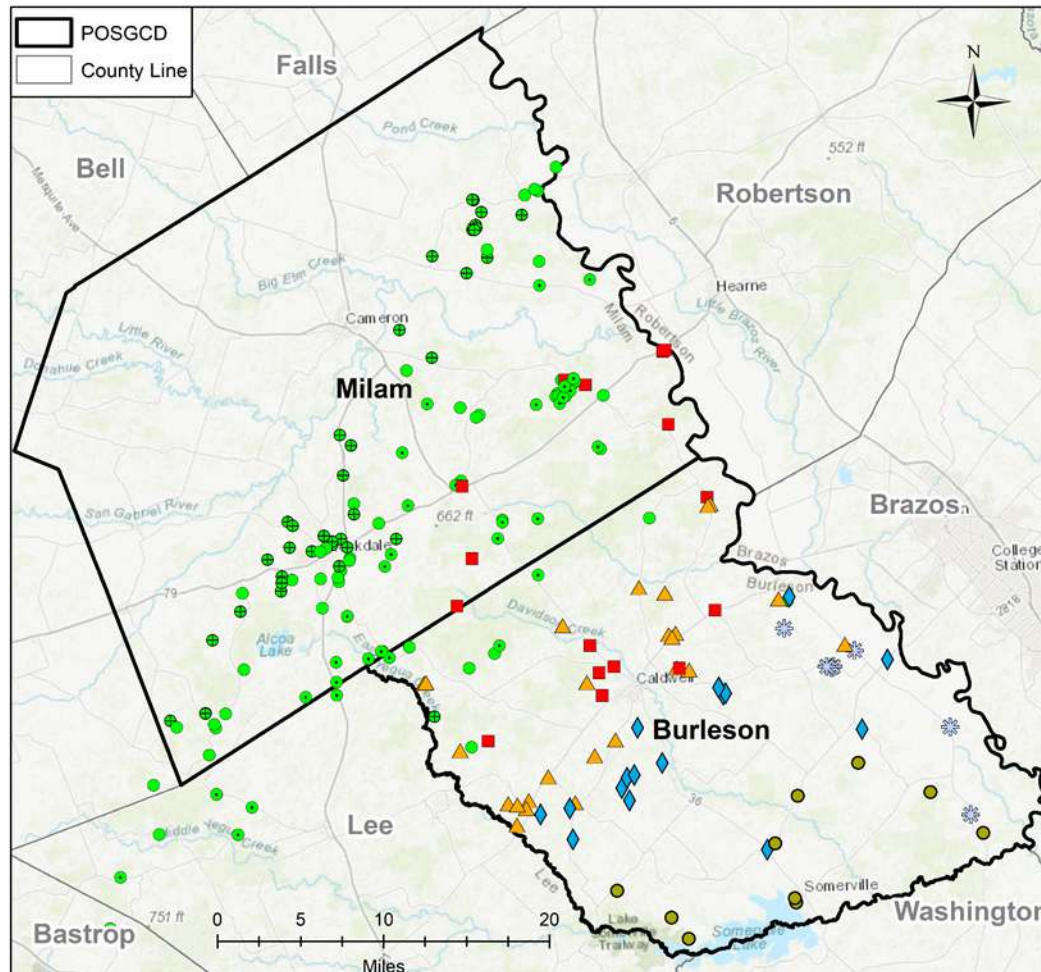
- Comparison of Revised GAM and Former GAM
 - Sparta is generally less productive
 - Simsboro is more productive
- Existing DFCs among GCDs are not Compatible using Revised GAM
- Significant increase in Simsboro pumping has occurred for all GCDs in GAM simulations
- Carrizo Aquifer DFC appears to be the most problematic for POSGCD

SP/QC/C-W Aquifers: Next Steps

- During January 29 meeting, General Managers to have met with their Board and provide guidance
- GCD consultants to check consistency between BRAA and SP/QC/C-W GAM simulations
- GCD consultants to consider type of GAM simulations to help quantify uncertainty in simulated 2070 drawdowns (currently at 5% to 10%)
 - pumping rates (temporal and spatial distribution)
 - aquifer properties in GAM
 - recharge rates

Monitoring\Compliance

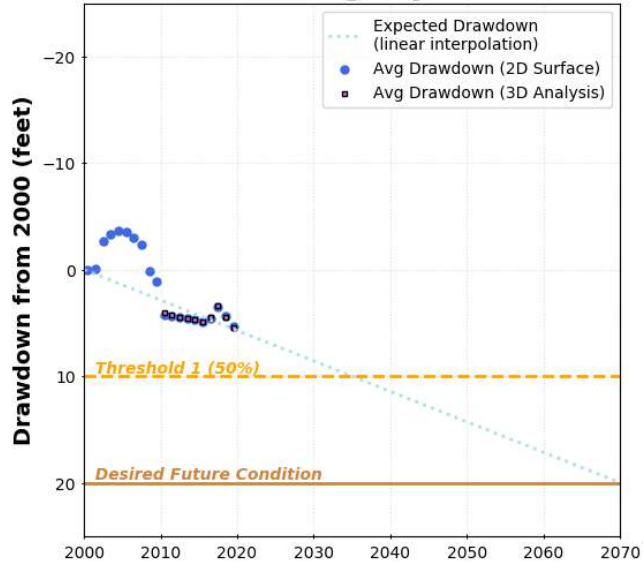
Monitoring Well Network



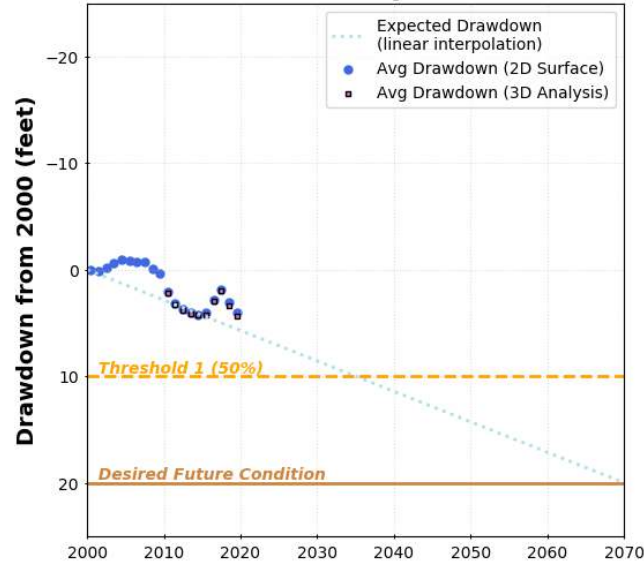
-  BRAA
-  Yegua/Jackson
-  Sparta
-  Reklaw/Weches
-  Queen City
-  Carrizo
-  Calvert Bluff
-  Simsboro
-  Hooper
-  Below Hooper
-  Not Yet Assigned

PDL Compliance

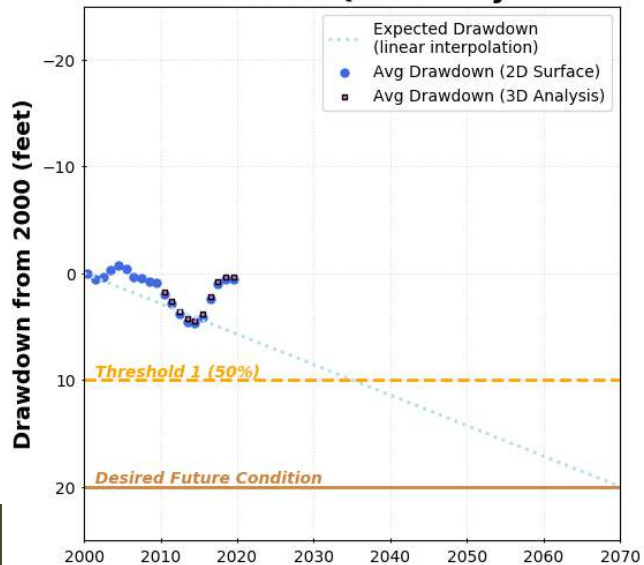
Shallow Yegua-Jackson



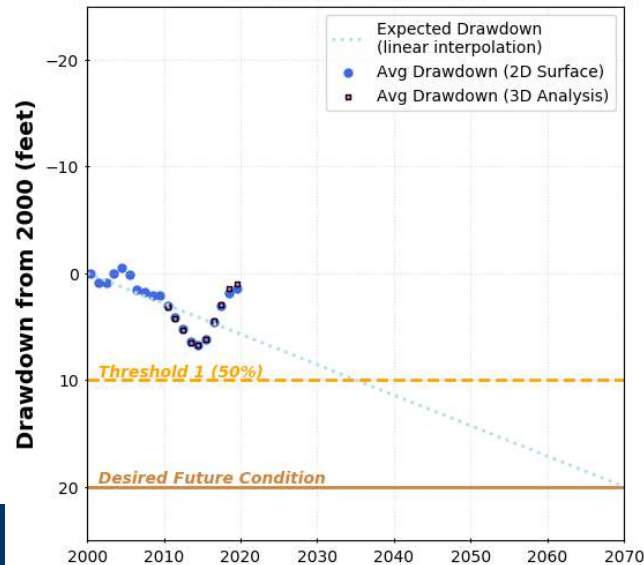
Shallow Sparta



Shallow Queen City

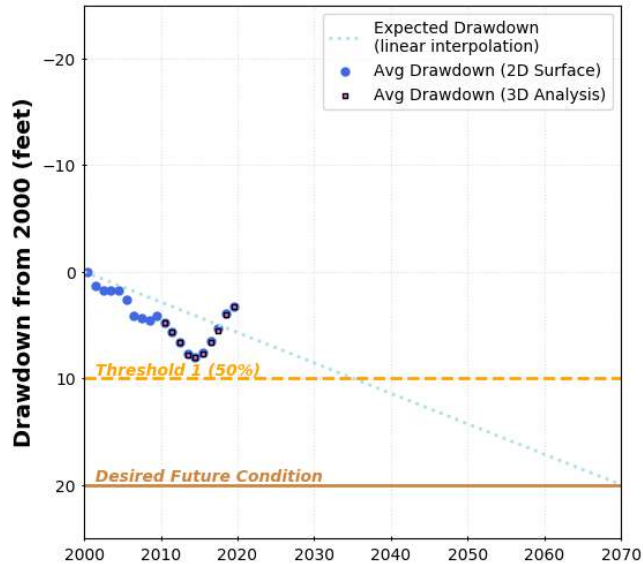


Shallow Carrizo

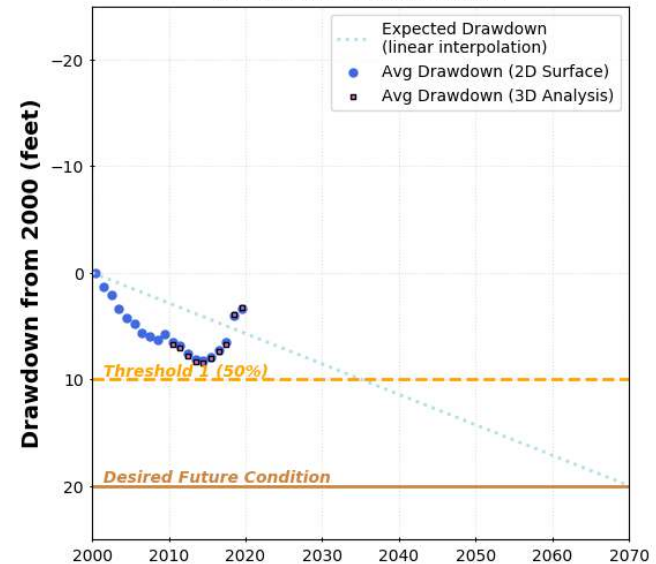


PDL Compliance

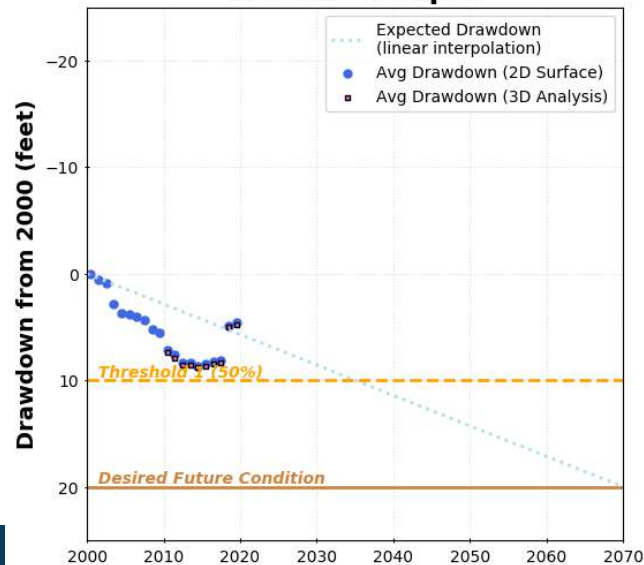
Shallow Calvert Bluff



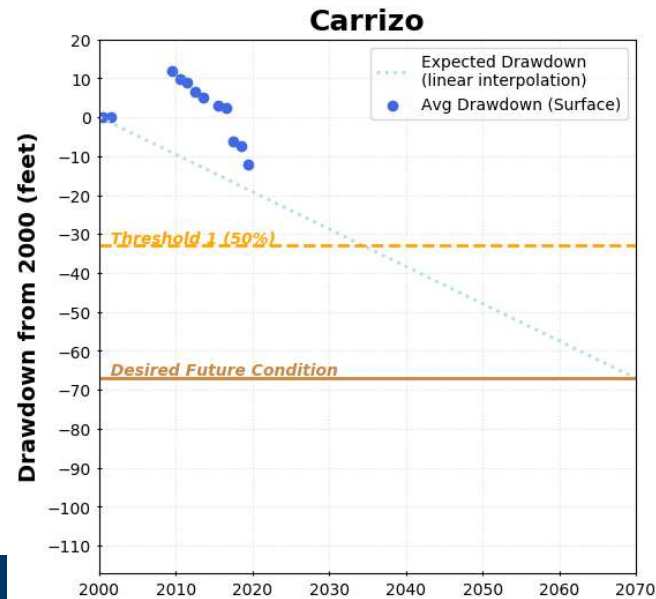
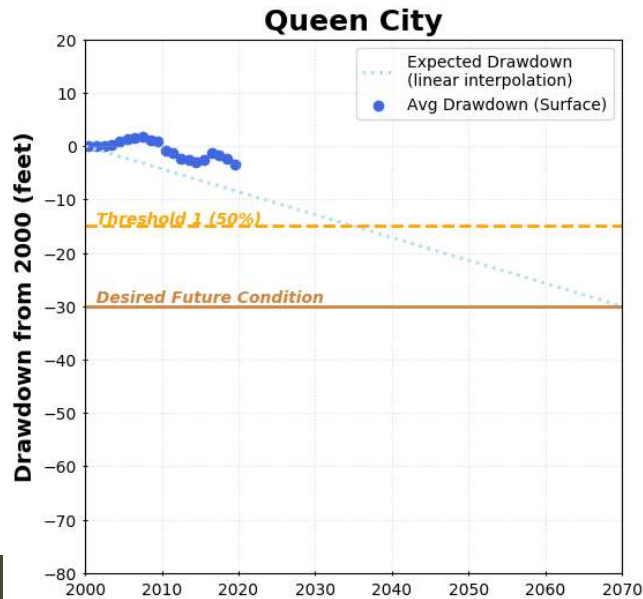
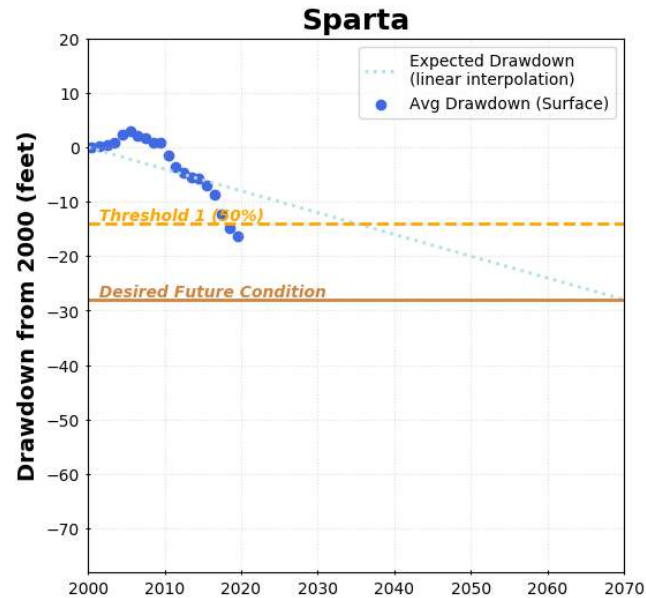
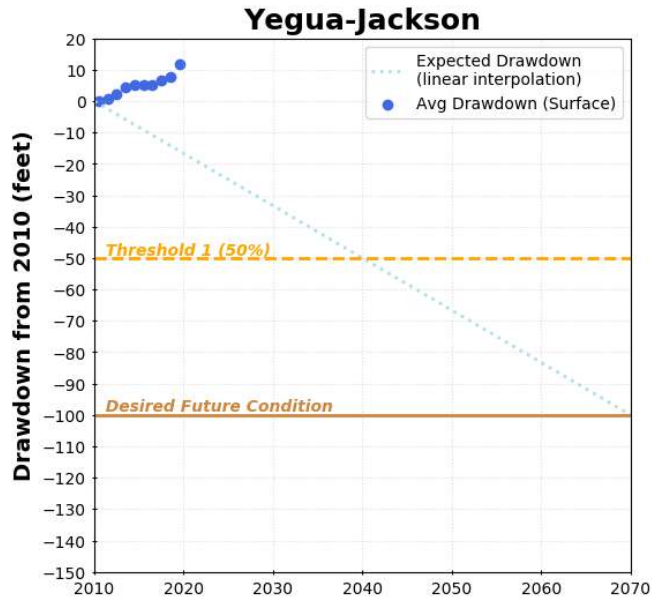
Shallow Simsboro



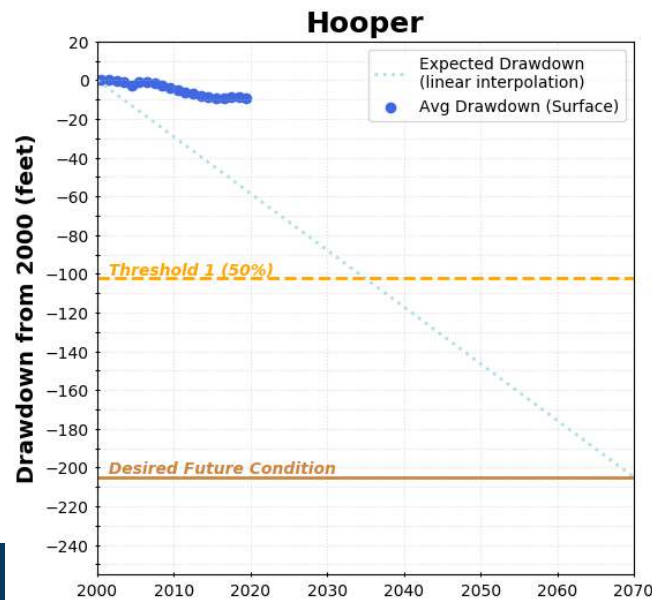
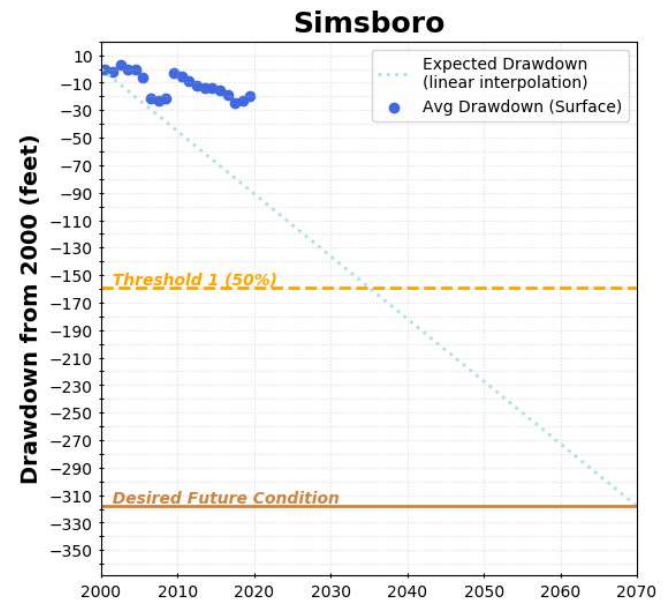
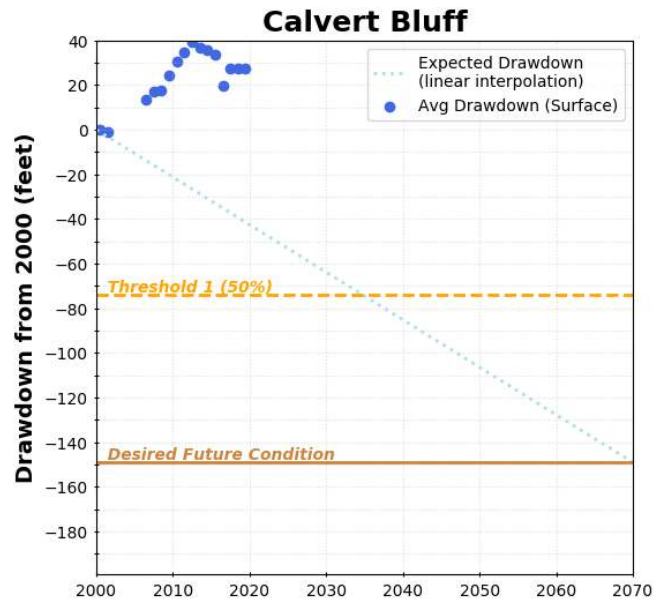
Shallow Hooper



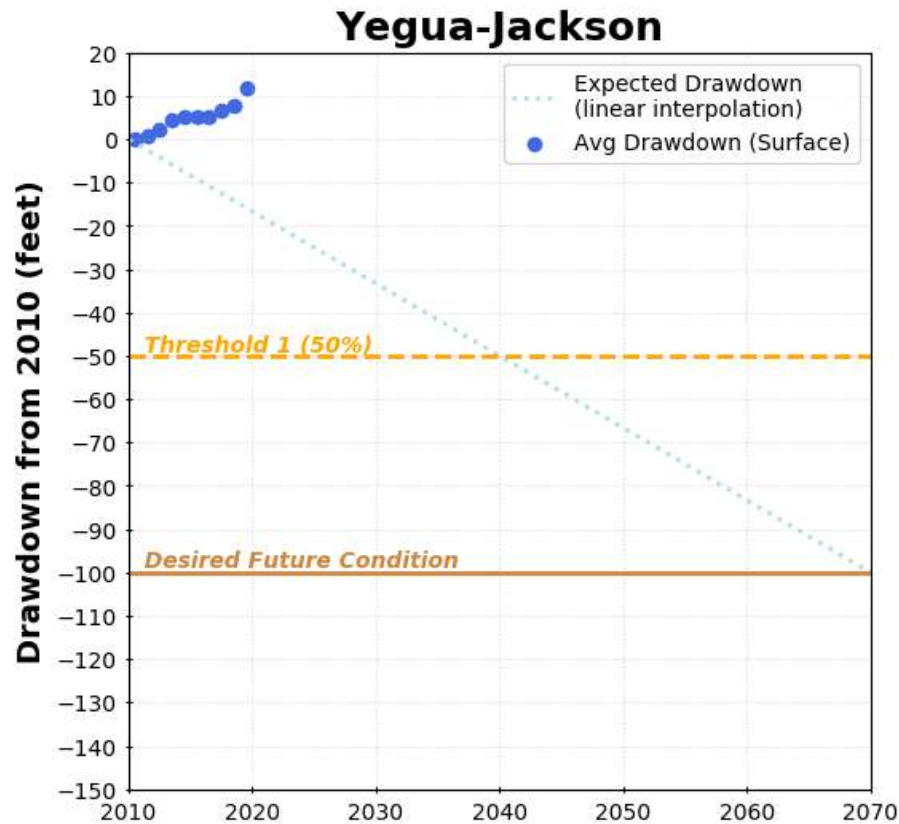
DFC Compliance



DFC Compliance



DFC Compliance



Impact Assessment

- **Completion of Draft GWAP Assessment and Staff Review**
 - Presents predictions from 2018 to 2028 and identifies wells where water levels are predicted to drop below pump levels
 - Analysis identifies seven priority wells that should be closely monitoring over next 10 years
 - Report will be released after District contacts owners of seven priority wells and respond to comments are completed
- **Lessons Learn from GWAP Analysis**
 - Useful analysis, should be included as apart of DFC evaluation process
 - Use of only GMA 12 Future Pumping Scenarios should be evaluated
 - Some pump elevations in POGSCD database are not reliable (additional input from well owners is needed)
 - Because of uncertainty associated with model predictions, additional work on GAMs is needed to improve predictions at local scale and reliability of GWAP Analysis
 - Additional checks should be performed on reported pumping rates

On-going Activities

- Discussions with Vista Ridge to Obtain Monitoring Data
 - Improve predictive accuracy of GAM
 - Improve understanding of the aquifer
- Working Relationship with University of Texas for Interpreting water level data using Geostatistics
 - Evaluate and improve calculations/approach for DFC compliance
 - Evaluate and improve calculations/approach for assessing impacts
- Expanded Monitoring Network
 - Convert oil/gas test wells to monitoring well
 - Additional of wells to monitoring network
 - Additional transducers to monitoring network

On-going Activities

- Increased Frequency of Measurement of Water Levels for Wells in Monitoring Network
- New Program for checking meters used to verify pumping from permitted wells



Questions ?