GMA 12

Preliminary QC/Sparta/C-W Modeling Results and discussion of the Yegua-Jackson and Brazos River Alluvium Aquifers

by

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Draft Results

Model Run S-7 and S-8

- Sparta, Queen City, and Carrizo-Wilcox Aquifers
- All runs- estimated historic pumpage for 2011 to 2018
- S-7- Minor corrections of Run S-2 (anticipated ramp up of pumpage for 2019 to 2070).
- S-8- Last run where modifications to pumpage for each GCD was made to try and meet the current DFCs.

Pumpage

- Details on pumpage assumptions reviewed at last GMA 12 meeting
- Pumping for non-GCD areas did not change for all six simulations

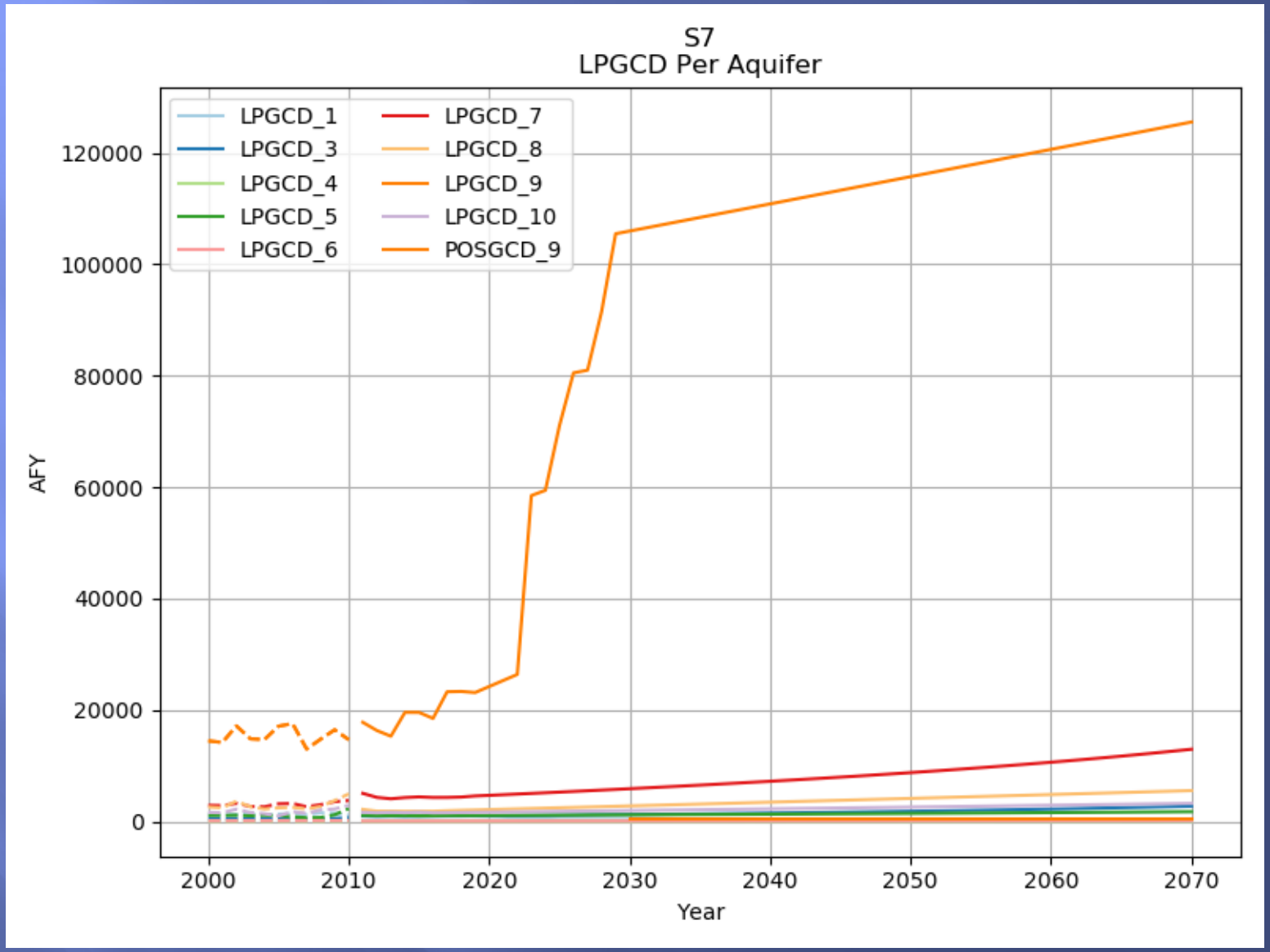
Model Layers- Aquifer

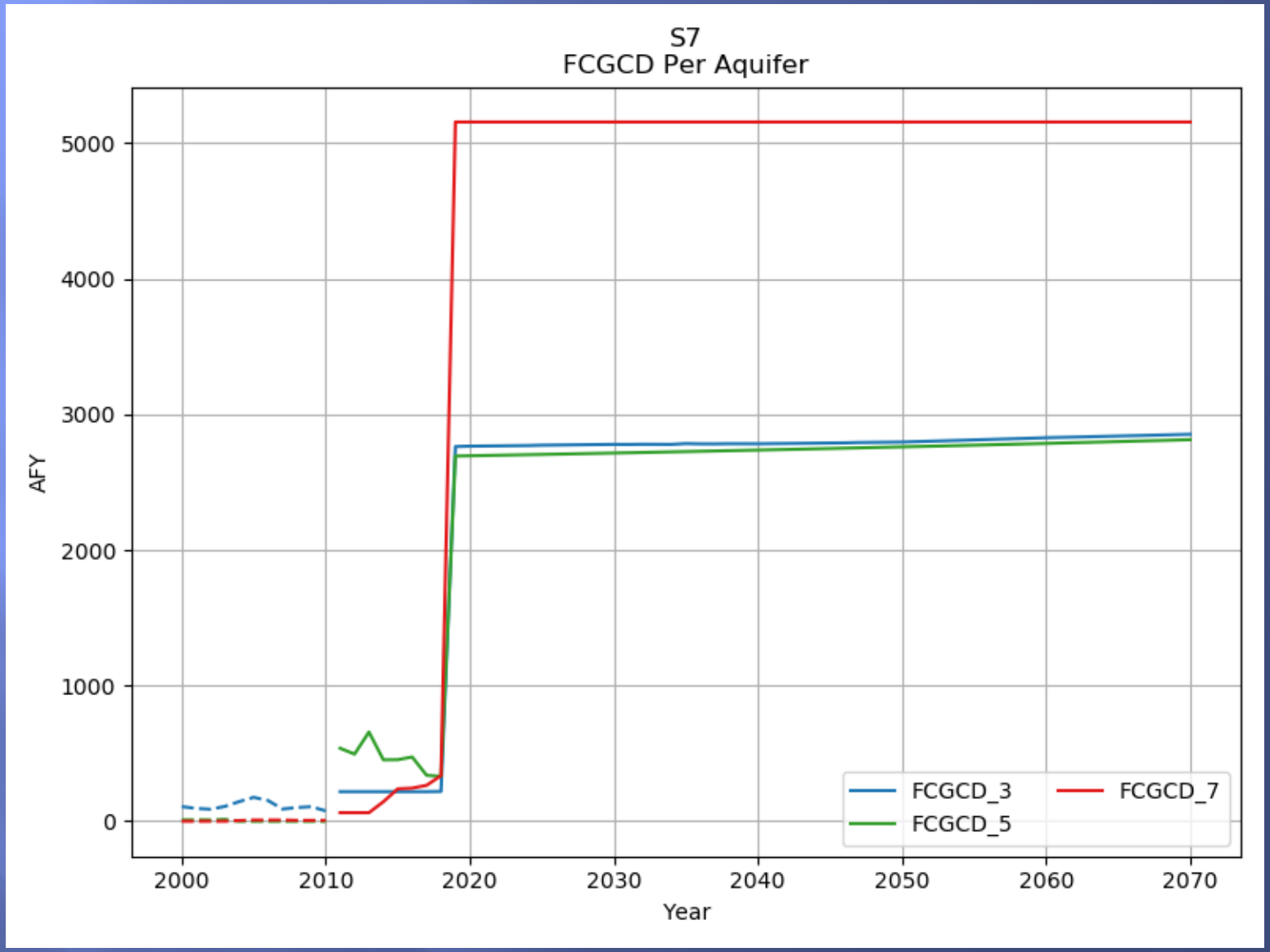
- Layer 1- Colorado and Brazos River Alluvium
- Layer 2- Shallow flow systems
- Layer 3- Sparta Aquifer
- Layer 4- Weches Formation
- Layer 5- Queen City Aquifer
- Layer 6- Reklaw Formation
- Layer 7- Carrizo Aquifer
- Layer 8- Calvert Bluff Aquifer
- Layer 9- Simsboro Aquifer
- Layer 10- Hooper Aquifer

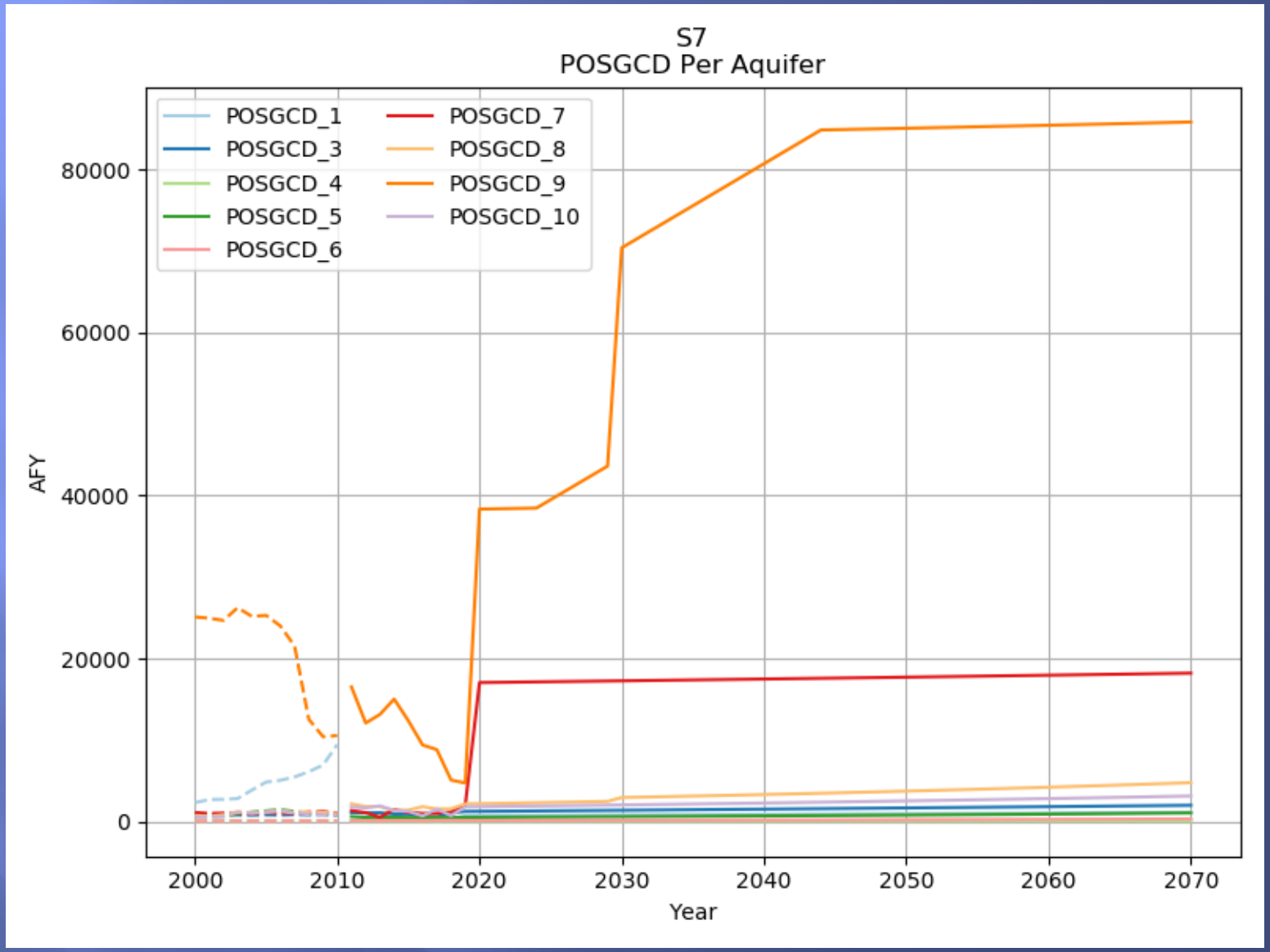
Methods

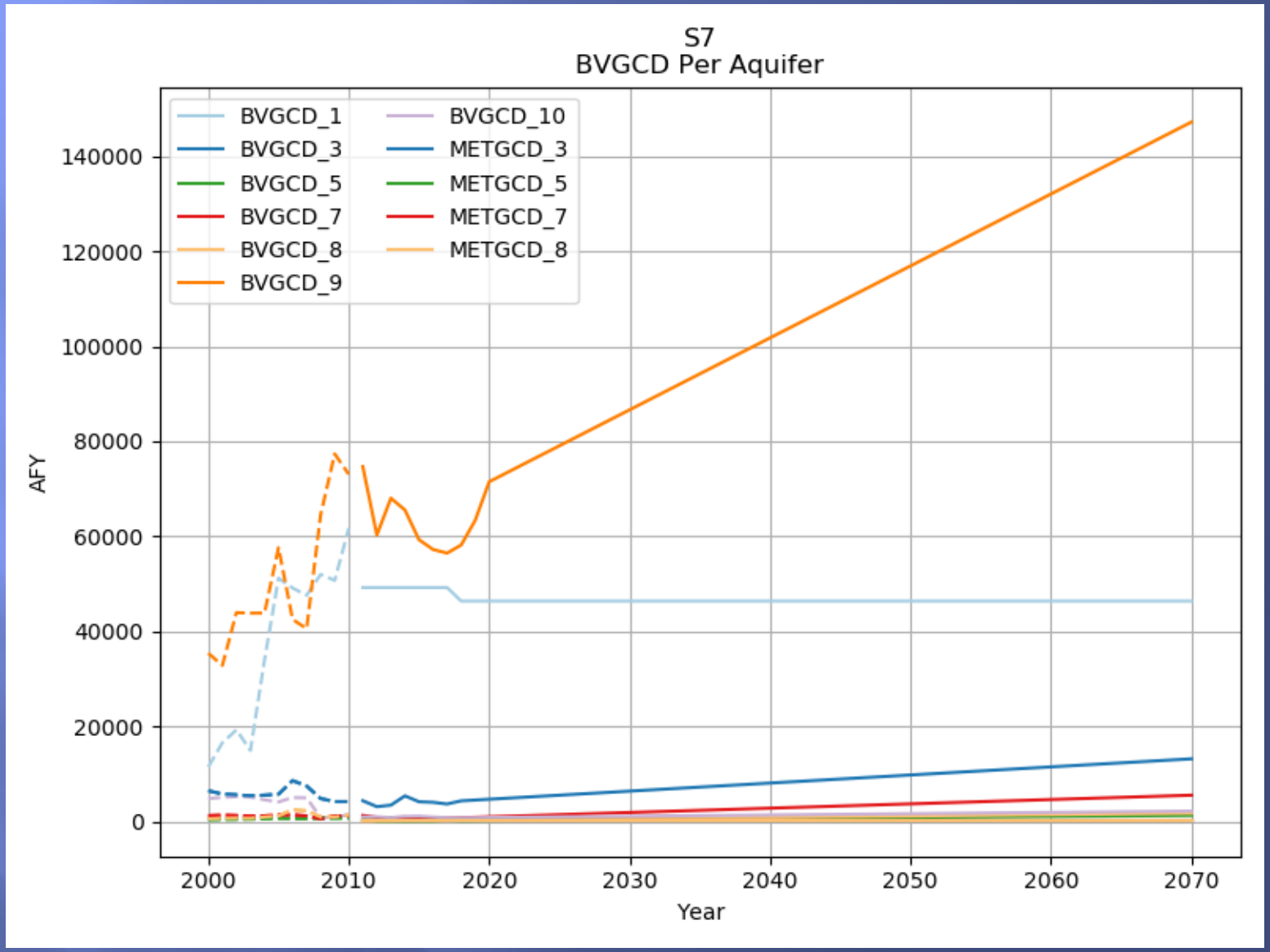
- Drawdown calculations are typically shown from the end of the historic calibration time period (i.e. 2010 for the new GAM)
- Current DFCs are worded so that they start from the end of the historic calibration time period of the previous GAM (i.e. end of 1999/start of 2000).
- Both methods are shown in this presentation
  - anticipate that new DFCs will be set starting in 2010
  - to compare to current DFCs required use of 2000 heads

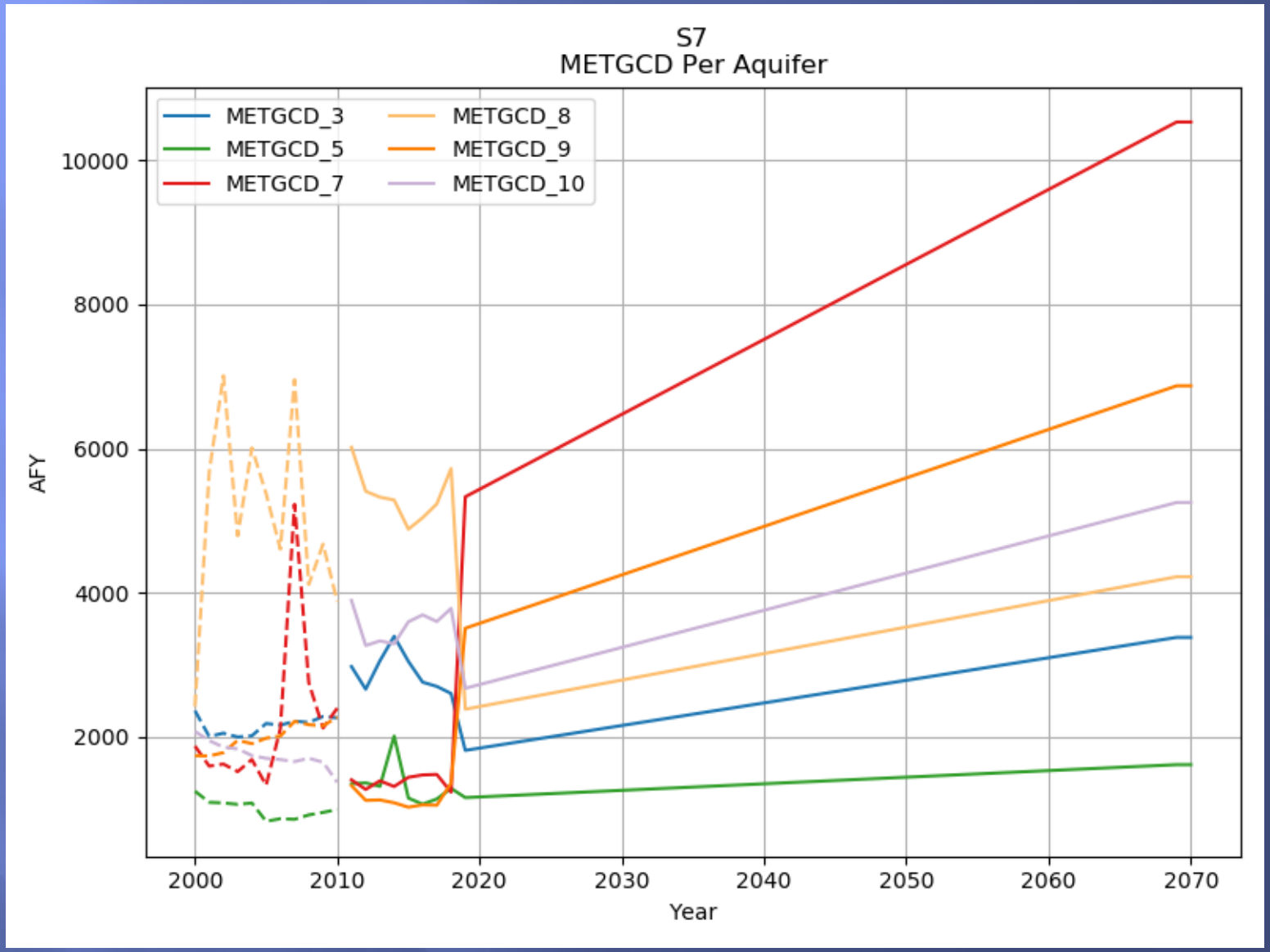
S-7 Pumpage


S7
LPGCD Per Aquifer
LPGCD_1
LPGCD_3
LPGCD_4
LPGCD_5
LPGCD_6
LPGCD_7
LPGCD_8
LPGCD_9
LPGCD_10
POSGCD_9
120000
100000
80000
60000
40000
20000
0
AFY
2000
2010
2020
2030
2040
2050
2060
2070
Year


S7
FCGCD Per Aquifer
AFY
5000
4000
3000
2000
1000
0
2000
2010
2020
2030
2040
2050
2060
2070
Year
FCGCD_3
FCGCD_7
FCGCD_5


S7
POSGCD Per Aquifer
POSGCD_1
POSGCD_3
POSGCD_4
POSGCD_5
POSGCD_6
POSGCD_7
POSGCD_8
POSGCD_9
POSGCD_10
AFY
80000
60000
40000
20000
0
2000
2010
2020
2030
2040
2050
2060
2070
Year


S7
BVGCD Per Aquifer
BVGCD_1
BVGCD_3
BVGCD_5
BVGCD_7
BVGCD_8
BVGCD_9
BVGCD_10
METGCD_3
METGCD_5
METGCD_7
METGCD_8
AFY
0
20000
40000
60000
80000
100000
120000
140000
2000
2010
2020
2030
2040
2050
2060
2070
Year


S7
METGCD Per Aquifer
METGCD_3
METGCD_5
METGCD_7
METGCD_8
METGCD_9
METGCD_10
AFY
10000
8000
6000
4000
2000
2000
2010
2020
2030
2040
2050
2060
2070
Year

S-7 Drawdowns

(2010 to 2070)

Lost Pines

	Current DFC (feet)	Current MAG in 2070	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Pumpage in 2070 (acre-feet)
Sparta	5	2,393	20	2,766
Queen City	15	1,315	26	1,774
Carrizo	62	12,052	140	12,981
Calvert Bluff	100	3,984	162	5,563
Simsboro	240	30,303	334	125,958
Hooper	165	1,255	183	3,273

Fayette

	Current DFC (feet)	Current MAG in 2070	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Pumpage in 2070 (acre-feet)
Sparta	47	2,802	40	2,853
Queen City	64	2,708	66	2,813
Carrizo	110	5,474	125	5,155
Calvert Bluff	--	--	--	--
Simsboro	--	--	--	--
Hooper	--	--	--	--

Post Oak Savannah

	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

Brazos Valley

	Current DFC (feet)	Current MAG in 2070	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Pumpage in 2070 (acre-feet)
Sparta	12	9,019	47	13,161
Queen City	12	1,200	41	1,269
Carrizo	61	5,494	77	5,498
Calvert Bluff	125	1,757	97	1,726
Simsboro	295	96,198	214	147,235
Hooper	207	2,000	153	2,139

Mid-East Texas

	Current DFC (feet)	Current MAG in 2070	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Pumpage in 2070 (acre-feet)
Sparta	5	3,343	25	3,381
Queen City	2	974	21	1,616
Carrizo	80	11,090	49	10,528
Calvert Bluff	90	3,915	60	4,222
Simsboro	138	7,173	82	6,870
Hooper	125	5,501	74	5,251

S-7 Drawdowns

(end of 1999 to end of 2069)

Lost Pines

	Current DFC (feet)	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Drawdown from 1999 to 2069 (feet)
Sparta	5	20	25
Queen City	15	26	30
Carrizo	62	140	147
Calvert Bluff	100	162	170
Simsboro	240	334	346
Hooper	165	183	193

Fayette

	Current DFC (feet)	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Drawdown from 1999 to 2069 (feet)
Sparta	47	40	52
Queen City	64	66	75
Carrizo	110	125	136
Calvert Bluff	--	--	--
Simsboro	--	--	--
Hooper	--	--	--

Post Oak Savannah

	Current DFC (feet)	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Drawdown from 1999 to 2069 (feet)
Sparta	28	17	21
Queen City	30	19	21
Carrizo	67	177	184
Calvert Bluff	149	183	196
Simsboro	318	355	384
Hooper	205	222	239

Brazos Valley

	Current DFC (feet)	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Drawdown from 1999 to 2069 (feet)
Sparta	12	47	50
Queen City	12	41	43
Carrizo	61	77	84
Calvert Bluff	125	97	112
Simsboro	295	214	257
Hooper	207	153	176

Mid-East Texas

	Current DFC (feet)	S-7 Drawdown from 2010 to 2070 (feet)	S-7 Drawdown from 1999 to 2069 (feet)
Sparta	5	25	31
Queen City	2	21	25
Carrizo	80	49	53
Calvert Bluff	90	60	64
Simsboro	138	82	89
Hooper	125	74	79

Run S-8

- Adjusted pumpage in the well file S-7 GCD-by-GCD for each aquifer
- All stress periods for 2019 to 2070 adjusted equally
- Started with Simsboro, moved to Carrizo, then Calvert Bluff, then Hooper, then Queen City, and finally the Sparta
- Final results were labeled “S-8” and are presented here

Factors Used

	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
BVGCS	0.25	0	0.6	10	1.27	8
FCGCD	1	1	2	1	1	1
LPGCD	0	0	0	0	0.67	15
METGCD	0	0	3.5	0	7	5
POSGCD	2	15	0	6	0.52	1

Draft Results

S-8 Drawdowns
Draft Results

(end of 1999 to end of 2069)

Lost Pines

	Current DFC (feet)	Current MAG in 2070	S-8 Drawdown from 1999 to 2069 (feet)	S-8 Pumpage in 2070 (acre-feet)
Sparta	5	2,393	18	0
Queen City	15	1,315	20	0
Carrizo	62	12,052	71	0
Calvert Bluff	100	3,984	107	0
Simsboro	240	30,303	241	84,391
Hooper	165	1,255	164	49,100

Draft Results

Fayette

	Current DFC (feet)	Current MAG in 2070	S-8 Drawdown from 1999 to 2069 (feet)	S-8 Pumpage in 2070 (acre-feet)
Sparta	47	2,802	47	2,853
Queen City	64	2,708	65	2,813
Carrizo	110	5,474	112	10,310
Calvert Bluff	--	--	--	--
Simsboro	--	--	--	--
Hooper	--	--	--	--

Draft Results

Post Oak Savannah

	Current DFC (feet)	Current MAG in 2070	S-8 Drawdown from 1999 to 2069 (feet)	S-8 Pumpage in 2070 (acre-feet)
Sparta	28	6,735	30	3,966
Queen City	30	504	30	15,675
Carrizo	67	7,058	81	0
Calvert Bluff	149	1,036	149	28,565
Simsboro	318	48,503	319	44,645
Hooper	205	4,422	204	3,126

Draft Results

Brazos Valley

	Current DFC (feet)	Current MAG in 2070	S-8 Drawdown from 1999 to 2069 (feet)	S-8 Pumpage in 2070 (acre-feet)
Sparta	12	9,019	13	3,290
Queen City	12	1,200	16	0
Carrizo	61	5,494	62	3,299
Calvert Bluff	125	1,757	128	17,261
Simsboro	295	96,198	295	186,988
Hooper	207	2,000	207	17,110

Mid-East Texas

	Current DFC (feet)	Current MAG in 2070	S-8 Drawdown from 1999 to 2069 (feet)	S-8 Pumpage in 2070 (acre-feet)
Sparta	5	3,343	19	0
Queen City	2	974	22	0
Carrizo	80	11,090	80	36,848
Calvert Bluff	90	3,915	94	0
Simsboro	138	7,173	139	48,087
Hooper	125	5,501	126	26,257

Draft Results

Factors Used

	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
BVGCS	0.25	0	0.6	10	1.27	8
FCGCD	1	1	2	1	1	1
LPGCD	0	0	0	0	0.67	15
METGCD	0	0	3.5	0	7	5
POSGCD	2	15	0	6	0.52	1

Draft Results

Carrizo-Wilcox Summary

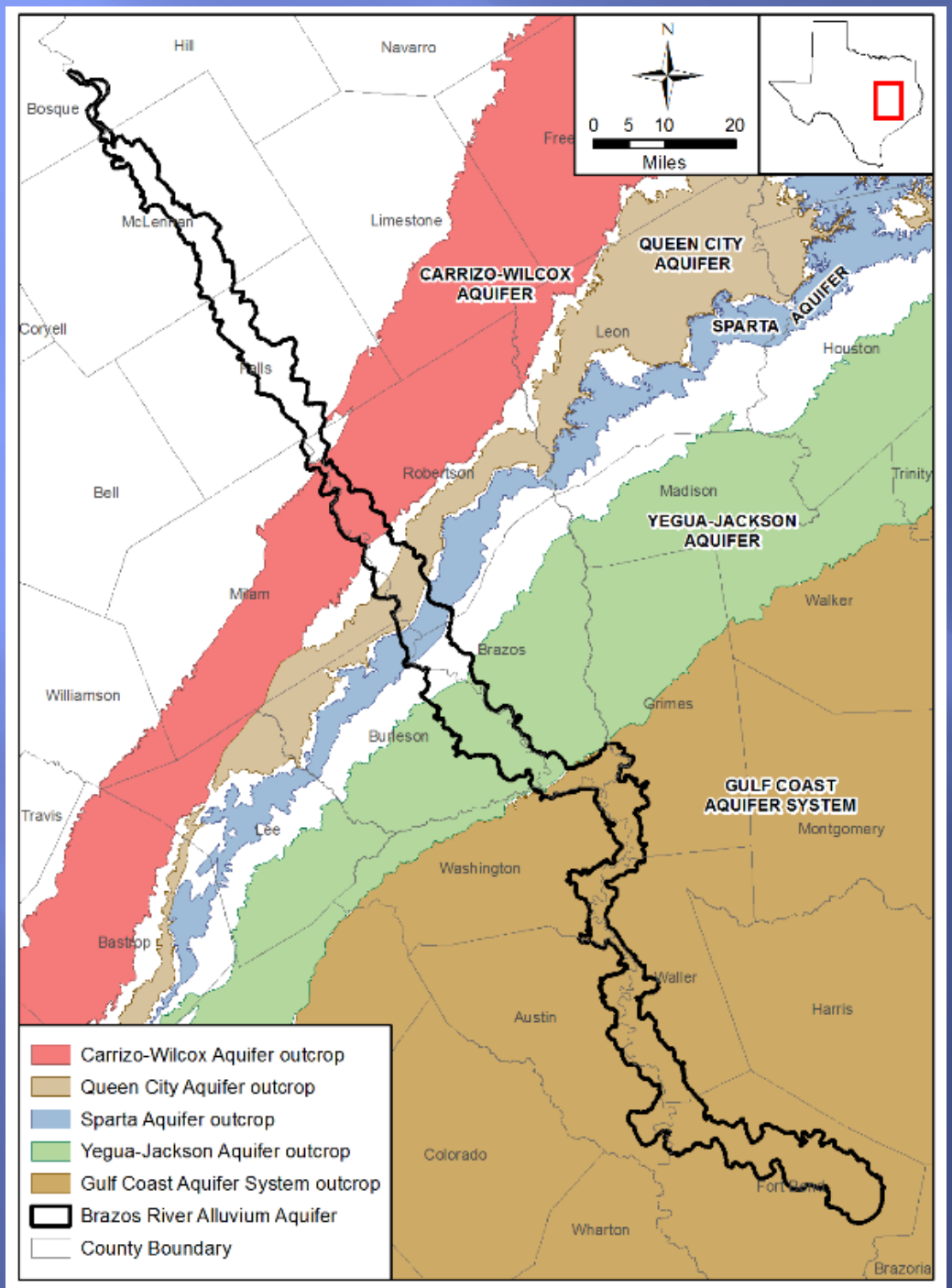
- Difference in drawdowns for 1999 to 2069 compared to 2010 to 2070 varies from GCD to GCD
- Can come close to matching most of the current DFCs with extreme adjustments to pumpage.
- Even with zero pumpage, some DFCs can not be reduced sufficiently to meet the current DFCs

Brazos River Alluvium

Development of DFCs

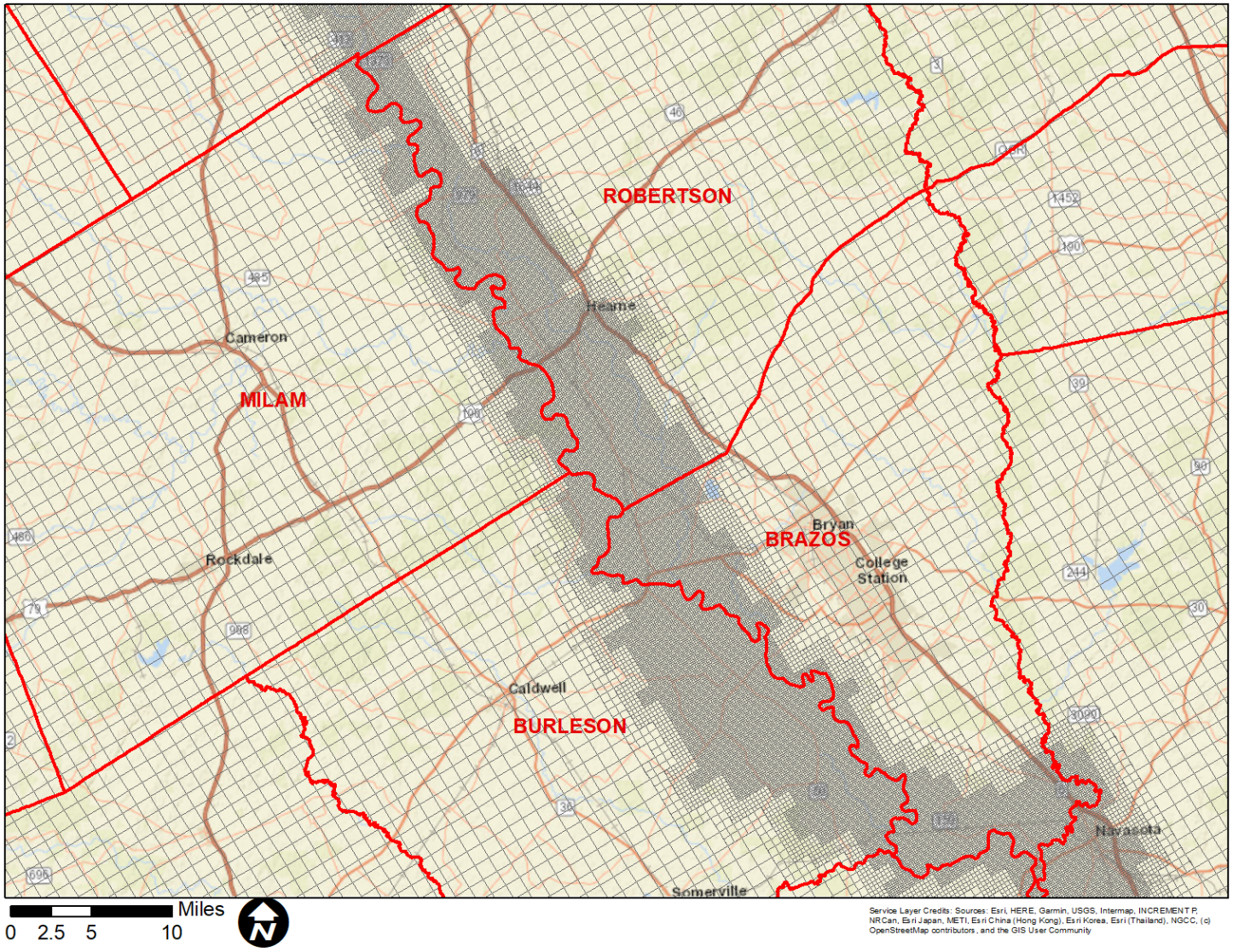
- Use the Brazos River Alluvium Aquifer GAM completed in 2016, the same GAM used to develop MAGS in the GMA 12 2016 planning cycle
- Develop distribution of pumping consistent with areas of irrigated agriculture in Milam, Burleson, Robertson and Brazos counties
- Consider pumping history in the counties and past effects of pumping when developing future DFCs

Extent of Brazos River Alluvium Model



From: Final Numerical Model Report for the Brazos River Alluvium Aquifer Groundwater Availability Model, August 2016

Model Grid for the BRAA GAM



Development of DFCs (cont.)

- Also, review distribution of pumping used in the GAM in 2016 cycle of planning and adjust as appropriate
- Pumping from the Brazos River Alluvium aquifer in areas outside Milam, Burleson, Robertson and Brazos counties will remain the same through the modeling period
- DFCs to be expressed as an average feet of drawdown or average percent of saturation

Next Steps

- Carrizo-Wilcox- Finalize drawdown calculation methodology
- Carrizo-Wilcox- Discussion on approaches to use to create feasible DFCs
- Brazos River Alluvium- Initiate development of WEL files, perform simulations and provide initial results at the next GMA 12 meeting

Questions???