Status Report on Modeling Results for the Sparta, Queen City, and Carrizo-Wilcox Aquifers Scenarios S-1, S-2 and S-3

Presented to

BVGCD Board of Directors

By Ground Water Consultants, LLC

August 8, 2019

GMA12 Simulations Descriptions

- All initial runs include estimated historic pumping for 2011 to 2018
- S-1- Full permitted pumping for 2020 to 2070. *Half of total permitted pumping increase added in 2019.*
- S-2- Anticipated ramp up of pumping for 2019 to 2070. 2070 pumping either the total permitted or estimated total demand based on demand projections.

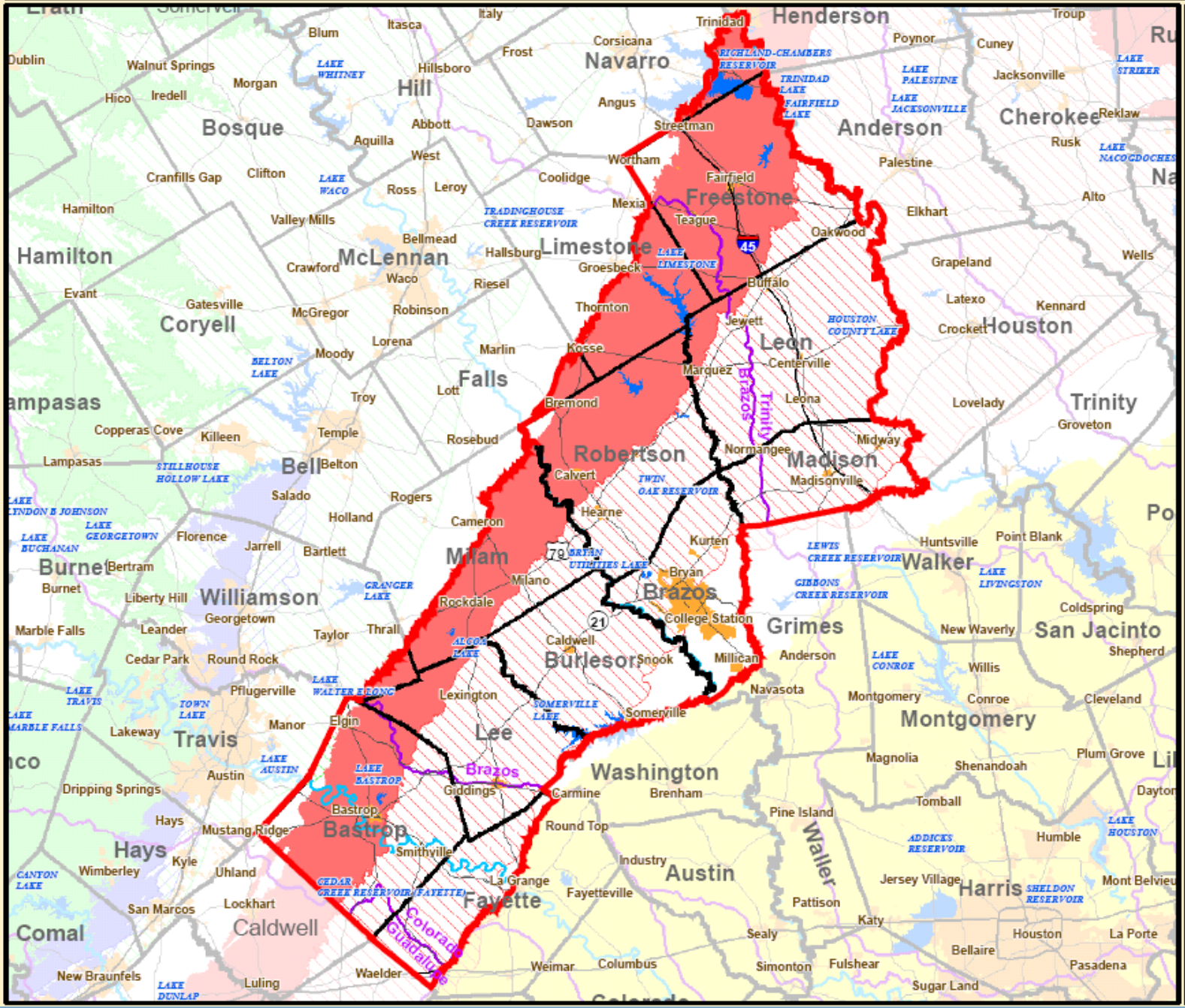
GMA 12 Simulations Descriptions (cont.)

- S-3- Same as S-2 except only increasing pumping to half of total permitted amount in 2070 or to current MAG
- S-4 to S-6- The same as S-1 to S-3 except with reduced recharge:
  - Recharge for 2026 to 2030 is 75 percent of average
  - Recharge for 2051 to 2060 is 75 percent of average
  - Recharge for rest of predictive simulation is average recharge included in the updated model

Pumping Assumptions

- Details on pumping assumptions reviewed at GMA 12 meeting in May
- Some review and minor adjustments of pumping in initial runs will be needed before proceeding with developing DFC runs.
- Pumping for non-GCD areas did not change for all six simulations

Groundwater Management Area #12



MAP LEGEND

- GMA #12
- River
- River Basin
- Reservoir
- Cities
- Counties

Major Aquifers

- Cenozoic Pecos Alluvium
- Seymour
- Gulf Coast
- Carrizo - Wilcox (outcrop)
- Carrizo - Wilcox (downdip)
- Hueco - Mesilla Bolson
- Ogallala
- Edwards - Trinity Plateau (outcrop)
- Edwards - Trinity Plateau (downdip)
- Edwards BFZ (outcrop)
- Edwards BFZ (downdip)
- Trinity (outcrop)
- Trinity (downdip)

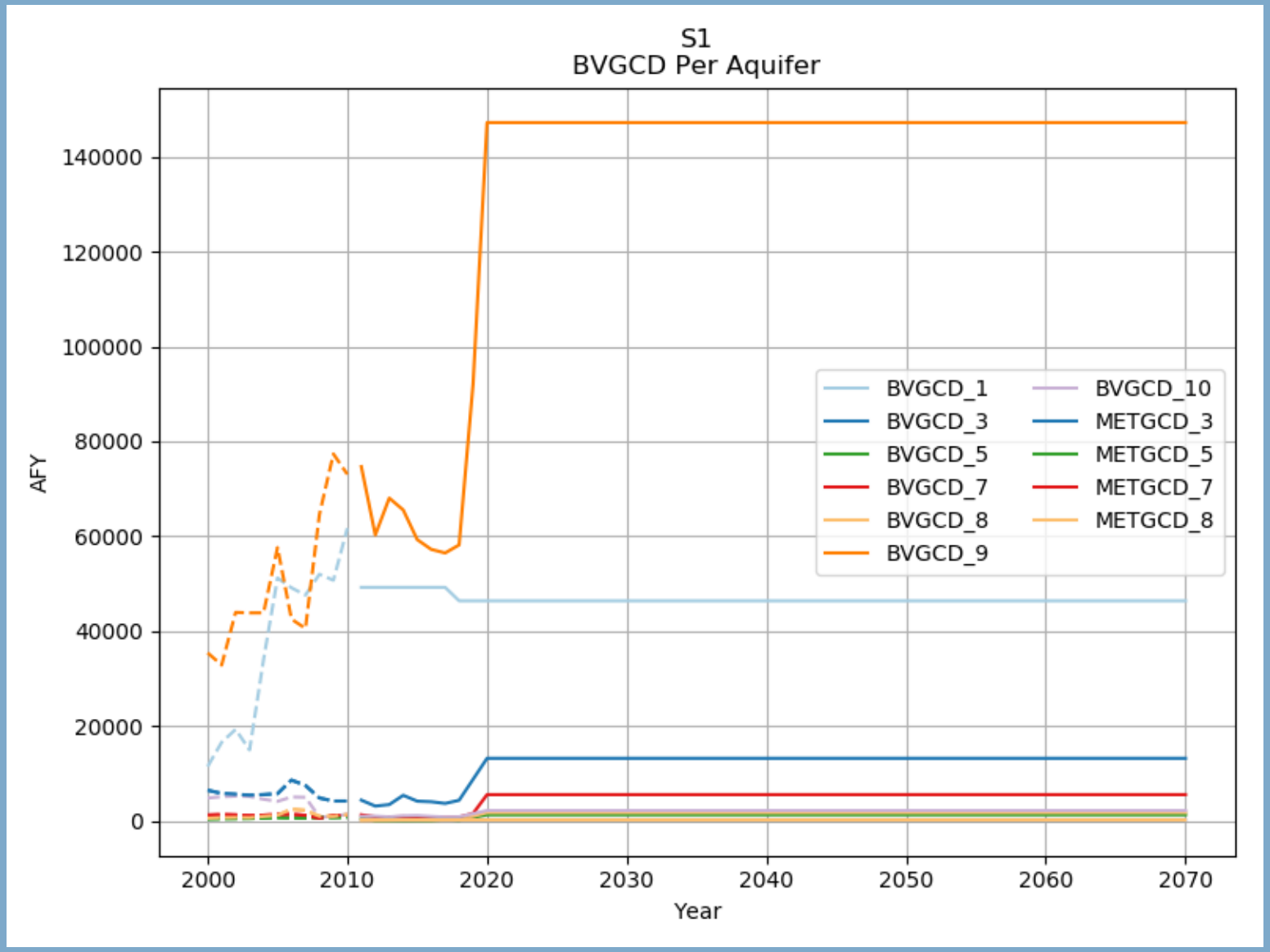
Map prepared by Mark Hayes
Texas Water Development Board
GIS Section
12/21/2005

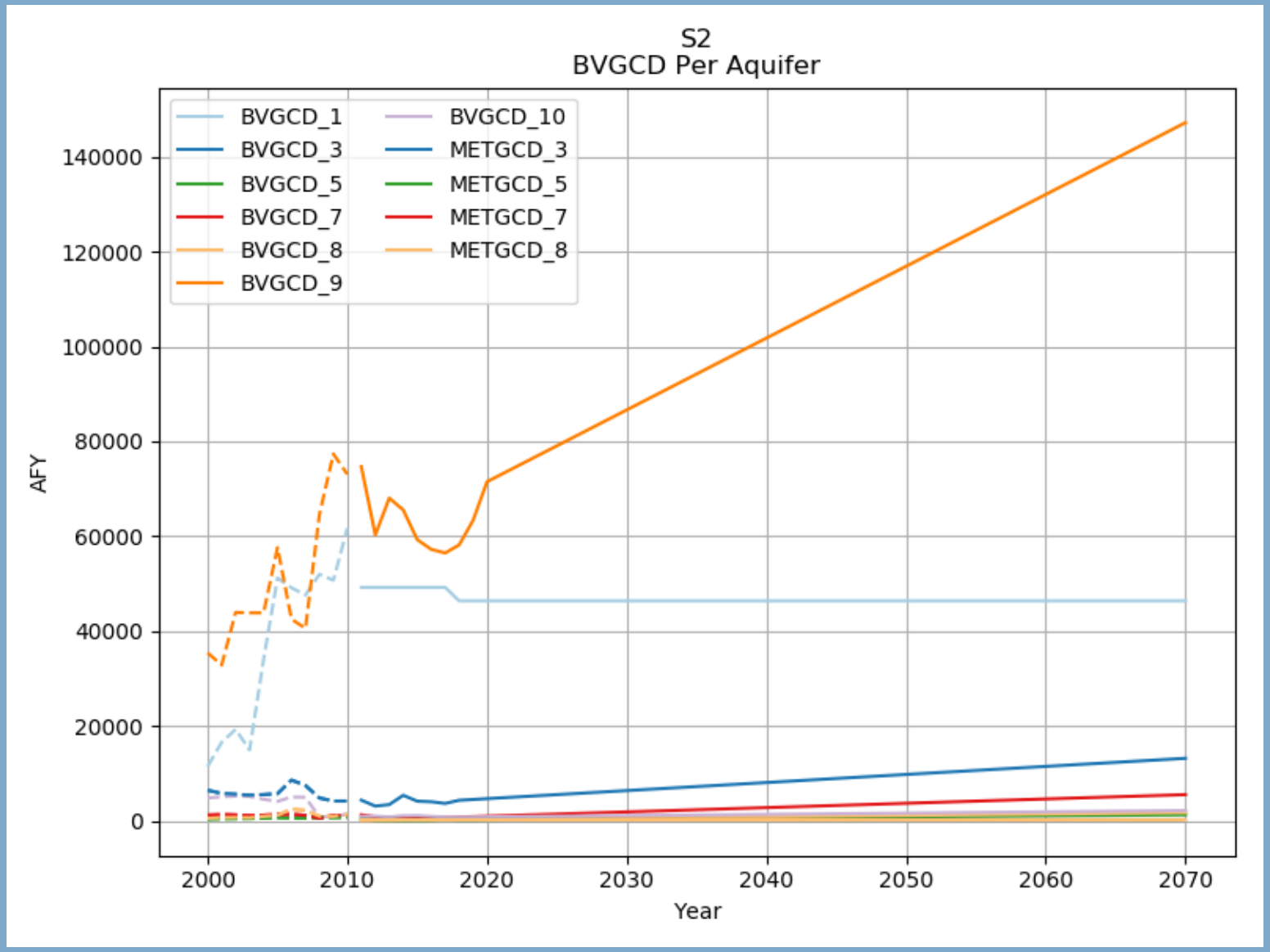
0 7 14 21 28 Miles

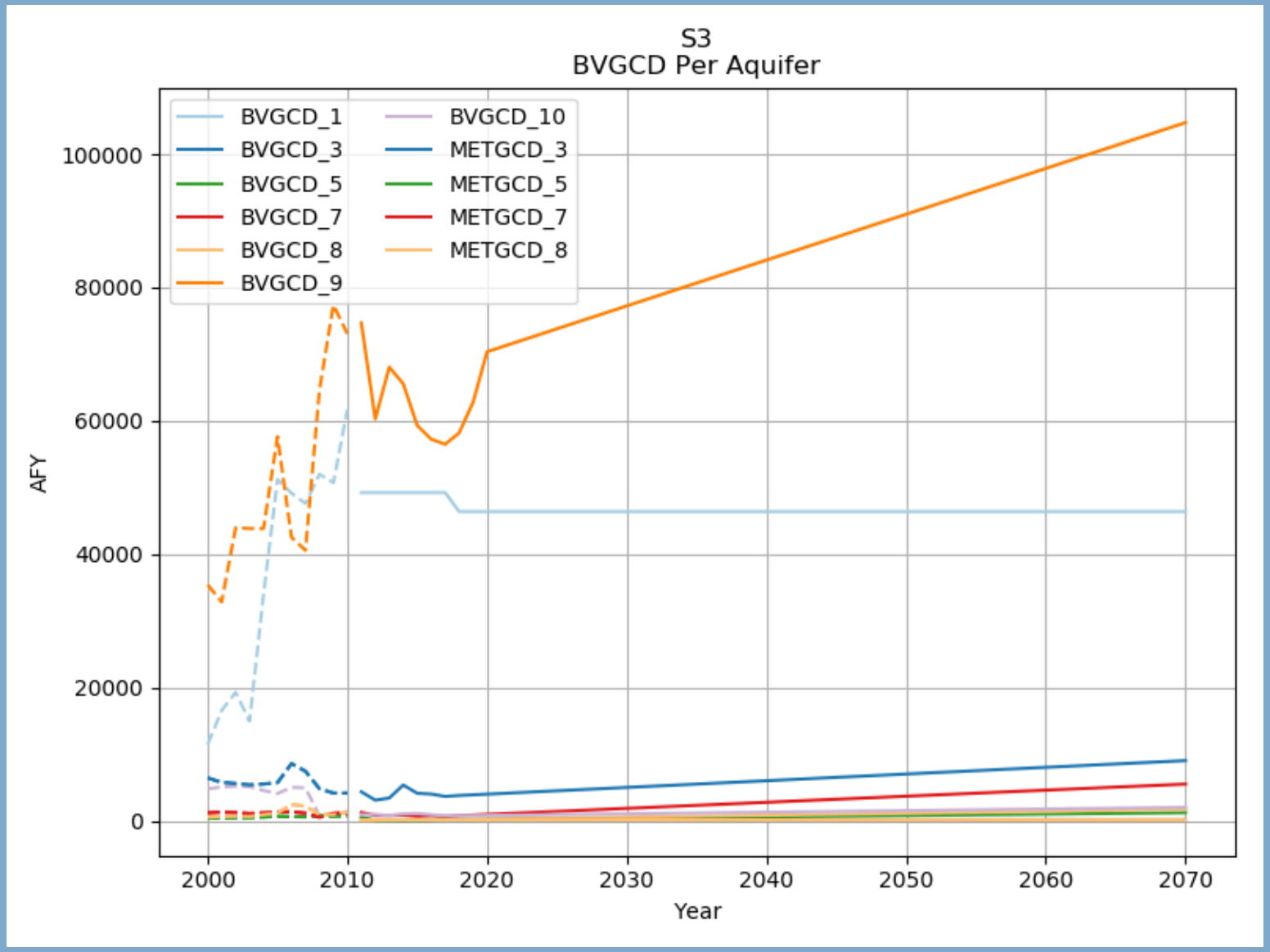
1 inch equals 26 miles

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


S1
BVGCD Per Aquifer
AFY
Year
0
20000
40000
60000
80000
100000
120000
140000
2000
2010
2020
2030
2040
2050
2060
2070
BVGCD_1
BVGCD_3
BVGCD_5
BVGCD_7
BVGCD_8
BVGCD_9
BVGCD_10
METGCD_3
METGCD_5
METGCD_7
METGCD_8


S2
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
140000
120000
100000
80000
60000
40000
20000
0
2000
2010
2020
2030
2040
2050
2060
2070
Year

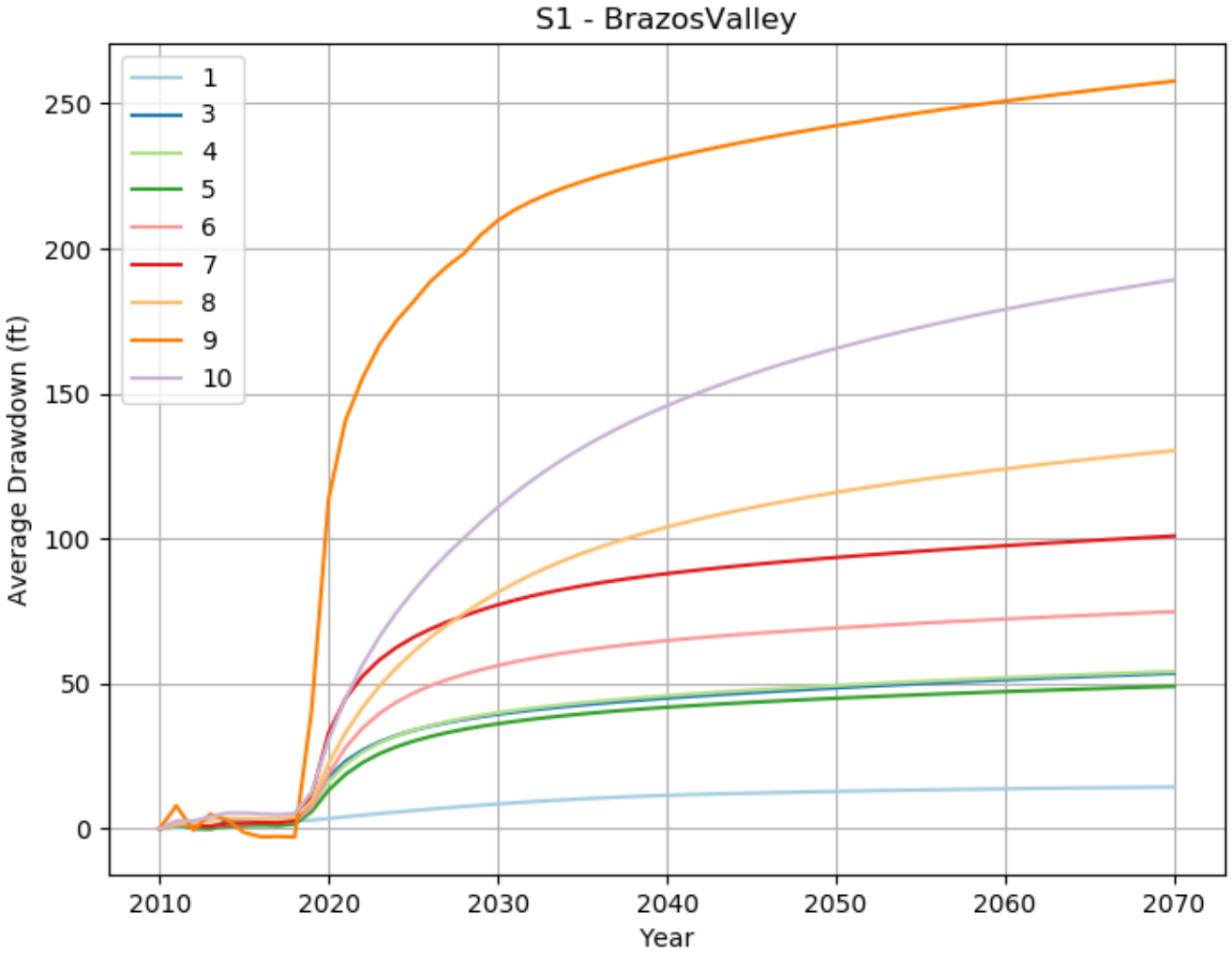

S3
BVGCD Per Aquifer
BVGCD_1
BVGCD_3
BVGCD_5
BVGCD_7
BVGCD_8
BVGCD_9
BVGCD_10
METGCD_3
METGCD_5
METGCD_7
METGCD_8
AFY
100000
80000
60000
40000
20000
0
2000
2010
2020
2030
2040
2050
2060
2070
Year

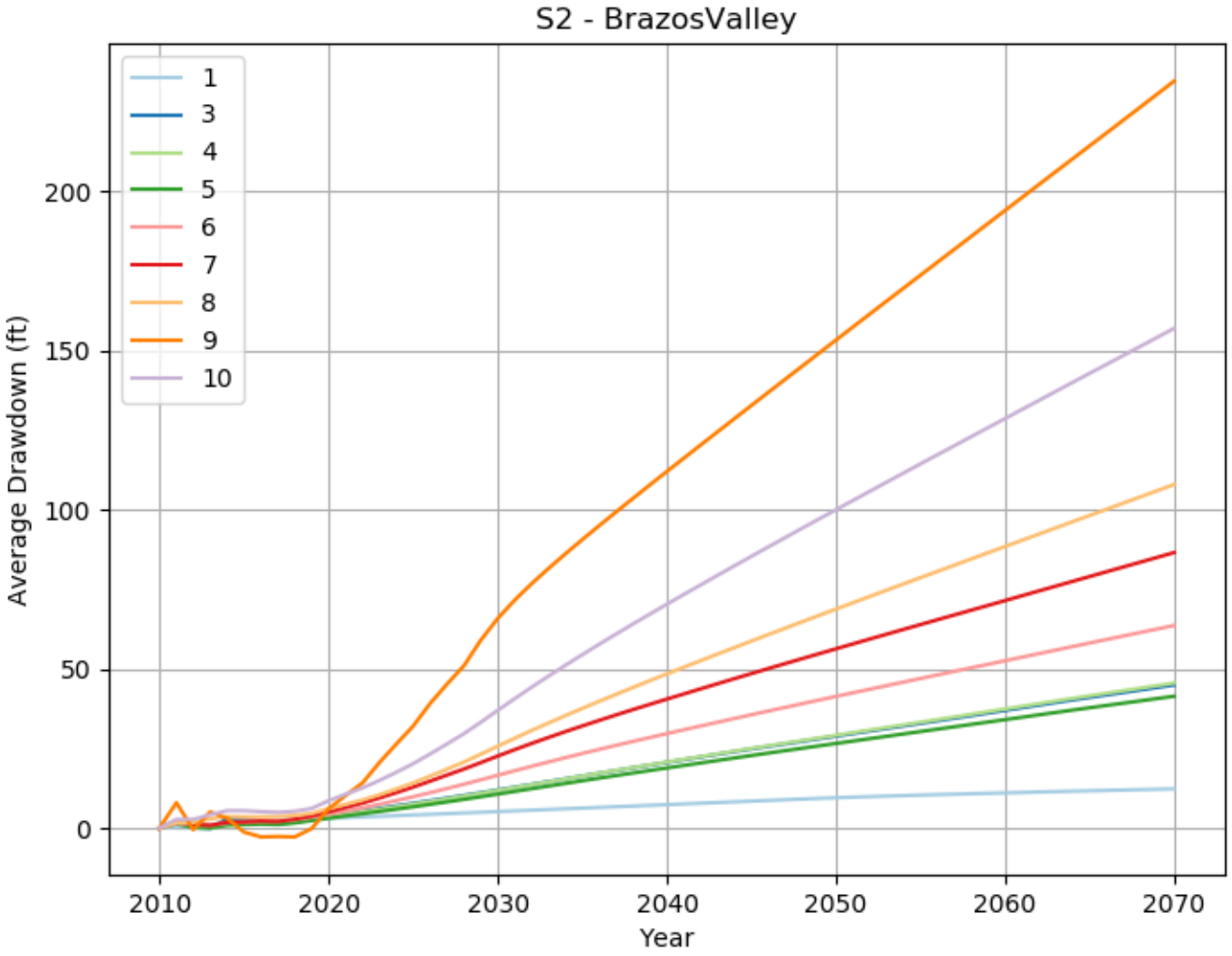
Results Show Minimal Impacts of Reduced Recharge

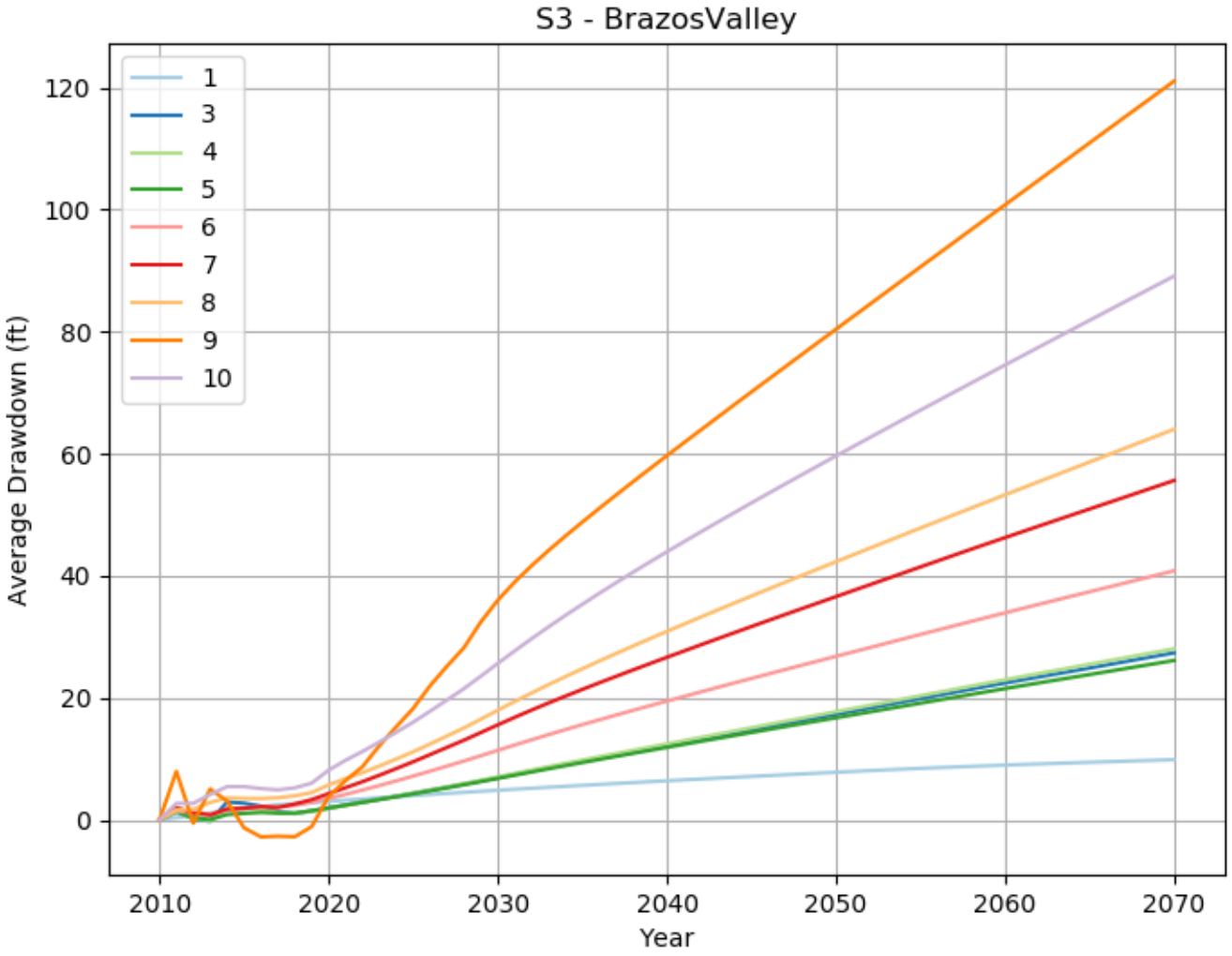
	S-1 Drawdown (feet)		S-2 Drawdown (feet)		S-3 Drawdown (feet)	
	Without Drought	With Drought	Without Drought	With Drought	Without Drought	With Drought
Sparta	27	28	15	16	11	12
Queen City	34	35	20	21	14	16
Carrizo	166	167	126	127	73	74
Calvert Bluff	180	181	148	149	81	82
Simsboro	349	350	317	317	161	162
Hooper	196	197	167	168	88	89

Lost Pines GCD Results

Drawdowns from Runs S-1, S-2, and S-3


S1 - BrazosValley
Average Drawdown (ft)
Year
0
50
100
150
200
250
2010
2020
2030
2040
2050
2060
2070
1
3
4
5
6
7
8
9
10


S2 - BrazosValley
1
3
4
5
6
7
8
9
10
Average Drawdown (ft)
0
50
100
150
200
2010
2020
2030
2040
2050
2060
2070
Year


S3 - BrazosValley
Average Drawdown (ft)
Year
0
20
40
60
80
100
120
2010
2020
2030
2040
2050
2060
2070
1
3
4
5
6
7
8
9
10

Brazos Valley - S-1

	Current DFC (feet)	Current MAG in 2070	S-1 Drawdown in 2070 (feet)	S-1 Pumpage in 2070 (acre-feet)
Sparta	12	9,019	54	13,161
Queen City	12	1,200	49	1,269
Carrizo	61	5,494	101	5,498
Calvert Bluff	125	1,757	130	1,726
Simsboro	295	96,198	258	147,235
Hooper	207	2,000	189	2,139

Brazos Valley - S-2

	Current DFC (feet)	Current MAG in 2070	S-2 Drawdown in 2070 (feet)	S-2 Pumpage in 2070 (acre-feet)
Sparta	12	9,019	45	13,161
Queen City	12	1,200	41	1,269
Carrizo	61	5,494	87	5,498
Calvert Bluff	125	1,757	108	1,726
Simsboro	295	96,198	235	147,235
Hooper	207	2,000	157	2,139

Brazos Valley - S-3

	Current DFC (feet)	Current MAG in 2070	S-3 Drawdown in 2070 (feet)	S-3 Pumpage in 2070 (acre-feet)
Sparta	12	9,019	27	9,019
Queen City	12	1,200	26	1,215
Carrizo	61	5,494	56	5,498
Calvert Bluff	125	1,757	64	1,726
Simsboro	295	96,198	121	104,714
Hooper	207	2,000	89	2,000

Summary of Average Drawdowns

GCD	Sparta				Queen City				Carrizo			
	DFC	S-1	S-2	S-3	DFC	S-1	S-2	S-3	DFC	S-1	S-2	S-3
Brazos Valley	***12***	54	45	27	***12***	49	41	26	***61***	101	87	56
Fayette County	***47***	30	20	16	***64***	57	38	28	***110***	141	96	63
Lost Pines	***5***	27	15	11	***15***	34	20	14	***62***	166	126	73
Mid-East Texas	***5***	34	31	20	***2***	26	23	16	***80***	47	42	31
Post Oak Savannah	***28***	28	23	10	***30***	26	21	11	***67***	201	172	99

GCD	Calvert Bluff				Simsboro				Hooper			
	DFC	S-1	S-2	S-3	DFC	S-1	S-2	S-3	DFC	S-1	S-2	S-3
Brazos Valley	***125***	130	108	64	***295***	258	235	121	***207***	189	157	89
Fayette County	*--*	*--*	*--*	*--*	*--*	*--*	*--*	*--*	*--*	*--*	*--*	*--*
Lost Pines	***100***	180	148	81	***240***	349	317	161	***165***	196	167	88
Mid-East Texas	***90***	61	54	39	***138***	81	74	48	***125***	77	66	46
Post Oak Savannah	***149***	211	176	98	***318***	376	342	170	***205***	247	207	110

Summary

- Inclusion of drought has minimal impact on results
- As shown in 2018 work by DB Stephens, average drawdowns in the Wilcox are less than with the previous GAM. Average drawdowns in the Sparta, Queen City, and Carrizo are higher in BVGCD as were anticipated due to updated model improvements

Next Steps

- Some additional adjustments of pumping will be needed before moving forward with runs leading to development of DFCs
  - Fayette County GCD pumping will be increased to current MAG levels
  - Mid-East Texas GCD pumping will be changed to correct MAG levels
  - Post Oak Savannah GCD ramp up of pumping will be adjusted
- With a to be developed "baseline pumping file S-4" pumping will be adjusted in GCDs so that average drawdowns are near 2016 GMA 12 DFCs

Next Steps

- Pumping outside of the five GMA 12 GCDs will remain the same for the new predictive simulations
- Work will begin in upcoming months regarding developing DFCs for the Brazos River Alluvium and Yegua-Jackson aquifers


Thank you!
Questions?