



Status Report of Groundwater Modeling Results



Presented to:
Groundwater Management Area 12

February 4, 2016

Prepared by GMA 12 Consultants

Sparta, Queen City, and Carrizo-Wilcox

Predictive Scenario 5 (PS5)

Central Queen City-Sparta GAM

- 💧 Updated GMA12-7B Well File used for Current DFCs
- 💧 Historical Pumping from 2000 to 2010 Updated
- 💧 Some Predictive Pumping Updated
- 💧 Compare Results of Average Drawdowns for 2060 versus 2070

Predictive Scenario 6 (PS6)

Central Queen City-Sparta GAM

- 💧 Minor modification of PS5

- 💧 Added PS4 ramp-up scenario for Hooper in METGCD

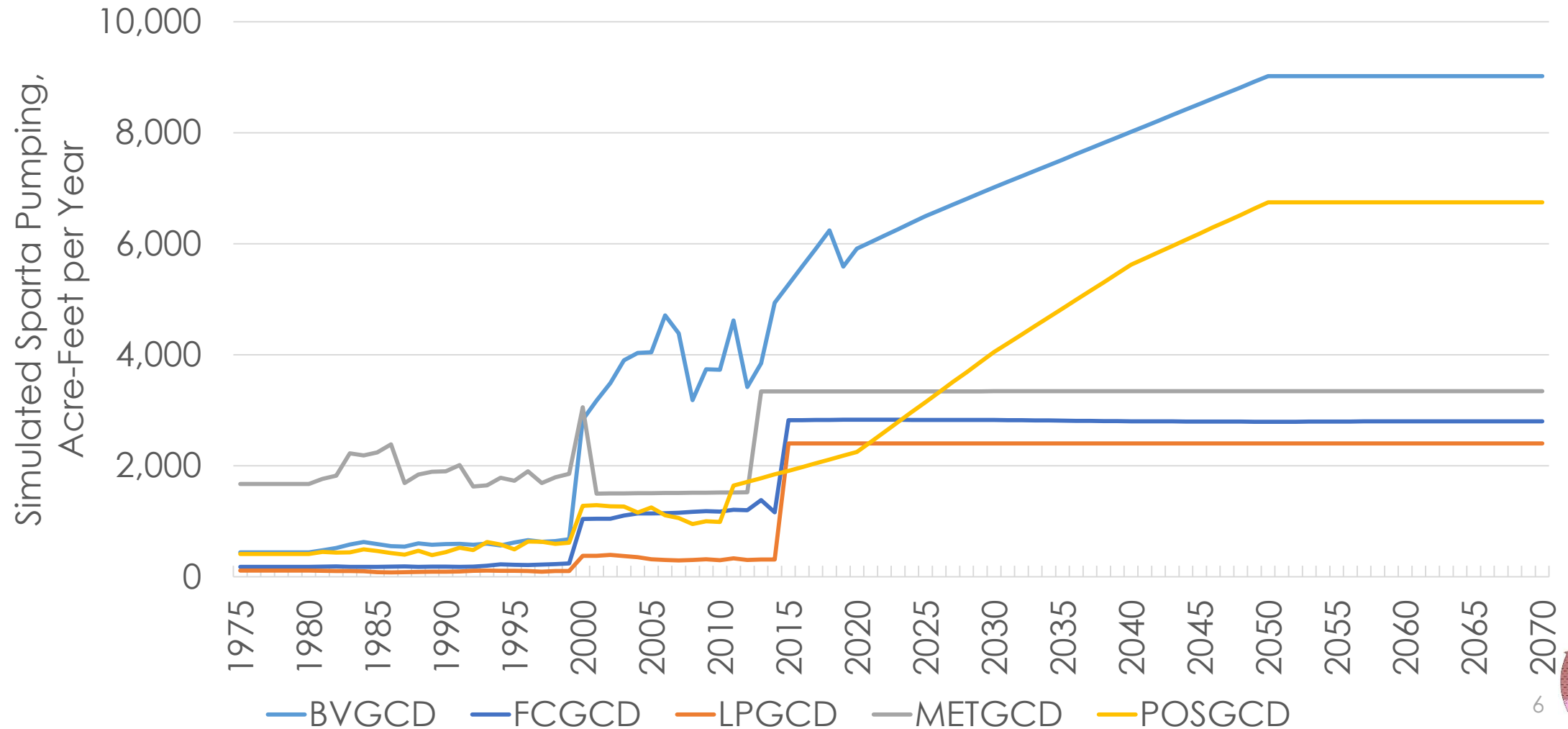
- 💧 Increased Hooper pumping in METGCD from 835 acre-feet in 2070 to 5,550 acre-feet in 2070

PS6 Year 2070 Pumping (Acre-Feet)

District	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper	Total
Brazos Valley	9,019	1,200	5,494	1,758	96,187	2,001	115,659
Fayette County	2,802	2,708	5,474	—	—	—	10,984
Lost Pines	2,405	1,315	12,052	3,984	37,249	2,592	59,597
Mid-East Texas	3,343	974	11,091	3,917	7,181	835 5,550	27,341 32,056
Post Oak Savannah	6,747	504	7,063	1,037	48,503	4,480	68,334
GMA 12 GCDs	24,317	6,701	41,173	10,696	189,119	9,908 14,624	281,914 286,630

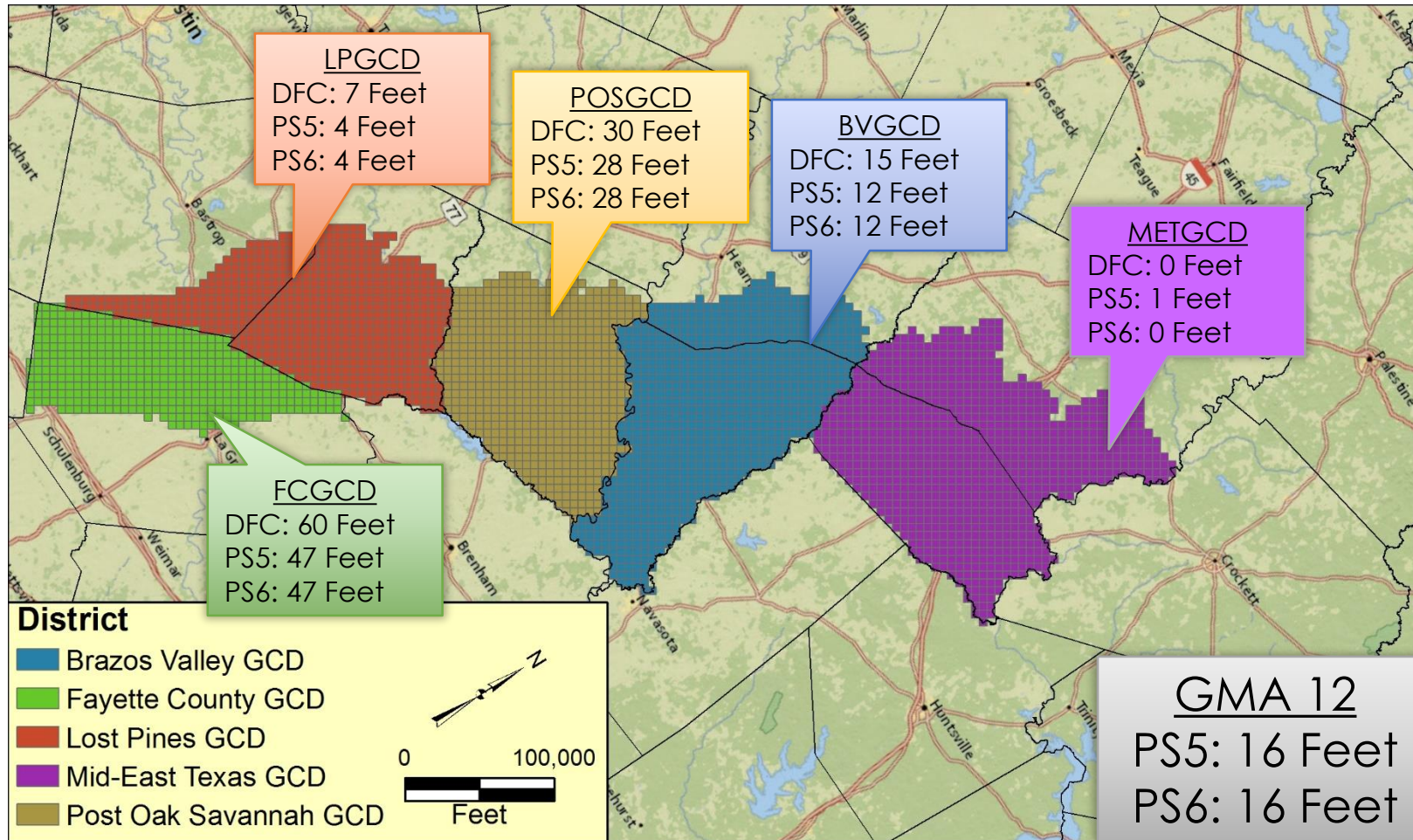


PS6 – Sparta Pumping

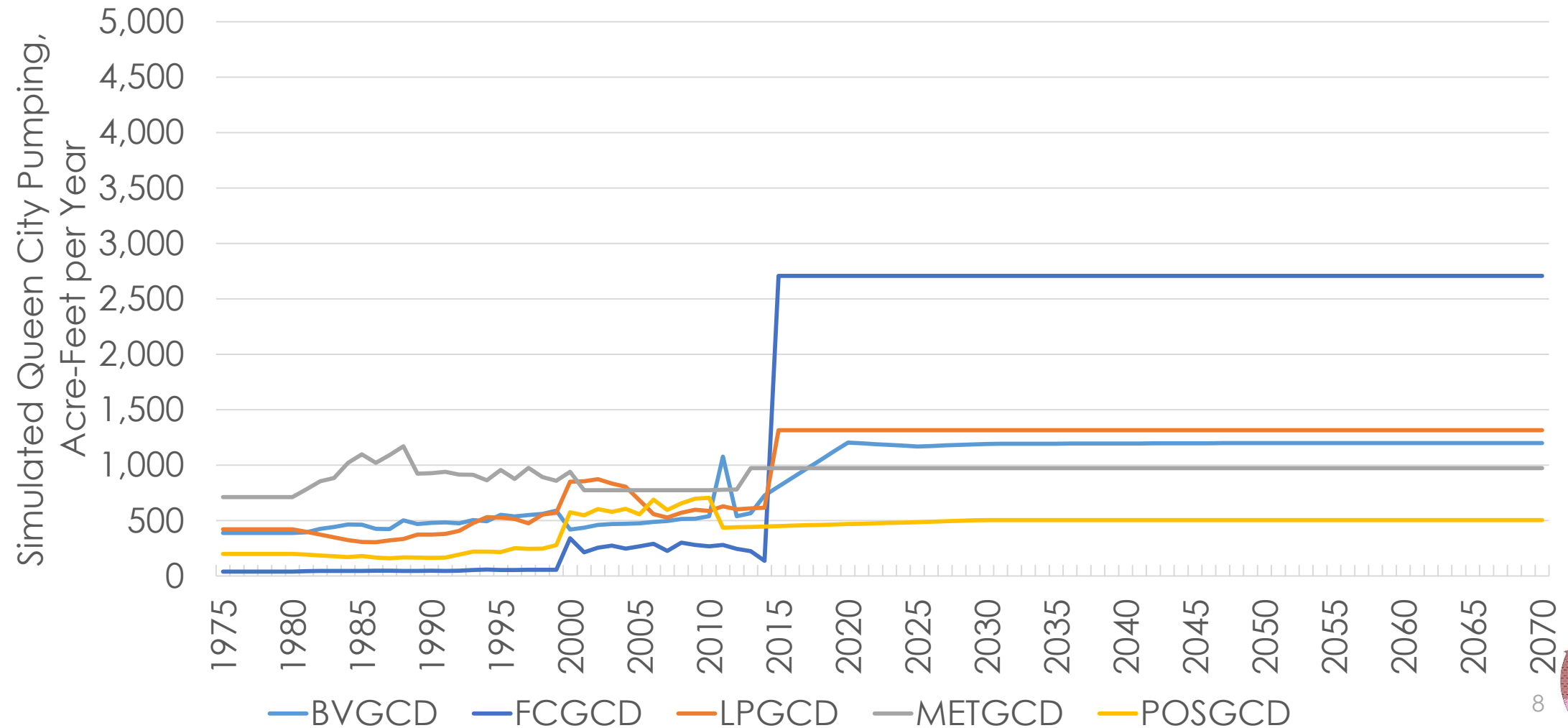


Sparta Aquifer (Layer 1)

Average Drawdown – 1/1/2000 through 12/31/2070

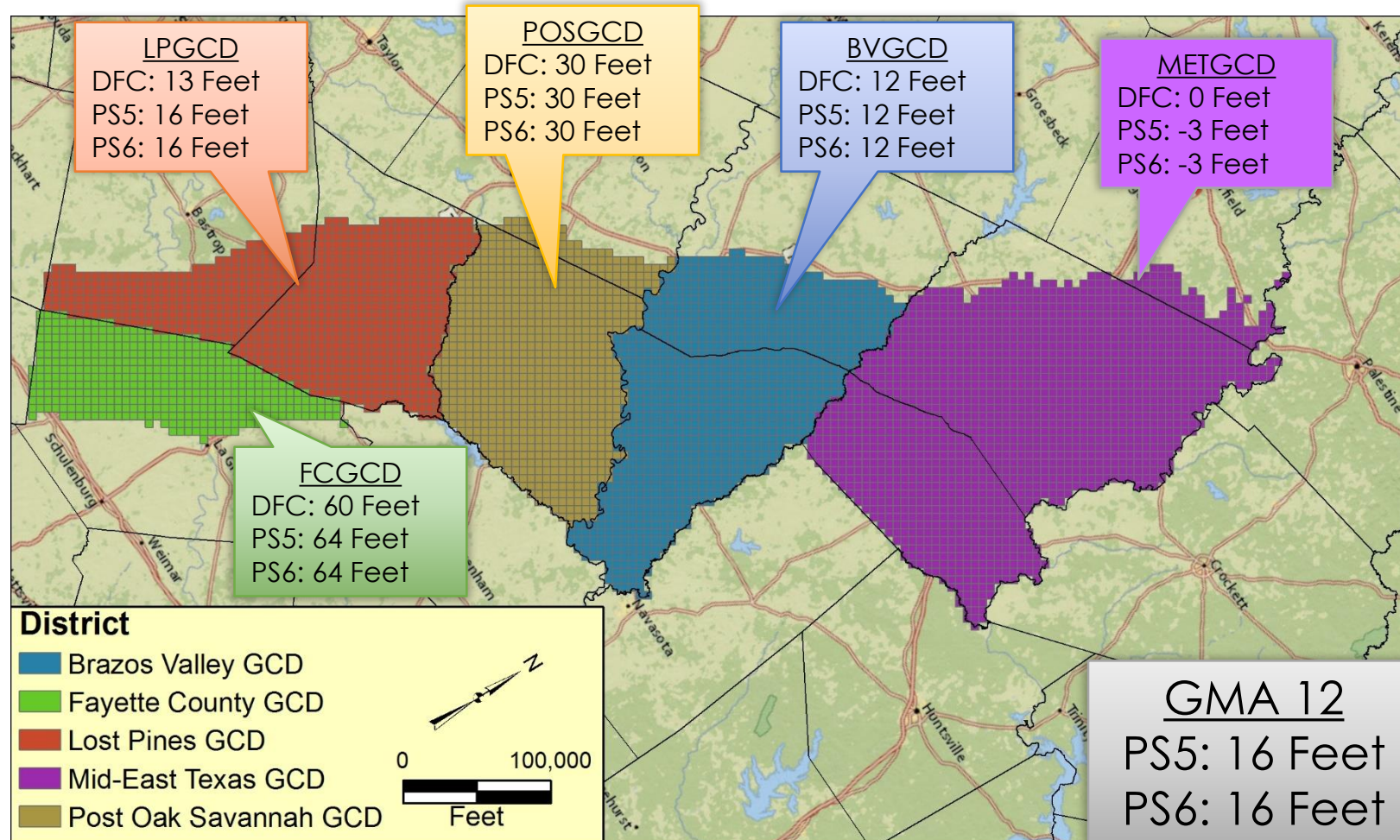


PS6 – Queen City Pumping

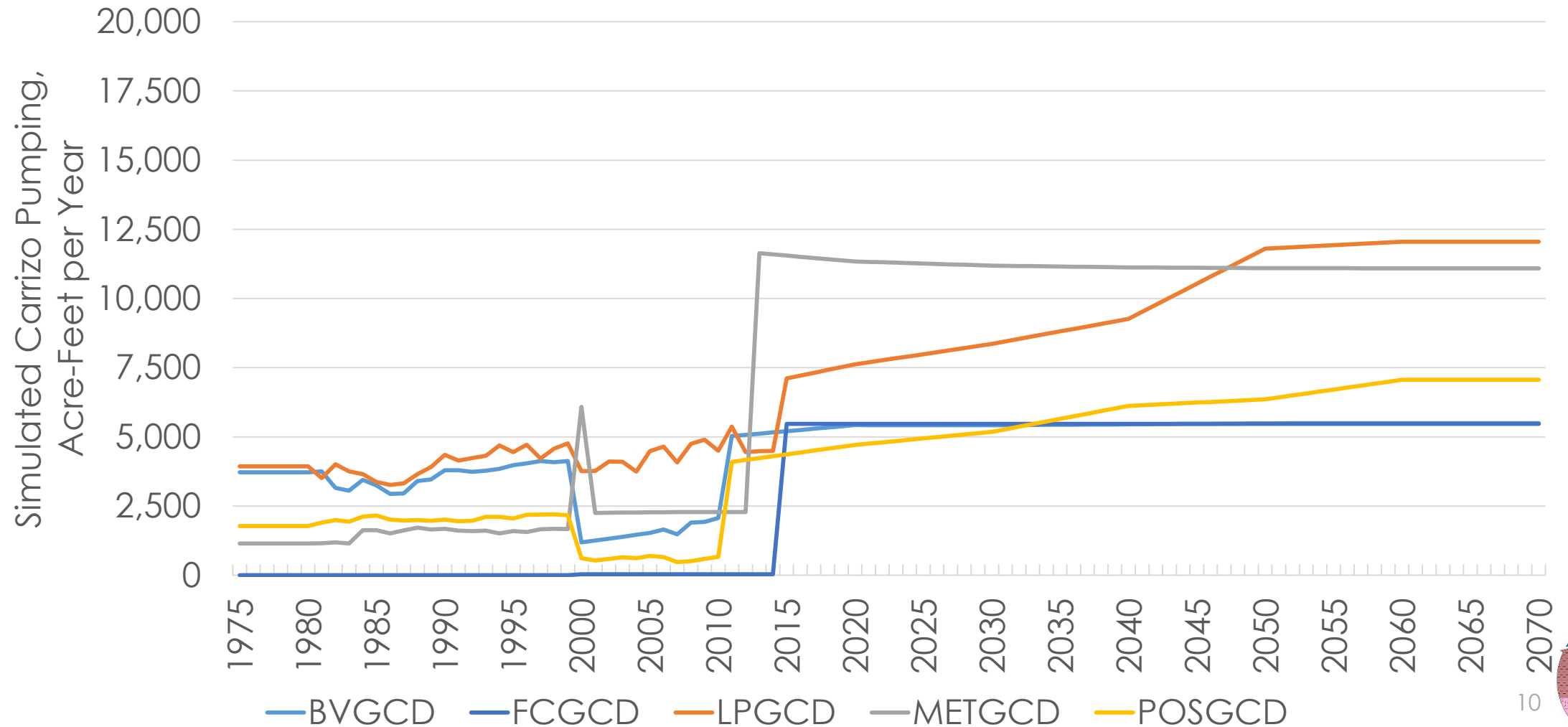


Queen City Aquifer (Layer 3)

Average Drawdown – 1/1/2000 through 12/31/2070

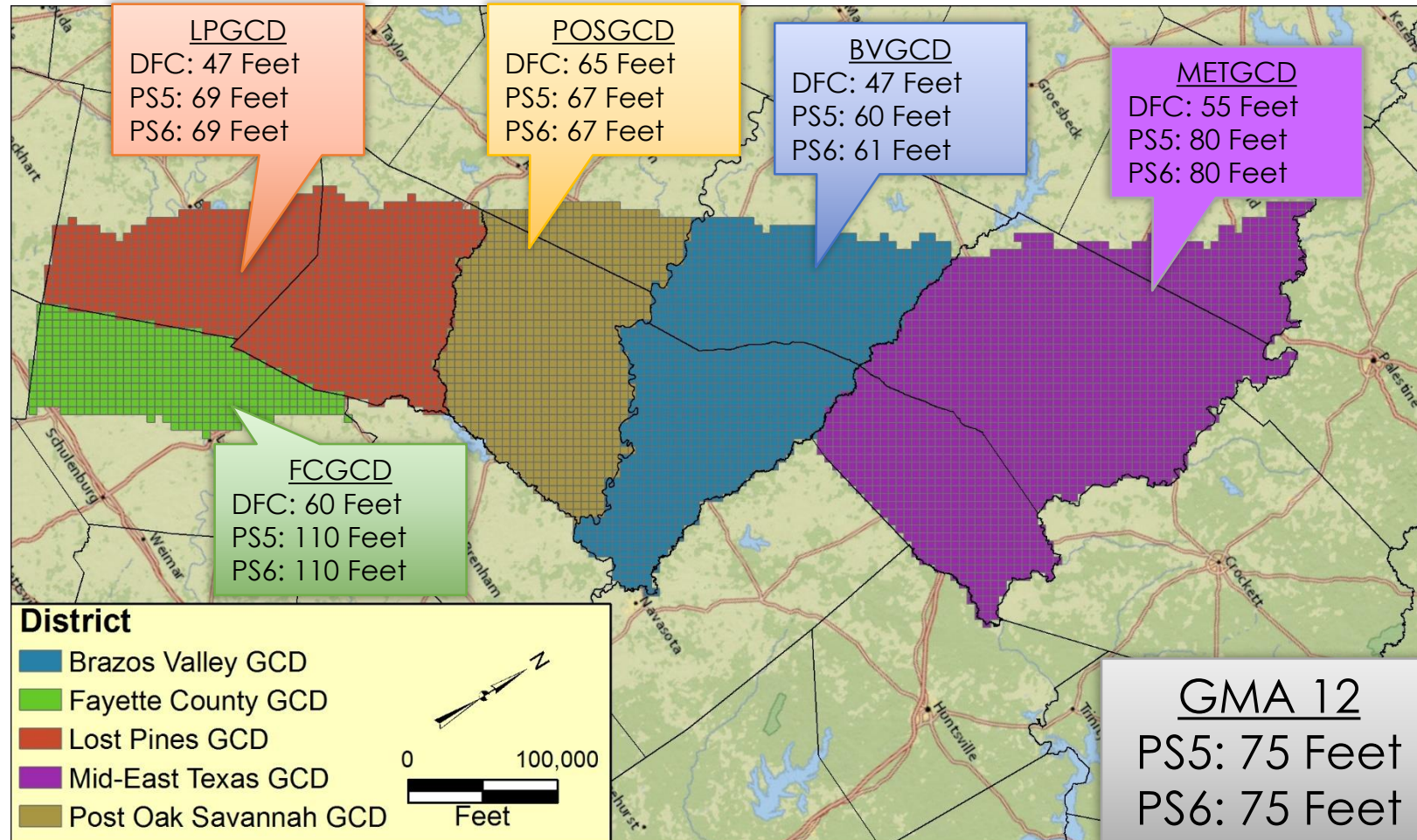


PS6 – Carrizo Pumping

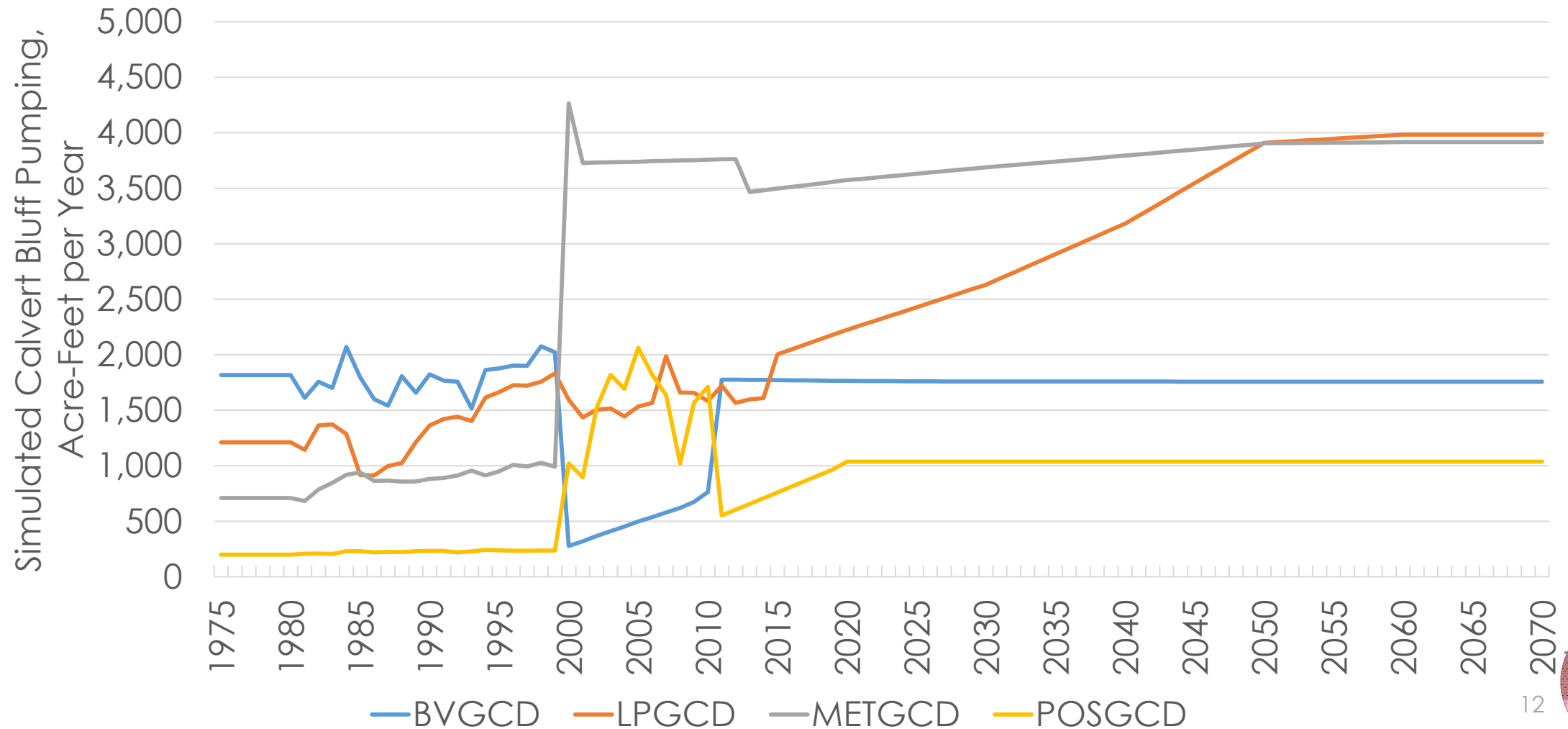


Carrizo Aquifer (Layer 5)

Average Drawdown – 1/1/2000 through 12/31/2070

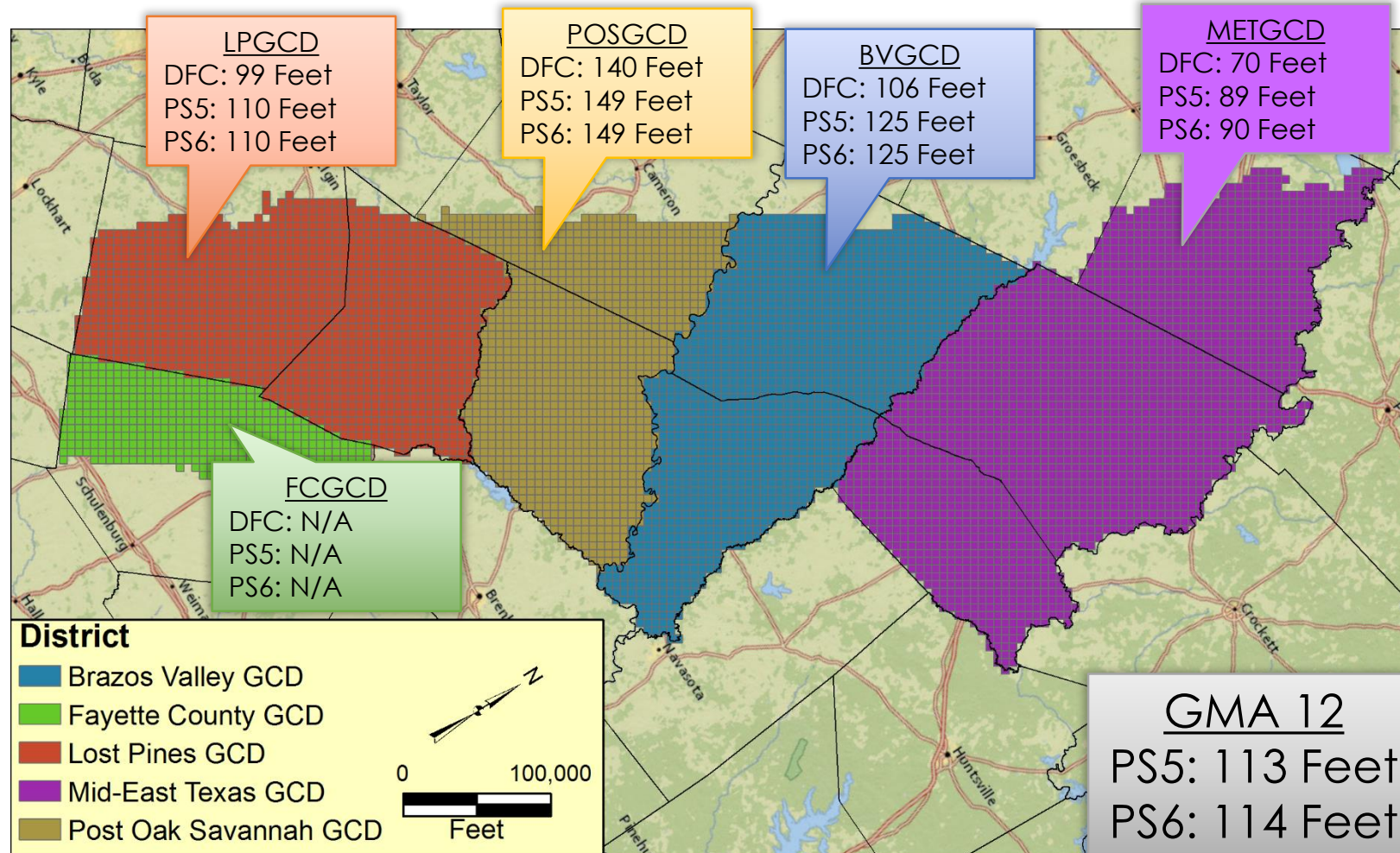


PS6 – Calvert Bluff Pumping

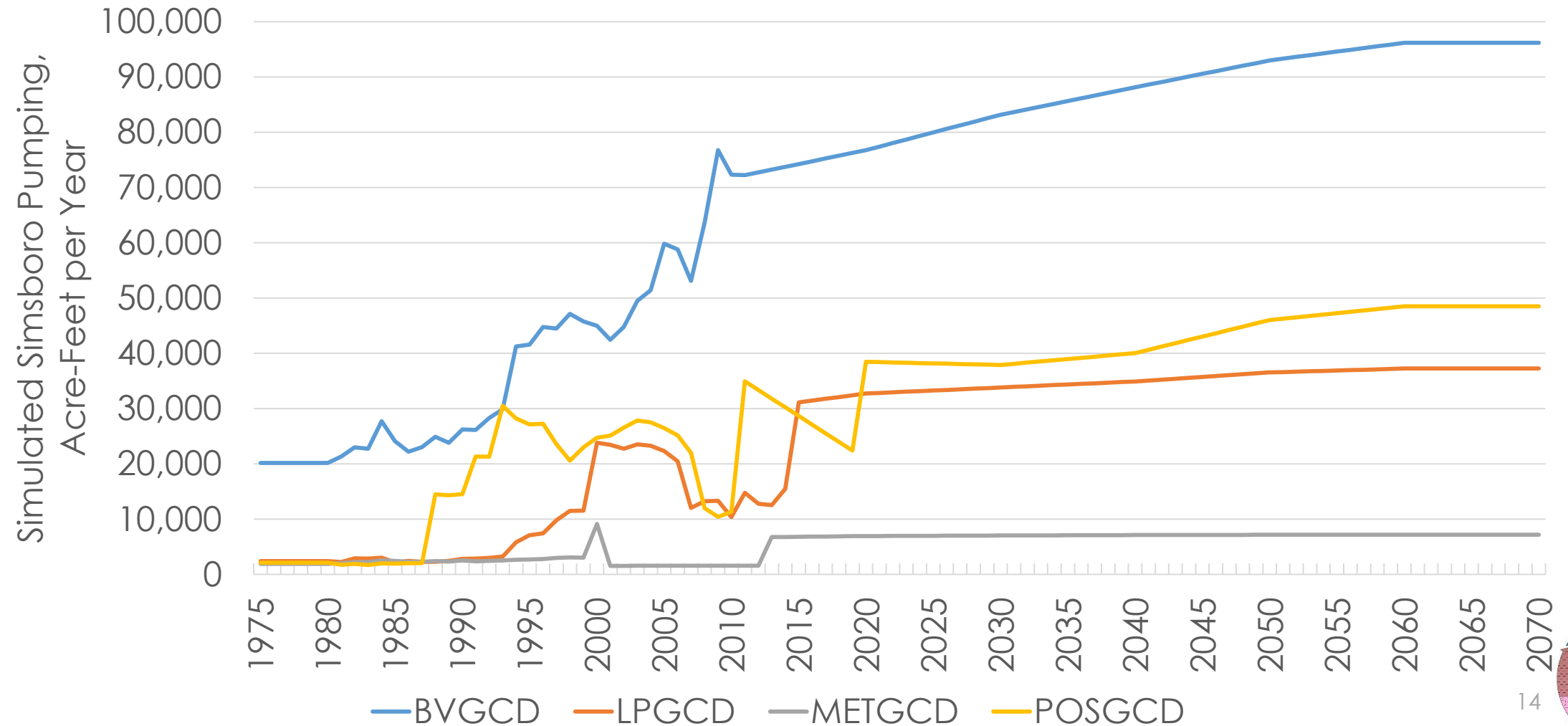


Calvert Bluff Aquifer (Layer 6)

Average Drawdown – 1/1/2000 through 12/31/2070

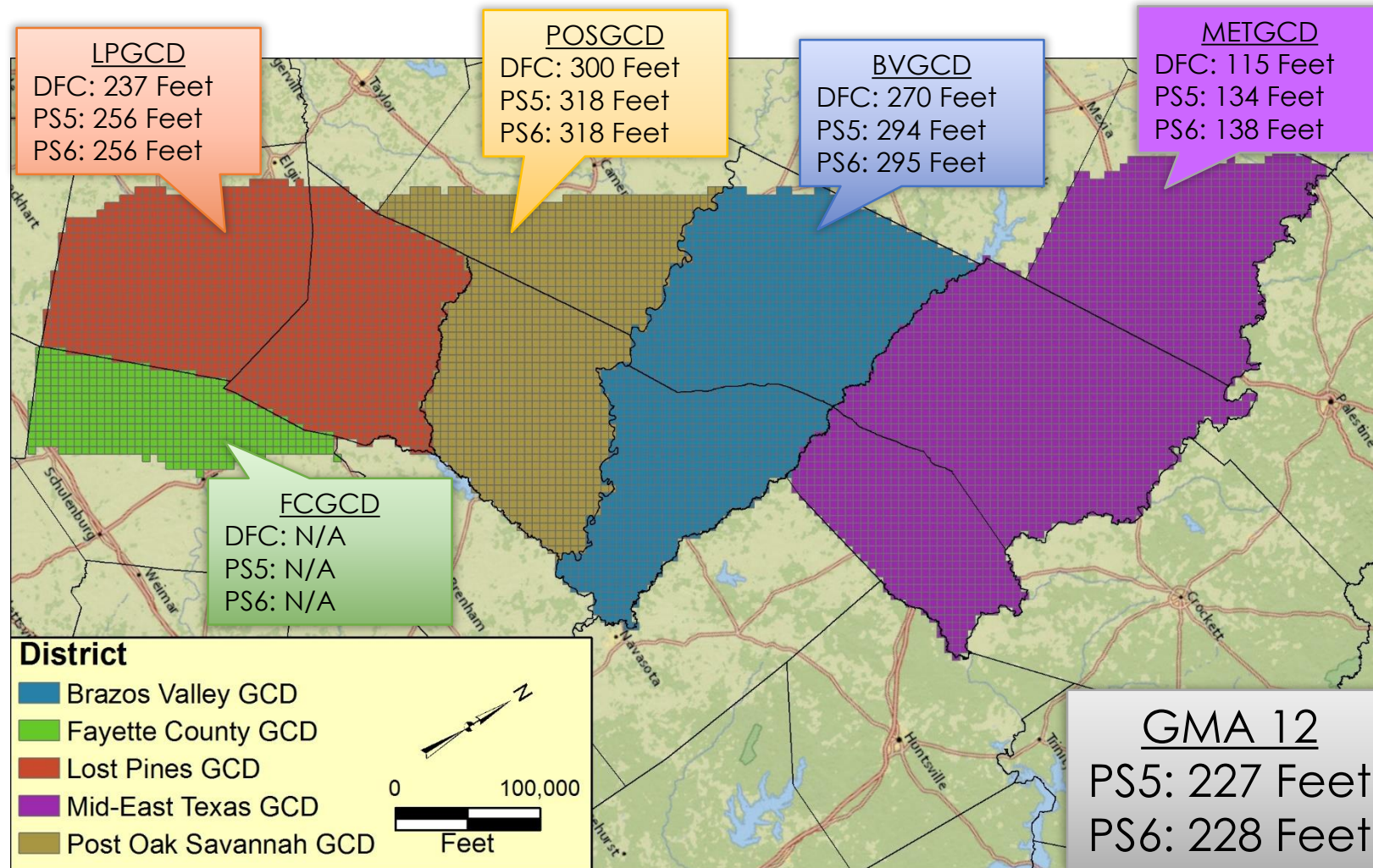


PS6 – Simsboro Pumping

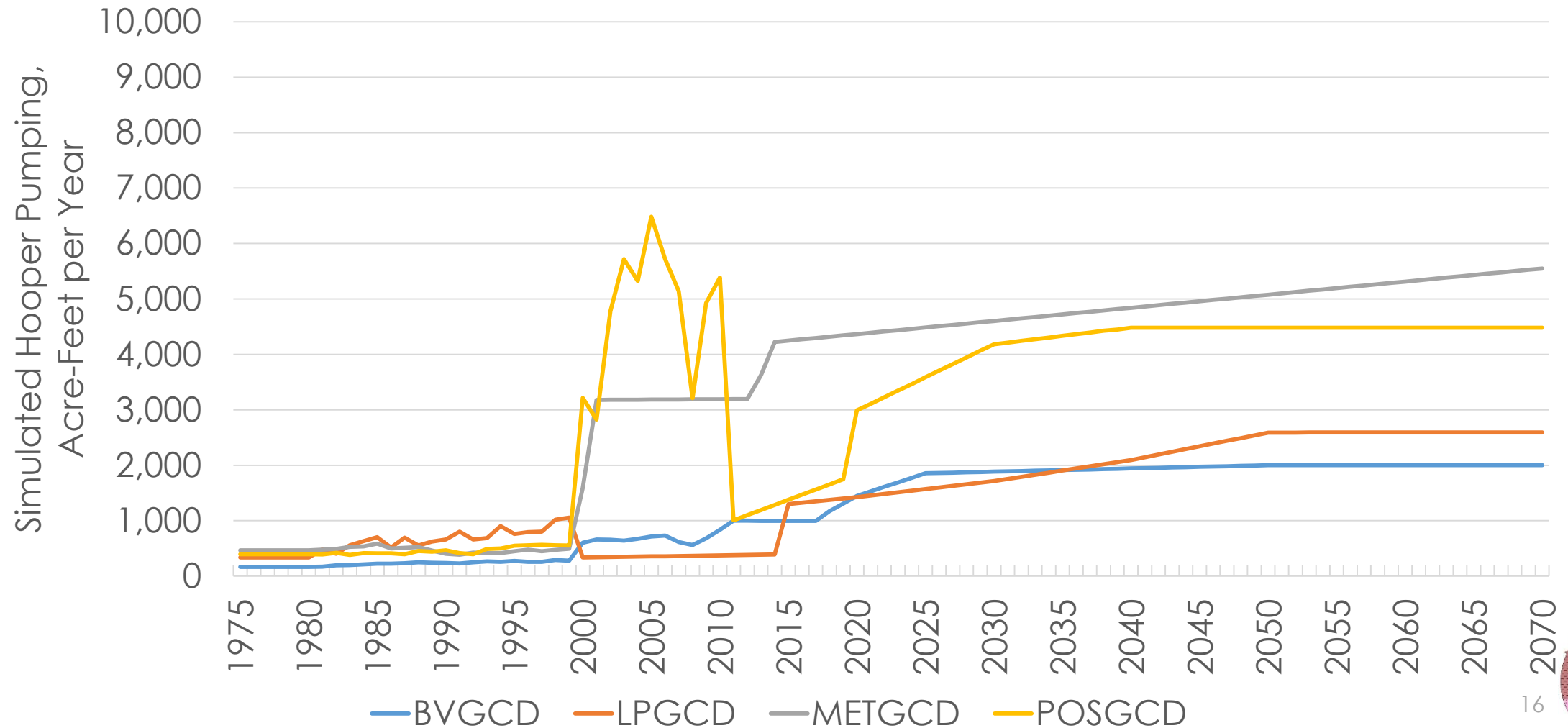


Simsboro Aquifer (Layer 7)

Average Drawdown – 1/1/2000 through 12/31/2070

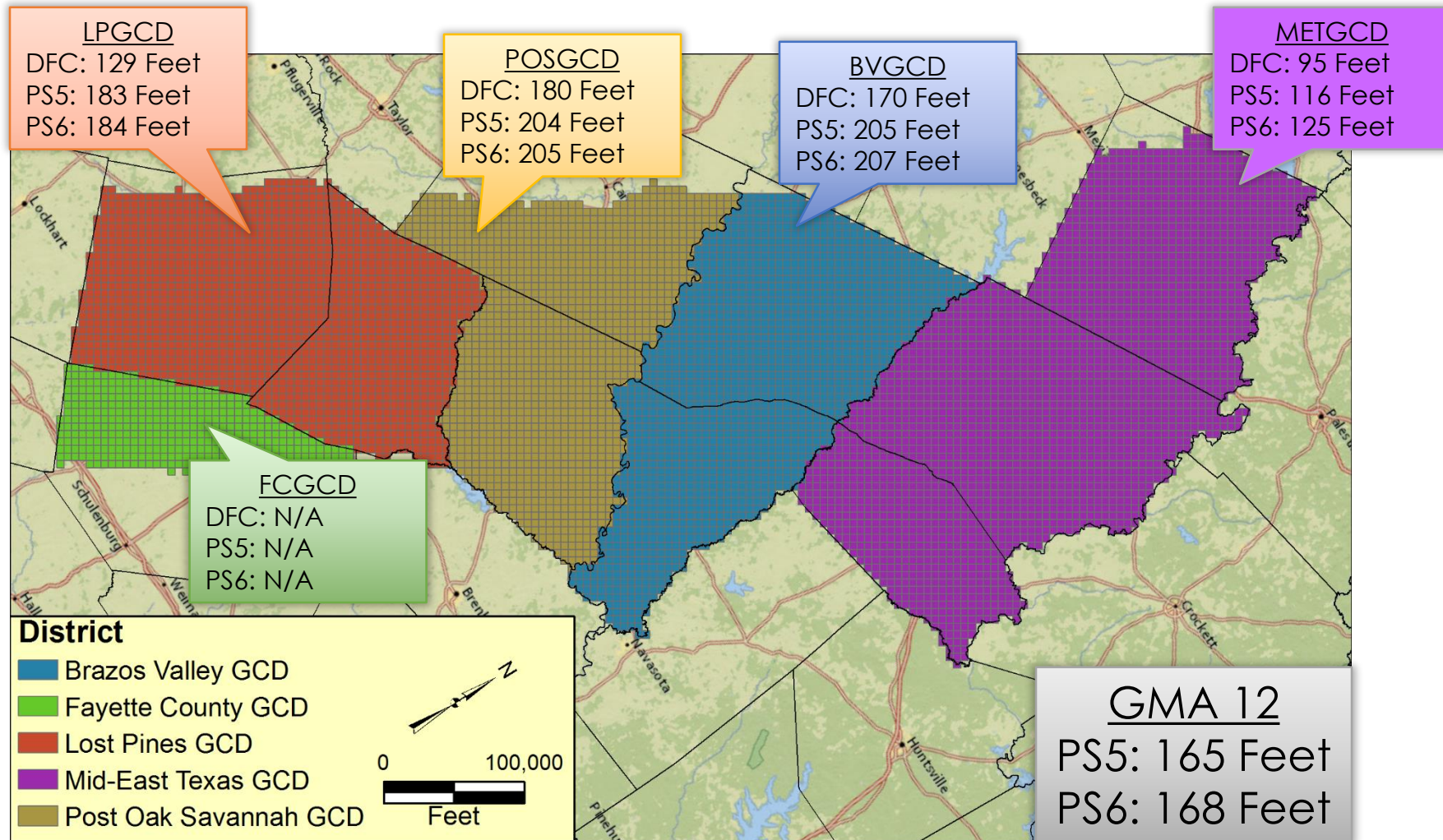


PS6 – Hooper Pumping



Hooper Aquifer (Layer 8)

Average Drawdown – 1/1/2000 through 12/31/2070



Yegua-Jackson

Yegua-Jackson MAGs and DFCs for 2060

District	MAG (Acre-Feet per Year)	DFC (Average Feet of Drawdown)
Brazos Valley	7,071	Yegua: 70 Jackson: 110
Fayette County	5,762	75
Lost Pines	N/A	N/A
Mid-East Texas	1,122	5
Post Oak Savannah	12,923	100
GMA 12 GCDs	26,878	



Yegua-Jackson Modeling

- 💧 Utilize Previously Developed DFC Well File
- 💧 Extend 2060 Pumping Through 2070
- 💧 Review Results

Yegua-Jackson Pumping (Acre-Feet) 2010 - 2070

District	YGJK-PS1	MAG
Brazos Valley	7,167	7,071
Fayette County	9,269 (5,839)	5,762
Lost Pines	N/A	N/A
Mid-East Texas	1,122	1,122
Post Oak Savannah	14,693	12,923
GMA 12 GCDs	32,251	26,878

Values in parentheses are within the defined aquifer footprint per the TWDB grid definition file.



Yegua-Jackson Model Grid

Model Report (2010) Page 6-3

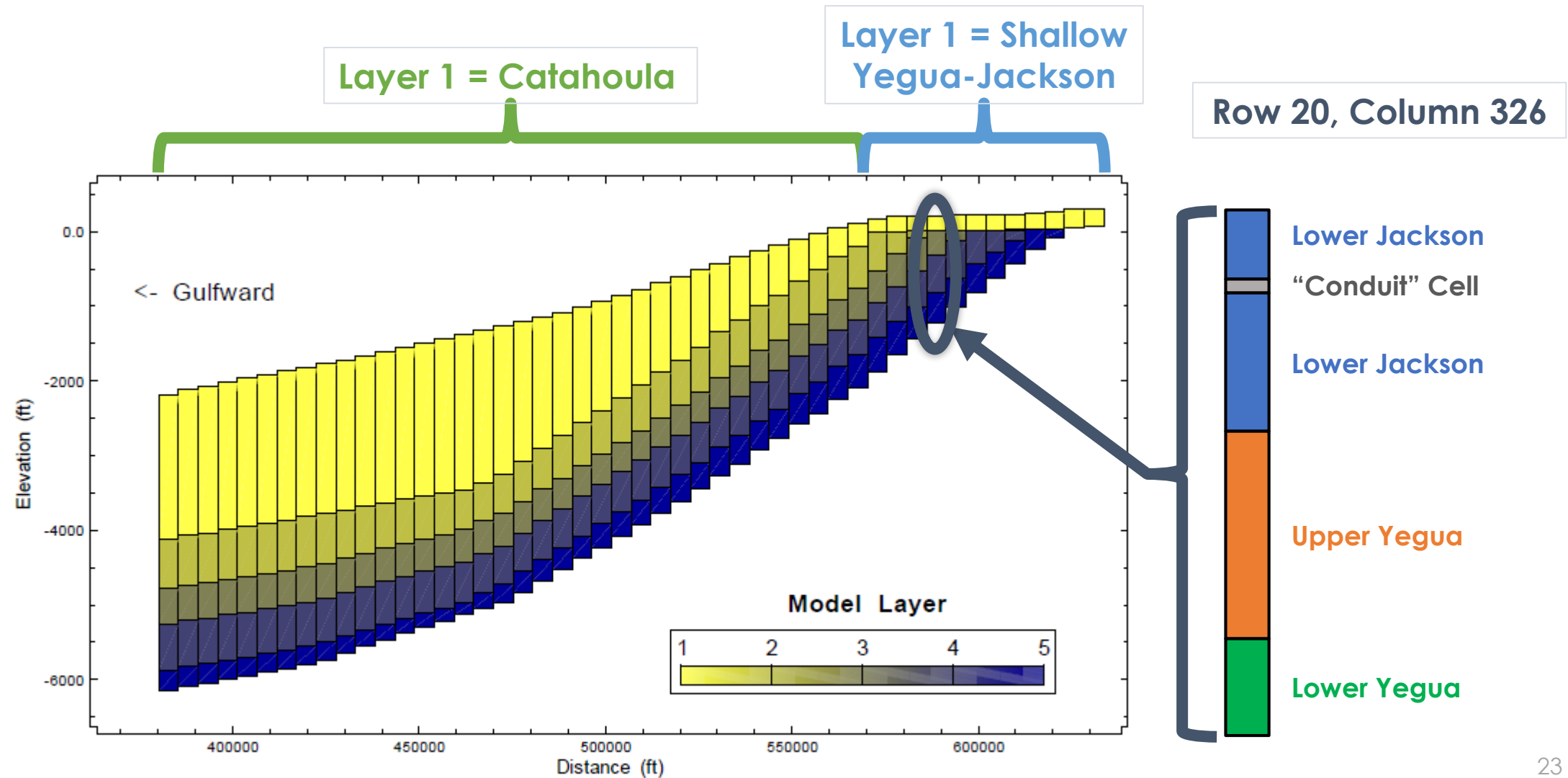
💧 Layer 1

- Represents the shallow portion of the Yegua-Jackson Aquifer in the outcrop
- Represents the shallow portion of all of the units making up the Yegua-Jackson Aquifer
- Bottom, where it represents the outcrop region, defined based on an estimate of the predevelopment water table elevation offset deeper by 100 feet

💧 Layers 2 through 5 represent the downdip portions



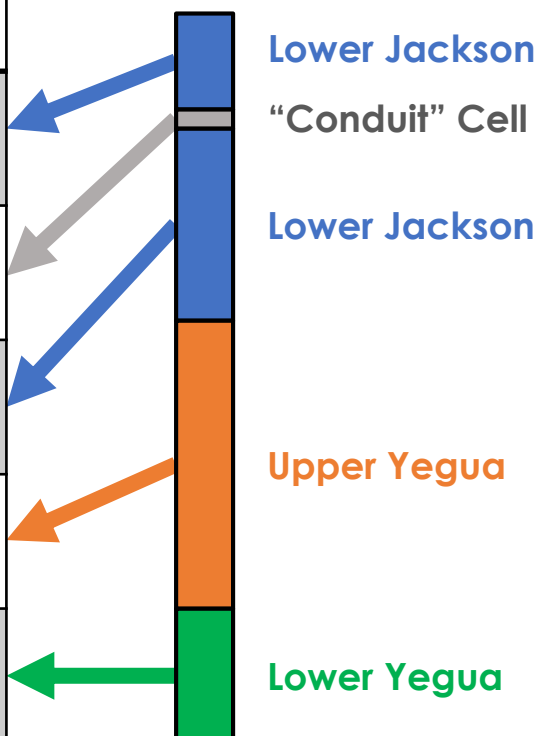
Yegua-Jackson Model Cross-Section



Example of Water Level Differences

GMA 12 PS1 – Row 20, Column 326

Layer	Aquifer	Cell Bottom Elevation	2010 Water Level	2070 Water Level	2070 Drawdown
1	Lower Jackson	(Top = 224.4 ft MSL) 3.9 ft MSL	166 ft MSL	165 ft MSL	1 ft
2	"Conduit" Cell	2.9 ft MSL	181 ft MSL	69 ft MSL	112 ft
3	Lower Jackson	-292.2 ft MSL	181 ft MSL	69 ft MSL	112 ft
4	Upper Yegua	-938.5 ft MSL	190 ft MSL	114 ft MSL	76 ft
5	Lower Yegua	-1,287.2 ft MSL	199 ft MSL	93 ft MSL	106 ft



Lower Jackson
"Conduit" Cell
Lower Jackson
Upper Yegua
Lower Yegua

Drawdown Calculation

- 💧 Significant difference in simulated water levels where Layer 1 represents the shallow portion of an aquifer
- 💧 Simple average used to calculate drawdown
 - Straight-forward and easily understood
 - Does not weight result based on how water flows through aquifer
- 💧 Only calculate values within TWDB official aquifer footprint
 - “Conduit” cells not included
 - Active model cells outside of official footprint not included per TWDB guidance*

*http://www.twdb.texas.gov/groundwater/docs/How_to_Do_a_MAG_05_2014.pdf



Simple Average

- 💧 Sum of the drawdown in each layer divided by the number of cells in each layer
- 💧 For the example (Row 20, Column 326):

$$\textit{drawdown} = \frac{1 + 112 + 76 + 106}{4} = 74 \textit{ ft}$$

- 💧 Simple average method used for the first round of DFCs



Yegua-Jackson Average Drawdown 1/1/2010 – 12/31/2070

District	DFC (2010 to 2060)	YGJK-PS1 Simple Average
Brazos Valley	Jackson: 110 Feet Yegua: 70 Feet	Jackson: 114 Feet Yegua: 70 Feet
Fayette County	75 Feet	77 Feet
Lost Pines	N/A	N/A
Mid-East Texas	5 Feet	7 Feet
Post Oak Savannah	100 Feet	100 Feet



Yegua-Jackson Modeling Conclusions

- 💧 Similar average drawdown to previous round
- 💧 If adopted, anticipate similar MAGs as previous round

Discussion

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