GMA 8 Joint Planning Meeting

Discussion of Southern GMA 8 GAM Run 9 Results

November 18, 2015

Purpose of the GAM Run

- Provide Information in Support of the Joint Planning Process
- Facilitate Discussion Amongst the Districts Regarding Potential Aquifer DFCs
- Develop Additional Data for Consideration of the "Nine Factors"

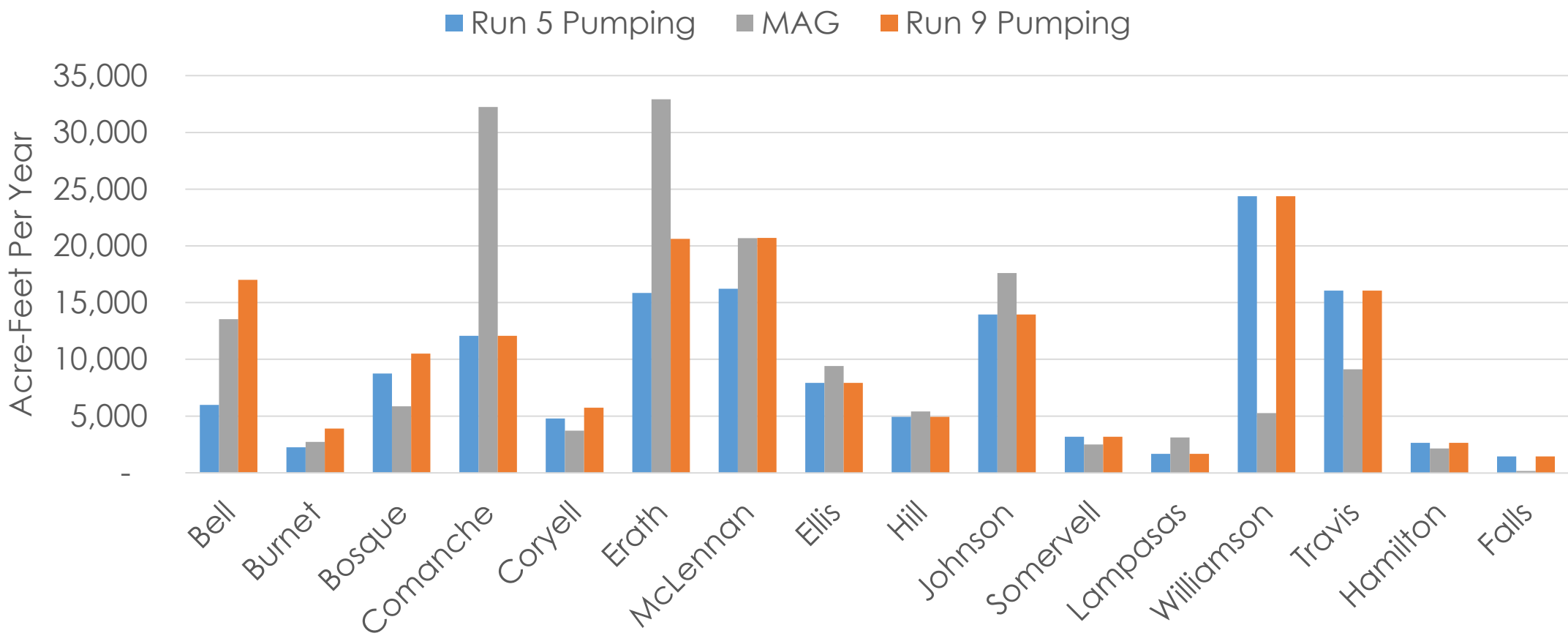
GAM Run Process

- Modify Pumping Inputs per District Requests
- Conduct Simulation
  - Use Modified Version of the TWDB Accepted GAM
  - Modification Allows Aquifers to be Simulated as Unconfined
- Prepare Evaluations of Results

Changes in Pumping

District	County	Run 5 (AFY)	Run 9 (AFY)	Difference
CUWCD	Bell	5,972	16,995	11,023
CTGCD	Burnet	2,250	3,893	1,643
STGCD	McLennan	16,219	20,690	4,471
MTGCD	Bosque	8,757	10,509	1,751
	Comanche	12,079	12,079	0
	Coryell	4,779	5,735	956
	Erath	15,858	20,615	4,757
PGCD	Ellis	7,920	7,920	0
	Hill	4,933	4,933	0
	Johnson	13,949	13,949	0
	Somervell	3,181	3,181	0

Summary of Total Pumping Changes (Woodbine, Edwards, and Trinity Aquifers)

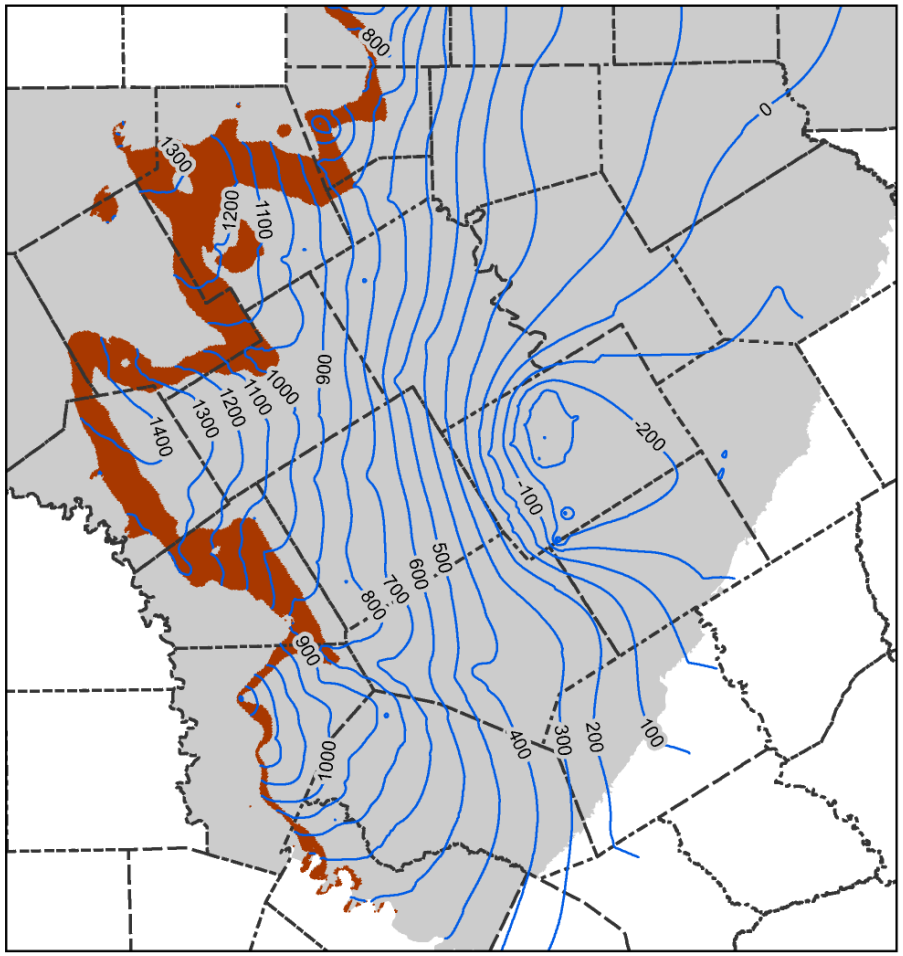


Conduct Simulation

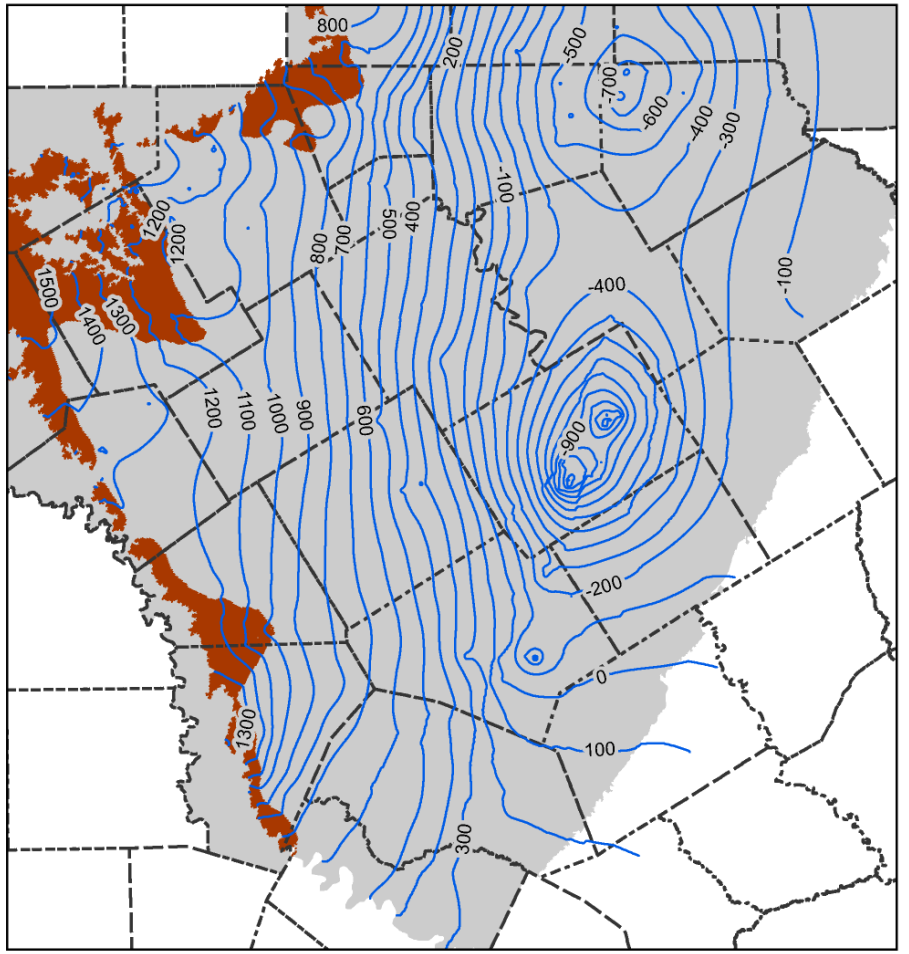
- Create New Well File
  - No change in pumping distribution from Run 5
  - Added new and pending permit locations in Bell County
- Perform Simulation Using Modified GAM
  - Layers allowed to convert from confined to unconfined
  - Specific Yield = 0.10 for all layers
  - Pumping not reduced until cell is essentially dry

Simulation Results
2070 Water Levels

Hensell Aquifer

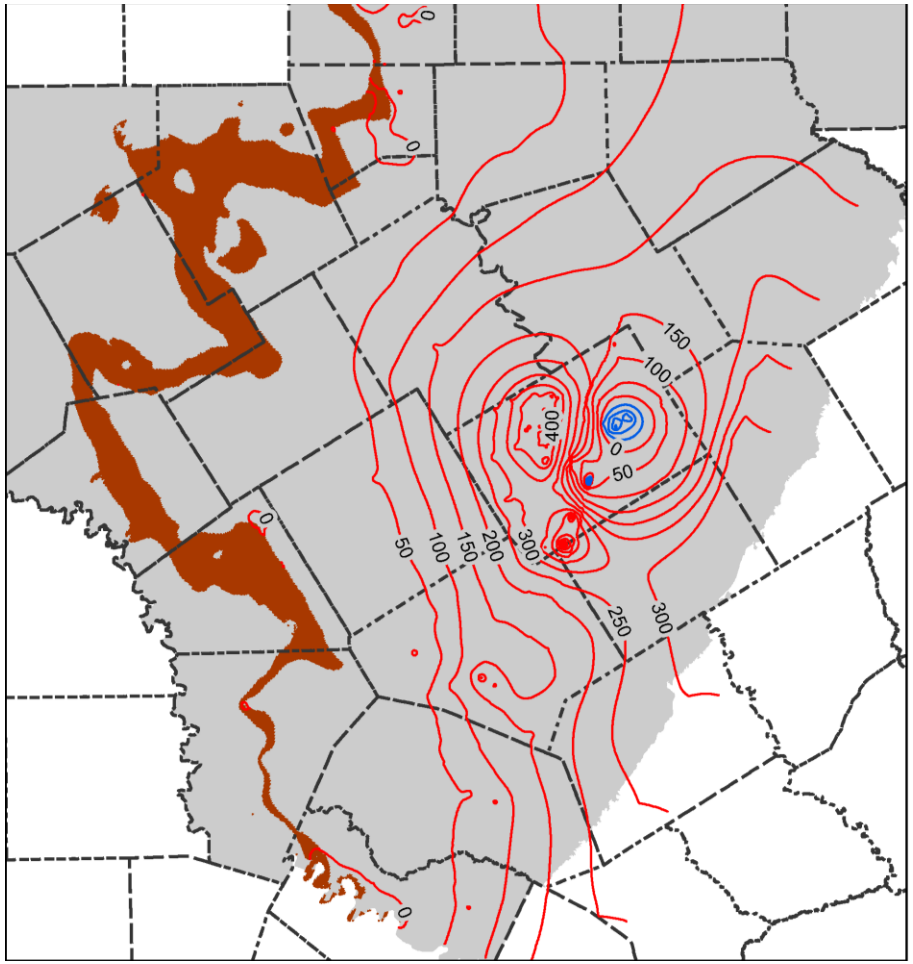


Hosston Aquifer

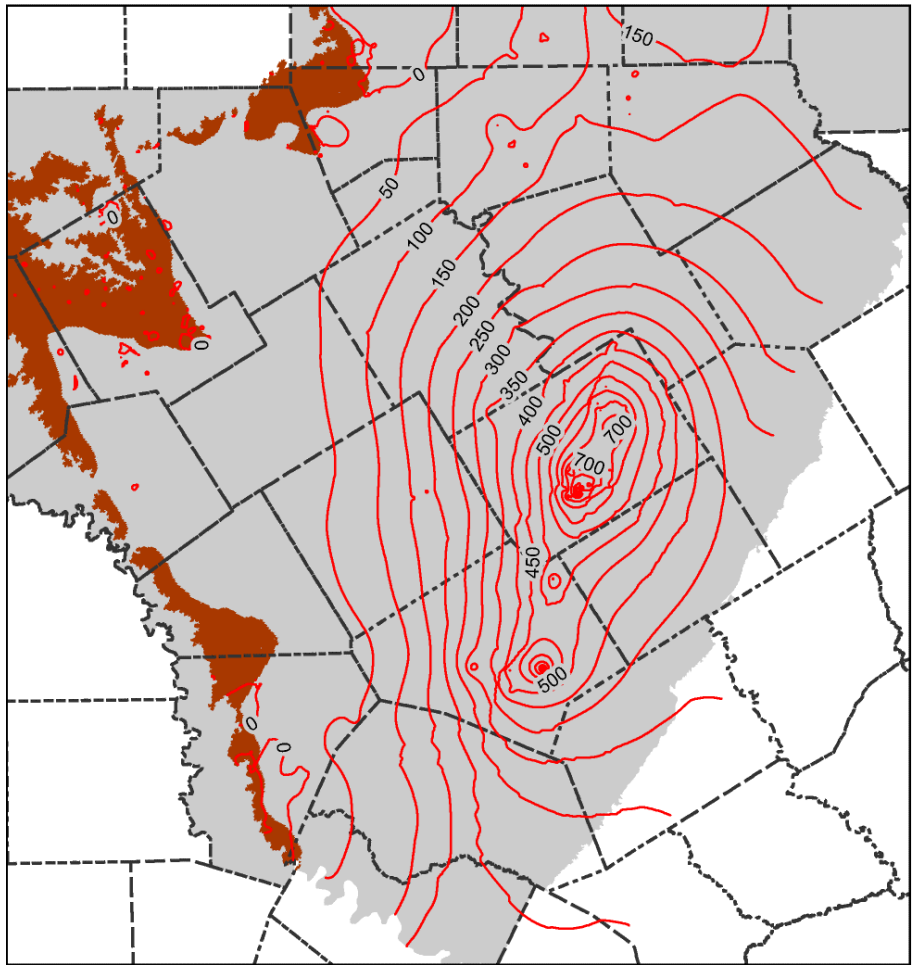


Simulation Results
2070 Drawdown

Hensell Aquifer



Hosston Aquifer



Simulation Results
2070 Average Drawdown

South GMA 8 Run 9 - Total Average Drawdown in feet from 2010 through 2070 - Current DFC as 50-Year Average Drawdown in parentheses ()							
County	**Woodbine**	**Wash/Fred**	**Paluxy**	**Glen Rose**	**Hensell**	**Pearsall**	**Hosston**
Bell	25 (N/A)	34 (N/A*)	55 (134)	75 (155)	129 (286)	221 (N/A)	316 (319)
Bosque	N/A	1 (N/A)	5 (26)	42 (33)	115 (201)	157 (N/A)	178 (220)
Burnet	N/A	N/A	N/A	2 (1)	7 (11)	12 (N/A)	12 (29)
Comanche	N/A	N/A	N/A	2 (0)	2 (2)	2 (N/A)	3 (11)
Coryell	N/A	2 (N/A)	7 (15)	12 (15)	62 (156)	106 (N/A)	123 (179)
Ellis	44 (102)	49 (N/A)	46 (265)	107 (283)	128 (336)	173 (N/A)	162 (362)
Erath	N/A	2 (N/A)	1 (1)	4 (1)	9 (11)	15 (N/A)	18 (27)
Falls	123 (N/A)	210 (N/A)	229 (279)	251 (354)	283 (459)	383 (N/A)	396 (480)
Hamilton	N/A	2 (N/A)	3 (0)	3 (2)	12 (39)	24 (N/A)	32 (51)
Hill	29 (87)	26 (N/A)	33 (209)	106 (253)	145 (381)	257 (N/A)	276 (406)
Johnson	1 (4)	-1 (N/A)	-20 (37)	22 (83)	50 (208)	107 (N/A)	106 (234)
Lampasas	N/A	N/A	N/A	1 (1)	1 (12)	7 (N/A)	10 (23)
McLennan	26 (N/A)	35 (N/A)	29 (251)	118 (291)	198 (489)	410 (N/A)	503 (527)
Milam	157 (N/A)	225 (N/A)	238 (252)	247 (294)	258 (337)	282 (N/A)	295 (344)
Somervell	N/A	5 (N/A)	3 (1)	3 (4)	15 (53)	42 (N/A)	55 (113)
Travis	52 (N/A)	91 (N/A*)	96 (124)	61 (61)	38 (98)	78 (N/A)	126 (116)
Williamson	41 (N/A)	63 (N/A*)	72 (108)	68 (88)	69 (142)	116 (N/A)	161 (166)

*Model not applicable for Edwards (BFZ), but DFC for Bell County = 100 acre-feet per month of stream/spring flow in Salado Creek, Travis County DFC = 42 acre-feet per month of aggregate stream/spring flow, and Williamson County DFC = 60 acre-feet per month of aggregate stream/spring flow.

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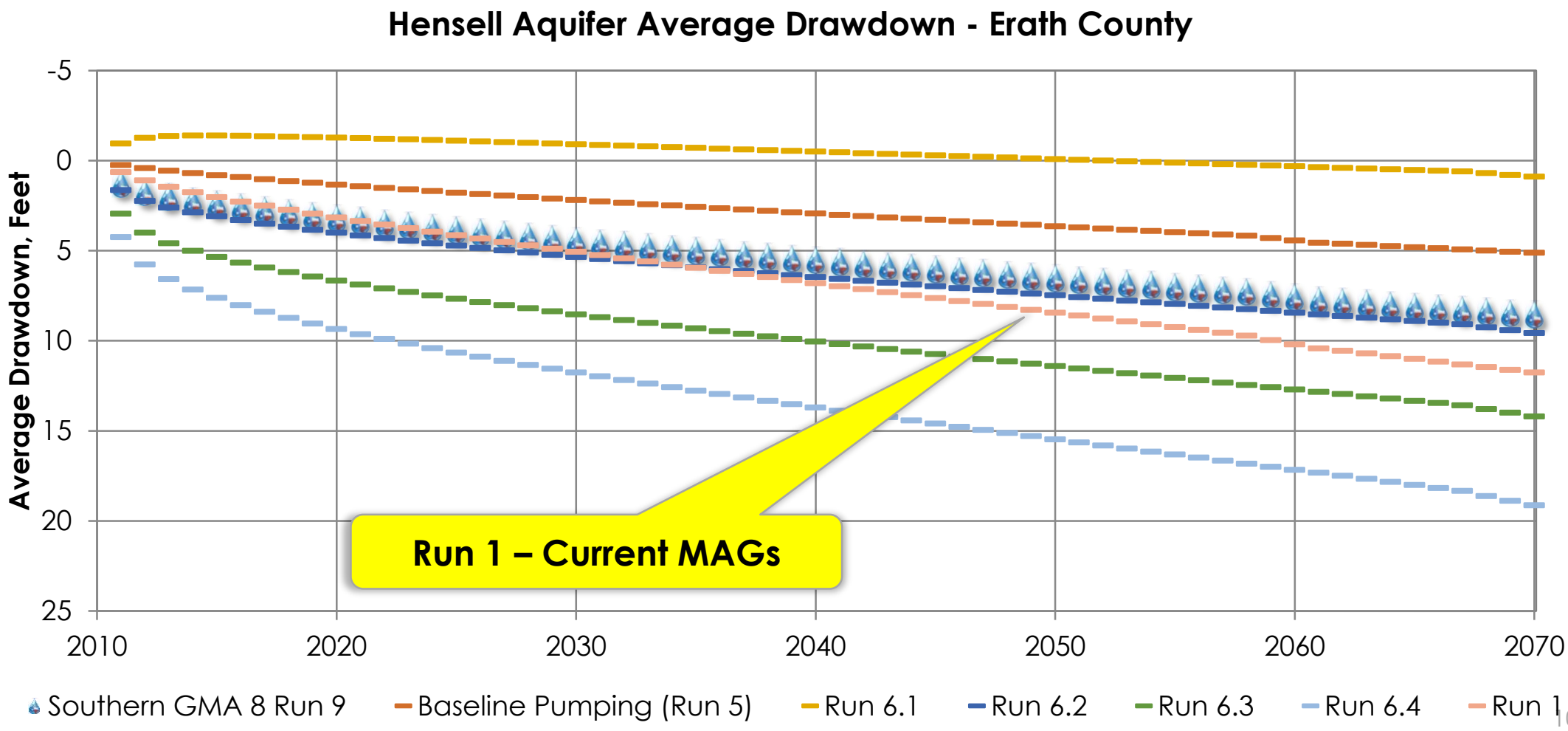
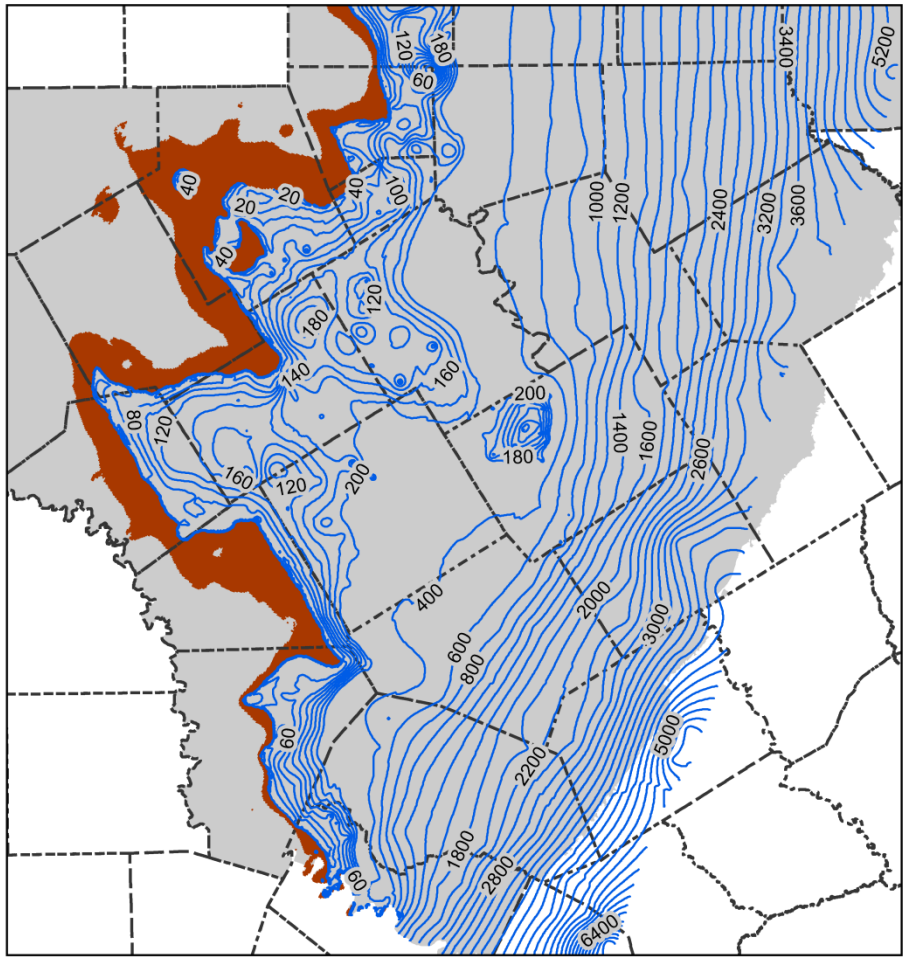
Simulation Results
2070 Average Drawdown

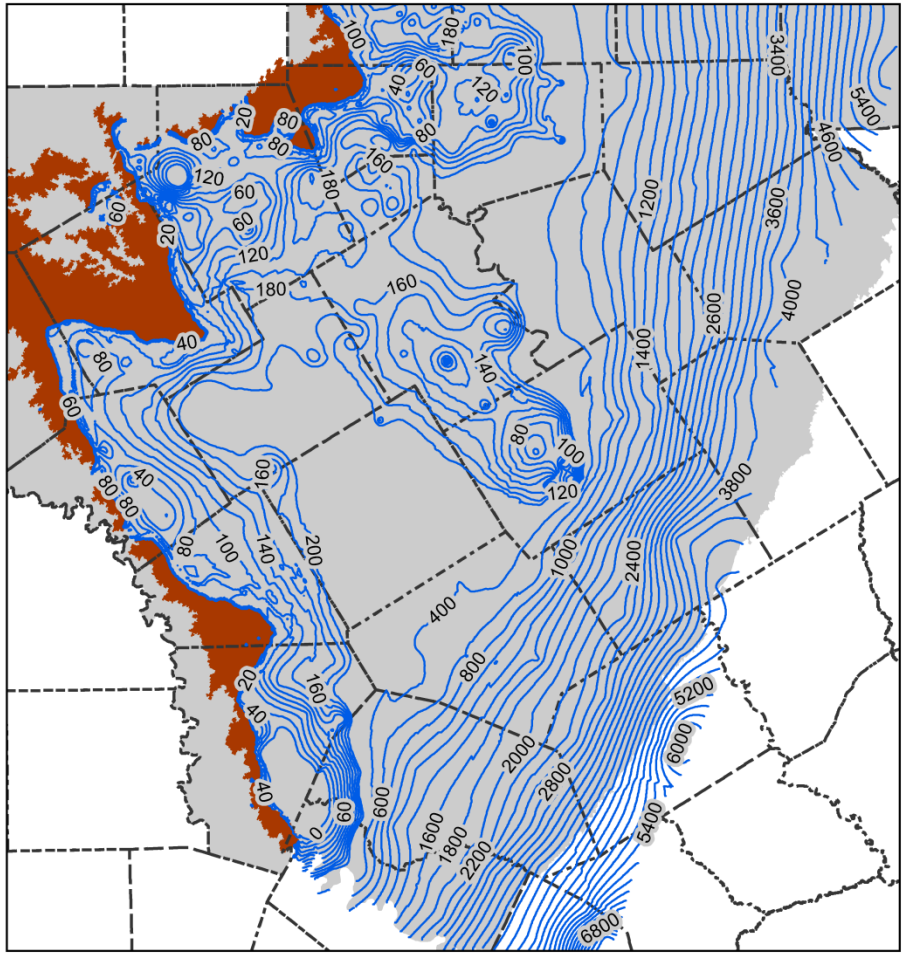


Simulation Results
2070 Artesian Head (above top of aquifer)

Hensell Aquifer



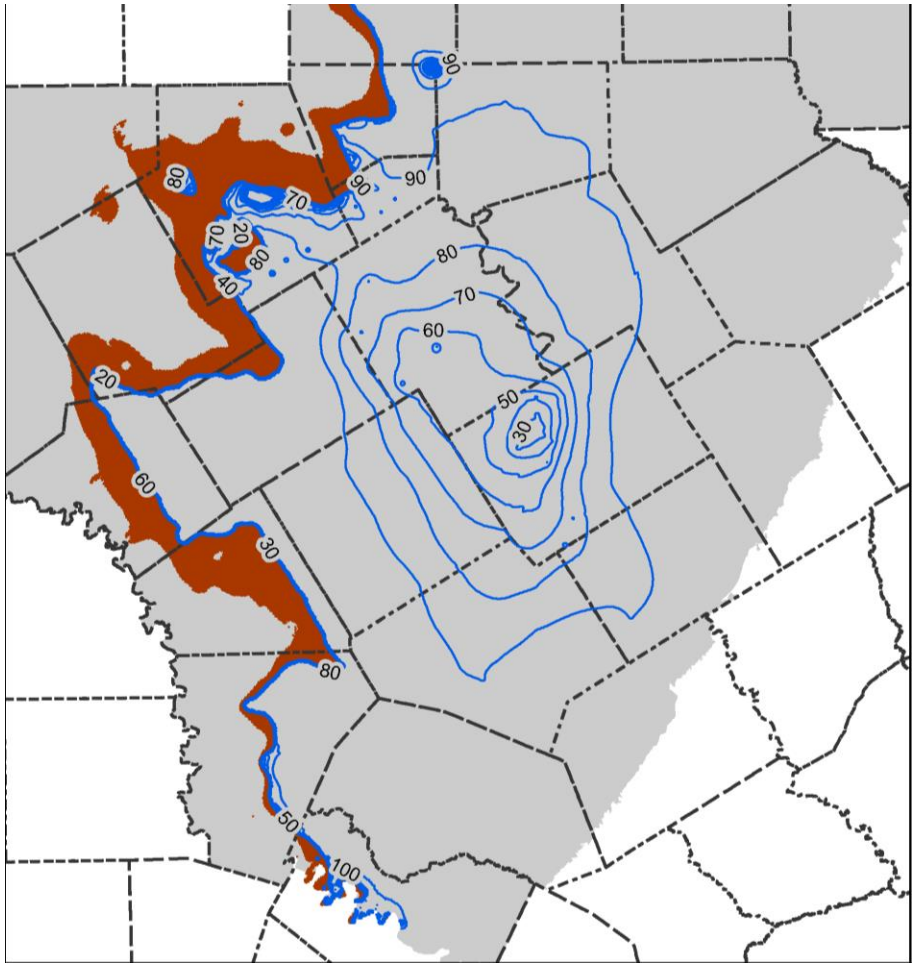
Hosston Aquifer



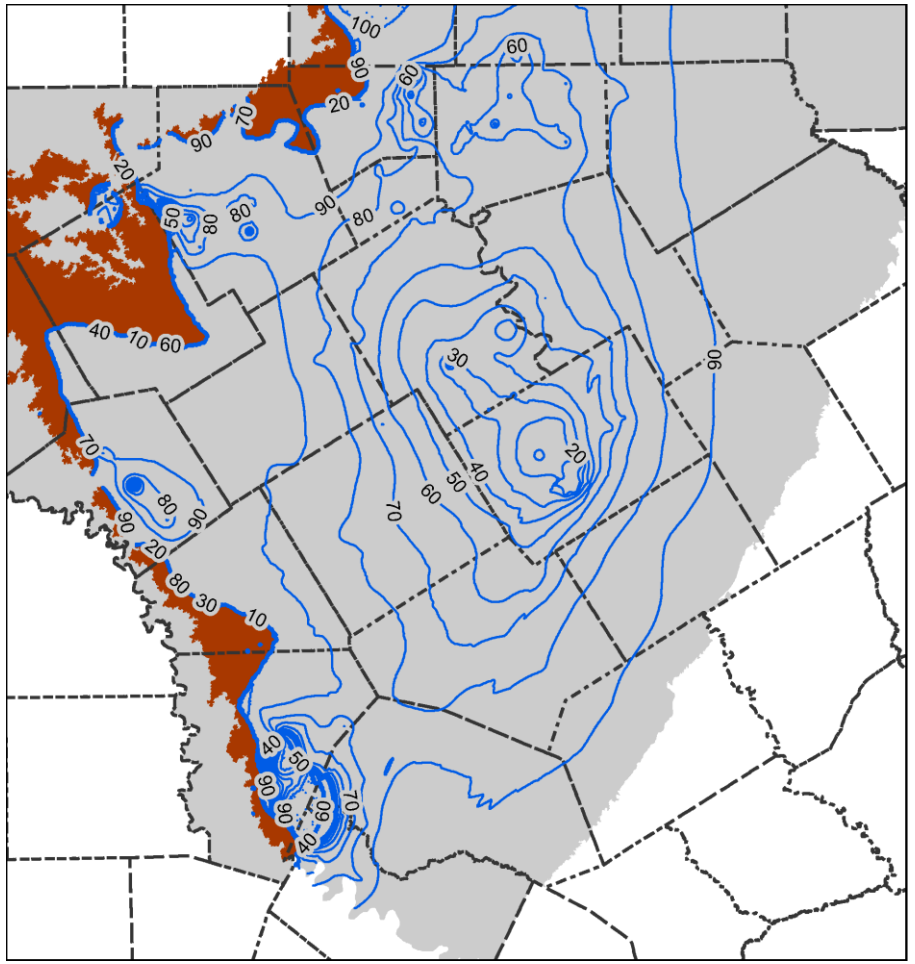
Simulation Results

Percent of 2010 Artesian Head Remaining in 2070

Hensell Aquifer



Hosston Aquifer

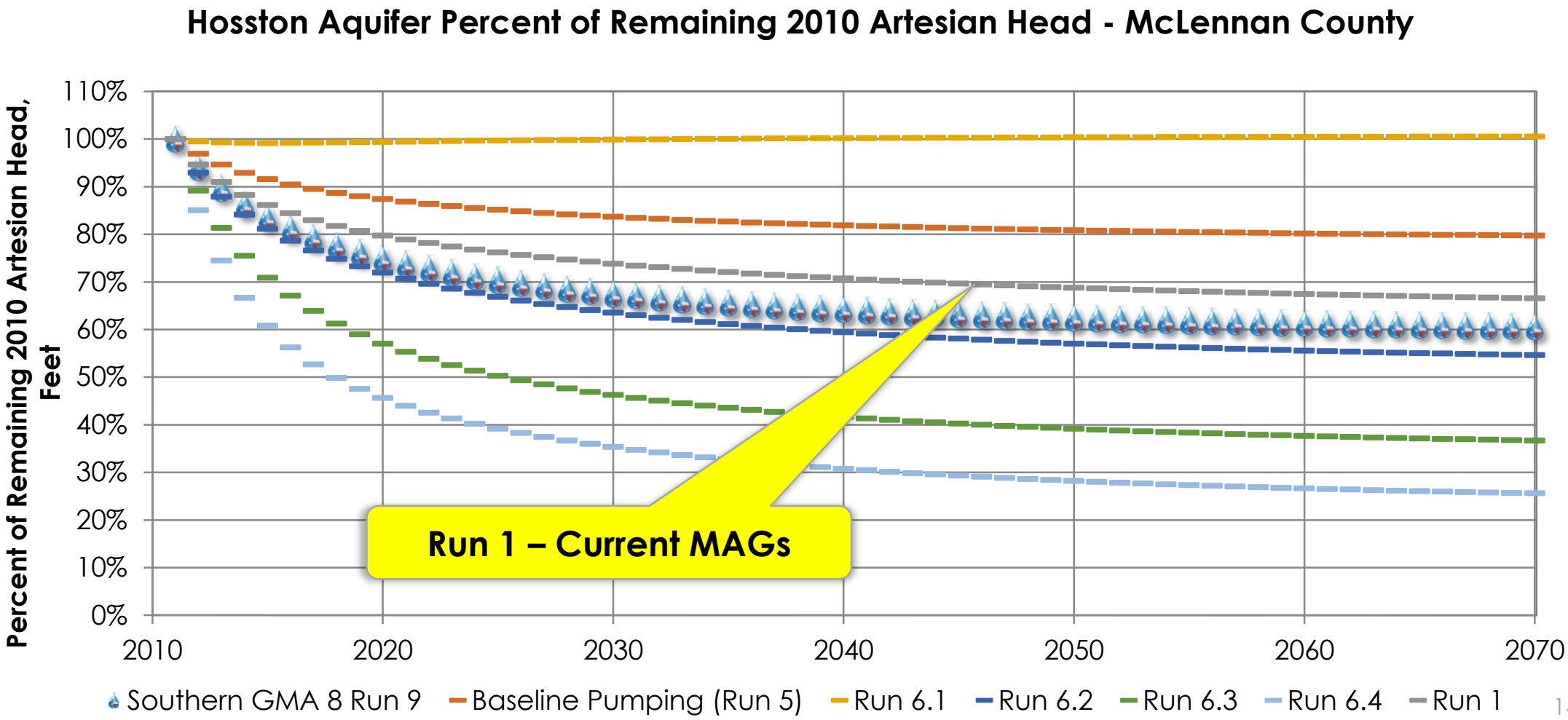


Average Percent of 2010 Available Drawdown Remaining in 2070 (Artesian Head)

South GMA 8 Run 9 - Percent of 2010 Average Artesian Head Remaining in 2070							
County	Woodbine	Wash/Fred	Paluxy	Glen Rose	Hensell	Pearsall	Hosston
Bell	96%	92%	93%	89%	90%	82%	79%
Bosque	N/A	N/A	96%	49%	68%	56%	51%
Burnet	N/A	N/A	N/A	N/A	97%	91%	89%
Comanche	N/A	N/A	N/A	N/A	96%	97%	96%
Coryell	N/A	N/A	96%	78%	82%	72%	70%
Ellis	92%	95%	97%	93%	95%	92%	92%
Erath	N/A	N/A	98%	91%	87%	90%	90%
Falls	93%	88%	90%	89%	91%	88%	89%
Hamilton	N/A	N/A	97%	94%	94%	89%	88%
Hill	92%	92%	96%	86%	88%	79%	77%
Johnson	95%	99%	112%	87%	90%	75%	67%
Lampasas	N/A	N/A	N/A	N/A	98%	93%	92%
McLennan	95%	90%	95%	83%	82%	66%	61%
Milam	94%	91%	93%	92%	94%	93%	94%
Somervell	N/A	N/A	95%	91%	88%	81%	78%
Travis	95%	91%	94%	95%	98%	95%	93%
Williamson	96%	91%	94%	93%	96%	93%	91%

Simulation Results

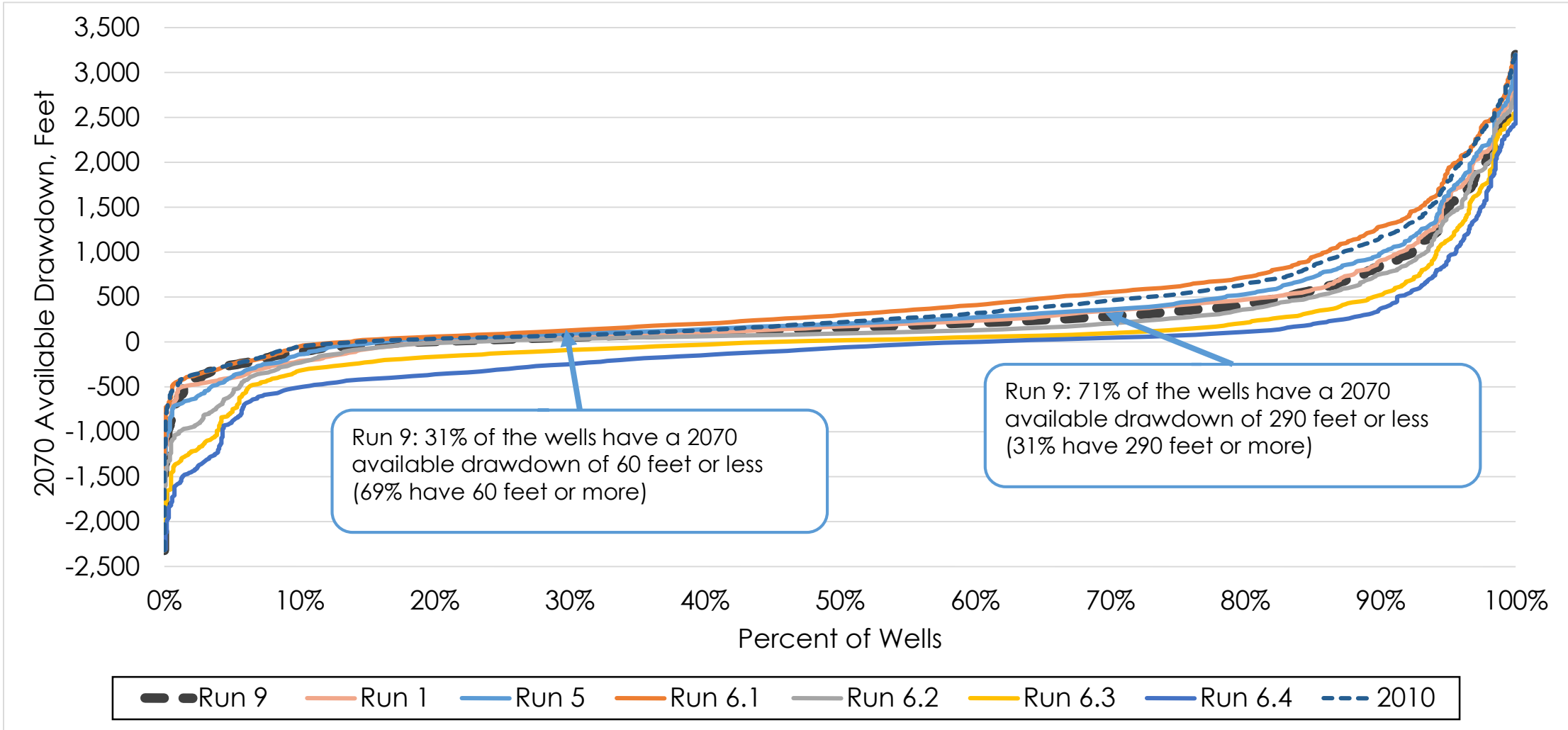
Percent of 2010 Average Artesian Head Remaining in 2070



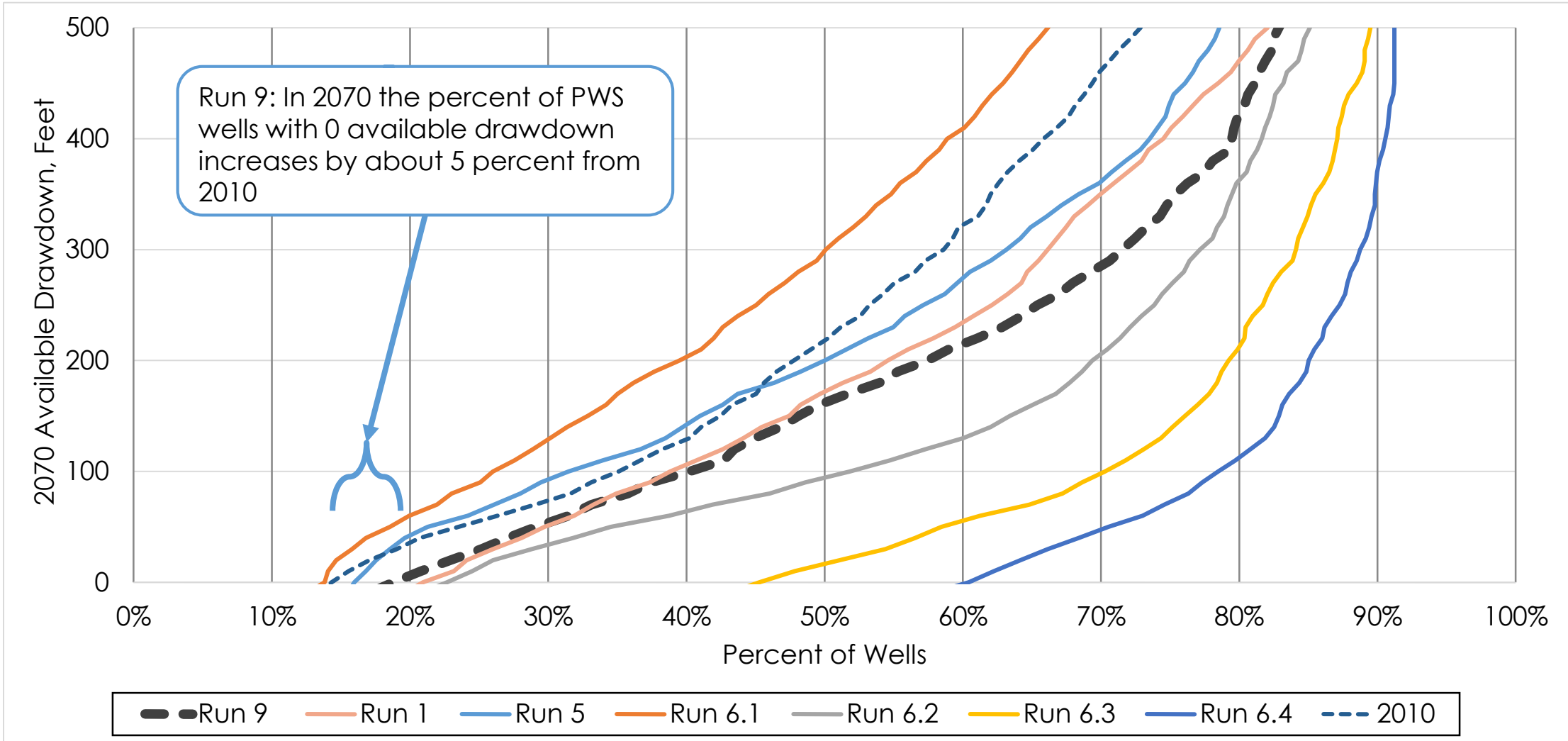
Simulation Results
Public Water Supply Well Impacts

- Calculated as Remaining Available Drawdown
- Available Drawdown Defined as the Difference Between:
  - The water level and the top of the screen; or,
  - The water level and where the well diameter is 6 inches or less.
- Presented as:
  - Percent of wells with more or less particular available drawdown
  - Number of wells with more or less particular available drawdown

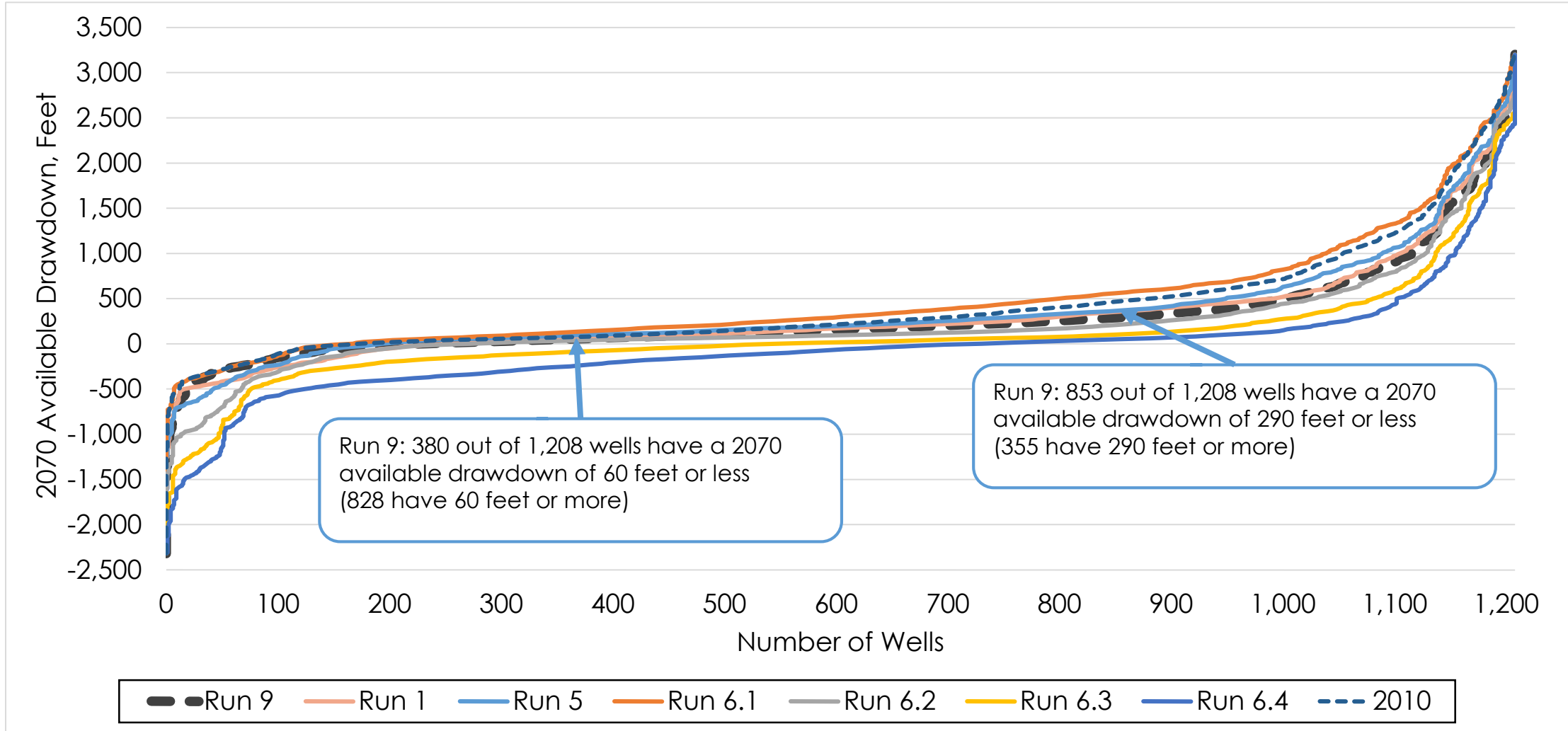
Public Water Supply Well Impacts



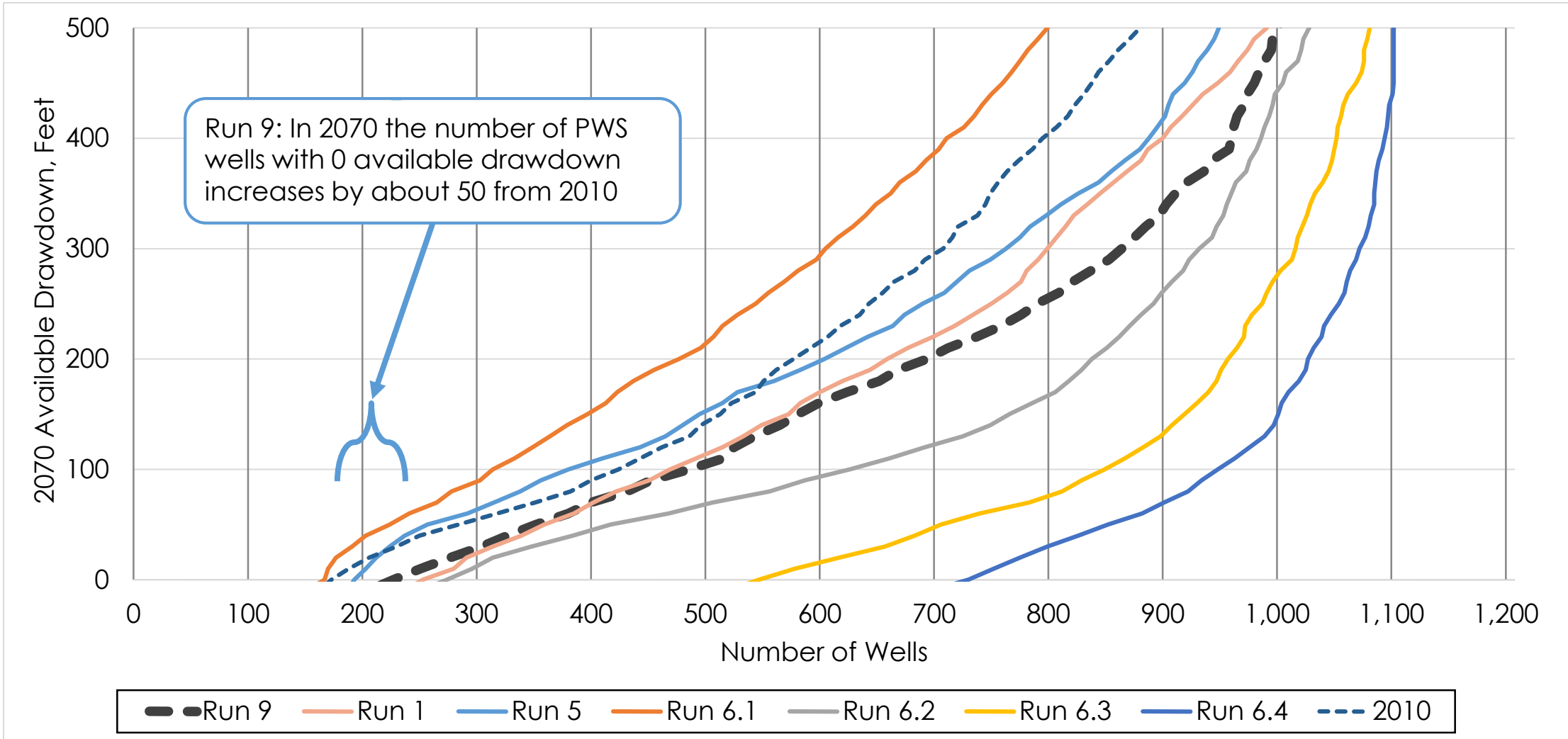
Public Water Supply Well Impacts



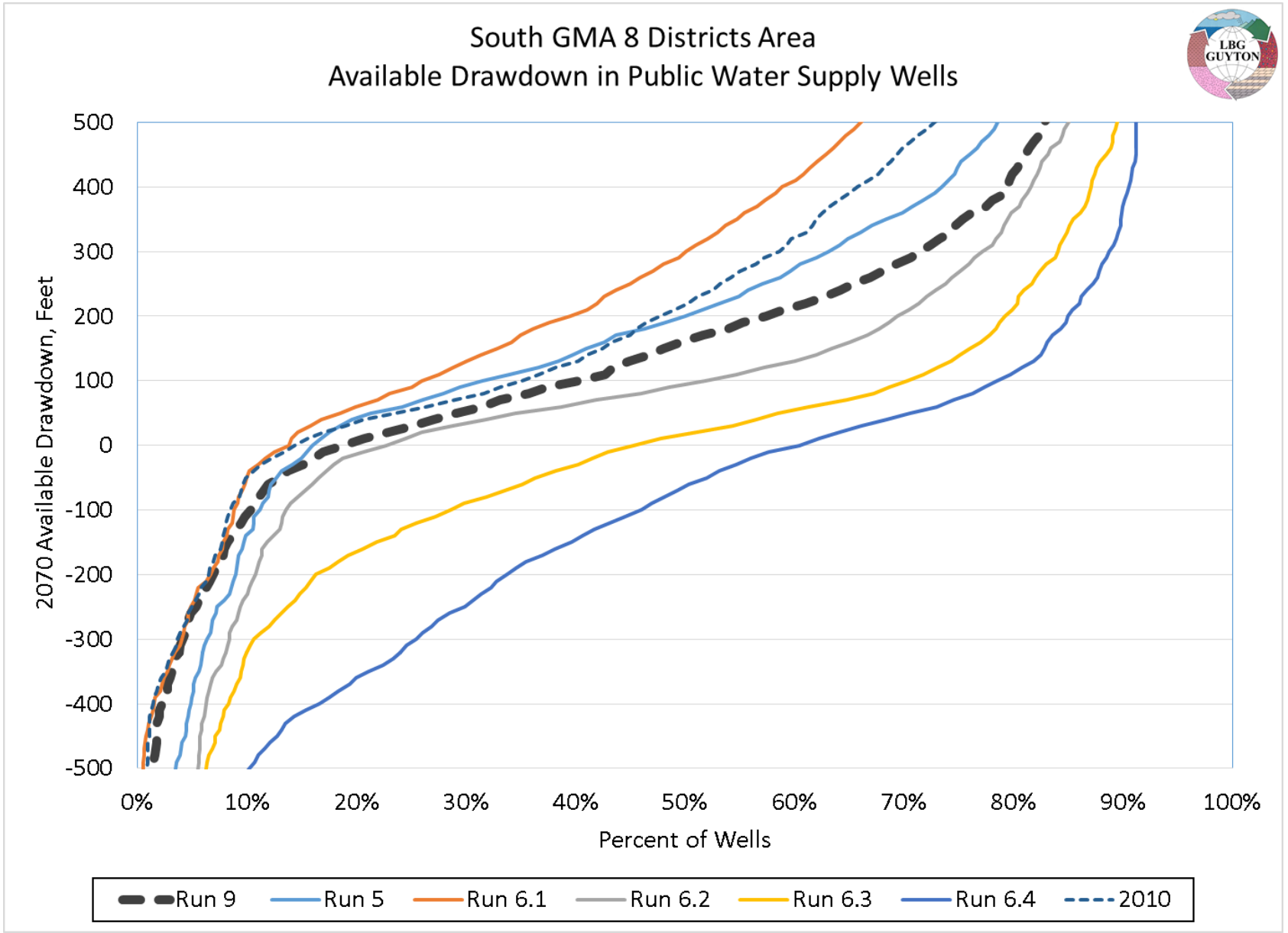
Public Water Supply Well Impacts



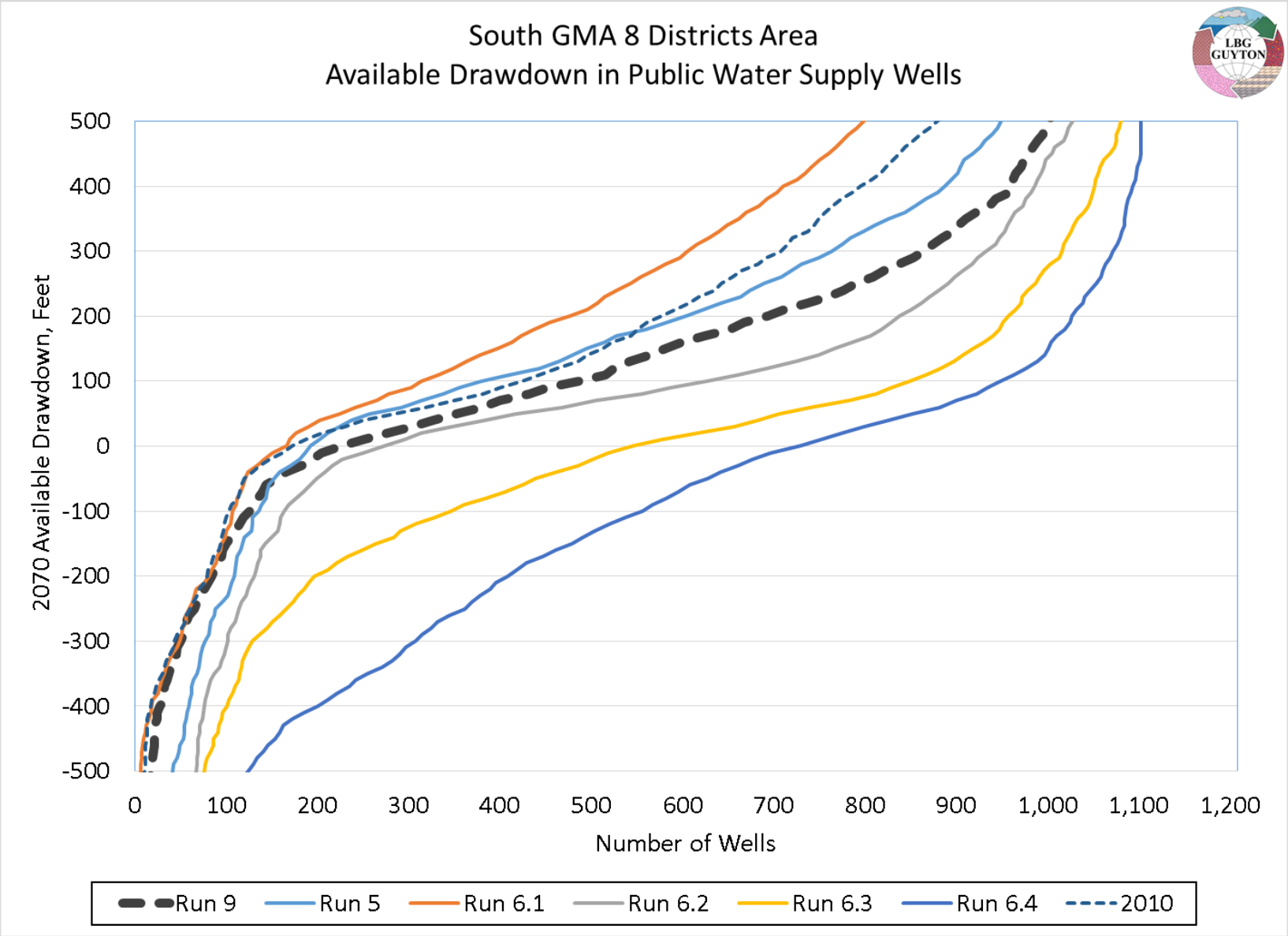
Public Water Supply Well Impacts



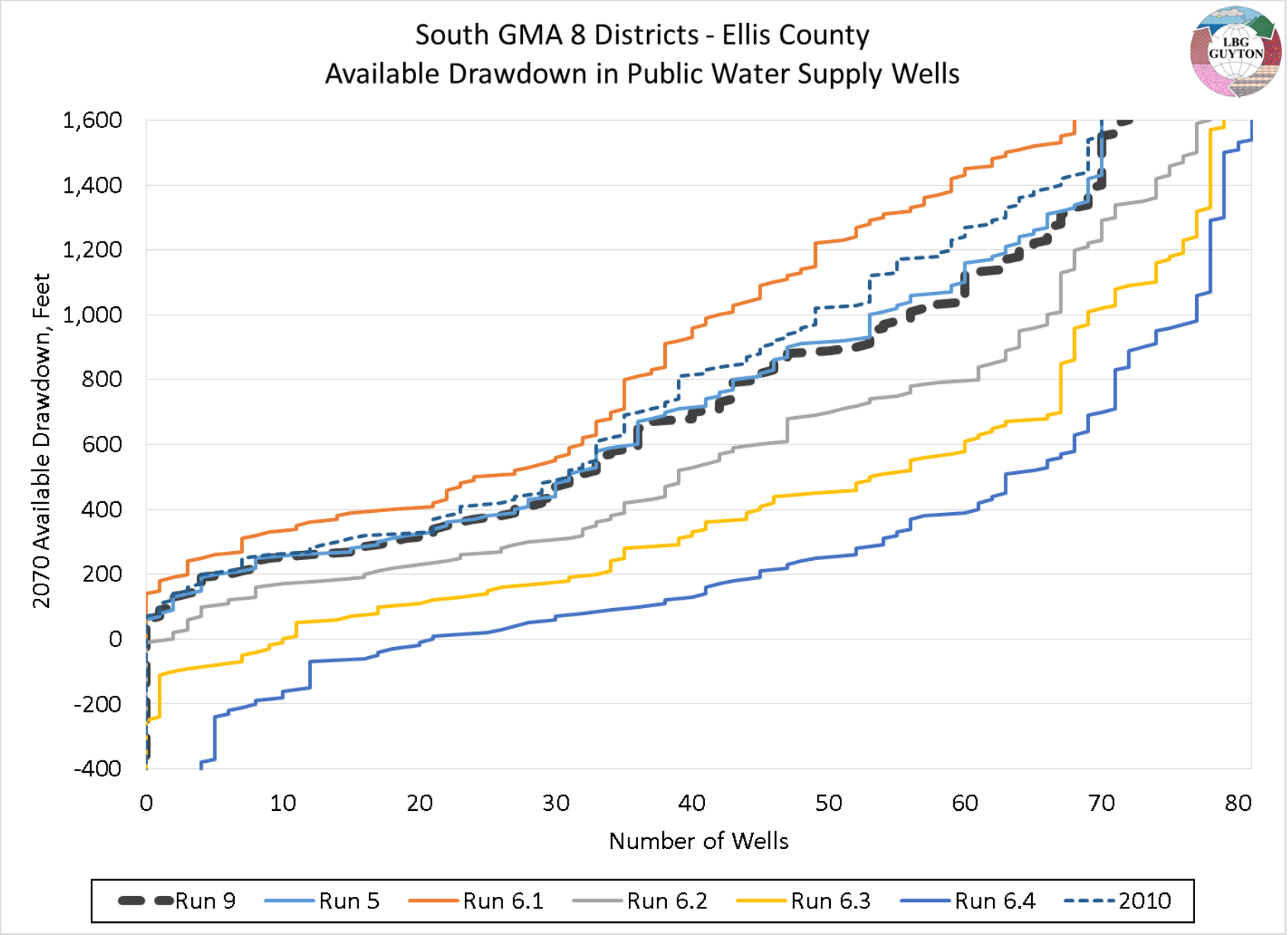
Public Water Supply Well Impacts



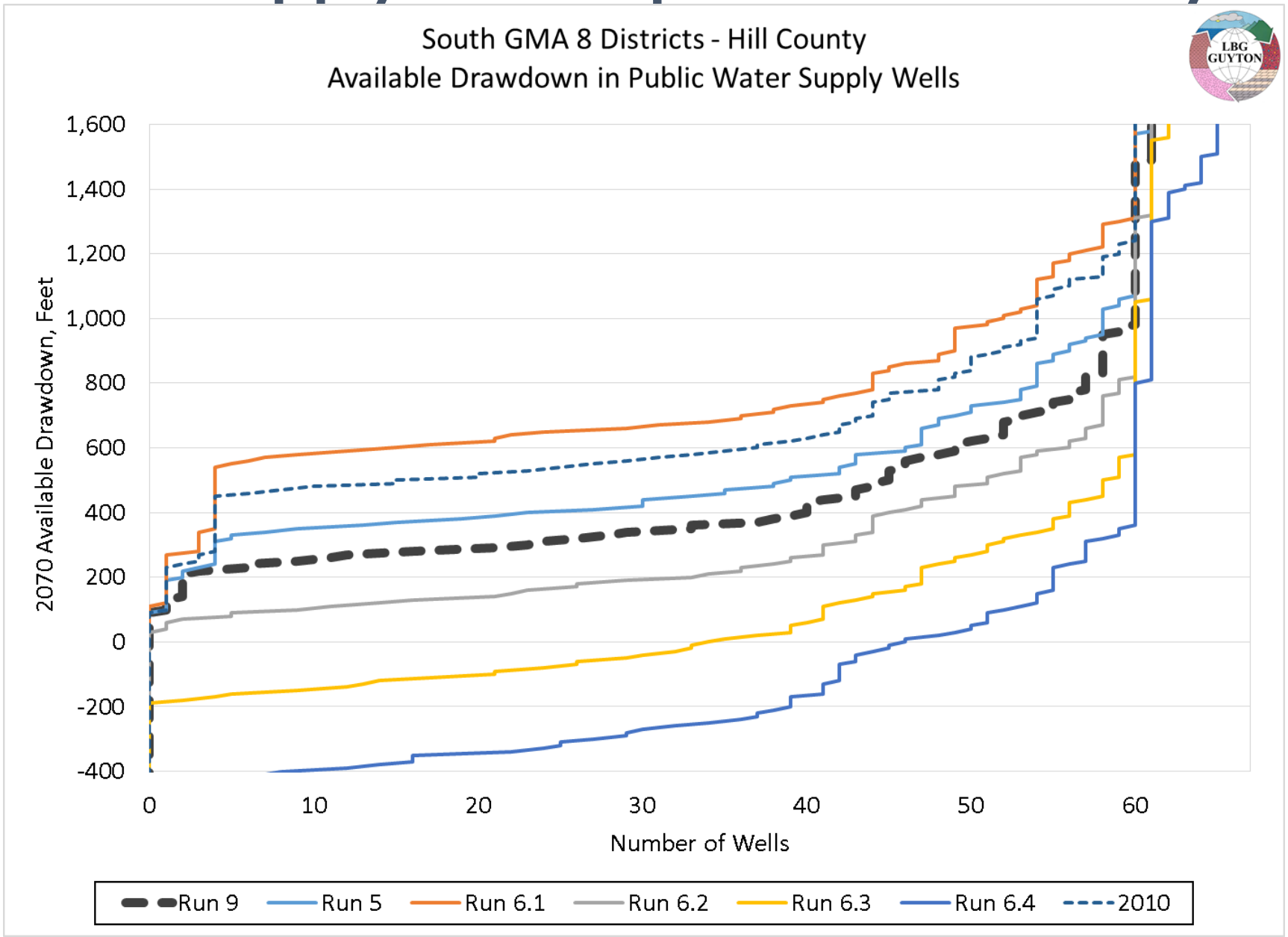
Public Water Supply Well Impacts



Public Water Supply Well Impacts – Ellis County



Public Water Supply Well Impacts – Hill County



Simulation Results
Public Water Supply Well Impacts

South GMA 8 Run 9 - PWS Well 2070 Available Drawdown						
County	PWS Wells*	Less than 50 feet	50 to 100 feet	100 to 250 feet	250 to 500 feet	More than 500 feet
Bell	36	11	1	0	3	21
Bosque	87	3	12	50	21	1
Burnet	36	22	8	6	0	0
Comanche	10	3	7	0	0	0
Coryell	34	0	0	19	15	0
Ellis	81	0	2	7	22	50
Erath	91	39	40	11	1	0
Falls	15	3	0	0	0	12
Hamilton	12	5	1	6	0	0
Hill	67	0	1	8	36	22
Johnson	272	94	32	94	46	6
Lampasas	12	2	7	3	0	0
McLennan	171	23	5	22	42	79
Somervell	57	1	3	52	1	0
Travis	91	64	4	10	9	4
Williamson	136	82	11	16	15	12

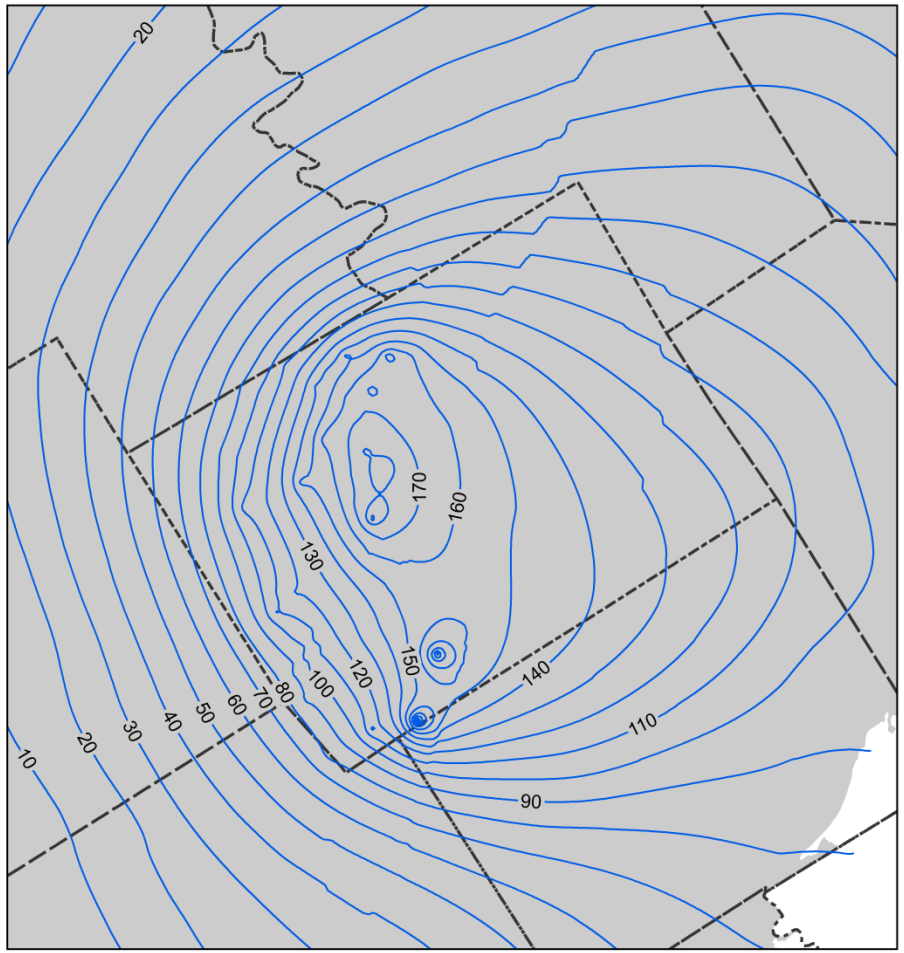
*Only public water supply wells (PWS) completed in one or more of the modeled aquifers are included in the calculation.

Simulation Results
Effects on Neighbors

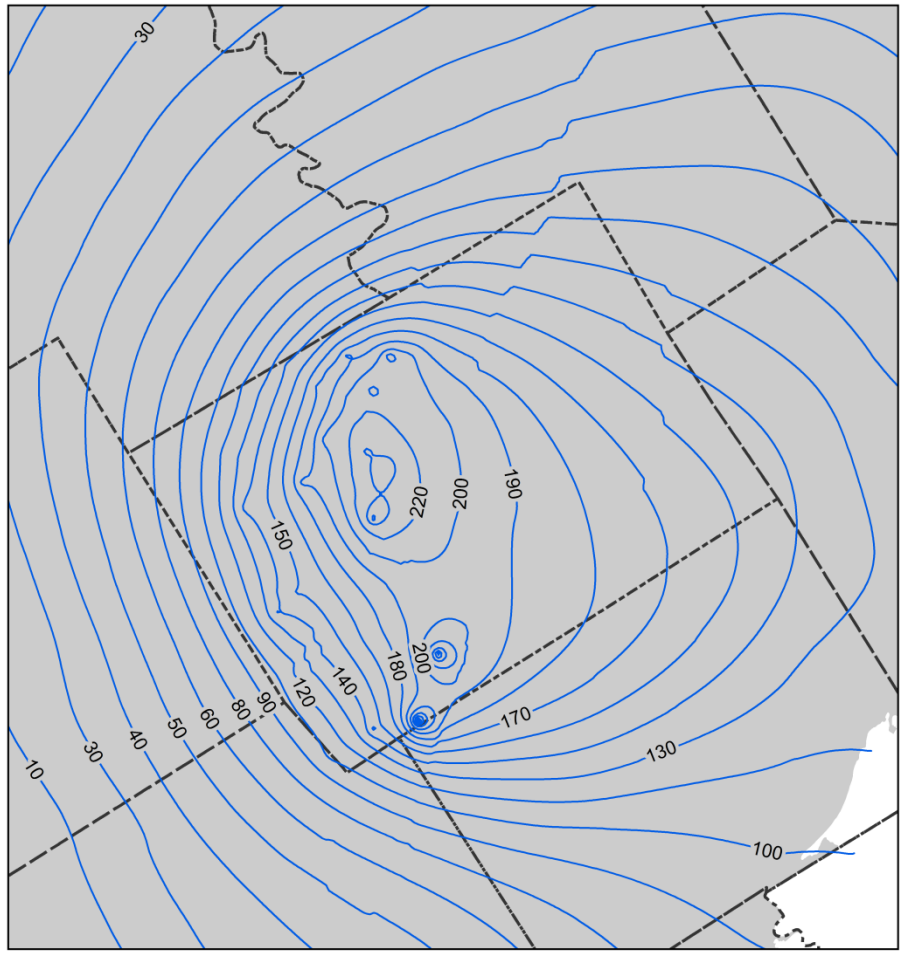
- Use Run 7 to Evaluate Effects of Changing Pumping
- Ratio of Run 9 Increased Pumping to Run 7 Increase Pumping Multiplied by Additional Drawdown
- For Example:
  - Bell County Hosston Run 7 Increase = 720 Acre-Feet per Year
  - Bell County Hosston Run 9 Increase = 6,319 Acre-Feet per Year
  - Ratio: 6,319 / 720 = 8.78
  - Additional Drawdown: 8.78 x Run 7 results

Simulation Results
2070 Additional Drawdown

Hensell Aquifer – McLennan County
Run 7 Add'l Drawdown

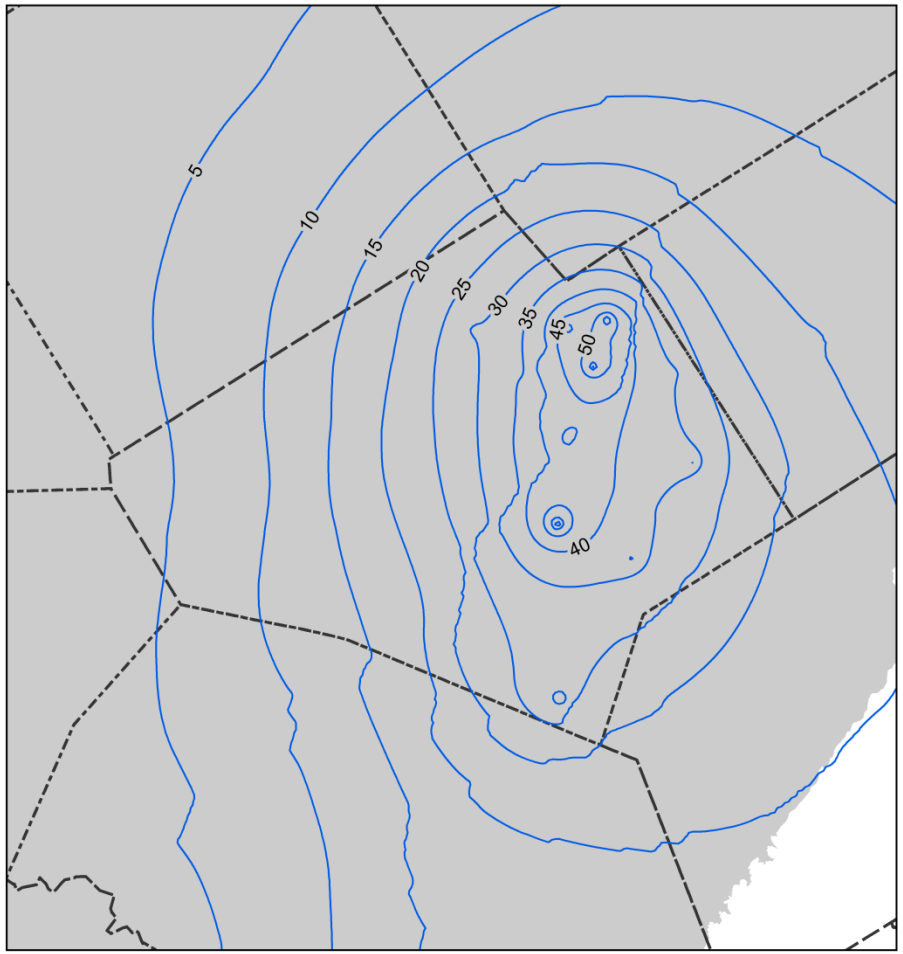


Hensell Aquifer – McLennan County
Run 9 Add'l Drawdown (Run 7 x 1.28)

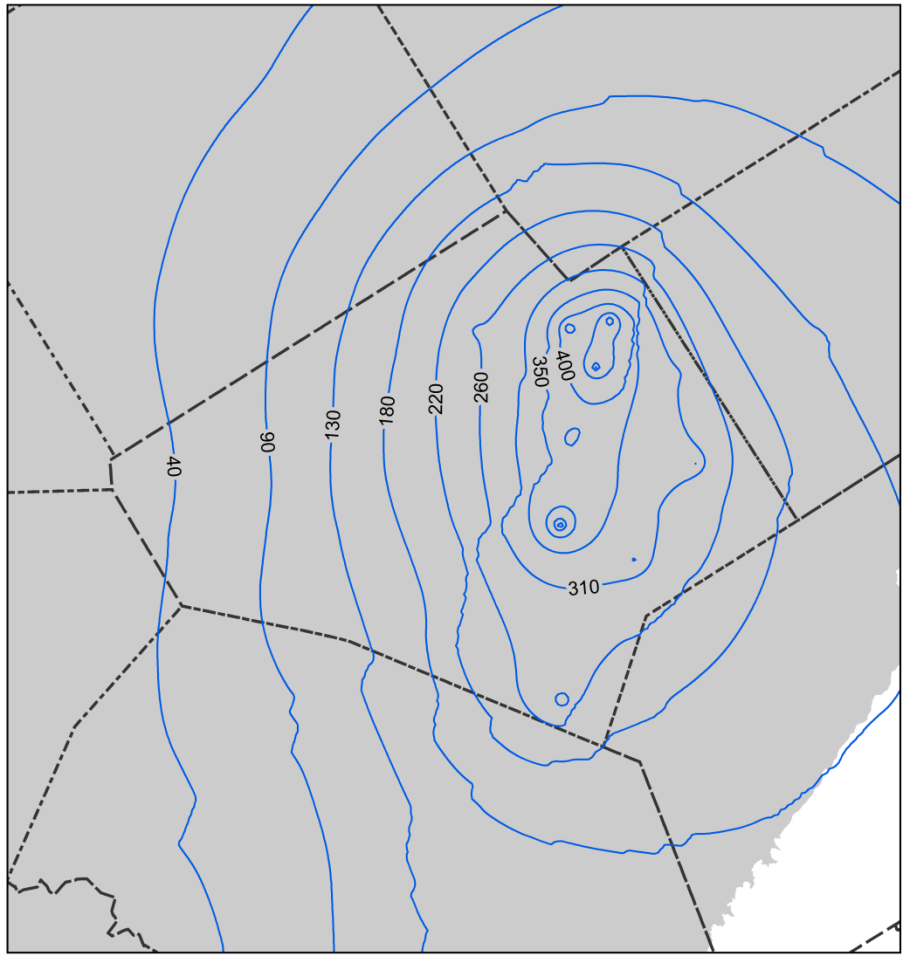


Simulation Results
2070 Additional Drawdown

Hosston Aquifer – Bell County
Run 7 Add'l Drawdown



Hosston Aquifer – Bell County
Run 9 Add'l Drawdown (Run 7 x 8.78)



Run 9 Findings

- Bell and Burnet Counties have relatively large increase in pumping, but the water level decline is significantly less than when all counties increase to 1.9
- Generally – Run 9 impacts on PWS wells are significantly less than consistent Run 6.2, 6.3, and 6.4
- GMA-8 needs to decide what the DFC should be counties with no districts

Questions