Brazos Valley Groundwater Conservation District

GMA 12
Scenario PS4-1

and

Other Scenarios

May 8, 2025

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PS4-1

P = Pumping

S = Scenario

4 = Fourth Round of Joint Planning

1 = First scenario (All permits in all GCDs)

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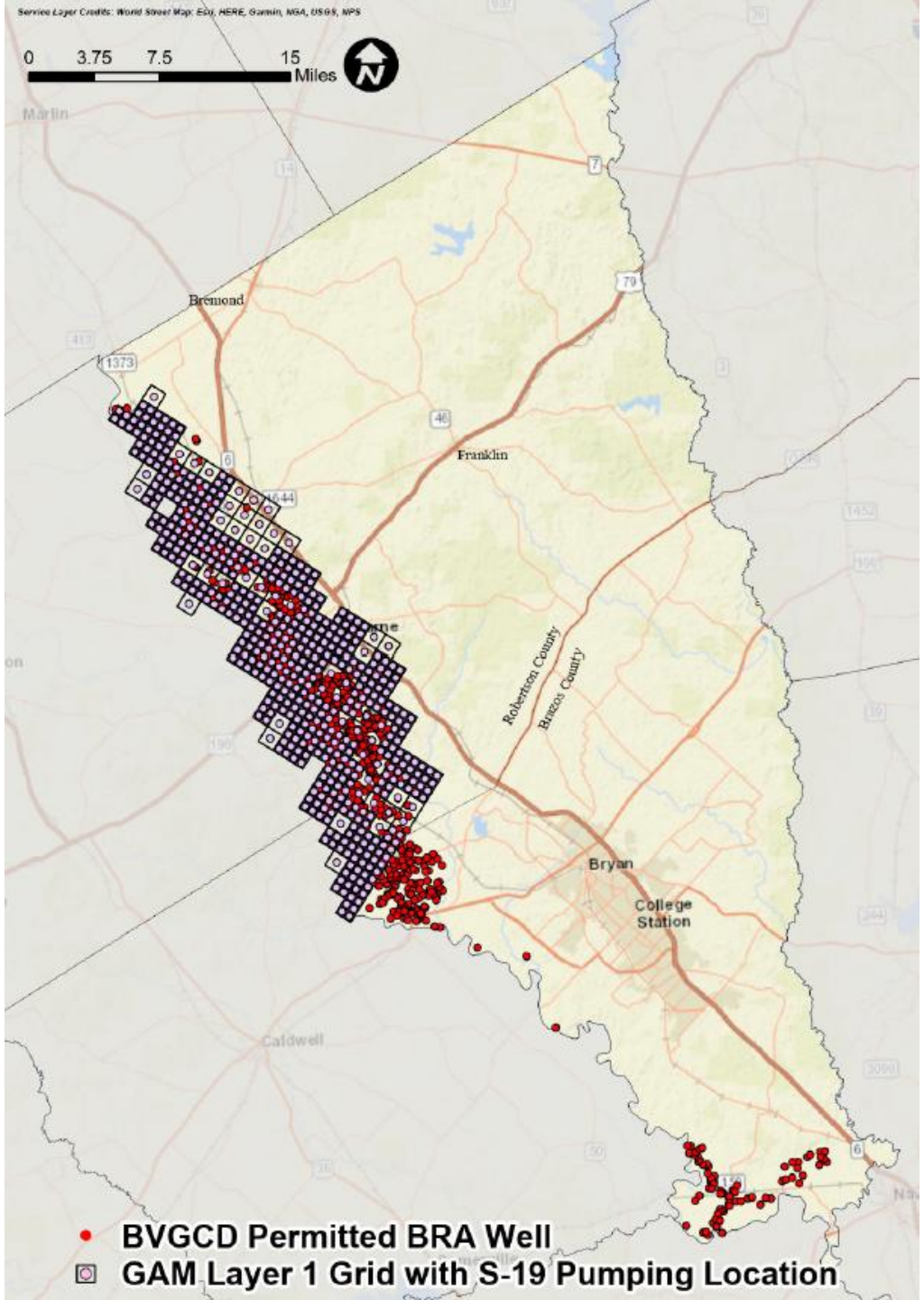
S-19 All Permits Run (PS4-1)

- S-19 is the Base Run
- Pumping in model layers 2 - 10 was removed from all GCDs from S-19 starting in 2025
- Permitted pumping as provided by each GCD begins in 2025 at the full permitted value and is held constant through 2070
- No changes were made to the Alluvium pumping (layer 1).
- The Walnut Creek Mine pumping from the Simsboro Aquifer in Robertson County is not permitted by BVGCD and is not included in the All Permits Run (up to ~7,000 afy in S-19)
- Limestone County pumping still not included

Brazos River Alluvium

- The total permitted BRA = 96,049 afy
- PS4-1 BRA pumping included = 57,634 afy
  - Difference = 38,415 afy
- Permitted Pumping within Grid: 64,217 afy
- Permitted Pumping Outside Grid: 31,831afy
  - Difference of Permitted Pumping within GAM Grid: 6,584 afy
- Difference between permitted and pumping has very little impact on Carrizo-Wilcox, Sparta, Queen City
- Updated permit data provided to GMA12 consultants on May 1, 2025
- BRA Permitted Pumping has been updated in simulations going forward



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PS4-1 Pumping

(Presented at GMA-12)

Permitted Pumping – AGS (702,935 afy)

GCD	Sparta (afy)	Weches (afy)	Queen City (afy)	Reklaw (afy)	Carrizo (afy)	Calvert Bluff (afy)	Simsboro (afy)	Hooper (afy)
BVGCD	12,544	0	1,653	0	10,537	1,594	335,419	1,921
FCGCD	299	0	830	0	3,362	0	0	0
LPGCD	1,159	0	885	0	24,126	6,352	136,967	1,953
METGCD	3,506	8	1,037	0.2	785	5,590	2,159	2,274
POSGCD	7,166	34	1,477	36	18,457	5,953	112,790	2,063

Permitted Pumping – Intera (705,687 afy)

GCD	Sparta (afy)	Weches (afy)	Queen City (afy)	Reklaw (afy)	Carrizo (afy)	Calvert Bluff (afy)	Simsboro (afy)	Hooper (afy)
BVGCD	12,540	0	1,652	0	10,530	1,617	335,312	1,920
FCGCD	299	0	829	0	3,360	0	0	0
LPGCD	1,158	0	884	0	24,109	5,901	136,181	1,952
METGCD	3,503	8	1,036	0.2	785	5,586	2,158	2,272
POSGCD	7,161	34	1,597	36	18,444	7,114	115,532	2,177

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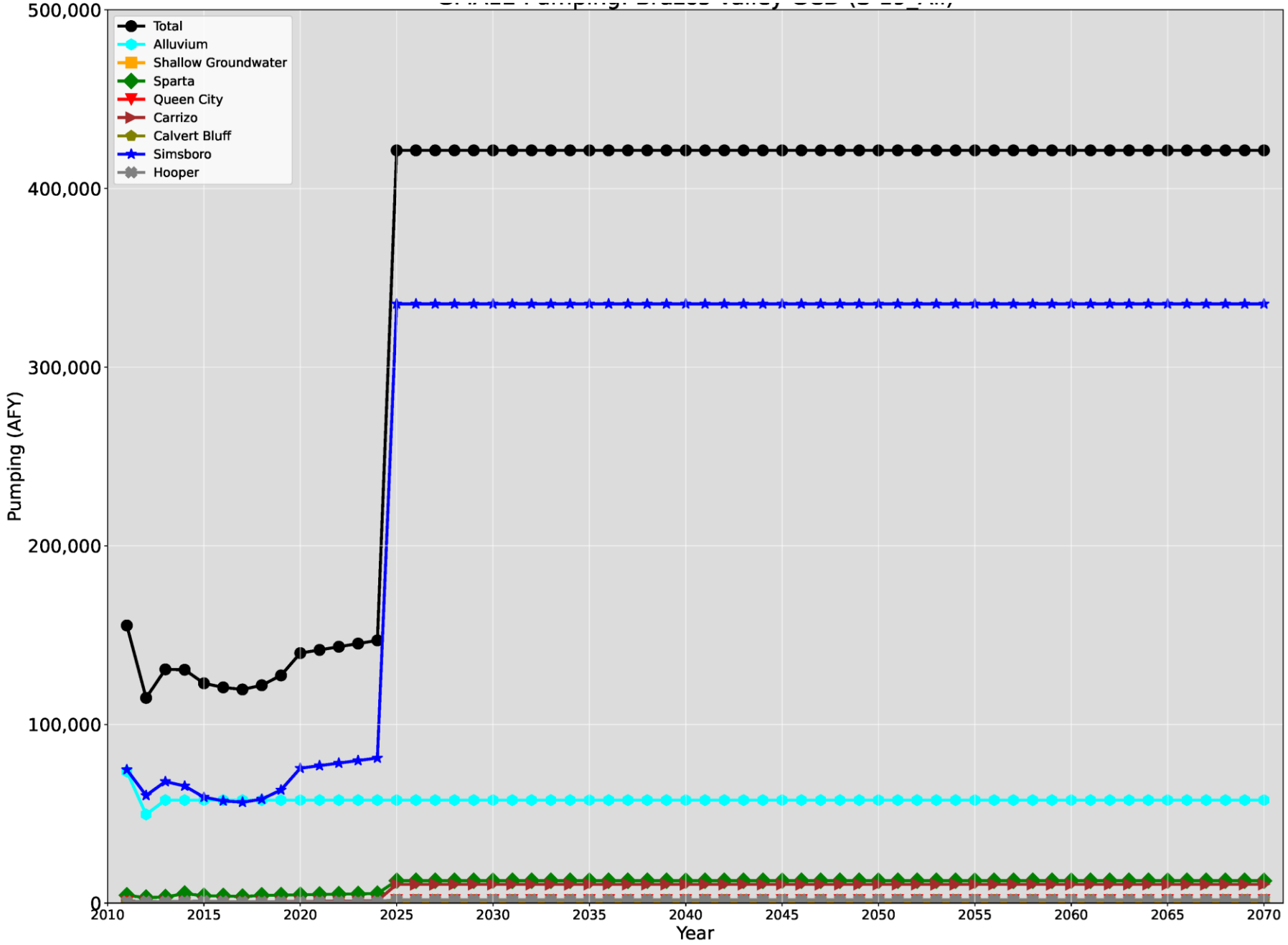
BVGCD Pumping: S-19 All Permits (PS4-1)



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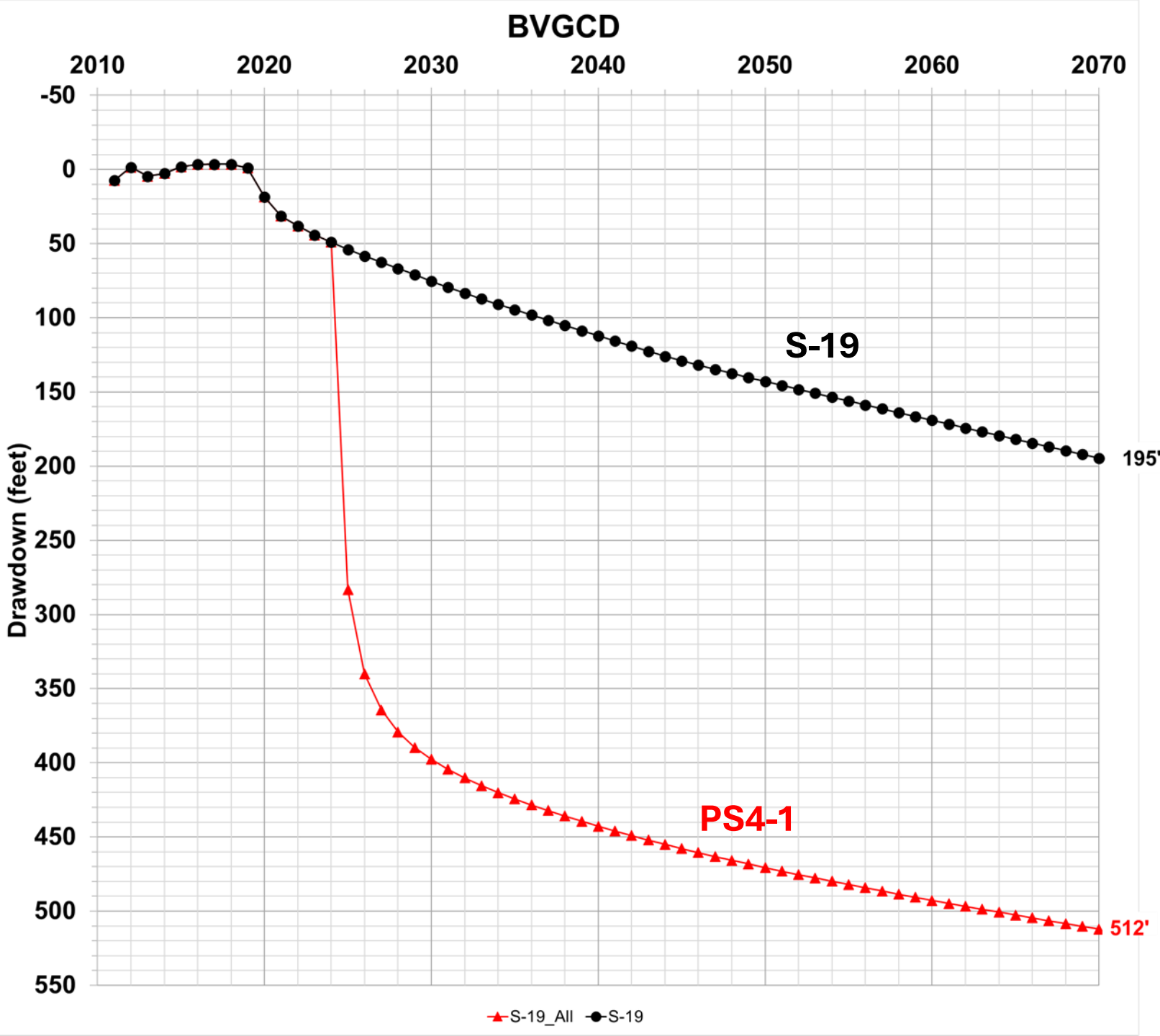
BVGCD Simsboro Drawdown



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2010-2070 Drawdown (S-19 & PS4-1)

S-19

S-19	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	22	28	134	132	240	138
POSGCD	32	30	162	156	278	178
BVGCD	47	40	72	89	195	136
METGCD	25	21	48	57	76	69
FCGCD	43	73	140	-	-	-

S-19 All Permits (PS4-1)

S-19_All Permits (AGS)	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	23	32	196	224	444	259
POSGCD	62	41	249	312	612	403
BVGCD	72	61	131	208	512	351
METGCD	34	29	62	89	132	119
FCGCD	30	68	169	-	-	-

Difference

Difference	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	1	5	62	92	204	121
POSGCD	30	11	87	156	335	226
BVGCD	24	21	59	120	317	214
METGCD	10	8	14	32	56	49
FCGCD	-12	-4	29	-	-	-

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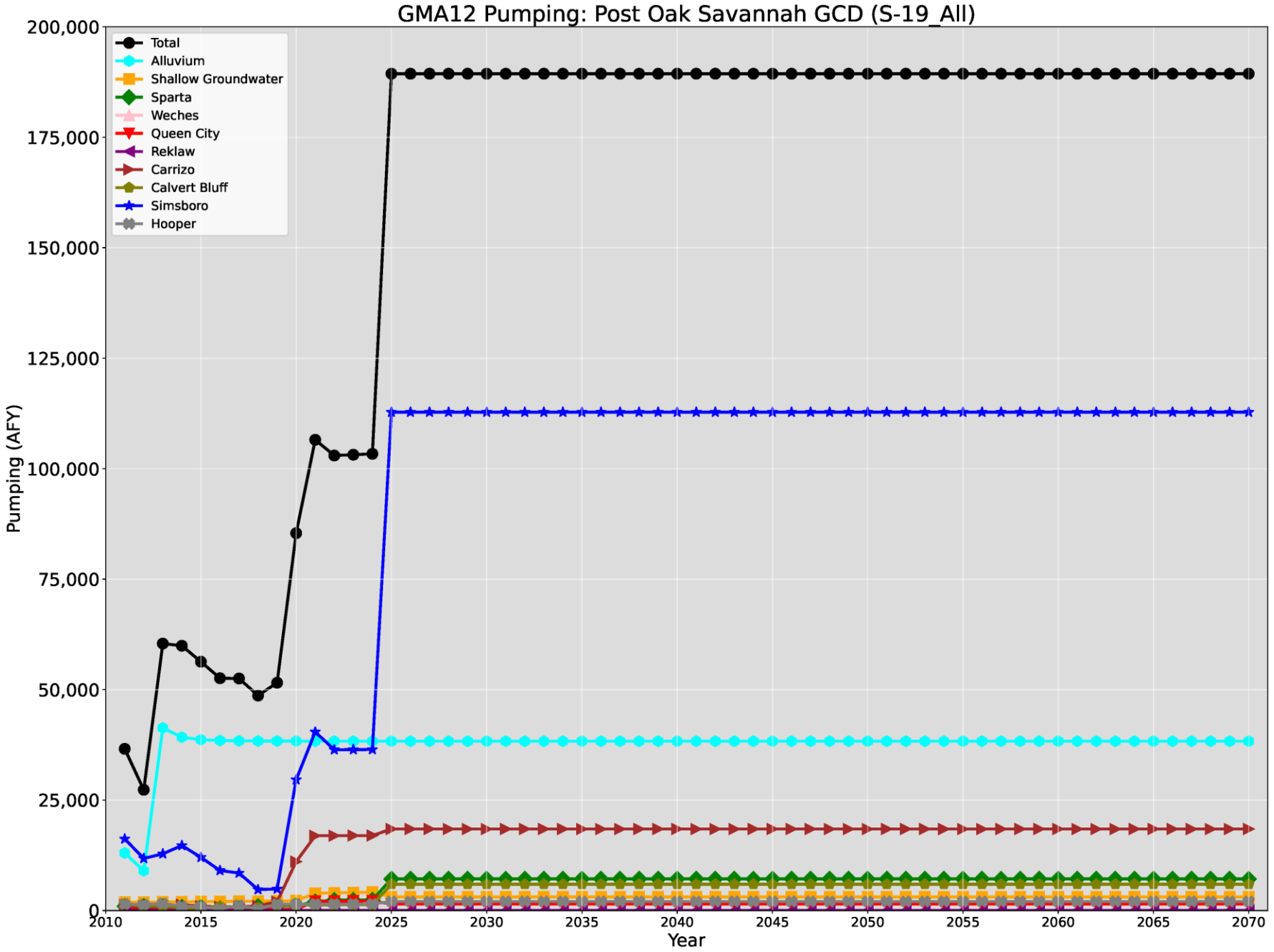
Support slides for PS4-1

POSGCD Pumping: S-19 All Permits Run (PS4-1)



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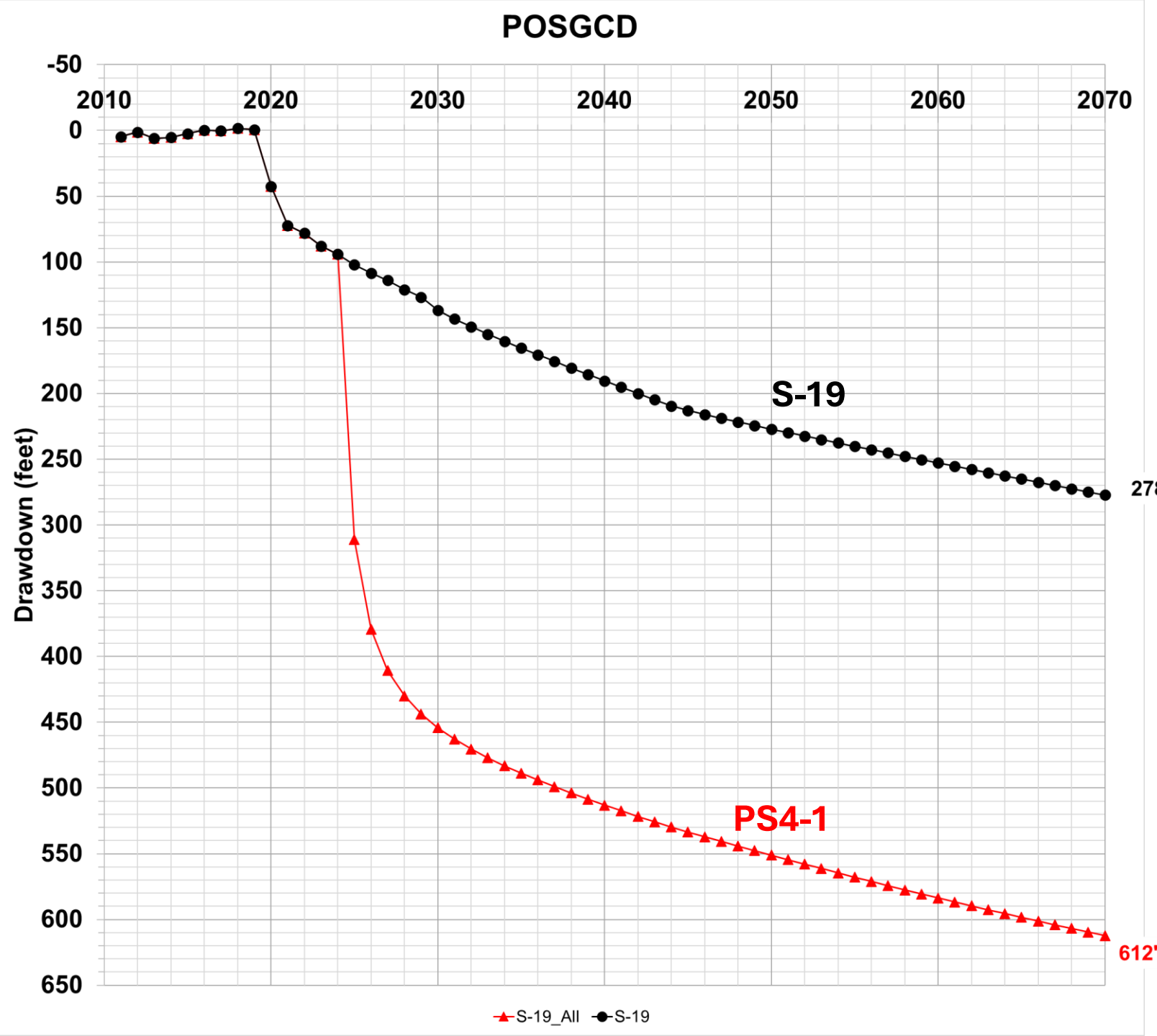
POSGCD Simsboro Drawdown



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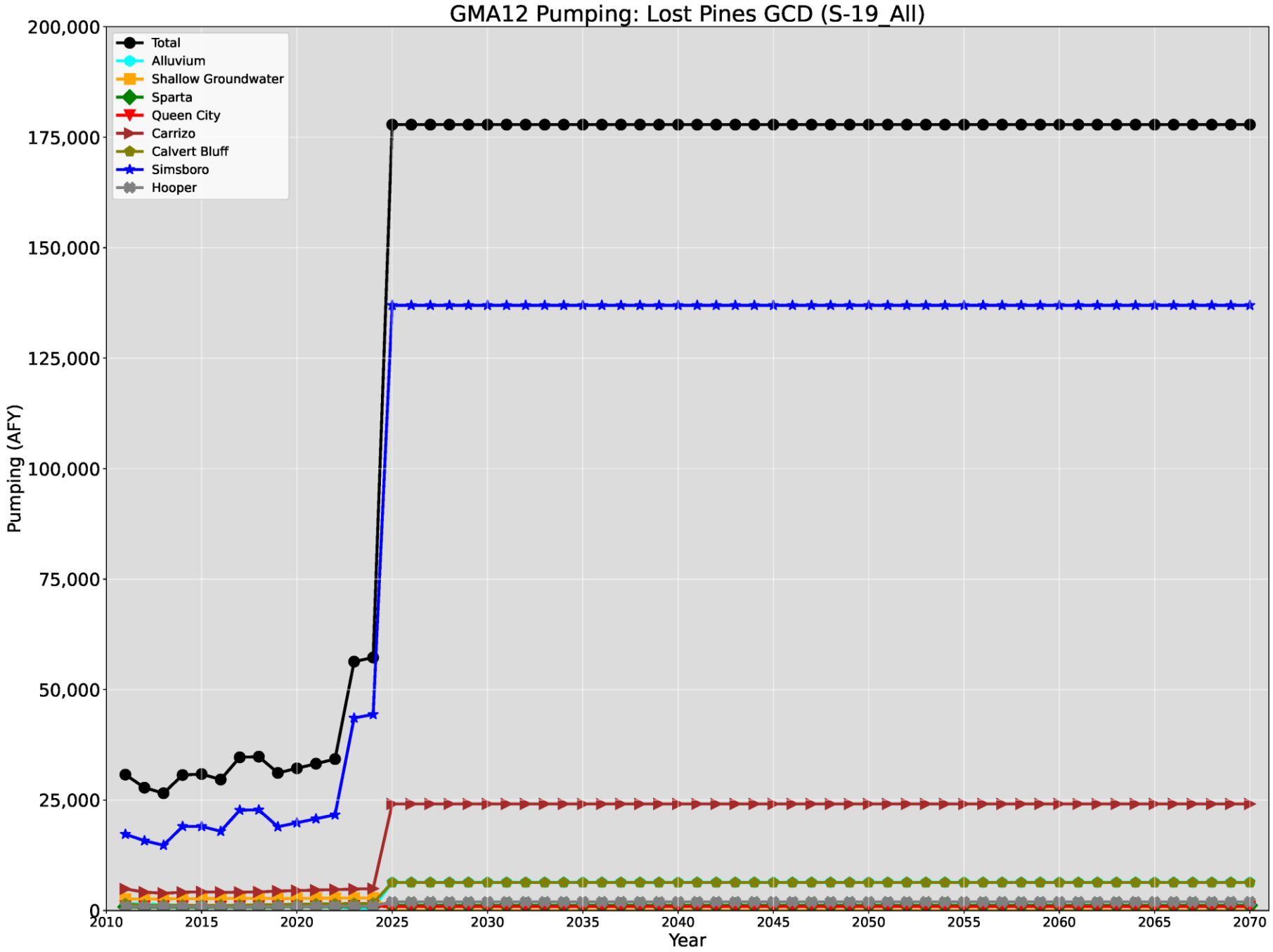
LPGCD Pumping: S-19 All Permits Run (PS4-1)



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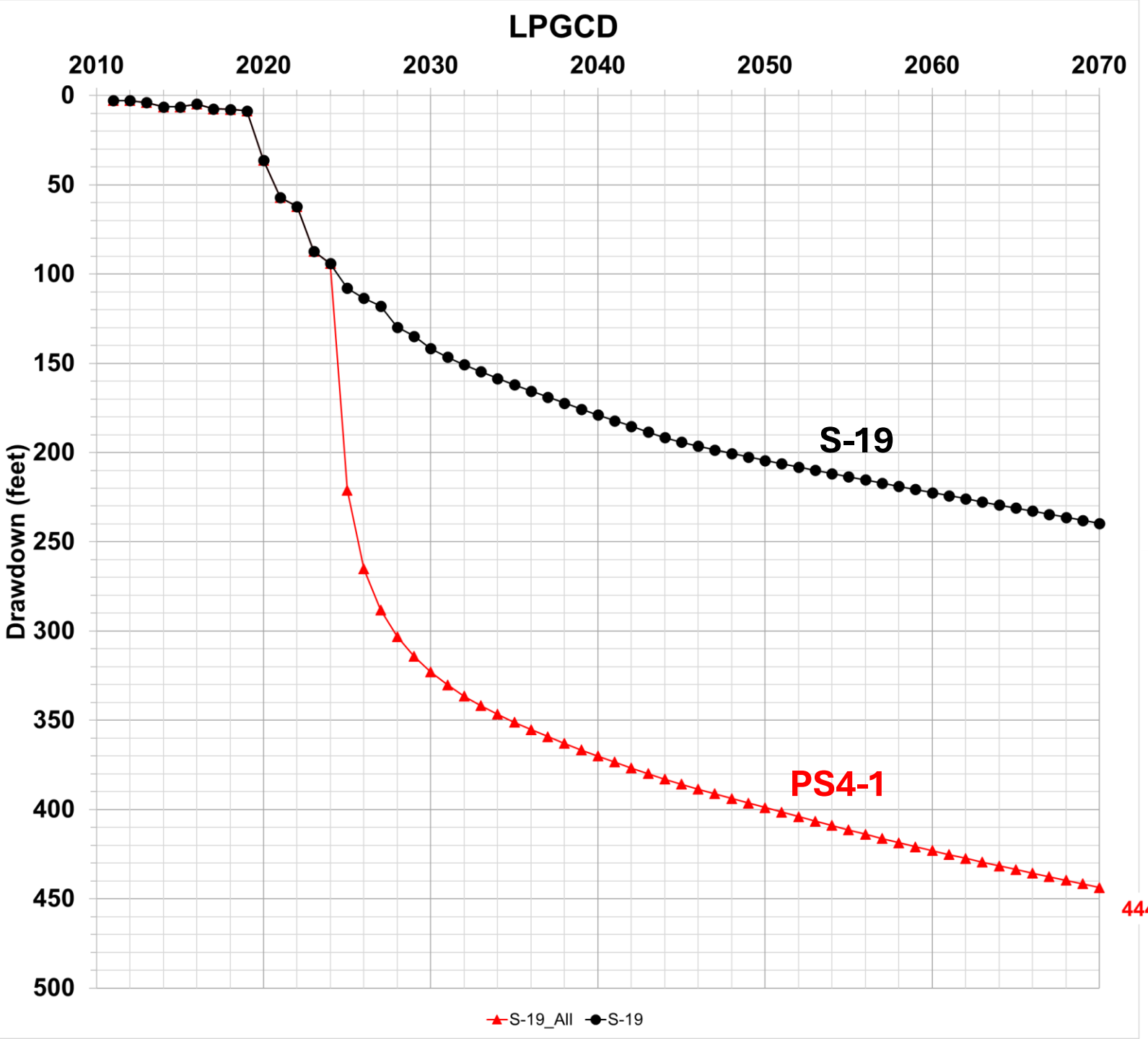
LPGCD Simsboro Drawdown



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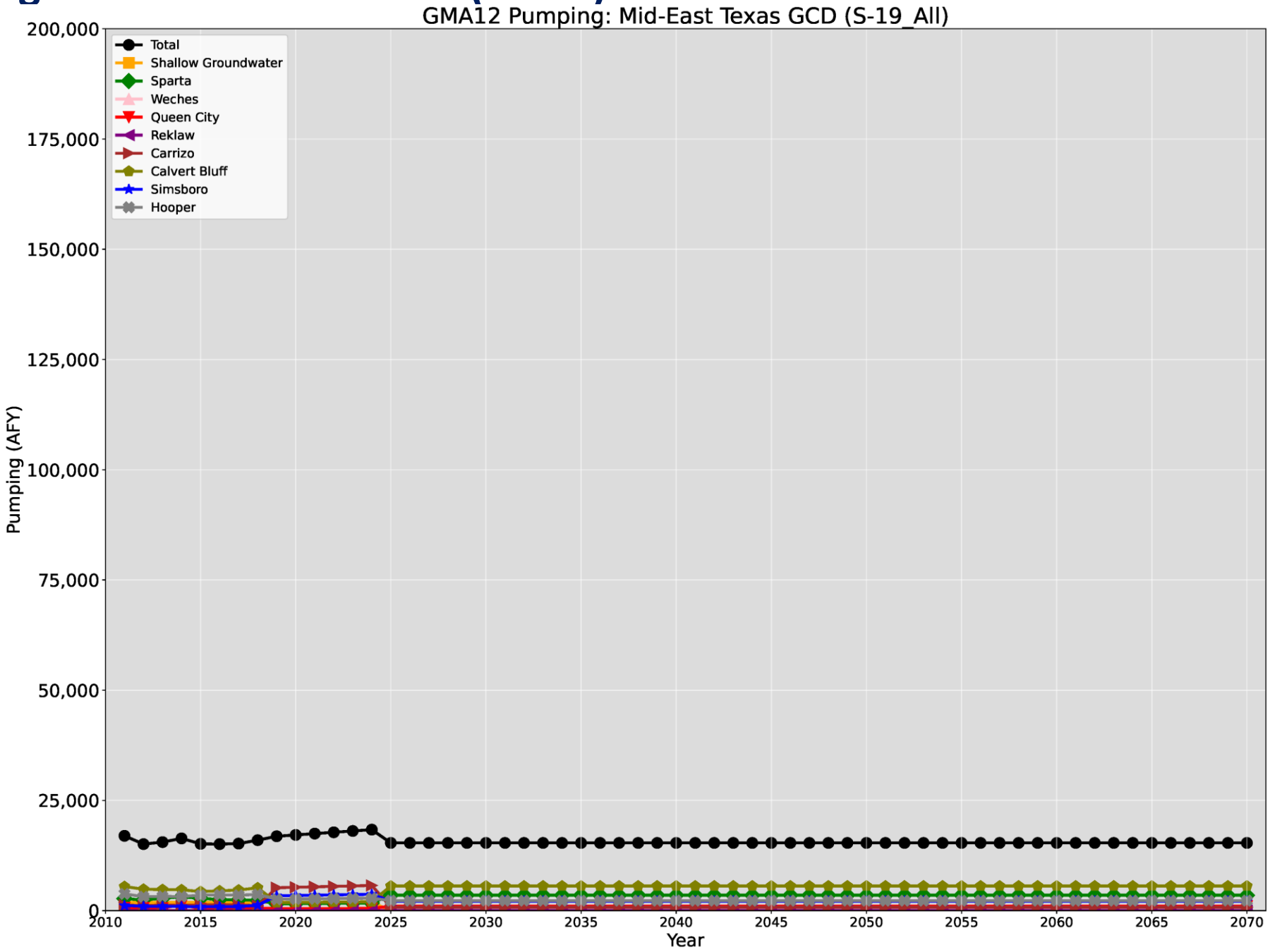
METGCD Pumping: S-19 All Permits Run (PS4-1)



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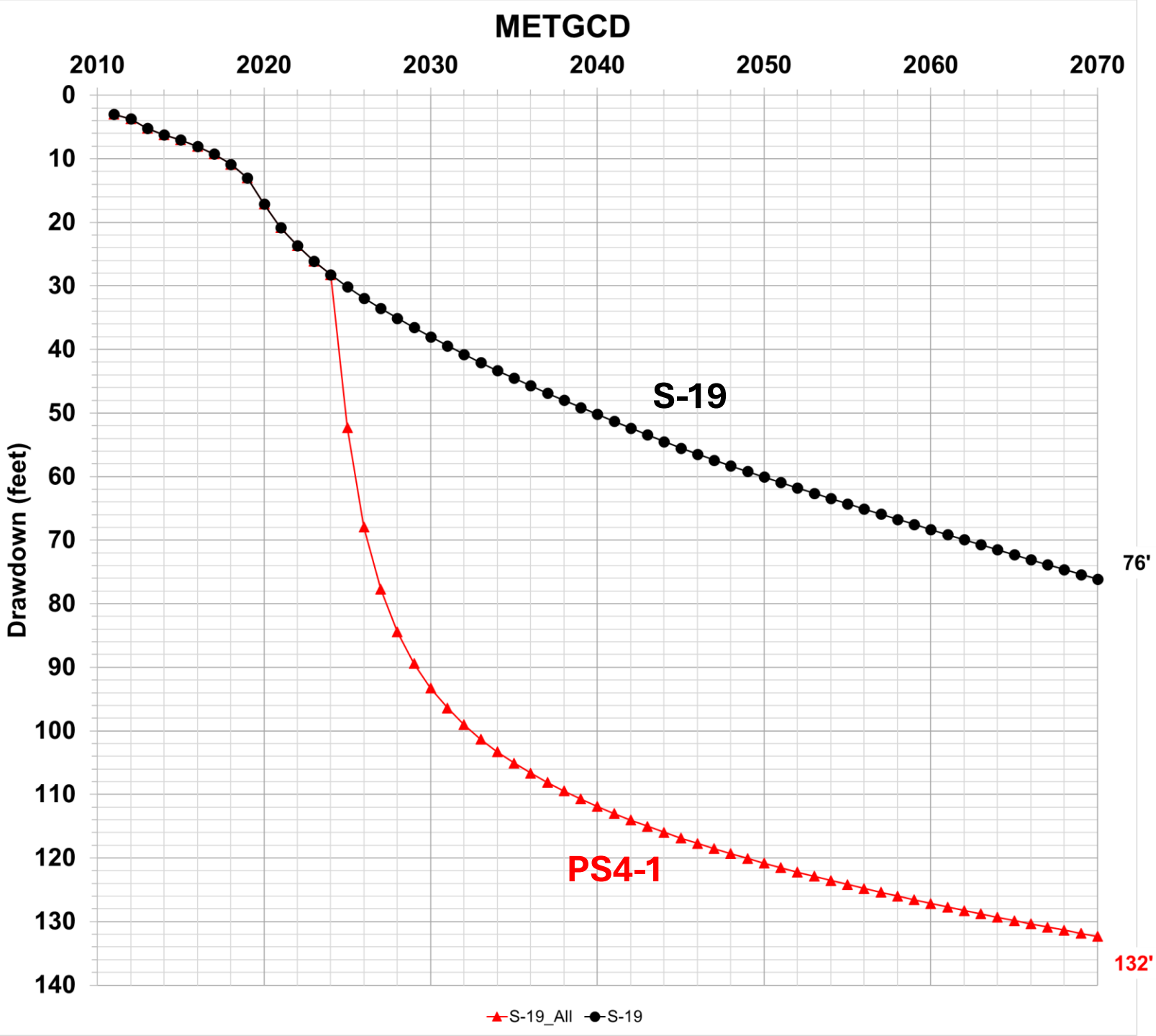
METGCD Simsboro Drawdown



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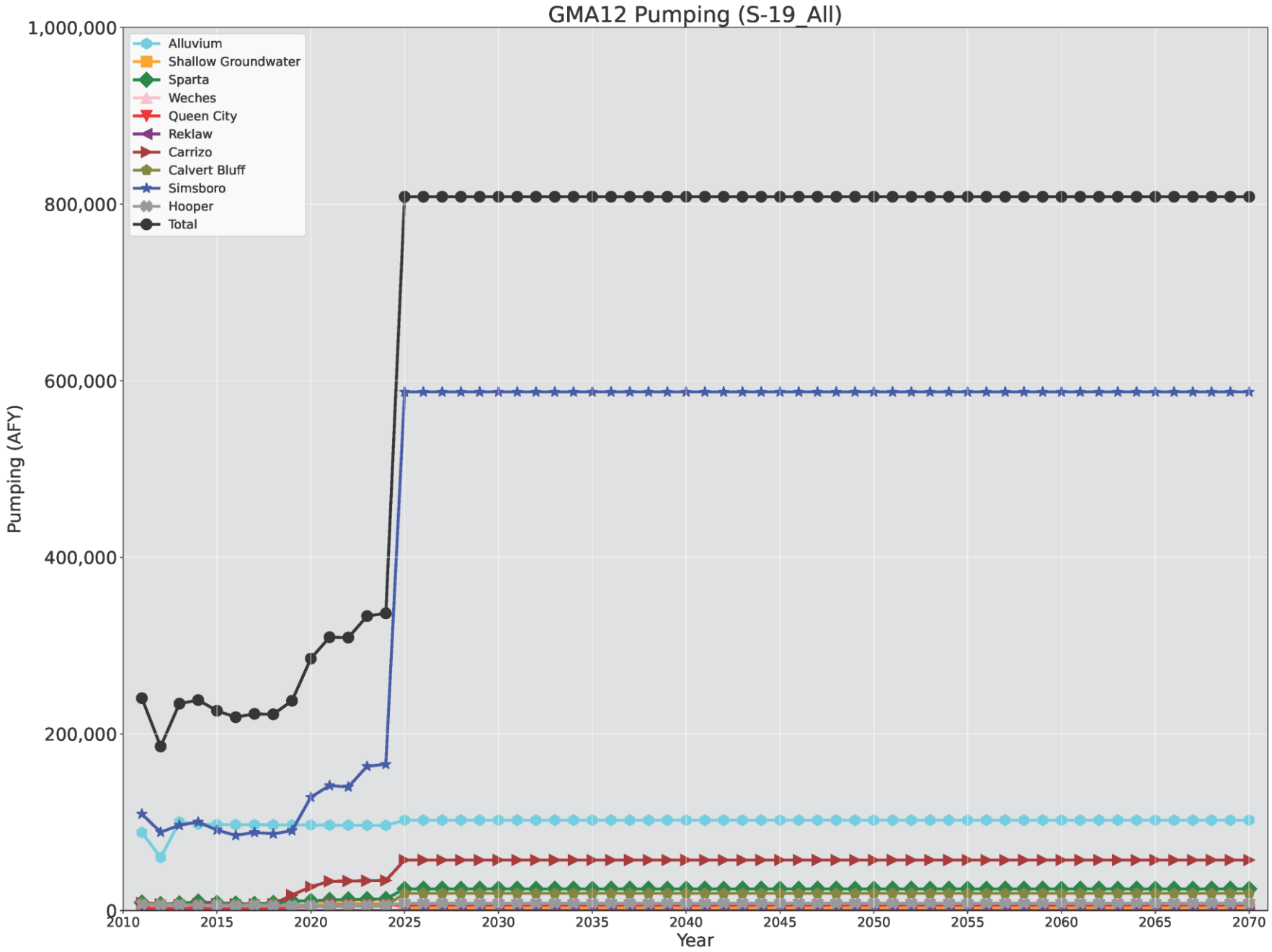
GMA 12 Pumping (All GCDs): S-19 All Permits Run (PS4-1)



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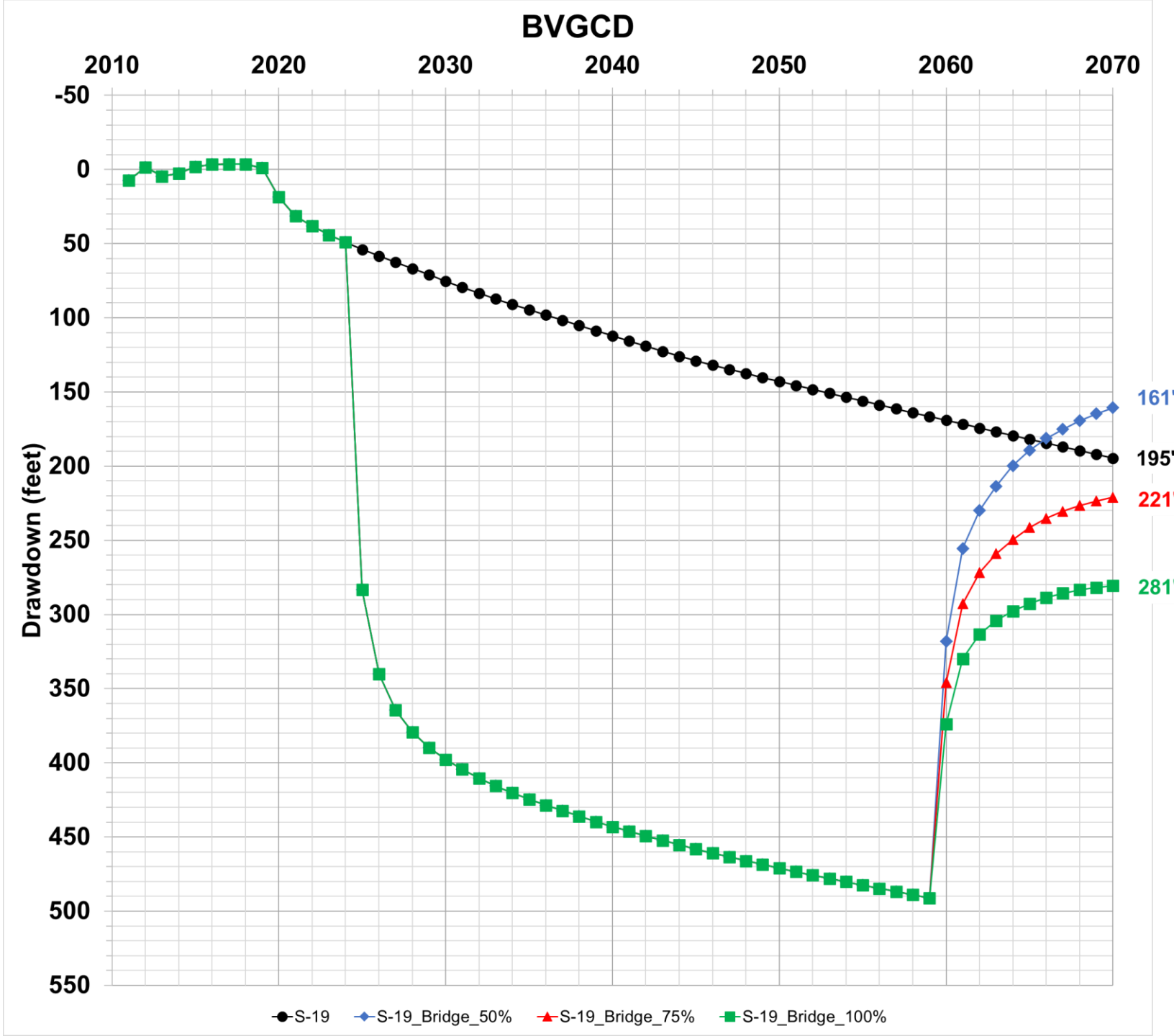
PS4-1 Bridge 2060

April 23 GMA 12 Meeting

- **Sustainability**
  - POSGCD provided results of long-term modeling assessments to estimate sustainable production
- **Bridges**
  - District representatives indicated that large projects should be seen as a “bridge” and not a permanent “solution”
- **Thought experiment**
  - What if a 35-year “bridge” is allowed for all permits until other water supplies are developed
  - What is the 2070 drawdown if all permits were reduced after 35 years (2060)?
  - What is the worst-case status of the Simsboro in 2060?



161' 50% of S19 after 2059

195'

221' 75% of S19 after 2059

281' 100% of S19 after 2059

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2070 Drawdown: S-19 & PS4-1 Bridge 2060 (25% reduction)

S-19

S-19	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	22	28	134	132	240	138
POSGCD	32	30	162	156	278	178
BVGCD	47	40	72	89	195	136
METGCD	25	21	48	57	76	69
FCGCD	43	73	140	-	-	-

PS4-1 Bridge (reduce to 75% of S19 in 2060)

S-19_Bridge_75%	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	20	28	137	152	251	178
POSGCD	28	28	173	204	304	251
BVGCD	46	41	84	127	221	202
METGCD	24	21	49	63	78	86
FCGCD	36	65	130			

Difference

Difference	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	-2	0	3	20	12	39
POSGCD	-4	-2	10	47	26	73
BVGCD	-1	1	12	38	26	65
METGCD	-1	1	1	6	2	17
FCGCD	-6	-7	-10	-	-	-

All drawdown calculated from 2010

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2070 Drawdown: S-19 & PS4-1 Bridge 2060 (50% reduction)

S-19

S-19	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	22	28	134	132	240	138
POSGCD	32	30	162	156	278	178
BVGCD	47	40	72	89	195	136
METGCD	25	21	48	57	76	69
FCGCD	43	73	140	-	-	-

PS4-1 Bridge (reduce to 50% of S19 in 2060)

S-19_Bridge_50%	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	16	23	110	128	195	154
POSGCD	19	21	141	174	228	215
BVGCD	34	31	68	107	161	171
METGCD	18	16	39	51	59	73
FCGCD	28	51	100			

Difference

Difference	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	-6	-5	-24	-4	-44	16
POSGCD	-13	-9	-22	17	-50	38
BVGCD	-13	-9	-4	19	-34	35
METGCD	-7	-4	-9	-6	-17	4
FCGCD	-14	-21	-40	-	-	-

All drawdown calculated from 2010

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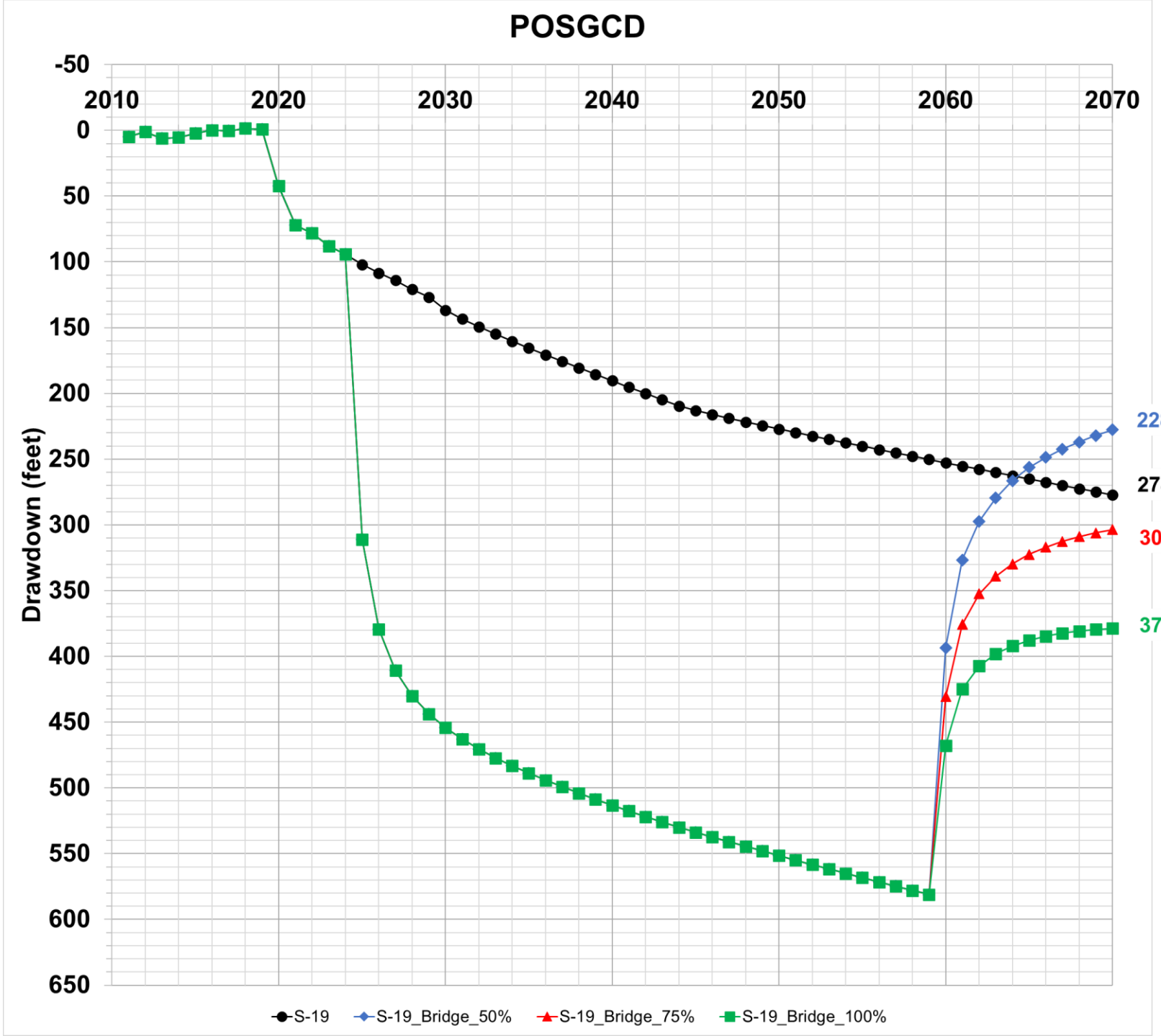

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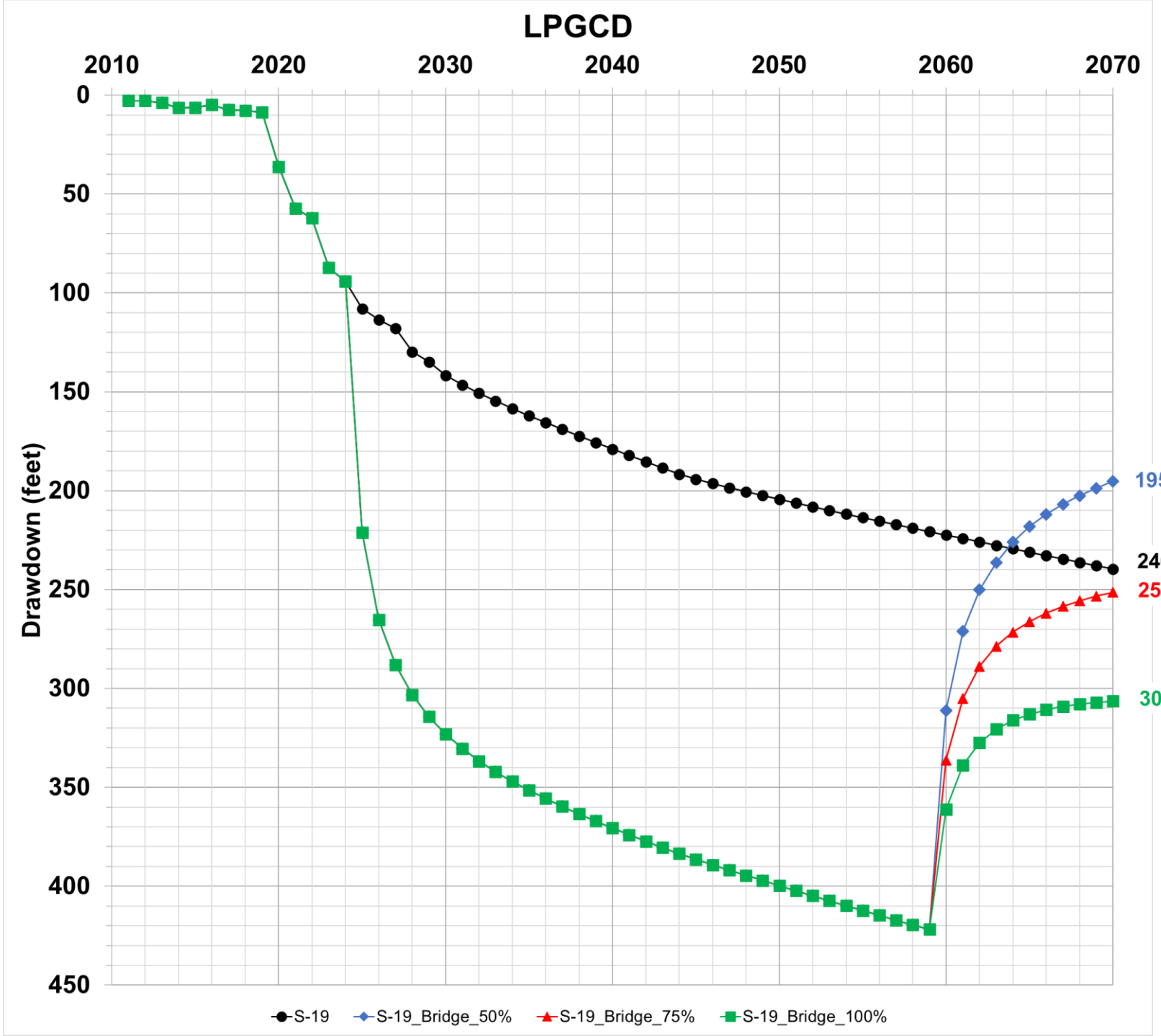

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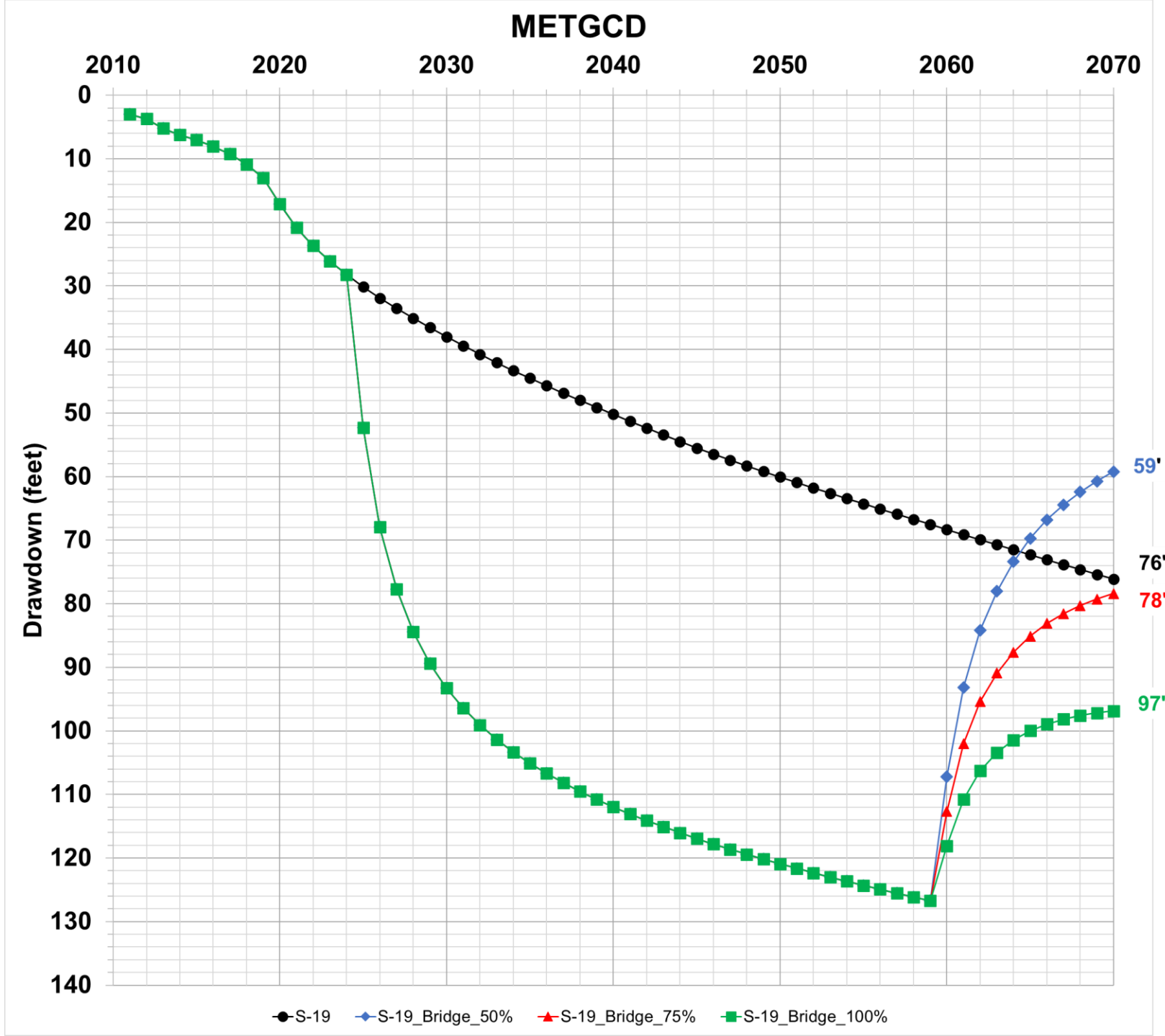

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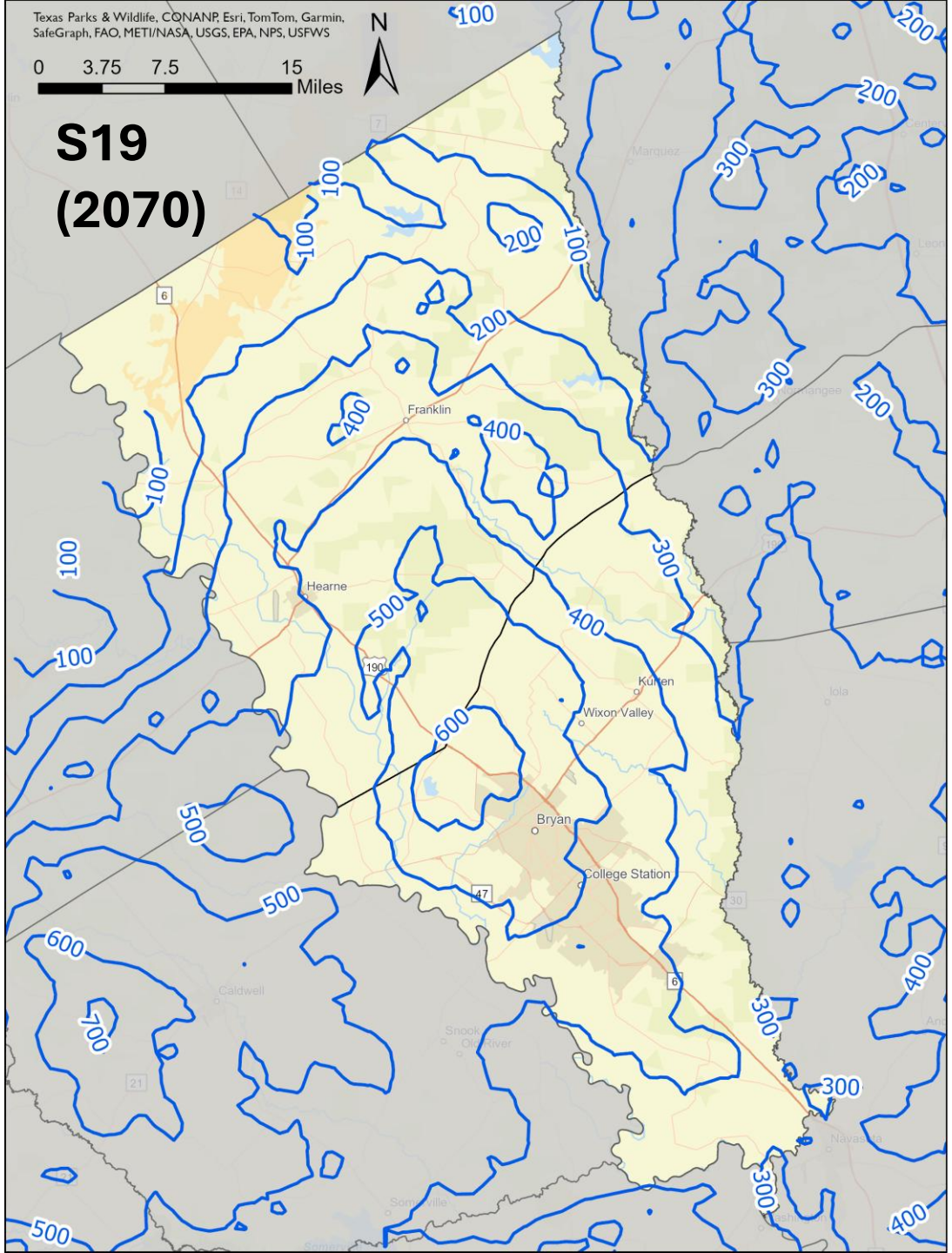
Simulated Depth to Water in Simsboro (feet)



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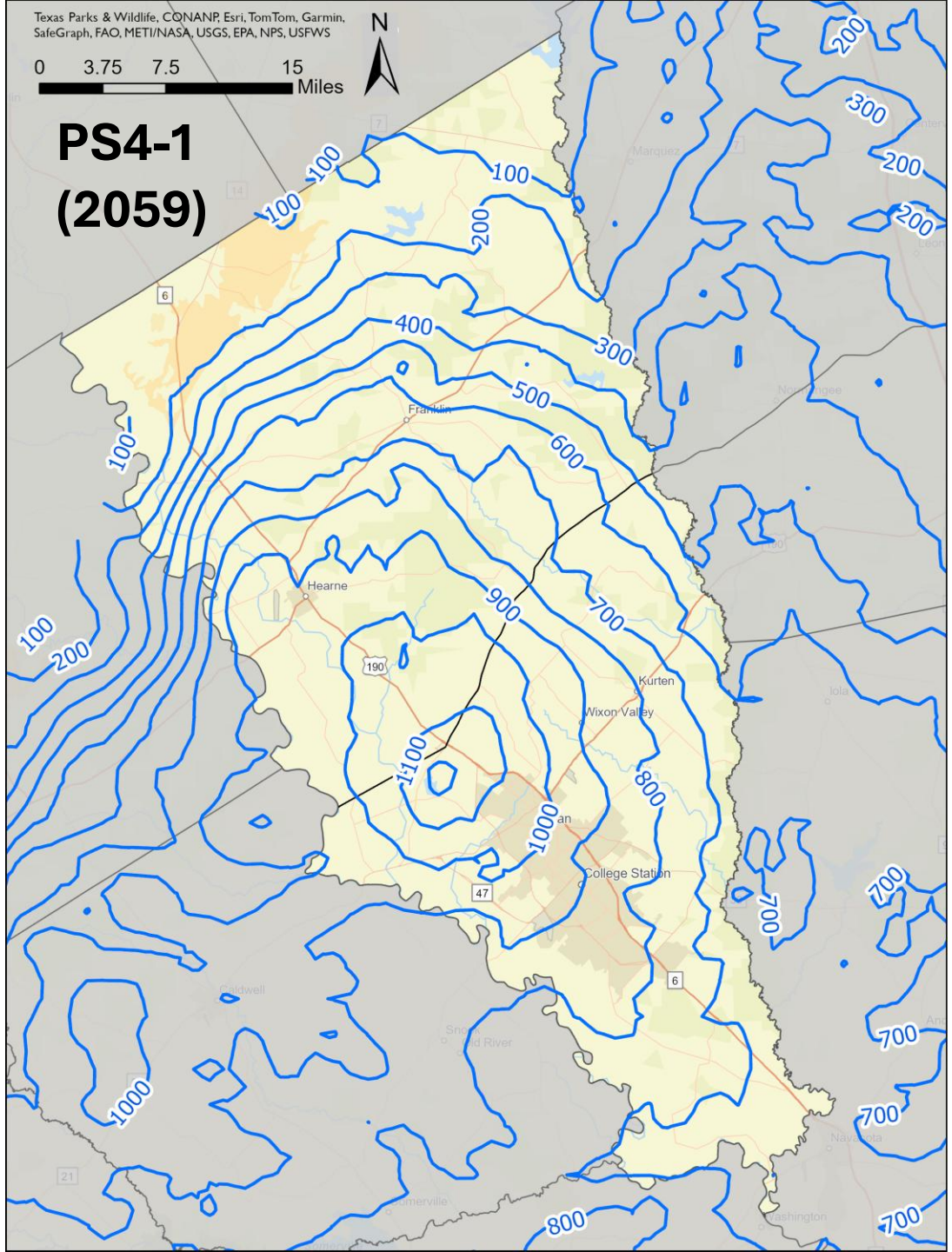
Simulated Depth to Water in Simsboro (feet)



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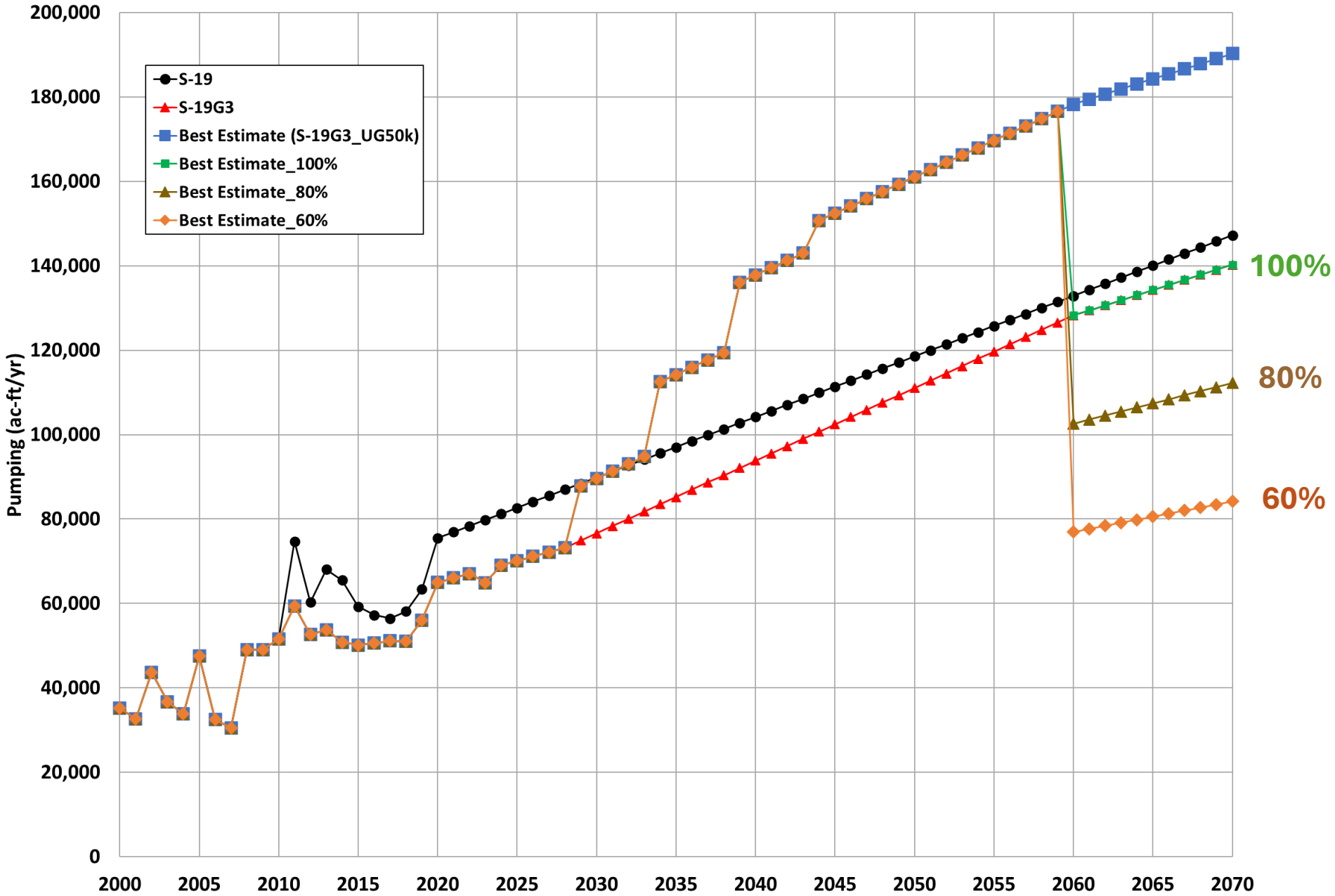
Observations from PS4-1 Bridge run

- After a 35-year “bridge” of pumping all permits, reducing pumping to 60-70% of S19 between 2060 and 2070 may be sufficient to match current DFCs

- In other words, a 30-40% reduction of S19 in pumping between 2060 and 2070 would approximately accommodate current DFCs

BVGCD “Best Estimate” as Bridge

BVGCD Simsboro Best Estimate Pumping



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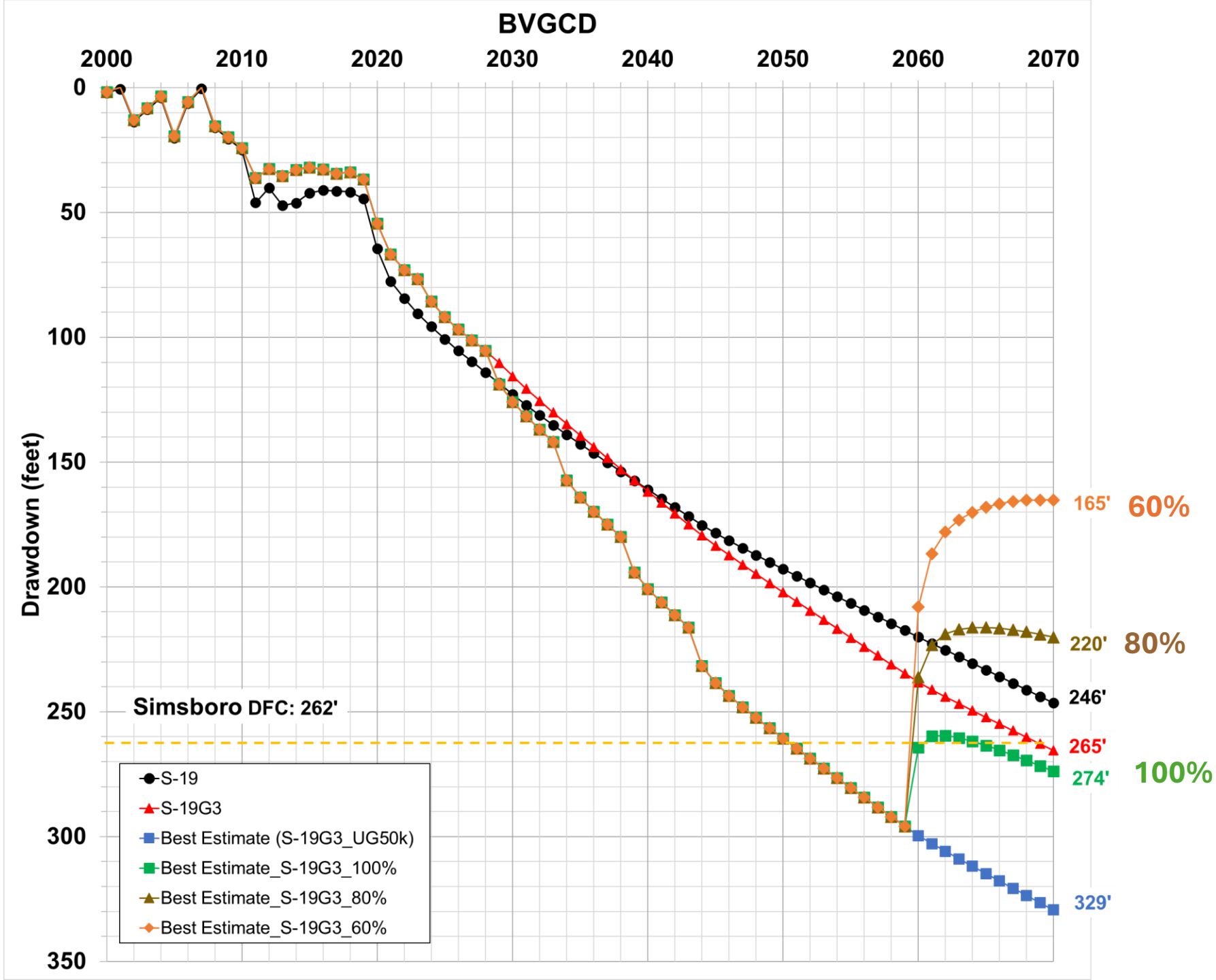
Simsboro Drawdown



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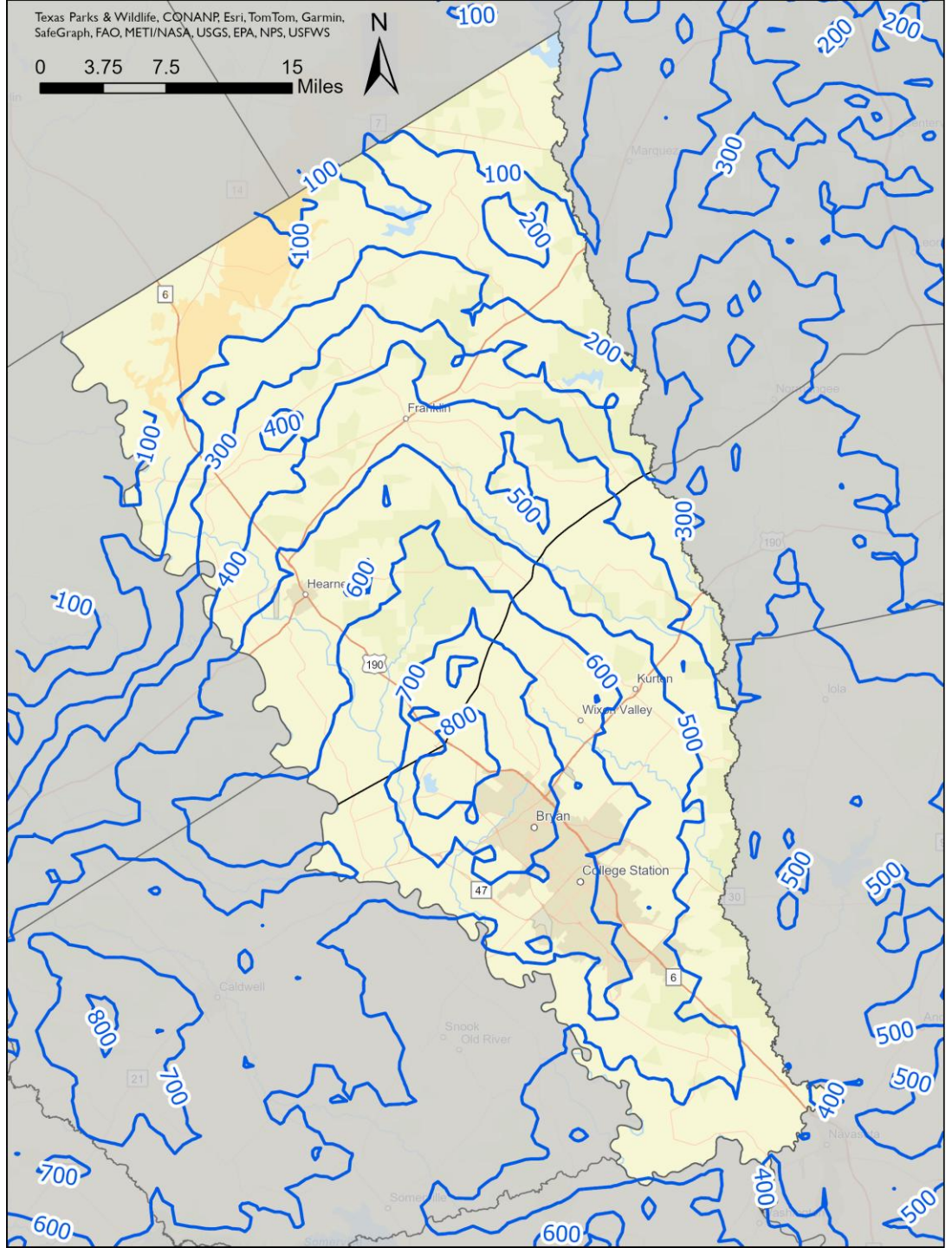
BVGCD Best Estimate: Simsboro

Simulated Depth to Water in 2070



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2070 Drawdown BVGCD Best Estimate Scenario

Best Estimate

Best Estimate thru 2059
100% of S19G3 after 2060

Best Estimate thru 2059
80% of S19G3 after 2060

Best Estimate thru 2059
60% of S19G3 after 2060

Best Estimate (S-19G3_UG50k)	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	27	35	135	151	290	166
POSGCD	36	35	158	195	387	244
BVGCD	55	49	92	137	329	215
METGCD	32	30	60	75	103	90
FCGCD	46	80	148			

Best Estimat_100%	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	27	35	133	146	277	160
POSGCD	36	35	153	182	346	221
BVGCD	54	48	87	121	274	183
METGCD	31	30	58	70	94	85
FCGCD	46	79	147			

Best Estimat_80%	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	23	31	113	126	227	138
POSGCD	30	30	130	156	278	189
BVGCD	45	41	74	104	220	157
METGCD	26	26	50	61	78	74
FCGCD	40	68	124			

Best Estimate_60%	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
LPGCD	20	27	93	105	177	117
POSGCD	23	24	106	129	209	157
BVGCD	36	32	61	86	165	130
METGCD	21	22	42	51	61	63
FCGCD	33	57	100			

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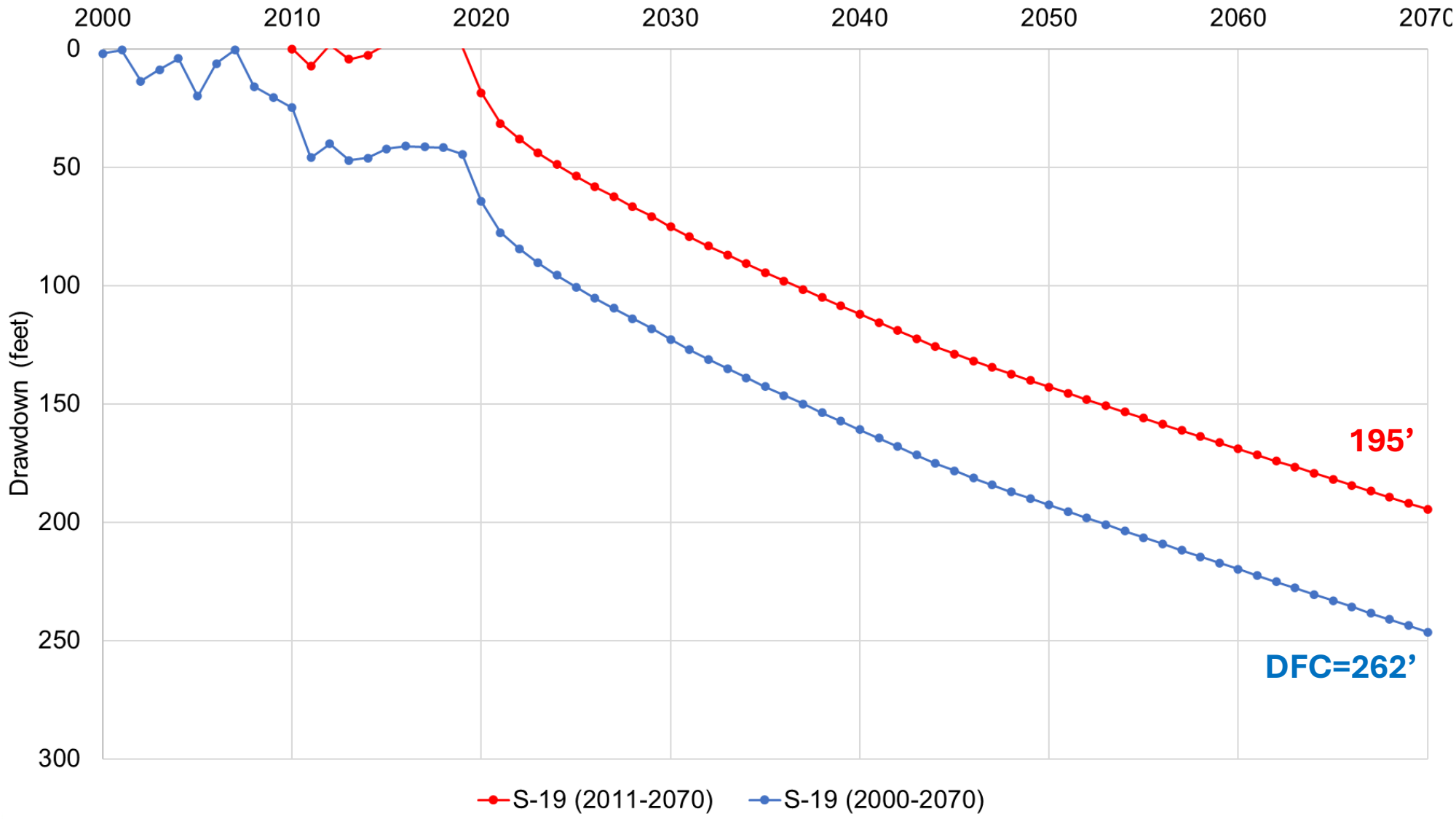
Observations from “Best Estimate” as a Bridge

- Reducing pumping to 90% of S-19G3 between 2060 and 2070 may be sufficient to match current DFCs

Impact of 2000 versus 2010

Comparison of 2000 to 2010 Start Using S-19



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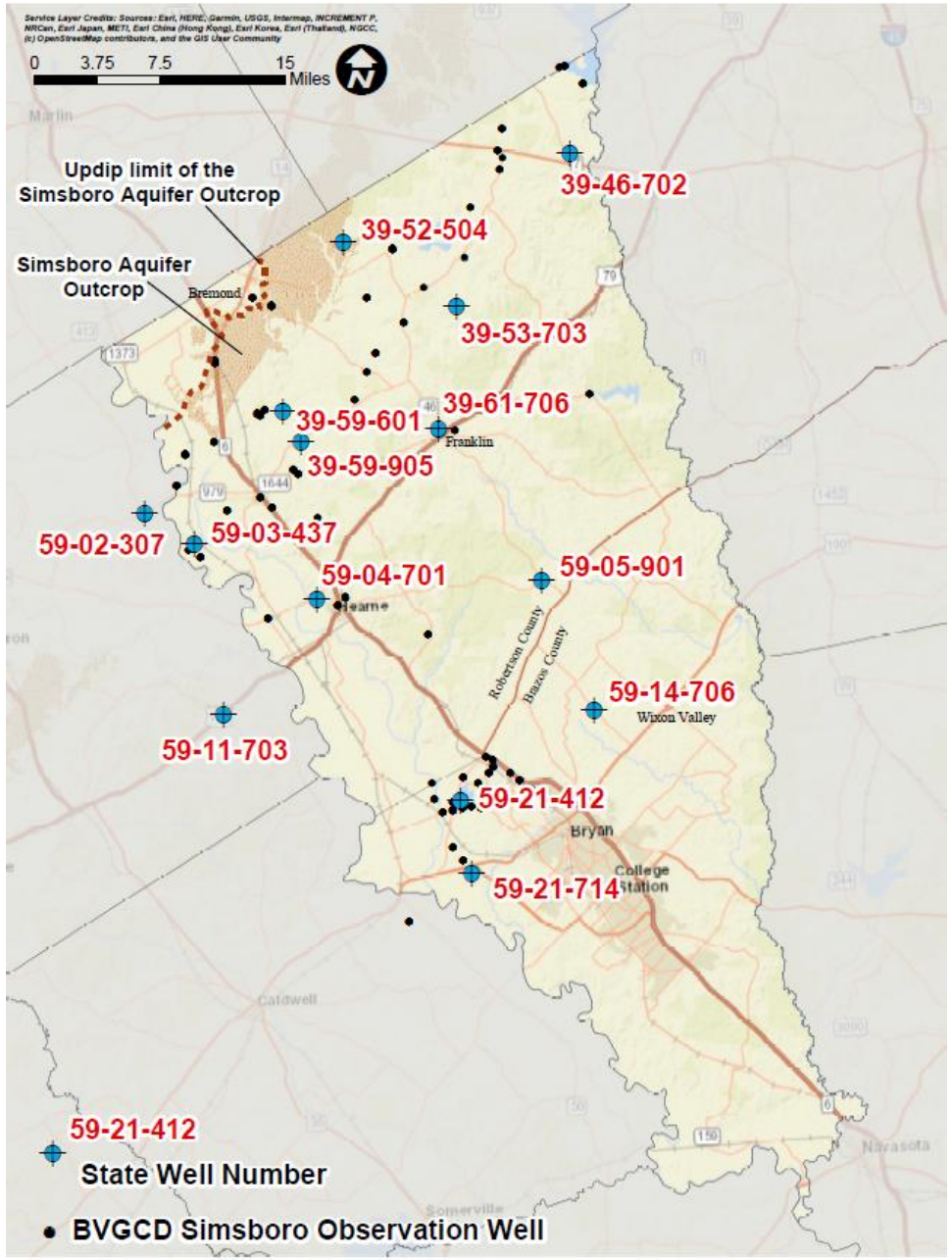
Simsboro Aquifer DFC Monitoring Wells

State Well Number	Well Owner
39-46-702	Private
39-52-504	Private
39-53-703	Private
39-59-601	Private
39-59-905	Private
39-61-706	City of Franklin Well 4
59-03-437	Private
59-04-701	City of Hearne Well 4
59-05-901	Wickson Creek SUD Wheelock Well
59-14-706	Wickson Creek SUD Well 1
59-21-412	City of Bryan Well 19
59-21-714	TAMU Well 8



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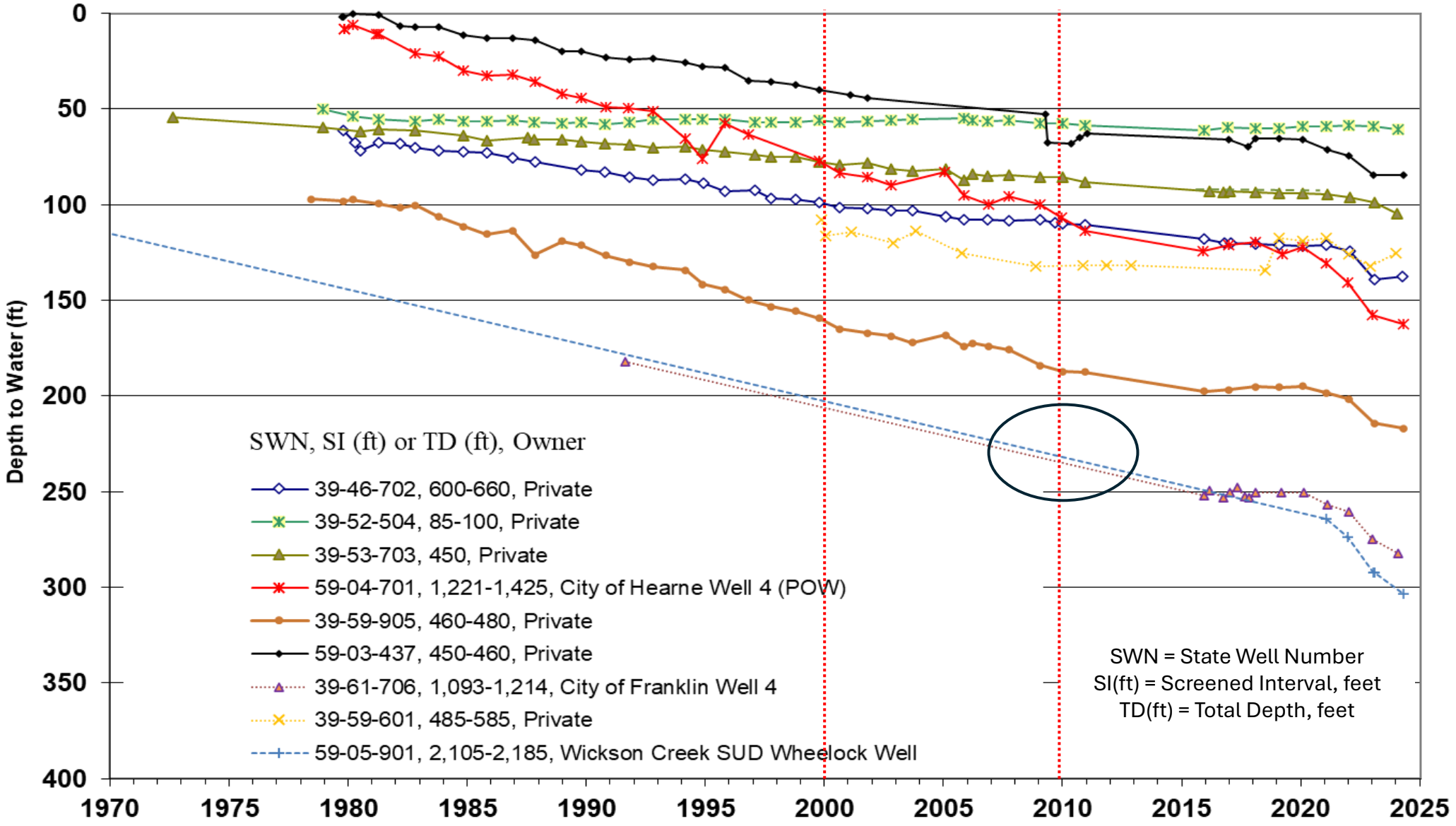
Simsboro Aquifer Observation Wells (Robertson County)



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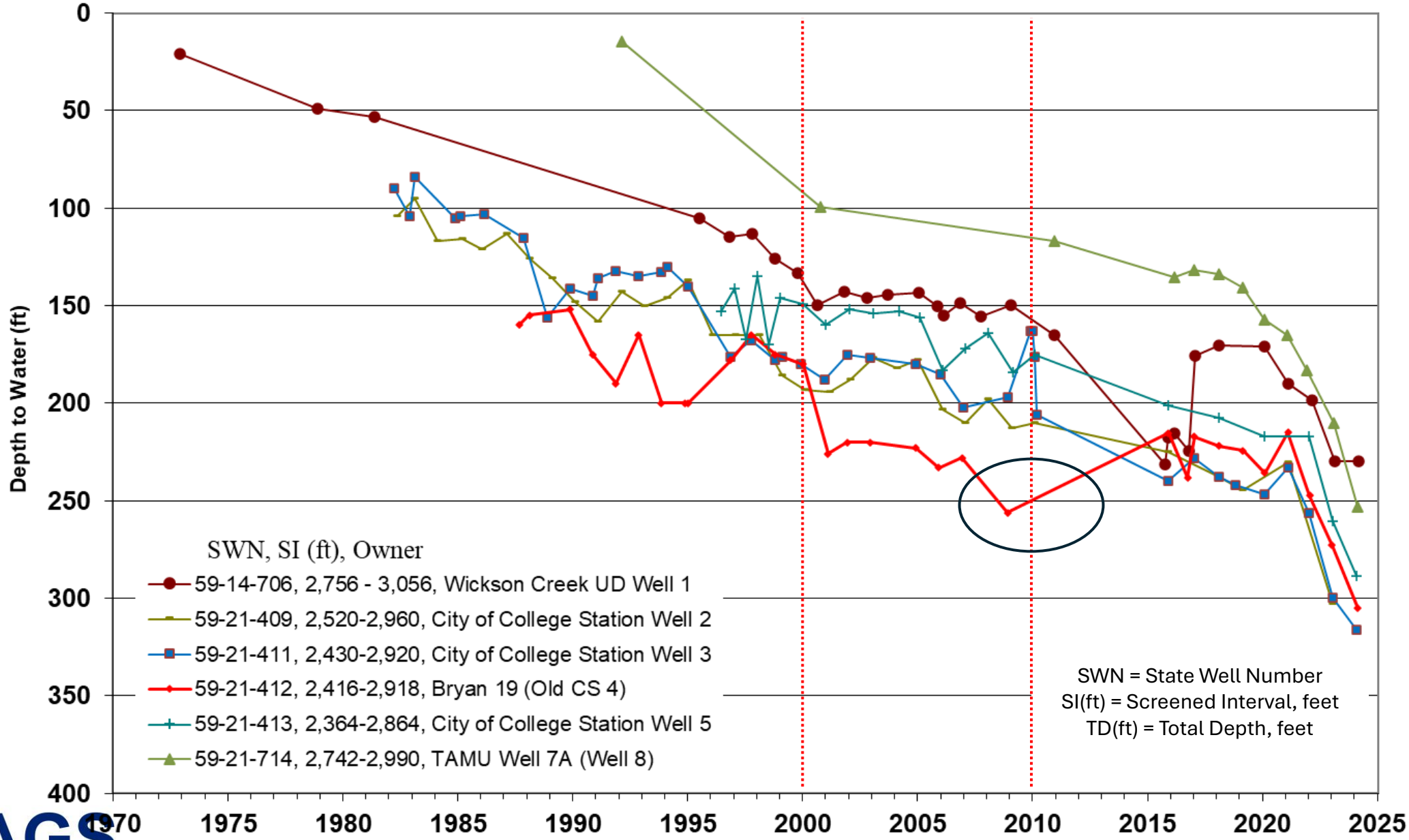
Simsboro Aquifer Observation Wells (Brazos County)



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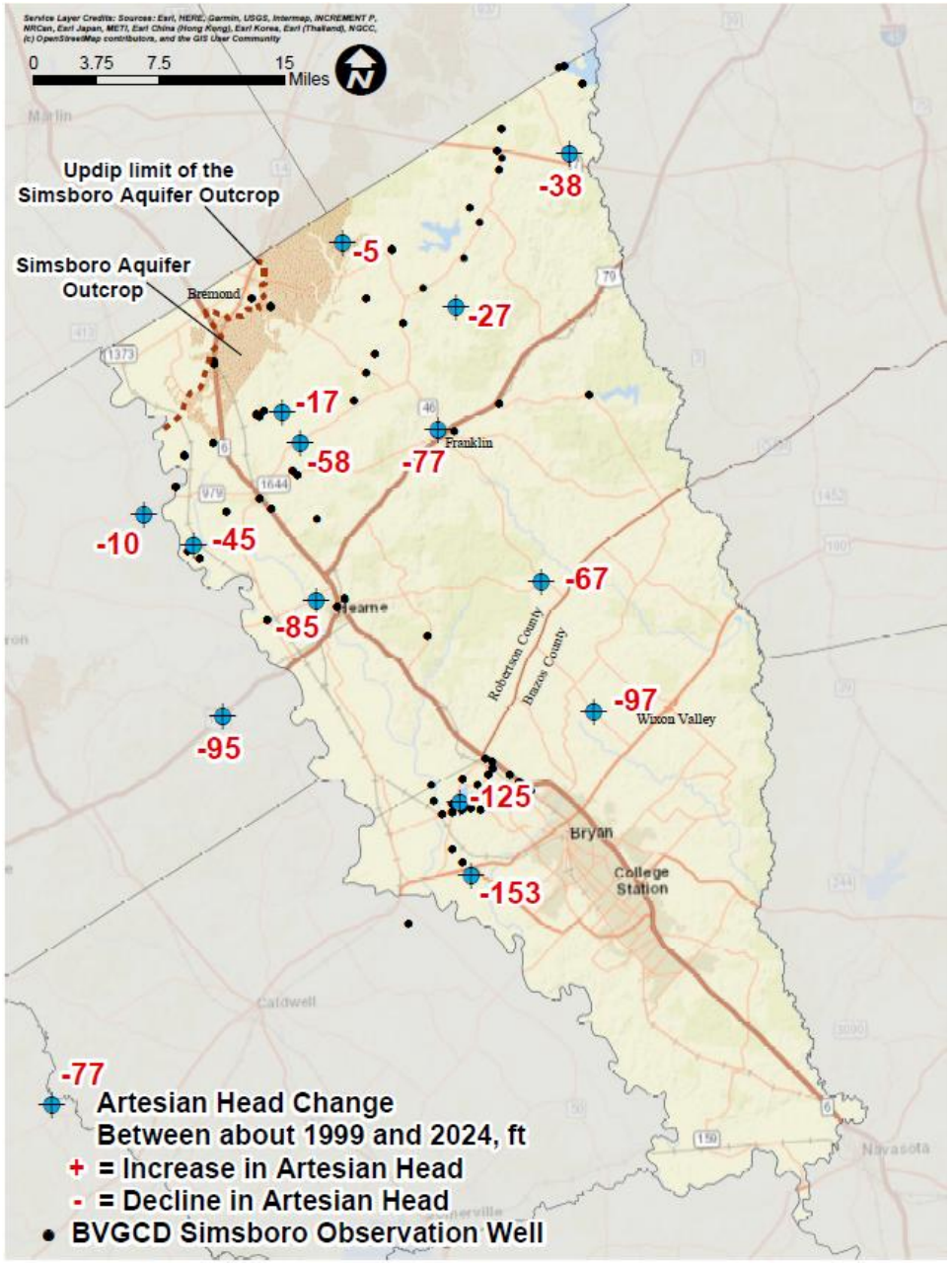
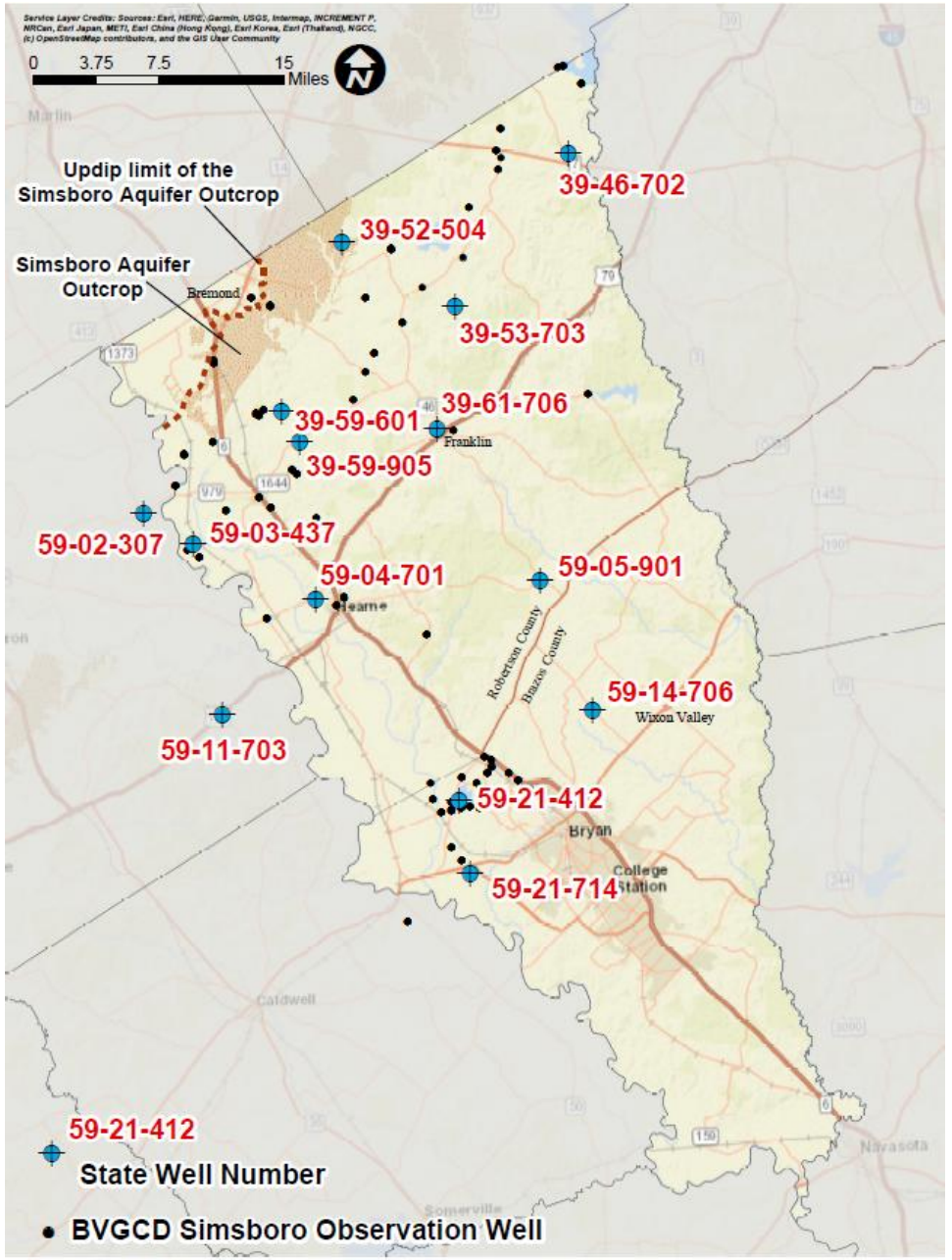
2024 Simsboro Aquifer DFC Example

Arithmetic Average Artesian Head Change 2000-2024: 66 feet decline

2070 DFC Average Artesian Head 262 feet decline





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Comparison of Simsboro Aquifer Arithmetic Average Artesian Head Change Staring in 2000 to Starting in 2010

Year	Simsboro Aquifer Arithmetic Average Artesian Head Change From 2000 (feet of decline)	Simsboro Aquifer Arithmetic Average Artesian Head Change From 2010 (feet of decline)
2020	32	11
2021	34	13
2022	43	22
2023	53	31
2024	66	45

*2010 Starting Water Levels Based on BVGCD Data and Interpolation from static water level Hydrographs

There is approximately 21 feet of difference in arithmetic average artesian head decline based on a DFC start date in 2000 and in 2010

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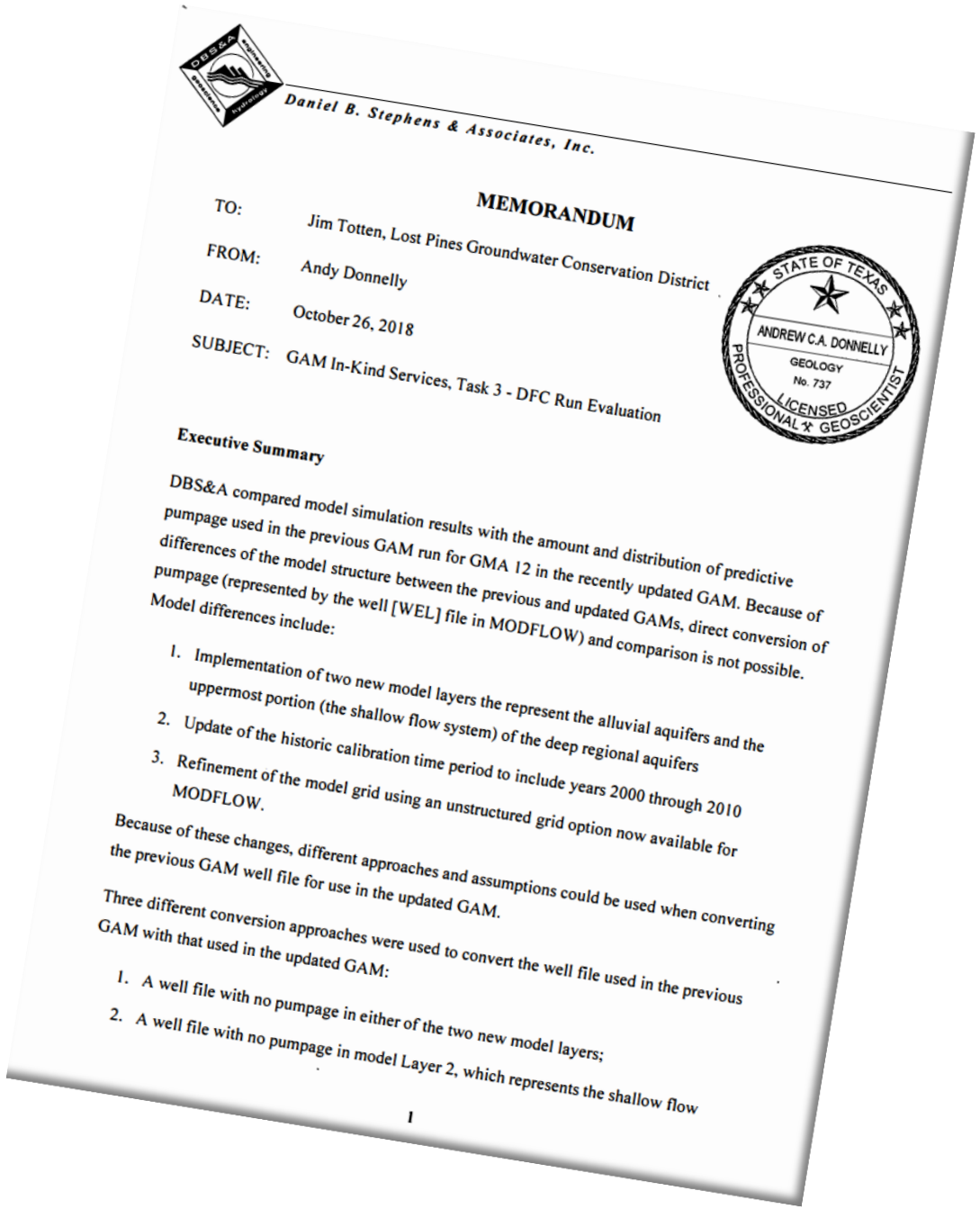
GMA 12 Model Update in 2018



Daniel B. Stephens & Associates, Inc.

MEMORANDUM

TO: Jim Totten, Lost Pines Groundwater Conservation District

FROM: Andy Donnelly

DATE: October 26, 2018

SUBJECT: GAM In-Kind Services, Task 3 - DFC Run Evaluation

STATE OF TEXAS
ANDREW C.A. DONNELLY
GEOLOGY
No. 737
LICENSED
PROFESSIONAL GEOSCIENTIST

Executive Summary

DBS&A compared model simulation results with the amount and distribution of predictive pumpage used in the previous GAM run for GMA 12 in the recently updated GAM. Because of differences of the model structure between the previous and updated GAMs, direct conversion of pumpage (represented by the well [WEL] file in MODFLOW) and comparison is not possible. Model differences include:

1. Implementation of two new model layers the represent the alluvial aquifers and the uppermost portion (the shallow flow system) of the deep regional aquifers
2. Update of the historic calibration time period to include years 2000 through 2010
3. Refinement of the model grid using an unstructured grid option now available for MODFLOW.

Because of these changes, different approaches and assumptions could be used when converting the previous GAM well file for use in the updated GAM.

Three different conversion approaches were used to convert the well file used in the previous GAM with that used in the updated GAM:

1. A well file with no pumpage in either of the two new model layers;
2. A well file with no pumpage in model Layer 2, which represents the shallow flow

1

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GMA 12 Comparison

New GAM

Table 6. Range of drawdowns calculated for the three simulations using the updated GAM.

GCD or County	Average Aquifer Drawdown (feet) measured from January 2011 through December 2070					
	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
Brazos Valley GCD	39-41	33-38	66-73	77-84	143-150	115-123
Fayette County GCD	34-35	65	134-135	Declared as non-relevant		
Lost Pines GCD	24-25	27-28	98-99	85-89	138-143	103-105
Mid-East Texas GCD	26-27	19-20	41-42	40-42	50-52	47-48
Post Oak Savannah GCD	62-64	31-33	103-107	110-114	191-198	151-152
Falls County	--	--	--	--	9-15	5
Limestone County	--	--	--	9-12	8-10	7
Navarro County	--	--	--	0.1-0.3	0.2-0.5	0.2
Williamson County	--	--	--	28	23-32	14
GMA-12	***36-37***	***34-36***	***80-84***	***79-83***	***126-131***	***106-107***

Old GAM

Table 7. Drawdowns calculated using the previous GAM.

GCD or County	Average Aquifer Drawdown (feet) measured from January 2011 through December 2070					
	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
Brazos Valley GCD	12	12	61	125	295	207
Fayette County GCD	47	64	110	Declared as non-relevant		
Lost Pines GCD	4	16	68	110	251	181
Mid-East Texas GCD	1	-3.2	81	90	138	126
Post Oak Savannah GCD	28	30	67	149	322	206
Falls County	--	--	--	--	-2	27
Limestone County	--	--	--	11	51	53
Navarro County	--	--	--	-1	6	6
Williamson County	--	--	--	-11	47	68
GMA-12	***16***	***16***	***75***	***115***	***231***	***171***

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Observations

- GMA 12 simulations and DFCs for first 3 rounds of planning
  - Cause and effect runs (not setting an effect and calculating a cause)
  - Calculate average drawdown per district
  - “Relative” benchmarks that have moved based on:
    - Model updates
    - Pumping assumptions (ramping, permits to include, etc.)
    - Permit updates
    - Other

- For current round of planning
  - How to set DFCs to find the balance between highest practicable production and conservation
    - Socioeconomic (impacts on wells)
    - Private property consideration
    - Other 7 factors

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