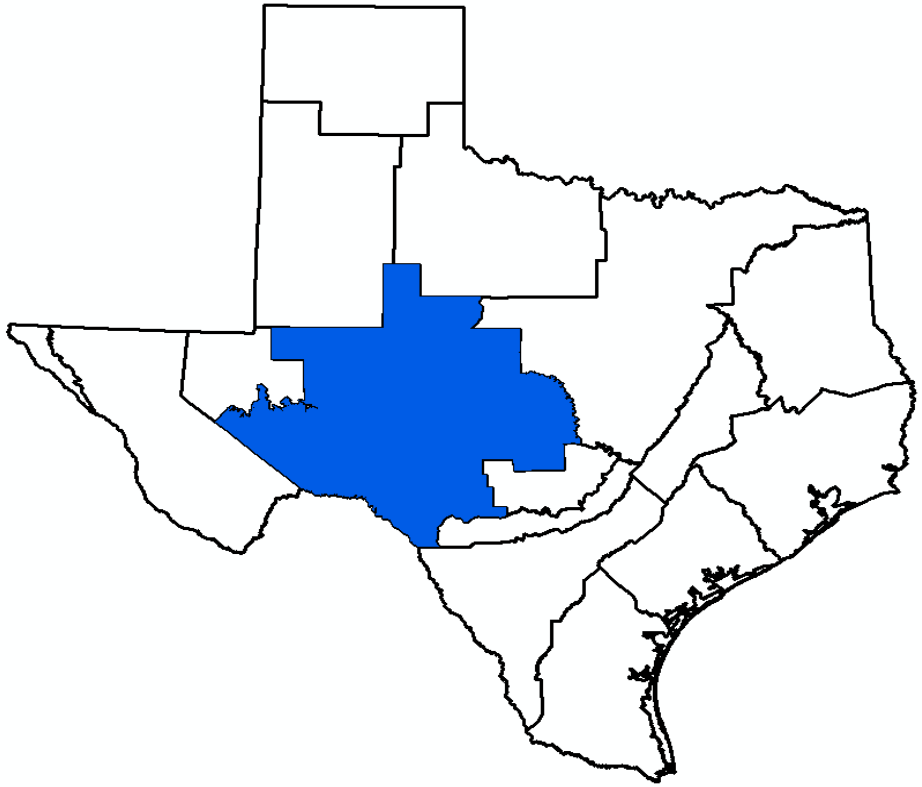
Agenda Item 7:
Phase 2 Progress - Comparison of Measured Drawdown and Simulated Drawdown from 2021 DFC Simulation



Bill Hutchison

GMA 7 Meeting

November 6, 2025

Summary of GMA 7 Meeting of August 14, 2025

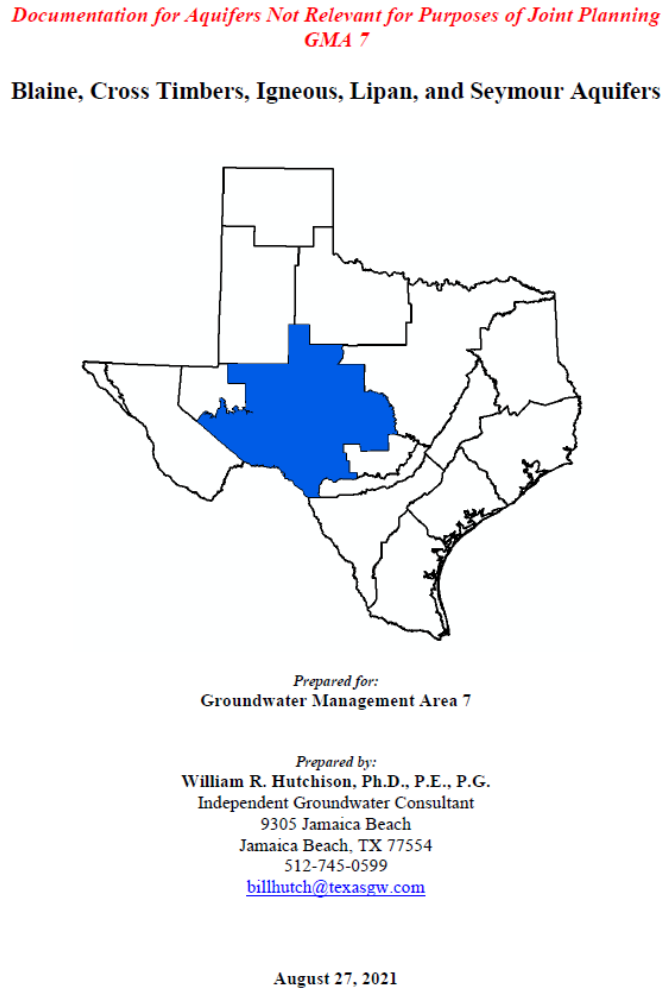
- Reviewed HB 2078 Provisions
- Reviewed Phase 1 Comparison of Actual and Simulated Drawdowns (TWDB Data)
- Recommended Phase 2 Comparison of Actual and Simulated Drawdowns (GCD Data and Interpolated Baselines)
- Recommended update to Alternative GAM based on findings of Phase 1 data comparison
- Recommended Classification of Aquifers as Not Relevant for Purposes of Joint Planning

15 Aquifers in GMA 7

- Blaine
- Capitan Reef
- Cross Timbers
- Dockum
- Edwards-Trinity (Plateau)
- Ellenburger-San Saba
- Hickory
- Igneous
- Lipan
- Marble Falls
- Ogallala
- Pecos Valley
- Rustler
- Seymour
- Trinity

Not Relevant for Purposes of Joint Planning (2021)

- Blaine
- Capitan Reef
- Cross Timbers
- Dockum
- Edwards-Trinity (Plateau)
- Ellenburger-San Saba
- Hickory
- Igneous
- Lipan
- Marble Falls
- Ogallala
- Pecos Valley
- Rustler
- Seymour
- Trinity



Documentation for Aquifers Not Relevant for Purposes of Joint Planning GMA 7

Blaine, Cross Timbers, Igneous, Lipan, and Seymour Aquifers

Prepared by:
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512-745-0599
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August 27, 2021

Recommended Additions to Not Relevant List from GMA 7 Meeting of August 14, 2025

- Blaine
- Capitan Reef
- Cross Timbers
- Dockum
- Edwards-Trinity (Plateau)
- Ellenburger-San Saba
- Hickory
- Igneous
- Lipan
- Marble Falls
- Ogallala
- Pecos Valley
- Rustler
- Seymour
- Trinity

Additional Recommendations Related to Not Relevant Aquifers (8/14/2025)

- Marble Falls currently not relevant for purposes of joint planning
  - Current documentation is contained in Llano Uplift Aquifers Explanatory Report
  - Recommend same approach
- Edwards-Trinity (Plateau) in Val Verde County
  - Recommended classification as not relevant
  - Supported by public comment (No MAG, but “Available Groundwater” would be set by Region J, where Val Verde County has representation)

Relevant Aquifers (2026 Joint Planning)

- Blaine
- Capitan Reef
- Cross Timbers
- Dockum
- Edwards-Trinity (Plateau)
- Ellenburger-San Saba
- Hickory
- Igneous
- Lipan
- Marble Falls
- Ogallala
- Pecos Valley
- Rustler
- Seymour
- Trinity

Relevant Aquifers (2026 Joint Planning)

- Blaine
- Capitan Reef
- Cross Timbers
- Dockum
- **Edwards-Trinity (Plateau)**
- **Ellenburger-San Saba**
- **Hickory**
- Igneous

Llano Uplift GAM

- Lipan
- Marble Falls
- Ogallala
- **Pecos Valley**
- Rustler
- Seymour
- **Trinity**

ETP Alternative GAM

Phase 1 of DFC Comparison

- Based on requirements of HB 2078, compared actual drawdowns with “intermediate” drawdowns from GAM simulation that was the basis of desired future condition (DFC)
- Point-by-point comparison for each year
- Requires a “baseline” groundwater elevation in each monitoring well
  - ETP Alternative GAM = 2010
  - Llano Uplift GAM = 2010
- Some counties had no monitoring data in “baseline” year
  - Recommended GCD data (Irion and Sterling provided data)
  - Recommended interpolation of earlier and later data to estimate baseline where no baseline was available

Phase 2 of DFC Comparison

- Work not quite completed
- Summary of work completed to date
- Report will be completed once work is finished

Drawdown Comparison:

Edwards-Trinity (Plateau), Pecos Valley, Trinity Aquifers

County	Data Source	Number of Actual Drawdown Measurements	Average Drawdown (ft - 2010 Base, 2011 to 2024 Data)		Average Simulated minus Measured (ft)	DFC Drawdown (ft - 2010 to 2070)
			Measured	Simulated		
Coke	TWDB - Int	2 Wells				0
Concho	TWDB	4	1.07	0.03	-1.04	NR
Crockett	TWDB	239	-0.15	3.10	3.25	10
Ector	TWDB	104	-3.12	0.47	3.59	4
Edwards	TWDB	34	2.27	1.21	-1.06	2
Gillespie	TWDB	435	5.10	2.25	-2.84	5
Glasscock	TWDB	269	0.59	13.85	13.26	42
Irion (Nearest Active)	GCD	148	2.04	3.07	1.03	10
Irion (Honor Grid)	GCD	122	2.78	3.64	0.86	10
Kimble	TWDB - Int	11 Wells				1
Menard	TWDB	Work in progress				1
Midland	TWDB	33	1.67	2.02	0.35	12
Nolan	TWDB	11	9.37	0.00	-9.37	NR
Pecos	TWDB	463	2.90	3.44	0.53	14
Reagan	TWDB	114	9.01	16.32	7.31	42
Real	TWDB	58	23.79	1.53	-22.26	4
Schleicher	TWDB	162	1.70	4.44	2.73	8
Sterling (Nearest Active)	TWDB	394	1.50	1.07	-0.43	7
Sterling (Honor Grid)	TWDB	141	1.87	2.33	0.46	7
Sutton	TWDB	292	0.38	2.95	2.58	6
Taylor	TWDB - Int	5 Wells				0
Terrell	TWDB	93	10.75	1.65	-9.10	2
TomGreen	TWDB	2	-2.23	0.42	2.64	NR
Upton	TWDB	14	-22.23	0.65	22.87	20
Uvalde		No Suitable Wells				2

NR = County is Not Relevant for Purposes of Joint Planning
TWDB Int - Interpolated Baseline Estimated

GCD Data Update

Drawdown Comparison:

Edwards-Trinity (Plateau), Pecos Valley, Trinity Aquifers

County	Data Source	Number of Actual Drawdown Measurements	Average Drawdown (ft - 2010 Base, 2011 to 2024 Data)		Average Simulated minus Measured (ft)	DFC Drawdown (ft - 2010 to 2070)
			Measured	Simulated		
Coke	TWDB - Int	2 Wells				0
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Terrell	TWDB	93	10.75	1.65	-9.10	2
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Uvalde		No Suitable Wells				2

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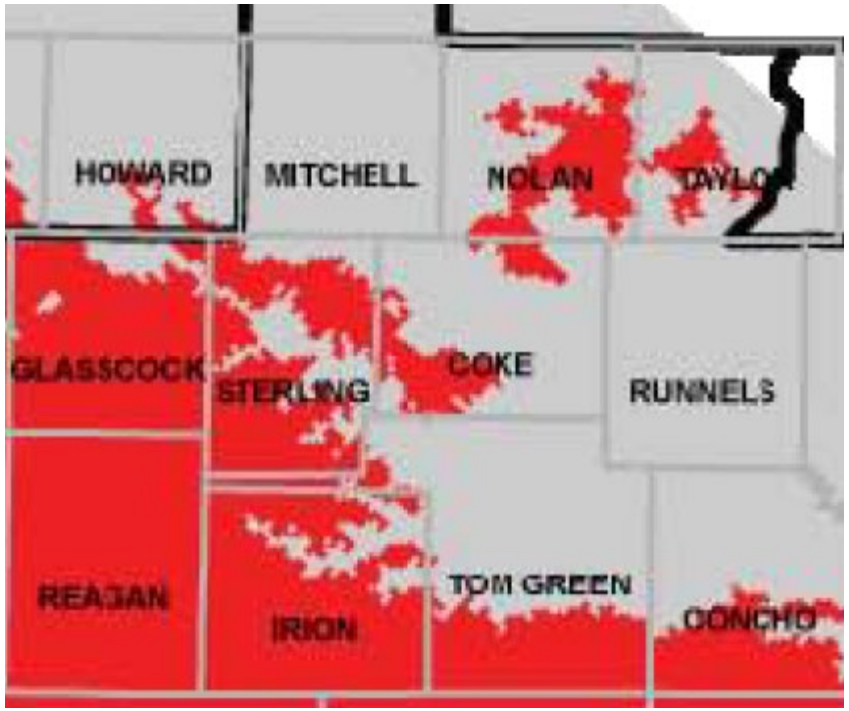
GCD Data Update



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Upton	TWDB	14	-22.23	0.65	22.87	20
Uvalde		No Suitable Wells				2

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TWDB Int - Interpolated Baseline Estimated

Interpolated Baseline – Work in Progress

Menard – TWDB Data

Drawdown Comparison:

Edwards-Trinity (Plateau), Pecos Valley, Trinity Aquifers

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Upton	TWDB	14	-22.23	0.65	22.87	20
Uvalde		No Suitable Wells				2

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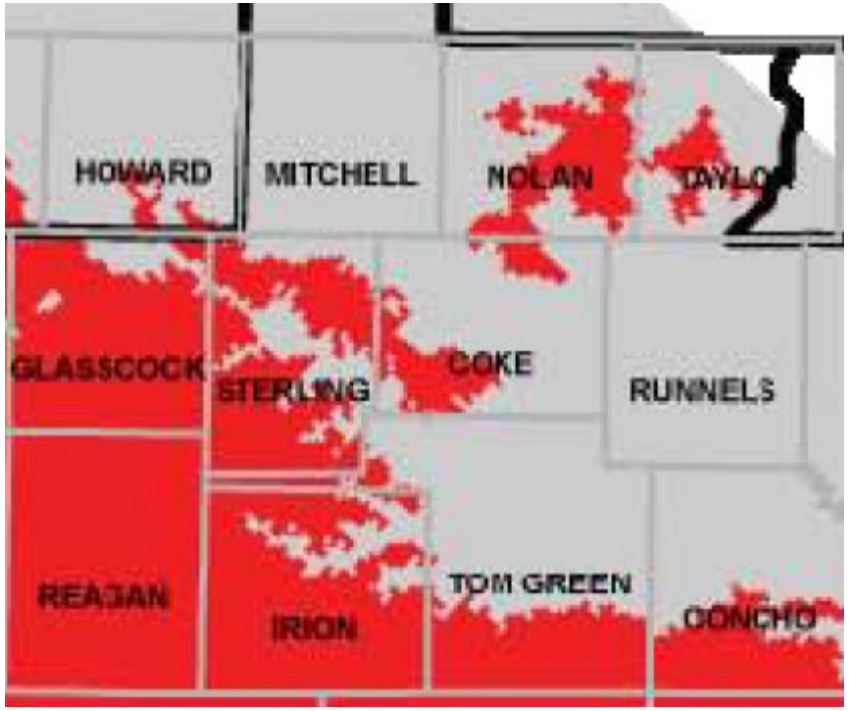
Interpolated Baseline – Work in Progress

Drawdown Comparison:



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TomGreen	TWDB	2	-2.23	0.42	2.64	NR
Upton	TWDB	14	-22.23	0.65	22.87	20
Uvalde		No Suitable Wells				2

NR = County is Not Relevant for Purposes of Joint Planning
TWDB Int - Interpolated Baseline Estimated

To Be Addressed with GAM Update (In Progress)

Drawdown Comparison:

Edwards-Trinity (Plateau), Pecos Valley, Trinity Aquifers

County	Data Source	Number of Actual Drawdown Measurements	Average Drawdown (ft - 2010 Base, 2011 to 2024 Data)		Average Simulated minus Measured (ft)	DFC Drawdown (ft - 2010 to 2070)
			Measured	Simulated		
Coke	TWDB - Int	2 Wells			?	0
Concho	TWDB	4	1.07	0.03	-1.04	NR
Crockett	TWDB	239	-0.15	3.10	3.25	10
Ector	TWDB	104	-3.12	0.47	3.59	4
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Irion (Honor Grid)	GCD	122	2.78	3.64	0.86	10
Kimble	TWDB - Int	11 Wells			?	1
Menard	TWDB	Work in progress			?	1
Midland	TWDB	33	1.67	2.02	0.35	12
Nolan	TWDB	11	9.37	0.00	-9.37	NR
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Sutton	TWDB	292	0.38	2.95	2.58	6
Taylor	TWDB - Int	5 Wells			?	0
Terrell	TWDB	93	10.75	1.65	-9.10	2
TomGreen	TWDB	2	-2.23	0.42	2.64	NR
Upton	TWDB	14	-22.23	0.65	22.87	20
Uvalde		No Suitable Wells				2

NR = County is Not Relevant for Purposes of Joint Planning
TWDB Int - Interpolated Baseline Estimated

Drawdown Comparison:

Ellenburger-San Saba Aquifer

County	Data Source	Number of Actual Drawdown Measurements	Average Drawdown (ft - 2010 Base, 2011 to 2024 Data)		Average Simulated minus Measured (ft)	DFC Drawdown (ft - 2010 to 2070)
			Measured	Simulated		
Gillespie	TWDB	429	5.28	2.48	-2.80	8
Kimble	TWDB - Int	No Data				18
Mason	TWDB - Int	No Suitable Wells				14
McCulloch	TWDB - Int	3 Wells				29
Menard	TWDB - Int	11	10.07	22.86	12.80	46
SanSaba	TWDB - Int	At least 4 wells (work in progress)				5

TWDB Int - Interpolated Baseline Estimated

Interpolated Baseline – Work in Progress

Drawdown Comparison:

Ellenburger-San Saba Aquifer

County	Data Source	Number of Actual Drawdown Measurements	Average Drawdown (ft - 2010 Base, 2011 to 2024 Data)		Average Simulated minus Measured (ft)	DFC Drawdown (ft - 2010 to 2070)
			Measured	Simulated		
Gillespie	TWDB	429	5.28	2.48	-2.80	8
Kimble	TWDB - Int	No Data				18
Mason	TWDB - Int	No Suitable Wells				14
McCulloch	TWDB - Int	3 Wells				29
Menard	TWDB - Int	11	10.07	22.86	12.80	46
SanSaba	TWDB - Int	At least 4 wells (work in progress)				5

TWDB Int - Interpolated Baseline Estimated

Drawdown Comparison:

Hickory Aquifer

County	Data Source	Number of Actual Drawdown Measurements	Average Drawdown (ft - 2010 Base, 2011 to 2024 Data)		Average Simulated minus Measured (ft)	DFC Drawdown (ft - 2010 to 2070)
			Measured	Simulated		
Concho		No TWDB Data after 2004				53
Gillespie	TWDB	177	0.34	4.54	4.20	9
Kimble		No TWDB Data after 2000				18
Llano	TWDB	12	5.06	-4.78	-9.83	NR
Mason	TWDB	111	4.77	9.19	4.42	17
McCulloch	TWDB	79	4.71	12.16	7.45	29
Menard		No TWDB Data after February 2009				46
SanSaba	TWDB	101	5.81	2.11	-3.69	6

Drawdown Comparison:

Hickory Aquifer

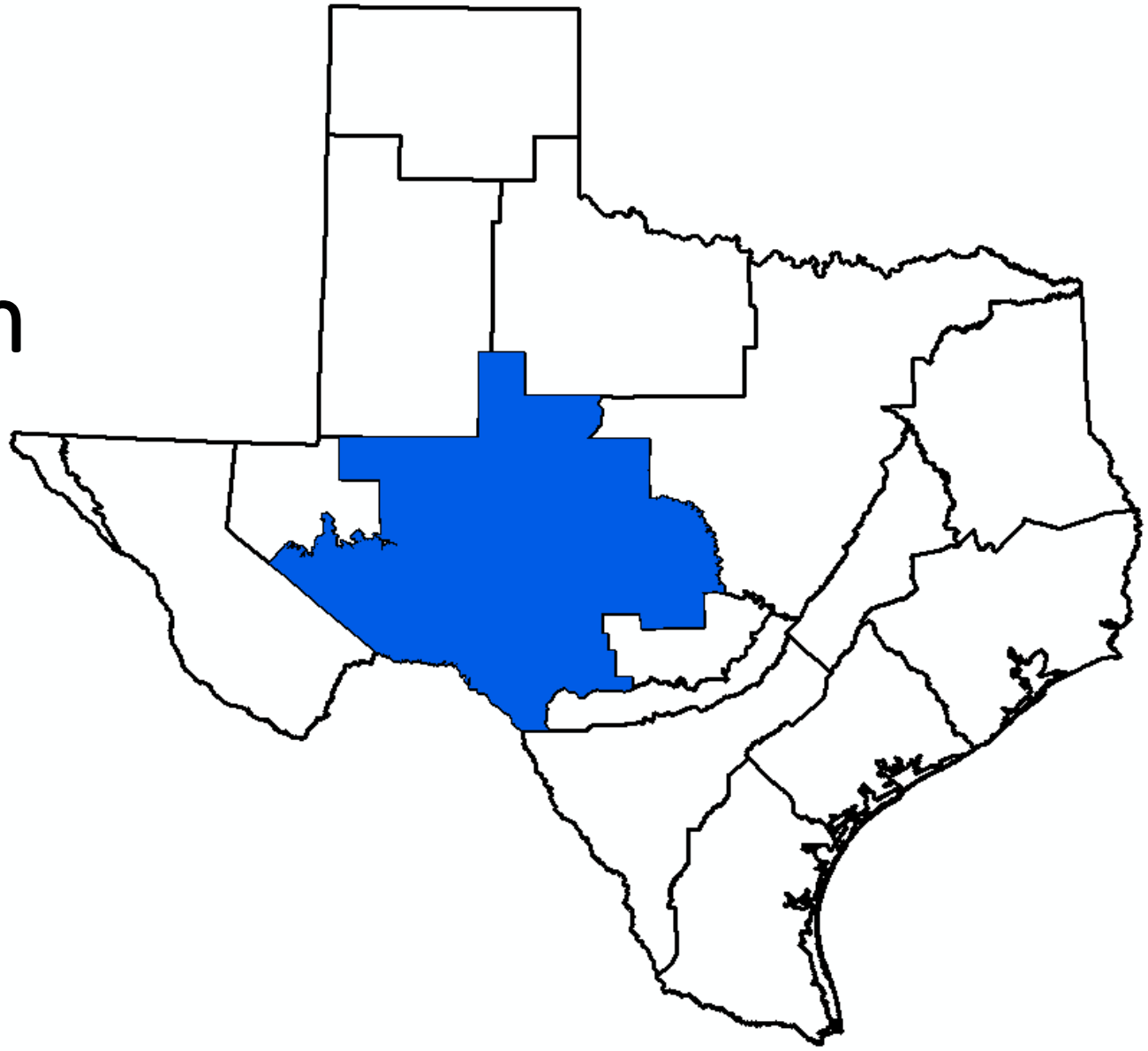
County	Data Source	Number of Actual Drawdown Measurements	Average Drawdown (ft - 2010 Base, 2011 to 2024 Data)		Average Simulated minus Measured (ft)	DFC Drawdown (ft - 2010 to 2070)
			Measured	Simulated		
Concho		No TWDB Data after 2004				53
Gillespie	TWDB	177	0.34	4.54	4.20	9
Kimble		No TWDB Data after 2000				18
Llano	TWDB	12	5.06	-4.78	-9.83	NR
Mason	TWDB	111	4.77	9.19	4.42	17
McCulloch	TWDB	79	4.71	12.16	7.45	29
Menard		No TWDB Data after February 2009				46
SanSaba	TWDB	101	5.81	2.11	-3.69	6

Issues to be Resolved (Not Relevant?)

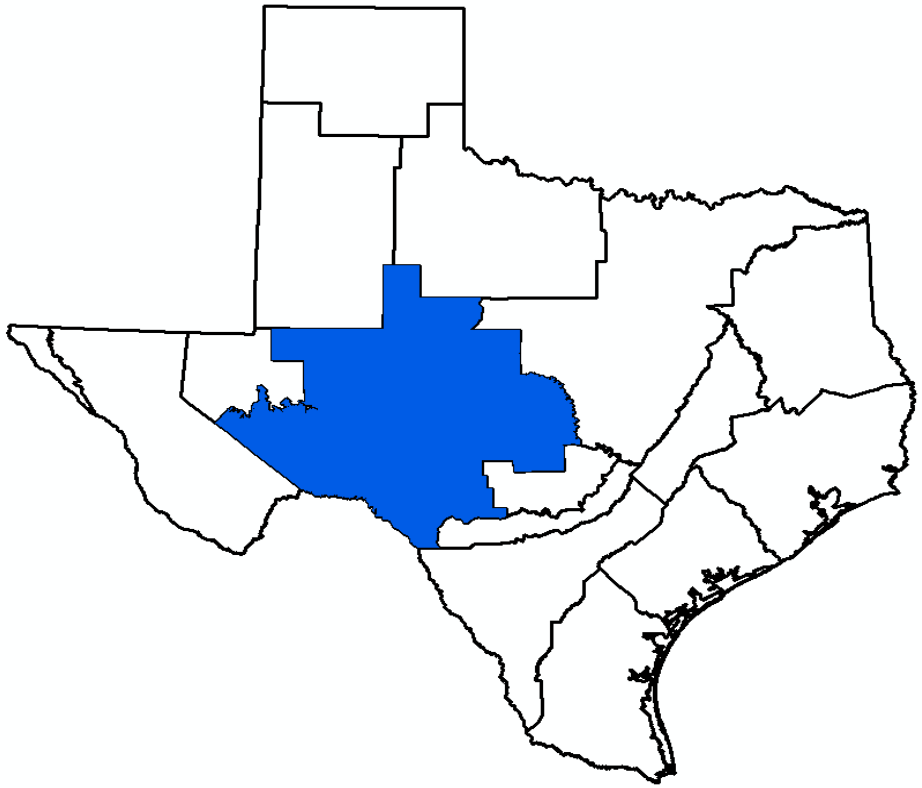
- HB 2078 DFC Comparison Analysis identified some counties with no monitoring data
  - Edwards-Trinity (Plateau) Aquifer
    - Uvalde County
  - Ellenburger-San Saba Aquifer
    - Kimble County
    - Mason County
  - Hickory Aquifer
    - Concho County
    - Kimble County
    - Menard County

Questions/Discussion

Bill Hutchison
billhutch@texasgw.com



Agenda Item 10:
Future GAM Simulations



Bill Hutchison

GMA 7 Meeting

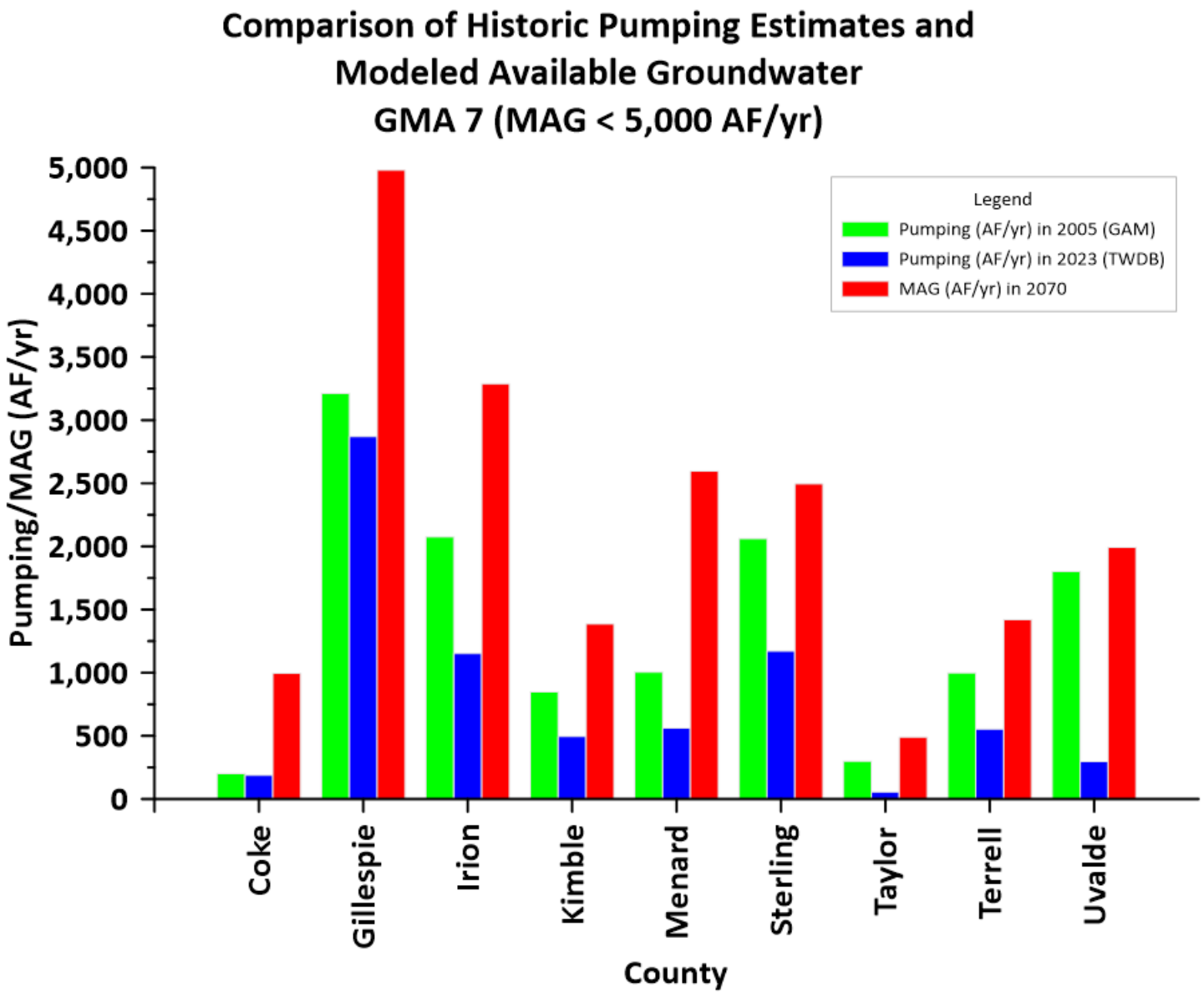
November 6, 2025

Upcoming GAM Simulations

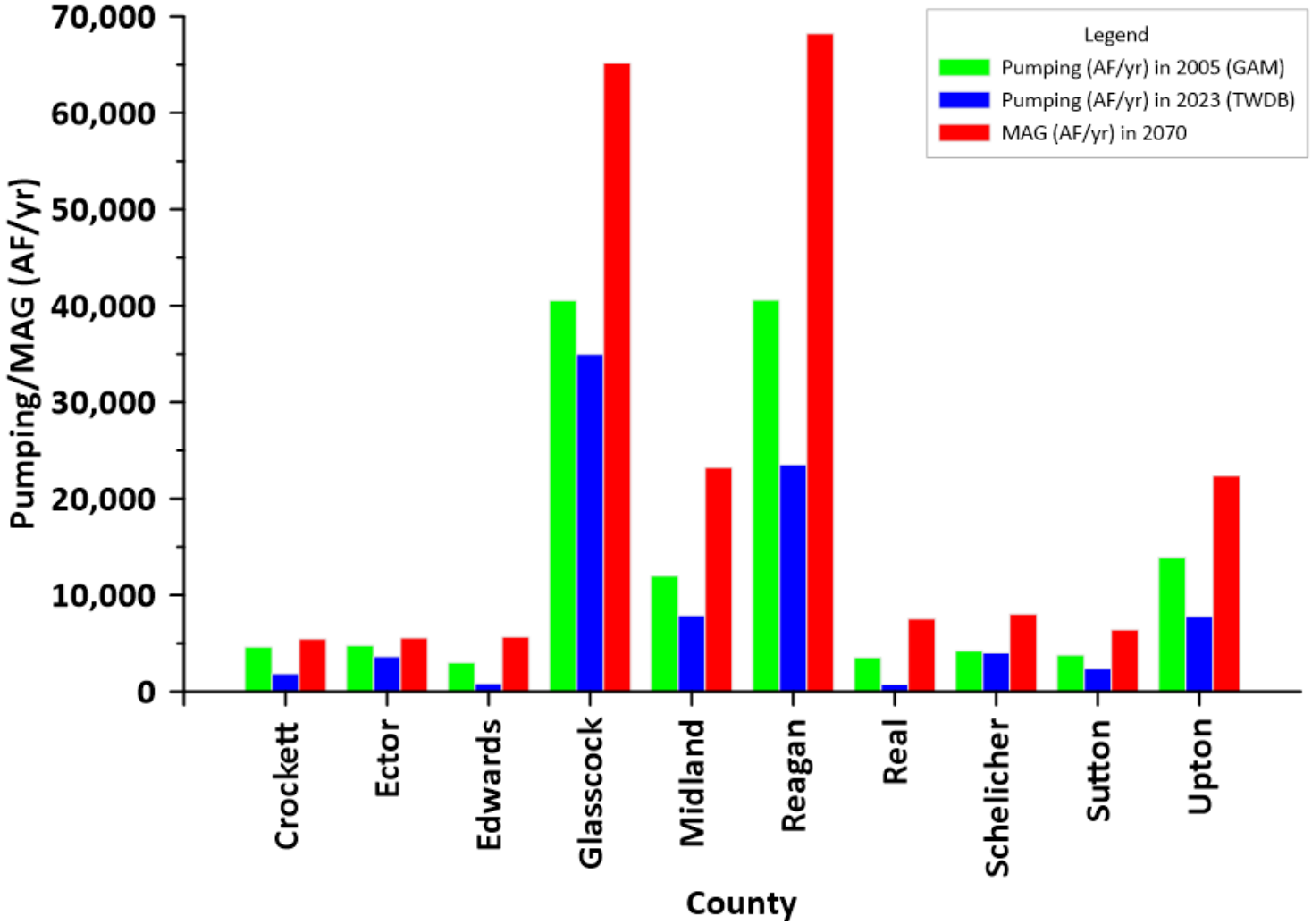
- Specify Pumping for Simulation
  - Output pumping “becomes” MAG
  - Llano Uplift GAM can reduce “input request” due to groundwater level decline
- Review two historic pumping estimates and current MAGs to discuss possible adjustments
  - Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers (combined)
  - Ellenburger-San Saba Aquifer
  - Hickory Aquifer

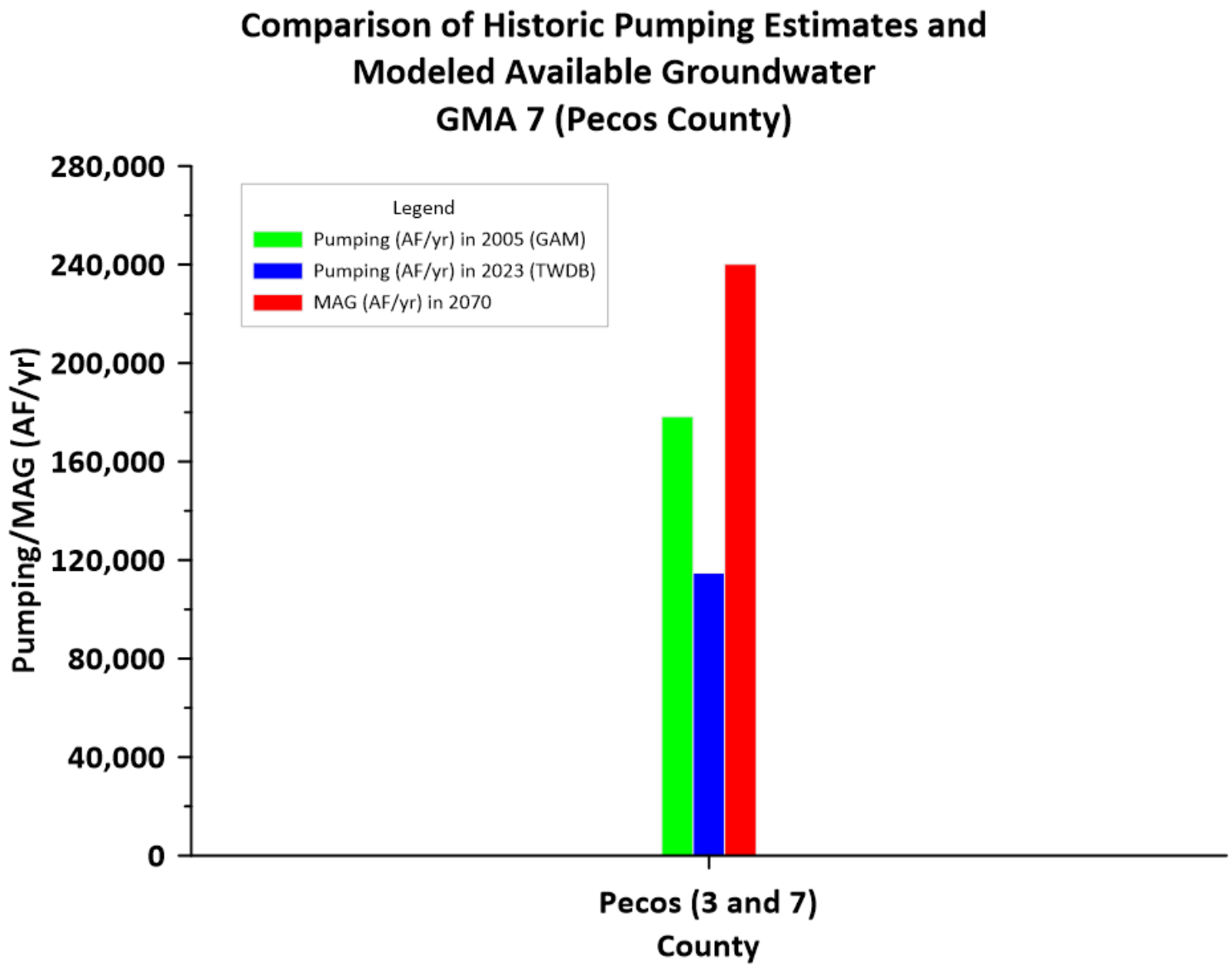
Historic Pumping Estimates vs. Current MAGs

- GAM Pumping
  - ETP = 2005 Pumping
  - Llano Uplift = Maximum in calibration period
- Review TWDB Estimated pumping from 2023
- Review current MAG (pumping in 2070)


Comparison of Historic Pumping Estimates and
Modeled Available Groundwater
GMA 7 (MAG < 5,000 AF/yr)
Pumping/MAG (AF/yr)
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Legend
Pumping (AF/yr) in 2005 (GAM)
Pumping (AF/yr) in 2023 (TWDB)
MAG (AF/yr) in 2070
Coke
Gillespie
Irion
Kimble
Menard
Sterling
Taylor
Terrell
Uvalde
County

Comparison of Historic Pumping Estimates and Modeled Available Groundwater GMA 7 (MAG > 5,000 AF/yr)




Comparison of Historic Pumping Estimates and
Modeled Available Groundwater
GMA 7 (Pecos County)
Legend
Pumping (AF/yr) in 2005 (GAM)
Pumping (AF/yr) in 2023 (TWDB)
MAG (AF/yr) in 2070
Pumping/MAG (AF/yr)
280,000
240,000
200,000
160,000
120,000
80,000
40,000
0
Pecos (3 and 7)
County

Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers – Not Relevant Counties

County	Pumping (AF/yr) in 2005 (GAM)	Pumping (AF/yr) in 2023 (TWDB)	MAG (AF/yr) in 2070
Concho	302	278	NA
Mason	12	10	NA
McCulloch	91	7	NA
Mitchell		3	NA
Nolan	351	341	NA
Runnels		19	NA
Tom Green	1,699	2,061	NA

Edwards-Trinity (Plateau), Pecos Valley, and Trinity Aquifers –

Relevant Counties

County	Pumping (AF/yr) in 2005 (GAM)	Pumping (AF/yr) in 2023 (TWDB)	MAG (AF/yr) in 2070
Coke	202	188	997
Crockett	4,636	1,864	5,447
Ector	4,788	3,632	5,542
Edwards	3,002	820	5,676
Gillespie	3,211	2,870	4,979
Glasscock	40,556	34,970	65,186
Irion	2,075	1,153	3,289
Kimble	847	494	1,386
Menard	1,005	561	2,597
Midland	11,970	7,908	23,233
Pecos (3 and 7)	178,157	114,749	240,208
Reagan	40,576	23,508	68,233
Real	3,500	749	7,523
Schelicher	4,209	4,015	8,034
Sterling	2,062	1,170	2,495
Sutton	3,794	2,358	6,410
Taylor	300	56	489
Terrell	998	553	1,420
Upton	13,951	7,783	22,369
Uvalde	1,801	296	1,993

Ellenburger-San Saba Aquifer

County	Maximum Pumping (AF/yr) before 2010 (GAM)	Pumping (AF/yr) in 2023 (TWDB)	MAG (AF/yr) in 2070
Gillespie	6,463	3,735	6,294
Kimble	535	8	521
Mason	3,863	79	3,237
McCulloch	4,492	159	4,364
Menard	309	5	309
San Saba	8,391	2,080	7,890

Hickory Aquifer

County	Maximum Pumping (AF/yr) before 2010 (GAM)	Pumping (AF/yr) in 2023 (TWDB)	MAG (AF/yr) in 2070
Concho	27	368	27
Gillespie	1,814	694	1,751
Kimble	165	44	165
Mason	15,066	7,492	13,212
McCulloch	24,468	5,824	24,377
Menard	2,725	967	2,725
San Saba	7,751	4,302	7,680

Request

- Provide updated “input” pumping for your county prior to December 1, 2025
- At least one simulation will be needed for each GAM
  - TWDB requiring simulation to extend to 2080
- Review simulation results at next GMA 7 meeting
- Additional simulations?
  - At meeting (ETP GAM)?
  - Could require an additional meeting?

Questions/Discussion

Bill Hutchison
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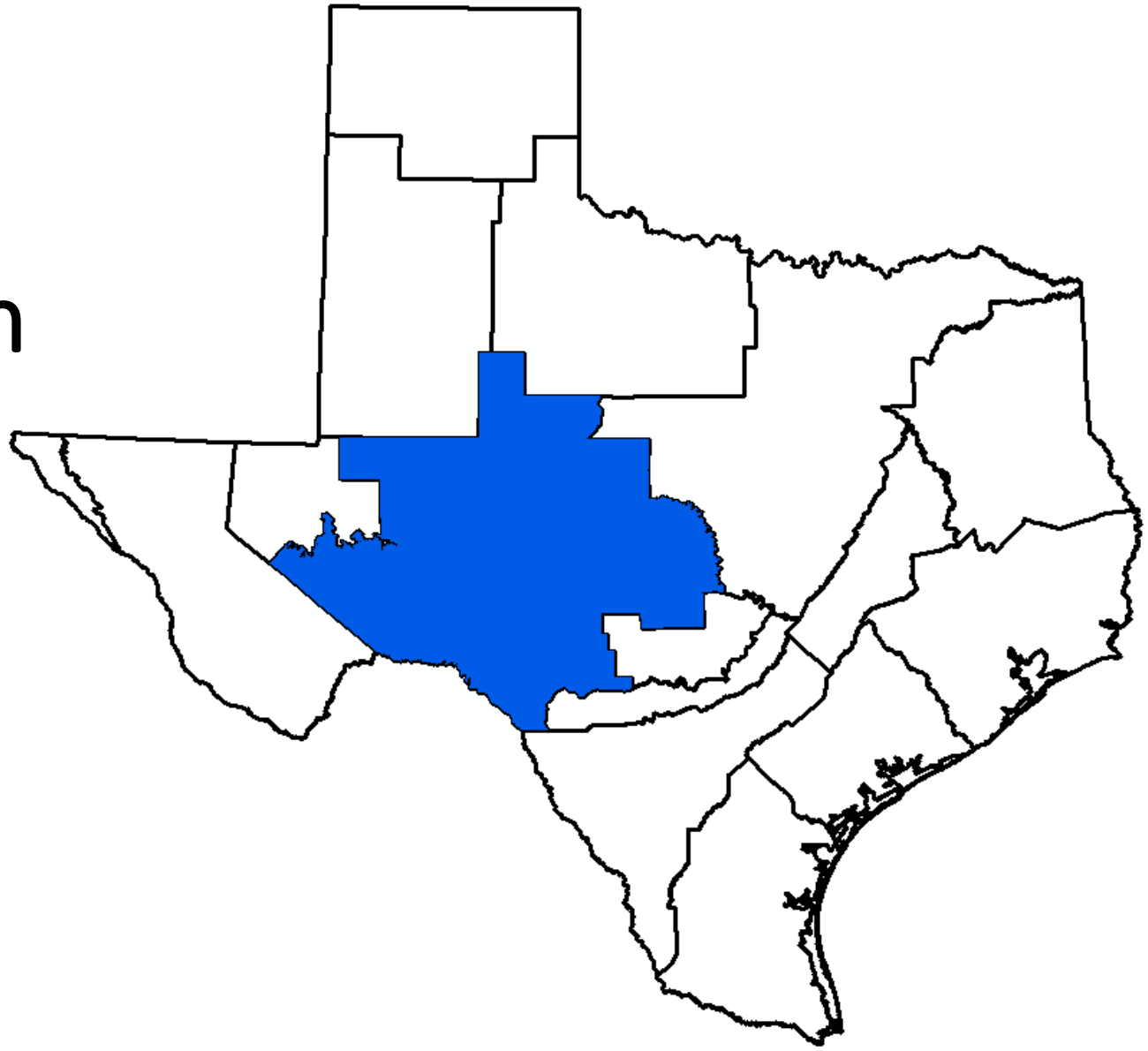
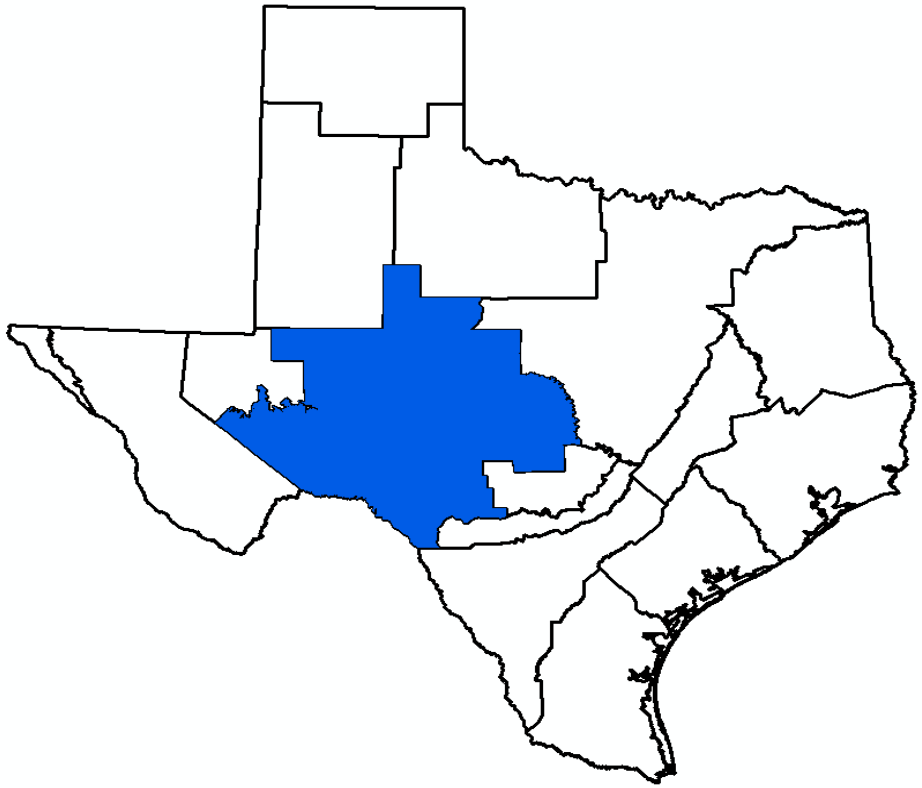


Agenda Item 11:
Workplan/Schedule/Budget



Bill Hutchison

GMA 7 Meeting

November 6, 2025

Workplan/Schedule/Budget

- Review past invoices for 4th round of joint planning
- Review proposed invoice and assumptions related to recommended budget
- Review updated proposed schedule of meetings

Past Invoices for 4th Round of Joint Planning

- Invoice A: $7,500 (October 20, 2022)
  - Review TWDB recharge and pumping reports, 10/22/2025 GMA 7 meeting
- Invoice B: $4,000 (February 25, 2025)
  - Updated GAM meetings with TWDB, 2/19/2025 joint GMA 3 and GMA 7 meeting
- Invoice C: $2,500 (April 10, 2025)
  - 4/10/2025 GMA 7 meeting
- Invoice 1: $6,500 (August 14, 2025)
  - 8/14/2025 GMA 7 Meeting
  - Phase 1 of Drawdown Comparison

Total = $20,500

Approved Budget Assumptions

- Capitan Reef Complex, Dockum, Ogallala, and Rustler are not relevant for purposes of joint planning
  - Only two GAMs and two explanatory reports plus not relevant documentation
- Phase 2 of the DFC Comparison is completed
- Alternative GAM (one-layer model) is updated
- Four GAM runs are needed for DFC development
  - Any combination for the two GAMs (2 and 2, 3 and 1, or 1 and 3)

Current Budget Progress

GMA 7 Support Task List and Invoicing Scehdule
William R. Hutchison, Ph.D, P.E., P.G.

Invoice 2 (11/6/2025)

Task No.	Task	Number	Unit Cost	Total Budget	Past Invoice Amount	Current Invoice Amount	Remaining Budget	Invoice Date
1	Meetings	5	$2,500	$12,500	$2,500	$2,500	$7,500	2 of 5
2a	DFC Comparison (Phase 1)	1	$4,000	$4,000	$4,000	$0	$0	8/14/2025
2b	DFC Comparison (Phase 2)	1	$6,000	$6,000	$0	$0	$6,000	
2c	DFC Comparison Report	1	$4,000	$4,000	$0	$0	$4,000	
3	Update Alterntative GAM	1	$6,000	$6,000	$0	$0	$6,000	
4	GAM Simulations and Tech Memos	4	$6,000	$24,000	$0	$0	$24,000	
5	Draft Explanatory Report and Not Relevant Documentation	3	$6,000	$18,000	$0	$0	$18,000	
6	Respond to Comments and Finalize	1	$6,000	$6,000	$0	$0	$6,000	
	Total			**$80,500**	**$6,500**	**$2,500**	**$71,500**	

Proposed Meeting Schedule

- November 14, 2025 (today):
  - Phase 2 of DFC Comparison Progress
  - Discuss upcoming GAM simulations
- February 2026: Phase 2 DFC Comparison Report, Updated Calibration of GAM, Updated GAM simulations (as directed from today's meeting), Draft Explanatory Reports (includes 9 factors discussion), and not relevant documentation
  - Next GMA 3 meeting is February 18, 2026
- April 2026: Updates based on input/discussion from January 2026 meeting (i.e. updated draft explanatory report), vote on proposed DFCs
- October 2026: Review public comments, proposed responses, draft final Explanatory Reports, vote on final DFCs

Questions/Discussion

Bill Hutchison
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