

Groundwater Management Area 16 Joint Planning Cycle 2019-2022: Preliminary Model Results

Falfurrias, TX

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Meeting Objectives

- *Review Model from Previous Joint Planning Cycle*
- District responses for updated pumping values
- Implementation of updated pumping values
- Discuss options for calculating DFC & MAG values

Previous Model

Modeled Available Groundwater (MAG)

GCD	2010	2020	2030	2040	2050	2060	INTERA Check
Bee GCD	7,689	8,971	10,396	11,061	11,392	11,584	11,584
Brush Country GCD*	14,182	18,672	19,037	19,365	19,730	20,022	20,022
Duval County GCD	18,973	20,571	22,169	23,764	25,363	26,963	26,983
Kenedy County GCD	13,989	23,314	32,637	41,964	51,289	51,289	51,287
Live Oak UWCD	6,556	8,338	9,343	8,564	8,441	8,441	8,441
McMullen GCD	510	510	510	510	510	510	510
Red Sands GCD	1,368	1,667	1,966	2,265	2,563	2,863	2,863
San Patricio County GCD	14,201	43,611	45,016	46,422	47,828	49,234	49,234
Starr County GCD	2,742	3,722	4,701	5,681	6,659	7,639	7,639

* The published MAG report (Goswami, 2017) has a typo – these are the corrected values from TWDB website

Previous Model

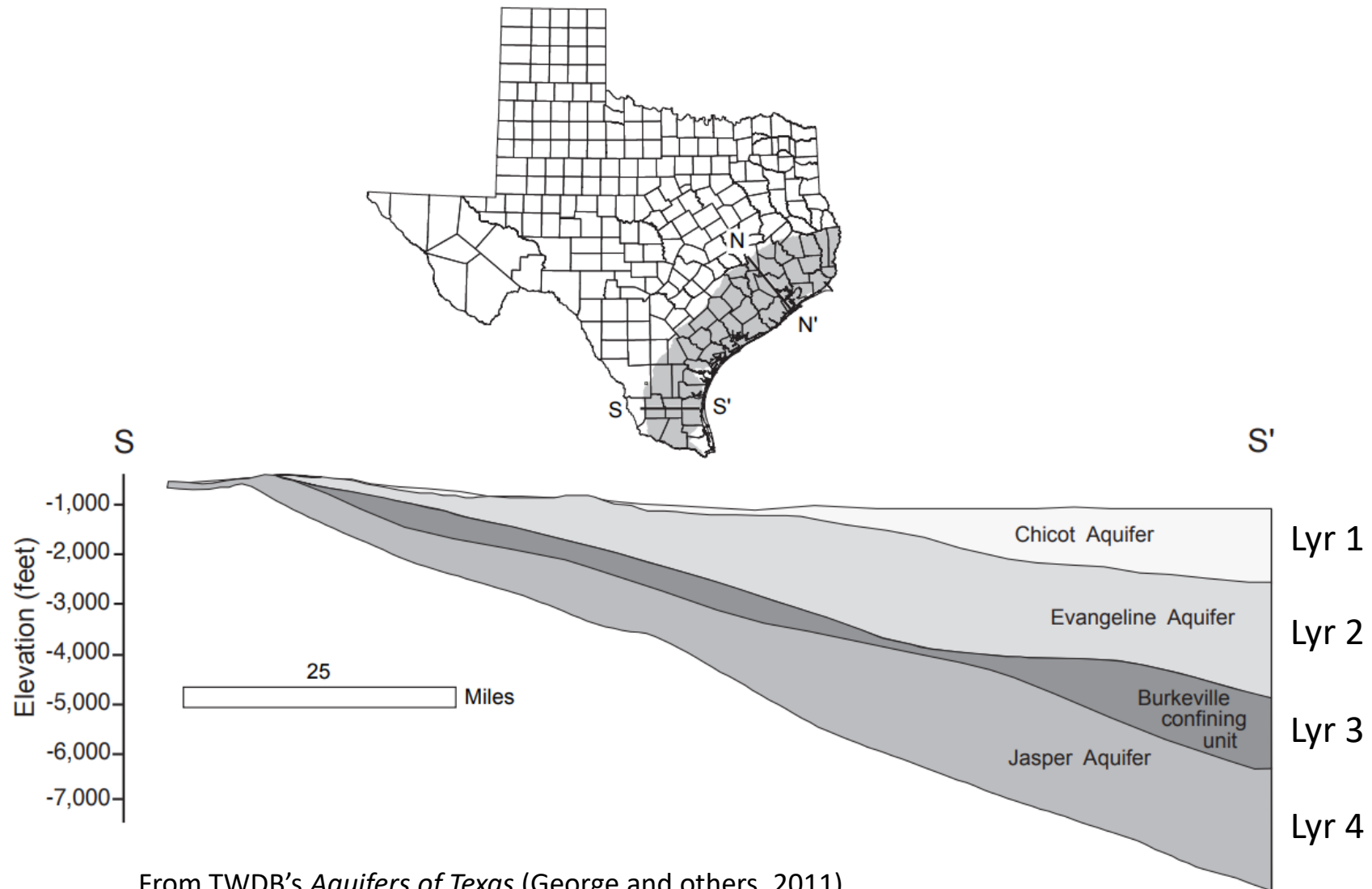
Desired Future Conditions (DFC)

GCD	2060	INTERA Check
Bee GCD	76	76
Brush Country GCD	69	69
Duval County GCD	104	107
Kenedy County GCD	40	39
Live Oak UWCD	34	34
McMullen GCD	9	9
Red Sands GCD	40	40
San Patricio County GCD	48	49
Starr County GCD	69	69

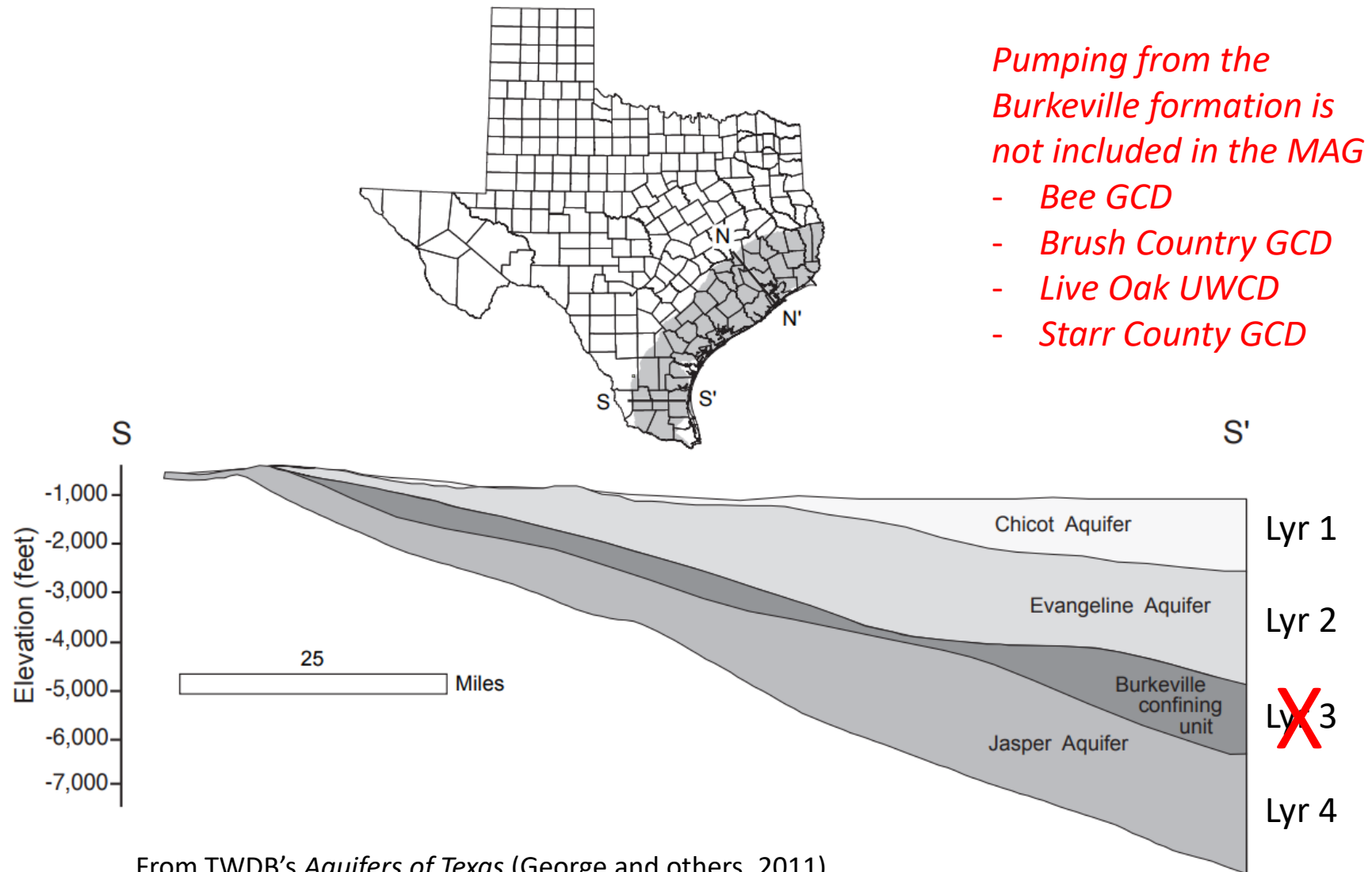
Key MAG assumptions

- *Excludes pumping in Layer 3 (Burkeville Confining Unit)*
- Excludes pumping outside of the official TWDB Gulf Coast Aquifer boundary
- Includes pumping in cells that go dry

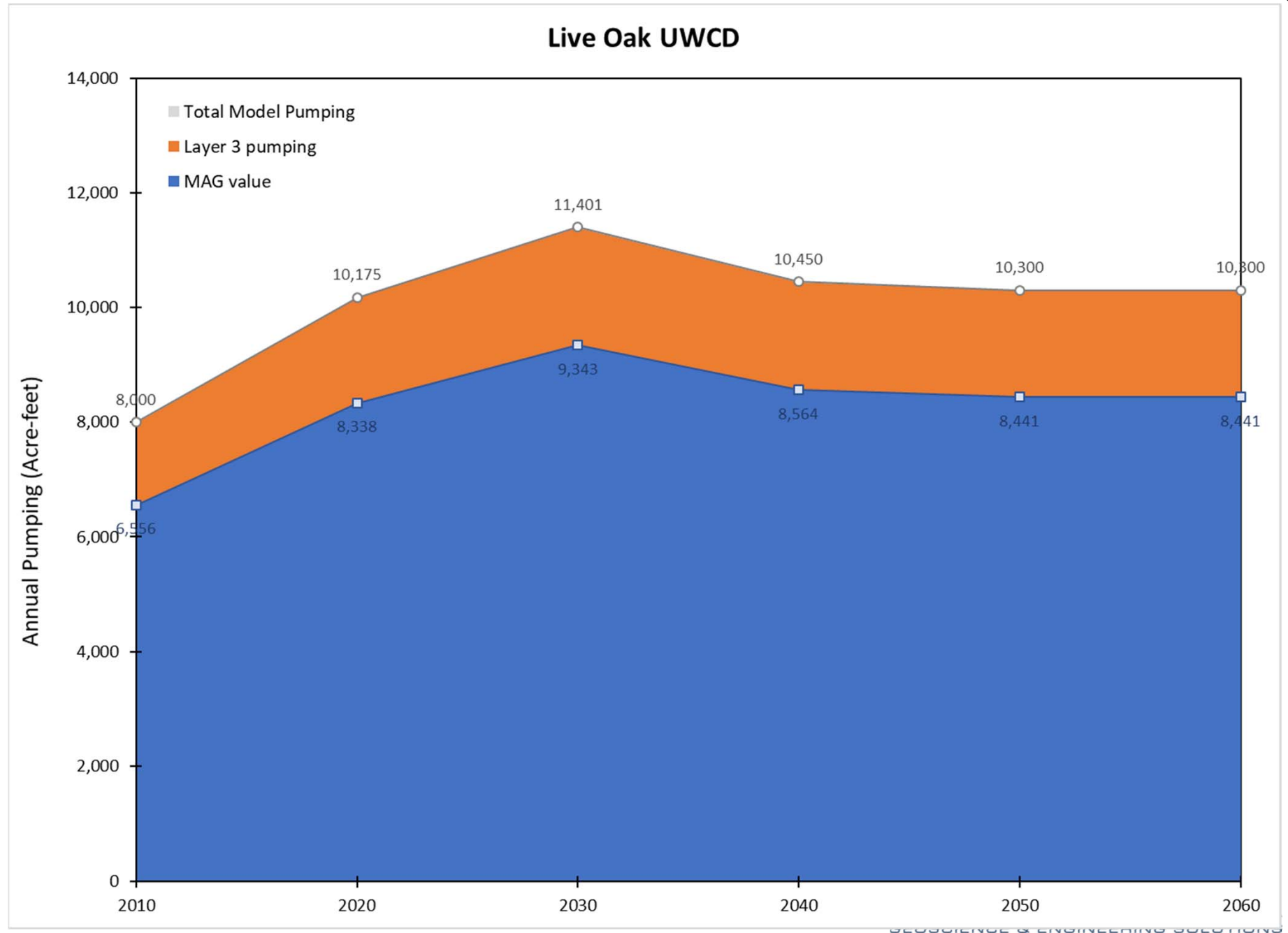
Key MAG assumptions



Key MAG assumptions



From TWDB's *Aquifers of Texas* (George and others, 2011)



Key MAG assumptions

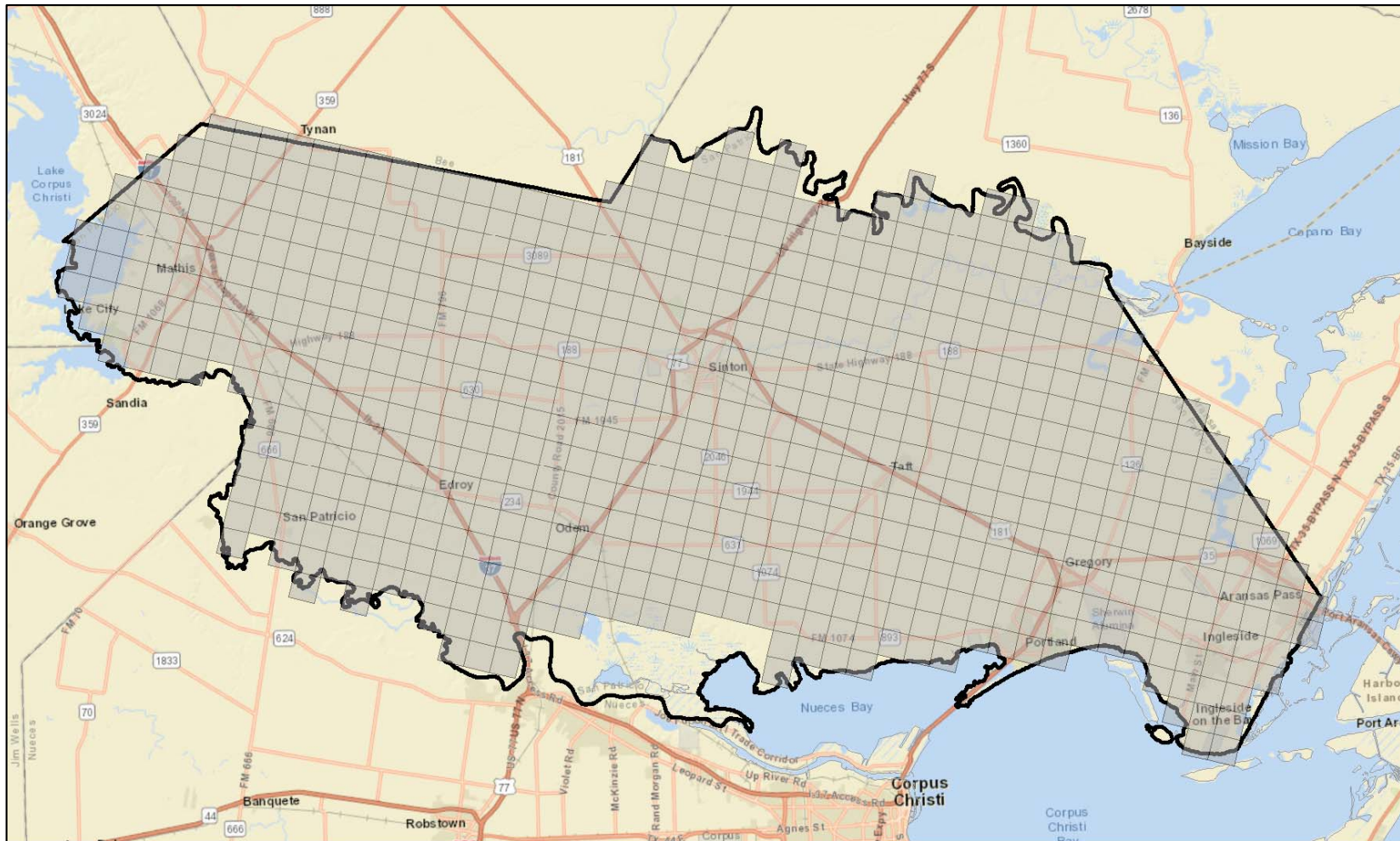
Pumping in Burkeville (Layer 3)

	2010	2020	2030	2040	2050	2060
Bee GCD	405	472	547	582	599	609
Brush County GCD	7	7	7	7	7	7
Duval County GCD	0	0	0	0	0	0
Kenedy County GCD	0	0	0	0	0	0
Live Oak UWCD	1,439	1,831	2,051	1,880	1,853	1,853
McMullen GCD	0	0	0	0	0	0
Red Sands GCD	0	0	0	0	0	0
San Patricio GCD	0	0	0	0	0	0
Starr County GCD	56	76	96	116	135	156

Key MAG assumptions

- Excludes pumping in Layer 3 (Burkeville Confining Unit)
- *Excludes pumping outside of the official TWDB Gulf Coast Aquifer boundary*
- Includes pumping in cells that go dry

Key MAG assumptions

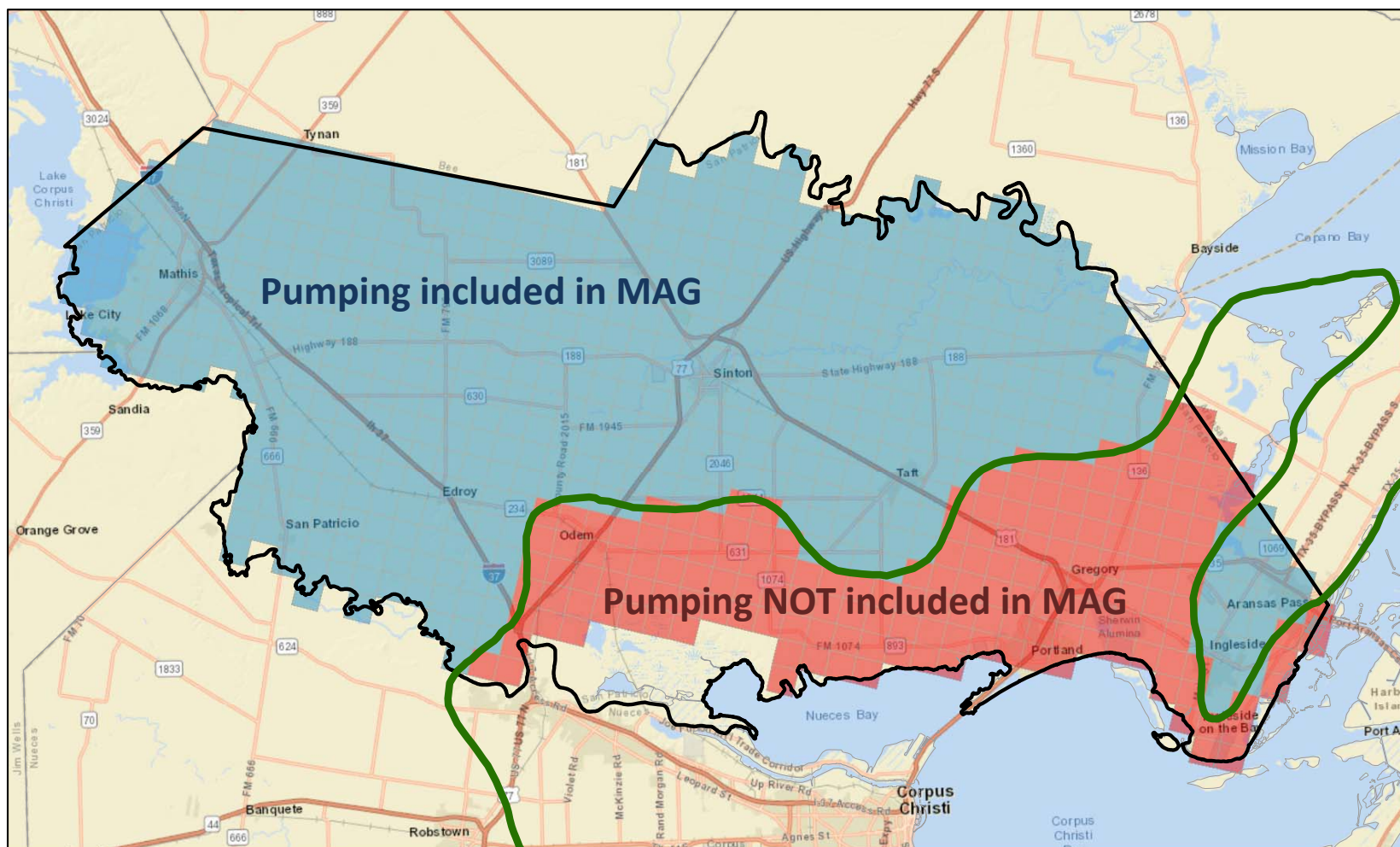


Active Model Cells

Model Grid San Patricio County

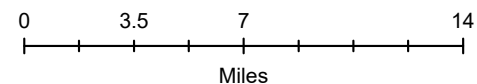
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Miles

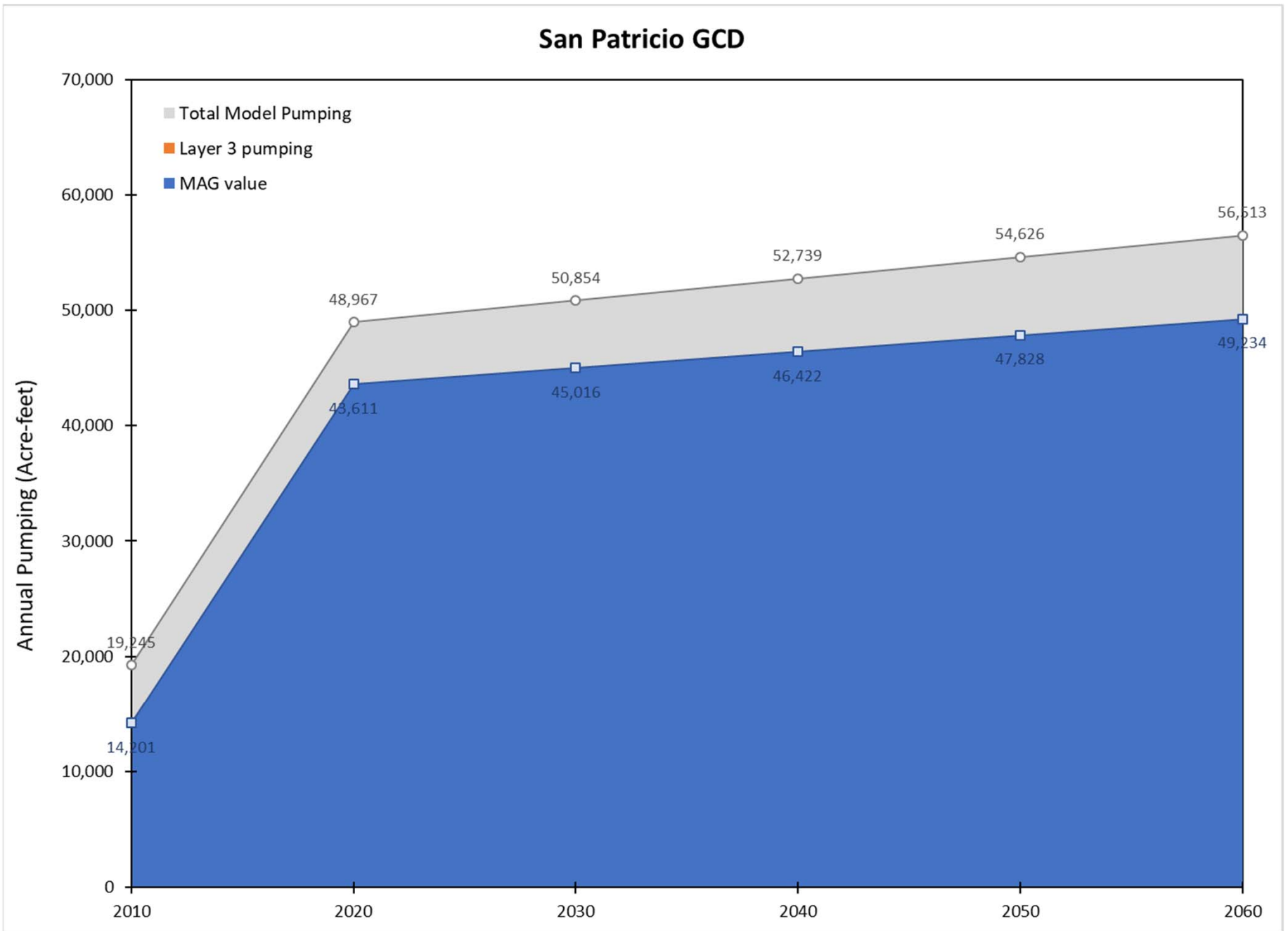
Key MAG assumptions



Active Model Cells

- Inside TWDB boundary
- Outside TWDB boundary
- San Patricio County
- TWDB Gulf Coast Aquifer boundary





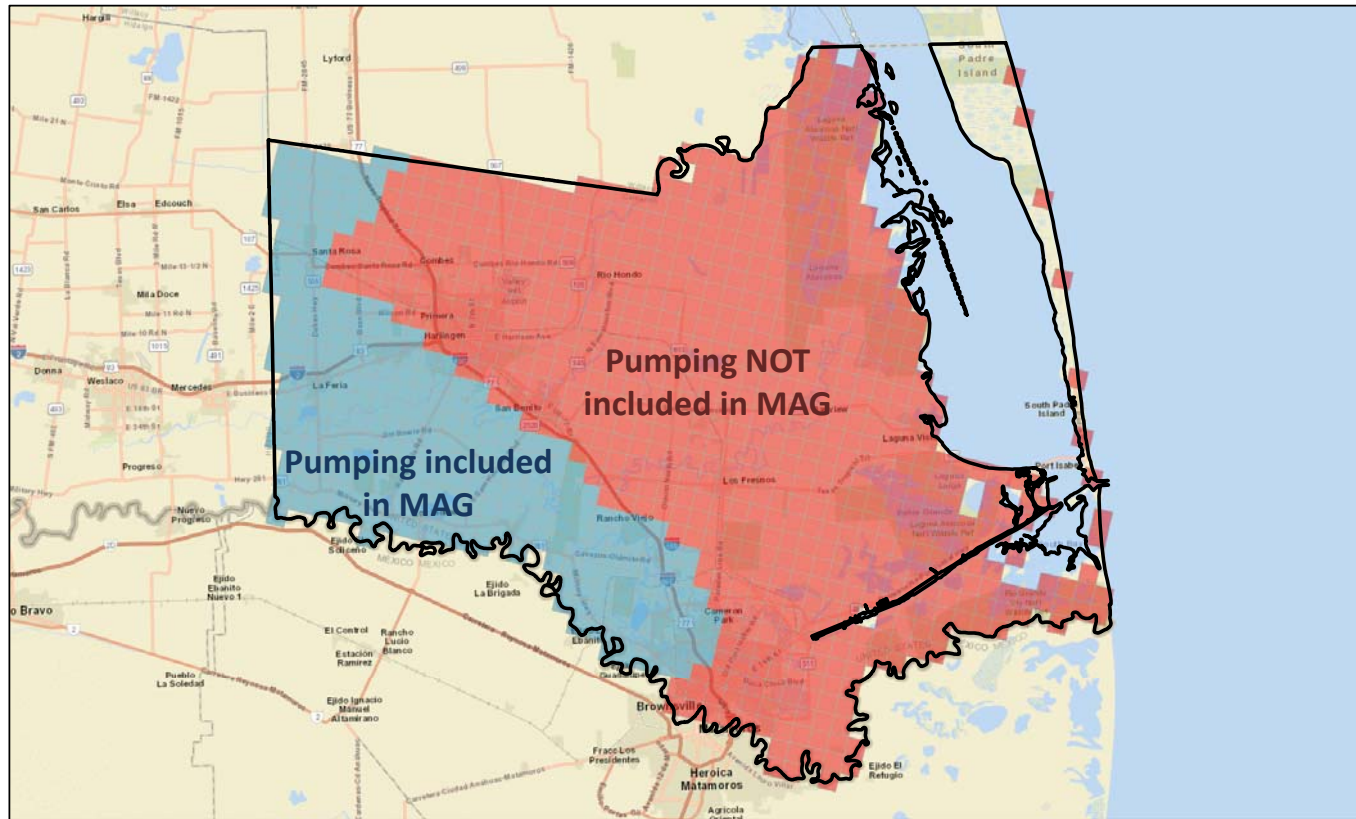
Key MAG assumptions

Pumping outside TWDB official Gulf Coast Aquifer boundary

	2010	2020	2030	2040	2050	2060
Bee GCD	0	0	0	0	0	0
Brush County GCD	0	0	0	0	0	0
Duval County GCD	0	0	0	0	0	0
Kenedy County GCD	1,010	1,684	2,358	3,031	3,705	3,705
Live Oak UWCD	0	0	0	0	0	0
McMullen GCD	0	0	0	0	0	0
Red Sands GCD	0	0	0	0	0	0
San Patricio GCD	4,846	5,326	5,806	6,285	6,765	7,245
Starr County GCD	0	0	0	0	0	0

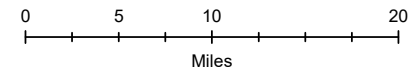
Affects GCDs along the Coast

Non-District Cameron County

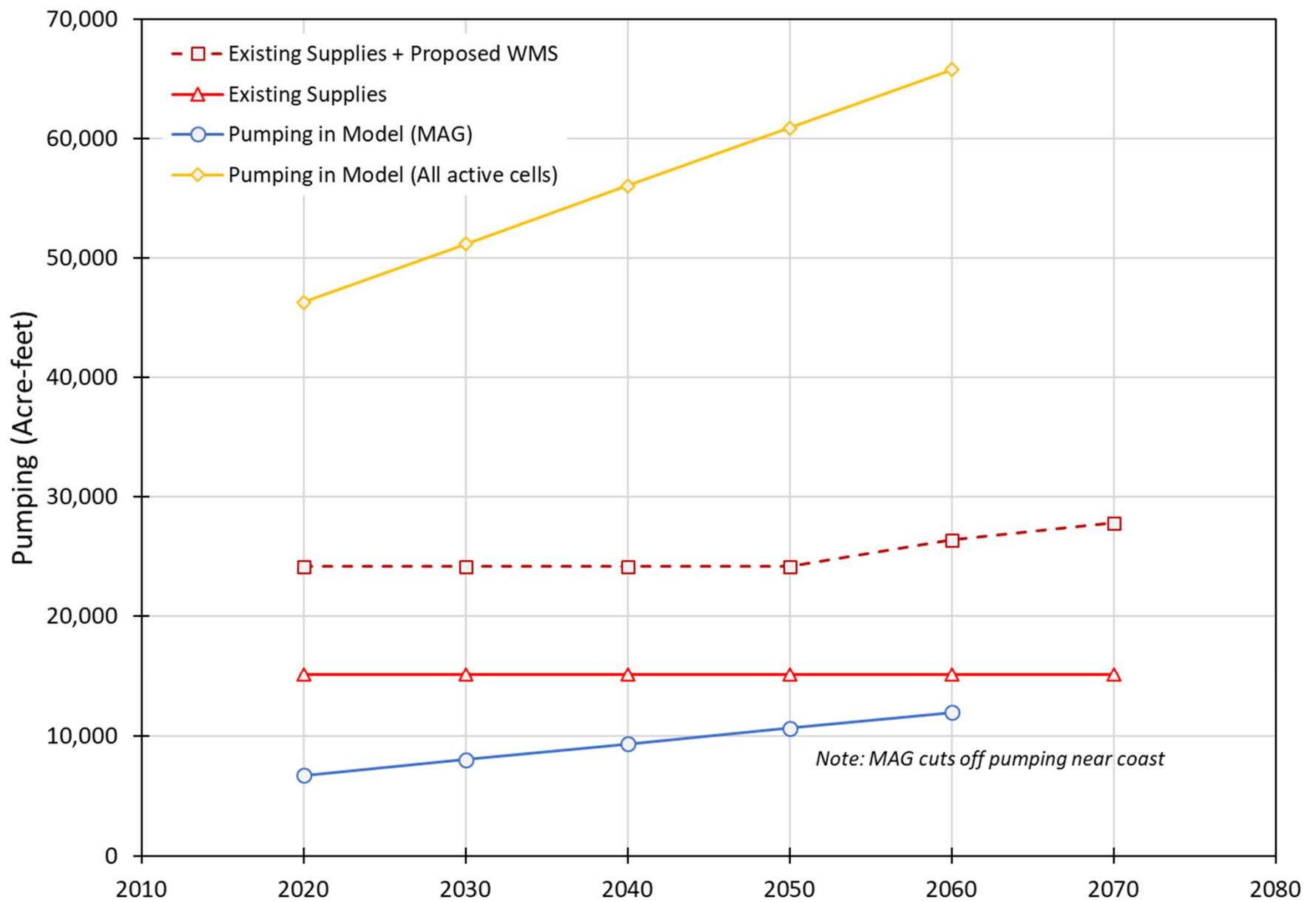


Active Model Cells

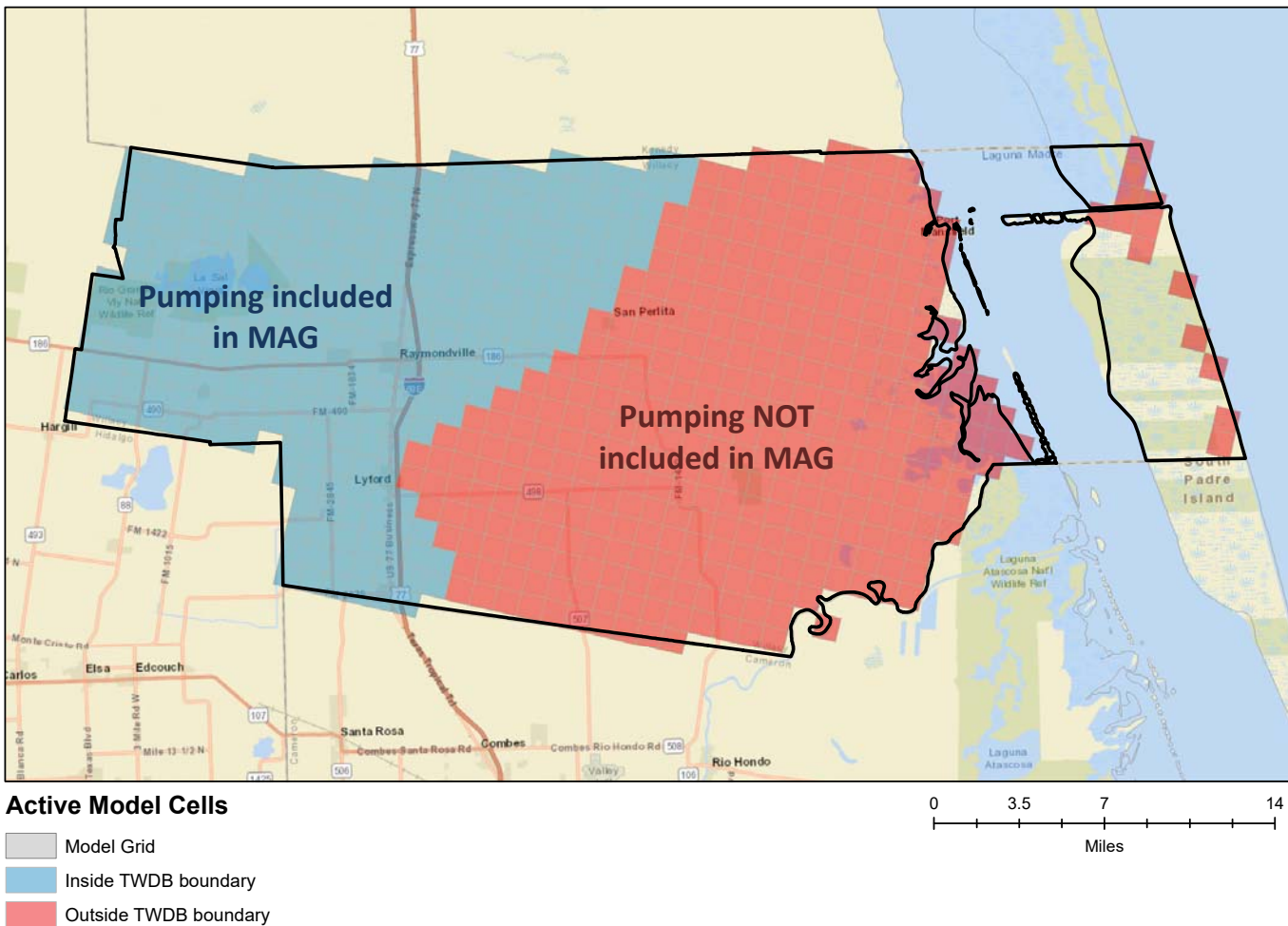
- Model Grid
- Inside TWDB boundary
- Outside TWDB boundary



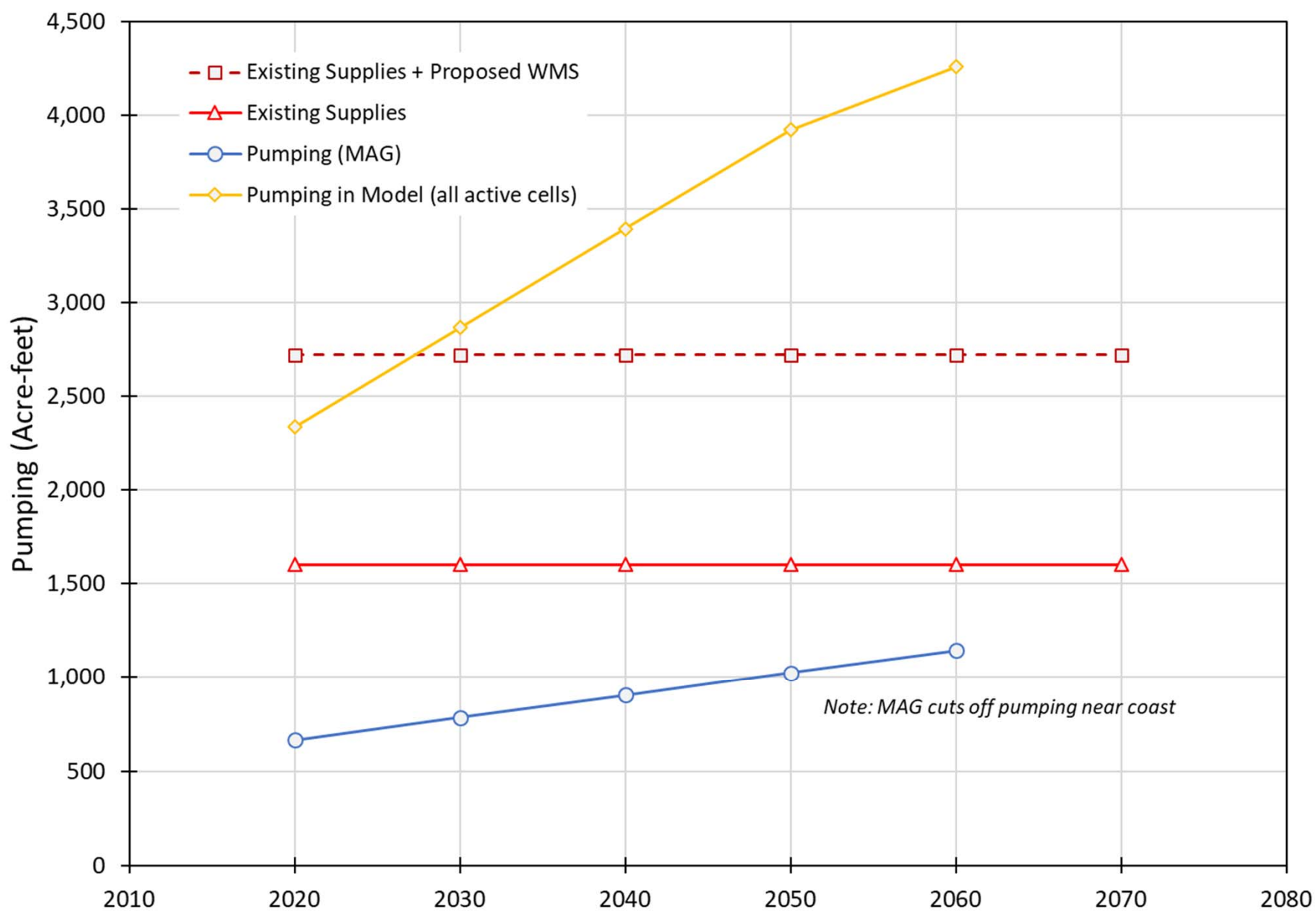
Non-District Cameron County



Non-District Willacy County



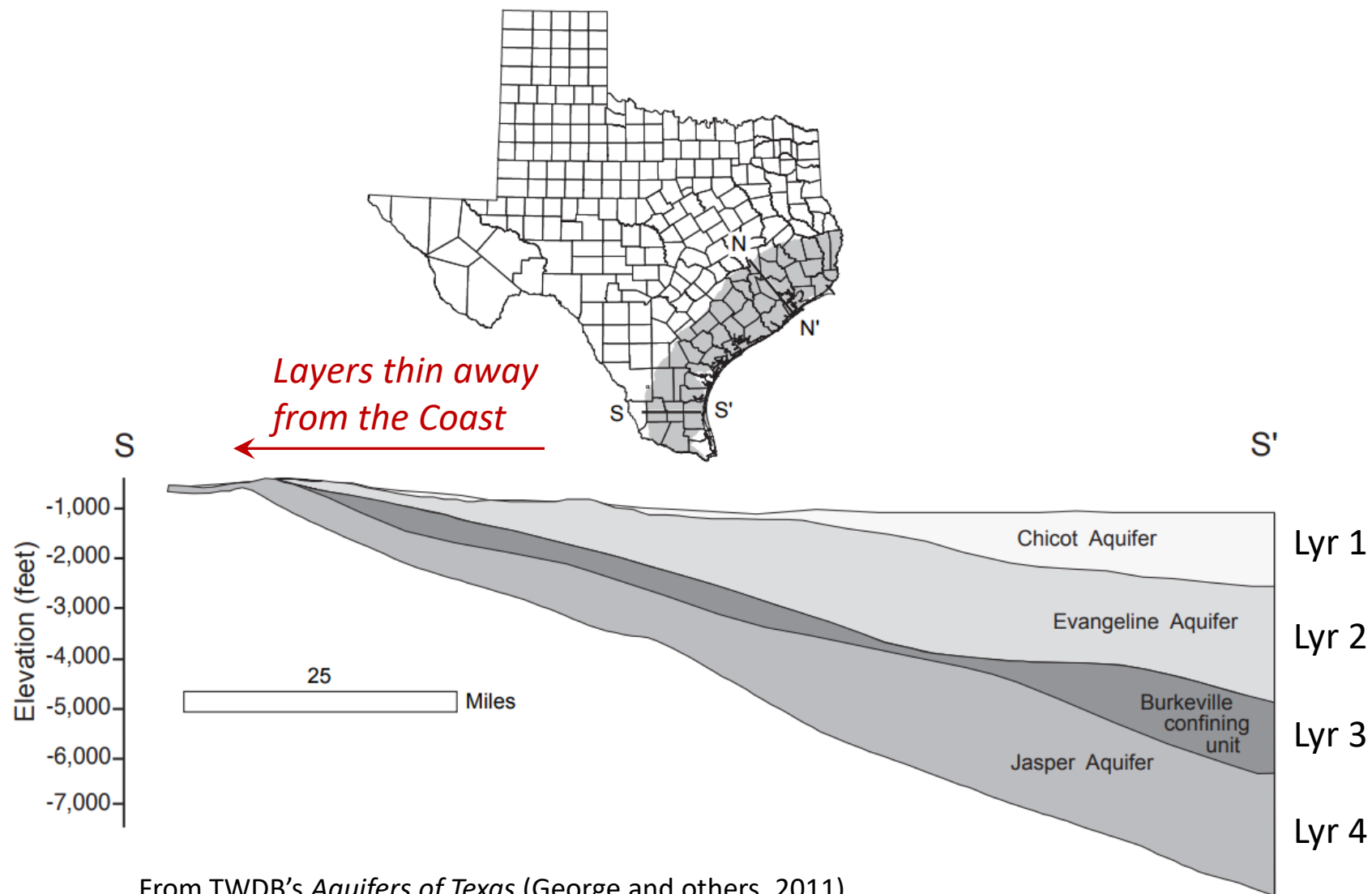
Willacy County



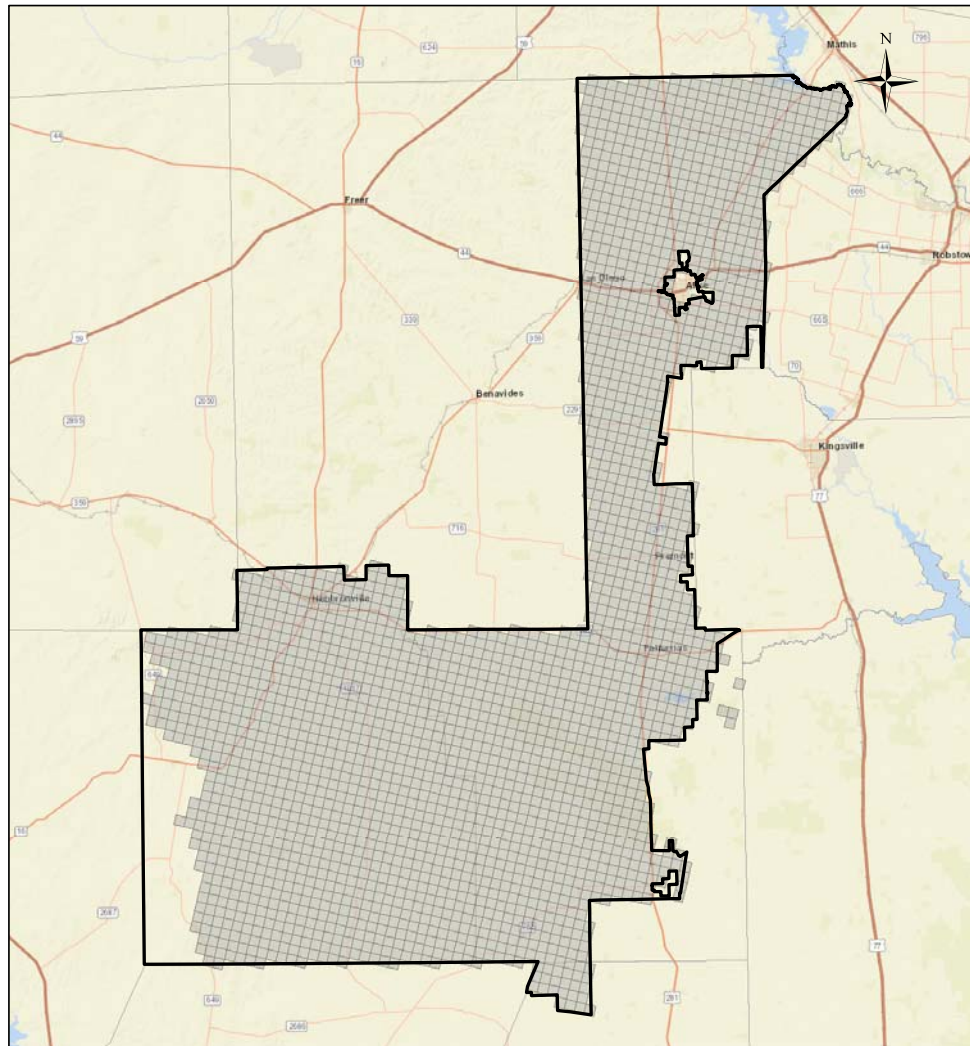
Key MAG assumptions

- Excludes pumping in Layer 3 (Burkeville Confining Unit)
- Excludes pumping outside of the official TWDB Gulf Coast Aquifer boundary
- *Includes pumping in cells that go dry*

Key MAG assumptions



Key MAG assumptions

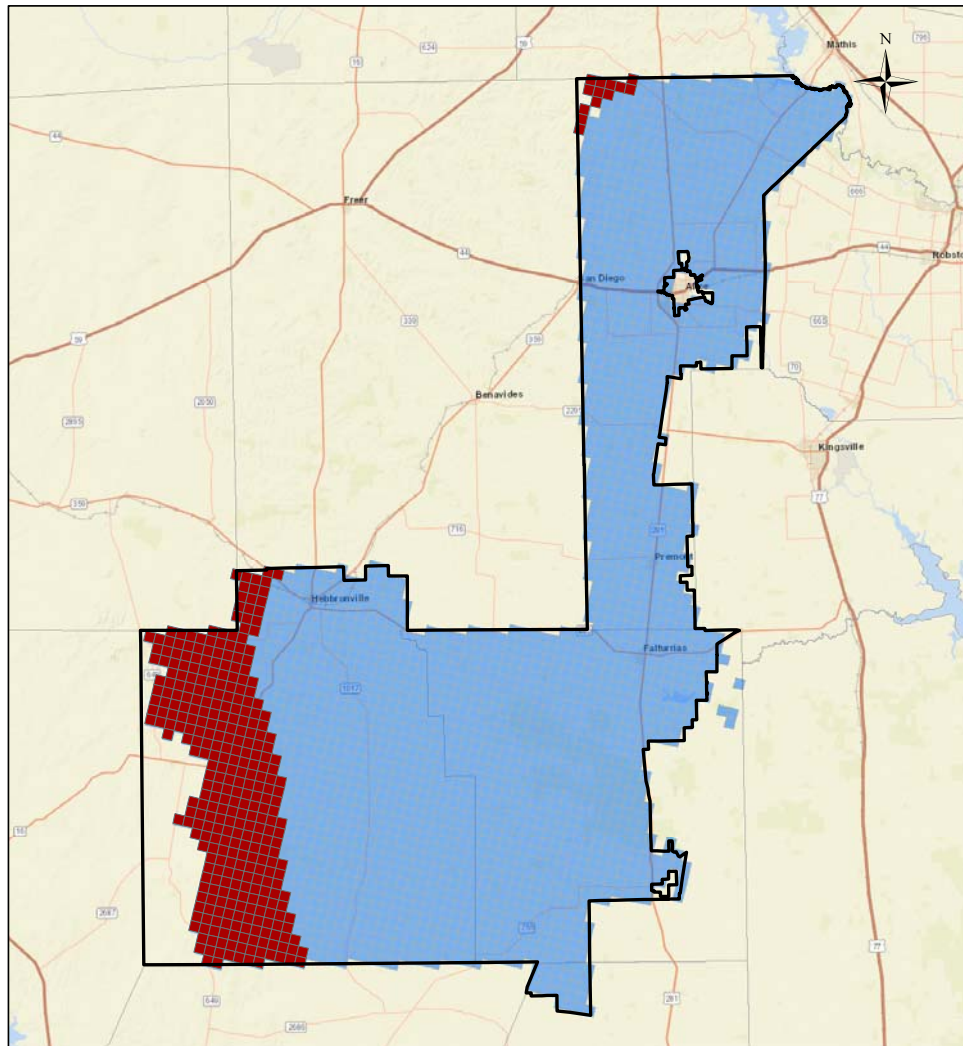


Active Model Cells - Layer 2

 Model Grid - Lyr 2  Brush Country GCD

A horizontal number line representing distance in miles. It starts at 0 and ends at 20. Major tick marks are labeled at 0, 5, 10, and 20. There are also minor tick marks between these major numbers, indicating every 1 mile. The word "Miles" is written below the line.

Key MAG assumptions



Active Model Cells - Layer 2

■ Dry in 2010 Brush Country GCD
■ Wet in 2010

0 5 10 20
Miles

MAG:
 Pumping in wet cells +
 Pumping in dry cells

DFC:
 Drawdown in wet cells only

Key MAG assumptions

Pumping within dry cells

	2000	2010	2020	2030	2040	2050	2060
Bee GCD	1,895	2,214	2,797	3,519	3,988	4,189	4,345
Brush County GCD	3,489	3,897	4,256	4,618	4,840	5,039	5,276
Duval County GCD	5,630	6,510	7,539	8,475	9,506	10,406	11,443
Kenedy County GCD	5	10	24	53	83	140	163
Live Oak UWCD	814	946	1,239	1,501	1,452	1,464	1,561
McMullen GCD	115	119	120	124	126	128	128
Red Sands GCD	92	114	168	247	388	479	578
San Patricio County GCD	754	990	1,399	1,977	2,476	2,929	3,489
Starr County GCD	367	427	624	865	1,146	1,436	1,767

Key MAG assumptions

Pumping within dry cells (as % of total GMA 16 pumping)

	2000	2010	2020	2030	2040	2050	2060
Bee GCD	23%	27%	30%	32%	34%	35%	36%
Brush County GCD	25%	27%	23%	24%	25%	26%	26%
Duval County GCD	30%	34%	37%	38%	40%	41%	42%
Kenedy County GCD	0.0%	0.1%	0.1%	0.2%	0.2%	0.3%	0.3%
Live Oak UWCD	10%	12%	12%	13%	14%	14%	15%
McMullen GCD	23%	23%	24%	24%	25%	25%	25%
Red Sands GCD	7%	8%	10%	13%	17%	19%	20%
San Patricio County GCD	4%	5%	3%	4%	5%	5%	6%
Starr County GCD	13%	15%	16%	18%	20%	21%	23%

Affects GCDs away from the coast (closer to the outcrop)

Meeting Objectives

- Review Model from Previous Joint Planning Cycle
- ***District responses for updated pumping values***
- Implementation of updated pumping values
- Discuss options for calculating DFC & MAG values

Survey Results

Changes Requested:

- Bee GCD - move 1,000 AF from GMA 16 --> GMA 15
- Brush Country GCD – update pumping timeline
- Kenedy County GCD – update pumping timeline
- San Patricio GCD – update old model values, if necessary

Requested NO change:

- Duval County GCD
- Red Sands GCD
- Live Oak UWCD
- McMullen GCD

Excluded (assumed no change):

- Corpus Christi ASRCD
- Starr County GCD

Meeting Objectives

- Review Model from Previous Joint Planning Cycle
- District responses for updated pumping values
- ***Implementation of updated pumping values***
- Discuss options for calculating DFC & MAG values

Groundwater Availability Model Runs

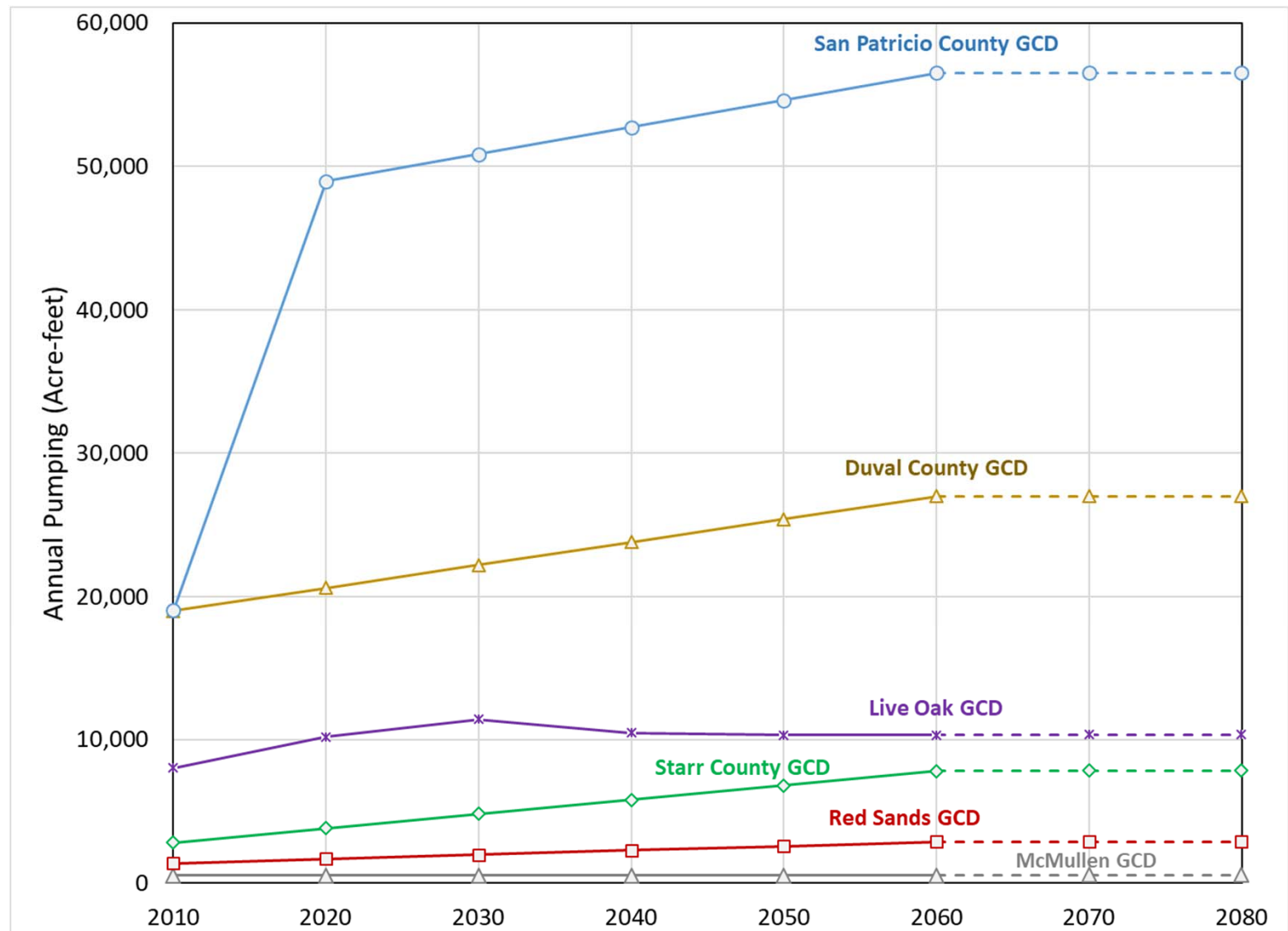
- Extended to 2080 to be consistent with the next regional water planning cycle
- Performed two Model Runs:
 - Original model extended to 2080
 - assumed 2080 pumping = 2060 pumping
 - Updated pumping values extended to 2080
 - For GCDs/counties with no change, assumed 2080 pumping = 2060 pumping
 - For GCDs with updated pumping, assumed 2080 pumping = 2070 pumping

Annual Pumping (Acre-feet) by Groundwater Control District (GCD)

Year	San Patricio County GCD	Kenedy County GCD	Duval County GCD	Bee GCD	Brush Country GCD	Live Oak GCD	Starr County GCD	Red Sands GCD	McMullen GCD
2010	19,000	15,000	19,000	17,500	14,000	8,000	3,000	1,500	500
2020	49,000	25,000	20,500	18,500	18,500	10,000	4,000	1,800	500
2030	51,000	35,000	22,000	20,000	19,000	11,500	5,000	2,000	500
2040	53,000	45,000	23,500	21,000	19,500	10,500	6,000	2,200	500
2050	55,000	55,000	25,500	21,500	20,000	10,500	7,000	2,500	500
2060	57,000	55,000	27,000	21,500	20,000	10,500	8,000	3,000	500
2070	57,000	55,000	27,000	21,500	20,000	10,500	8,000	3,000	500
2080	57,000	55,000	27,000	21,500	20,000	10,500	8,000	3,000	500

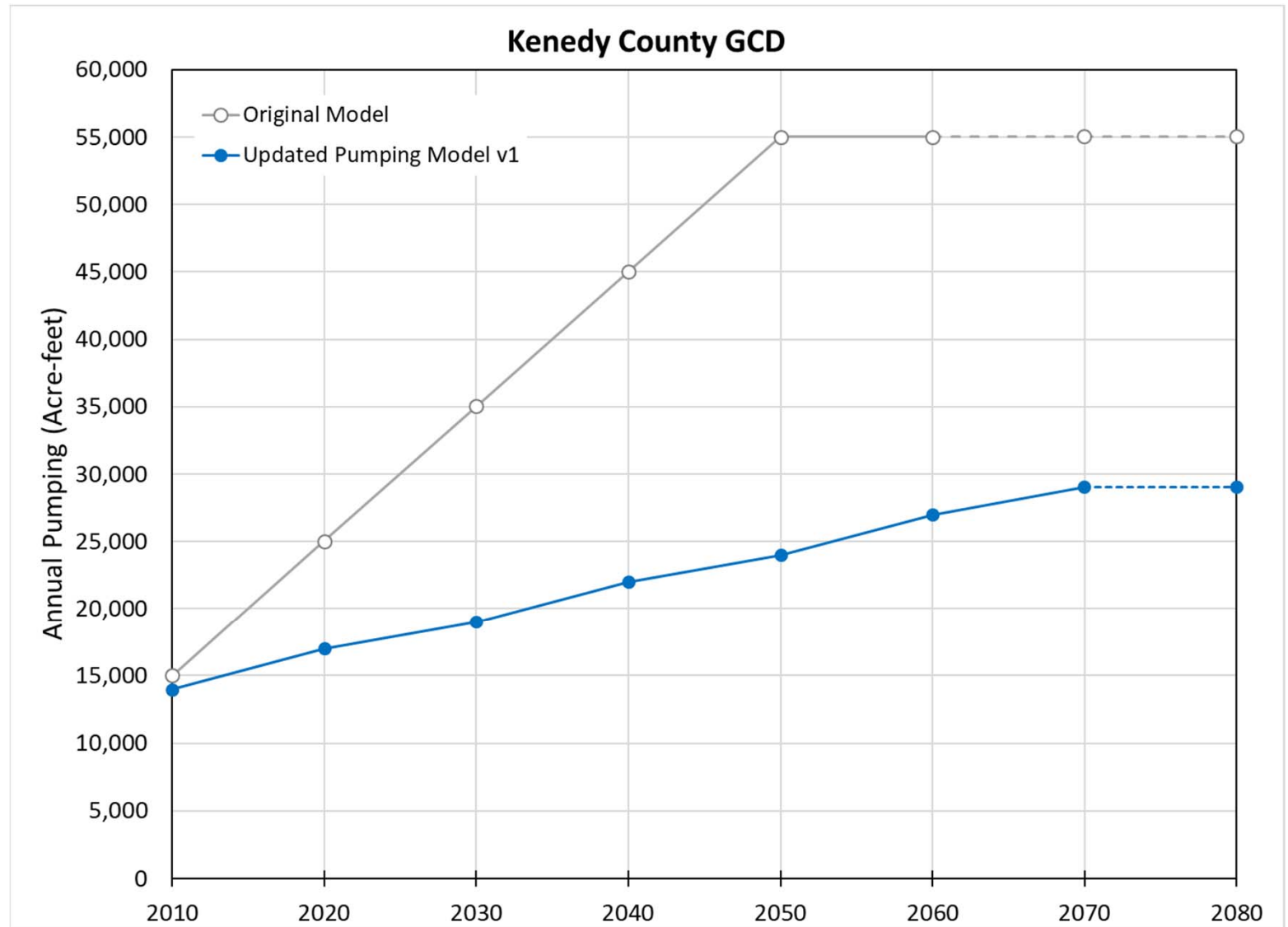
Groundwater Availability Model Run #2

Unchanged Pumping:



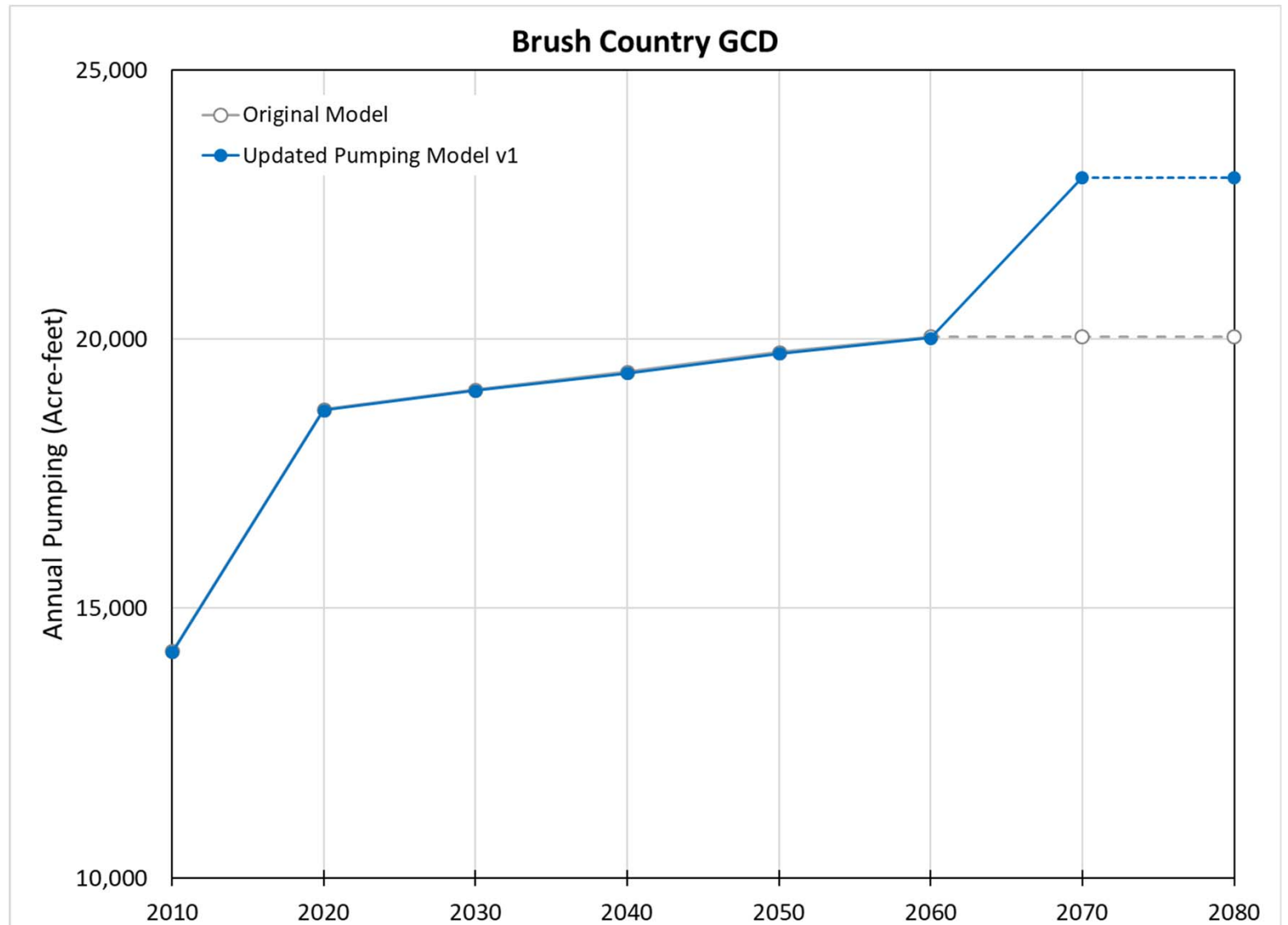
Groundwater Availability Model Run #2

Requested Changes to Pumping:



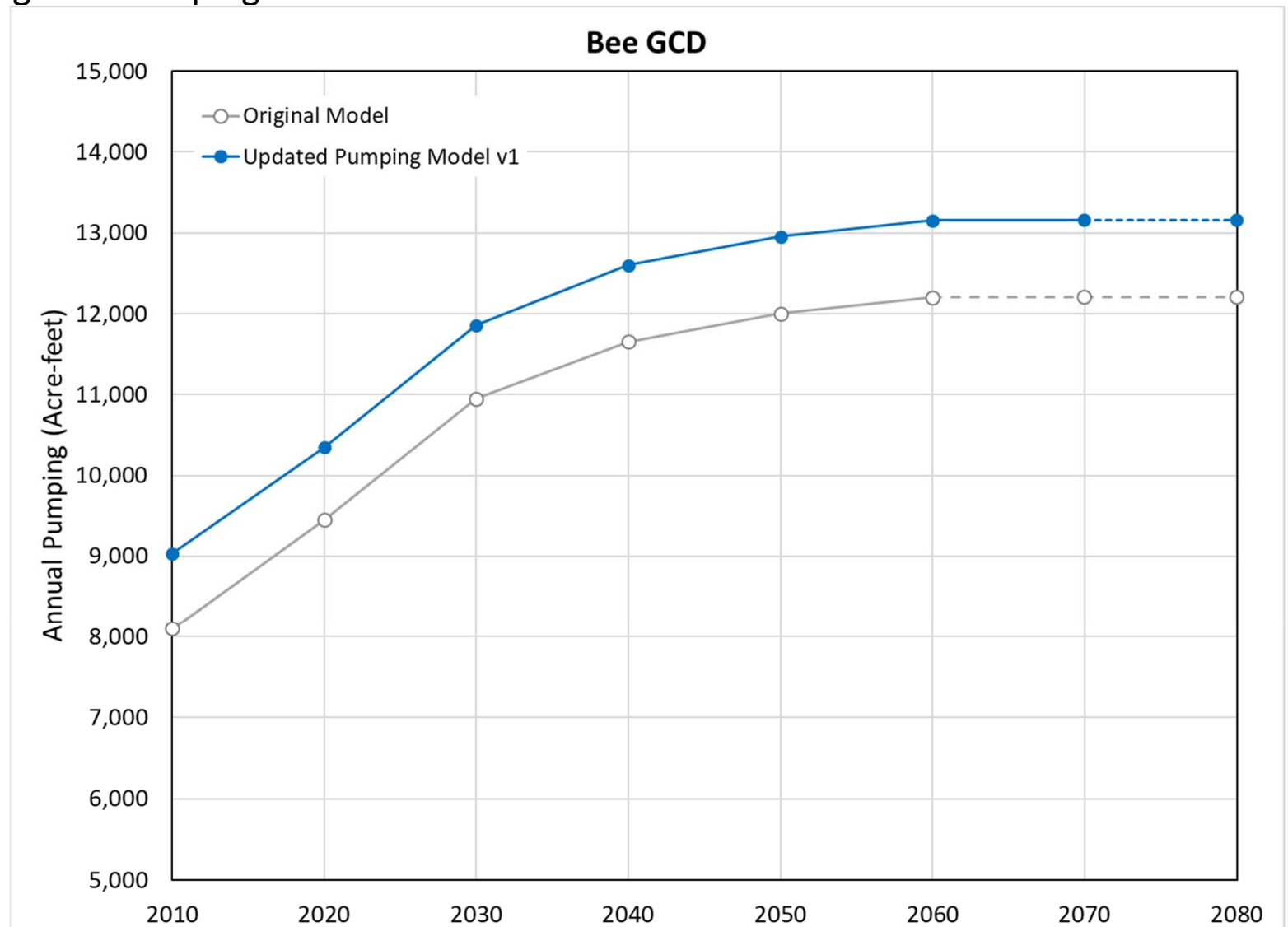
Groundwater Availability Model Run #2

Requested Changes to Pumping:



Groundwater Availability Model Run #2

Requested Changes to Pumping:



Meeting Objectives

- Review Model from Previous Joint Planning Cycle
- District responses for updated pumping values
- Implementation of updated pumping values
- ***Discuss options for calculating DFC & MAG values***

Preliminary Model Results

DFC

	Original Model Pumping extended to 2080		Updated Model Pumping extended to 2080	
	Inside TWDB boundary only 2080	Include area outside TWDB boundary 2080	Inside TWDB boundary only 2080	Include area outside TWDB boundary 2080
Bee GCD	91	91	91	91
Brush County GCD	91	91	90	90
Duval County	136	136	136	136
Kenedy County GCD	51	49	28	26
Live Oak UWCD	44	44	44	44
McMullen GCD	12	12	12	12
Red Sands GCD	65	65	61	61
San Patricio County GCD	69	61	69	61
Starr County GCD	94	94	94	94

Preliminary Model Results

MAG

	Original Model			Updated Model		
	Inside TWDB boundary only 2080	Include area outside TWDB boundary 2080	Include area outside & exclude Dry cells 2080	Inside TWDB boundary only 2080	Include area outside TWDB boundary 2080	Include area outside & exclude Dry cells 2080
Bee GCD	12,201	12,201	7,856	13,154	13,154	8,809
Brush County GCD	20,043	20,043	14,767	23,000	23,000	17,723
Duval County GCD	27,001	27,001	15,558	27,001	27,001	15,558
Kenedy County GCD	51,322	55,027	54,864	27,048	29,000	28,837
Live Oak UWCD	10,300	10,300	8,739	10,300	10,300	8,739
McMullen GCD	510	510	382	510	510	382
Red Sands GCD	2,865	2,865	2,287	2,865	2,865	2,287
San Patricio GCD	49,268	56,513	53,024	49,268	56,513	53,024
Starr County GCD	7,800	7,800	6,033	7,800	7,800	6,033

Highlight = GCDs along Coast

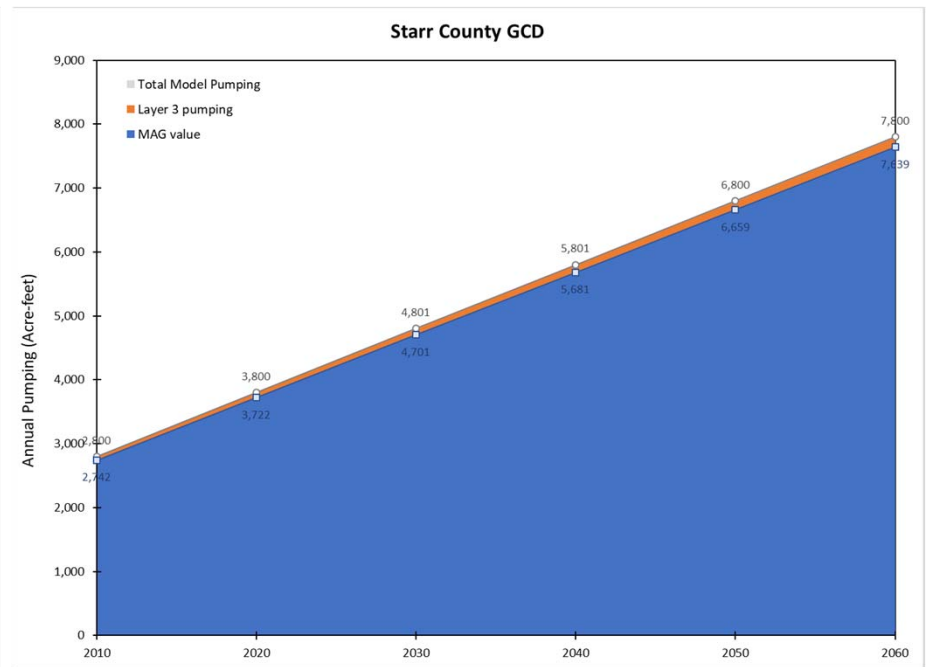
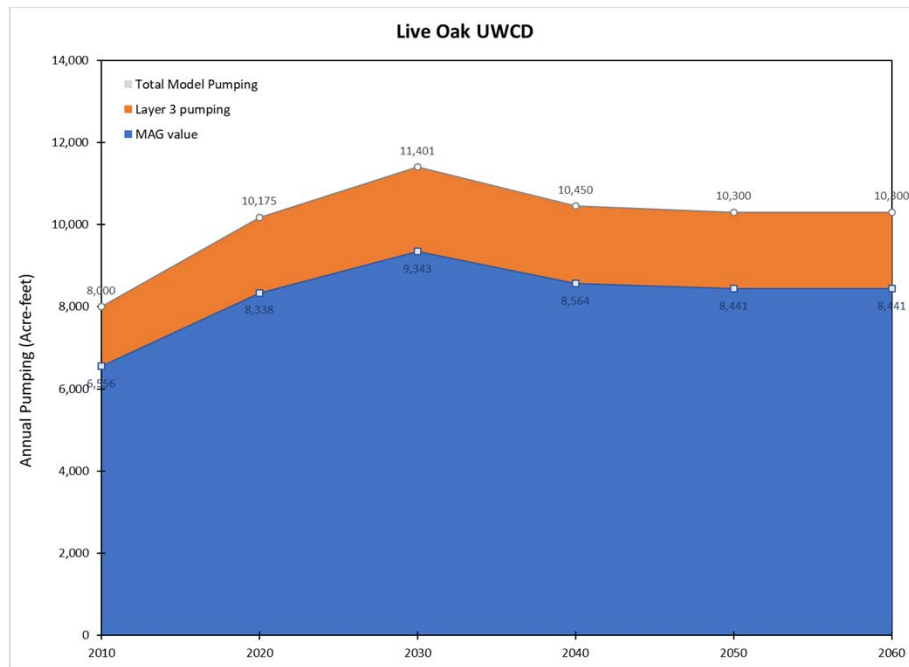
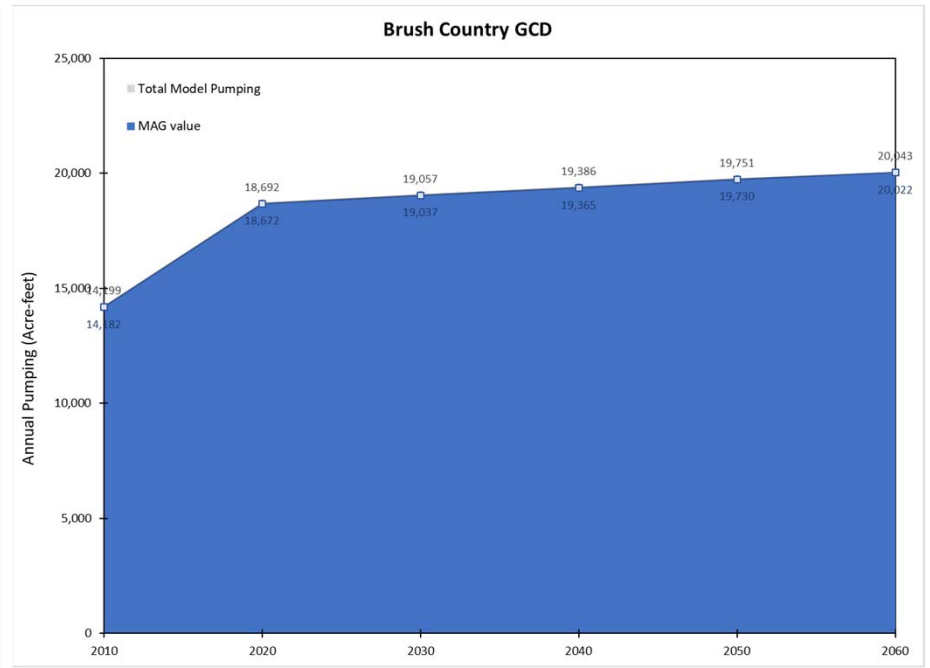
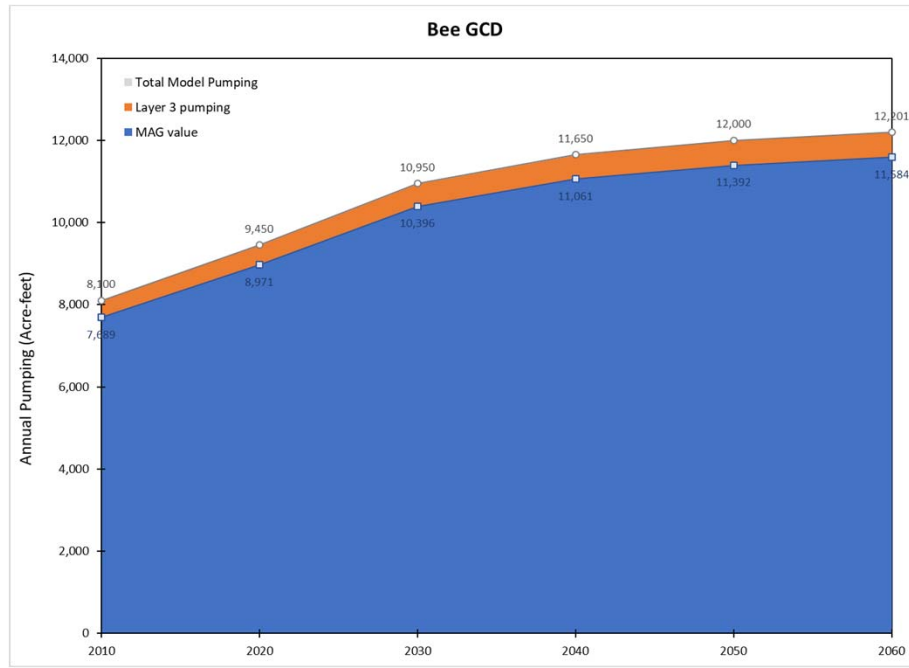
Preliminary Model Results

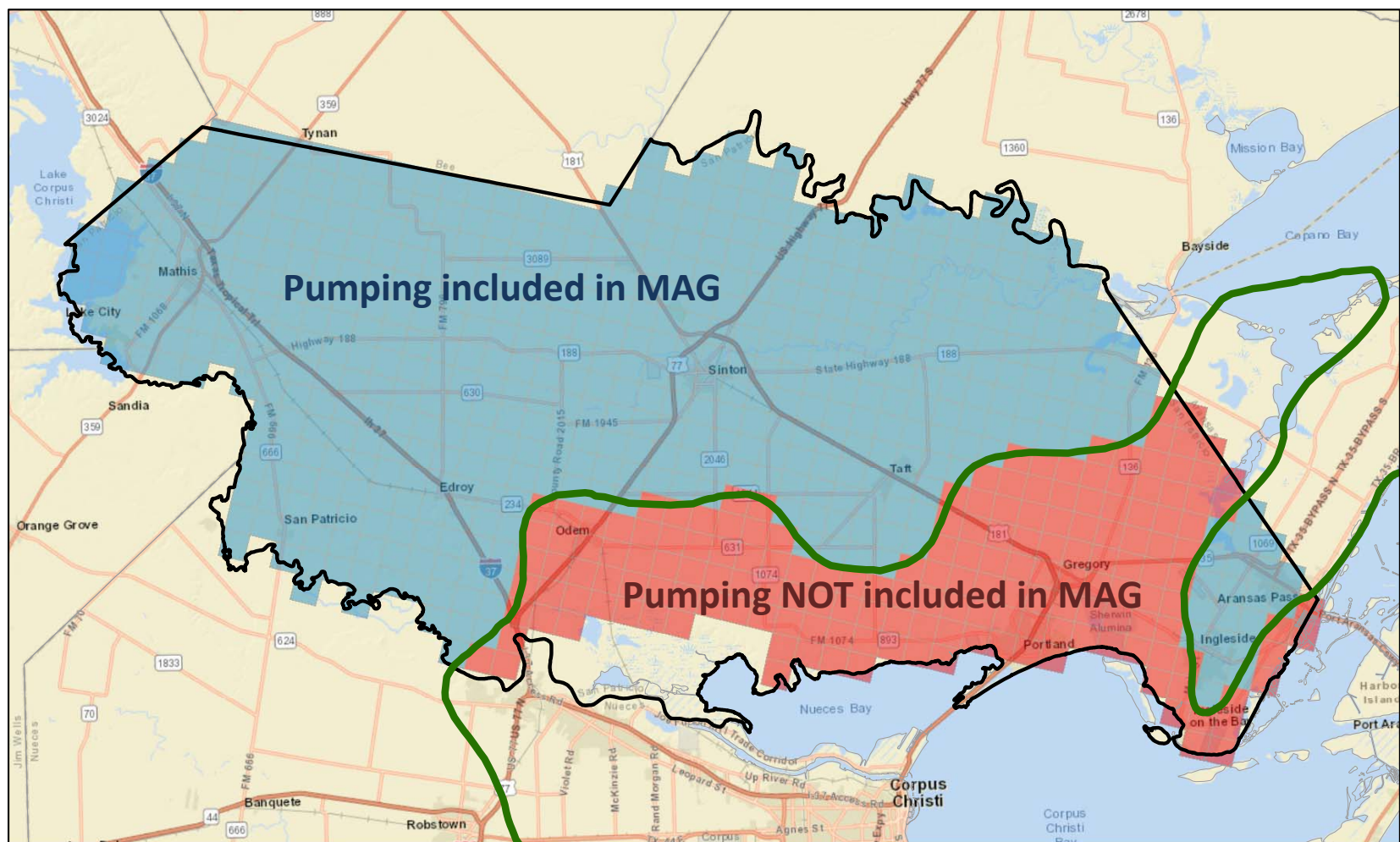
MAG

	Original Model			Updated Model		
	Inside TWDB boundary only 2080	Include area outside TWDB boundary 2080	Include area outside & exclude Dry cells 2080	Inside TWDB boundary only 2080	Include area outside TWDB boundary 2080	Include area outside & exclude Dry cells 2080
Bee GCD	12,201	12,201	7,856	13,154	13,154	8,809
Brush County GCD	20,043	20,043	14,767	23,000	23,000	17,723
Duval County GCD	27,001	27,001	15,558	27,001	27,001	15,558
Kenedy County GCD	51,322	55,027	54,864	27,048	29,000	28,837
Live Oak UWCD	10,300	10,300	8,739	10,300	10,300	8,739
McMullen GCD	510	510	382	510	510	382
Red Sands GCD	2,865	2,865	2,287	2,865	2,865	2,287
San Patricio GCD	49,268	56,513	53,024	49,268	56,513	53,024
Starr County GCD	7,800	7,800	6,033	7,800	7,800	6,033

Highlight = GCDs with high % dry cell pumping

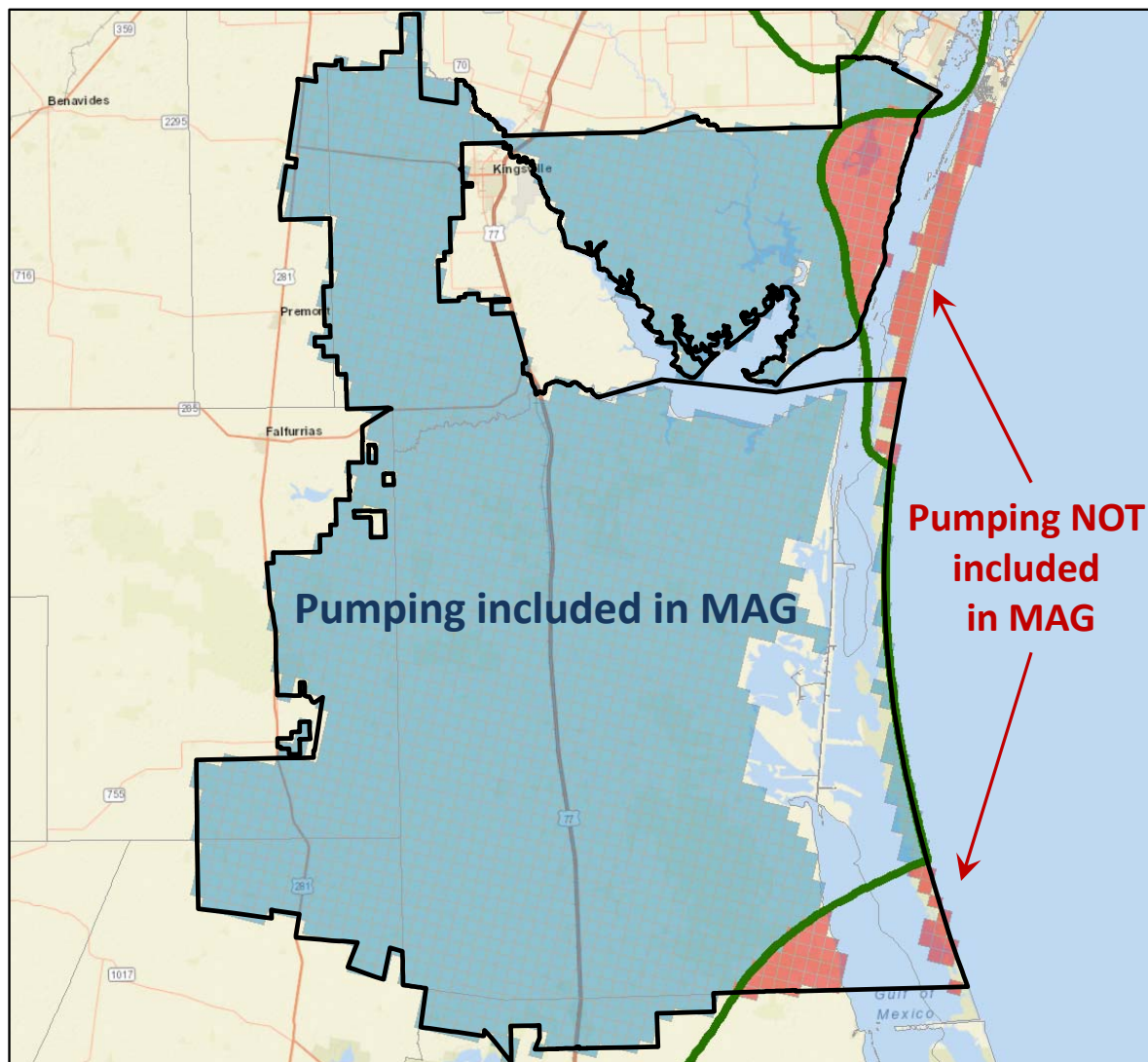
Questions?





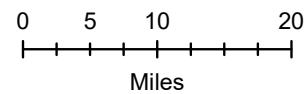
Active Model Cells



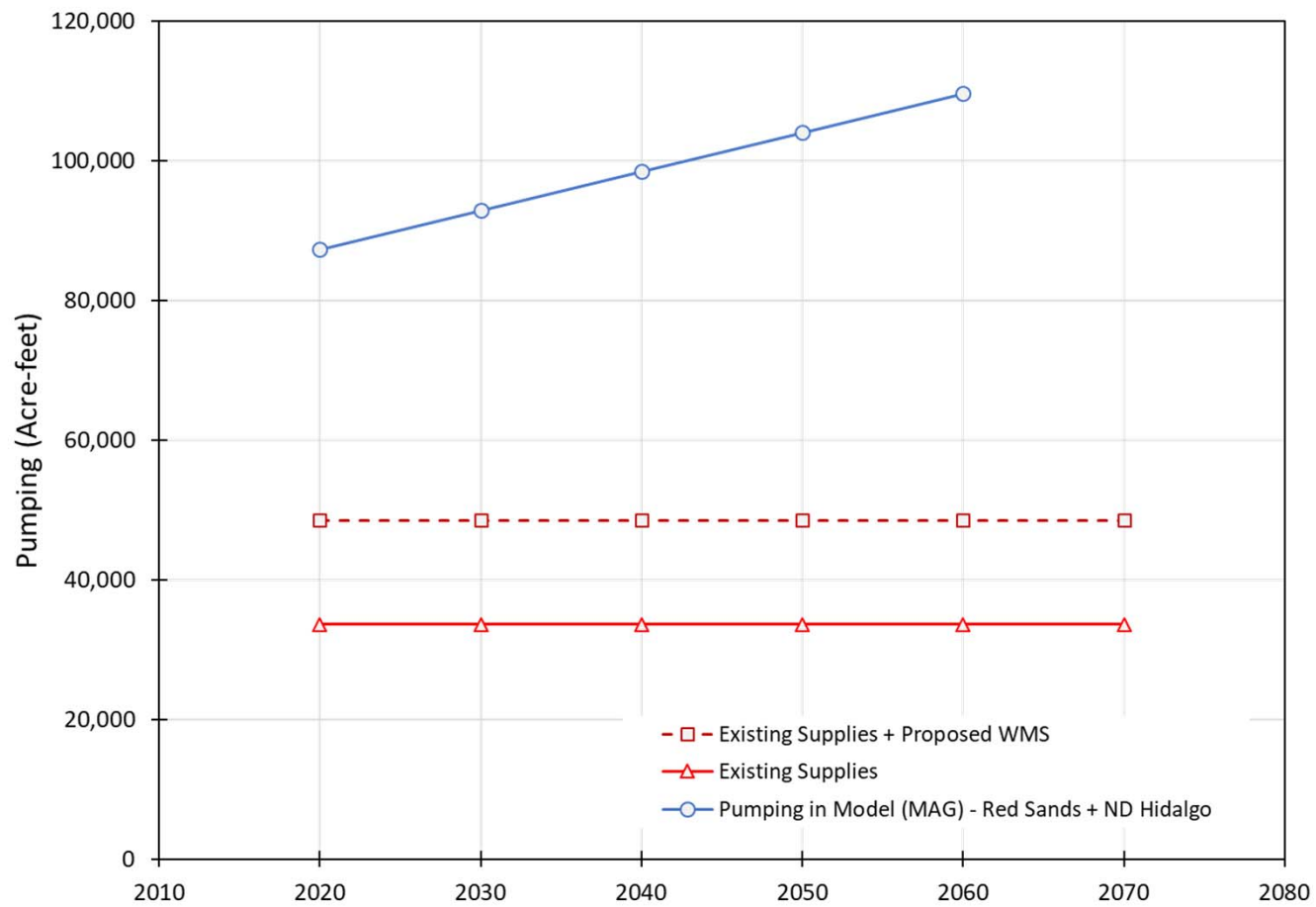


Active Model Cells

- Model Grid
- Inside TWDB Boundary
- Outside TWDB Boundary
- TWDB Gulf Coast Aquifer boundary



Hidalgo County (includes Red Sands GCD)



Starr County

