NOTICE OF OPEN MEETING

An urgent public necessity exists requiring the Groundwater Management Area (GMA) 16 Planning Committee to alter its meeting procedures due to COVID-19 pandemic. Notice is hereby given, as required by Texas Water Code section 36.108(e), that a meeting of the GMA 16 Planning Committee, comprised of delegates (GMA delegates) from the following groundwater conservation districts located wholly or partially within GMA 16: Bee GCD, Brush Country GCD, Live Oak UWCD, McMullen GCD, Kenedy County GCD, Corpus Christi Aquifer Storage and Recovery Conservation District, San Patricio GCD, Starr GCD, Duval GCD, and Red Sands GCD will be held Tuesday, July 28, 2020 at 1:00PM in the Brush County GCD Office, 732 West Rice St., Falfurrias, Texas. A quorum of the GMA delegates may be present in person at the physical location or may participate via audio and video conference call. Likewise, members of the public may participate in person at the physical location or via audio or videoconference call. The meeting will be conducted pursuant to Texas Government Code, Sections 551.125, 551.127 and 551.131, and as modified by the Governor of Texas who ordered suspension of various provisions of the Open Meetings Act, Chapter 551, Government Code, effective March 16, 2020, in accordance with the Texas Disaster Act of 1975 (see the Governor's proclamation on March 13, 2020 as renewed, certifying that the COVID-19 pandemic poses an imminent threat of disaster and declaring a state of disaster for all counties in Texas). The audio and videoconference information for the GMA delegates and public to participate in the meeting described below follows the Governor’s guidance for conducting a public meeting and ensures public accessibility. The GMA delegates and members of the public not attending in person may call in or participate via videoconference as follows:

GMA 16 July 28,2020
Tue, Jul 28, 2020 1:00 PM - 4:00 PM (CDT)

Please join my meeting from your computer, tablet or smartphone.

https://global.gotomeeting.com/join/243461901

You can also dial in using your phone.
(For supported devices, tap a one-touch number below to join instantly.)

United States: +1 (408) 650-3123
- One-touch: tel:+14086503123,,243461901# Access Code: 243-461-901

This meeting will be recorded and the recording will be available on the Brush Country Groundwater Conservation District’s website www.brushcountrygcd.com after the meeting. A copy of the agenda packet for this meeting will be available on the Brush Country Groundwater Conservation District’s website www.brushcountrygcd.com at the time of the meeting.

Discussion and Possible Action on the following agenda items:

1. Welcome and Introductions
2. Minutes of the previous meeting
3. Treasurer's report
4. Report from TWDB
5. Consultant Report
6. Update from Starr County GCD on petition
7. District members and public members discussion
8. Set date for next meeting.
9. Future agenda items.
10. Adjournment.

Lonnie Stewart, Vice-Chairman Groundwater Management Area 16

For more information, please contact me at louwcd@yahoo.com or 361-449-7017.

Groundwater Management Area 16 Joint Planning Cycle: 2019-2022 Hydrological Conditions

Falfurrias, TX
June 23, 2020

Jevon Harding, P.G.
Steve Young, Ph.D., P.G., P.E.

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Joint Planning Requirements

- Balancing Test
  - DFCs must provide "*a balance between the highest practicable level of groundwater production and the conservation, preservation, protection, recharging, and prevention of waste of groundwater and control of subsidence in the management area*"

Joint Planning Requirements

- Consideration of 9 “factors” (paraphrased)
  - Aquifer uses or conditions
  - Water supply needs and management strategies
  - ***Hydrological conditions***
  - Other environmental impacts
  - Impact on subsidence
  - Socioeconomic impacts
  - Impact on private property rights
  - Feasibility of achieving the DFC
  - Any other relevant information

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Consideration of Hydrological Conditions

- Describe the hydrological conditions, including for each aquifer in the management area the total estimated recoverable storage as provided by the executive administrator, and the average annual recharge, inflows, and discharge

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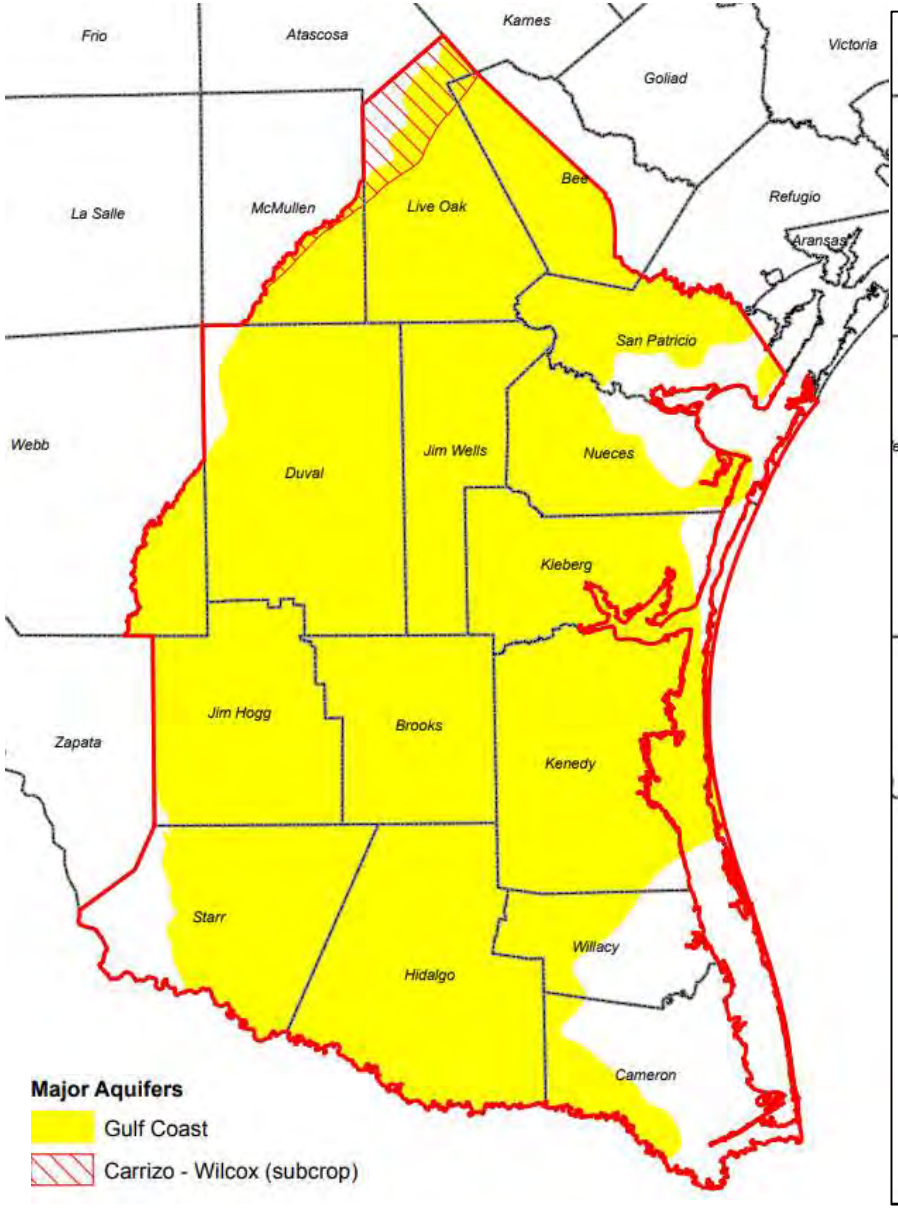
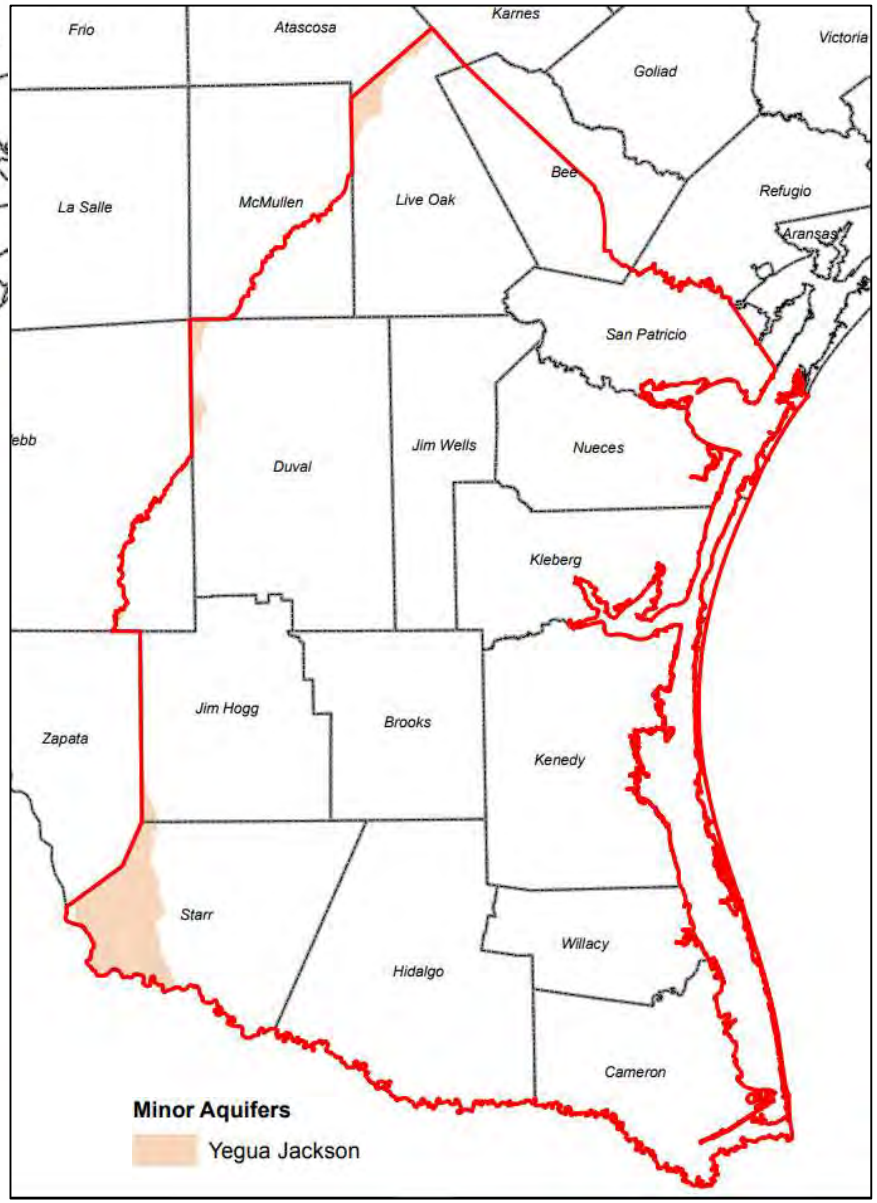
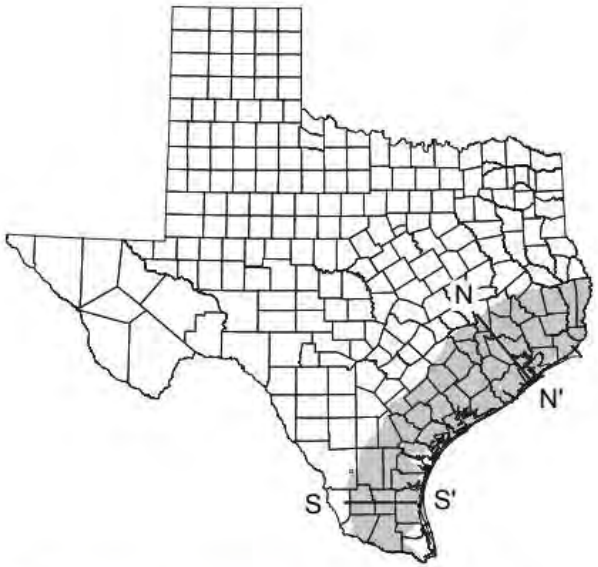
Non-Relevant Aquifers

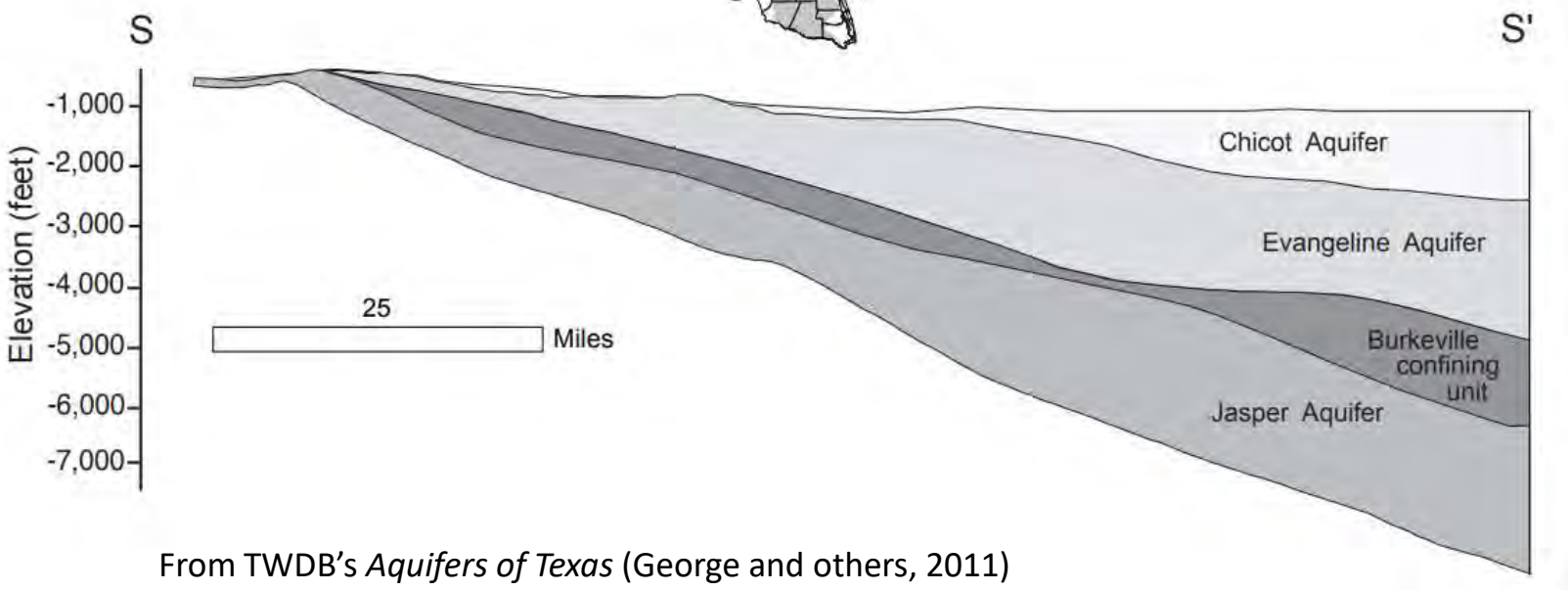




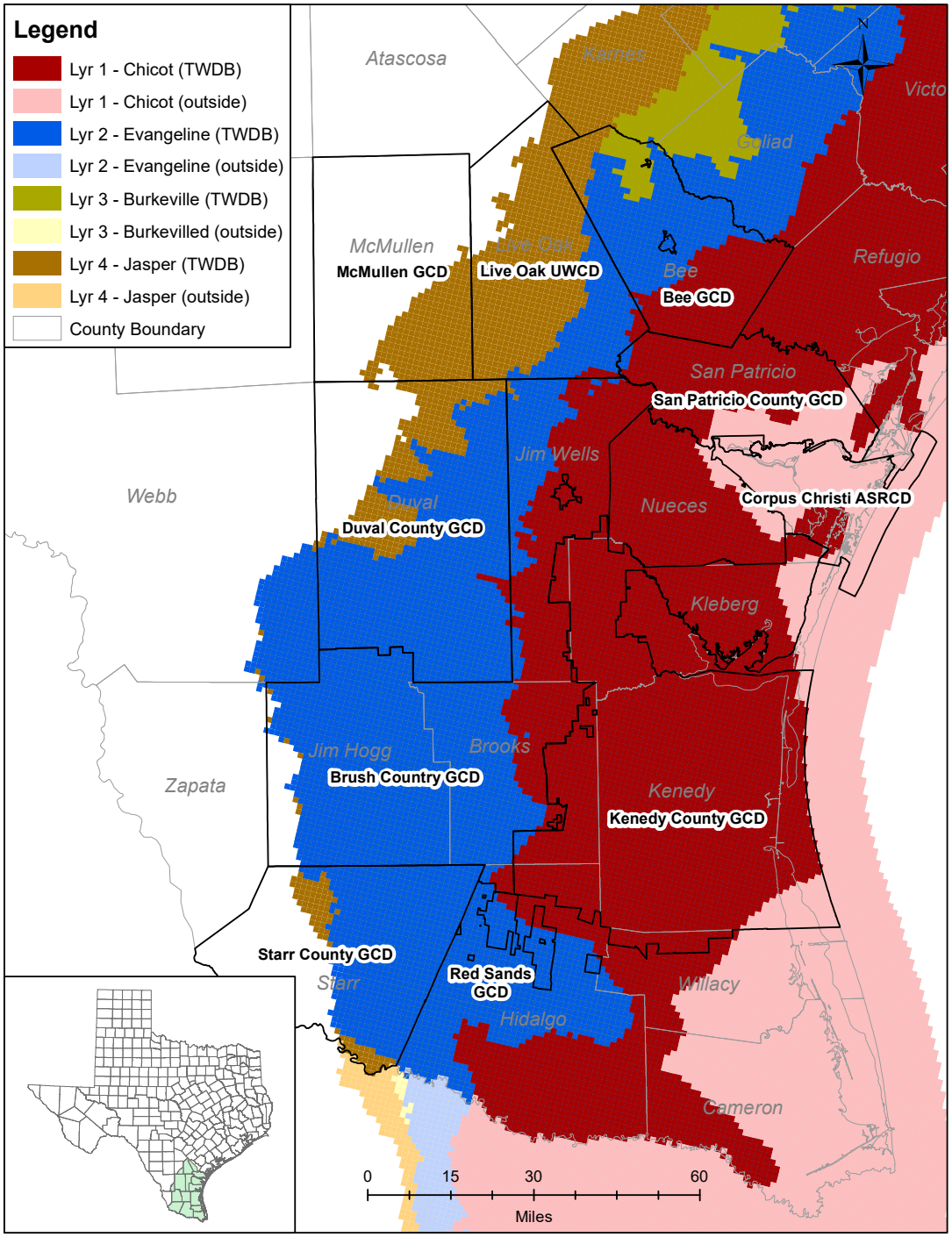
Gulf Coast Aquifer System

- Aquifers outcrop from East to West
- All layers dip towards the coast
- Unconfined in outcrop
- Confined downdip





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



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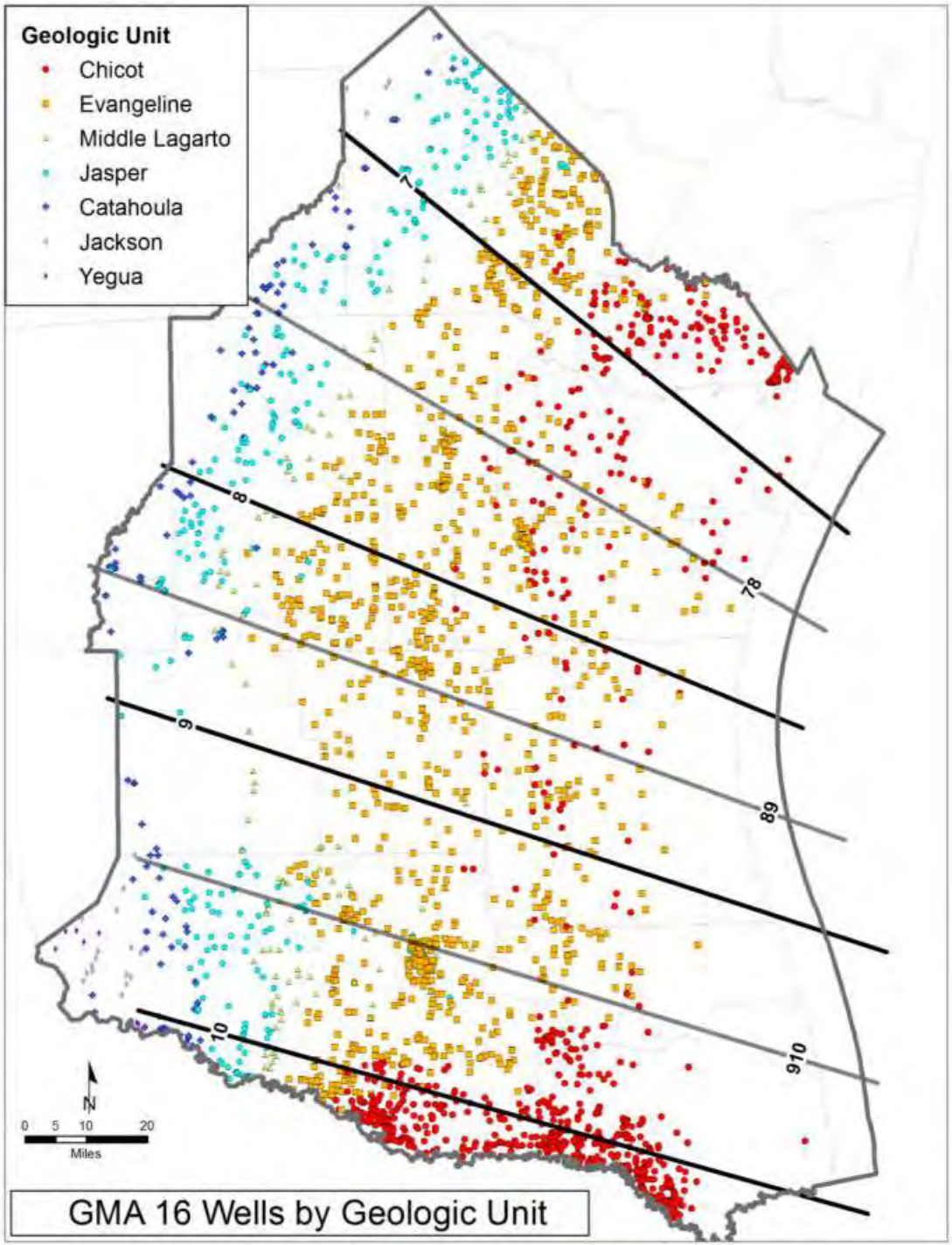
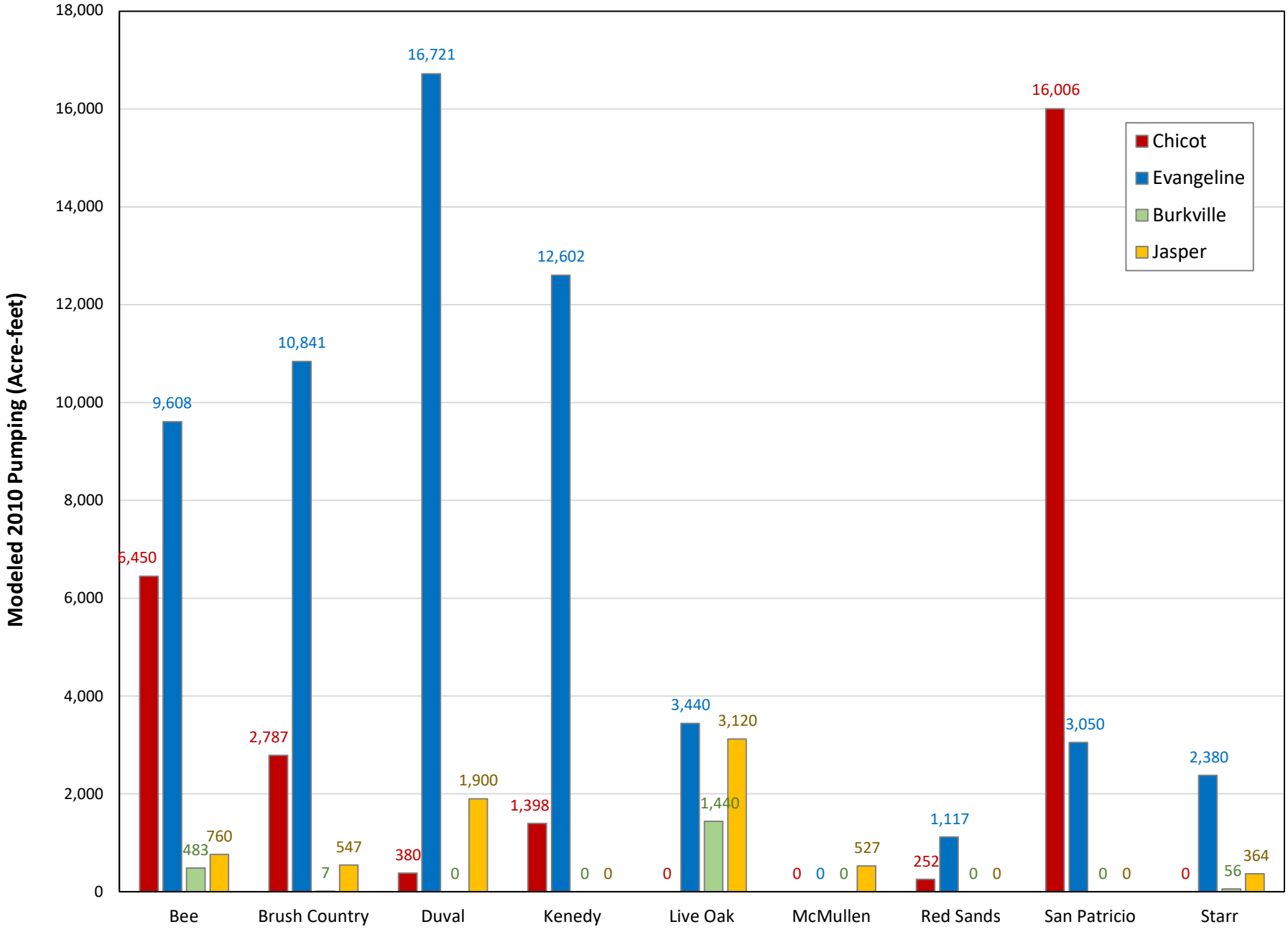
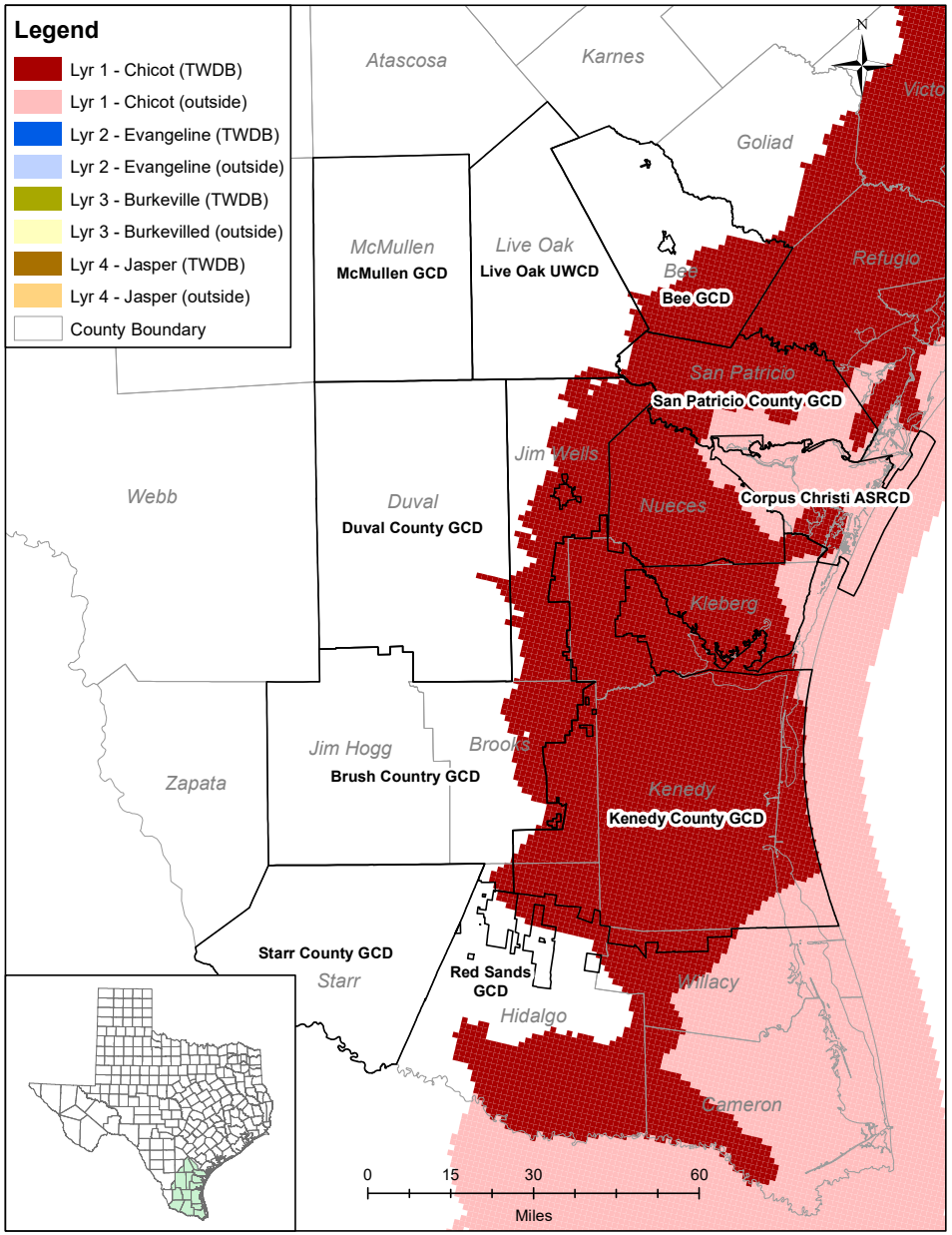


Hydrogeochemical Evaluation of the Texas Gulf Coast Aquifer System and Implications for Developing Groundwater Availability Models (Young & others, 2014)


Modeled 2010 Pumping (Acre-feet)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Chicot
Evangeline
Burkville
Jasper
6,450
9,608
483
760
2,787
10,841
7
547
380
16,721
0
1,900
1,398
12,602
0
0
0
3,440
1,440
3,120
0
0
0
527
252
1,117
0
0
16,006
3,050
0
0
0
2,380
56
364
Bee
Brush Country
Duval
Kenedy
Live Oak
McMullen
Red Sands
San Patricio
Starr

Chicot Aquifer

- Shallowest unit of the Gulf Coast Aquifer
- Sandy unit composed of Beaumont, Lissie & Willis Formations
- Most common source of water in San Patricio & near Rio Grande
- Also provides water to Bee, Brush Country, Duval, Kenedy & Red Sands
- Some wells in eastern section of GMA 16 but water quality degrades towards the coast



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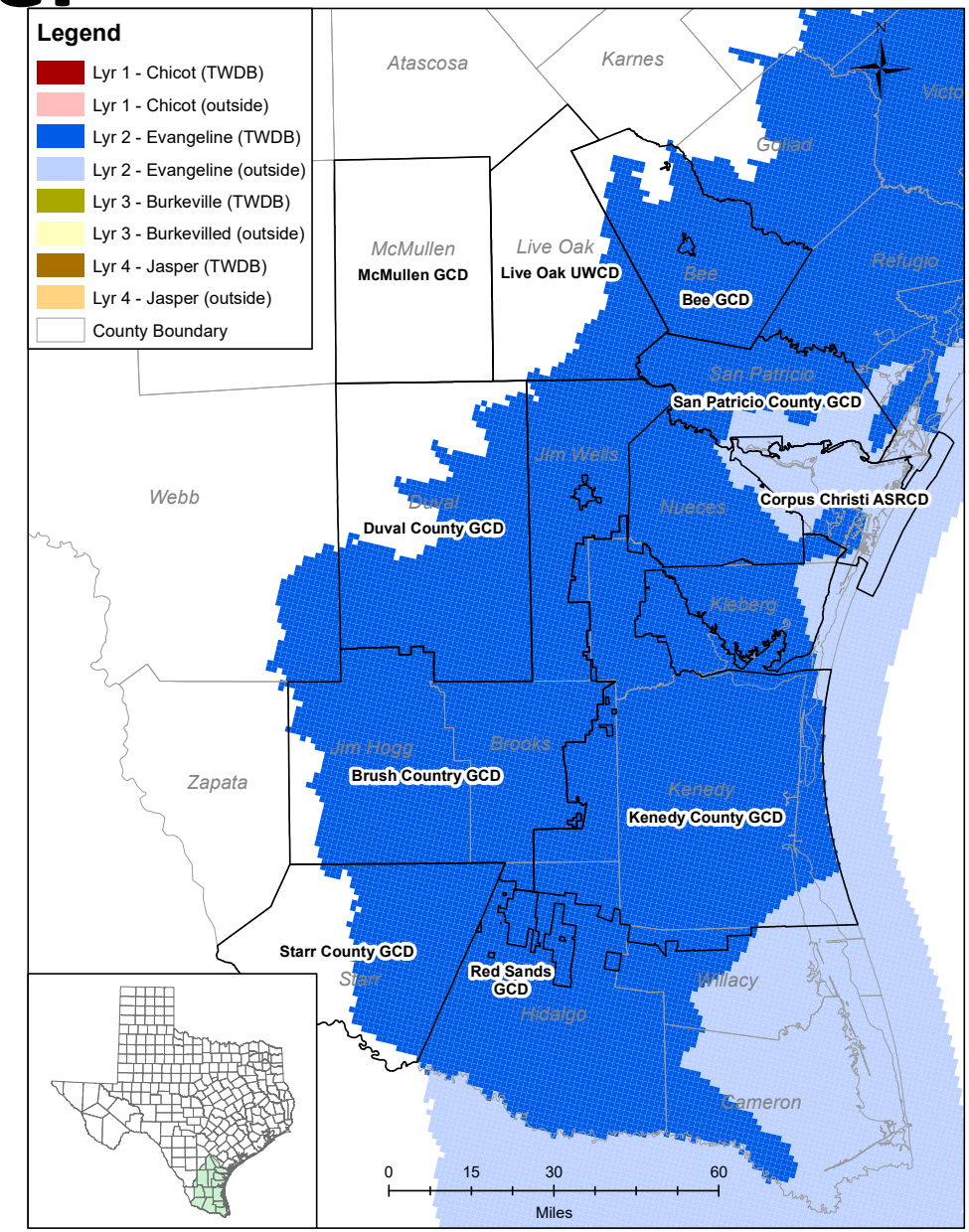
Evangeline Aquifer

- Unit of the Gulf Coast Aquifer below Chicot Aquifer
- Sandy unit comprised of the Goliad Formation
- Most common source of groundwater in GMA 16, except in McMullen and San Patricio



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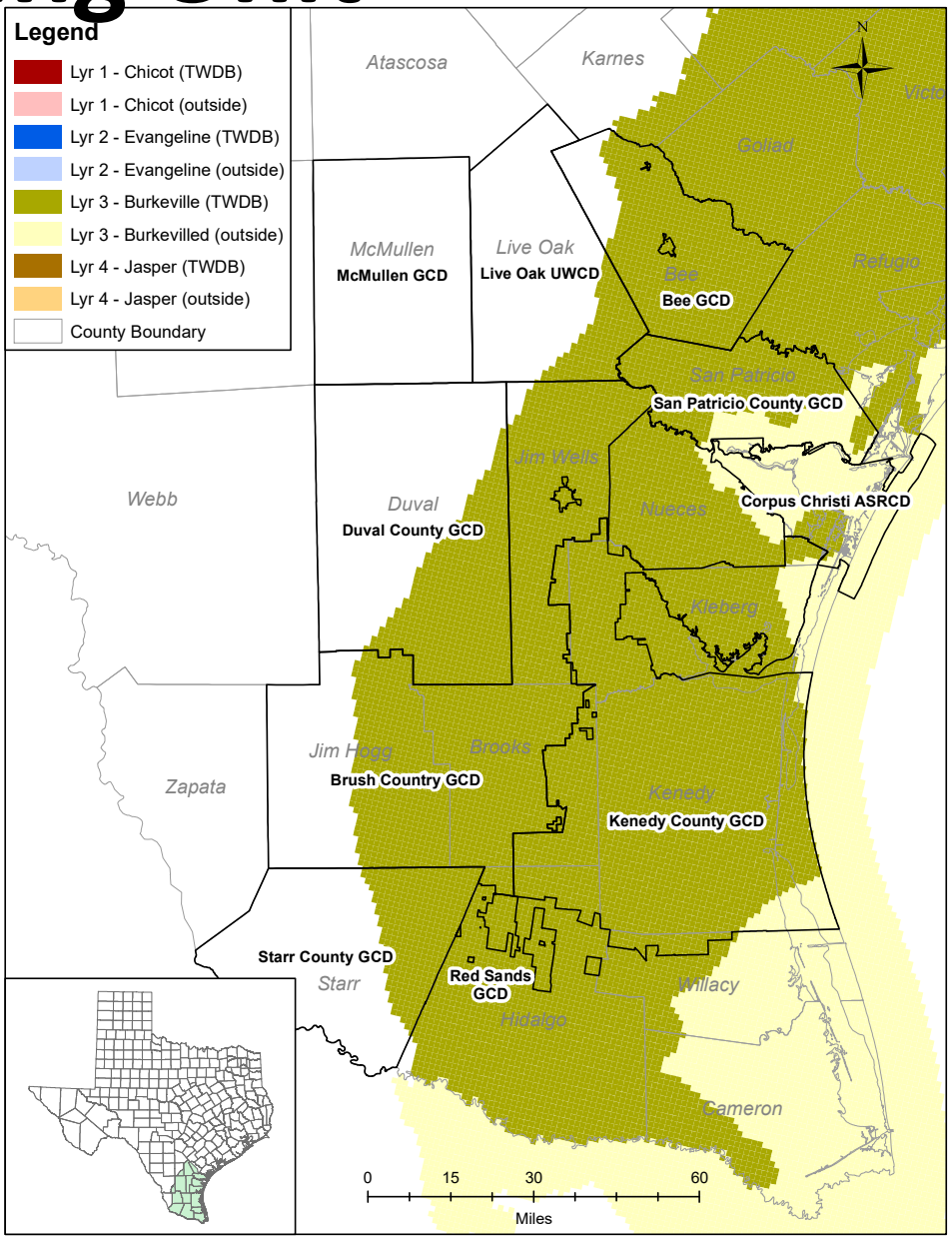
Burkeville Confining Unit

- Unit of the Gulf Coast Aquifer below Evangeline Aquifer
- It acts as a confining unit in some places but can produce water in others
- Composed of Lagarto Formation
- Wells generally clustered in shallow Burkeville in western section of GMA 16
- Provides a small % of water in Bee, Live Oak, Starr & Brush Country



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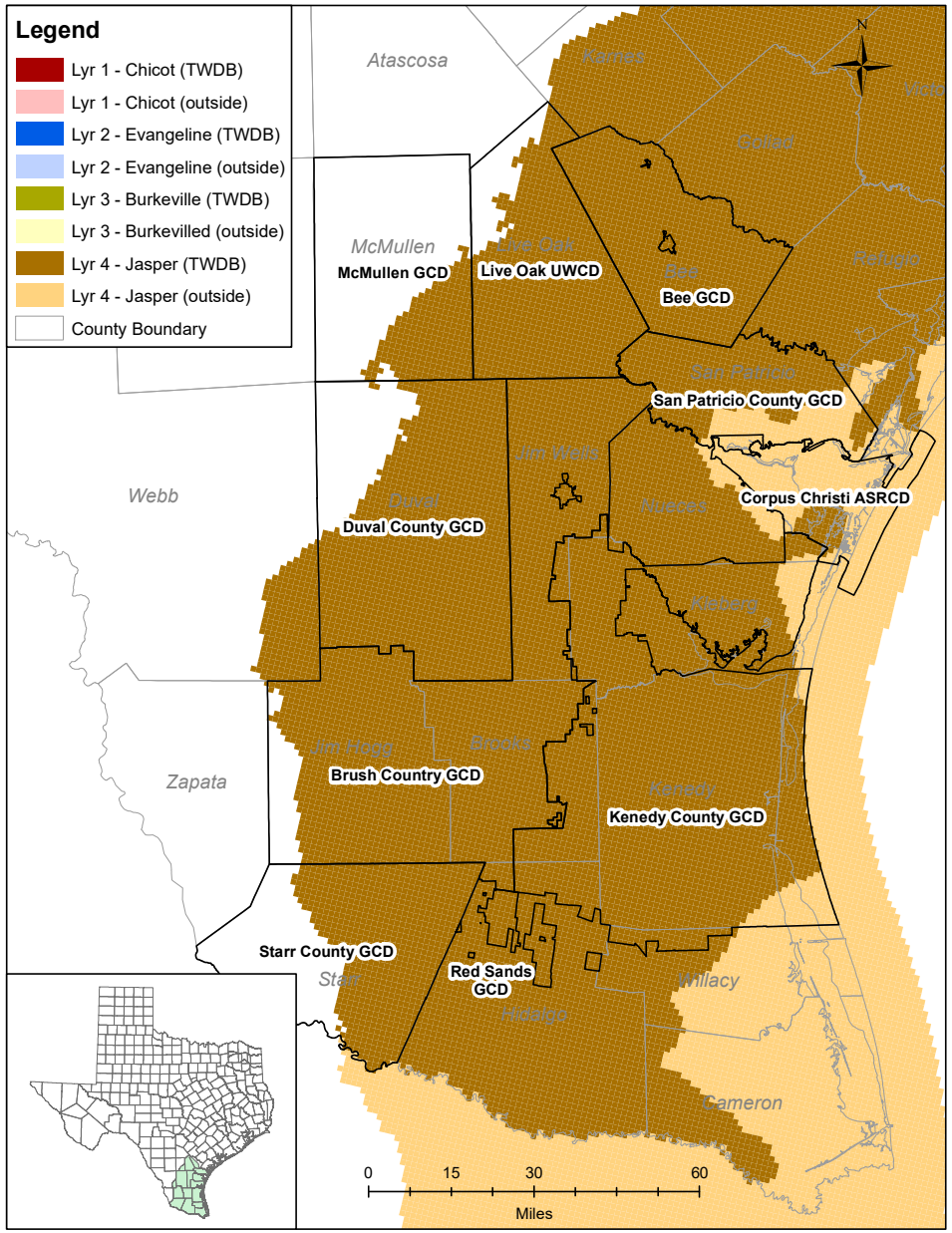
Jasper Aquifer

- Deepest unit of the Gulf Coast Aquifer
- Sandy unit comprised of Oakville Formation
- Wells generally found in shallower section in western/northwestern part of GMA 16
- Only source of Gulf Coast Aquifer water in McMullen
- Provides a large % of water in Live Oak and smaller % in Bee, Brush Country, Duval & Starr



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Total Estimated Recoverable Storage (TERS)

- **Total Estimated Recoverable Storage**—The estimated amount of groundwater within an aquifer that accounts for recovery scenarios that range between 25% and 75% of the porosity-adjusted aquifer volume

- TERS is a required consideration as part of the DFC process

- TERS is :
  - The amount of water physically present in the aquifer
  - NOT the amount of water available for production
  - NOT the amount of pumping that will prevent harm to the aquifer/users

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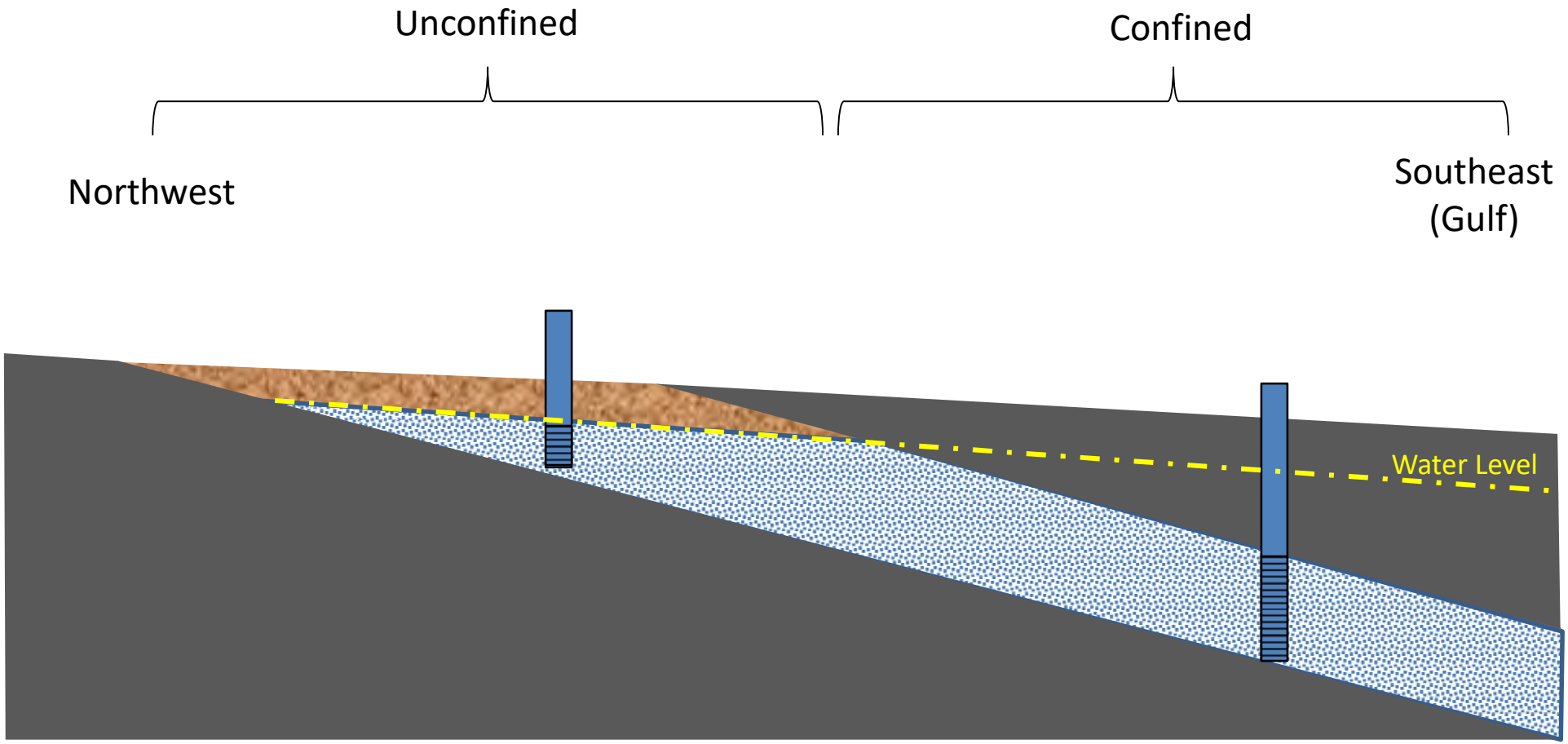
"Recoverable" is Aquifer Specific

- The range of 25% - 75% is not an appropriate range for all aquifers.
  - Could be 55 -75% or more for highly productive, unconfined aquifers at the surface such as the Ogallala and Seymour.
  - Likely no more than 3 - 15% for most dipping, confined aquifers in Texas (Trinity, Carrizo-Wilcox, Gulf Coast, etc.). Recovery of anywhere close to 75% is physically impossible given current well depths and impacts to water levels, quality, existing wells, well yields, surface water, and subsidence.
  - For karst aquifers, total storage is practically irrelevant to aquifer planning and management long term (Edwards). Total storage is relatively small and fluctuates significantly over time due to recharge events.

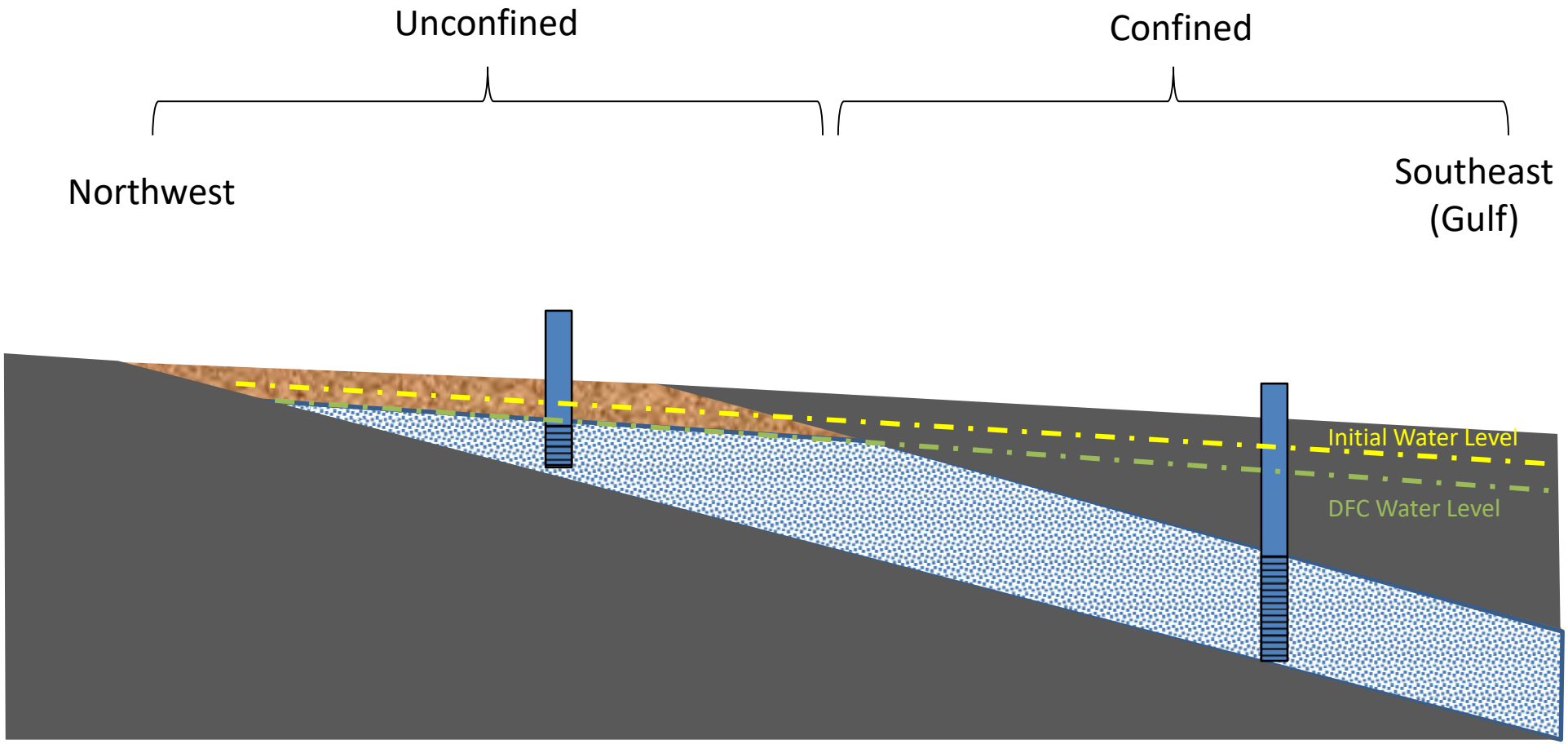
- Wade Oliver (INTERA), Feb 2014 TAGD Quarterly Meeting

Typical Dipping Aquifer in South/Southeast Texas



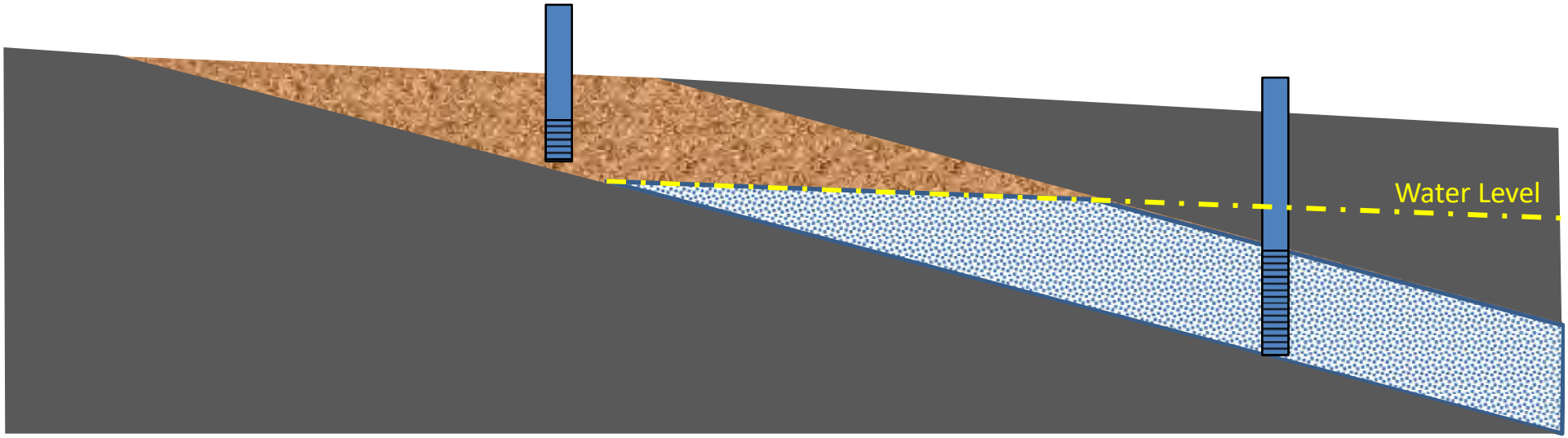
Approximate illustration – not to scale

Typical DFC Water Level Change in South/Southeast Texas

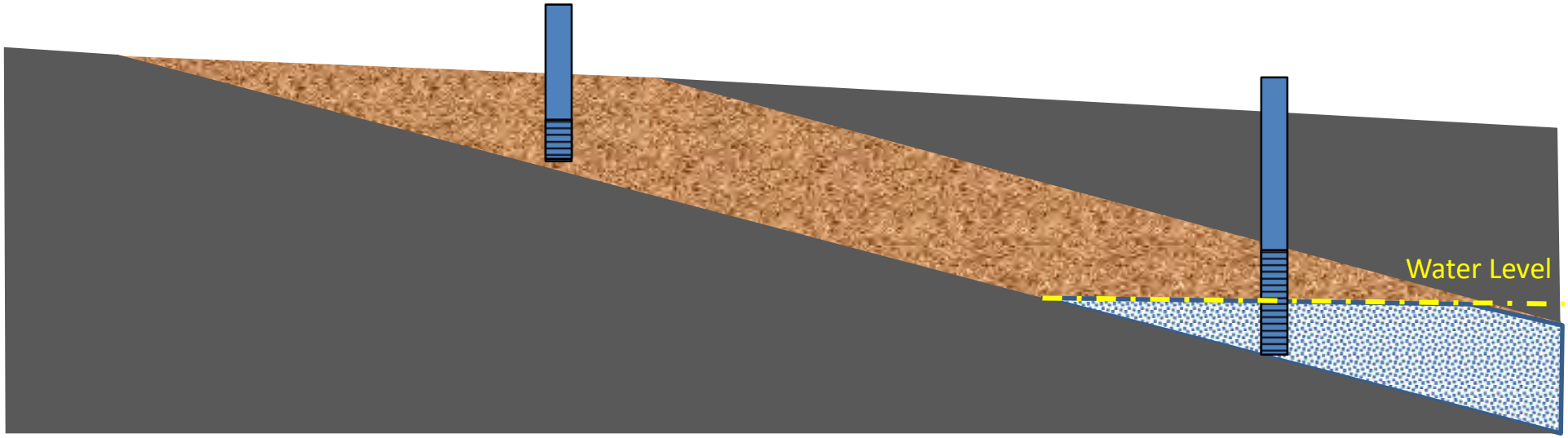


Approximate illustration – not to scale

~25% Storage removed (Low End of TERS)



~75% Storage removed (High End of TERS)

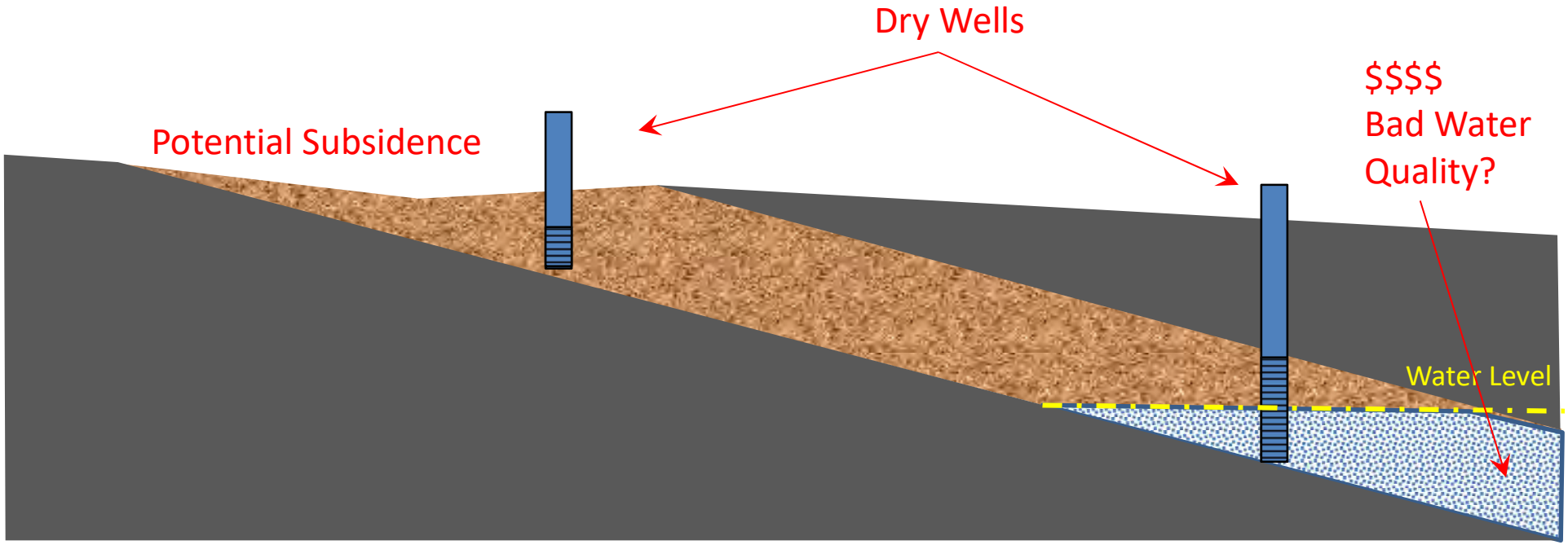


Approximate illustration – not to scale

Total Estimated Recoverable Storage (TERS)

TERS does not account for :

– Aquifer water quality
– Water levels dropping below pumps
– Land surface subsidence
– Degradation of water quality
– Changes to surface water-groundwater interaction
– Practicality/economics of development



Approximate illustration – not to scale

Total Estimated Recoverable Storage (TERS)

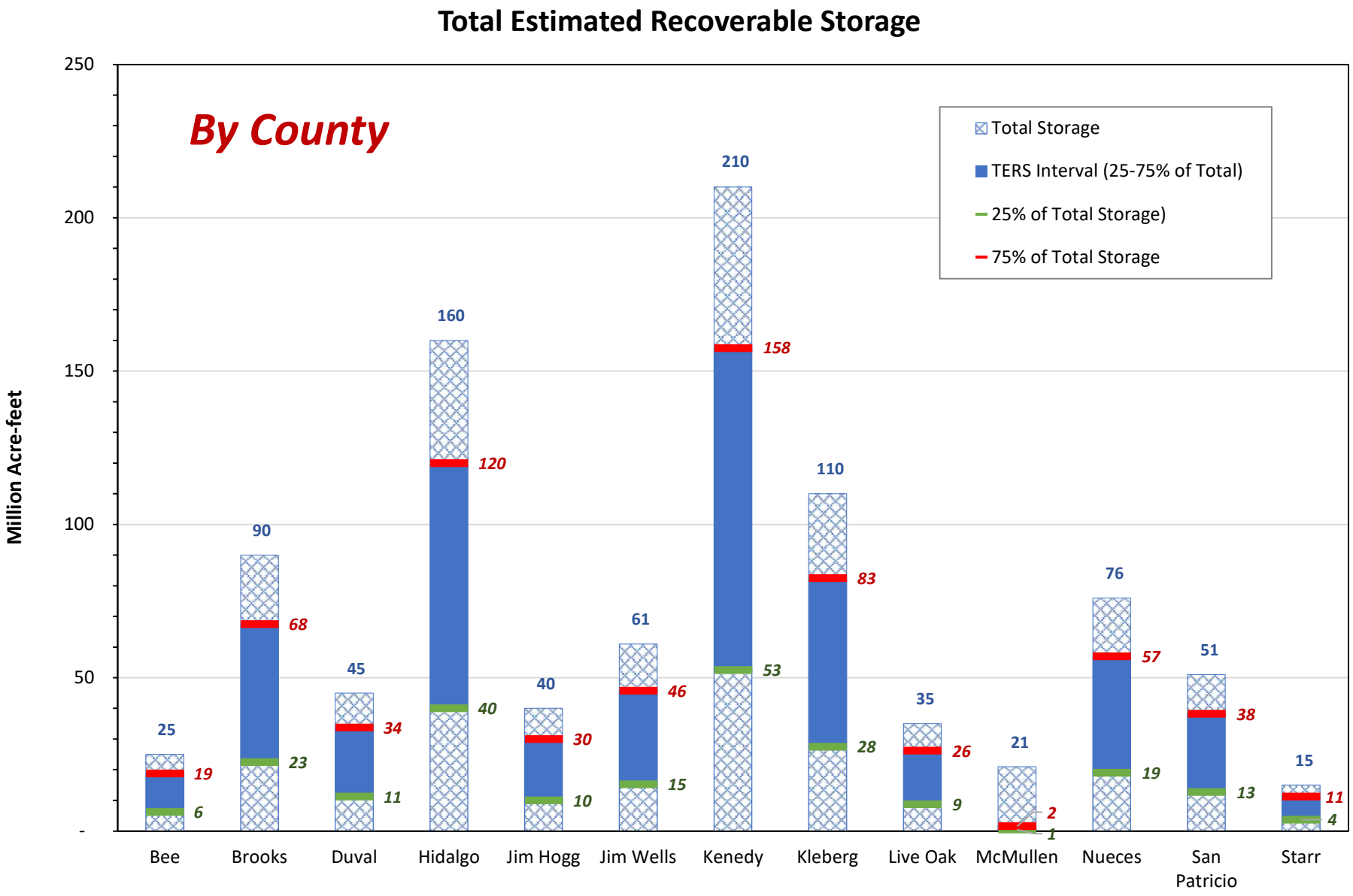
*Note: TWDB only provides TERS values for entire Gulf Coast Aquifer, not the individual 4 units

Source for GMA 16: TWDB report GAM RUN 12-025 (March 28, 2013)

By County

County	*Total Storage (acre-feet)*	*25% of Total Storage (acre-feet)*	*75% of Total Storage (acre-feet)*
Bee	25,000,000	6,250,000	18,750,000
Brooks	90,000,000	22,500,000	67,500,000
Cameron	49,000,000	12,250,000	36,750,000
Duval	45,000,000	11,250,000	33,750,000
Hidalgo	160,000,000	40,000,000	120,000,000
Jim Hogg	40,000,000	10,000,000	30,000,000
Jim Wells	61,000,000	15,250,000	45,750,000
Kenedy	210,000,000	52,500,000	157,500,000
Kleberg	110,000,000	27,500,000	82,500,000
Live Oak	35,000,000	8,750,000	26,250,000
McMullen	2,100,000	525,000	1,575,000
Nueces	76,000,000	19,000,000	57,000,000
San Patricio	51,000,000	12,750,000	38,250,000
Starr	15,000,000	3,750,000	11,250,000
Webb	250,000	62,500	187,500
Willacy	45,000,000	11,250,000	33,750,000
Total	**1,014,350,000**	**253,587,500**	**760,762,500**

Total Estimated Recoverable Storage (TERS)



Total Estimated Recoverable Storage (TERS)

*Note: TWDB only provides TERS values for entire Gulf Coast Aquifer, not the individual 4 units

Source for GMA 16: TWDB report GAM RUN 12-025 (March 28, 2013)

By GCD

Groundwater Conservation District	*Total Storage (acre-feet)*	*25% of Total Storage (acre-feet)*	*75% of Total Storage (acre-feet)*
Bee	25,000,000	6,250,000	18,750,000
Brush Country	150,000,000	37,500,000	112,500,000
Corpus Christi ASRCD	6,000,000	1,500,000	4,500,000
Duval County	45,000,000	11,250,000	33,750,000
Kenedy County	360,000,000	90,000,000	270,000,000
Live Oak	35,000,000	8,750,000	26,250,000
McMullen	2,100,000	525,000	1,575,000
Red Sands	3,100,000	775,000	2,325,000
San Patricio County	51,000,000	12,750,000	38,250,000
Starr County	15,000,000	3,750,000	11,250,000
No District	310,000,000	77,500,000	232,500,000
Total	**1,002,200,000**	**250,550,000**	**751,650,000**

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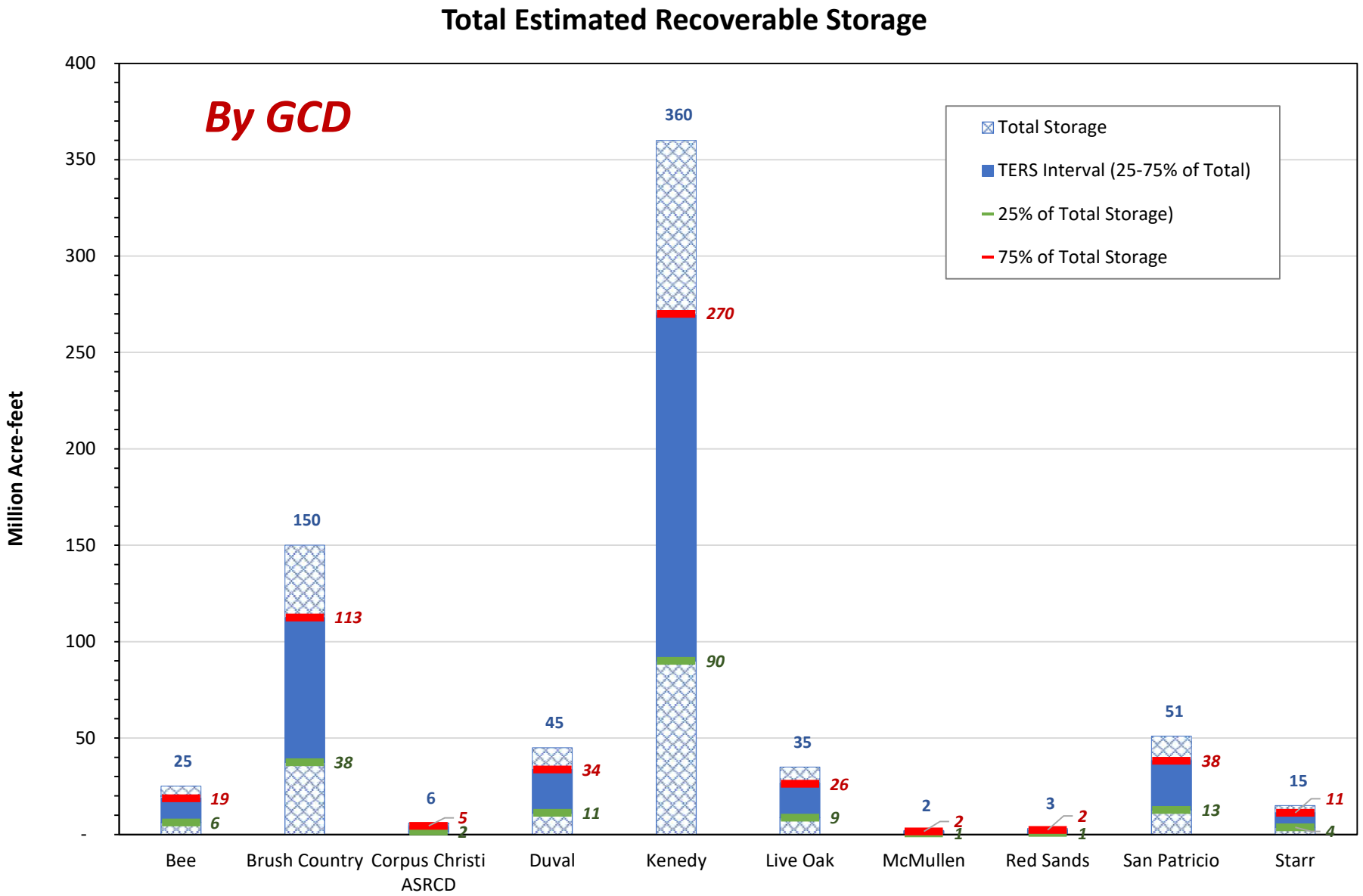
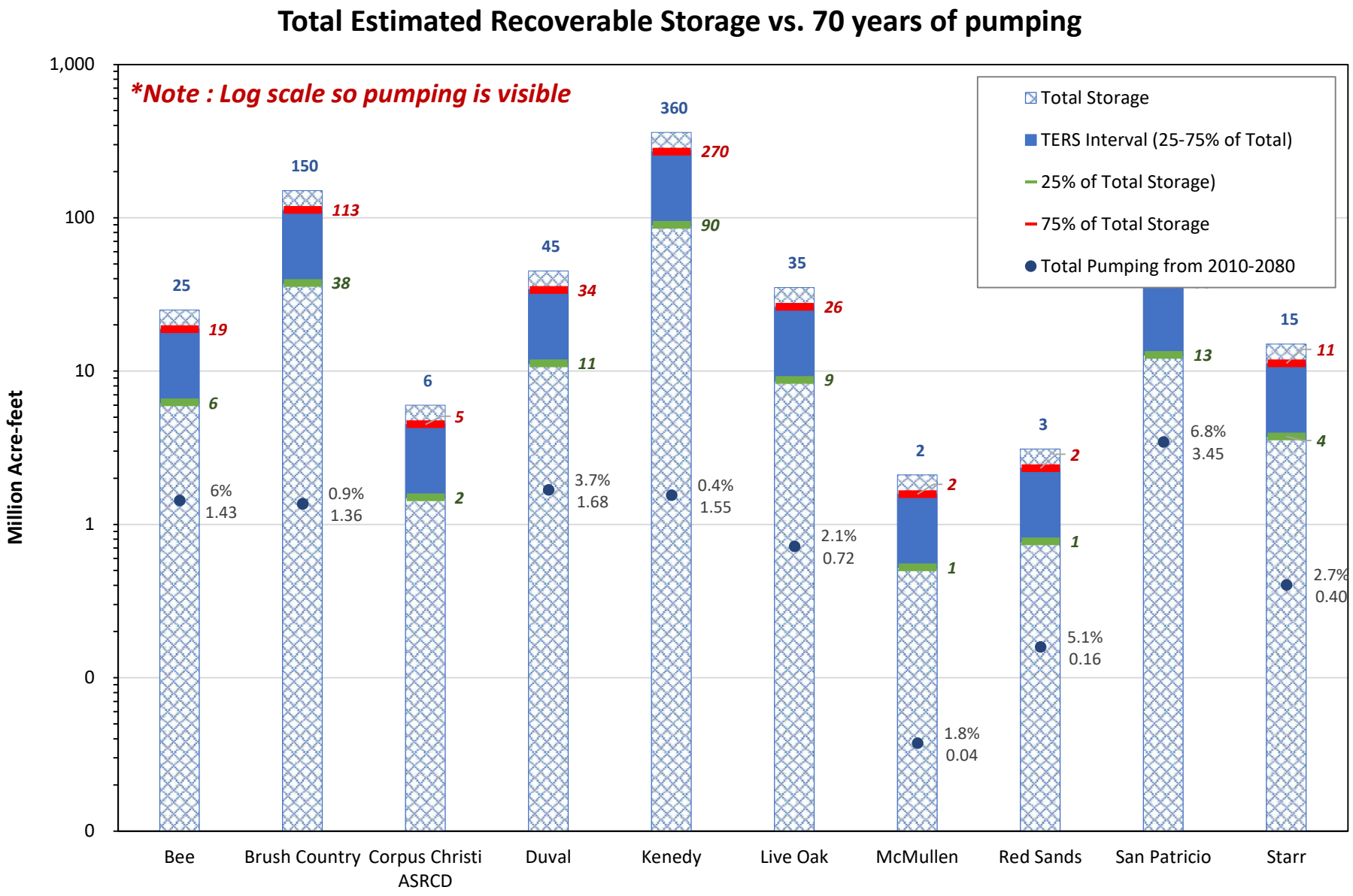
Total Estimated Recoverable Storage (TERS)



Total Estimated Recoverable Storage (TERS)



Annual Recharge, Inflows & Discharge

- Annual Recharge, Inflow & Discharges are required consideration as part of the DFC process
- TWDB provides GAM Run reports in support of management plan development

*Note: TWDB only provides annual values for entire Gulf Coast Aquifer, not the individual 4 units

GCD	Report Name	Report Date
Bee	GAM Run 17-015	1/31/2018
Brush Country	GAM Run 17-001	10/4/2017
Corpus Christi ASRCD	GAM Run 18-012	6/27/2018
Duval County	GAM Run 16-011	10/21/2016
Kenedy County	GAM Run 16-009	3/18/2016
Live Oak	GAM Run 14-014	12/12/2014
McMullen	GAM Run 17-011	11/20/2017
Red Sands	GAM Run 16-008	5/16/2016
San Patricio County	GAM Run 16-003	8/4/2016
Starr County	GAM Run 18-016	2/28/2019

Annual Recharge, Inflows & Discharge – Bee GCD

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	21,081
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Gulf Coast Aquifer System	13,055
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	4,000
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	17,080
Estimated net annual volume of flow between each aquifer in the district	Flow from the Catahoula Formation into the Jasper Aquifer[1]	332
	Flow to the Catahoula Formation from the Upper Jackson Formation subcrop[1]	46

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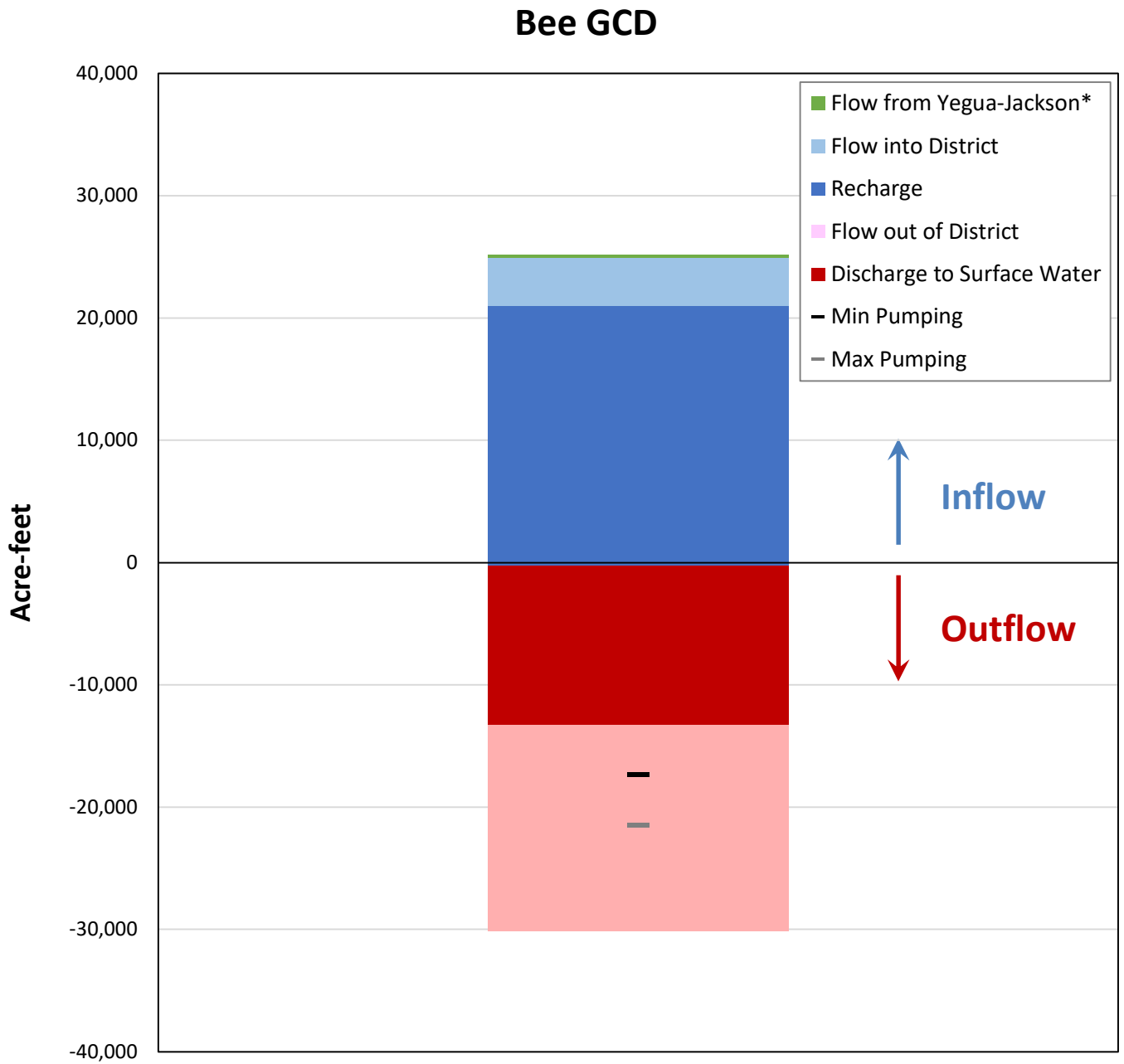

*refers to Catahoula Formation in Yegua-Jackson GAM

Annual Recharge, Inflows & Discharge – Brush Country GCD

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer	8,291
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Gulf Coast Aquifer	2,633
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer	26,724
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer	43,886
Estimated net annual volume of flow between each aquifer in the district	From the Gulf Coast Aquifer into the underlying Yegua-Jackson Aquifer	401

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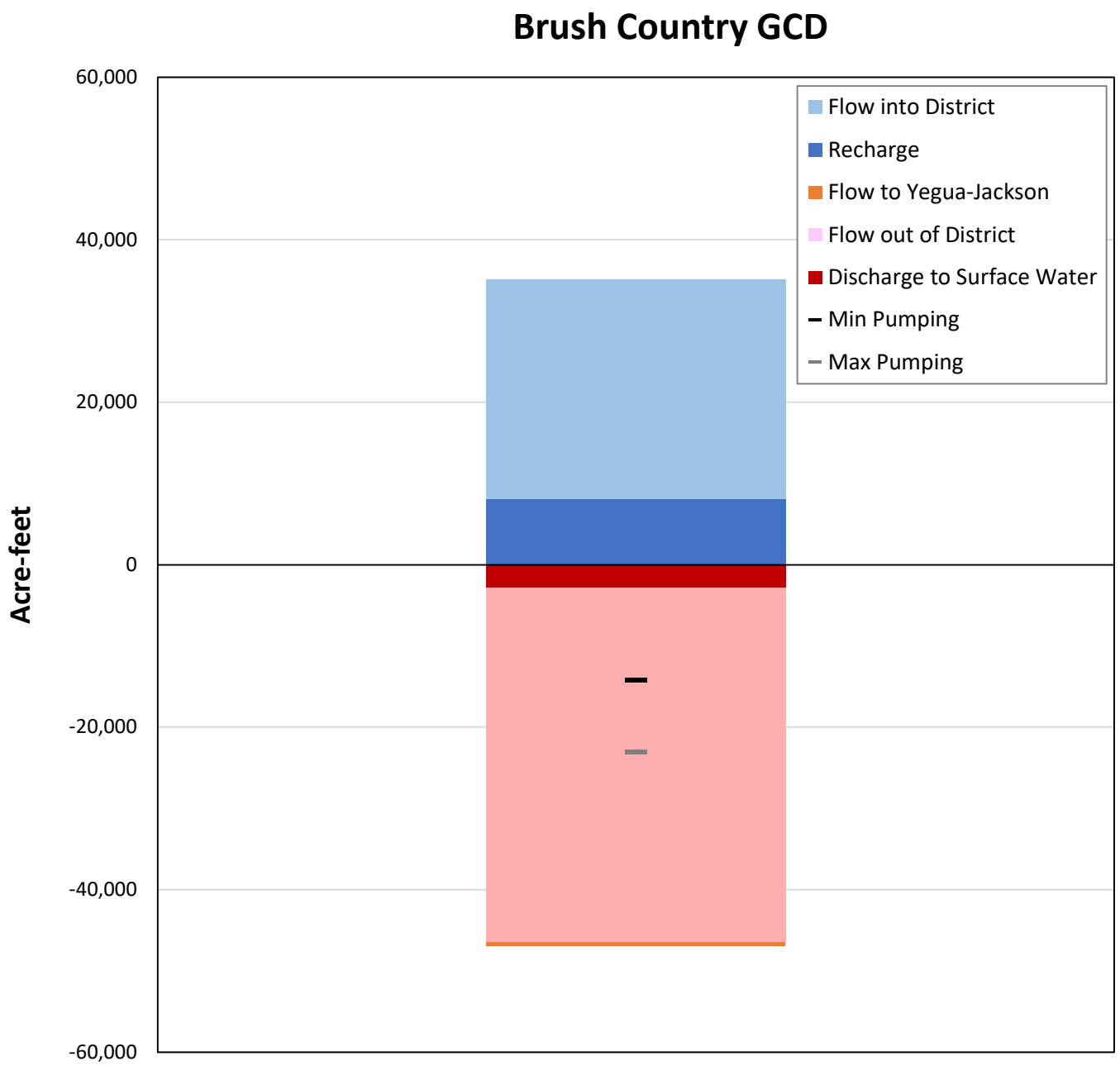
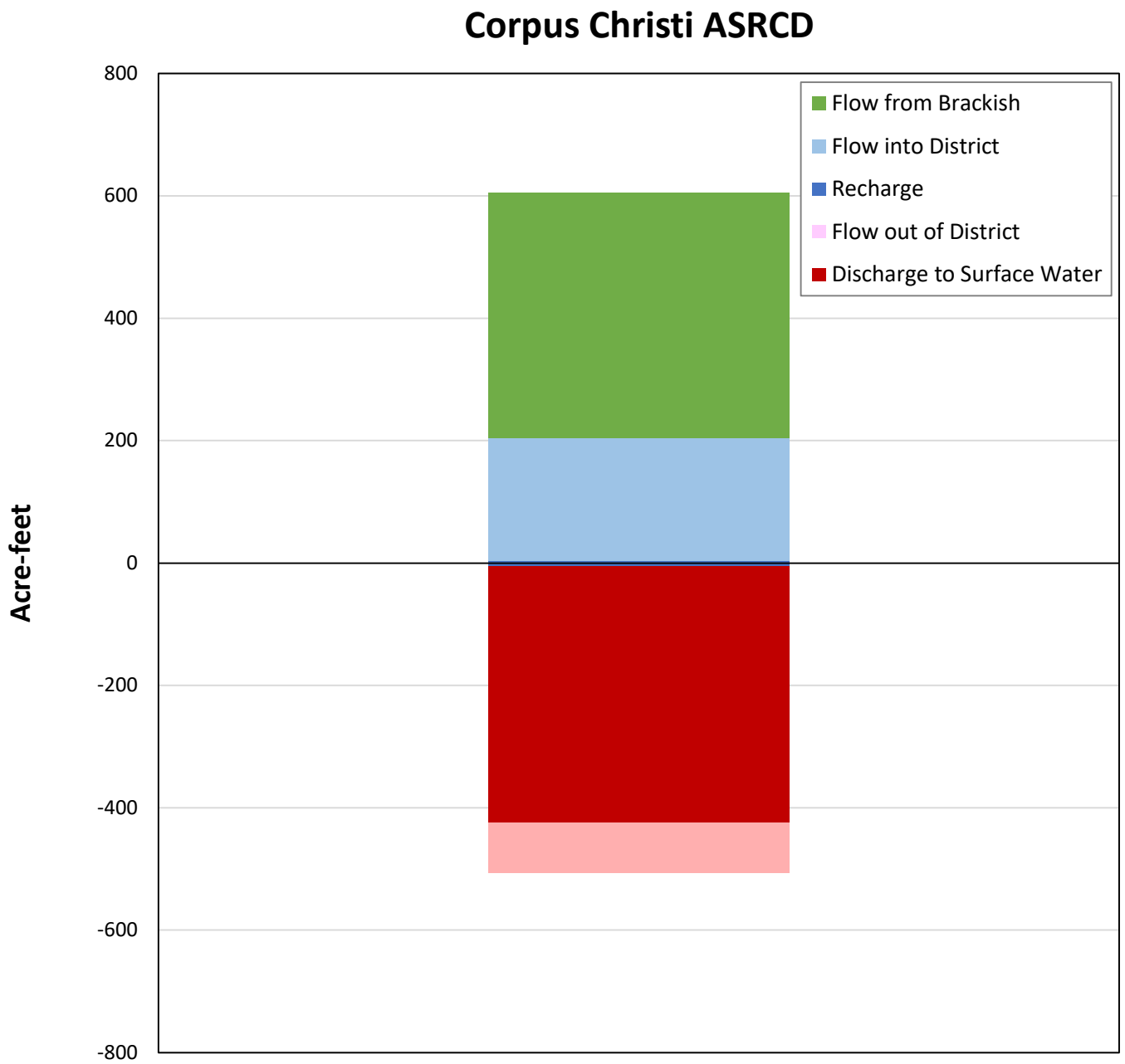

Brush Country GCD
60,000
40,000
20,000
0
-20,000
-40,000
-60,000
Acre-feet
Flow into District
Recharge
Flow to Yegua-Jackson
Flow out of District
Discharge to Surface Water
Min Pumping
Max Pumping

Annual Recharge, Inflows & Discharge – Corpus Christi ASRCD

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	7
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Gulf Coast Aquifer System	417[1]
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	202
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	89
Estimated net annual volume of flow between each aquifer in the district	Flow from brackish units into the Gulf Coast Aquifer System	396


Corpus Christi ASRCD
Acre-feet
800
600
400
200
0
-200
-400
-600
-800
Flow from Brackish
Flow into District
Recharge
Flow out of District
Discharge to Surface Water

Annual Recharge, Inflows & Discharge – Duval County GCD

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	18,509
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Gulf Coast Aquifer System	11,537
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	3,830
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	10,341
Estimated net annual volume of flow between each aquifer in the district[1]	Not applicable	Not applicable

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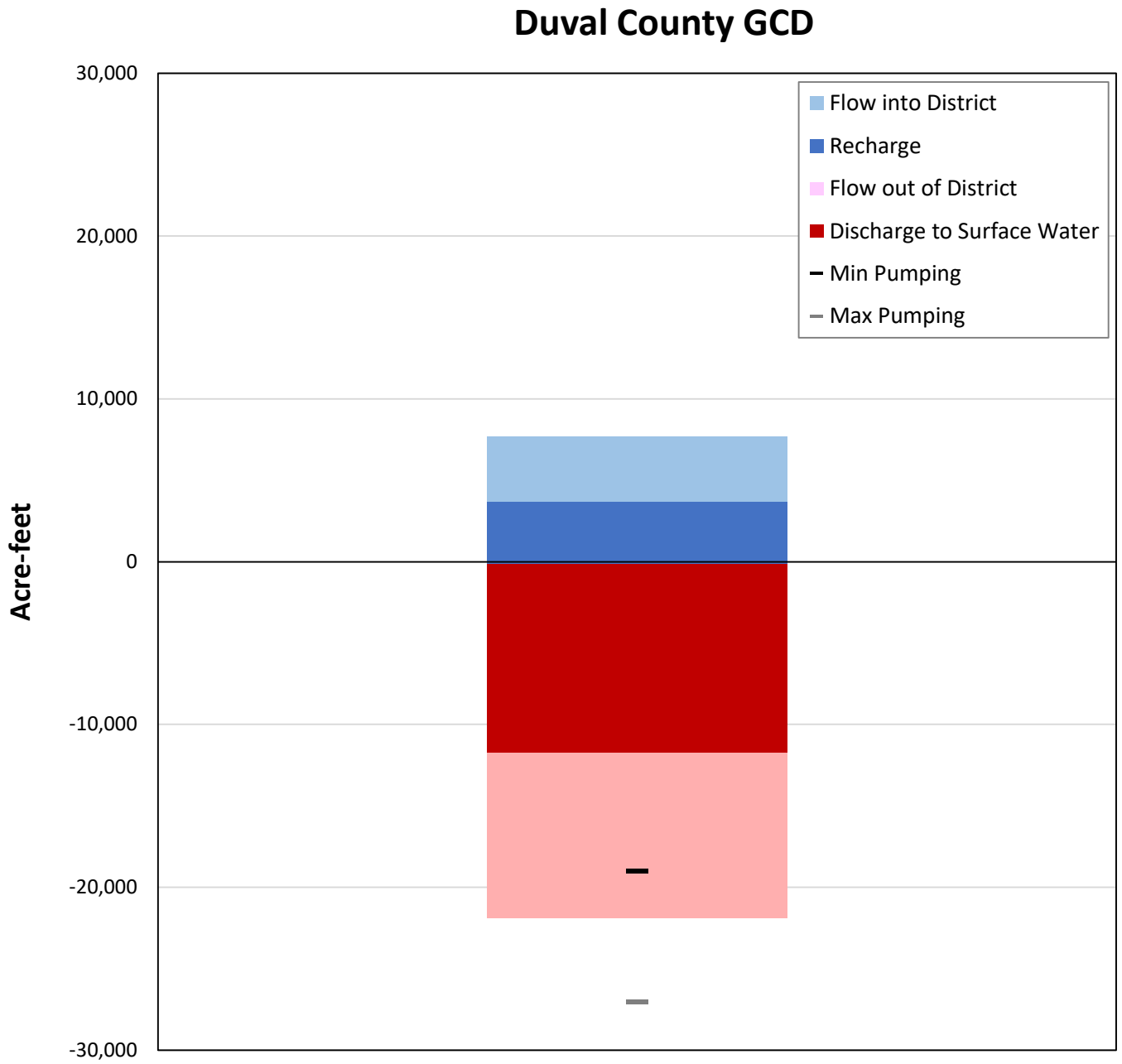
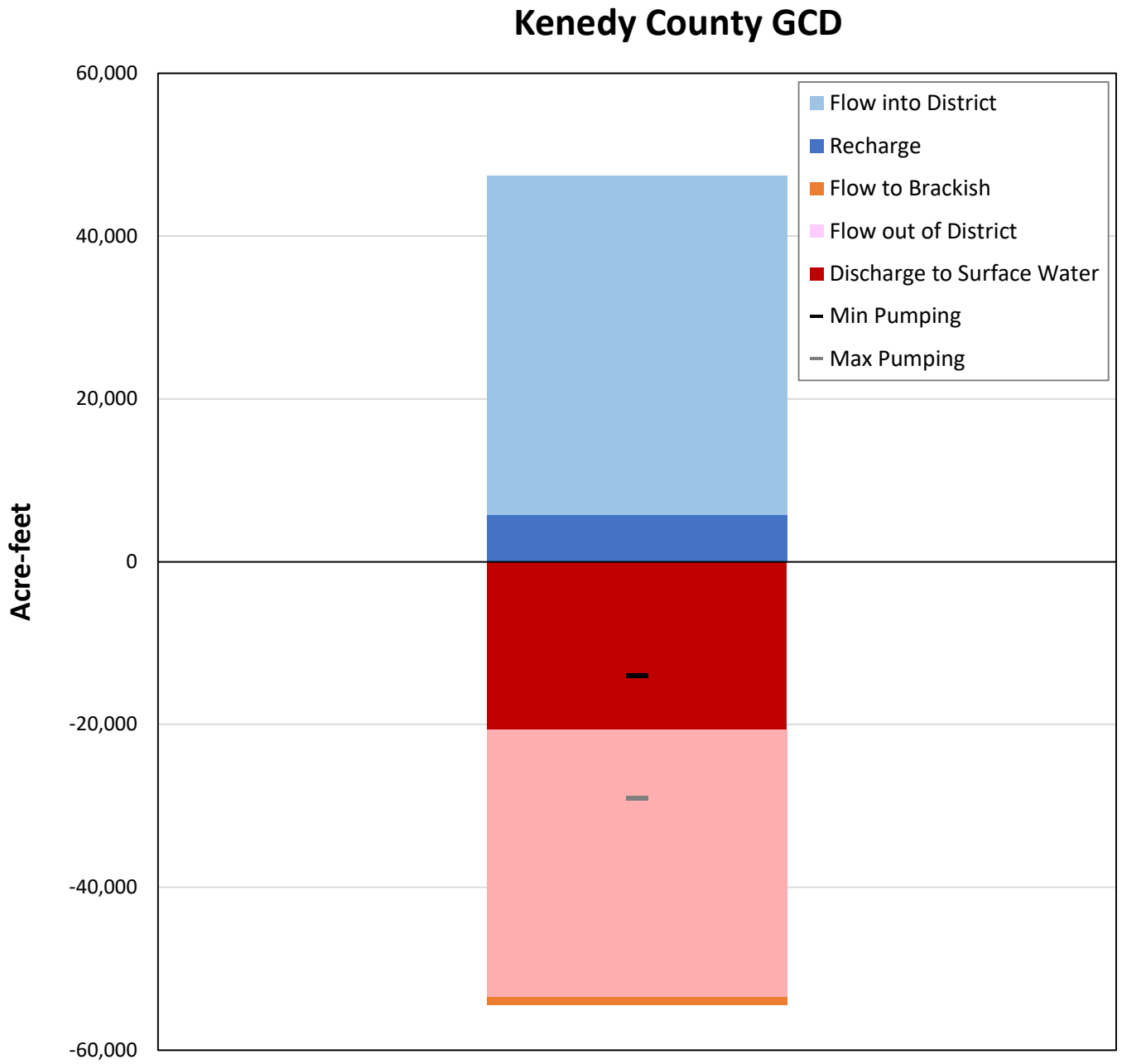

Duval County GCD
30,000
20,000
10,000
0
-10,000
-20,000
-30,000
Acre-feet
Flow into District
Recharge
Flow out of District
Discharge to Surface Water
Min Pumping
Max Pumping

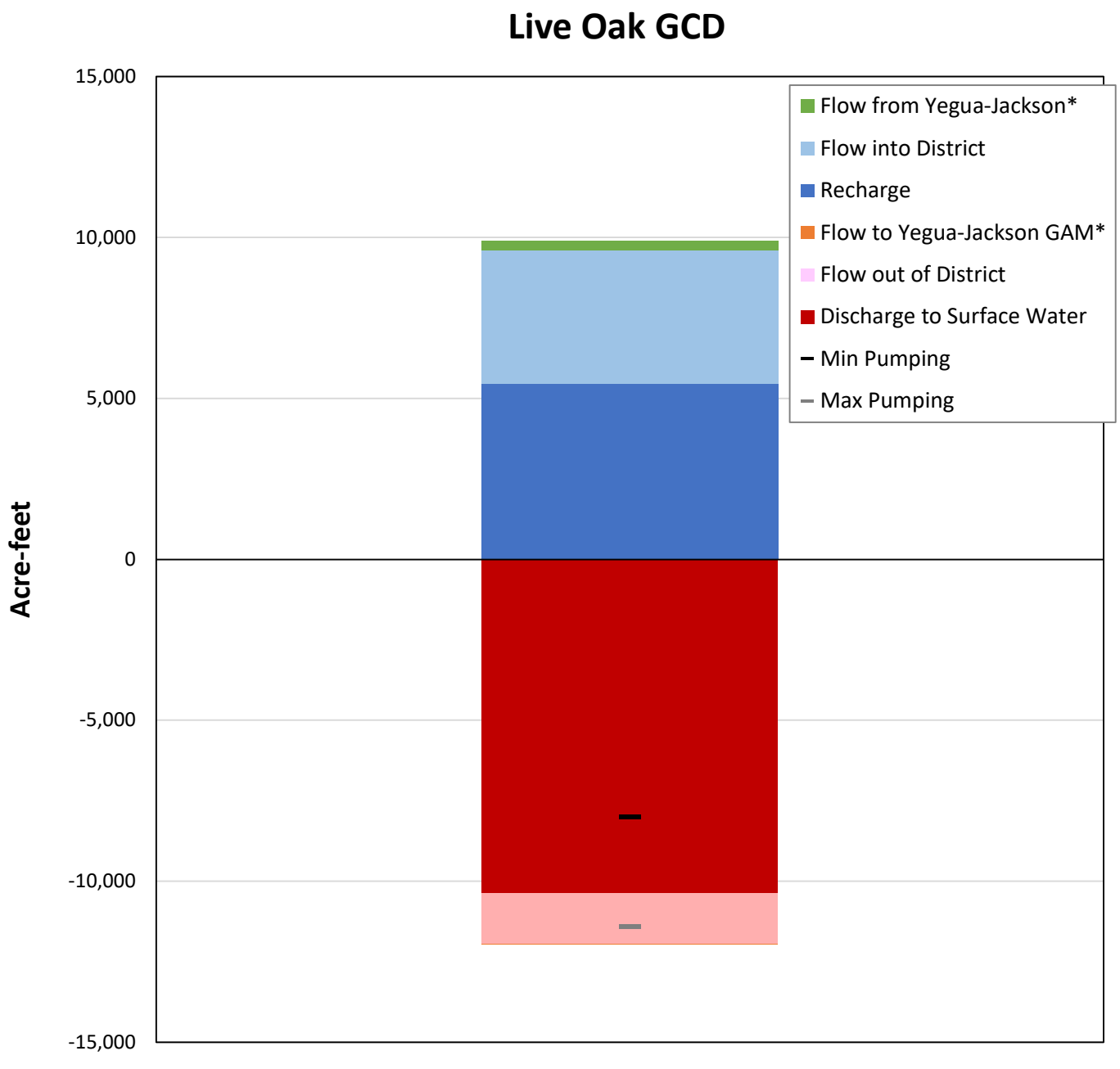
Annual Recharge, Inflows & Discharge – Kenedy County GCD

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	5,998
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Gulf Coast Aquifer System	20,643
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	41,396
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	32,644
Estimated net annual volume of flow between each aquifer in the district *	From Gulf Coast Aquifer System to brackish water containing formations	1,216


Kenedy County GCD
60,000
40,000
20,000
0
-20,000
-40,000
-60,000
Acre-feet
Flow into District
Recharge
Flow to Brackish
Flow out of District
Discharge to Surface Water
Min Pumping
Max Pumping

Annual Recharge, Inflows & Discharge – Live Oak GCD

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	5,487
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Gulf Coast Aquifer System	10,378
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	4,124
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	1,572
Estimated net annual volume of flow between each aquifer in the district	From the Catahoula Formation into Yegua-Jackson Aquifer[1]	7
	From the confined Yegua-Jackson units into the Catahoula Formation[2]	273



** Refers to Catahoula Formation in Yegua-Jackson GAM*

Annual Recharge, Inflows & Discharge – McMullen GCD

Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	244
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Gulf Coast Aquifer System	809
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	242
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	594
Estimated net annual volume of flow between each aquifer in the district	Not Applicable*	Not Applicable*

*Model assumes no-flow conditions at the base

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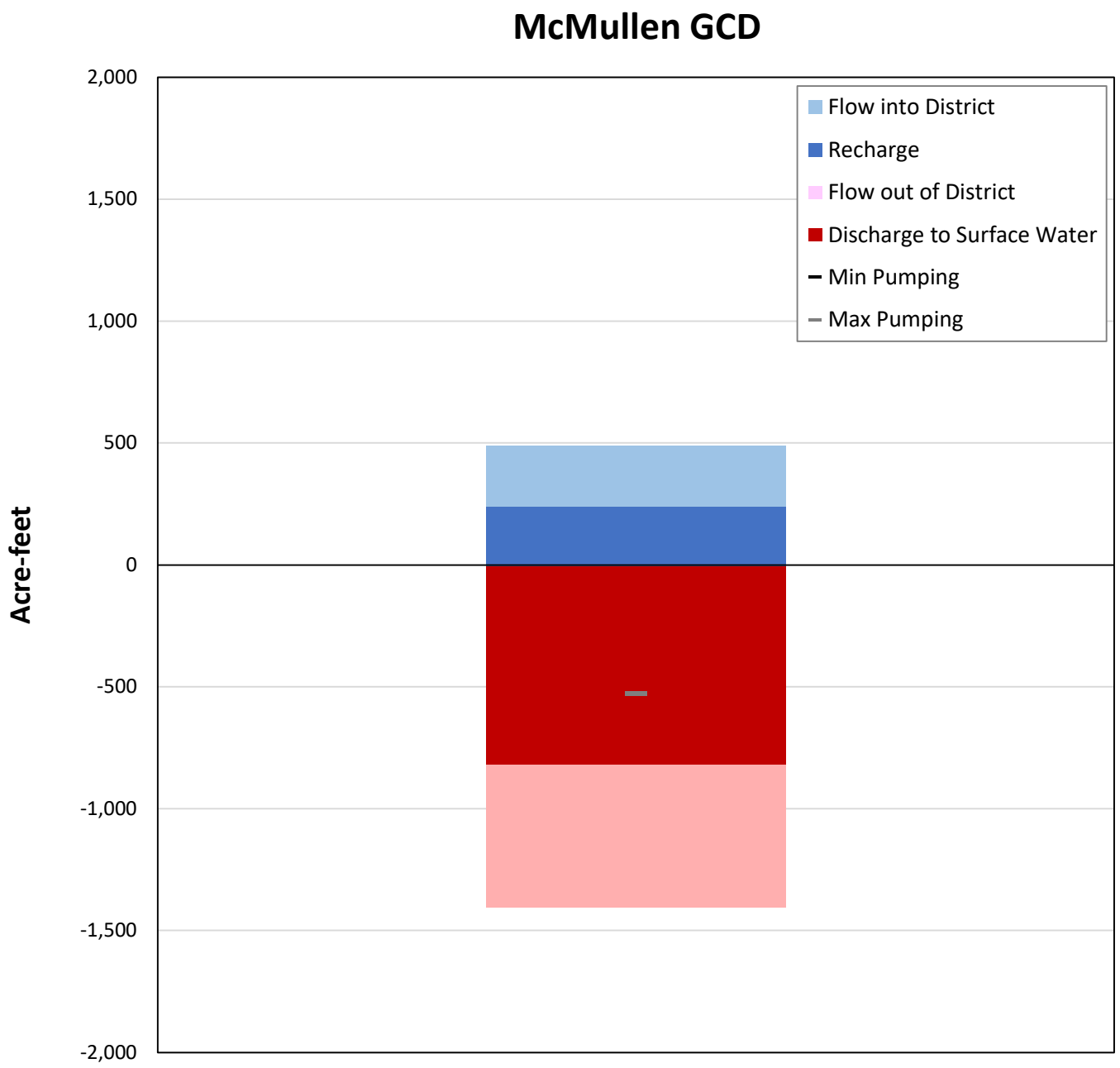
McMullen GCD
Acre-feet
2,000
1,500
1,000
500
0
-500
-1,000
-1,500
-2,000
Flow into District
Recharge
Flow out of District
Discharge to Surface Water
Min Pumping
Max Pumping

Annual Recharge, Inflows & Discharge – Red Sands GCD

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	675
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, rivers, springs, and flowing wells	Gulf Coast Aquifer System	0
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	6,324
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	6,548
Estimated net annual volume of flow between each aquifer in the district	Not applicable*	Not applicable

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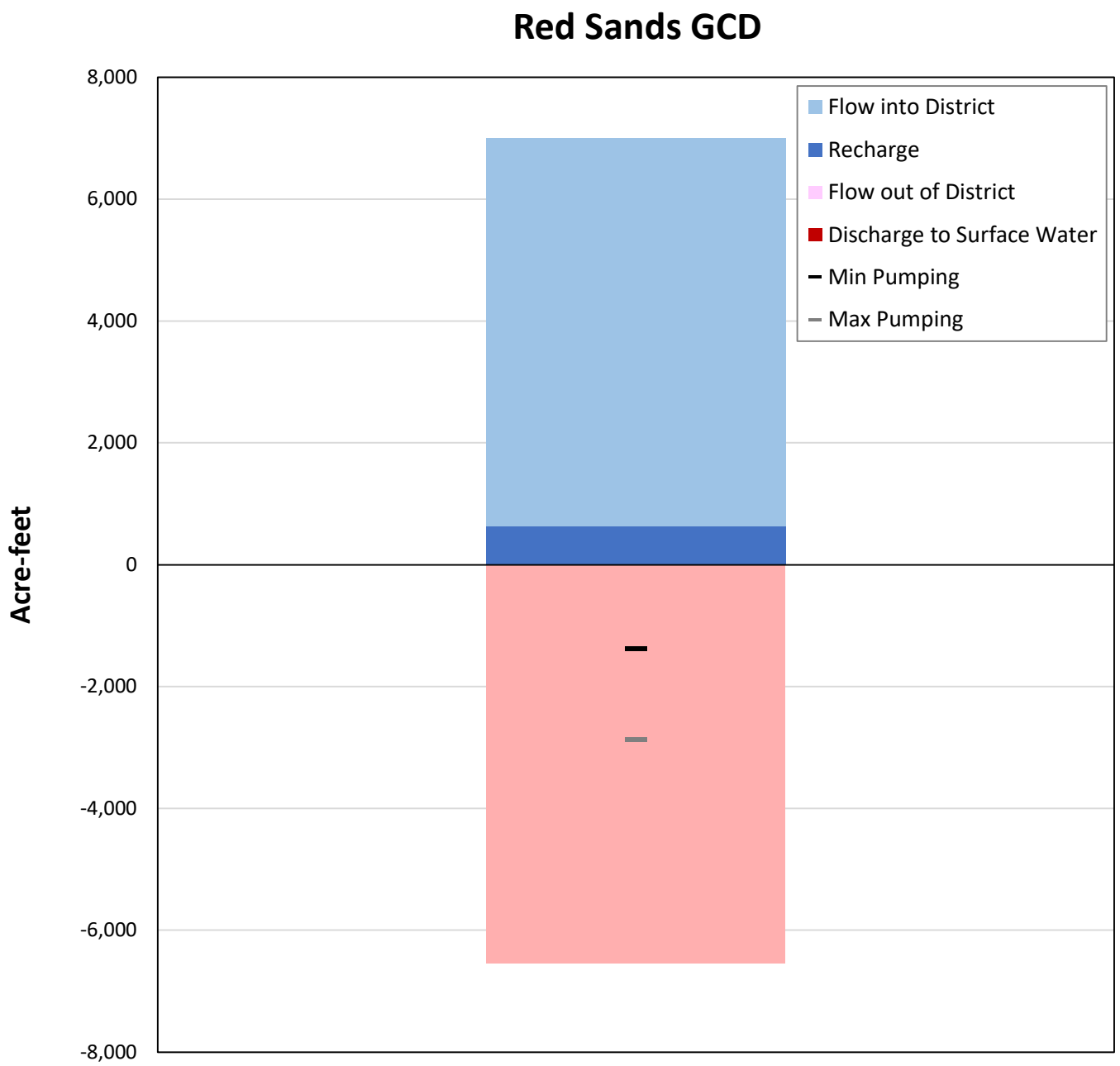
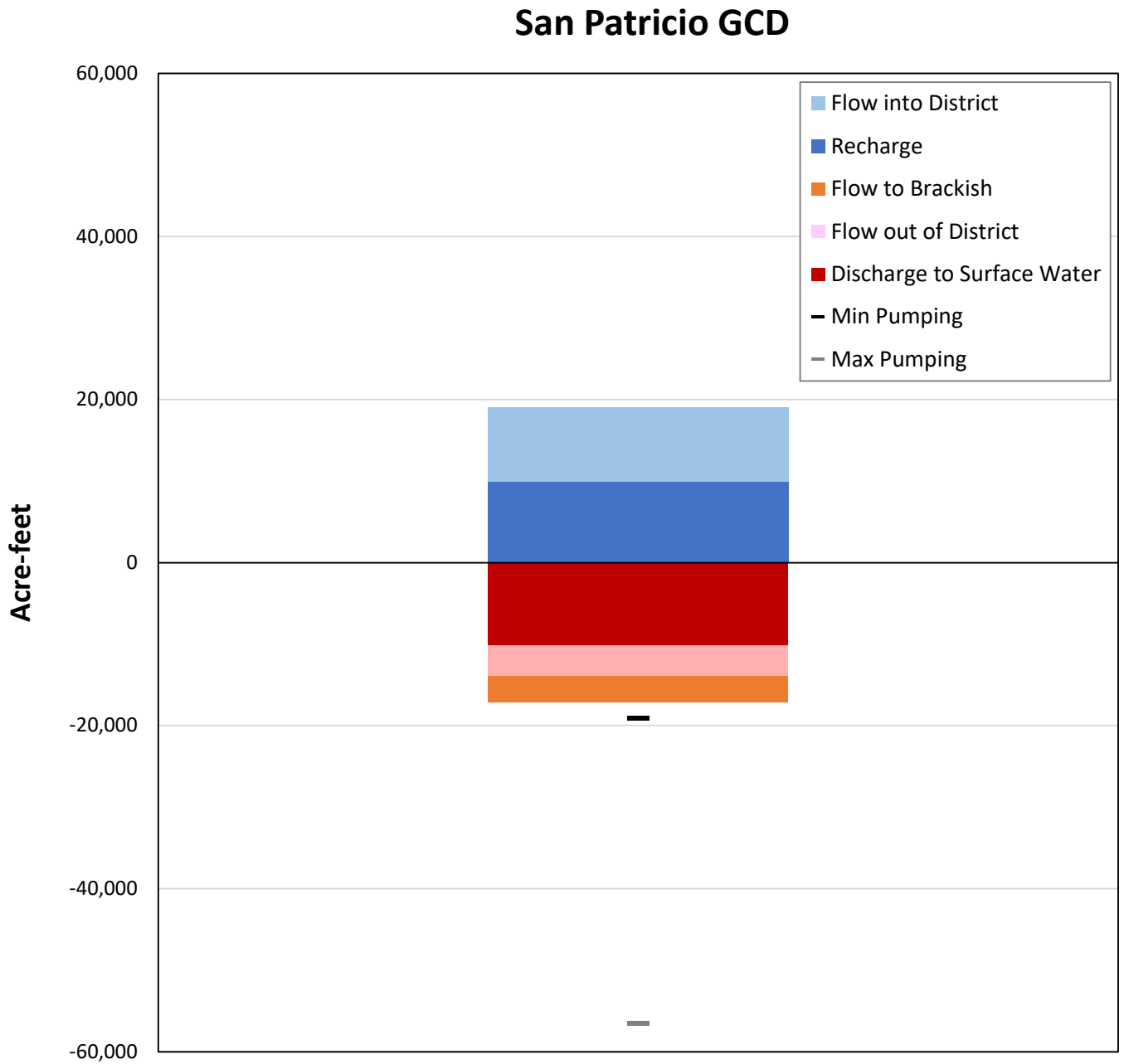

Red Sands GCD
Acre-feet
8,000
6,000
4,000
2,000
0
-2,000
-4,000
-6,000
-8,000
Flow into District
Recharge
Flow out of District
Discharge to Surface Water
Min Pumping
Max Pumping

Annual Recharge, Inflows & Discharge – San Patricio GCD

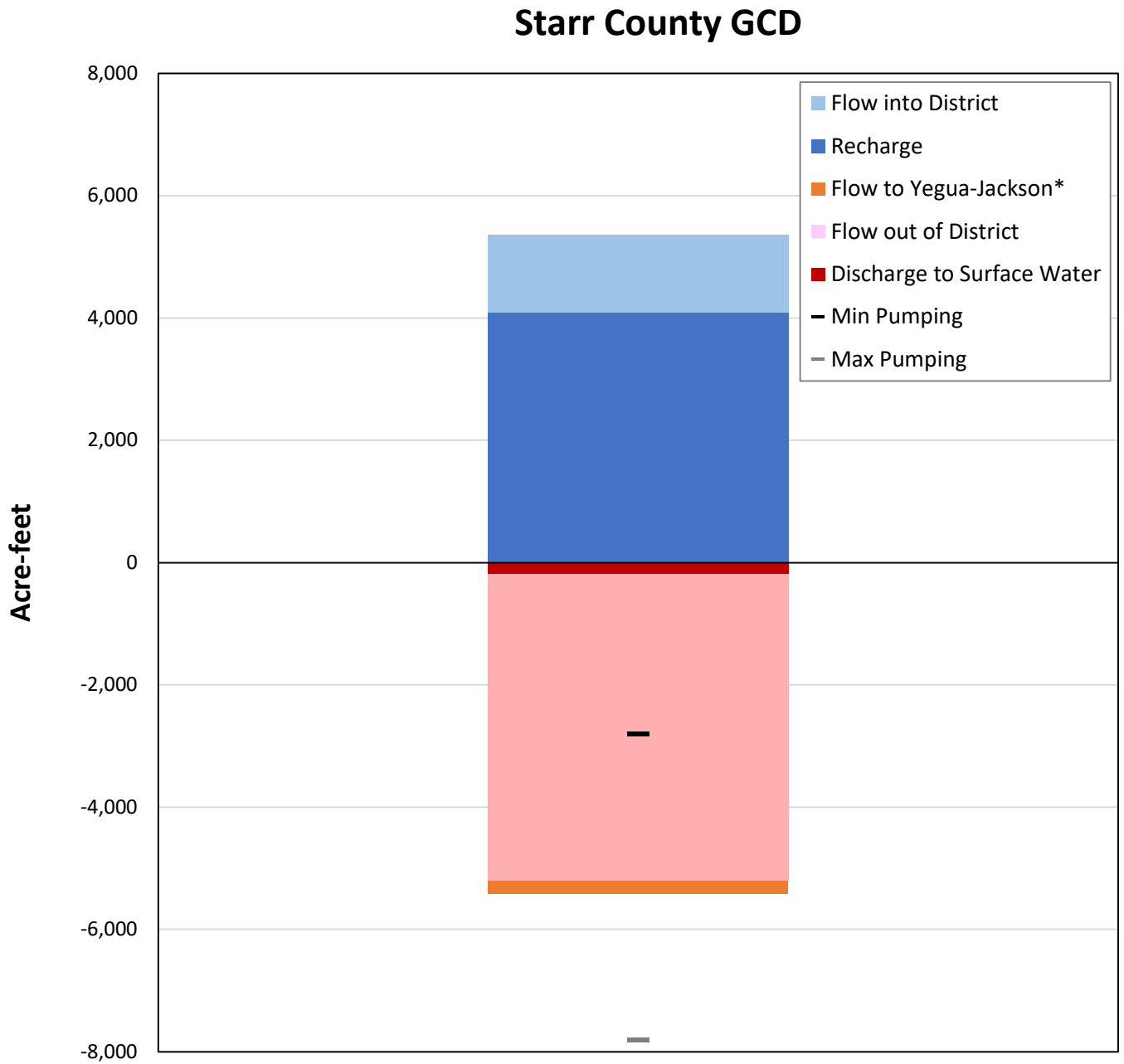
Management Plan requirement	*Aquifer or confining unit*	*Results*
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	9,977
Estimated annual volume of water that discharges from the aquifer to springs and any surface water body including lakes, streams, and rivers	Gulf Coast Aquifer System	10,100
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	9,013
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	3,807
Estimated net annual volume of flow between each aquifer in the district[1]	From Gulf Coast Aquifer System to formations containing brackish water	3,216


San Patricio GCD
60,000
40,000
20,000
0
-20,000
-40,000
-60,000
Acre-feet
Flow into District
Recharge
Flow to Brackish
Flow out of District
Discharge to Surface Water
Min Pumping
Max Pumping

Annual Recharge, Inflows & Discharge – Starr County GCD

Management Plan requirement	Aquifer or confining unit	Results
Estimated annual amount of recharge from precipitation to the district	Gulf Coast Aquifer System	4,119
Estimated annual volume of water that discharges from the aquifer to springs and any surface-water body including lakes, streams, and rivers	Gulf Coast Aquifer System	167
Estimated annual volume of flow into the district within each aquifer in the district	Gulf Coast Aquifer System	1,241
Estimated annual volume of flow out of the district within each aquifer in the district	Gulf Coast Aquifer System	5,046
Estimated net annual volume of flow between each aquifer in the district	From Gulf Coast Aquifer System (Catahoula Formation) to Yegua-Jackson Aquifer	210*

*: Flow calculated from the groundwater availability model for the Yegua-Jackson Aquifer.



** Refers to Catahoula Formation in Yegua-Jackson GAM*

Explanatory Report

- Previous report (O'Rourke, 2017) will be used as template
- Explanatory report will briefly summarize this presentation & provide a copy as appendix
- Any District can provide INTERA with more District-specific information or details regarding this topic, if they feel it is necessary
- Deadline for addl District-specific information: next GMA meeting

Questions?

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Groundwater Management Area 16 Joint Planning Cycle: 2019-2022 Water Supply Needs & Management Strategies

Falfurrias, TX
June 23, 2020

Jevon Harding, P.G.
Steve Young, Ph.D., P.G., P.E.

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Joint Planning Requirements

- Balancing Test
  - DFCs must provide "*a balance between the highest practicable level of groundwater production and the conservation, preservation, protection, recharging, and prevention of waste of groundwater and control of subsidence in the management area*"

Joint Planning Requirements

- Consideration of 9 “factors” (paraphrased)
  - Aquifer uses or conditions
  - ***Water supply needs and management strategies***
  - Hydrological conditions
  - Other environmental impacts
  - Impact on subsidence
  - Socioeconomic impacts
  - Impact on private property rights
  - Feasibility of achieving the DFC
  - Any other relevant information

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Consideration of Water Supply Needs & Management Strategies

- Describe the water supply needs and water management strategies included in the state water plan

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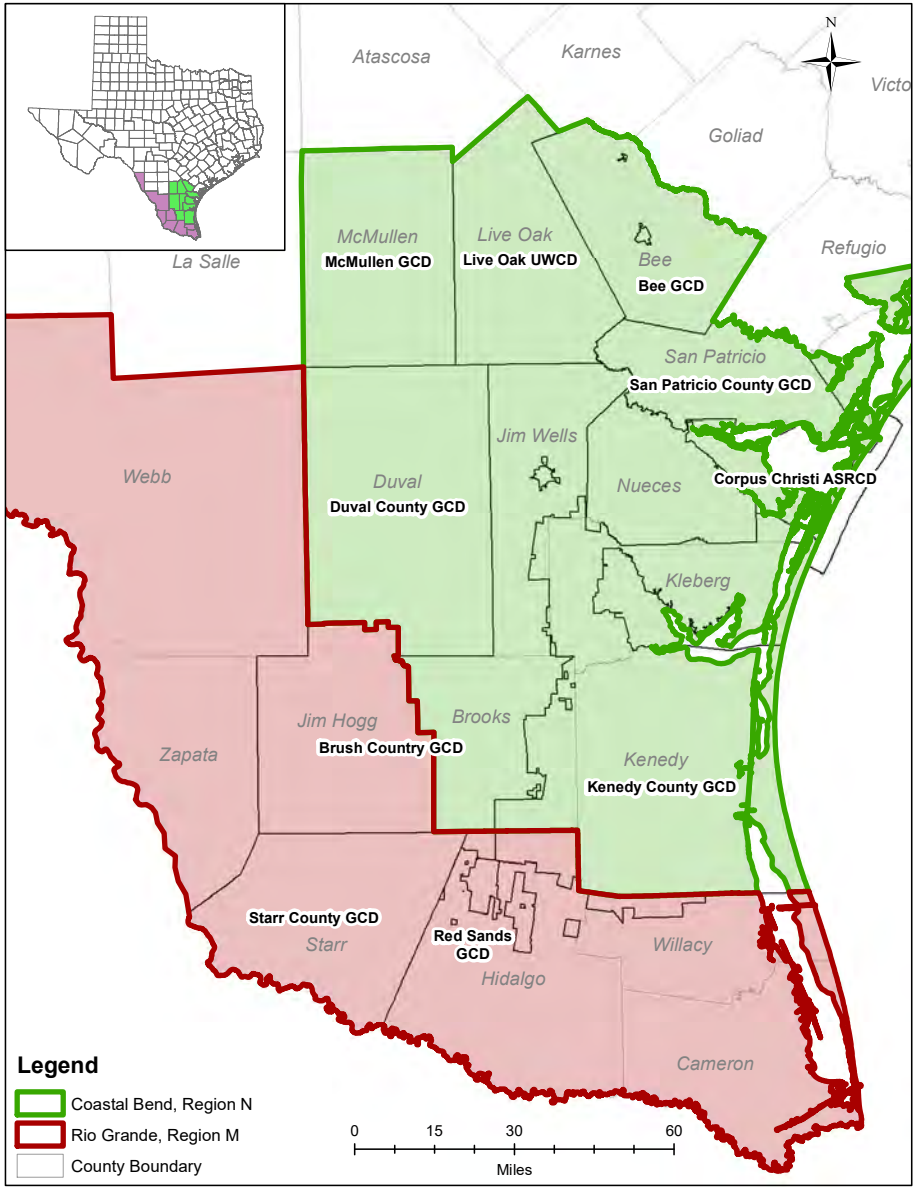
Regional Water Planning Areas



Document Path: S:\AUS\GMA_16\JointPlanning_2019_to_2022\GIS\BaseMap_RWPG.mxd

- Texas State Water Plan is compilation of Regional Water Plans
- GMA 16 falls into 2 Regional Water Planning Areas:
  - Region N (Coastal Bend)
  - Region M (Rio Grande)

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Regional Water Planning Areas

RIO GRANDE REGIONAL WATER PLAN:
2021 UPDATE

INITIALLY PREPARED PLAN

Prepared by: Rio Grande Regional Water Planning Group
With administration by: Lower Rio Grande Valley Development Council

MARCH 3, 2020

RIO GRANDE REGIONAL WATER PLANNING GROUP

BLACK & VEATCH

Coastal Bend
Regional Water Planning Area
Region N

Executive Summary and
Initially Prepared Plan
March 2020

Prepared for

Texas Water Development Board

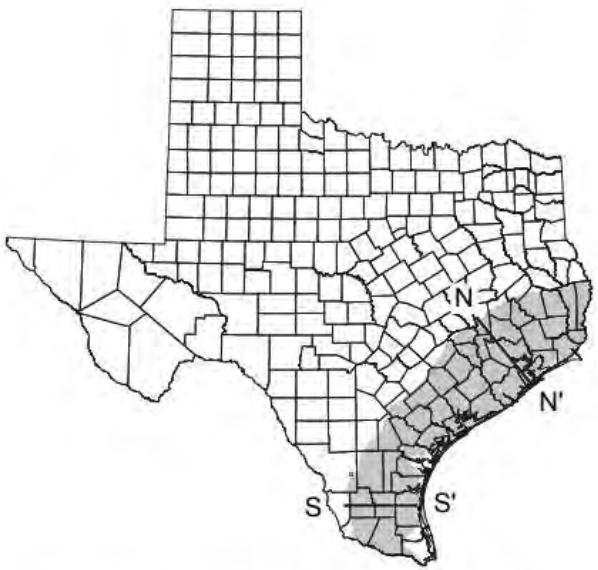
Prepared by
Coastal Bend Regional
Water Planning Group

With administration by

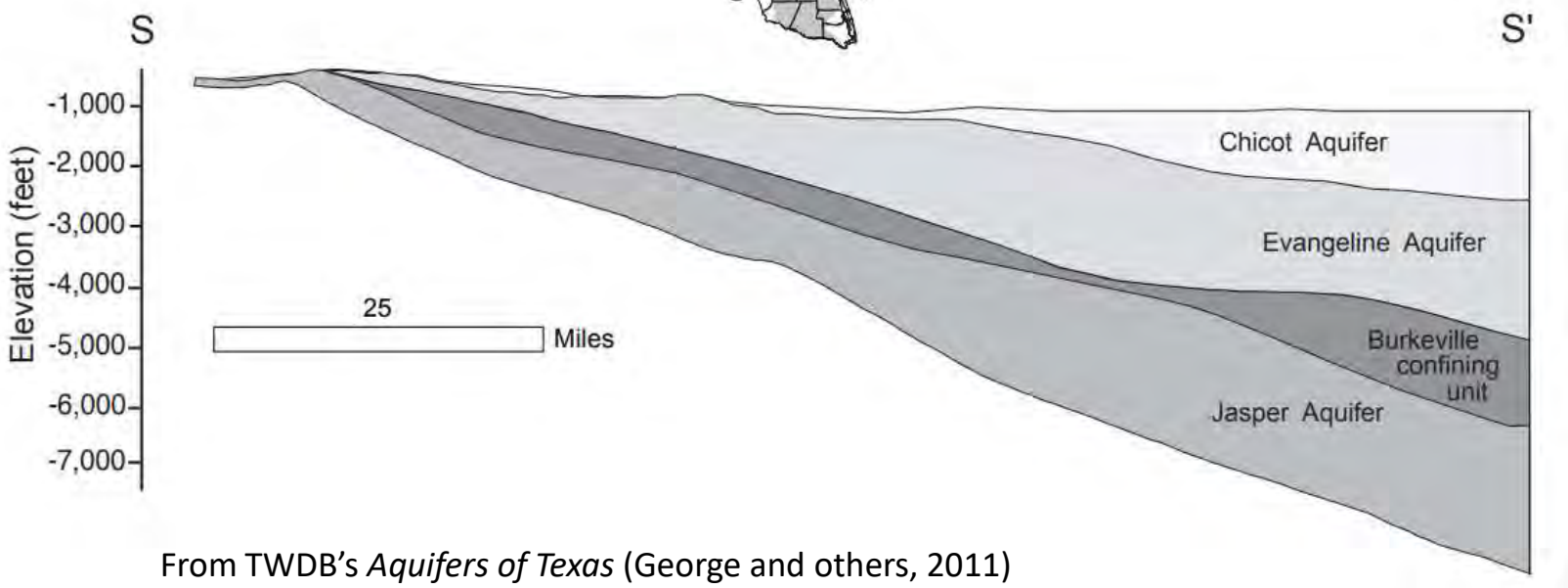
With technical assistance by
HDR Engineering, Inc

HDR

Gulf Coast Aquifer System



- Gulf Coast Aquifer is the only groundwater source listed for GMA 16 counties (*except Live Oak, McMullen & Starr*)
- Regional Water Planning values only specify the major aquifer name (Gulf Coast Aquifer)
- Regional Planning values do not distinguish between the 4 aquifer layers



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

Example of Regional Water Plan Accounting by County

Existing Groundwater Supplies (Kleberg County)

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	2020	2030	2040	2050	2060	2070
BAFFIN BAY WSC	N	GULF COAST AQUIFER SYSTEM | KLEBERG COUNTY	237	253	268	285	303	320
KINGSVILLE	N	GULF COAST AQUIFER SYSTEM | KLEBERG COUNTY	3781	3946	4168	4415	4424	4561
NAVAL AIR STATION	N	GULF COAST AQUIFER SYSTEM | KLEBERG COUNTY	256	284	303	327	347	366
RIVIERA WATER SYSTEM	N	GULF COAST AQUIFER SYSTEM | KLEBERG COUNTY	114	121	129	137	145	153
COUNTY-OTHER	N	GULF COAST AQUIFER SYSTEM | KLEBERG COUNTY	218	231	247	264	281	297
MANUFACTURING	N	GULF COAST AQUIFER SYSTEM | KLEBERG COUNTY	1809	1809	1809	1809	1809	1809
MINING	N	GULF COAST AQUIFER SYSTEM | KLEBERG COUNTY	218	218	218	218	218	218
LIVESTOCK	N	GULF COAST AQUIFER SYSTEM | KLEBERG COUNTY	673	673	673	673	673	673
IRRIGATION	N	GULF COAST AQUIFER SYSTEM | KLEBERG COUNTY	850	850	850	850	850	850

Existing Surface Water Supplies (Kleberg County)

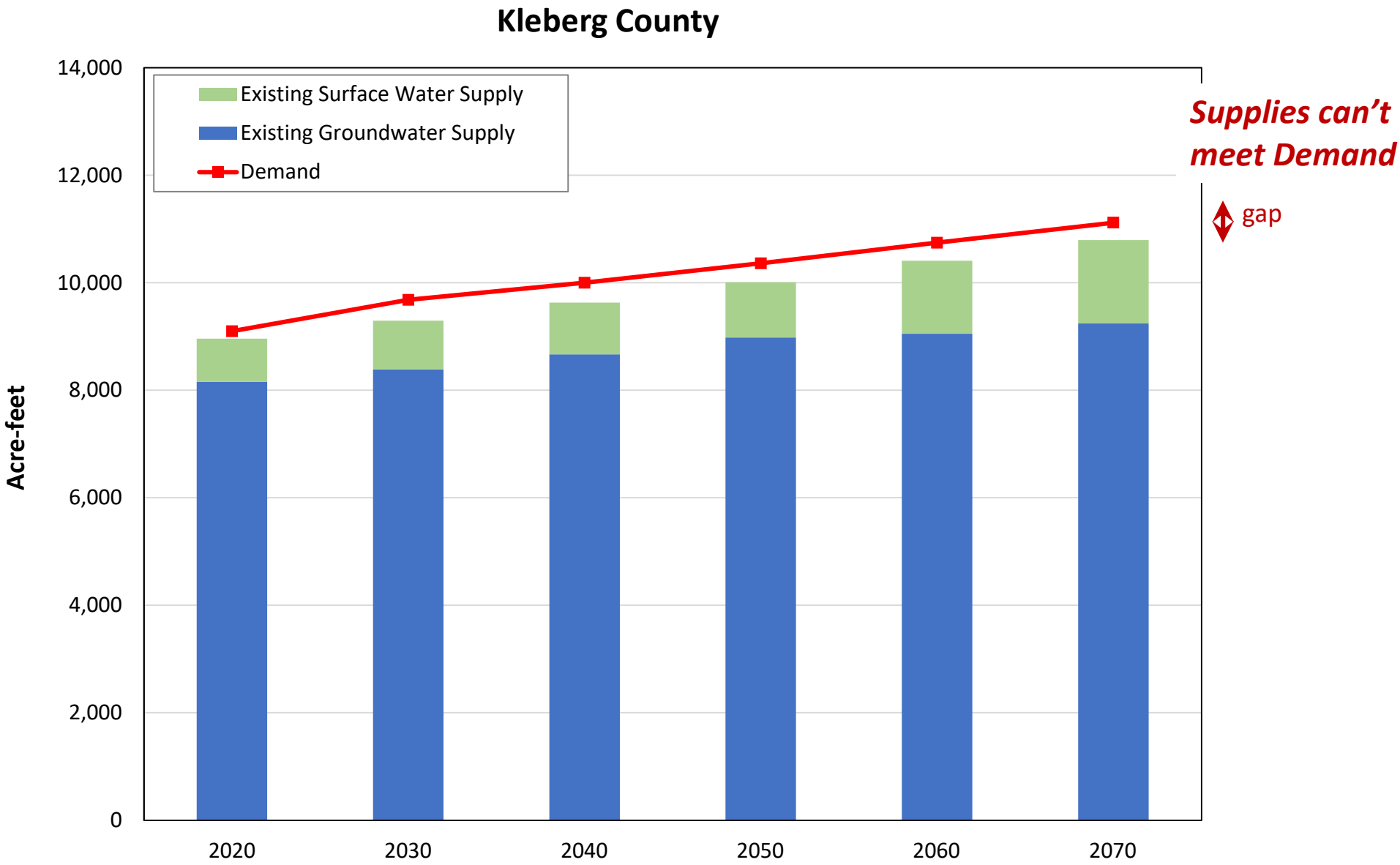
WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	2020	2030	2040	2050	2060	2070
KINGSVILLE	N	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	211	252	268	289	438	518
KINGSVILLE	P	TEXANA LAKE/RESERVOIR	213	255	270	288	439	520
RICARDO WSC	N	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	170	180	191	202	215	227
RICARDO WSC	P	TEXANA LAKE/RESERVOIR	170	181	191	203	215	227
COUNTY-OTHER	N	CORPUS CHRISTI-CHOKE CANYON LAKE/RESERVOIR SYSTEM	20	21	22	24	25	26
COUNTY-OTHER	P	TEXANA LAKE/RESERVOIR	19	20	22	23	25	26

Example of Regional Water Plan Accounting by County

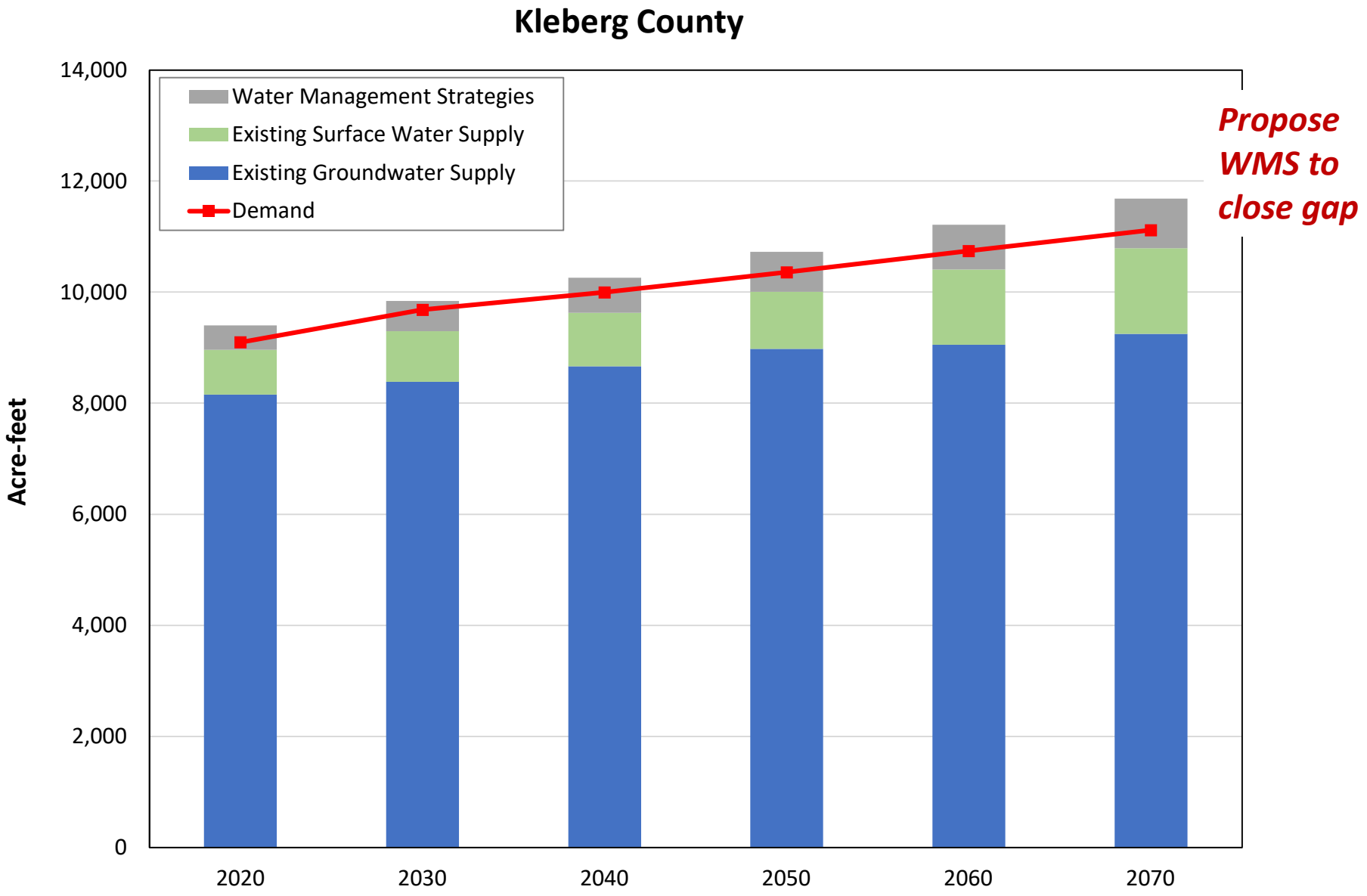
Predicted Demand (Kleberg County)

Demand	2020	2030	2040	2050	2060	2070
Municipal	5,409	5,744	6,078	6,457	6,857	7,241
Manufacturing	1,809	2,056	2,056	2,056	2,056	2,056
Steam-Electric	0	0	0	0	0	0
Mining	357	360	340	324	308	298
Irrigation	850	850	850	850	850	850
Livestock	673	673	673	673	673	673

Example of Regional Water Plan Accounting by County



Example of Regional Water Plan Accounting by County



Example of Regional Water Plan Accounting by County

Water Management Strategies can include:

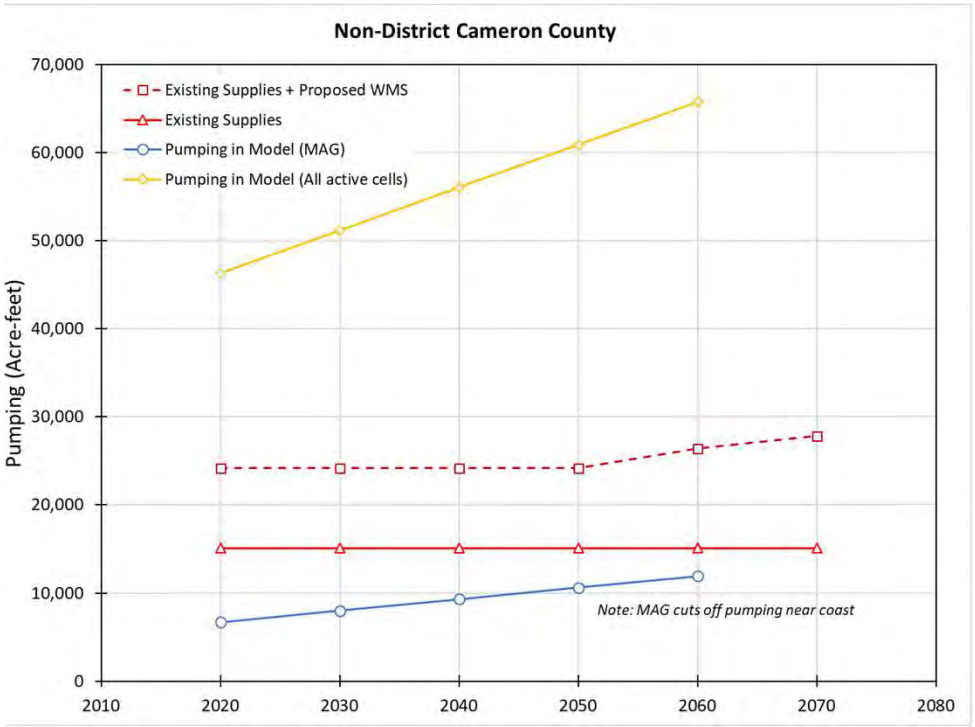
- Conservation
- Demand Reduction
- Water Re-use
- Additional Infrastructure
  - Groundwater wells
  - Desalination plants
  - Reservoirs or pipelines

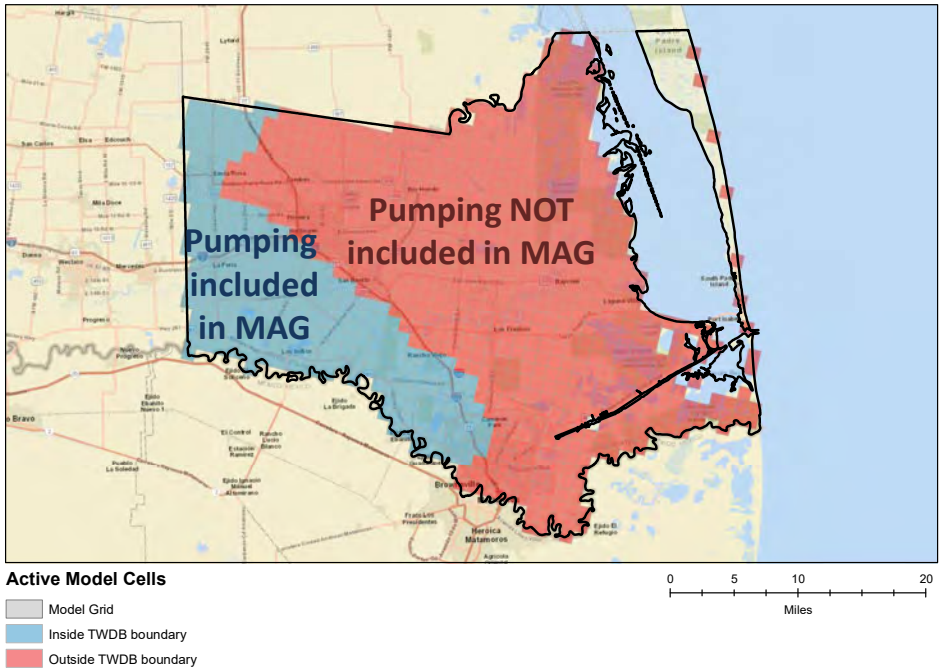
What is the connection between Regional Water Planning & GMA?

- If Water Management Strategy involves groundwater, it has to be possible based on modeled MAG values.

- GMA modeled pumping should be equal or higher to Existing Supplies listed in Regional Water Planning – this is a double-check that modeled pumping realistically accounts for pumping in the GMA.

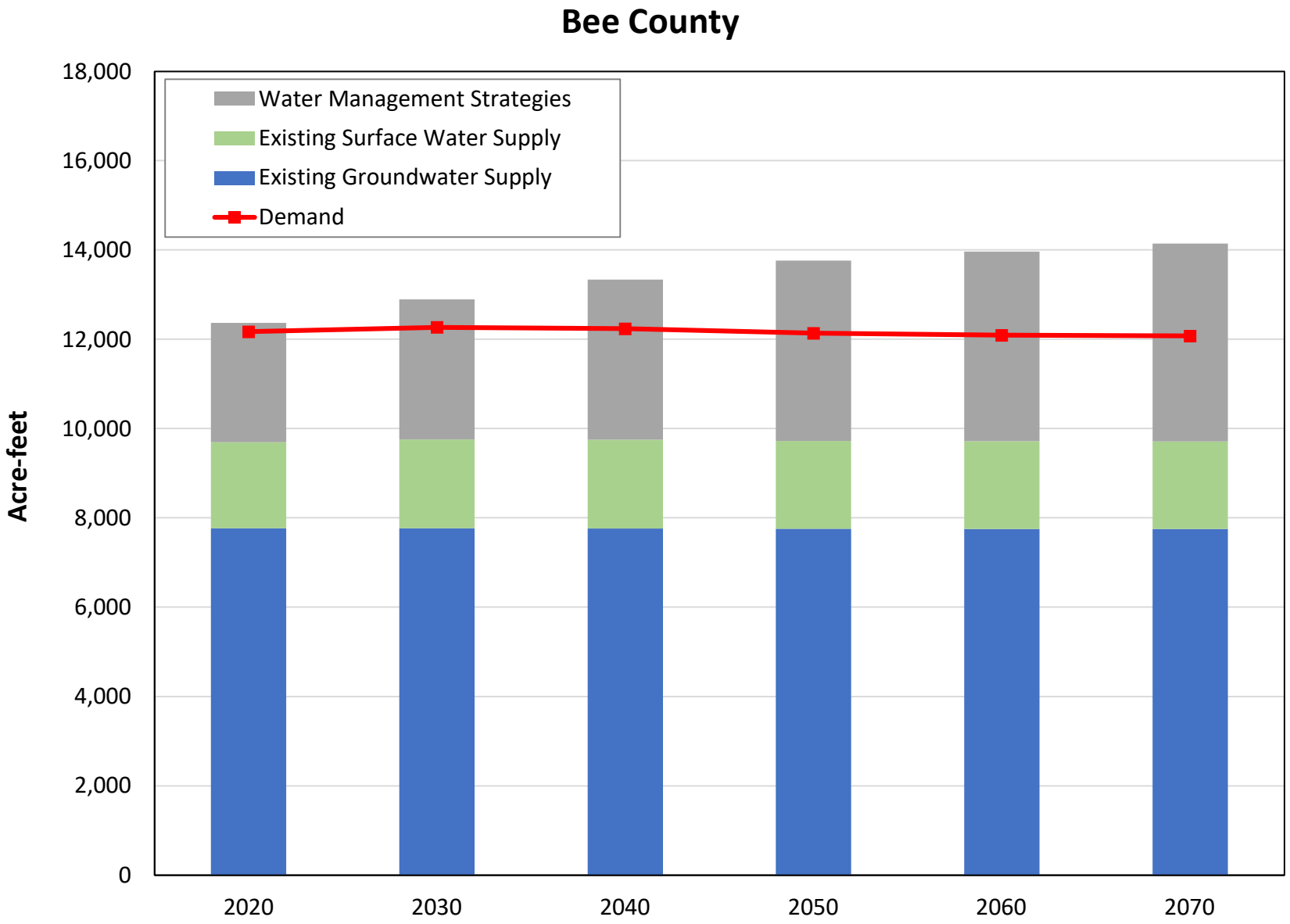
Connection between Regional Water Planning & GMA



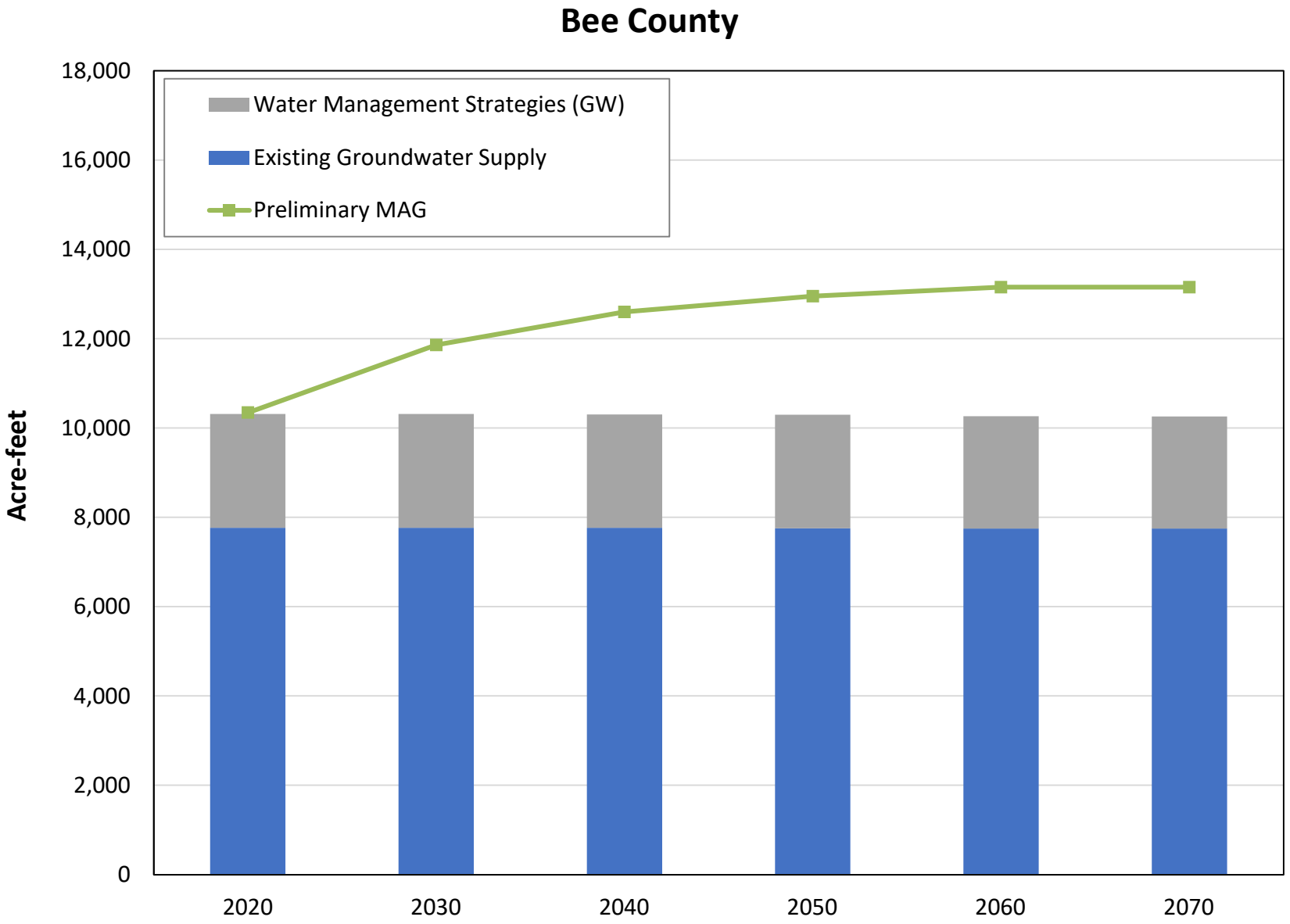


*Cameron County (Region M) could not suggest addl WMS because MAG did not include all pumping

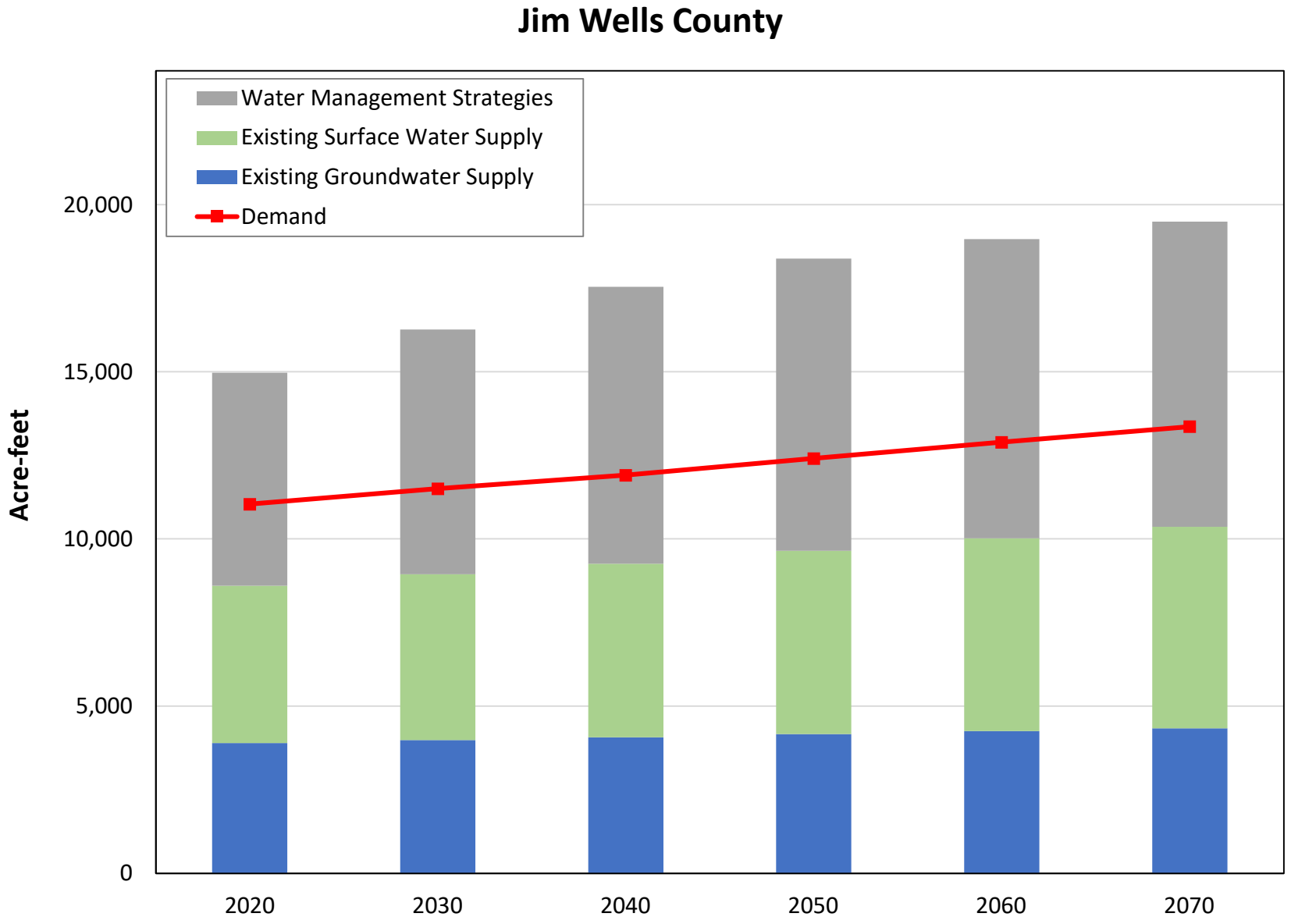
Bee GCD


Bee County
Water Management Strategies
Existing Surface Water Supply
Existing Groundwater Supply
Demand
Acre-feet
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2020
2030
2040
2050
2060
2070

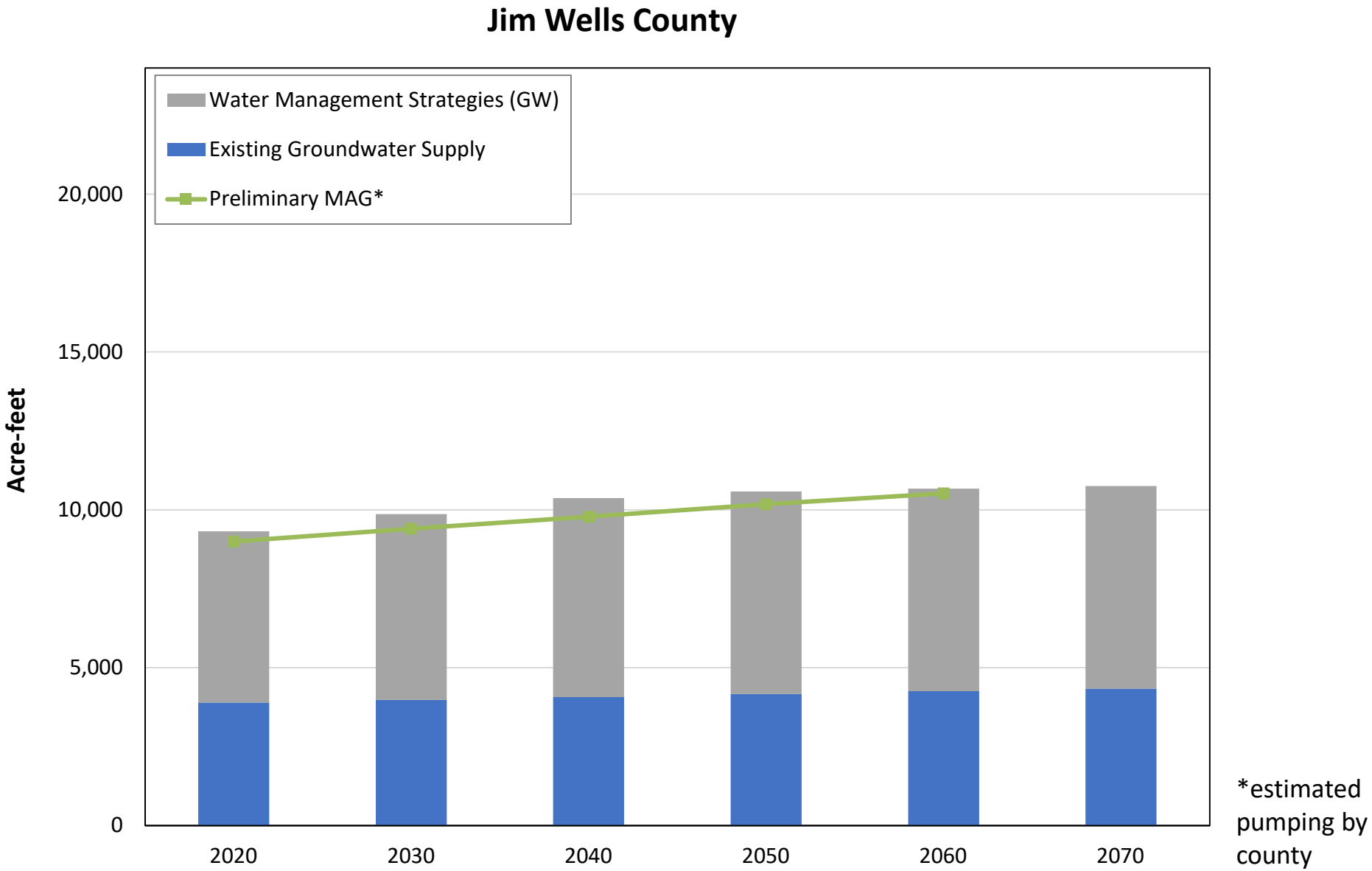
Bee GCD


Bee County
Water Management Strategies (GW)
Existing Groundwater Supply
Preliminary MAG
Acre-feet
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2020
2030
2040
2050
2060
2070

Brush Country GCD

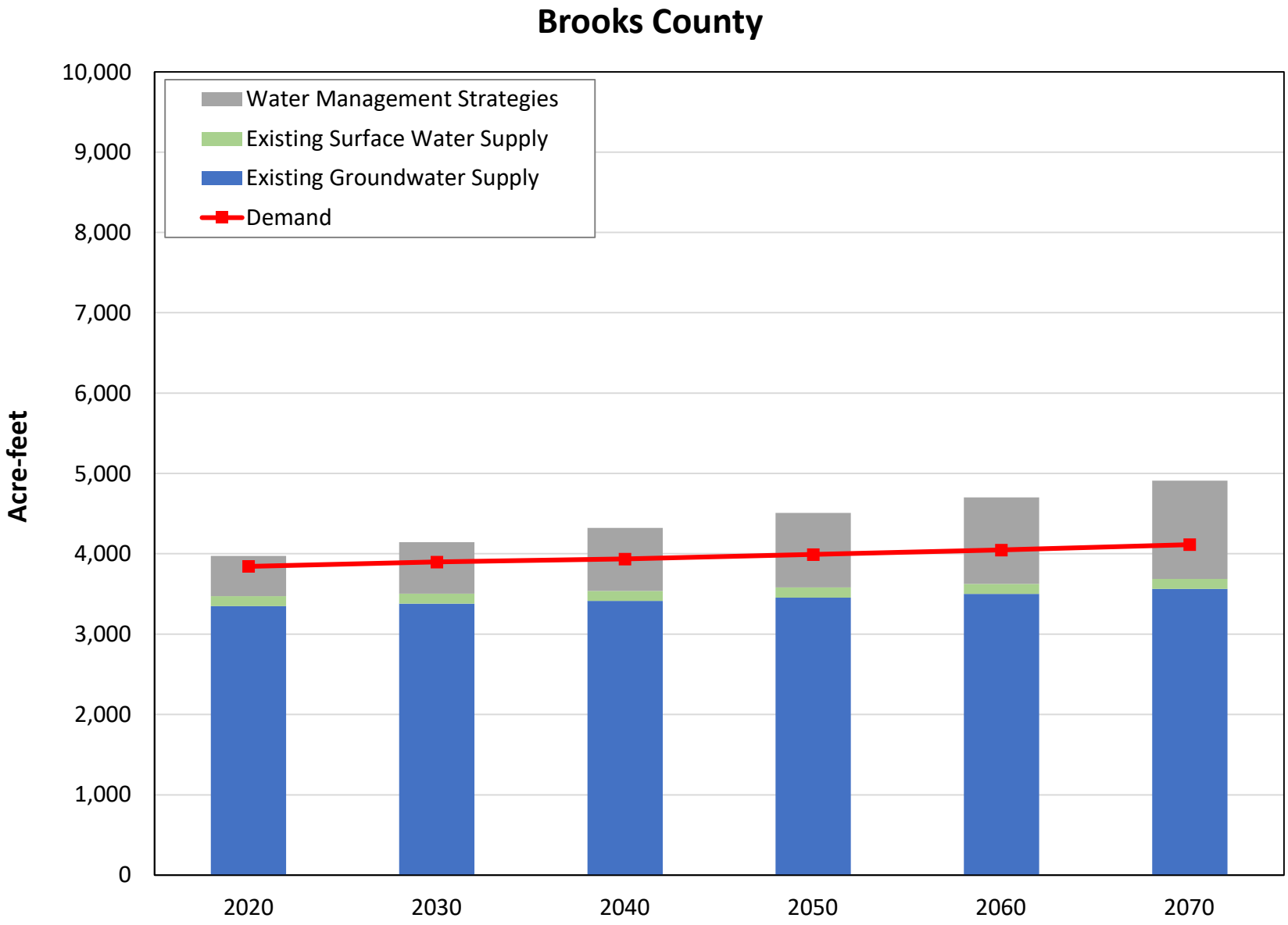


Brush Country GCD

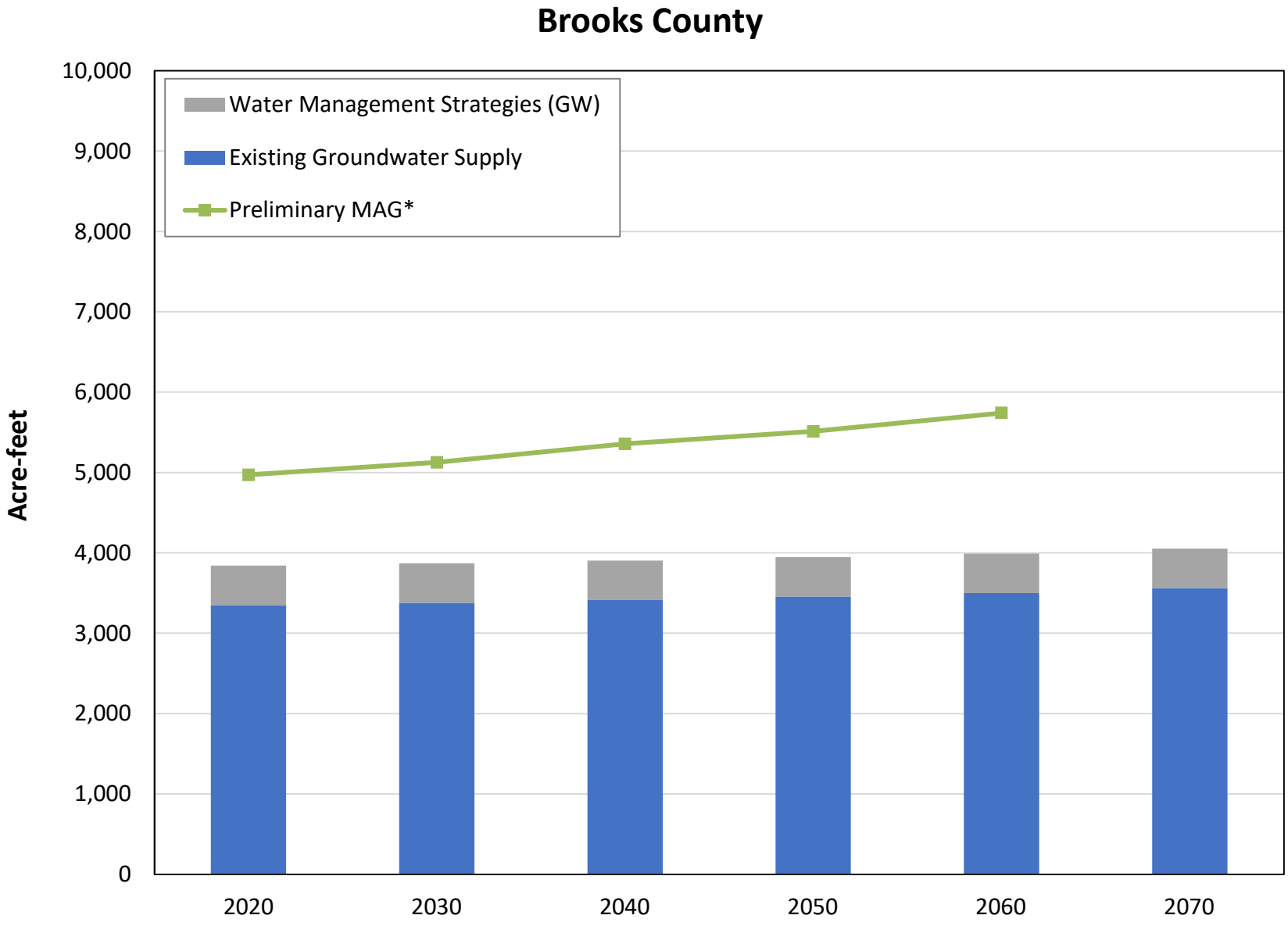


*estimated pumping by county

Brush Country GCD

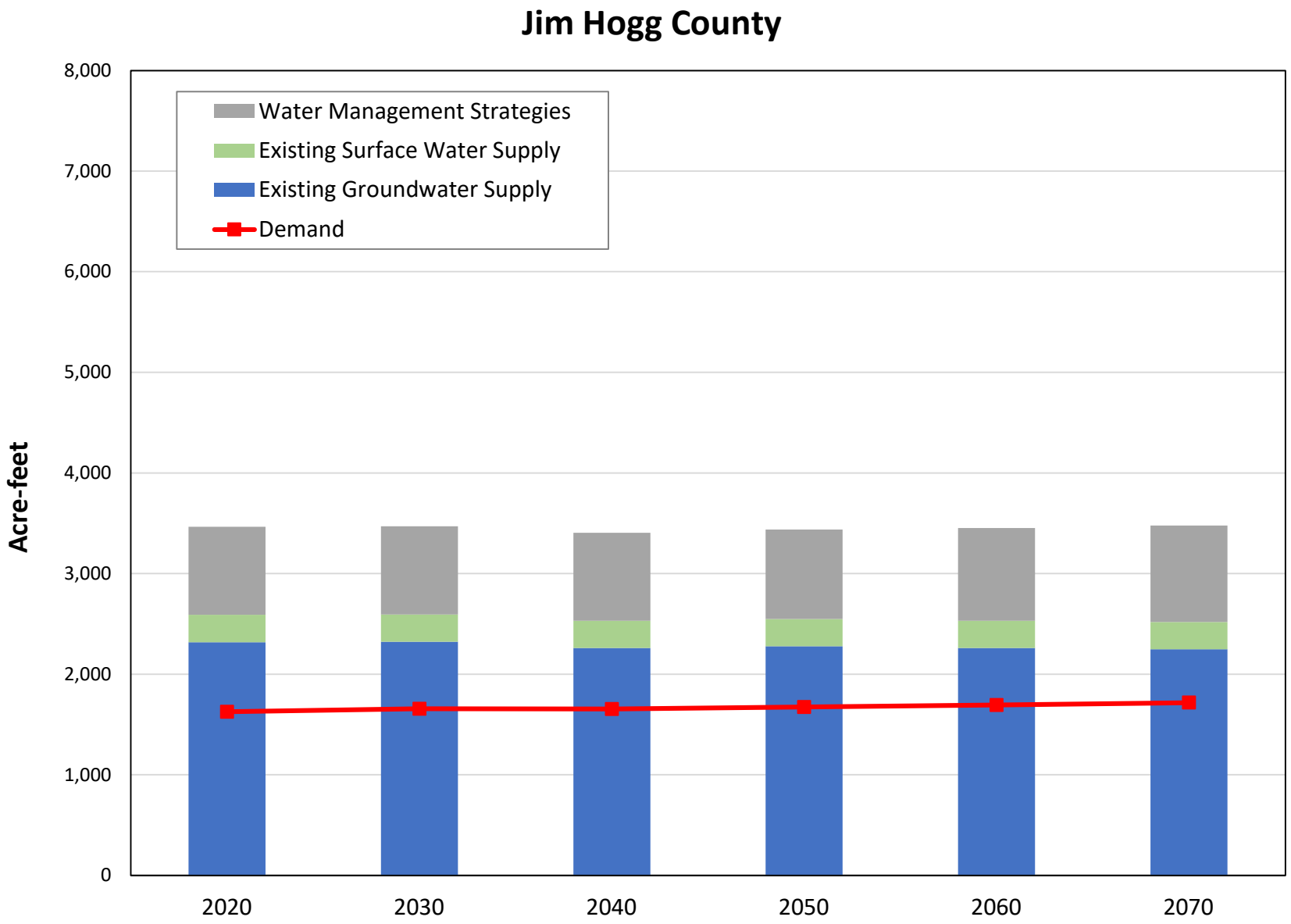


Brush Country GCD



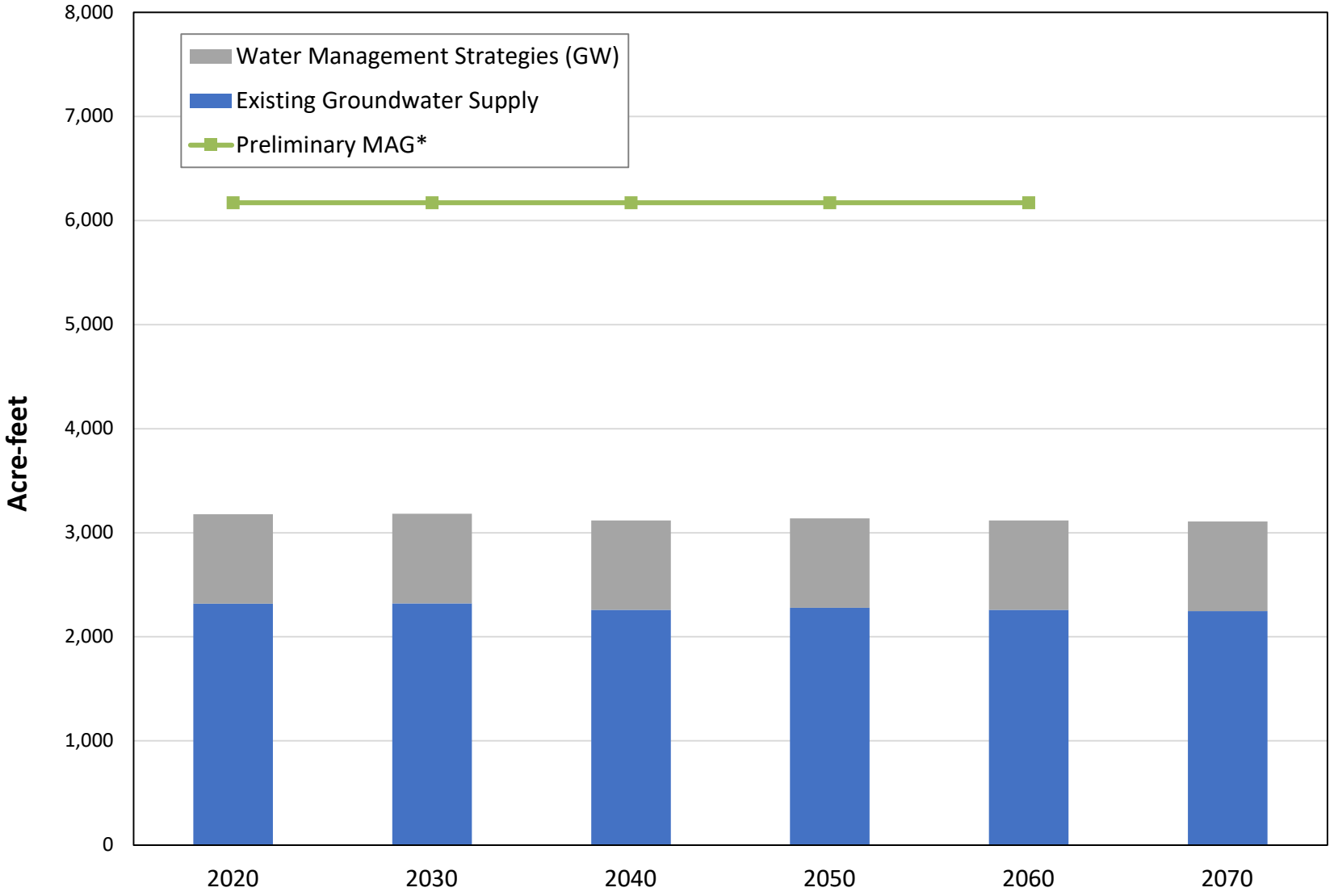
*estimated pumping by county

Brush Country GCD



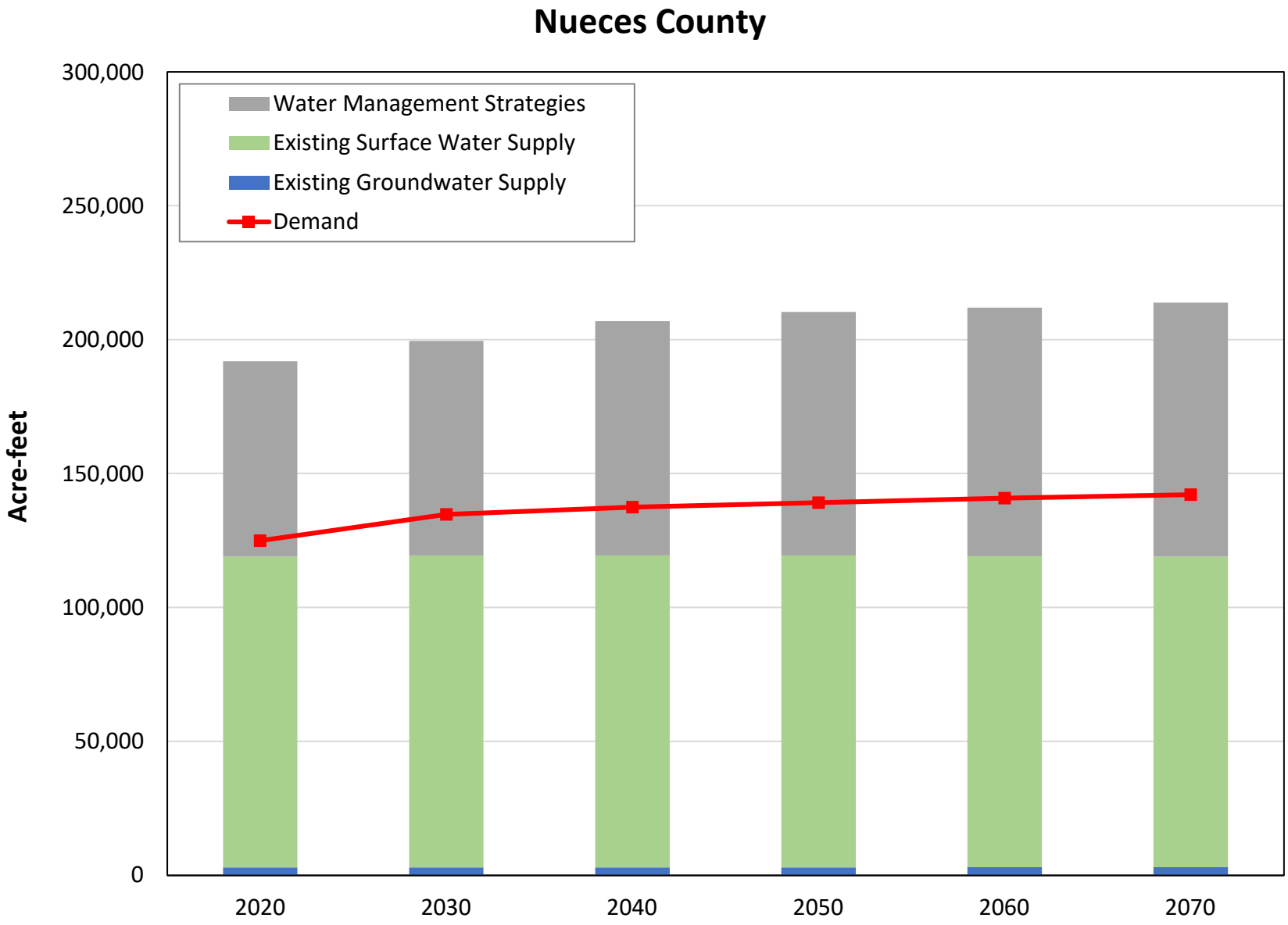
Brush Country GCD

Jim Hogg County

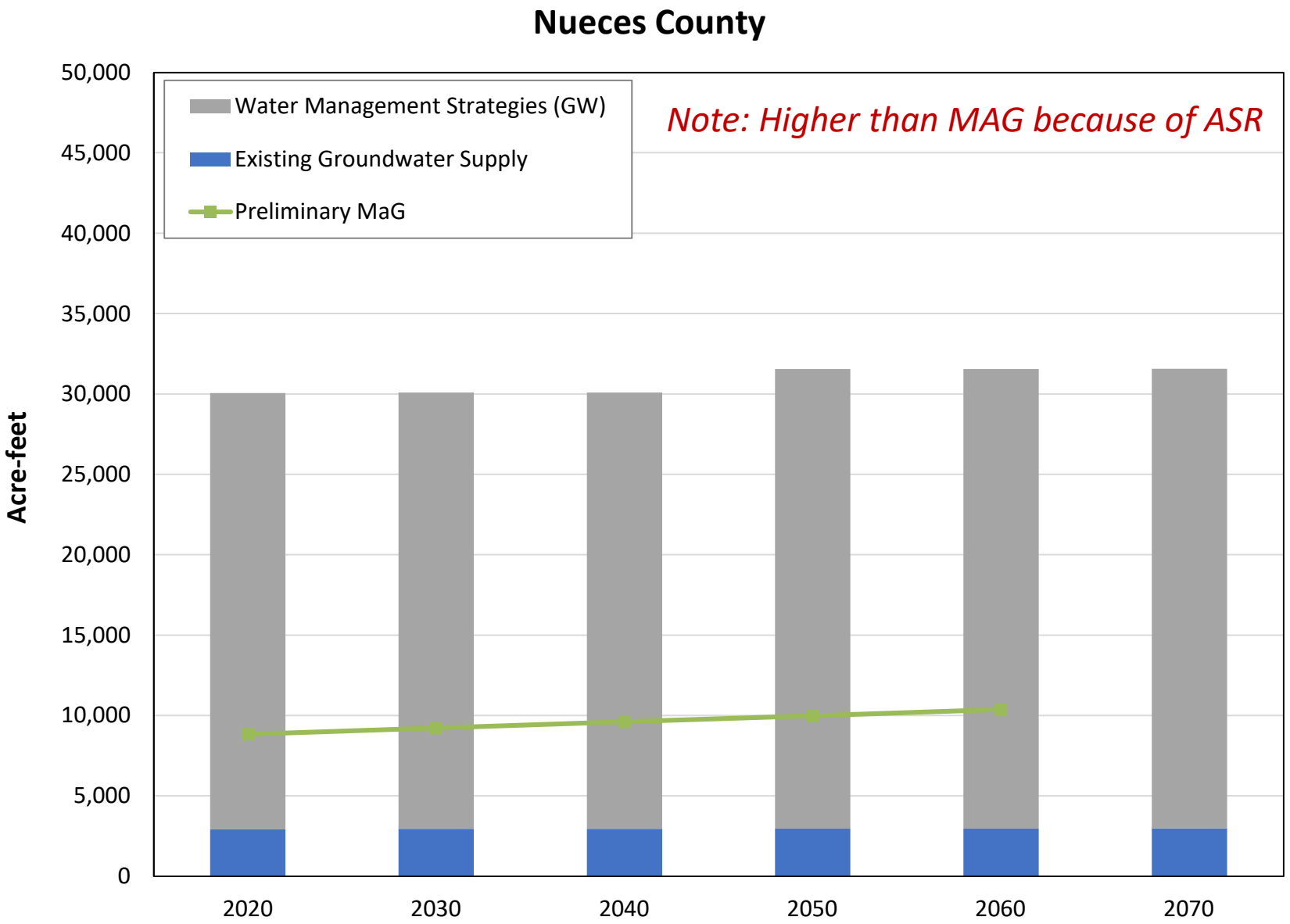


*estimated pumping by county

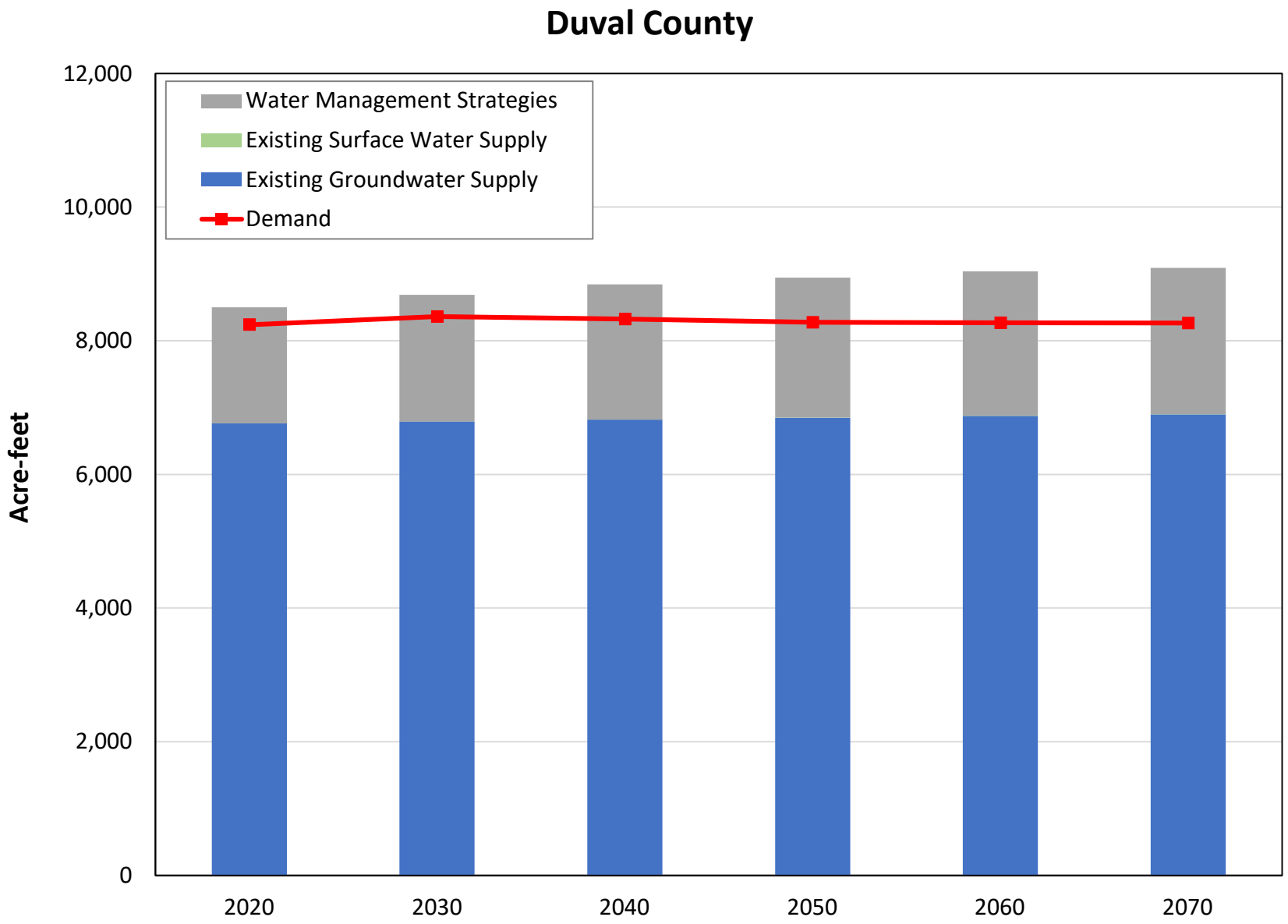
Corpus Christi ASRCD



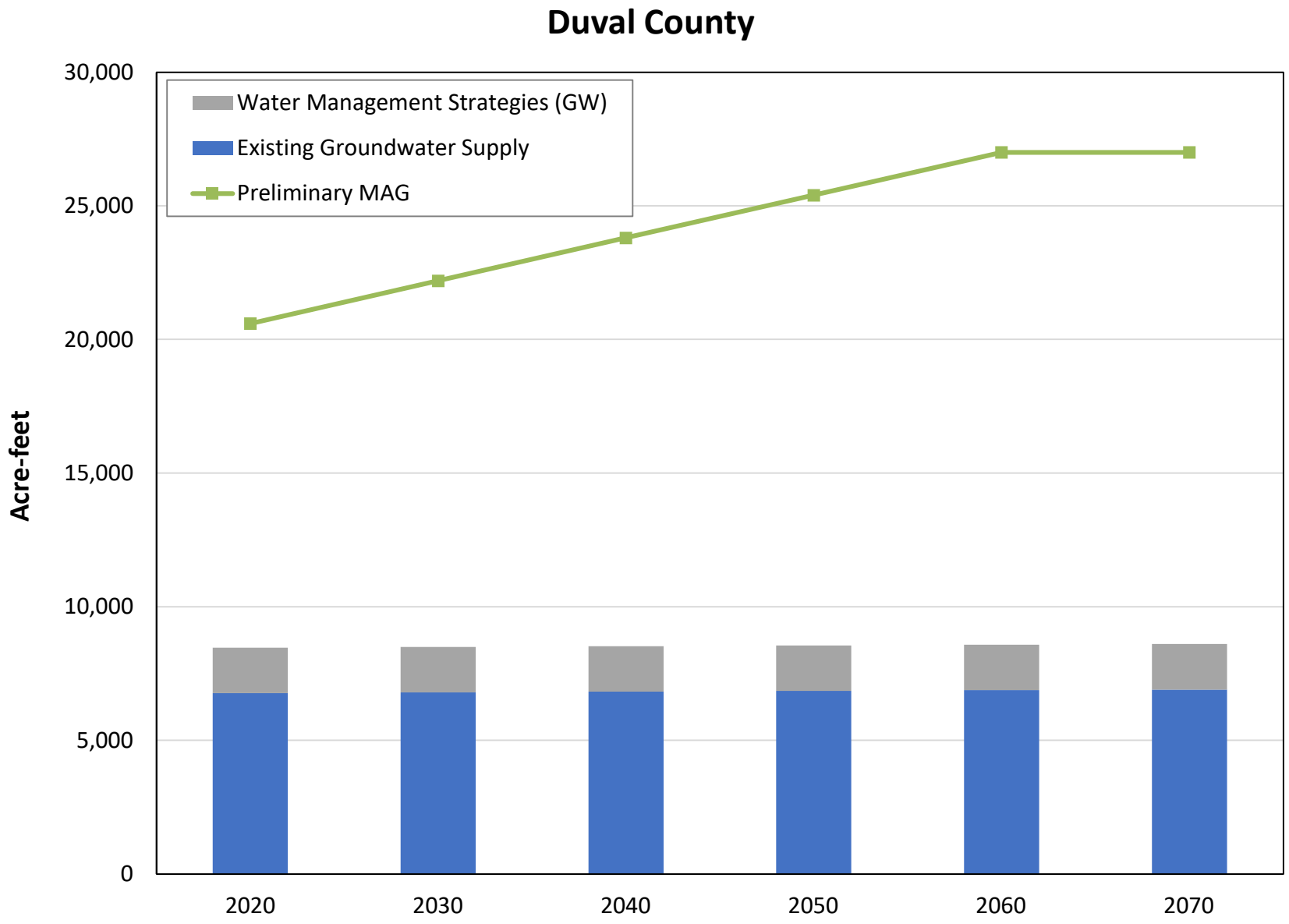
Corpus Christi ASRCD



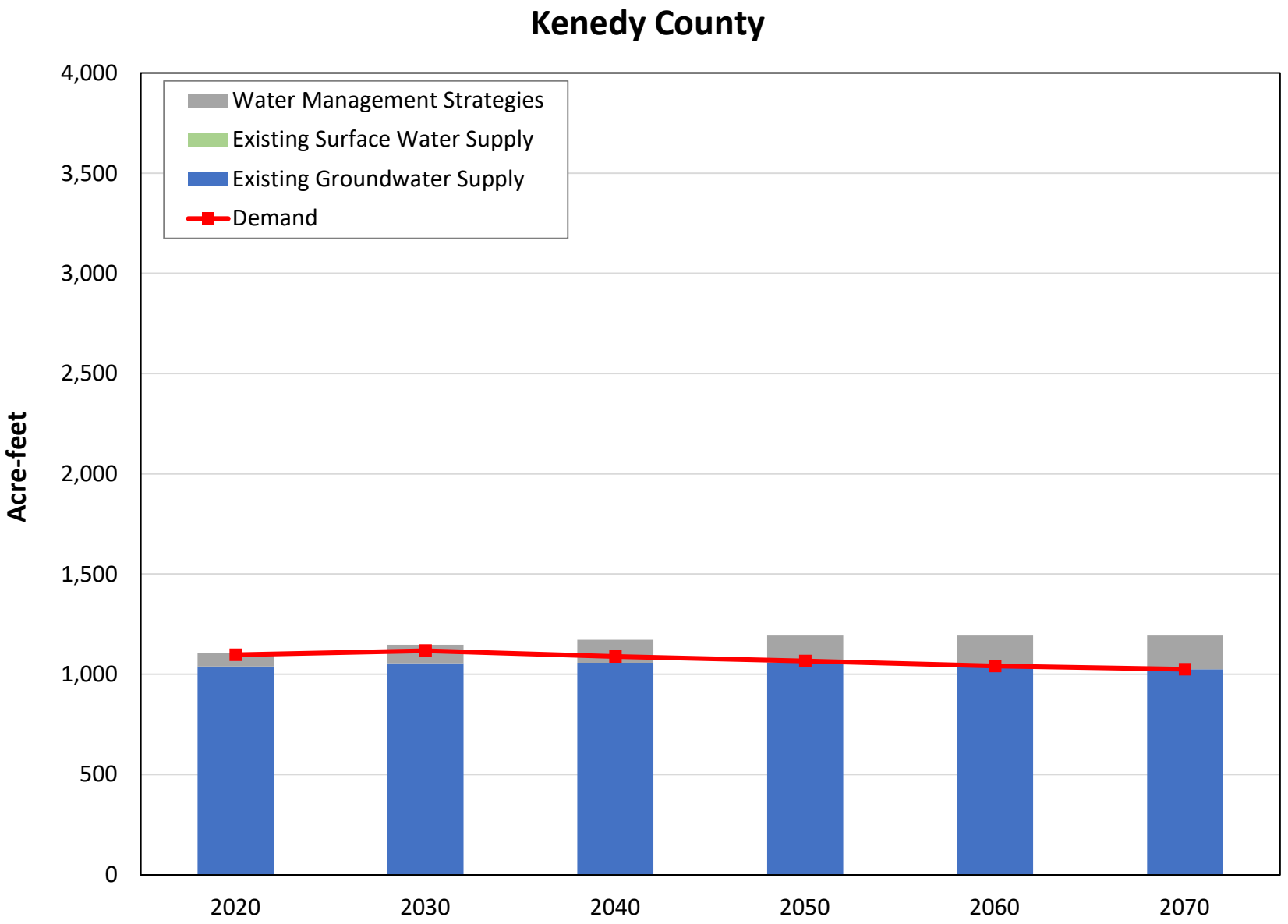
Duval County GCD



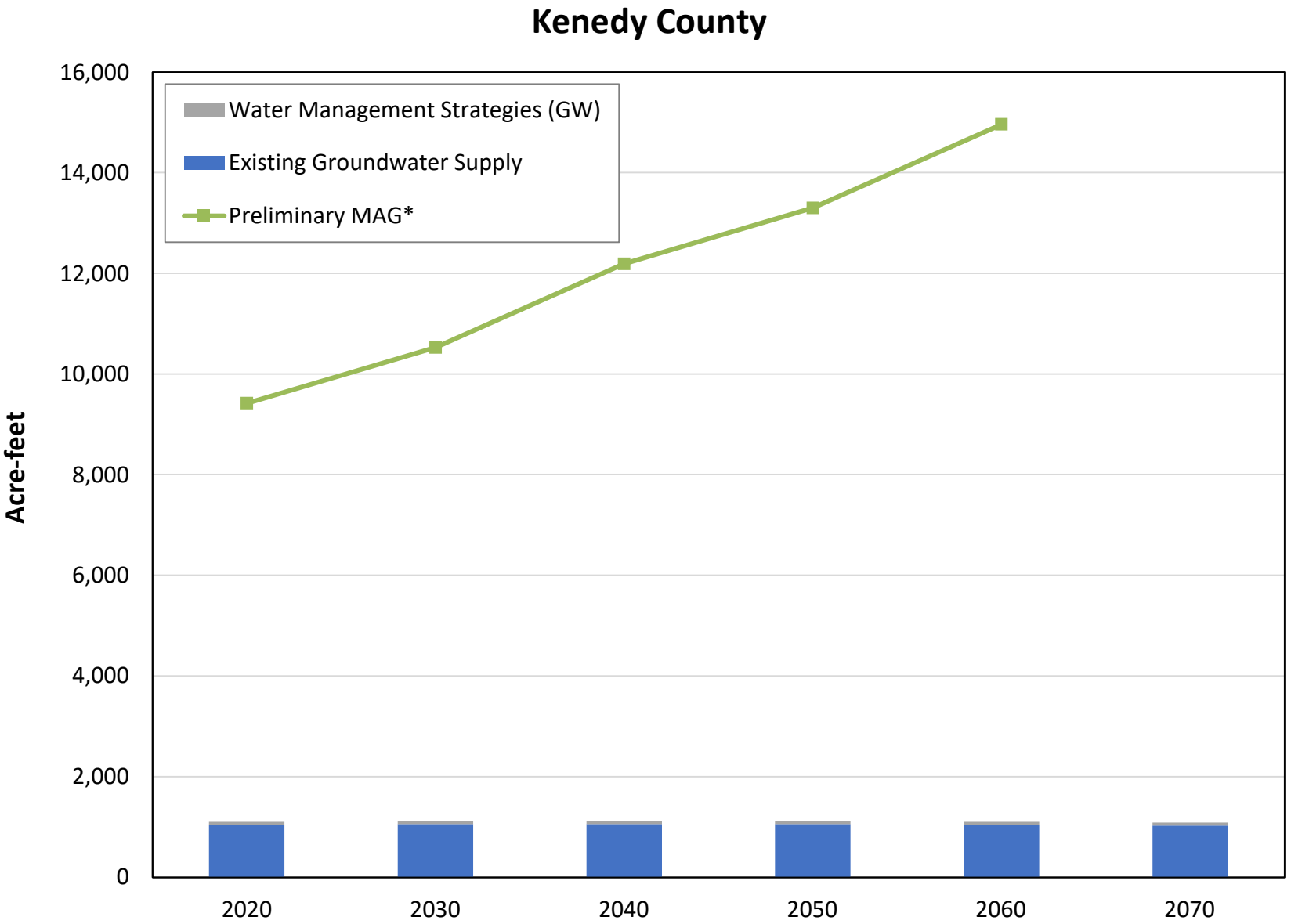
Duval County GCD



Kenedy County GCD

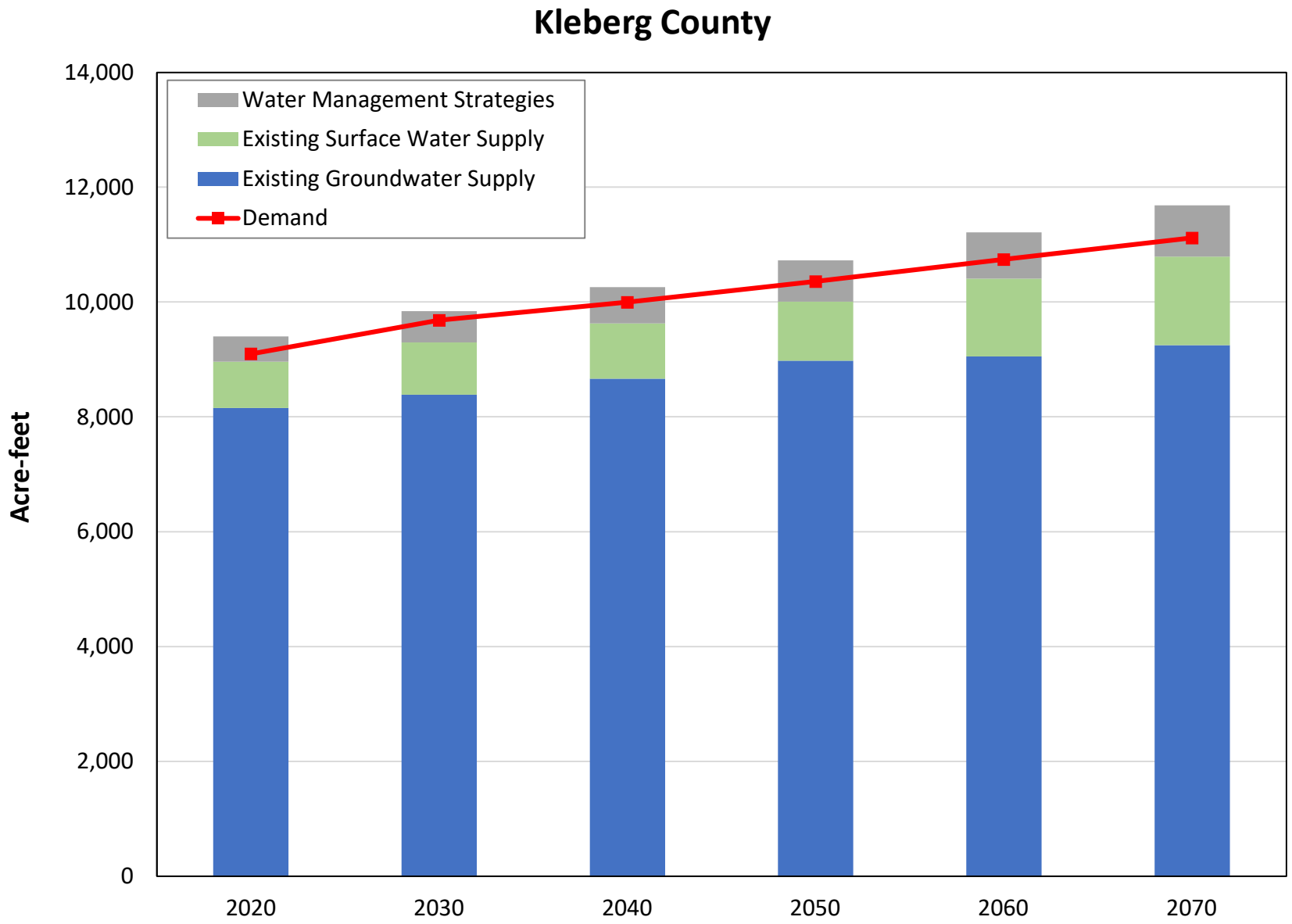


Kenedy County GCD

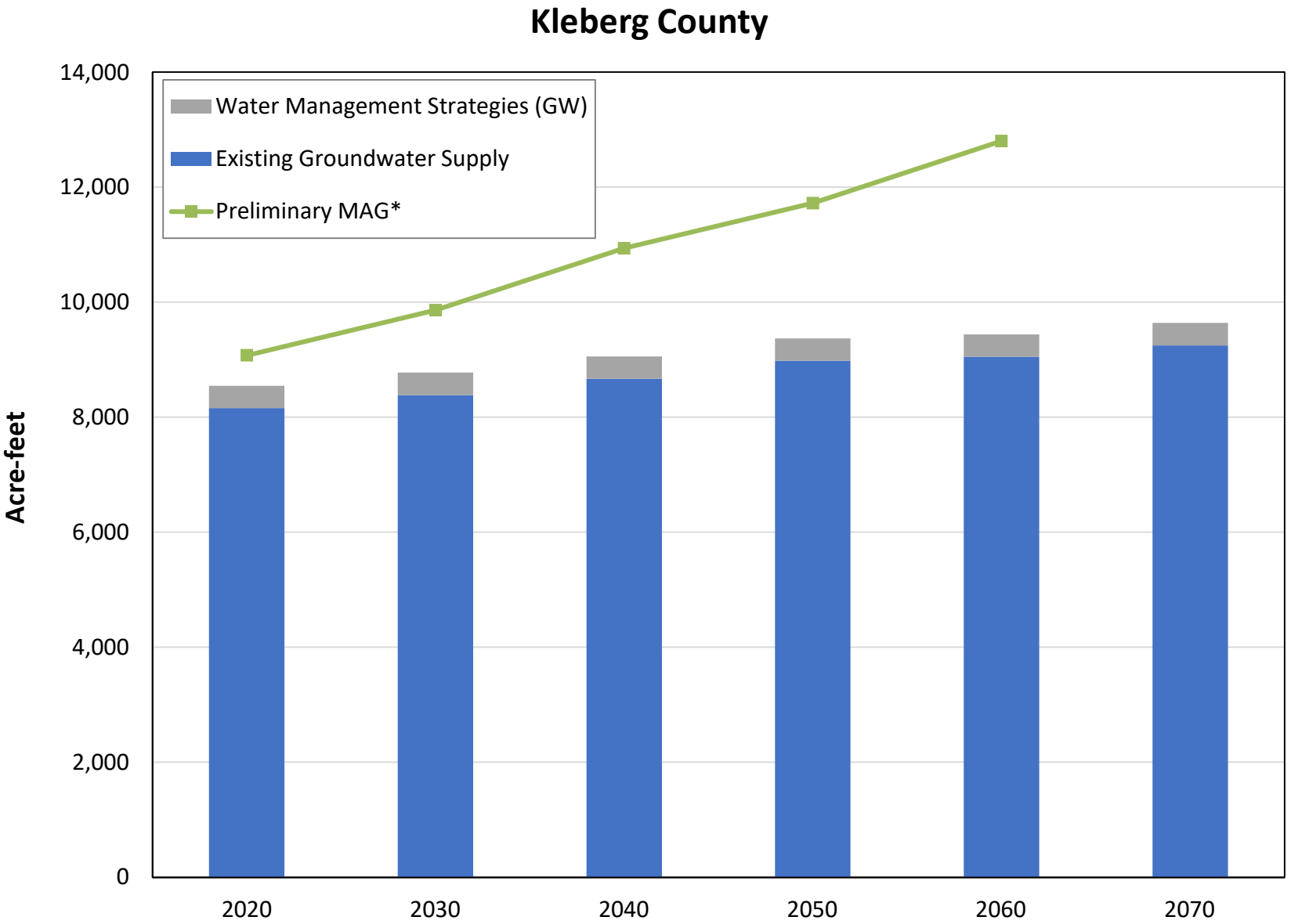


*estimated pumping by county

Kenedy County GCD

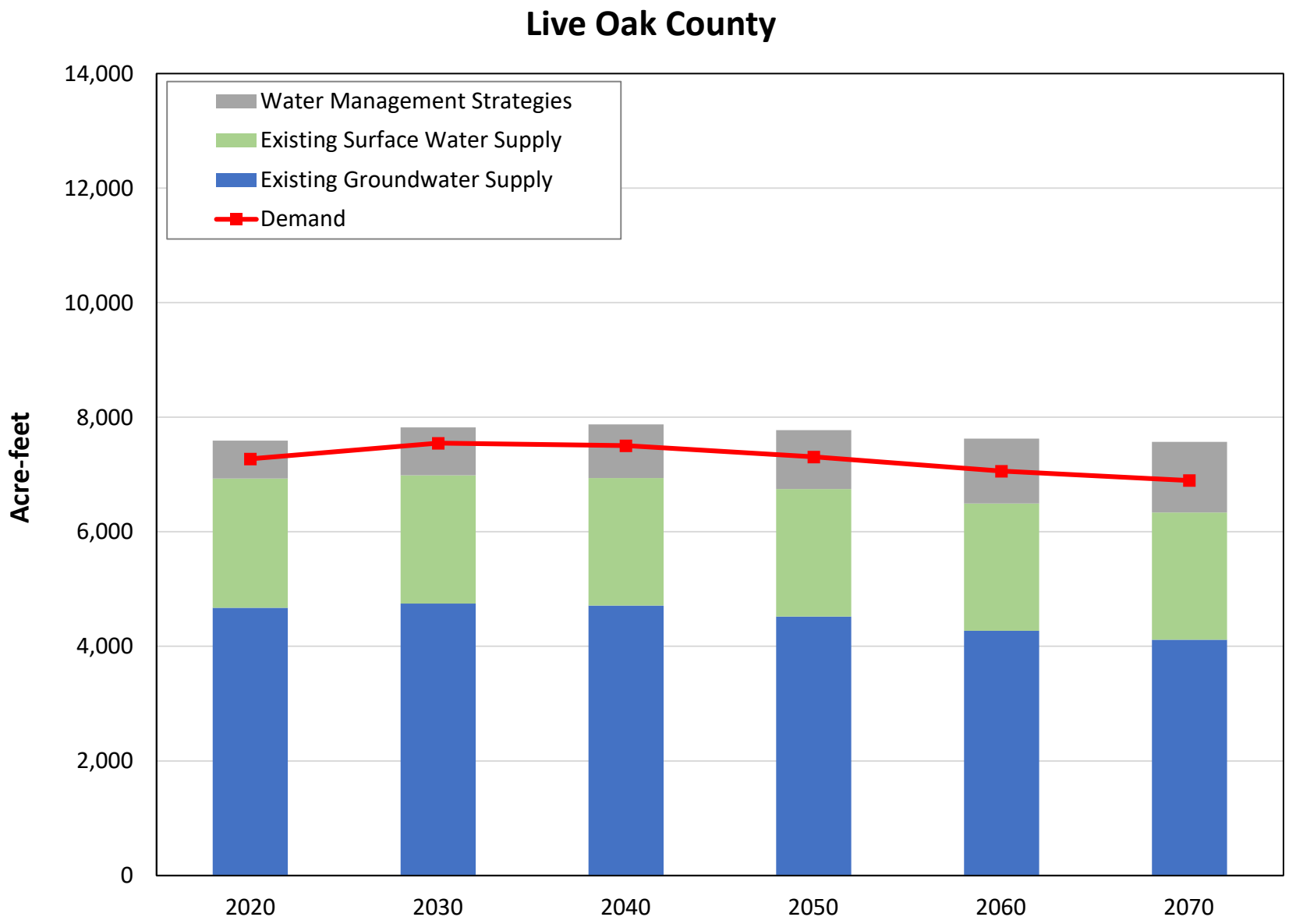


Kenedy County GCD

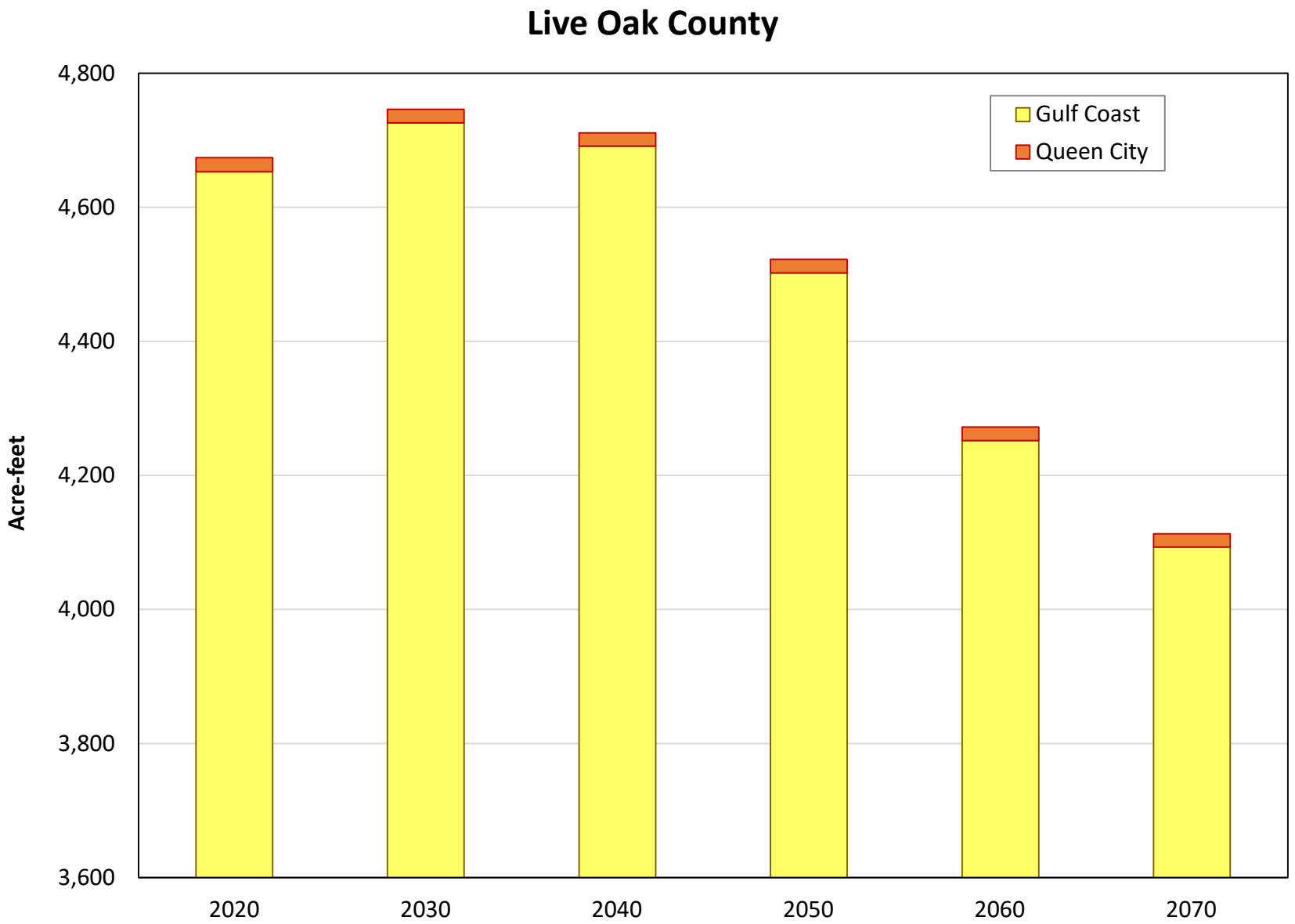


*estimated pumping by county

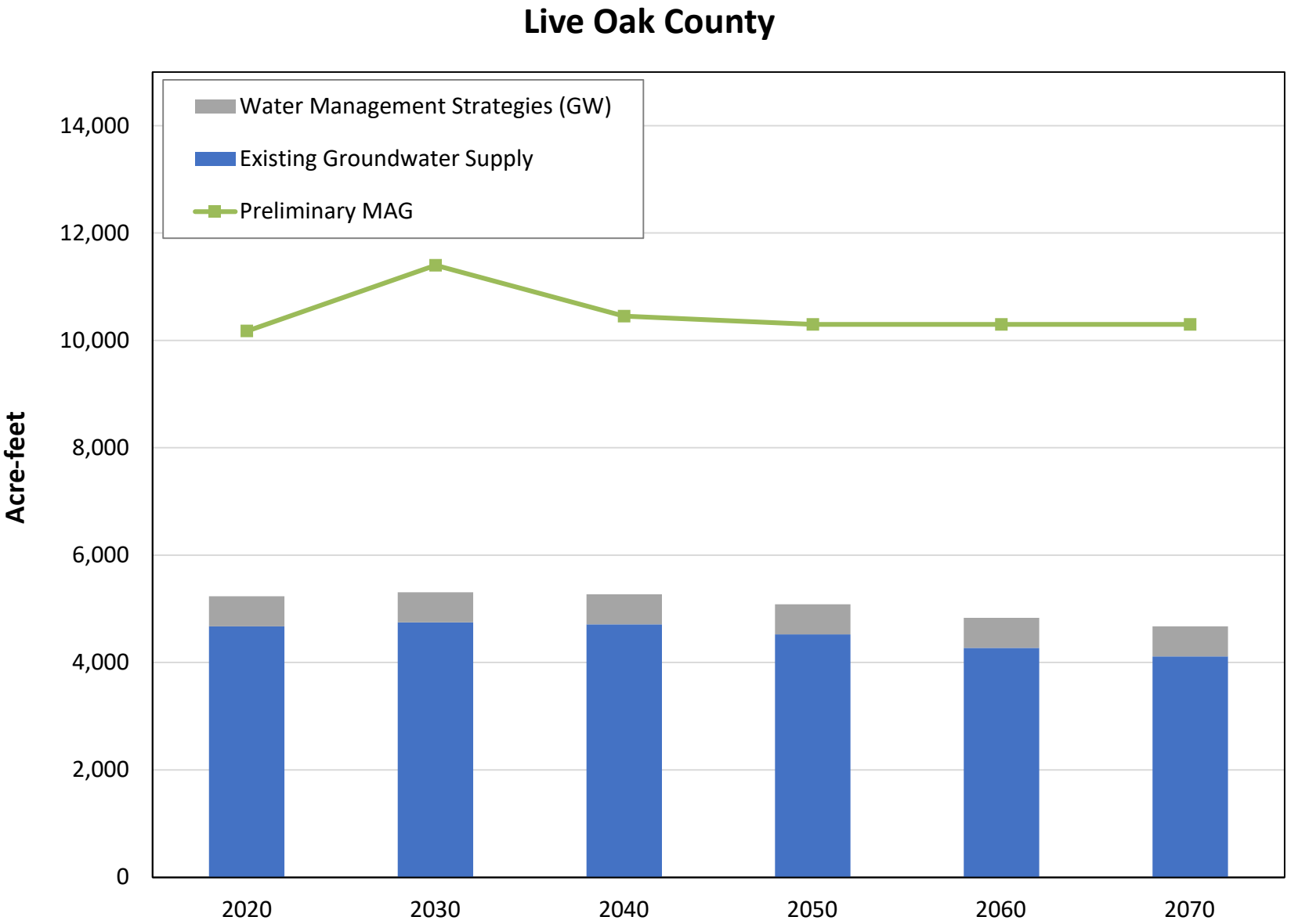
Live Oak GCD


Live Oak County
Water Management Strategies
Existing Surface Water Supply
Existing Groundwater Supply
Demand
Acre-feet
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2020
2030
2040
2050
2060
2070

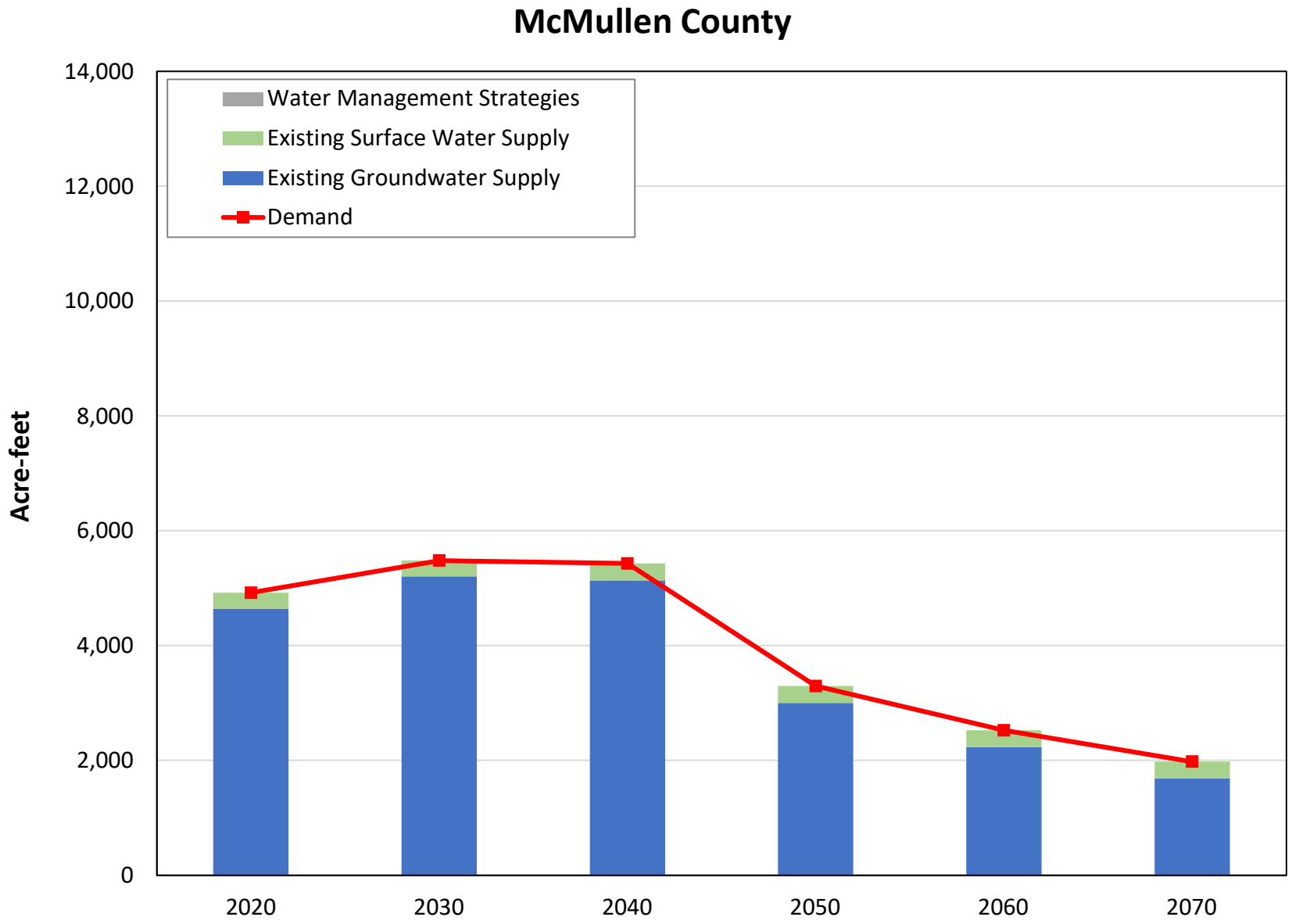
Live Oak GCD


Live Oak County
Acre-feet
4,800
4,600
4,400
4,200
4,000
3,800
3,600
Gulf Coast
Queen City
2020
2030
2040
2050
2060
2070

Live Oak GCD


Live Oak County
Water Management Strategies (GW)
Existing Groundwater Supply
Preliminary MAG
Acre-feet
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2020
2030
2040
2050
2060
2070

McMullen GCD



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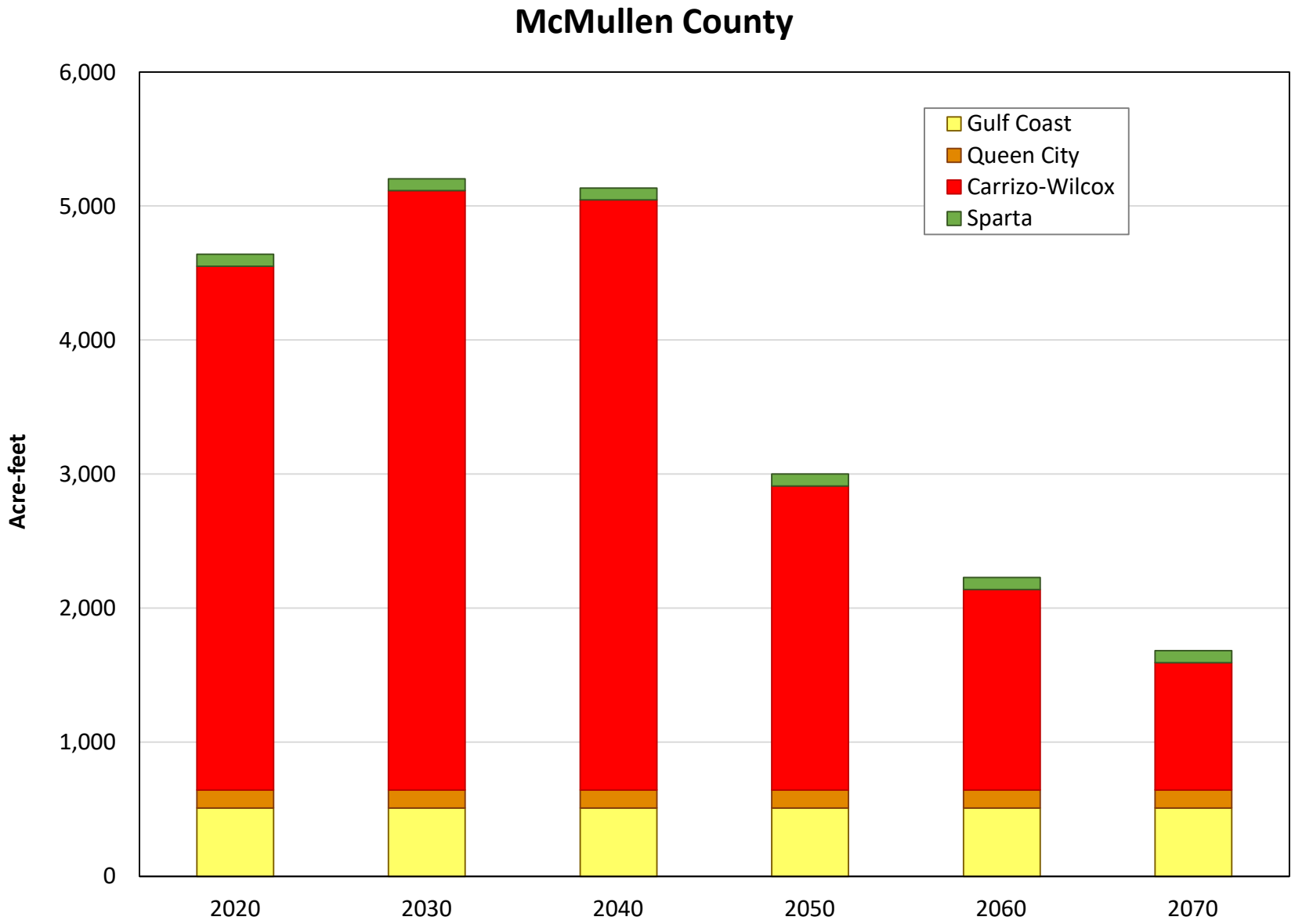
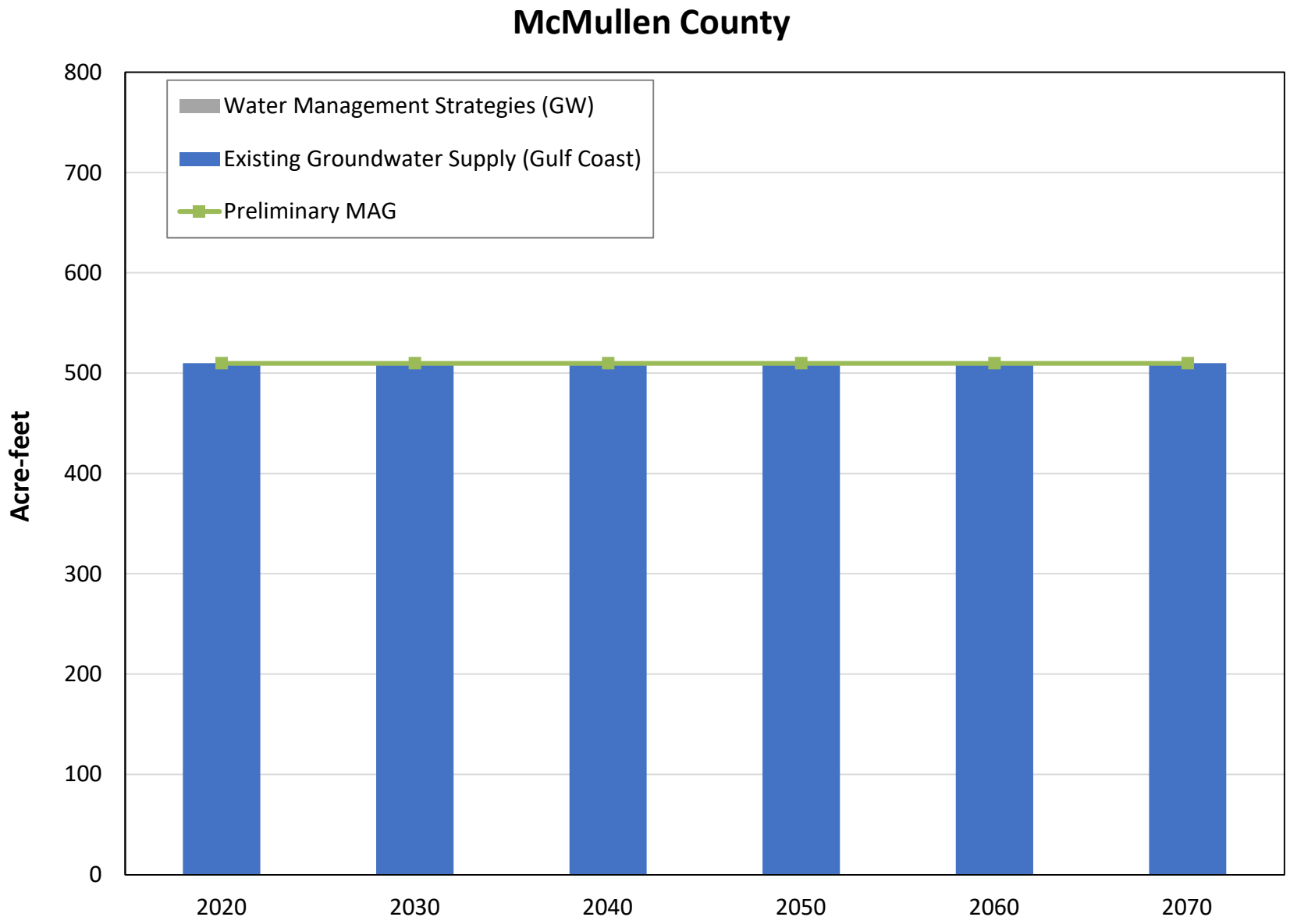


McMullen GCD



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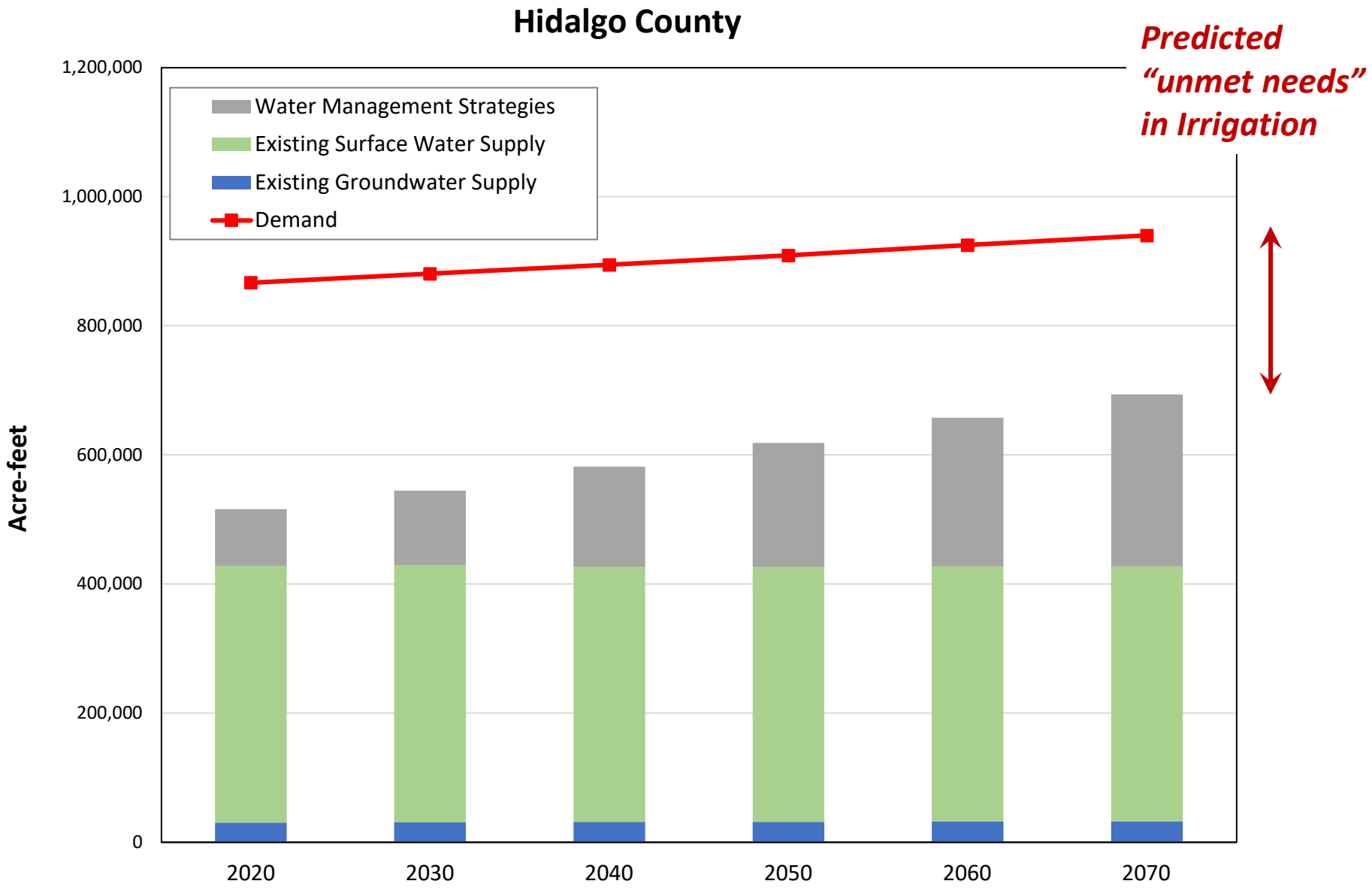

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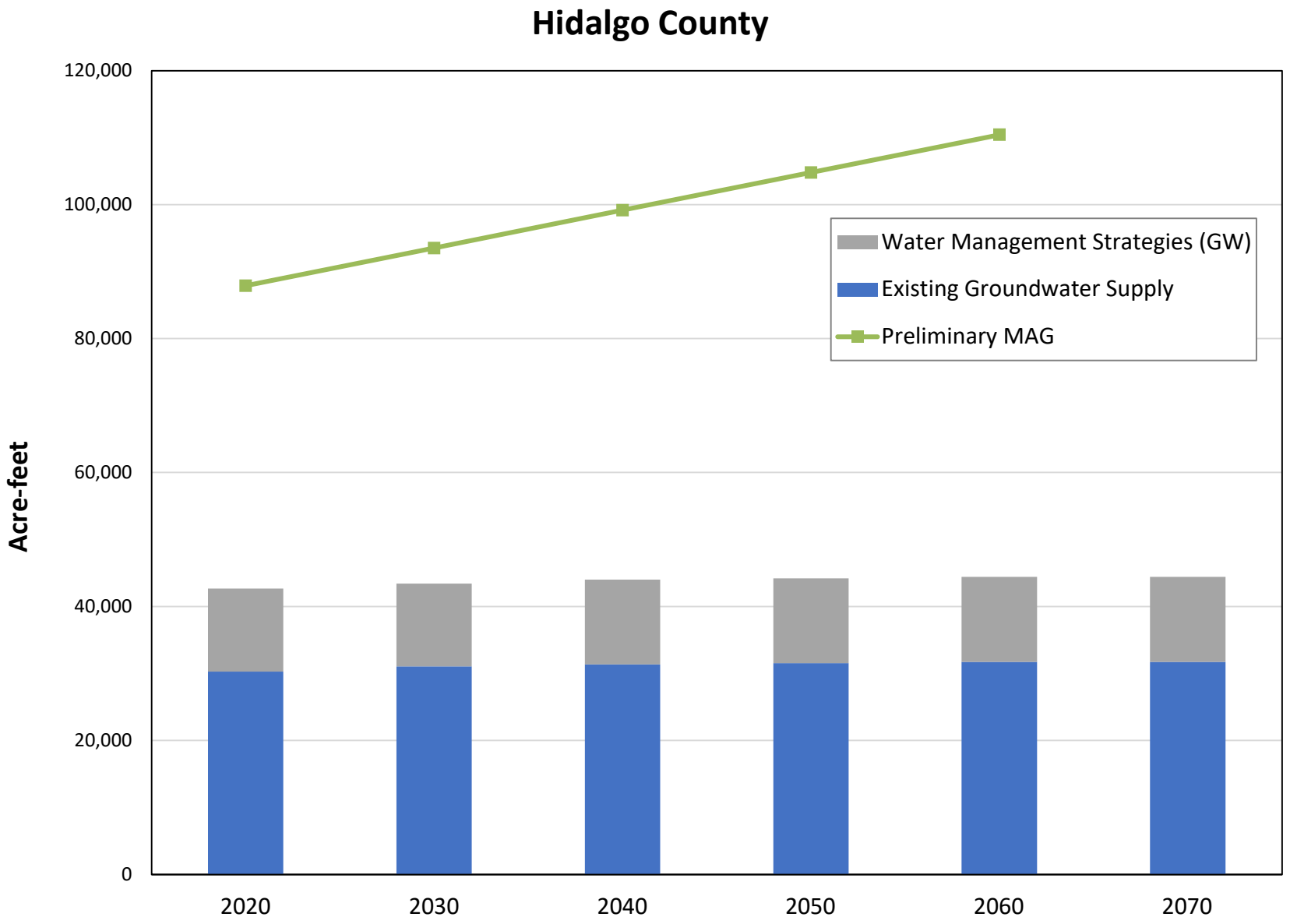

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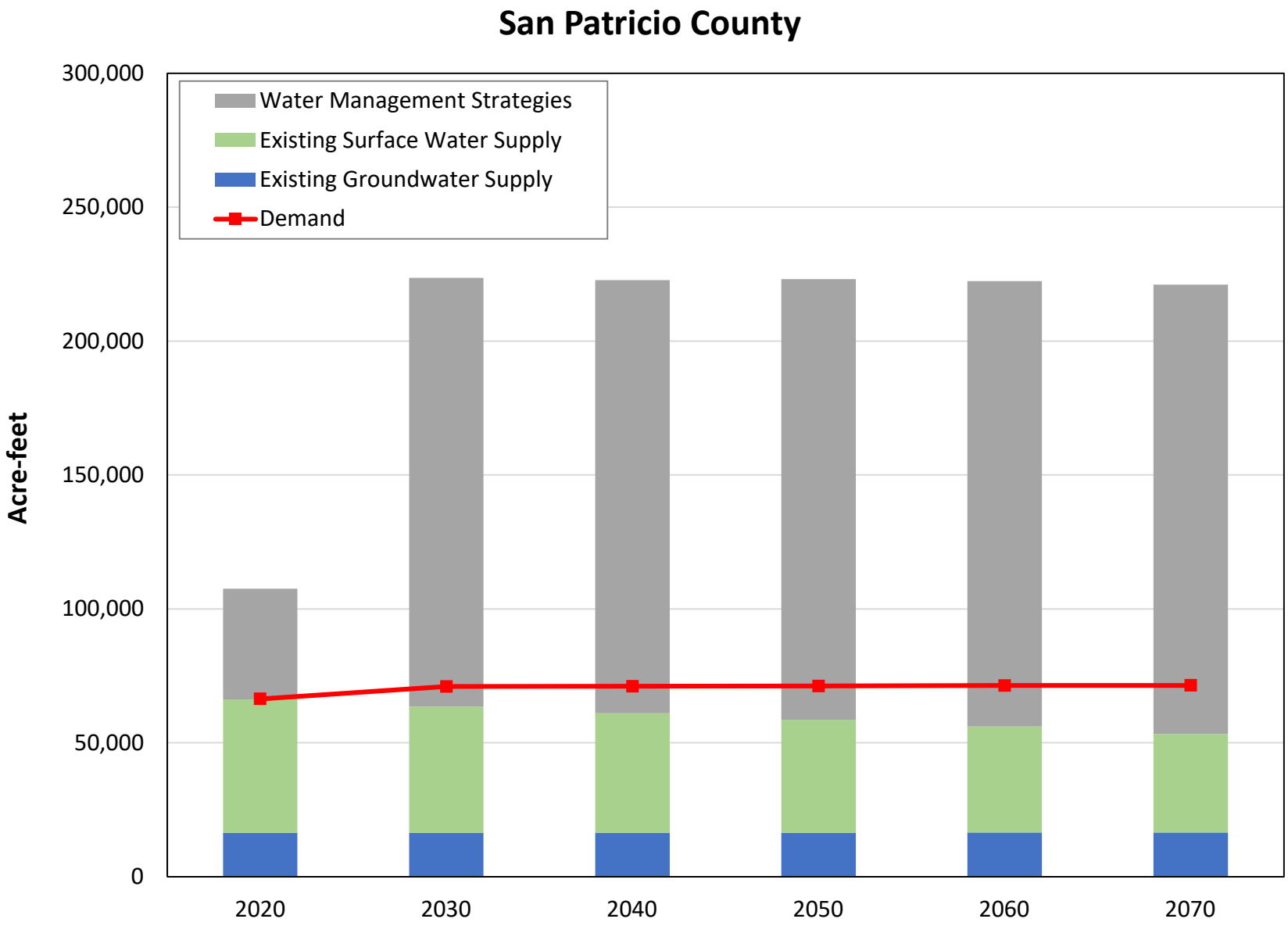

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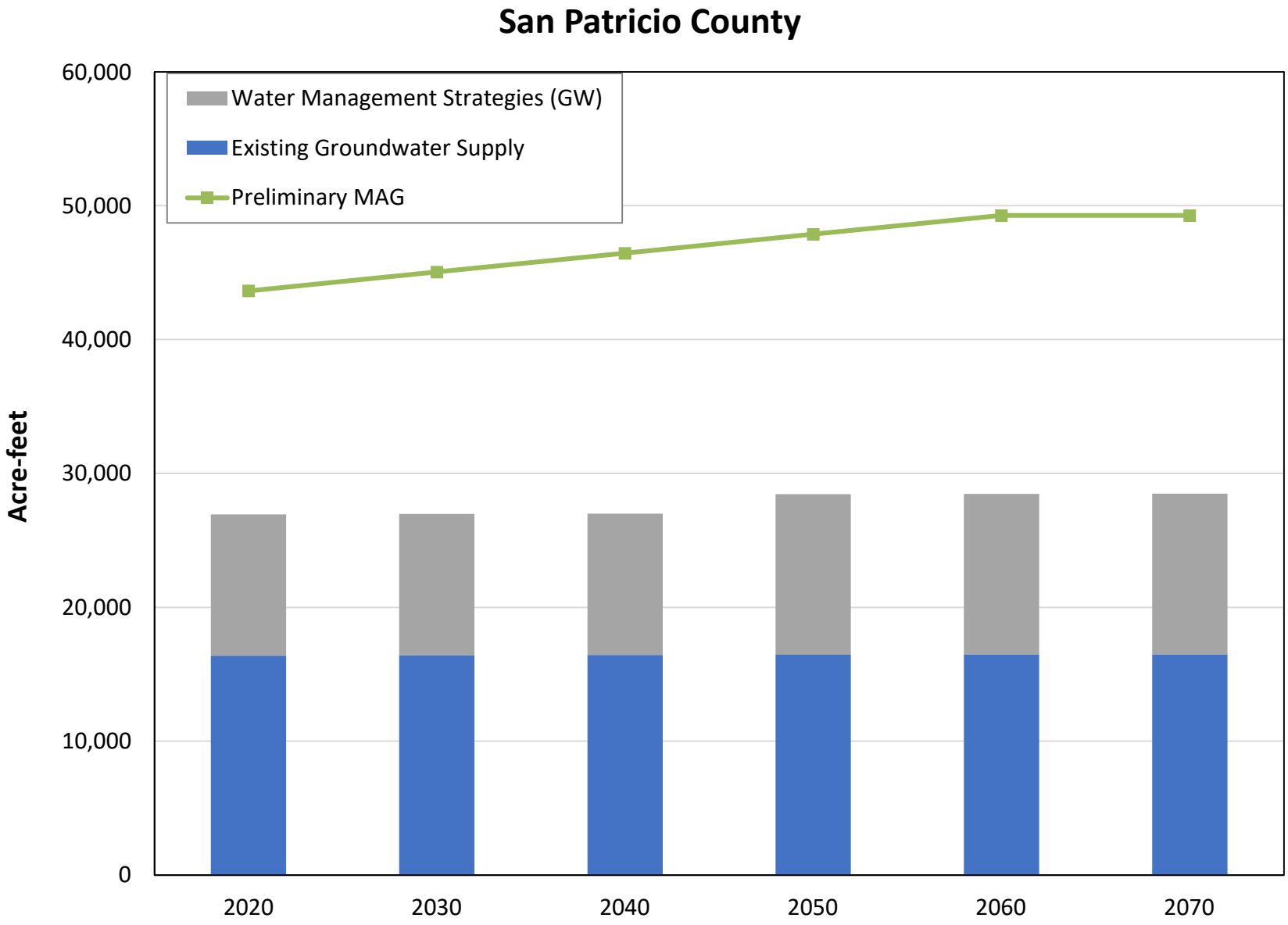

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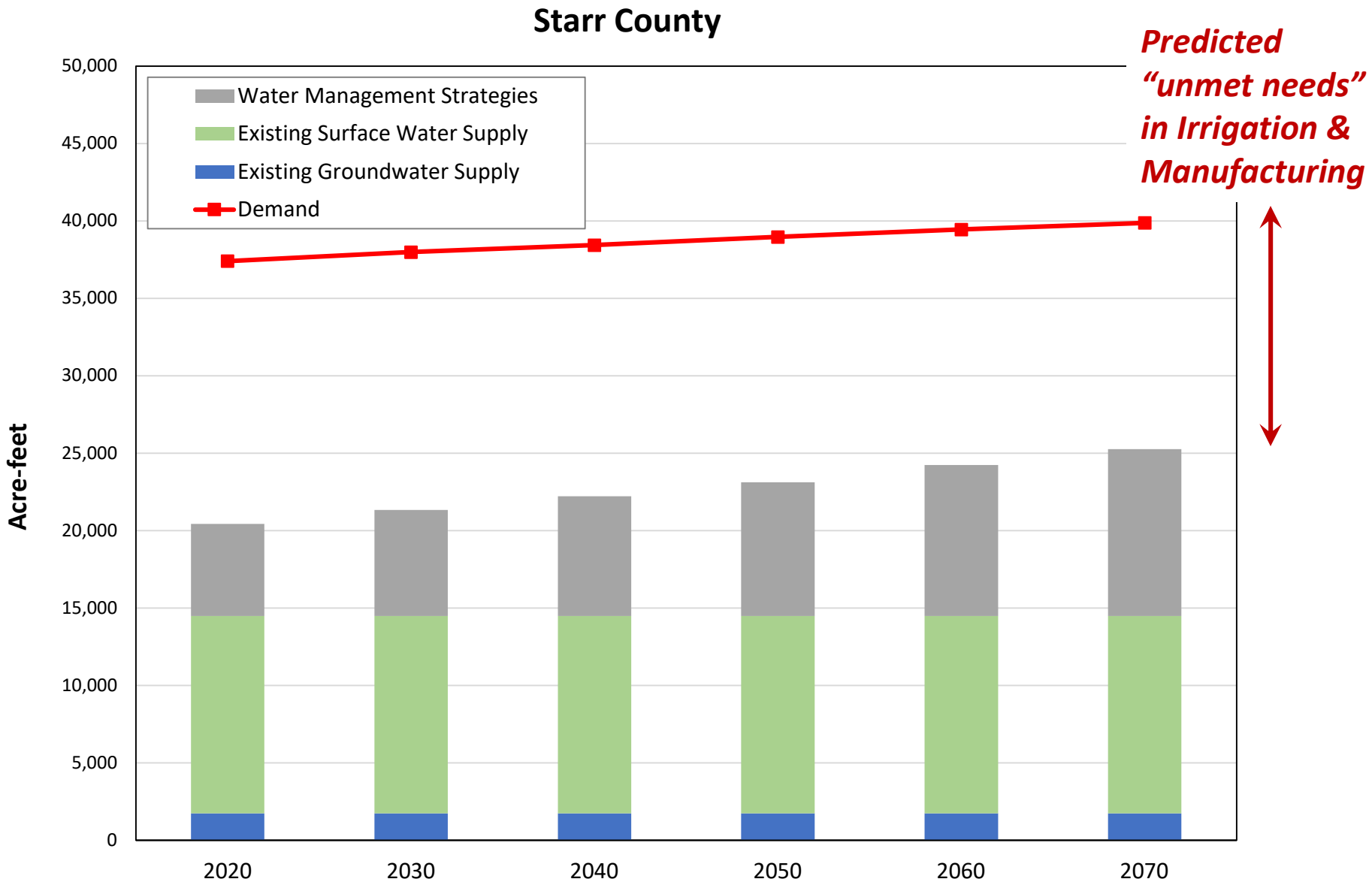

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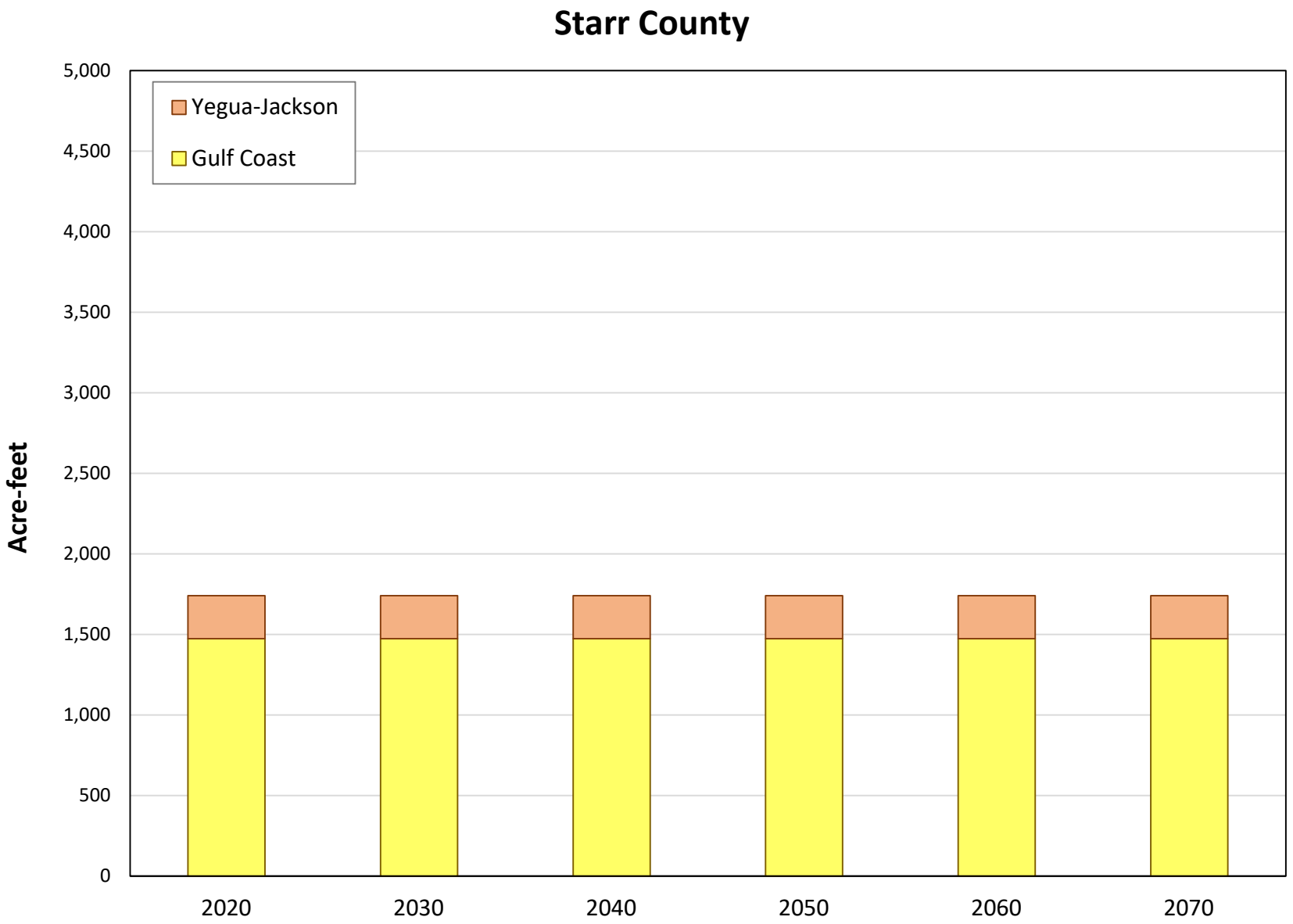

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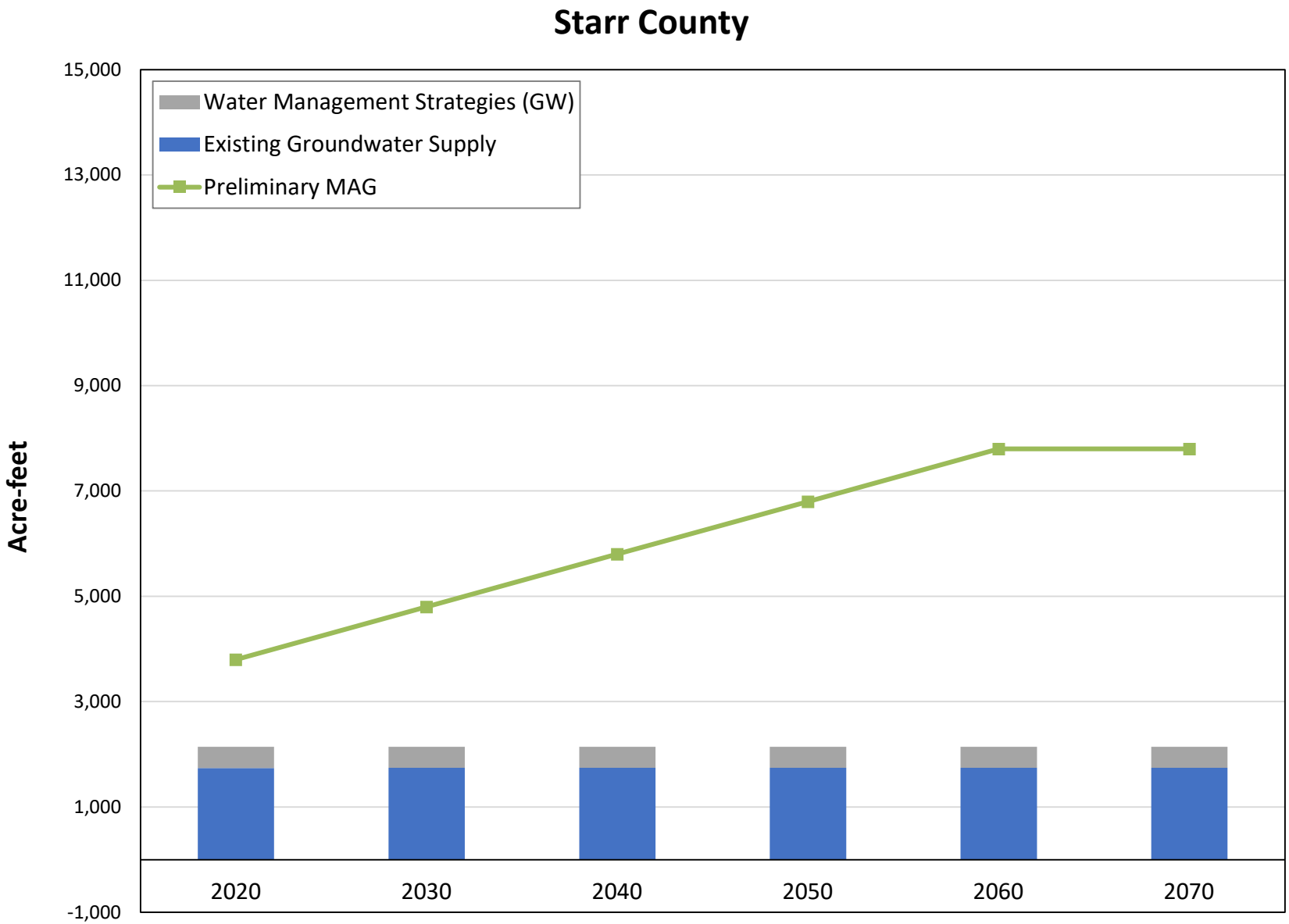

Explanatory Report

DFC Explanatory Report for Groundwater Management Area 16

5.2 Water Supply Needs and Water Management Strategies

The GCDs of GMA 16 considered the following information regarding water supply needs and water management strategies in developing a DFC:

- Data from the 2012 State Water Plan on;
- Identified groundwater sources
- Identified needs
- Water management strategies using a groundwater source
- Modeled Available Groundwater Report; GAM Run 10-047 (Hassan and Jigmond, 2011)
- A tabular summary of the range of future pumping estimates used in developing the proposed DFC

The Rio Grande Valley is expected to have a significant increase in growth and water demands over the next 50 years. The GMA 16 counties in Region N are also expected to grow, although the rate of growth will not be as great as in the Rio Grande Valley (Table 1). A significant part of anticipated new water supplies for portions of these planning regions are expected to be met by increased groundwater production. The Gulf Coast Aquifer is the primary groundwater supply source for these regions. Much of the groundwater in this region is brackish, and may need to be treated to drinking water standards if intended for drinking water supply.

The information on water supply needs and water management strategies considered by the GCDs of GMA 16 are included in Appendix E. Also included in Appendix E is the Modeled Available Groundwater Report (Wade, 2012) that was developed by TWDB associated with the previously developed DFC adopted in 2011. These data were presented to the GMA 16 Board and discussed in the public meeting on March 25, 2014. Revisions to proposed pumping scenarios in light of developing water management strategies discussed by the Board represented a large part of the public meetings conducted from March 5, 2013, through June 23, 2014. Details regarding these alternative pumping scenarios are presented in the technical memos included in Appendix C.

- Explanatory report will briefly summarize this presentation & provide a copy as appendix
- Any District can provide INTERA with more District-specific information or details regarding this topic, if they feel it is necessary
- Deadline for addl District-specific information: next GMA meeting

← Previous report (O'Rourke, 2017) will be used as template

Questions?

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