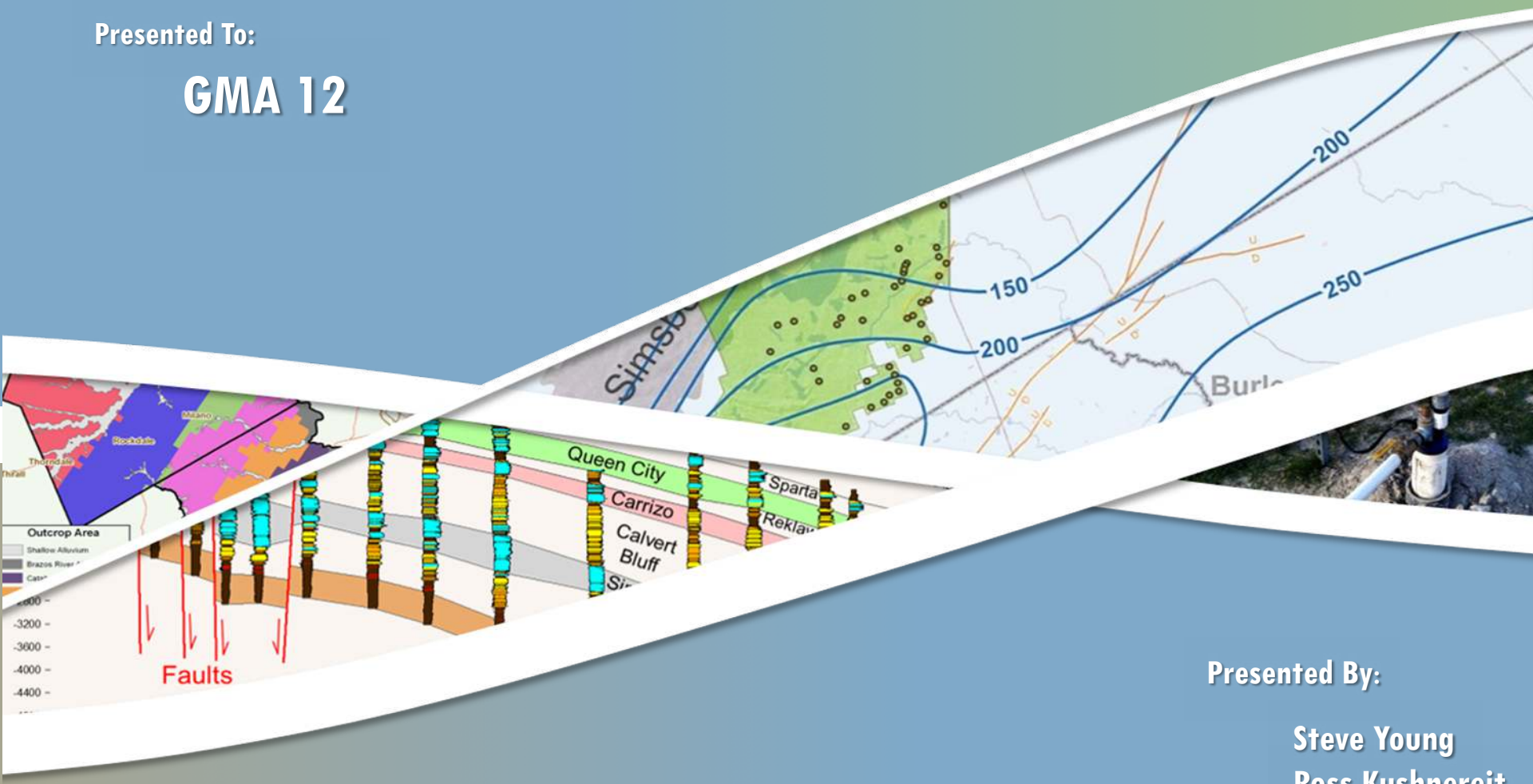
Review of DFCs and MAGs – Brazos River Alluvium

Presented To:

GMA 12



Presented By:

Steve Young
Ross Kushnereit

May 30, 2019

Agenda

- Brazos River Alluvium Properties
- Review MAGs and DFCs
- Discuss Process of Developing MAGs
- Review BRAA Properties
- Discuss options for GMA 12 for adopting DFC(s)
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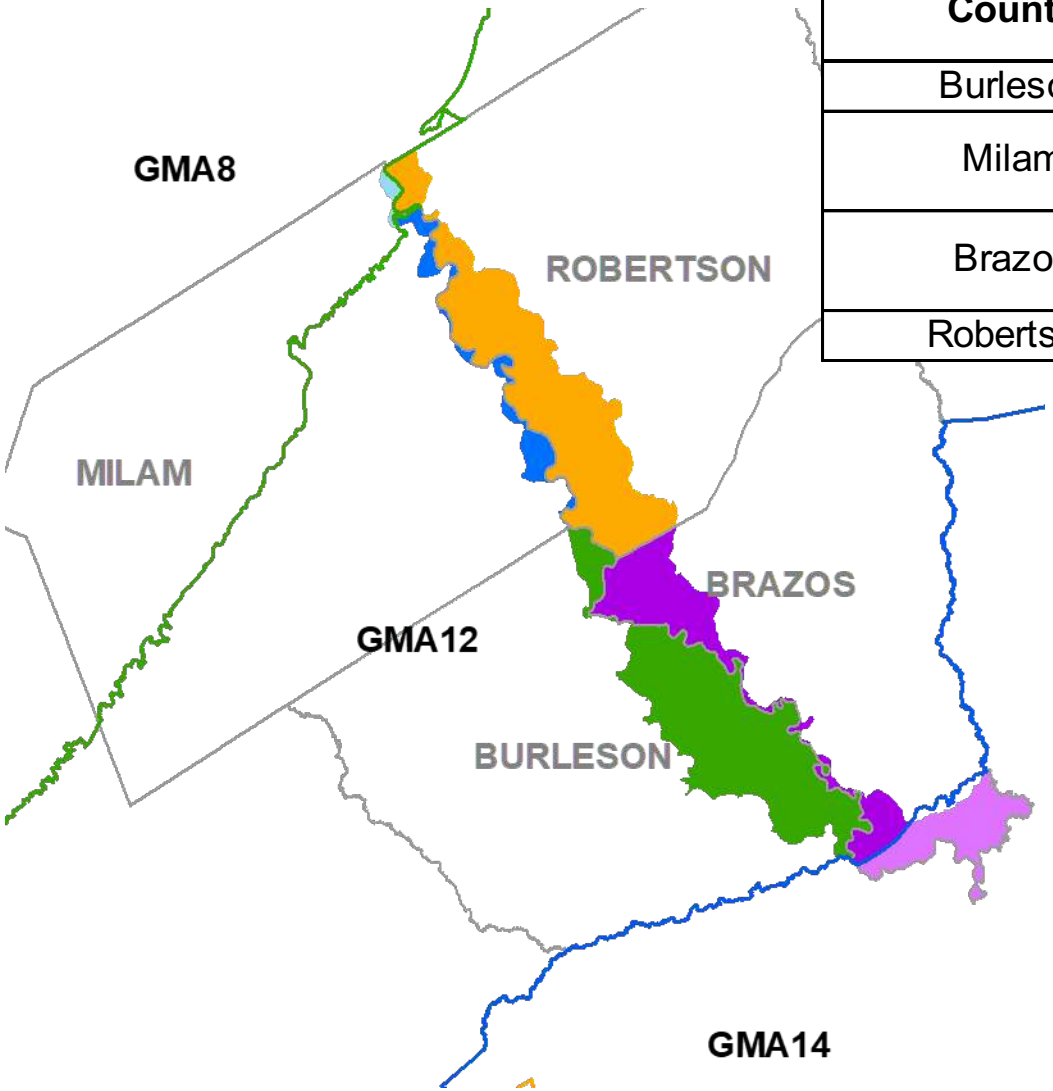
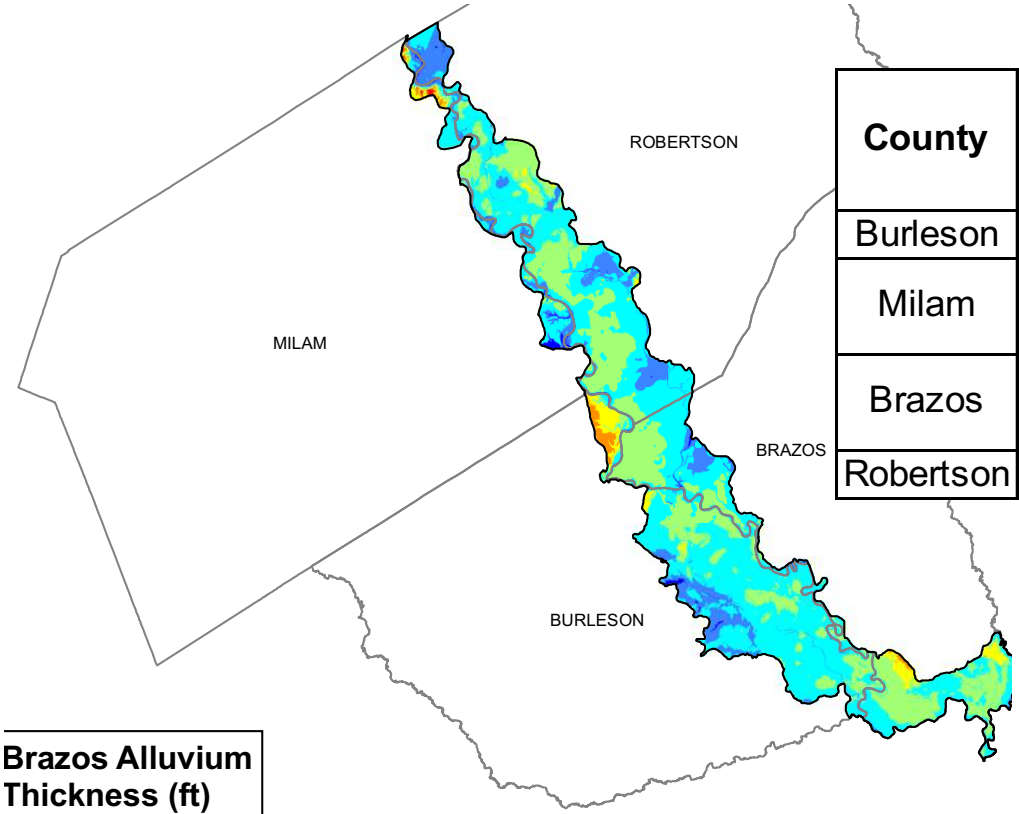
Brazos River Alluvium: Areal Extent



County	GMA	Area (sq. miles)	
		GMA	Total
Burleson	12	130	130
Milam	8	3	22
	12	19	
Brazos	12	61	97
	14	36	
Robertson	12	132	132

Brazos River Alluvium: Thickness



County	GMA	Average Thickness		Maximum Thickness
		GMA Area	Total Area	GMA
Burleson	12	55	55	113
Milam	8	55	51	129
	12	49		147
Brazos	12	58	58	125
	14	59		119
Robertson	12	54	54	104

Brazos Alluvium Thickness (ft)

- 0 - 20
- 21 - 40
- 41 - 60
- 61 - 80
- 81 - 100
- 101 - 120
- 121 - 160

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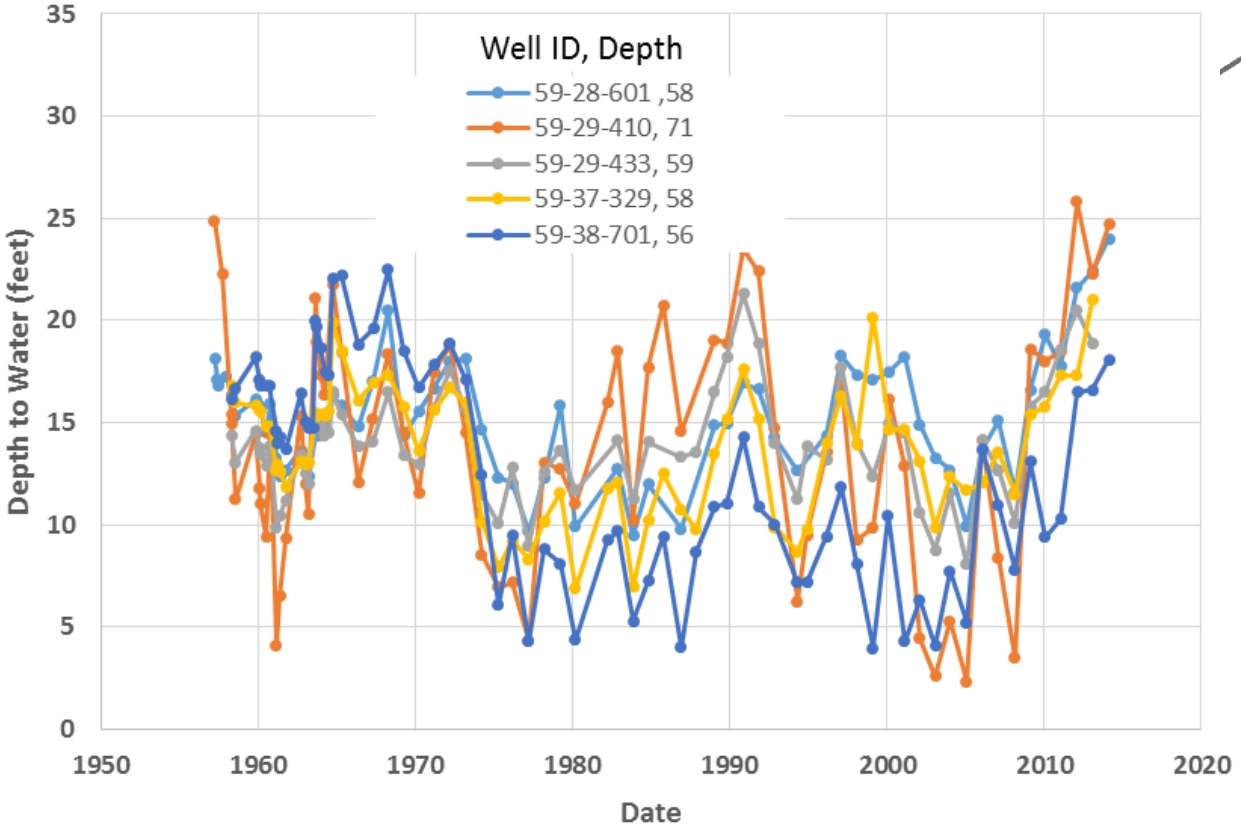
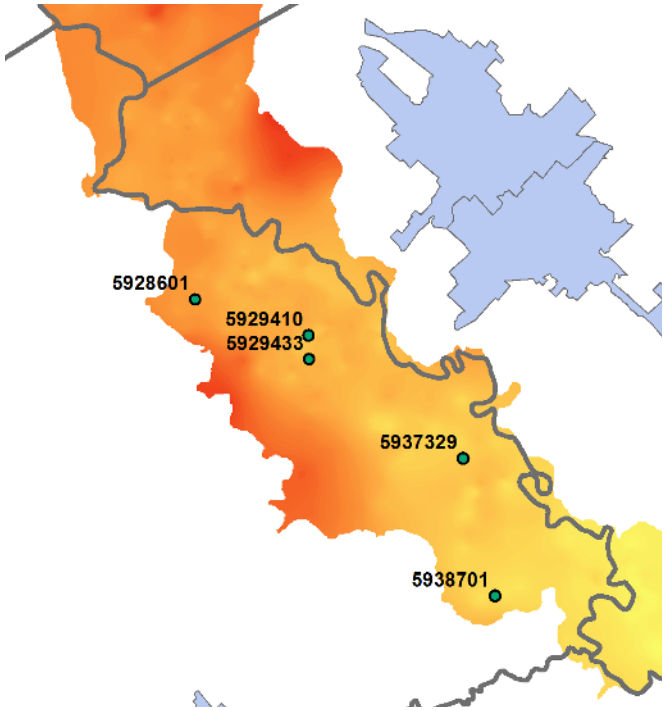
0 5 10 20 Miles

Note: Thickness = ground surface – base of aquifer (from Shah and Houston, 2007)

Brazos River Alluvium Water Level Data: Burleson County





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Brazos River Alluvium DFCs

Groundwater Conservation District	County	Desired Future Condition
Brazos Valley	Brazos and Robertson	North of State Highway 21: Percent saturation shall average at least 30 percent of total well depth. South of State Highway 21: Percent Saturation shall average at least 40 percent of total well depth.
Post Oak Savannah	Burleson	A decrease in 6 feet in the average saturated thickness over the period from 2010 to 2070.
Post Oak Savannah	Milam	A decrease in 5 feet in average saturated thickness over the period from 2010 to 2070.

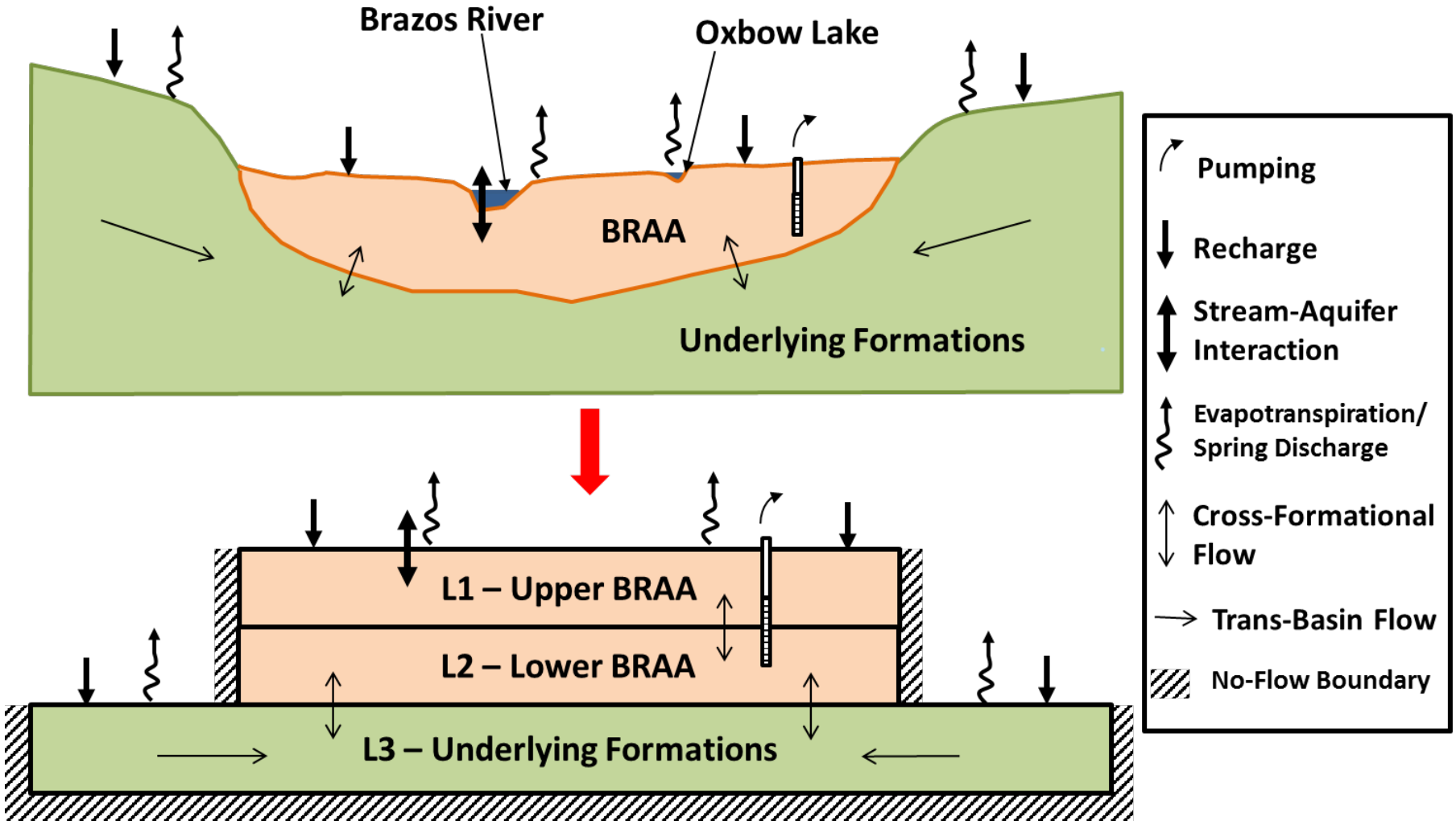
Brazos River Alluvium MAGs (AFY)

- TWDB GAM RUN 17-030 MAG (AFY) Report (TWDB, 2017)

County	RWPA	River Basin	Aquifer	2020	2030	2040	2050	2060	2070
Brazos	G	Brazos	Brazos River Alluvium	81,581	80,311	80,081	79,976	79,913	79,872
Burleson	G	Brazos	Brazos River Alluvium	28,472	28,418	28,414	28,414	28,414	28,413
Falls	G	Brazos	Brazos River Alluvium	NR	NR	NR	NR	NR	NR
Milam	G	Brazos	Brazos River Alluvium	47,818	47,785	47,779	47,775	47,773	47,771
Robertson	G	Brazos	Brazos River Alluvium	61,161	57,959	57,633	57,544	57,503	57,480
GMA 12 Total			**Brazos River Alluvium**	**219,032**	**214,473**	**213,907**	**213,709**	**213,602**	**213,536**

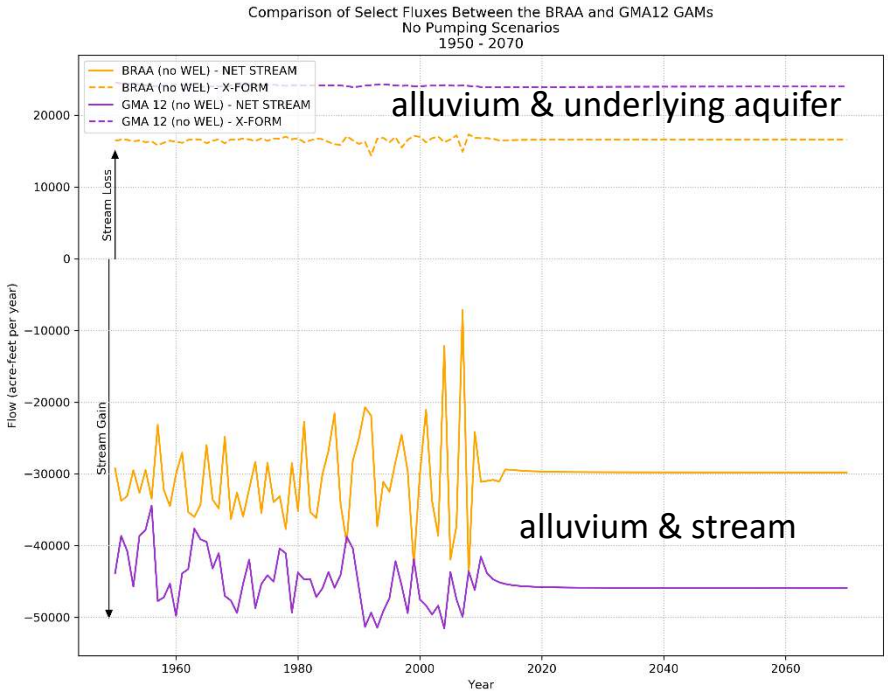
NR: Groundwater Management Area 12 declared the Brazos River Alluvium Aquifer not relevant in these areas.

Brazos River Alluvium GAM: Conceptual Model

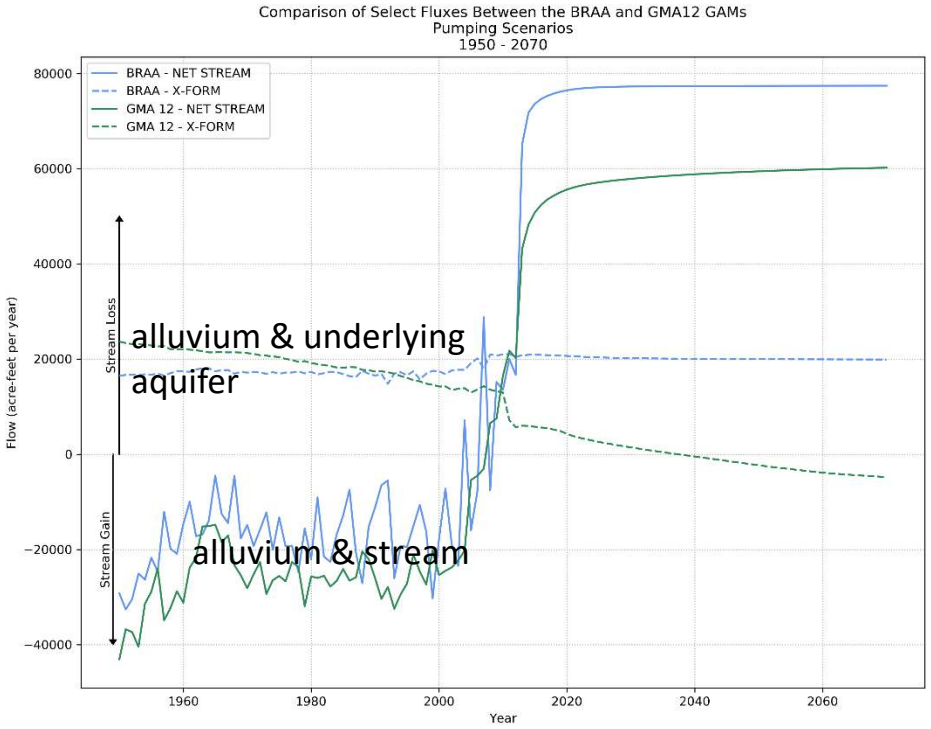


Water Budget for Brazos River for Pumping and No Pumping Conditions

No Pumping

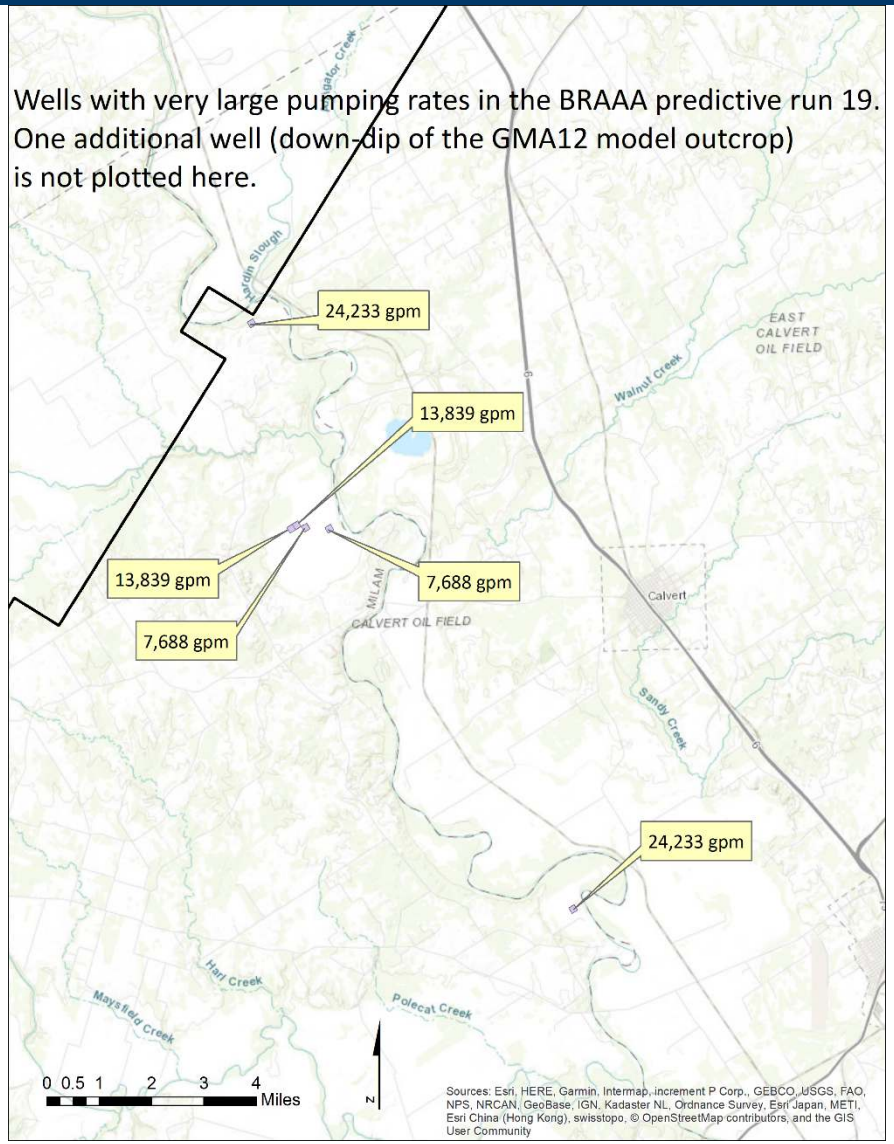


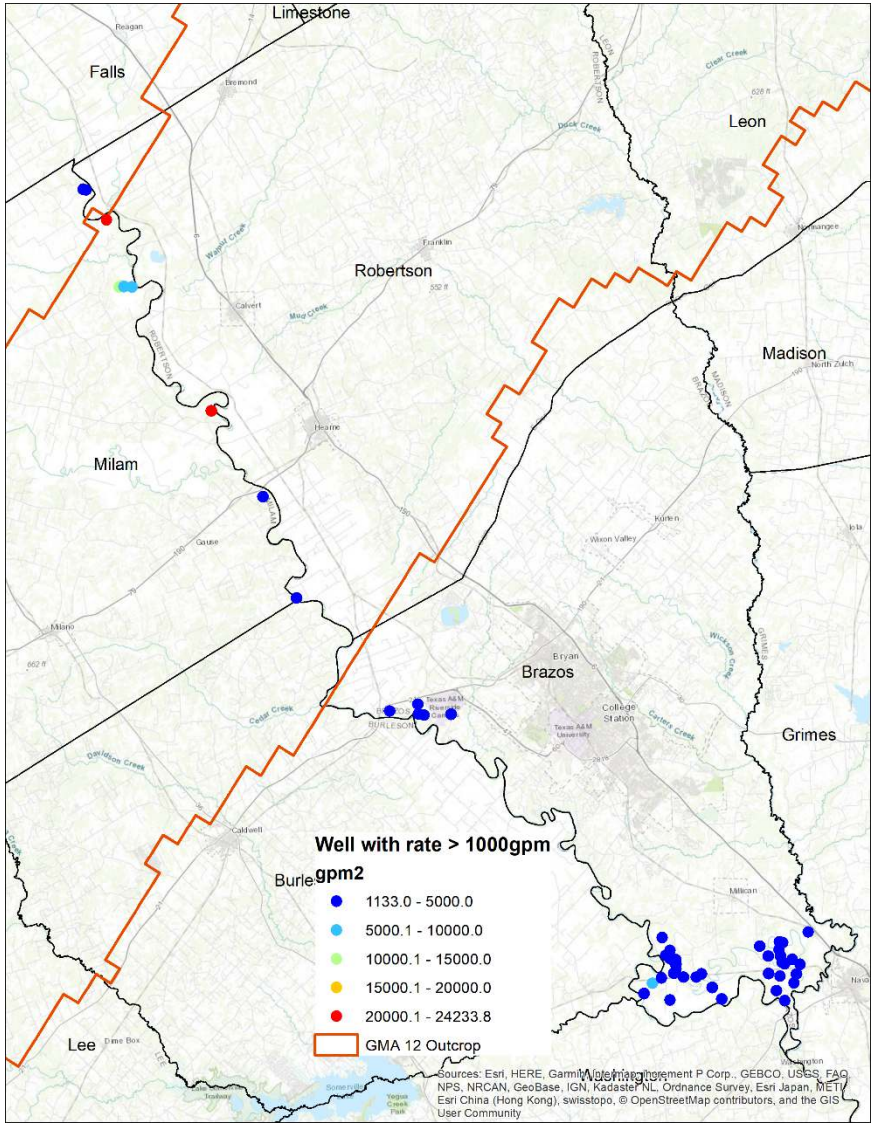
Pumping



- Under No pumping conditions, Brazos River gains about 40,000 AFY consistently
- Under pumping conditions, Brazos River gains about 20,000 AFY until year 2000
- At about 2010, Brazos becomes a losing stream. DFC runs cause stream to lose 65,000 AFY

Pumping Rates Extracted from BRAA GAM Well File





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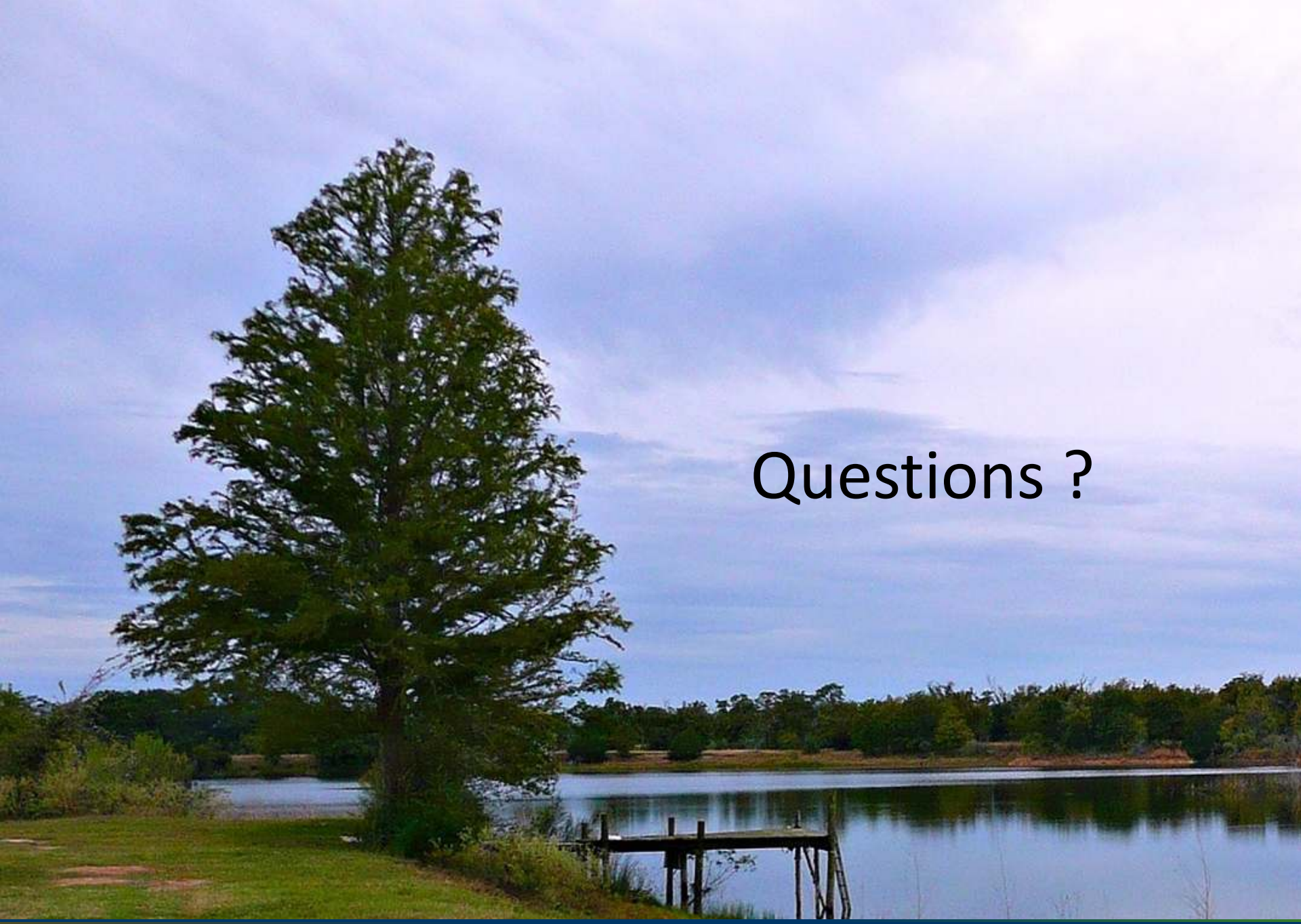
Approach for Calculating MAG from DFC

- Avoid Methodologies
  - that generate wells with large future pumping rates
  - that place wells close to the river cells representing Brazos River
  - that generate large river losses to alluvium
- Consider Methodologies
  - that allows variable recharge rates and fluctuations in underlying aquifers
  - consider water balance criteria for limiting river flow to alluvium
  - Consider restrictive area for pumping


Questions ?

Comparison of Pumping in Model Input Files and Reject Pumping in Model Output Files