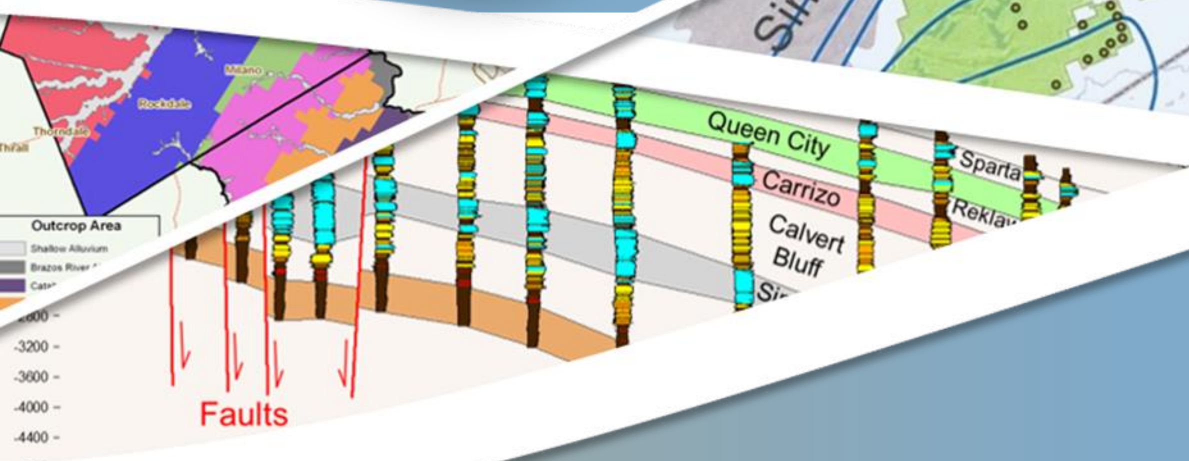
POSGCD Desired Future Committee Update

Presented To: DFC Committee



Presented By:

Steve Young

INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

December 15, 2021

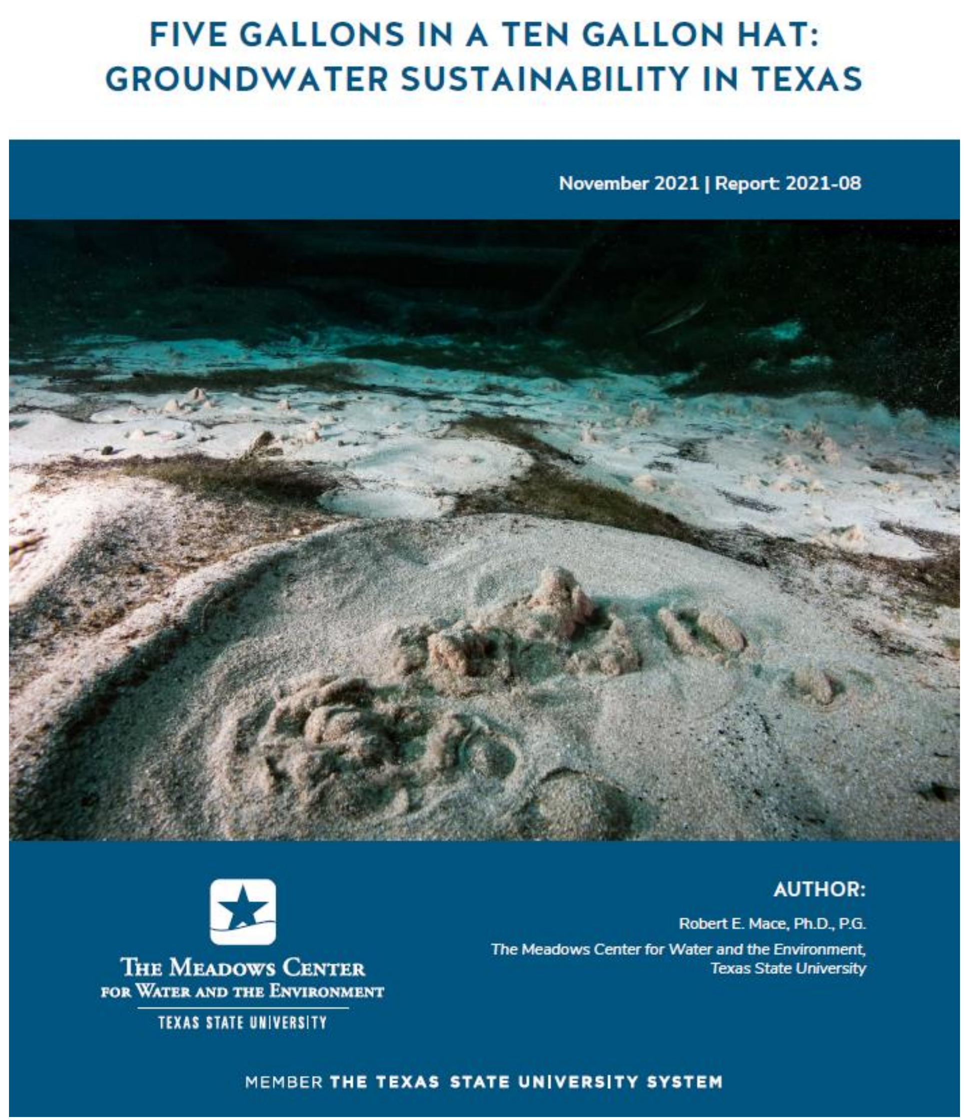
Outline

- Recent Reports on Groundwater Sustainability
- GMA 12: DFCs and Explanatory Report
- Qualifications for GWAP
- GWAP Annual Needs Assessment Draft Report
- Guidance Document 2021 Draft Report
- Monitoring Compliance Update

Recent Reports on Groundwater Sustainability

Meadows Center for the Environment

- Aquifers of Texas
- Historical Perspective of Sustainability
- Sustainability
  - Water planning
  - Groundwater management
  - Desired Future Conditions
- GWAP Annual Needs Assessment Draft Report
- Types of Factors that Could Lead to Groundwater Sustainability
- Recommendations

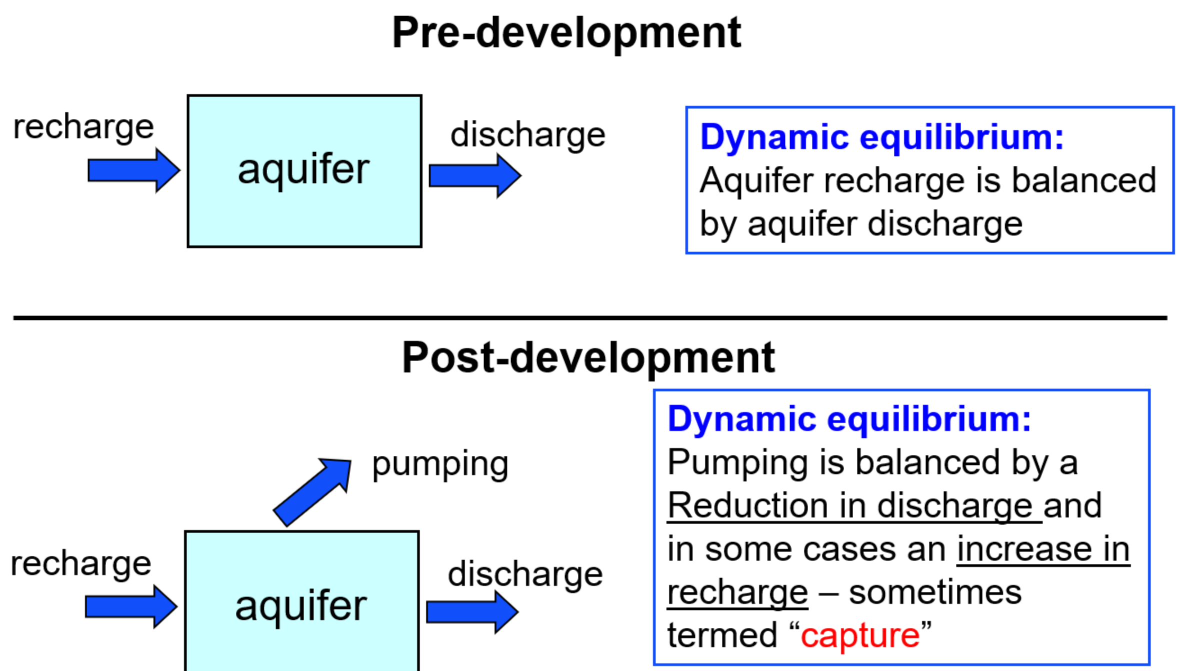


Sustainable Production

Sustainable production or the words sustainable or sustainably outside of the above contexts refers to any action that can be performed indefinitely. Sustainable yield and maximum sustainable production are special cases of sustainable production.

Maximum sustainable production is the maximum amount of groundwater that can be produced sustainably.

Aquifer Dynamics (Effects of Pumping)



After Alley et al, (1999) and Bredehoeft (2002)

Recharge Myth

"Sustainable ground-water developments have almost nothing to do with recharge ……Capture from natural discharge is usually what determines the size of a sustainable development

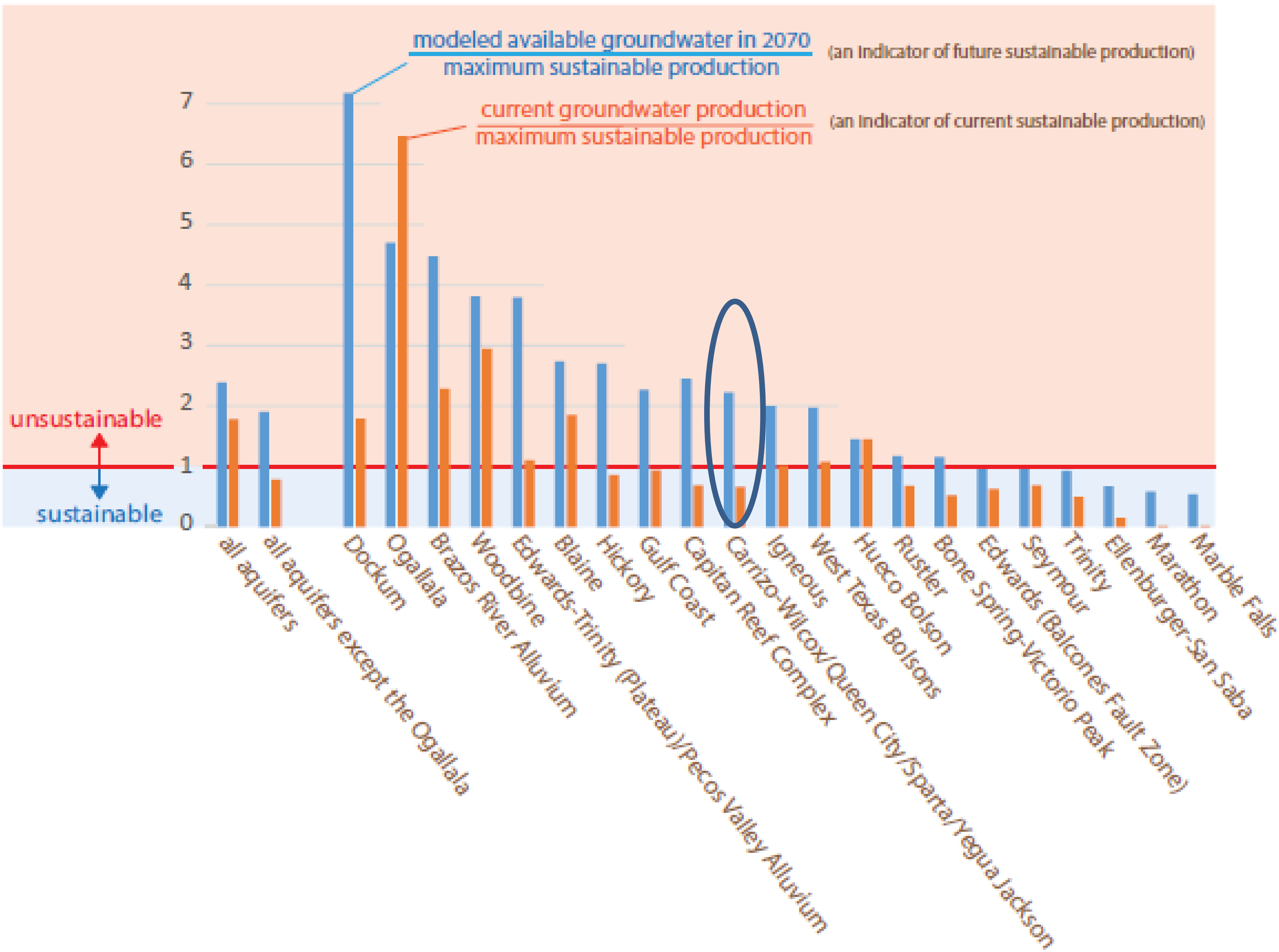
(Bredehoeft, J., 1997, "Safe Yield and the Water Budget Myth," Groundwater, Vol 35, 6)

Groundwater Sustainability

Groundwater sustainability is the development and use of ground water in a manner that can be maintained for an indefinite time without causing unacceptable environmental, economic, or social consequences (Alley and others). Groundwater sustainability has to be defined by a decisionmaker, ideally through a stakeholder process.

Groundwater sustainability is consistent Chapter 36 of Texas Water Code (TWC) requirements for establishing DFCs

- TWC §36.108 (d): " the districts shall consider nine factors when developing the DFCs " (aquifer conditions, water supply needs and management strategies, hydrological conditions, environmental impacts, land subsidence, socioeconomic, private property right)
- TWC §36.108 (d-2): 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.



modeled available groundwater in 2070
maximum sustainable production
(an indicator of future sustainable production)
current groundwater production
maximum sustainable production
(an indicator of current sustainable production)
unsustainable
sustainable
0
1
2
3
4
5
6
7
all aquifers
all aquifers except the Ogallala
Dockum
Ogallala
Brazos River Alluvium
Woodbine
Edwards-Trinity (Plateau)/Pecos Valley Alluvium
Blaine
Hickory
Gulf Coast
Capitan Reef Complex
Carrizo-Wilcox/Queen City/Sparta/Yegua Jackson
Igneous
West Texas Bolsons
Hueco Bolson
Rustler
Bone Spring-Victorio Peak
Edwards (Balcones Fault Zone)
Seymour
Trinity
Ellenburger-San Saba
Marathon
Marble Falls

Environmental Defense Fund

- GCD Authorities
- Tools for Achieving Sustainable Groundwater Management
- Pathway to More Sustainable Management

Advancing Groundwater Sustainability in Texas

A Guide to Existing Authorities and Management Tools for Groundwater Conservation Districts and Communities

Authors

Vanessa Puig-Williams
Director, Texas Water Program
Environmental Defense Fund

Jennifer Diffley
Culp & Kelly LLP

Graham Pough
2022 J.D. Candidate
University of Texas School of Law

November 2020

EDF
ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

Barriers to Sustainable Management

Potential Conflict from Opposing Management Goals

First, GCDs' responsibility to conserve and preserve groundwater coupled with the responsibility of protecting property rights can create the appearance of conflicting management obligations. Additionally, in some places attempts to regulate groundwater have resulted in legal challenges and costly litigation. Uncertainty regarding management obligations plus fear of litigation risk can create powerful disincentives for district leadership to attempt any untested management paths.

Potential Problems with Establishing a Balance

Second and relatedly, in some places, reductions in overall existing pumping would be needed to bring the groundwater basin into balance. This is somewhat uncharted territory for GCDs in Texas who are faced with potential lawsuits for denying new groundwater permits or reducing existing ones.[49]

Potential Problems with Sufficient Hydrogeologic Information/Data

Third, many GCDs in Texas lack the local data that is needed to even set sustainable DFCs and management goals. While Chapter 36 requires GCDs to consider socioeconomic impacts or impacts to springflow, GCDs cannot make these considerations without adequate data. The TWDB does not provide GCDs with any economic analyses related to future impacts of DFCs on local economies. Additionally, the groundwater availability models that the TWDB develops are too regional in nature to provide any meaningful data on the impact that various levels of drawdown will have on localized springflow. The same holds true for data related to local permitting decisions – it is difficult for GCDs to consider how a potential permit will unreasonably impact surface water resources when data does not exist and local models have not been developed.

Pathways for GCDs to Better Equipped for Promoting Sustainable Production

- Building Public Engagement and Buy-in
  - Proactively engaging public in long-term vision and strategy
  - Strong case to be made for sustainable management is critical to protecting property rights
- Navigating Uncharted Territory Through Small Steps
  - Concerns regarding legal and political risks
  - Involve small stakeholder groups to address localized concerns
  - Implement new management tools on an "opt-in" or voluntary/incentive basis (call out to POSGCD Conservancy Program)
- Continually Develop and Refine Local Data, Science, and Models
  - Without decision support tools and information GCDs cannot adequately address potential outcomes of GW management decisions
  - Consider applying for federal grants and funding from private entities

Discussion Topics

- Investigate Groundwater Sustainability (District, GMA 12)
  - Define and determine Maximum Sustainable Production
  - Define and determine different levels of Groundwater Sustainability
- Verbalize DFC Goals
  - What are acceptable impacts to existing wells, groundwater resources, GW-SW interactions
  - Explain how to quantify acceptable impacts to existing wells (GWAP + economics)
  - Explain how to protect/preserve GW resources (shallow DFC + monitoring + analyses)
  - Chapter 36
- Pursue Grants/Funding for GMA 12
  - Data Support System for monitoring, managing, and evaluating measured water levels
  - Approaches for defining and evaluating groundwater sustainability
  - Interactive web site for GMA 12 stakeholders

Example of GCD Funding From Grants

Big Bend Conservation Alliance, Far West Texas Groundwater Districts Adopt Data Management Software and Develop a Data-Sharing Module to See the Bigger Pictureof Shared Aquifer Health

Reclamation Funding: $48,000 → **Total Project Cost: $96,000**

Big Bend Conservation Alliance, in partnership with Presidio County Underground Water Conservation District, Brewster County Groundwater Conservation District, and Culberson County Groundwater Conservation District, located in west Texas, will establish a common datamanagement software platform in the region enabling them to share data on shared aquifers and to provide for better coordination of region-wide water management goals. The proximityof these counties to the Permian Basin, which is experiencing an explosion of growth in unconventional oil exploration, puts this region at substantial risk for groundwater depletion. The adoption of this software and data sharing module will provide an efficient way to monitor the aquifer levels, groundwater management models, and desired future conditions over time atthe district and regional level and facilitate sharing this data with state agencies and other stakeholders.

Southwest Research Institute, Application of a geochemical framework for waterresource management in a semi-arid landscape: Trans-Pecos Texas, USA

Reclamation Funding: $200,000 → **Total Project Cost: $319,998**

Southwest Research Institute, located in San Antonio, Texas, will work with the Middle Pecos Groundwater Conservation District and Reeves County Groundwater Conservation District to conduct a geochemical and statistical analysis to improve understanding of the hydrology of two interconnected spring systems in west Texas, the San Solomon Springs in Balmorhea, and Comanche Springs in Fort Stockton. The analysis and resulting database will be used to identify relative amounts of recharge from different source areas, potential changes in spring hydrochemistry resulting from land use practices, and recharge and discharge rates. Spring systems in arid and semi-arid environments are threatened by changes in land use and development, including irrigation practices and pumping for oil and gas development, as well aschanges to recharge from precipitation. This project will help inform several ongoing efforts in the area, including efforts to reduce groundwater extraction to increase spring discharge and restore perennial flows.

GMA 12: DFCs and Explanatory Report

GMA 12 Explanatory Report

- Submission to TWDB by January 30, 2022 (60 days after adoption of DFCs by resolution)
- GCD Consultants
  - Using 2017 Explanatory Report as template
  - Partitioning the writing assignments based on presentations
  - Draft by Jan. 7, 2022
- Response to Comments Limit to those received during 90-day comment period

DESIRED FUTURE CONDITION EXPLANATORY REPORT FOR GROUNDWATER MANAGEMENT AREA 12

This report was considered and approved by the member districts of Groundwater Management Area 12 on September 20, 2017.

Member Districts:

1. Brazos Valley Groundwater Conservation District
2. Fayette County Groundwater Conservation District
3. Lost Pines Groundwater Conservation District
4. Mid-East Texas Groundwater Conservation District
5. Post Oak Savannah Groundwater Conservation District

Prepared by:

Daniel B. Stephens & Associates, Austin, TX

INTERA Incorporated, Austin, TX

LBG-Guyton Associates, Houston, TX

Matthew M. Uliana, P.G., Austin, TX

Desired Future Conditions

GCD	Aquifer: Sparta, Queen City, Carrizo, Calvert Bluff, Simsboro and Hooper	Aquifer: Yegua-Jackson	Aquifer: Brazos River Alluvium
Brazos Valley GCD	Y	Y	Y
Fayette County GCD	Y	Y	Y
Lost Pines GCD	N	Y	Y
Mid-East Texas GCD	Y	Y	Y
Post Oak Savannah GCD	Y with objection as to process	Y with objection as to process	Y with objection as to process

GCD or County	Average Aquifer Drawdown (ft) measured from January 2011 through December 2070					
	Sparta	Queen City	Carrizo	Calvert Bluff	Simsboro	Hooper
Brazos Valley GCD	53	44	84	111	262	167
Fayette County GCD	43*	73*	140*	--	--	--
Lost Pines GCD	22	28	134	132	240	138
Mid-East Texas GCD	25	20	48	57	76	69
Post Oak Savannah GCD	32	30	146	156	278	178
Falls County	--	--	--	--	7	3
Limestone County	--	--	--	2	3	3
Navarro County	--	--	--	0	1	0
Williamson County	--	--	--	25	31	24

* Fayette County GCD DFCs are for all of Fayette County.
Brazos Valley GCD DFCs are for 2000 through 2070

Note: POSGCD Carrizo DFC is 10% lower than simulated average drawdown
BVGCD DFCs are 5% higher than simulated average drawdowns for all aquifers except: Simsboro (10%), BRAA (0%)

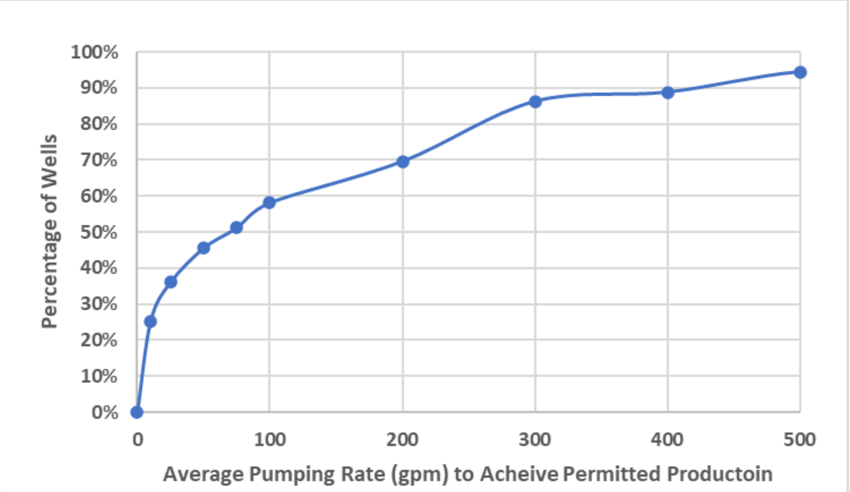
Discussion Topics

- Presentations/Memos to be Included in Appendix
  - Include presentations associated with nine factors
  - List presentation available on GMA 12 web site
  - Consultants agreed to asks Districts if additional presentations should be added
    - Comments on proposed DFCs outside of comment period
    - POSGCD position paper and presentations related to process
    - Non GCDs presentation of other factors (SW-GW interaction, economic impacts, existing permit holders, achieving balance)
- Rationale and Justification of DFC Selection
  - Discussion of POSGCD protest of process
  - Discussion of other issues

Qualifications for GWAP

Discussion Topics: Low-Capacity Wells

Permitted Production Amount		Number of Wells With Production less or Equal to Permitted Amount	Percent of Wells
Acre-ft/yr	GPM		
0	0	0	0%
16	10	99	25%
40	25	141	36%
81	50	178	46%
121	75	200	51%
161	100	227	58%
322	200	272	70%
483	300	337	86%
644	400	347	89%
805	500	369	94%
966	600	371	95%
1,127	700	371	95%
1,288	800	371	95%
1,449	900	371	95%
1,610	1000	371	95%
4,025	2500	391	100%



GWAP Annual Needs Assessment Draft Report

Overview of GANA

Objective: identify eligible wells where water levels are likely to decline below the elevation of the pump setting as a result of regional groundwater production in GMA 12 within the next 10 years.

High-Priority wells: number of wells with pump elevation data that the GW model predicts will have water level in 2030 that are less than 15 feet above the elevation of its pump settings recorded in the POSGCD database

Moderate-Priority well: number of wells without pump elevation data that the GW model predicts will have water level in 2030 that are less than 15 feet above the elevation of if pump setting elevation were recorded

Overview of GANA

- Model Simulation
  - Updated GAM presented at POSGCD Summit
  - PS-19 DFC Run (GMA 12 adopted simulation)

- Wells
  - 4605 Exempt Wells
  - 105 low-capacity Permitted Wells

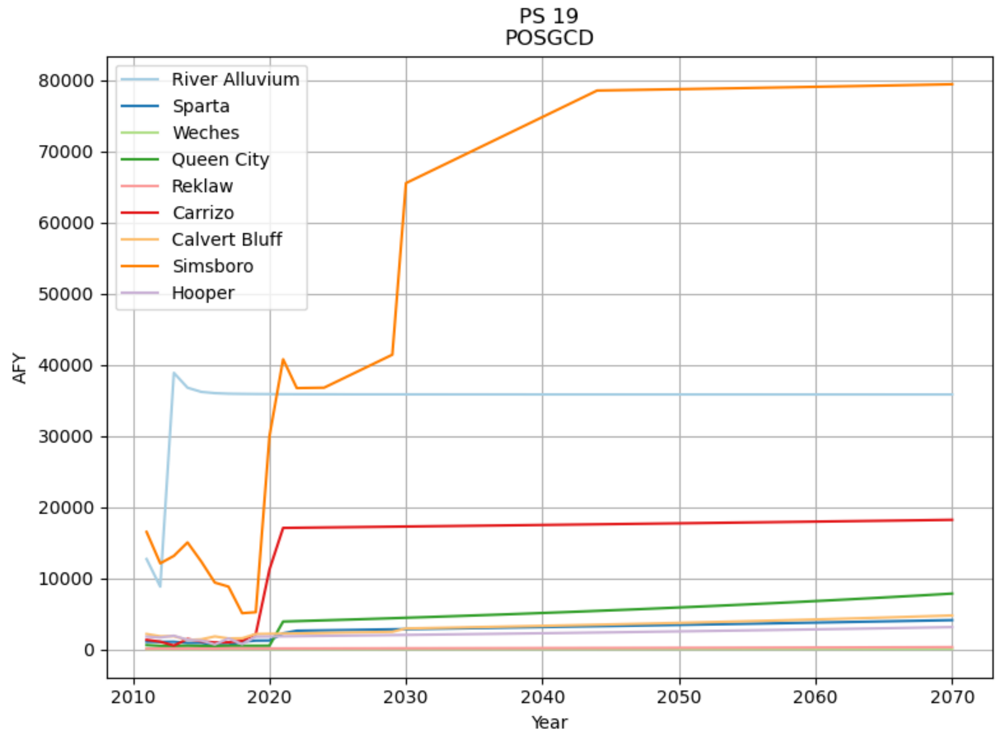


Table 3 Number of exempt and permitted wells eligible for the GWAP by aquifer

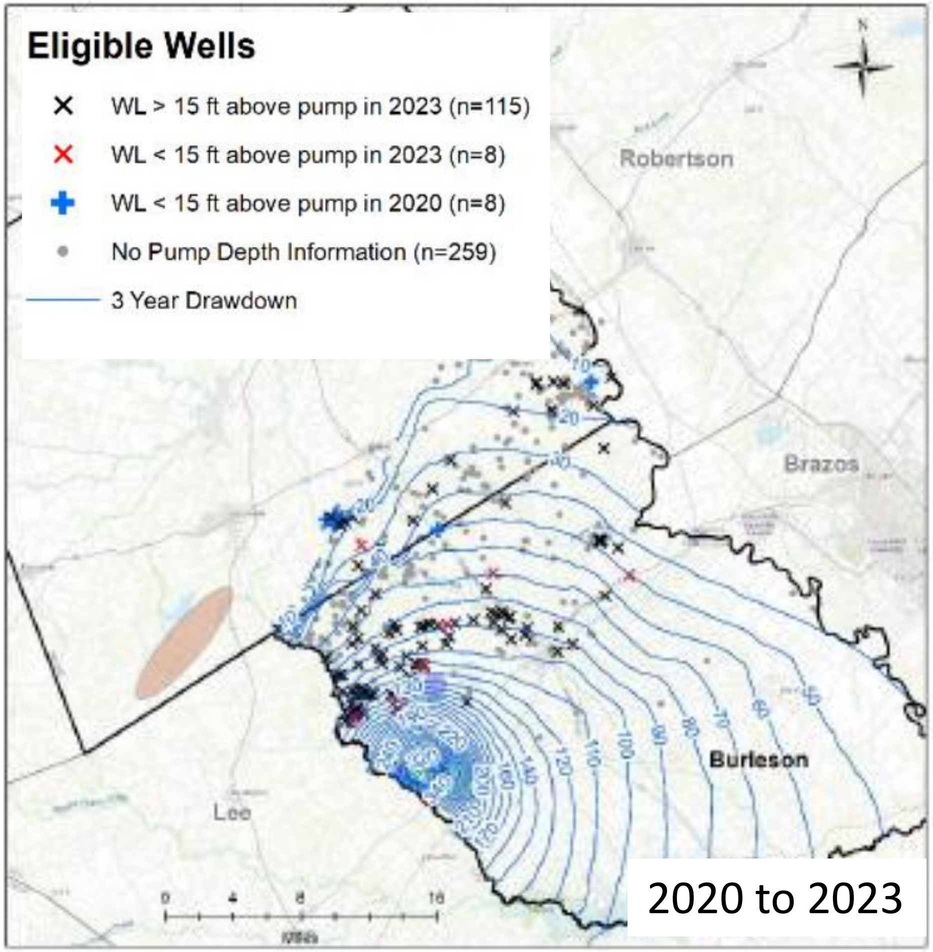
Aquifer	Total Eligible Exempt Wells	Total Eligible Permitted Wells	Total Eligible Wells
Sparta	1162	22	1184
Queen City	1175	16	1191
Carrizo	381	10	391
Calvert Bluff	745	34	779
Simsboro	439	13	452
Hooper	703	10	713
TOTAL	4605	105	4710

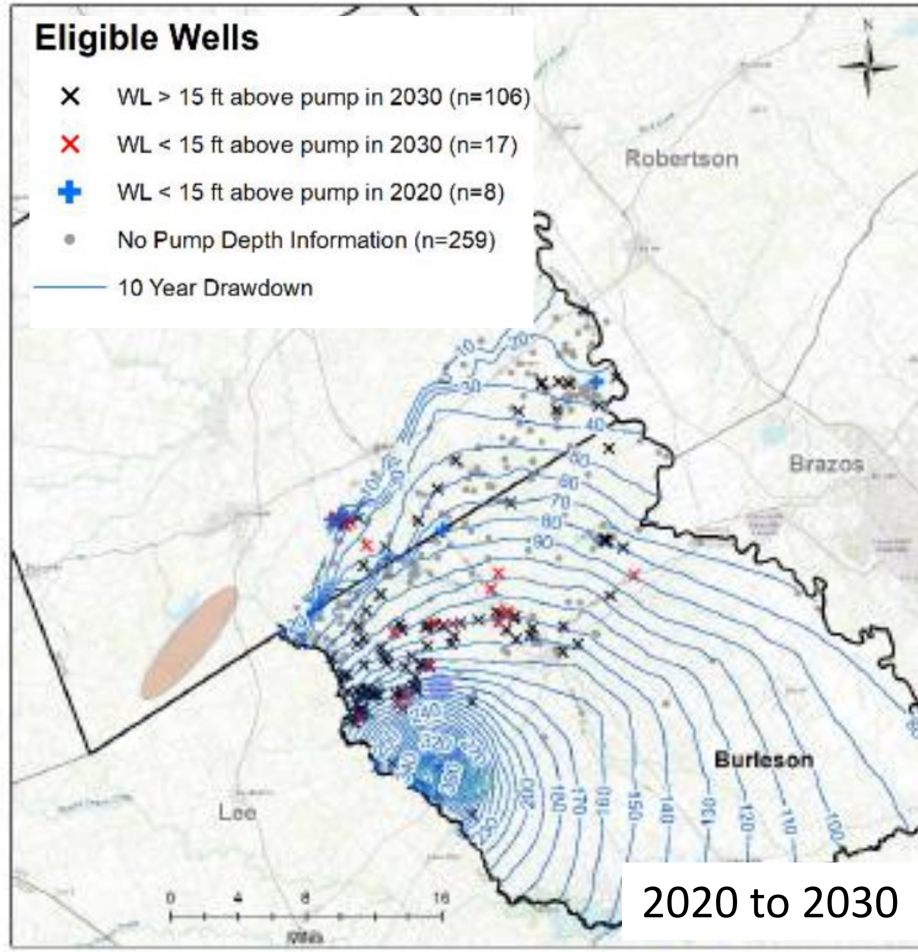
Summary of GWAP in 2020-2021

- Predictions for 2020-2021 GWAP Wells
  - 53 wells have been assisted
  - Out of the 51 wells with pumps elevation, 2021 GANA simulations identify 45 as high-priority wells
  - 16 additional wells are on waiting-list
  - Out of the 16 wells, all are identified as high-priority wells
- Predictions for Remaining Wells
  - 26* wells identified as high priority wells
    (19 Carrizo, 3 Sparta, 3 Calvert Bluff, 1 Queen City)
  - 26 wells identified as moderate priority wells (all Carrizo)
- Comparison to 2020 GWAP
  - 56 wells identified as high priority wells

* Reports states 24 wells, but two wells missed in the report have been recently identified as high priority wells

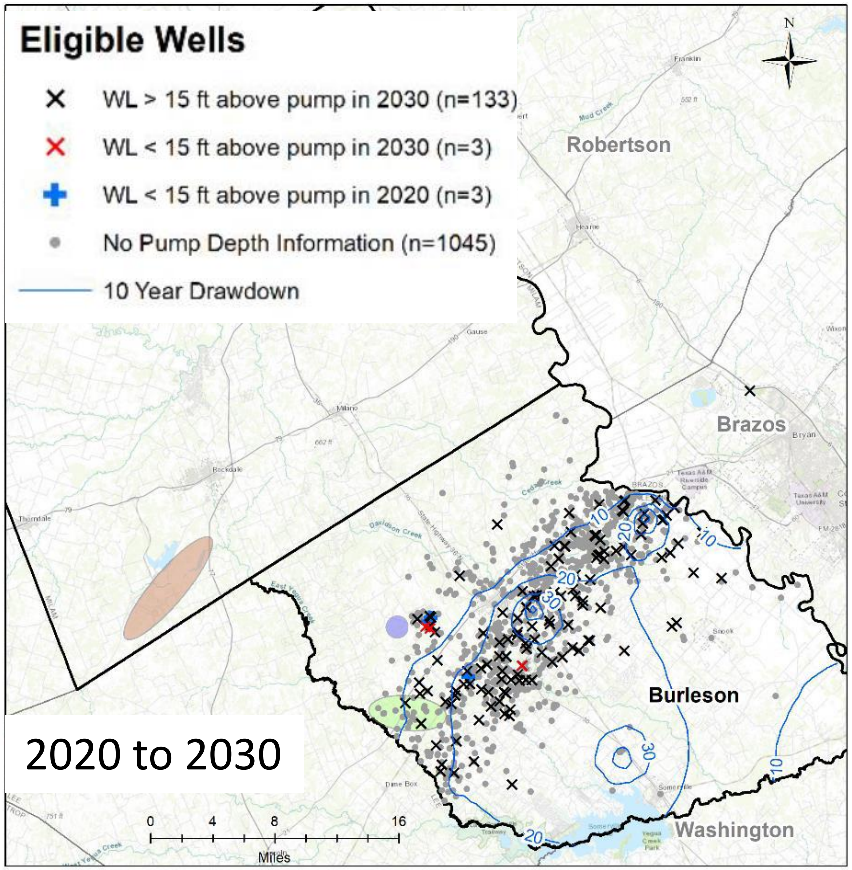
Contours of Simulated Drawdown and Location of High Priority Carrizo Wells



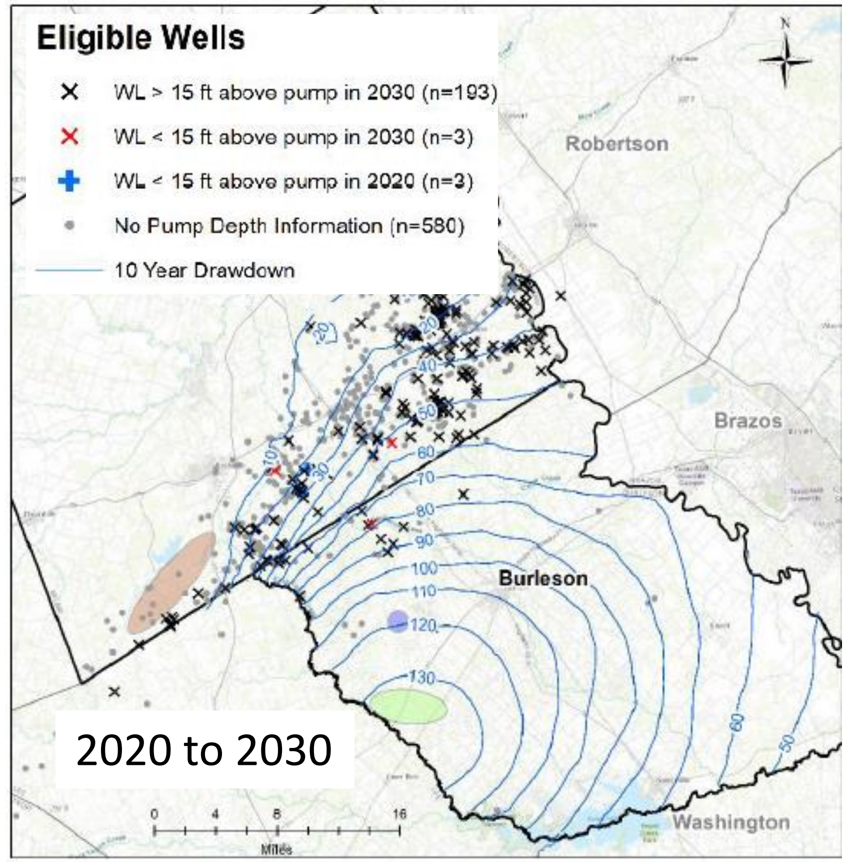


Contours of Simulated Drawdown and Locations of High Priority Sparta and Calvert Bluff Wells

Sparta



Calvert Bluff



Tabulation of 53 GWAP Assisted Wells

POSGCD Well ID	Previous Pump Elevation (ft-amsl)	Current Pump Elevation (ft-amsl)	Change in Pump Elevation (ft)	Simulated Water above Current Pump (ft) in 2030	Simulated Available Drawdown above formation (ft) in 2030
PO-000475	244	144	100	16	279
PO-001327	244	124	120	37	145
PO-001328	235	115	120	66	155
PO-001331	201	-11	212	193	155
PO-001342	234	54	180	146	475
PO-003440	259	79	180	131	133
PO-003444	190	-30	220	206	176
PO-004459	97	35	62	147	155
PO-004976	252	52	200	124	604
PO-005228	265	165	100	81	127
PO-005231	234	54	180	124	426
PO-005767	ND	49	ND	221	243
PO-005816	223	51	172	255	187
PO-005817	211	91	120	180	243
PO-005821	149	9	140	151	279
PO-006405	197	137	60	26	185
PO-006551	222	52	170	124	604
PO-006658	159	-1	160	160	279
PO-006815	201	61	140	137	177
PO-006816	230	41	189	175	140
PO-007393	252	112	140	150	127

POSGCD versus TWDB Pumping Estimates: 2010 to 2019

Carrizo-Wilcox Aquifer

Year	Non-shared Pumping (Acre-ft)			Shared Pumping (Acre-ft)			Total Pumping (Acre-ft)		
	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference
2010	645	2,456	-117%	11984	16242	-30%	12,629	18,698	-39%
2011	2,051	3,700	-57%	17970	16986	6%	20,021	20,686	-3%
2012	2,319	5,004	-73%	12600	11664	8%	14,919	16,668	-11%
2013	3,732	3,770	-1%	11948	11290	6%	15,680	15,061	4%
2014	2,437	3,361	-32%	15108	13978	8%	17,545	17,338	1%
2015	3,068	2,611	16%	12084	11002	9%	15,152	13,613	11%
2016	2,403	2,487	-3%	9046	8939	1%	11,450	11,426	0%
2017	3,252	2,867	13%	8903	7869	12%	12,155	10,735	12%
2018	2,919	2,803	4%	3926	3682	6%	6,845	6,484	5%
2019	3,540	2,847	22%	4202	2957	35%	7,742	5,804	29%

Brazos River Alluvium

Year	Non-shared Pumping (Acre-ft)			Shared Pumping (Acre-ft)			Total Pumping (Acre-ft)		
	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference
2010	18,361	17,851	3%	0	0	NA	18,361	17,851	3%
2011	24,639	21,119	15%	0	0	NA	24,639	21,119	15%
2012	18,978	25,189	-28%	0	0	NA	18,978	25,189	-28%
2013	19,020	22,731	-18%	0	0	NA	19,020	22,731	-18%
2014	17,904	15,687	13%	0	0	NA	17,904	15,687	13%
2015	14,498	7,913	59%	0	0	NA	14,498	7,913	59%
2016	8,908	14,363	-47%	0	0	NA	8,908	14,363	-47%
2017	12,470	19,861	-46%	0	0	NA	12,470	19,861	-46%
2018	11,527	20,665	-57%	0	0	NA	11,527	20,665	-57%
2019	8,298	13,490	-48%	0	0	NA	8,298	13,490	-48%

POSGCD versus TWDB Pumping Estimates: 2010 to 2019 (con't)

Sparta Aquifer

Year	Non-shared Pumping (Acre-ft)			Shared Pumping (Acre-ft)			Total Pumping (Acre-ft)		
	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference
2010	248	415	-50%	517	524	-1%	765	940	-20%
2011	353	439	-22%	620	560	10%	973	998	-3%
2012	429	377	13%	515	477	8%	944	854	10%
2013	447	339	27%	515	496	4%	962	835	14%
2014	283	319	-12%	510	468	9%	793	787	1%
2015	347	314	10%	464	468	-1%	811	783	4%
2016	82	304	-115%	454	450	1%	536	754	-34%
2017	134	207	-43%	331	449	-30%	465	657	-34%
2018	640	201	104%	343	511	-39%	983	712	32%
2019	282	195	36%	365	516	-34%	646	711	-9%

Queen City

Year	Non-shared Pumping (Acre-ft)			Shared Pumping (Acre-ft)			Total Pumping (Acre-ft)		
	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference
2010	27	788	-187%	232	231	0%	259	1,019	-119%
2011	95	1,302	-173%	307	306	0%	402	1,608	-120%
2012	64	1,709	-186%	248	248	0%	312	1,957	-145%
2013	40	1,252	-188%	249	250	0%	289	1,502	-135%
2014	83	1,189	-174%	238	250	-5%	321	1,439	-127%
2015	17	1,037	-194%	265	265	0%	282	1,303	-129%
2016	21	936	-191%	242	242	0%	263	1,178	-127%
2017	41	1,059	-185%	275	275	0%	315	1,334	-124%
2018	41	1,042	-185%	272	272	0%	313	1,314	-123%
2019	6	967	-198%	269	221	20%	275	1,188	-125%

POSGCD versus TWDB Pumping Estimates: 2010 to 2019 (con't)

Yegua-Jackson Aquifer

Year	Non-shared Pumping (Acre-ft)			Shared Pumping (Acre-ft)			Total Pumping (Acre-ft)		
	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference
2010	22	533	-184%	165	0	NA	187	533	-96%
2011	113	582	-135%	210	0	NA	323	582	-57%
2012	73	498	-149%	160	0	NA	233	498	-73%
2013	47	432	-161%	117	0	NA	164	432	-90%
2014	34	374	-167%	67	0	NA	101	374	-115%
2015	15	336	-183%	111	0	NA	126	336	-91%
2016	43	357	-157%	105	0	NA	148	357	-83%
2017	29	368	-171%	152	0	NA	181	368	-68%
2018	51	382	-153%	109	0	NA	160	382	-82%
2019	13	351	-186%	133	0	NA	145	351	-83%

Other

Year	Non-shared Pumping (Acre-ft)			Shared Pumping (Acre-ft)			Total Pumping (Acre-ft)		
	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference	POSGCD	TWDB	% Difference
2010	991	2,241	-77%	0	0	NA	991	2,241	-77%
2011	1,575	4,062	-88%	0	0	NA	1,575	4,062	-88%
2012	1,011	5,939	-142%	0	0	NA	1,011	5,939	-142%
2013	1,291	4,388	-109%	0	0	NA	1,291	4,388	-109%
2014	559	3,968	-151%	0	0	NA	559	3,968	-151%
2015	469	3,116	-148%	0	0	NA	469	3,116	-148%
2016	581	3,027	-136%	0	0	NA	581	3,027	-136%
2017	676	3,709	-138%	0	0	NA	676	3,709	-138%
2018	1,028	3,648	-112%	0	0	NA	1,028	3,648	-112%
2019	898	3,103	-110%	0	0	NA	898	3,103	-110%

POSGCD versus TWDB Pumping Estimates: 2010 to 2019 (con't)

City of Rockdale Pumping

Year	Pumping (Acre-ft)			% Difference
	POSGCD	TWDB	Difference	
2010	995	990	5	1%
2011	1178	1179	-1	0%
2012	1074	1074	0	0%
2013	1141	931	210	20%
2014	861	923	-62	-7%
2015	634	786	-152	-21%
2016	0	894	-894	NA
2017	1094	1087	7	1%
2018	0	866	-866	NA
2019	833	831	2	0%

City of Snook Pumping

Year	Pumping (Acre-ft)			% Difference
	POSGCD	TWDB	Difference	
2010	137	137	0	0%
2011	169	177	-8	-4%
2012	132	132	0	0%
2013	145	145	0	0%
2014	143	143	0	0%
2015	119	119	0	0%
2016	113.3	113	0	0%
2017	0	113	-113	NA
2018	0	132	-132	NA
2019	0	132	-132	NA

Comparison of Aquifers

SurveyName	County	TWDB Aquifer	POSGCD Aquifer
APACHE HILLS SUBDIVISION	Burleson	Sparta	Yegua-Jackson
BIRCH CREEK RECREATION INC	Burleson	Sparta	Yegua-Jackson
CADE LAKES WSC	Burleson	Sparta before 2010; Other from 2010	Carrizo-Wilcox
CITY OF ROCKDALE	Milam	Carrizo-Wilcox before 2011; Other from 2010	Carrizo-Wilcox
CLARA HILLS CIVIC ASSOCIATION	Burleson	Sparta; Yegua-Jackson in 2010 only	Yegua-Jackson
GAUSE WSC	Milam	Carrizo-Wilcox; Other in 2010 only	Carrizo-Wilcox
LAKEVIEW MARSHALL OAK SOMERVILLE	Burleson	Sparta	Yegua-Jackson
LYONS WSC	Burleson	Sparta and Carrizo-Wilcox	Sparta
MARLOW WSC	Milam	Carrizo-Wilcox before 2011; Other from 2011	Carrizo-Wilcox
MILANO WSC	Burleson and Milam	Carrizo-Wilcox and Other	Carrizo-Wilcox
SOUTHWEST MILAM WSC	Milam	Carrizo-Wilcox and Other	Carrizo-Wilcox
WHISPERING WOODS	Burleson	Sparta	Yegua-Jackson
YEGUA WATER COMPANY	Burleson	Sparta	Yegua-Jackson

Discussion Topics

- Estimate of Economic Impact of Lower Water Levels
  - Current and Future Well Design
  - Pump Capacities
  - Electrical Costs
- Guidelines for Drillers
- Model Layers
- Update GAM to Include Other Pumping
  - Approach
  - POSGCD versus TWDB Estimated Pumping for 2010 to 2019

Guidance Document 2021 Draft Report

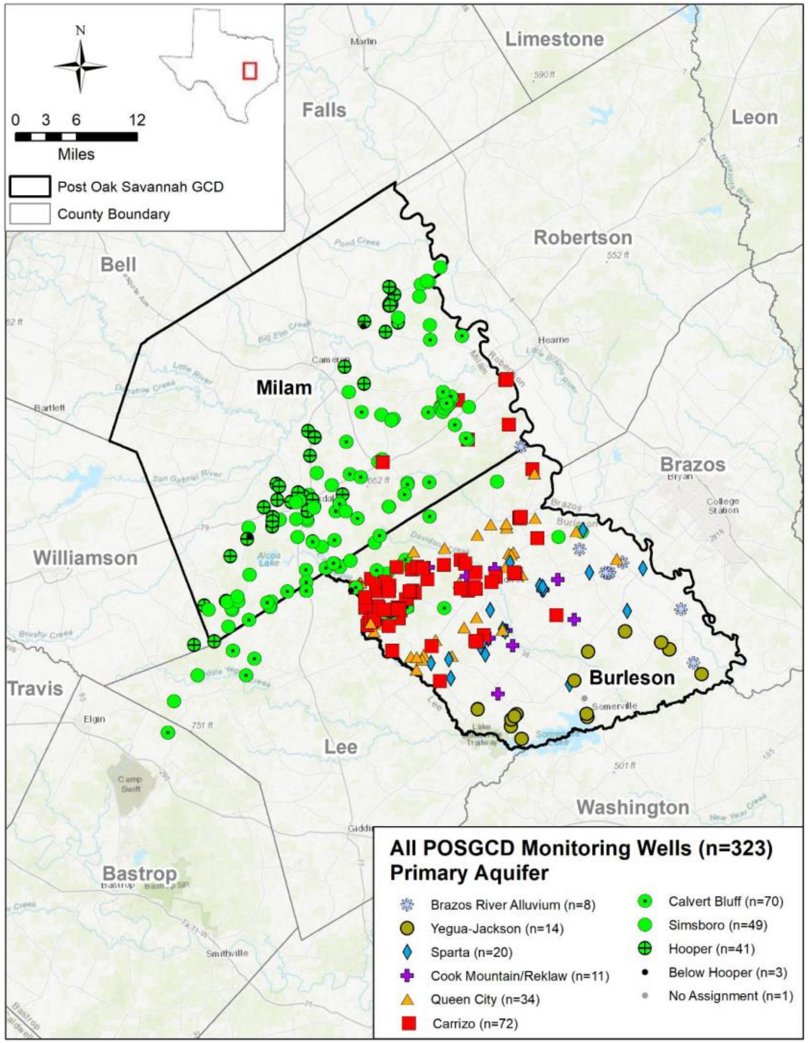
Overview of Changes

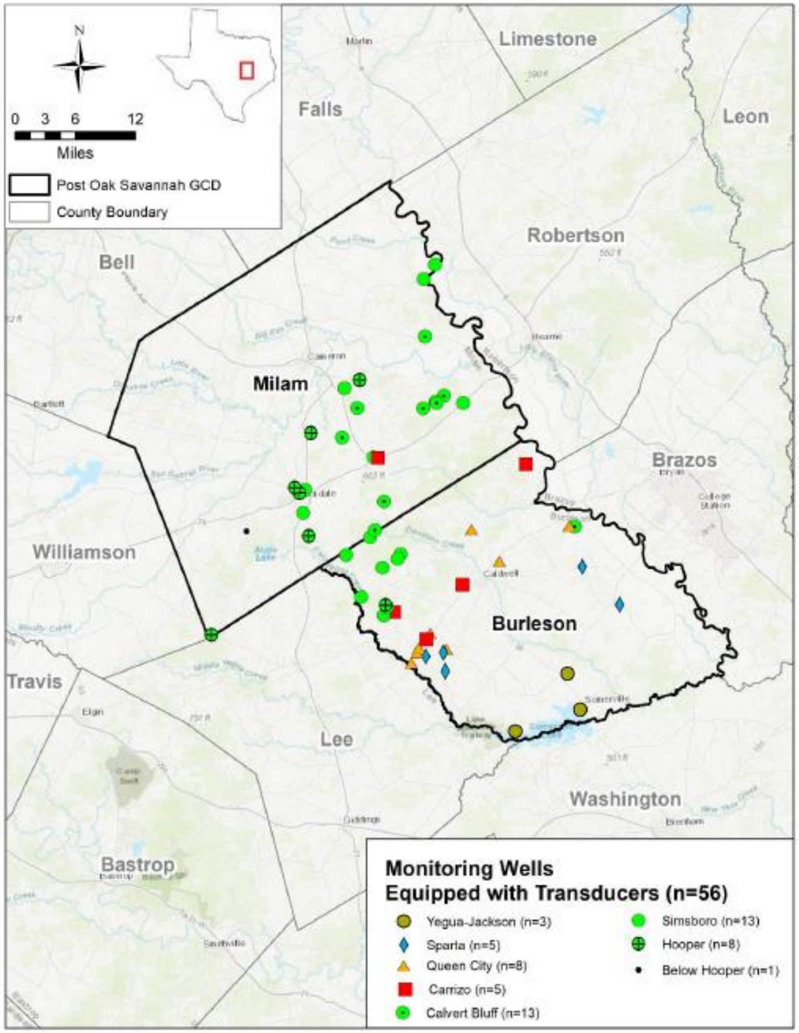
- Update Monitoring Well Information
- Aquifer Assignments
- Addition of Transducer Wells
- Averaging of Monitoring Data for 1-year
- Drawdown Calculations
- Addition of Transducer Wells
- Data Analysis Methods

Monitoring Wells

Total= 323 (109 in 2018)

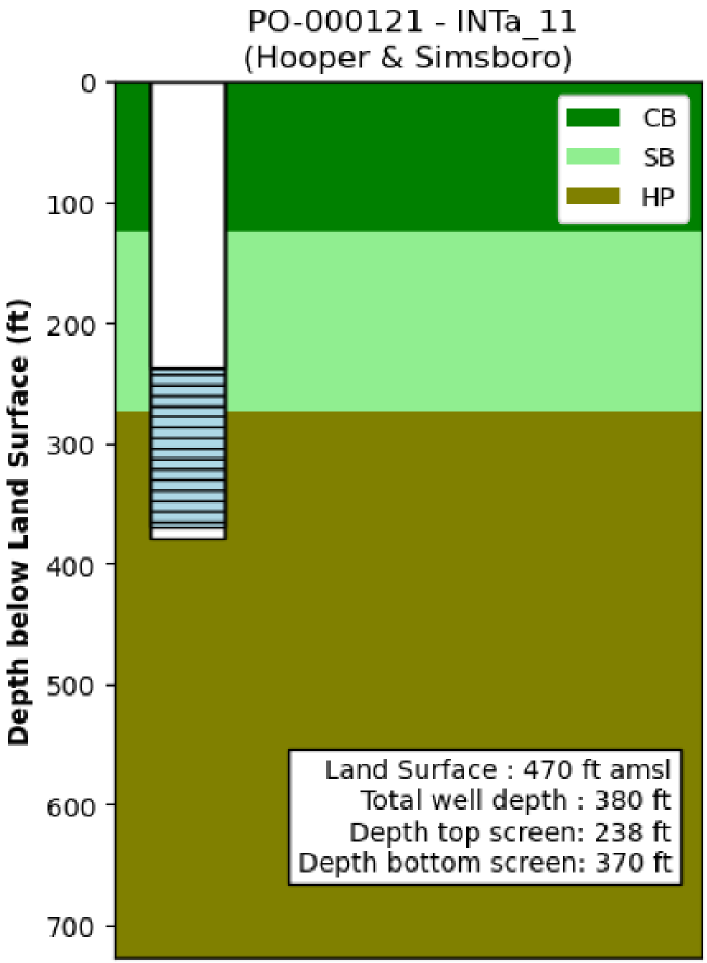
w/Transducer =55 (20 in 2018)



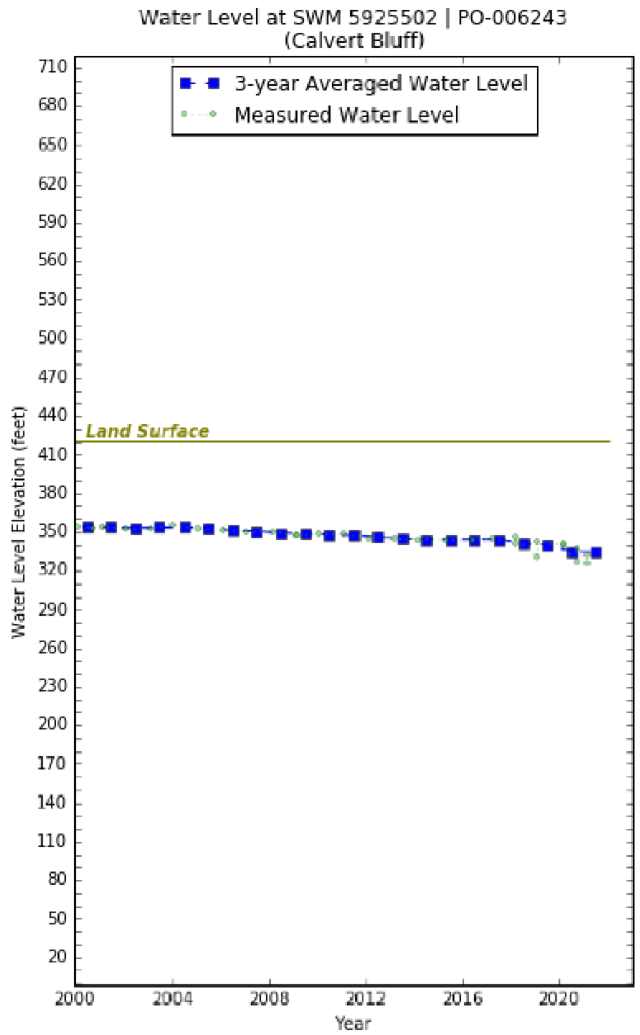


Monitoring Wells

Well diagrams



Hydrographs



Monitoring Wells Information

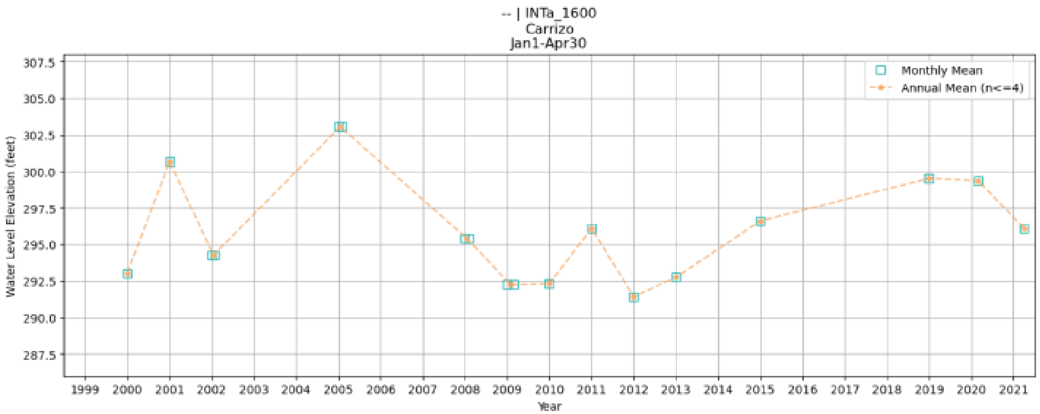
POSGCD Well Number	State Well Number	Latitude *(decimal degrees)*	Longitude *(decimal degrees)*	Surface Elevation *(ft amsl)*	Depth *(ft)*	Screened Intervals	TWDB Aquifer	POSGCD Aquifer (First Unit)	POSGCD Aquifer (Second Unit)	County	Shallow?	Transducer
PO-000020	5917505	30.6811	-96.9480	427	540	498-540	124SMBR - Simsboro Sand Member of Rockdale Formation	Simsboro		Milam	No	
PO-000025	5917409	30.6685	-96.9869	516	391	226-290, 320-390	124HOOP - Hooper Formation	Simsboro	Hooper	Milam	Yes	Yes
PO-000026	5917103	30.7238	-96.9830	457	410	115-410	124HOOP - Hooper Formation	Hooper	Simsboro	Milam	No	
PO-000053	5909901	30.7841	-96.8955	428	169	109-169	124SMBR - Simsboro Sand Member of Rockdale Formation	Calvert Bluff	Simsboro	Milam	Yes	Yes
PO-000059	5911402	30.7971	-96.7347	426	323	307-323	124CABF - Calvert Bluff Formation	Carrizo		Milam	Yes	
PO-000073	5910907	30.7809	-96.7850	378	440	410-430	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	Yes
PO-000077	5919103	30.7406	-96.7208	432	522	507-522	124CABF - Calvert Bluff Formation	Calvert Bluff		Milam	No	
PO-000084	5919302	30.7283	-96.6323	338	45	--	124QNCT - Queen City Sand of Claiborne Group	Brazos River Alluvium		Milam	Yes	

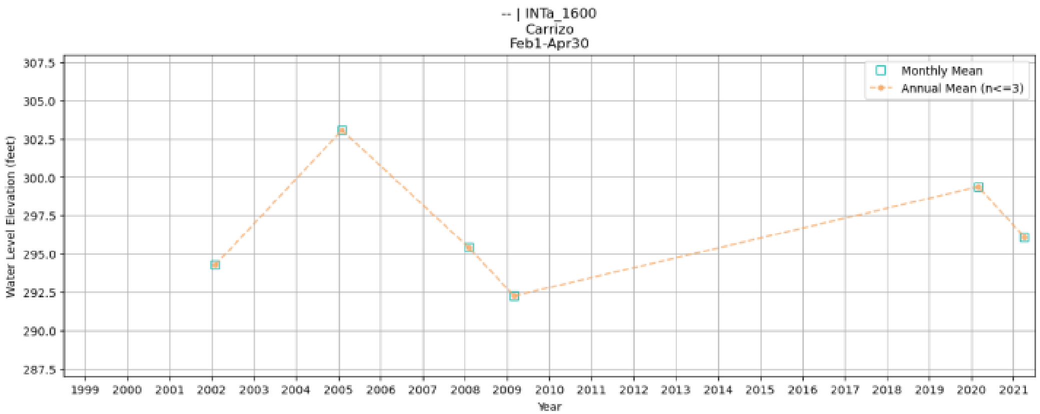
Coordination with TWDB on Well Information (memo sent June 2021)

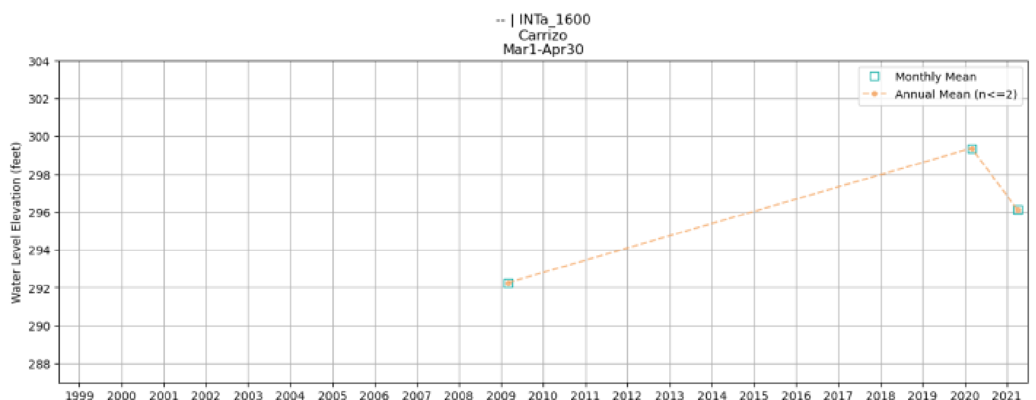
Requested Changes :
1) 134 Well locations
2) 30 Aquifer assignments
3) 13 wells with different completion information

Status of Review:
1) Well locations approved, waiting for TWDB database update
2) Well construction approved except for one well
3) Will not complete aquifer assignment until 2022

Monitoring Well Average Period: Jan 1 – April 30







Determine Monthly Average

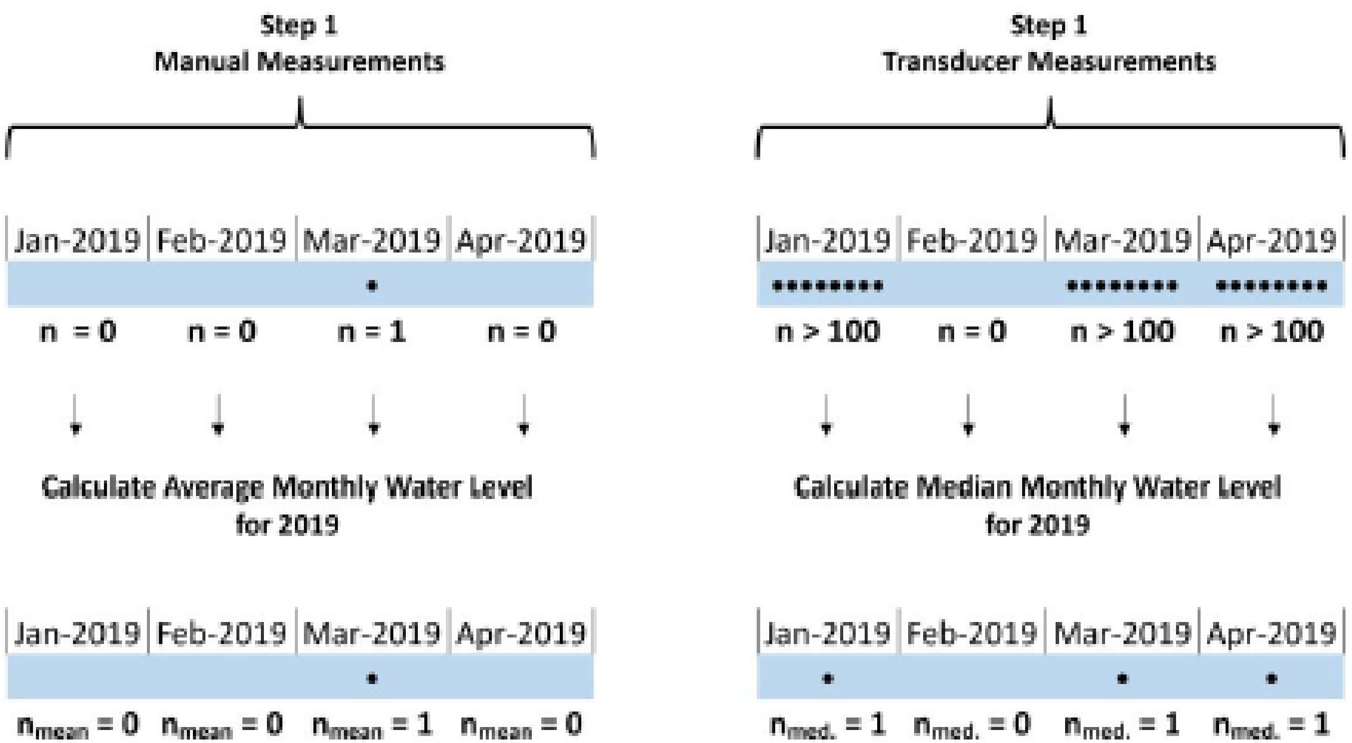
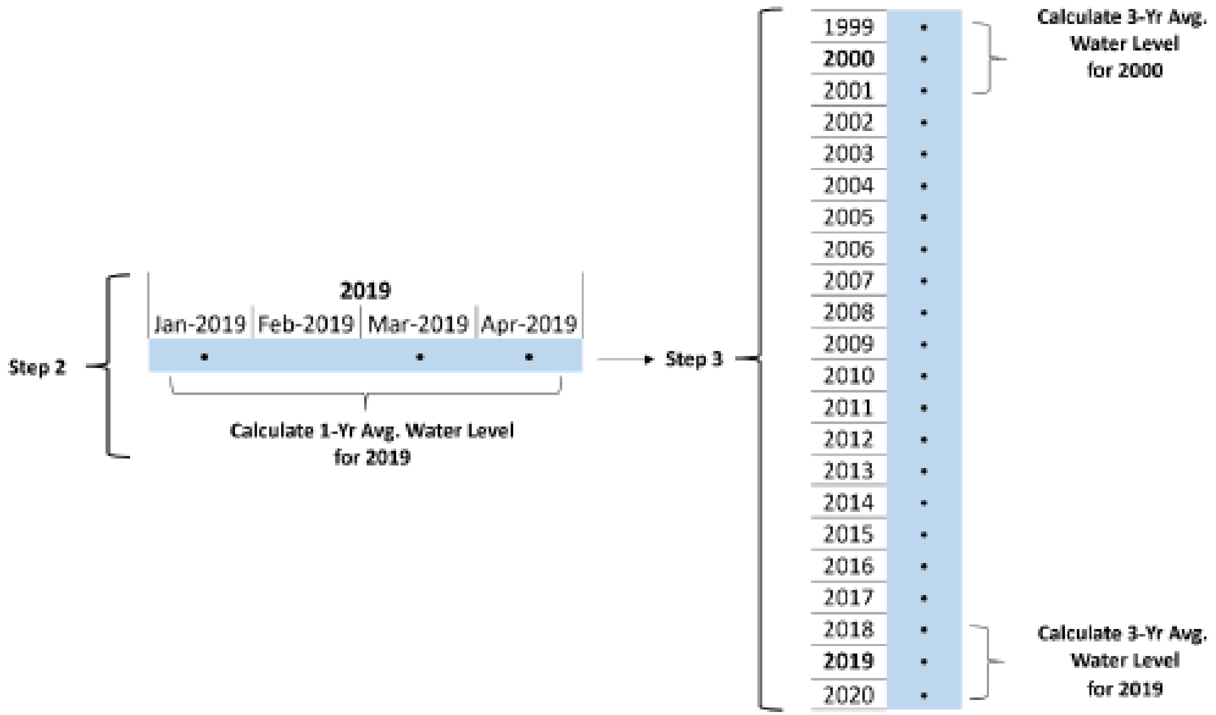


Figure 5-3 Schematic diagram showing the calculations used to determine monthly values for a well with only manual measurements (left) and for a well with transducer measurements (right)

Three-year Average and Drawdown Calculations



Evaluated options for selection of data points for calculating average drawdown for base year and end year. Determined that the calculation should not be restricted to common well locations.

Data Analysis Method for Calculating Average Drawdowns

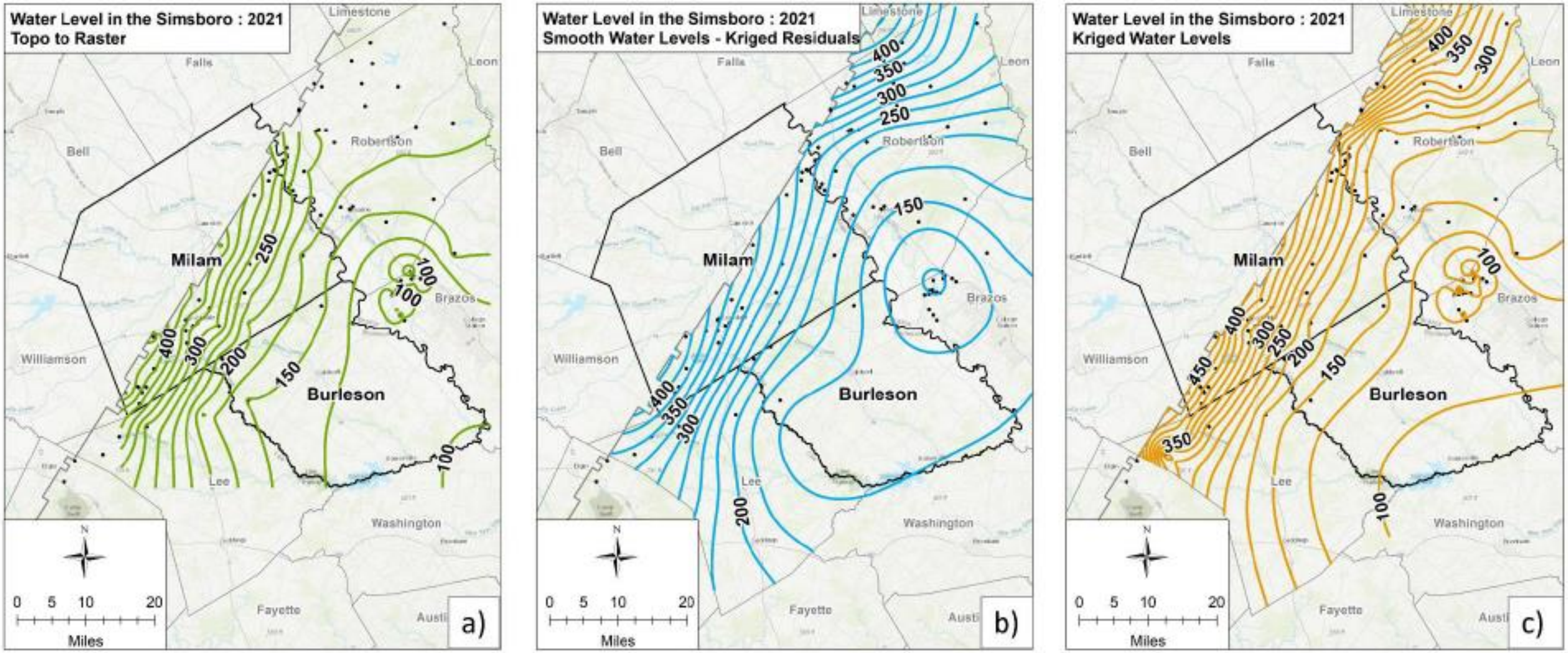


Figure 5-5 Diagrams comparing final interpolated water level surfaces results for the Total Simsboro Aquifer Management Zone using (a) topo to raster, (b kriging with detrending, and (c) kriging without detrending

Data Analysis Method for Calculating Average Drawdowns

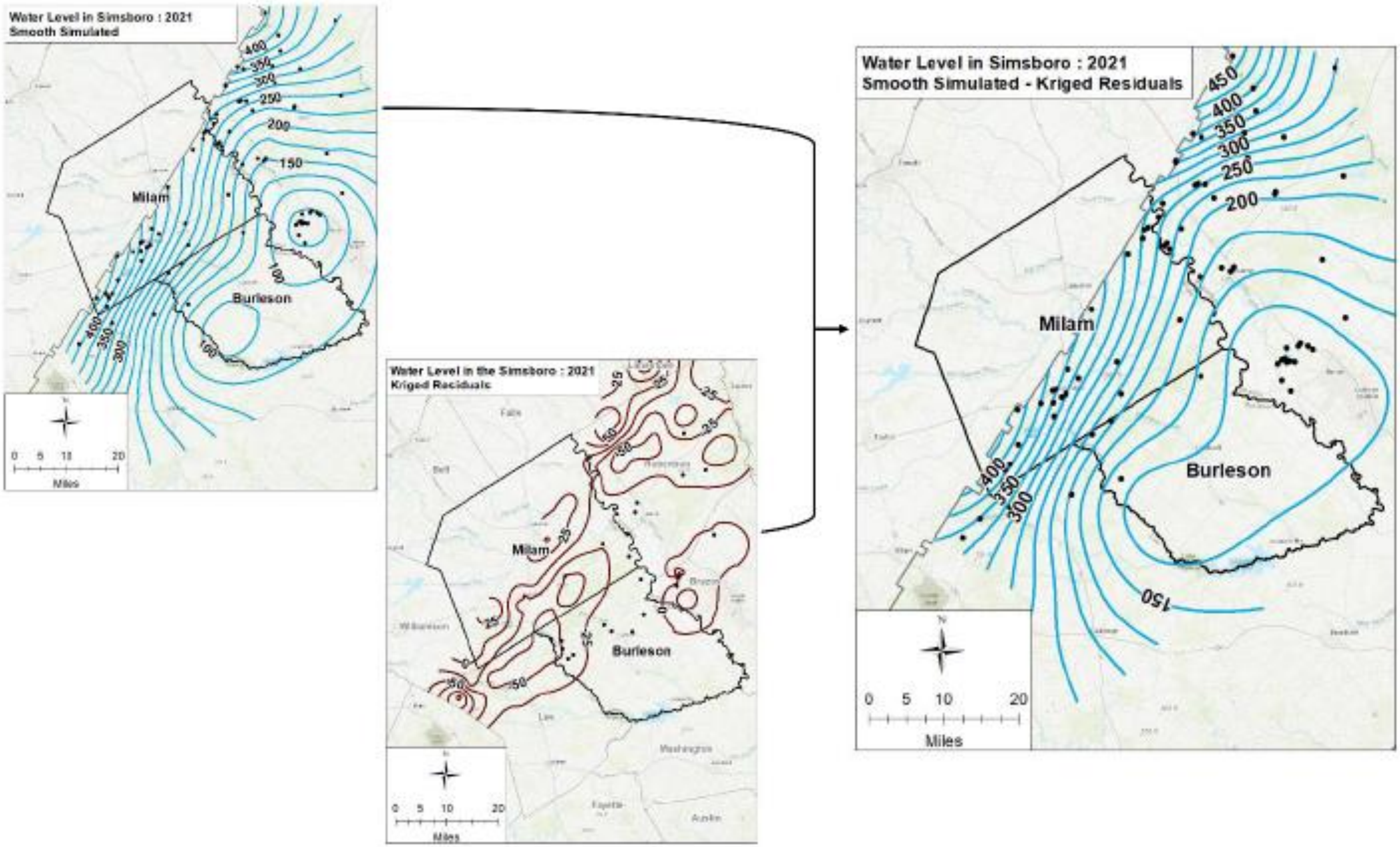


Figure J-2 Diagram showing steps to combine simulated water level surface (left) and Kriged residuals (middle; simulated minus measured water level) to generate final water level surface (right).

Discussion Topics

- Aquifer Associations
  - GAM Model Layers
  - TWDB Selection
  - GMA 12
  - Nearby Districts
- Multiple Data Analysis
  - Evaluation a part of 2022 Compliance report
  - Indicator Wells

Monitoring Compliance Update

Vista Ridge

- Compliance

Month	Maximum Instantaneous Pumping Rate								
	CW1	CW2	CW3	CW4	CW5	CW6	CW7	CW8	CW9
Nov-21	956	1122	1125	841	925	950	1129	1101	902

Month	Date & Time of the Maximum Instantaneous Pumping Rate								
	CW1	CW2	CW3	CW4	CW5	CW6	CW7	CW8	CW9
Nov-21	11/3/2021 2:00:00 AM	11/5/2021 2:00:00 AM	11/5/2021 3:00:00 PM	11/4/2021 7:00:00 PM	11/8/2021 11:00:00 AM	11/2/2021 9:00:00 AM	11/5/2021 11:00:00 PM	11/8/2021 11:00:00 AM	11/5/2021 5:00:00 AM

Month	Number of Daily Violations								
	CW1	CW2	CW3	CW4	CW5	CW6	CW7	CW8	CW9
Nov-21	0	0	0	0	0	0	0	0	0

Month									
	PW9	PW10	PW11	PW12	PW13	PW14	PW15	PW16	PW17
Nov-21	2974	2980	2966	2965	2982	2478	2973	2964	2985

Month									
	PW9	PW10	PW11	PW12	PW13	PW14	PW15	PW16	PW17
Nov-21	11/25/2021 1:00:00 PM	11/22/2021 2:00:00 AM	11/19/2021 7:00:00 PM	11/21/2021 11:00:00 PM	11/15/2021 12:00:00 PM	11/4/2021 3:00:00 PM	11/9/2021 4:00:00 AM	11/10/2021 11:00:00 AM	11/9/2021 7:00:00 PM

Month									
	PW9	PW10	PW11	PW12	PW13	PW14	PW15	PW16	PW17
Nov-21	0	0	0	0	0	0	0	0	0

- Monitoring Equipment
- QA/QC Protocols

Project 130

- Compliance

Month	Maximum Instantaneous Pumping Rate	
	PBPW1	PBPW2
Nov-21	2090	2332

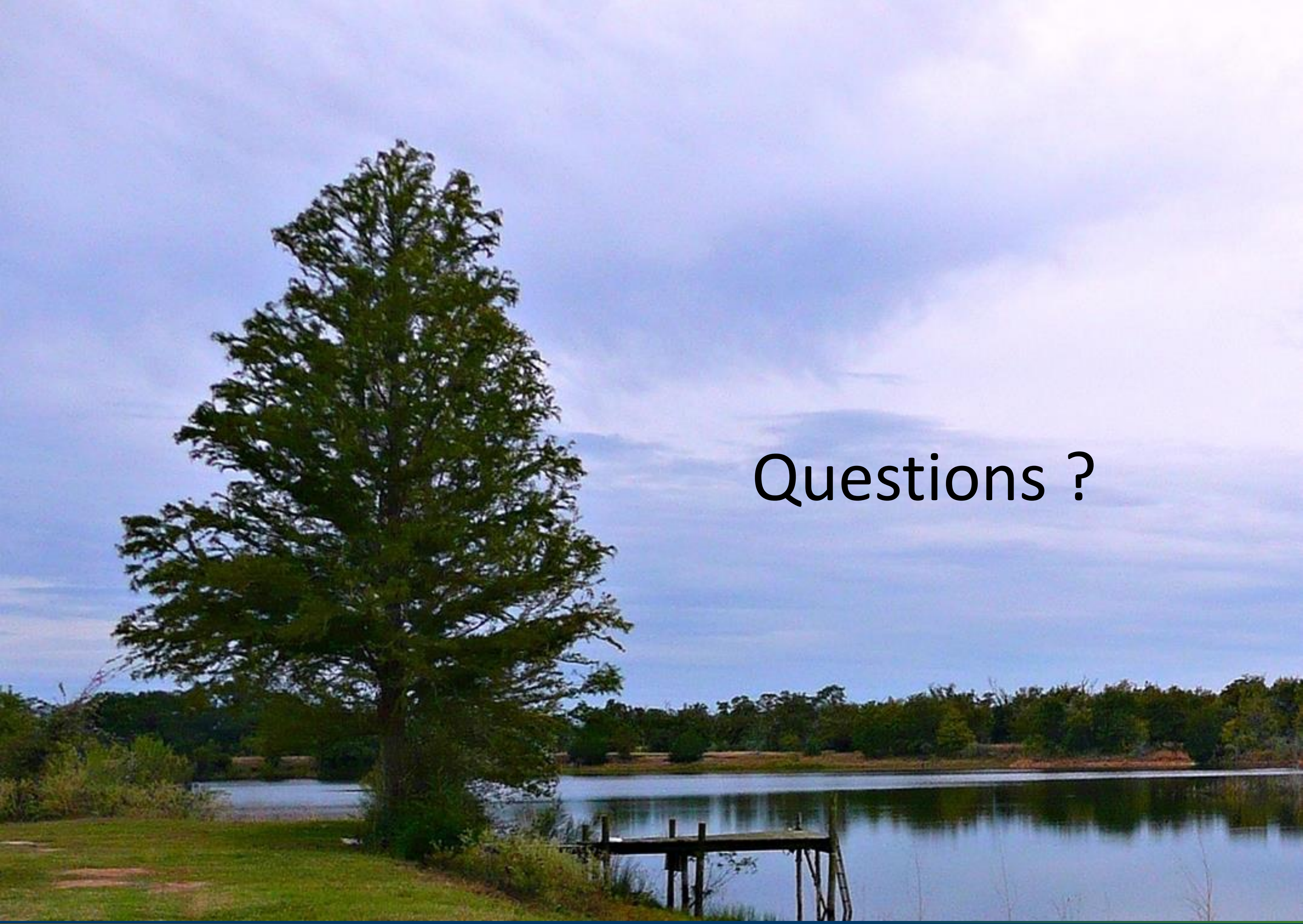
Month	Maximum of Daily Average i130 Pumping Rate	
	PBPW1	PBPW2
Nov-21	11/2/2021 11:00:00 PM	11/17/2021 10:00:00 AM

Month	Number of Daily Violations		
	PBPW1	PBPW2	Total
Nov-21	0	0	0

- Monitoring Equipment
- QA/QC Protocols

SLR Properties

- Compliance
- Monitoring Equipment
- QA/QC Protocols


Questions ?