Rural Community Outreach Workgroup

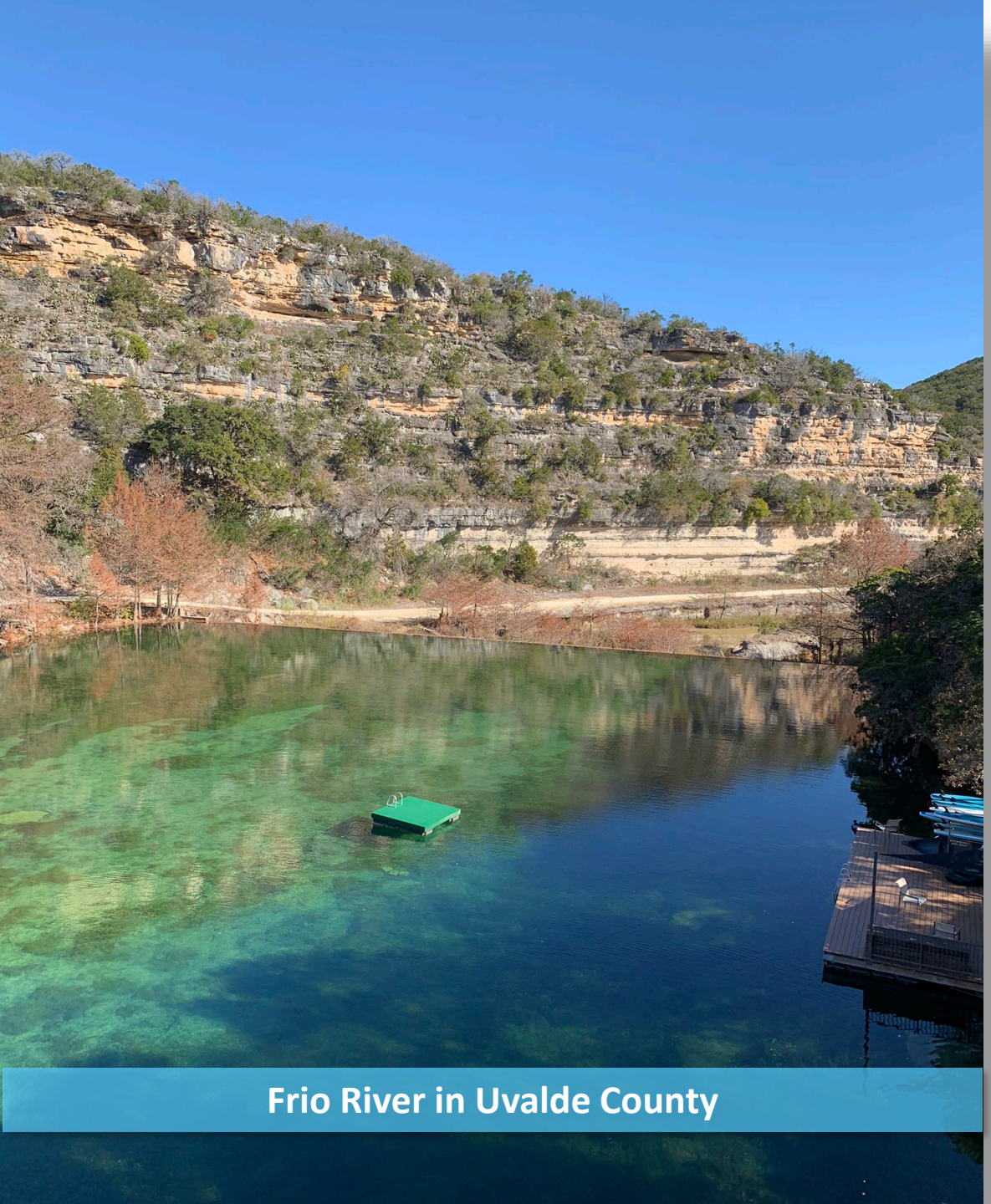
South Central Texas (Region L)
Regional Water Planning Group (SCTRWPG)

July 10, 2024, 1:30 pm

BLACK & VEATCH

7/10/2024

Agenda Item 1: Review and Discussion Regarding Water Management Strategies for Rural Communities



Frio River in Uvalde County

ADDRESSING IRRIGATION & RURAL WATER NEEDS

Issues from Previous Regional Water Plans:

- Significant Unmet Irrigation Needs (Shortages:
  - 15 Counties with Unmet Needs
  - 137,000 acft/yr in Region L
  - 103,000 acft/yr in Nueces Basin
- Low Engagement with Rural Communities Led to Inclusion of Few Projects and Water Management Strategies (WMSs)

Solutions for 2026 Regional Water Plan:

- Outreach Initiative and Workgroup to Develop WMSs to Benefit Rural Entities

Background: Irrigation

Issues

- 13 Counties with Irrigation Needs

1. Bexar
2. Caldwell
3. Calhoun
4. Dimmit
5. Goliad
6. Guadalupe
7. Karnes
8. La Salle
9. Medina
10. Uvalde
11. Victoria
12. Wilson
13. Zavala

- Total Irrigation Needs (2080): 72,074 acft/yr
- Majority of Needs are in the Nueces River Basin: 58,847 acft/yr

Solutions

- Add New Strategies into the 2026 Plan to Address Irrigation Needs
  - Identify appropriate irrigation measures/strategies for counties with Needs
  - Develop methodology to determine water savings (yields) and costs
  - Evaluate impacts of strategies on natural resources

Agenda Overview

1. Recap of Previous Workgroup Meeting on June 5th
2. Irrigation Conservation WMS Description
3. Irrigation Drought Management WMS
4. Rainwater Harvesting WMS

1. Recap of Previous Workgroup Meeting on June 5th

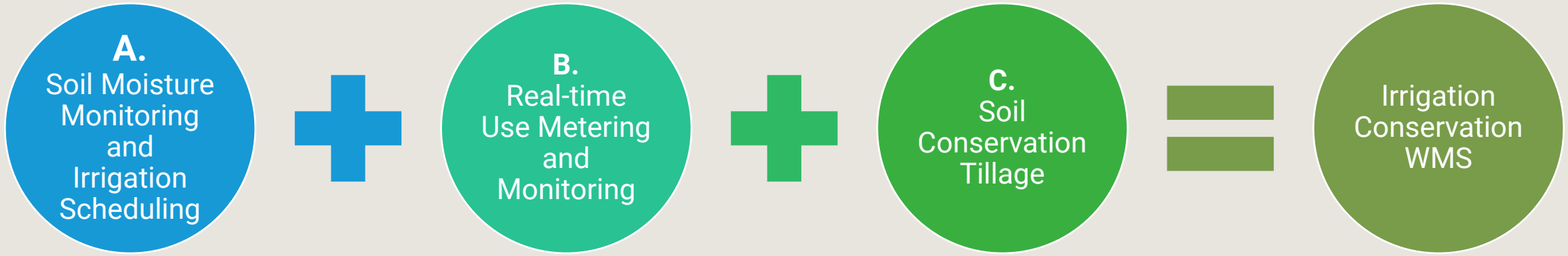
- Discussed Potential Irrigation Conservation WMSs
  - Workgroup considered several potential irrigation conservation strategies
  - Workgroup directed Black & Veatch (Technical Consultant) to develop potential methodologies for:
    - Soil Moisture Monitoring and Irrigation Scheduling;
    - Real-time Use Metering and Monitoring; and,
    - Soil Conservation Tillage
- Workgroup discussed Nueces River Authority potentially becoming a wholesale water provider (WWP) to sponsor projects
- Strategy write-up will include resources and guidance for funding (e.g., USDA, NRCS, TSSWCB, AgriLife, EAA)

2. Irrigation Conservation WMS Description

2. Irrigation Conservation WMS Description

Approach: Apply the "Irrigation Conservation WMS" for Irrigation water user groups (WUGs) that have needs

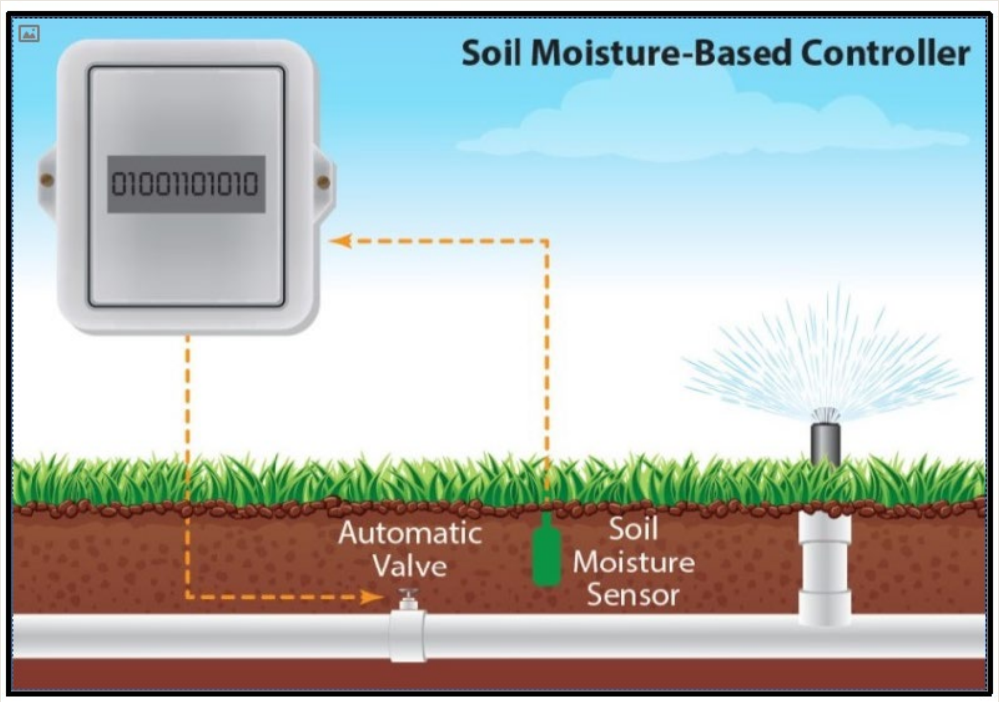
- **Yield:** Calculated by summing the demand reductions (water savings) from implementing three different conservation measures (shown below as A., B., and C.).
- **Cost:** Calculated by summing the costs associated with implementing the three conservation measures (shown below as A., B., and C).



2.A. Soil Moisture Monitoring & Irrigation Scheduling

Description:

- **Soil Moisture Monitoring:** Managing soil moisture levels by use of soil matric potential sensors to measure water suction in soil. Generally, planting in wet soil and adequate water before critical growth periods indicates the success of a crop.
- **Irrigation Scheduling:** Process of allocating irrigation water according to crop requirements based on meteorological demands and field conditions.



Source: U.S. General Services Administration

2.A. Soil Moisture Monitoring & Irrigation Scheduling

Methodology:

- Take the total acreage of cropland by county planted annually to determine potential acres of implementation
- Assume 10% of planted acres would implement strategy by 2030, 3% of planted acres would implement strategy in future decades
- Apply anticipated water savings (10%) to applied acres*
- Assume sensor has a 10-year lifespan and will be replaced
- Costs: $1,000 per sensor, 1 sensor per 10 acres**

*Irrigation Scheduling, “Analyzing potential water conservation strategies in the Texas Panhandle,” Crouch, MariKate; Guerrero, Bridget; Amosson, Steve; Marek, Thomas; Almas, Lal, Irrigation Science, Volume 38 (5-6): 9 – July 31, 2020.

**Zotarelli, L. & Dukes, Michael & Paranhos, Marcelo. (2013). Minimum Number of Soil Moisture Sensors for Monitoring and Irrigation Purposes. EDIS. 2013. 10.32473/edis-hs1222-2013.

2.A. Soil Moisture Monitoring & Irrigation Scheduling

WMS Yields by County

County	*Planted Cropland (ac)	*County Demand (acft/yr)	Water Savings (acft/yr)					
			2030	2040	2050	2060	2070	2080
Bexar	7,885	11,751	118	153	188	223	259	294
Caldwell	467	680	7	9	11	13	15	17
Calhoun	2,312	10,460	105	136	167	199	230	262
Dimmit	2,710	4,689	47	61	75	89	103	117
Goliad	3,280	3,126	31	41	50	59	69	78
Guadalupe	550	942	9	12	15	18	21	24
Karnes	780	915	9	12	15	17	20	23
La Salle	2,787	4,461	45	58	71	85	98	112
Medina	37,670	54,809	548	713	877	1,041	1,206	1,370
Uvalde	41,735	52,703	527	685	843	1,001	1,159	1,318
Victoria	3,723	11,092	111	144	177	211	244	277
Wilson	8,327	13,318	133	173	213	253	293	333
Zavala	24,373	42,574	426	553	681	809	937	1,064

Source: TWDB

2.B. Real-time Use Metering and Monitoring

- **Description:**
  - Real-time monitoring involves the installation of meters that assess water use by automatically recording and transferring flow data at 15-minute intervals.

- **Methodology:**
  - Take the total acreage of cropland by county planted annually to determine potential acres of implementation
  - Assume 3% of planted acres would implement strategy per decade
  - Apply anticipated water savings (10%) to applied acres*
  - Assume meters have a 20-year lifespan and will be replaced
  - Costs: $6,000 per meter, 1 meter per farm

*Fipps, Guy. “Potential Water Savings in Irrigated Agriculture for the Rio Grande Planning Region”, 2001.

2.B. Real-time Use Metering and Monitoring

WMS Yields by County

County	*Planted Cropland (ac)	*County Demand (acft/yr)	Water Savings (acft/yr)					
			2030	2040	2050	2060	2070	2080
Bexar	7,885	11,751	35	71	106	141	176	212
Caldwell	467	680	2	4	6	8	10	12
Calhoun	2,312	10,460	31	63	94	126	157	188
Dimmit	2,710	4,689	14	28	42	56	70	84
Goliad	3,280	3,126	9	19	28	38	47	56
Guadalupe	550	942	3	6	8	11	14	17
Karnes	780	915	3	5	8	11	14	16
La Salle	2,787	4,461	13	27	40	54	67	80
Medina	37,670	54,809	164	329	493	658	822	987
Uvalde	41,735	52,703	158	316	474	632	791	949
Victoria	3,723	11,092	33	67	100	133	166	200
Wilson	8,327	13,318	40	80	120	160	200	240
Zavala	24,373	42,574	128	255	383	511	639	766

**Source: TWDB*

2.C. Soil Conservation Tillage

Description:

Implementation of tillage practices that minimize soil and water loss by maintaining a surface residue cover of more than 30 percent on the soil surface. Conservation tillage can reduce evaporation, increase rainfall infiltration, enhance soil profile water storage, soil moisture conservation, and water use efficiency.

Source: Journey 2050

2.C. Soil Conservation Tillage

Methodology:

- Potential acreage of implementation based on total acreage of cropland by county planted annually
- Current implementation in region is 63% of cropland (minimum till, strip till or no-till)*
- Future implementation assumed to be a decadal increase of 6 percent slowing in later years of the planning horizon until 95 percent of all irrigated acreage practices some sort of conservation tillage.
- Apply anticipated water savings (1.75 ac-in/ac) to applied acres*
- Costs: None

* December 2015 USDA report on Conservation-Practice Adoption Rates
**Irrigation Scheduling, "Analyzing potential water conservation strategies in the Texas Panhandle," Crouch, MariKate; Guerrero, Bridget; Amosson, Steve; Marek, Thomas; Almas, Lal, Irrigation Science, Volume 38 (5-6): 9 – July 31, 2020.

2.C. Soil Conservation Tillage

WMS Yields by County

County	*Planted Cropland (ac)	Water Savings (acft/yr)					
		2030	2040	2050	2060	2070	2080
Bexar	7,885	69	138	207	276	322	368
Caldwell	467	4	8	12	16	19	22
Calhoun	2,312	20	40	61	81	94	108
Dimmit	2,710	24	47	71	95	111	126
Goliad	3,280	29	57	86	115	134	153
Guadalupe	550	5	10	14	19	22	26
Karnes	780	7	14	20	27	32	36
La Salle	2,787	24	49	73	98	114	130
Medina	37,670	330	659	989	1,318	1,538	1,758
Uvalde	41,735	365	730	1,096	1,461	1,704	1,948
Victoria	3,723	33	65	98	130	152	174
Wilson	8,327	73	146	219	291	340	389
Zavala	24,373	213	427	640	853	995	1,137

Source: TWDB

2. Irrigation Conservation WMS

WMS Yields by County

County	Water Savings (acft/yr)					
	2030	2040	2050	2060	2070	2080
Bexar	222	362	501	640	757	874
Caldwell	13	21	29	37	44	51
Calhoun	156	239	322	406	481	558
Dimmit	85	136	188	240	284	327
Goliad	69	117	164	212	250	287
Guadalupe	17	28	37	48	57	67
Karnes	19	31	43	55	66	75
La Salle	82	134	184	237	279	322
Medina	1,042	1,701	2,359	3,017	3,566	4,115
Uvalde	1,050	1,731	2,413	3,094	3,654	4,215
Victoria	177	276	375	474	562	651
Wilson	246	399	552	704	833	962
Zavala	767	1,235	1,704	2,173	2,571	2,967
TOTAL	**3,945**	**6,410**	**8,871**	**11,337**	**13,404**	**15,471**

2. Irrigation Conservation WMS (1 of 2)

WMS Yields by County-Basin Split

County	Basin	2080 Need	Water Savings (acft/yr)						Post-Strategy 2080 Need
			2030	2040	2050	2060	2070	2080	
Bexar	Nueces (11%)	-	24	40	55	70	83	96	-
Bexar	San Antonio (89%)	(1,873)	198	322	446	570	674	778	(1,095)
Caldwell	Colorado (3%)	(19)	-	1	1	1	1	1	(18)
Caldwell	Guadalupe (97%)	-	13	20	28	36	43	50	-
Calhoun	Colorado-Lavaca (5%)	-	8	12	16	20	24	28	-
Calhoun	Lavaca-Guadalupe (95%)	(9,173)	148	227	306	386	457	530	(8,643)
Dimmit	Nueces (89%)	(3,917)	76	122	168	215	254	292	(3,625)
Dimmit	Rio Grande (11%)	(419)	9	14	20	25	30	35	(384)
Goliad	Guadalupe (18%)	-	12	21	29	38	44	51	-
Goliad	San Antonio (69%)	-	48	81	114	147	174	199	-
Goliad	San Antonio-Nueces (13%)	-	9	15	21	27	32	37	-
Guadalupe	Guadalupe (81%)	(20)	14	23	30	39	46	54	-
Guadalupe	San Antonio (19%)	-	3	5	7	9	11	13	-

2. Irrigation Conservation WMS (2 of 2)

WMS Yields by County-Basin Split

County	Basin	2080 Need	Water Savings (acft/yr)						Post-Strategy 2080 Need
			2030	2040	2050	2060	2070	2080	
Karnes	Guadalupe (5%)	-	1	2	2	3	3	4	-
Karnes	Nueces (9%)	(78)	2	3	4	5	6	6	(72)
Karnes	San Antonio (83%)	(659)	15	25	35	45	55	62	(597)
Karnes	San Antonio-Nueces (3%)	(7)	1	1	2	2	2	3	(4)
La Salle	Nueces (100%)	(413)	82	134	184	237	279	322	(91)
Medina	Nueces (86%)	(21,770)	897	1,465	2,031	2,598	3,070	3,543	(18,227)
Medina	San Antonio (14%)	(526)	145	236	328	419	496	572	-
Uvalde	Nueces (100%)	(18,480)	1,050	1,731	2,413	3,094	3,654	4,215	(14,265)
Victoria	Guadalupe (12%)	(200)	21	33	45	57	67	78	(122)
Victoria	Lavaca-Guadalupe (88%)	-	156	243	330	417	495	573	-
Wilson	Nueces (44%)	-	107	174	240	307	363	419	-
Wilson	San Antonio (56%)	(331)	139	225	312	397	470	543	-
Zavala	Nueces (100%)	(14,189)	767	1,235	1,704	2,173	2,571	2,967	(11,222)
TOTAL		**(72,074)**	**3,945**	**6,410**	**8,871**	**11,337**	**13,404**	**15,471**	**(58,365)**

Project Cost Estimate Summary

Irrigation Conservation Estimate Summary

WMS Cost Summary	
Cost of Facilities	$ 24,261,000
Total Project Costs	$ 33,817,000
Annual Costs*	$ 4,309,000
Project Yield (acft/yr)	15,471
Unit Costs ($/acft/yr)	$ 279

* Includes debt service amortization at 3.5% for 20 years, O&M, and power costs

- September 2023 dollars
- Developed using Uniform Costing Model (UCM) from TWDB
- Includes capital costs, annual debt service, operation and maintenance, power, land acquisition, and environmental mitigation

3. Irrigation Drought Management WMS

3. Irrigation Drought Management WMS

- **Description:** During severe drought conditions, farmers that use groundwater would restrict their usage by 25 percent.
- **Costs:** No capital costs are associated with this strategy; however, costs for drought management for irrigation will be determined using the TWDB Socioeconomic Impact Analysis of Unmet Needs from the 2026 Region L Water Plan, which will show an impact cost to the local economy based on the missed opportunity to grow agriculture. Unit costs range from county to county.

3. Irrigation Drought Management WMS

WMS Yields by County

County	% Demand Met by Groundwater	Demand Expected to be met by GW (acft/yr)	Water Demand Reduction, Based on 25% GW Usage (acft/yr)					
			2030	2040	2050	2060	2070	2080
Bexar	100%	11,747	2,937	2,937	2,937	2,937	2,937	2,937
Caldwell	100%	680	170	170	170	170	170	170
Calhoun	100%	10,460	2,615	2,615	2,615	2,615	2,615	2,615
Dimmit	40%	1,886	472	472	472	472	472	472
Goliad	100%	3,126	782	782	782	782	782	782
Guadalupe	60%	564	141	141	141	141	141	141
Karnes	90%	820	205	205	205	205	205	205
La Salle	88%	3,939	985	985	985	985	985	985
Medina	100%	54,809	13,702	13,702	13,702	13,702	13,702	13,702
Uvalde	98%	51,594	12,899	12,899	12,899	12,899	12,899	12,899
Victoria	100%	11,092	2,773	2,773	2,773	2,773	2,773	2,773
Wilson	92%	12,232	3,058	3,058	3,058	3,058	3,058	3,058
Zavala	100%	42,574	10,644	10,644	10,644	10,644	10,644	10,644

2. Irrigation Conservation WMS (1 of 2)

WMS Yields by County-Basin Split

County	Basin	Water Savings (acft/yr)					
		2030	2040	2050	2060	2070	2080
Bexar	Nueces (11%)	323	323	323	323	323	323
Bexar	San Antonio (89%)	2,614	2,614	2,614	2,614	2,614	2,614
Caldwell	Colorado (3%)	5	5	5	5	5	5
Caldwell	Guadalupe (97%)	165	165	165	165	165	165
Calhoun	Colorado-Lavaca (5%)	131	131	131	131	131	131
Calhoun	Lavaca-Guadalupe (95%)	2,484	2,484	2,484	2,484	2,484	2,484
Dimmit	Nueces (89%)	422	422	422	422	422	422
Dimmit	Rio Grande (11%)	50	50	50	50	50	50
Goliad	Guadalupe (18%)	139	139	139	139	139	139
Goliad	San Antonio (69%)	543	543	543	543	543	543
Goliad	San Antonio-Nueces (13%)	100	100	100	100	100	100
Guadalupe	Guadalupe (81%)	114	114	114	114	114	114
Guadalupe	San Antonio (19%)	27	27	27	27	27	27

2. Irrigation Conservation WMS (2 of 2)

WMS Yields by County-Basin Split

County	Basin	Water Savings (acft/yr)					
		2030	2040	2050	2060	2070	2080
Karnes	Guadalupe (5%)	10	10	10	10	10	10
Karnes	Nueces (9%)	17	17	17	17	17	17
Karnes	San Antonio (83%)	171	171	171	171	171	171
Karnes	San Antonio-Nueces (3%)	7	7	7	7	7	7
La Salle	Nueces (100%)	985	985	985	985	985	985
Medina	Nueces (86%)	11,798	11,798	11,798	11,798	11,798	11,798
Medina	San Antonio (14%)	1,904	1,904	1,904	1,904	1,904	1,904
Uvalde	Nueces (100%)	12,899	12,899	12,899	12,899	12,899	12,899
Victoria	Guadalupe (12%)	333	333	333	333	333	333
Victoria	Lavaca-Guadalupe (88%)	2,440	2,440	2,440	2,440	2,440	2,440
Wilson	Nueces (44%)	1,332	1,332	1,332	1,332	1,332	1,332
Wilson	San Antonio (56%)	1,726	1,726	1,726	1,726	1,726	1,726
Zavala	Nueces (100%)	10,644	10,644	10,644	10,644	10,644	10,644
		51,383	**51,383**	**51,383**	**51,383**	**51,383**	**51,383**

Irrigation WMSs Yields (2 of 2)

County	Basin	2080 Need	2080 Irrigation Conservation Yield	2080 Irrigation Drought Management Yield	Post-Strategy 2080 Need
Bexar	Nueces	-	96	323	-
Bexar	San Antonio	(1,873)	778	2,614	-
Caldwell	Colorado	(19)	1	5	(13)
Caldwell	Guadalupe	-	50	165	-
Calhoun	Colorado-Lavaca	-	28	131	-
Calhoun	Lavaca-Guadalupe	(9,173)	530	2,484	(6,159)
Dimmit	Nueces	(3,917)	292	422	(3,203)
Dimmit	Rio Grande	(419)	35	50	(334)
Goliad	Guadalupe	-	51	139	-
Goliad	San Antonio	-	199	543	-
Goliad	San Antonio-Nueces	-	37	100	-
Guadalupe	Guadalupe	(20)	54	114	-
Guadalupe	San Antonio	-	13	27	-

Irrigation WMSs Yields (2 of 2)

County	Basin	2080 Need	2080 Irrigation Conservation Yield	2080 Irrigation Drought Management Yield	Post-Strategy 2080 Need
Karnes	Guadalupe	-	4	10	-
Karnes	Nueces	(78)	6	17	(55)
Karnes	San Antonio	(659)	62	171	(426)
Karnes	San Antonio-Nueces	(7)	3	7	-
La Salle	Nueces	(413)	322	985	-
Medina	Nueces	(21,770)	3,543	11,798	(6,429)
Medina	San Antonio	(526)	572	1,904	-
Uvalde	Nueces	(18,480)	4,215	12,899	(1,366)
Victoria	Guadalupe	(200)	78	333	-
Victoria	Lavaca-Guadalupe	-	573	2,440	-
Wilson	Nueces	-	419	1,332	-
Wilson	San Antonio	(331)	543	1,726	-
Zavala	Nueces	(14,189)	2,967	10,644	(578)
TOTAL		**(72,074)**	**15,471**	**51,383**	**(18,563)**

4. Rainwater Harvesting

Rainwater Harvesting

Project Description

Demand reduction associated with collecting the run-off from a structure or other impervious surface to store for later use

- Project Sponsor(s): As requested by WUG
  - Boerne, Kirby, Kyle, Leon Valley, Port Lavaca, Poteet
- Source: Demand reduction
- Yield: Varies based on WUG
- Facilities: None

Image Source: TWDB

Demand Reduction (Yield) by WUG

Rainwater Harvesting

Yield Assumptions:

- 10% of households (one catchment area per household) will implement large-scale rainwater harvesting starting in 2040
- A catchment area of 2,000 square feet yields about 1,000 gallons for 1 inch of rainfall
- Storage capacity limitation of 15,000 gallons/household

WUG	County	Basin	Yield (acft/yr)					
			2030	2040	2050	2060	2070	2080
Boerne	Kendall	San Antonio	-	62	84	109	139	172
Kirby	Bexar	San Antonio	-	18	18	18	18	18
Kyle	Hays	Guadalupe	-	148	202	226	234	240
Leon Valley	Bexar	San Antonio	-	32	32	32	32	32
Port Lavaca	Calhoun	Lavaca-Guadalupe	-	19	19	19	19	19
Poteet	Atascosa	Nueces	-	3	3	3	3	3

Project Cost Estimate Summary

Rainwater Harvesting Estimate Summary

One household system = $21,000

WUG	Cost of Facilities	Annual Costs*	2080 Project Yield (acft/yr)	Unit Costs ($/acft)
Boerne	$78,372,000	$9,424,000	172	$54,791
Kirby	$8,253,000	$992,000	18	$55,111
Kyle	$109,620,000	$13,181,000	240	$54,921
Leon Valley	$14,385,000	$1,730,000	32	$54,063
Port Lavaca	$8,652,000	$1,040,000	19	$54,737
Poteet	$1,659,000	$199,000	3	$66,333

* Includes debt service amortization at 3.5% for 10 years

- September 2023 dollars
- Developed using Uniform Costing Model (UCM) methodology from TWDB
- Includes capital costs and annual debt service

Agenda Item 2: Open Discussion