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Economically Recoverable Water in Texas: An Underappreciated Water Management Strategy?

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THE MEADOWS CENTER
FOR WATER AND THE ENVIRONMENT

TEXAS STATE UNIVERSITY

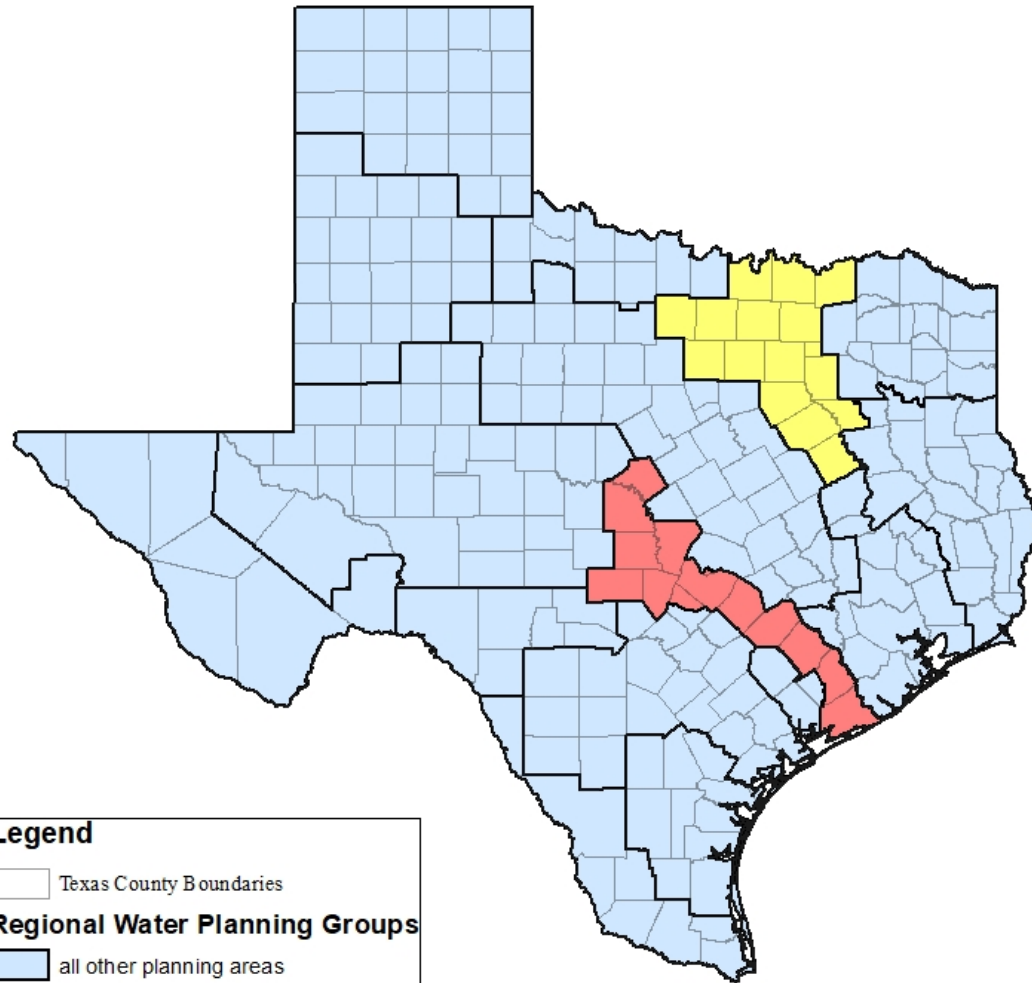
Acknowledgments

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- *Texas State University:*
 - *University of Advancement, Office of Development*
 - *Office of the Provost and VP of Academic Affairs*
- Texas Water Development Board, Water Science & Conservation, and Water Supply & Infrastructure staff
- *Geography Graduate Students: Christina Lopez, MAG and Jamie P. Gordon (MAG 2019)*

Project Purpose

- 1) Reconsider the “value” of real and apparent losses in a drought-prone state,
- 2) *Estimate the economically recoverable portion of utility water loss, and*
- 3) Compare results from #1 and #2 above to near-term regional plans

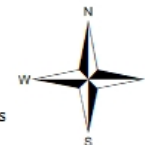
Texas Regional Water Planning Groups C & K



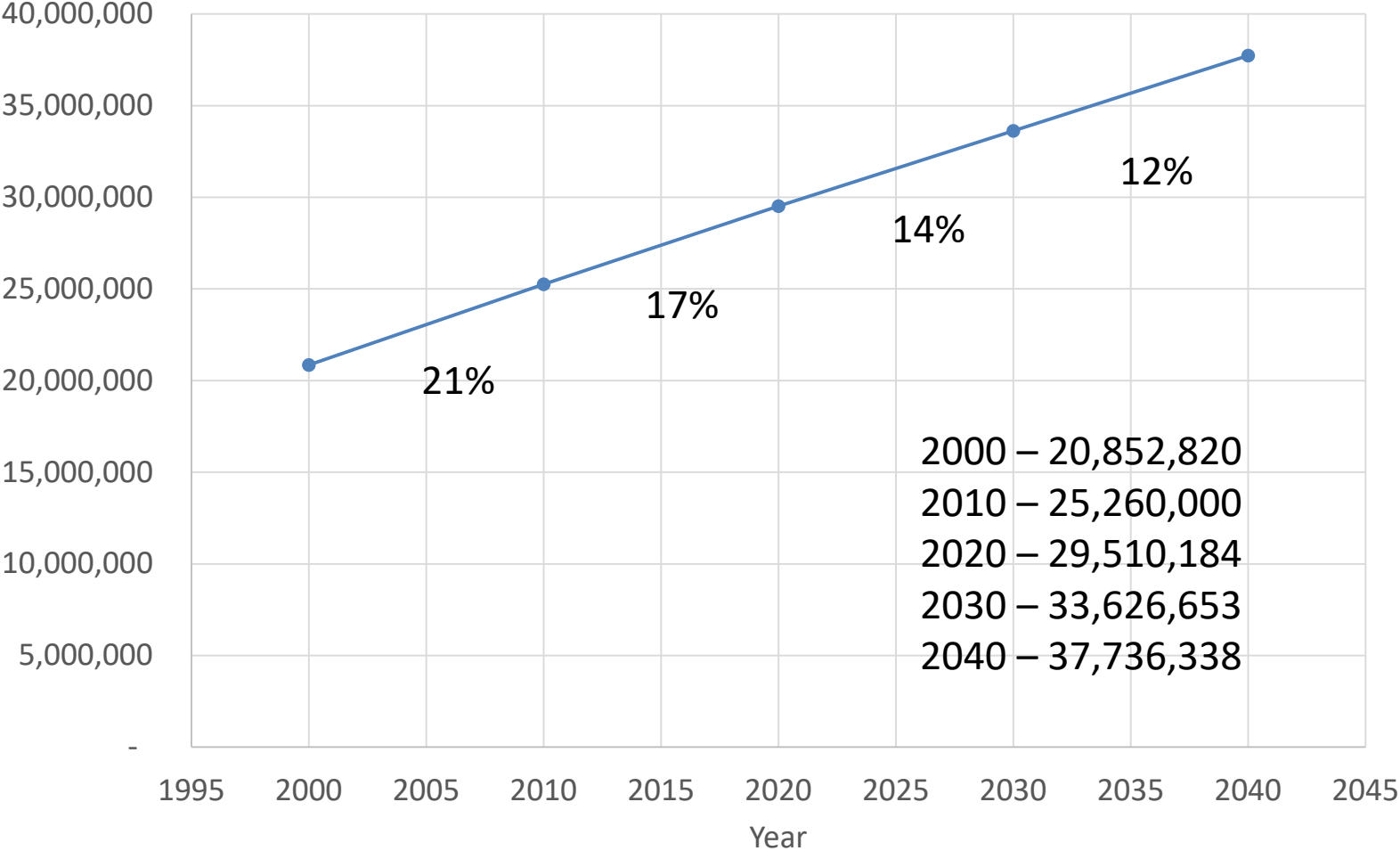
Legend

- Texas County Boundaries
- all other planning areas
- C
- K

8/21/2018
Texas County Boudaries: TxDOT
Regional Water Planning Areas: TNRIS



State of Texas Population: 2000 - 2040



2017 State Water Plan



- Water Demand outstrips existing supplies!*
- *Municipal demand to exceed agricultural use in 2060s.*
- \$63 billion needed by 2070 to close the gap!

Data Details ...

- Dataset includes 106 Water Service Providers (WSPs)
- Some analyses based on top 27 WSPs
 - Captures ~ 85% of total system input volume!
 - Some analyses exclude WSPs with implausible data (e.g., $ILL < 1$); thus, “n” is variable across analyses
- Current state of data: *unvalidated, but with some filtering*
- *Two regions combined into one dataset, with some partitioning done based on WSP size*
- *Some values are normalized for extrapolation statewide*

WSP Characteristics by Size Class (n=106)

	X-Large (3)	Large (12)	Medium (58)	Small (33)
Range of Pop. Served	781,100 - 1,232,360	91,429 - 369,308	10,005 - 68,667	190 - 8,819
Avg. System Input Volume	185,715	28,906	4,836	336
Avg. No. of Service Connect.	260,047	67,124	10,788	1,168
Avg. Miles of Main	4,089	829	228	28

Average Water Consumption in TX

- *Monthly consumption based on:*
 - 2.84 persons per household
(US Census Bureau 2017)
 - 94 gpcd, statewide residential average
(Hermitte and Mace 2012)
 - **About 8,000 gallons / month**

Audit Reported Retail Price of Water (2014) vs. Current (2017) Retail Rates (\$; n=26)

	Water Audit / Average Current	X-Large WSP (3) Audit / Current	Large WSP (11) Audit / Current	Medium WSP (12) Audit / Current
Retail Price / 1,000 gallons	3.94 / 5.22	3.68 / 5.37	4.29 / 4.93	3.64 / 5.27
Percent Increase	32	46	15	31

Average variable production cost is \$1.87 / 1,000 gallons.

Water Loss Performance Indicators

<i>median values</i>	Reg. C & K, TX - 2014	Andrews and Sturm (2016)	Unit
Retail Cost	4.00	4.67	\$ / 1,000 gallons
Variable Prod. Cost	1,680	950	\$ / million gallons

Water Loss Performance Indicators

Apparent Losses	5.81	5.73	gallons / service connection / day
Real Losses	32.03	39.88	gallons / service connection / day
Real Losses	1,424	786	gallons / miles of main / day
ILI	2.82	2.48	<i>dimen'less</i>

Economic Level of Loss

Two approaches considered ...

1) ELL estimated using midpoint between CARL and UARL, and

2) KWEC method applied to PA utilities (2017)

	<i>Regions C and K (2014)</i>	<i>State of Texas (2010)</i>
Population Served	6,816,020	25,260,000
Total System Inputs (MG/ac-ft)	392,764 / 1,205,348	1,456,350 / 4,469,374
Avg. Economically Recoverable Real Loss (gallons)/person/year ^c	2,519	(assumes 2,519 gallons/person for entire population)
Value of Economically Recoverable Real Losses/ person/year ^d	Calculated for water (1,000 gallons) valued at:	
	a) variable production cost - \$4.71	
	b) audit reported retail - \$10.08	
	c) current rate retail price - \$13.15	
Value of Economically Recoverable Real Losses/ year based on pop. served	a) \$32,103,454	\$118,974,600 - \$332,169,000
	b) \$68,705,482	
	c) \$89,630,663	

	<i>Regions C and K (2014)</i>	<i>State of Texas (2010)</i>
Average Economically Recoverable Apparent Loss (gallons)/person/year ^a	590	(assumes 589.85 per person for entire population)
Value of Economically Recoverable Apparent Loss per person per year	\$2.36 - \$3.08	
	Calculated for water valued at audit reported retail (\$4.00/1,000 gallons) and by the current rate retail price (\$5.22/1,000 gallons)	
Value of Economically Recoverable Apparent Loss/year based on pop. served	\$16,085,807 - \$20,993,342	\$59,613,600 - \$77,800,800

	<i>Regions C and K (2014)</i>	<i>State of Texas (2010)</i>
Average Economically Recoverable Real and Apparent Loss (gallons)/person/year	3,109	(assumes total loss of 3,109 per person for entire population)
Value of Economically Recoverable Real and Apparent Loss/person/year	\$12.44 - \$16.23	
	Calculated for water valued at reported retail (\$4.00/1,000 gallons) and by the current rate price (\$5.22/1,000 gallons) for Regions C and K.	
Total volume (MG/ac-ft) of Economically Recoverable Real & Apparent Losses	21,191 / 65,033	78,533 / 241,010
Total value of Economically Recoverable Real and Apparent Losses/year	Applying retail rates only: reported: \$84,791,289 - current: \$110,624,005	\$314,234,400 - \$409,969,800

2017 State Water Plan

Economically Recoverable Water: Regions C and K, TX (2014)

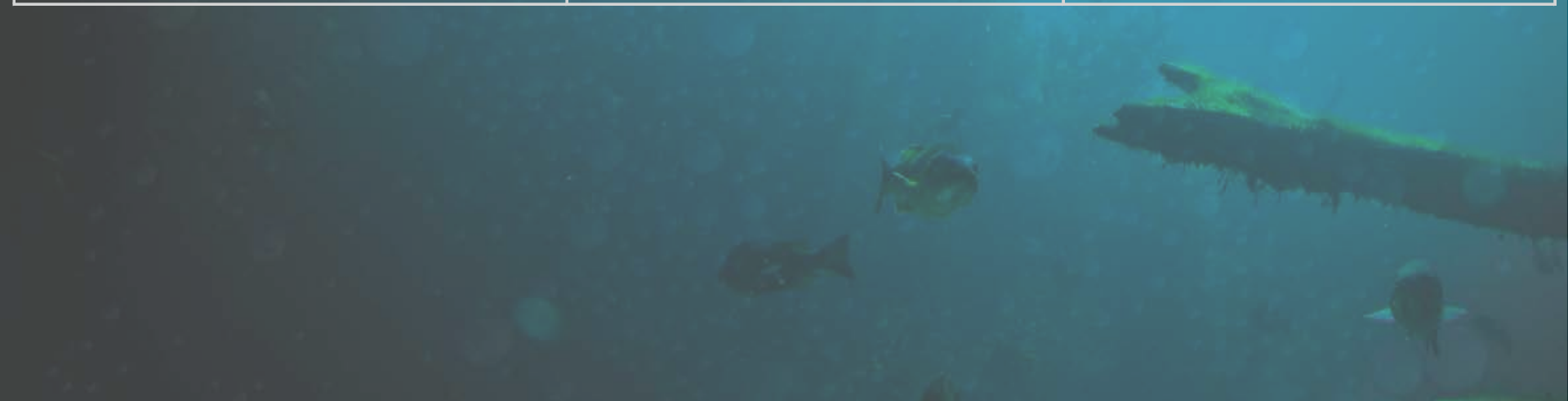
**21,191.0 MG /
65,032 ac-ft**

Region C Plan: Annual Water Loss Control (2020s)

**8,687.5 MG /
26,661 ac-ft**

Region K Plan: Annual Water Loss Control (2020s)

?



2017 State Water Plan

<i>Retail Value of Economically Recoverable Water: Regions C and K, TX (2014)</i>	<i>Region C Plan: Annual Cost for Water Loss Control (2020s)</i>	<i>Region K Plan: Annual Cost for Water Loss Control (2020s)</i>
as much as \$110 million	\$22.9 million	?

Conclusions

- Value of economically recoverable water loss in Texas is underestimated!
- *Water Loss Control strategies (in Region C, Texas) planned for the next decade appear to be very conservative in capturing the volume of economically recoverable water.*
- Estimation of value here greatly exceeds the planned annual investment in repair and recovery.

Thank You!!

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