# This presentation premiered at WaterSmart Innovations

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# The Texas Water Loss Audit Validation (TWLAV) Study

Results from the 2020 Water Loss Audit Validations

### Daniel Rice Municipal Conservation Team Lead

Unless specifically noted, this presentation does not necessarily reflect official Board positions or decisions.

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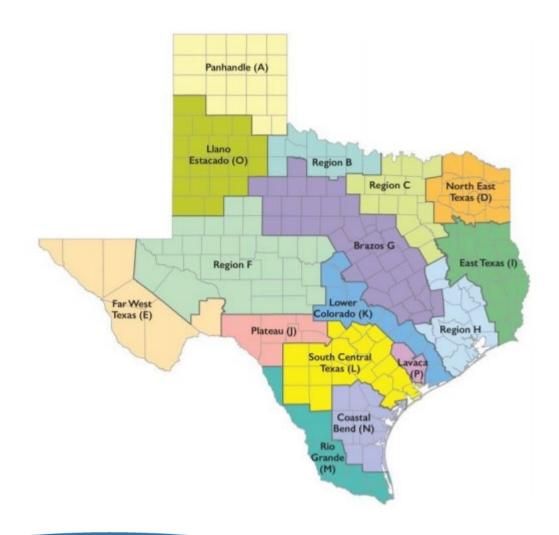
# Texas Water Development Board

### Mission

To lead the state's efforts in ensuring a secure water future for Texas and its citizens.

> Water Planning Data Collection and Dissemination **Financial Assistance** Technical Assistance Mapping Flood Assistance **And More**

# Regional Water Planning



### Texas Water Loss Audit Program History

**Riders** Pre-2000's 5-year audits required Early 2000's LUC; Update methodology; Data assessment scores; Annual audits required Early 2010's Expanded trainings; Required trainings; Historical water loss data viewer Late 2010's • Explore expanded water loss programs and data validation; Develop interactive water loss data viewer 2020's





2019 - Water Balance Data for Statewide Totals as of 9/15/2021

2019 - Water Balance Data for Statewide Totals as 01 9/15/2021						
StateWide Totals Audits Submitted 562	System Input Value 946,521,926,426	Authorization Consumption 802,872,527,033 84%	Bill Consumption 772,641,076,649 81%	Billed Metered 772,083,159,705.00 81% Billed Unmetered 557,916,944 0%	Revenue Water 772,641,076,649 81%	
946			Unbilled Consumption 30,231,450,384 3%	Unbilled Metered 9,598,446,357 1% Unbilled Unmetered		
				20,633,004,027 2%	Non-Revenue Water	
	100%		Apparent Loss 20,589,954,262 1%	Unauthorized Consumption 2,505,145,221 0%	174,438,766,721 16.37%	
		Water Loss 143,649,399,393 13.37%		Customer Meter Accuracy Loss 17,269,956,797 1%		
				System Data Handling Discrepancy 814,852,244 0%		
			Real Loss 123,059,445,131 12.37%	Reported Breaks And Leaks 31,971,445,095.00 3.37%		
				Unreported Loss 91,088,000,036 9%		

### **Water Loss Audit Methodology**

Follows AWWA water loss audit methodology







WLUC Water Use Survey Water Loss Audit Water Conservation

Water Use Survey

- Water Use Survey List					
Survey Number	PWS Code	System Name	Status	File Date	
0041010	2270001	CITY OF AUSTIN-GENERAL DISTRIBUTION SYSTEM	Submitted		

Water Loss Audit

- Water Loss Audit List					
PWS Code	System Name	Year Due	Status	Submitted Date	
<u>2270001</u>	CITY OF AUSTIN WATER & WASTEWATER	2021	Submitted	04/30/2021	

Water Conservation Annual Report

ı	- WC Annual R	eport List				
	PWS Code	Utility Type	System Name	Year Due	Status	Submitted Date
	2270001	Retail Water Supplier	City of Austin Water & Wastewater	2021	Review Completed	05/04/2021

Water Conservation Utility Profile

- WC Utility Profile List

Water Loss, Use, and Conservation (LUC) Application







# TWLAV Study: Beginnings



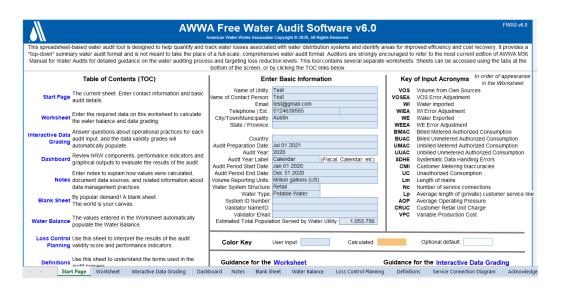
TWDB WLA Program always evolving



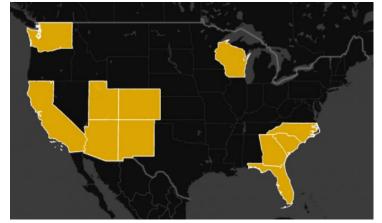
Interest in best management practices to help our customers Improving water use, loss, and conservation data improves water planning



Money available



Water Loss Technical Assistance Program (TAP) States



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Source: Cavanaugh & Associates





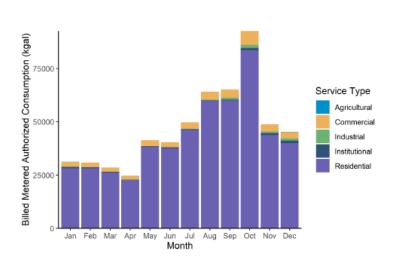
# TWLAV Study: Methods

- Voluntary Level 1 Validation of 10 utilities
  - -< 10,000; 10,000-49,999; 50,000-100,000 population</p>
  - Good geographic representation
- Draft validation questions
- Review historic water loss data
- Webinar
- Validation meetings
- Validation report to utilities with recommendations



# TWLAV Study: Methods cont'd

- Advanced validation was performed
  - 1 utility Billing Data Analysis
  - 2 utilities Real Loss Component Analysis



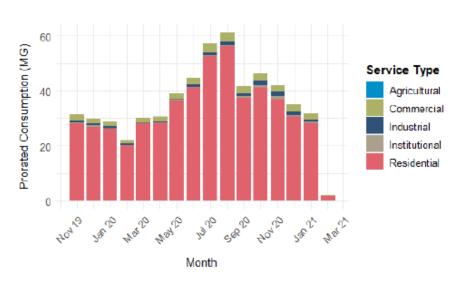


Figure 16: Uncorrected Billing Dataset – Volumes by Month with October Anomaly (Ann = 561 MG)

Figure 17: Corrected Billing Dataset - Volumes by Month (Annual Total = 516 MG)

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# TWLAV Study: Deliverables

#### Texas Water Loss Audit - Level 1 Validation Report

#### Audit Information:

Utility: Crystal Clear Special Utilities District PWS ID: 940015

System Type: Potable Audit Period: Calendar 2020

Utility Representation: Regina Franke (Assistant Director), Stephanie Olson-Haseloff (CCSUD), Carla Brayton (MSENG) [TWDB: John Sutton]

Validation Date: 4/29/2021 Call Time: 8:30am Supporting Documents Provided: Yes

#### Validation Findings & Confirmation Statement:

**Key Audit Metrics:** Pre-Validation Post-Validation

Total Assessment Score: 81.5 78.5 ILI: 2.0 2.7

Real Loss: 92.0 (gal/conn/day) 85.6 (gal/conn/day) Apparent Loss: 14.4 (gal/conn/day) 4.8 (gal/conn/day)

#### Validator Information:

Water Audit Validator: Larry Lewison Validator Qualifications: Contractor for TWDB

#### **Summary Recommendations for Utility Next Steps**

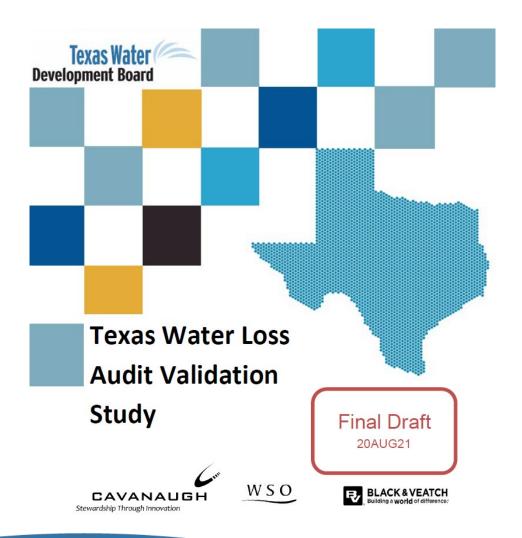
- Customized estimate of Unbilled Unmetered Authorized Consumption: consider producing itemized, agency-specific estimates of unbilled unmetered (operational) uses, rather than using the default. Ensure leakage estimates are excluded.
- Improved understanding of Supply Meter (Own or Import) Master Meter Error: consider adopting or increasing the rigor of a source meter volumetric testing and calibration program, informed by the guidance provided in AWWA Manual M36 - Appendix A.
- Temporal alignment of Billed Metered Authorized Consumption with Water Supplied: consider pro-rating the first and last months of the audit period to better align consumption with actual dates of use, and using read date as basis for reporting.
- Level 2 validation on raw data for Billed Metered Authorized Consumption to determine and resolve any instances of potable volume duplication or nonpotable volume inclusion. Note: this is being performed subsequently as a part of the current TWDB project.
- Improved estimation of CMI: consider a customer meter testing program which tests a sample of random meters whose stratification (by size, age, or other characteristics) represents the entire customer meter stock.



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## TWLAV Study: Deliverables





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Table 1: Level 1 Validated Water Loss Audit Results (before / after Level 1 validation)

Utility	Apparent Loss (gal/conn/day)	Real Loss (gal/conn/day)	Infrastructure Leakage Index	Data Validity Assessment Score
1	6.8 / 6.8	117.3 / 117.3	3.8 / 3.8	79.5 / 75.5
2	2.4 / 2.4	23.0 / 23.0	1.0 / 1.0	84.5 / 67.0
3	16.1 / 16.1	14.6 / 14.6	1.4 / 1.0	78.0 / 70.0
4 <sup>‡</sup>	blank / 7.1	blank / 74.2	blank / 3.6	blank / 47.5
5	3.6 / 3.6	73.0 / 73.0	n/a / n/a	44.0 / 35.0
6*	5.8 / 5.8	45.7 / 48.7	1.4 / 1.4	65.0 / 66.0
7*	14.4 / 4.8	92.0 / 85.6	2.0 / 2.7	81.5 / 78.5
8	6.7 / 6.7	75.6 / 75.6	n/a / n/a	79.0 / 73.0
9	19.5 / 19.4	140.0 / 138.1	6.9 / 6.8	41.5 / 51.0
10	5.3 / 5.3	15.4 / 13.9	0.9 / 0.8	71.0 / 74.0
Average:	9.0 / 7.8	73.5 / 66.4	2.5 / 2.6	69.3 / 65.6

### **TWLAV Study: Results**

Level 1 Validation updates the data validity scores but can also update the data inputs.

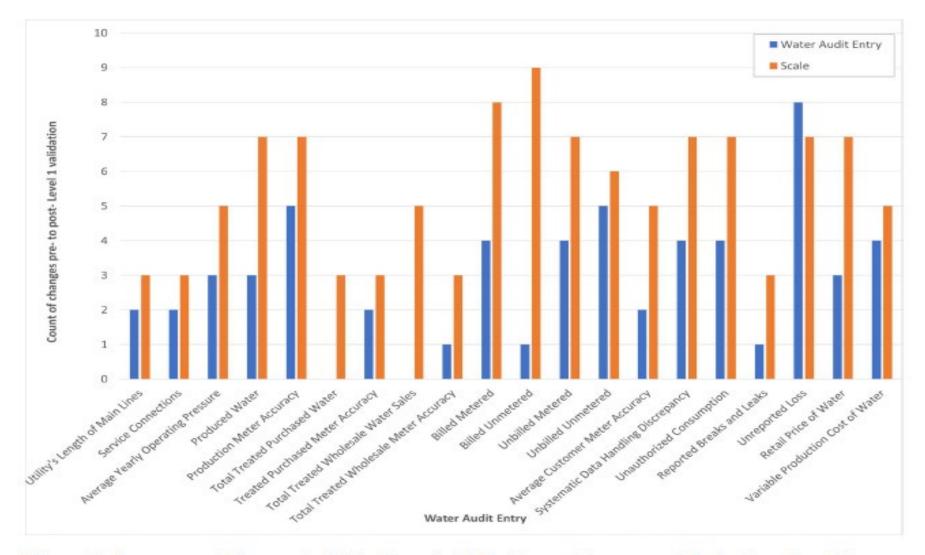


Figure 9 - Summary of Changes to Water Loss Audit Entries and Assessment Scales from Level 1 Validation

**TWLAV Study: Results** 

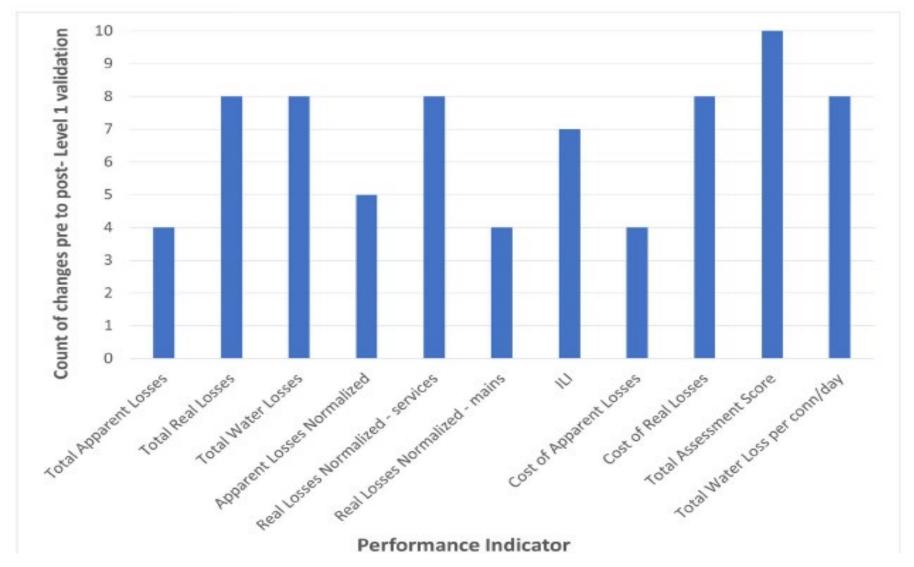


Figure 11 - Summary of Changes to Performance Indicators from Level 1 Validation **TWLAV Study: Results** 

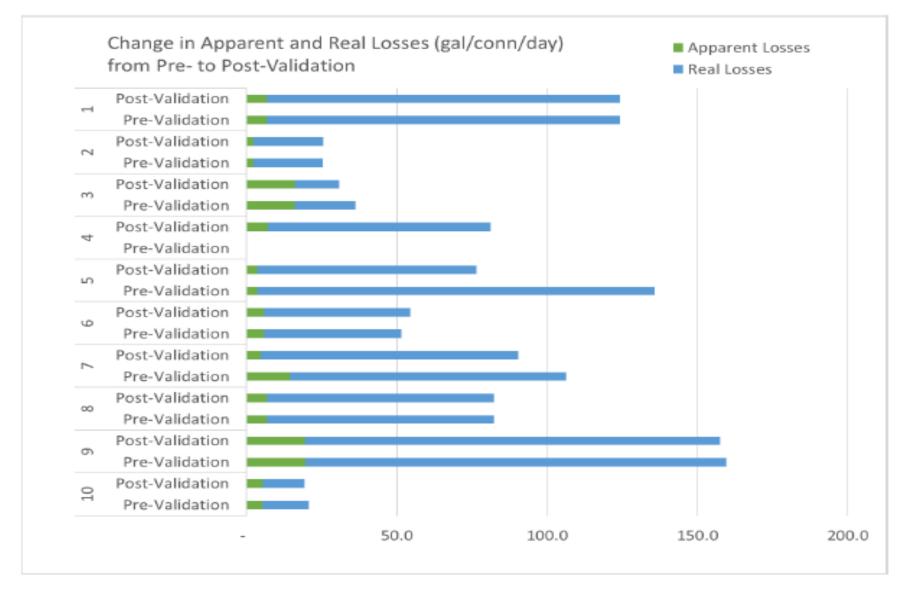


Figure 13: Change in Apparent and Real Loss Through Validation **TWLAV Study: Results** 



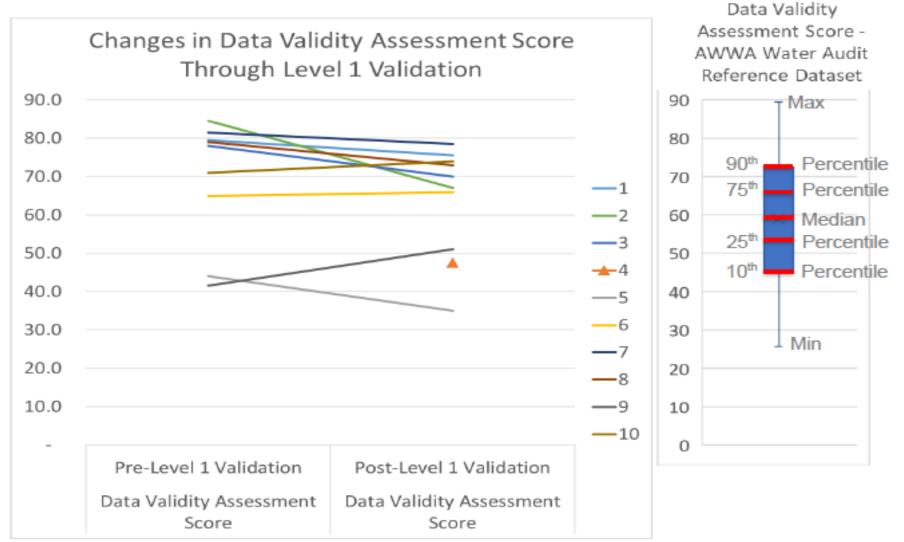


Figure 14: Spread of Data Validity Assessment Scores Through Level 1 Validation and Comparison to Typical Ranges in North America<sup>6</sup>

**TWLAV Study: Results** 

- Test
- Calibrate

Production Meters

- Sample Test
- Test Large Usage

Temporal alignment of Billed and Supplied

Customer Meters



Lag-time Correction



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- More accurate values
- Improve Apparent **Loss Costs**

**Retail Cost** 



- Direct/Indirect **Expenses**
- Improve Real Loss Costs

**Production** Cost



### **TWLAV Study: Utility Recommendations**

Most utilities had an Assessment Score of 50-80, suggesting next steps.

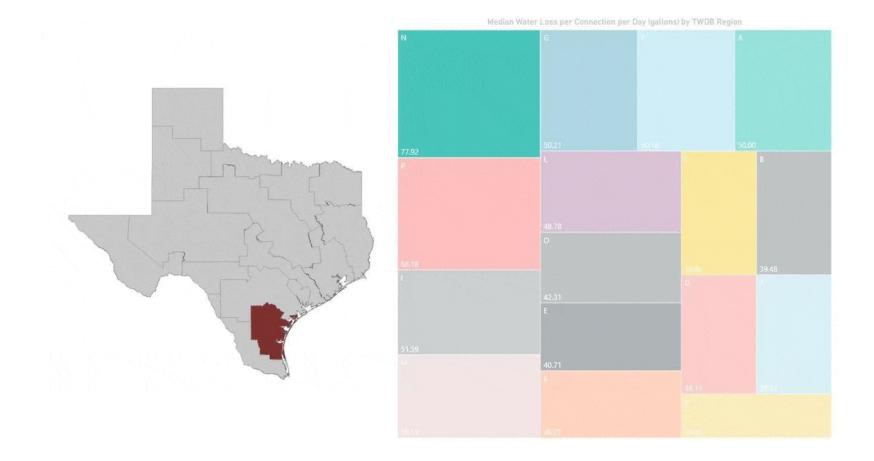
# TWLAV Study: Findings



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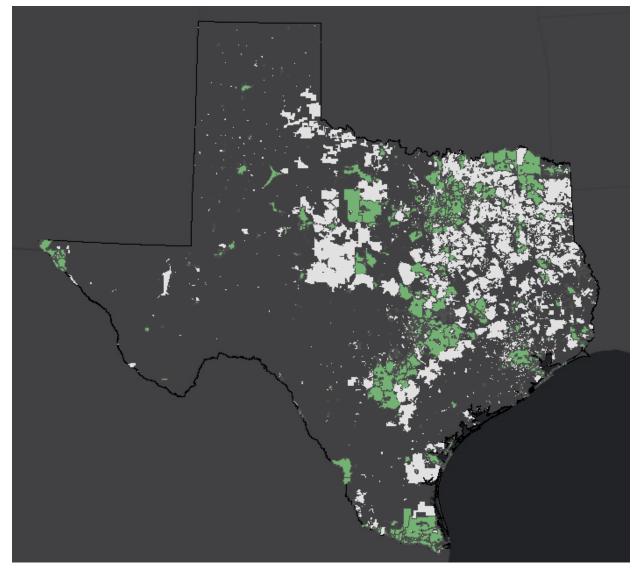


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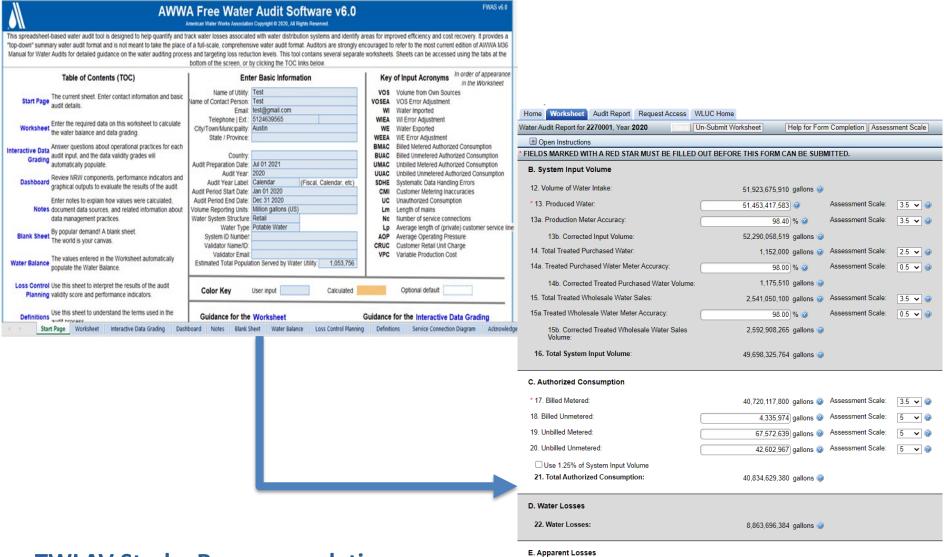
### **TWLAV Study: Recommendations**

1: Expand the Water Loss Audit Validation Study into a Regional Validation Program (RVP)



**TWLAV Study: Recommendations** 

2: Require Level 1 Validation for all annually required water loss audits



### **TWLAV Study: Recommendations**

3: Require Level 1 Validation for all annually required water loss audits

# TWLAV Study: Next Steps

- Continue to evolve with the industry
- Expand water loss program
  - Resources dictate possibilities
  - Further stress importance of data validation
- Continue to work closely with regional water planning

### TWDB Staff



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### **Study Contractors**







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### **Contact Information**

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Texas Water Development Board's Texas Water Loss Audit Validation Study

