

# This presentation premiered at WaterSmart Innovations

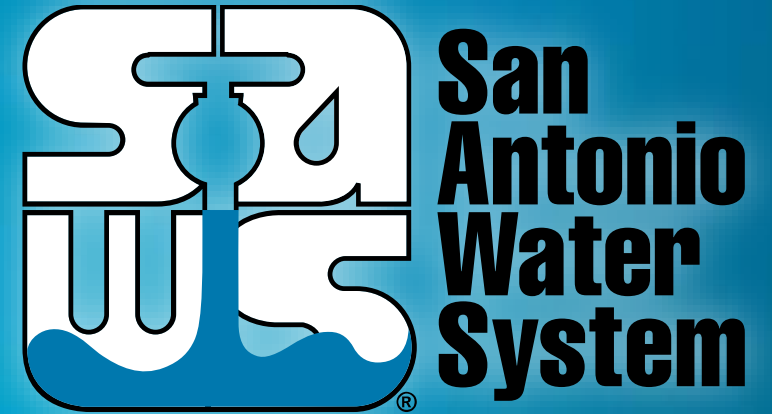
[watersmartinnovations.com](http://watersmartinnovations.com)



# San Antonio Tackles Water Loss

*5 years of water loss work*

**Patrick Shriver**, Water Resources, SAWS  
**Kate Gasner**, Water Systems Optimization

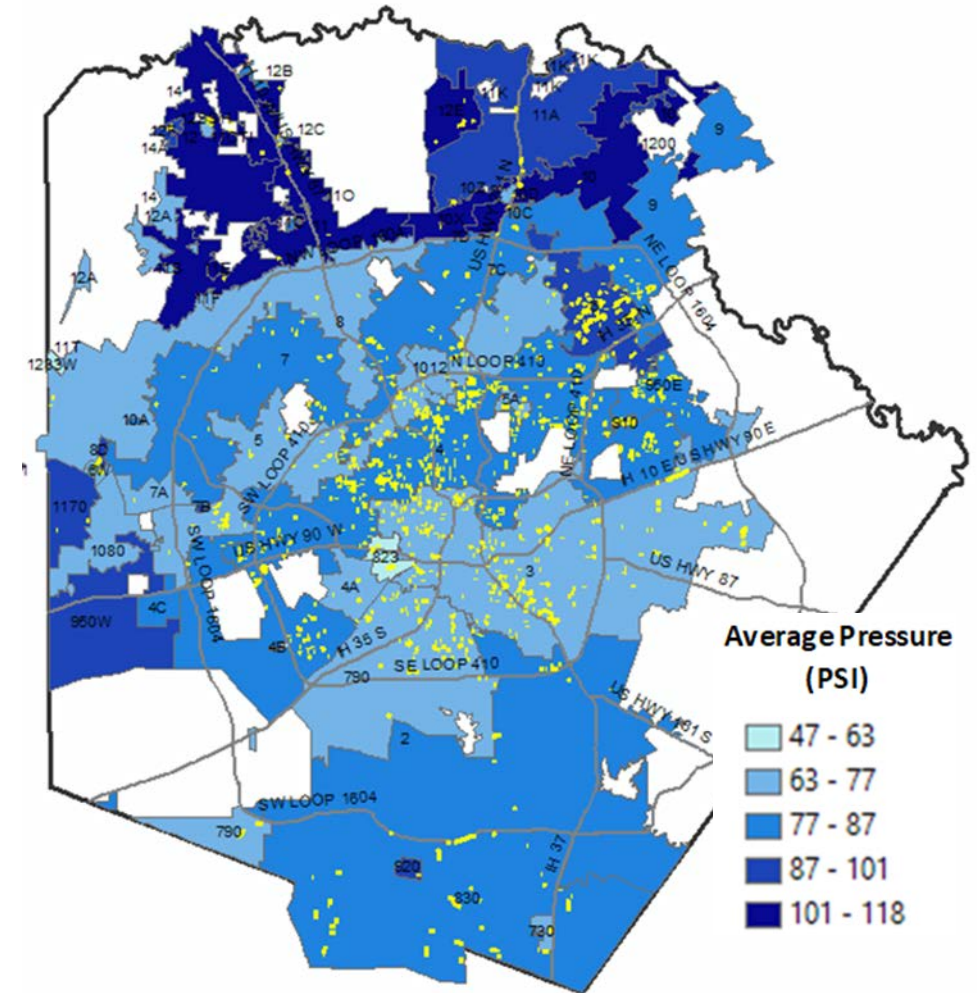


MAKING SAN ANTONIO  
**WATERFUL**



# San Antonio Water System - Intro

- Municipally Owned
- Population 1.8M
- 500,000+ Water Customers
- 7,000 Miles of Water Main
- ~60 Pressure Zones
- 1,700 Employees



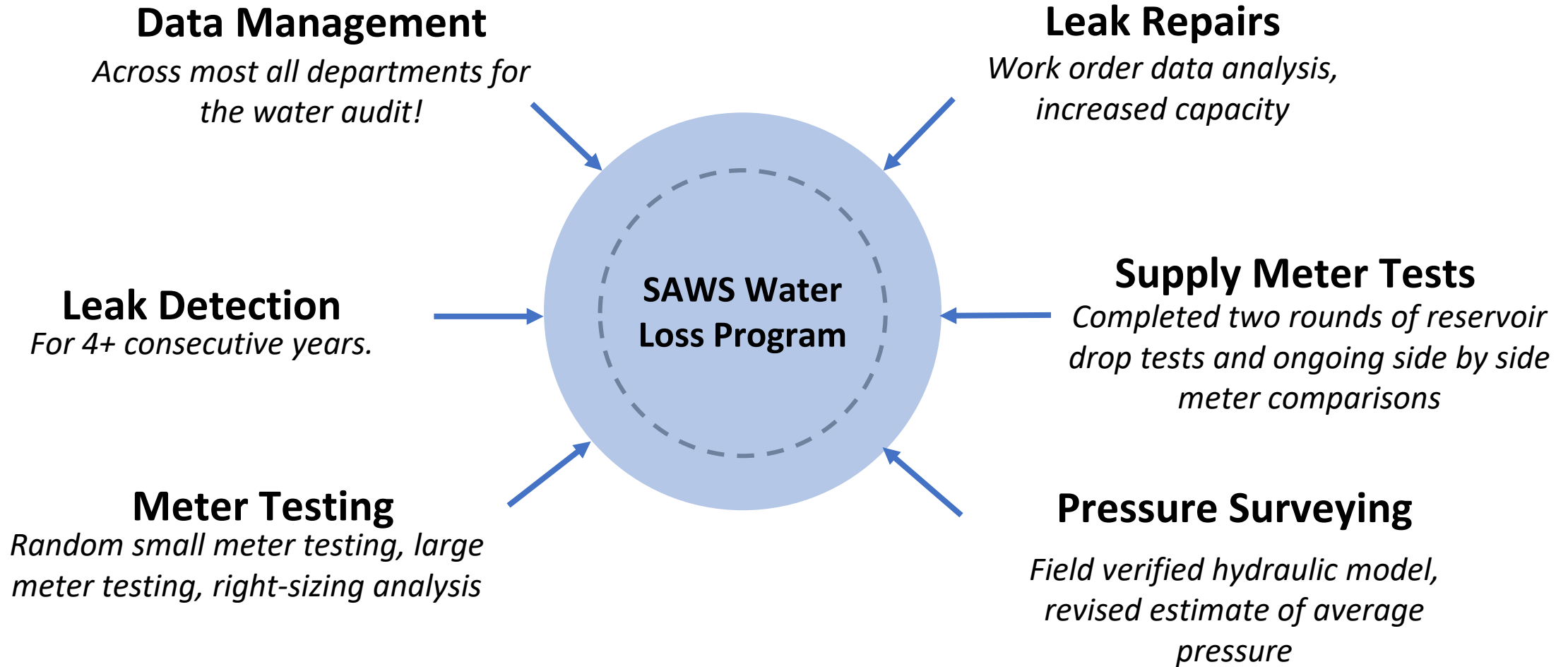


# SAWS's Interest in Water Loss

- Efficiency Measure
- Executive Management Goal
- State Requirement
- Canary in Coalmine!
- Public Perceptions
- Saving Water & Money



# SAWS Water Loss Program



# Water Loss Activities & Investments

	2014	2015	2016	2017	2018
<b>Water Loss Data &amp; Strategy</b>	<ul style="list-style-type: none"> <li>• Full water audit data source review</li> <li>• Initial plan development</li> </ul>	<ul style="list-style-type: none"> <li>• Pressure data collection</li> </ul>		<ul style="list-style-type: none"> <li>• Pressure data collection and hydraulic model verification</li> </ul>	
<b>Supply Meter Testing</b>	<ul style="list-style-type: none"> <li>• 13 critical supply meter tests</li> </ul>	<ul style="list-style-type: none"> <li>• 8 supply meter re-tests</li> </ul>			
<b>Customer Meter Testing</b>		<ul style="list-style-type: none"> <li>• 430 random small meter tests</li> <li>• 30 large meter flow profiling</li> </ul>		<ul style="list-style-type: none"> <li>• 243 random small meter tests</li> <li>• 15 large meter flow profiling</li> </ul>	<ul style="list-style-type: none"> <li>• Large meter testing program frequency review</li> </ul>

# Water Loss Activities & Investment

	2014	2015	2016	2017	2018
<b>Leakage Recovery &amp; Analysis</b>	<ul style="list-style-type: none"><li>• Leakage Component Analysis (work order data review)</li></ul>	<ul style="list-style-type: none"><li>• 3,480 miles surveyed</li></ul>	<ul style="list-style-type: none"><li>• 3,283 miles surveyed</li></ul>	<ul style="list-style-type: none"><li>• 3,721 miles surveyed</li></ul>	<ul style="list-style-type: none"><li>• 2,500+ miles surveyed</li></ul>



# Highlights



**Customer Meter Accuracy  
Testing**



**Proactive Leakage Recovery**



**Repair Record  
Improvement**



# Customer Meter Accuracy Testing

Example of a data improvement effort for water audit input

Small meter testing effort – 2015, 2017

Meter Size	Number of Tests	Average Accuracy	95% Confidence Limits
5/8"	741	98.2%	+/- 0.4%
3/4"	174	96.0%	+/- 2.1%
1"	79	97.8%	+/- 2.2%
1 1/2"	67	100.0%	+/- 0.6%
2"	133	98.7%	+/- 1.1%
<b>ALL</b>	<b>1194</b>	<b>98.0%</b>	<b>+/- 0.5%</b>
<i>stuck meters</i>	32		-

- Critical for insight into Apparent Losses
- Directly impacts Real Loss estimation
- Currently evaluating the continuation of program:
  - Frequency
  - Scale

# Proactive Leakage Recovery

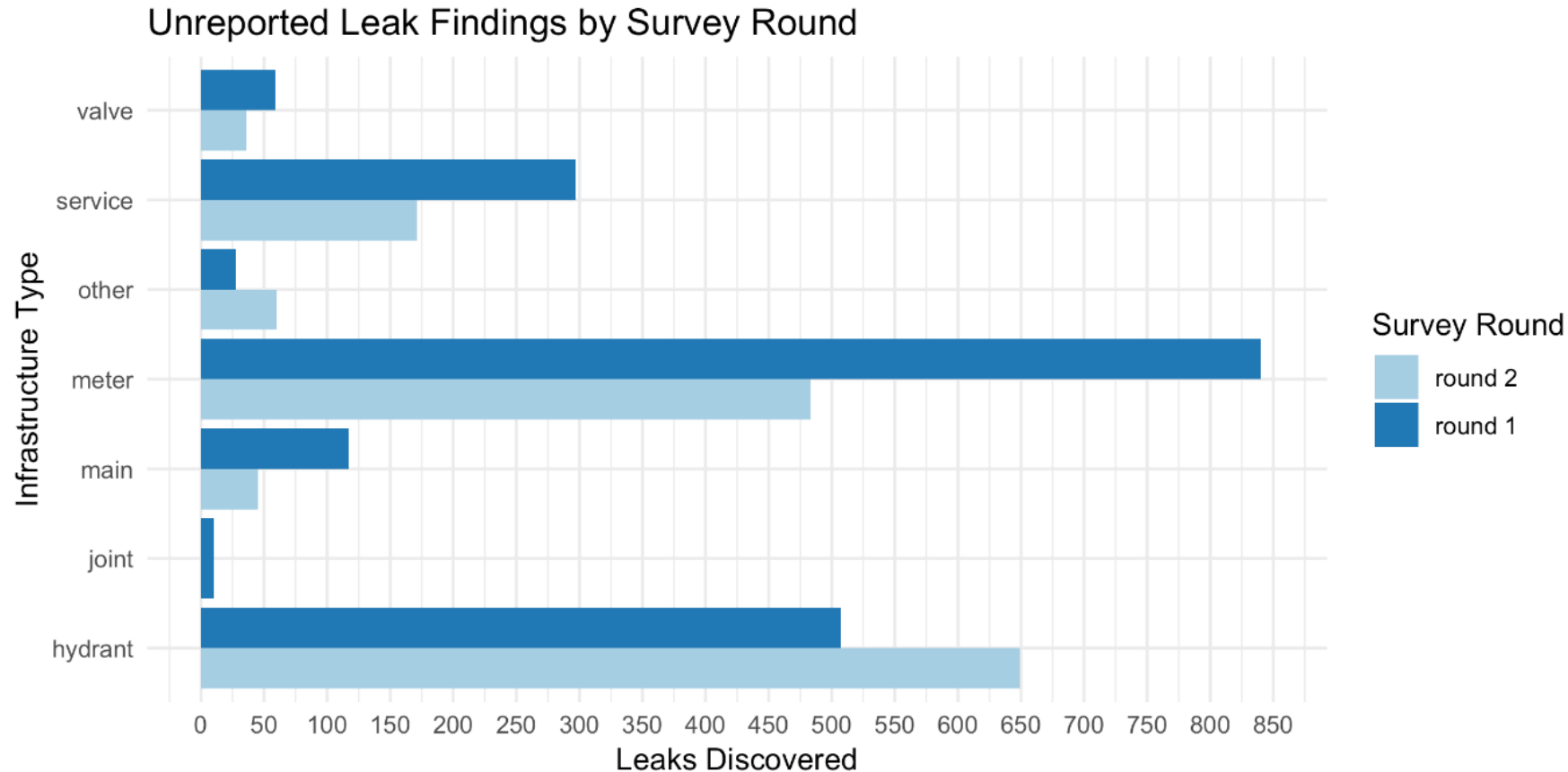
~ **13,000** miles of leak detection  
between 2015 and 2018

**3,500+** unsurfaced leaks identified

**Two rounds** of surveying on the same mileage allow  
for an investigation of the recurrence of leakage



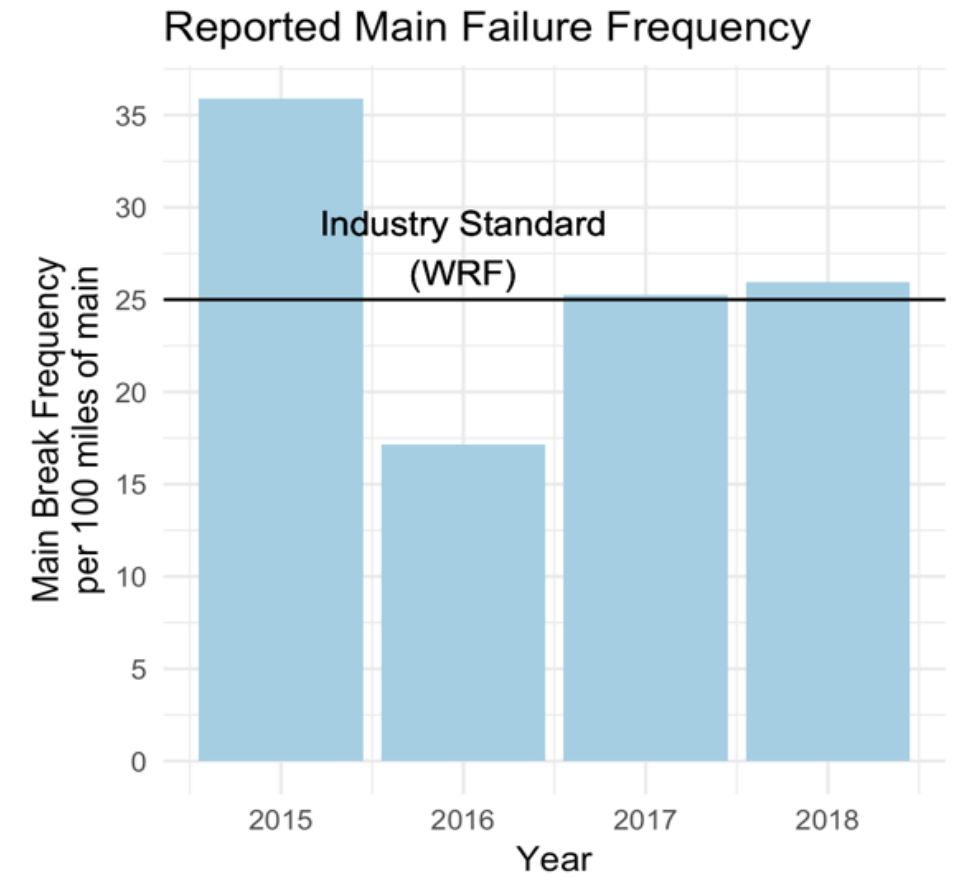
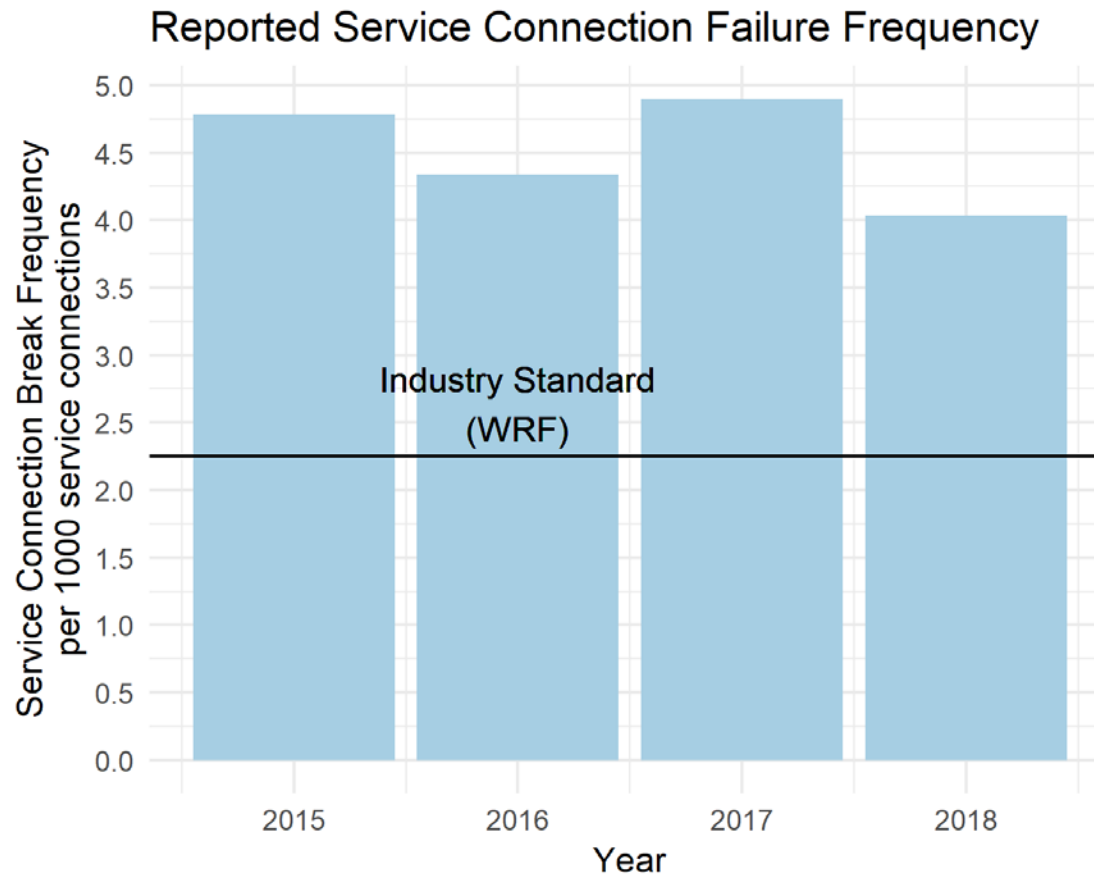
# Proactive Leakage Recovery – Rate of Rise



**1.5** kgal leakage  
developed  
per mile  
per day

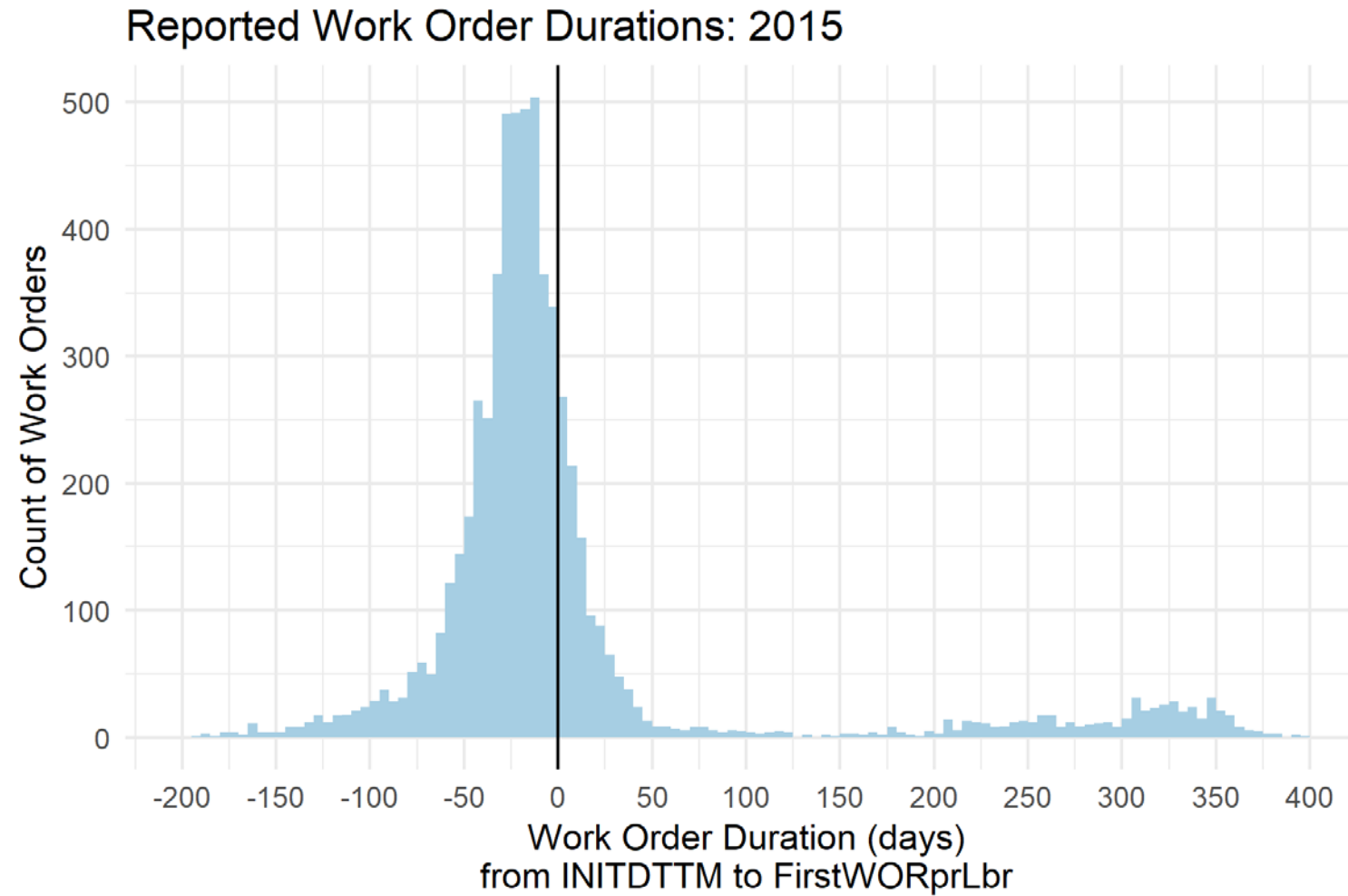
# Repair Record Improvement

- 31,000+ reported repairs (2018)



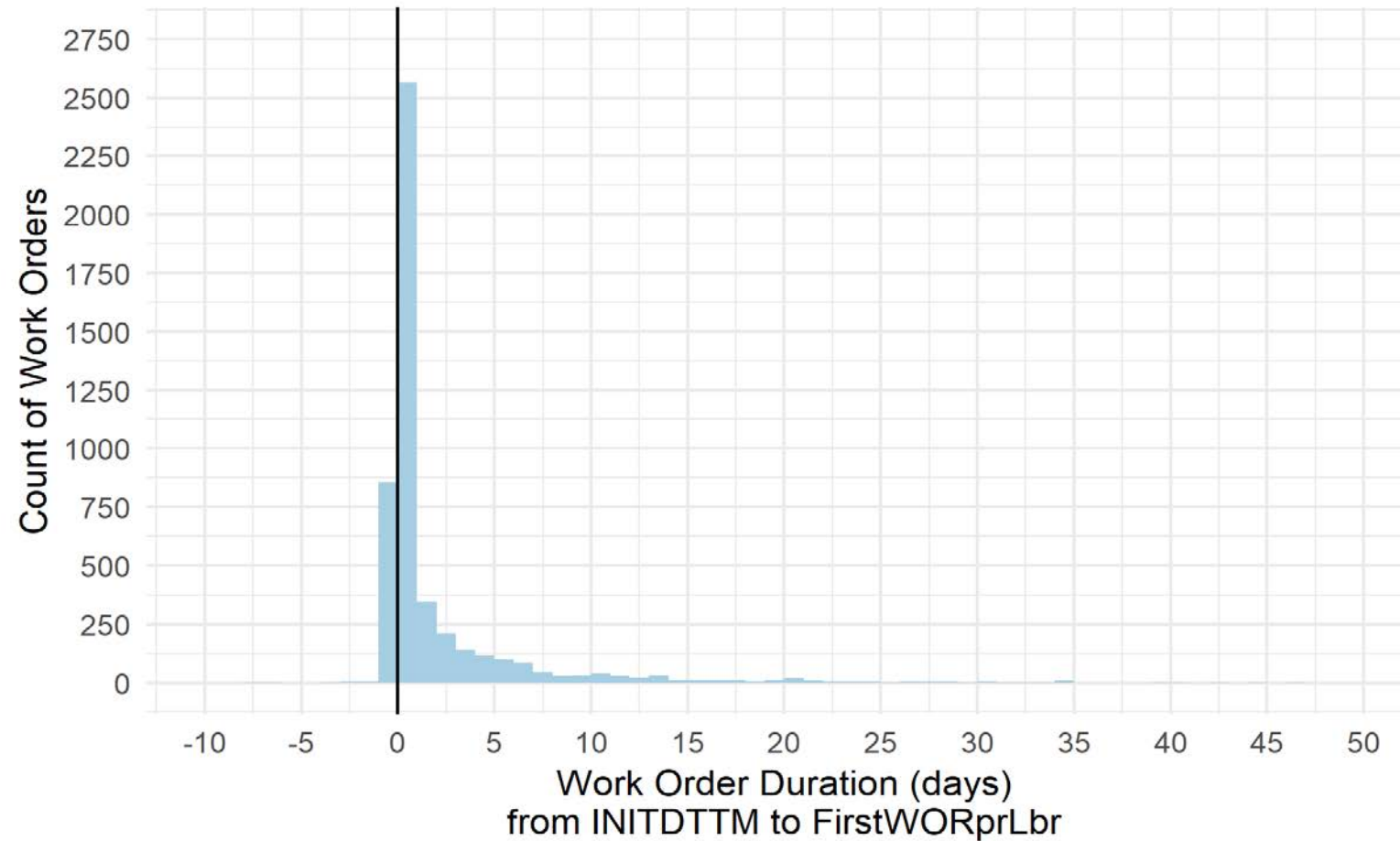


# Repair Record Improvement

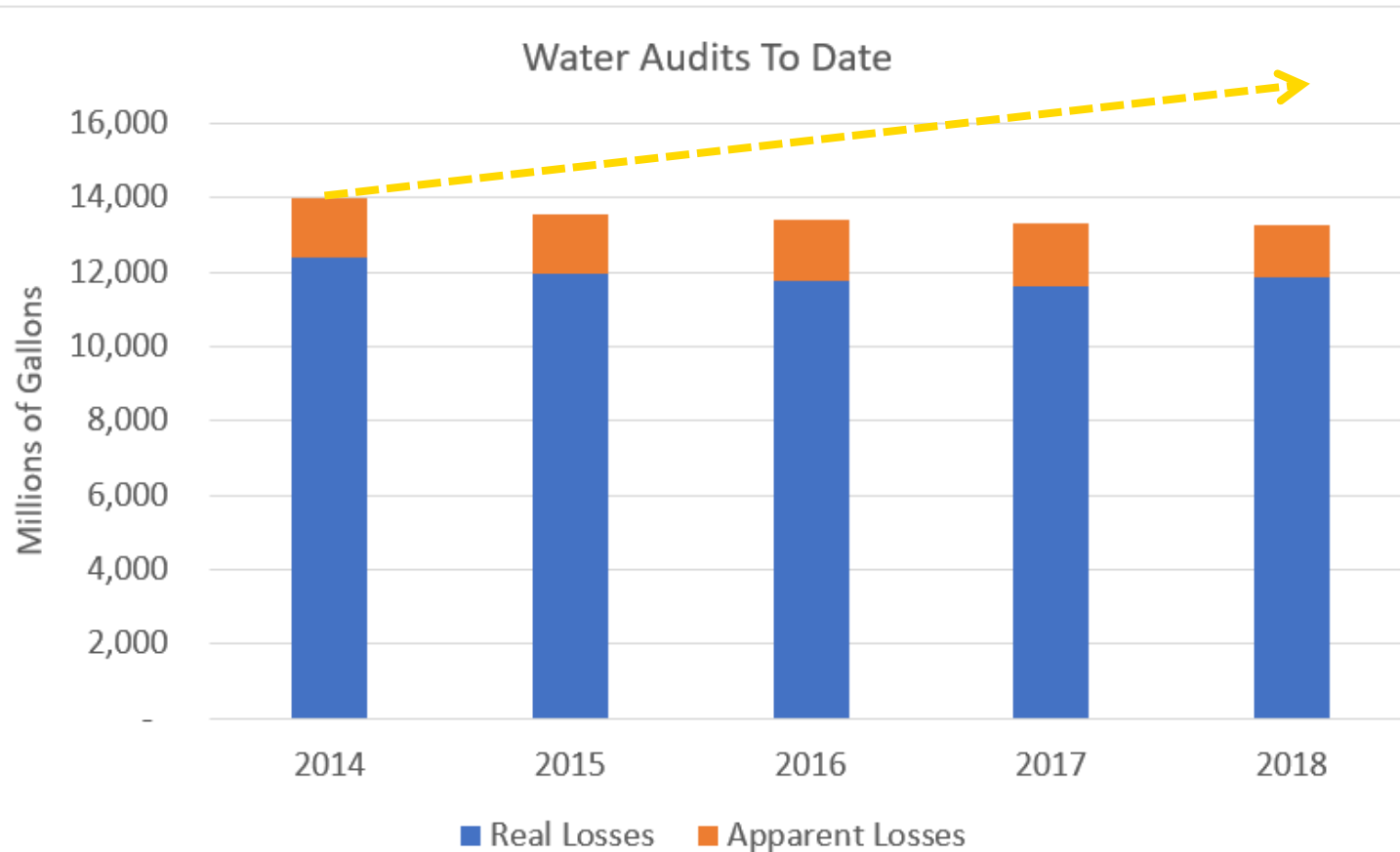


# Repair Record Improvement

Reported Work Order Durations: 2018



# Performance Indicators



~ 60 gallons / connection / day of leakage

## ✓ Progress:

- Streamlining process so that it is well documented and repeatable
- Holding losses steady still indicates *savings in avoided leakage*
- Investing in better data collection
- Reducing authorized unbilled volumes

## ✗ Concerns

- System wide leak detection not showing up in water audit results
- Adjustments on supply need refinement



# Current Activities

## Water Loss Control Team

- Quarterly Meetings
- Updates on “Leading Indicators”
- Irregular Sub-Committee Meetings

Production  
Metering

Customer Meter  
Inaccuracy

Repair Capacity /  
Documentation

Pressure

Proactive Leak  
Detection



## Water Loss Control Plan

2020 - 2024

### Water Loss Control Plan



## Water Audit Handbook

2019

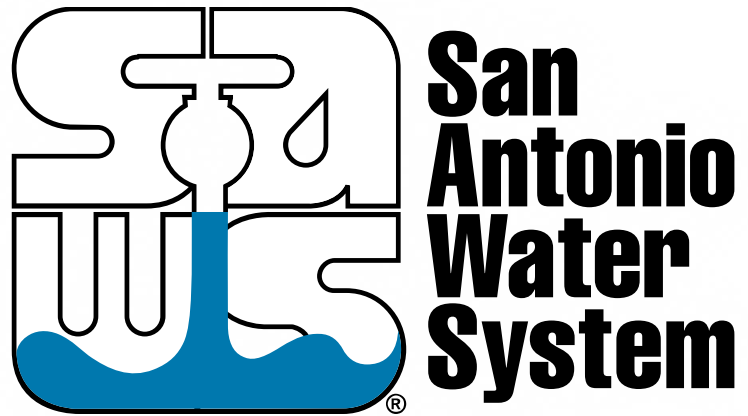
### Non-Revenue Water Calculation Handbook



SAWS Procedures and Supporting Documentation  
for the Texas Water Development Board  
Non-Revenue Water Calculations



Thank You!



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