

Hawai'i Water Audit Program Summary

Presentation to the Commission on Water Resource Management
by the CWRM Planning Branch

March 18, 2025



A photograph showing three men in work attire inspecting large industrial water valves. One man is kneeling on the left, another is kneeling in the middle, and a third is standing on the right, leaning over a valve. The valves are mounted on a wooden pallet and are situated outdoors against a light blue corrugated metal wall. The scene is well-lit, suggesting daytime.

Overview

- Background
- Hawaii Water Audit Program
- Water Audit Results
- Challenges and Opportunities

Act 169, SLH 2016, Relating to Water Audits

- Requires Commission to establish a water audit program
 - Currently consists of 2 CWRM staff (Neal & Nick)
- Requires Commission to train affected potable water systems
- Does not account for surface water systems
- Affects ~100 public water systems
 - All County-owned
 - Large capacity (serving population ≥ 1000) or within designated water management areas

Approved by the Governor
on JAN 30 2016
THE SENATE
TWENTY-EIGHTH LEGISLATURE, 2016
STATE OF HAWAII

ACT 169
S.B. NO. 2645
S.D. 2
H.D. 1
C.D. 1

A BILL FOR AN ACT

RELATING TO WATER AUDITS.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

1 SECTION 1. Article XI, section 7, of the Hawaii State
2 Constitution obligates the State to protect, control, and
3 regulate the use of Hawaii's water resources for the benefit of
4 its people.

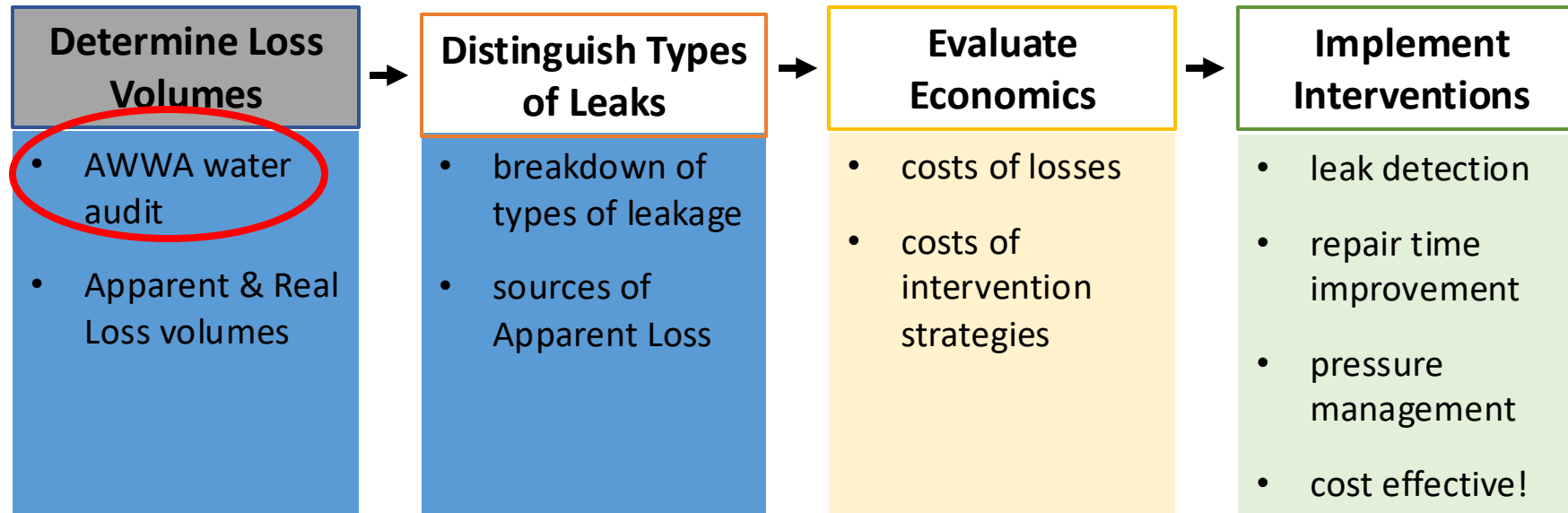
5 Fresh water is the lifeblood of society. The quantity and
6 quality of fresh water directly impact the health, welfare,
7 economy, and quality of life in Hawaii. Fresh water
8 infrastructure has been constructed to withdraw water from
9 available sources, to treat it to acceptable standards, and to
10 distribute it to our various communities.

11 Based on the department of health's database, there are a
12 little over fifty county-run public water systems statewide and
13 another fifty large capacity public water systems and public
14 water systems operating in designated ground water management
15 areas. Many of these water distribution systems, however, may
16 be operating with inefficiencies that result in the loss of
17 water, increased energy costs, and lost revenue.

2016-2348 SB2645 CD1 SMA.doc



Water Loss Control Program



AWWA Water Balance

Water Supplied 100	Authorized Consumption 90	Billed Authorized Consumption 80	Billed Metered Consumption 75	Revenue Water 80
			Billed Unmetered Consumption 5	
		Unbilled Authorized Consumption 10	Unbilled Metered Consumption 8	Non-Revenue Water 20
		Unbilled Unmetered Consumption 2		
	Water Losses 10	Apparent Losses 3	Unauthorized Consumption 1	
			Customer Metering Inaccuracies 1	
			Systematic Data Handling Errors 1	
		Real Losses 7		



AWWA Free Water Audit Software: Worksheet

FWAS v6.0

American Water Works Association.
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Water Audit Report for: << Please enter system details on the Start Page >>

Audit Year:

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: [go to start page](#)

To access definitions, click the [input name](#)

PLEASE CHOOSE REPORTING UNITS FROM THE START PAGE BEFORE ENTERING DATA

[Water Supplied Error Adjustments](#)

WATER SUPPLIED

VOS	Volume from Own Sources:	<input type="text"/>	<input type="text"/>	<input type="text"/>
WI	Water Imported:	<input type="text"/>	<input type="text"/>	<input type="text"/>
WE	Water Exported:	<input type="text"/>	<input type="text"/>	<input type="text"/>

VOSEA
WIEA
WEEA

WATER SUPPLIED:

AUTHORIZED CONSUMPTION

BMAC	Billed Metered:	<input type="text"/>	<input type="text"/>	<input type="text"/>
BUAC	Billed Unmetered:	<input type="text"/>	<input type="text"/>	<input type="text"/>
UMAC	Unbilled Metered:	<input type="text"/>	<input type="text"/>	<input type="text"/>
UUAC	Unbilled Unmetered:	<input type="text"/>	<input type="text"/>	<input type="text" value="3"/>

choose entry option:

Default option selected for Unbilled Unmetered, with automatic data grading of 3

AUTHORIZED CONSUMPTION:

WATER LOSSES

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

SDHE	Systematic Data Handling Errors:	<input type="text"/>	<input type="text"/>	<input type="text" value="3"/>	<input type="text" value="0.000"/>
CMI	Customer Metering Inaccuracies:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="0.000"/>
UC	Unauthorized Consumption:	<input type="text"/>	<input type="text"/>	<input type="text" value="3"/>	<input type="text" value="0.000"/>

choose entry option:

Default option selected for Unauthorized Consumption, with automatic data grading of 3

[Start Page](#)

[Worksheet](#)

[Interactive Data Grading](#)

[Dashboard](#)

[Notes](#)

[Blank Sheet](#)

[Water Balance](#)

[Loss Control Planning](#)

[Definitions](#)

[Service Connection Diagram](#)

[Acknowledgements](#)

Types of Water Loss

Apparent Losses



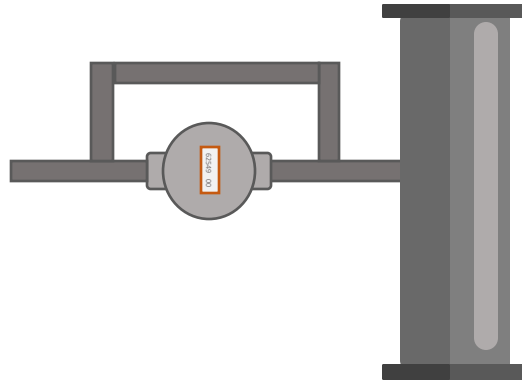
Real Losses



W S O

Water Audits do not account for surface water systems.

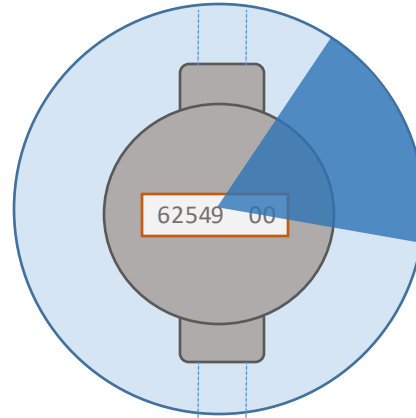
Types of Apparent Losses - Potable Water Systems



Unauthorized Consumption



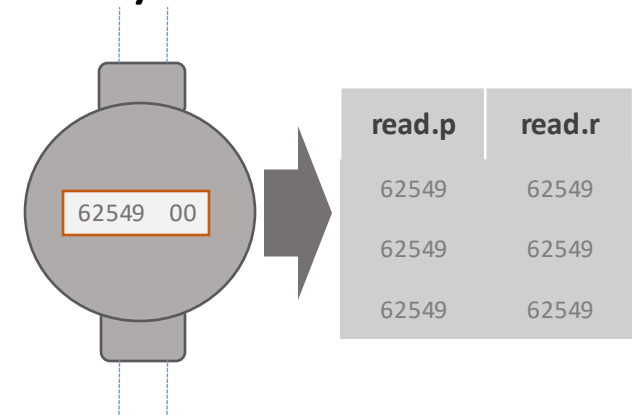
Theft!



Metering Inaccuracy



Customer meter under registration



Data Handling Errors

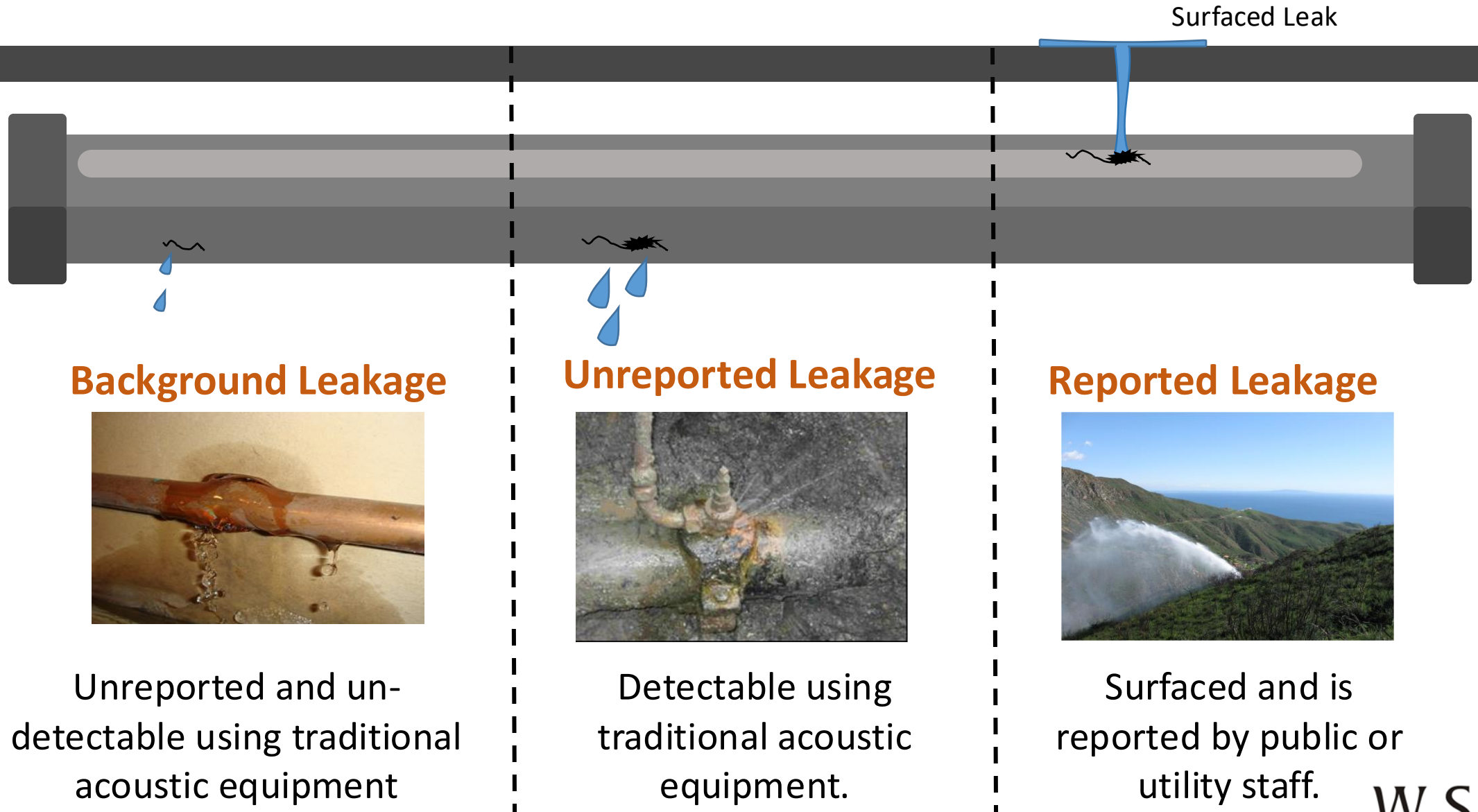


Reporting or other clerical errors during the handling of meter reading data

Water Audits account for potable water that starts at the source meter and ends at the customer meter.



Types of Real Losses – Potable Water Systems



Water Audits account for potable water that starts at the source meter and ends at the customer meter.

Initial Training on All Major Islands (2017)

- Trained 32 individuals from four county water departments
 - Delineated 47 discrete sub-systems
 - Kauai – 9
 - Oahu – 5
 - Maui – 10
 - Hawaii – 23
- Trained 77 individuals from 48 Large-Cap/WMA PWS



Common Opportunities for Water Loss Control

Data Management

- Source meter volumetric testing and calibration
- Customer meter testing program development
- Billing database analysis - detailed review of underlying raw consumption data
- Universal metering

Real Loss Recovery

- Data management refinements will likely take priority over loss recovery
- Pressure surveys to assess opportunities to modify pressure and mitigate transients
- Leak detection surveys to proactively find leaks for repair

Apparent Loss Recovery

- Customer meter testing program development
- Large customer meter test & repair/replacement program development

Water Audit Program Delivery

Continue annual water audit validation

Completed validator certification for staff

Completed training for AWWA FWAS v6.0

Migrating to AWWA FWAS v6.0 in 2025

Attend monthly collaborative meetings with other State/Provincial agencies responsible for water audits to learn and share information

Implementing actions to improve data validity

AWWA FWAS v6.0 Training – August 2024

- Training on use of latest version of the AWWA Free Water Audit Software v6.0
- Kauaʻi, Oʻahu, Maui, Molokai, Hilo, Kona
- Trained 57 individuals from Large-Cap/WMA PWS including County systems



CY 2022
Water Audit
Summary

County Water Departments

- 27 audits received & validated
- 189 MGD water supplied
- 23 MGD real losses

Large-cap/WMA

- 45 audits received, 37 validated
- 41 MGD water supplied
- 5 MGD real losses

CY 2022 Water Audit Summary

ISLAND	WATER SUPPLIED (MGD)	REAL LOSS (MGD)
Kaua'i	13	2
O'ahu	163	23
Maui	46	4
Big Island	8	0.4
TOTAL	230	28

CY 2022 Water Audit Summary

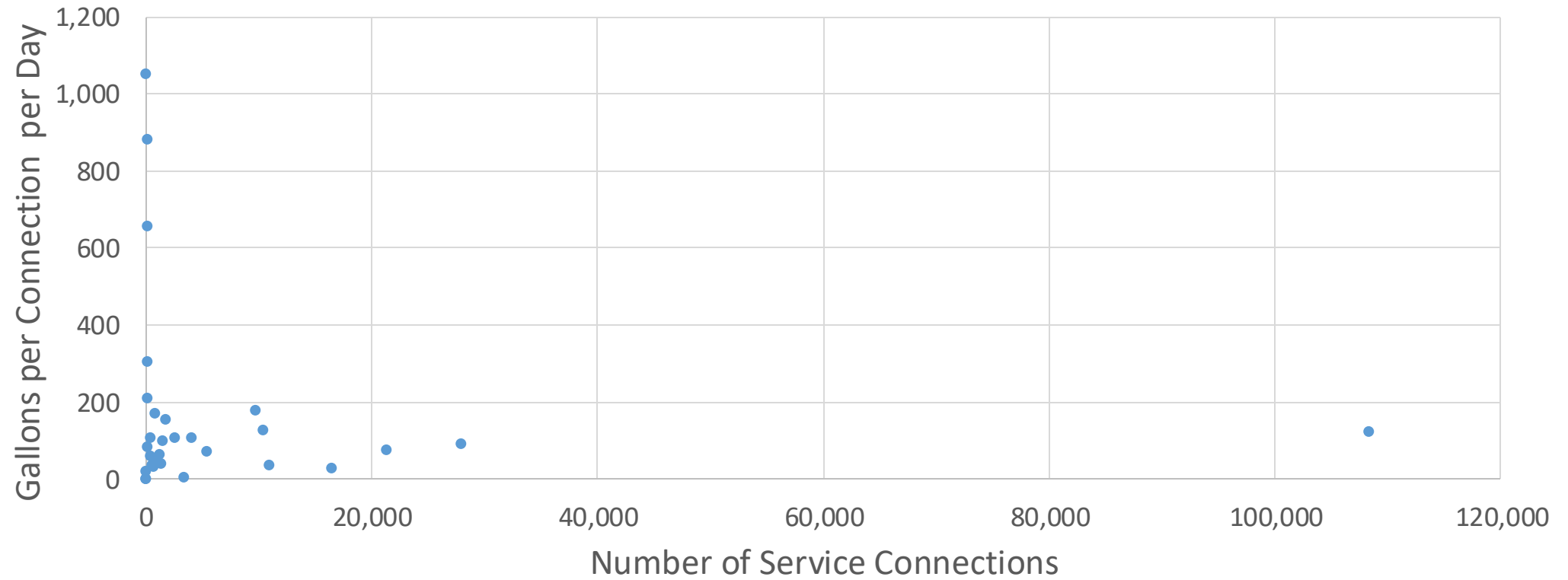
COUNTY WATER DEPARTMENT	WATER SUPPLIED (MGD)	REAL LOSS (MGD)
KDOW	13	1
HBWS	137	19
MDWS	39	3
TOTAL	189	23

CY 2022 Water Audit Summary

LARGE-CAP / WMA SYSTEMS	WATER SUPPLIED (MGD)	REAL LOSS (MGD)
ALL	41	5

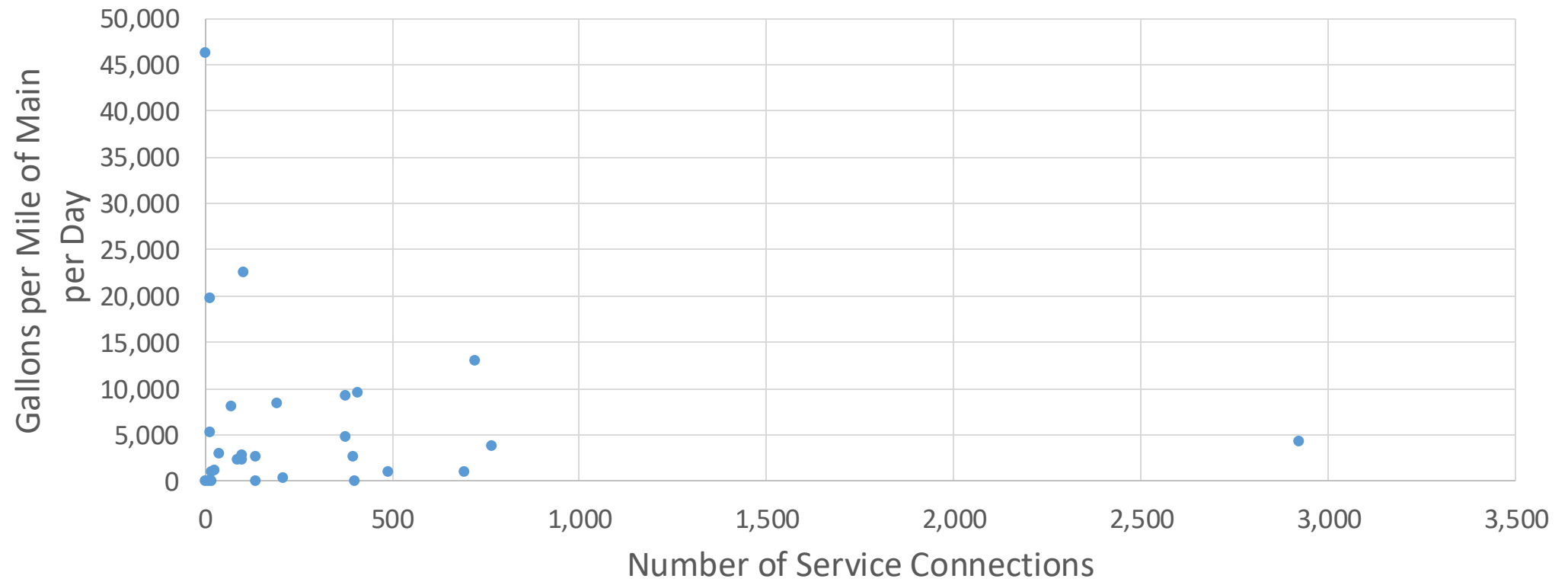
CY 2022 Real Losses

Volume of Real Losses v Number of Connections



CY 2022 Real Losses

Volume of Real Losses v Number of Connections



Challenges

Program compliance

AWWA water audit software not designed for some PWS that are not utilities (~16 PWS)

Several large and small systems lack customer metering (~27 PWS)

Data validity/uncertainty (Data validity grades average ~50)

Significant variability in year-to-year results for some systems

Some water audits may be unreliable/unrealistic

Available funding to implement recommendations on smaller systems

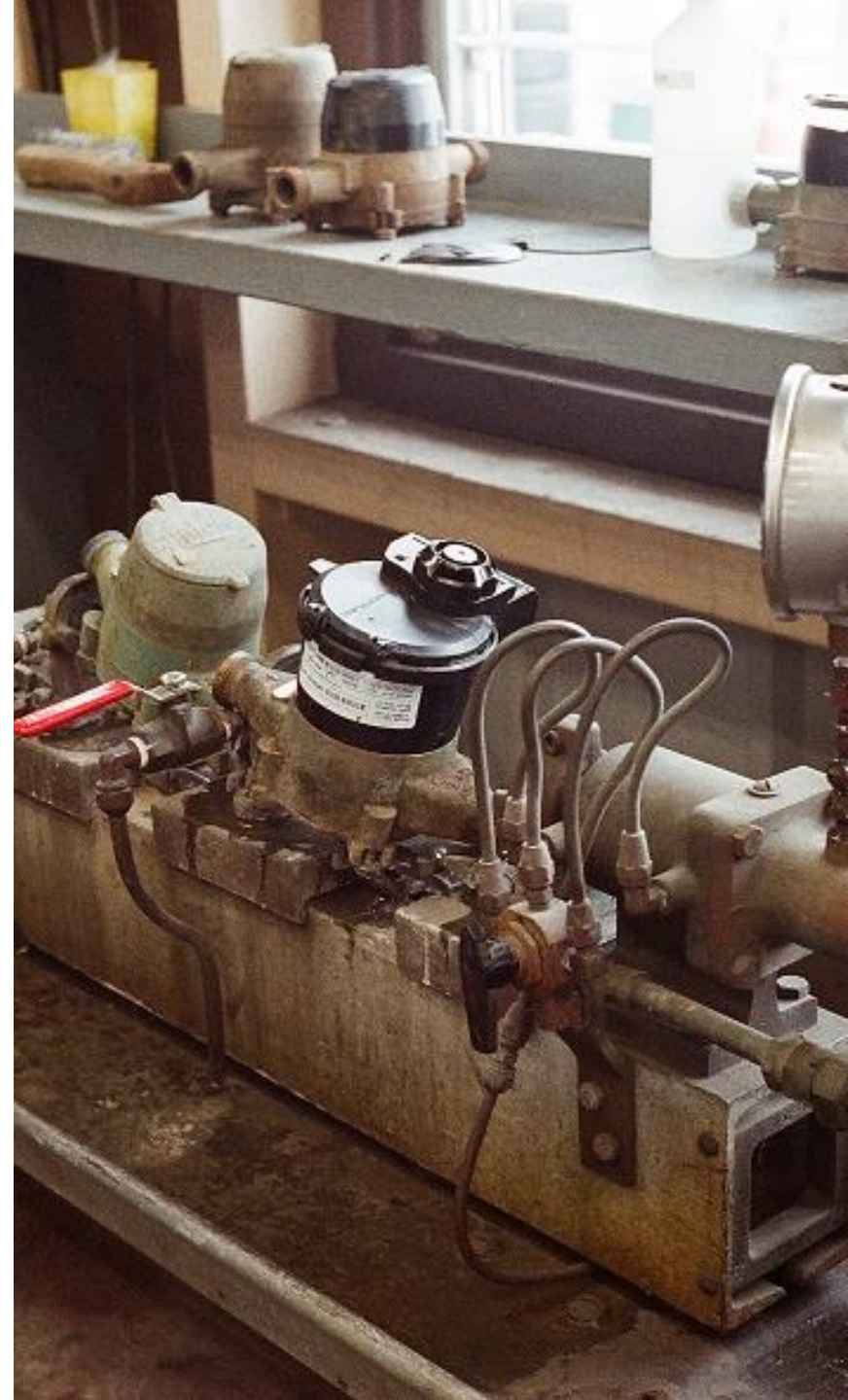
Current and Future Projects

- Statewide training program on water meter testing (2025)
- Federal CDS/earmark funding for meter testing and leak-detection funding for disadvantaged PWS (2025). \$100K received to supplement funding.
- Exploring online submission of annual water audits (2026)
- Explore funding sources for water loss control



Opportunities for Project Funding and Technical Assistance

- Hawai'i DOH DWSRF
- Bureau of Reclamation WaterSMART
- Hawai'i Rural Water Association
- Rural Community Assistance Corporation



A dimly lit conference room with several people seated at long tables. A man in a light-colored shirt stands on the left, holding papers, addressing the group. A large screen on the left displays a software interface with the title "AWWA Tree Water Audit Software" and various data fields. Another man in a dark shirt stands in the background near another screen. The room has a patterned carpet and recessed ceiling lights.

Mahalo

Questions?