

Hawai‘i Water Audit Program Summary

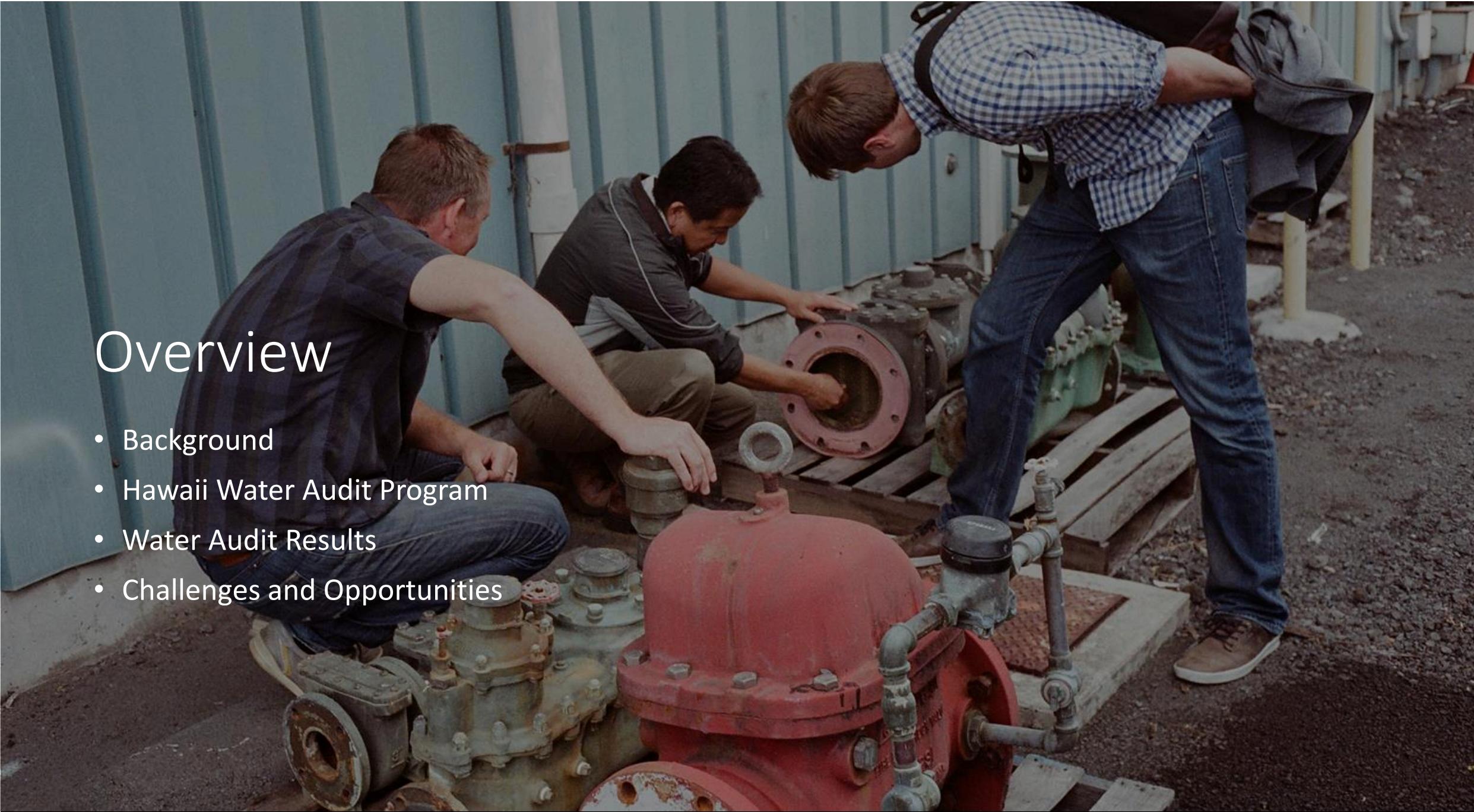
Presentation to the Commission on Water Resource Management
by the CWRM Planning Branch

October 15-16, 2025



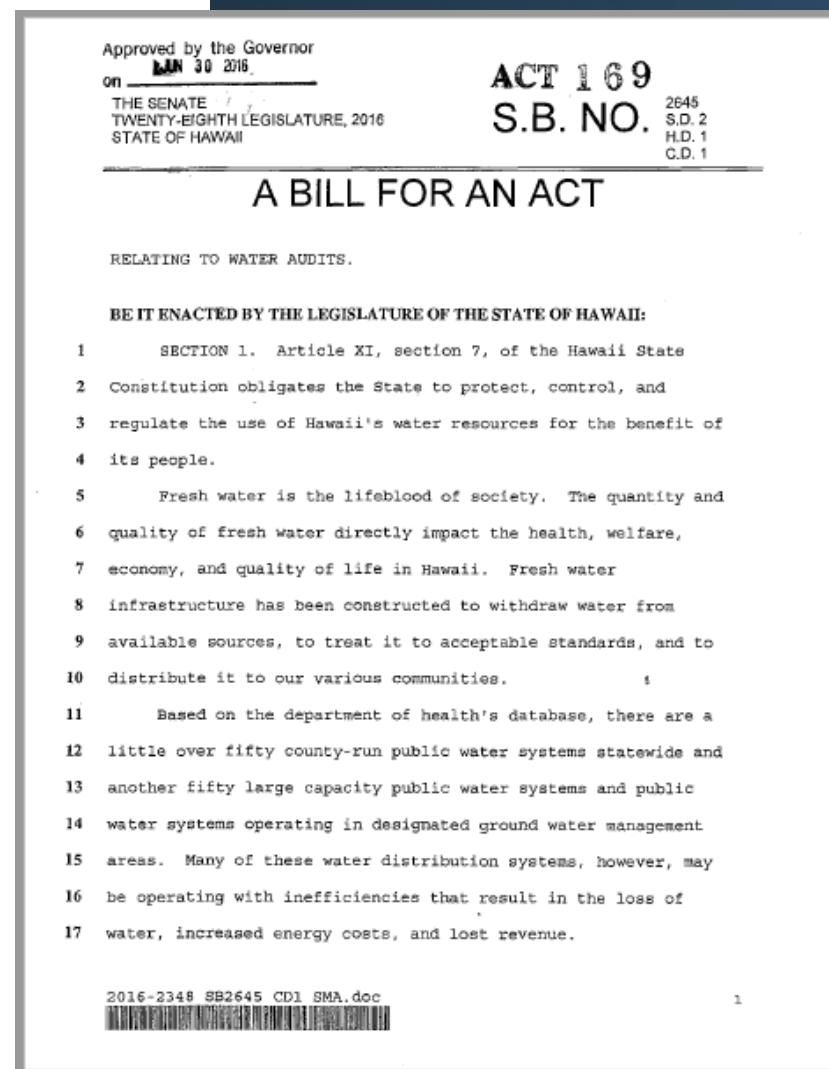
Overview

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

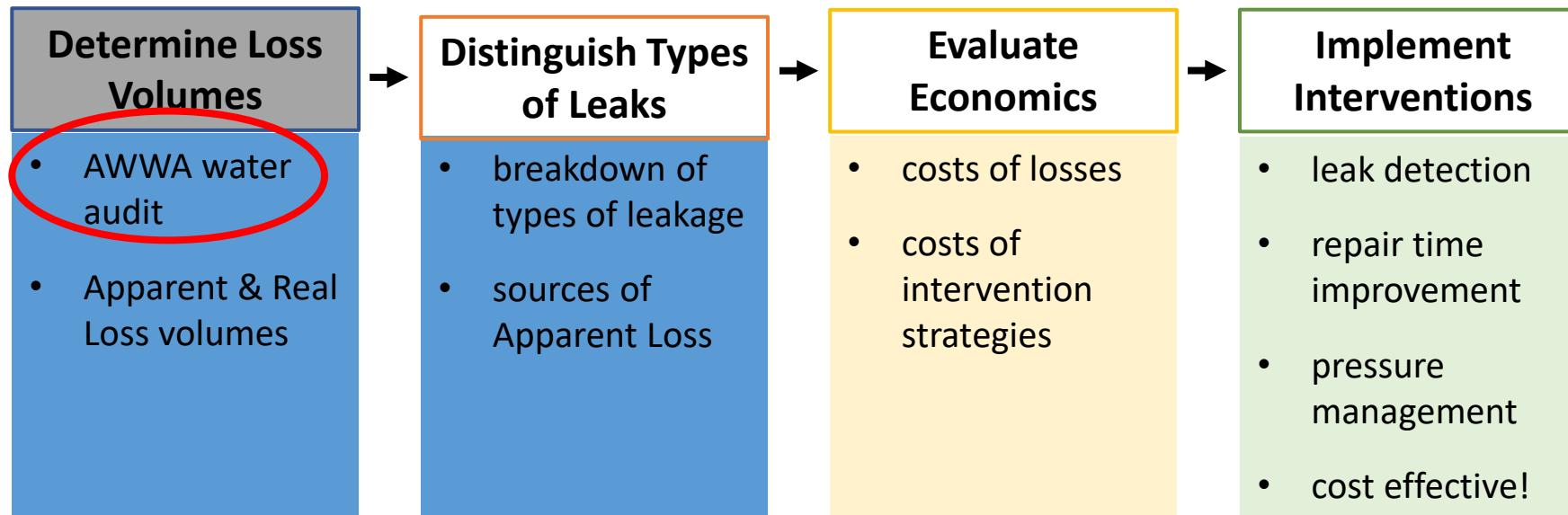


Act 169, SLH 2016, Relating to Water Audits

- 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



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 | |
| | | | Unbilled Unmetered Consumption 2 | |
| | | | Unauthorized Consumption 1 | |
| | | | Customer Metering Inaccuracies 1 | |
| | | | Systematic Data Handling Errors 1 | |
| | | | Real Losses 7 | |
| | | | | Non-Revenue Water 20 |

WSO



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:

| | |
|---|---|
| n | g |
|---|---|

VOSEA

WI

Water Imported:

| | |
|---|---|
| n | g |
|---|---|

WIEA

WE

Water Exported:

| | |
|---|---|
| n | g |
|---|---|

WEEA

WATER SUPPLIED:

| |
|-------|
| 0.000 |
|-------|

AUTHORIZED CONSUMPTION

BMAC

Billed Metered:

| | |
|---|---|
| n | g |
|---|---|

VOSEA

BUAC

Billed Unmetered:

| | |
|---|---|
| n | g |
|---|---|

WIEA

UMAC

Unbilled Metered:

| | |
|---|---|
| n | g |
|---|---|

WEEA

UUAC

Unbilled Unmetered:

| | | | |
|---|---|---|-------|
| n | g | 3 | 0.000 |
|---|---|---|-------|

choose entry option:

0.25% default

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

AUTHORIZED CONSUMPTION:

| |
|-------|
| 0.000 |
|-------|

WATER LOSSES

0.000

Apparent Losses

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

choose entry option:

Systematic Data Handling Errors:

| | | | |
|---|---|---|-------|
| n | g | 3 | 0.000 |
|---|---|---|-------|

0.25% default

Customer Metering Inaccuracies:

| | | | |
|---|---|--|-------|
| n | g | | 0.000 |
|---|---|--|-------|

percent

under-registration

Unauthorized Consumption:

| | | | |
|---|---|---|-------|
| n | g | 3 | 0.000 |
|---|---|---|-------|

0.25% default

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

Types of Water Loss

Apparent Losses



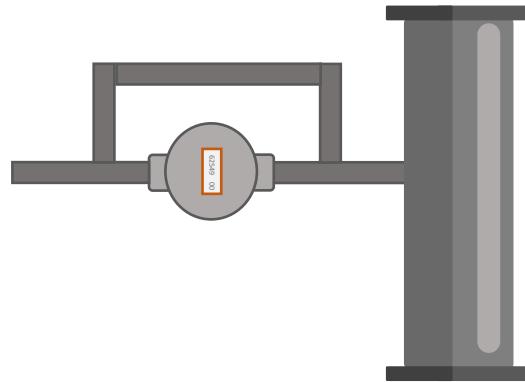
Real Losses



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Water Audits do not account for surface water systems.

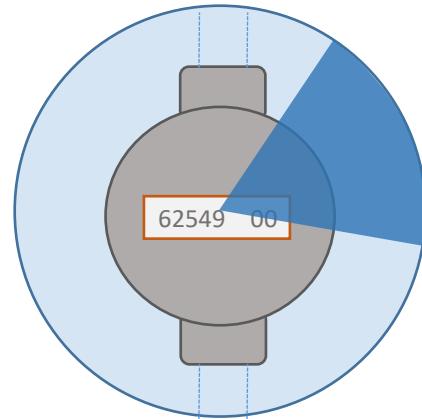
Types of Apparent Losses - Potable Water Systems



Unauthorized Consumption



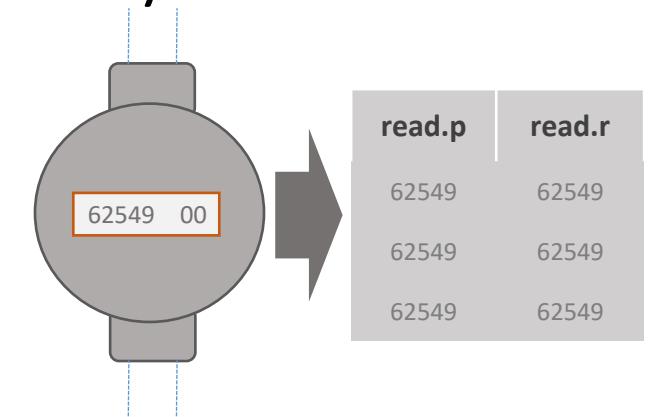
Theft!



Metering Inaccuracy



Customer meter under registration



Data Handling Errors

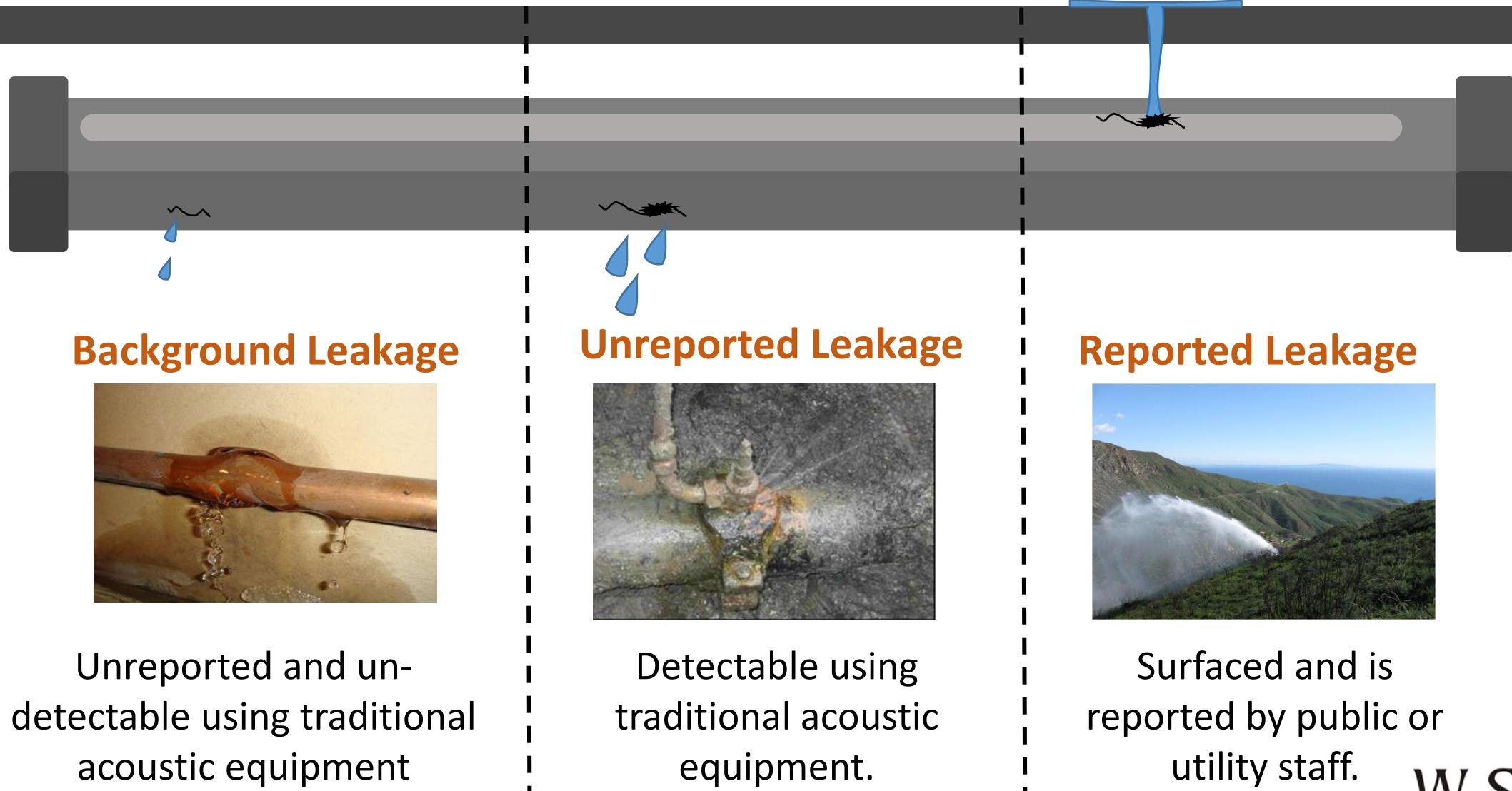


Reporting or other clerical errors during the handling of meter reading data

WSO

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.

WSO

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
- Kaua‘i, O‘ahu, 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 |

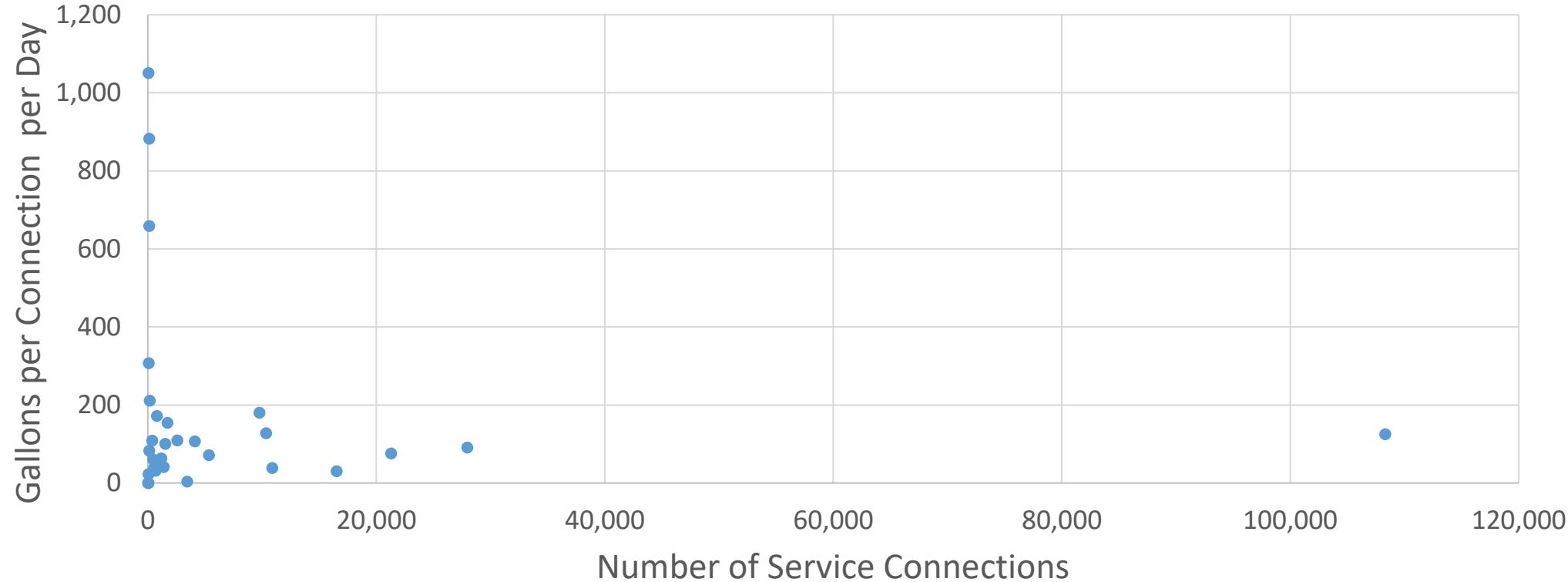
CY 2022 Water Audit Summary

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

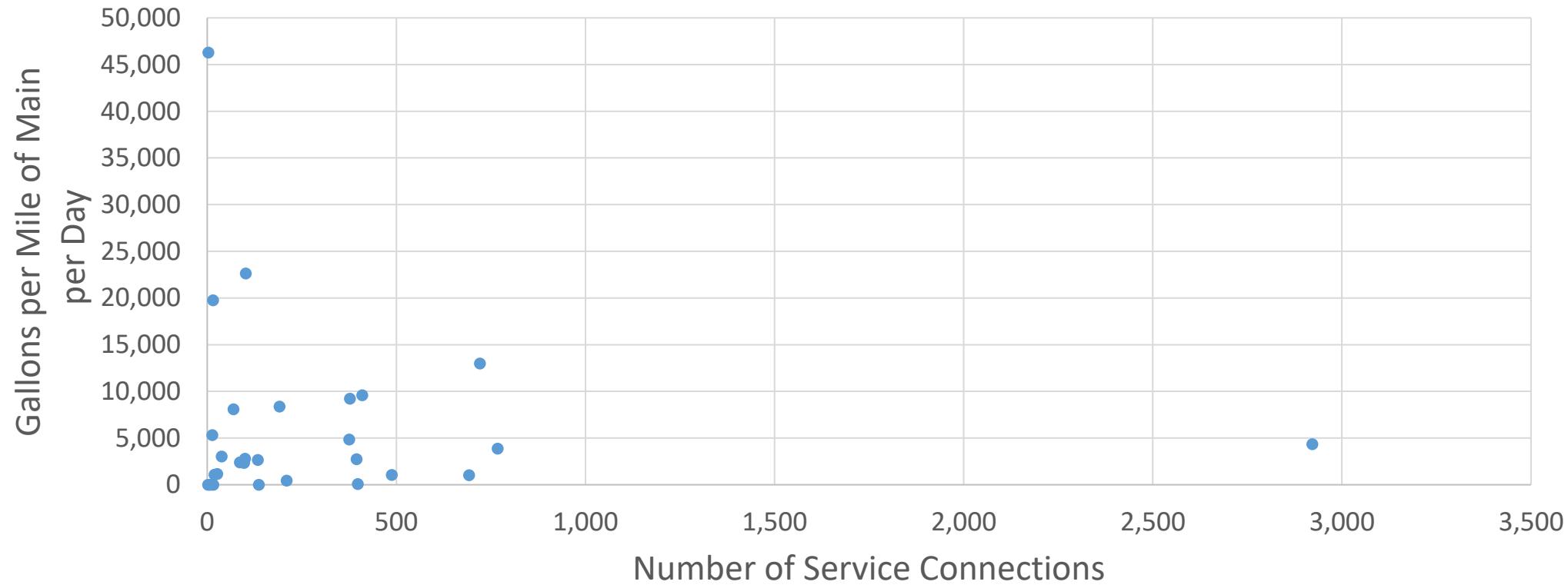
CY 2022 Water Audit Summary

| 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

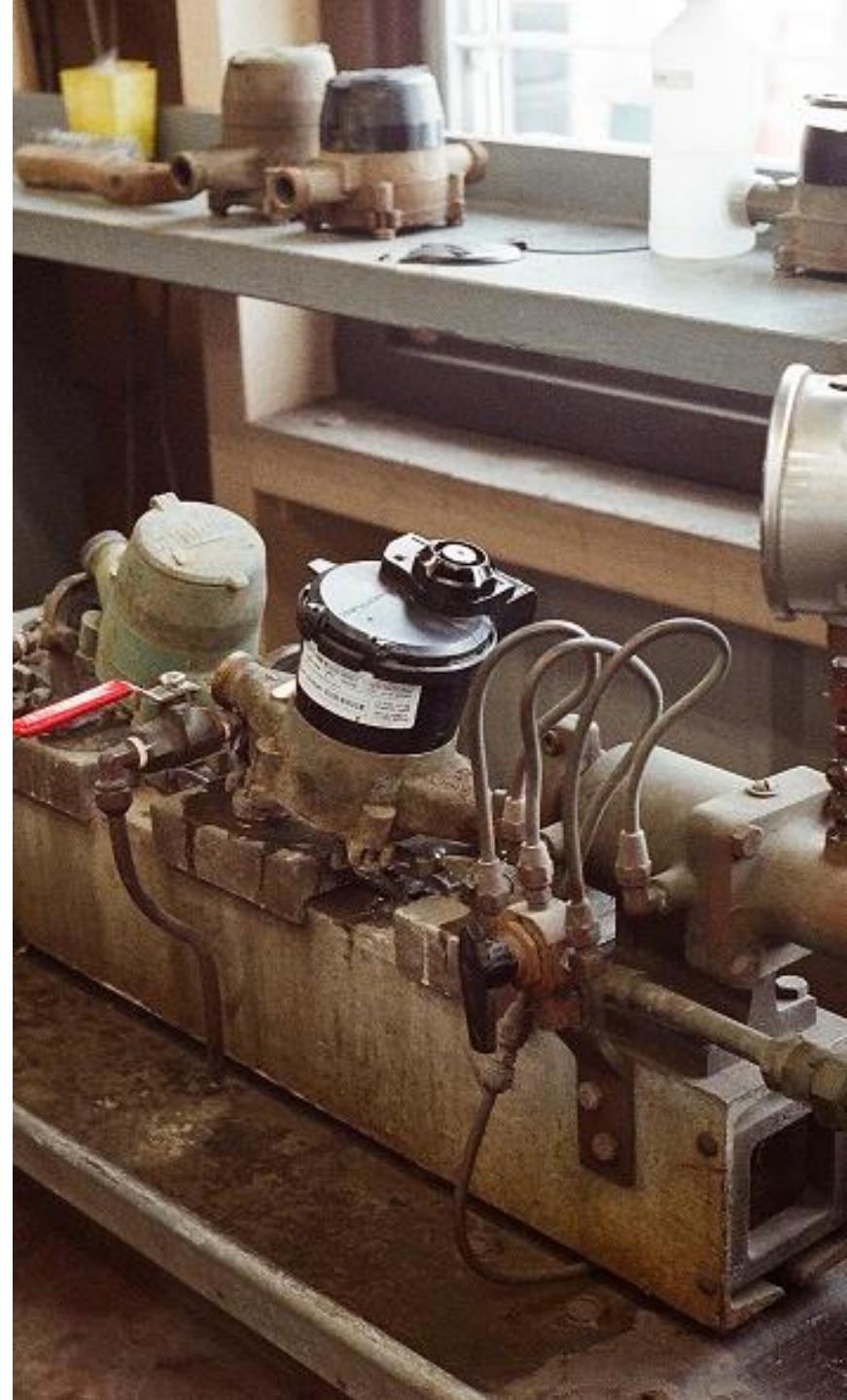


| 2025 Source Meter Training Workshops | | | | 2025 Large Customer Meter Training Workshops | | | |
|--------------------------------------|--------|---------------|--|--|--------|---------------|--|
| Date | Island | Workshop Type | Location | Date | Island | Workshop Type | Location |
| 11/3 | Oahu | Classroom | Kalanimoku Building DLNR Board Room 1151 Punchbowl Street, Rm. 132 Honolulu, HI 96813 | 11/3 | Kauai | Classroom | Department of Water, County of Kaua'i Microlab Meeting Room 4398 Pua Loke Street Lihu'e, Hawai'i 96766 |
| 11/4 | Oahu | Field | Waimānalo Wells II – Near Kaulukanu Place | 11/4 | Kauai | Field | Shops at Kukui'ula 2829 Ala Kalanikaumaka St Poipu, HI 96756 |
| 11/6 | Kauai | Classroom | Department of Water, County of Kaua'i Microlab Meeting Room 4398 Pua Loke Street Lihu'e, Hawai'i 96766 | 11/6 | Oahu | Classroom | Kalanimoku Building DLNR Board Room 1151 Punchbowl Street, Rm. 132 Honolulu, HI 96813 |
| 11/7 | Kauai | Field | Well F - From Ala Kinoiki, head to Maulepu Rd to the gate at the old Koloa Mill | 11/7 | Oahu | Field | Kalanimoku Building 1151 Punchbowl Street Honolulu, HI 96813 |

| 2026 Source Meter Training Workshops | | | | 2026 Large Customer Meter Training Workshops | | | |
|--------------------------------------|---------|---------------|--|--|---------|---------------|--|
| Date | Island | Workshop Type | Location | Date | Island | Workshop Type | Location |
| 1/12 | Maui | Classroom | UH Maui College Laulima 225 310 W. Ka'ahumanu Ave. Kahului, HI 96732 | 1/12 | Molokai | Classroom | Department of Hawaiian Home Lands Molokai District Office Conference Room |
| 1/13 | Maui | Field | Wailuku #2 - Kehalani Mauka Pkwy, south of Laau Loke Lp | 1/13 | Molokai | Field | Maui Community College 193 Alanui Kaimike St. Kaunakakai, HI 96748 |
| 1/15 | Molokai | Classroom | Department of Hawaiian Home Lands Molokai District Office Conference Room | 1/15 | Maui | Classroom | UH Maui College Laulima 225 310 W. Ka'ahumanu Ave. Kahului, HI 96732 |
| 1/16 | Molokai | Field | Kualapuu Well - 1793 Kalae Hwy, Kualapuu, HI 96748 | 1/16 | Maui | Field | Wailuku #2 - Kehalani Mauka Pkwy, south of Laau Loke Lp |

Opportunities for Project Funding and Technical Assistance

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



Mahalo Questions?

