

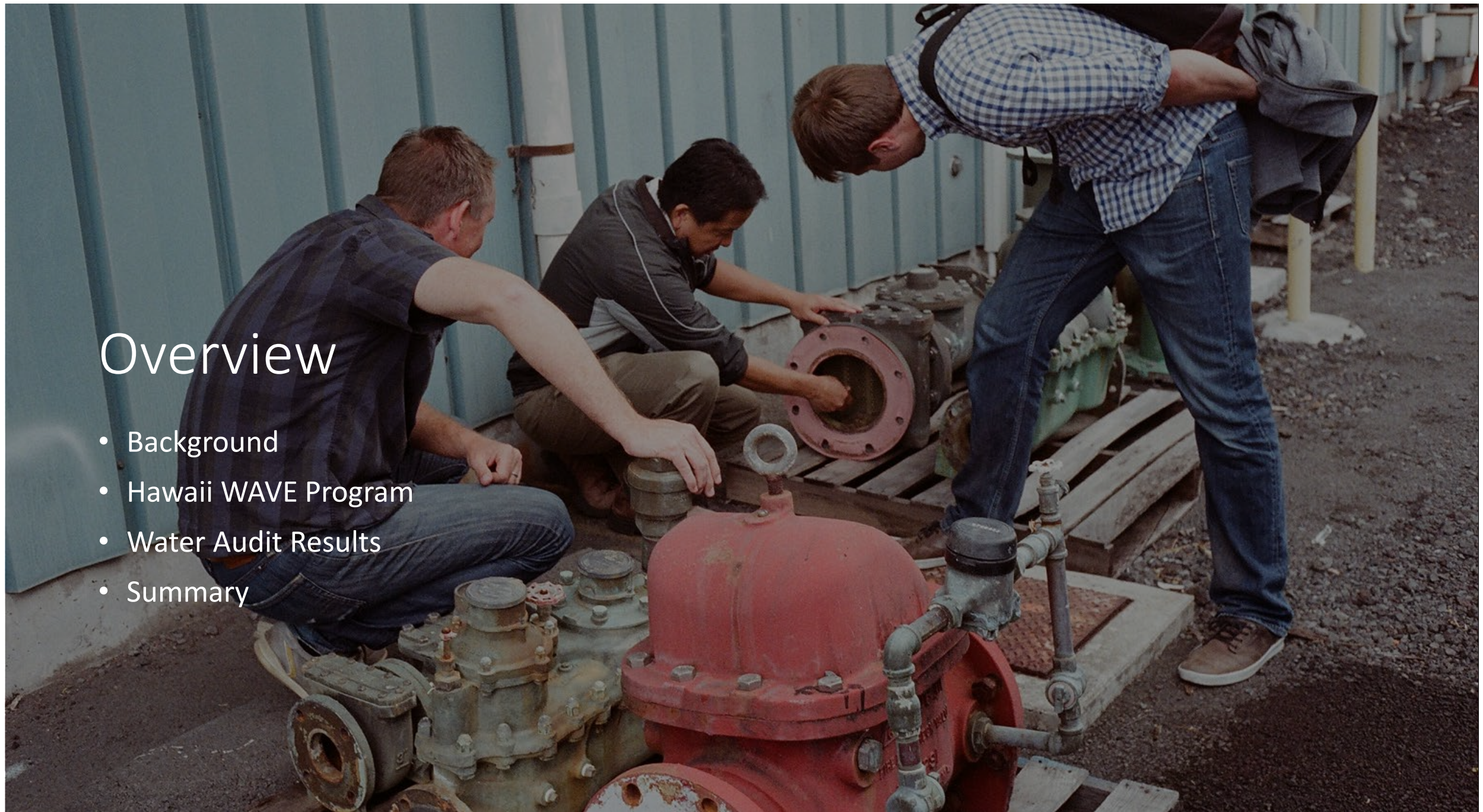
CWRM Water Audit Program Update

September 21, 2021
Honolulu, HI



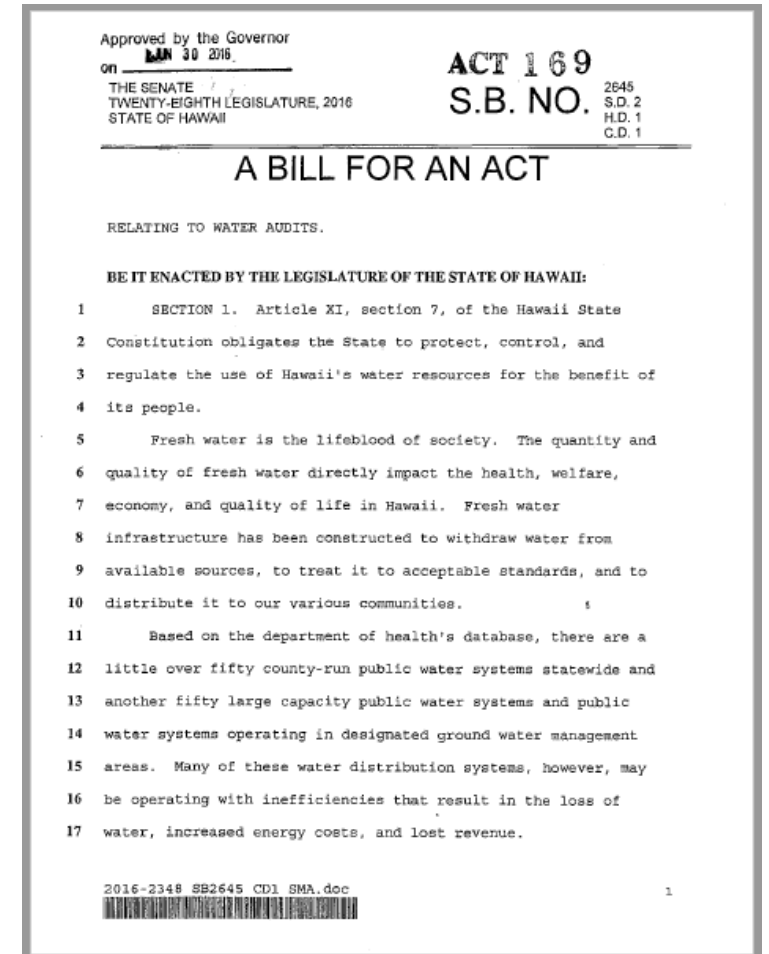
Overview

- Background
- Hawaii WAVE Program
- Water Audit Results
- Summary



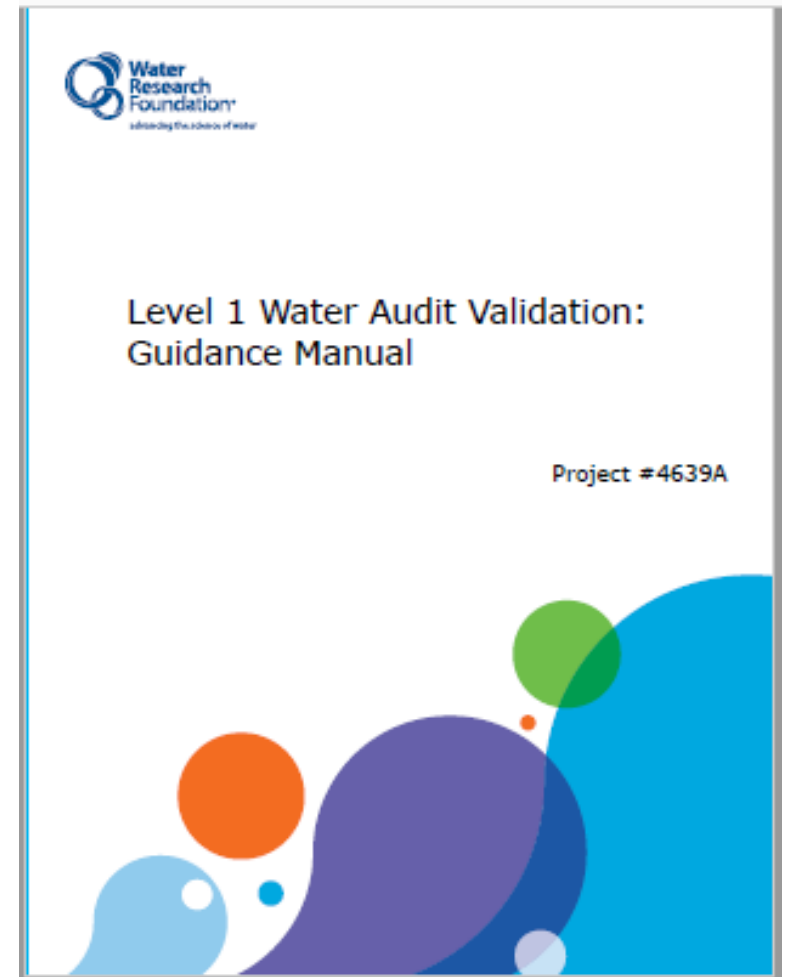
Act 169, SLH 2016, Relating to Water Audits

- Act 169 helps to implement the Commission's Water Conservation Plan (2013)
- Requires Commission to implement water audit program
- Commission will provide technical assistance & training at no cost to the utility (i.e., FREE!)
- Affects ~100 public water systems
 - 1st County-owned
 - 2nd Large capacity (serving population ≥ 1000) or within designated water management areas



Act 169, SLH 2016, Relating to Water Audits

- **Phase 1** County water audits due July 1, 2018
- **Phase 2** Large Capacity & WMA water audits due July 1, 2020
- Annual water audits due each July 1 thereafter
- AWWA water audits must be Level 1 Validated

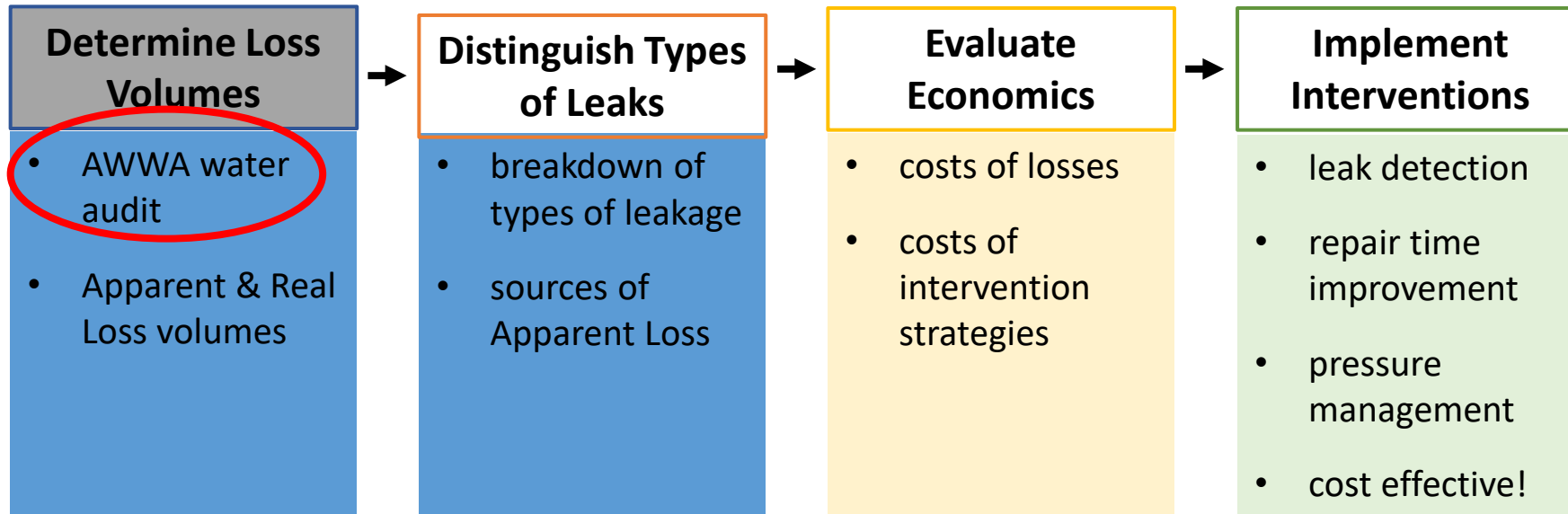


Act 169, SLH 2016, Relating to Water Audits

- Act 169 authorizes \$600,000 federal and \$100,000 private funding
- U.S. Environmental Protection Agency / Hawaii Department of Health / Hawaii Community Foundation
- Contract with Water Systems Optimization, Inc. to assist Commission



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		
	Water Losses 10	Unbilled Authorized Consumption 10		Unbilled Metered Consumption 8	Non-Revenue Water 20
				Unbilled Unmetered Consumption 2	
		Apparent Losses 3		Unauthorized Consumption 1	
				Customer Metering Inaccuracies 1	
				Systematic Data Handling Errors 1	
			Real Losses 7		





AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

American Water Works Association.
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- ? Click to access definition
- + Click to add a comment

Water Audit Report for:
Reporting Year: 2018 7/2017 - 6/2018

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below

WATER SUPPLIED

<----- Enter grading in column 'E' and 'J' ----->

Volume from own sources: + ? 1 MG/Yr
 Water imported: + ? n/a MG/Yr
 Water exported: + ? n/a MG/Yr

Master Meter and Supply Error Adjustments

	Pcnt:		Value:				MG/Yr
+	?	3	<input style="width: 50px;" type="text"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input style="width: 100px;" type="text"/>	MG/Yr
+	?	<input style="width: 50px;" type="text"/>	<input style="width: 50px;" type="text"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input style="width: 100px;" type="text"/>	MG/Yr
+	?	<input style="width: 50px;" type="text"/>	<input style="width: 50px;" type="text"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input style="width: 100px;" type="text"/>	MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: ? 8,579.770 MG/Yr

AUTHORIZED CONSUMPTION

Billed metered: + ? 5 MG/Yr
 Billed unmetered: + ? 7 MG/Yr
 Unbilled metered: + ? n/a MG/Yr
 Unbilled unmetered: + ? 5 21.449 MG/Yr

Click here: ?
for help using option buttons below

	Pcnt:		Value:				MG/Yr
+	?	<input style="width: 50px;" type="text"/>	<input style="width: 50px;" type="text"/>	<input type="radio"/>	<input checked="" type="radio"/>	21.449	MG/Yr

Use buttons to select percentage of water supplied OR value

AUTHORIZED CONSUMPTION: ? 7,336.635 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption) 1,243.135 MG/Yr

Apparent Losses

Unauthorized consumption: + ? 21.449 MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies: + ? 3 466.916 MG/Yr
 Systematic data handling errors: + ? ? 18.288 MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

	Pcnt:		Value:				MG/Yr
+	0.25%	<input checked="" type="radio"/>	<input type="radio"/>	<input style="width: 100px;" type="text"/>	<input type="radio"/>	<input style="width: 100px;" type="text"/>	MG/Yr

+	6.00%	<input checked="" type="radio"/>	<input type="radio"/>	<input style="width: 100px;" type="text"/>	<input type="radio"/>	<input style="width: 100px;" type="text"/>	MG/Yr
+	0.25%	<input checked="" type="radio"/>	<input type="radio"/>	<input style="width: 100px;" type="text"/>	<input type="radio"/>	<input style="width: 100px;" type="text"/>	MG/Yr

Types of Water Loss

Apparent Losses



Real Losses



W S O



Hawaii W.A.V.E.

- Water
- Audit
- Validation
- Effort

W S O



Hawaii WAVE is a Water Audit Training and Technical Assistance Program spanning four years and two phases

WAVE 1: Outreach & Introductory workshops

WAVE 2: Follow-up conference calls; practice audit

WAVE 3: Outreach & Intermediate workshops

WAVE 4: Follow-up conference calls; water audit validation

Act 169 Requirements

Utility Mandate
County-Owned systems + Large Capacity & WMA systems = **100 AWWA water audits**

CWRM Mandate
On-Site Training workshops + Technical Assistance conference calls = **4 Years** of expert support



Phase 1 County-owned Public Water Systems

- WAVE 1: Conducted five 2-day workshops in 4 counties
 - Day 1: Introduction to water audits, AWWA Water Audit Spreadsheet, data review
 - Day 2: Identification of system boundaries, sources of water supplied, customer meter records, practice audits
 - **Trained 32 individuals from four county water departments**
 - Delineated 45 discrete sub-systems
 - Kauai – 9
 - Oahu – 5
 - Maui – 10
 - Hawaii – 21

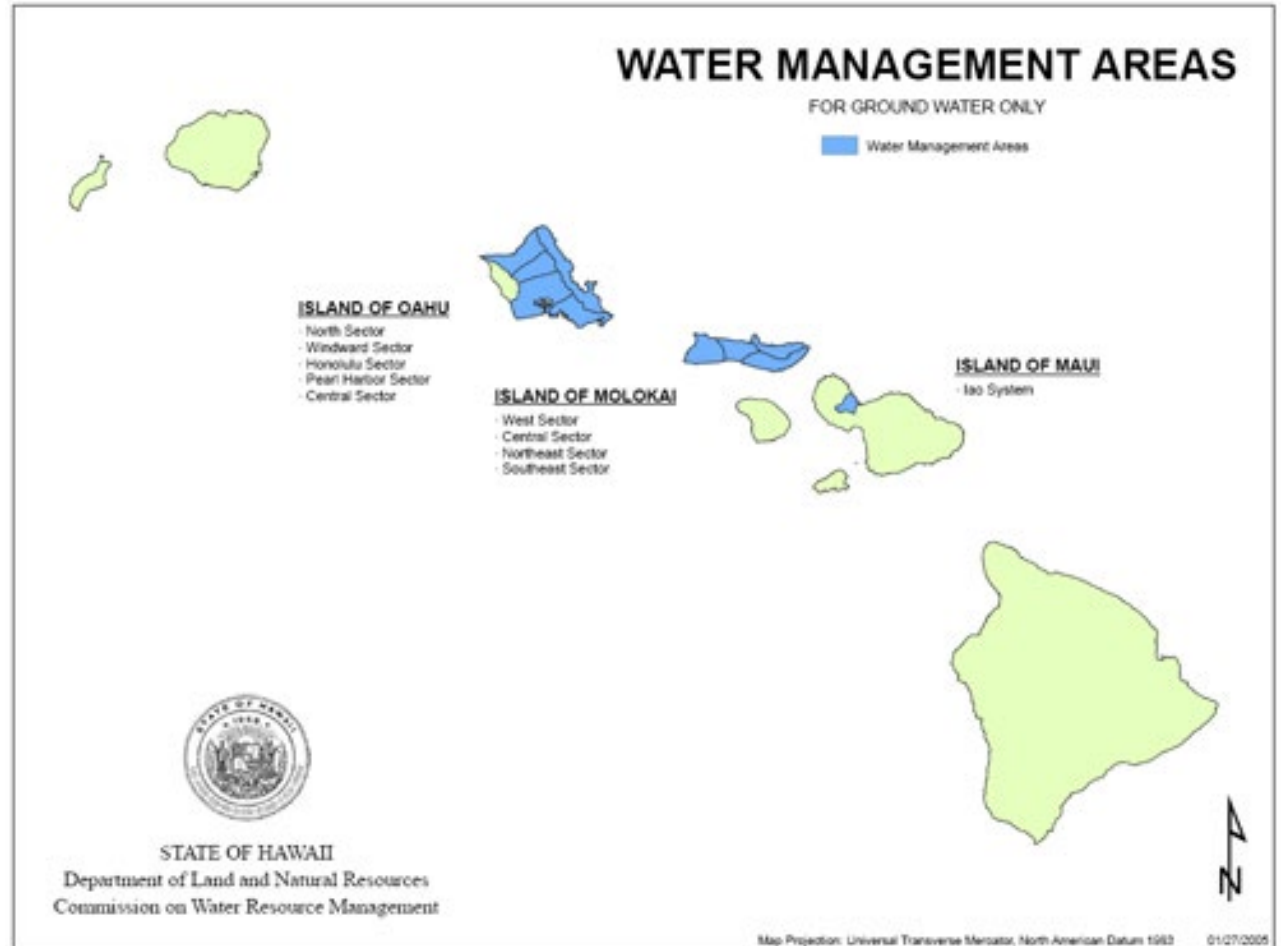


Phase 1 County-owned Public Water Systems

- WAVE 2: Completed follow-up teleconferences, data and validation review, received completed audits on time from all counties, technical memos
- WAVE 3: Completed workshops February-March 2018; “official” audit preparation
- WAVE 4: Completed validation calls and evaluated supporting documentation
- All inaugural water audits submitted by July 1, 2018

Phase 2 Large Capacity / WMA Public Water Systems

- **51** affected PWS in four counties
- Kauai – 4
- Oahu – 30
- Maui – 6
- Lanai – 1
- Molokai -5
- Hawaii - 5



Phase 2 Large Capacity / WMA Public Water Systems

- WAVE 1: Workshops on all islands Feb. – Apr. 2019
 - **48 PWS, 77 individuals trained**
- WAVE 2: Validation follow-up calls Apr. – Jul. 2019
 - **42 PWS practice audits, 38 follow-up documents completed**
- WAVE 3: Workshops Feb. – Mar. 2020
- WAVE 4: Validation calls (CY2019)
 - **49 validated audits received by CWRM**



Water Audit Program Participation

Phase 1 County Audits Received

- 2017 – 45
- 2018 – 47
- 2019 – 47/47
- 2020 – 24/47 (ongoing)

Phase 2 Large-Cap/WMA Audits Received

- 2019 – 49/51
- 2020 – 32/51 (ongoing)



Overall Results Summary (Unfiltered Results)

45/49

Systems

\$17/3.5

Million



4,287/880

Miles of Mains

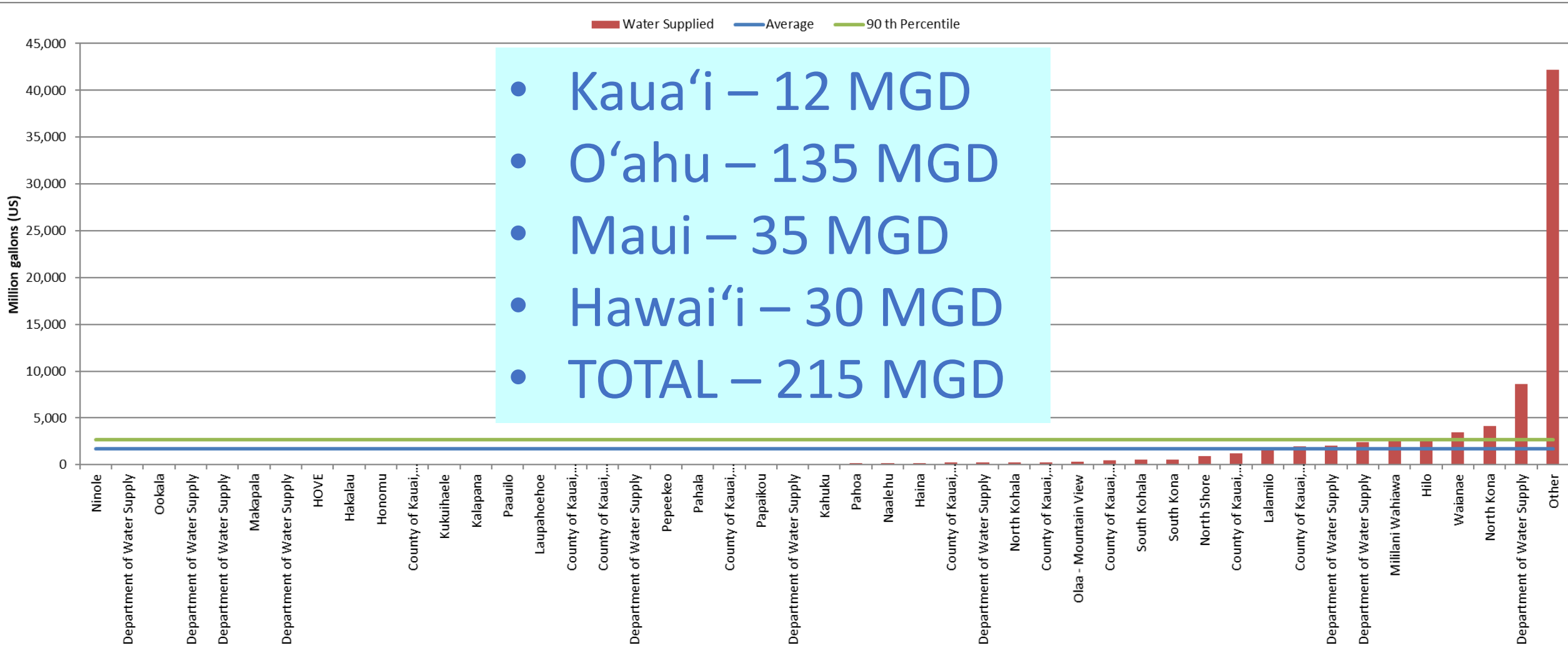
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MGD Apparent Loss

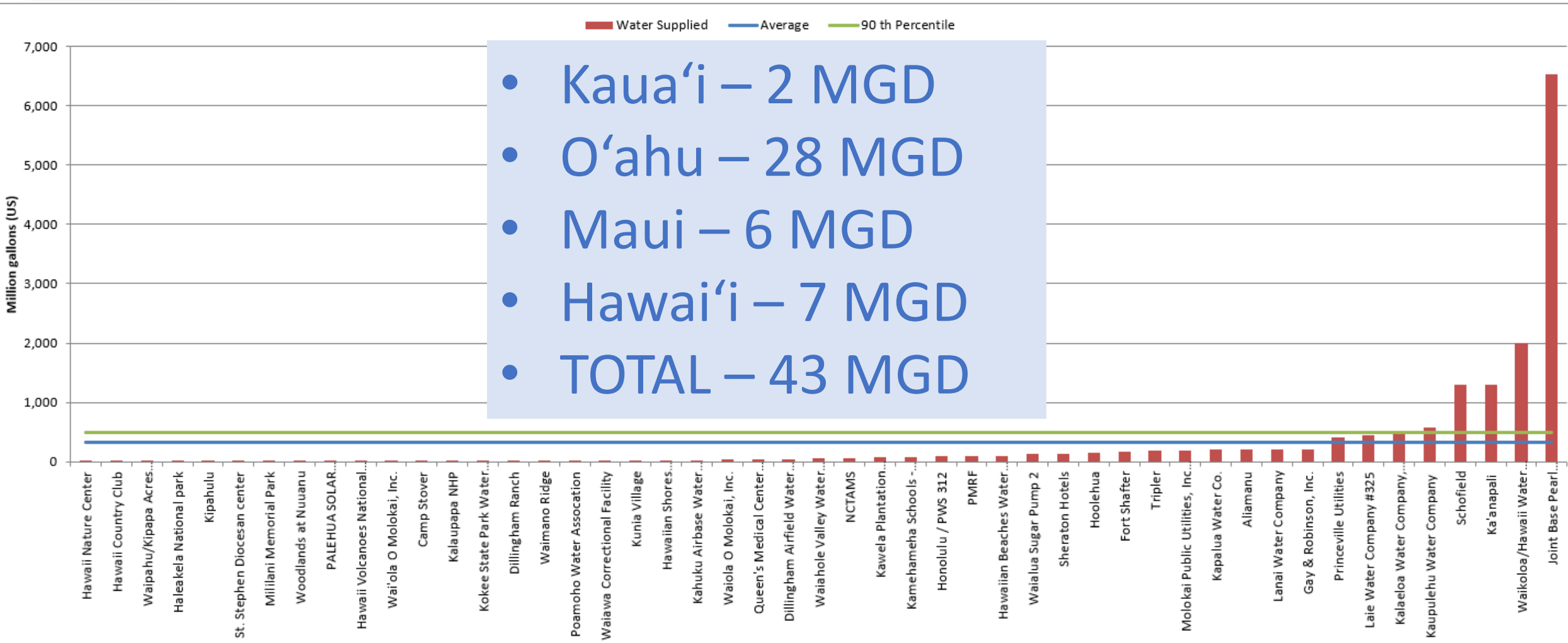
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MGD Real Loss

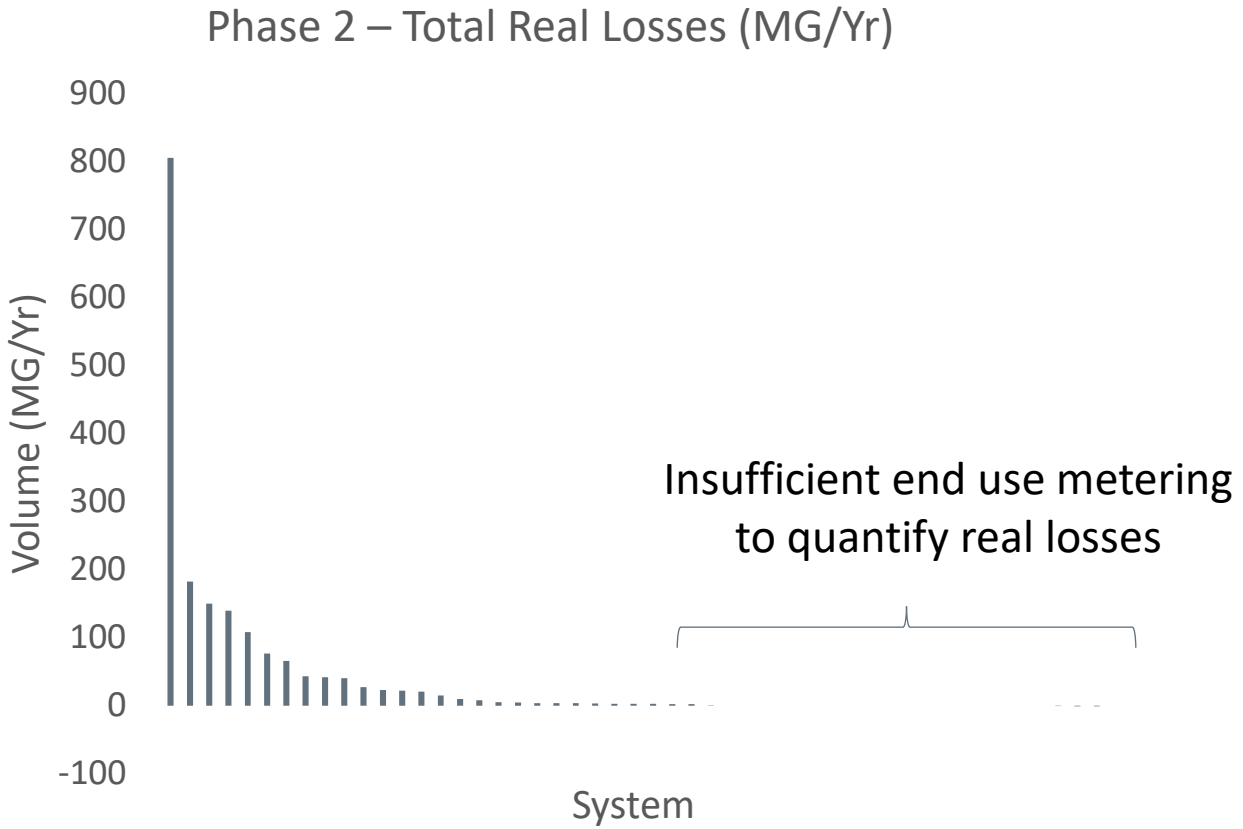
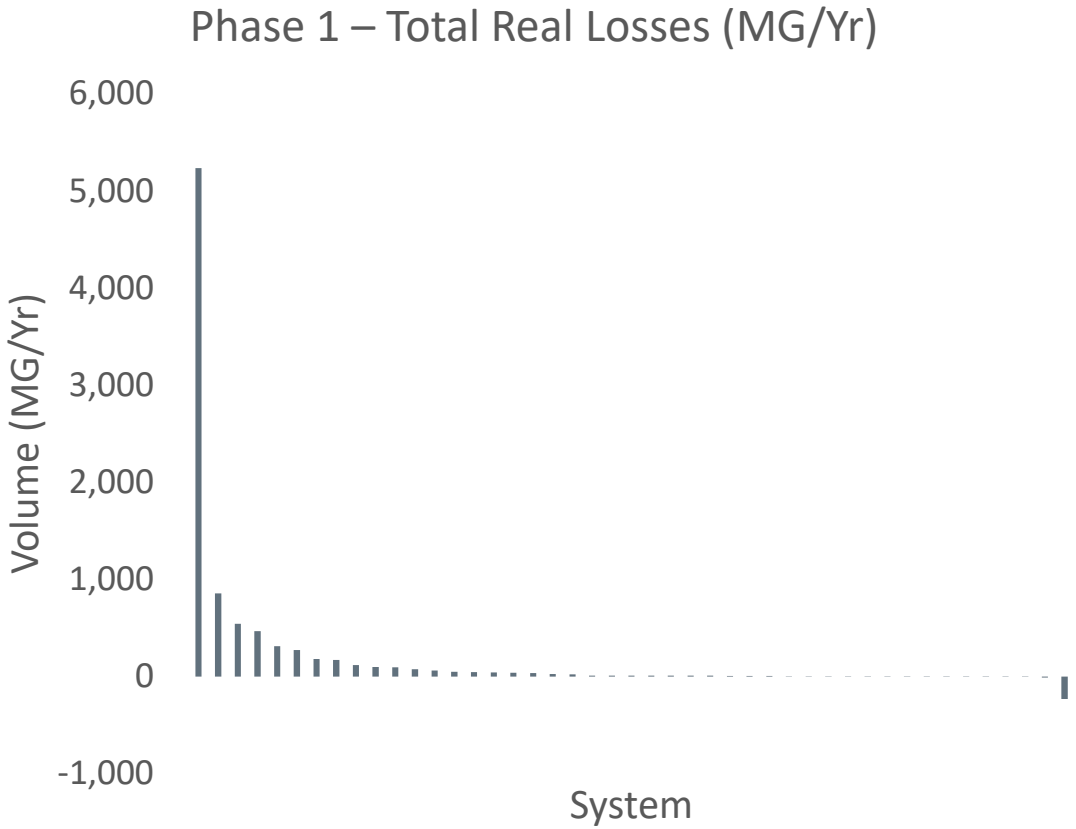
County System 2018 Water Supplied



Large Capacity / WMA System 2019 Water Supplied



Real Loss Key Performance Indicators



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

Real Loss Recovery

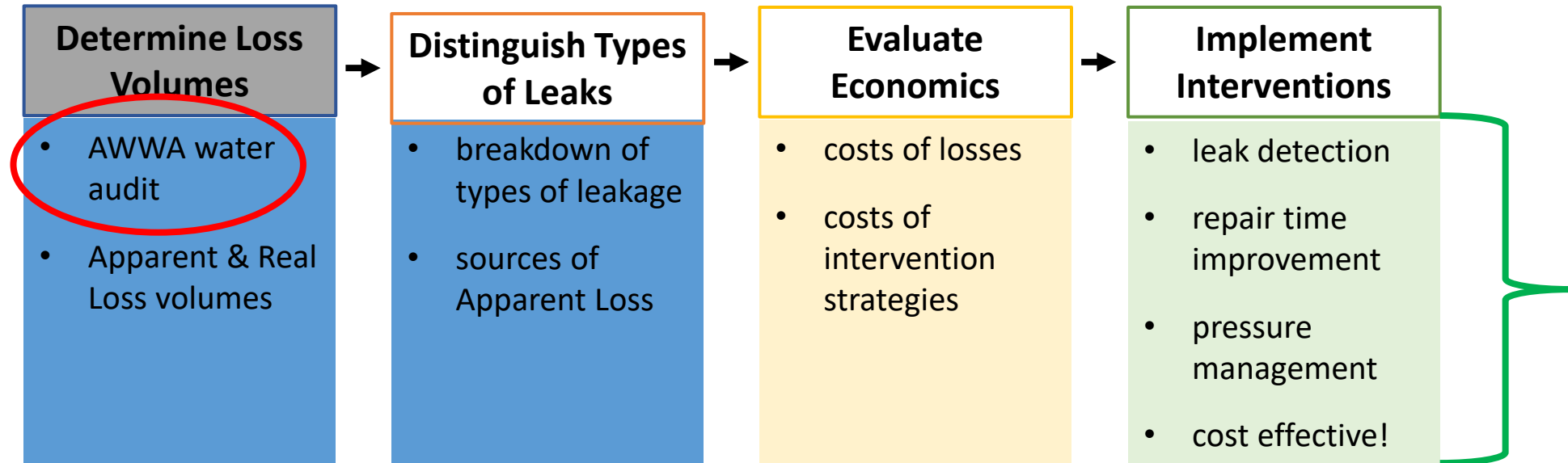
- Data management refinements will likely take priority over loss recovery
- Pressure surveys to assess opportunities to modify pressure and mitigate transients
- Leak detection surveys to proactively find leaks for repair

Apparent Loss Recovery

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



Water Loss Control Program



Hawai'i WAVE Summary

- Water audit program achieved its goals of providing training/technical assistance and producing validated audits
- **Counties** (47 systems) supply **215 MGD**, real losses **23 MGD**
- **Large-cap/WMA** (51 systems) supply **43 MGD**, real losses **5 MGD**



Hawai'i WAVE Summary

- Many non-utilities/special cases affected by Act 169 – may need to reevaluate goals & objectives of the Act
- Water audits are only a first step in a utility's comprehensive water loss control plan – many opportunities exist
- Too soon to see any water savings
- Seeking out partners to implement program recommendations

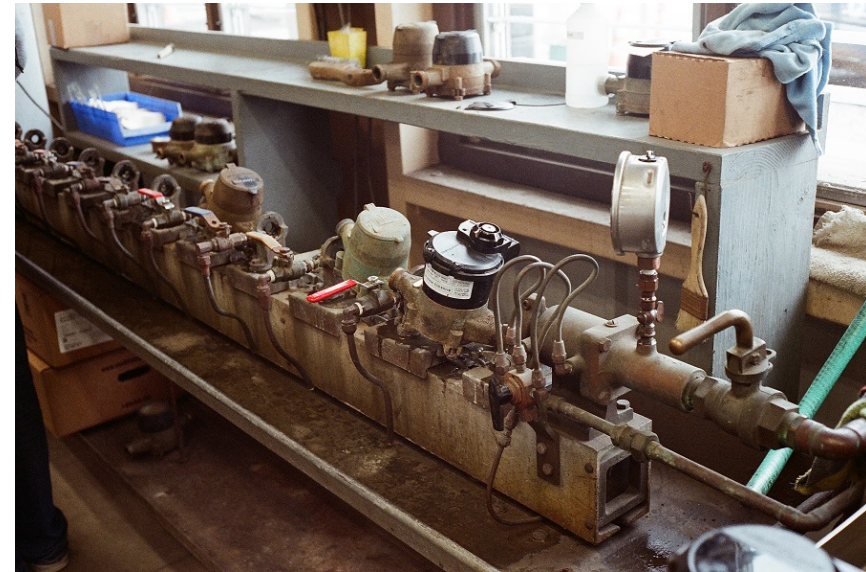


Next Steps

- Address small PWS with insufficient end-use meters – AWWA water audit not suited for non-utility PWS
- Validator certification for staff
- AWWA WAS v.6
- Training for v.6
- Expand partnerships with industry champions
- Identify funding sources to assist smaller water systems
- Developing relationships with other State/Provincial agencies responsible for water audits to learn and share information

Opportunities for Project Implementation

- USEPA DWSRF
- USDA Rural Development
- Bureau of Reclamation WaterSMART
- Hawai'i Rural Water Association
- Rural Community Assistance Corporation



Mahalo

Questions?

