

CWRM Water Audit Program Update

July 21, 2020
Honolulu, HI



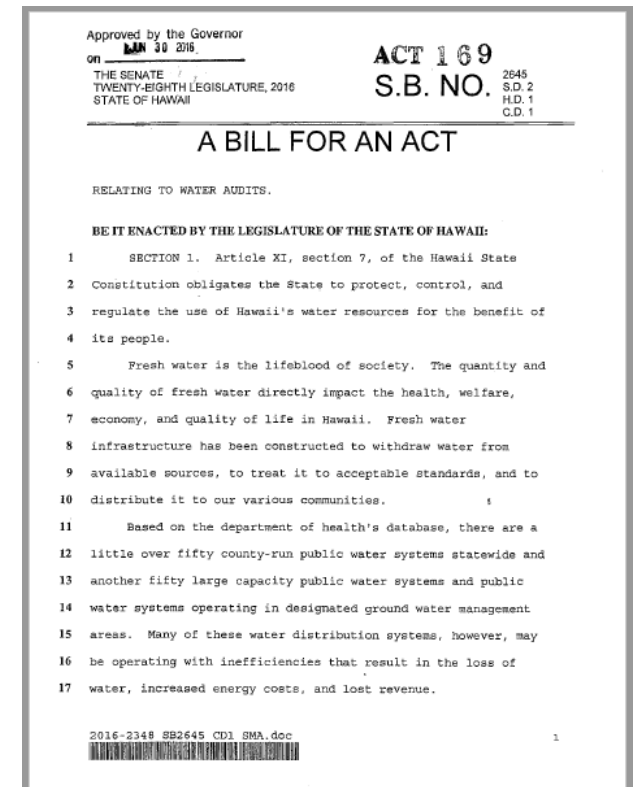
Overview

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



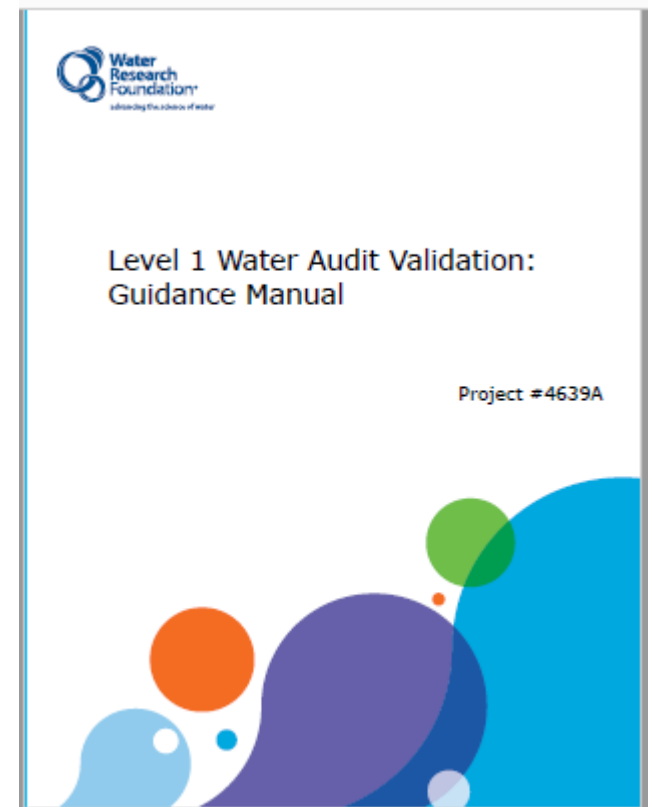
Act 169, SLH 2016, Relating to Water Audits

- 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

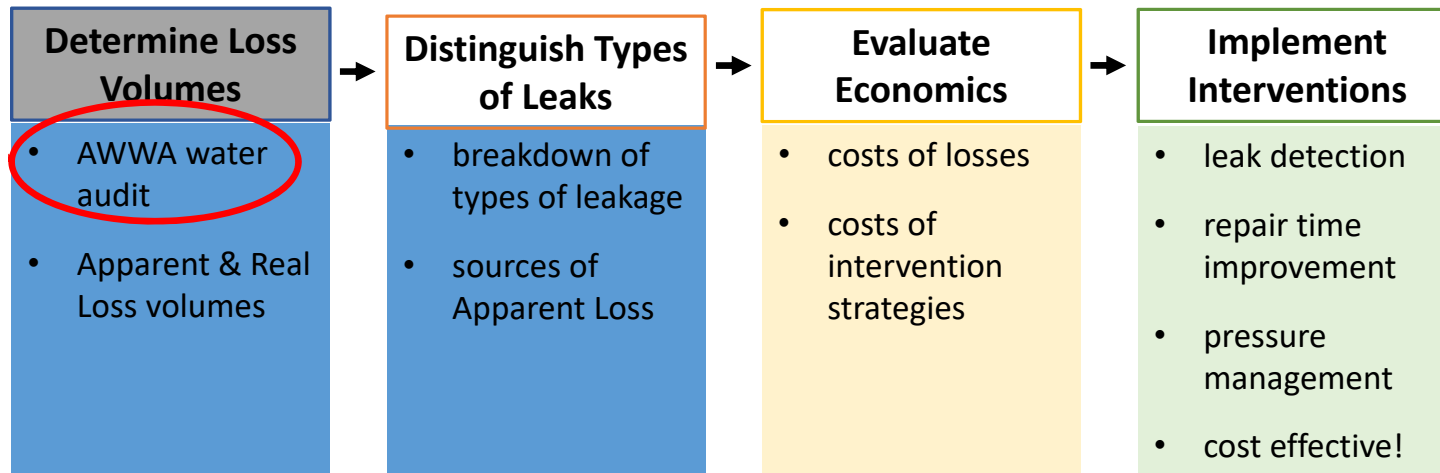


Act 169, SLH 2016, Relating to Water Audits

- 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	
		Unbilled Authorized Consumption 10	Unbilled Metered Consumption 8	Non-Revenue Water 20
	Water Losses 10	Apparent Losses 3	Unbilled Unmetered Consumption 2	
			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: Department of Water Supply (Central)
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	8579.77	MG/Yr
Water imported:	+	?	n/a		MG/Yr
Water exported:	+	?	n/a		MG/Yr

Master Meter and Supply Error Adjustments

	Pcnt:		Value:	
+	?	3	● ○	MG/Yr
+	?		● ○	MG/Yr
+	?		● ○	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	7,315.016	MG/Yr
Billed unmetered:	+	?	7	0.170	MG/Yr
Unbilled metered:	+	?	n/a	0.000	MG/Yr
Unbilled unmetered:	+	?	5	21.449	MG/Yr

Click here: ?
for help using option
buttons below

	Pcnt:		Value:	
○ ●	○ ●	○ ●	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:	
0.25%	● ○	○ ●		MG/Yr

	Pcnt:		Value:	
6.00%	● ○	○ ●		MG/Yr
0.25%	● ○	○ ●		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

WAVE 1: Outreach & Introductory workshops

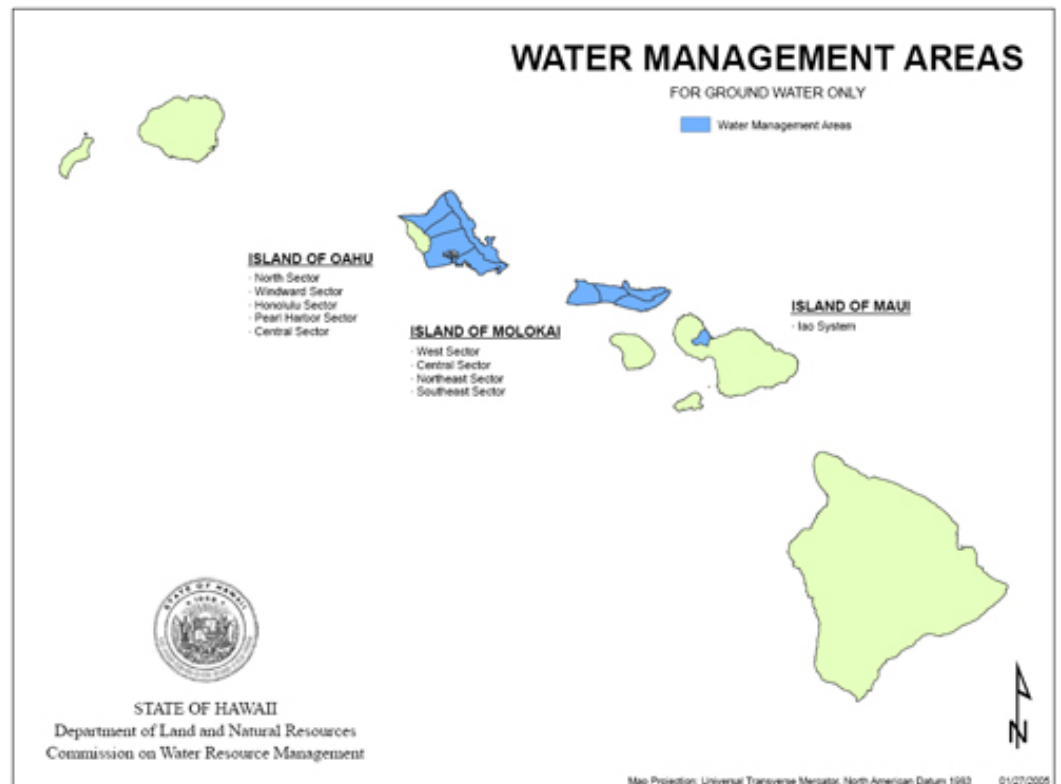
WAVE 2: Follow-up conference calls; practice audit

WAVE 3: Outreach & Intermediate workshops

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

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



Schedule: Phase 2 Large Capacity & WMA Public Water Systems



Phase 2 Hawaii WAVE Program Activity	Q1 2018	2018	2018	2018	Q1 2019	2019	2019	2019	Q1 2020	2020
WAVE 1 Large Cap / WMA – Workshops										
WAVE 2 Large Cap / WMA – Teleconferences										
WAVE 3 Large Cap / WMA – Workshops										
WAVE 4 Large Cap / WMA – Teleconferences										

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
 - 50 calls scheduled, 41 calls completed, 26 audits received



Lessons & Challenges

- Knowledgeable consultants are invaluable ✓
- Early outreach to industry is important – communication is key for buy-in
- Support from utility upper management critical
- Practically no source meter testing / meter installation quality control ✓
- We're here to help: utilities are apprehensive
- Persistence – would be good to have some teeth in the legislation
- Large-capacity PWS includes non-utilities: school & hospital campuses; national parks; etc. ✓
- AWWA water audit not ideally-suited for non-utility PWS ✓



Water Audit Program Participation

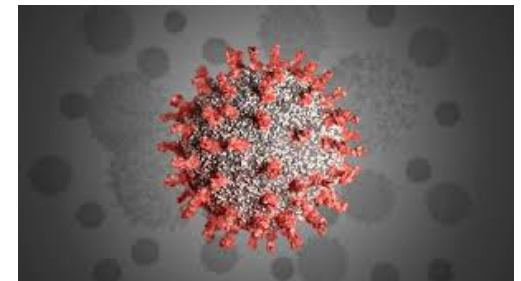
Phase 1 County Audits Received

- 2017 – 45
- 2018 – 47
- 2019 – 15/47 (as of 7/20/20)

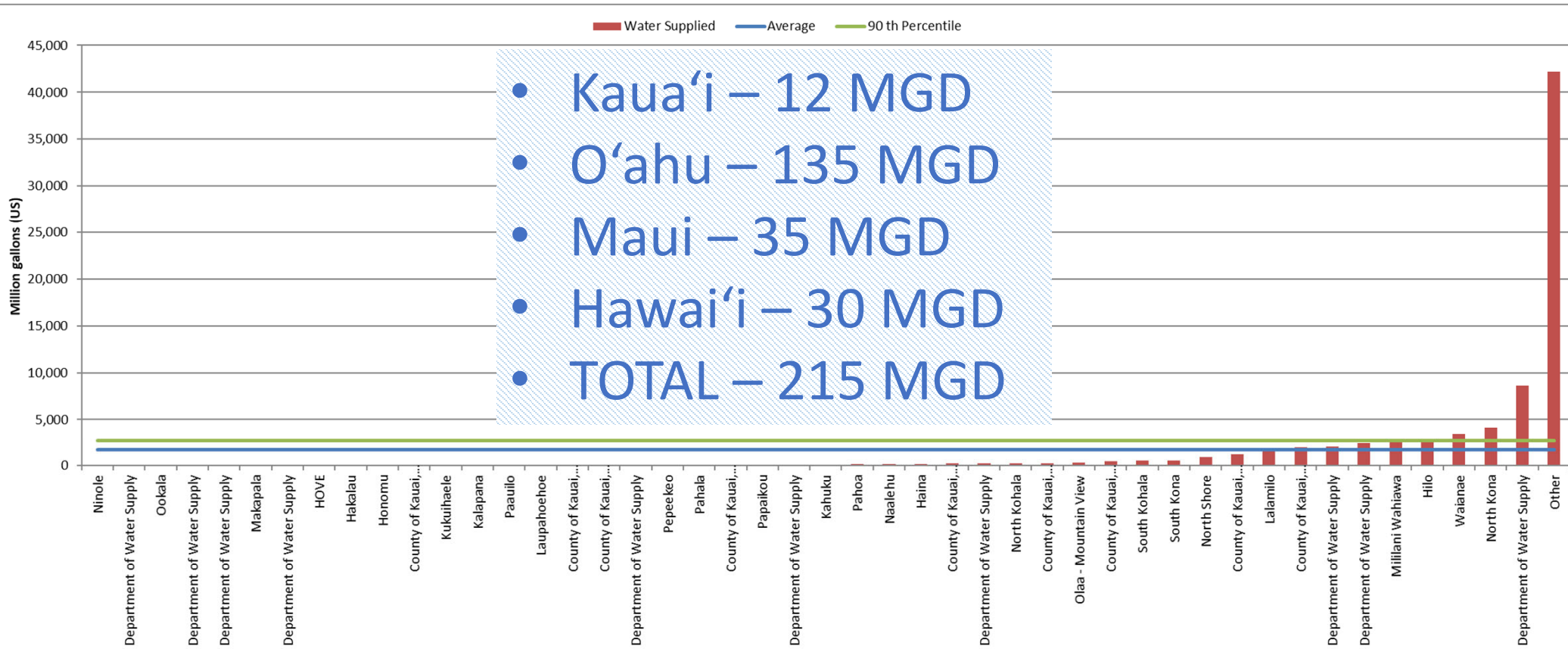
Phase 2 Large-Cap/WMA Audits Received

- 2019 – 26/51 (as of 7/20/20)

Corona virus causing delays in audit submission



County System 2018 Water Supplied



County System Results Summary

Audit Year	Number of Systems	Miles of Main	Real Losses	Apparent Losses	Cost of Real and Apparent Losses
2017	35	4107	24 MGD	7 MGD	\$17M
2018	42	4606	26 MGD	7 MGD	\$17.8M



County Real Loss Summary 2017 Audit Period

County	Count of System Audits	Miles of Main	Total Rate of Real Loss (MGD)	Total Cost of Real Losses (\$/yr)	Real Losses per Service Connection (gal/con/day)	Real Losses per Mile of Main (gal/mi/day)	*Cost of Real Losses per Mile of Main (\$/mi/yr)
Kauai	6	370	1	\$347,117	61	3,148	\$938
Honolulu	4	2,015	16	\$2,352,716	97	8,077	\$1,210
Maui	9	763	3	\$1,338,185	79	3,738	\$1,751
Hawaii	16	959	4	\$1,786,451	214	4,566	\$1,863
TOTALS	35	4,107	24	\$5,824,469			



County Real Loss Summary 2018 Audit Period

County	Count of System Audits	Miles of Main	Total Rate of Real Loss (MGD)	Total Cost of Real Losses (\$/yr)	Real Losses per Service Connection (gal/con/day)	Real Losses per Mile of Main (gal/mi/day)	*Cost of Real Losses per Mile of Main (\$/mi/yr)
Kauai	6	370	1	\$376,840	52	2,972	\$1,019
Honolulu	4	2,122	17	\$2,622,334	102	8,084	\$1,280
Maui	9	766	3	\$1,352,510	82	4,226	\$1,765
Hawaii	23	1,148	5	\$2,319,570	226	4,085	\$2,021
TOTALS	42	4,406	26	\$6,671,254			



County Apparent Loss Summary 2017 Audit Period

County	Count of System Audits	Number of Service Connections	Customer Metering Inaccuracy (%)	Total Rate of Apparent Loss (MGD)	Total Cost of Apparent Losses (\$/yr)	Apparent Losses per Connection per Day (gal/conn/day)	**Cost of Apparent Losses per Connection per Year (\$/conn/yr)
Kauai	6	18,987	2%	0.3	\$539,910	14	\$28
Honolulu	4	166,397	2%	3.1	\$5,249,221	19	\$32
Maui	9	36,113	6%	2.2	\$3,510,310	60	\$97
Hawaii	16	20,452	5%	1.4	\$1,856,551	68	\$91
TOTALS	35			7	\$11,155,992		



County Apparent Loss Summary 2018 Audit Period

County	Count of System Audits	Number of Service Connections	Customer Metering Inaccuracy (%)	Total Rate of Apparent Loss (MGD)	Total Cost of Apparent Losses (\$/yr)	Apparent Losses per Connection per Day (gal/conn/day)	**Cost of Apparent Losses per Connection per Year (\$/conn/yr)
Kauai	6	21,136	2%	0.2	\$486,788	10	\$23
Honolulu	4	162,338	2%	3.0	\$5,097,165	18	\$31
Maui	9	39,574	6%	2.2	\$3,571,992	55	\$90
Hawaii	23	20,762	5%	1.4	\$1,960,800	69	\$94
TOTALS	42			7	\$11,116,746		



Common Opportunities for Water Loss Control

Data Management

- Regular master meter volumetric testing and calibration
- Customer meter testing program development
- Billing database auditing - detailed review of underlying raw consumption data

Real Loss Recovery

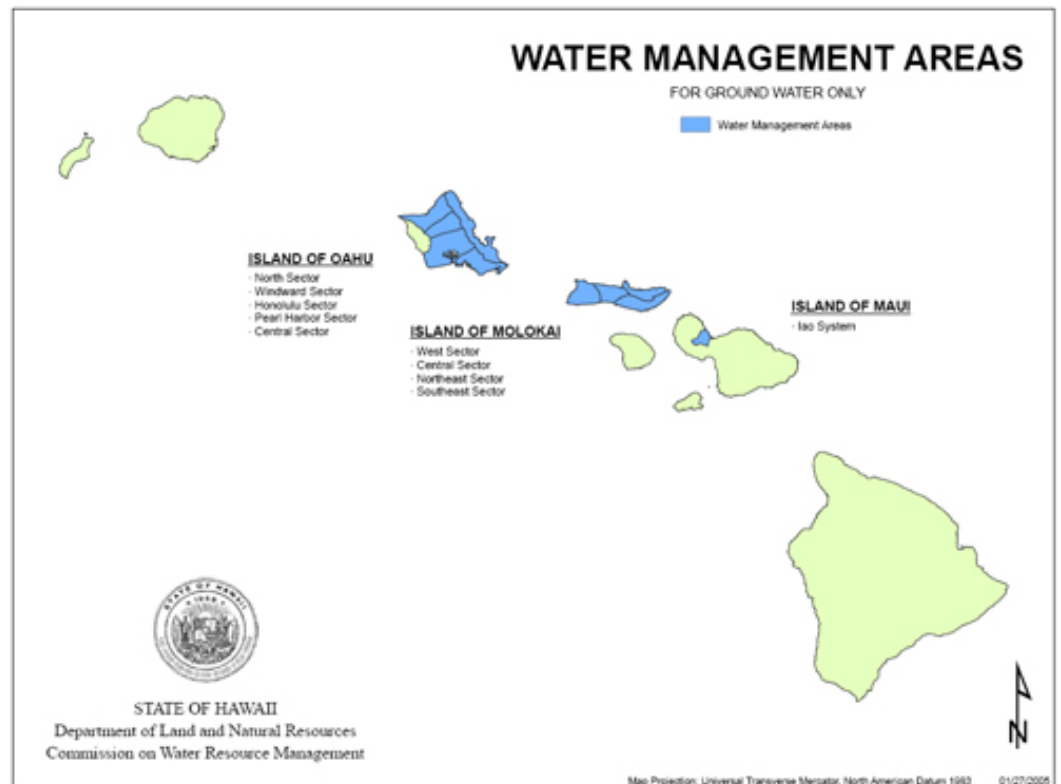
- Data management refinements will likely take priority over loss recovery
- Pressure surveys to assess opportunities to modify pressure and mitigate transients
- Comprehensive leak detection surveys to proactively find leaks for repair

Apparent Loss Recovery

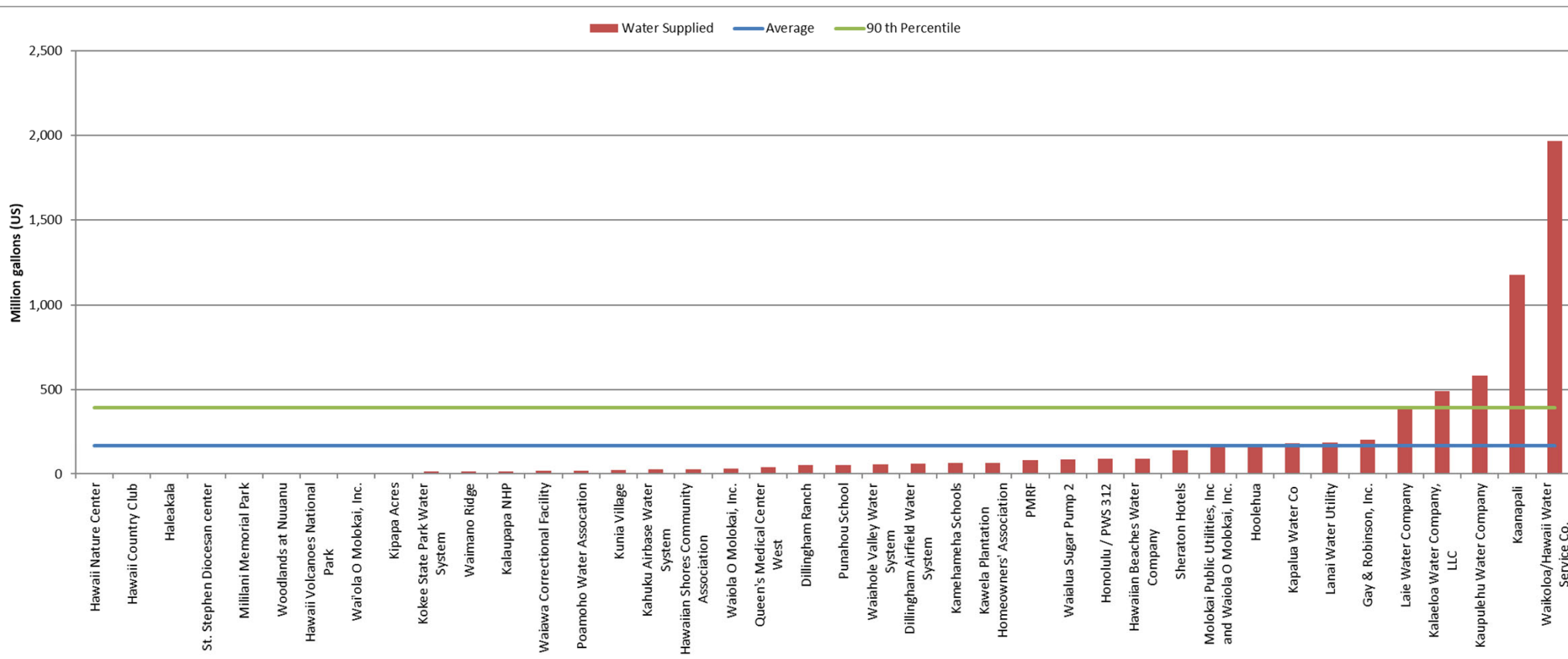
- Customer meter testing program development

Phase 2 Large Capacity & WMA Public Water Systems

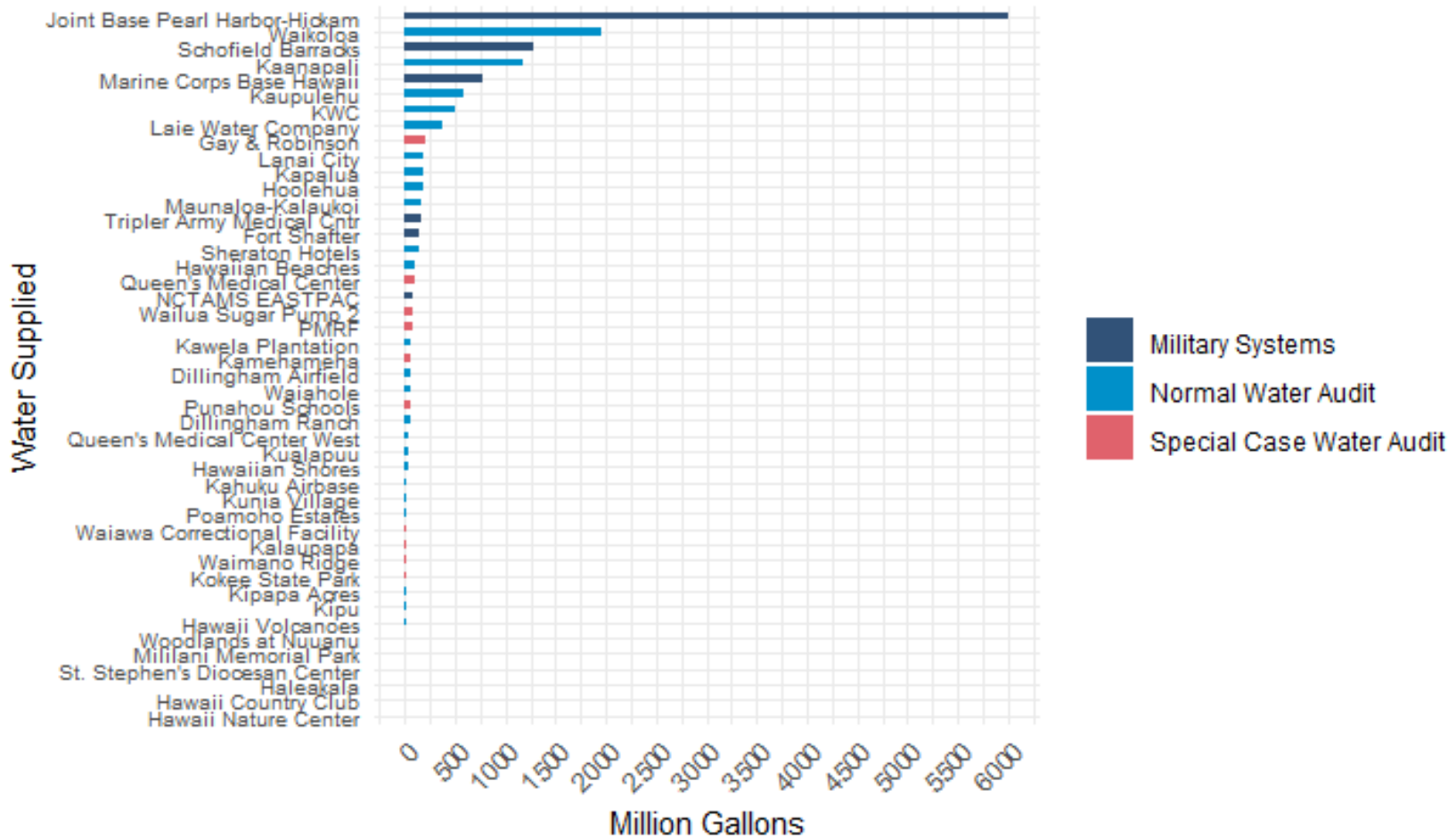
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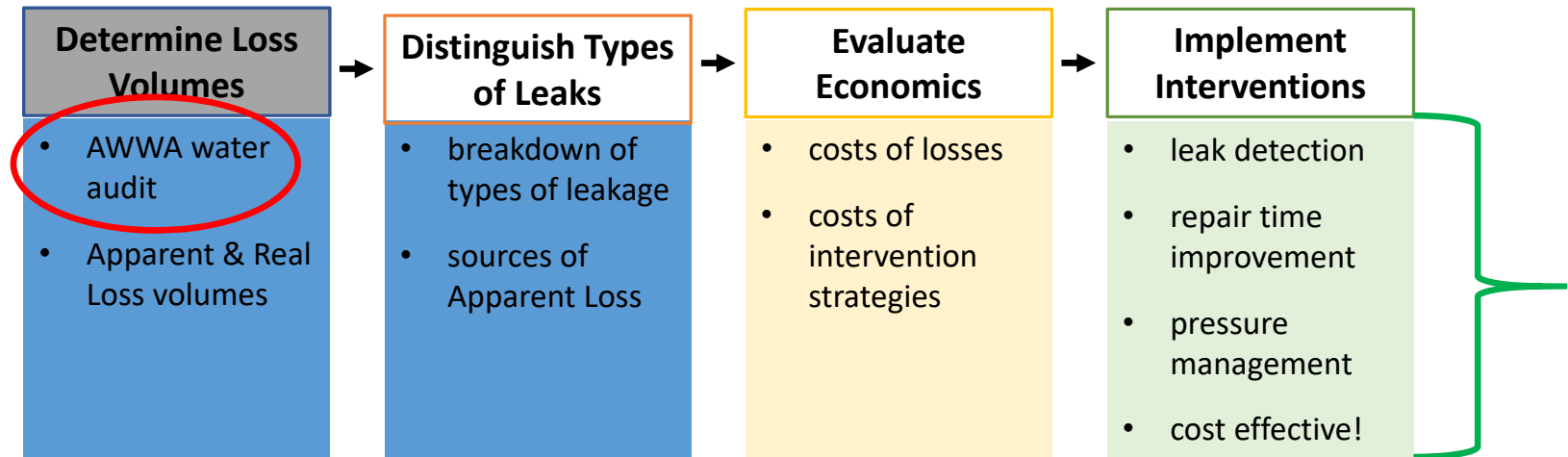
Phase 2 2018 Practice Audits Water Supplied – 18 MGD



Water Supplied in Phase 2 Systems ~ 41 MGD



Water Loss Control Program



Success Stories



- Oahu private utility used water audit results along with advanced leak detection techniques to find and repair a large main leak which was previously undetected
- A neighbor island County water department is implementing water loss control projects based on water audit findings
- Many utilities are finding water audits a useful tool and are considering/implementing projects to improve DVG or address water losses

Common Opportunities for Water Loss Control

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Real Loss Recovery

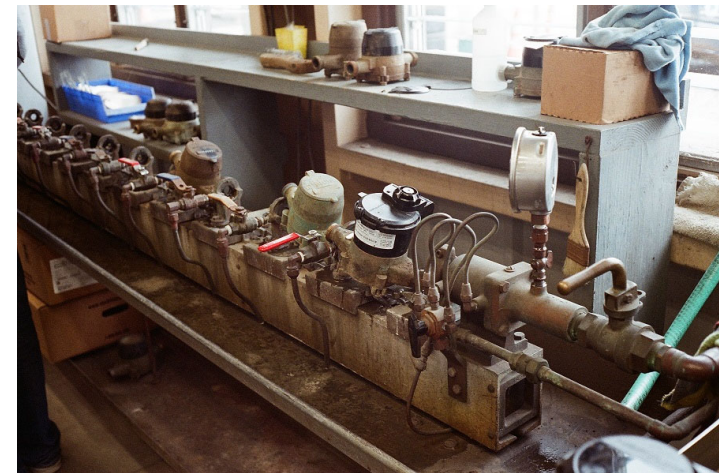
- Data management refinements will likely take priority over loss recovery
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Apparent Loss Recovery

- Customer meter testing program development

Opportunities for Project Implementation

- Hawai'i DOH DWSRF loans
- Bureau of Reclamation WaterSMART grants
- Hawai'i Rural Water Association
- Rural Community Assistance Corporation
- Utility hui to leverage resources



Summary

- Water audit program achieved its goals of providing training/technical assistance and producing validated audits
- **Counties** (48 systems) supply **215 MGD**, real losses **26 MGD**
- **Large-cap/WMA** (51 systems) supply **~41 MGD**, real losses **?? MGD**
- Audit submissions delayed due to COVID – expect close to 100% compliance



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



Mahalo

Questions?