Hoʻola Hou: Planning and Rebuilding Maui Post-Wildfires

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PNWS-AWWA 2026 / May 7, 2026

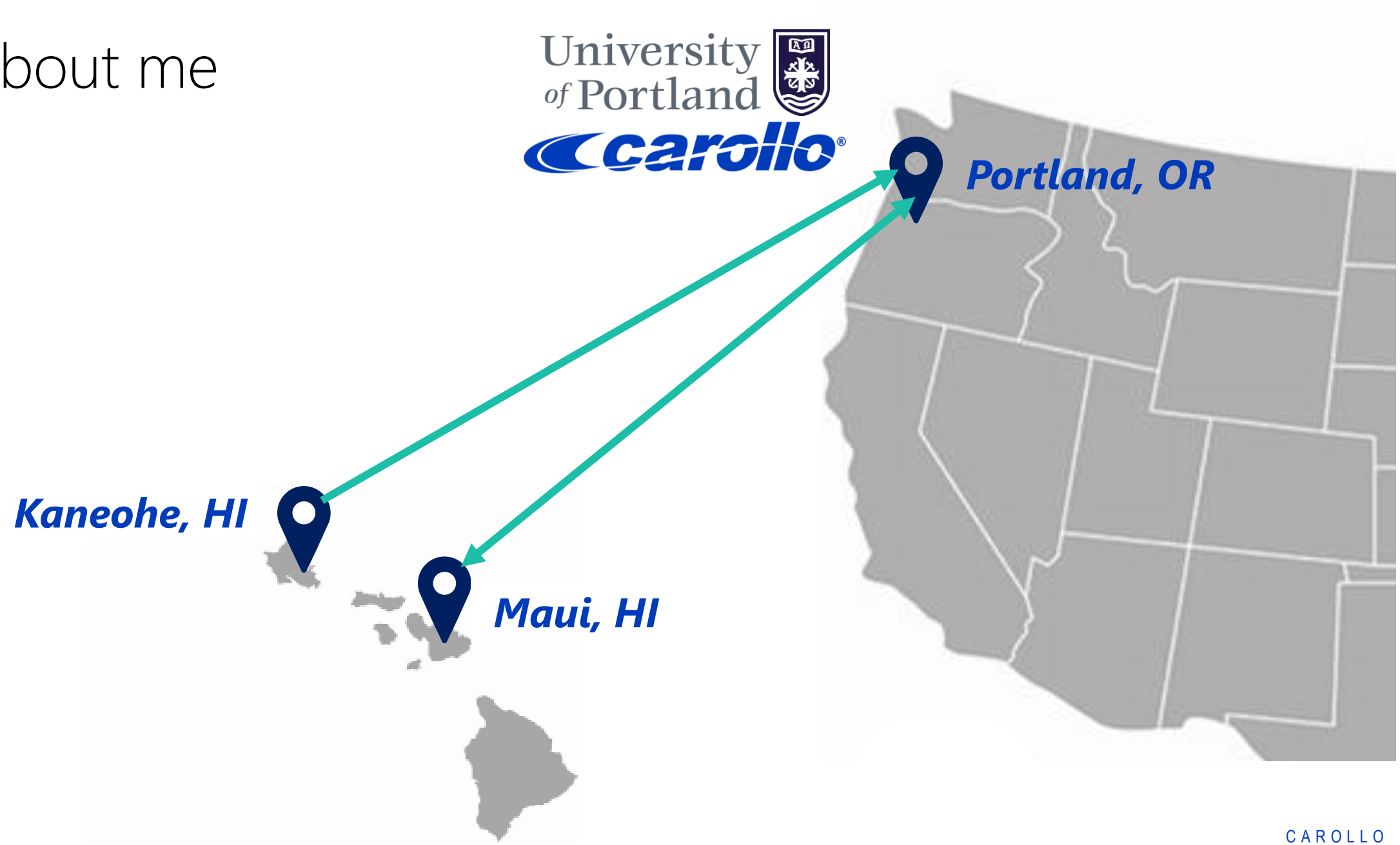


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01

Introduction/Background

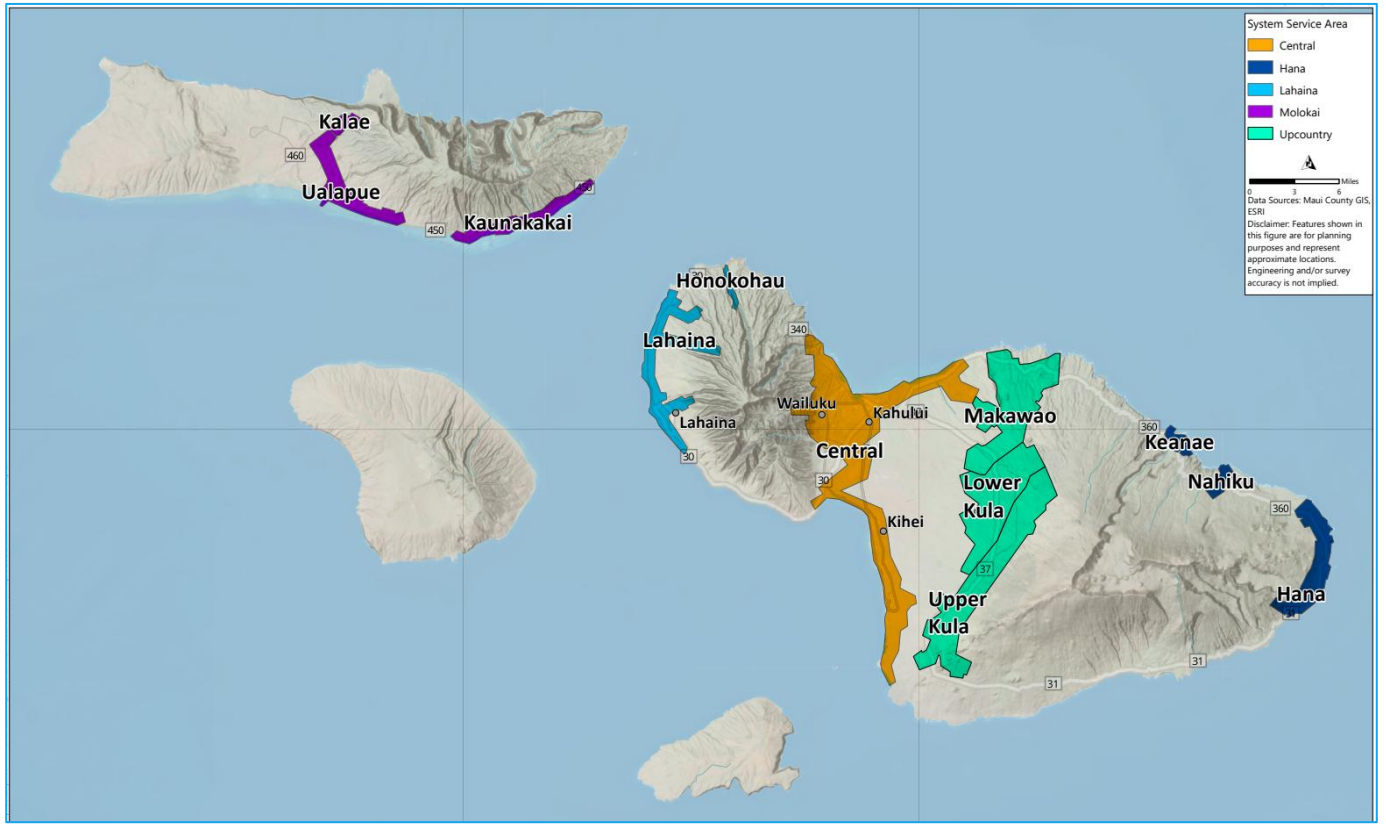
About me



Maui DWS

COUNTY OF MAUI
DEPARTMENT OF WATER SUPPLY
WATER RESOURCES & PLANNING

- Serves 37,000+ service connections across Molokai and Maui
- 12 separate water systems across two islands
- Mix of surface water and groundwater supply



Field work in Maui

- Spent 6 months in field
  - » Data collection for hydraulic model/ GIS development
  - » Condition assessment of facilities
  - » Damage assessment for 2023 wildfire
  - » Staff augmentation for DWS



02

Impacts of 2023 Wildfires

What comes to mind when you think of Hawaii?



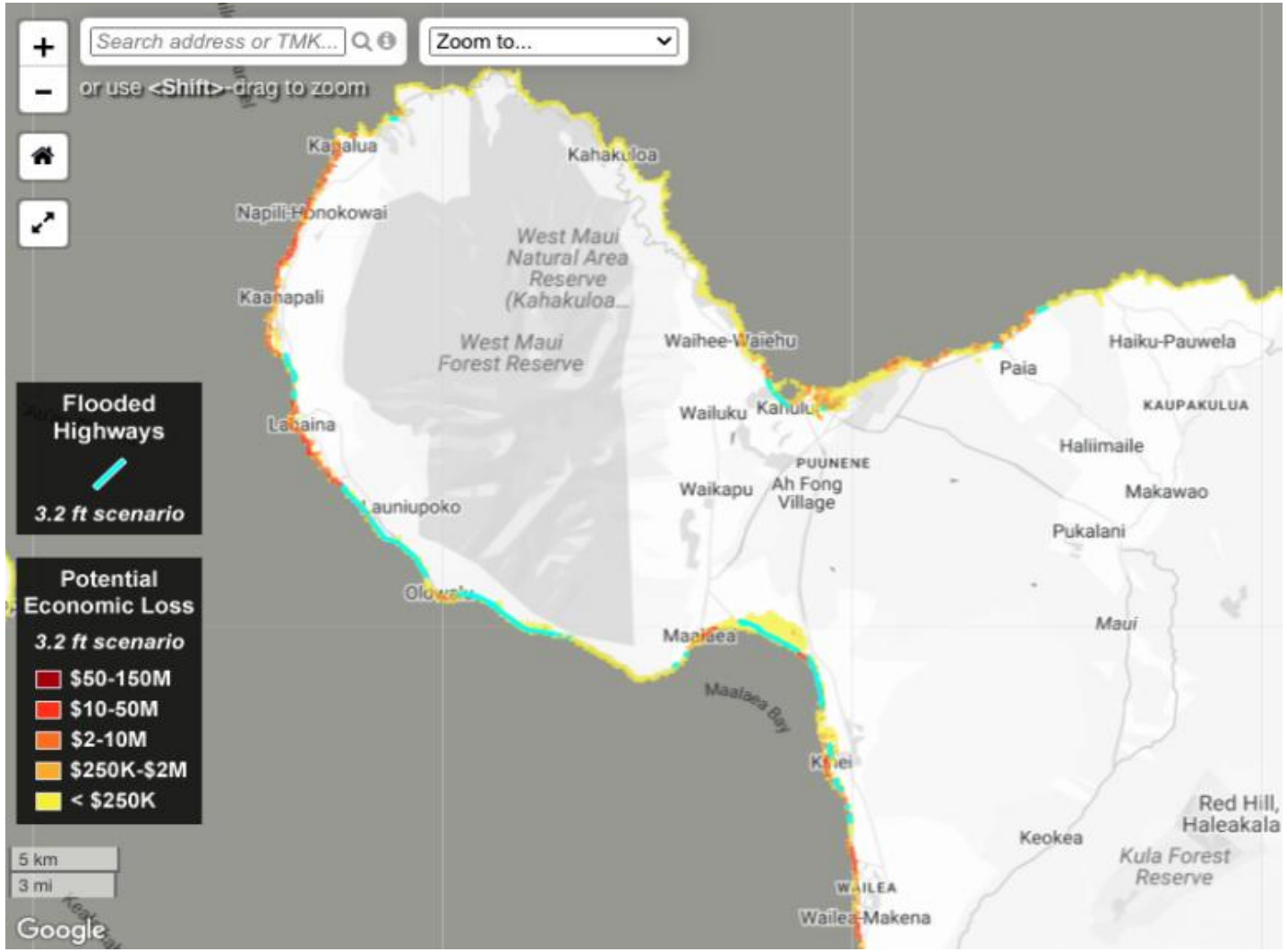




What often gets overlooked is….

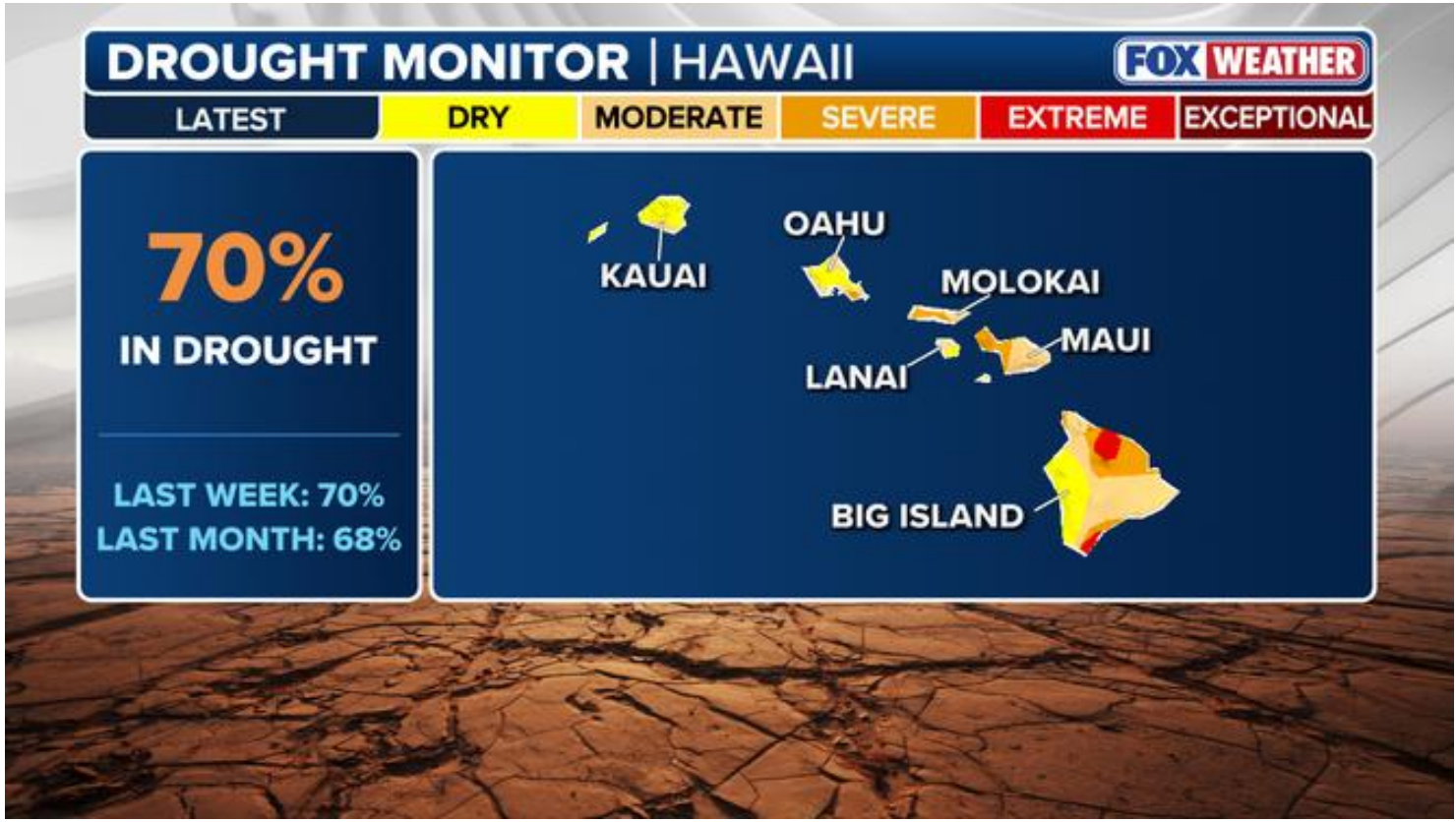
Vulnerable to sea level rise





Impacted by ongoing drought





Drought cycles come in weeks

- Limited raw water reservoirs in Hawaii
- PNW or other places in the US have large reservoirs to offset multiple dry years



Four separate wildfires across Maui on August 8, 2023

- Contributing Factors:
  - High winds (60+ mph)
  - Low humidity
  - Dry vegetation (drought)



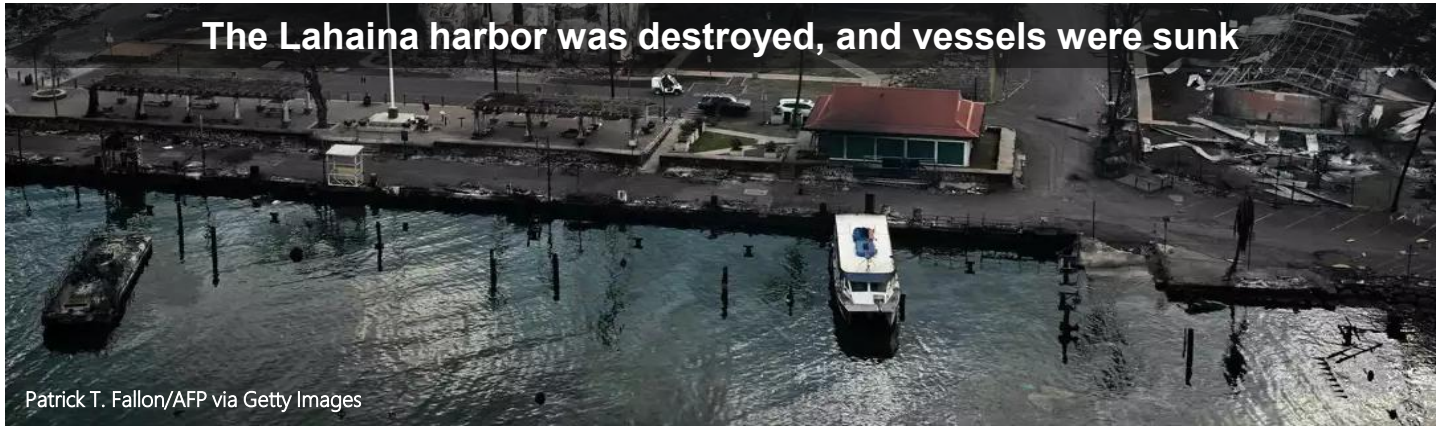
Lahaina wildfire

Immediate impacts – *homes, restaurants, historic buildings, art galleries*










Banyan Tree Spa
Ululani's Hawaiian Shave Ice - Banyan Tree
Lahaina Banyan Court
Spirit Of Lahaina
Banyan Tree Fine Art Gallery
Banyan Tree Fine Art Gallery
Atlantis Submarines Maui
Lahaina Cannons
Reefdancer
Hawaii Ocean Rafting Whale Watch...
Maui Adventure Cruises
Ultimate Whale Watch & Snorkel
Canal St
Data LDEO-Columbia, NSF, NOAA
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data SOEST/UHM
Google
Imagery Date: 6/15/2019 20°52'16.48" N 156°40'39.11" W elev 40 ft eye alt















Upcountry wildfires

Immediate impacts – homes, businesses, agriculture



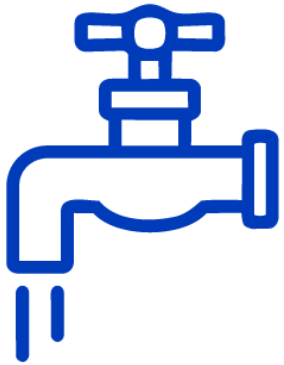




Course of Action for Response



Isolate System



Restore Water Service



Conduct Damage Assessment

Initial response to secure the water system

- The water department field crews were in Lahaina immediately following the fire closing valves and isolating water leaks
- Finding and operating the valves was challenging
- The system was quickly re-pressurized

Sampling and testing for presence and degree of contamination

- Assistance from Hawaii Department of Health and EPA was essential
- Assumed all areas were impacted and issued unsafe water advisory
- Tested for VOCs, SVOCs, and coliform bacteria
- Testing includes screening testing and clearance testing
- Multiple lines of evidence to determine when the unsafe water advisory (UWA) could be amended
- Posted sampling and testing plan results online

Tested:
276 Hydrants
1,500+ Laterals

No Detection:
Declared as Clear

Detection:
Flush & Retest
Cut & Cap



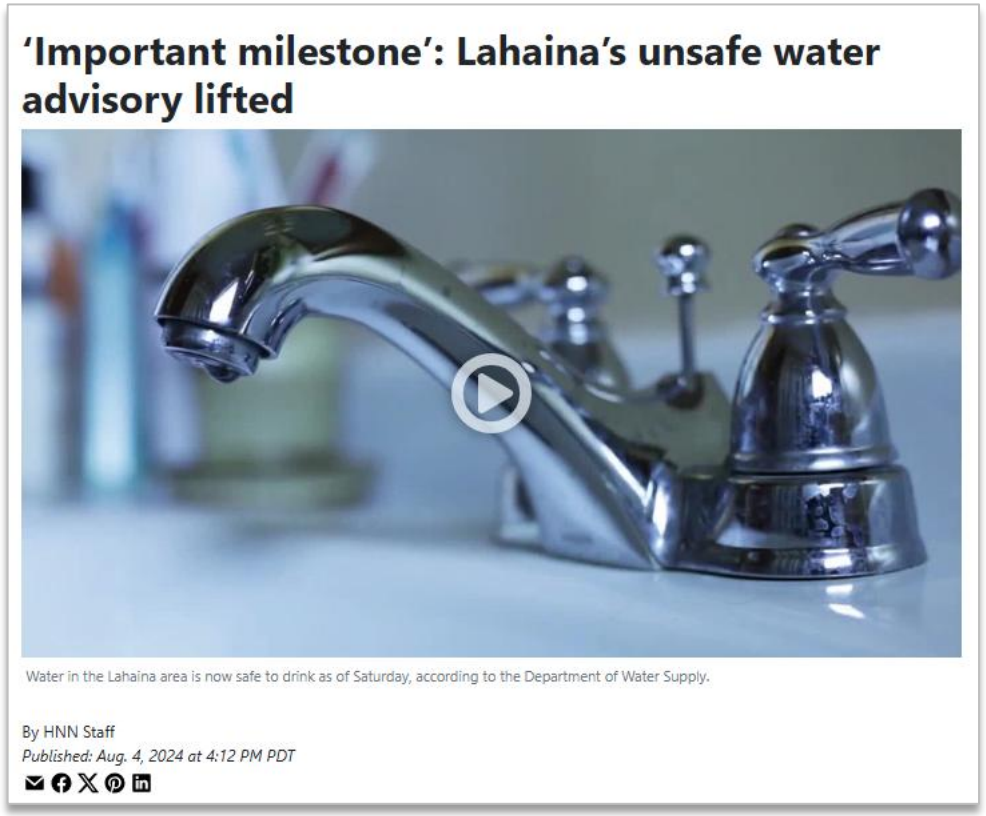
Damage assessment

- Carollo completed an assessment of all above-ground assets
  - Hydrants/standpipes
  - Water meters
  - Air/vac valves
- Below-ground assets:
  - For buried iron pipes with no fire-related system leakage, assumed the system was not or very minimally impacted.



Unsafe water advisory lifted 1-year after fires

August 4, 2024



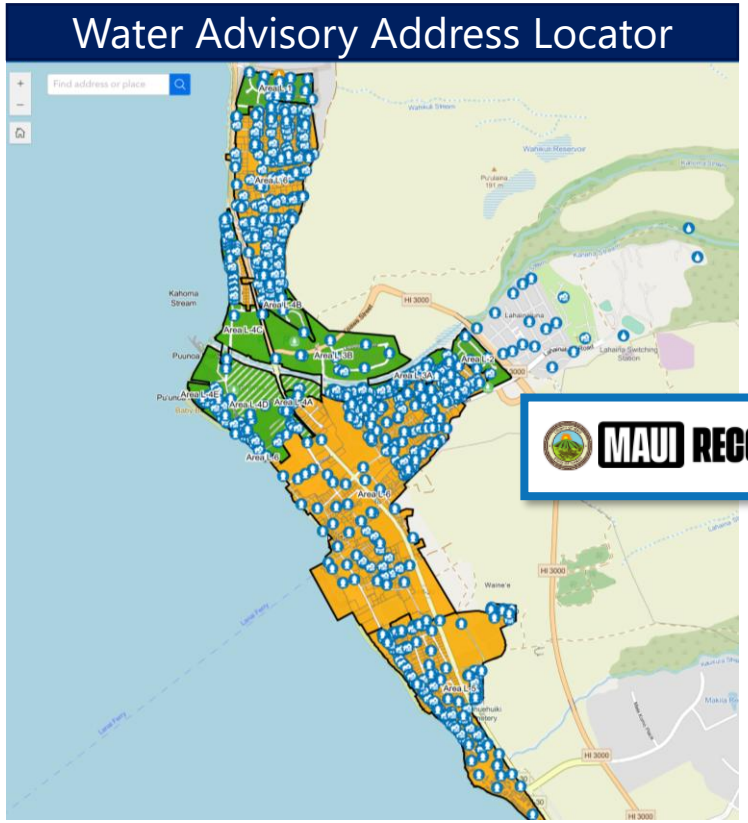
‘Important milestone’: Lahaina’s unsafe water advisory lifted

Water in the Lahaina area is now safe to drink as of Saturday, according to the Department of Water Supply.

By HNN Staff

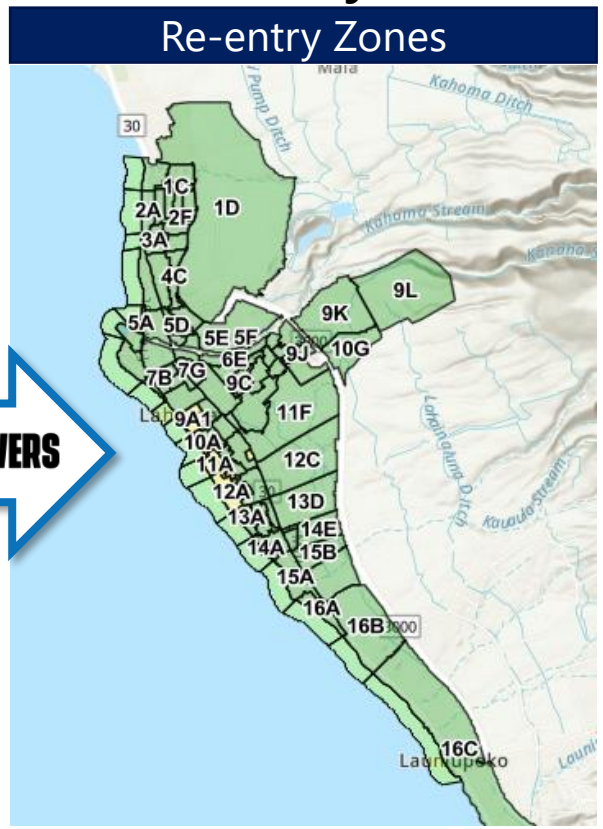
Published: Aug. 4, 2024 at 4:12 PM PDT

During Recovery



MAUI RECOVERS

Today



Lessons learned

- Know your system
- Ensure maps/as-builts are up to date
- Be prepared to communicate
- Recognize that plastic pipes present additional concerns in wildfire situations
- Water systems are not sized to fight urban wildfires

03

Rethinking Water Distribution

Identify areas for improvement



Supply



Distribution



Repair/Replacement



Asset Management/Record Keeping

Having resilient supply

- Understand demands vs. supplies
- Climate change implications
- Developing new water supply is complex regardless of location
- Strategically leverage existing supplies



Identify areas for improvement



Supply



Distribution



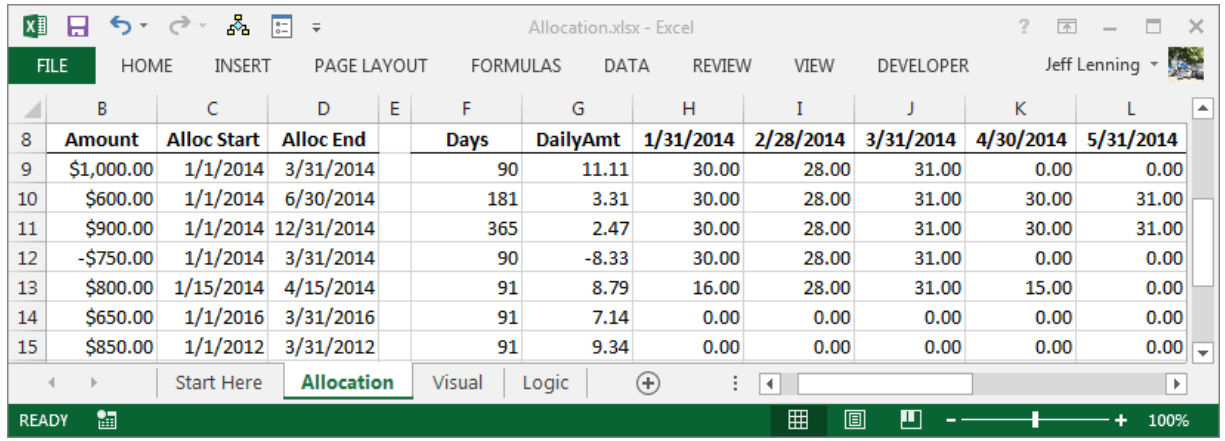
Repair/Replacement



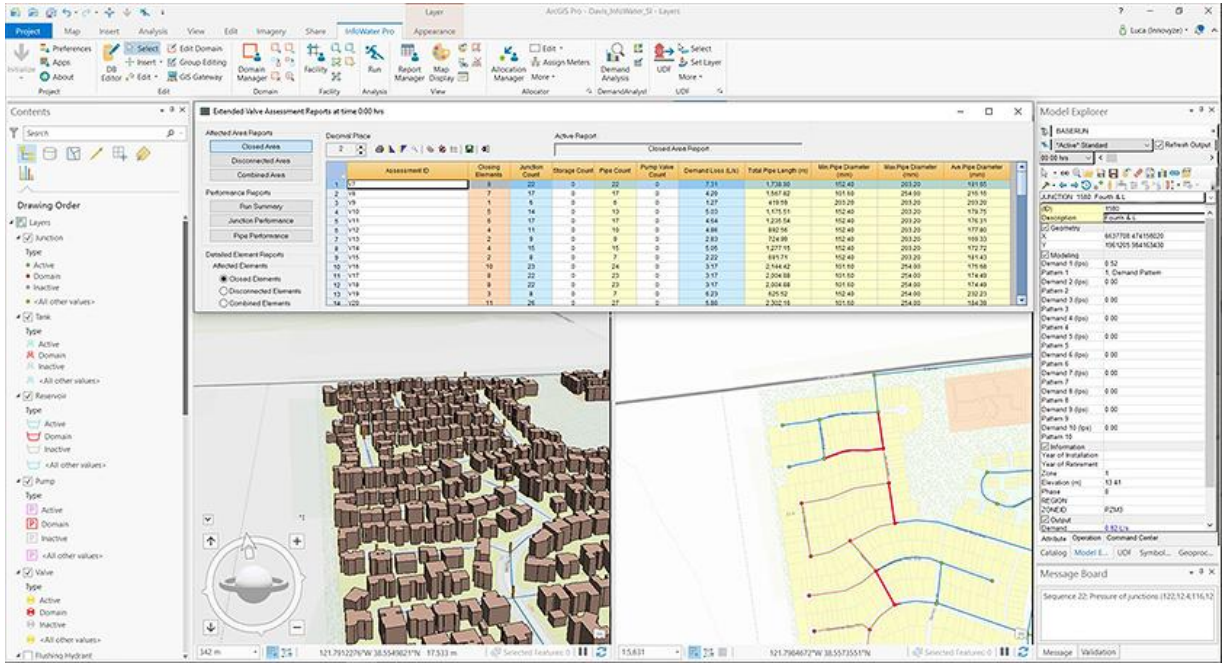
Asset Management/Record Keeping

Development of distribution system hydraulic models

- Historically used excel spreadsheet calculations to evaluate water system
- Carollo built and calibrated hydraulic models for each water system

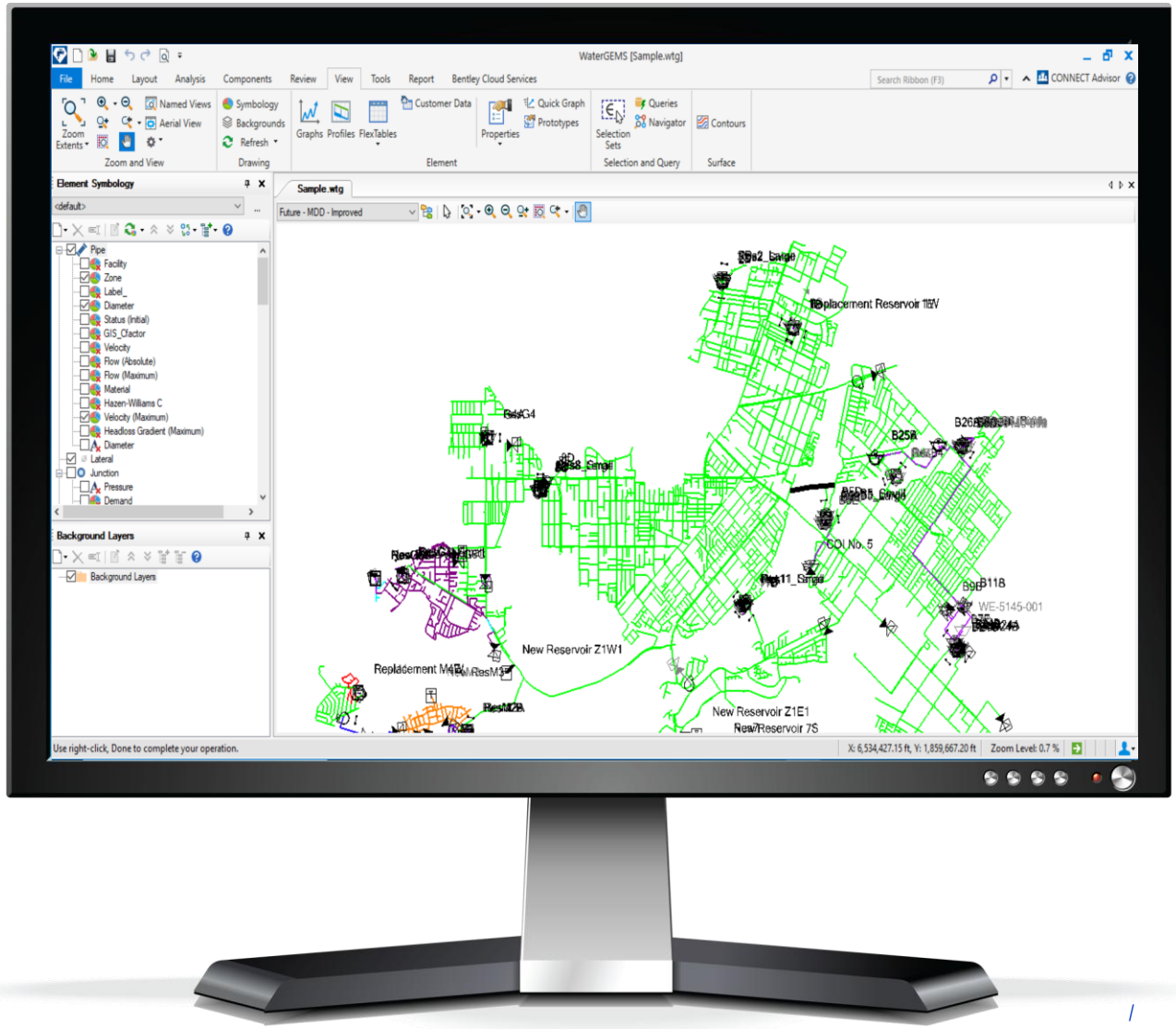


	B	C	D	E	F	G	H	I	J	K	L
8	Amount	Alloc Start	Alloc End		Days	DailyAmt	1/31/2014	2/28/2014	3/31/2014	4/30/2014	5/31/2014
9	$1,000.00	1/1/2014	3/31/2014		90	11.11	30.00	28.00	31.00	0.00	0.00
10	$600.00	1/1/2014	6/30/2014		181	3.31	30.00	28.00	31.00	30.00	31.00
11	$900.00	1/1/2014	12/31/2014		365	2.47	30.00	28.00	31.00	30.00	31.00
12	-$750.00	1/1/2014	3/31/2014		90	-8.33	30.00	28.00	31.00	0.00	0.00
13	$800.00	1/15/2014	4/15/2014		91	8.79	16.00	28.00	31.00	15.00	0.00
14	$650.00	1/1/2016	3/31/2016		91	7.14	0.00	0.00	0.00	0.00	0.00
15	$850.00	1/1/2012	3/31/2012		91	9.34	0.00	0.00	0.00	0.00	0.00

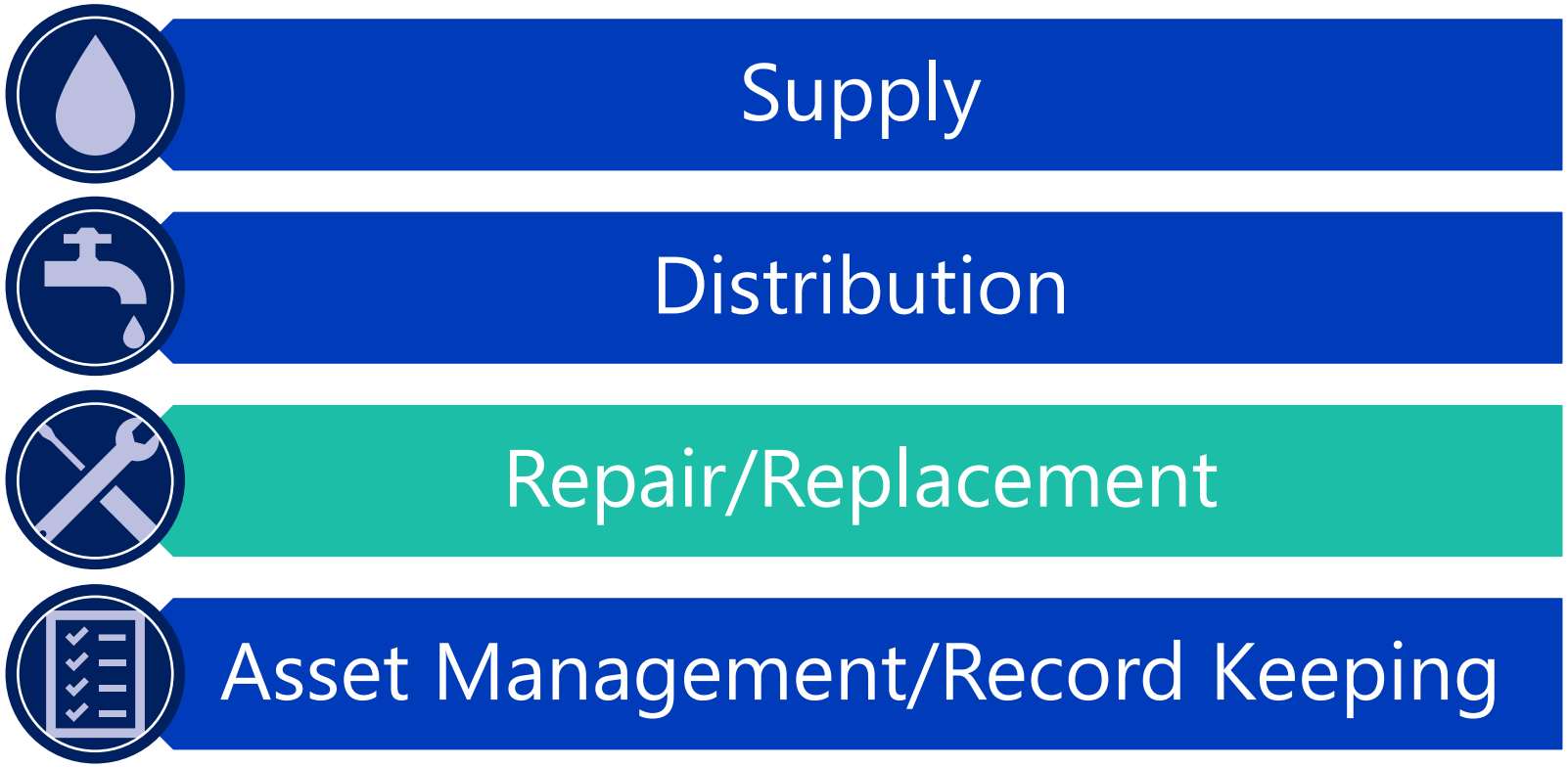


Why are hydraulic models important?

- A tool that is meant to be used to answer questions
- Can also be used for criticality analysis



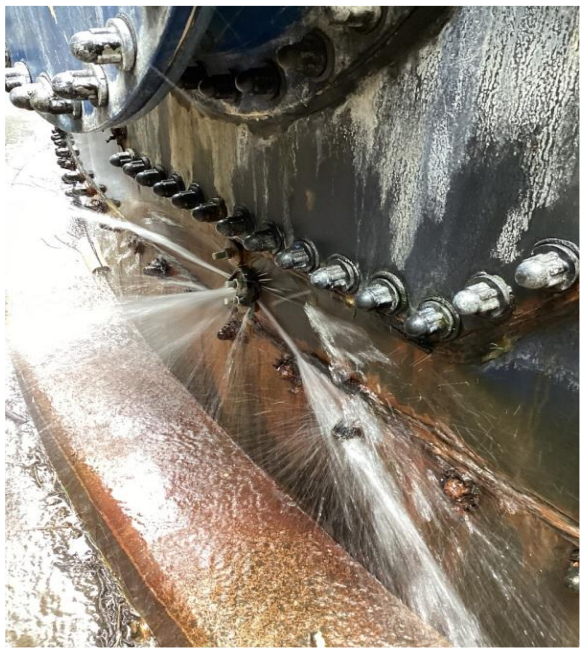
Identify areas for improvement



R&R is important, not only after fires

- Utilities have lots of aging infrastructure
- Routine preventative maintenance programs are important





Incorporation of R&R to CIP

- Conditional assessment used to prioritize replacement of critical infrastructure
- Develops a framework to budget necessary funds in CIP

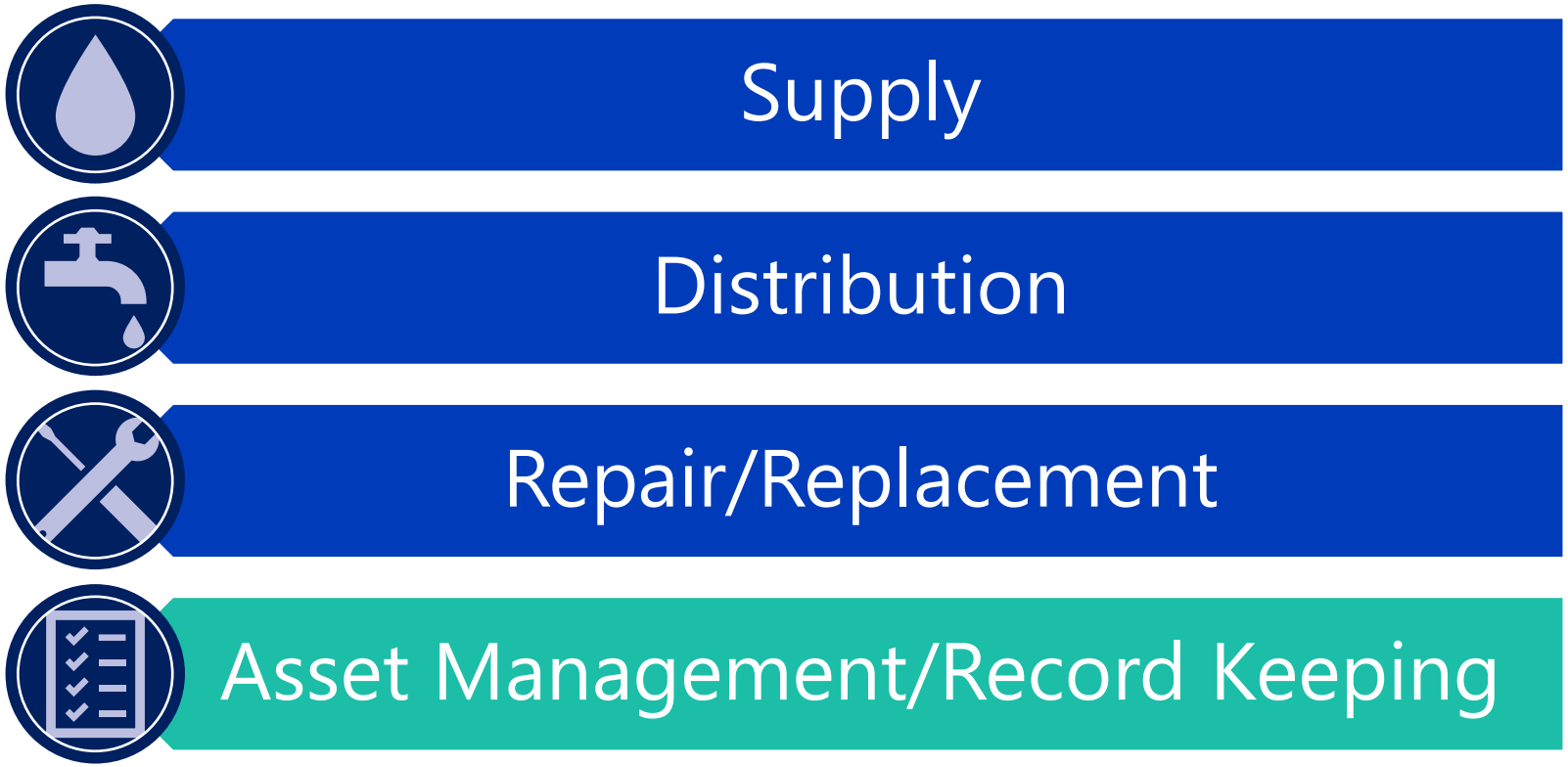




Improvement Type	Madden Creek ($, Million)	Tahoe Cedars ($, Million)	Total Combined ($, Million)
Capacity Improvements	**$10.58**	**$30.64**	**$41.22**
Water Main	$7.13	$24.13	$31.26
Storage Reservoir	$2.88	$5.78	$12.91
Hydrant	$0.37	$0.80	$1.17
Rehabilitation & Replacement Projects	**$0.42**	**$0.21**	**$0.63**
Storage Reservoir	$0.35	$0.13	$0.48
Well	$0.06	$0.08	$0.14
Water Service Projects	**$1.70**	**$17.48**	**$19.18**
Service Meters	$0.96	$7.19	$8.15
Lateral	$0.74	$10.30	$11.04
Total CIP	**$12.69**	**$48.32**	**$61.01**

CIP Development

Identify areas for improvement



Updating record keeping methods



- Physical copies of old record drawings, dating back to the 1980s or prior
- Historically, poorly documented information
- Carollo helped to develop GIS and CMMS to maintain/update water system info



Key takeaways

- **Maui DWS did an exceptional job in responding 2023 wildfires**
- **Wildland urban interface (WUI) areas pose wildfire concerns**
- **Ensure existing infrastructure is properly documented**
- **Adaptive planning can improve future resilience**

Thank you!