Maui County Department of Water Supply
Draft Water Shortage and Conservation Plan

Commission on Water Resource Management

| February 20, 2024

Agenda

1. Water Shortage Plan

Background: DWS water shortage triggers and response

Water shortage plan scope and need

Proposed water supply shortage framework

Proposed water shortage response actions

2. Water Conservation Plan

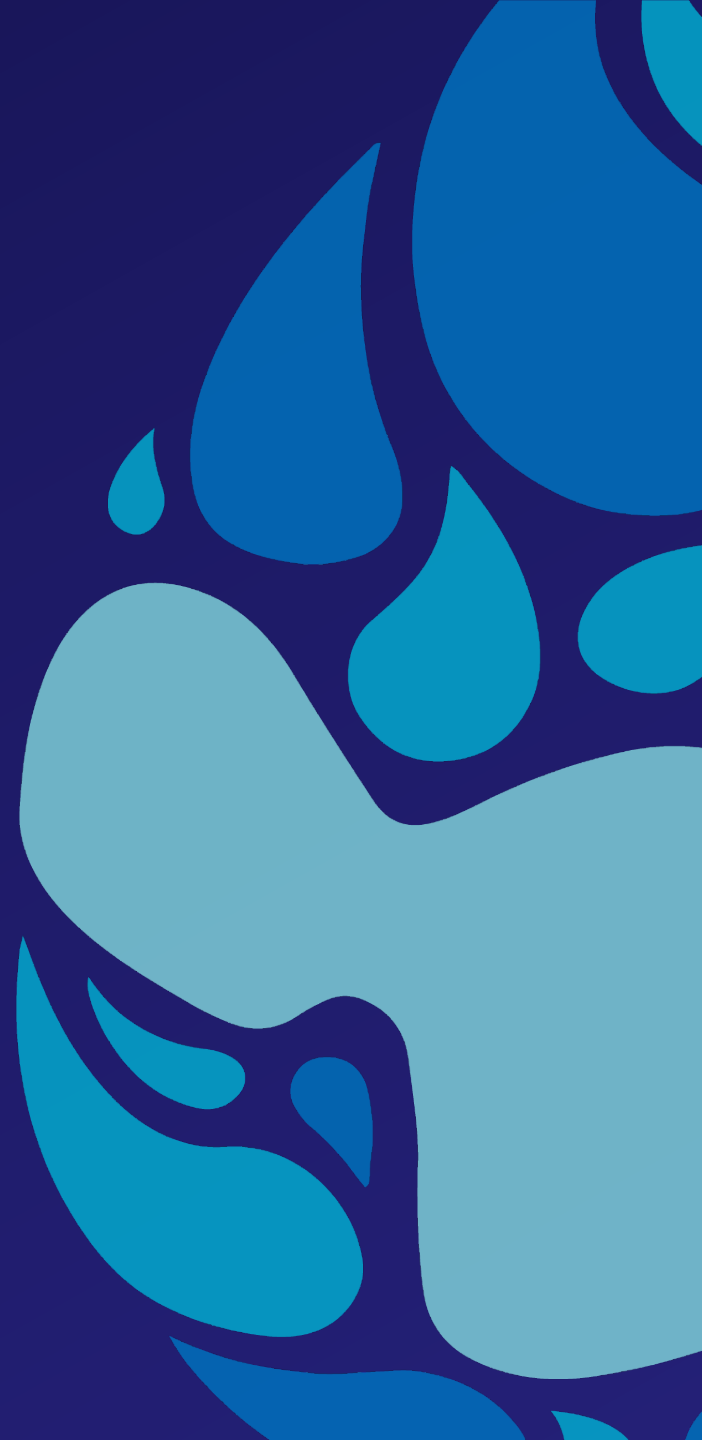
Background: DWS water conservation history

Water conservation plan scope and need

Proposed water conservation measures

3. Next Steps

1. WATER SHORTAGE PLAN



Background: Maui DWS Water Shortage Triggers and Response

Maui County Code 14.06A - WATER CONSERVATION AND CONTROL OF WATER USAGE DURING WATER SHORTAGE

The director, with approval of the mayor, may declare a water shortage **whenever the water supply becomes inadequate** in any area in the County or County water system because of a period of drought, an infrastructure or mechanical malfunction, natural disaster, or other event causing a water shortage.

Prior to declaring a water shortage, the director shall consider the following:

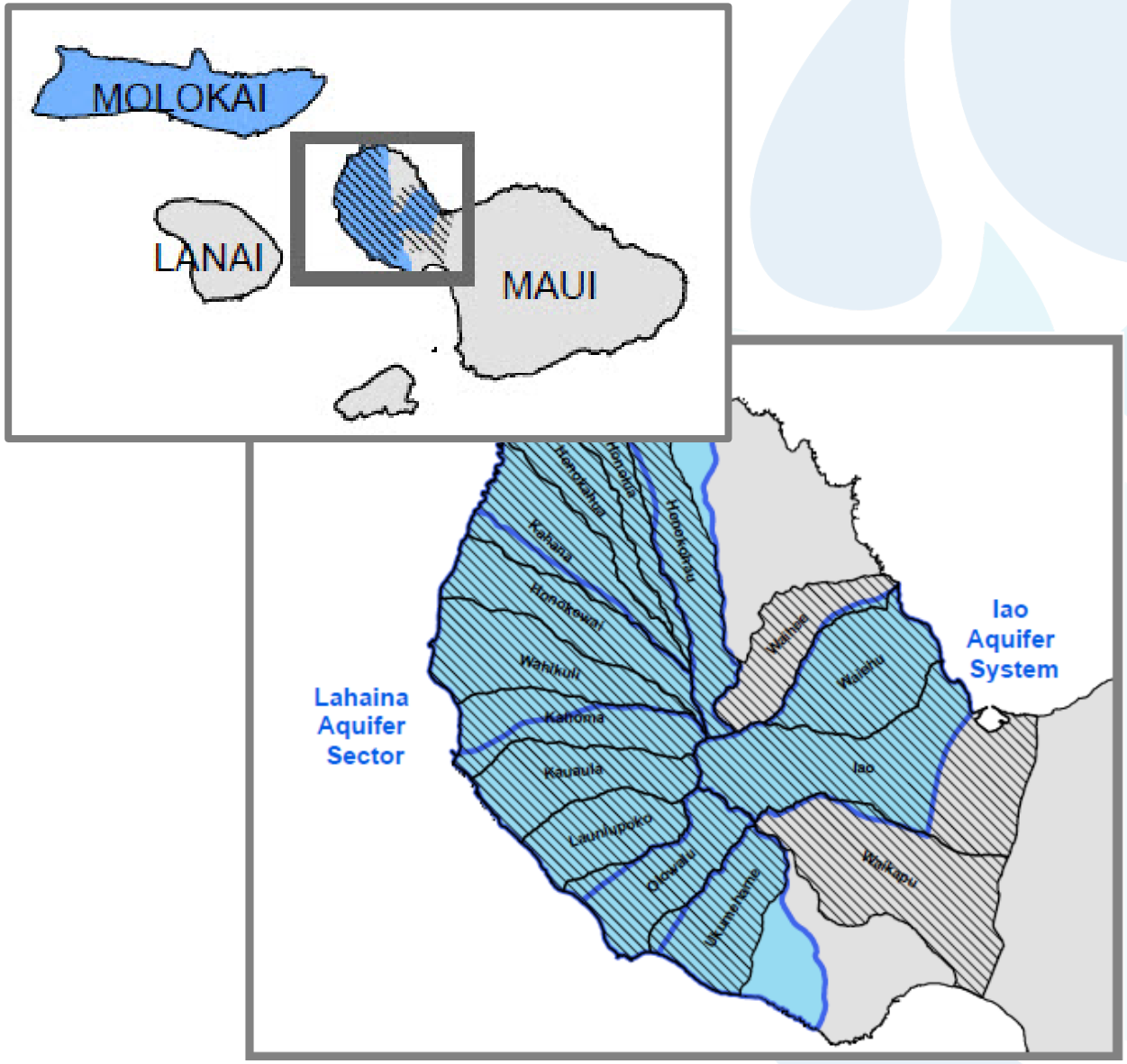
- Current and predicted weather patterns.
- Reservoir water levels.
- Surface water flow.
- Current and predicted water usage.
- Operational status of water production facilities.

Background: Water Shortage in Designated Water Management Areas

HRS 174C-62(a) The commission shall formulate a plan for implementation during periods of water shortage.

HRS 174C-62(b) The commission, by rule, may declare that a water shortage exists within all or part of a water management area when insufficient water is available to meet the requirements of the permit system or when conditions are such as to require a temporary reduction in total water use within the area to protect water resources from serious harm.

HAR 13-171-42(c) “All permittees…shall submit a water shortage plan outlining how it will reduce its own water use in case of a of a shortage. Every water shortage plan shall be subject to approval or modification by the commission”



Water Shortage Plan Scope and Need

Except for designated water management areas, public water purveyors are not required to have response plans in place that address water shortage due to increased demand, drought or operational malfunctions.

2022 Maui Island Water Use and Development Plan:

- Strategy 13-71:*" Formalize shortage plans that identify actions to protect aquifer health in all DWS service areas.*
- Strategy 13-73: *"Increase system flexibility so that regional sources can be moved to support areas of need, both within the municipal systems and between regional public water systems".*

Water Shortage Plan Scope for each DWS District:

- Develop water budget forecast process and method
- Develop water supply shortage indicators
- Develop shortage response actions
- Explore supply contingency plans with private water purveyors

Water Shortage Plan Scope and Need

2014

Ordinance 4178 Water Conservation and control of water usage during water shortage

2022 January

Maui Island Water Use & Development Plan adopted by ordinance

2022 August

CRWM designation Lahaina Aquifer Sector Area for groundwater and surface water management area

2022 November

Initiated the Water Shortage & Conservation Plan

2023 March

Federal grant award to develop the Water Shortage & Conservation Plan

2024 April

Water Shortage & Conservation Plan estimated to be completed

Proposed Framework

Shortage Stages

STAGE 0	STAGE 1	STAGE 2	STAGE 3
Conservation	Alert	Severe	Critical

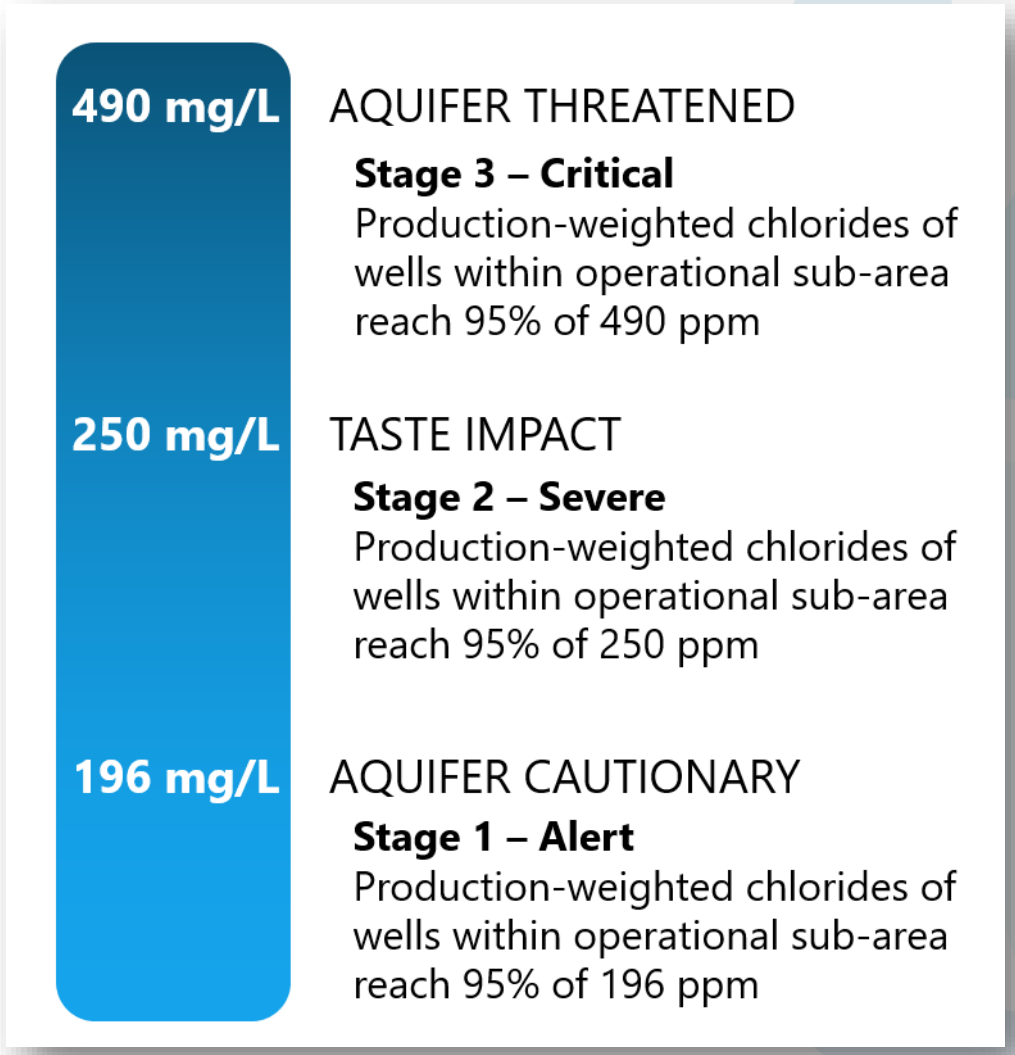
Shortage Stages

Stage	Name	Shortage Range	Conditions
Stage 0	Conservation	Normal	• No anticipated shortages projected over the next 30 days. • Adherence to permanent water conservation ordinances. • Responsible water use and voluntary conservation behaviors.
Stage 1	Alert	Up to 10%	• Anticipated shortage requires mandatory reduction in demand of 10%. • DWS implement the mandatory Level 1 water shortage measures.
Stage 2	Severe	11% to 20%	• Anticipated shortage requires mandatory reduction in demand of 20%. • DWS implement the mandatory Level 2 water shortage measures.
Stage 3	Critical	21% or more	• Anticipated shortage requires mandatory reduction in demand of 30%. • Preserve water supplies and conserve supplies for human consumption, sanitation, and fire protection. • DWS implement the mandatory Level 3 water shortage measures.

Shortage Indicators and Triggers

Groundwater

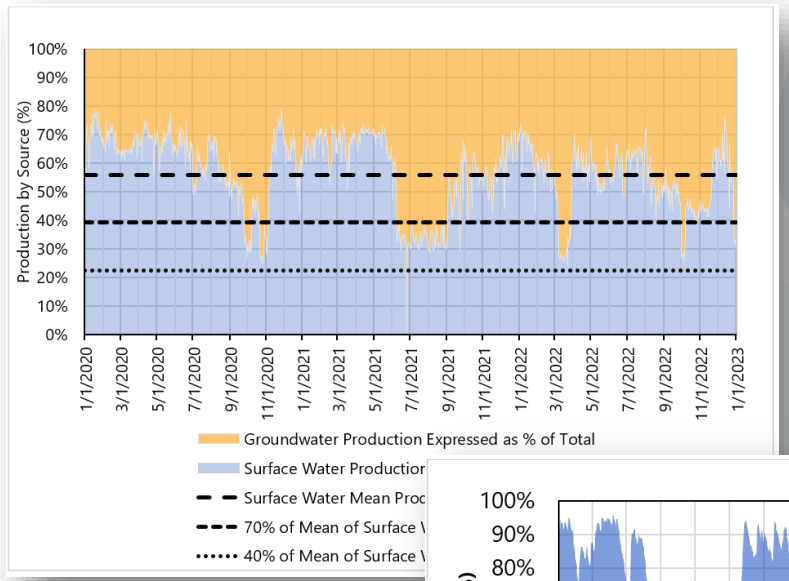
- Consistent framework across all systems
- Groupings of wells based on aquifer and operational area
- Weighted-production chlorides
- Relies on DWS data
- Secondary clause added where backup wells are not yet developed

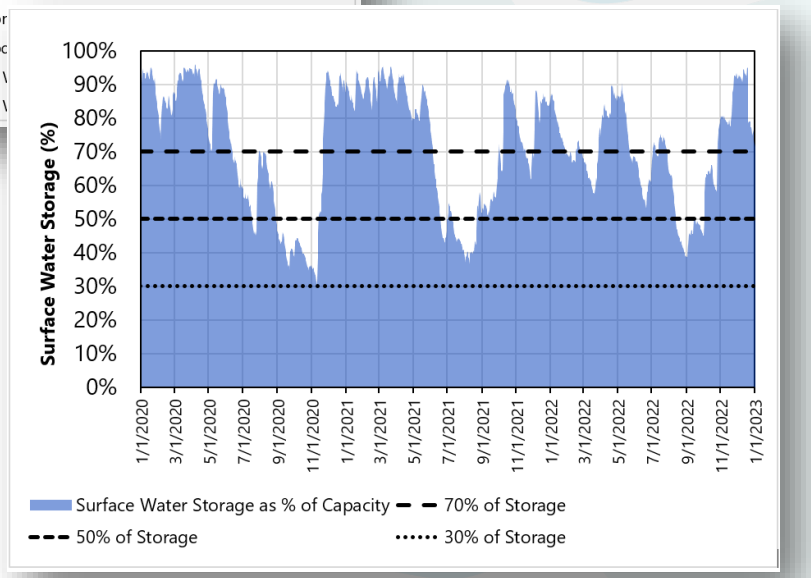


Shortage Indicators and Triggers

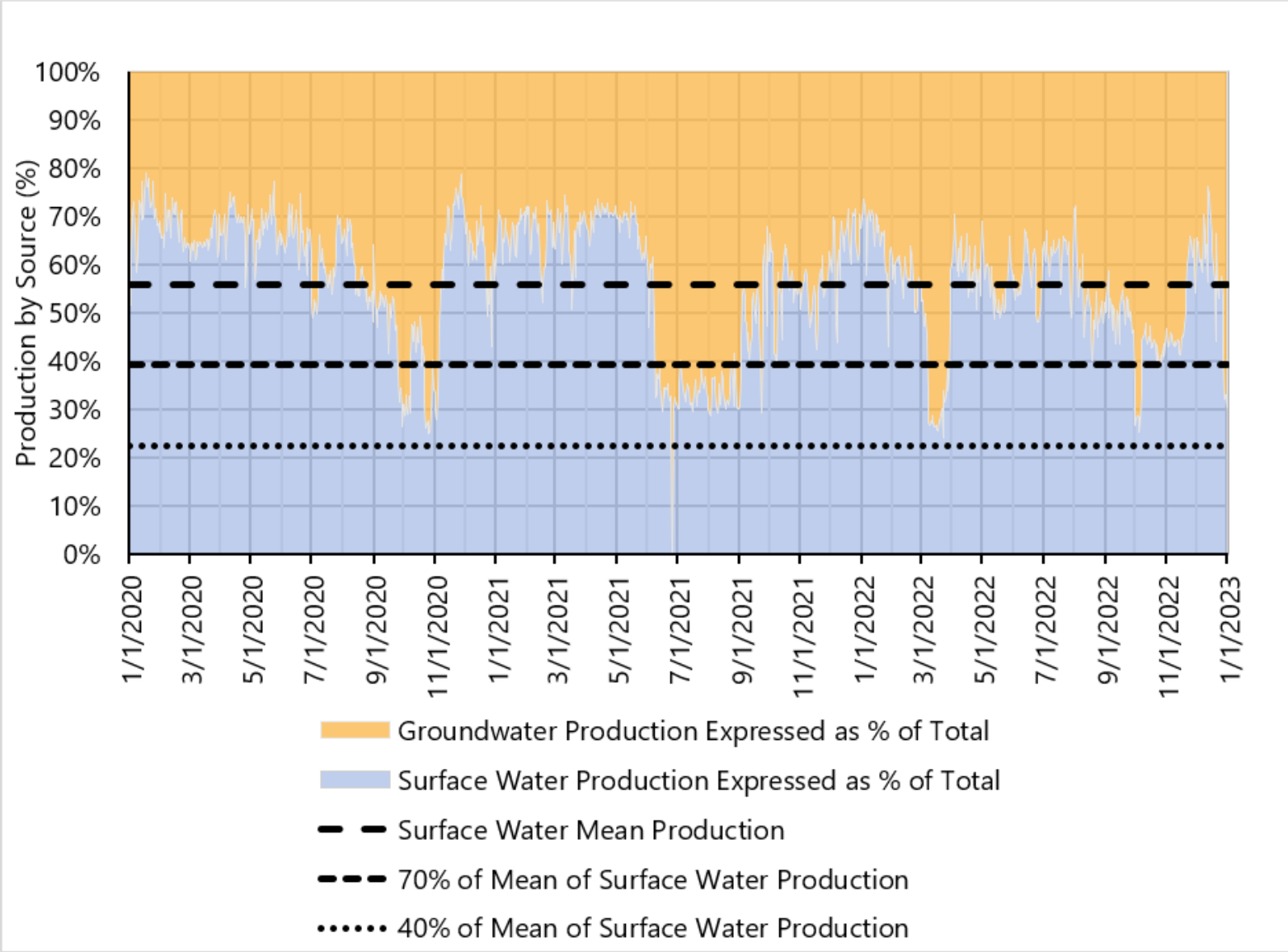
Surface Water

- Unique framework for each surface water system
- Surface water system in:
  - Lahaina
  - Upcountry
  - Central
- Framework developed to rely on DWS data
- Established indicators at DWS operational level





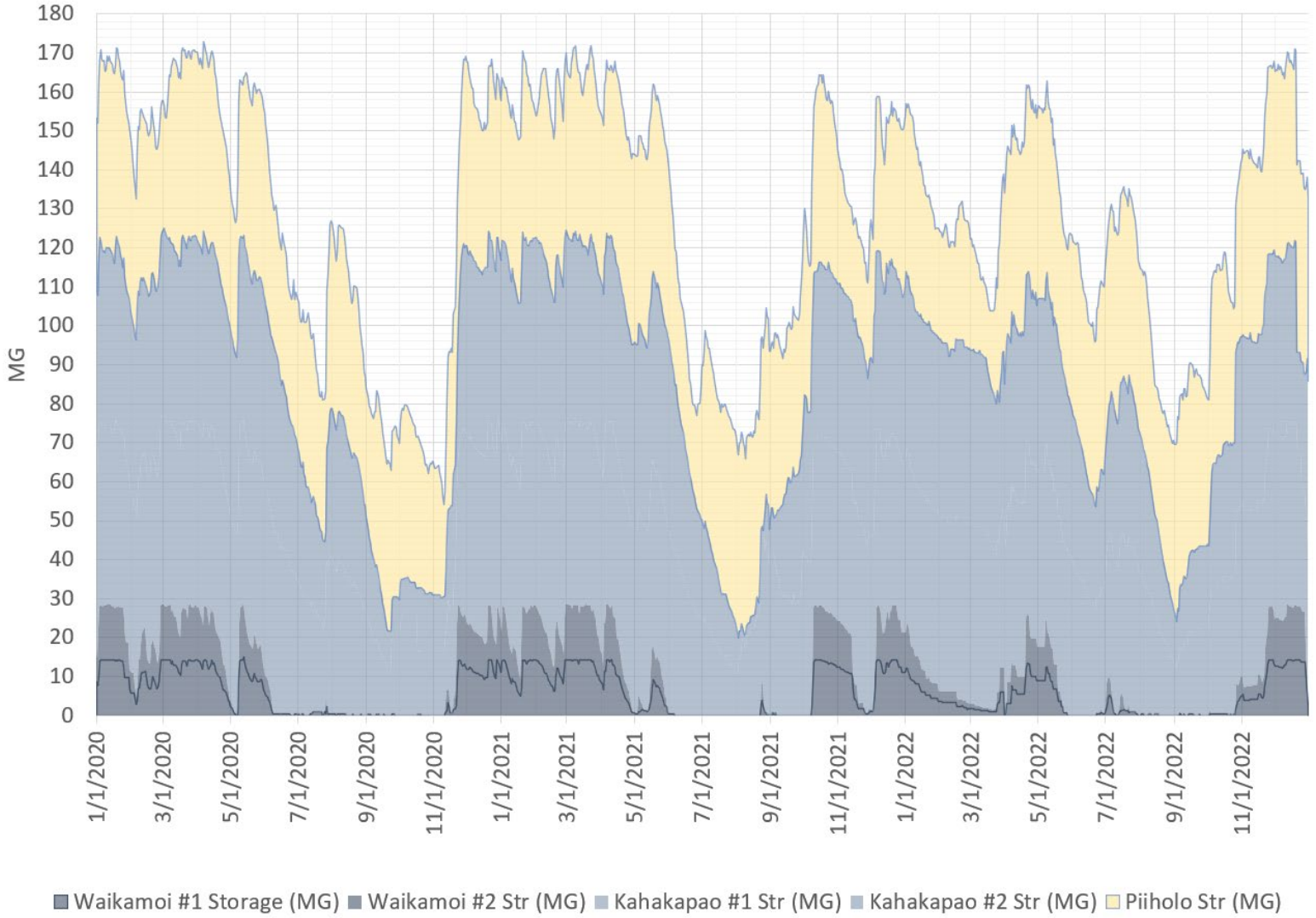
Lahaina – Surface Water Trigger



"Lower than mean surface water"

3-year average
~but~
If new supplies are added (i.e., new groundwater), then re-estimate the new surface water mean

Upcountry – Surface Water Triggers – Upper/Lower Kula



Surface Water Storage = 180 MG

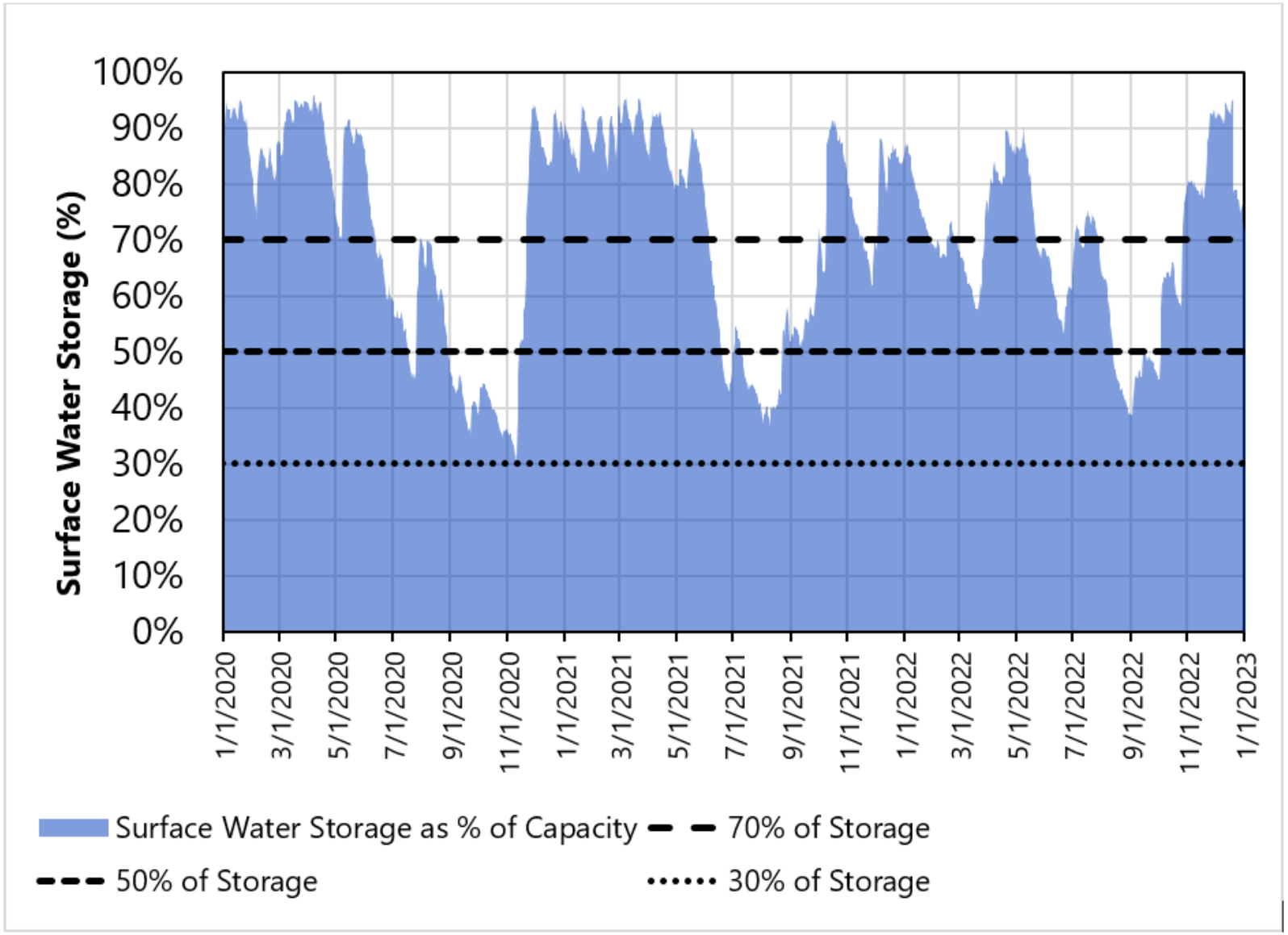
Olinda = 130 MG

Waikamoi 1&2 = 30 MG

Kahakapao 1&2 = 100 MG

Piiholo = 50 MG

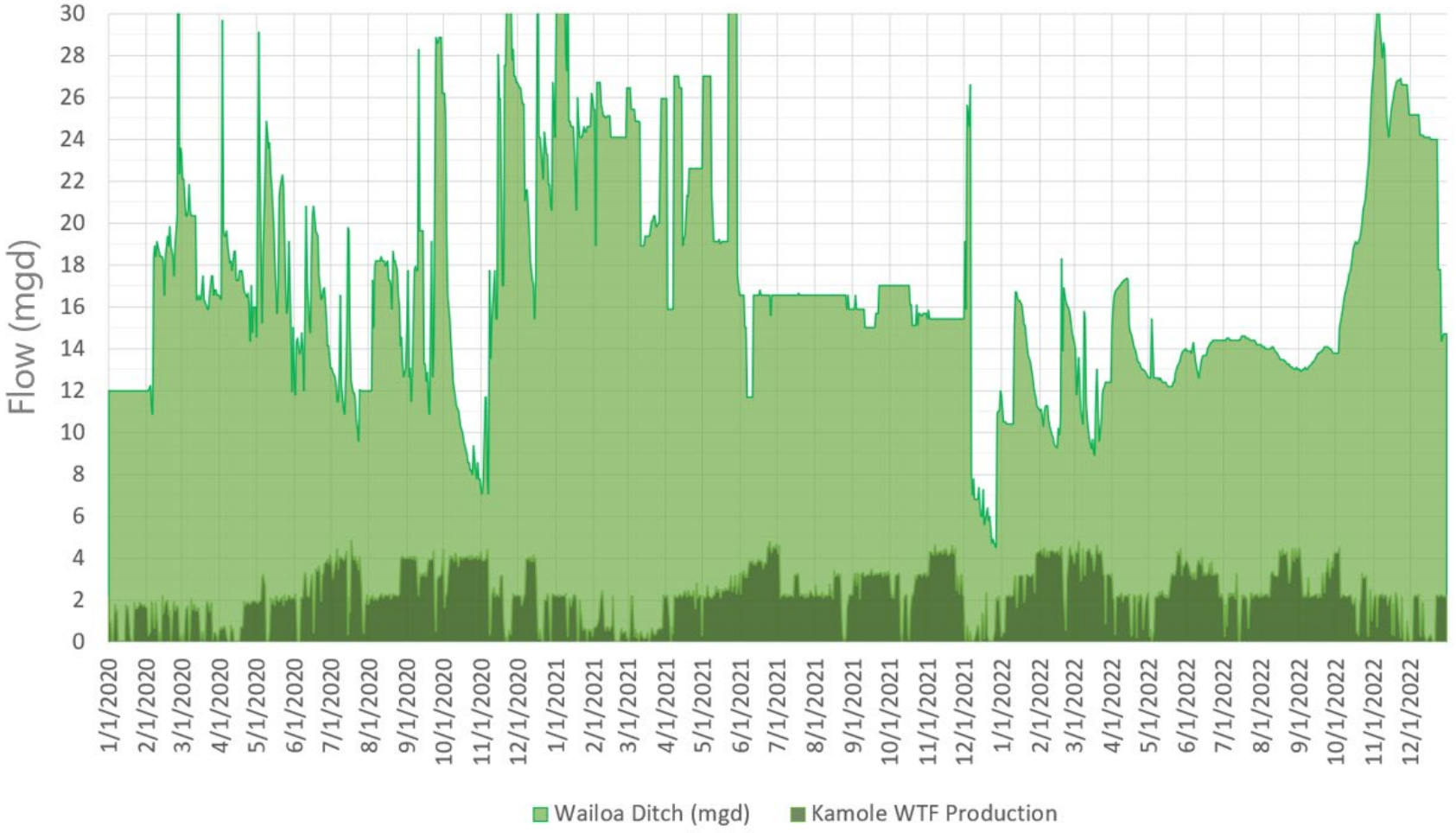
Upcountry – Surface Water Triggers – Upper/Lower Kula



"Percent of storage Available"

70% of Storage Available
50% of Storage Available
30% of Storage Available

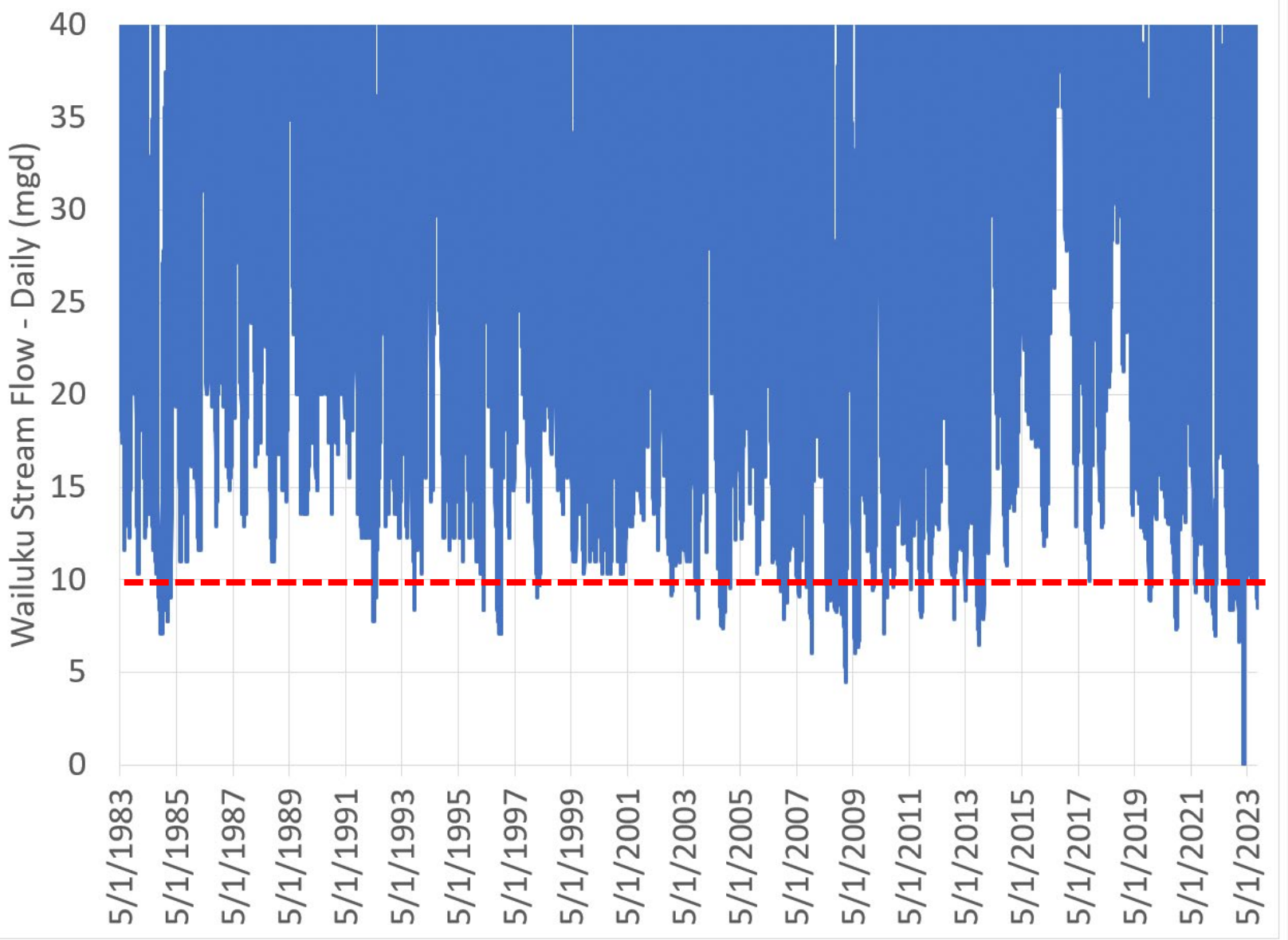
Upcountry – Surface Water Triggers – Makawao



"Available Wailoa Ditch Supply Less than Kamole Production Needs"

Hasn't happened historically, but with potential changes to IIFS, should be monitored

Central – Surface Water Triggers – Wailuku River

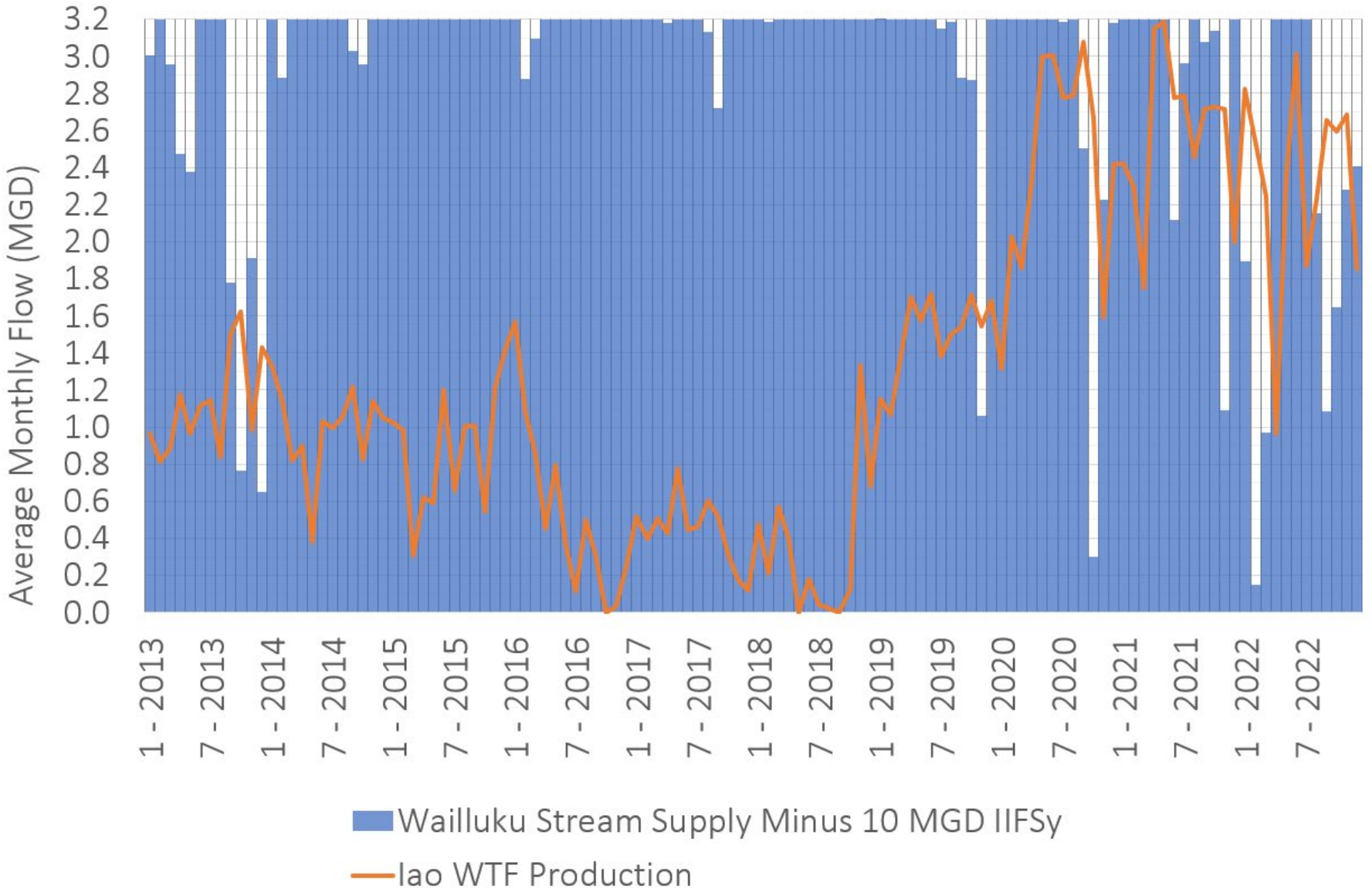


Wailuku River stream flow 1983-2023

(axis zoomed to 0-40 mgd)

IIFS = 10 mgd

Central – Surface Water Triggers – Iao WTF

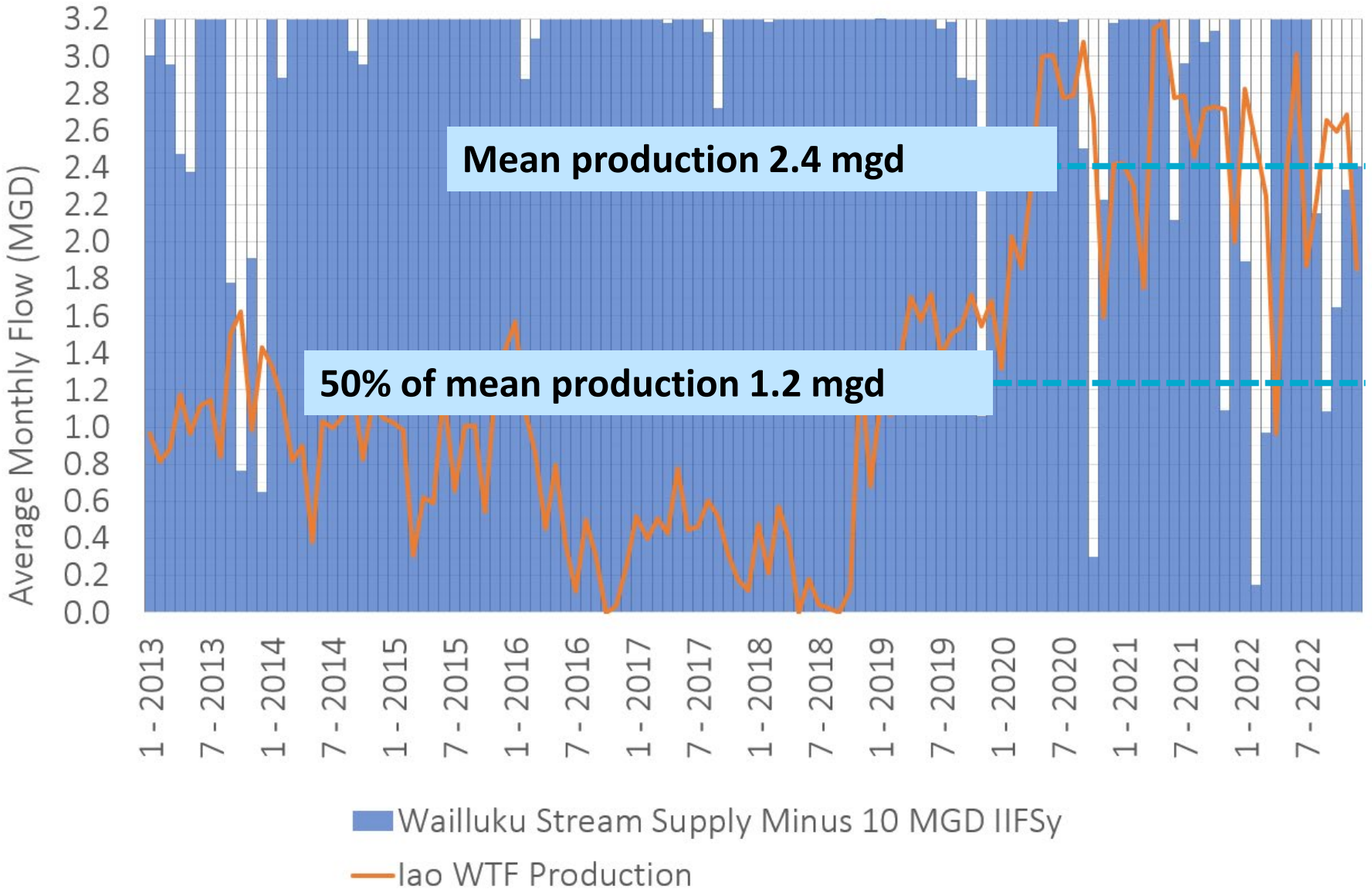


Wailuku River stream flow minus IIFS

Iao WTF Production

2013-2022

Central – Surface Water Triggers – Iao WTF



"Iao WTF production Less than 50% of mean"

Production varies at this facility. Provides 10%

Lahaina Triggers

Shortage Stage	Surface Water Conditions	Groundwater Conditions
Stage 1 - Alert Mandatory 10% cutback	Total **surface water production projected to be less than mean** at some point during the next 10 days	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the cautionary zone** (186 mg/L)
Stage 2 – Severe Mandatory 20% cutback	Total **surface water production projected to be less than 70% of mean** at some point during the next 10 days	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the NWQ secondary standard** (238 mg/L)
Stage 3 – Critical Mandatory 30% cutback	Total **surface water production projected to be less than 40% of mean** at some point during the next 10 days	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the threatened zone** (466 mg/L)

Upcountry Triggers

Shortage Stage	Surface Water Conditions	Secondary Surface Water Conditions	Groundwater Conditions
Stage 1 - Alert Mandatory 10% cutback	Percent of **surface water storage remaining** projected to be **less than 70% full** at some point during the next 10 days	**Wailoa Ditch** supply is projected to be **less than Kamole WTF production needs** at some point during the next 10 days	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the cautionary zone** (186 mg/L)
Stage 2 – Severe Mandatory 20% cutback	Percent of **surface water storage remaining** projected to be **less than 50% full** at some point during the next 10 days	Wailoa Ditch supply is projected to be less than Kamole WTF production needs, plus Stage 1 conditions reached for surface water storage	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the NWQ secondary standard** (238 mg/L)
Stage 3 – Critical Mandatory 30% cutback	Percent of **surface water storage remaining** projected to be **less than 30% full** at some point during the next 10 days	Wailoa Ditch supply is projected to be less than Kamole WTF production needs, plus Stage 2 conditions reached for surface water storage	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the threatened zone** (466 mg/L)

Central Triggers

Shortage Stage	Surface Water Conditions*	Groundwater Conditions
Stage 1 - Alert Mandatory 10% cutback	Average **surface water production at Iao WTF projected to be less than 50% of mean** over the next 30 days	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the cautionary zone** (186 mg/L)
Stage 2 – Severe Mandatory 20% cutback		Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the NWQ secondary standard** (238 mg/L)
Stage 3 – Critical Mandatory 30% cutback		Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the threatened zone** (466 mg/L)

***If Stage 1 conditions for groundwater and surface are both met, then the stage is increased to Stage 2**

Hana Triggers

Shortage Stage	Groundwater Conditions
Stage 1 - Alert Mandatory 10% cutback	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the cautionary zone** (186 mg/L)
Stage 2 – Severe Mandatory 20% cutback	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the NWQ secondary standard** (238 mg/L)
Stage 3 – Critical Mandatory 30% cutback	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the threatened zone** (466 mg/L)

Molokai Triggers

Shortage Stage	Groundwater Conditions
Stage 1 - Alert Mandatory 10% cutback	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the cautionary zone** (186 mg/L)
Stage 2 – Severe Mandatory 20% cutback	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the NWQ secondary standard** (238 mg/L)
Stage 3 – Critical Mandatory 30% cutback	Well **production-weighted chloride** levels for an operational area **reach salinity of 95% of the threatened zone** (466 mg/L)

Proposed Shortage Response Actions

Stage 0 - Conservation

Recommends 17 demand reduction actions

1. Water features must re-circulate
2. Vehicle washing limitations
3. Guidelines for spraying down impervious surfaces
4. Restrict/prohibit runoff from landscape irrigation
5. Irrigating ornamental turf on street medians prohibited
6. No irrigation following measurable rainfall
7. Time of day irrigation restriction
8. Watering schedule, irrigation allowed 3 days per week
9. Restaurants serve water upon request
10. Opt out of linen service at hotels, resorts
11. New commercial car washes must re-circulate
12. Timely leak repairs (7 days)
13. Pool covers for inactive swimming pools
14. New irrigation equipment must be efficient
15. New landscape plants must be water efficient plantings
16. Agriculture customers should implement BMPs
17. No unauthorized hydrant use

Stage 1 - Alert

Recommends 9 demand reduction actions

1. Prohibits filling ornamental lakes/ponds
2. Landscape irrigation allowed only 2 days per week
3. Timely leak repair (5 days)
4. Pools cannot be emptied and refilled using potable water
5. Expanded conservation education
6. Commercial, industrial, institutional equipment must be properly maintained
7. Use recycled water for construction
8. Agriculture users voluntary reduction by 10%
9. After 180 days, agriculture users required to reduce by 10%

Stage 2 - Severe

Recommends 9 demand reduction actions

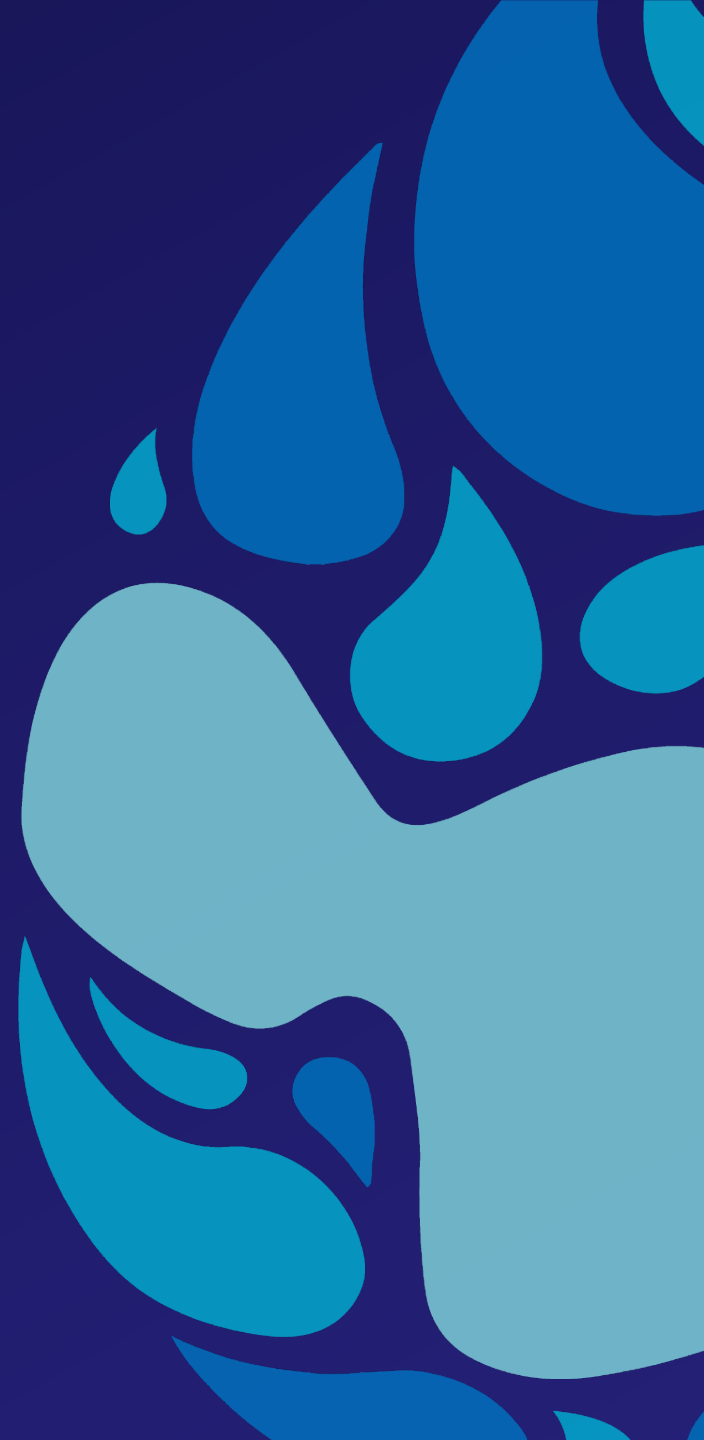
1. Nonessential commercial and industrial water use prohibited
2. Landscape irrigation allowed only 1 day per week
3. Timely leak repair (3 days)
4. Decrease line flushing
5. Potable water at temporary construction meters prohibited
6. Personal washing of vehicles prohibited
7. No new permits for pools to be issued
8. Prohibit water parks, school grounds, recreation fields (exception for rare plant species)
9. Agriculture users asked to reduce by 20%, mandatory after 180 days of shortage

Stage 3 - Critical

Recommends 5 demand reduction actions

1. Landscape irrigation prohibited
2. Timely leak repair (2 days)
3. Moratorium or net zero demand implemented on new connections
4. Water for commercial, manufacturing, or processing purposes reduced by up to 30%
5. Water for public health and safety – rationing may be implemented

2. WATER CONSERVATION PLAN



Background: DWS Water Conservation History

Water Conservation History

Demand side programs

Fixture Giveaways

- Rain barrels
- Ultra high efficiency toilets
- Low flow fixtures
- Pre-rinse spray valves
- Leak detection tablets, hose nozzles, toilet tank bags

Educational

- Xeriscaping guide
- Garden projects
- Annual poster & video contest
- Website with tips and tools
- Media campaigns

Codes

- Maui County codes & regulations
- Permitting gray water systems
- High consumption notices
- Tiered water rates to incentive conservation (new resort rates)

Community Gardens Projects

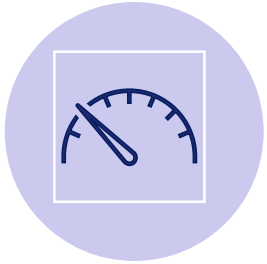
- Maui Nui Botanical Garden
- Ka Hale A Ke Ola Homeless Resource Center
- Native plant promotion & giveaway

Media Campaigns

Water Conservation History

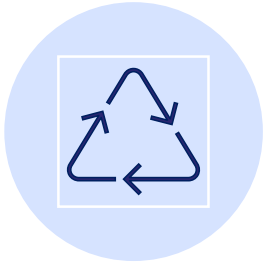
Supply side programs

Annual water audits



Advanced Metering Infrastructure (AMI)

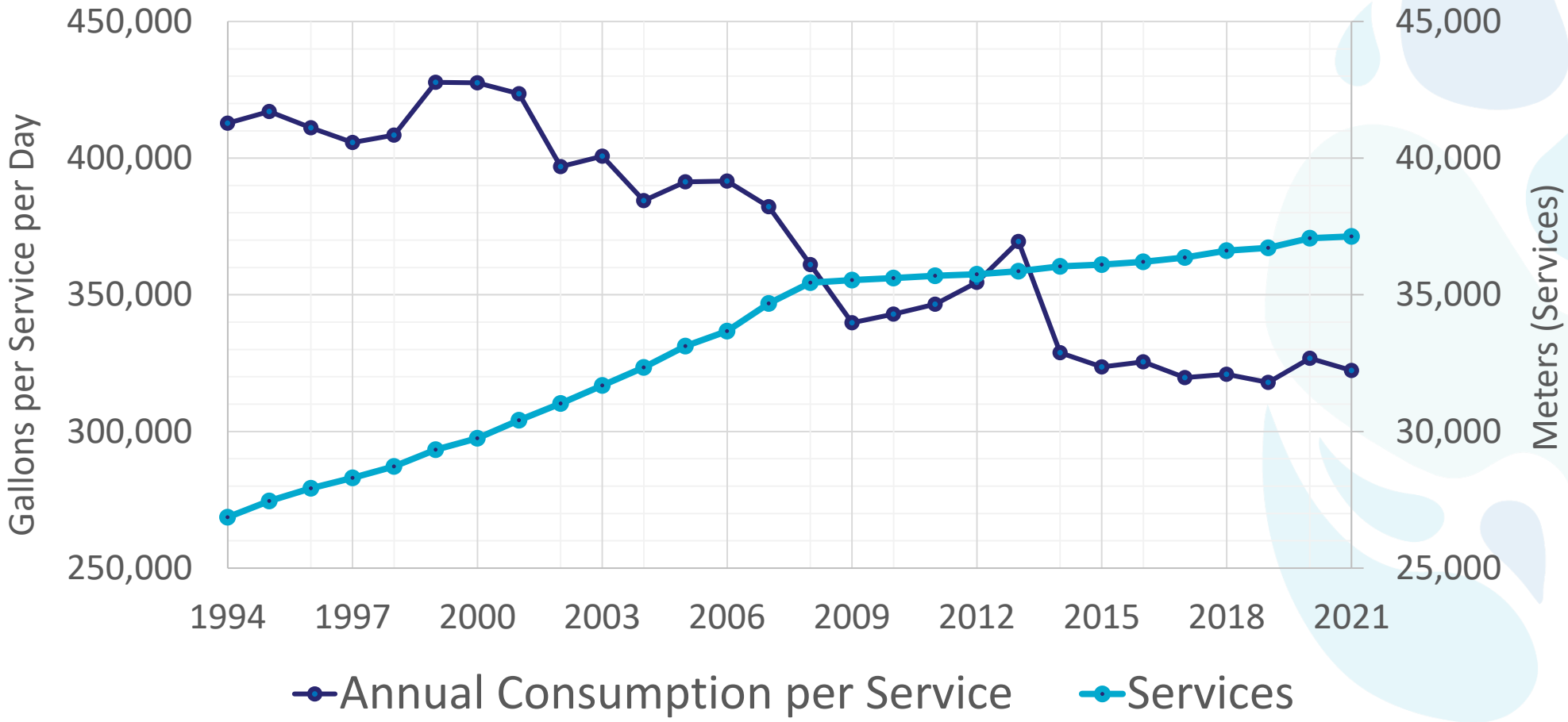
Proactive leak detection using Asterra satellite survey



Reuse pre-production water

Successful History of Improving Efficiency

DWS water use per service connection has declined 25% since 1999



Water Conservation Plan Scope and Need

2022 Maui Island Water Use and Development Plan:

Consistent with the Freshwater Initiative, reduction in DWS residential demand of 8 percent per capita has the potential to mitigate 9 mgd of water supply over the 20-year planning period.

- Strategy 13-41: *"Revise Maui County Code to require high efficiency fixtures in all new construction".*
- Strategy 13-42: *"Aggressive tiered rate structure based on audit and rate study. Create a new water user category for hotels and resorts .."*
- Strategy 13-48: *"Restrict outdoor water waste: disallow overspray and runoff, water wasting, and require hose nozzles. Address watering behaviors with education and outreach."*
- Strategy 13-49: *"Create measurable conservation policies for all areas at all times"*

Water Conservation Plan Scope and Need

Water Conservation Plan Scope:

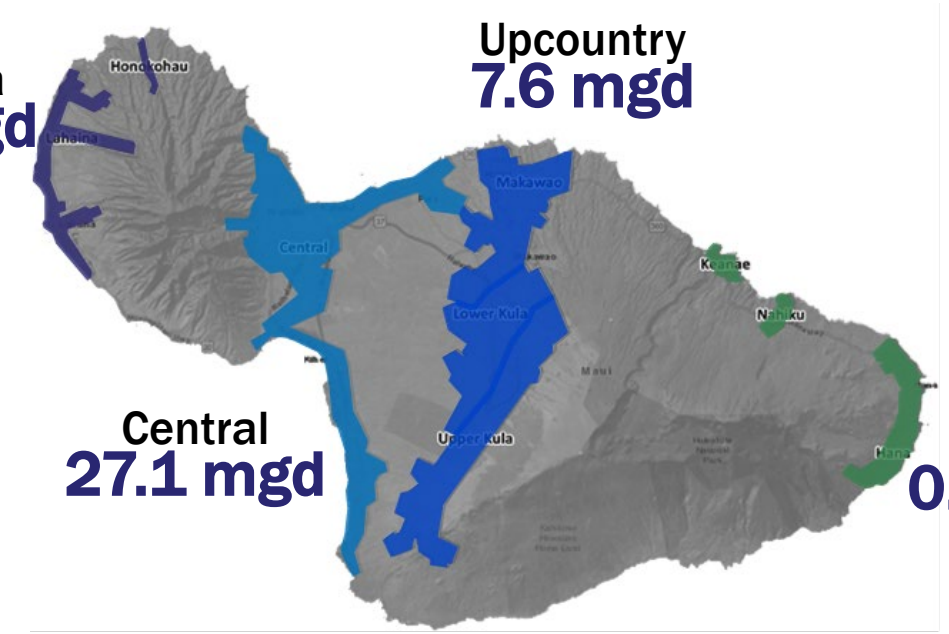
- Update demand projections and per capita water use
- Document water savings from DWS demand side conservation incentives and supply side efficiency measures
- Identify and prioritize potential measures to achieve conservation goals
- Conduct cost-effectiveness analysis of proposed measures
- Support community engagement

DWS Water Demand in 2022

Molokai
0.9 mgd

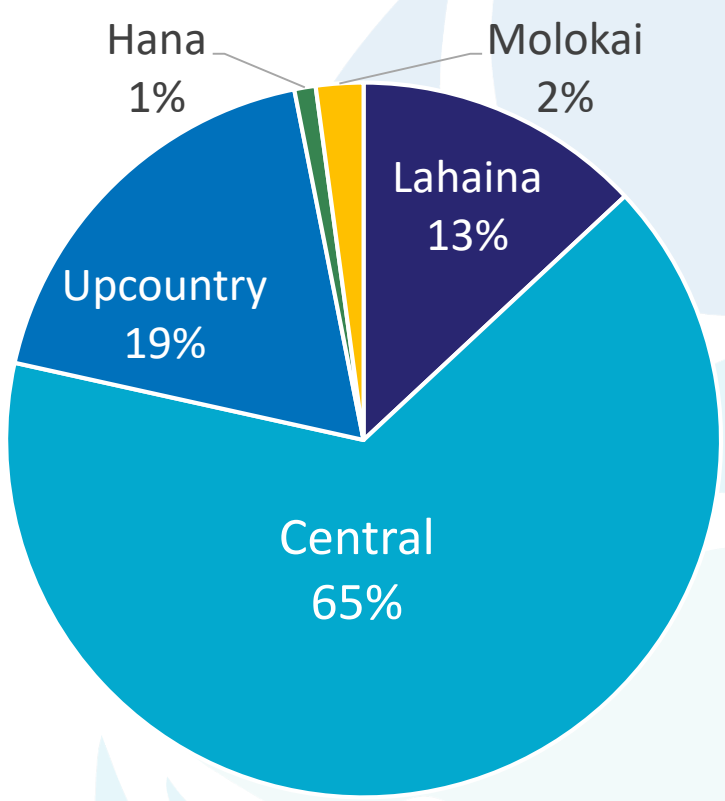
Lahaina
5.4 mgd

Upcountry
7.6 mgd



Central
27.1 mgd

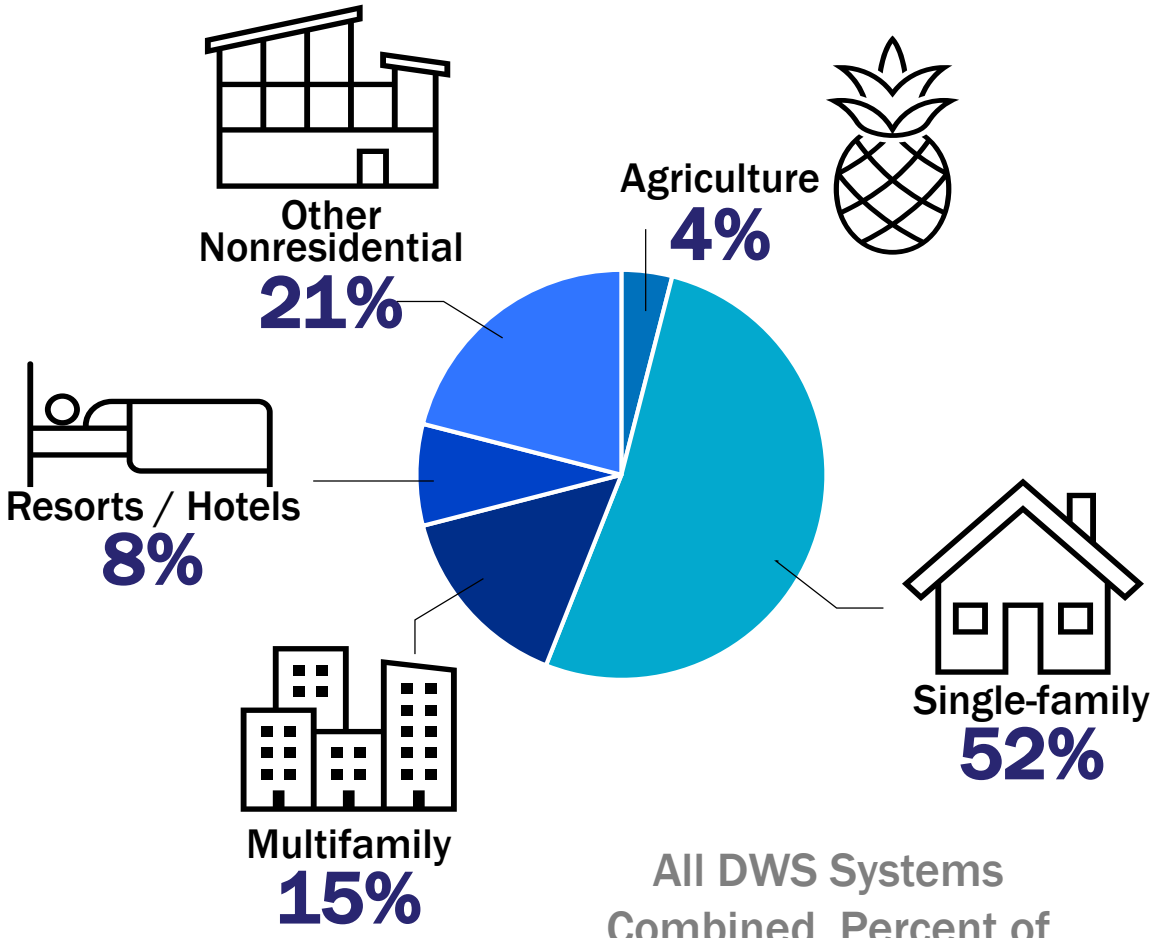
Hana
0.4 mgd



mgd = million gallons per day

Where Does DWS Water Go?

Demand by User Type in 2022



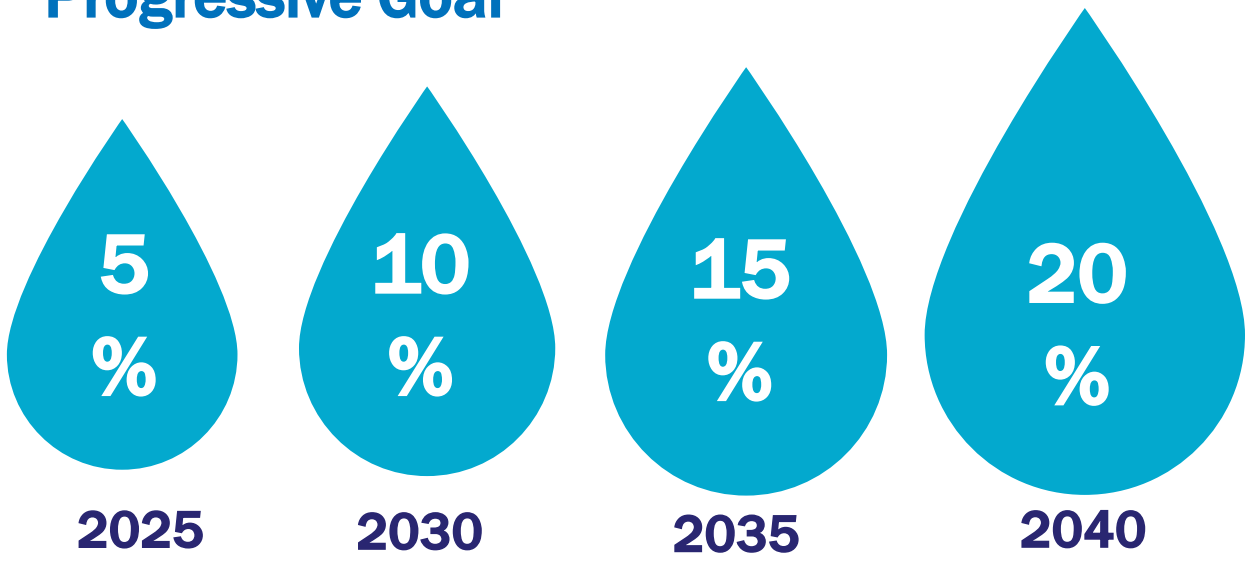
All DWS Systems Combined, Percent of Total

User Type	mgd
Agriculture	1.1
Single-family	17.5
Multifamily	5.0
Resorts and Hotels	2.6
Other Nonresidential	7.1
Total Consumption	**33.5**

mgd = million gallons per day

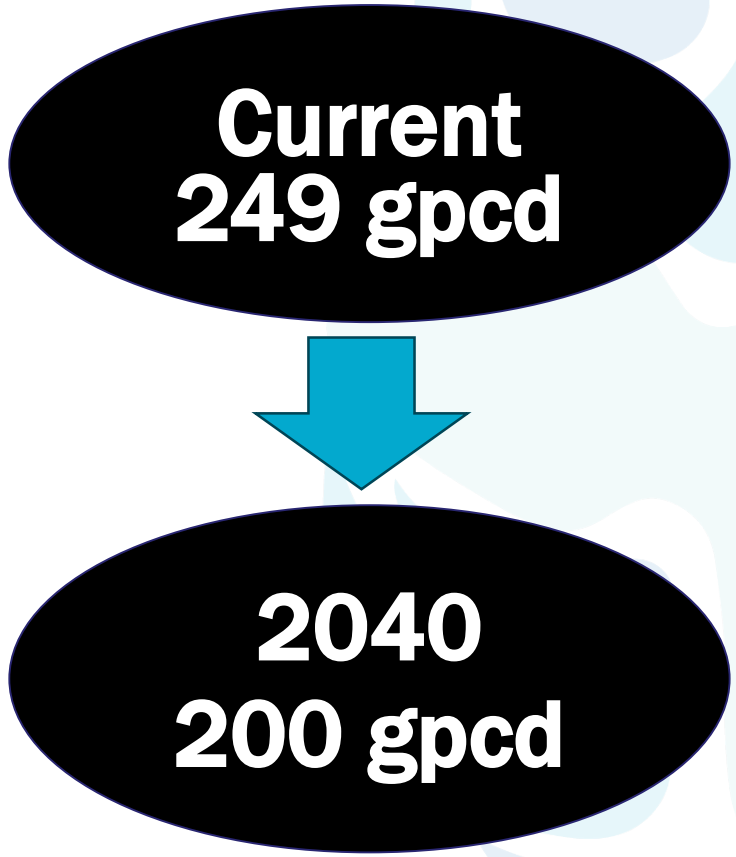
Water Conservation Goal - Recommended

Progressive Goal

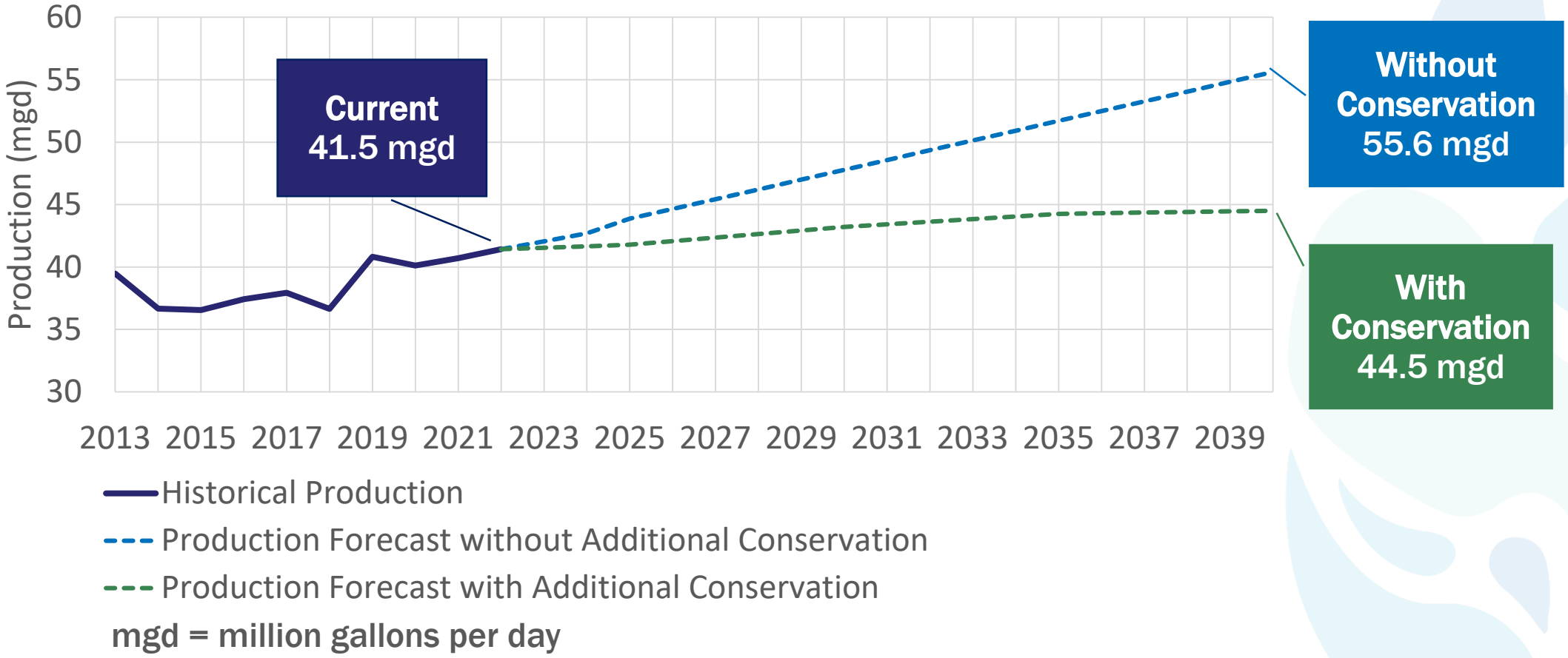


- Based on per capita, non-agriculture production
- Systems with larger demand (Central, Upcountry, Lahaina) ~20% goal
- Hana and Molokai ~10% goal

Per Capita Target - Recommended



Demand Forecast



mgd = million gallons per day

>> With a progressive goal, demand could be reduced by **11 mgd in 2040**

Proposed Water Conservation Measures

Selection Approach: Screening with DWS

Meeting with DWS Staff | November 11, 2023
Discussed **46** potential measures
Gathered DWS feedback and preferences

Email to DWS Staff | December 4, 2023
Provided **21** measures to move forward
11 recommended for benefit-cost analysis (BCA)

Community Meetings | January 2024
Several combined, one added
19 measures presented for community feedback

Adjusted some measure levels based on feedback on high interest measures

Conservation Plan | To Be Finalized April 2024
10 measures to meet conservation goals (BCA)
Other **9** measures will be described in report

Community Meetings

January 22, 2024 - Lahainaluna High School Cafeteria

January 23, 2024 – Kihei Community Center

January 24, 2024 – Mayor Hannibal Tavares Community Center

January 25, 2024 – Hana community virtual meeting via WEBEX

January 29, 2024 – Molokai community virtual meeting via WEBEX

Proposed Conservation Measures

Community Meetings, January 2024

Category	Measure	Saving Potential	Level of Interest (place your Voting Sticker here)
AMI*	Automatic Metering Infrastructure	💧💧💧	
PLUMBING FIXTURES	High Efficiency Toilet Incentive	💧	
PLUMBING FIXTURES	Clothes Washer Incentive	💧	
PLUMBING FIXTURES	Government Building Retrofits	💧💧💧	
PLUMBING FIXTURES	New Development Fixture Ordinance	💧💧	
PLUMBING FIXTURES	Low Income Plumbing Assistance	💧	
CII** PROGRAMS	Hotel/Resort Program	💧💧	
CII** PROGRAMS	Laundry Facility Incentive	💧	
CII** PROGRAMS	Pre-Rise Spray Valve Giveaway	💧	

Measures Presented to Community

Measures	BCA Modeled	Adjustments Based on Community Feedback	Community Votes Total	Community Rank
Use AMI to Target Savings	✓		28	1
Improved Water Loss Control			25	2
Irrigation Watering Schedule	✓		17	3
Smart Irrigation Controller Incentive	✓	Increased number rebates, upped priority	15	4
Hotel/Resort Program	✓	Increased hotels in program, upped priority	14	5
Promote Agricultural BMPs			10	6
Tiered Rate Structure Modification			9	7
Public Education Programs			8	8
High Efficiency Toilet Incentive	✓		7	9
Cooling Tower Ordinance			7	9
Low Income Plumbing Assistance			5	11
Xeriscape Improvement Incentive	✓		5	11
New Development Fixture Ordinance			4	13
Laundry Facility Incentive	✓		4	13
Ordinance to Reduce Waste			4	13
Clothes Washer Incentive	✓		3	16
Government Building Retrofits	✓		3	17
Recognition Program			2	18
Pre-Rinse Spray Valve Giveaway	✓		0	19

Water Conservation BCA

- **Benefits (Cost Benefits)**
  - Avoided water treatment and wastewater treatment costs
- **Costs**
  - Utility cost of conservation programs (materials, labor, marketing)

$$\text{Benefit-Cost Ratio (BCR)} = \frac{\text{Average Annual Benefits}}{\text{Average Annual Costs}}$$

Use AMI to Target Savings

Description:

DWS customers with AMI meters installed have access to the EyeOnWater App, which provides near real-time information on household water consumption. Customer access to real-time usage data has been shown to reduce water consumption. This measure involves increased App participation and utility management of AMI data to improve efficiency. This measure is paired with an existing initiative to expand AMI installation.

Analysis Assumptions:

- App participation rate growing to 50% by 2028 (conservative estimate, app participation has been shown to reach 70%+ with targeted marketing).
- Assumed 10% reduction per participant through reduction in leaks and behavioral changes. 80% of those savings assumed to be indoor.
- Cost does not include meter cost (currently 17,000 installed).
- Assumed 500 conservation staff hours to target AMI savings, plus marketing dollars of $10,000 for years 1-5, reducing to $5,000 for years 6-17.

1

User Target

System
Single-family
Multifamily

Resorts and Hotels
Other Nonresidential
Agriculture

End Use Target

Indoor
Outdoor

Participation Mechanism

Voluntary
Mandatory

Savings Potential

10% per participant

Start Year

2024

Duration (years)

17

Average Annual Savings (gpd)

1,624,000

Total Program Costs

$477,000

Total Avoided Costs

$21,429,000

Benefit-to-Cost Ratio 44.9

High-Efficiency Toilet Rebate

Description:

Provide customers with a rebate towards the replacement of inefficient toilets (using 3.5 gallons per flush or more) with an efficient model (using 1.28 gallons per flush or less). Savings can be up to 11,000 gallons per year per toilet!

Analysis Assumptions:

- $45 rebate offer
- 3,000 total rebates offered over ten years
- Toilets are flushed 5.1 times per day per person, 2.8 persons per household
- 1 hour per DWS conservation staff to administer each rebate
- Current fiscal structure can't accommodate rebates; DWS conservation staff would not administer but would seek a 3rd party

2

User Target

System
Single-family
Multifamily

Resorts and Hotels
Other Nonresidential
Agriculture

End Use Target

Indoor
Outdoor

Participation Mechanism

Voluntary
Mandatory

Savings Potential

31.7 gpd per rebate

Average Annual Savings (gpd)

70,000

Start Year

2024

Total Program Costs

$265,000

Duration (years)

10

Total Avoided Costs

$1,153,000

Benefit-to-Cost Ratio 4.4

Clothes Washer Incentive

Description:

Provide customers with a rebate towards the replacement of inefficient clothes washers that use 39 gallons per load or more with a more efficient model that uses 21 gallons per load or less. This can save over 5,000 gallons per year per clothes washer!

Analysis Assumptions:

- $45 rebate offer
- 2,000 total rebates offered over ten years
- On average, home occupants do 295 loads per year
- 1 hour per DWS conservation staff to administer each rebate
- Current fiscal structure can't accommodate rebates; DWS conservation staff would not administer but would seek a 3rd party

2

User Target

System
Single-family
Multifamily

Resorts and Hotels
Other Nonresidential
Agriculture

End Use Target

Indoor
Outdoor

Participation Mechanism

Voluntary
Mandatory

Savings Potential

22 gpd per rebate

Average Annual Savings (gpd)

32,000

Start Year

2024

Total Program Costs

$236,000

Duration (years)

10

Total Avoided Costs

$2535,000

Benefit-to-Cost Ratio 2.3

Government Building Retrofits

3

Description:

Install water efficient fixtures and landscaping at public facilities and in government buildings. Installations would include signage at facilities describing the benefits of water conservation. It is estimated that 1 building could save over 300,000 gallons per year!

Analysis Assumptions:

- There are 314 government building meters across DWS. Assumes 90% of buildings will be retrofitted.
- Assumed 20% savings (aligned with WaterSense labeled fixture savings).
- For costs, estimated $5,000 in materials plus 16 hours per building.
- All costs included, although budget for retrofits and labor could be from other County departments.

User Target

System
Single-family
Multifamily
Resorts and Hotels
Other Nonresidential
Agriculture

End Use Target

Indoor
Outdoor

Participation Mechanism

Voluntary
Mandatory

Savings Potential

20% per building

Average Annual Savings (gpd)

212,000

Start Year

2026

Total Program Costs

$1,593,000

Duration (years)

17

Total Avoided Costs

$2,797,000

Benefit-to-Cost Ratio 1.8

Laundry Facility Incentive

Description:

Provide commercial laundry facilities with a rebate towards the replacement of inefficient clothes washers with a more efficient model. This measure can save over 77,000 gallons per year per clothes washer!

Analysis Assumptions:

- DWS will target 5 buildings per year, with 15 washers per building.
- Savings assume a 9.5 gpc/ft3 washer will be replace with a 4 gpc/ft3 washer. Each washer is used an estimated 2,080 loads per year.
- DWS offers a $100 rebate per machine
- Current fiscal structure can't accommodate rebates; DWS conservation staff would not administer but would seek a 3rd party

3

User Target

System
Single-family
Multifamily

Resorts and Hotels
Other Nonresidential
Agriculture

End Use Target

Indoor
Outdoor

Participation Mechanism

Voluntary
Mandatory

Savings Potential

58% per machine

Average Annual Savings (gpd)

61,000

Start Year

2026

Total Program Costs

$50,000

Duration (years)

5

Total Avoided Costs

$1,008,000

Benefit-to-Cost Ratio 20.0

Hotel and Resort Program

Description:

Provide hotels and resorts with a complimentary water audit, provided that the hotel or resort agree to replace inefficient equipment identified within an allotted time frame or schedule. DWS may offer a rebates for water efficient equipment replacements associated with the audit.

Analysis Assumptions:

- There are 174 hotel/resort meters within the DWS system. Assumes 90% of hotels will participate.
- Water use for hotel/resort meters average 6,700 gpd. Assumes 20% savings, mostly targeted at indoor uses (80% of savings).
- For costs, assumes DWS will offer up to a $5,000 rebate for program participation, but will require hotels/resorts to fix inefficient water use identified during the audit within an allotted period of time.

1

User Target

System
Single-family
Multifamily

Resorts and Hotels
Other Nonresidential
Agriculture

End Use Target

Indoor
Outdoor

Participation Mechanism

Voluntary
Mandatory

Savings Potential

20% per participant

Average Annual Savings (gpd)

146,000

Start Year

2026

Total Program Costs

$876,000

Duration (years)

7

Total Avoided Costs

$1,926,000

Benefit-to-Cost Ratio 2.2

Pre-Rinse Spray Valve Giveaway

2

Description:

Provide commercial kitchen facilities with pre-rinse spray valves that use 1.15 gallons of water per minutes or less. One new pre-rinse spray valve can save a commercial kitchen facility over 16,000 gallons of water each year, plus associated energy savings from reduction in hot water use!

Analysis Assumptions:

- DWS to buy in bulk.
- Assumes 500 giveaways over four years.
- Research shows the high-efficient spray valves save 77 gpd each.
- Assumes a $40 rebate offer, plus one-half hour each for administration of the rebate.
- Additional cost savings for commercial entity due to reduction in hot water energy costs (not included in avoided costs).

User Target

System
Single-family
Multifamily

Resorts and Hotels
Other Nonresidential
Agriculture

End Use Target

Indoor
Outdoor

Participation Mechanism

Voluntary
Mandatory

Savings Potential

77 gpd per rebate

Average Annual Savings (gpd)

35,000

Start Year

2024

Total Program Costs

$31,000

Duration (years)

4

Total Avoided Costs

$579,000

Benefit-to-Cost Ratio 18.8

Irrigation Watering Schedule

1

Description:

Outdoor irrigation often accounts for over half of a home or business' total water use. Many lawns can thrive on less than 1 inch of water per week under normal conditions. To promote water conservation and reduce overwatering, Maui County could pass an ordinance that would limit irrigation of turf grass to no more than three days per week, and limit irrigation during high evapotranspiration times (8a-6p). There are many success stories from places like Texas, Florida, and California. This ordinance could save over 6 million gallons of water each day for Maui DWS customers alone!

Analysis Assumptions:

- Assumed high enforcement and a 90% compliance rate.
- Savings derived by estimating portion of residential and nonresidential demand that is outdoor, and then applying a reduction factor of 45%. This assumes that watering, on average, occurs 5 days per week currently, for a reduction of 40%. An additional 5% was added to account for time-of-day restriction.
- Results in overall reduction of 12%, which is within literature reported range.
- Costs assume 500 hours per year for enforcement plus $5K marketing costs annually.

User Target

System
Single-family
Multifamily
Resorts and Hotels
Other Nonresidential
Agriculture

End Use Target

Indoor
Outdoor

Participation Mechanism

Voluntary
Mandatory

Savings Potential

45% of outdoor use

Average Annual Savings (gpd)

6,063,000

Start Year

2024

Total Program Costs

$452,000

Duration (years)

17

Total Avoided Costs

$29,071,000

Benefit-to-Cost Ratio 64.3

Smart Irrigation Controller Incentive

Description:

Provide customers with a rebate towards the purchase and installation of a smart irrigation controller. Smart irrigation controllers can be soil-moisture based or weather-based and work to assure landscapes are not over watered. This measure can save residential customers over 28,000 gallons of water each year and commercial customers over 86,000 gallons each year!

Analysis Assumptions:

- 250 rebates per year for 8 years, for a total of 2,000 rebates.
- Incentive amount $100 per controller.
- Savings applied after Irrigation Watering Schedule measure to avoid over-estimating.
- 4 hours of labor per rebate for installation approval.
- Current fiscal structure can't accommodate rebates; DWS conservation staff would not administer but would seek a 3rd party

1

User Target

System
Single-family
Multifamily

Resorts and Hotels
Other Nonresidential
Agriculture

End Use Target

Indoor
Outdoor

Participation Mechanism

Voluntary
Mandatory

Savings Potential

15% per rebate

Average Annual Savings (gpd)

203,000

Start Year

2025

Total Program Costs

$625,000

Duration (years)

8

Total Avoided Costs

$972,000

Benefit-to-Cost Ratio 1.6

Xeriscape Improvement Incentive

3

Description:

Provide customers with a rebate to remove turf and replace it with low-water-use, native, micro-climate plants and landscapes. Depending on the amount of turf replaced, this measure can save residential customers over 165,000 gallons of water per year and commercial customers over 245,000 gallons per year!

Analysis Assumptions:

- Parcel area was calculated from Maui County data, where residential irrigated area is 6,780 ft2, and commercial area is 10,080 ft2.
- Savings calculated assuming water schedule reduction, to avoid over estimating. Assumes 75% reduction in irrigation – from 1 inch/week to ¼ inch/week.
- Costs include a $0.25 per square foot incentive. 75 participants per year.
- DWS staff time of 2 hours per participant was included for verification and application processing.

User Target

System
Single-family
Multifamily

Resorts and Hotels
Other Nonresidential
Agriculture

End Use Target

Indoor
Outdoor

Participation Mechanism

Voluntary
Mandatory

Savings Potential

450-670 gpd per participant

Start Year

2027

Duration (years)

10

Average Annual Savings (gpd)

251,000

Total Program Costs

$1,749,000

Total Avoided Costs

$1,205,000

Benefit-to-Cost Ratio 0.7

BCA Summary

Priority	Measure Name	Average Annual Savings, gpd	Savings in 2040, gpd	Cumulative Program Savings, gpd	Total Program Costs	Total Avoided Costs	BCR	Rank (BCR)	Rank (Cuml. Savings)
1	Use AMI to Target Savings	1,624,000	2,107,000	27,616,000	$477,000	$21,429,000	44.9	2	2
2	High-efficiency Toilet Incentive	70,000	95,000	1,189,000	$265,000	$1,153,000	4.4	5	7
2	Clothes Washer Incentive	32,000	44,000	552,000	$236,000	$535,000	2.3	6	10
3	Government Building Retrofits	212,000	343,000	3,605,000	$1,593,000	$2,797,000	1.8	8	4
3	Hotel/Resort Program	146,000	207,000	2,482,000	$876,000	$1,926,000	2.2	7	6
3	Laundry Facility Incentive	61,000	80,000	1,039,000	$50,000	$1,008,000	20.0	3	8
2	Pre-Rinse Spray Valve Giveaway	35,000	39,000	597,000	$31,000	$579,000	18.8	4	9
1	Irrigation Watering Schedule	6,063,000	6,827,000	103,073,000	$452,000	$29,071,000	64.3	1	1
2	Smart Irrigation Controller Incentive	203,000	276,000	3,445,000	$625,000	$972,000	1.6	9	5
3	Xeriscape Improvement Incentive	251,000	450,000	4,273,000	$1,749,000	$1,205,000	0.7	10	3
	Total	**8,697,000**	**10,468,000**	**147,871,000**	**$6,354,000**	**$60,675,000**	**9.5**		

Other Recommended Measures

Other Recommended Measures - Ordinances

New Development Fixture Ordinance	Maui County could pass an ordinance requiring WaterSense fixtures in all new residential and commercial development and redevelopment. Fixtures types could include toilets, urinals, showerheads, faucets, washing machines, and dishwashers. WaterSense fixtures can reduce water usage by 20%!
Cooling Tower Ordinance	Cooling towers use potable water to remove heat from buildings for HVAC cooling, cold storage, and industrial purposes, and are generally the single largest point of water consumption for commercial buildings. Maui County could pass an ordinance that would ensure 5-10 cycles of concentration before blow down, with an included timeline for implementation for existing cooling towers (e.g., 5 years) and a requirement that all new development comply.
Ordinance to Reduce Waste	Pass an ordinance that would prohibit the waste of water, with specific actions defined. Examples of actions could include requirements for fixing water leaks in a timely fashion; providing hotel customers the option of not having linens laundered daily; requirements for irrigation system equipment and plantings to be efficient; require new car washes and ornamental water features to recirculate water; and require pool covers under certain conditions.

Other Recommended Measures – Education and Assistance

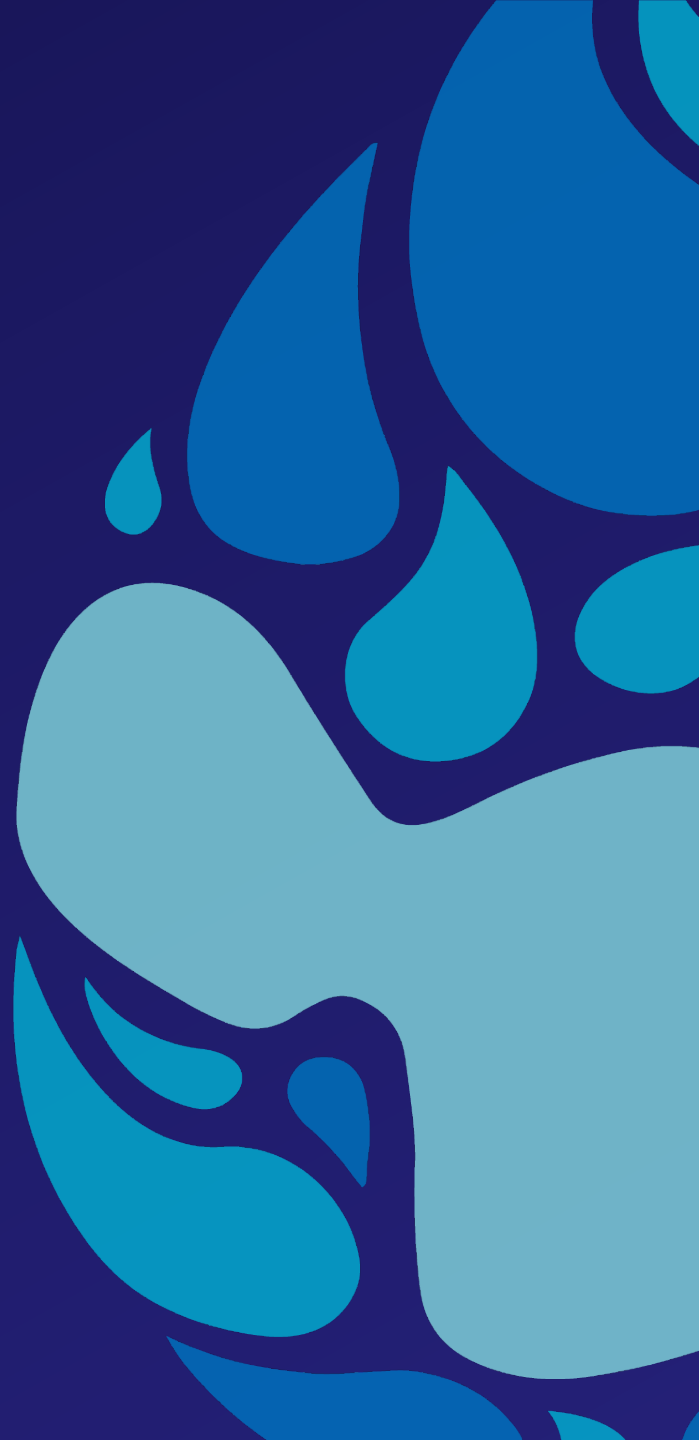
Low Income Plumbing Assistance	Customer leaks can go uncorrected at properties where owners are least able to pay the costs of repair. This program would provide financial support to low-income residents to replace inefficient plumbing fixtures and leaks.
Recognition Program	Sponsor an annual awards program for residences, multifamily properties, and businesses that significantly reduce water use. Winners would receive a plaque or other form of recognition.
Public Education Programs	Continue current public education activities, such as demonstration gardens, annual poster and video contest, and website. Expand to promote new offerings. Message around Maui culture, protection of the natural environmental, and vulnerability of water supplies.
Promote Agriculture BMPs*	Promote agricultural BMPs that are practical, cost-effective actions that agricultural producers can take to conserve water and reduce the amount of fertilizers, animal waste, and other pollutants entering water resources. BMPs can include irrigation management to reduce water and nutrient losses.

*BMPs = Best Management Practices

Other Recommended Measures – System

Tiered Rate Structure Modification	Water rates must meet utility costs, but some features can improve customer accountability by better imposing cost impacts for high water usage. Re-evaluate Maui DWS tier structures to encourage more efficient water use practices. This measure would require a rate study.
Improved Water Loss Control	Implement enhanced program to find and repair leaks in the distribution system to reduce real water loss. Actions could include installation of data loggers and proactive leak detection. Leak repairs would be handled by existing crews.

3. NEXT STEPS



JANUARY

COMMUNITY MEETINGS

FEBRUARY

BOARD OF WATER SUPPLY COMMISSION ON WATER RESOURCE MANAGEMENT

WATER SUPPLY CONTINGENCY MEETINGS

MARCH

SHORTAGE FORECASTING TOOL

DRAFT WATER SHORTAGE AND CONSERVATION PLAN

APRIL

FINAL WATER SHORTAGE AND CONSERVATION PLAN

MAY

WATER CONSERVATION BILL TO BOARD OF WATER SUPPLY and MAUI COUNTY COUNCIL

2024?

SHORTAGE PLANS TO CWRM FOR ISSUED WATER USE PERMITS