



# BWS WATER SHORTAGE PLAN

March 15, 2022

[www.boardofwatersupply.com](http://www.boardofwatersupply.com)

# BWS WATER SHORTAGE PLAN

- Red Hill Water Shortage Situation
- Water Shortage Declaration
- BWS Water Shortage Condition Triggers
- BWS Response Objectives, Strategies, and Tactics
- Water Shortage Response Procedures
- Recovery Phase



# Red Hill Water Shortage Situation



**SIGNS OF STRAIN ON BERETANIA WELLS PROMPTS CALL  
FOR ALL OAHU WATER USERS TO VOLUNTARILY REDUCE USE BY 10%**

Wells are used to make up for Halawa Shaft supply deficit.

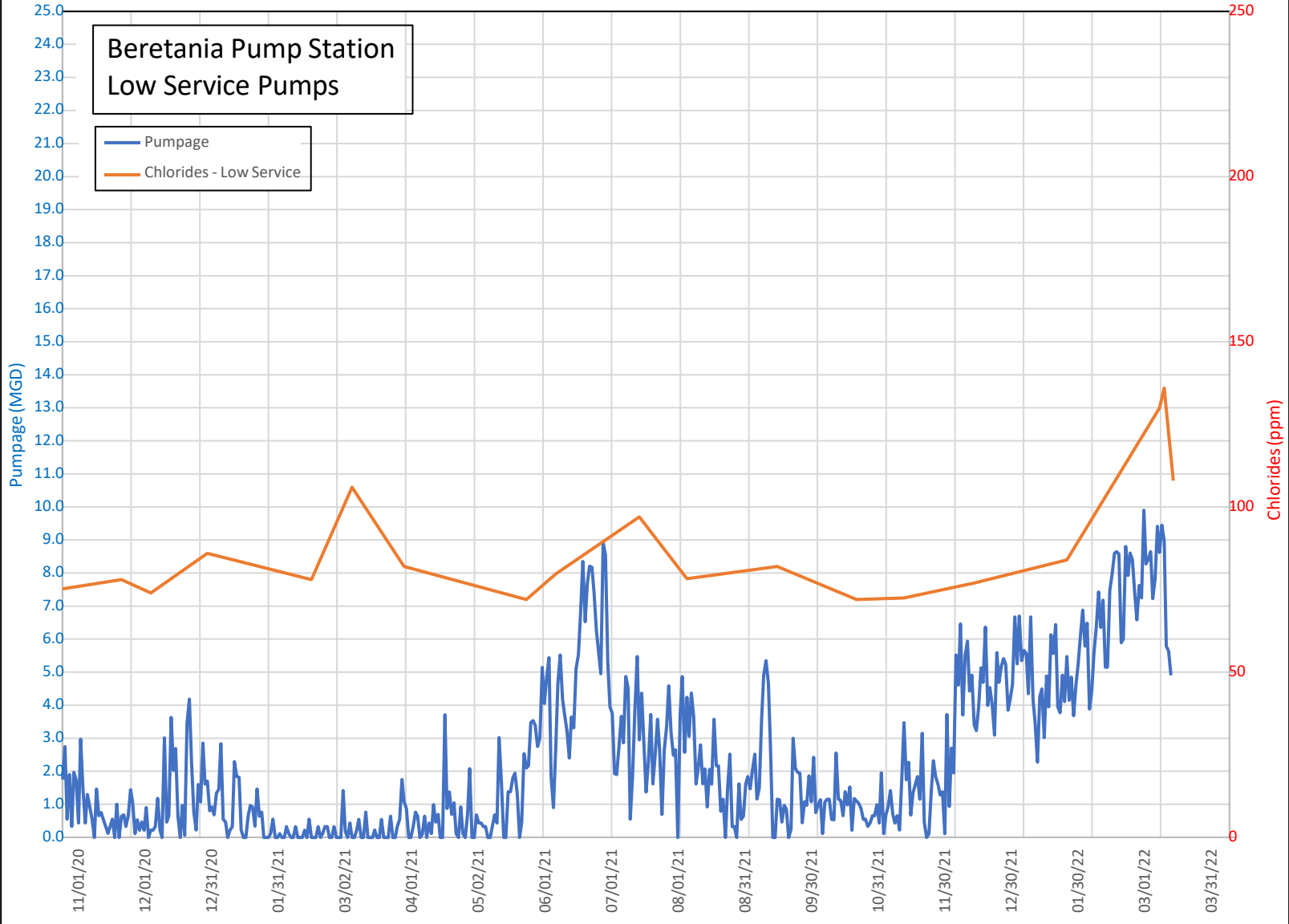
BWS News Release 3/10/2022

Rising levels of chloride in Board of Water Supply (BWS) Beretania Wells resulting from additional pumping to help make up the loss of supply from Halawa Shaft, which was shut down last year in response to fuel contamination of the Navy's Red Hill source -- coupled with less than normal rainfall – has led the BWS to ask island residents and businesses to voluntarily reduce their water use by 10 percent now to prepare for the summer season.



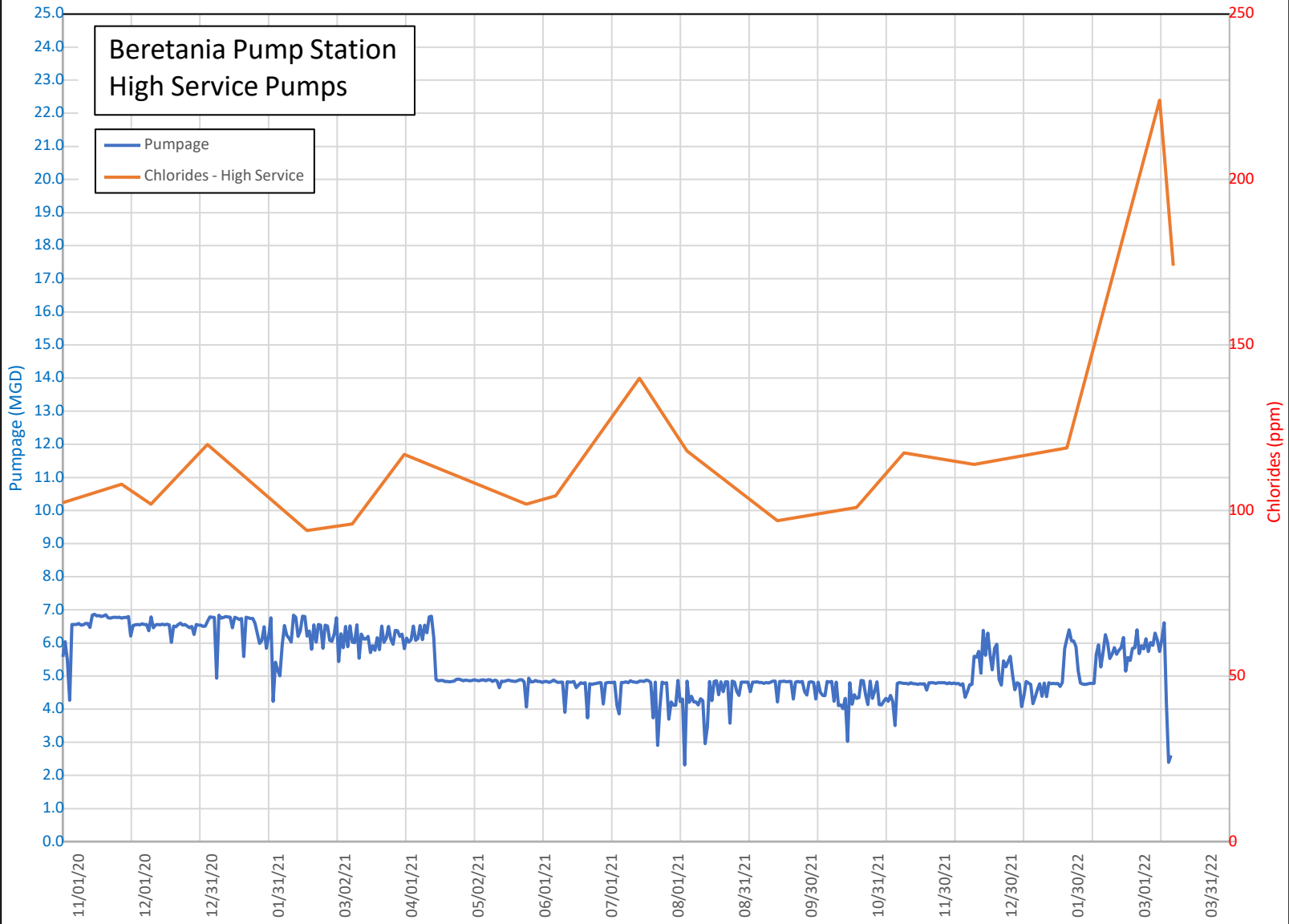
# Beretania Pump Station Low Service Pumps

- Pumpage
- Chlorides - Low Service

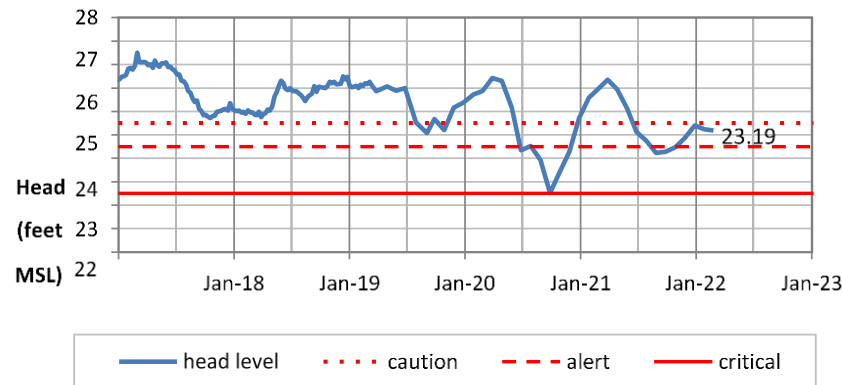


# Beretania Pump Station High Service Pumps

- Pumpage
- Chlorides - High Service



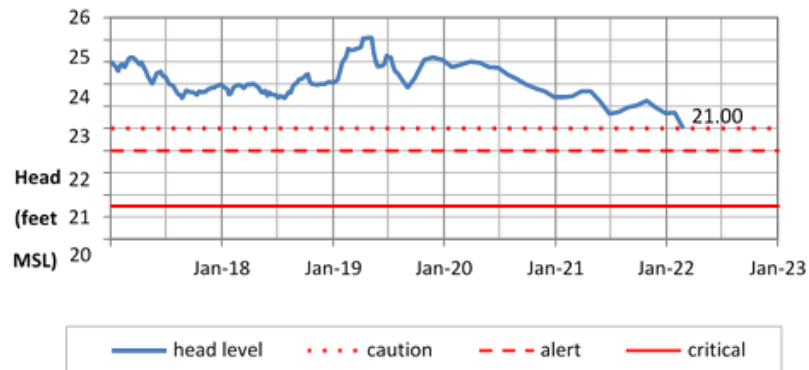
### Kaimuki 03/01/22



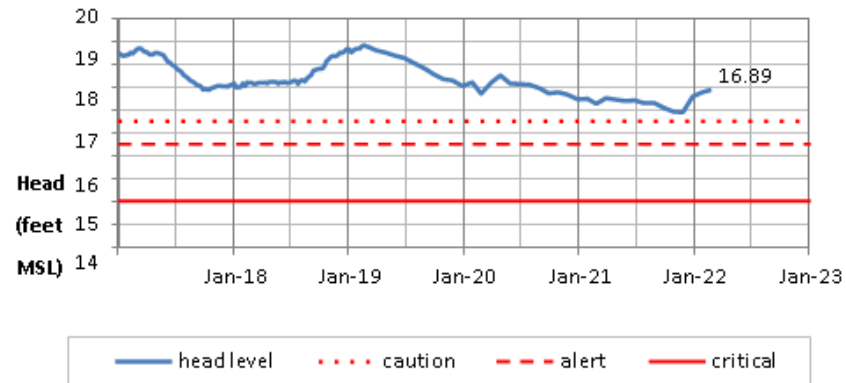
### Halawa 03/06/22



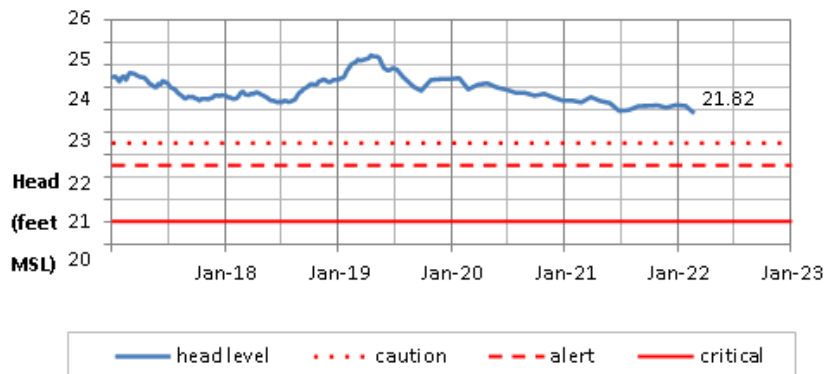
### Beretania 02/28/22



### Kalauao 03/03/22



### Kalihi 02/28/22

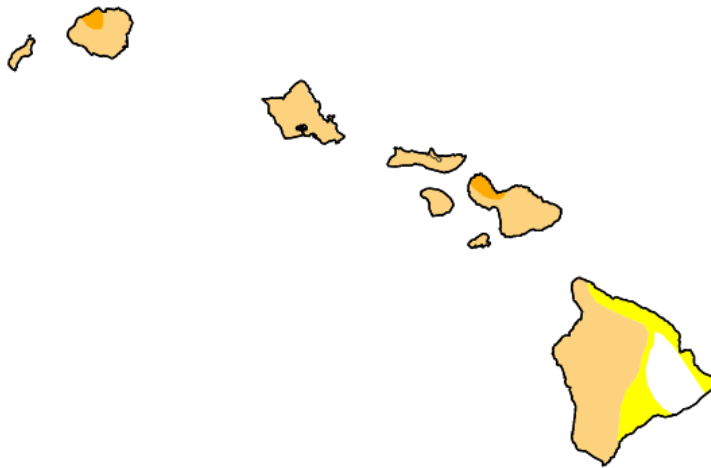


### Waipahu 03/01/22



# HAWAII DROUGHT MONITOR

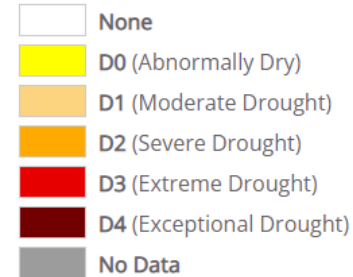
## Hawaii



**Map released: Thurs. March 10, 2022**

**Data valid: March 8, 2022 at 7 a.m. EST**

### Intensity



### Authors

**United States and Puerto Rico Author(s):**

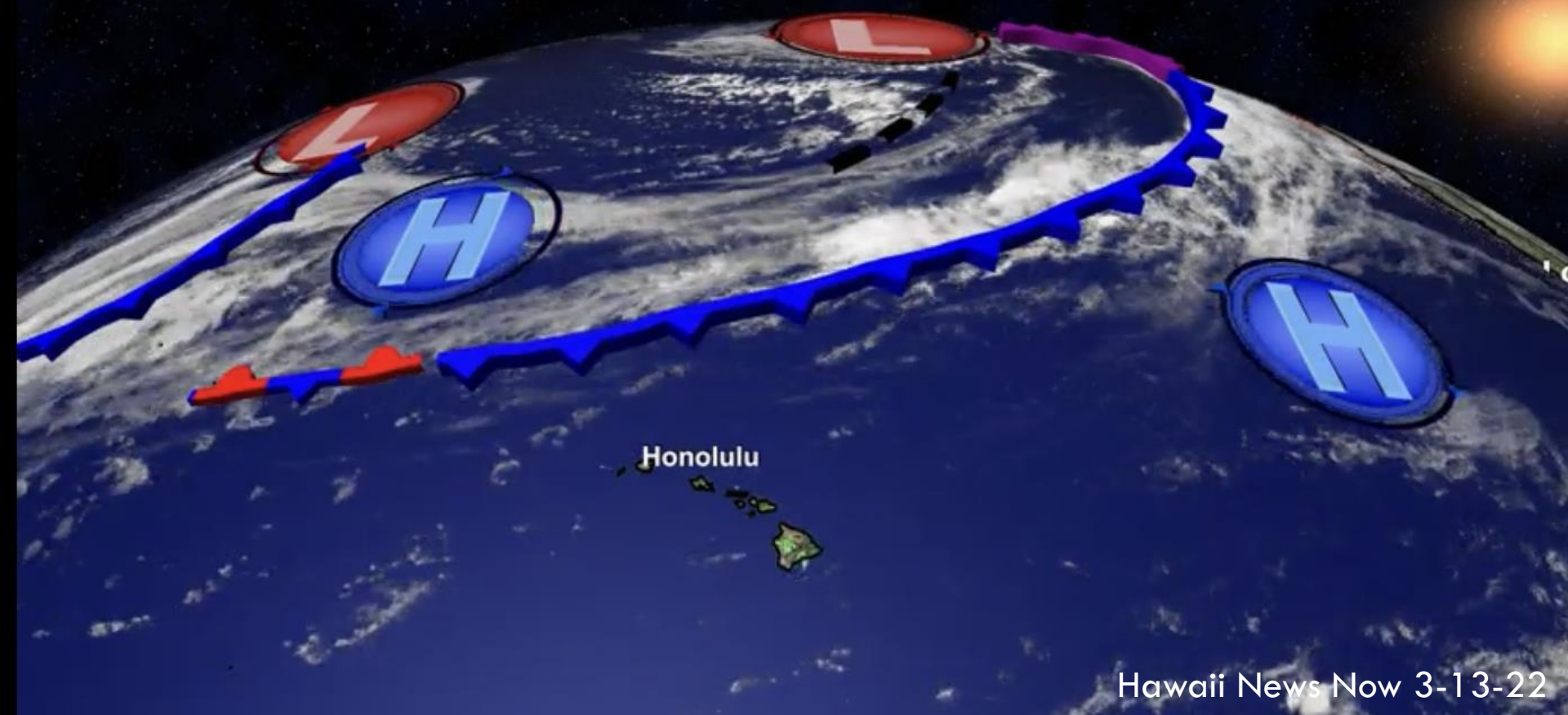
**Brian Fuchs**, National Drought Mitigation Center

**Pacific Islands and Virgin Islands Author(s):**

**Denise Gutzmer**, National Drought Mitigation Center

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying [text summary](#) for forecast statements.*



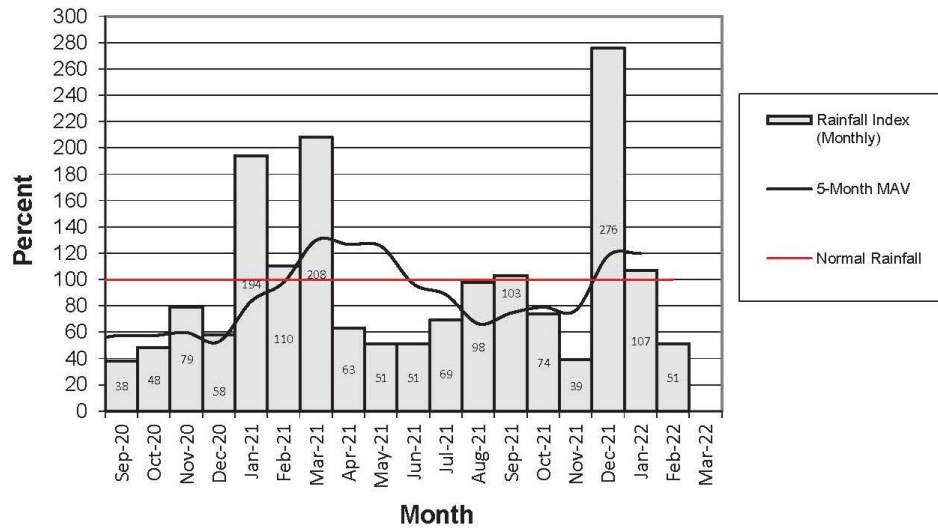


Hawaii News Now 3-13-22

- La Nina rains in Dec 2021 wasn't a transition to the wet season. It was a sudden swing, all in one month. Been stuck in this Jet Stream pattern since Jan. 3.
- 4-6 weeks out, looks dry even though NOAA forecast is 50% chance of above normal rains.
- March usually highest flash flood month. If don't get rains in the next 4-6 weeks, it will probably be dry for the year. (in consultation with NWS)
- NWS Summer/Fall seasonal and hurricane forecast due end of May

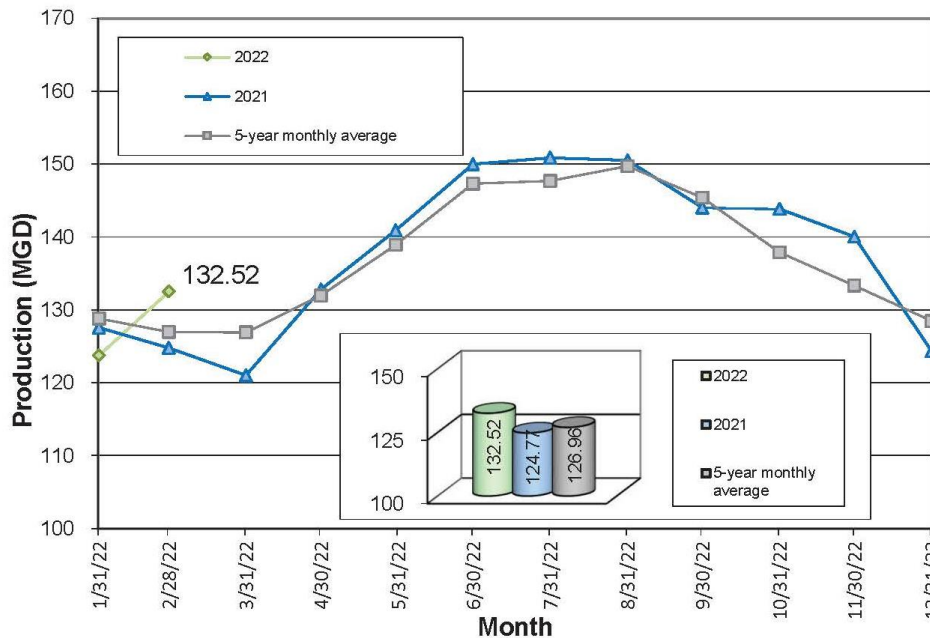


### HONOLULU WATERSHED AREA Rainfall Intake



- Strong correlation between rainfall and source production.
- Dec 2021 at 276% of normal rainfall. More runoff than recharge
- Feb 2022 at 51% of normal rainfall
- Feb 2022 production (BWS islandwide system) was 132.5 mgd, about 5 mgd over 5-year monthly average

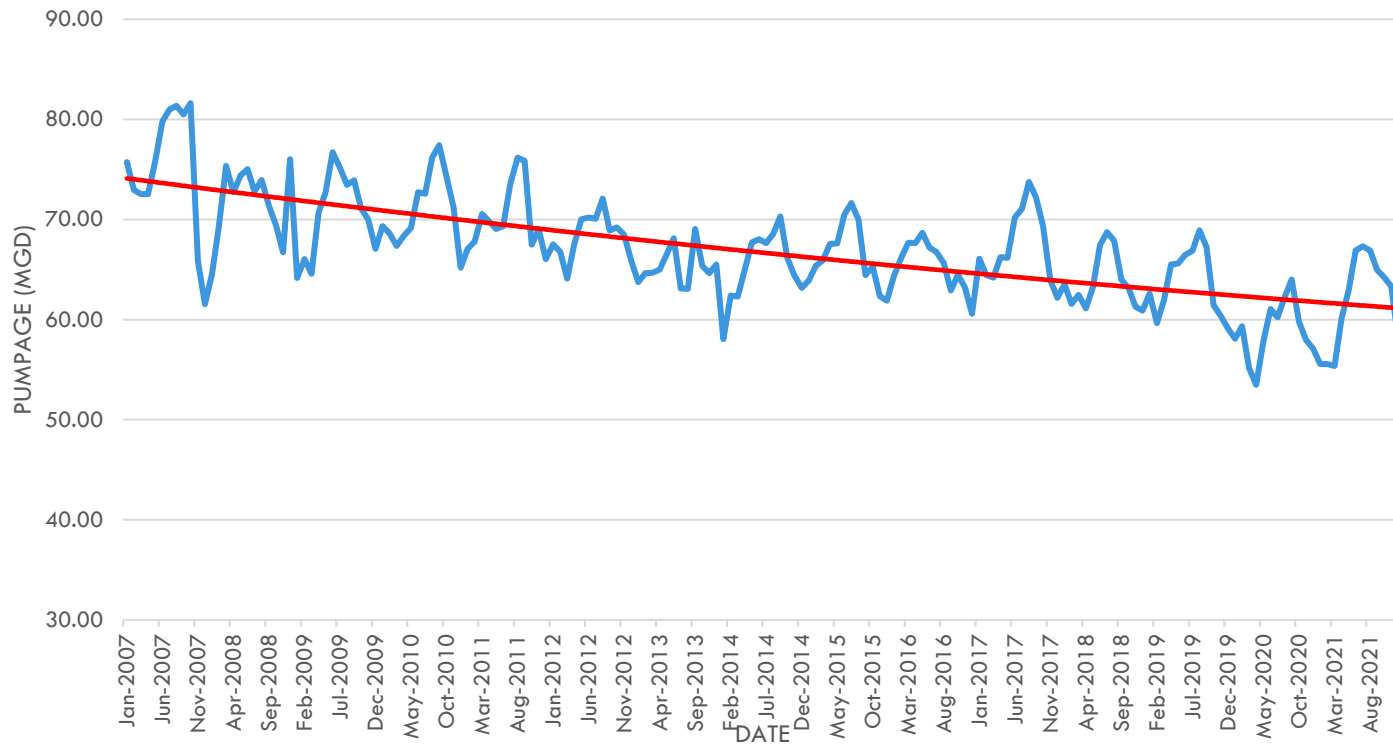
### Monthly Production



- Main difference between winter and summer demand (+20 mgd) is outdoor water use
- Honolulu Avg Day = 65 mgd, Max Day = 74 mgd
- Aiea Halawa Avg Day = 3.5 mgd, Max Day = 4 mgd
- The Perfect Drought Scenario



METRO LOW/HIGH MONTHLY AVG PUMPAGE (MGD)



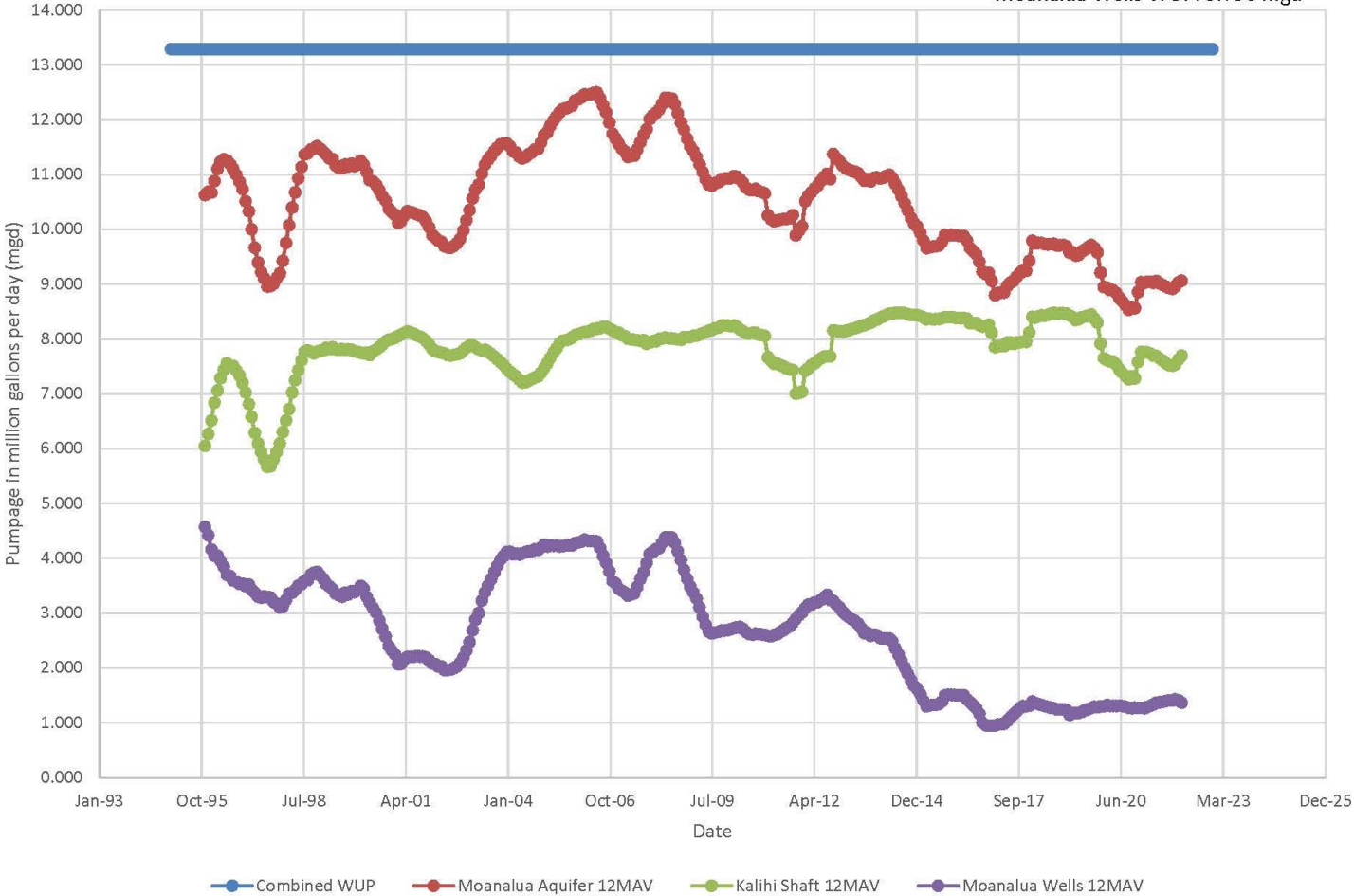
- Conservation plays a significant role in a decreasing trend in Metro (Salt Lake to Hawaii Kai) monthly source production from 2007-2021.
- Reduced aquifer withdrawals and reduced max day demand
- The polynomial trendline shows a slight flattening of the rate of decrease, which will plateau in the future as conservation saturation is reached.
- The trendline is expected to then increase with the rate of growth.



# BWS 12-MO MOVING AVERAGES FEBRUARY 2022 HONOLULU

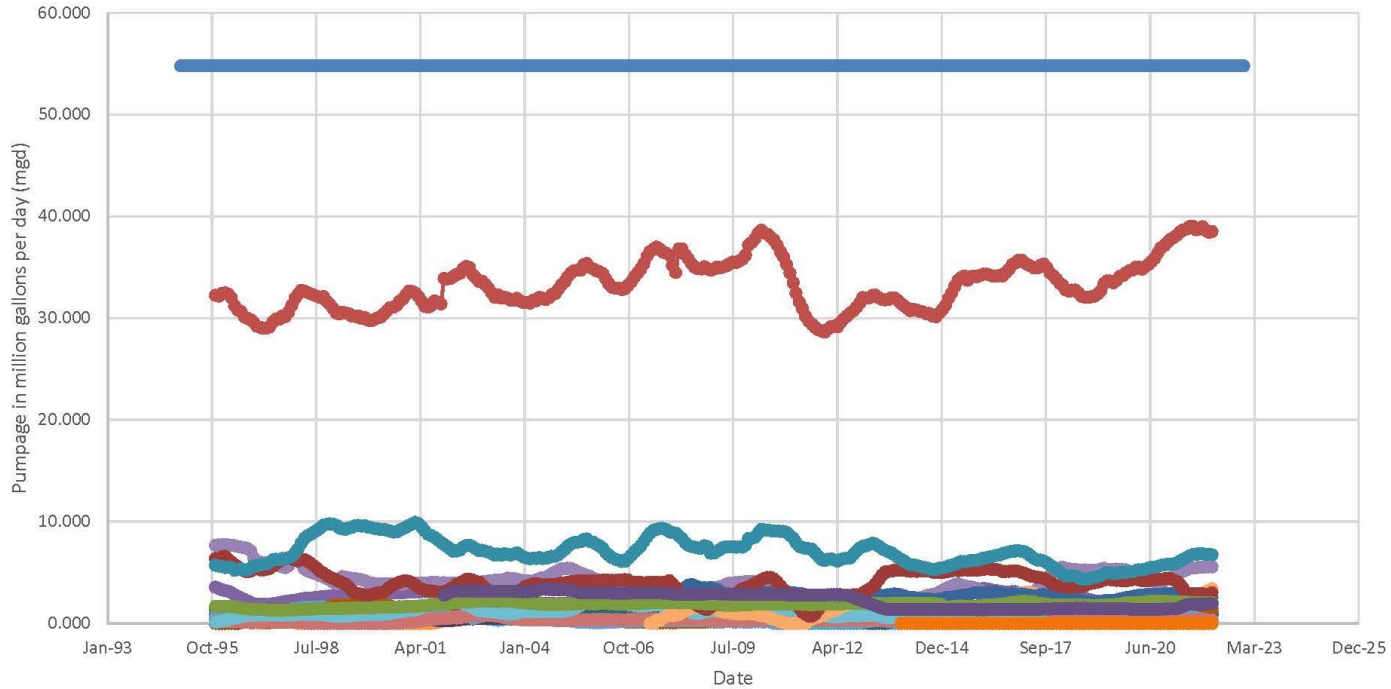
Moanalua Aquifer (Combined Wells)  
12MAV vs Combined WUP (13.290 mgd)

Kalihi Shaft WUP: 9.500 mgd  
Moanalua Wells WUP: 3.790 mgd



# BWS 12-MO MOVING AVERAGES FEBRUARY 2022 PEARL HARBOR

Waipahu-Waiawa Aquifer (Combined Wells)  
12MAV vs Combined WUP (54.792 mgd)



- |                             |                                 |                               |                            |
|-----------------------------|---------------------------------|-------------------------------|----------------------------|
| ● Combined WUP              | ● Waipahu- Waiawa Aquifer 12MAV | ● Manana 12MAV                | ● Mililani Wells I 12MAV   |
| ● Mililani Wells II 12MAV   | ● Mililani Wells III 12MAV      | ● Mililani Wells IV 12MAV     | ● Pearl City Wells I 12MAV |
| ● Pearl City Wells II 12MAV | ● Pearl City Well III 12MAV     | ● Pearl City Shaft 12MAV      | ● Waipio Hts. Wells 12MAV  |
| ● Waipio Hts. Wells I 12MAV | ● Waipio Hts. Wells II 12MAV    | ● Waipio Hts. Wells III 12MAV | ● Waipahu Wells 12MAV      |
| ● Waipahu Wells II 12MAV    | ● Waipahu Wells III 12MAV       | ● Waipahu Wells IV 12MAV      | ● Kunia Wells I 12MAV      |
| ● Kunia Wells II 12MAV      | ● Kunia Wells III 12MAV         | ● Hoaeae Wells 12MAV          | ● Ewa Shaft 12MAV          |



# HONOLULU WATER SYSTEM



# RED HILL WATER SHORTAGE CAPITAL RESPONSE PROJECTS

## Proposed FY 2023 CIP Projects, possibly with SRF & ARPA Funding

- Construct 5-6 exploratory wells in Waimalu & possibly Moanalua to replace 3 pump stations shut down due to Red Hill contamination
- Install 4 sentinel monitoring wells in Halawa Valley
- Interconnect Pearl City 285' water system with Metro 180' and Aiea-Halawa 277' water systems
- Test pump Waimalu II, Kaonohi II and Kaamilo pump 2 for yield & chloride recovery
- Ewa Shaft Well Field
- Kunia Wells IV
- Waikele Gulch Wells
- Waialae Nui Valley Well
- Wailele Well
- Kalaeloa Seawater Desalination DBOM

Complete repairs of Kalihi Pump Station and Kalauao Wells

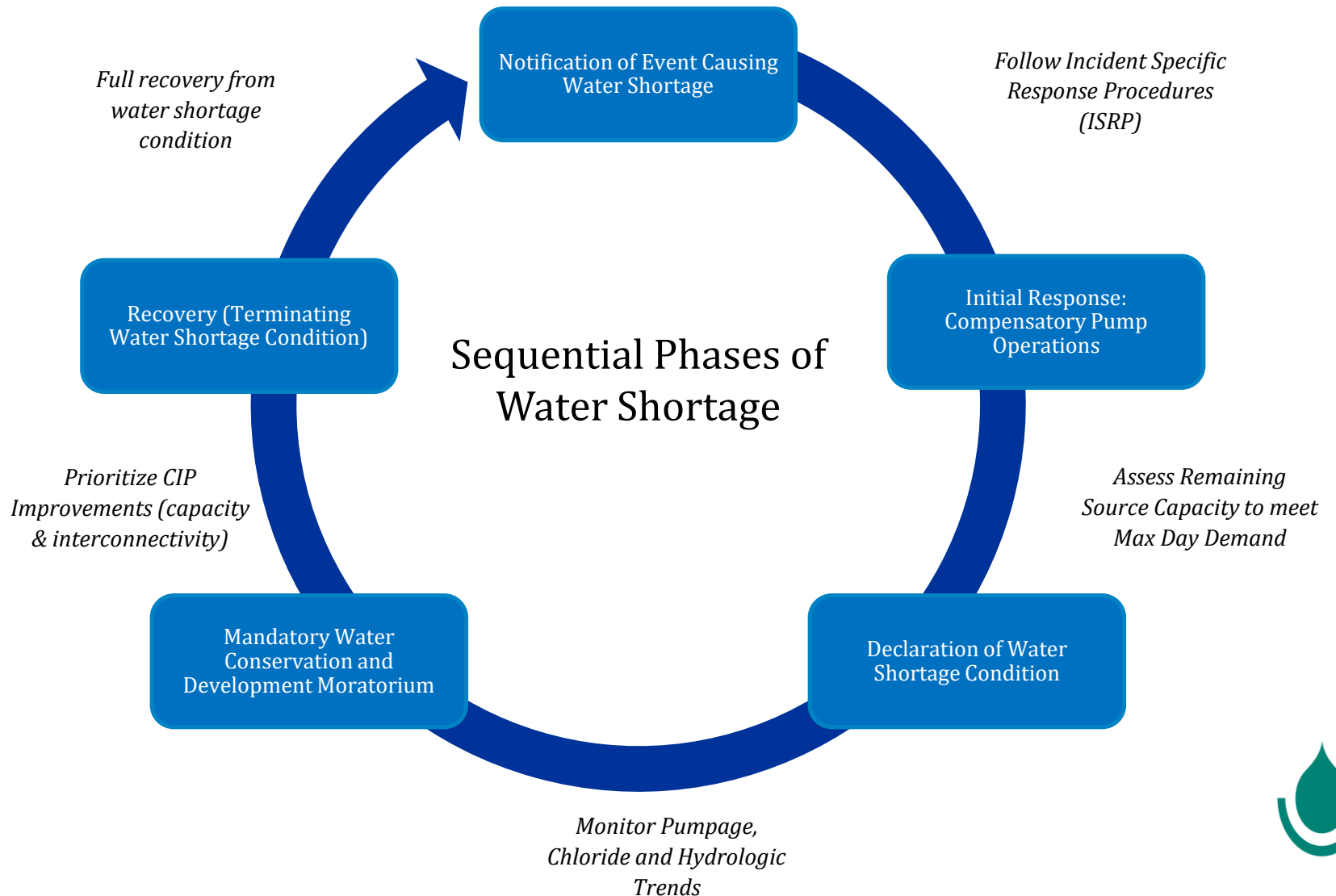


# Water Shortage Declaration





# WATER SHORTAGE PLAN PROVIDES STRATEGIC AND TACTICAL STEPS TO ASSESS, DECLARE AND CONTROL WATER DEMAND



# BWS WATER SHORTAGE DEFINITIONS

*A water shortage condition exists when water supply is not available to meet existing and/or future water demands due to degradation of water quality or extended disruptions to water system delivery infrastructure.*

*A low groundwater condition exists when 3 or more index well levels fall below levels designated (caution, alert, critical), and chloride levels rise for 3 consecutive months at sufficient sources to hamper operations. Sec 3-318 to 322 BWS Rules & Regulations*



# BWS RULES AND REGULATIONS

## CHAPTER II: WATER SERVICE TO CONSUMERS

### **Sec. 2-209: Conservation Measures and Interruption of Water Supply**

1. The Department will exercise reasonable diligence to deliver water to the consumer and avoid shortages or interruptions in service, but will not be liable for any interruption, shortage, insufficiency of supply, or any loss or damage occasioned thereby.

2. Whenever, in the Department's opinion, special conservation measures are advisable in order to forestall water shortages, the Department may restrict the use of water by any means or method of control.



BWS may at any time during the period in which a water shortage condition exists:

- Declare that a water shortage condition exists. A water shortage condition shall continue to exist, once it is declared, until such time as BWS declares that the condition is terminated.
- Implement mandatory restrictions within the scope of BWS Rules and Regulations.
- Punish offenders within the scope of BWS Rules and Regulations.

The Manager shall, at each regular Board meeting while a declared water shortage condition is in effect, report to the Board the status of the water system capacity; the weekly average of daily pumpage and demands; the effectiveness of the restrictions and allotments in force; recommendations to increase or reduce restrictions and allotments; and such other information.

BWS may terminate the declared water shortage condition when the event causing degradation of water quality or disruptions to water system delivery infrastructure has been resolved.

In a Critical Water Shortage Condition where Mandatory Conservation is required because of insufficient response to voluntary conservation, the Board may declare a Building Moratorium.



# Water Shortage Condition Triggers



# WATER SHORTAGE CONDITION TRIGGERS

Water Shortage Condition	Source Capacity Demand Trigger	Chloride Content Trigger*
No Water Shortage	Available pumping units meet max day demand in 16 hours w/ standby not included.	Stable Chloride and Head Level Trends
Alert	Available pumping units meet $Q_{95}$ max day demand in 20 hours, standby pumps not included.*	Chloride content rises between 12 ppm and 16 ppm over three consecutive months at sufficient sources to hamper operations.
Critical	Available pumping units cannot meet $Q_{95}$ max day demand in 22 hours, standby pumps not included*	Chloride content rises over 16 ppm over three consecutive months at sufficient sources to hamper operations.

\*Assumes 5-10% Water Conservation Reductions to flatten max day demand peaks

Requirement for Monitoring chloride trends and index well head levels more frequently (from monthly to weekly). Available remaining pumping stations may have to be pumped harder to meet  $Q_{95}$  max day demand and with drought, may increase chloride levels and decrease head levels into Alert or Critical low groundwater levels.



# Response Objectives, Strategies, and Tactics



# Water Shortage Objectives and Strategies shape the compensatory water system operations, water conservation, outreach and development control tactics

## Objectives

Prevent contamination & infrastructure disruptions

Meet Max Day Demand

Reduce Potable Water Use

Minimize low water pressure

Minimize overdraft conditions and excessive salt-water intrusion

New water source development and water system connectivity

## Strategies

Strategy 1 - Compensatory water system operations

Strategy 2 - Water system capacity assessments & water system improvements

Strategy 3 - Demand-side Mgt, Water loss control & Development controls

Strategy 4 - Increase water system & hydrologic monitoring

Strategy 5 - Limit chloride content rises & excessive head levels drops during summer/fall seasons

## Tactics

Data collection

Improve system efficiency

Inter-agency coordination

Voluntary conservation measures

Mandatory conservation measures

Irrigation schedules

Non-residential conservation targets

Water allotments and flow restrictors and rate surcharges

Stable condition operation guidance

Water loss controls

Engage critical customers

Public outreach and education

Public communication

CIP Improvements

Development moratorium





# Water Shortage Response Procedures



# VOLUNTARY CONSERVATION MEASURES FOR ALERT **WATER SHORTAGE CONDITIONS** (not limited to...)

Request military, commercial, industrial, and agricultural users and government agencies reduce their usage by 10%

- Include simple water conservation strategies and current usage, WaterSmart

Request the following of all customers:

- Use automatic shut-off nozzles on all hoses.
- Only wash cars, boats, trailers, or other vehicles with automatic shut-off nozzle hoses and buckets
- Do not hose or wash sidewalks, driveways, parking lots, or other hard surfaces
- Make a reasonable effort to repair water leaks in toilets, plumbing fixtures, and customer-side water lines within 24 hours

Adjust Irrigation Schedules to achieve overall reduction in irrigation

- Parks, highways, cemeteries, schools
  - Between the hours of 7 AM and 11 AM
  - Irrigation days for odd digit address: Tuesday, Thursday and Saturday
  - Irrigation days for even digit address: Wednesday, Friday, Sunday
- Domestic: Between the hours of 5 PM and 7 PM
- Military and golf courses: Between the hours of 12 AM and 5 AM
- Incentives for turf replacement & xeriscape and weather based irrigation controllers



# **MANDATORY CONSERVATION MEASURES FOR CRITICAL WATER SHORTAGE CONDITIONS** (not limited to...)

Require the following of appropriate customers:

- Do not fill swimming pools and other types of pools and ponds. Close public pools
- Serve water in restaurants only when requested by the customer, provide a notice of water shortage on each table
- Post a notice of water shortage and tips for water conservation in each hotel room, linen change outs
- Use re-circulating water only in ornamental fountains and post signage nearby that states that re-circulated water is being used
- Limit use of potable water for recreational purposes
- Coordinate with commercial water recreational facilities (such as water parks) on restrictions to minimize impact to businesses

Implement mandatory restrictions for City agencies:

- Restrict turf watering/landscaping irrigation at City facilities other than parks and right-of-way
- Inspect automatic sprinkler and irrigation systems for leak and waste
- Partner with HFD to reduce non-essential fire suppression training and hydrant flushing
- Increase use of recycled water for irrigation, construction activities, fire-fighting storage, agriculture, or other non-potable uses
- Implement mandatory BWS construction restrictions:
  - Halt all approvals of:
    - temporary water meters
    - new permanent water meters
    - pipeline chlorination or disinfection using potable water



# WATER ALLOTMENTS FOR CRITICAL MANDATORY WATER SHORTAGE CONDITIONS

Establish water allotments: For commercial, residential, industrial, military, governmental, and agricultural consumers

- At no less than 90% of user's previous 12-month average billed consumption
- At no less than 350 gals/day for SFD and duplex residences
- At no less than 270 gals/day/unit for Multi Family low rise
- At no less than 180 gals/day/unit for High Rise Apartments

Progressively Restrictive Allotments to achieve the reduction requirements:

- Establish water allotments: For commercial, residential, industrial, military, governmental, and agricultural consumers:
  - At no less than 70% of user's previous 12-month average billed consumption
  - At no less than 300 gallons/day for SFD and duplex residences
  - At no less than 210 gals/day/unit for Multi Family low rise
  - At no less than 140 gals/day/unit for High Rise Apartments
- At different times and different levels for the various classes of consumers to distribute demand over a day



# PENALTIES FOR EXCEEDANCE OF WATER ALLOTMENTS

BWS can implement penalties for customers whose monthly consumption is in excess of their water allotment, in accordance with the following:

- Maximum allowable exceedance of water allotments:
- Residential (single family and duplex): 5,000 gallons per monthly billing period
- Resort, commercial, multi-family, industrial, agricultural, military, and government: Difference between allotment and previous 12-month monthly average

First two offenses if the excessive use exceeds the maximum allowable as specified above and in Section 3-321 of the BWS Rules and Regulations.

- A warning letter will be issued after the first offense
- A flow restrictor may be installed after the second offense
- Surcharges for the first two offenses exceeding water allotments per the surcharge schedule

Gallons in Excess of Allotment for Meter Sizes 2" and Larger*	Gallons in excess of Allotment for Meter Sizes 5/8" to 1-1/2" (Monthly Billing)	Gallons in excess of Allotment for Meter Sizes 5/8" to 1-1/2" (Bi-Monthly Billing)	Surcharge
25% or less	3,000 or less	6,000 or less	2 Times Existing Water Rate
26% - 50%	3,001 – 6,000	6,001 - 12,000	3 Times Existing Water Rate
51% - 75%	6,001 – 9,000	12,001 - 18,000	4 Times Existing Water Rate
76% - 100%	9,001 – 12,000	18,001 - 24,000	12 Times Existing Water Rate
Over 100%	Over 12,000	Over 24,000	20 Times Existing Water Rate



# SECTION 1-101 AVAILABILITY OF WATER

*Availability of Water for Proposed Developments. The Department may issue water commitments to proposed developments as follows:*

- **Category 1: Areas with Adequate Water Supply.** *The Department may issue advance water commitments to proposed developments in areas where the water system has adequate supplies to assume new or additional services.*
- **Category 2: Areas with Limited Additional Water Supply.** *The Department may restrict the issuance of advance water commitments to proposed developments in areas where the water system has limited additional supplies to assume new or additional services.*
- **Category 3: Areas with No Additional Water Supply.** *The Department shall not issue water commitments to proposed developments in areas where the water system has no additional supplies to assume new or additional services. The only exception shall be the issuance of a single 3/4-inch meter to proposed developments on existing single vacant lots.*

BWS typically operates under Category 2 water availability, where **water commitments are confirmed when residential subdivision construction plans are approved or when building permits are approved for all other developments.** In a Critical Water Shortage Condition with Mandatory Conservation, BWS will operate under Category 3, for water systems with no additional water supply until the water system improvements to increase capacity are completed.



# BUILDING MORATORIUM CONTROLS

In a Critical Water Shortage Condition, if mandatory conservation measures and available pumping units are insufficient to accommodate existing and/or future growth, BWS may implement building development conditions to control the rate of water demand growth and the risk of water shortage. Limitations could include:

- Limit approvals to a single minimum size water meter for existing vacant lots.
- For redeveloped parcels, limit water demands to existing water meter sizes, previous water allocations and/or existing use prior to redevelopment.
- Require alternative onsite water supplies such as grey water reuse, stormwater catchments, A/C condensate recovery and high efficiency plumbing fixtures. Refer to the National Blue Ribbon Committee Distributed Nonpotable Water Manual.
- If additional water supply is still needed for a development, the developer could consider funding conservation measures in other existing buildings within the same water system where the actual water savings equates to the additional supply needed. (No Net Gain in Water Use)
- Exceptions



# Recovery





# RECOVERY PHASE

Ensure sufficient source and aquifer recovery post incident by reducing pumping when the next wet seasons reduce water demands.

- Identify pumping stations that have been pumped harder to meet max day demand and affected by drought, where chloride levels increased and head levels decreased into Alert or Critical low groundwater levels.
- Continue to monitor chloride trends and index well head levels.
- Step down water conservation measures accordingly
- Continue “Last On – First Off” pump operations until full recovery is achieved



# EPA DROUGHT RESPONSE & RECOVERY

## DROUGHT RESPONSE AND RECOVERY

A Basic Guide for Water Utilities

Select a menu option below. New users should start with Overview and Navigation.



Overview and Navigation



Staffing, Response Plans and Funding



Water Supply and Demand Management



Communication and Partnerships



Case Studies and Videos



# WATER CONSERVATION IS CRITICALLY IMPORTANT!

## 7 Easy Tips



**TIP #1 - WATER LAWNS JUST  
1-2 TIMES A WEEK**



**TIP #2 - DON'T WATER LAWNS  
BETWEEN 9 AM AND 5 PM**



**TIP #3 - CHECK FOR PLUMBING  
LEAKS**



**TIP #4 - INSTALL WATER-  
EFFICIENT FIXTURES**



**TIP #5 - TAKE SHORTER  
SHOWERS**



**TIP #6 - PUT A NOZZLE ON  
YOUR GARDEN HOSE**



**TIP #7 - DON'T LET THE FAUCET  
RUN AND RUN**

[www.boardofwatersupply.com](http://www.boardofwatersupply.com)



WaterSmart provides participating customers with detailed information on their water use and personalized recommendations for using water more efficiently.

This information is available online or by mobile.

Overtime, customers who access the WaterSmart platform are more likely to use water efficiently.

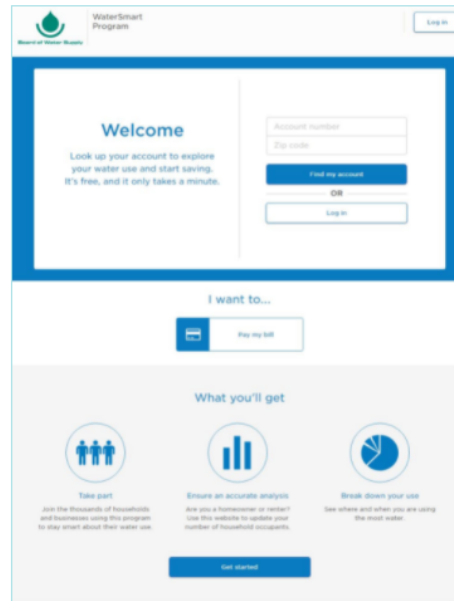


Create your WaterSmart® account today!

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### About the WaterSmart® Program

The Board of Water Supply (BWS) mission is to provide safe, dependable and affordable water now and into the future, Ka Wai Ola—Water for Life. WaterSmart® is an initiative that would help to ensure a sustainable water supply by promoting water conservation, a key objective in the BWS Water Master Plan.



[Log into the WaterSmart® Portal](#)

BWS first introduced WaterSmart® to roughly 38,000 customers in 2017, giving them the chance to learn how their water use compares with similar neighboring households and to have free and convenient access to tools that help them have a better understand their water use. The project was co-funded by Energy Excelerator, a Hawaii-based accelerator program for energy and water startups.

### Quick Links

[Frequently Asked Questions](#)

[Contact Us Form](#)

[WaterSmart® Portal Login](#)

[BWS Conservation Program](#)



# WATER SENSIBLE PROGRAM

Go to: [Commercial Rebates](#) | [Food Service](#) | [Residential Rebates](#) | [WaterWisdom](#) | [Program FAQs](#) |



[#WaterSensible](#) [#WaterForLife](#) [#KaWaIOla](#) [#BoardOfWaterSupply](#) [#WaterConservation](#)

The Honolulu Board of Water Supply (BWS) is working hard to preserve and protect our most essential resource – water. Through the Water Sensible program, Oahu residents and businesses will have the opportunity to save water and money. Water Sensible launched with a residential water conservation rebate program and has expanded its offerings to include the commercial sector. It has also recently launched a WaterWisdom program to help condominiums and townhome complexes improve their water conservation efforts.



## For More Information:

Call (808) 237-6877

Email [watersensible@honeywell.com](mailto:watersensible@honeywell.com).

[#WaterSensible](#) [#WaterForLife](#) [#KaWaIOla](#) [#BoardOfWaterSupply](#) [#WaterConservation](#)

Updated: 02/11/22





safe, dependable, and affordable  
water, now and into the future.



# Mahalo!

## BOARD OF WATER SUPPLY

Water Shortage Plan

March 15, 2022

