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
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.

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
Beretania Pump Station
Low Service Pumps

Pumpage (MGD)

Chlorides (ppm)

Chlorides - Low Service
Map released: Thurs. March 10, 2022
Data valid: March 8, 2022 at 7 a.m. EST

Intensity
- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data

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The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.
• 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
- 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.
- 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.
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.
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
- Waiele 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

Sequential Phases of Water Shortage

1. Declaration of Water Shortage Condition
2. Initial Response: Compensatory Pump Operations
3. Mandatory Water Conservation and Development Moratorium
4. Recovery (Terminating Water Shortage Condition)
5. Follow Incident Specific Response Procedures (ISRP)
6. Monitor Pumpage, Chloride and Hydrologic Trends
7. Assess Remaining Source Capacity to meet Max Day Demand
8. Prioritize CIP Improvements (capacity & interconnectivity)
9. Full recovery from water shortage condition

Notification of Event Causing Water Shortage
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
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

<table>
<thead>
<tr>
<th>Water Shortage Condition</th>
<th>Source Capacity Demand Trigger</th>
<th>Chloride Content Trigger*</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Water Shortage</td>
<td>Available pumping units meet max day demand in 16 hours w/ standby not included.</td>
<td>Stable Chloride and Head Level Trends</td>
</tr>
<tr>
<td>Alert</td>
<td>Available pumping units meet Q₉₅ max day demand in 20 hours, standby pumps not included.*</td>
<td>Chloride content rises between 12 ppm and 16 ppm over three consecutive months at sufficient sources to hamper operations.</td>
</tr>
<tr>
<td>Critical</td>
<td>Available pumping units cannot meet Q₉₅ max day demand in 22 hours, standby pumps not included*</td>
<td>Chloride content rises over 16 ppm over three consecutive months at sufficient sources to hamper operations.</td>
</tr>
</tbody>
</table>

*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 Q95 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
1. **Strategy 1 - Compensatory water system operations**
2. **Strategy 2 - Water system capacity assessments & water system improvements**
3. **Strategy 3 - Demand-side Mgt, Water loss control & Development controls**
4. **Strategy 4 - Increase water system & hydrologic monitoring**
5. **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
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

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

Updated: 02/11/22
Providing safe, dependable, and affordable drinking water, now and into the future.