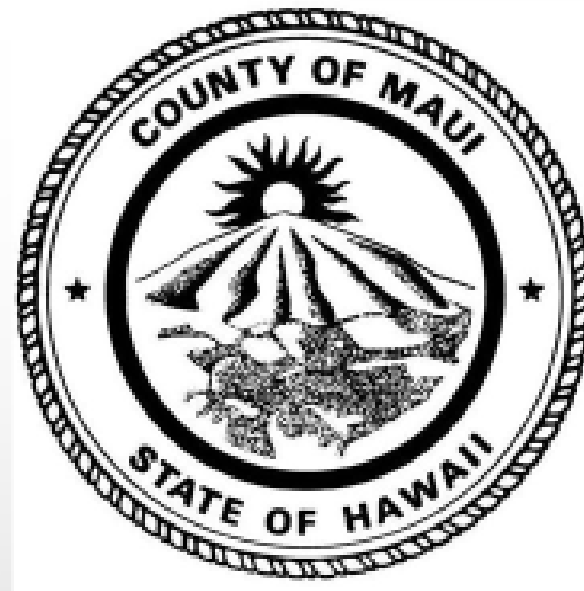


DEPARTMENT OF WATER SUPPLY

SERVING MAUI
COUNTY SINCE
1949



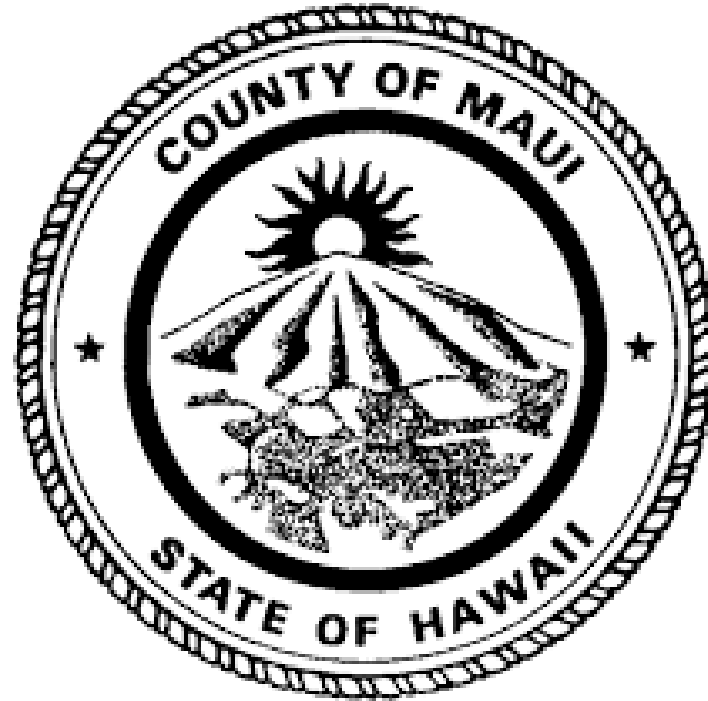
By Water All Things Find Life

RICHARD T. BISSEN, JR.
Mayor

KEKUHAUPIO R. AKANA
Managing Director

JOHN STUFFLEBEAN, P.E.
Director

JAMES A. LANDGRAF
Deputy Director



COUNTY OF MAUI
DEPARTMENT OF WATER SUPPLY
<http://www.mauicounty.gov/water>

Water Operations Group

Field Operations Division

Helaman Aiwohi T/A Field Operations Division Chief (88)

Base yards in Central, Lahaina, Makawao, Hana, Molokai Distribution, Maintenance, Construction, Support Services,
Dispatch & Warehouse

Plant Operations Division

Dean Tanimoto Water Plant Division Chief (35)

Water Quality Laboratory, Electrical, Electronics / SCADA, Mechanical / Pump,
Back Flow / Cross connection section. (35)

Water Treatment Division

Vacant- Water Treatment Division Chief (28)

Piiholo, Olinda, Kamole, Iao, Lahaina and Mahinahina Surface Water Treatment Plants

DWS System Layout

Molokai

Molokai: ground water

Upcountry

Central

Lahaina

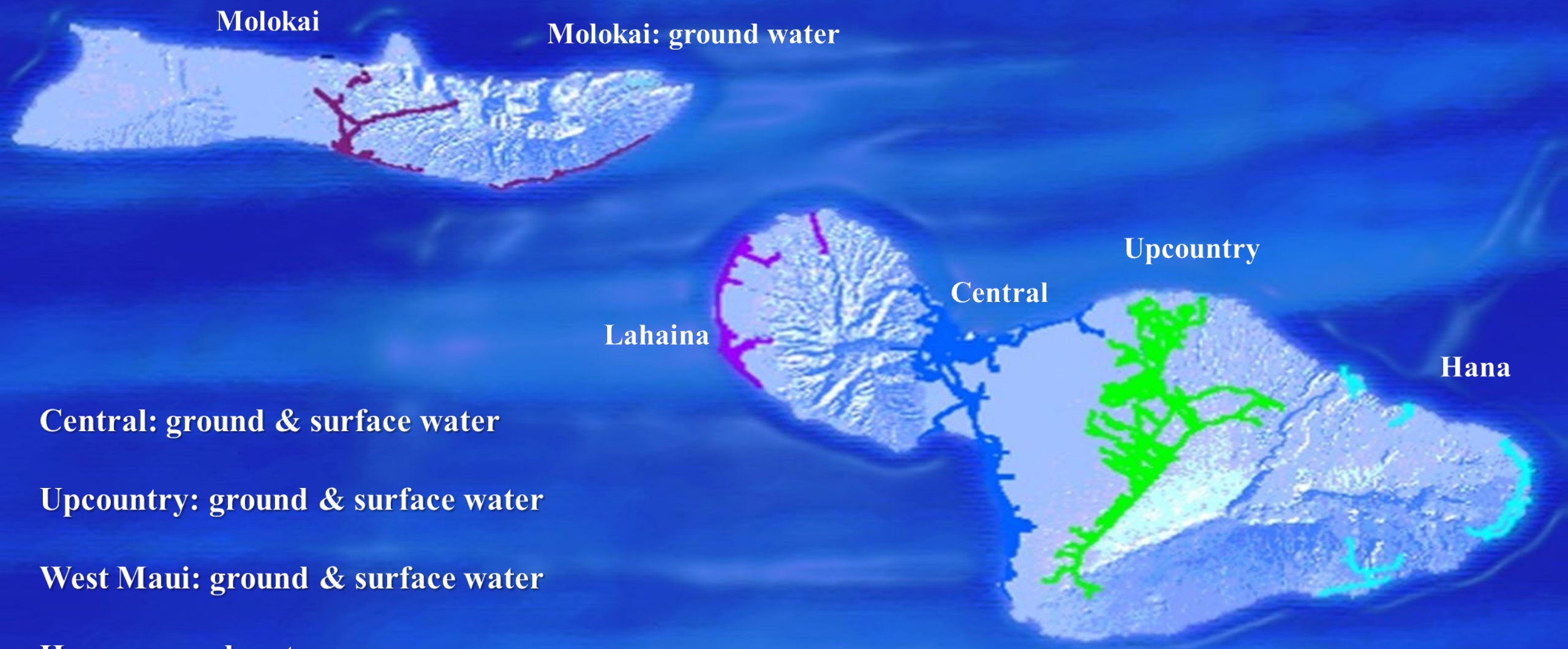
Hana

Central: ground & surface water

Upcountry: ground & surface water

West Maui: ground & surface water

Hana: ground water





49 Groundwater Sources



6 Surface Water Treatment Facilities



145 Storage Tanks



295 Million Gallons Total Storage Capacity



32 million gallons provided daily

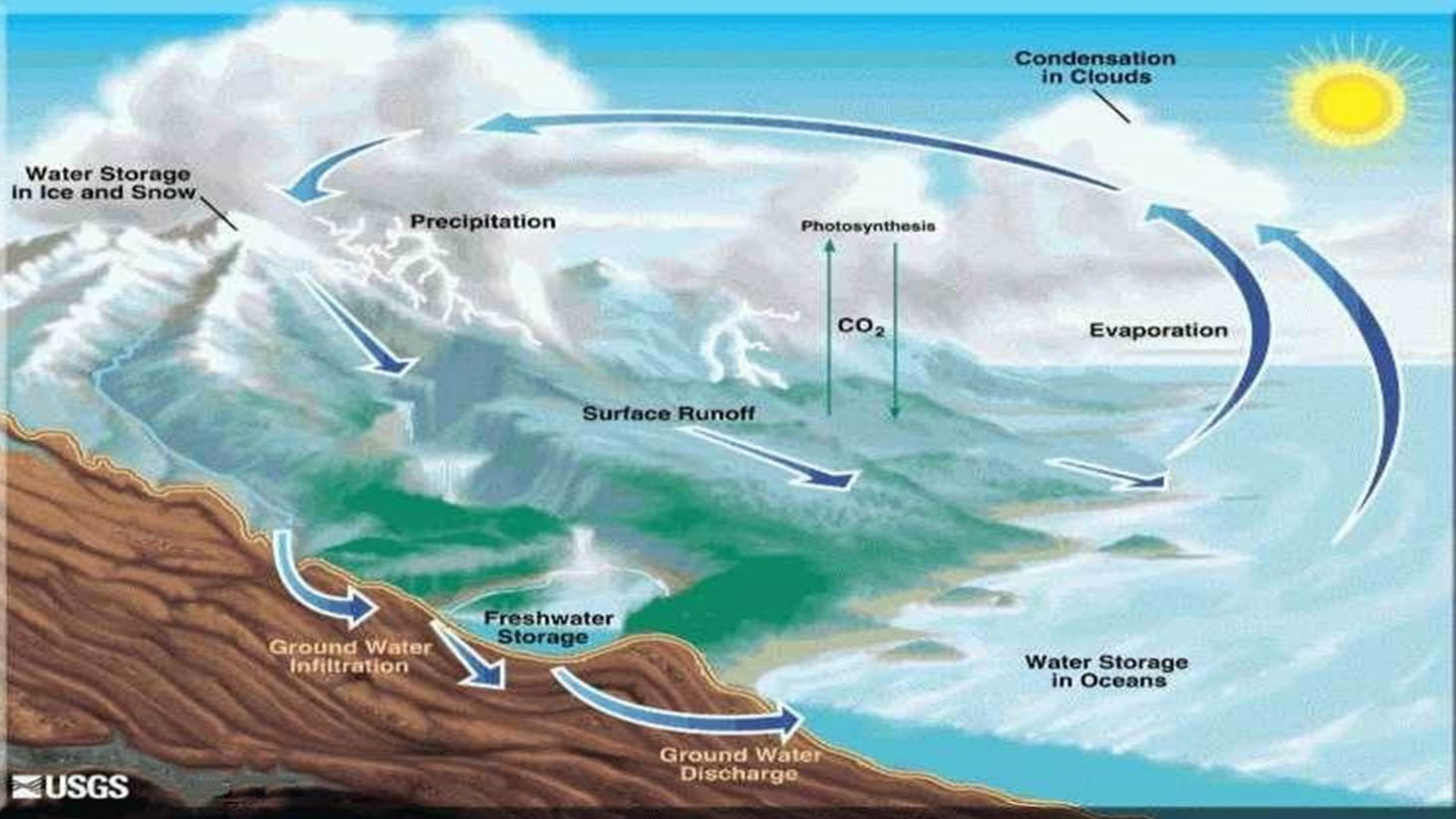


750 Miles of Pipeline



24/7 Service





Water Storage in Ice and Snow

Condensation in Clouds

Precipitation

Photosynthesis

Evaporation

Surface Runoff

CO₂

Ground Water Infiltration

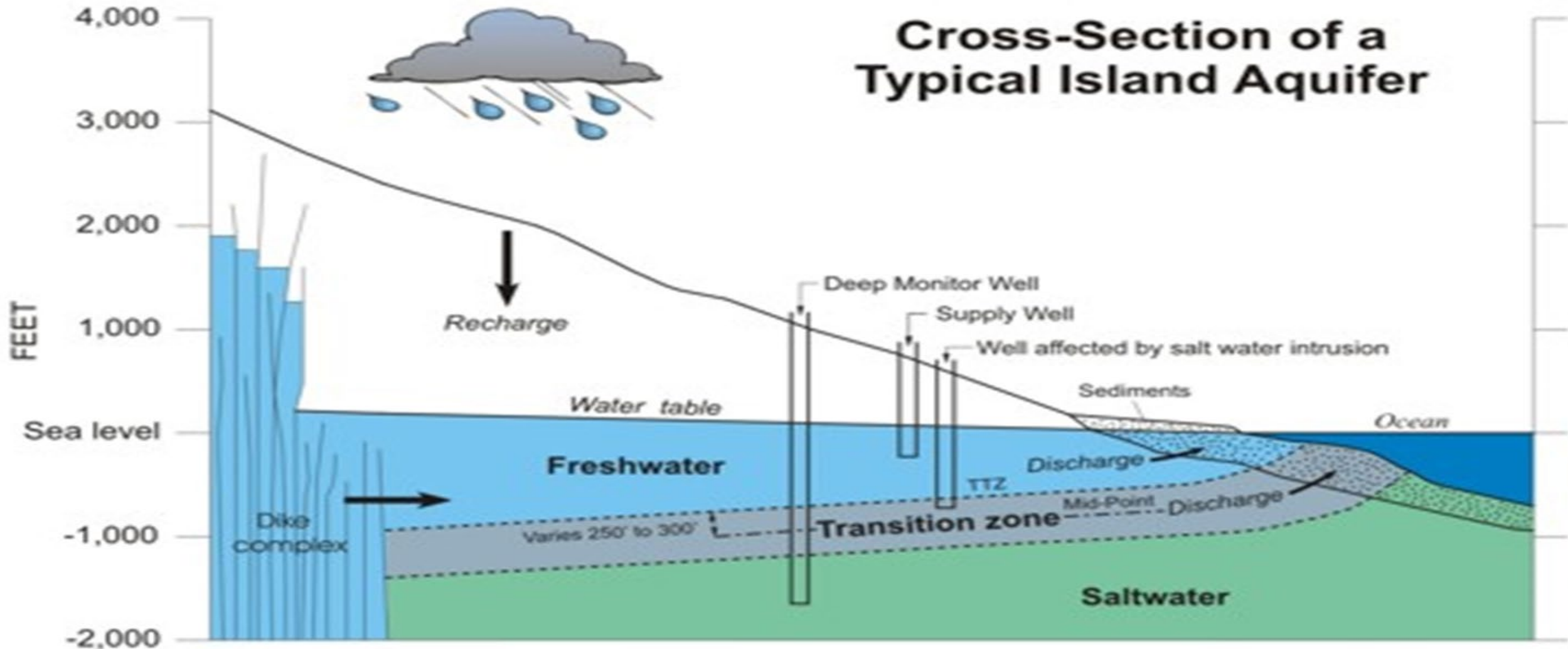
Freshwater Storage

Water Storage in Oceans

Ground Water Discharge

Island sitting on Water

Cross-Section of a Typical Island Aquifer





1" = 6 MILES

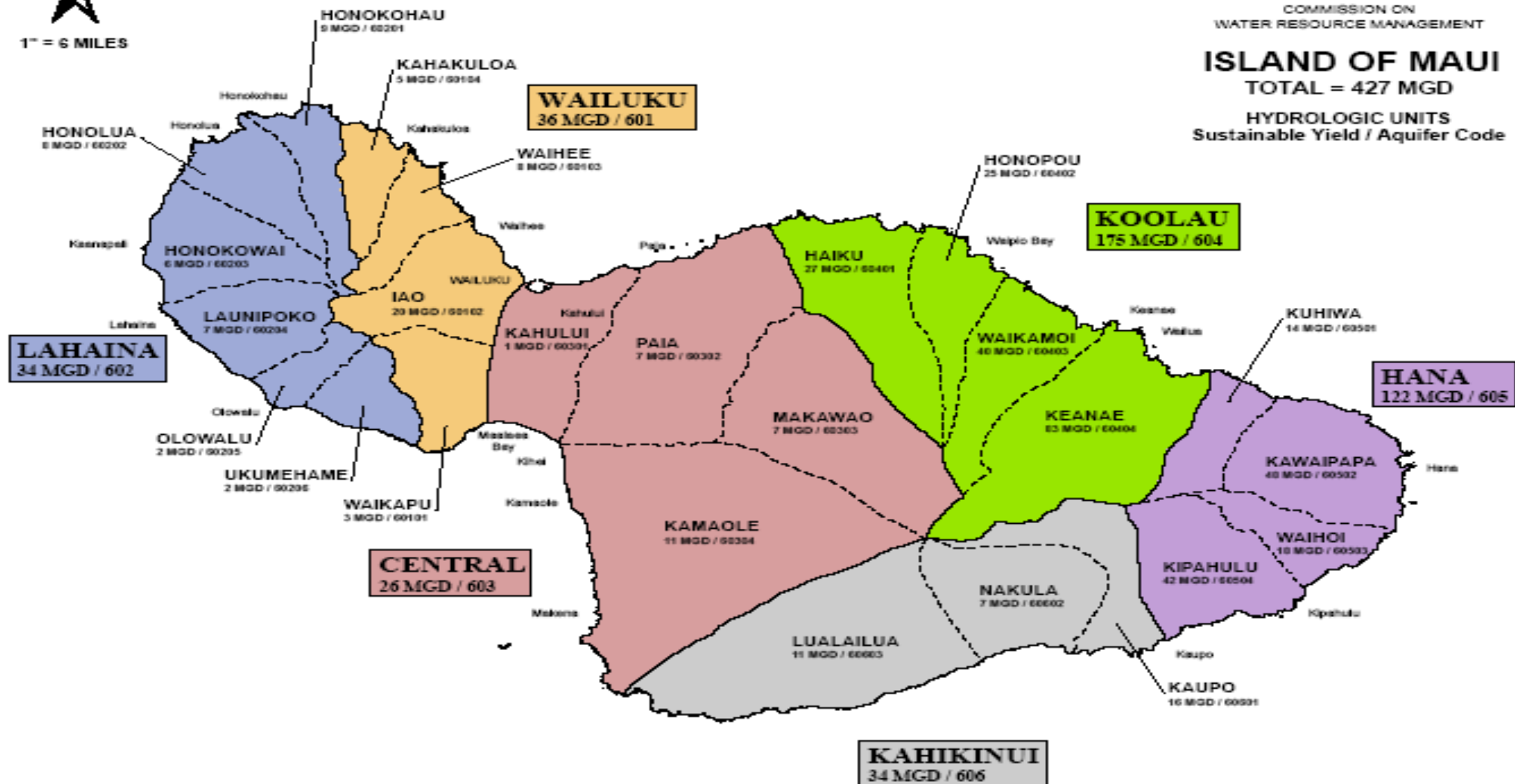


COMMISSION ON
WATER RESOURCE MANAGEMENT

ISLAND OF MAUI

TOTAL = 427 MGD

HYDROLOGIC UNITS
Sustainable Yield / Aquifer Code



Upcountry Water System

- **Upper Kula System – Olinda WTP thru upper Kula, Waiohuli, Kamaole, Ulupalakua to Kaniao**
- **Lower Kula / Makawao Water System – Piiholo WTP thru Makawao, Pukalani, Lower Kula, to Keokea. Also Includes Kamole WTP, Pookela well, Haiku well and Kaupakalua well.**

Filtration

Continuous Micro Filtration



Granular Activated Carbon

Mixed Media



Anthracite Coal

Silica Sand

Gravel

Water Production 2022

Maui Department of Water Supply 2022 Water Treatment Facilities Production Report (units in thousands of gallons)

Olinda WTF	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2022 YTD	ADP
22 Production	12220	3510	22940	39840	43640	44390	50880	50950	11040	2790	2700	8357	293257	365
Avg Daily Prod	394	121	740	1328	1408	1480	1641	1644	368	90	90	270		803
2021	38740	34490	35640	40580	45360	50950	46280	15040	0	0	11560	37770	356410	
Avg Daily Prod	1250	1189	1150	1353	1463	1698	1493	485	0	0	385	1218		
Piiholo WTF														
22 Production	79819	69851	66575	95382	85710	81231	106646	77233	85612	99822	106751	95218	1049850	
Avg Daily Prod	2575	2495	2148	3179	2765	2708	3440	2491	2854	3220	3558	3072		2876
2021	88493	87361	99466	75693	77818	76787	69721	105712	104629	124701	78068	93574		
Avg Daily Prod	2855	3120	3209	2523	2510	2560	2249	3410	3488	4023	2602	3019		
Kamole WTF														
22 Production	80490	112660	117500	55950	79240	99540	59300	104410	86560	69160	44790	38930	948530	
Avg Daily Prod	2596	4024	3790	1865	2556	3318	1913	3368	2885	2231	1493	1256		2599
2021	43290	24628	18870	60100	74600	114560	80620	68410	94620	73100	117910	21510		
Avg Daily Prod	1396	880	609	2003	2406	3819	2601	2207	3154	2358	3930	694		

WELL NAME	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Current Year	Last 12 Months
<i>UpCountry</i>														
Haiku	0	0	0	0	0	0	0	0	0	132	6,030	6,877	13,039	13,039
H' Poko #1	0	5,543	10,998	115	0	0	0	5,914	10,333	0	0	0	32,904	32,904
H' Poko #2	0	6,362	7,597	0	0	0	0	3,286	7,599	0	0	0	24,845	24,845
Kaupakalua	17,102	16,600	19,365	15,566	17,133	17,831	18,175	19,272	17,397	17,753	14,944	15,012	206,150	206,150
Pookela	20,601	34,058	38,202	3,105	7,897	6,823	6,022	20,442	37,085	39,132	37,734	24,103	275,203	275,203
DAILY AVERAGE	1,216	2,234	2,457	626	807	822	781	1,578	2,414	1,839	1,957	1,484	1,513	1,513

OLINDA WTP



- Built in 1988, upgraded in 1998

Kahakapao 1 & 2, Olinda WTP (far right)

50 MG + 50 MG = 100 MG



Chloramines vs Chlorine

- **More Stable - Longer Lived Residuals**
- **Less Reactive (reduced DBP formation)**
- **Minimizes Objective Taste and Odor (As long as Dichloramine and Trichloramine are not produced)**

- **WHAT IS CHLORAMINATION?**

- Chloramination is the process of adding chloramine to drinking water to disinfect it and kill germs. It is sometimes used as an alternative to chlorination. Chloramines are a group of chemical compounds that contain chlorine and ammonia. The particular type of chloramine used in drinking water disinfection is called monochloramine which is mixed into water at levels that kill germs but are still safe to drink.

- **ARE THERE ANY HEALTH ISSUES ASSOCIATED WITH CHLORAMINE IN WATER?**

- Studies indicate that using or drinking water with small amounts of chloramine does not cause harmful health effects and provides protection against waterborne disease outbreaks. These studies reported no observed health effects from drinking water with chloramine levels of less than 50 milligrams per liter (mg/L) in drinking water. A normal level for drinking water disinfection can range from 1.0 to 4.0 mg/L.
- We monitor water quality regularly to provide you with safe drinking water. Some people are more sensitive than others to chemicals and changes in their environment.

- **WHAT ARE SAFE LEVELS OF CHLORAMINE IN WATER?**

- Chloramine levels up to 4 milligrams per liter (mg/L) or 4 parts per million (ppm) are considered safe in drinking water. At these levels, harmful health effects are unlikely to occur.

- **DOES CHLORAMINE AFFECT PATIENTS DURING DIALYSIS?**

- During dialysis, large amounts of water are used to clean waste products out of a patient's blood. Dialysis centers must treat the water to remove all chemical disinfectants, including chlorine and chloramine, before the water can be used for dialysis. Home dialysis users should consult the machine manufacturer for instructions on how to properly treat their water before use.
- The U.S. Environmental Protection Agency (EPA) requires drinking water treatment plants to use chloramine and chlorine to disinfect drinking water. Research shows that chloramine and chlorine both have benefits and drawbacks.
- Chlorine is a highly effective method of disinfection. However, while in the pipes it produces small amounts of chemicals (called "disinfection by-products") if the source water has higher levels of dirt or germs that may react with chlorine.
- Chlorine is also used up quickly in water systems. Sometimes there is not enough chlorine left to kill germs in the water by the time it reaches the end of the pipes. Chloramine can last longer in the water pipes and produces fewer disinfection by-products. To meet EPA standards intended to reduce disinfection by-products, some water utilities are switching to chloramine.

- **WILL CHLORAMINE AFFECT MY WATER'S TASTE OR SMELL?**

- If you notice any change in the taste or smell of your water, it may be that the water treated with chloramine has less of a "chlorine" taste and smell than water treated with chlorine.

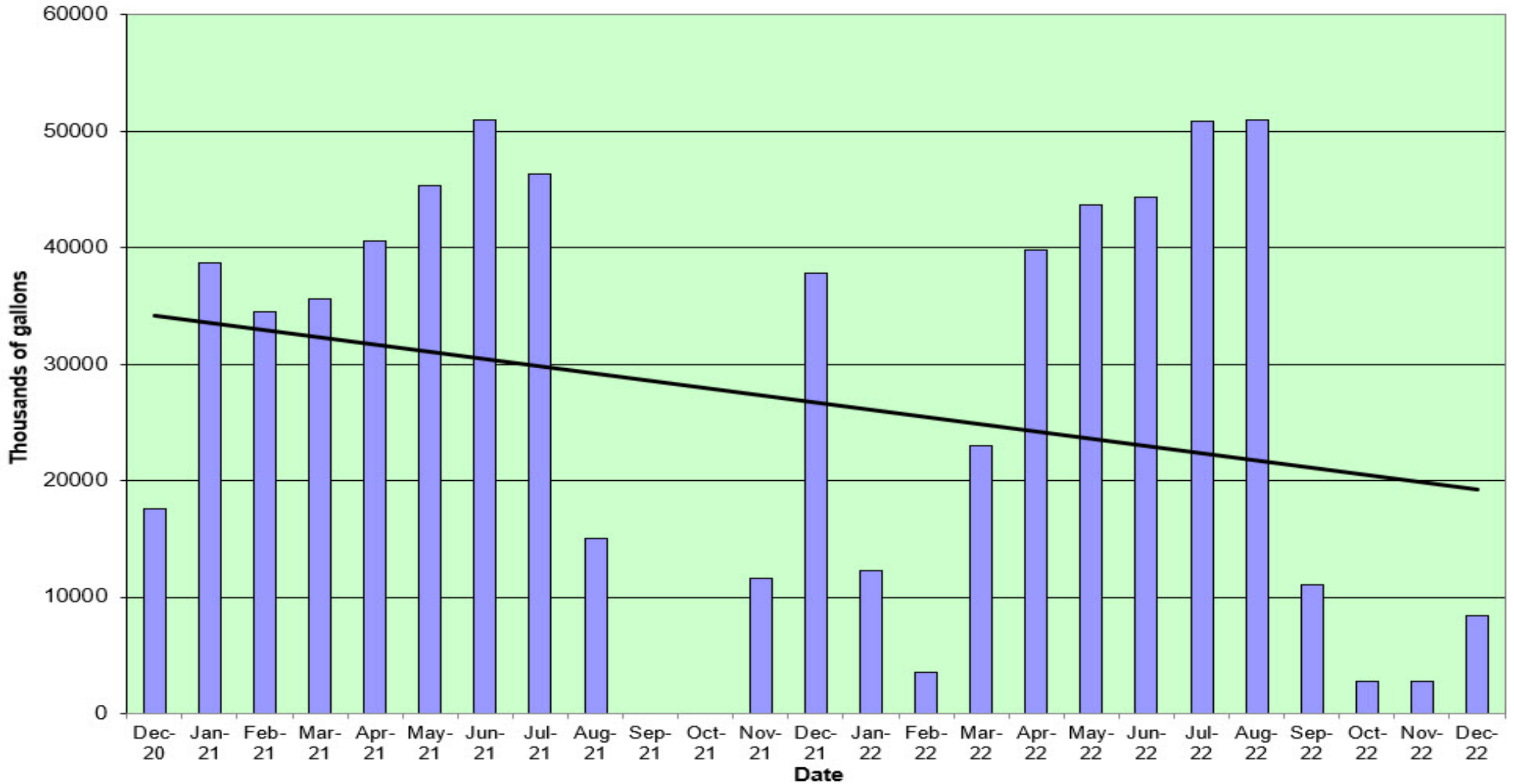
- **WILL CHLORAMINE AFFECT MY PETS?**

- Chlorine and chloramine are toxic to fish, other aquatic animals, reptiles and amphibians. Unlike humans and other household pets, these types of animals absorb water directly into the blood stream. Don't keep these animals in water that contains these disinfectants. Unlike chlorine, chloramine cannot be removed by letting water sit out for a few days. However, products are available at aquarium supply stores that can remove chloramine.

- **IS CHLORAMINE TREATMENT NEW?**

- Chloramine has been used as a drinking water disinfectant in the United States in places like Cleveland, Ohio, Springfield, Illinois, and Lansing, Michigan since 1929. In 1998, an EPA survey estimated 68 million Americans were drinking water disinfected with chloramine. Several major U.S. cities such as Philadelphia, San Francisco, Tampa Bay, and Washington, D.C. use chloramine to disinfect drinking water. Chloramine is recognized as a safe disinfectant and a good alternative to chlorine.

Olinda WTF 2yr Monthly Production



PIIHOLO WTP

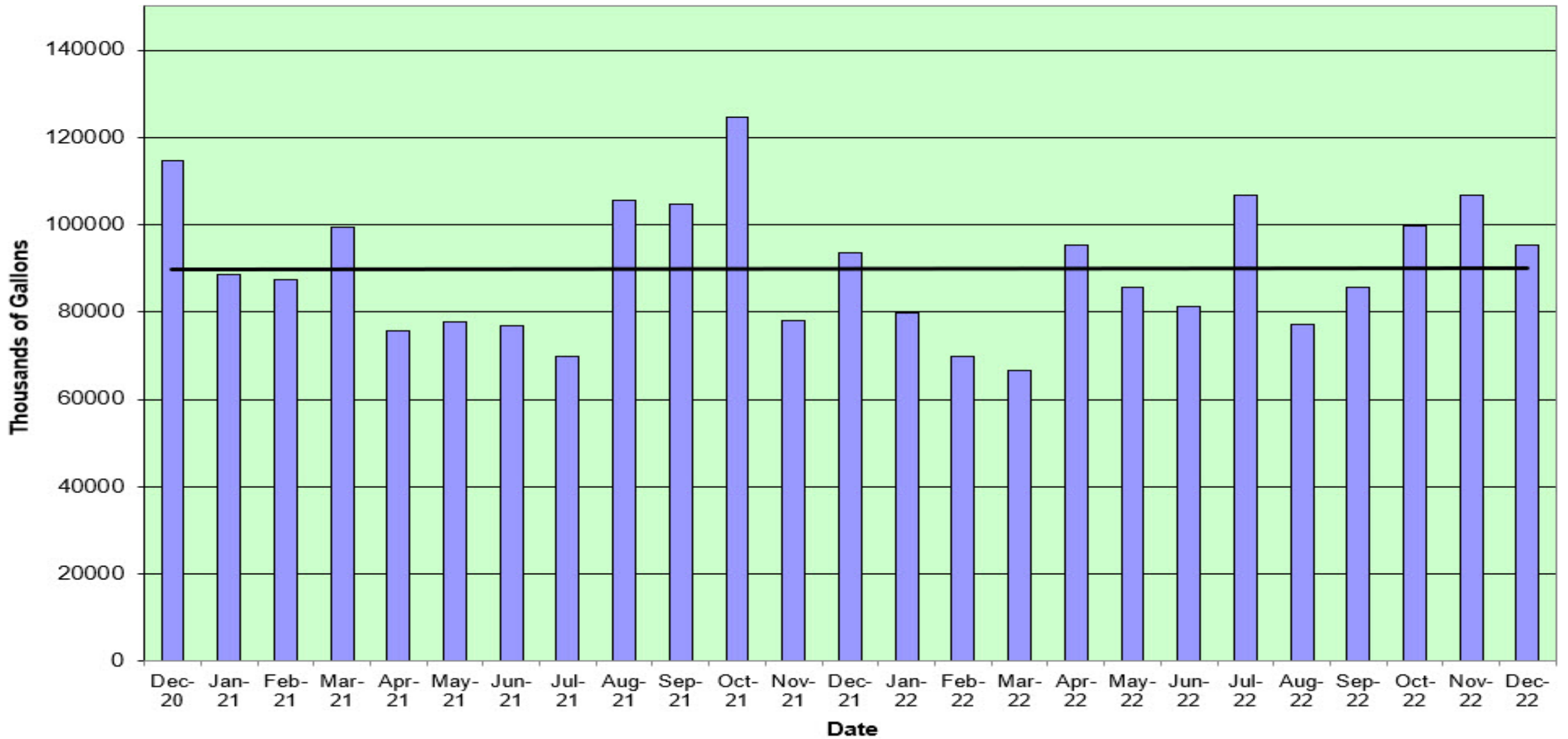


- Built in 1996
- 3 yrs. of construction at \$15.7 million

Piihola 50 MG Raw Water Reservoir



Pi'iholo WTF 2 yr Monthly Production



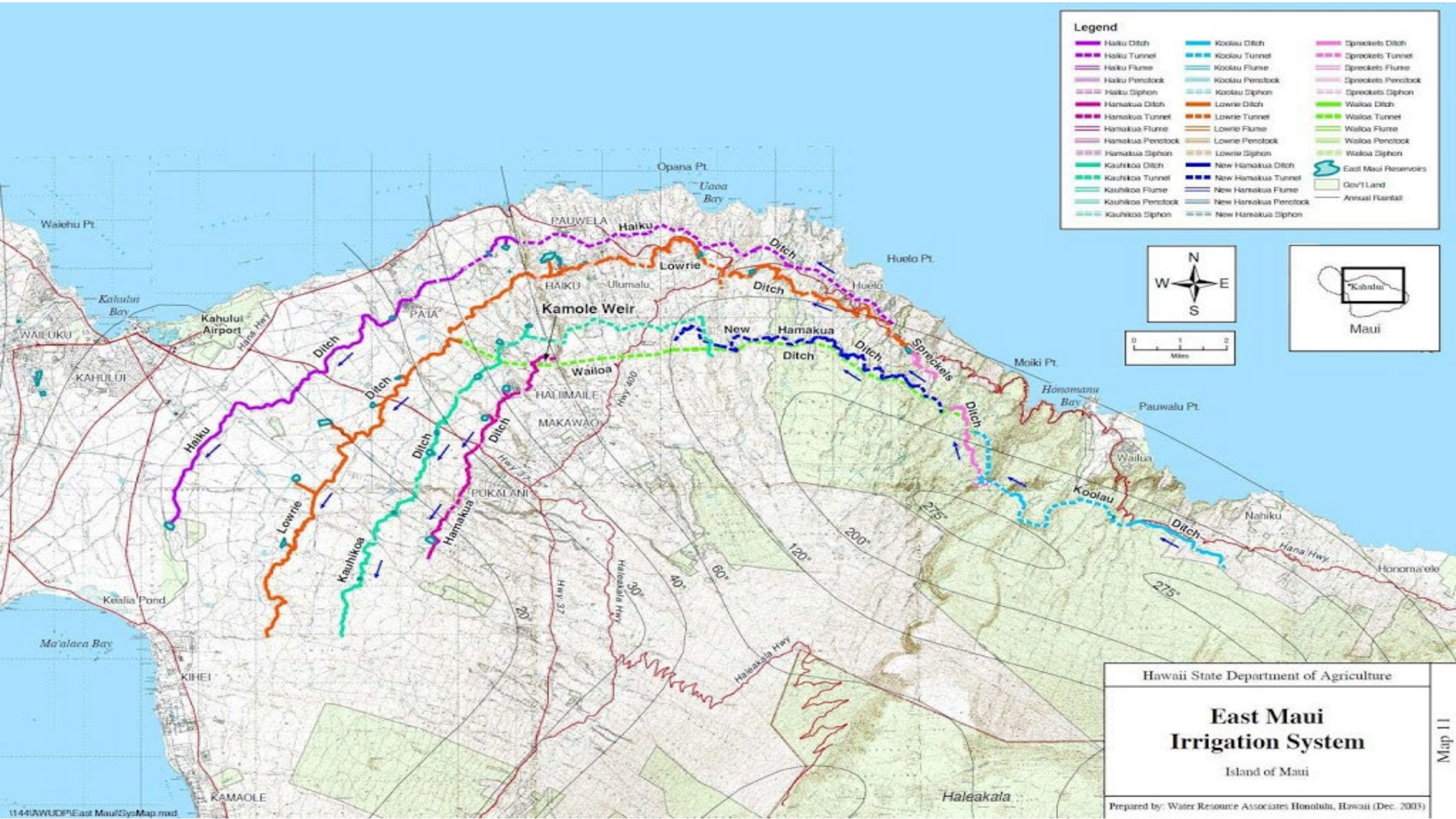
KAMOLE WTP



- Build in 1970, upgraded in 1998

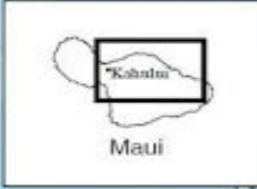
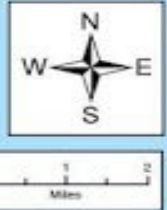
East Maui Irrigation Wailoa Ditch outfall @ next to Kamole WTP





Legend

Haiku Ditch	Koolau Ditch	Spreckels Ditch
Haiku Tunnel	Koolau Tunnel	Spreckels Tunnel
Haiku Flume	Koolau Flume	Spreckels Flume
Haiku Penstock	Koolau Penstock	Spreckels Penstock
Haiku Siphon	Koolau Siphon	Spreckels Siphon
Hamakua Ditch	Lowrie Ditch	Wailoa Ditch
Hamakua Tunnel	Lowrie Tunnel	Wailoa Tunnel
Hamakua Flume	Lowrie Flume	Wailoa Flume
Hamakua Penstock	Lowrie Penstock	Wailoa Penstock
Hamakua Siphon	Lowrie Siphon	Wailoa Siphon
Kauhiko Ditch	New Hamakua Ditch	East Maui Reservoirs
Kauhiko Tunnel	New Hamakua Tunnel	Gov't Land
Kauhiko Flume	New Hamakua Flume	Annual Rainfall
Kauhiko Penstock	New Hamakua Penstock	
Kauhiko Siphon	New Hamakua Siphon	



Hawaii State Department of Agriculture

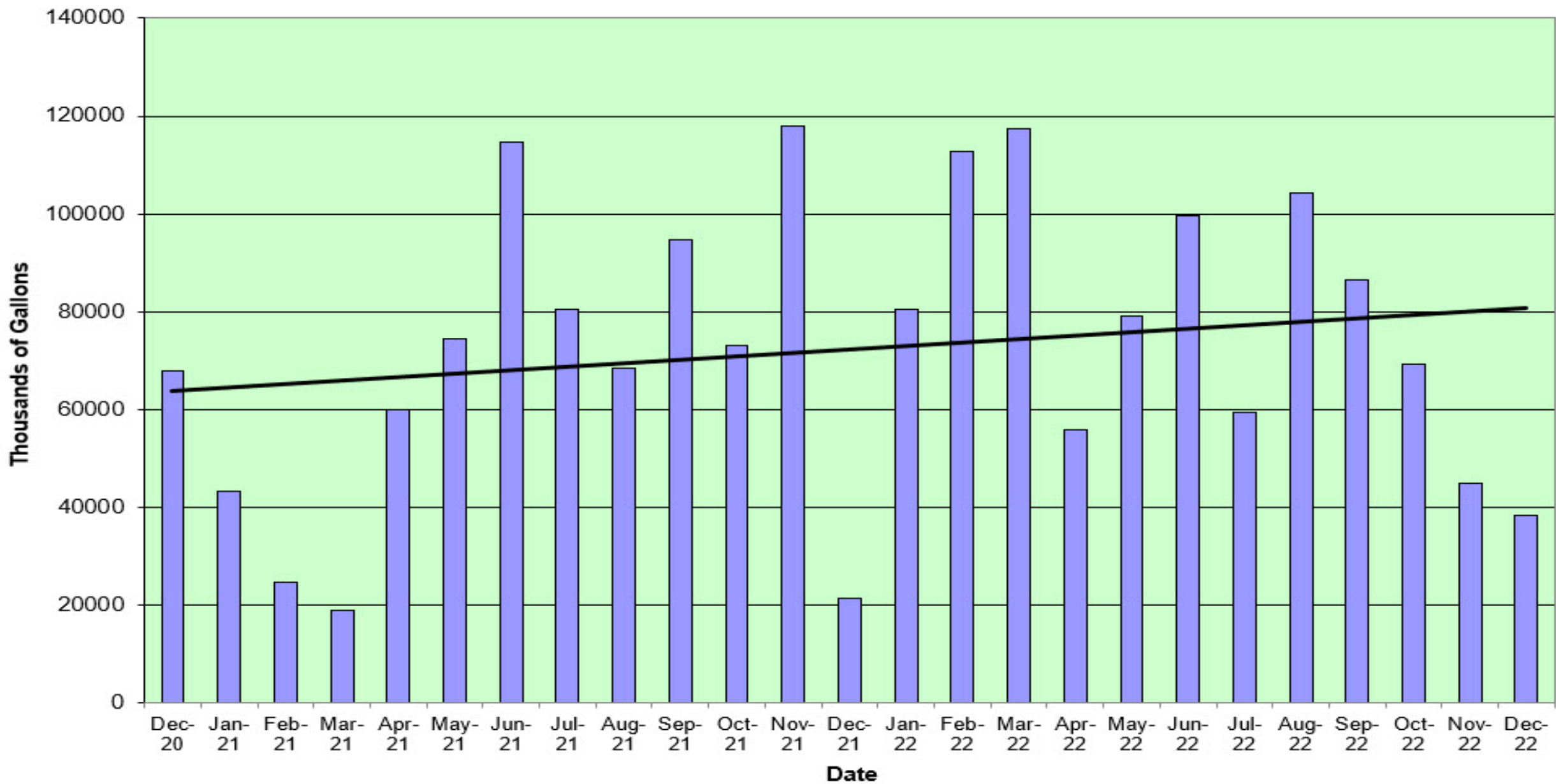
East Maui Irrigation System

Island of Maui

Map 11

Prepared by: Water Resource Associates Honolulu, Hawaii (Dec. 2003)

Kamole WTF 2 yr Production



Pookela Well (Makawao)

900 GPM / 1.3 MGD



Waikamoi 1 & 2

15 MG + 15 MG = 30 MG

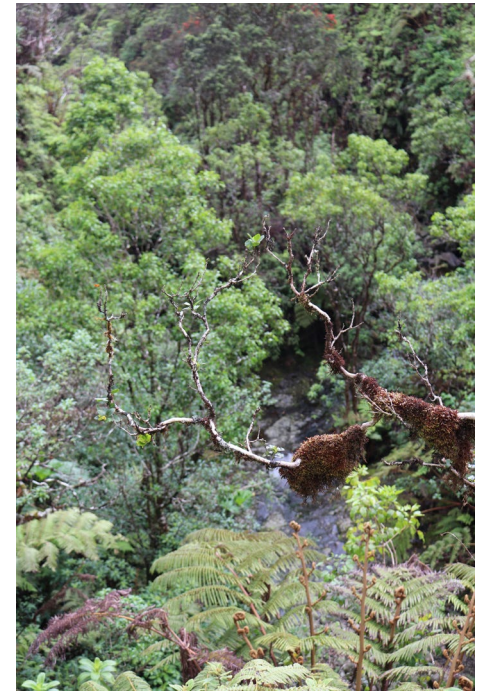


Honomanu, Haipuena & Waikamoi Streams



“New” Waikamoi Flume 2014





The Old Waikamoi Flume, Red Wood Box



County of Maui Dept. of Water Supply

Plant Operations SCADA

Application Version: 21360



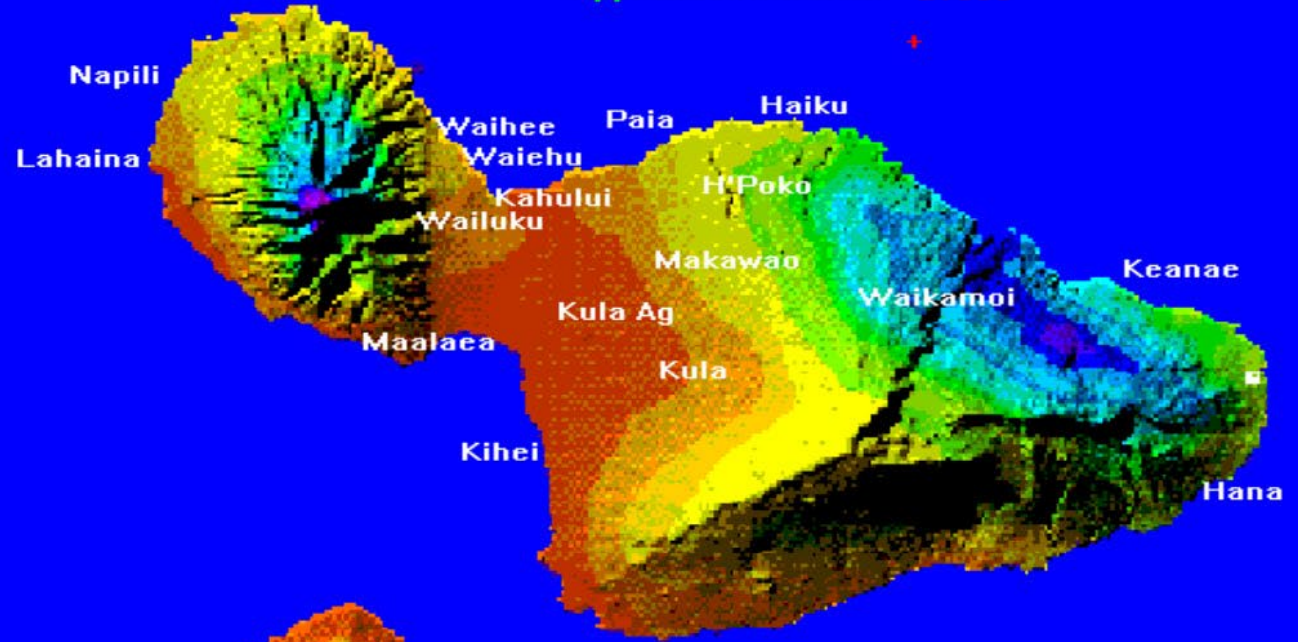
Molokai



Lanai



Kahoolawe



Napili

Lahaina

Waihee

Waiehu

Kahului

Wailuku

Maalaea

Kihei

Paia

Kula Ag

Kula

Haiku

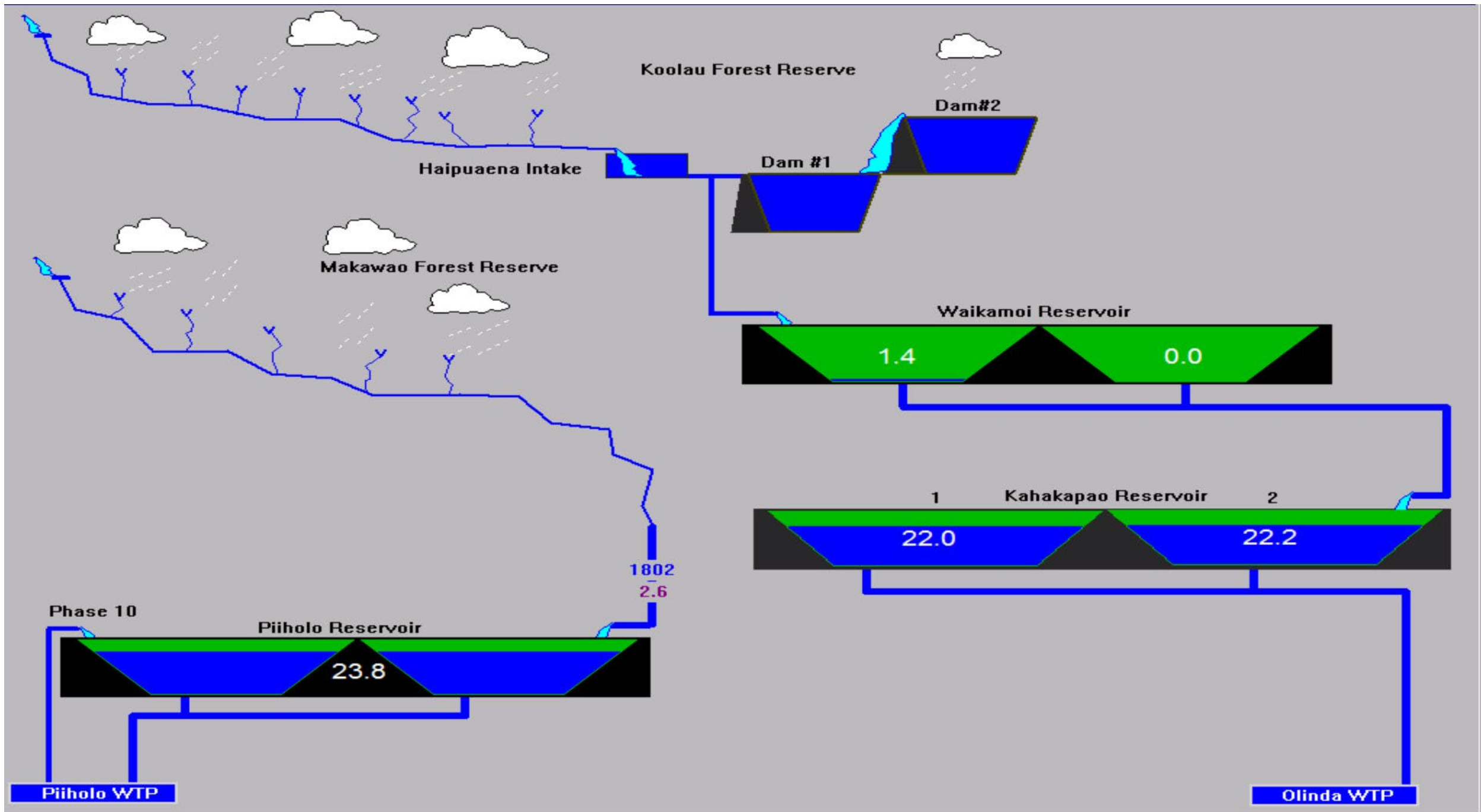
H'Poko

Makawao

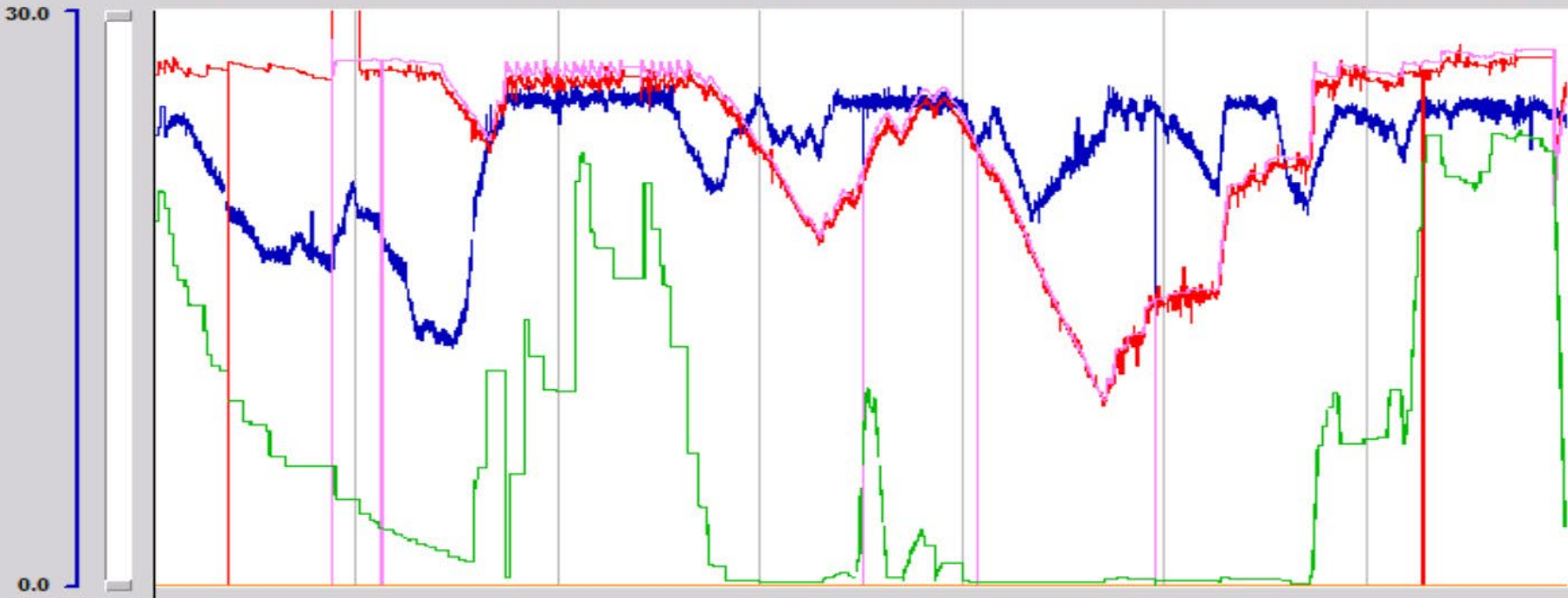
Waikamoi

Keanae

Hana



Jan 01 00:00:00 Feb 22 03:48:14 Apr 15 06:43:55 Jun 06 10:32:09 Jul 28 13:27:50 Sep 18 17:16:04 Nov 09 20:11:45 Jan 01 00:00:00



◀ 00:00:00
▶
Zoom In
365d
Zoom Out
◀ 00:00:00 ▶

4 hours
1 hour
◀◀
◀
Minutes
▶
▶▶
30 minutes
10 minutes
▶▶▶

Piiholo_Reservoir_Level Unavail 24.4	Kahakapau_Reservoir_Level_2 Unavail 26.3	None Unavail 0.0	None Unavail 0.0
Kahakapau_Reservoir_Level Unavail 25.2	None Unavail 0.0	None Unavail 0.0	Waikamoi_Reservoir_Level_East Unavail 4.5

Upper Kula Main Lines Storm Damage 2021

- **Alae Lateral**
- **Hapapa Lateral**
- **Waiakoa Lateral**

Alae Lateral (Temp Repair)



Hapapa Gluch Wash Out



Hapapa Gulch Repairs



Waiakoa Lateral Wash Out



Waiakoa Lateral (Temp Repairs)



2023 Storm Damage to Waikamoi Flume

- **Fallen Trees**
- **Land Slide**
- **Broken Aluminum Flume Box, Supports and Railings**











