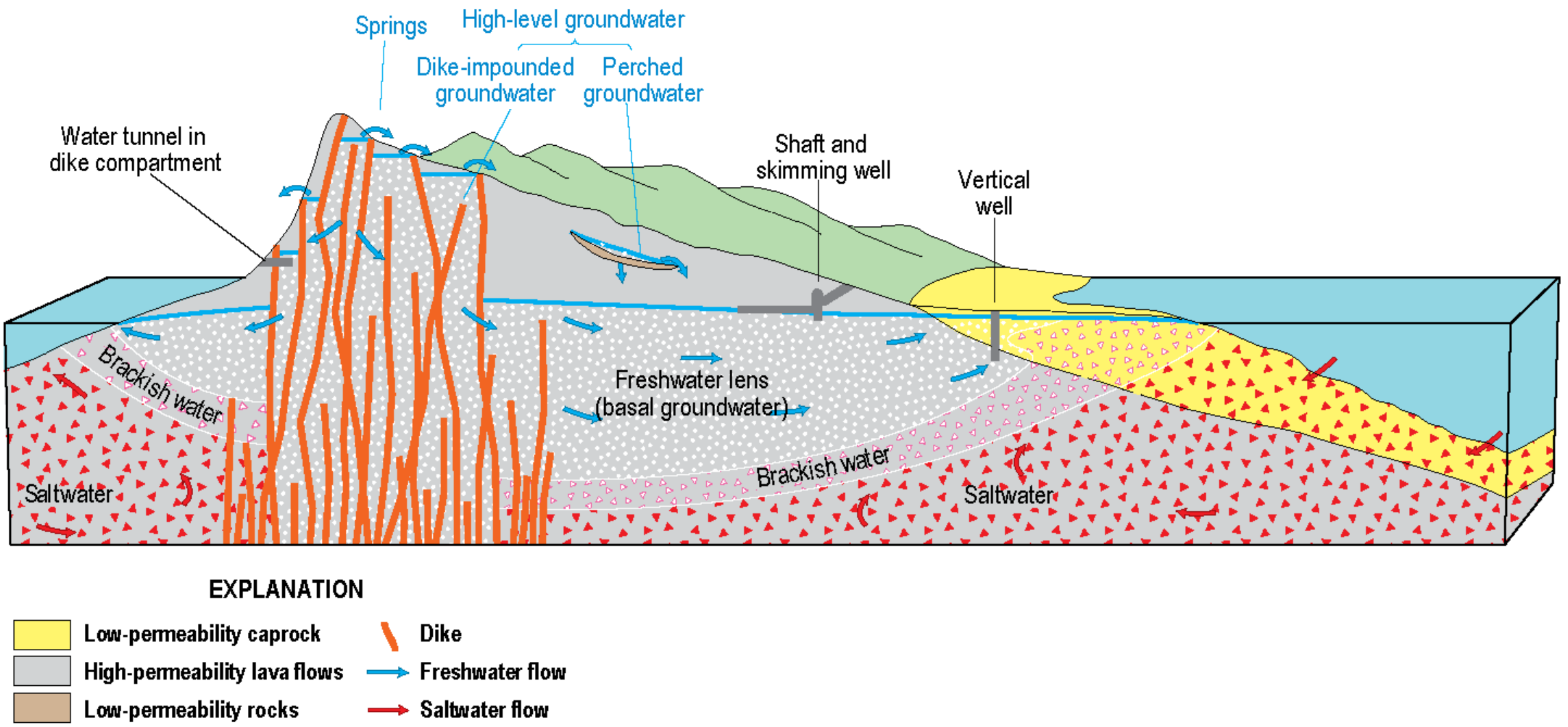
STATE OF HAWAI‘I
COMMISSION ON WATER RESOURCE MANAGEMENT

Lahaina Community Meeting

April 7th, 2025

LAHAINA SURFACE WATER

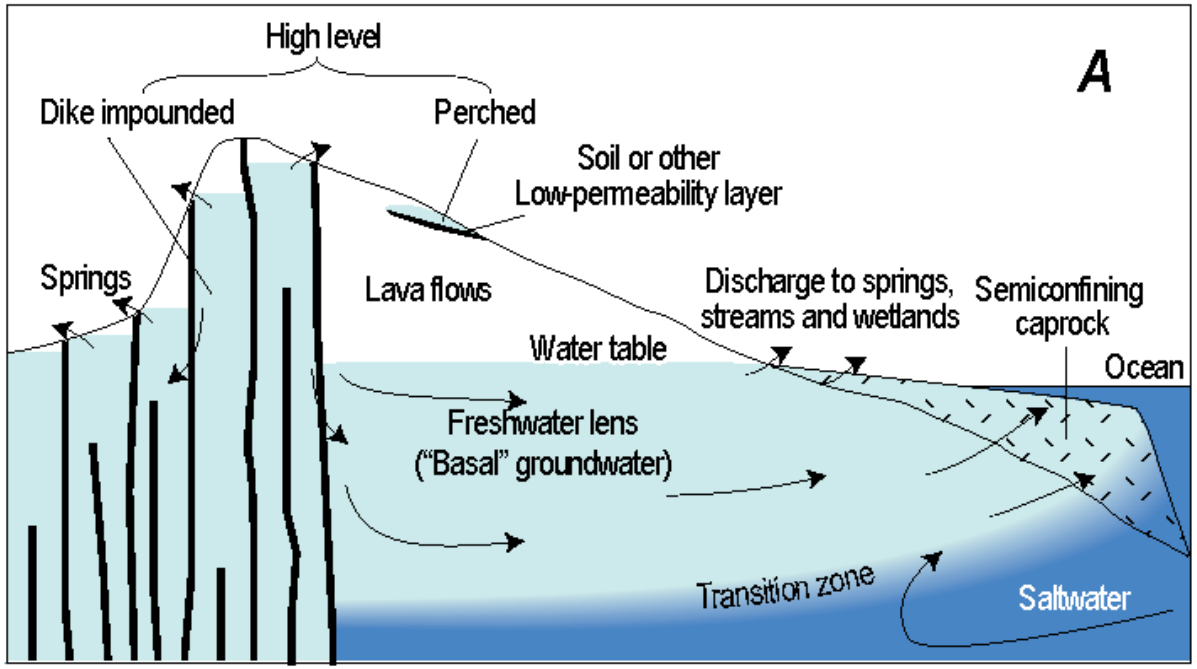
Hydrogeology Background



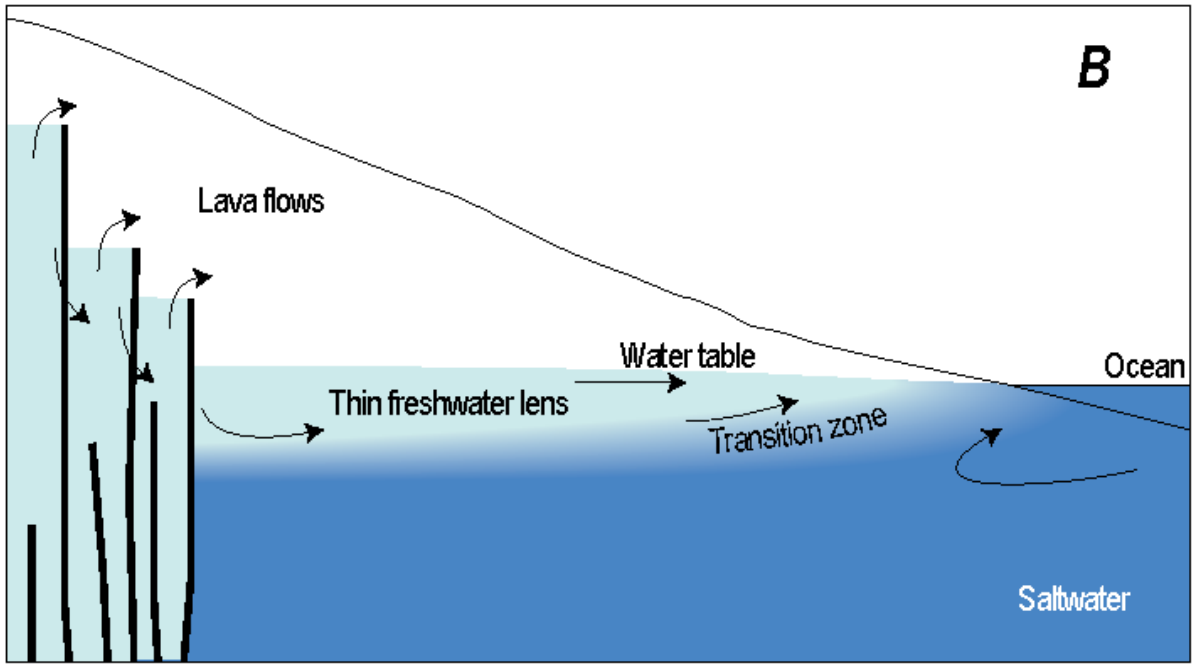
Izuka et al. 2018 USGS SIR 2015-5164

Hydrogeology Background

older shield volcano (e.g., O‘ahu)

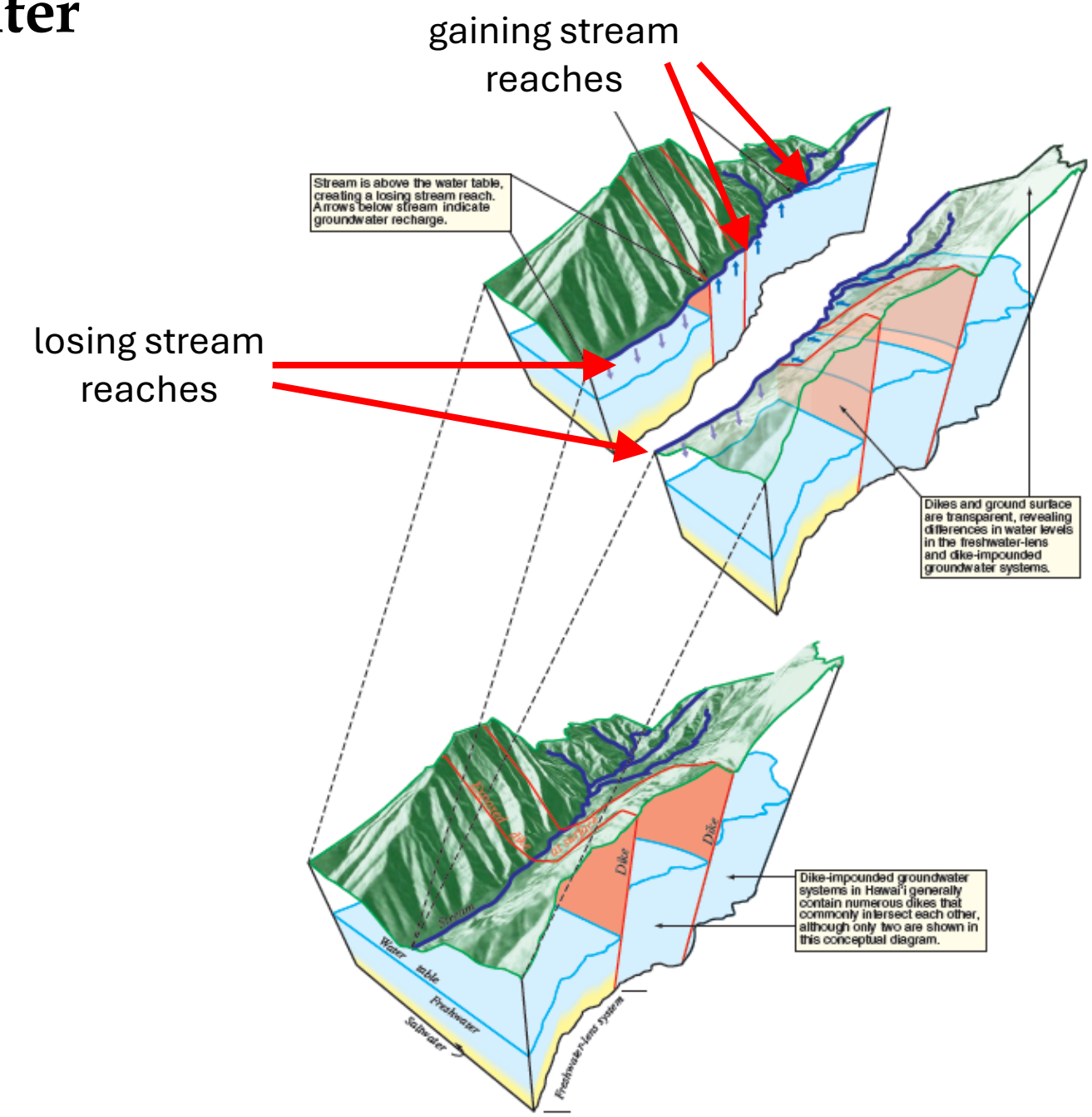


young shield volcano (e.g., Maui)



Izuka et al. 2018 USGS SIR 2015-5164

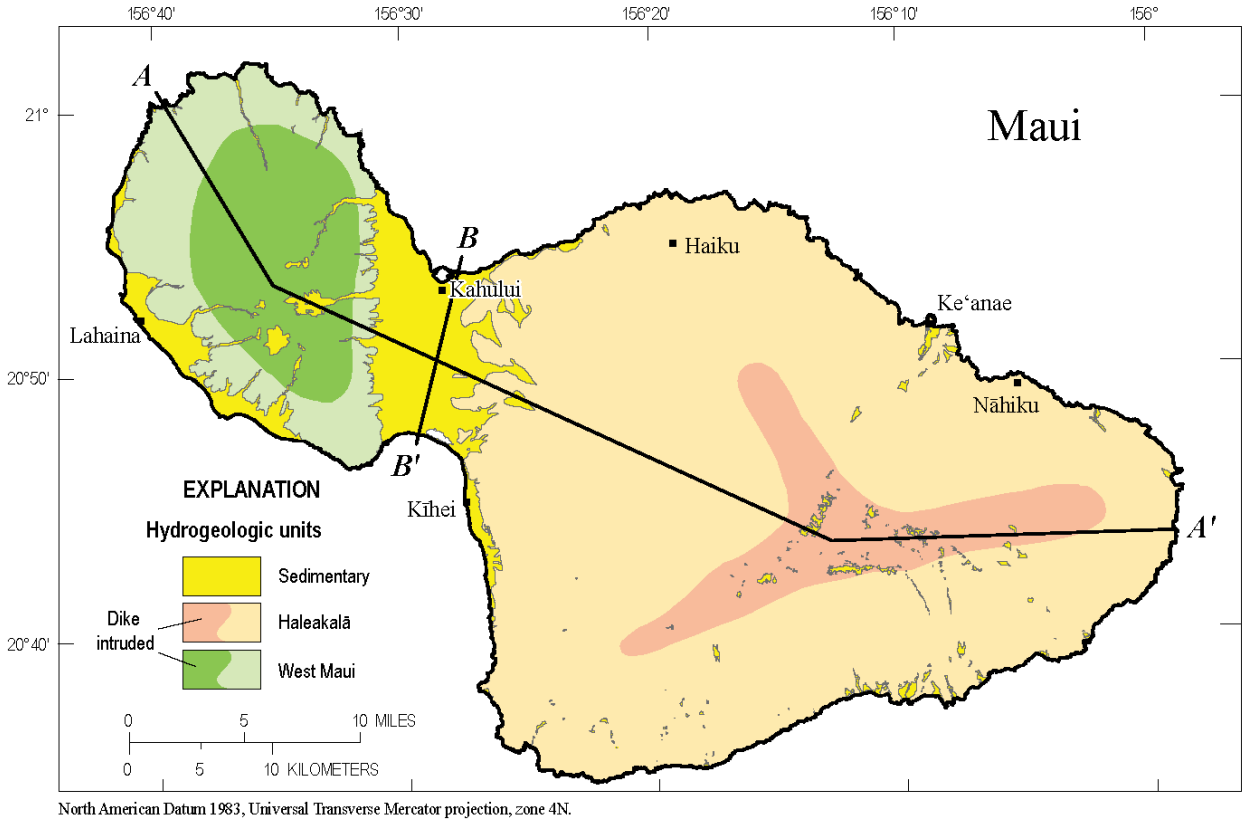
Groundwater-Surface Water Interactions

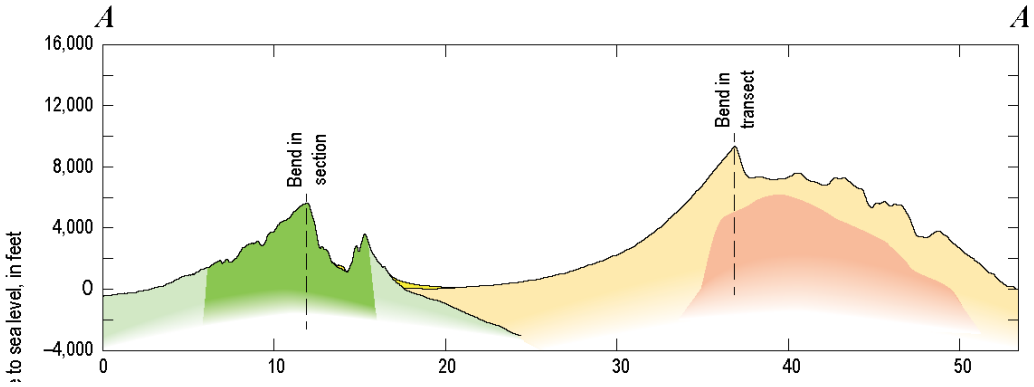


Chang 2014 USGS SIR 2014-5087

Hydrogeology Background

- Shield-building phase: Wailuku Volcanics
  - Dike formation along north and southeast rift zones
  - Dike formation around caldera
  - Older alluvium: highly permeable
- Post-shield phase: Honolua Volcanics
  - Overlaying Wailuku basalt
- Rejuvenation phase: Lahaina Volcanics
  - Limited extent; highly permeable





Izuka et al. 2018 USGS SIR 2015-5164

Hydrogeology Background

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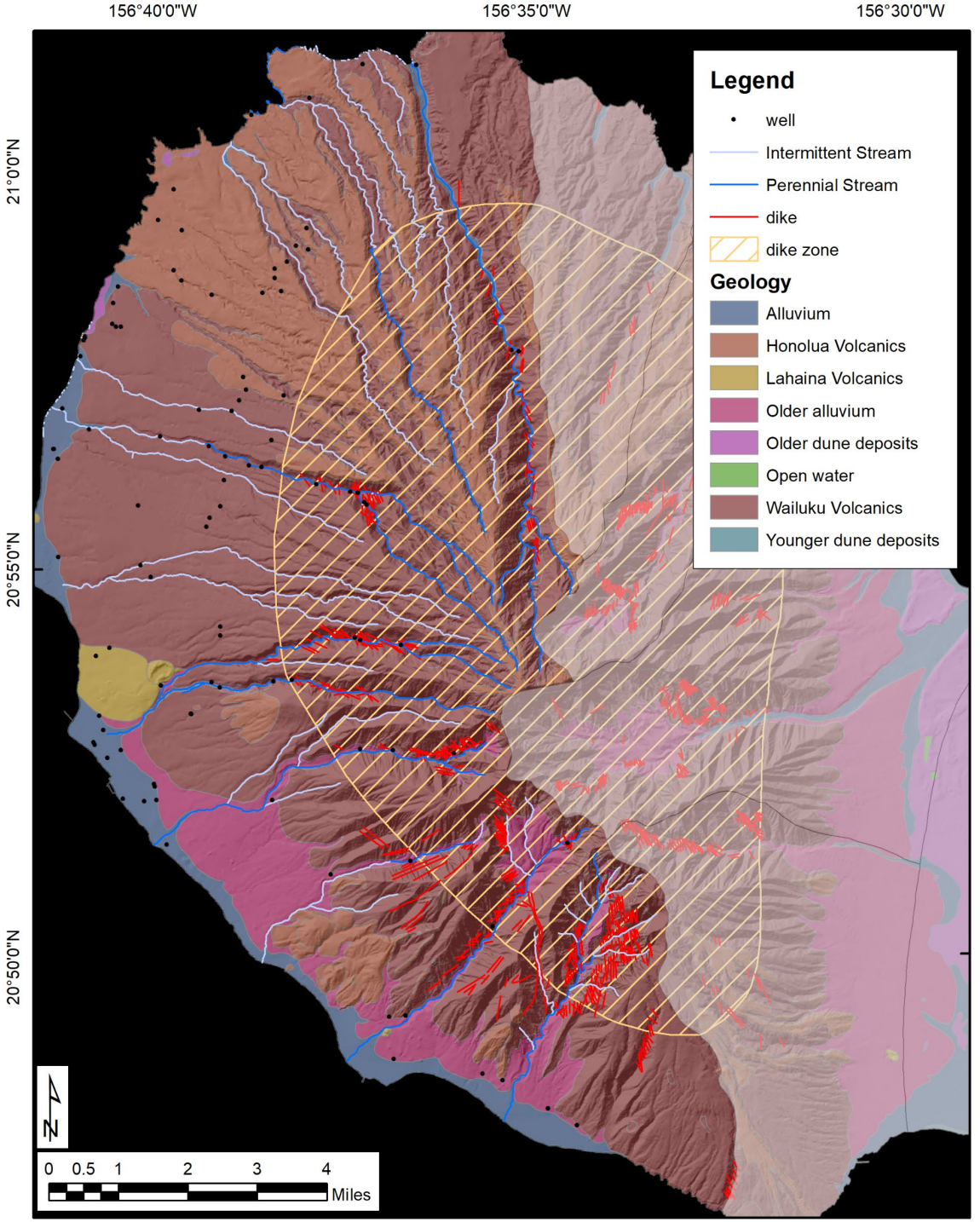


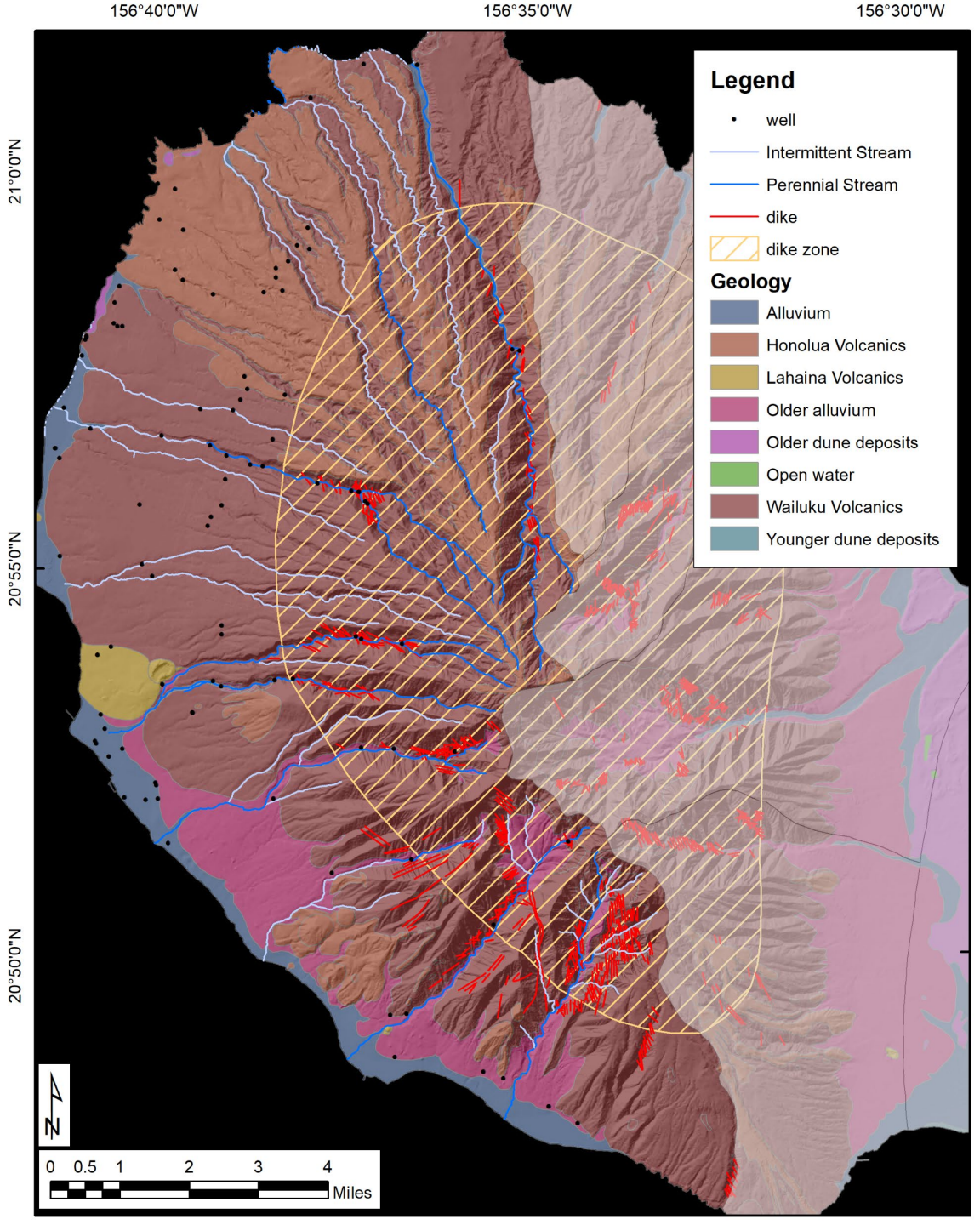
Groundwater Features

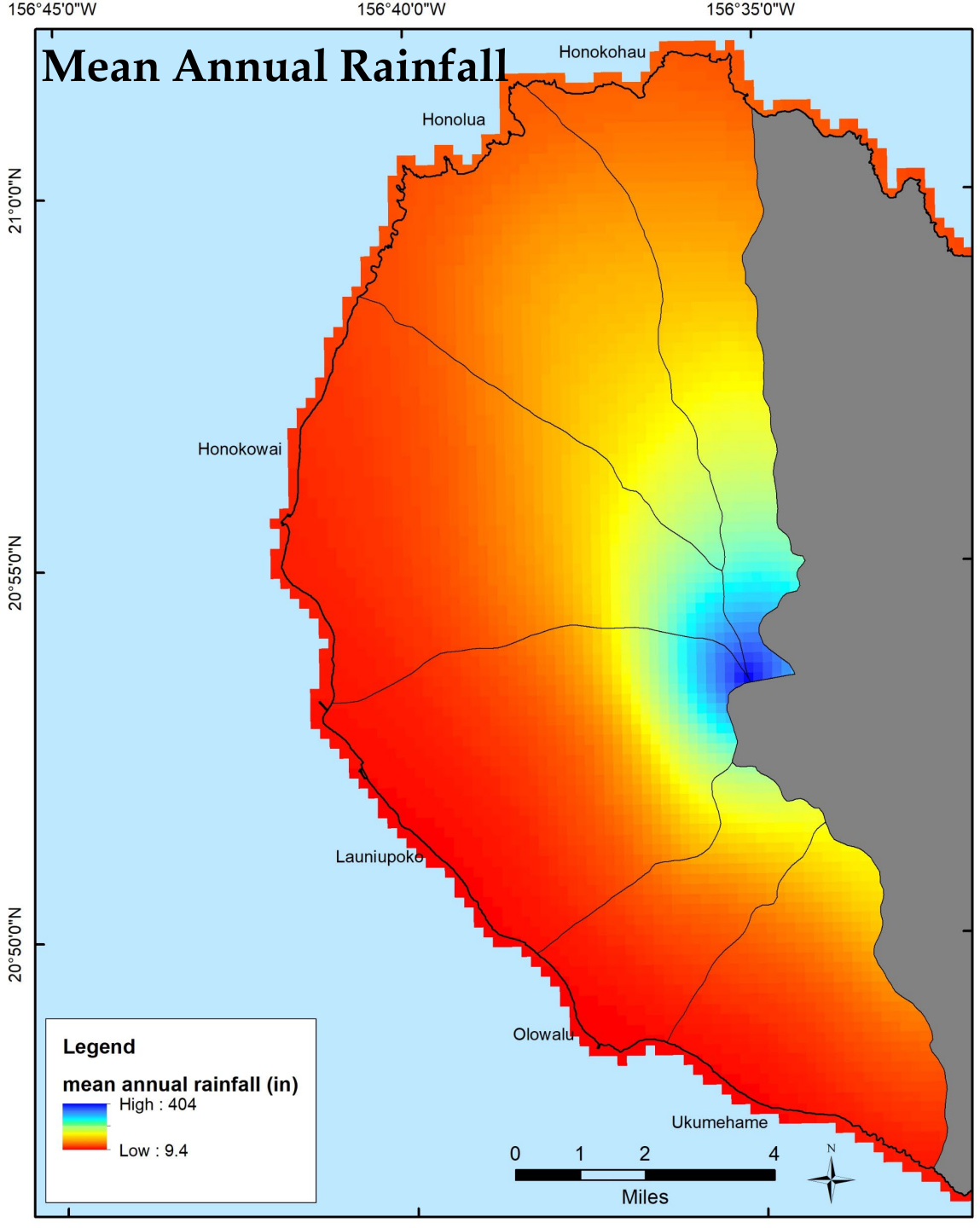
1. High elevation dike-confined aquifers contribute to gaining streamflow

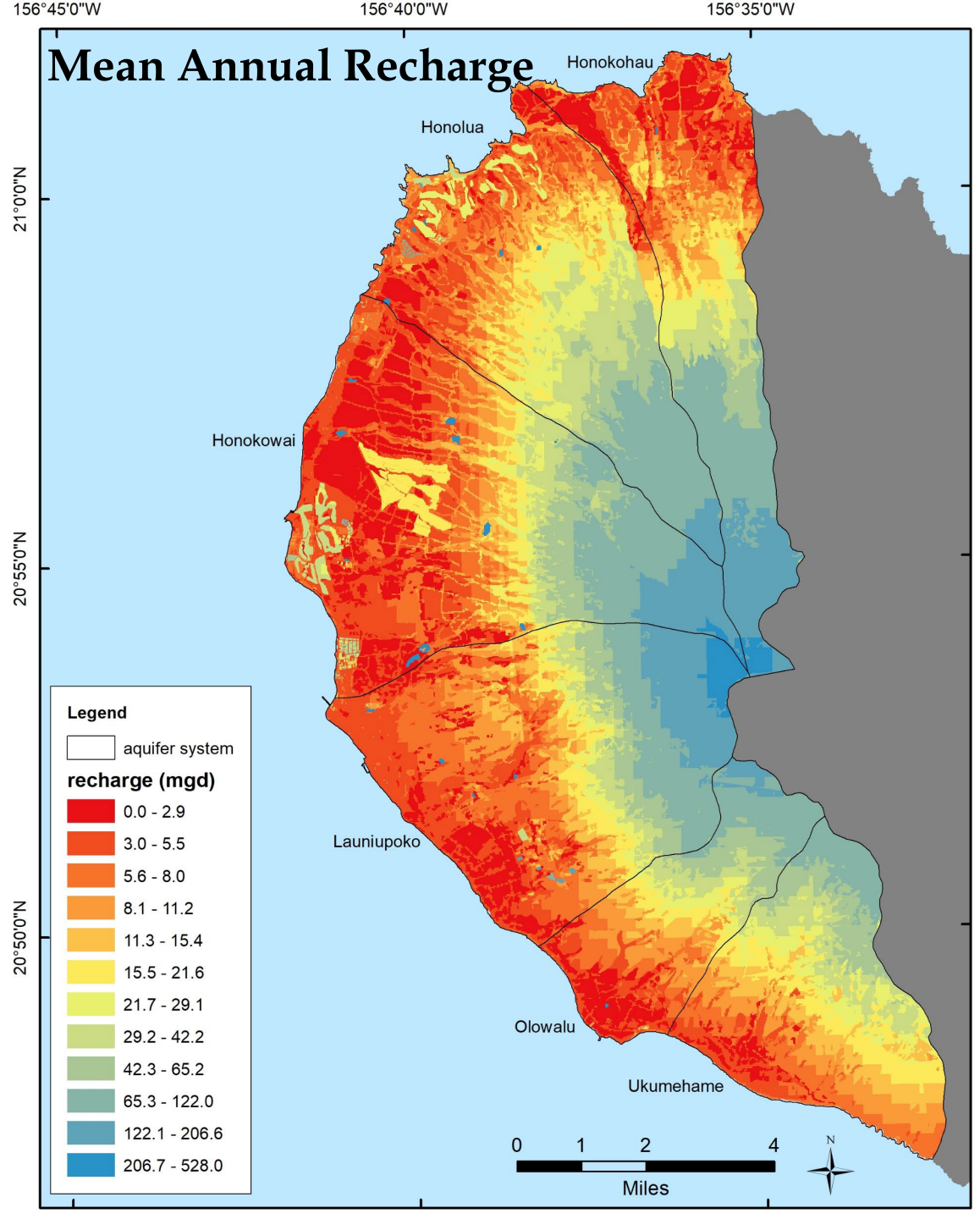
2. Thin basal aquifer subject saltwater upconing and high chlorides

3. Recharge historically enhanced by irrigation of pineapple and sugarcane no longer present

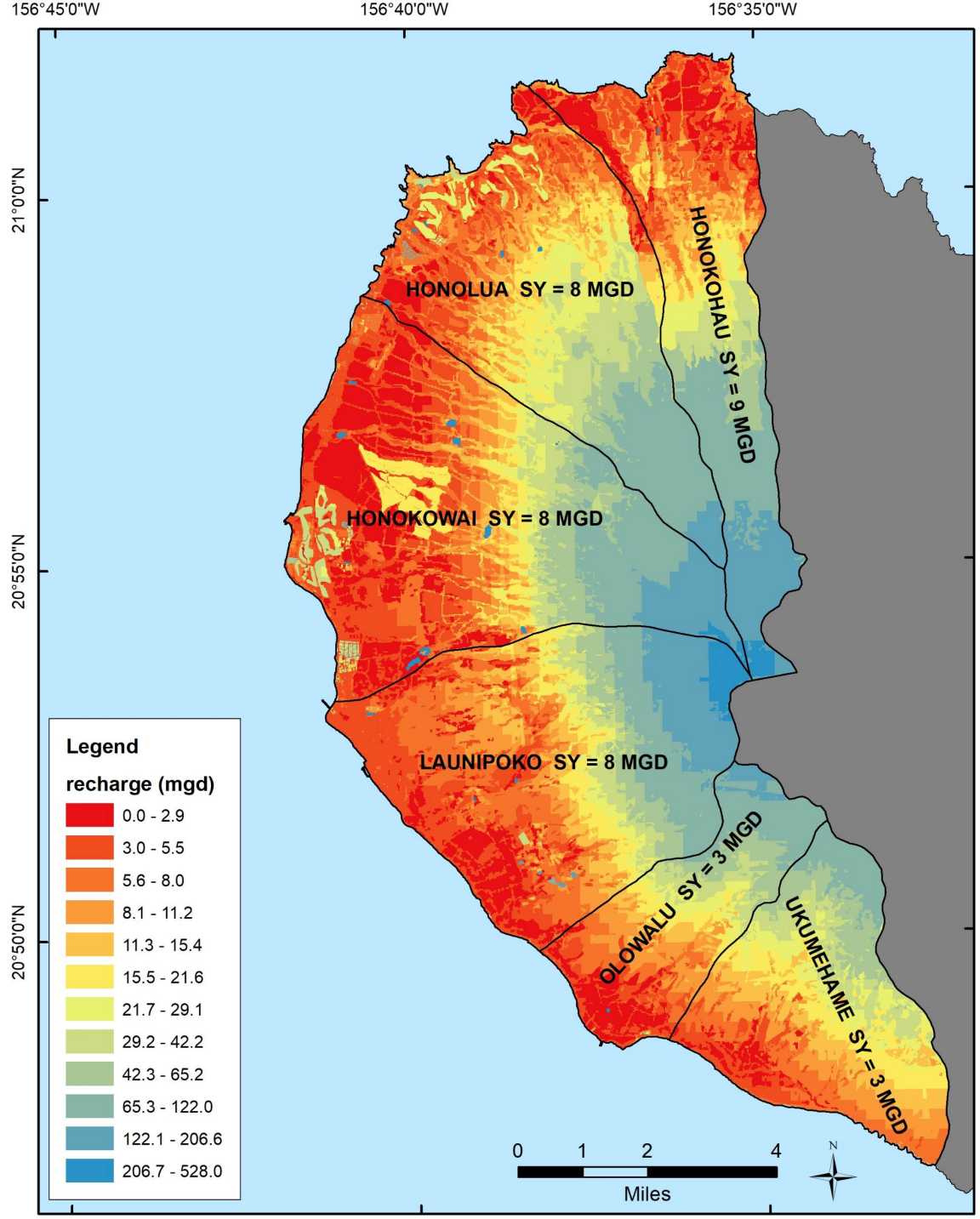
4. Groundwater sourced for potable and non-potable uses




Mean Annual Rainfall
156°45'0"W
156°40'0"W
156°35'0"W
21°0'0"N
20°55'0"N
20°50'0"N
Honokohau
Honolua
Honokowai
Launiupoko
Olowalu
Ukumehame
Legend
mean annual rainfall (in)
High : 404
Low : 9.4
0 1 2 4
Miles
N

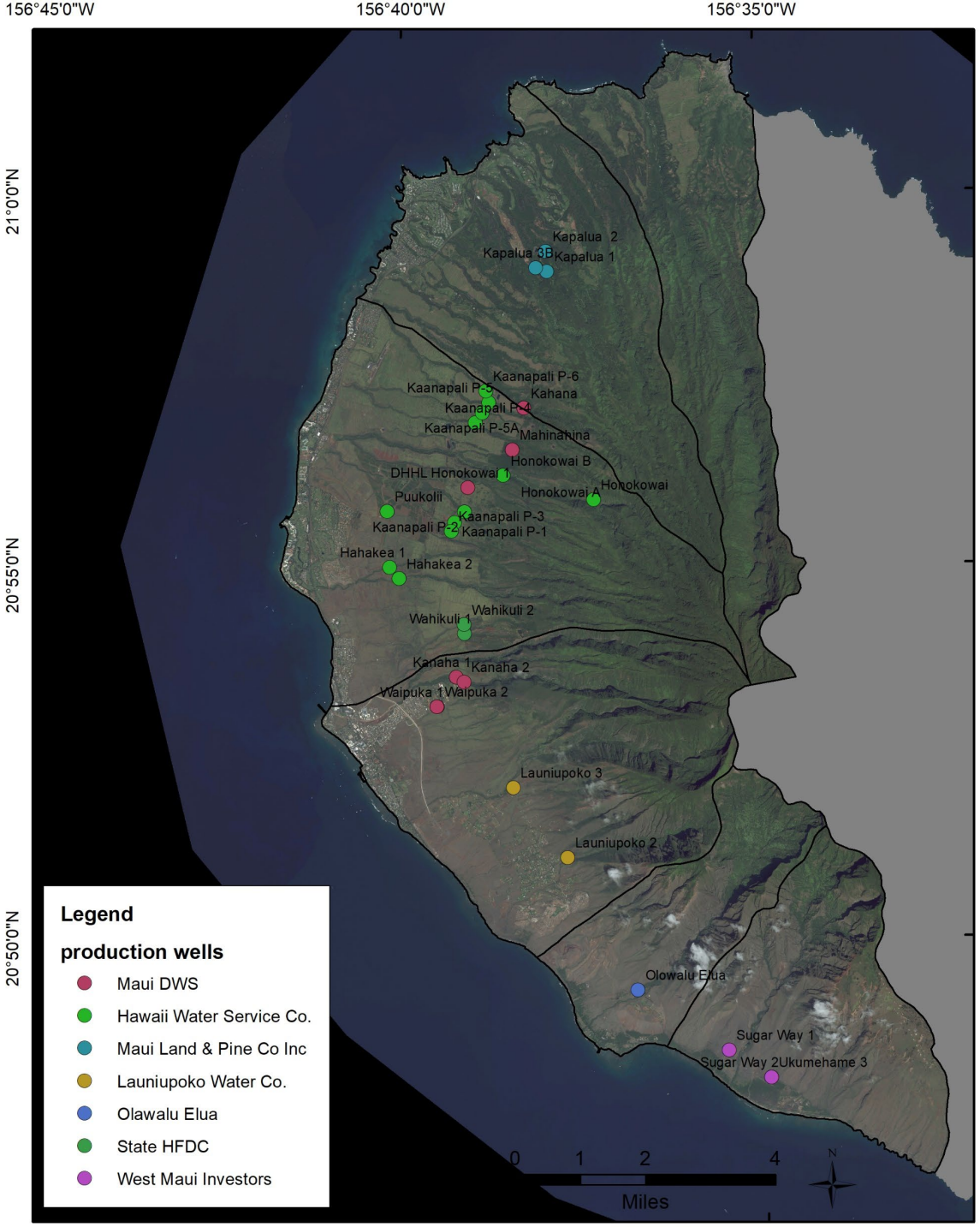

Mean Annual Recharge
156°45'0"W
156°40'0"W
156°35'0"W
21°0'0"N
20°55'0"N
20°50'0"N
Honokohau
Honolua
Honokowai
Launiupoko
Olowalu
Ukumehame
Legend
aquifer system
recharge (mgd)
0.0 - 2.9
3.0 - 5.5
5.6 - 8.0
8.1 - 11.2
11.3 - 15.4
15.5 - 21.6
21.7 - 29.1
29.2 - 42.2
42.3 - 65.2
65.3 - 122.0
122.1 - 206.6
206.7 - 528.0
0 1 2 4
Miles
N

Lahaina Groundwater Hydrologic Units



Lahaina Groundwater Production Sources

Maui Land & Pine (Hawaii Water Service)
Maui DWS North Lahaina System
Hawaii Water Service Kaanapali Service Area
Maui DWS South Lahaina System
Launiupoko Water Company System
Olowalu Water Company System
Ukumehame Water System

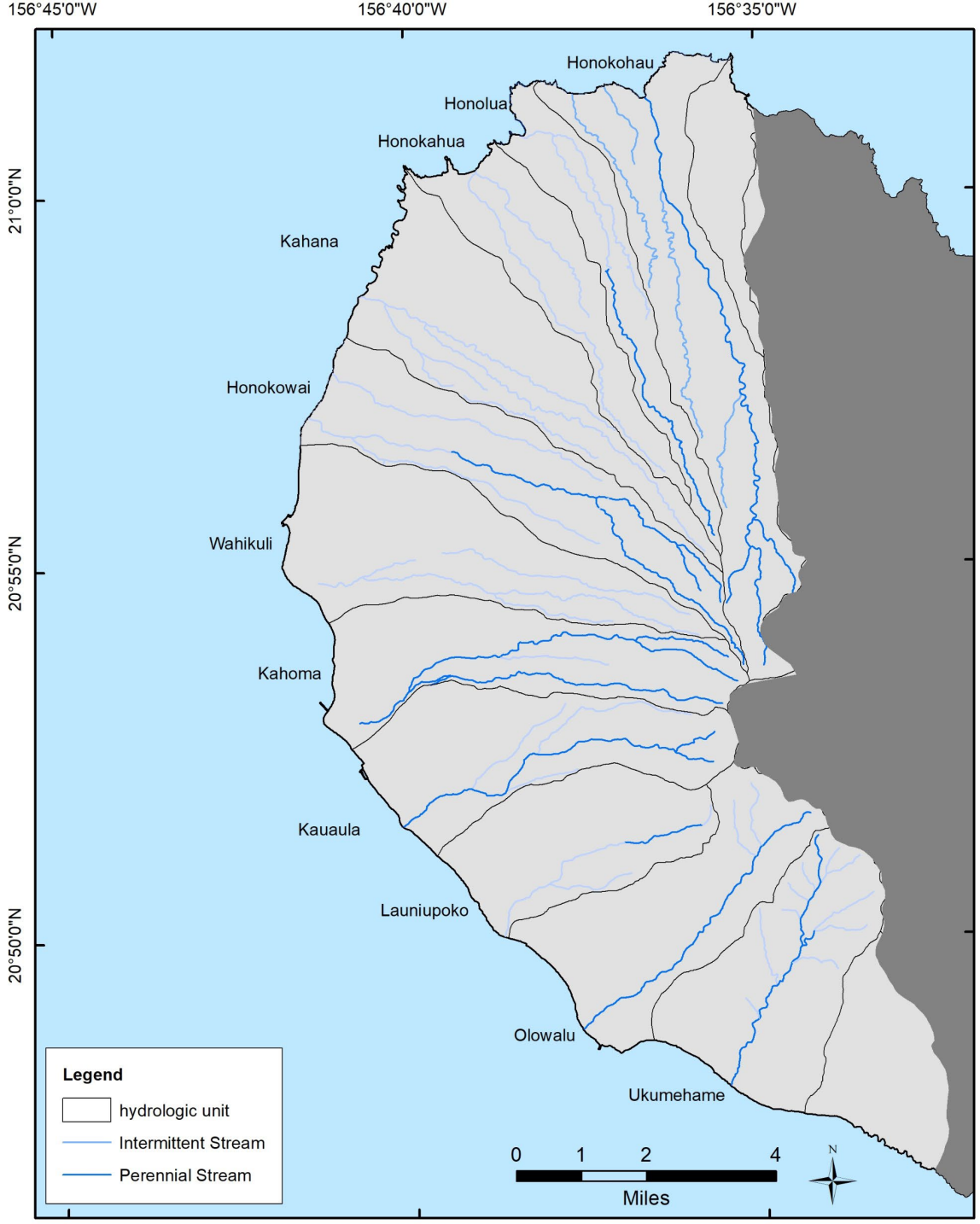


Lahaina Streams and Surface Water Hydrologic Units

Potable water sourced from Honokōhau and Kanahā streams

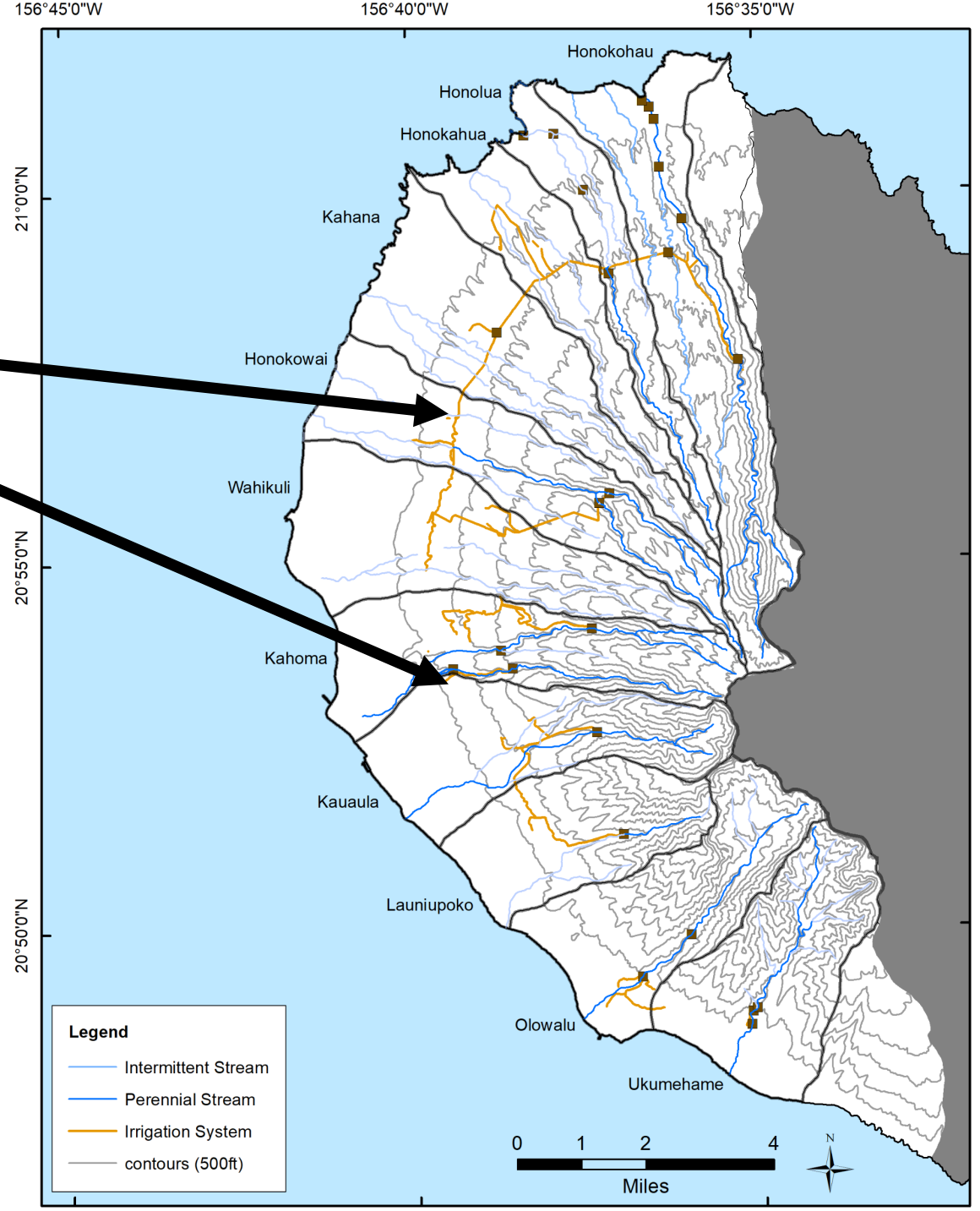
Instream uses include kalo loi, recreation, aesthetic, freshwater habitat, estuary and nearshore ecosystems

DHHL reservation



Lahaina Surface Water Production Systems

2 surface water treatment facilities



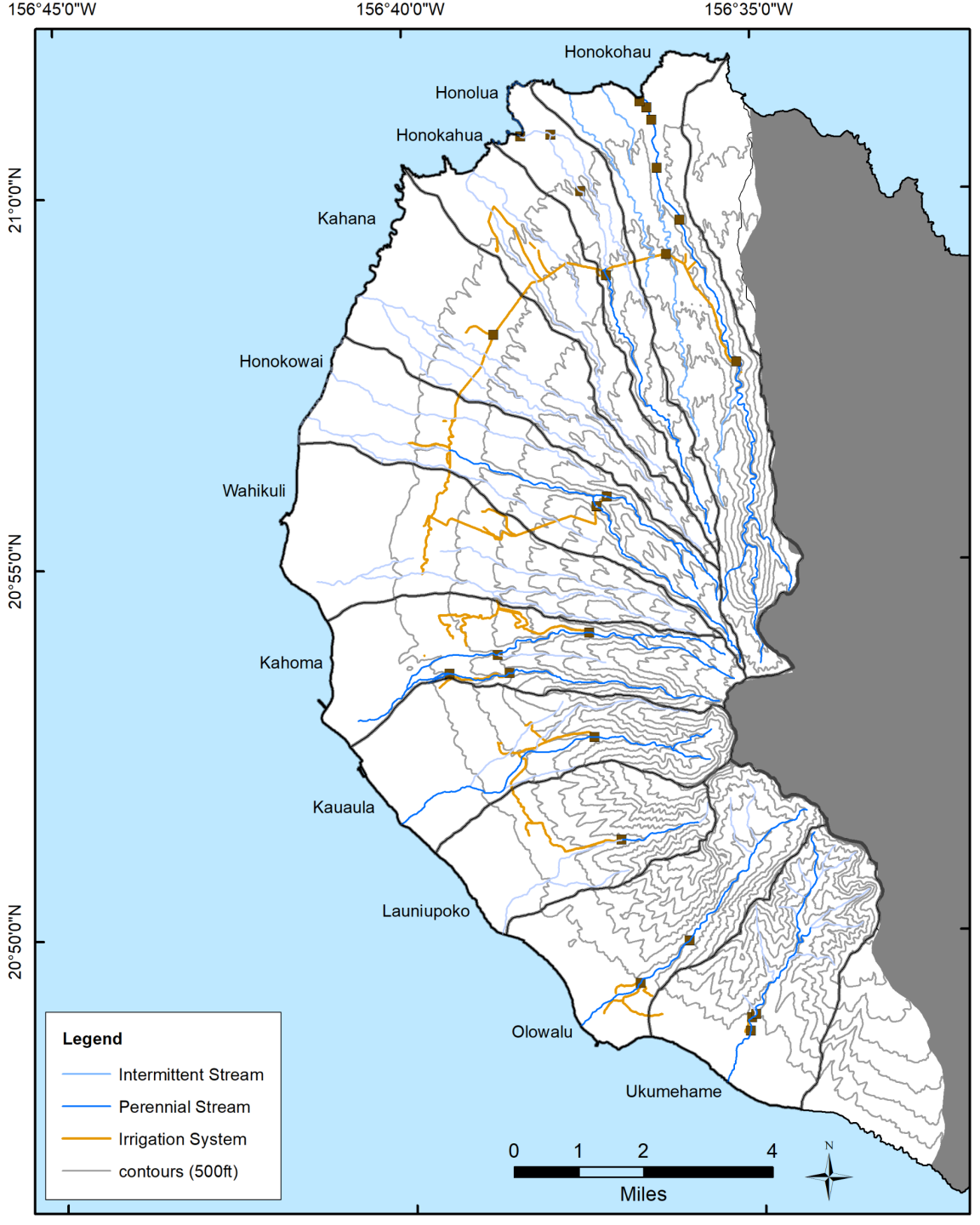
Lahaina Surface Water Features

1. High elevation dike-confined aquifers contribute to gaining streamflow

2. Streams lose surface water to groundwater recharge downstream of the dike zone

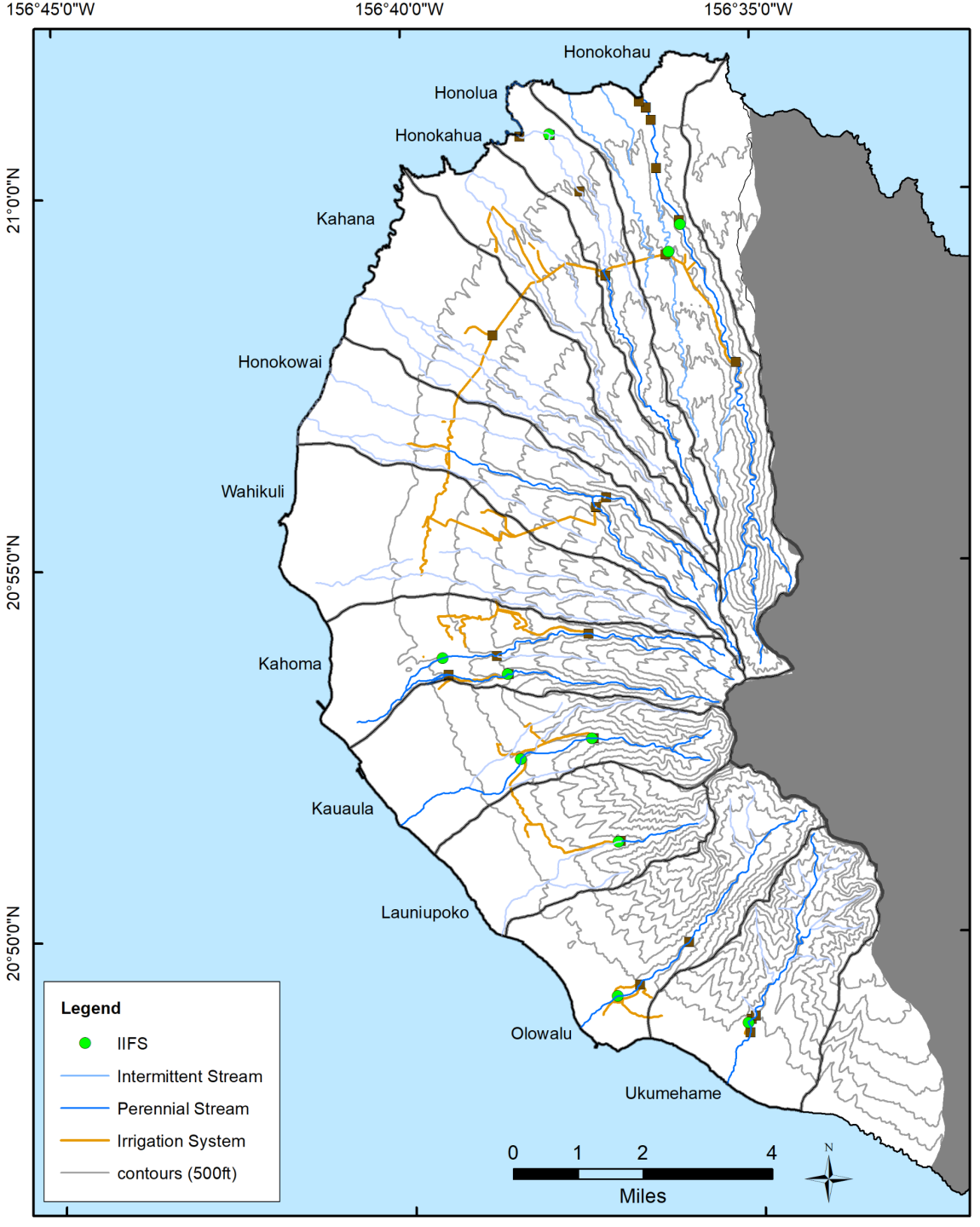
3. Historically, storage captured high flow events to support demand during drought periods

4. Groundwater sourced for potable and non-potable uses

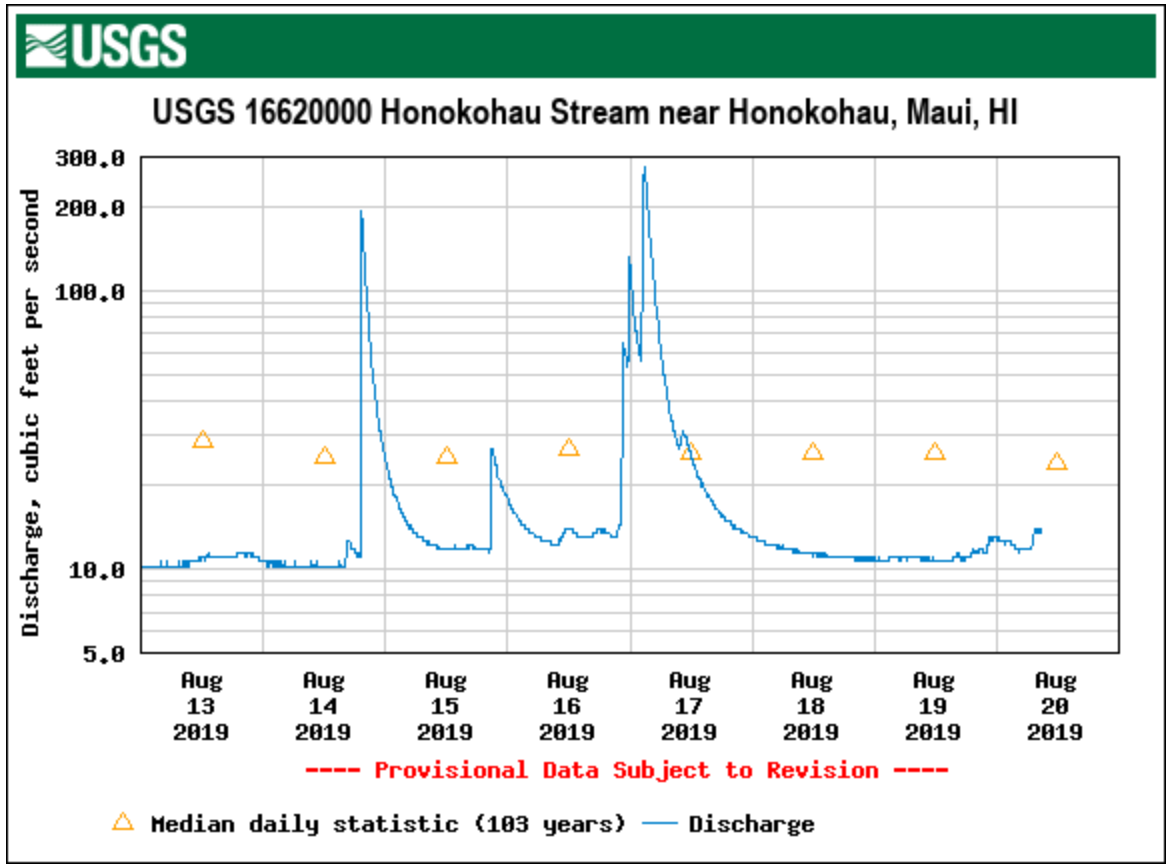


Lahaina Surface Water Interim Instream Flow Standards

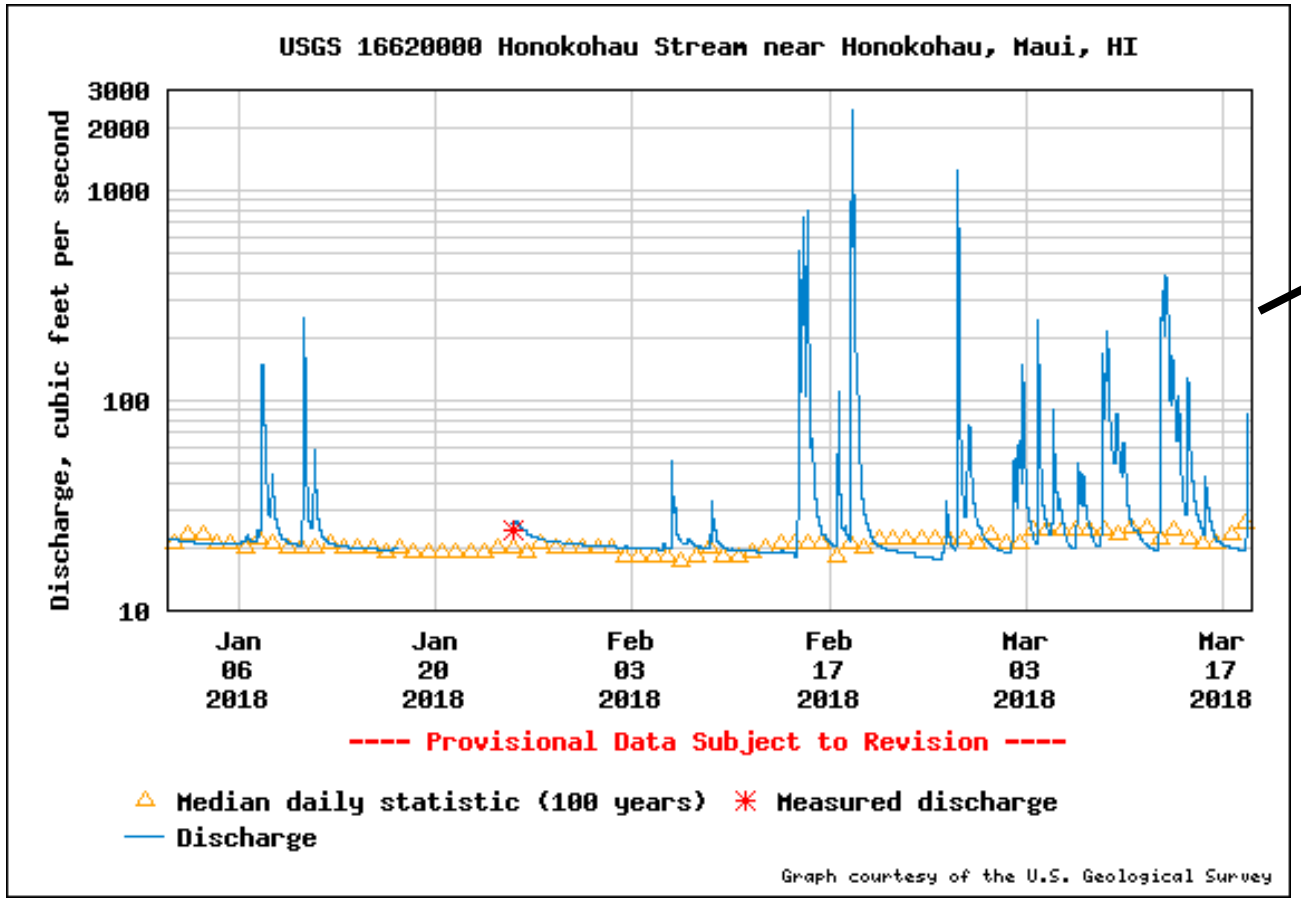
Stream Name	Elevation (ft)	2021-2025		Interim IFS (mgd)	Interim IFS elevation (ft)
		Q_{50} (mgd)	Q_{90} (mgd)		
Honokōhau	940	10.3	7.1	8.6	350
Honolua	850	2.46	0.00	natural flow	725
Honokōwai	1500	3.49	2.32	--	--
Kahoma	2100	3.75	1.87	3.49	2100
Kanahā	1650	3.17	2.65	0.50	1100
Kauaula	1550	3.55	2.39	--	--
Launiupoko	1340	0.30	0.23	0.00	1340
Olowalu	200	3.08	1.06	2.65	190
Ukumehame	400	2.65	1.75	2.90	200

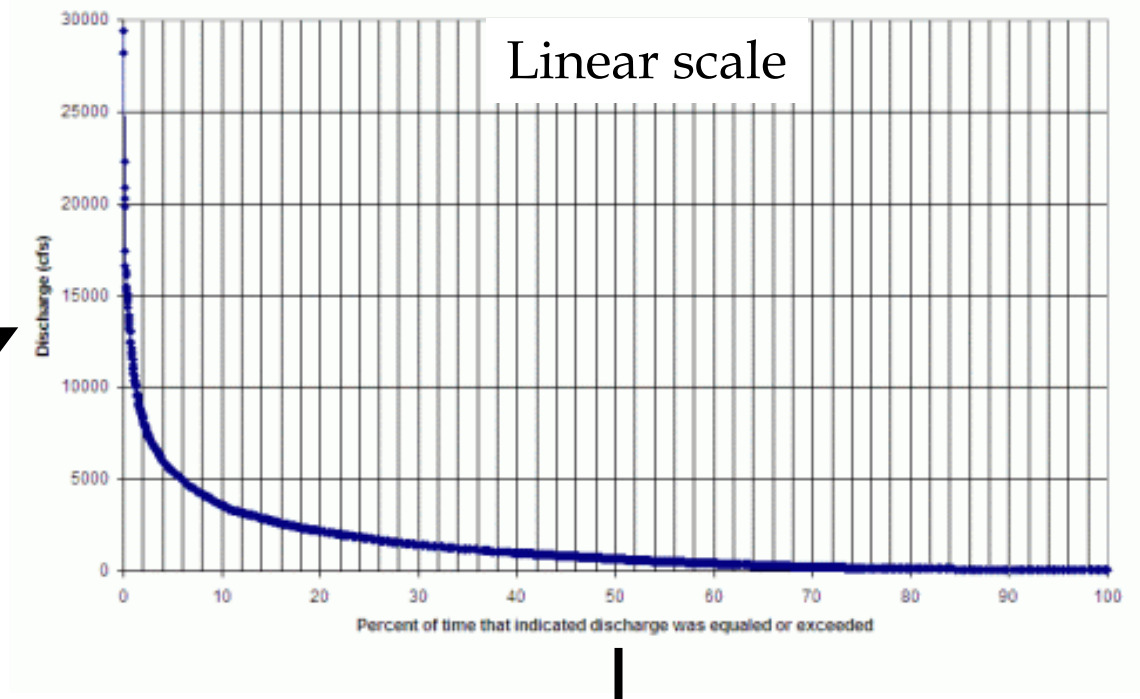


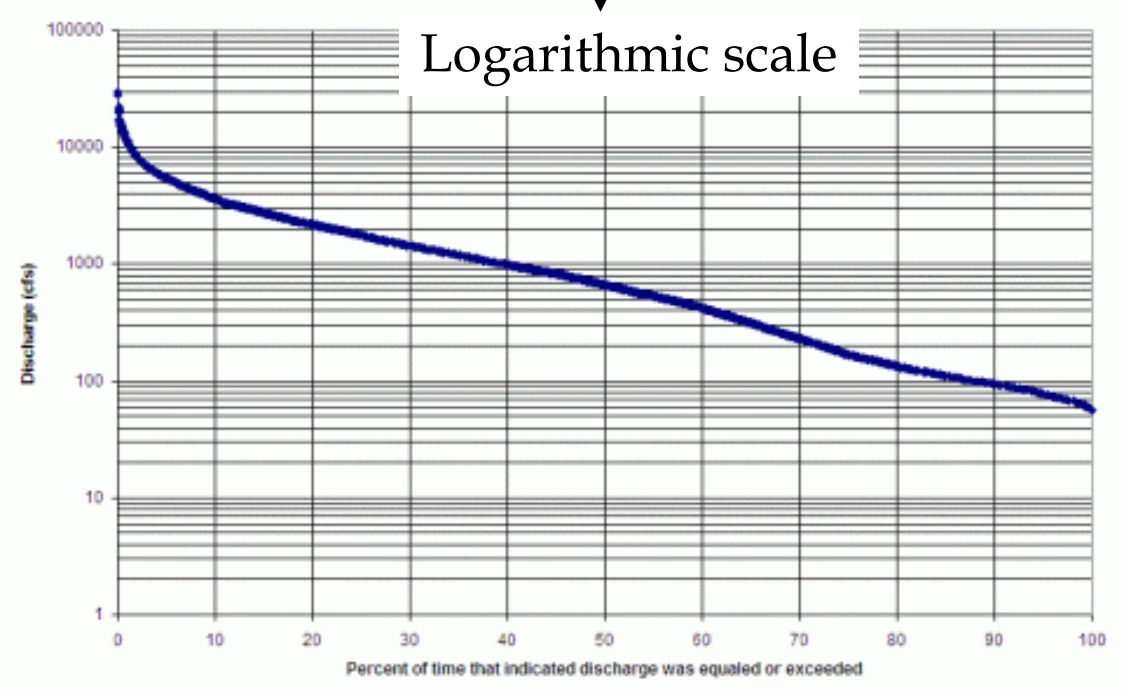
Honokōhau Stream at USGS 16620000



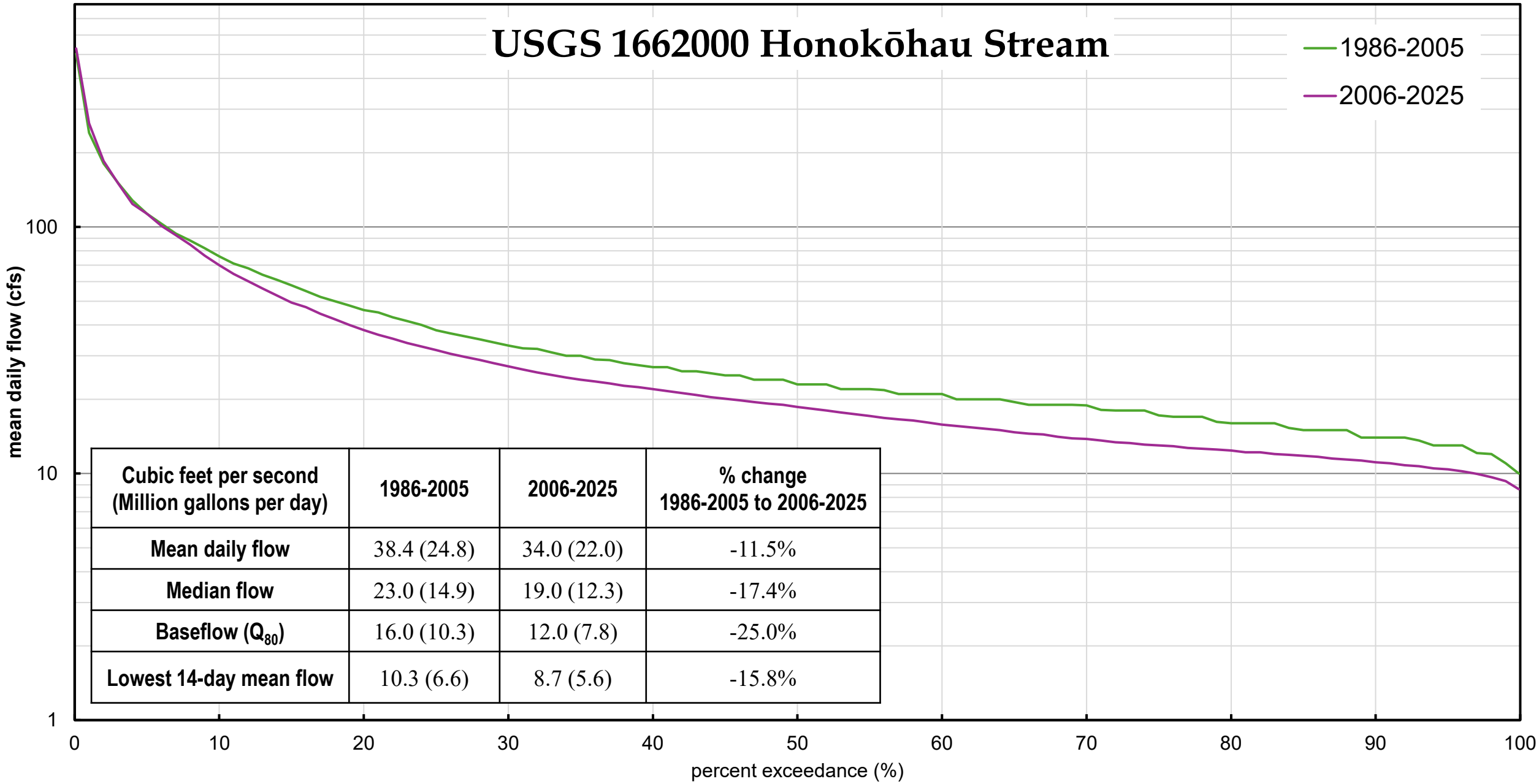
Flow Duration Curves







USGS 1662000 Honokōhau Stream



Cubic feet per second (Million gallons per day)	1986-2005	2006-2025	% change 1986-2005 to 2006-2025
Mean daily flow	38.4 (24.8)	34.0 (22.0)	-11.5%
Median flow	23.0 (14.9)	19.0 (12.3)	-17.4%
Baseflow (Q_{80})	16.0 (10.3)	12.0 (7.8)	-25.0%
Lowest 14-day mean flow	10.3 (6.6)	8.7 (5.6)	-15.8%

Issues with Resource Availability

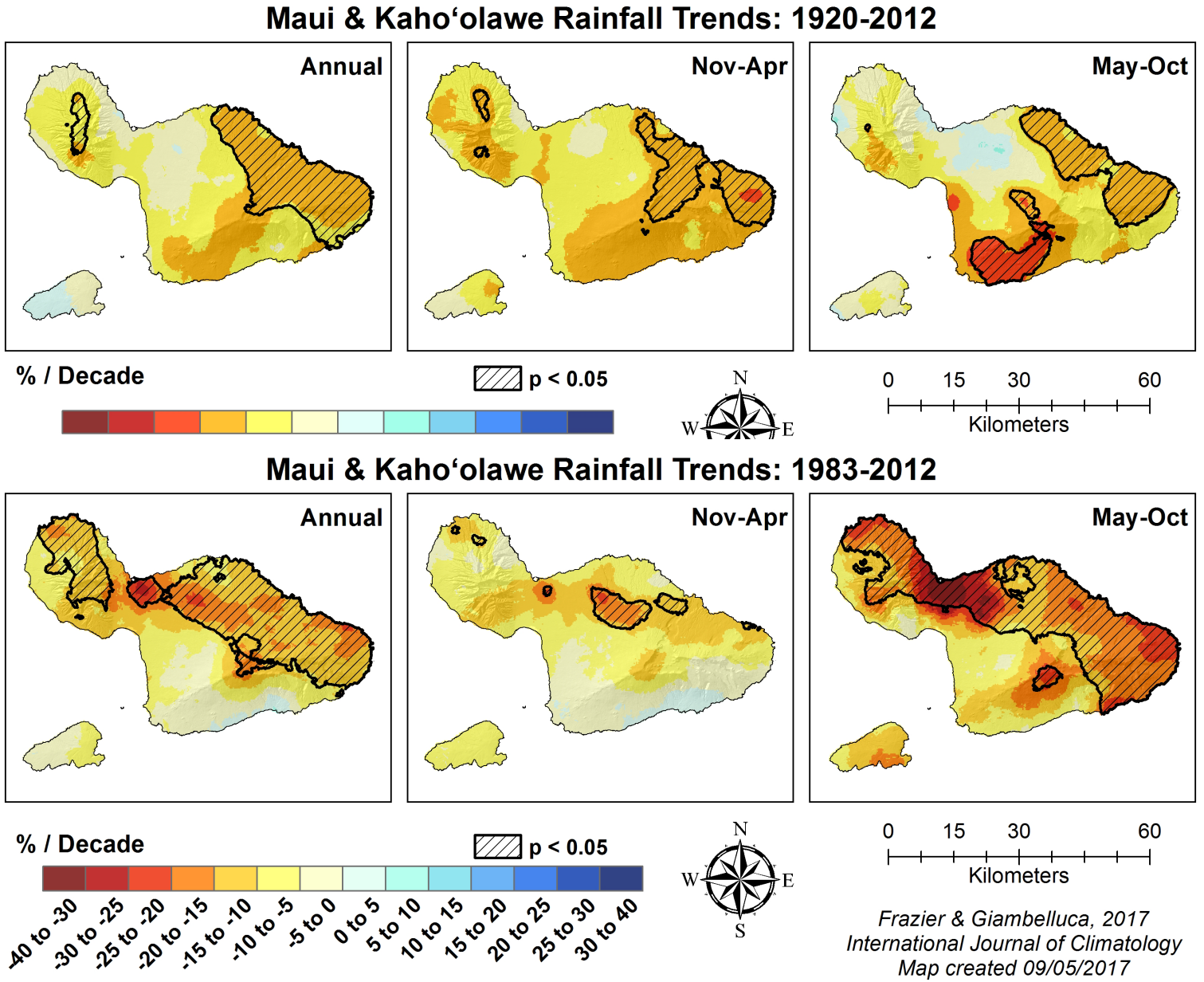
Reduced rainfall

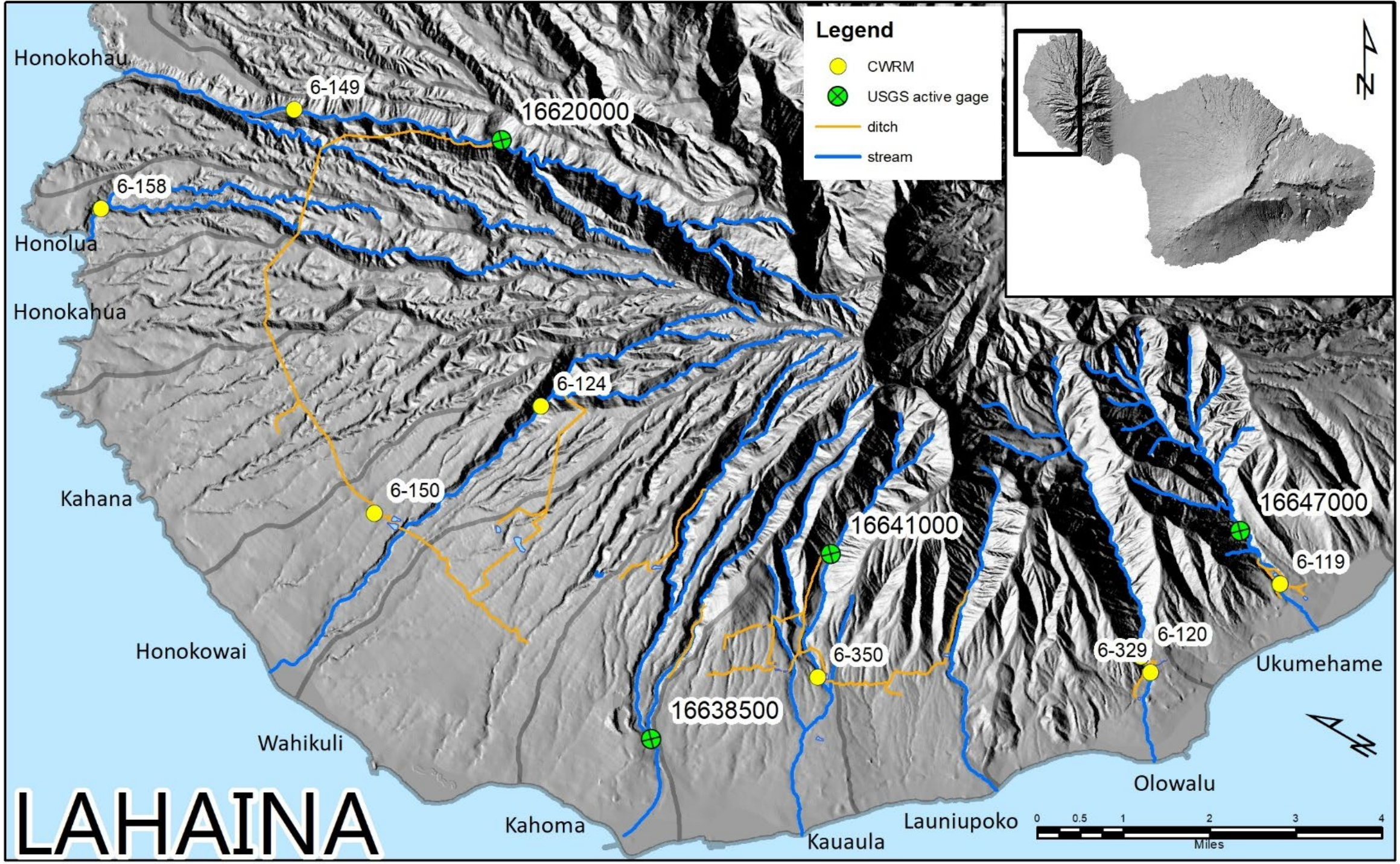
↓

Reduced runoff recharge

↓

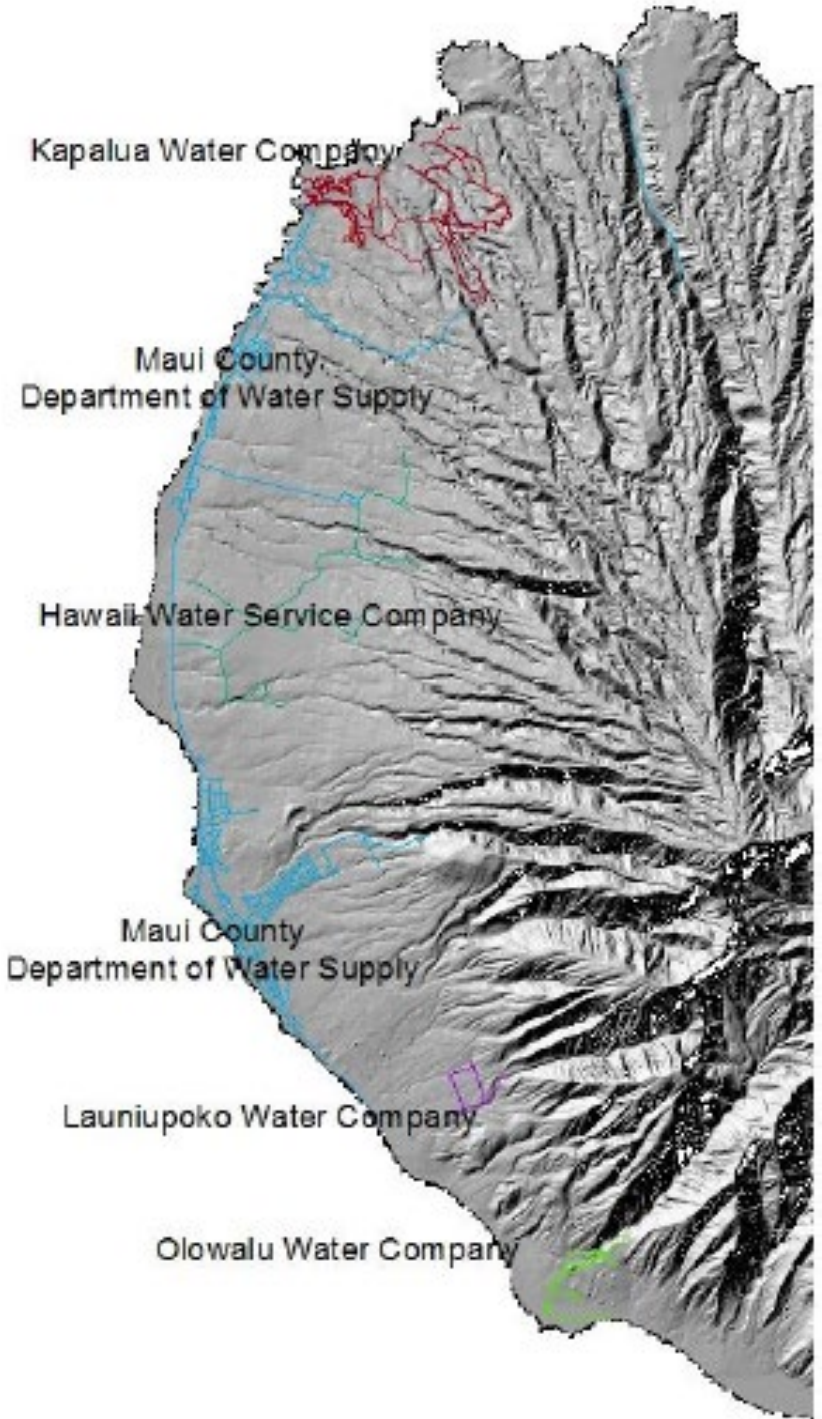
Reduced streamflow and basal aquifer



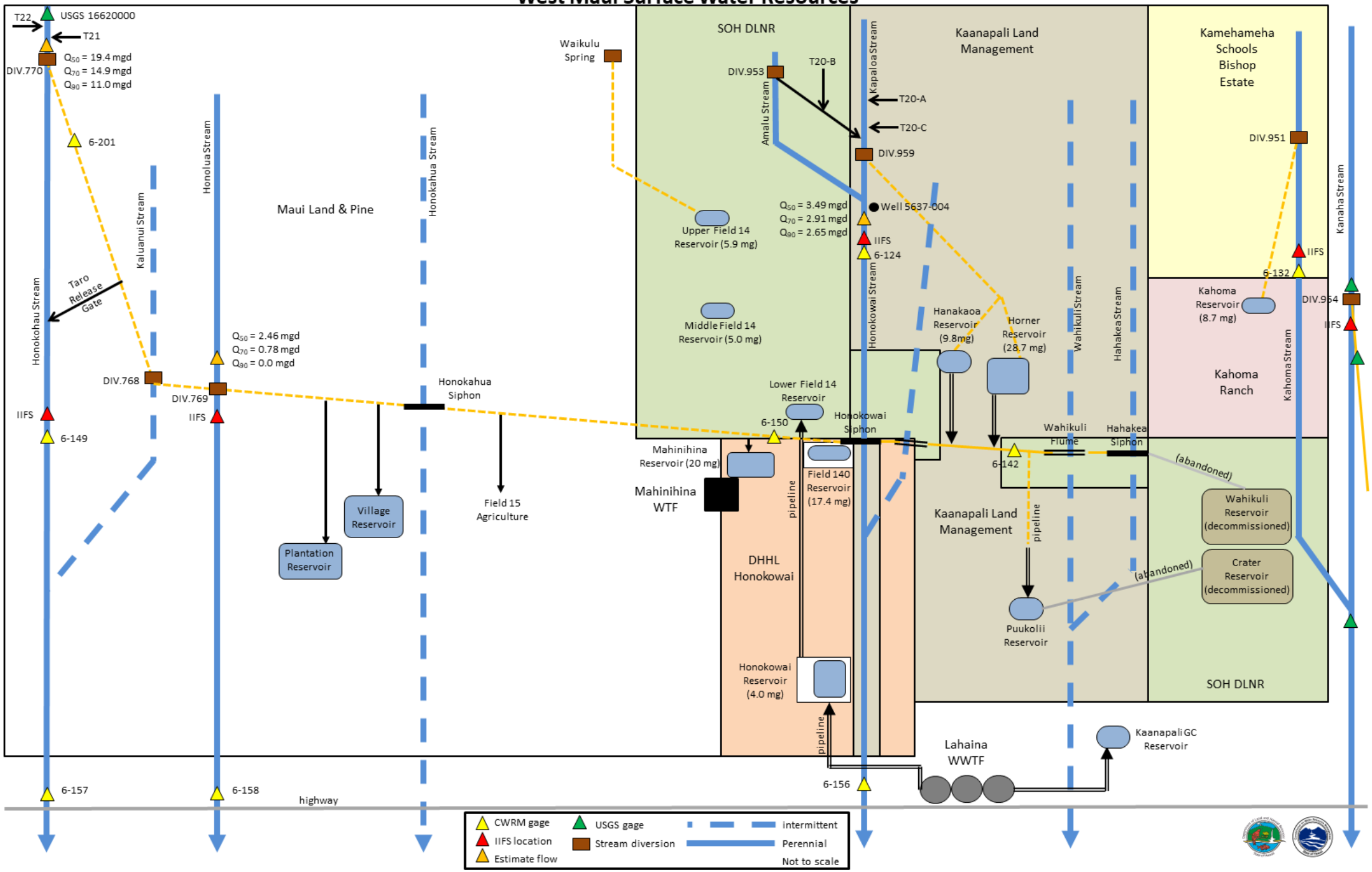

Legend
CWRM
USGS active gage
ditch
stream
N
Honokohau
6-149
16620000
6-158
Honolua
Honokahua
6-124
6-150
Kahana
16647000
16641000
6-119
6-120
6-329
6-350
Honokowai
Ukumehame
16638500
Wahikuli
Olowalu
Kahoma
Launiupoko
Kauaula
0 0.5 1 2 3 4
Miles
LAHAINA

Maui DWS Water System

Category	Consumption (mgd)	Percent of Total (%)
Domestic	5.082	94.3
Industrial	0.153	2.6
Municipal	0.14	2.4
Agricultural	0.005	0.1
Irrigation	0.005	0.1
Military	0.002	<0.1
Unknown	0.002	<0.1

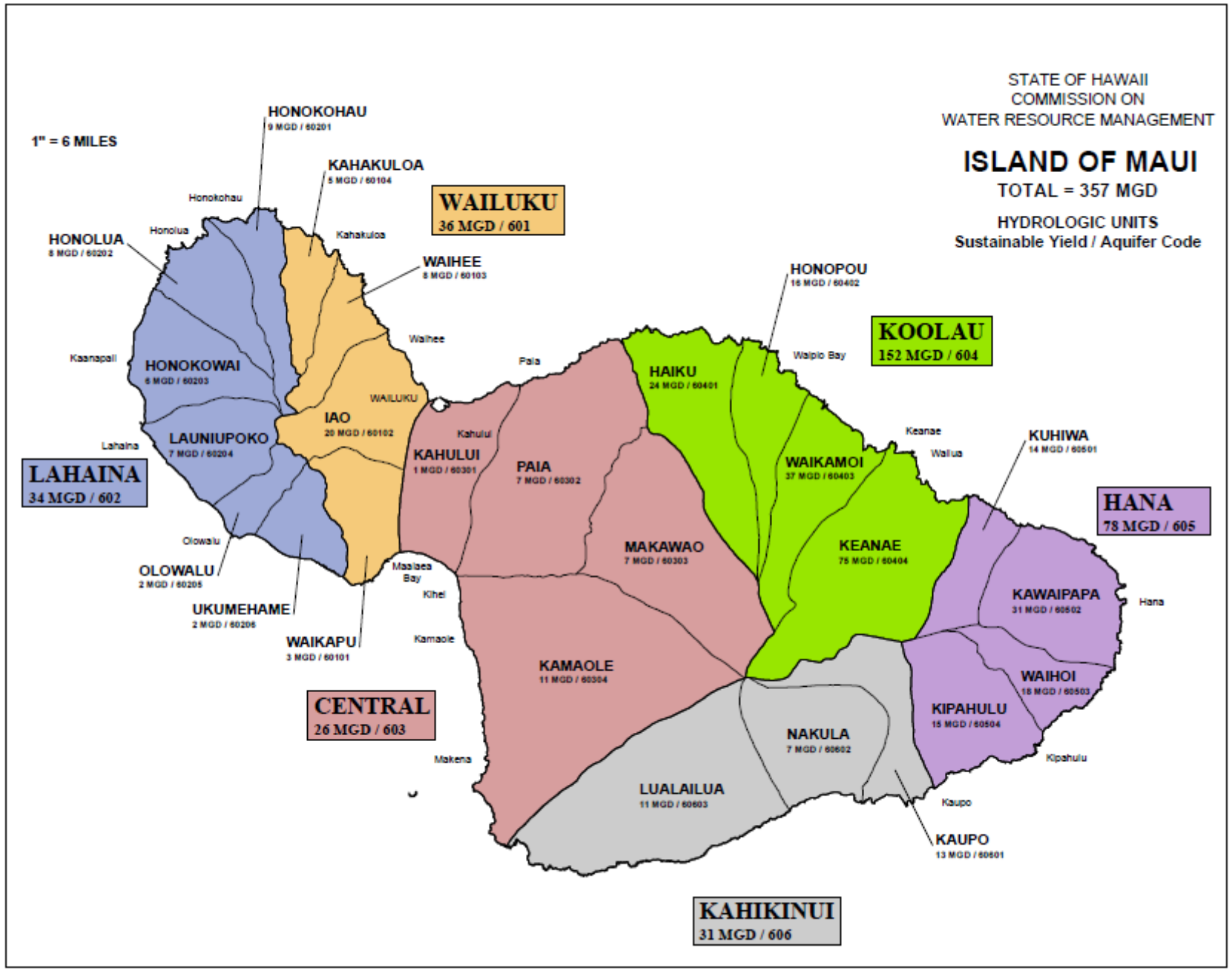


West Maui Surface Water Resources



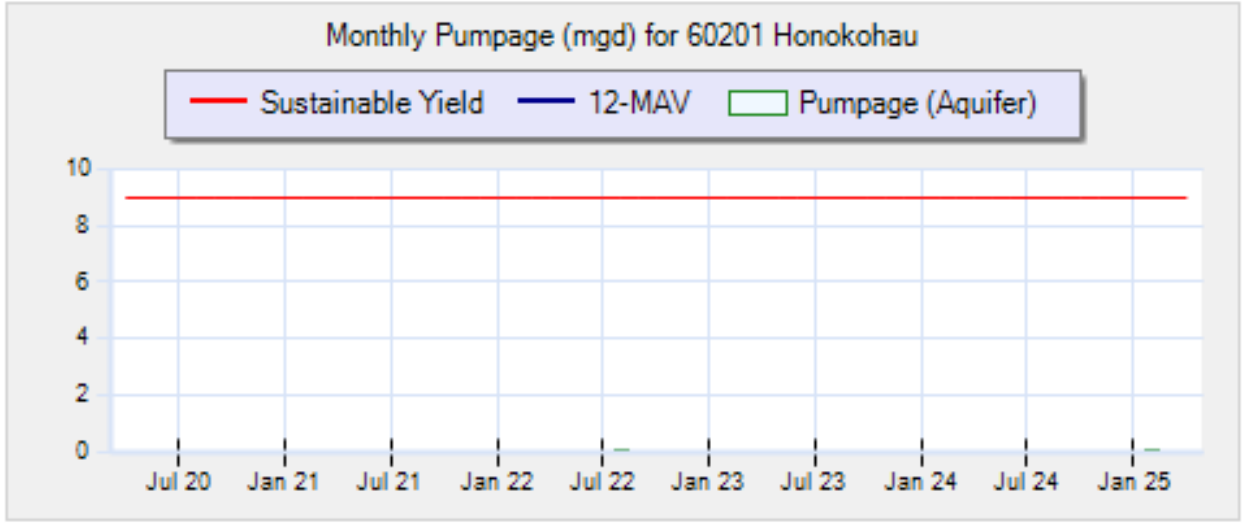
LAHAINA GROUND WATER CONDITIONS

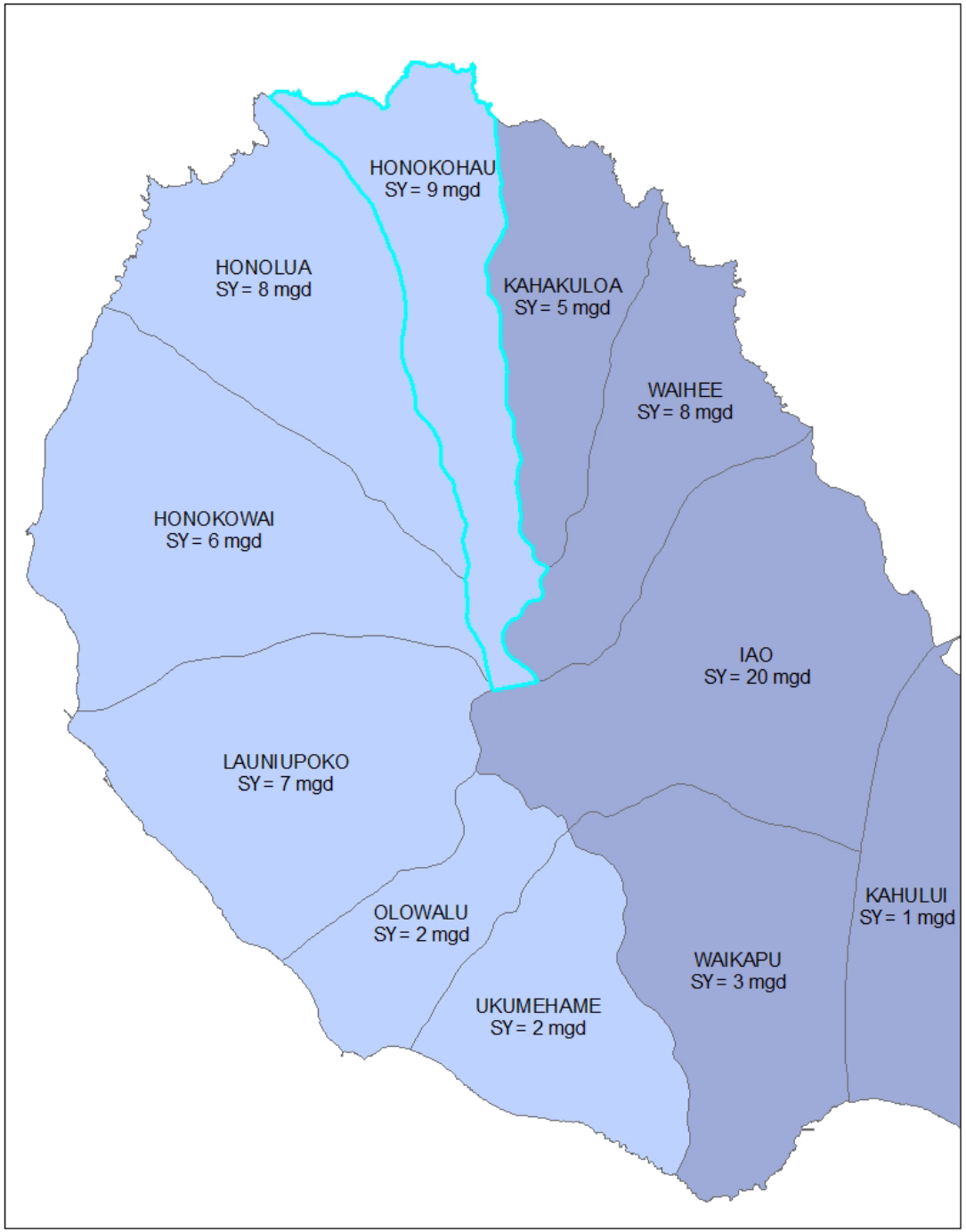
Sustainable Yield and Pumpage


STATE OF HAWAII
COMMISSION ON
WATER RESOURCE MANAGEMENT
ISLAND OF MAUI
TOTAL = 357 MGD
HYDROLOGIC UNITS
Sustainable Yield / Aquifer Code
1" = 6 MILES
HONOKOHAU
9 MGD / 60201
KAHAKULOA
5 MGD / 60104
WAILUKU
36 MGD / 601
HONOLUA
8 MGD / 60202
WAIHEE
8 MGD / 60103
HONOPOU
16 MGD / 60402
KOOLAU
152 MGD / 604
HONOKOWAI
6 MGD / 60203
IAO
20 MGD / 60102
HAIKU
24 MGD / 60401
LAUNIUPOKO
7 MGD / 60204
KAHULUI
1 MGD / 60301
PAIA
7 MGD / 60302
WAIKAMOI
37 MGD / 60403
KUHIWA
14 MGD / 60501
LAHAINA
34 MGD / 602
MAKAWAO
7 MGD / 60303
KEANAE
75 MGD / 60404
HANA
78 MGD / 605
OLOWALU
2 MGD / 60205
UKUMEHAME
2 MGD / 60206
WAIKAPU
3 MGD / 60101
KAWAIPAPA
31 MGD / 60502
KAMAOLE
11 MGD / 60304
WAIHOI
15 MGD / 60503
CENTRAL
26 MGD / 603
KIPAHULU
15 MGD / 60504
NAKULA
7 MGD / 60602
LUALAILUA
11 MGD / 60603
KAUPO
13 MGD / 60601
KAHIKINUI
31 MGD / 606
Honokohau
Honolua
Kahakuloa
Waihee
Kaanapali
Waiehu
Paia
Waiplo Bay
Kahului
Keanae
Wailua
Lahaina
Olowalu
Maalaea Bay
Kihei
Hana
Kamaole
Makena
Kipahulu
Kaupo
06/20/2018
Map Projection: Universal Transverse Mercator

Honokōhau Aquifer System Area

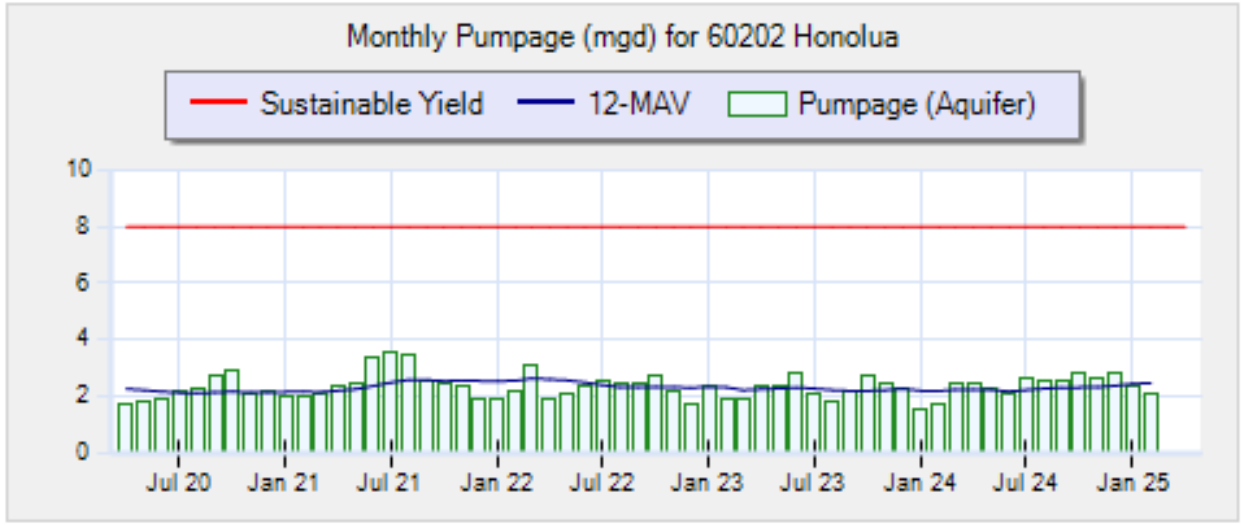
- Sustainable Yield = **9 million** gallons per day
- 12-month moving average pumpage through 12/31/2024 = N/A

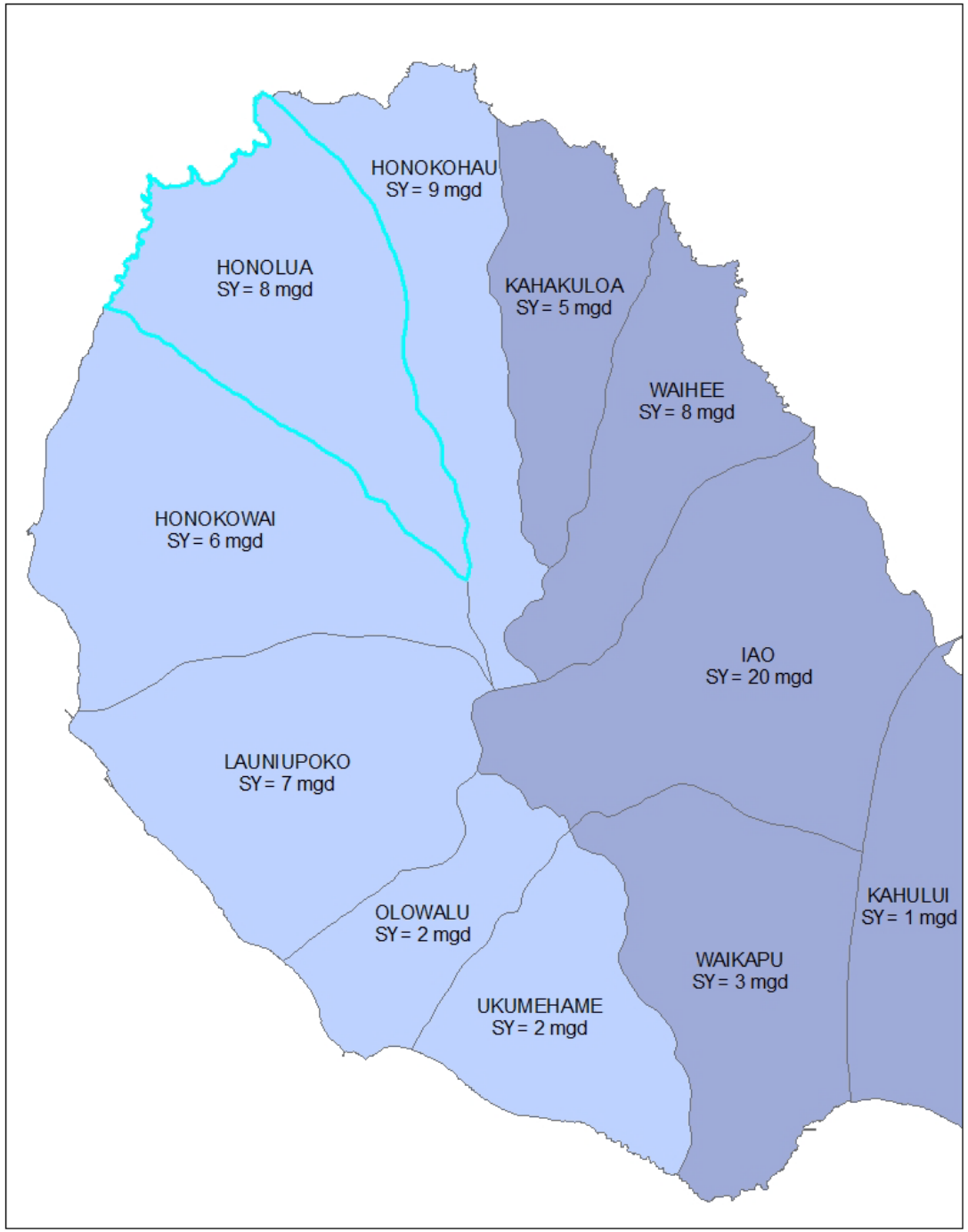


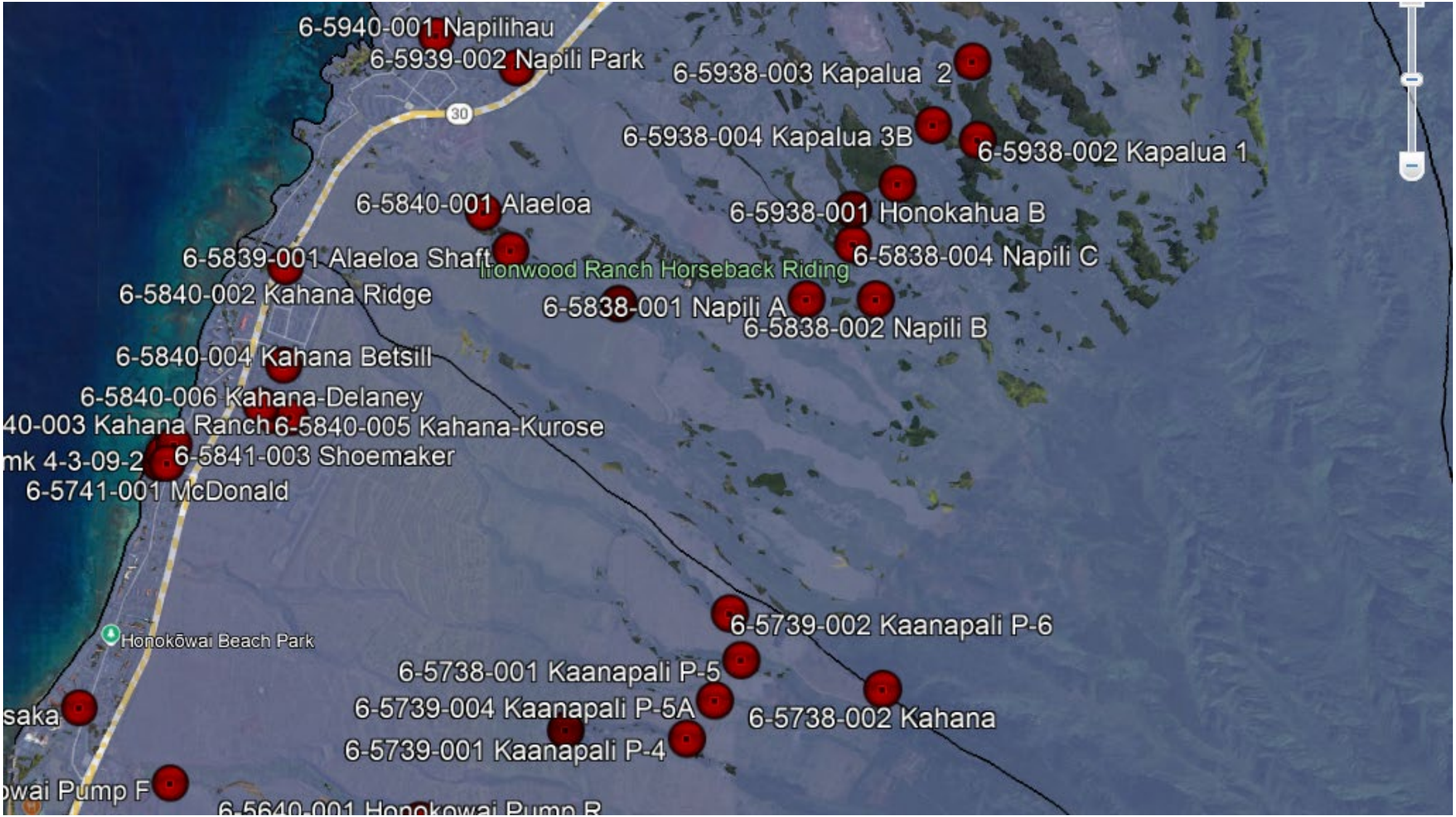


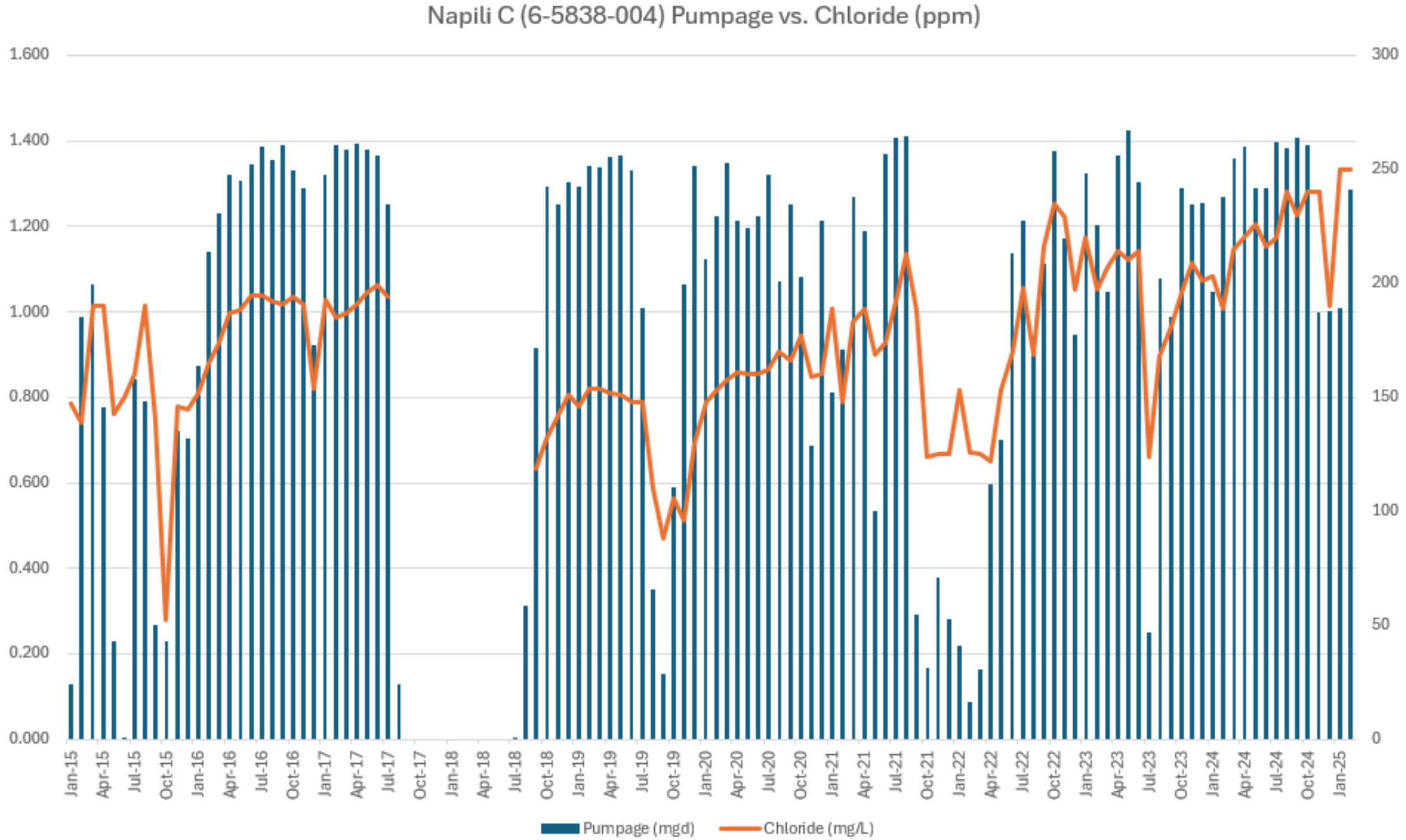
Honolua Aquifer System Area

- Sustainable Yield = **8 million** gallons per day
- 12-month moving average through 12/31/2024 = **2.365** million gallons per day






6-5940-001 Napilihau
6-5939-002 Napili Park
6-5938-003 Kapalua 2
30
6-5938-004 Kapalua 3B
6-5938-002 Kapalua 1
6-5840-001 Alaeloa
6-5938-001 Honokahua B
6-5839-001 Alaeloa Shaft
Ironwood Ranch Horseback Riding
6-5838-004 Napili C
6-5840-002 Kahana Ridge
6-5838-001 Napili A
6-5838-002 Napili B
6-5840-004 Kahana Betsill
6-5840-006 Kahana-Delaney
40-003 Kahana Ranch
6-5840-005 Kahana-Kurose
mk 4-3-09-2
6-5841-003 Shoemaker
6-5741-001 McDonald
6-5739-002 Kaanapali P-6
Honokōwai Beach Park
6-5738-001 Kaanapali P-5
saka
6-5739-004 Kaanapali P-5A
6-5738-002 Kahana
6-5739-001 Kaanapali P-4
owai Pump F


Napili C (6-5838-004) Pumpage vs. Chloride (ppm)
1.600
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
300
250
200
150
100
50
0
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Apr-17
Jul-17
Oct-17
Jan-18
Apr-18
Jul-18
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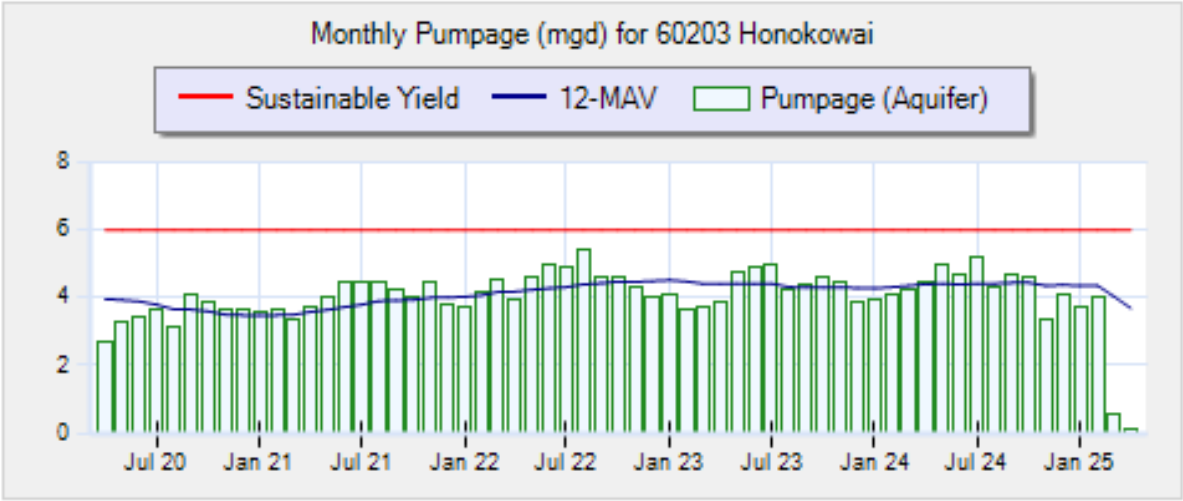
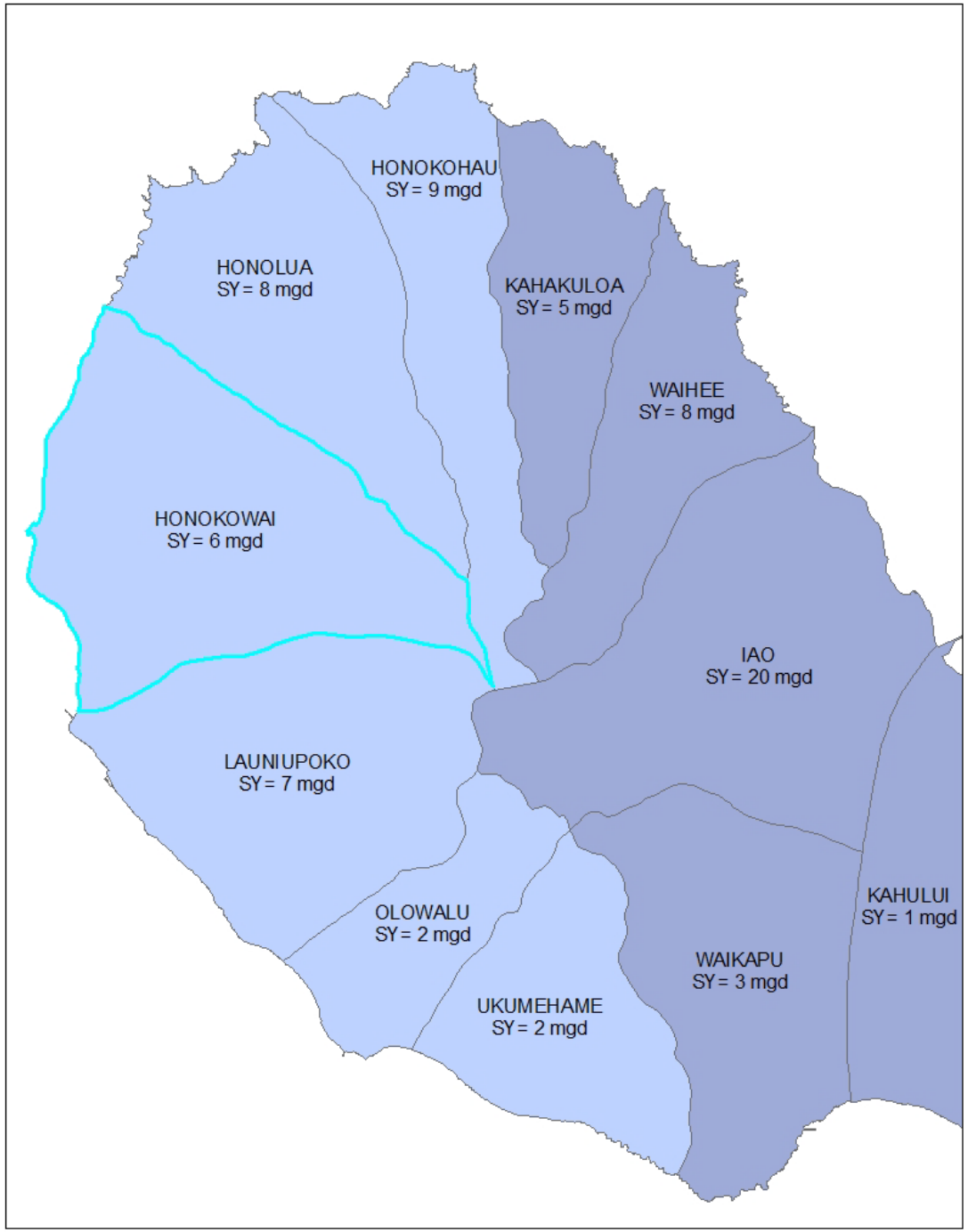
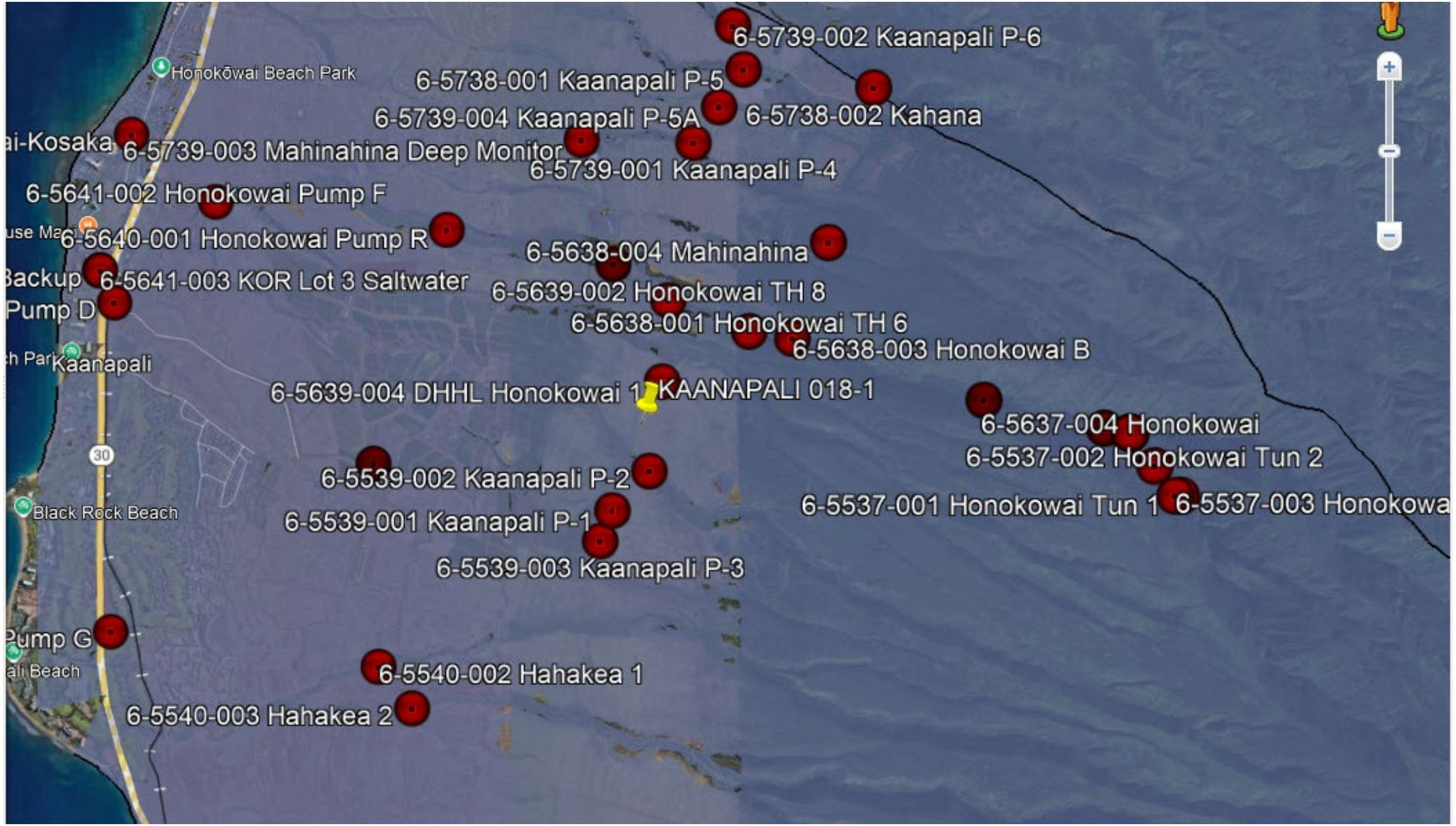
Jan-21
Apr-21
Jul-21
Oct-21
Jan-22
Apr-22
Jul-22
Oct-22
Jan-23
Apr-23
Jul-23
Oct-23
Jan-24
Apr-24
Jul-24
Oct-24
Jan-25
Pumpage (mgd)
Chloride (mg/L)

Honokōwai Aquifer System Area

- Sustainable Yield = **6 million** gallons per day
- 12-month moving average through 12/31/2024 = **4.381 million** gallons per day

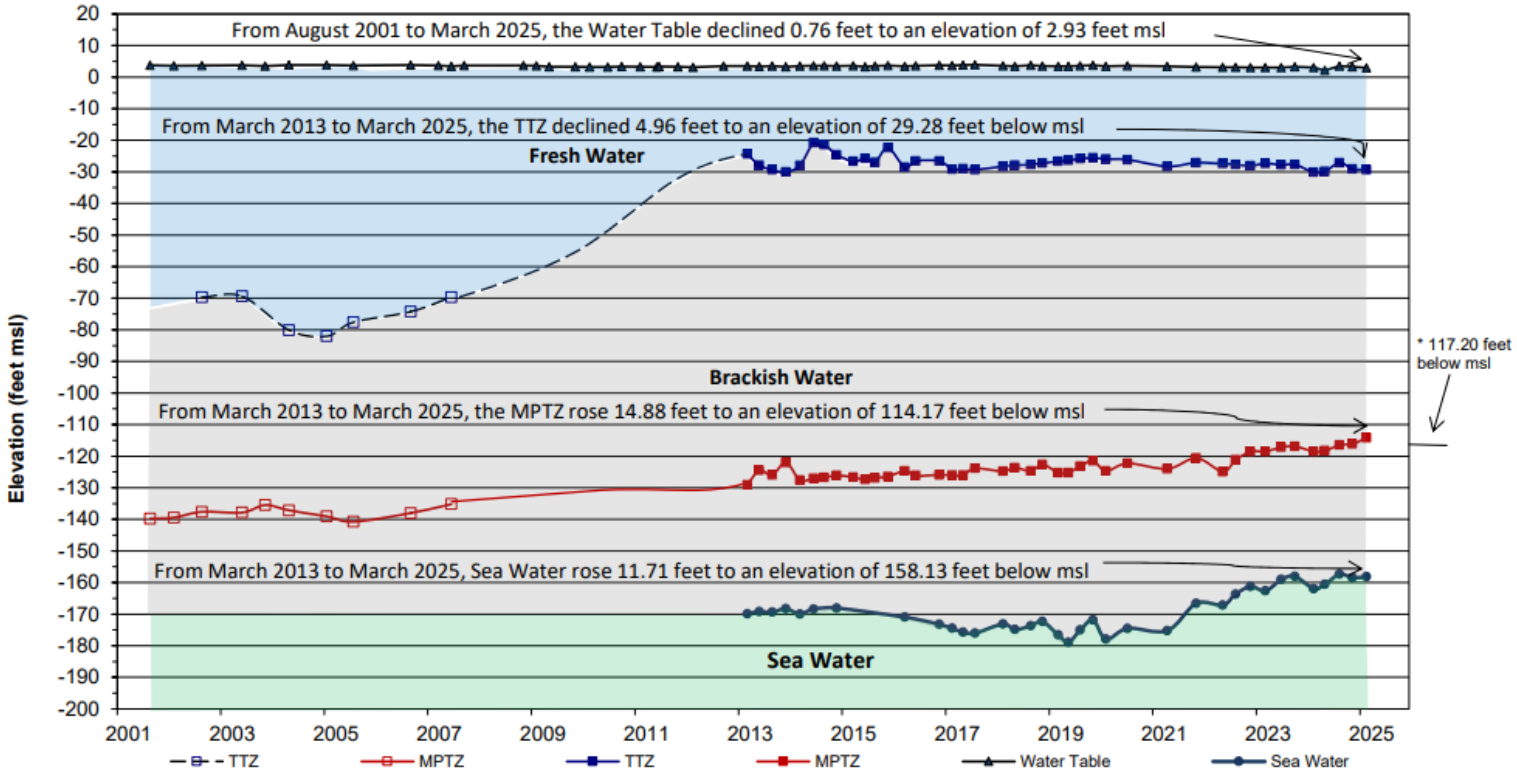





6-5739-002 Kaanapali P-6
Honokōwai Beach Park
6-5738-001 Kaanapali P-5
6-5739-004 Kaanapali P-5A
6-5738-002 Kahana
6-5739-003 Mahinahina Deep Monitor
6-5739-001 Kaanapali P-4
6-5641-002 Honokowai Pump F
6-5640-001 Honokowai Pump R
6-5638-004 Mahinahina
6-5641-003 KOR Lot 3 Saltwater
6-5639-002 Honokowai TH 8
6-5638-001 Honokowai TH 6
6-5638-003 Honokowai B
Kaanapali
6-5639-004 DHHL Honokowai 1
KAANAPALI 018-1
6-5637-004 Honokowai
6-5537-002 Honokowai Tun 2
6-5539-002 Kaanapali P-2
6-5537-001 Honokowai Tun 1
6-5537-003 Honokowa
6-5539-001 Kaanapali P-1
6-5539-003 Kaanapali P-3
30
Black Rock Beach
6-5540-002 Hahakea 1
6-5540-003 Hahakea 2

Mahinahina Deep Monitor Well, Maui (6-5739-003)

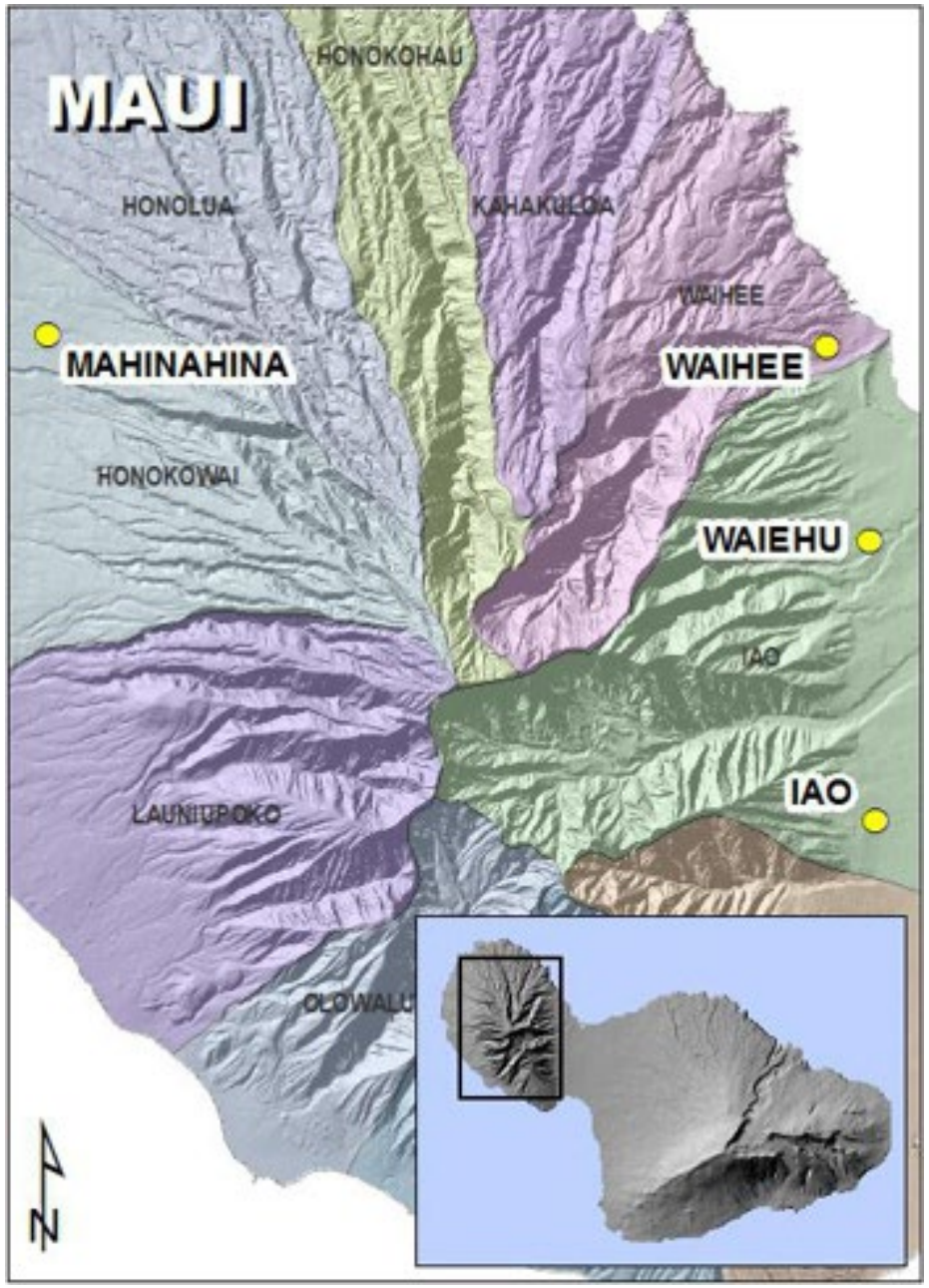
Fluctuations in the Water Table, Top of Transition Zone (TTZ), and Midpoint of Transition Zone (MPTZ) from August 2001 through March 2025

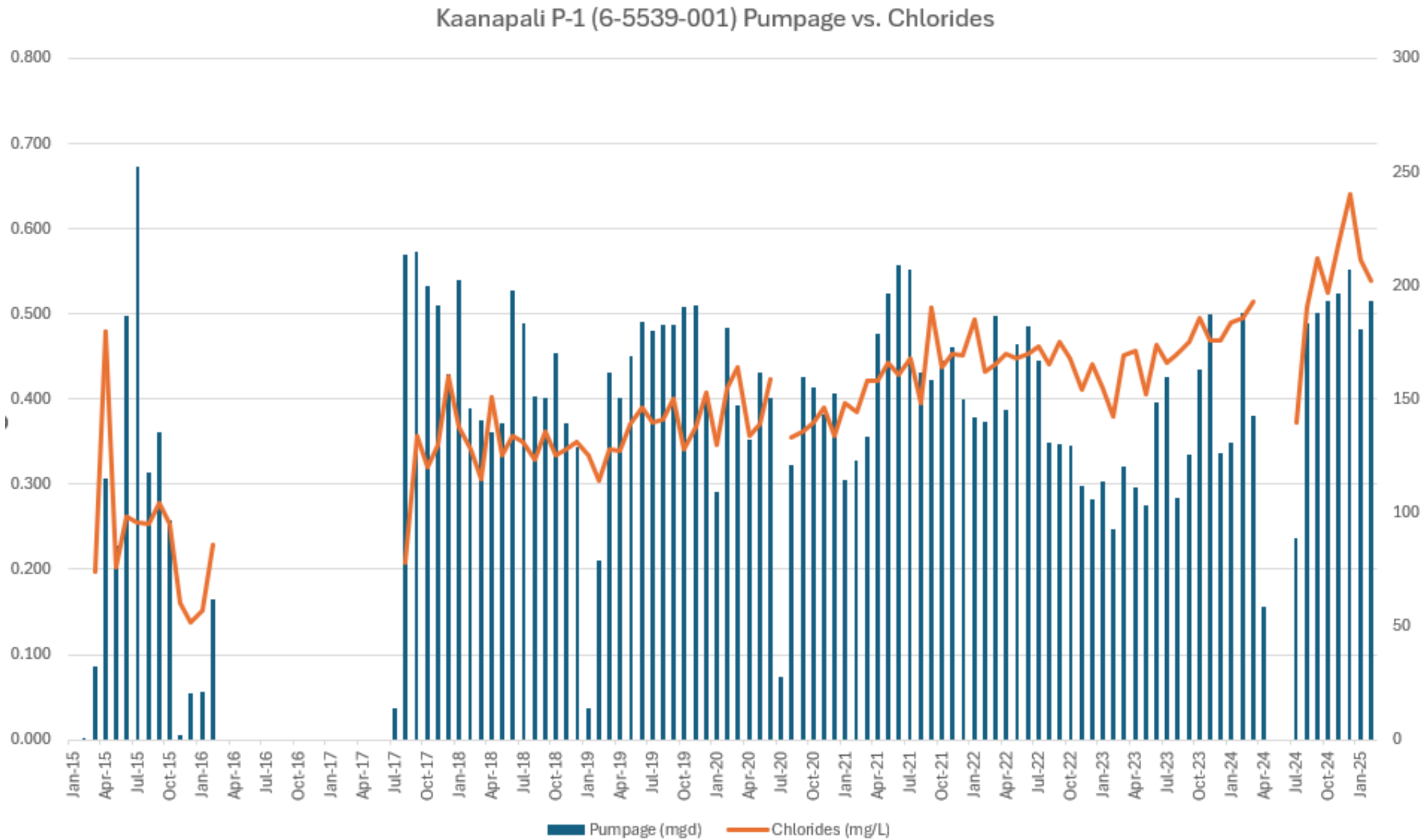


Notes: : (1) TTZ = 1,000 µS/cm (~ 220 mg/L Cl^-); MPTZ = 25,000 µS/cm (~ 8,500 mg/L Cl^-) (2) Fresh Water < 220 mg/L Cl^-, Brackish Water 220 mg/L CL^- to 19,399 mg/L Cl^-, Sea Water >= 19,400 mg/L Cl^-; (3) OS 421/425 = Ocean Sensors CTD (absolute conductivity); (4) RBR 12895 = RBR Global CTD (Specific Conductivity); (5) msl = mean sea level. Conditions inside the well prevented successful CTD deployment from 2006 through 2012, CTD profiling of this well was resumed 3-13-2013. CTD used prior to 2007 had a suspected calbration issue, therefore TTZ values from 2002 to 2006 are suspect, and are shown for comaprative purposes.

* Since the year 2013, the MPTZ rose 14.88 feet, to an elevation of 114.17 feet below msl, where it is above a calculated Ghyben-Herzberg equilibrium elevation of 117.20 feet below msl, relative to the Water Table, measured at 2.93 feet above msl.

last updated 3/21/2025




Kaanapali P-1 (6-5539-001) Pumpage vs. Chlorides
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
300
250
200
150
100
50
0
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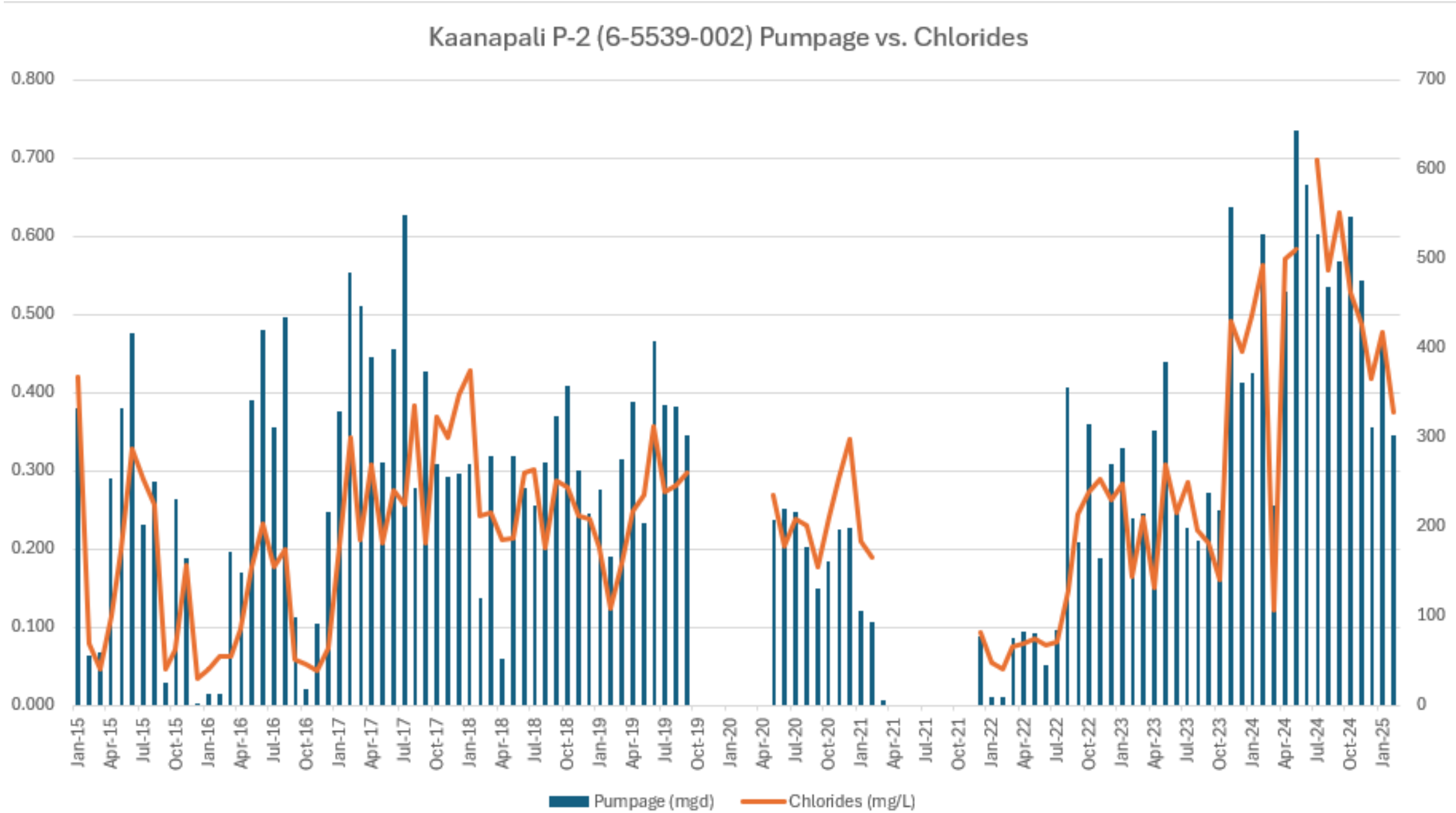
Jan-25
Pumpage (mgd)
Chlorides (mg/L)


Kaanapali P-2 (6-5539-002) Pumpage vs. Chlorides
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
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600
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400
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200
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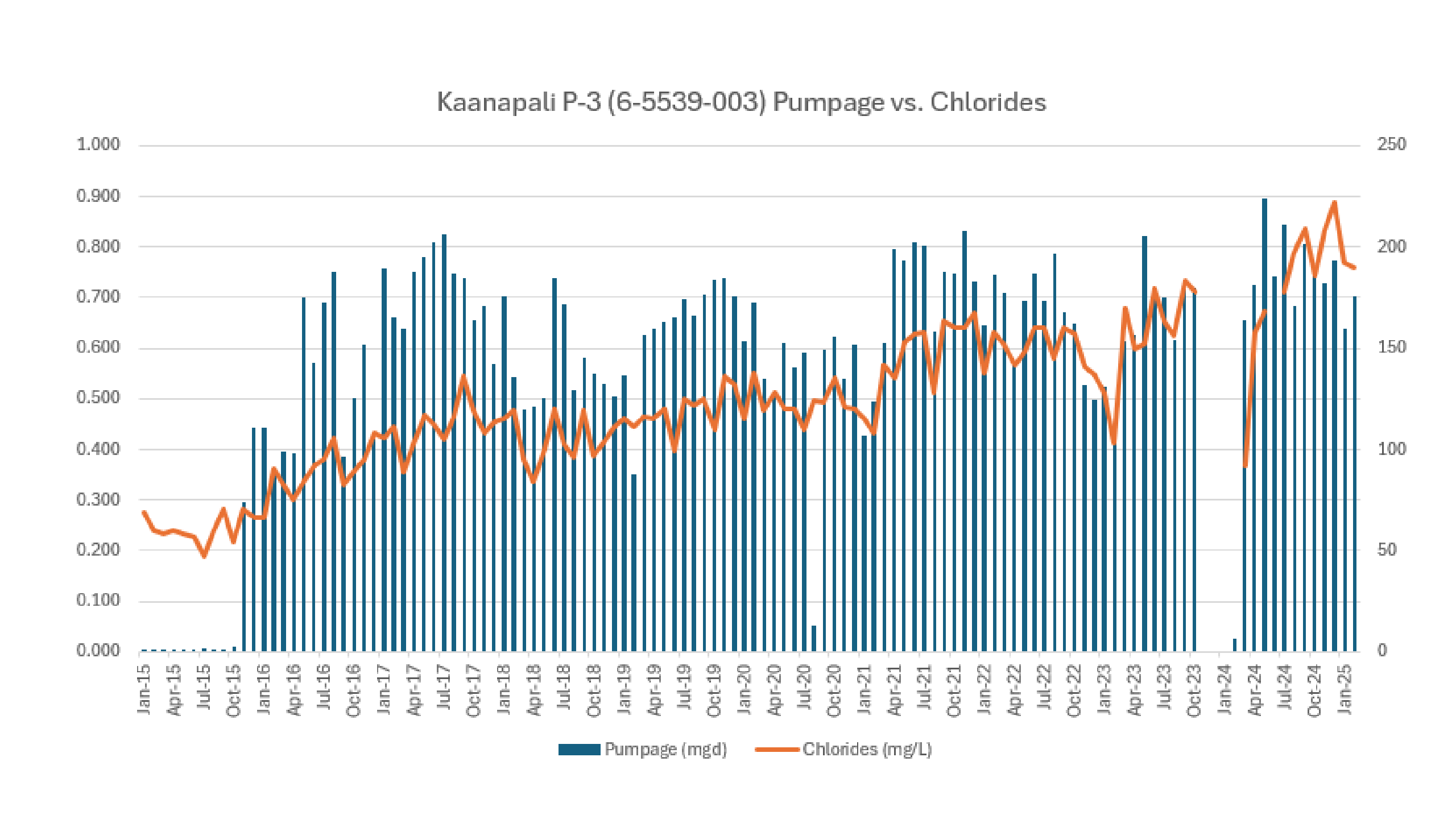
Jan-25
Pumpage (mgd)
Chlorides (mg/L)


Kaanapali P-3 (6-5539-003) Pumpage vs. Chlorides
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
250
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150
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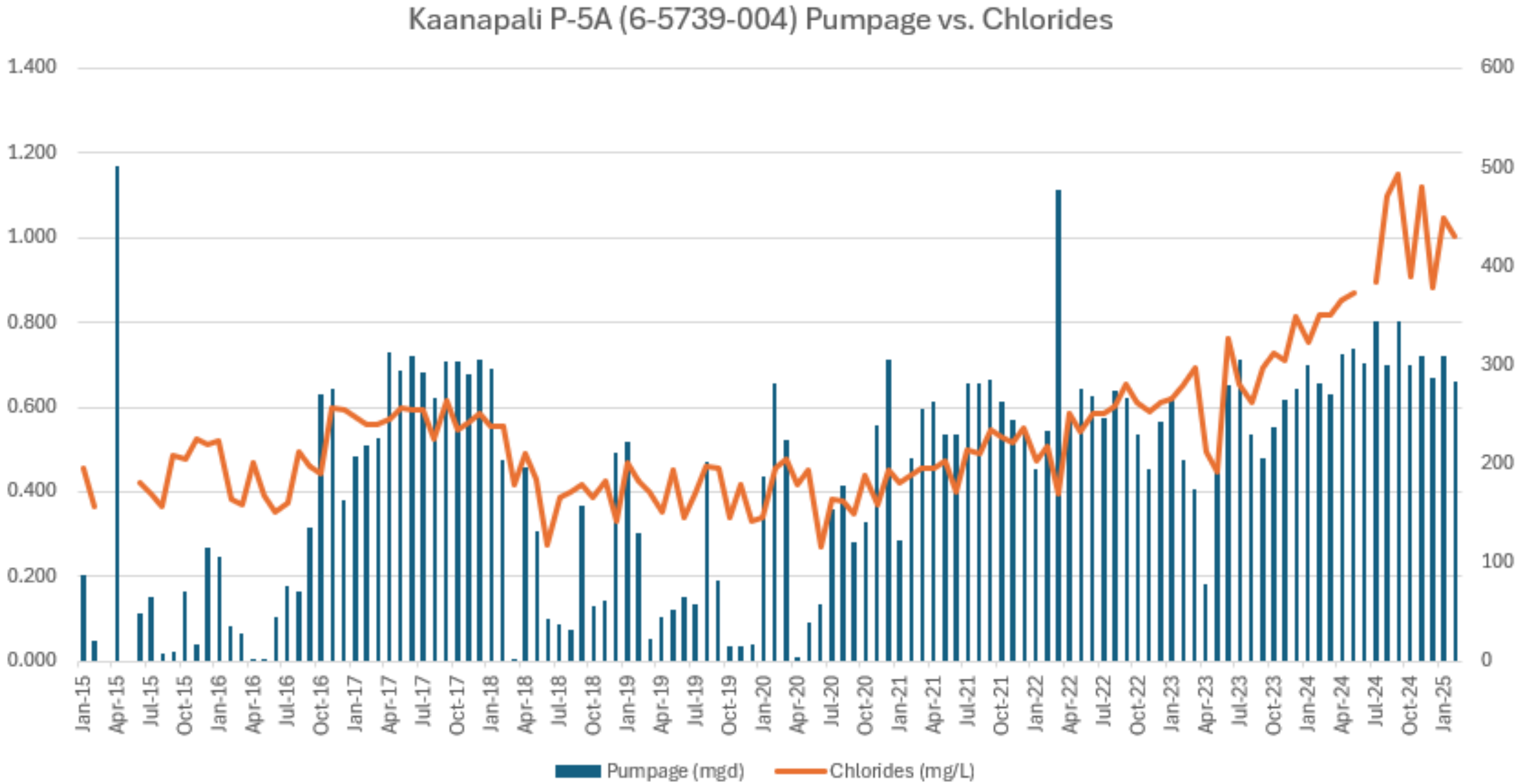
Pumpage (mgd)
Chlorides (mg/L)


Kaanapali P-5A (6-5739-004) Pumpage vs. Chlorides
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
600
500
400
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200
100
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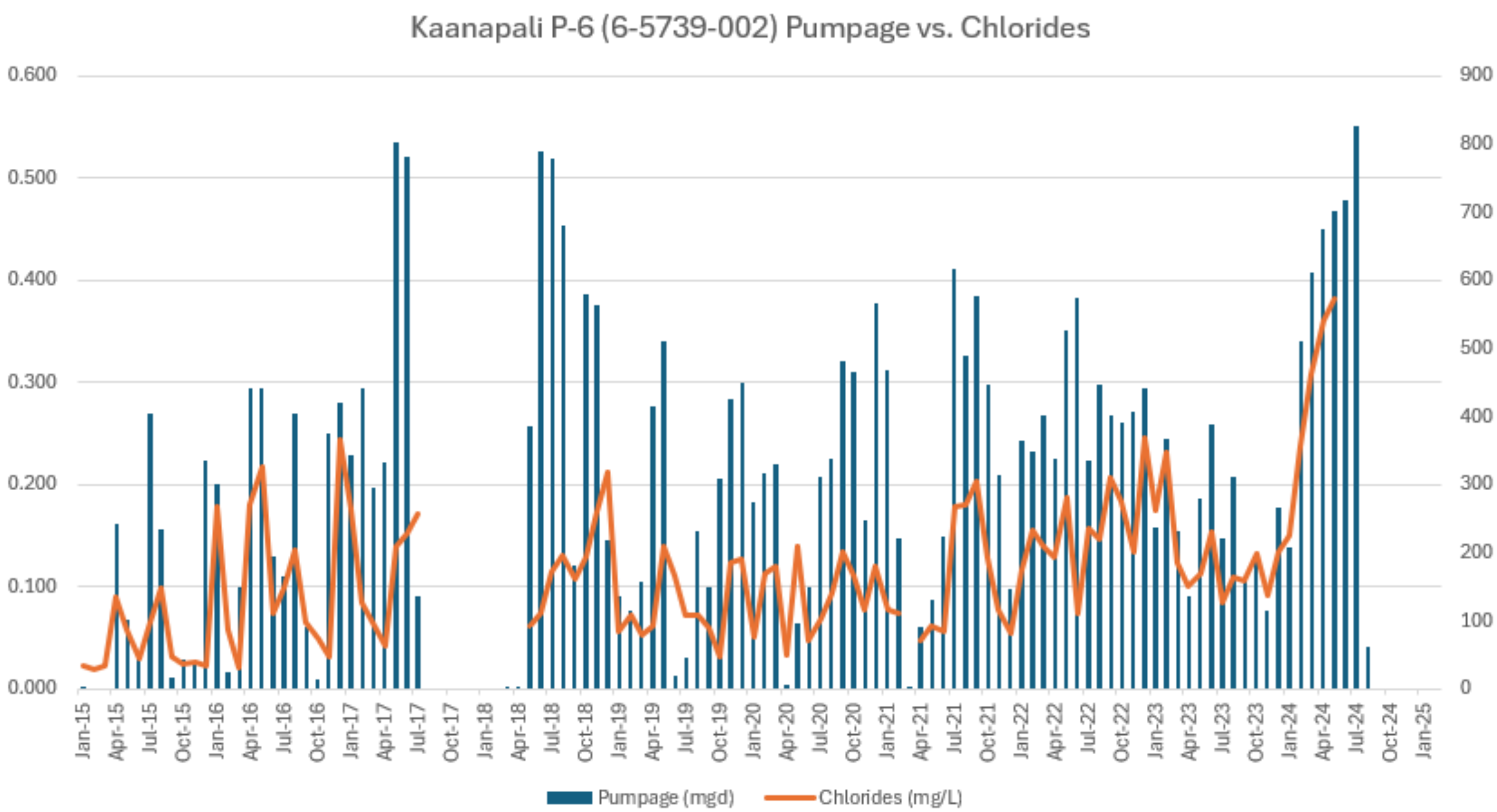
Jan-25
Pumpage (mgd)
Chlorides (mg/L)


Kaanapali P-6 (6-5739-002) Pumpage vs. Chlorides
0.600
0.500
0.400
0.300
0.200
0.100
0.000
900
800
700
600
500
400
300
200
100
0
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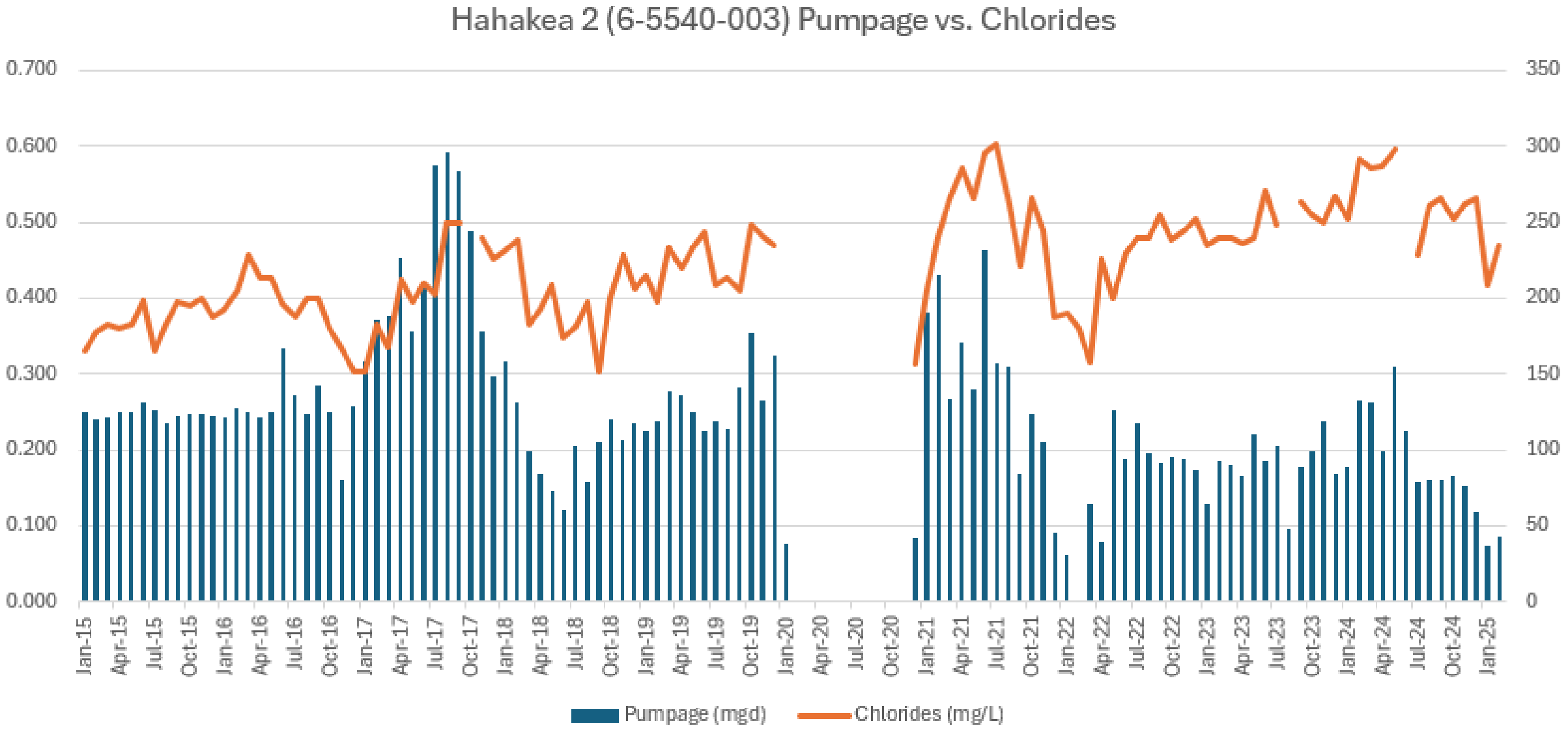
Jan-25
Pumpage (mgd)
Chlorides (mg/L)


Hahakea 2 (6-5540-003) Pumpage vs. Chlorides
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
350
300
250
200
150
100
50
0
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Jul-23
Oct-23
Jan-24
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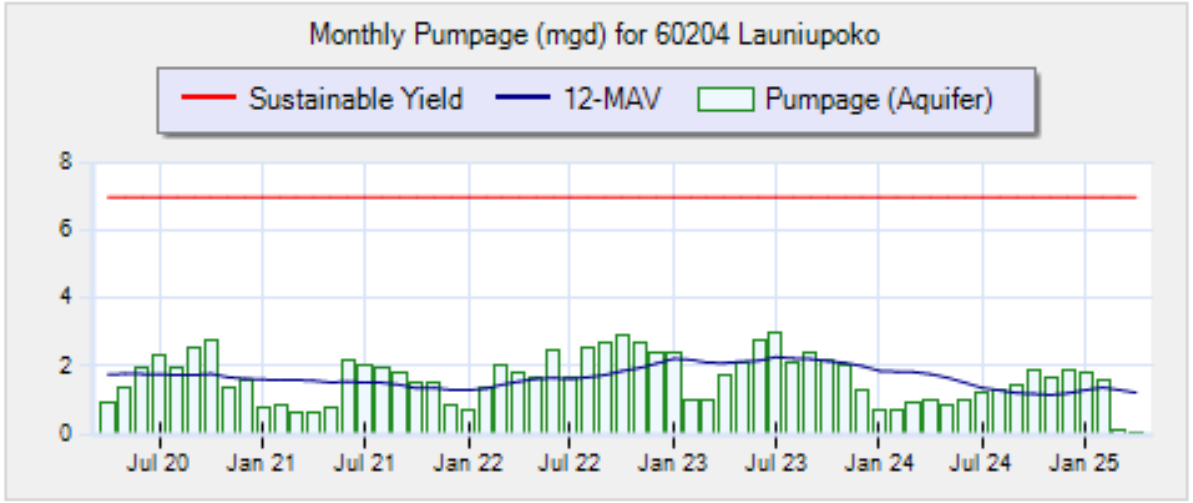
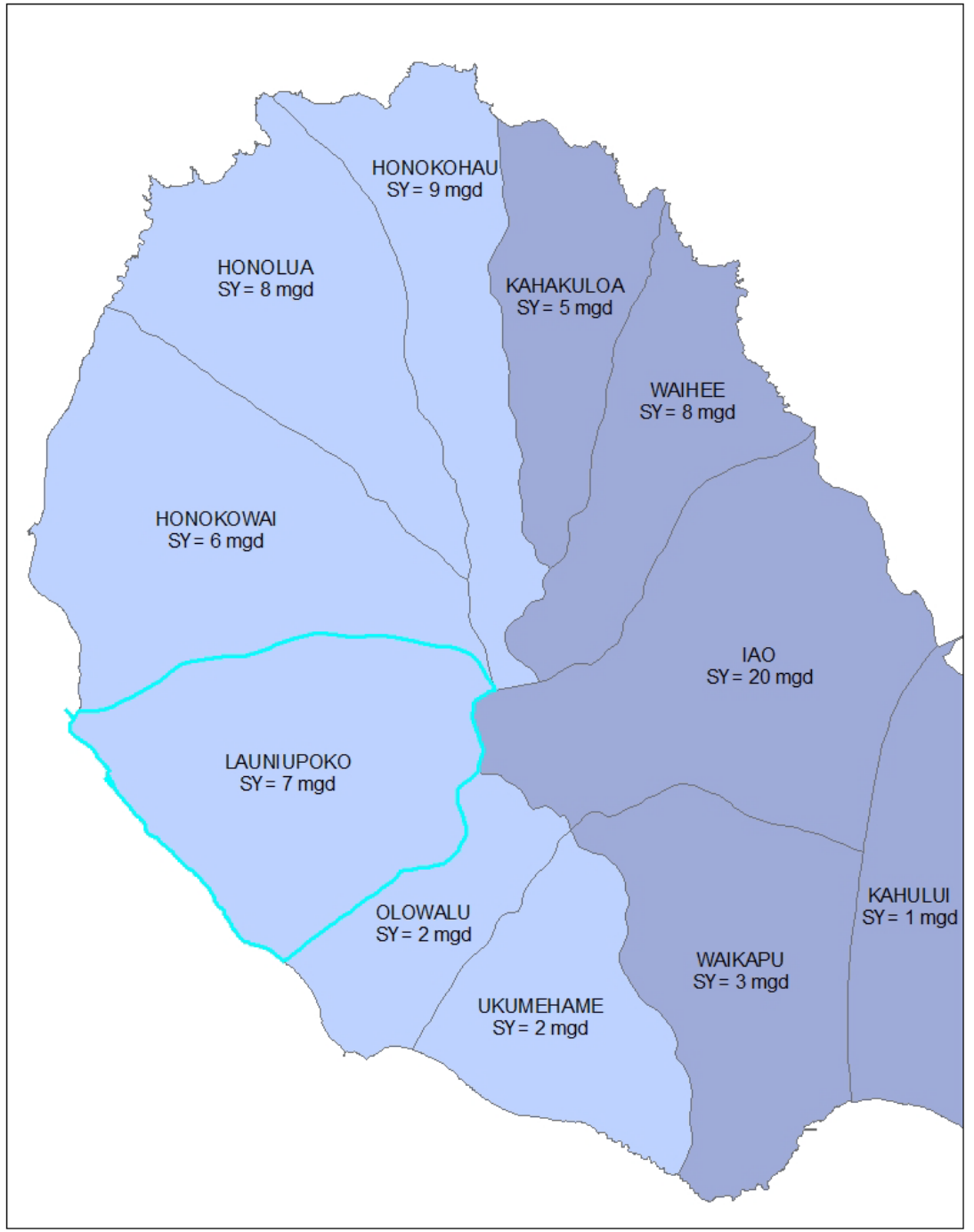
Oct-24
Jan-25
Pumpage (mgd)
Chlorides (mg/L)

Launiupoko Aquifer System Area

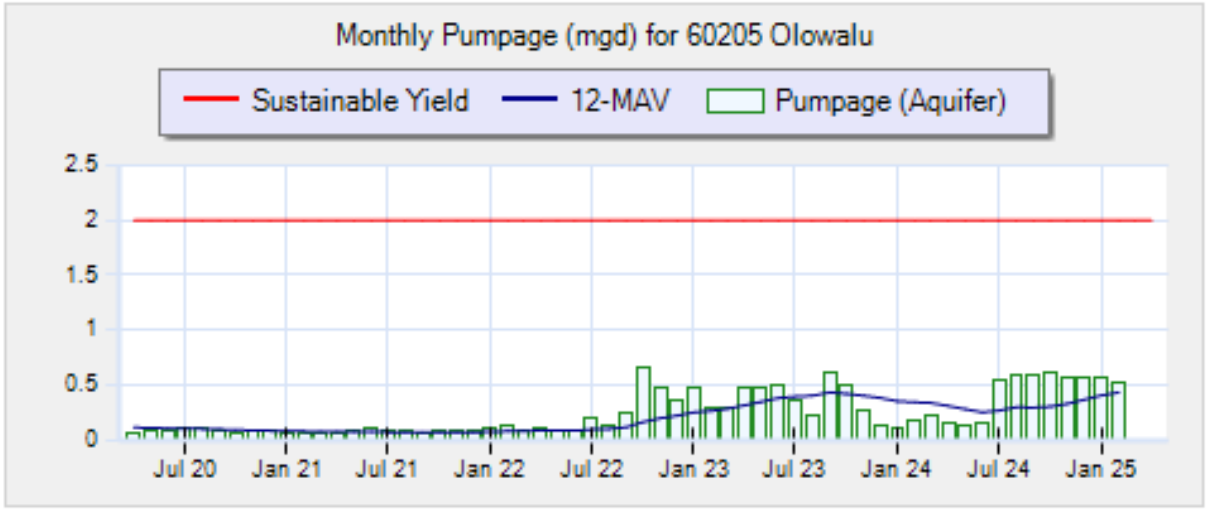
- Sustainable Yield = **7 million** gallons per day
- 12-month moving average through 12/31/2024 = **1.205 million** gallons per day

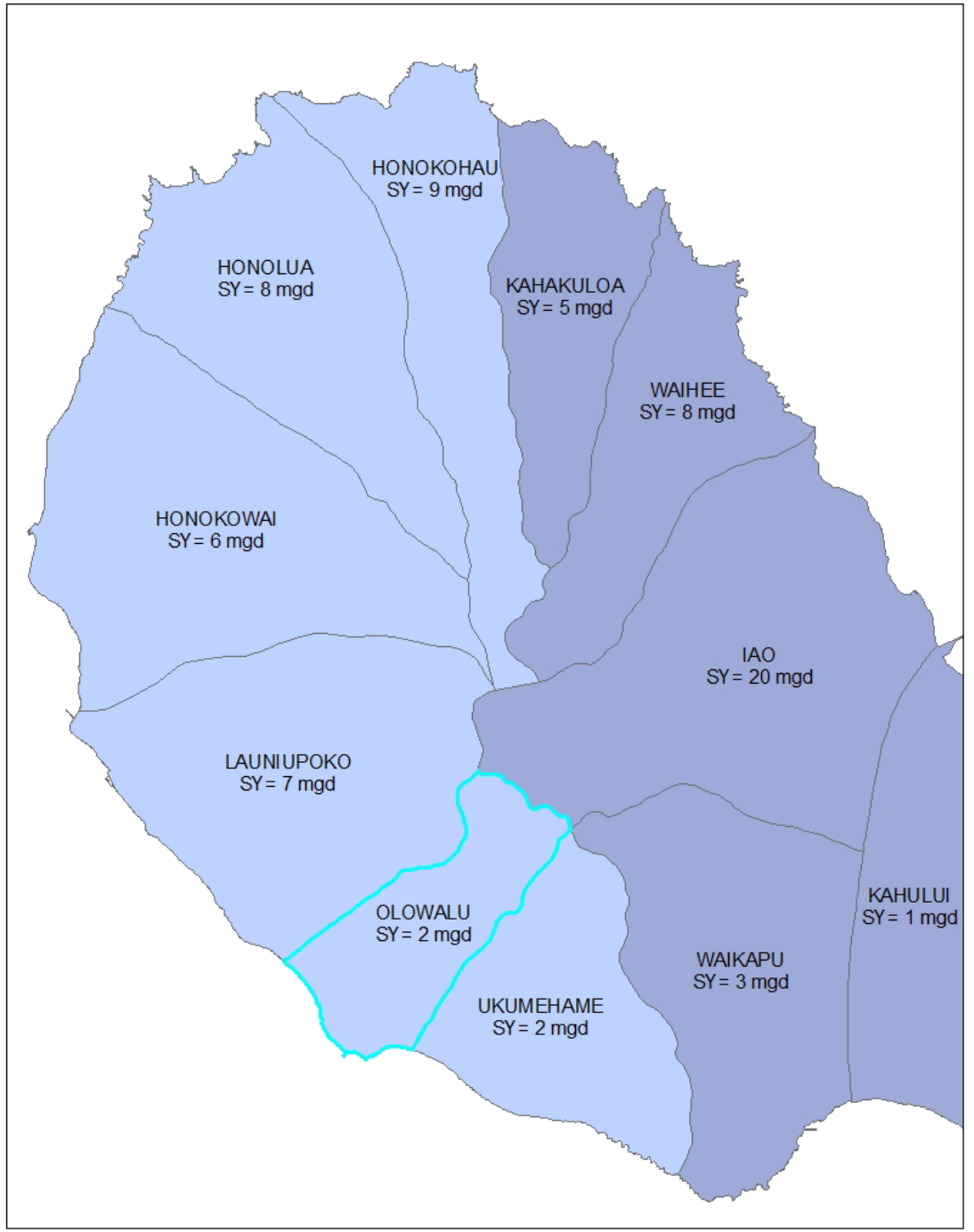




Olowalu Aquifer System Area

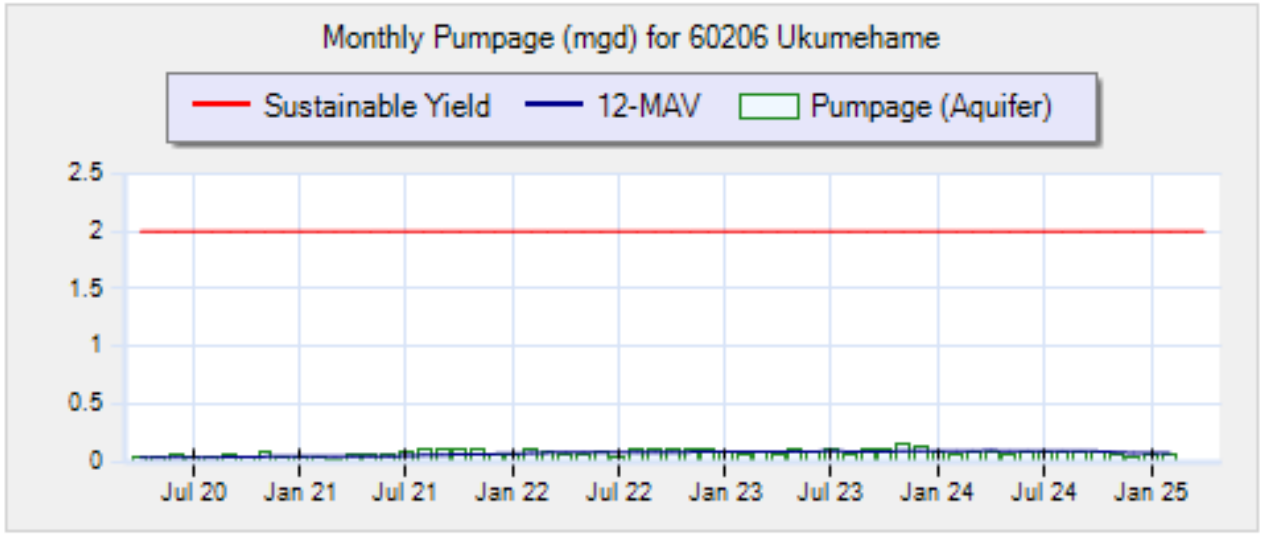
- Sustainable Yield = **2 million** gallons per day
- 12-month moving average through 12/31/2024 = **0.366 million** gallons per day

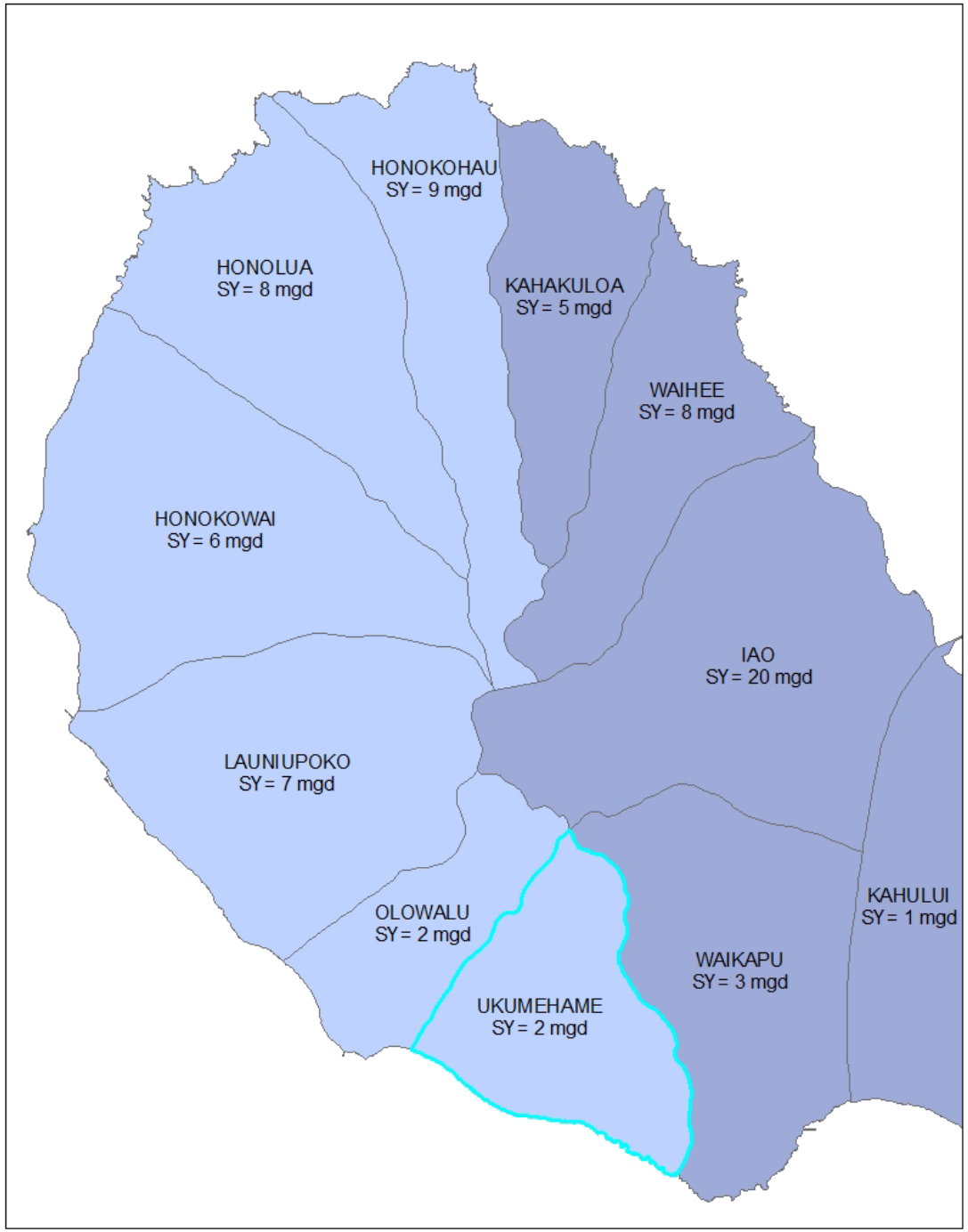




Ukumehame Aquifer System Area

- Sustainable Yield = **2 million** gallons per day
- 12-month moving average through 12/31/2024 = **0.074 million** gallons per day





LAHAINA WATER USE PERMITTING PROCESS

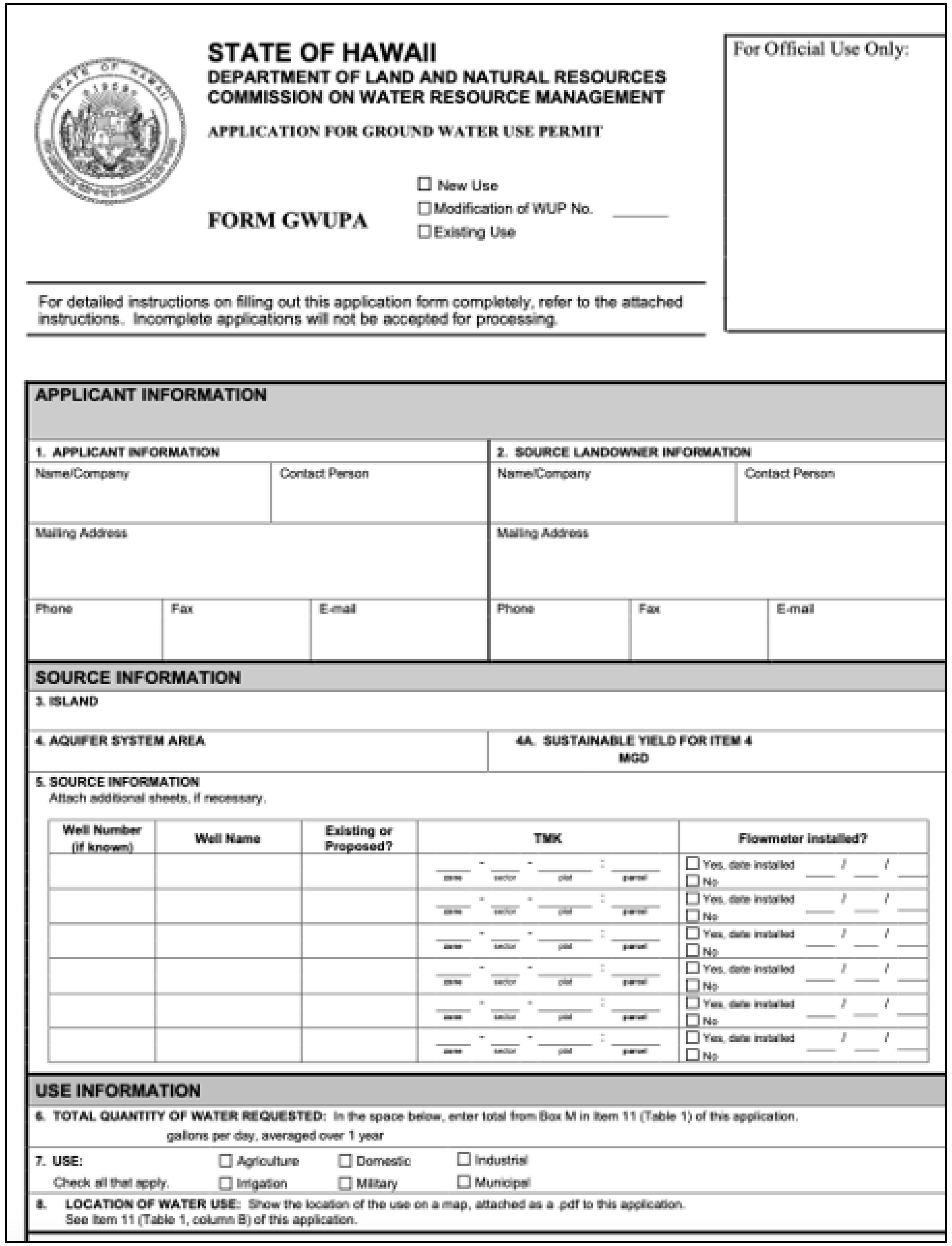
Background

- Most of West Maui designated as both a surface and ground water management area in August 2022
- Within designated water management areas, any withdrawal, impoundment, or consumptive use of water requires a water use permit
- Existing use applications were due August 7, 2023

Photo: Honokōhau Valley, ca. 1908, courtesy of Lahaina Restoration Foundation

Water Use Permits (WUP)

- Can be for ground or surface water
- Identifies quantity of water for each use (ex: 500,000 gpd for agriculture)
- Alternatives analysis
- Applicable to all water users (county and private)
- Except: catchment and individual domestic uses



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
APPLICATION FOR GROUND WATER USE PERMIT

For Official Use Only:

FORM GWUPA

☐ New Use
☐ Modification of WUP No. ______
☐ Existing Use

For detailed instructions on filling out this application form completely, refer to the attached instructions. Incomplete applications will not be accepted for processing.

APPLICANT INFORMATION

1. APPLICANT INFORMATION			2. SOURCE LANDOWNER INFORMATION		
Name/Company		Contact Person	Name/Company		Contact Person
Mailing Address			Mailing Address		
Phone	Fax	E-mail	Phone	Fax	E-mail

SOURCE INFORMATION

3. ISLAND

4. AQUIFER SYSTEM AREA

4A. SUSTAINABLE YIELD FOR ITEM 4 MGD

5. SOURCE INFORMATION
Attach additional sheets, if necessary.

Well Number (if known)	Well Name	Existing or Proposed?	TMK	Flowmeter installed?
			___ - ___ - ___ : ___ zone sector plat parcel	☐ Yes, date installed __ / __ / __ ☐ No
			___ - ___ - ___ : ___ zone sector plat parcel	☐ Yes, date installed __ / __ / __ ☐ No
			___ - ___ - ___ : ___ zone sector plat parcel	☐ Yes, date installed __ / __ / __ ☐ No
			___ - ___ - ___ : ___ zone sector plat parcel	☐ Yes, date installed __ / __ / __ ☐ No
			___ - ___ - ___ : ___ zone sector plat parcel	☐ Yes, date installed __ / __ / __ ☐ No
			___ - ___ - ___ : ___ zone sector plat parcel	☐ Yes, date installed __ / __ / __ ☐ No

USE INFORMATION

6. TOTAL QUANTITY OF WATER REQUESTED: In the space below, enter total from Box M in Item 11 (Table 1) of this application.
gallons per day, averaged over 1 year

7. USE: ☐ Agriculture ☐ Domestic ☐ Industrial
Check all that apply. ☐ Irrigation ☐ Military ☐ Municipal

8. LOCATION OF WATER USE: Show the location of the use on a map, attached as a .pdf to this application. See Item 11 (Table 1, column B) of this application.

Required Information

- ❑ Name and address of applicant and landowner
- ❑ Date
- ❑ Water source
- ❑ Quantity and quality of water requested
- ❑ Use of water and any limitations
- ❑ Location of use
- ❑ Location of well or diversion

Conditions for WUP

- ❑ Can be accommodated with available source
- ❑ Reasonable-beneficial use
- ❑ Will not interfere with any existing legal use of water
- ❑ Consistent with the public interest
- ❑ Consistent with state and county general plans and land use designations

More Conditions for WUP

Existing use:

- Cannot compete with another existing use of water
- If two or more existing use applications “compete” for the same water from an area, the Commission must hold a hearing to decide quantity and conditions

New use:

- If two applications compete or conflict, the Commission must try to accommodate both
- If not possible, the Commission shall approve the application that best serves the public interest

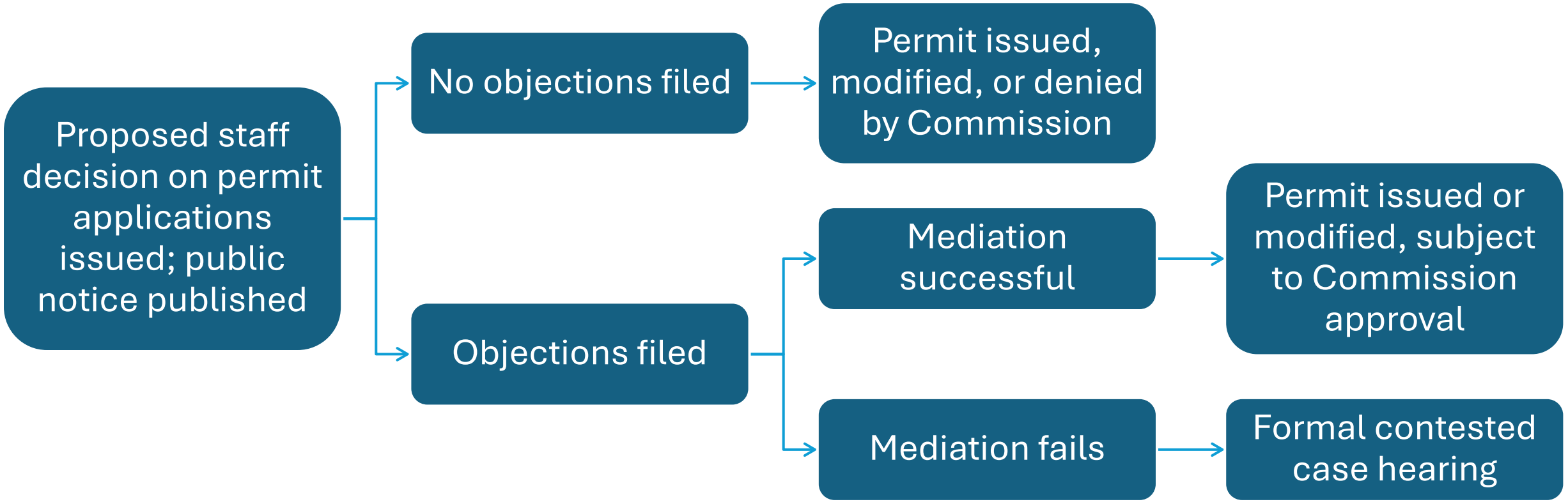
Other Requirements for WUP

- ❑ Public notice and opportunity to **object**
- ❑ **Public hearing** if objection received
- ❑ **Alternatives analysis**
- ❑ Does not interfere with **DHHL** reservations of water
- ❑ **Ka Paʻakai analysis** (impact on traditional and customary practices of Native Hawaiians)
- ❑ Allowable under the common law of Hawaiʻi

Public Hearing

- Contested case hearing under Chapter 91, HRS
- Must follow procedural due process (record, findings of fact/conclusions of law)
- Can involve discovery, cross-examination, expert testimony, and site visits
- Must be decided by the Commission
- May be appealed directly to the Hawai‘i Supreme Court
- **Alternative dispute resolution (mediation) will be encouraged**

Proposed Process Flowchart



Objections must be filed within 10 days from final publication of public notice

Applications Received – Surface Water

Hydrologic Unit	Existing Use	New Use
Ukumehame	2	1
Olowalu	1	1
Launiupoko	1	0
Kaua‘ula	6	8
Kahoma	17	5
Honokōwai	1	0
Honolua	2	0
Honokōhau	26	24

Applications Received – Ground Water

Hydrologic Unit	Existing Use	New Use
Ukumehame	2	2
Olowalu	3	5
Launiupoko	15	8
Honokōwai	11*	1
Honolua	5	1

*Letters sent regarding existing use applications

Common Missing Information

- Incorrect **source** location (TMK)
- Not legible or not complete
- Requested **water quantities** inconsistent or missing
- No or insufficient **alternatives** analysis
- Existing use applied for does not match actual existing use
- Well or stream diversion not properly permitted

Proposed Framework

- Beginning with Honokōwai GWMA and Honokōhau SWMA
- Tiered framework to prioritize and expedite public trust uses and affordable housing
- Tiers under discussion internally and will be announced for public comment this summer

RE-EVALUATING SUSTAINABLE YIELDS FOR LAHAINA

Background

- Considering the 2022 designation of Lahaina as a groundwater and surface water management area and the recently published 2023 USGS estimates of future recharge, CWRM has begun to reevaluate the sustainable yields for the Lahaina Aquifer Sector area.
- The purpose is to ascertain the amount of groundwater available for current and future uses in Lahaina.
- CWRM is focusing on Lahaina with plans to reevaluate SY in other areas depending on priorities and available resources.

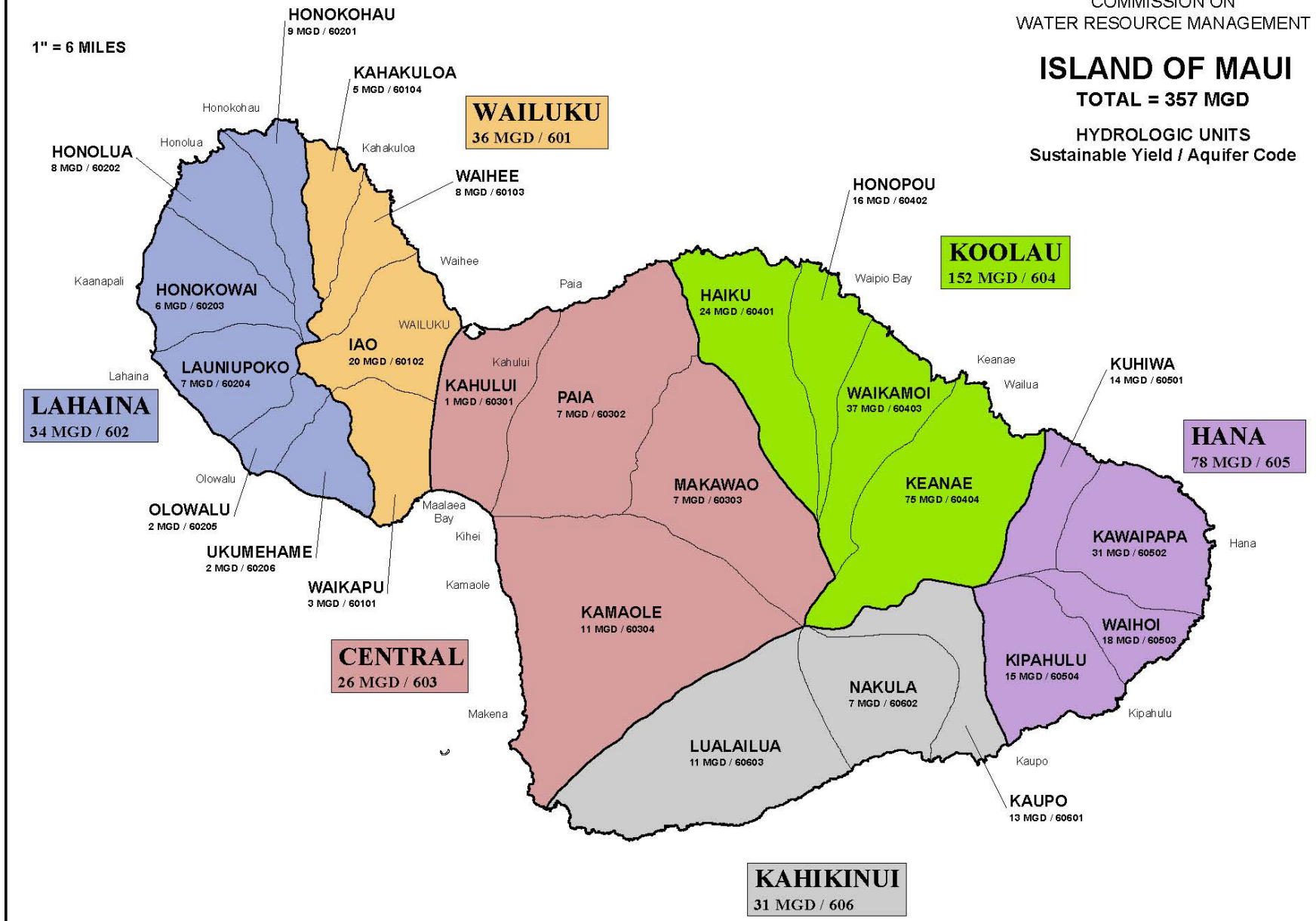
STATE OF HAWAII
COMMISSION ON
WATER RESOURCE MANAGEMENT

ISLAND OF MAUI

TOTAL = 357 MGD

HYDROLOGIC UNITS
Sustainable Yield / Aquifer Code

1" = 6 MILES



06/20/2018

Map Projection: Universal Transverse Mercator

Sustainable Yield

- "Sustainable yield" (SY) means the maximum rate at which water may be withdrawn from a water source without impairing the utility or quality of the water source as determined by the Commission.
- SY **sets the limits of the resource or available water** in an aquifer system area
- CWRM currently uses Robust Analytical Model (**RAM**) and RAM 2 for some aquifers with DMW
- Some hydrologists believe that RAM is outdated and not adequate given its limitations and the versatility of numerical models
- Numerical models can simulate flows based on aquifer properties and different recharge and pumping conditions, but will not provide a SY value directly

Lahaina Aquifer Conceptual Model

- 3 types of geologic formations Caprock, Basalt, Dike
- Water moves from high to low hydraulic head (pressure)
- Caprock is a barrier and holds back freshwater from easily flowing into the ocean
- Dikes are also barriers and builds up high water levels mauka

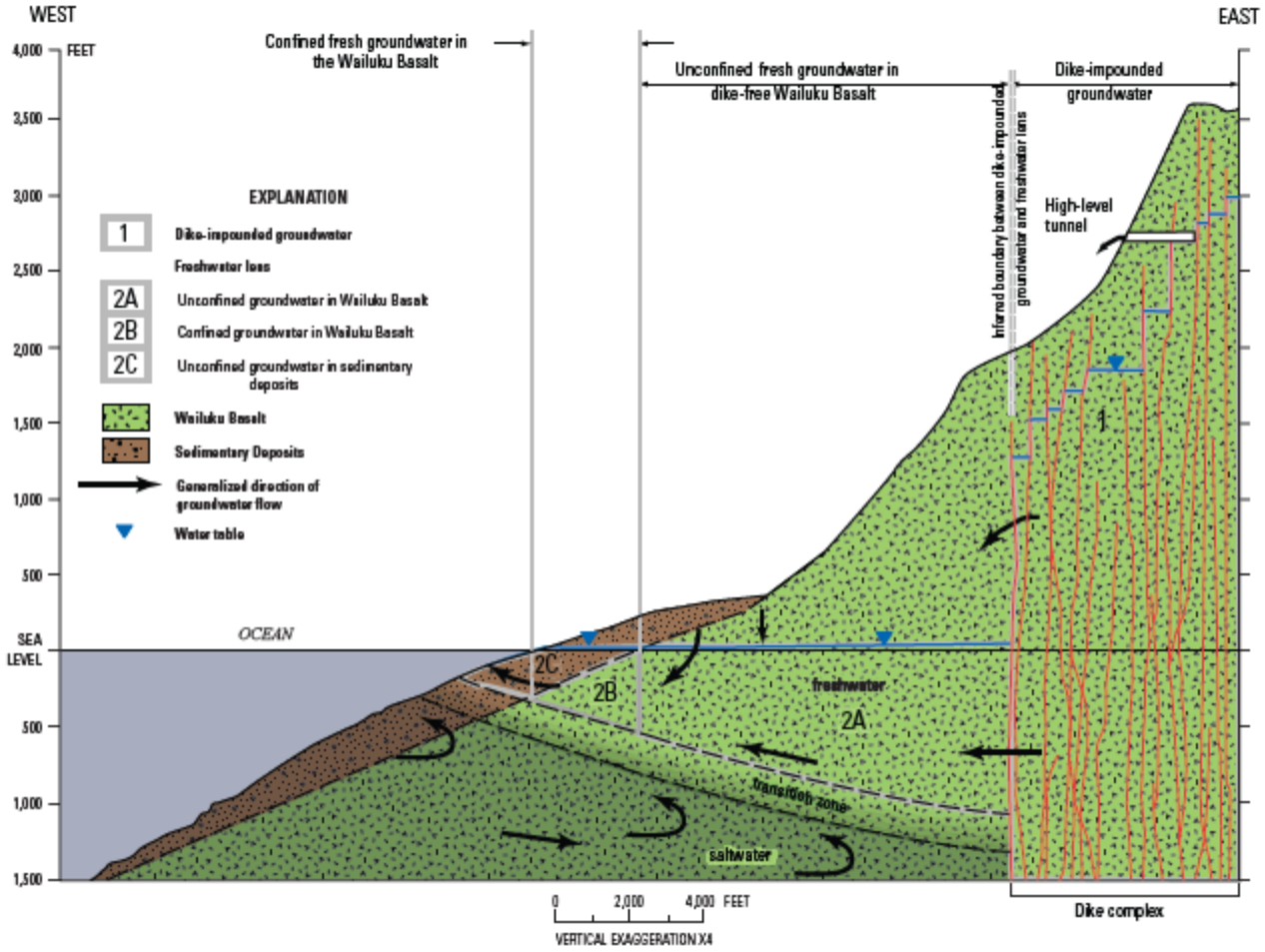


Figure 7. Geologic section of the Lahaina area showing groundwater occurrence and movement, west Maui, Hawai'i.

Figure source: USGS Scientific Investigations Report 2012-5010

Streams in Lahaina

- 11 major streams in Lahaina
- Most streams are losing streams where water in the streams percolate into the ground/aquifer
- Increasing stream flow would increase aquifer recharge

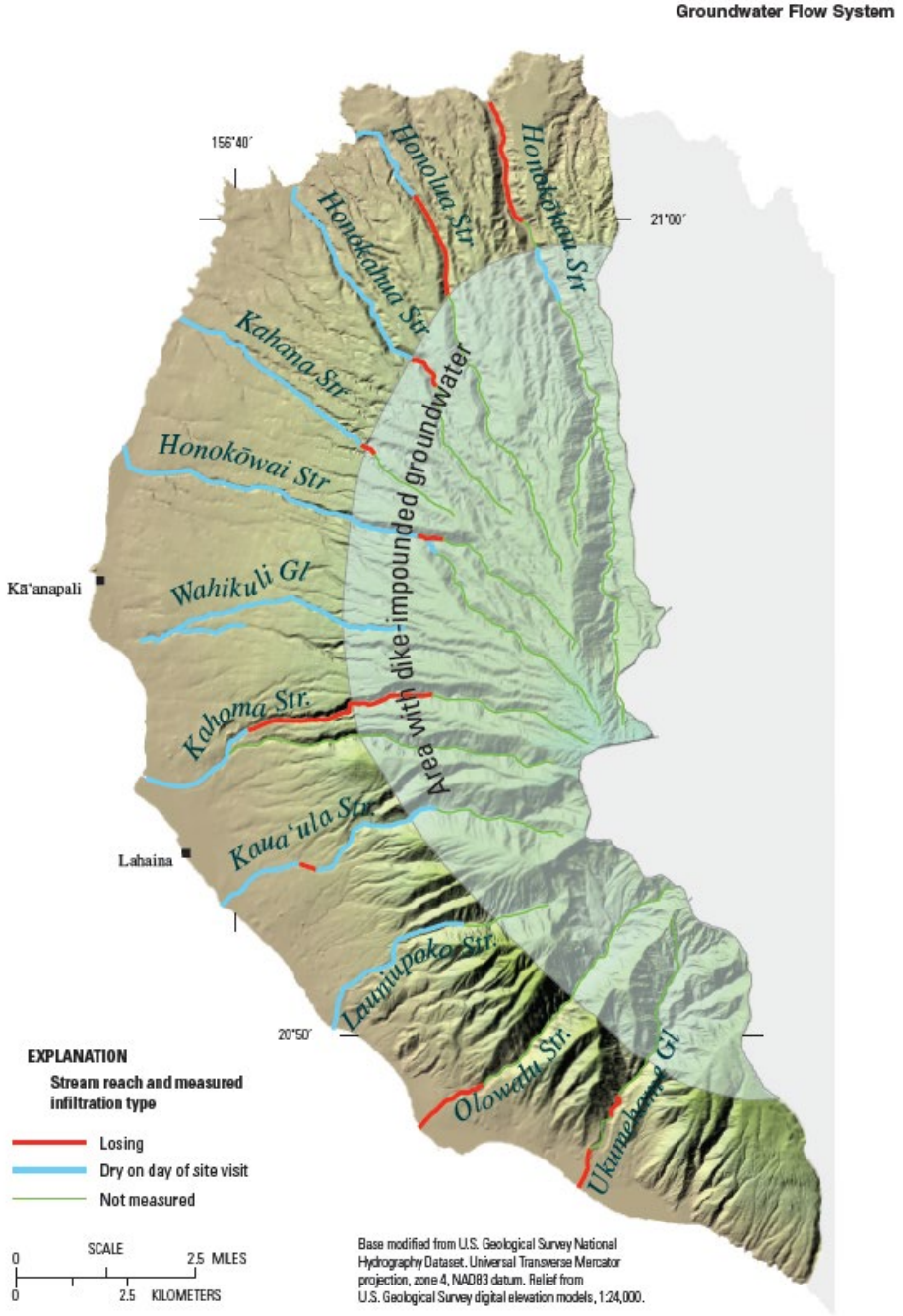


Figure 8. Measured losing and dry reaches in Lahaina District streams, west Maui, Hawai'i.

Methods of Estimating Sustainable Yields

- Recharge is a key component when estimating SY
- Robust Analytical Model (RAM) is simplified but has limitations
  - Pros: inexpensive, only requires recharge input, based on estimated initial water levels
  - Cons: assumes uniform aquifer, does not account for spatial distribution of recharge or withdrawals, cannot assess impacts to T&C and GDE
- Numerical models don't provide a SY value (MGD) but they simulate water levels, chloride levels, stream flow, and coastal discharge based on withdrawals (pumping) and recharge scenarios
  - Pros: accounts for complex geology; provides simulation of groundwater flow; can simulate multiple scenarios and impacts over long periods
  - Cons: does not provide a SY value, expensive and time consuming, limited aquifer data
- A SY can be selected based on the impacts or level of "impairment" that the Commission determines is acceptable

Resources

- **USGS Scientific Investigations Report 2012–5010:** Groundwater Availability in the Lahaina District, West Maui, Hawai‘i
  - Constructs a numerical groundwater model to simulate water levels, chlorides, and transition zone movement based on various future land use, pumping and recharge conditions.
  - This “Lahaina Model” was developed for the entire Lahaina Aquifer Sector Area.
- **USGS SIR 2023–5130**: Estimated Groundwater Recharge for Mid-Century and End-of-Century Climate Projections, Kaua‘i, O‘ahu, Moloka‘i, Lāna‘i, Maui, and the Island of Hawai‘i
- **USGS ongoing study** of Maui aquifers (completion in 2025)
- Relevant **GDE scientific studies** in the area
- Indigenous/traditional ecologic knowledge – **kilo**

Process for SY Reevaluation

- Met with “Water Professional” group (hydrologists + MDWS) to determine the best approach to reevaluating and revising Lahaina SY
- Meet with **traditional and customary practitioners** to learn what and where the practices are in the area; and **groundwater dependent ecosystems experts** to learn how the ecosystem interacts with coastal and submarine freshwater discharge – circa May 2025
- **Combined meeting** to discuss reevaluation of SY and options
- CWRM approval of revised SY if necessary
- Additional monitoring and model refinement

Range of Selected Recharge Estimates and Computed RAM SY for Lahaina Since 1990

							USGS SIR 2012-5010 2000–04 land use without plantation-scale agriculture and 1926–2004 rainfall		USGS SIR 2023-5130 Baseline		USGS SIR 2023-5130 Mid-Century		USGS SIR 2023-5130 Dry Scenario		USGS SIR 2023-5130 Wet Scenario	
System	**Aquifer Systems with DMWs**	**1990 Recharge Mink**	**2019 D/I**	**1990 SY MGD**	**2019 CWRM SY Range MGD**	**2019 CWRM SY MGD**	**Recharge**	**RAM Sustainable Yield**	**Recharge**	**RAM Sustainable Yield**	**Recharge**	**RAM Sustainable Yield**	**Recharge**	**RAM Sustainable Yield**	**Recharge**	**RAM Sustainable Yield**
HONOKOHAU		17	0.51	**10**	**9 - 17**	**9**	27.5	**14**	32.56	**17**	30.35	**15**	29.38	**15**	35.51	**18**
HONOLUA		19	0.44	**8**	**8 - 12**	**8**	19.06	**8**	24.06	**11**	21.44	**9**	20.63	**9**	25.65	**11**
HONOKOWAI	X	13	0.44	**8**	**6 - 16**	**6**	29.07	**13**	32.6	**14**	27.34	**12**	25.46	**11**	34.27	**15**
LAUNIPOKO		16	0.44	**8**	**7 - 18**	**7**	33.94	**15**	38.55	**17**	30.55	**13**	28.58	**13**	38.95	**17**
OLOWALU		4	0.44	**3**	**2 - 7**	**2**	14.53	**6**	11.28	**5**	7.31	**3**	6.38	**3**	11.55	**5**
UKUMEHAME		4	0.44	**3**	**2 - 6**	**2**	13.64	**6**	11.24	**5**	5.44	**2**	3.62	**2**	10.78	**5**
		73		**40**		**34**	89*	**63****	150	**68**	122	**56**	114	**52**	157	**71**

*SIR 2012-5010 uses 89 mgd recharge for Lahaina (dike zone excluded). Recharge also includes estimated horizontal recharge from dike zone.

** Computed using RAM and individual aquifer system recharge and did not consider dike zone contribution to recharge.

Range of Recharge Estimates for Lahaina Since 1990

Aquifer System	RAM SY (1990)	D/I - Mink's actual original	D/I 2019 CWRM Check	1990 Recharge	2008 SWAPP Generated Revised Recharge	Engott 2007 Maui	Engott 2012 Lahaina Maui	Engott, Johnson 2014 Maui (Average Climate B)	Engott, Johnson 2014 Maui (Average Climate B) (with USGS correction)	Mair, Alan 2019 - 2017 Land Cover	Mair, Alan 2019 - 2017 Land Cover (SD RCP8.5 2071-99)	Mair, Alan 2019 - 2017 Land Cover (HRCM A1B 2080-99)	2019 SY Range	SY 2019 (7/16/19)	Kane et al, 2023 SIR 2023-5130 Baseline Recharge	Kane et al, 2023 SIR 2023-5130 Mid-Century Recharge	Kane et al, 2023 SIR 2023-5130 Dry Scenario Recharge	Kane et al, 2023 SIR 2023-5130 Wet Scenario Recharge
Honokohau	10	0.59	0.51	17	33	33.41	27.5	32.4	32.87	33.60	30.51	37.08	9 - 17	9	32.56	30.35	29.38	35.51
Honolua	8	0.42	0.44	19	25	24.08	19.06	26.9	26.43	26.78	23.31	29.01	8 - 12	8	24.06	21.44	20.63	25.65
Honokowai	8	0.62	0.44	13	26	26.51	29.07	36.4	35.86	36.18	26.68	38.25	6 - 16	6	32.6	27.34	25.46	34.27
Launiupoko	8	0.50	0.44	16	31	32.83	33.94	41.0	40.54	42.68	31.54	42.58	7 - 18	7	38.55	30.55	28.58	38.95
Olowalu	3	0.75	0.44	4	16	16.45	14.53	13.0	12.76	14.43	8.50	14.66	2 - 7	2	11.28	7.31	6.38	11.55
Ukumehame	3	0.75	0.44	4	12	13.49	13.64	13.7	13.50	15.17	5.50	14.49	2 - 6	2	11.24	5.44	3.62	10.78
				73	143.53	146.77	137.74	163.4	161.96	168.84	126.04	176.07		34	150.29	122.43	114.05	156.71

*SIR 2012-5010 uses 89 mgd recharge for Lahaina (dike zone excluded)

Recharge includes horizontal recharge from dike zone

KAHANA WELL
REQUEST FOR DECLARATORY RULING

Kahana Well

- Request for declaratory ruling
- Purpose: to allow Kahana Well to be used for reliable capacity to serve existing uses in Lahaina, including temporary housing and rebuilding burned structures, until WUPA is acted on
- Draft request received
- To be heard by Commission on April 28

Kahana Well

For more information…

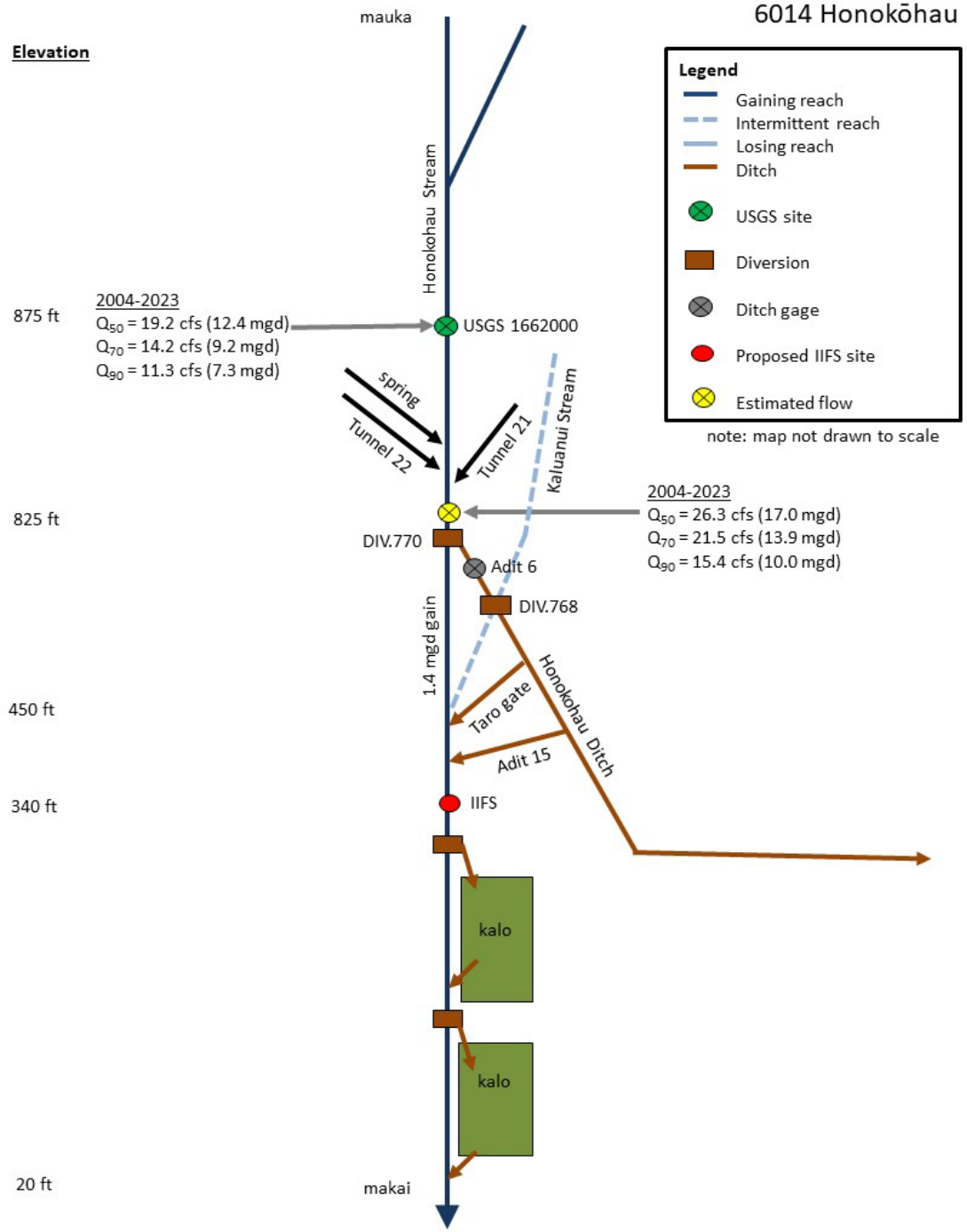
- Presentation provided by Maui DWS at Maui Recovers Lahaina Community Webinar, March 19
- Links and recording can be found on Maui Recovers website
- Slides: https://drive.google.com/file/d/1997VCaelaXqoHHWvK-PLEAO0uuIFkX3j/view
- Maui DWS presentation (timestamp 34:05): https://youtu.be/d_rVkF6zmgo?si=aPiKeE5T_UCJJ6Tz&t=2045

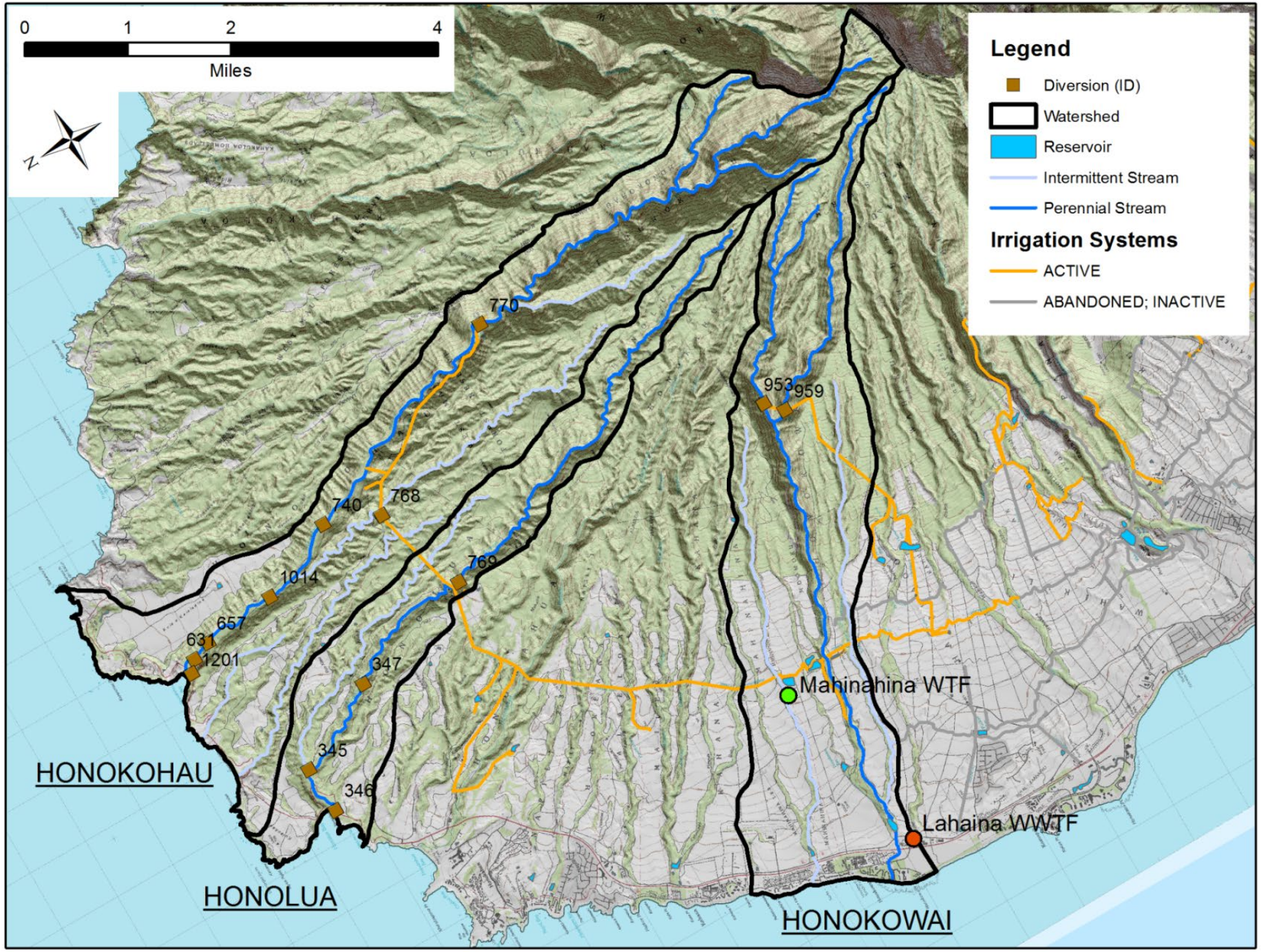
April 28 Commission Meeting

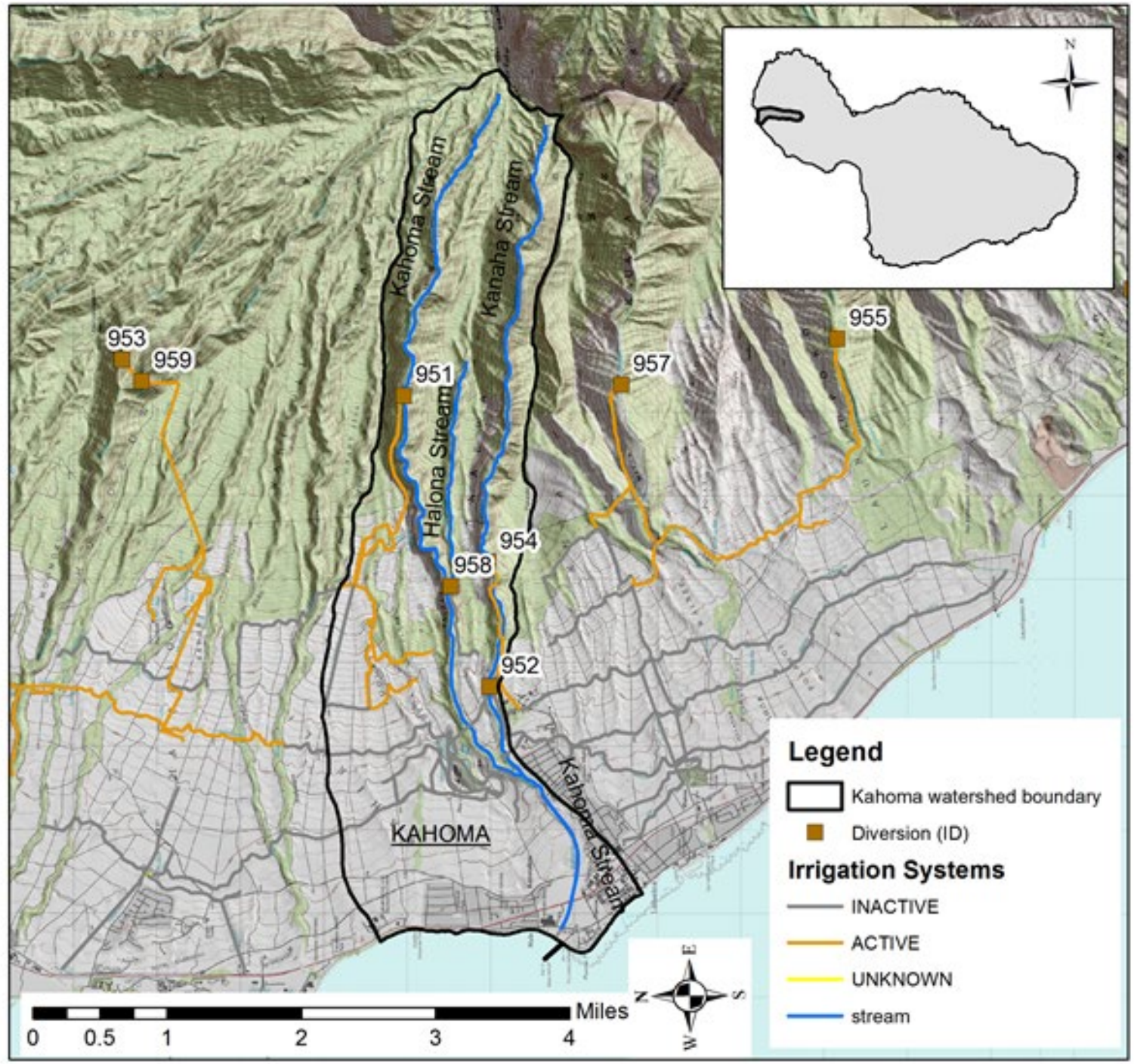
- Lahaina Civic Center and Zoom
- 9:30 a.m.
- Agenda and submittals will be posted at least 1 week in advance
- Livestream on Youtube:
  https://www.youtube.com/user/dlnrcwrm/

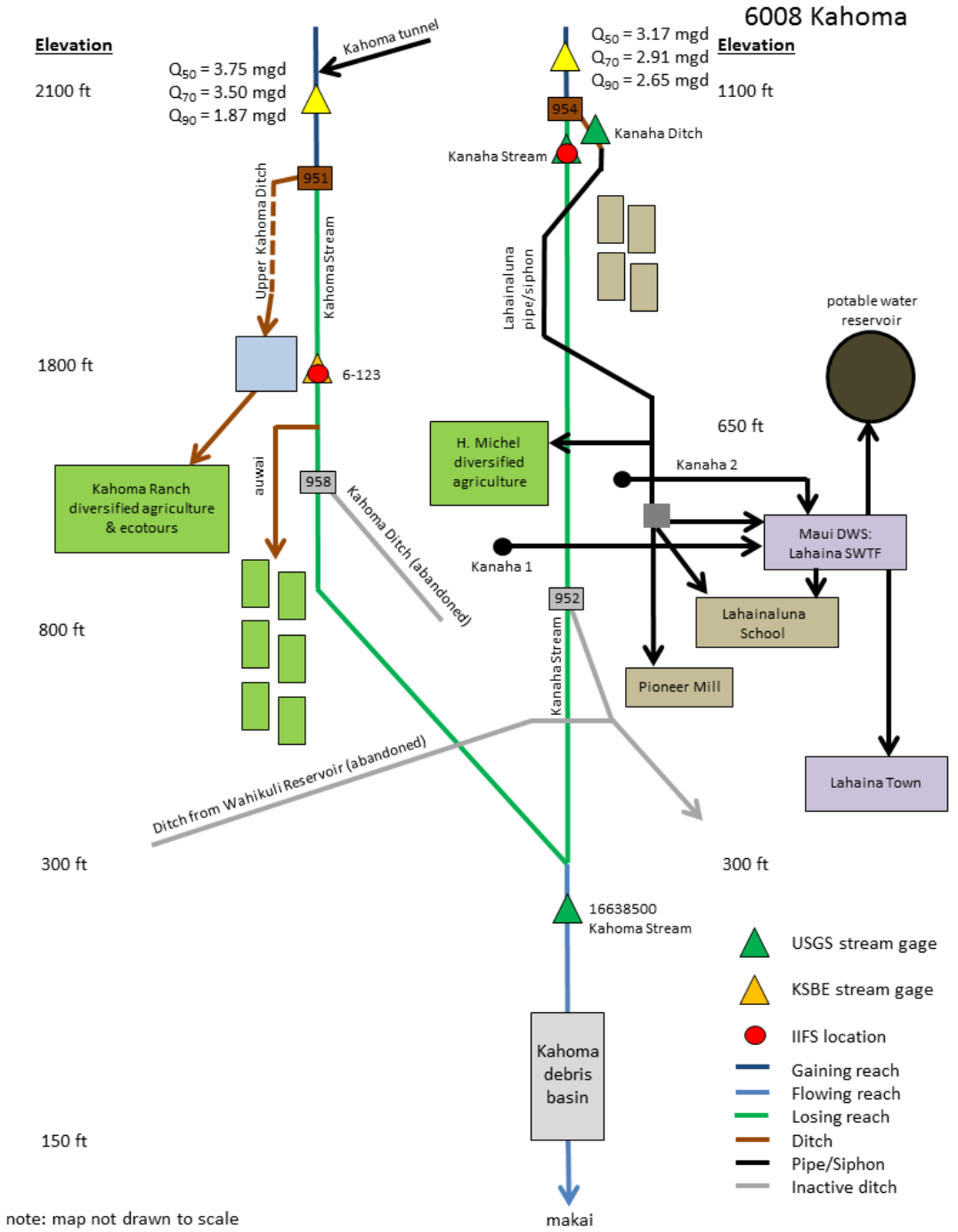
Questions

ADDITIONAL DIAGRAMS

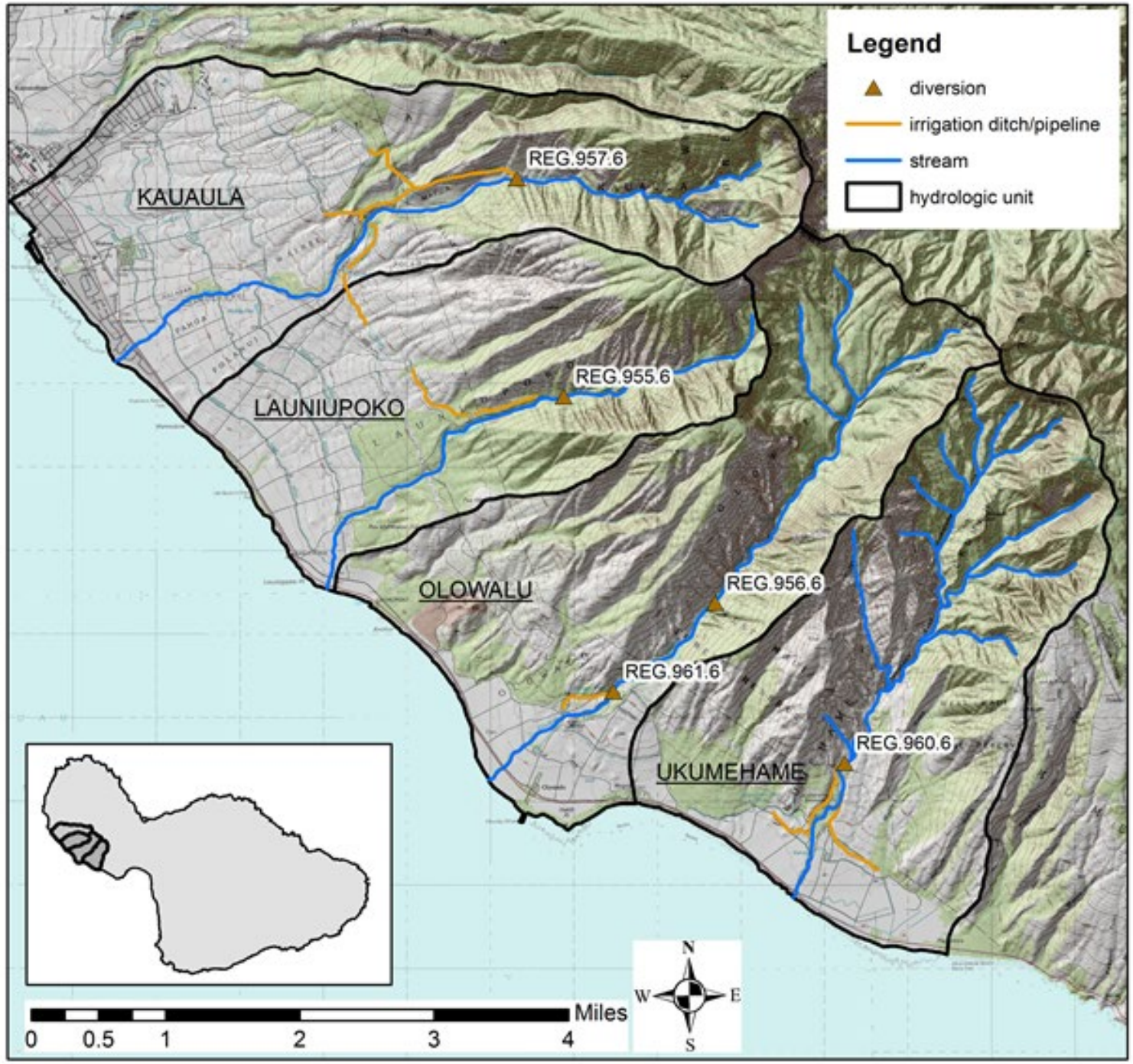

6014 Honokōhau
mauka
Elevation
Legend
Gaining reach
Intermittent reach
Losing reach
Ditch
USGS site
Diversion
Ditch gage
Proposed IIFS site
Estimated flow
note: map not drawn to scale
Honokohau Stream
875 ft
2004-2023
Q_{50} = 19.2 cfs (12.4 mgd)
Q_{70} = 14.2 cfs (9.2 mgd)
Q_{90} = 11.3 cfs (7.3 mgd)
USGS 1662000
spring
Tunnel 22
Tunnel 21
Kaluanui Stream
825 ft
2004-2023
Q_{50} = 26.3 cfs (17.0 mgd)
Q_{70} = 21.5 cfs (13.9 mgd)
Q_{90} = 15.4 cfs (10.0 mgd)
DIV.770
Adit 6
DIV.768
1.4 mgd gain
Honokohau Ditch
450 ft
Taro gate
Adit 15
340 ft
IIFS
kalo
kalo
20 ft
makai

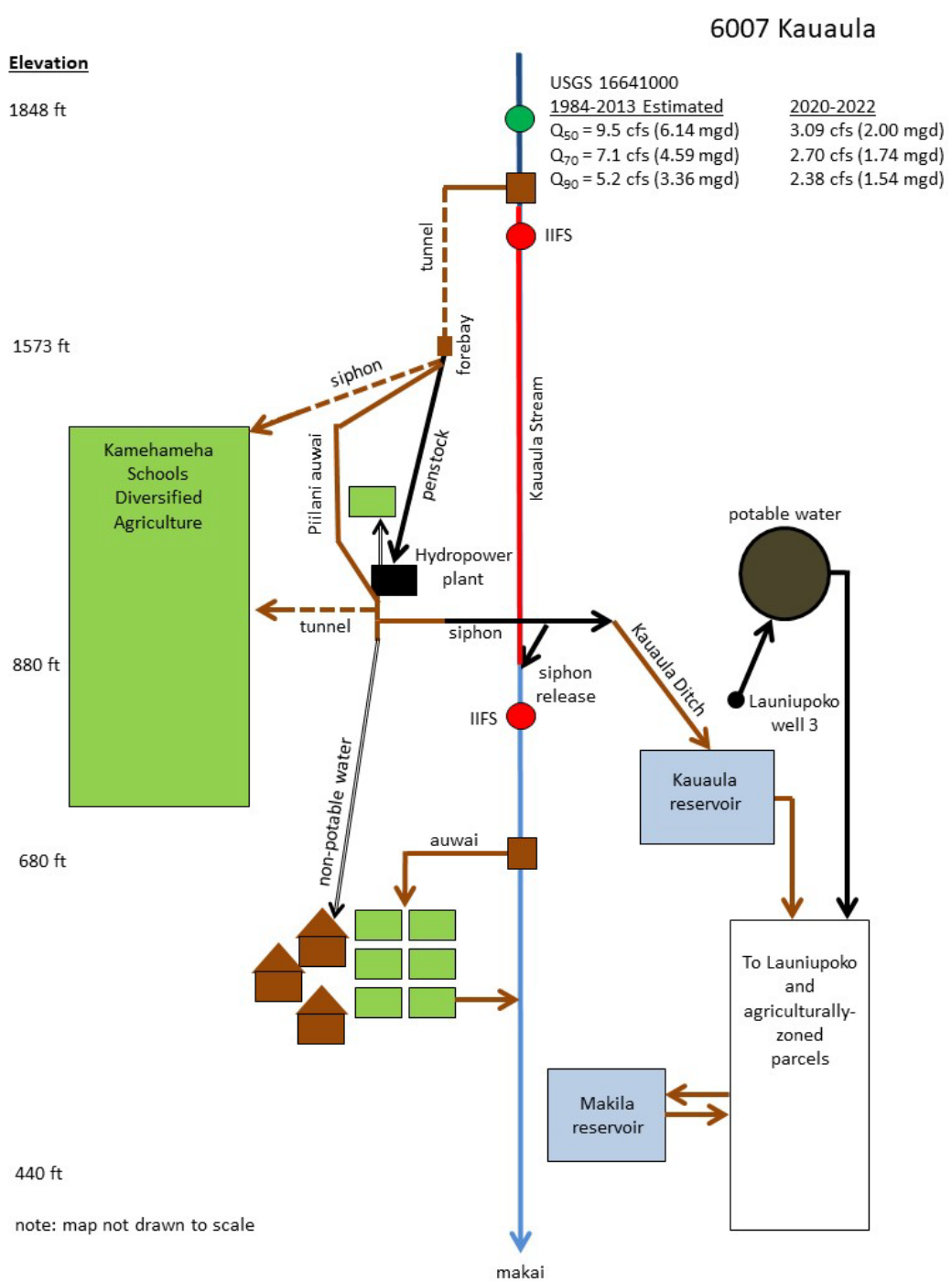

0
1
2
4
Miles
N
Legend
Diversion (ID)
Watershed
Reservoir
Intermittent Stream
Perennial Stream
Irrigation Systems
ACTIVE
ABANDONED; INACTIVE
770
953
959
740
768
769
1014
657
631
1201
347
345
346
Mahinahina WTF
Lahaina WWTF
HONOKOHAU
HONOLUA
HONOKOWAI

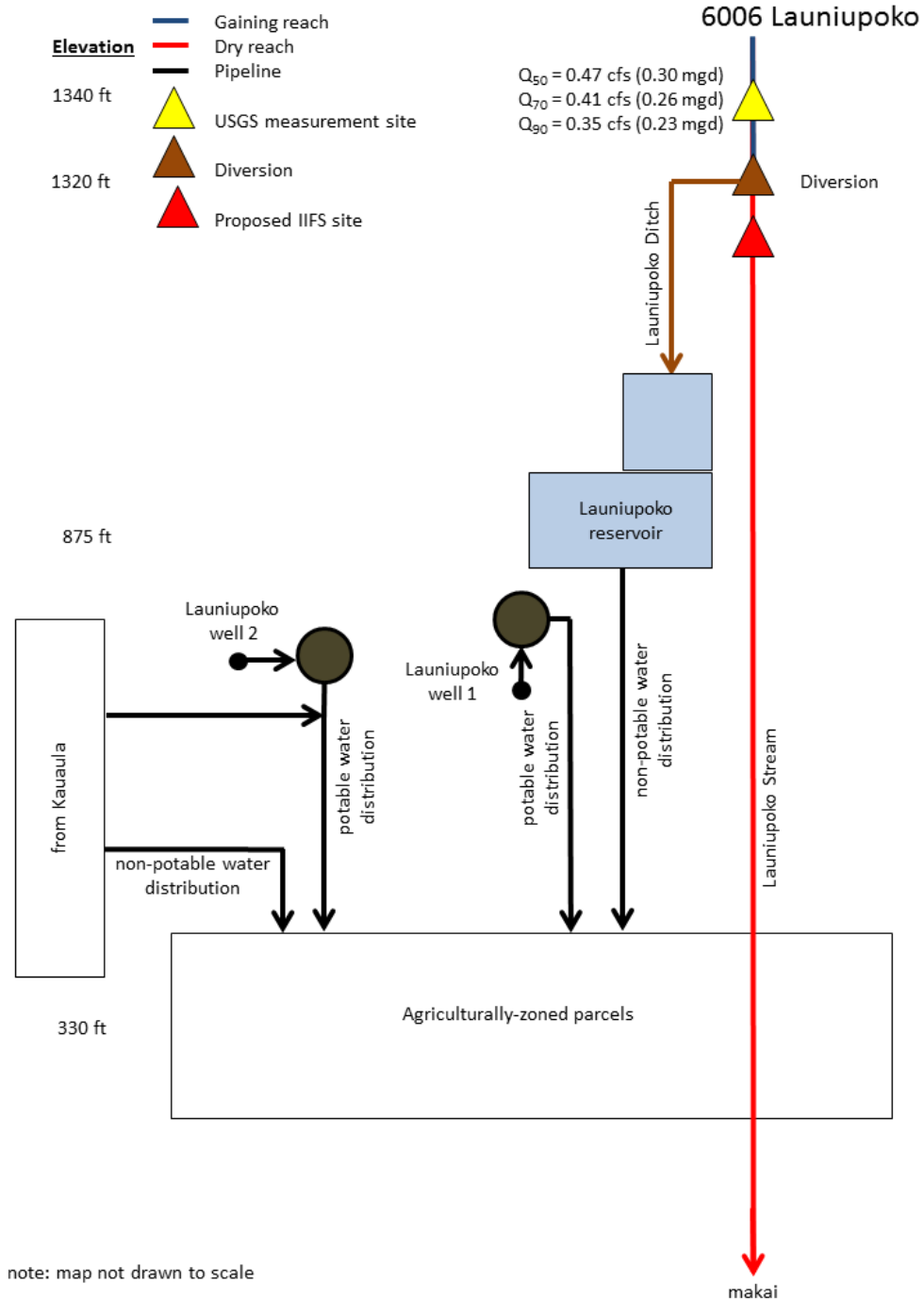

Kahoma Stream
Kanaha Stream
Halona Stream
Kahoma Stream
953
959
951
957
955
954
958
952
KAHOMA
N
Legend
Kahoma watershed boundary
Diversion (ID)
Irrigation Systems
INACTIVE
ACTIVE
UNKNOWN
stream
Miles
0
0.5
1
2
3
4
N
E
S
W

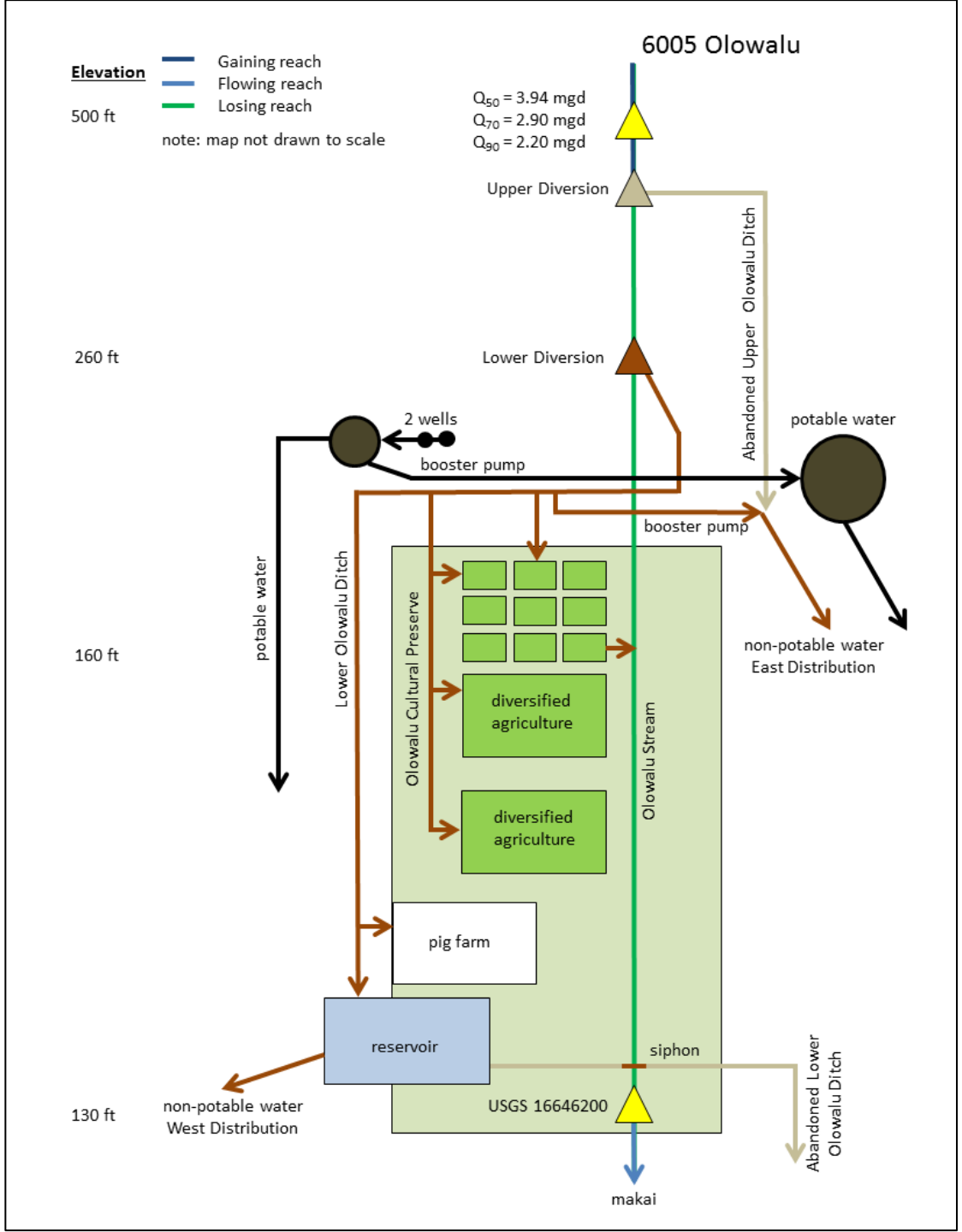


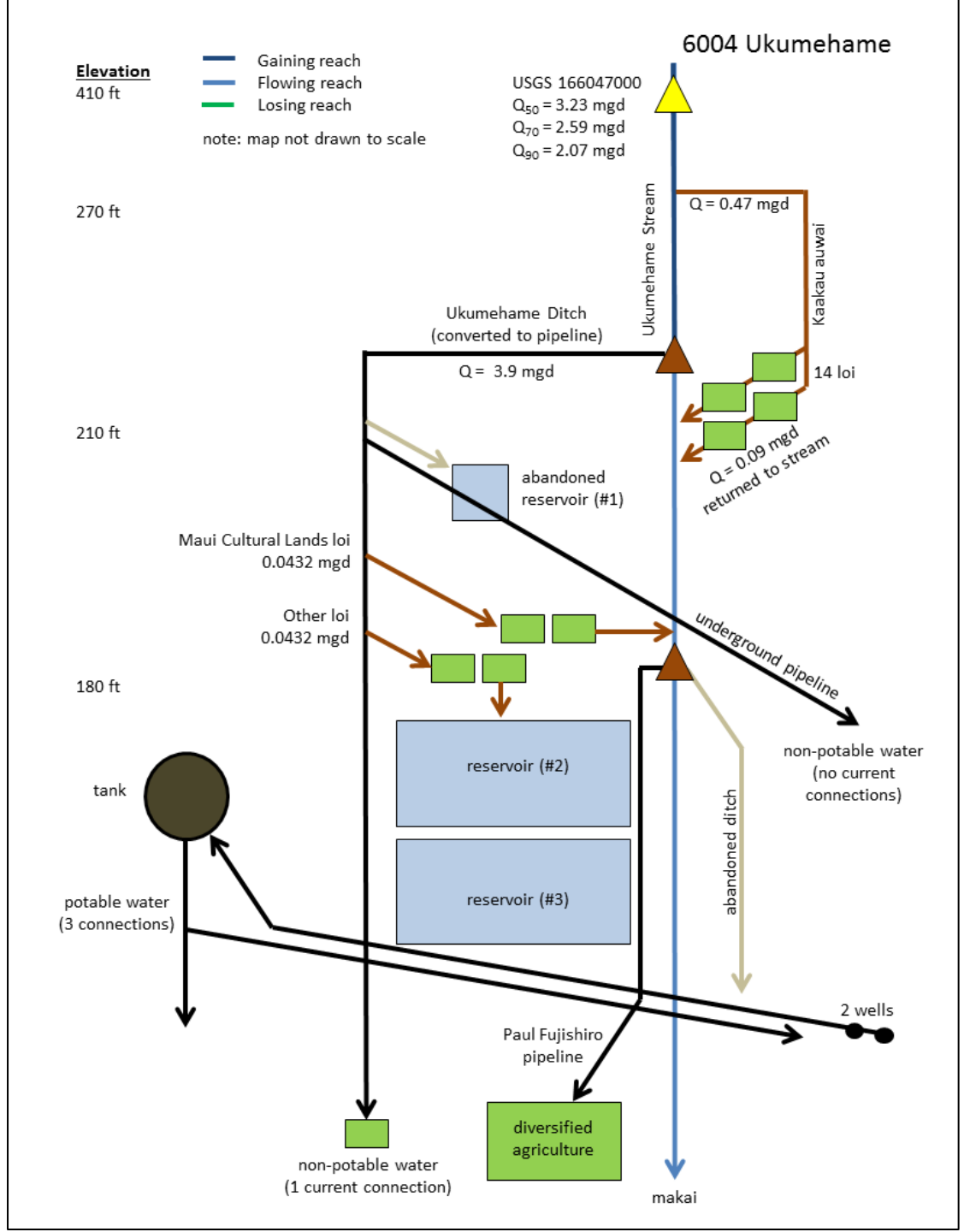
note: map not drawn to scale


Legend
diversion
irrigation ditch/pipeline
stream
hydrologic unit
REG.957.6
REG.955.6
REG.956.6
REG.961.6
REG.960.6
KAUAULA
LAUNIUPOKO
OLOWALU
UKUMEHAME
Miles
0
0.5
1
2
3
4
N
W
E
S


6007 Kauaula
Elevation
1848 ft
1573 ft
880 ft
680 ft
440 ft
USGS 16641000
1984-2013 Estimated
Q_{50} = 9.5 cfs (6.14 mgd)
Q_{70} = 7.1 cfs (4.59 mgd)
Q_{90} = 5.2 cfs (3.36 mgd)
2020-2022
3.09 cfs (2.00 mgd)
2.70 cfs (1.74 mgd)
2.38 cfs (1.54 mgd)
IIFS
tunnel
forebay
siphon
penstock
Piilani auwai
Kauaula Stream
Kamehameha Schools Diversified Agriculture
Hydropower plant
tunnel
siphon
siphon release
IIFS
Kauaula Ditch
potable water
Launiupoko well 3
Kauaula reservoir
non-potable water
auwai
To Launiupoko and agriculturally-zoned parcels
Makila reservoir
makai
note: map not drawn to scale


6006 Launiupoko
Elevation
1340 ft
1320 ft
875 ft
330 ft
Gaining reach
Dry reach
Pipeline
USGS measurement site
Diversion
Proposed IIFS site
Q_{50} = 0.47 cfs (0.30 mgd)
Q_{70} = 0.41 cfs (0.26 mgd)
Q_{90} = 0.35 cfs (0.23 mgd)
Diversion
Launiupoko Ditch
Launiupoko reservoir
Launiupoko well 2
Launiupoko well 1
from Kauaula
non-potable water distribution
potable water distribution
potable water distribution
non-potable water distribution
Launiupoko Stream
Agriculturally-zoned parcels
makai
note: map not drawn to scale


6005 Olowalu
Elevation
500 ft
260 ft
160 ft
130 ft
Gaining reach
Flowing reach
Losing reach
note: map not drawn to scale
Q50 = 3.94 mgd
Q70 = 2.90 mgd
Q90 = 2.20 mgd
Upper Diversion
Lower Diversion
Abandoned Upper Olowalu Ditch
2 wells
booster pump
potable water
booster pump
potable water
Lower Olowalu Ditch
Olowalu Cultural Preserve
Olowalu Stream
non-potable water
East Distribution
diversified agriculture
diversified agriculture
pig farm
reservoir
siphon
USGS 16646200
Abandoned Lower Olowalu Ditch
non-potable water
West Distribution
makai


6004 Ukumehame
Elevation
410 ft
270 ft
210 ft
180 ft
Gaining reach
Flowing reach
Losing reach
note: map not drawn to scale
USGS 166047000
Q50 = 3.23 mgd
Q70 = 2.59 mgd
Q90 = 2.07 mgd
Ukumehame Stream
Q = 0.47 mgd
Kaakau auwai
14 loi
Ukumehame Ditch
(converted to pipeline)
Q = 3.9 mgd
Q = 0.09 mgd
returned to stream
abandoned
reservoir (#1)
Maui Cultural Lands loi
0.0432 mgd
Other loi
0.0432 mgd
underground pipeline
non-potable water
(no current
connections)
reservoir (#2)
reservoir (#3)
abandoned ditch
tank
potable water
(3 connections)
2 wells
Paul Fujishiro
pipeline
diversified agriculture
non-potable water
(1 current connection)
makai