OVERVIEW OF THE HAWAI‘I COMMISSION ON WATER RESOURCE MANAGEMENT

Waimea Civic Club Meeting

April 30, 2025

PRESENTATION OVERVIEW

- Who is the Commission on Water Resource Management (“CWRM”)?
- Water Law in Hawai‘i
- Overview of CWRM Programs
  1. Planning Branch
  2. Groundwater Regulation Branch
  3. Stream Protection and Management Branch

WHO IS THE COMMISSION ON WATER RESOURCE MANAGEMENT (CWRM)?

CWRM IN A NUTSHELL

- 1978 constitutional amendment in article XI section 7 mandates a water resource agency
- Statute Created in 1987 & administratively attached to DLNR
- 7 member Commission supported by staff (currently at 20)
- Administers the State Water Code (HRS Chapter 174C)
  - Regulates *all* waters of the State and *all* water users

CWRM IN A NUTSHELL

- 7 members of the Commission (the decision makers)
  - Chairperson of BLNR (Chair of Water Commission)
  - Director, State DOH (ex-officio voting member)
  - 5 members are appointed by the Governor and approved by the State Senate
    - 1 member must have “substantial experience or expertise in traditional Hawaiian water resource management techniques and in traditional Hawaiian riparian usage such as those preserved by 174C-101”
    - Each member must have “substantial experience in the area of water resource management”

Dawn N.S. Chang

Kathleen Ho (DOH designee)

Lawrence H. Miike

Aurora Kagawa-Viviani

Wayne Katayama

Paul Meyer

Hanna Kihalani Springer

CWRM IN A NUTSHELL

Water Quantity

CWRM

Water Quality

DOH

MISSION

To protect and manage the water resources of the State and provide for the maximum beneficial use of water by present and future generations

VISION

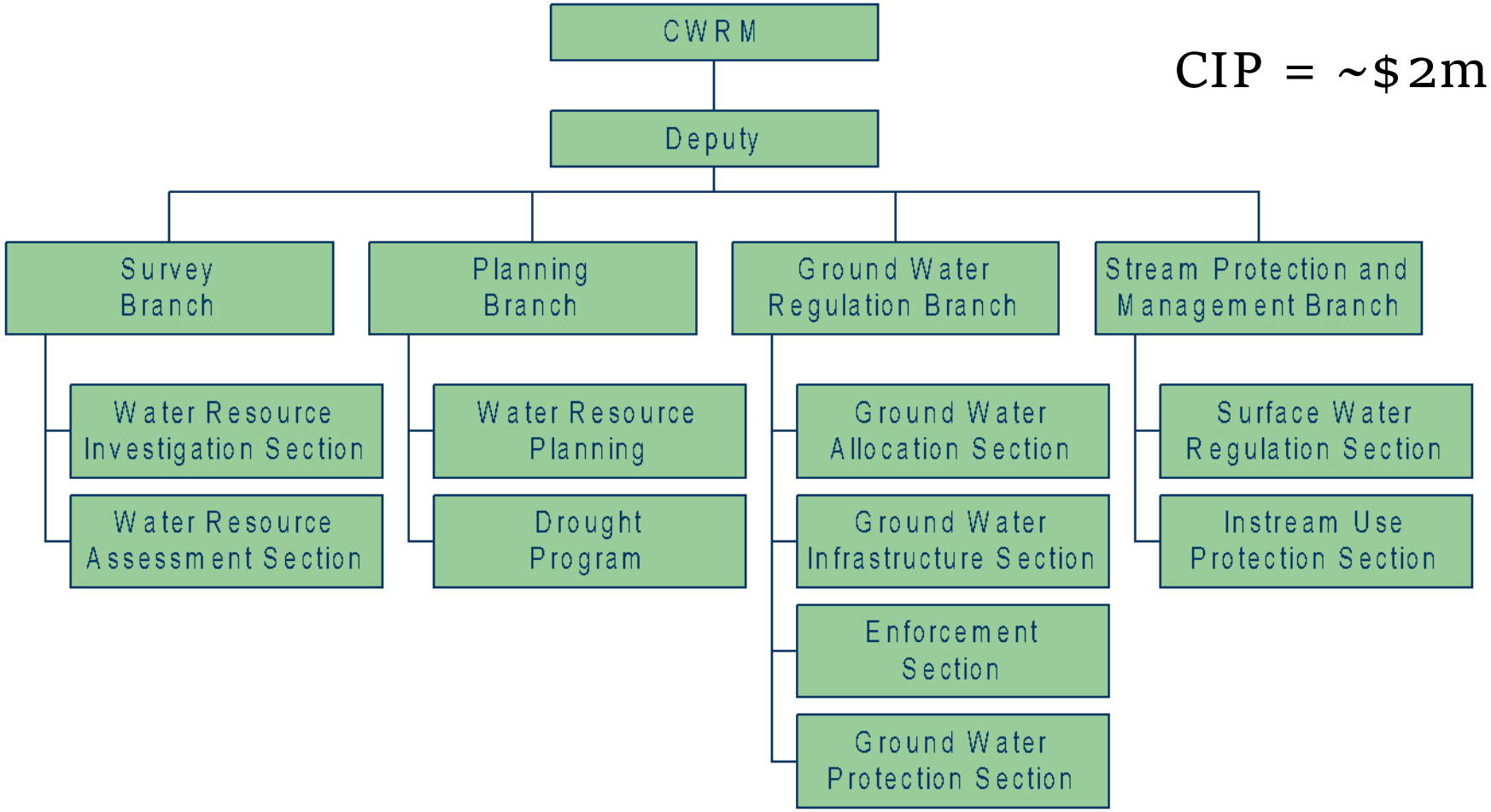
Flowing streams, sustainable aquifers, and functioning watersheds for the use, enjoyment, and benefit of all

ORGANIZATIONAL CHART

Commission staff = 33 positions (20 filled)

Budget = ~$4m/year operating

CIP = ~$2m/year



WATER LAW IN HAWAI‘I

HAWAIʻI CONSTITUTION, ARTICLE XI

SECTION 1

"All public natural resources are held in trust by the State for the benefit of the people."

SECTION 7

"The State has an obligation to protect, control and regulate the use of Hawaii's water resources for the benefit of its people.

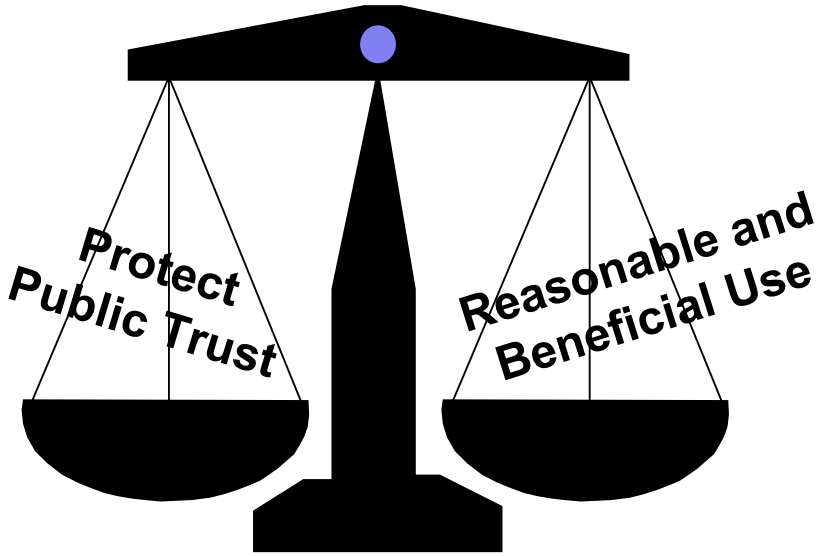
The legislature shall provide for a water resources agency which…shall set overall water conservation, quality and use policies; define beneficial and reasonable uses; protect ground and surface water resources, watershed and natural stream environments; establish criteria for water use priorities while assuring appurtenant rights and existing riparian uses and establish procedures for regulating all of Hawaii's water resources."

PUBLIC TRUST DOCTRINE

- Imposes a “dual mandate of
  (1) protection
  (2) maximum reasonable & beneficial use”

- Establishes an “affirmative duty to take the public trust into account in planning and allocation of water resources, and to protect public trust uses whenever feasible”

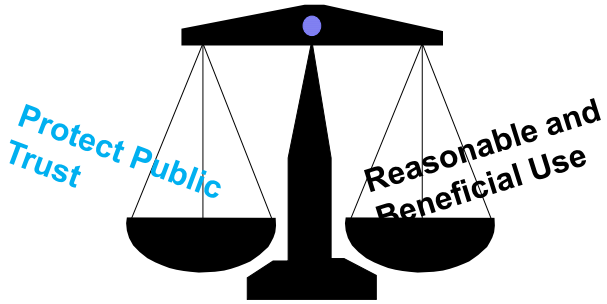
MUST BALANCE
PROTECTION OF THE PUBLIC TRUST
AND PROVIDE FOR
REASONABLE AND BENEFICIAL USES



PUBLIC TRUST PURPOSES

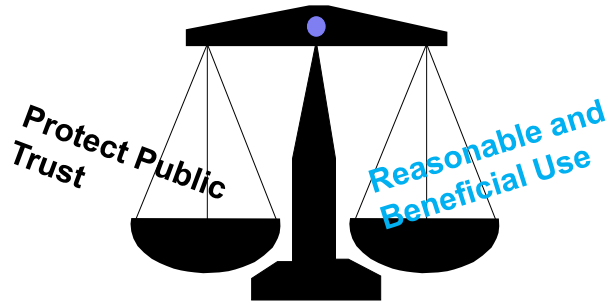
1. Environmental protection ("maintenance of water in its natural state")
2. Exercise of traditional and customary Native Hawaiian rights
3. Domestic water use
4. DHHL reservations

There are no "*absolute priorities*" between uses under the public trust.



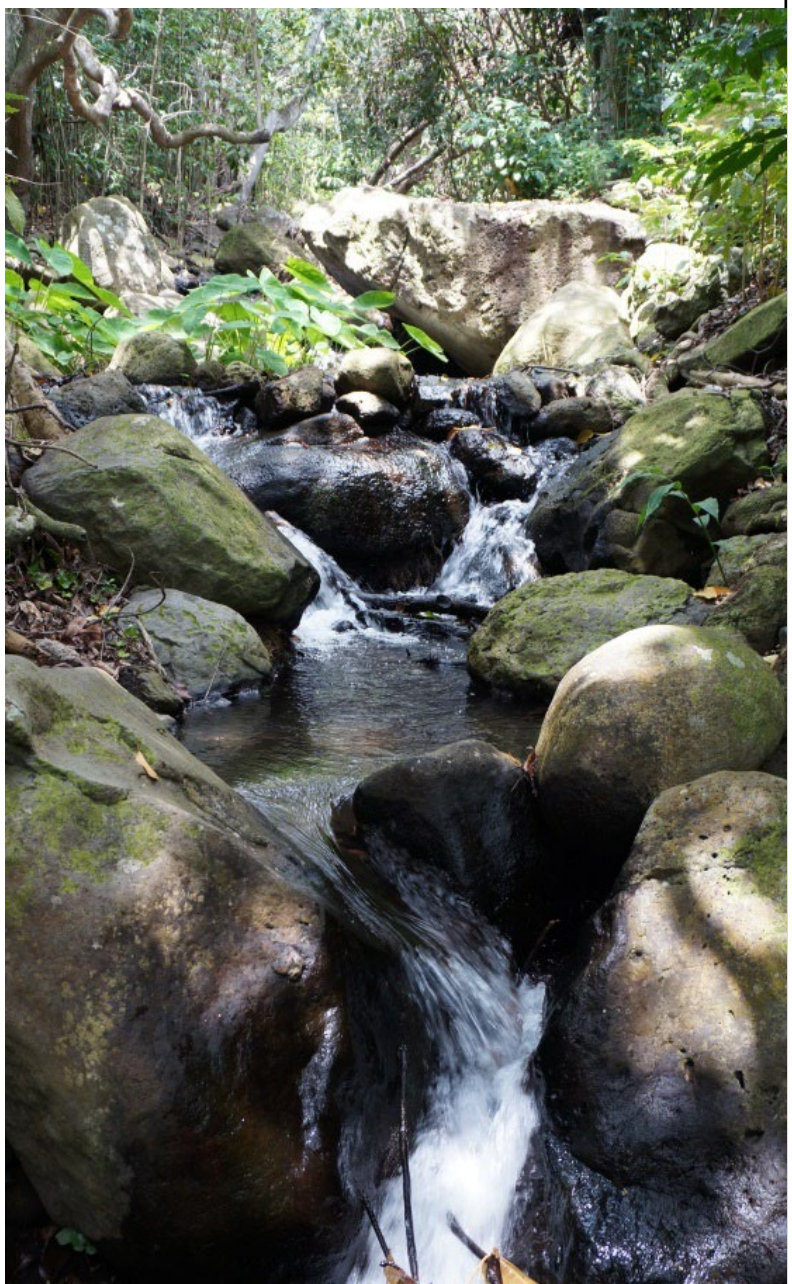
ENSURE USES ARE REASONABLE AND BENEFICIAL

- Purpose
- Justified Quantity
- Efficient
- Lack of practicable alternatives
- Consistent with the public interest
- Consistent with state and county land use plans



PRECAUTIONARY PRINCIPLE

There is a duty to take anticipatory action to protect public trust resources and uses from harm



OVERVIEW OF CWRM PROGRAMS

CWRM OVERVIEW

- PLANNING
  - Develops comprehensive, long-range plans for the protection, conservation, and management of the State's water resources
- GROUND WATER REGULATION
  - Issues well construction and pump installation permits, ground water use permits in management areas, monitors aquifer health, and establishes sustainable yields
- STREAM PROTECTION AND MANAGEMENT
  - Issues stream channel alteration permits, stream diversion works permits, surface water use permits in management areas, establishes instream flow standards, and conducts surface water resource assessments

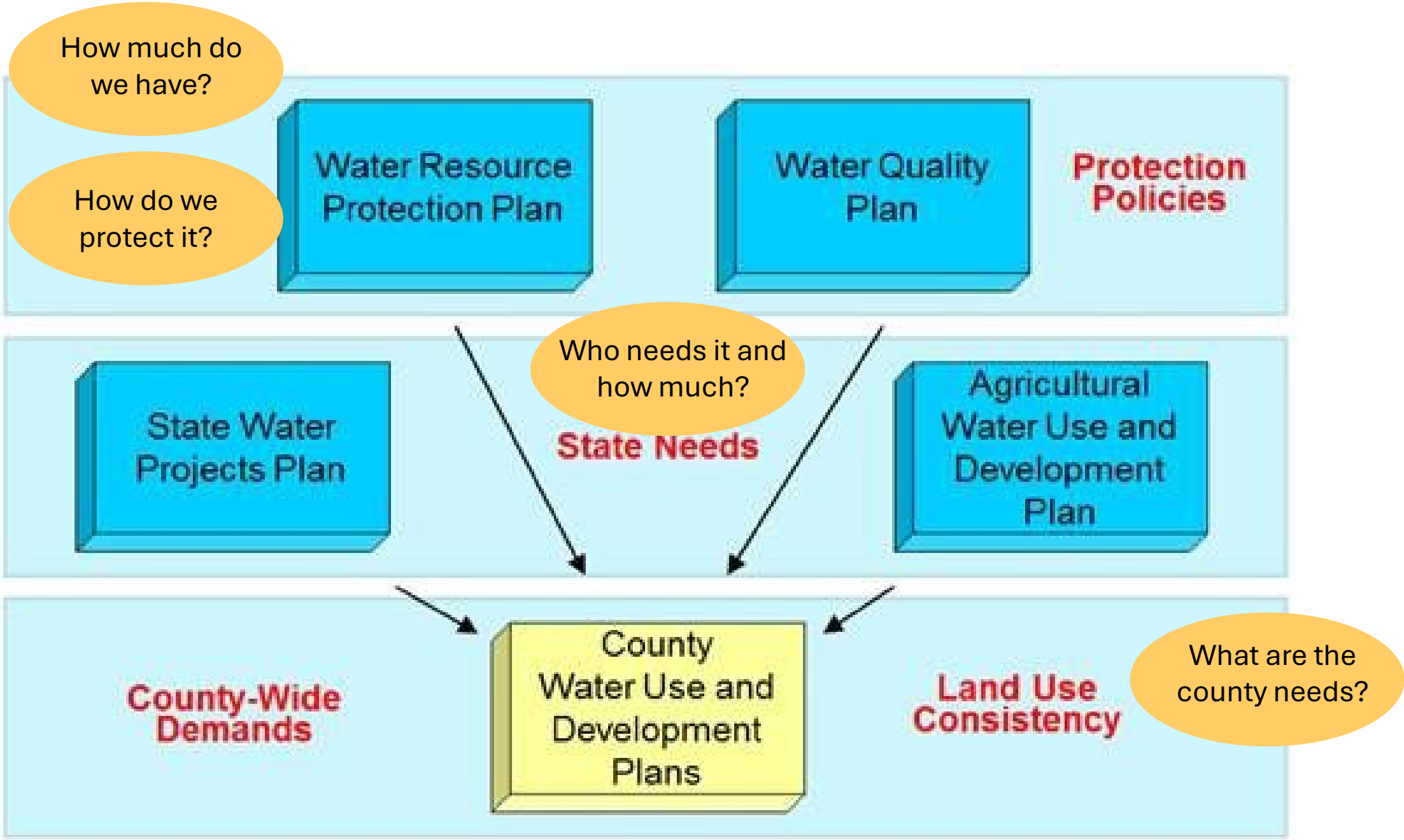
PLANNING BRANCH

- Implement the State Water Code through long-range planning and agency coordination

- Develop and update the Hawaiʻi Water Plan (HWP)

- Water conservation, shortage and drought planning

The Hawai‘i Water Plan

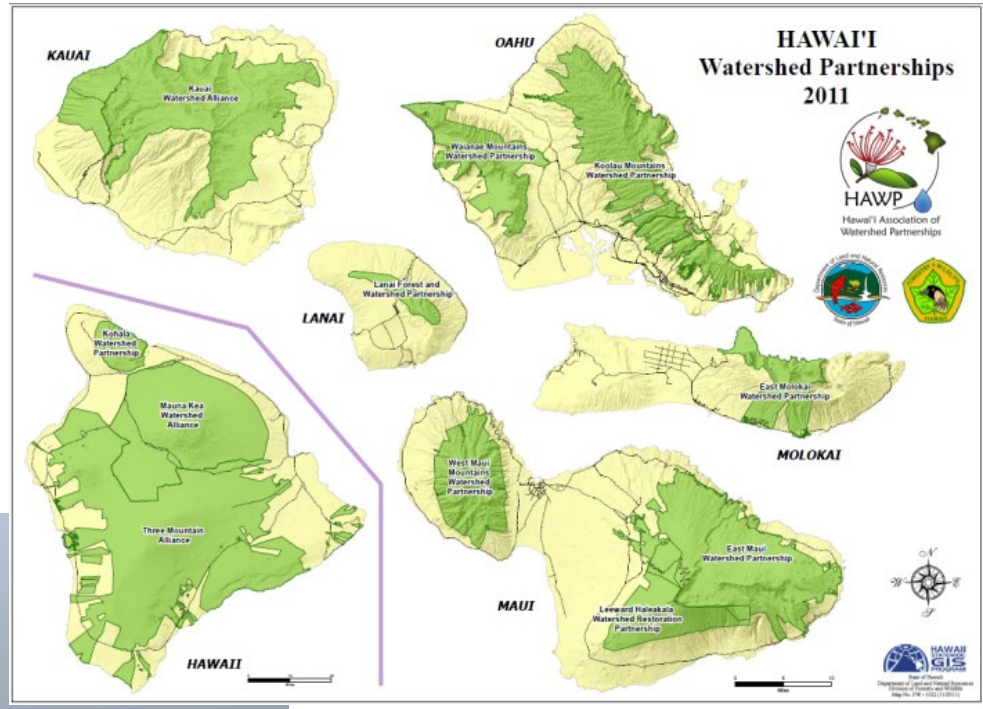


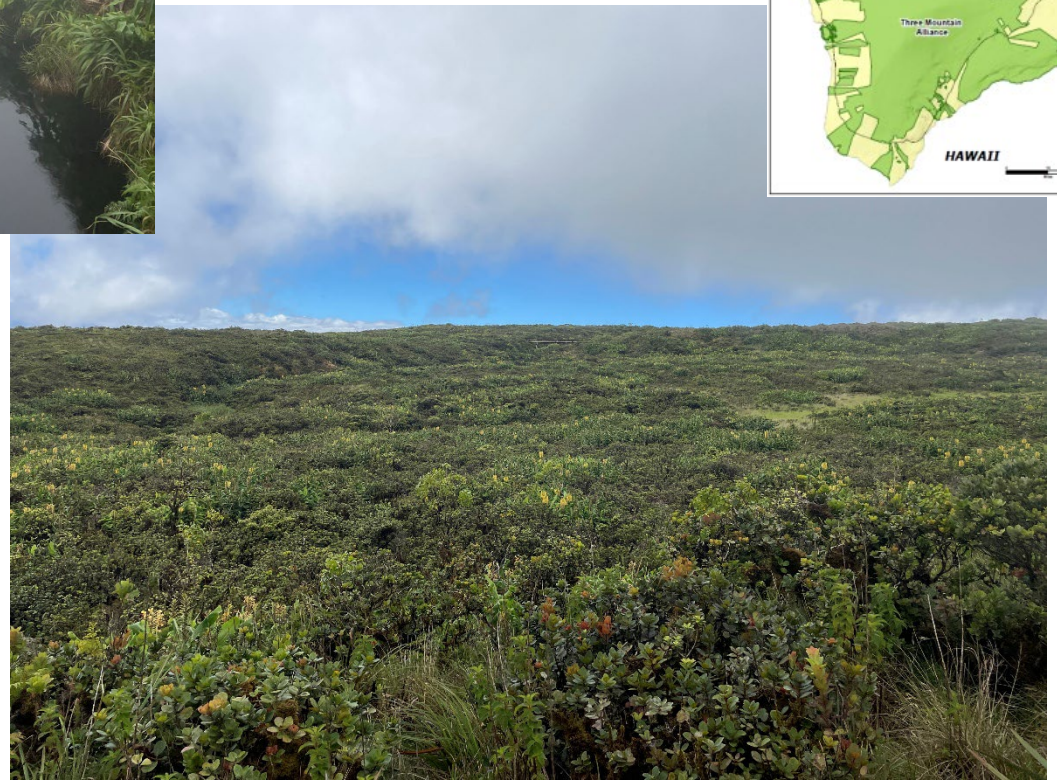
Resource Assessments:
How much water is available?

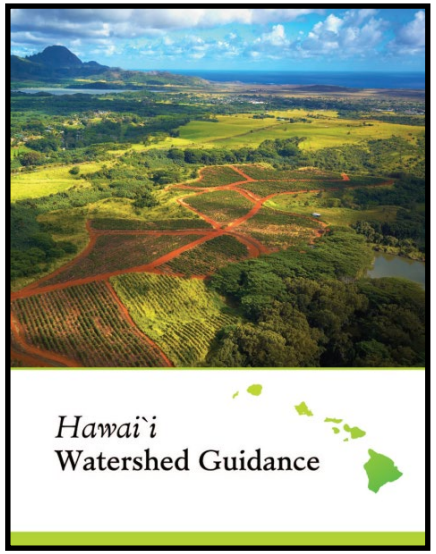
- Hydrologic Unit Delineation
- Ground Water Sustainable Yields
- Surface Water Instream Flow Standards

How will we meet all our water needs?

CWRM Support of Watershed Management

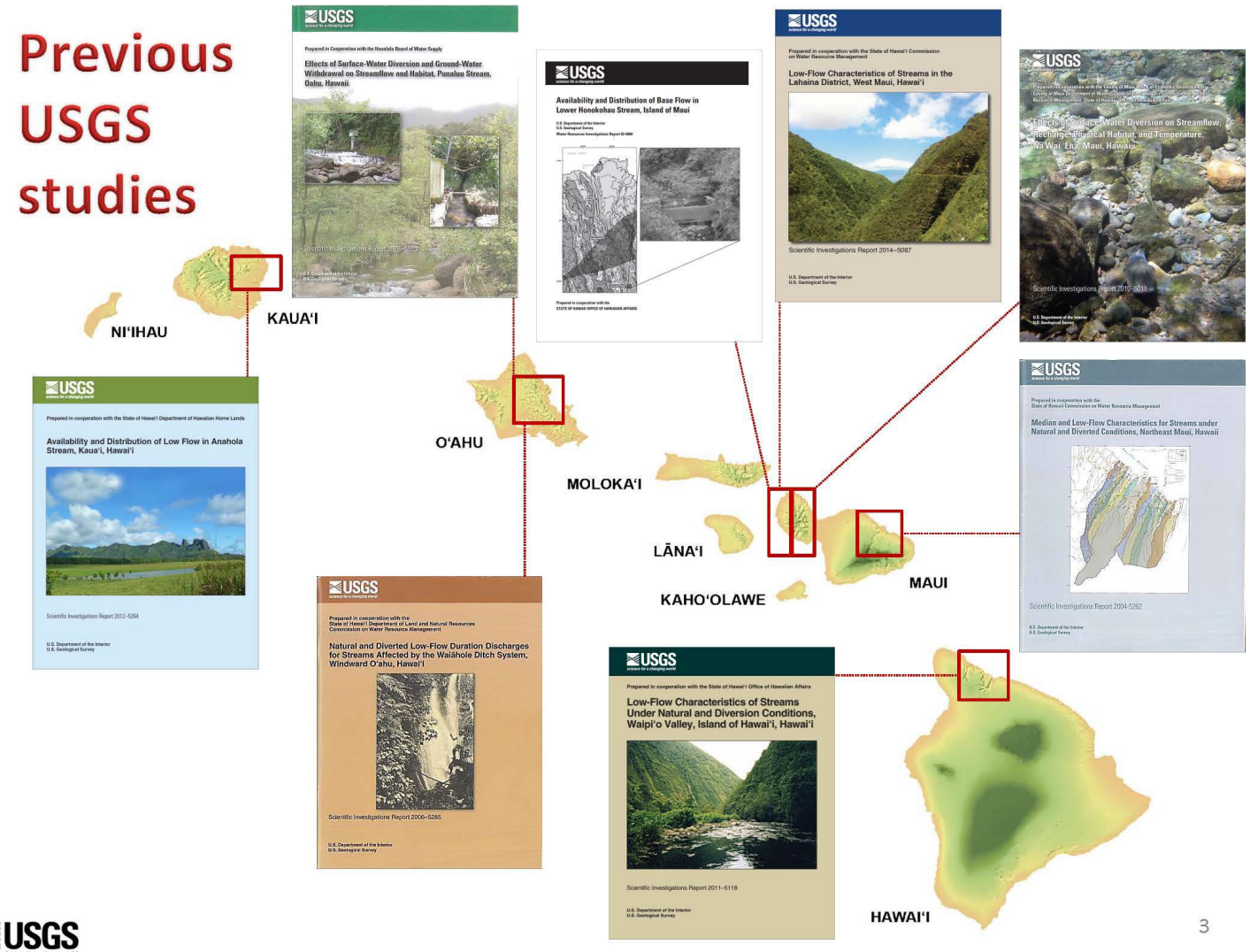






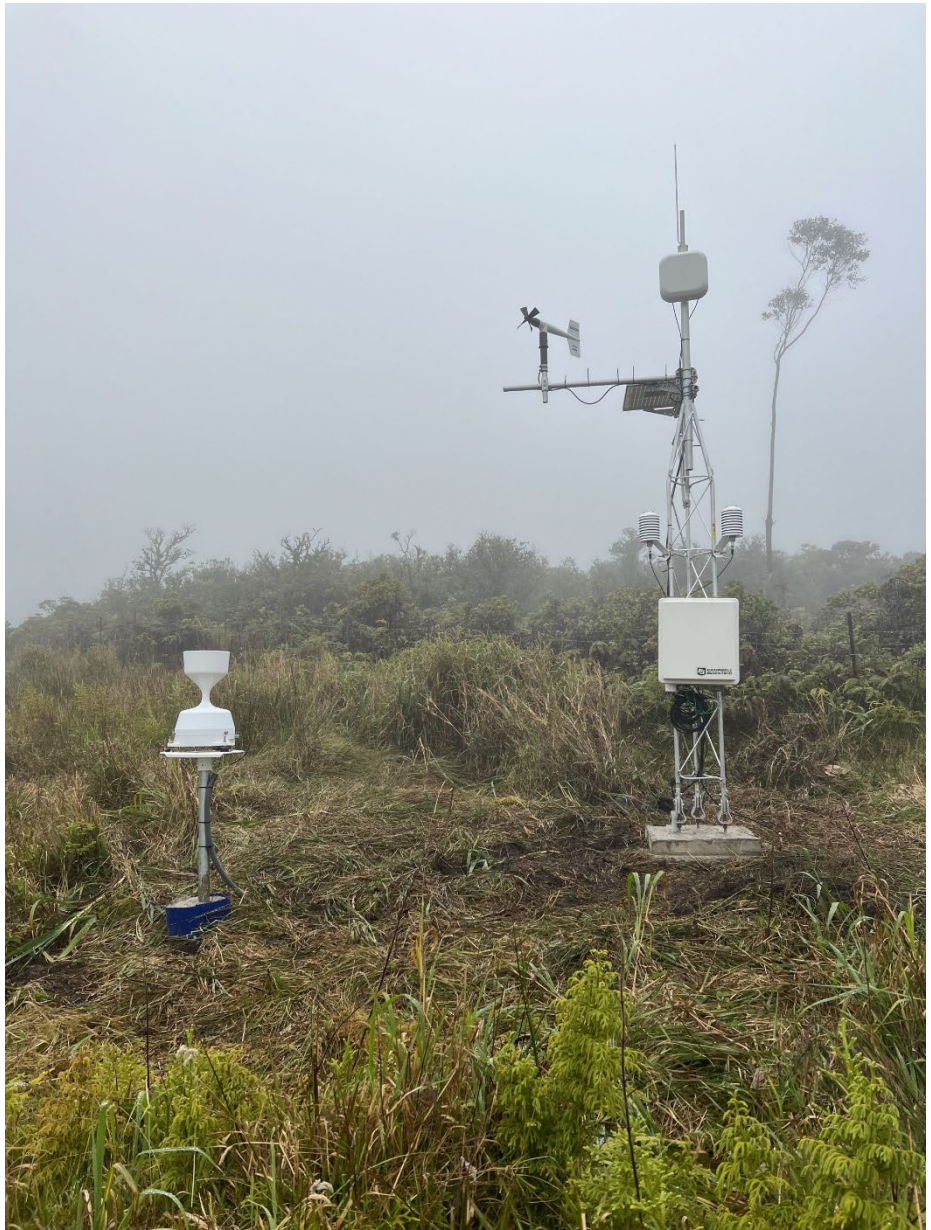
CWRM Support of Hydrologic Studies

- Climate Studies
  - Rainfall Trends
  - Evapotranspiration Analysis
- Hydrologic Studies
  - Recharge Updates
  - Numerical Groundwater Model Development
- Baseline Data Collection
  - Rainfall
  - Streamflow
  - Ground Water Levels
  - Aquifer Trends



CWRM Support of Hawaii Mesonet Project

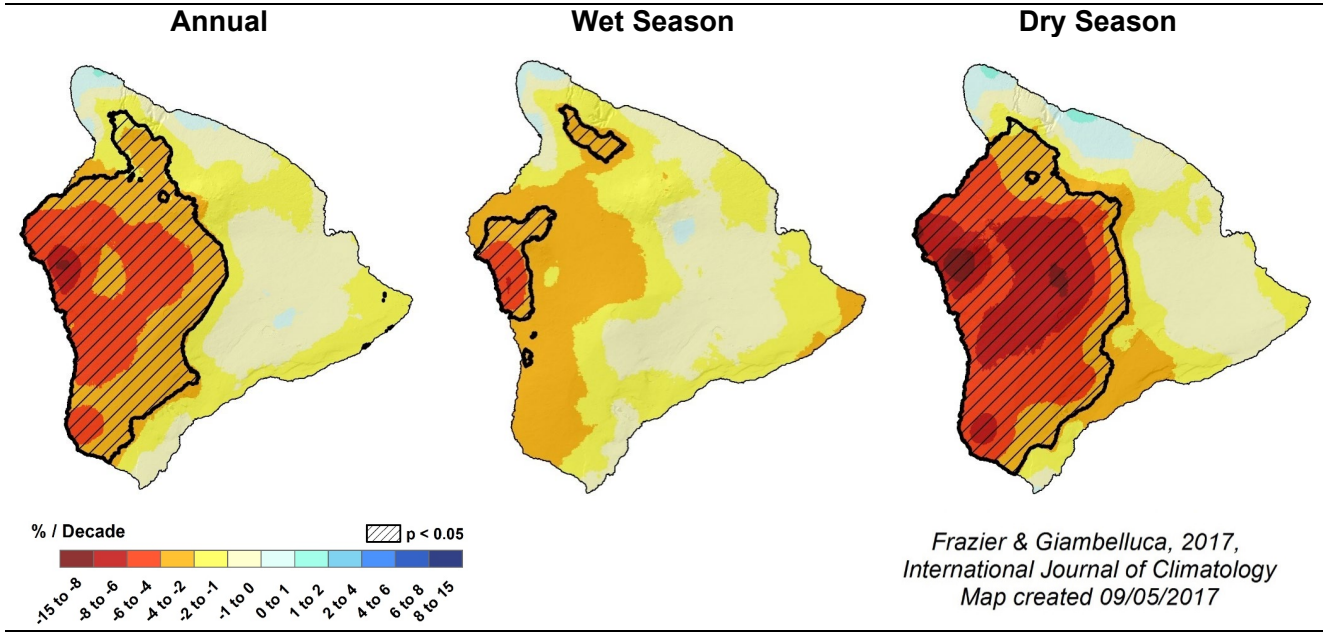
Real-Time Climate Monitoring Network at the University of Hawai‘i



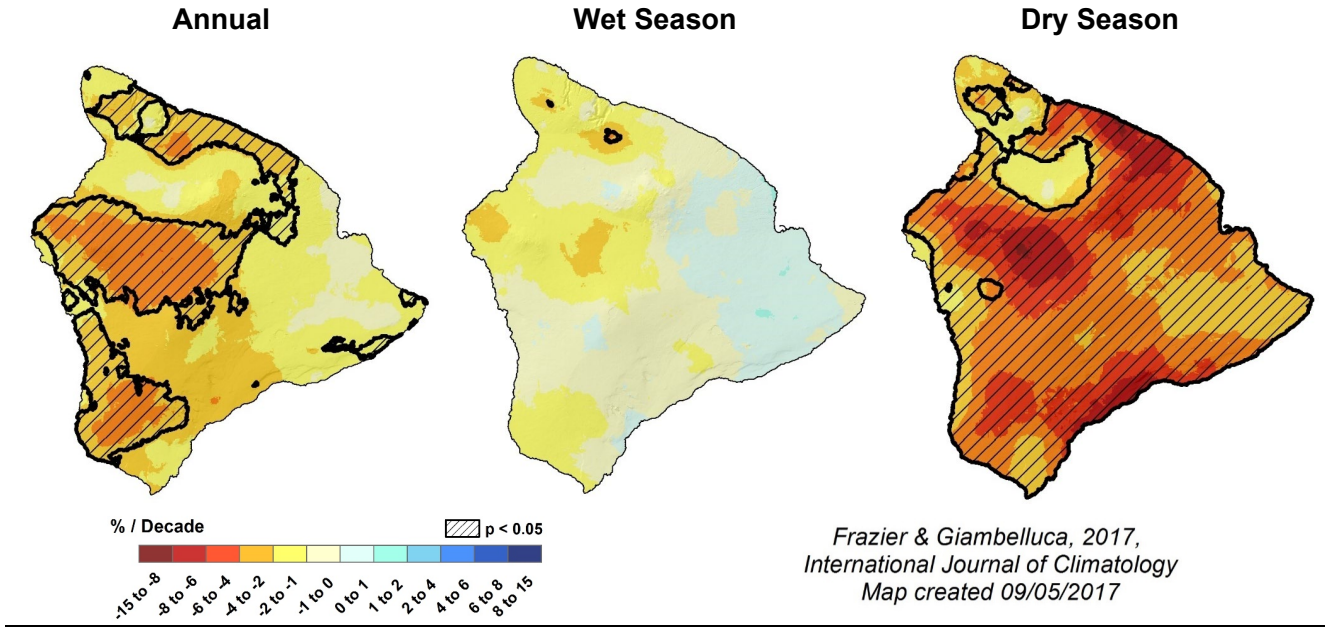
CWRM Support of Hydrologic Data Analysis

Trends in Annual and Seasonal Rainfall

1920-2012

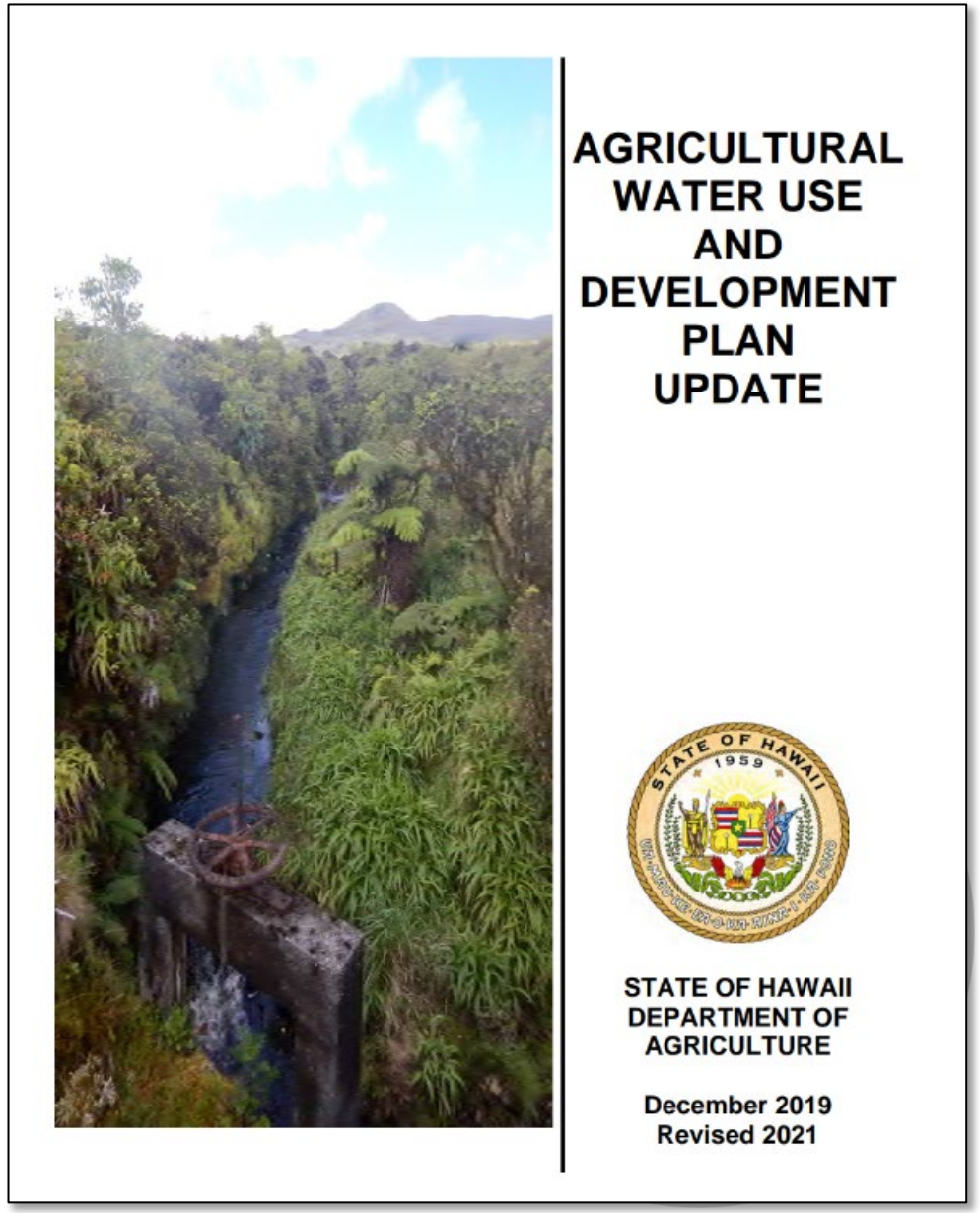


1983-2012

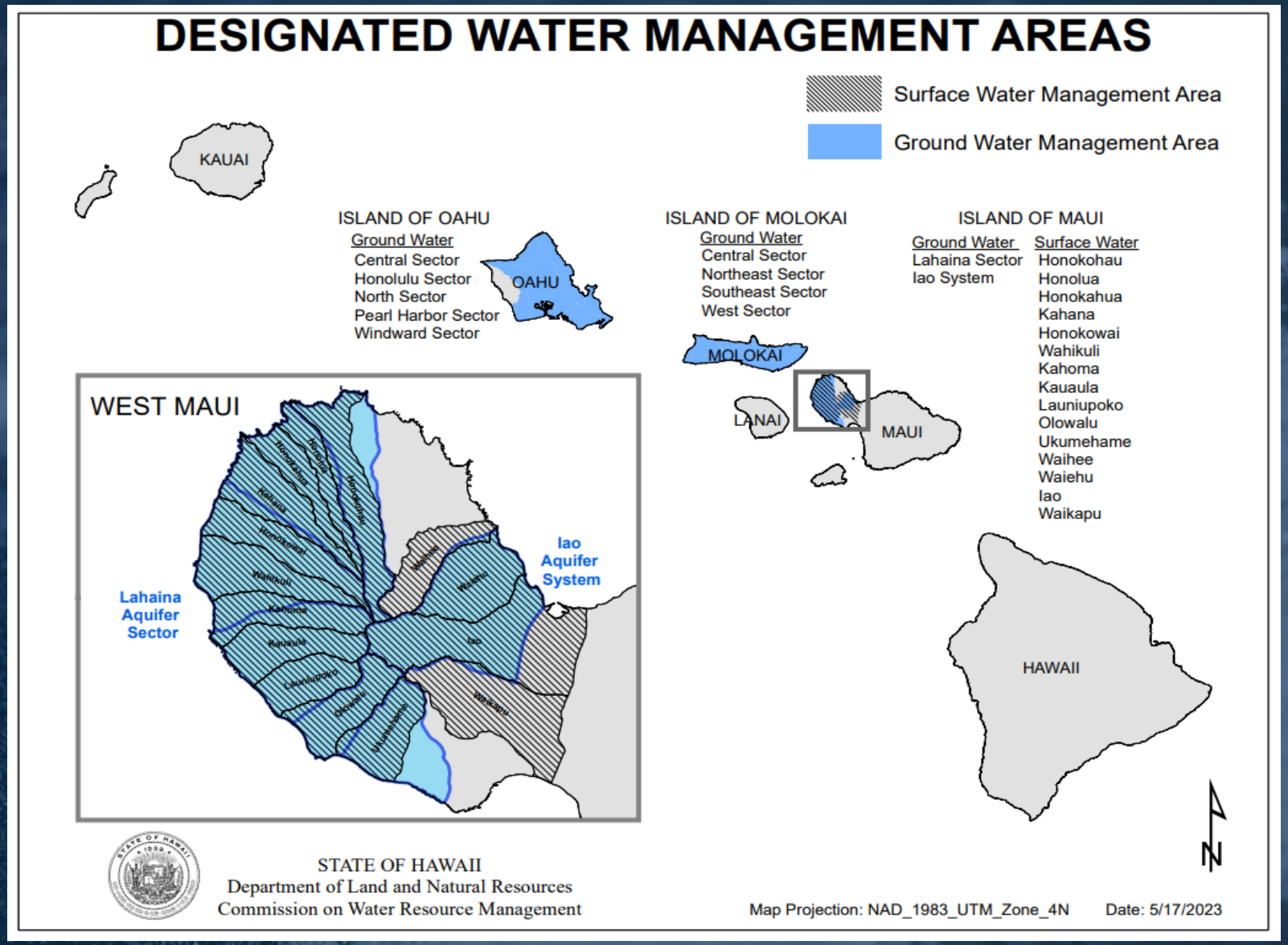


The Agricultural Water Use and Development Plan (AWUDP)

- Updated in 2021
- Estimate agricultural demand for state and private water use
- Plan for the rehabilitation and/or maintenance of irrigation systems statewide



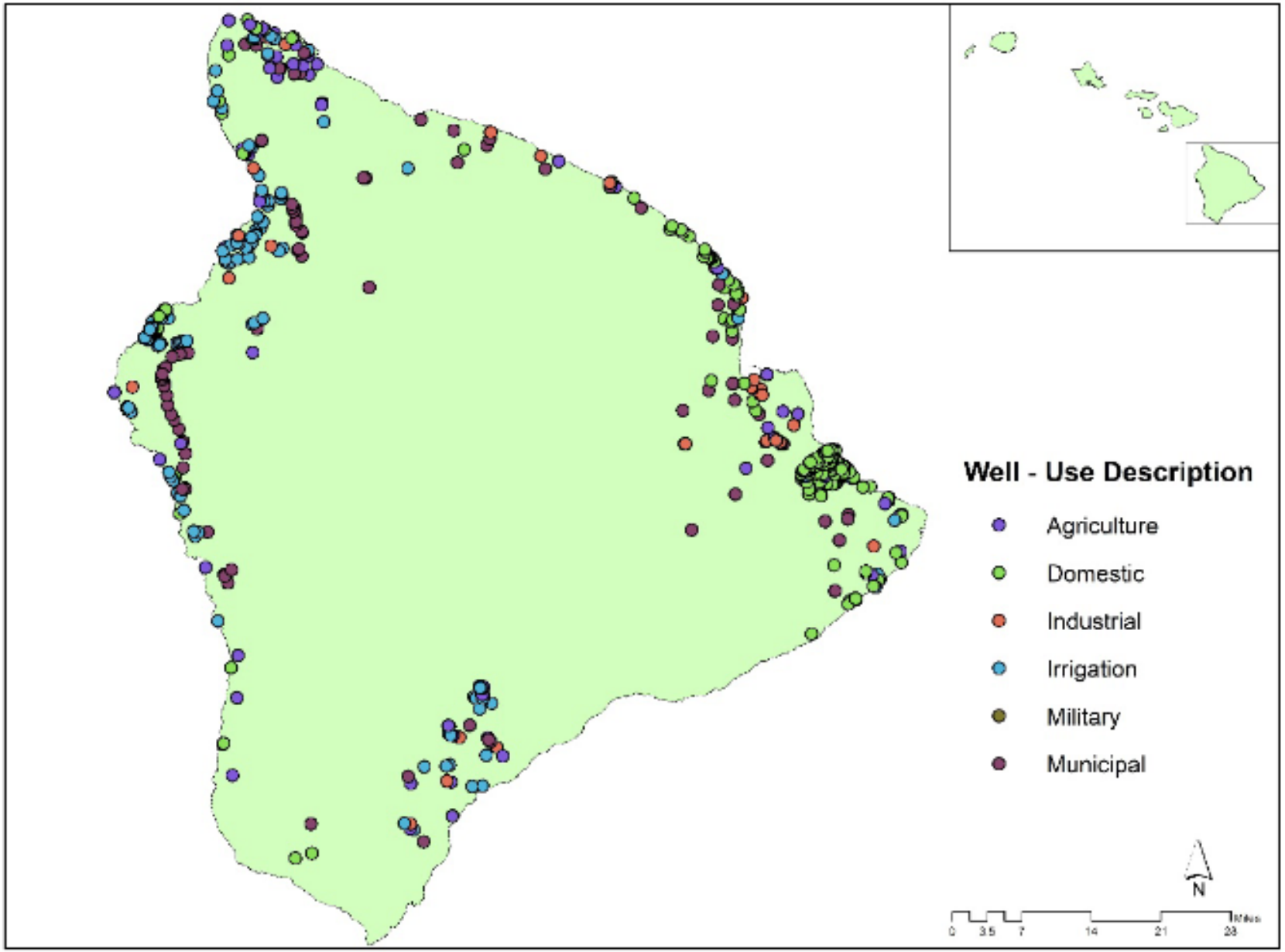
CWRM JURISDICTION



Regulates <u>all waters</u> of the State (excluding coastal waters) and
<u>all water users</u> including the County water boards/ departments)

Questions on Planning?

GROUND WATER REGULATION BRANCH



5,500 wells in the State

110 aquifer system areas statewide

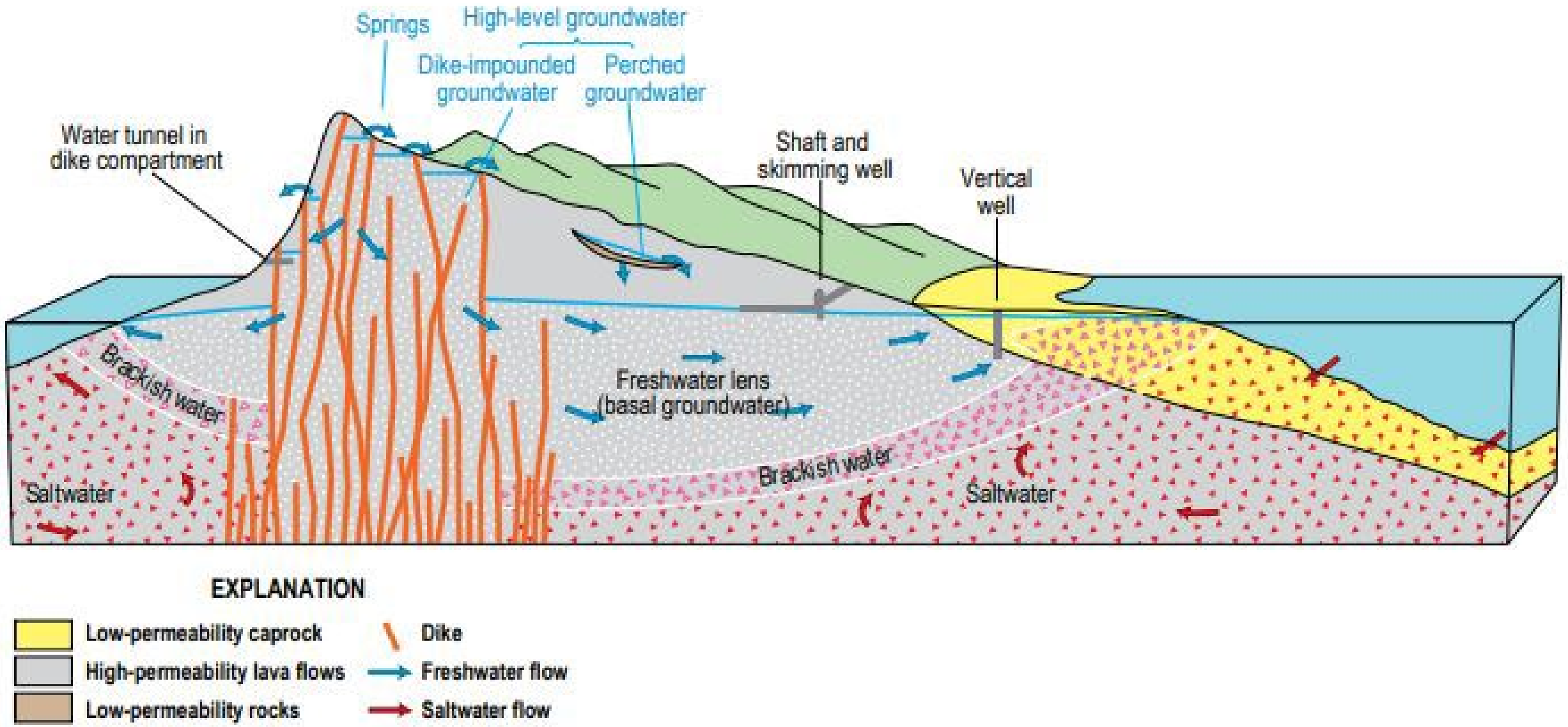
Sustainable limits (Sustainable Yields) set for each aquifer system

Commission on Water Resource Management
State of Hawaii

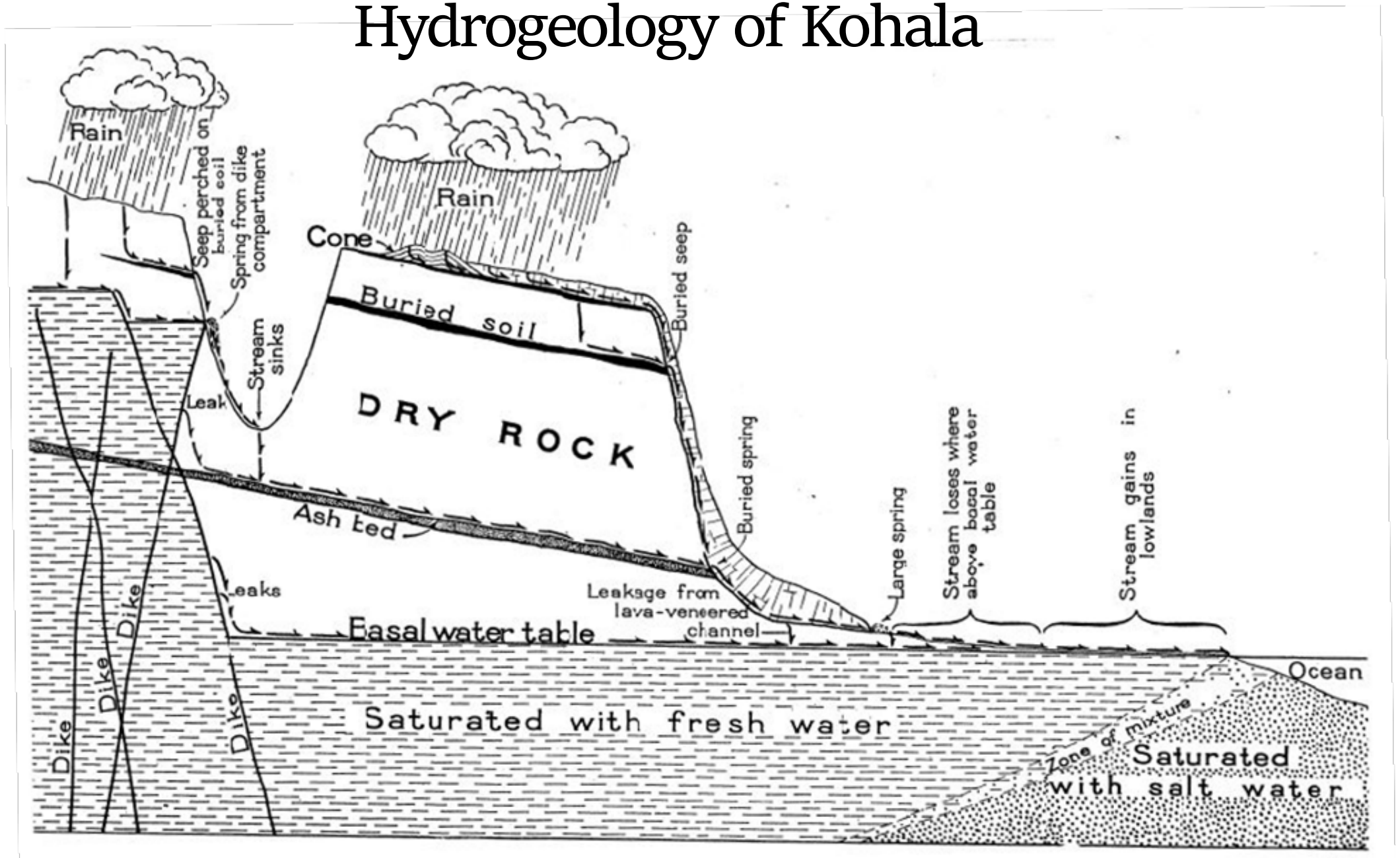
GROUND WATER REGULATION

- Regulation of ground water resources
- Well Construction and Pump Installation Permits

Types of Groundwater Bodies

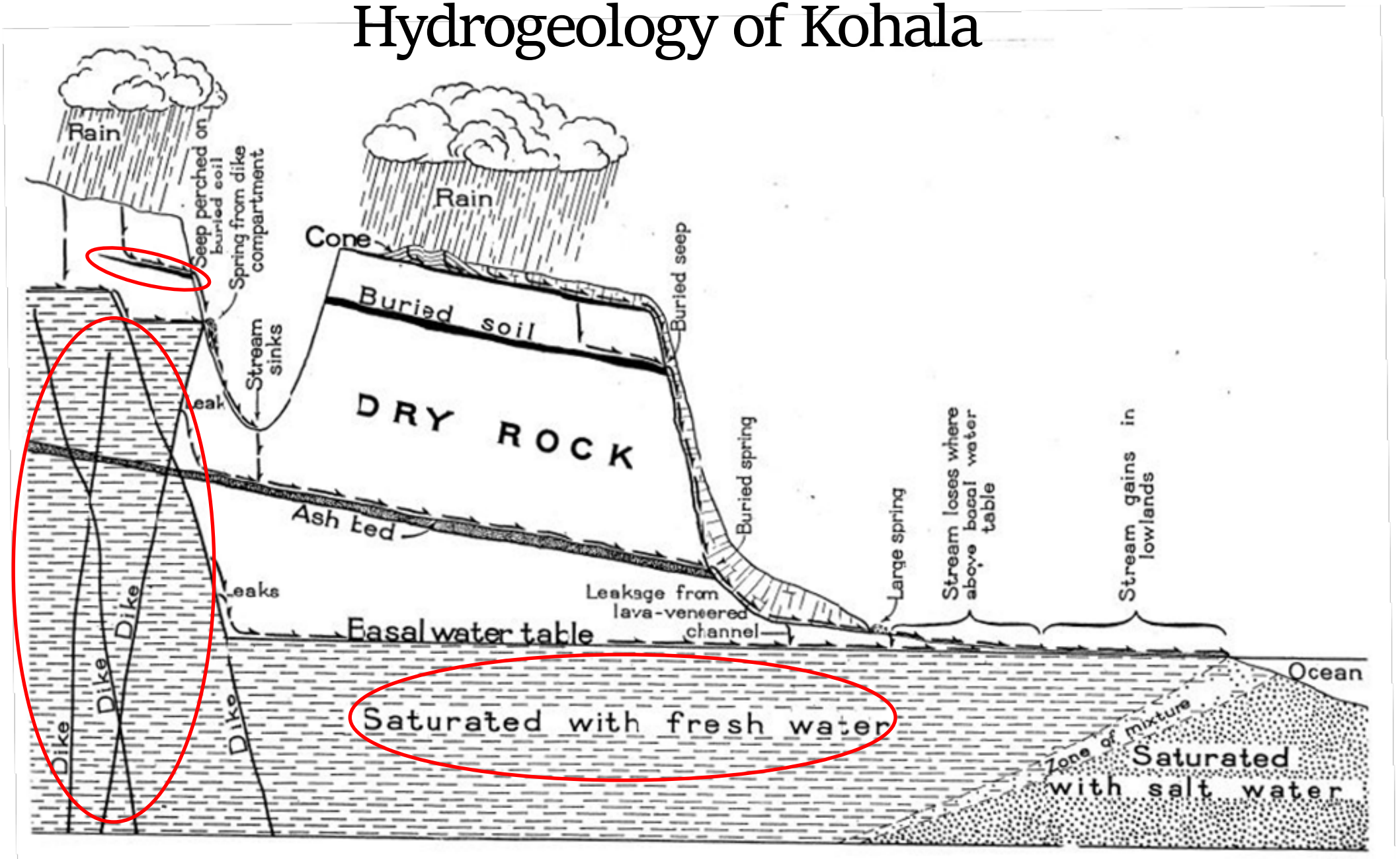


Hydrogeology of Kohala



Stearns, H.T., Macdonald, G.A. (1946). Geology and ground-water resources of the island of Hawaii: Hawaii (Terr.) Division of Hydrography Bulletin 9, 363 p.

Hydrogeology of Kohala



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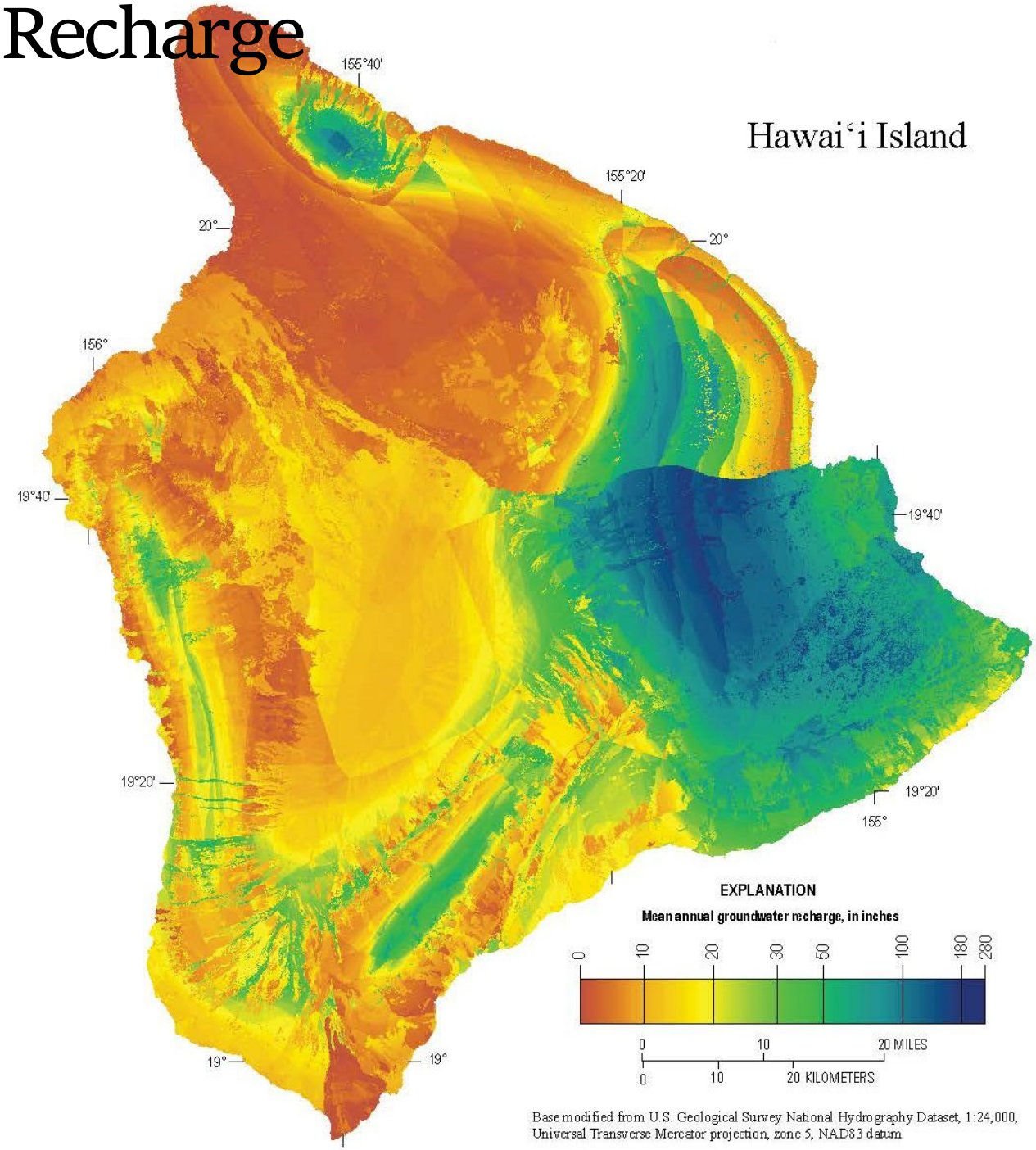
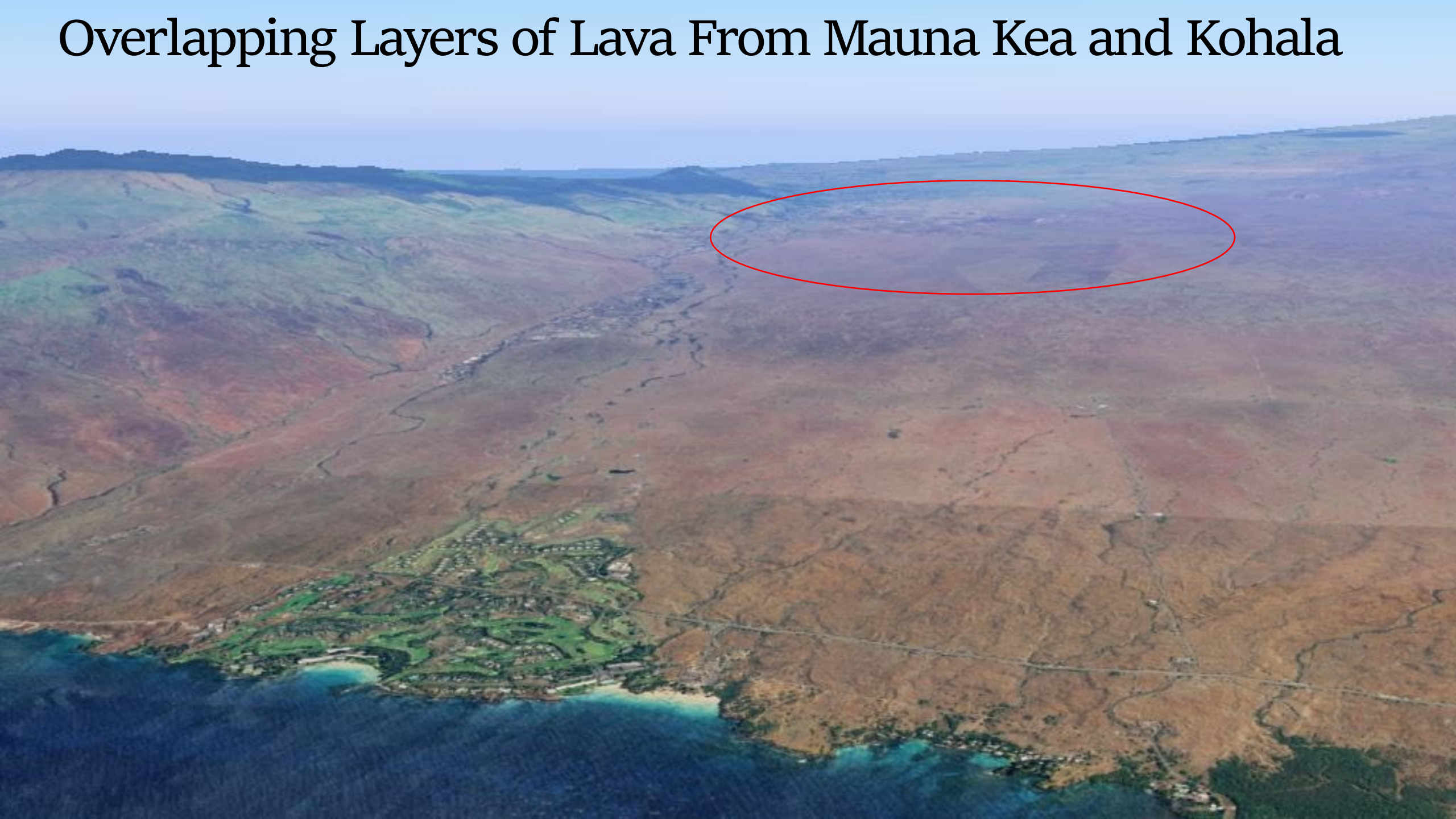
Mean Annual Groundwater Recharge

Water Budget Model

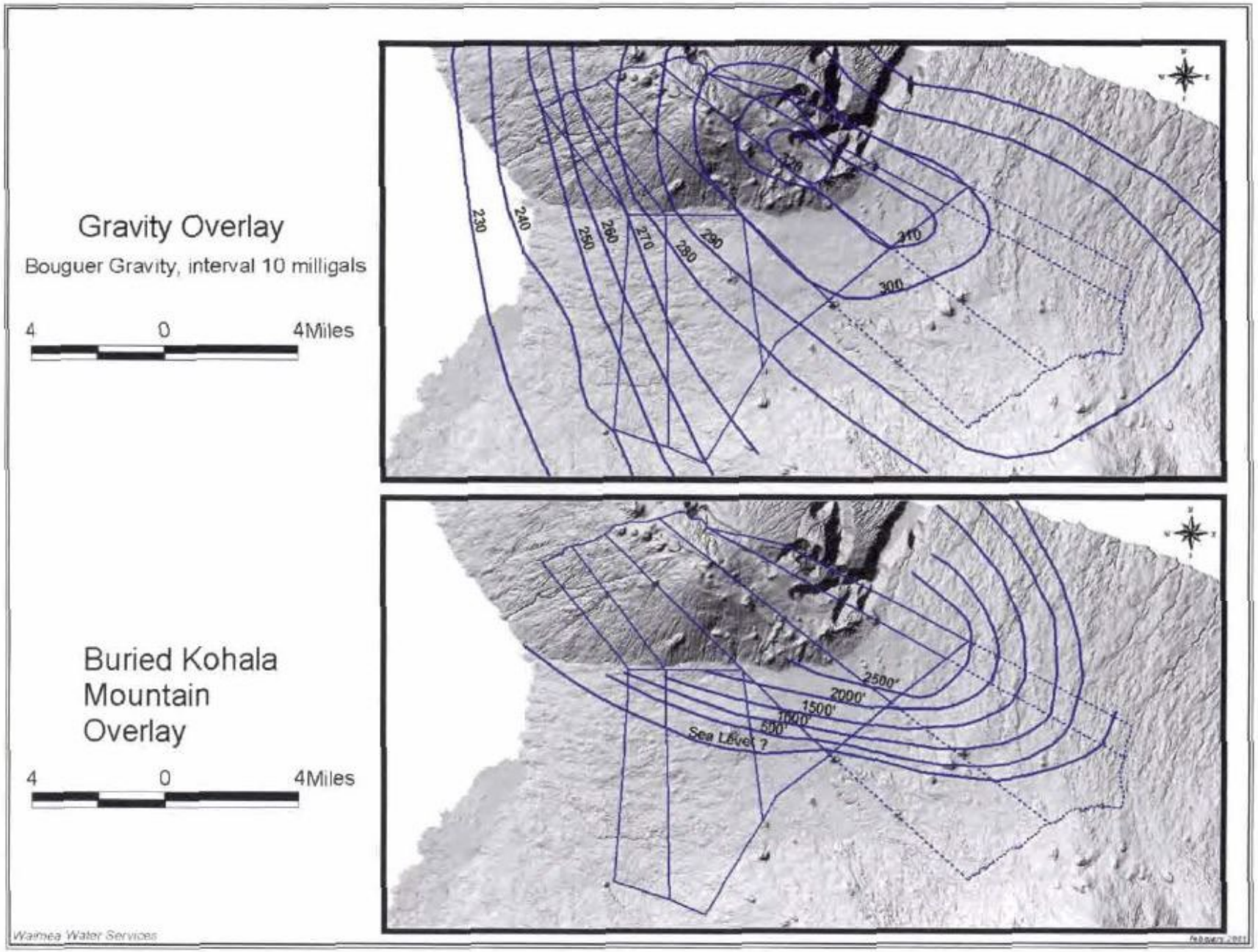


Izuka et al. 2018

Overlapping Layers of Lava From Mauna Kea and Kohala



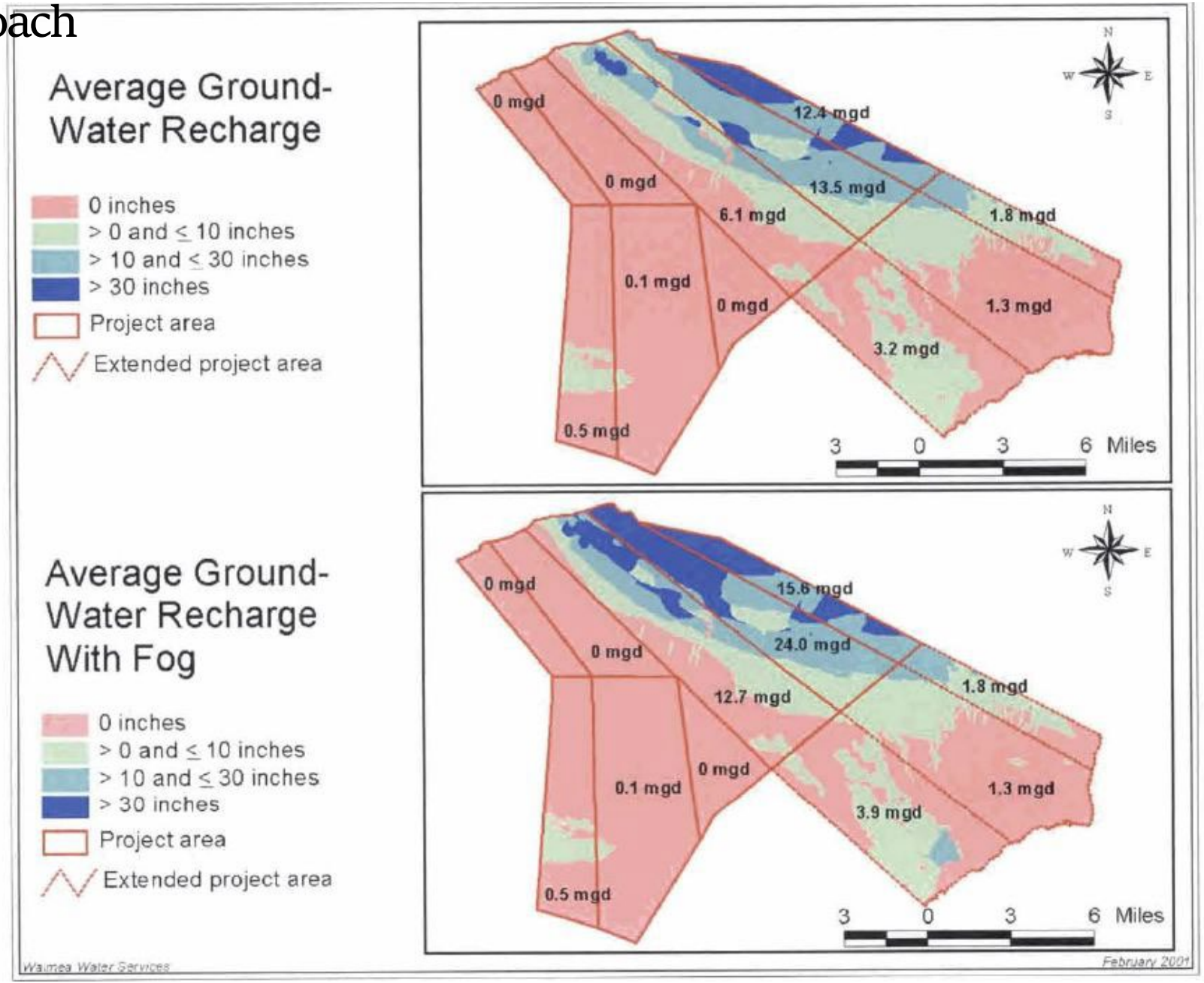
High Elevation Groundwater Along the Southeast Rift Zone



Hawaii Water Services, 2001

Estimated Groundwater Recharge

Field Measured Approach



Estimated Future 2080-2099 Conditions

Estimated anomaly of Mean ET:Rainfall during saturated conditions for HRCM2 RCP4.5 2080-99 scenario relative to 1978-2007 conditions

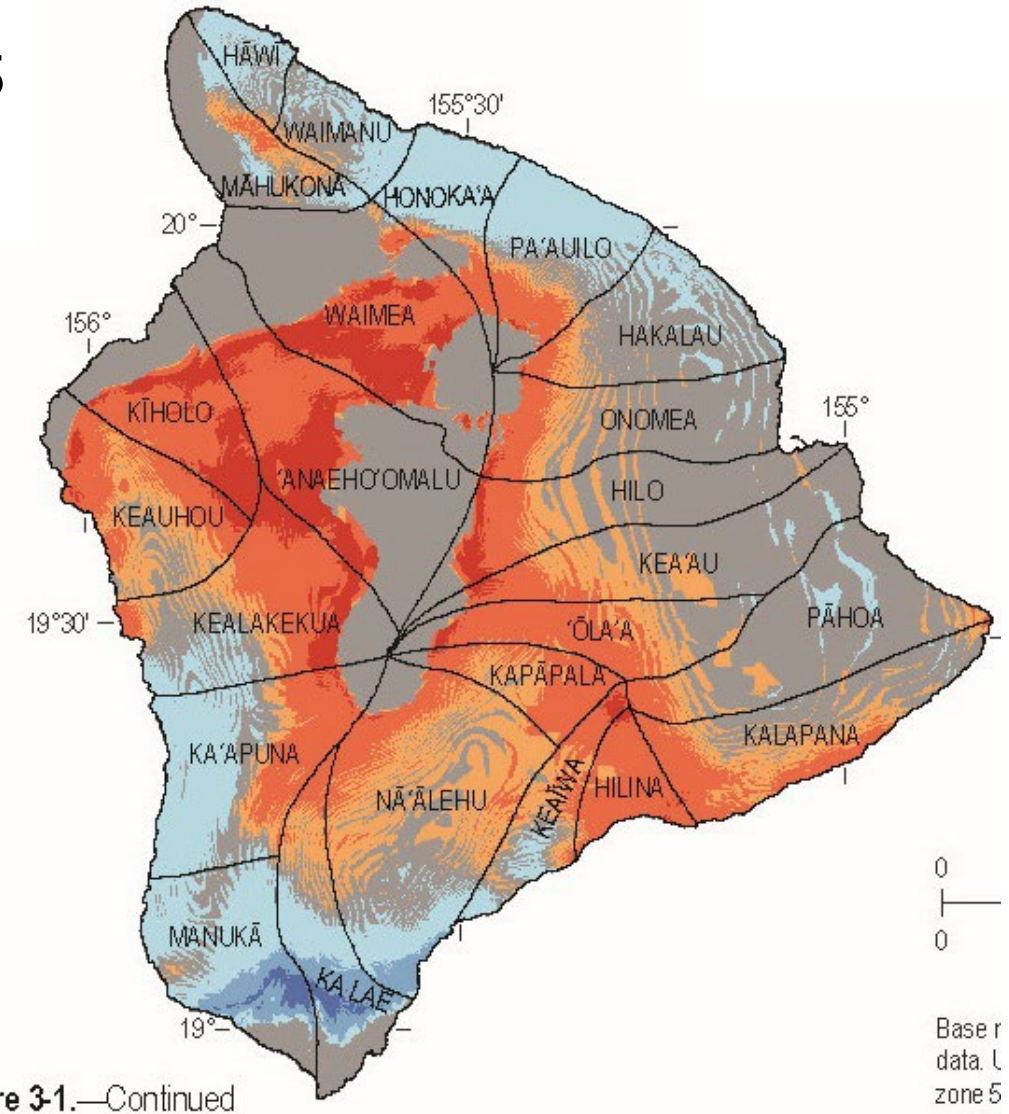


Figure 3-1.—Continued

Kane et al. 2024 USGS SIR 2023-5130

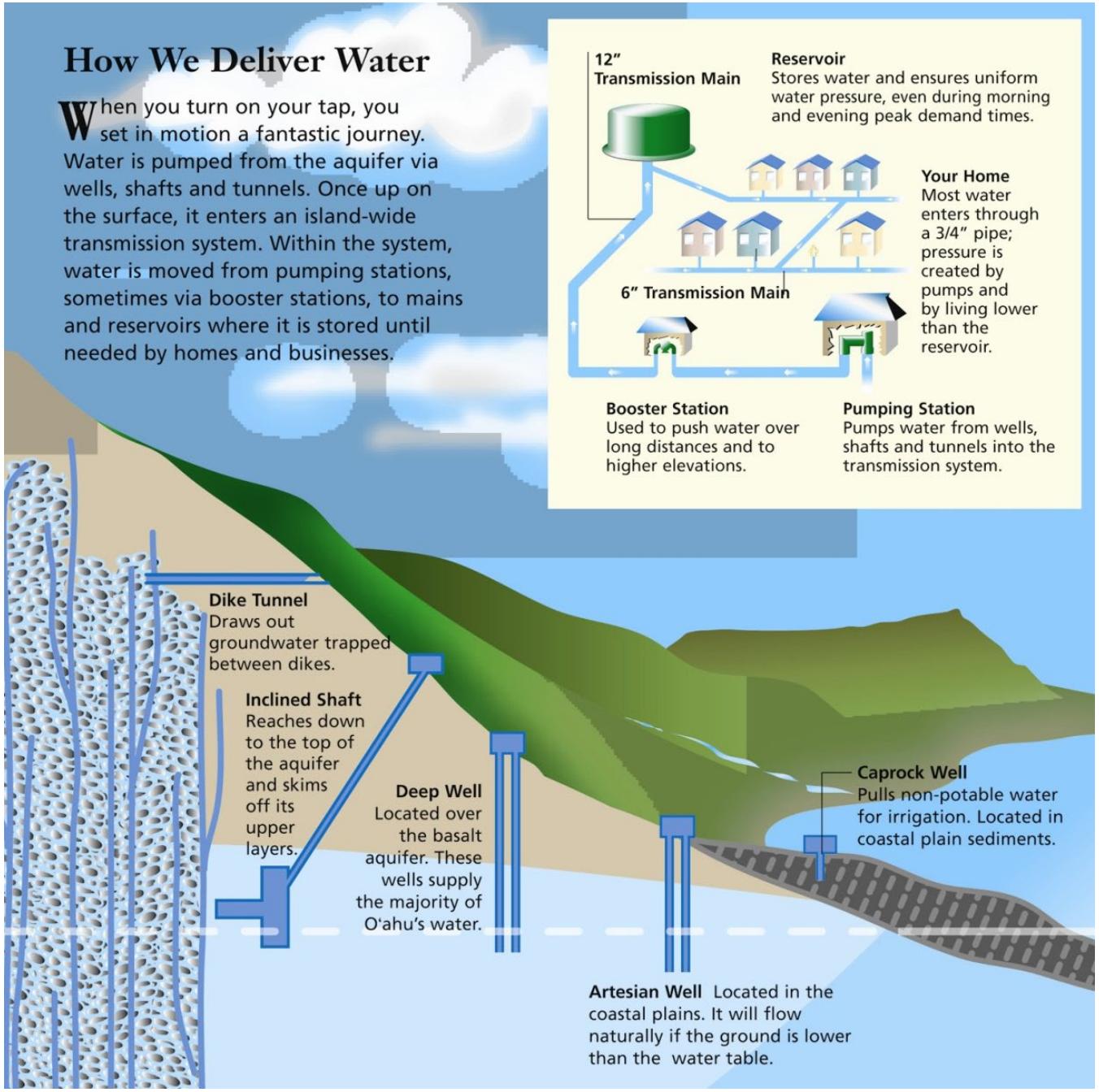
How is ground water developed?

Wells

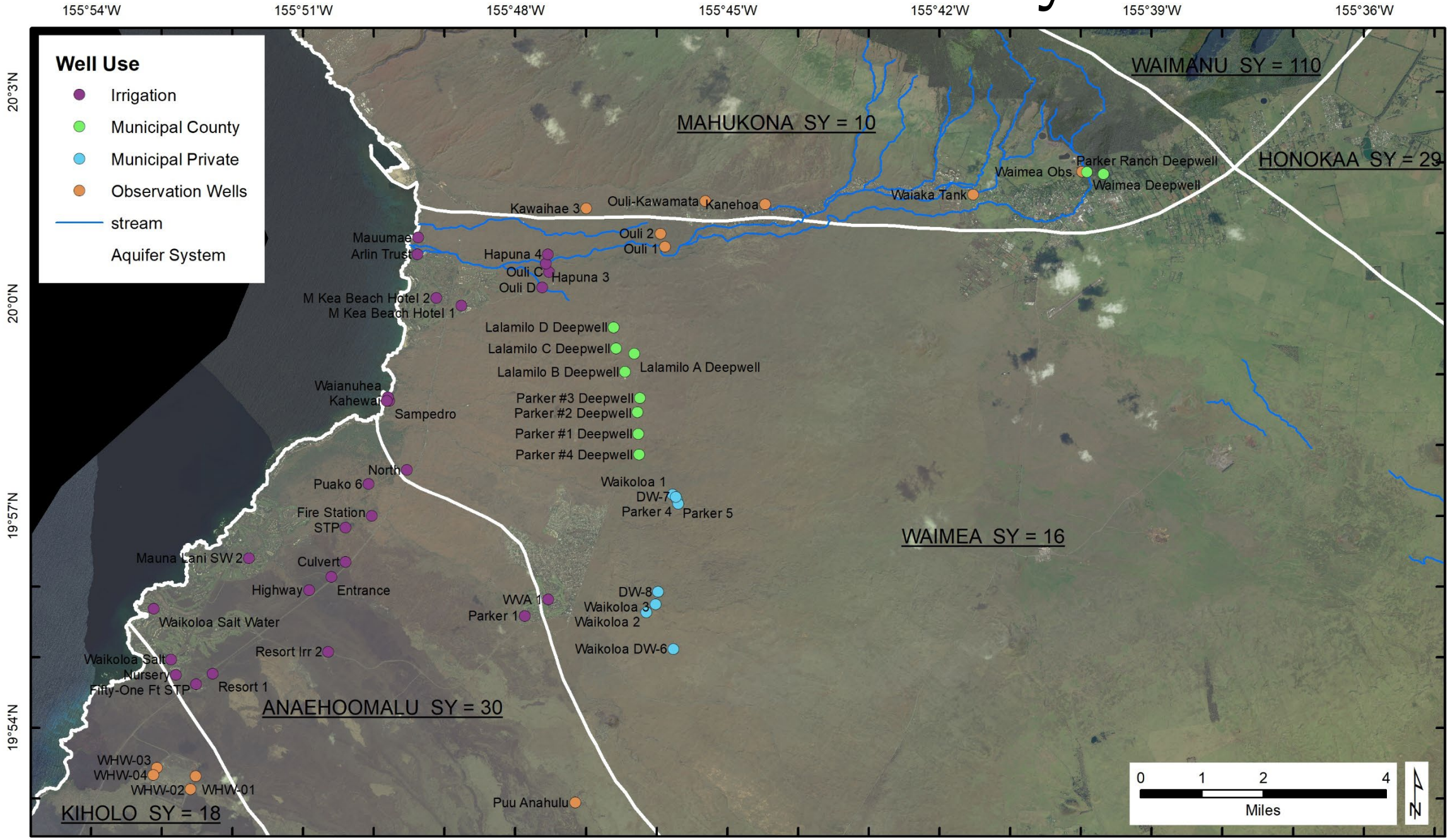
Shafts

Tunnels

Source: Honolulu Board of Water Supply

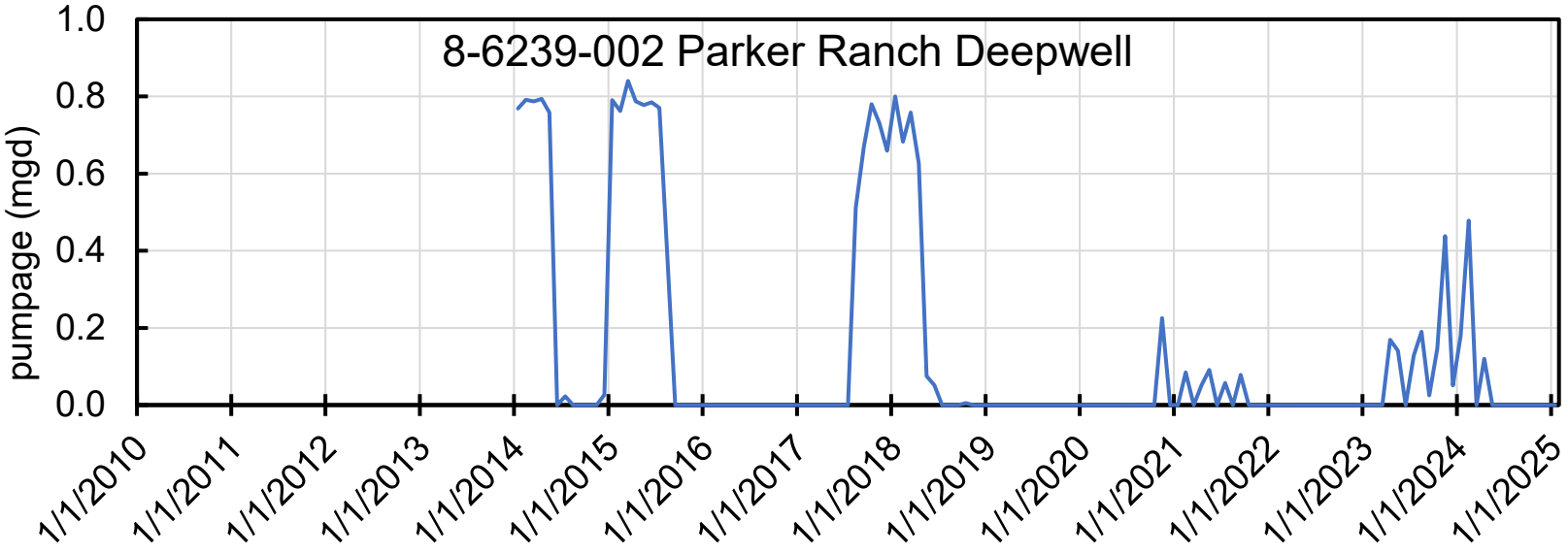


South Kohala Groundwater Systems



South Kohala Groundwater Use: Reported Pumpage

Hawaii County DWS P-130 System

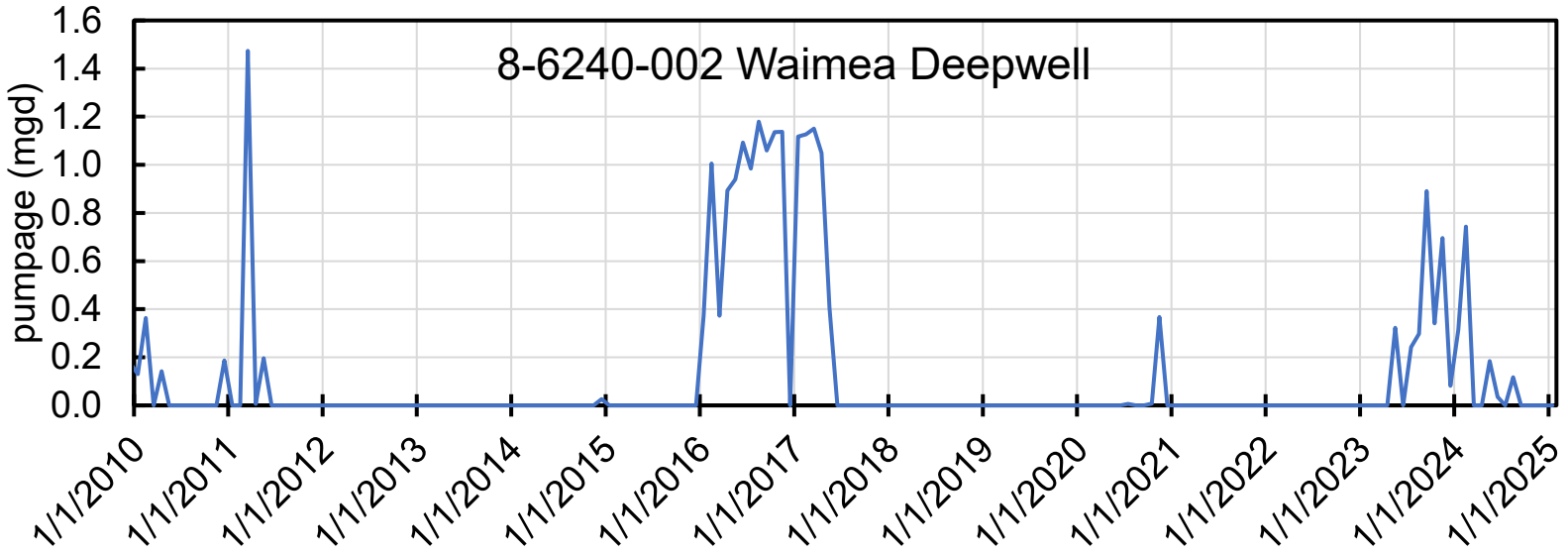


2010-2024 Pumpage

Mean = 0.233 mgd

Median = 0.000 mgd

Maximum = 0.850 mgd



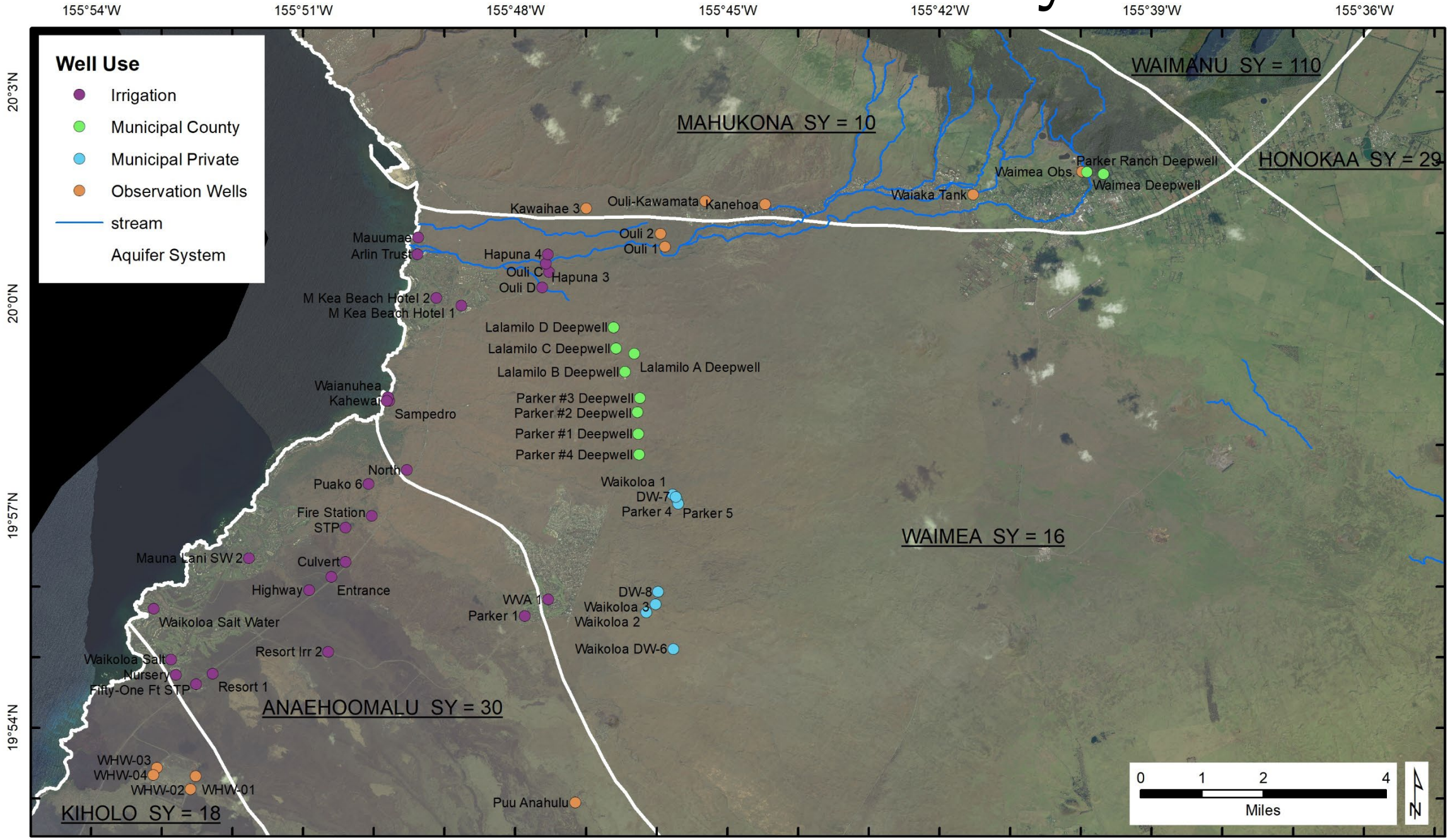
2010-2024 Pumpage

Mean = 0.123 mgd

Median = 0.000 mgd

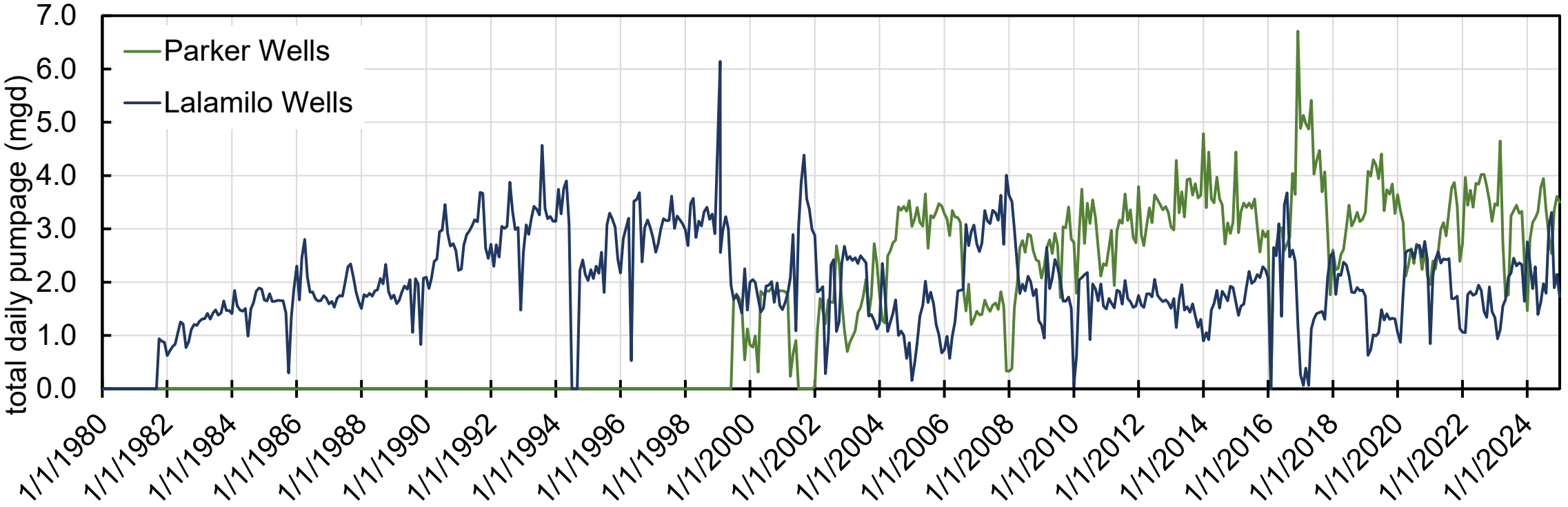
Maximum = 1.474 mgd

South Kohala Groundwater Systems



South Kohala Groundwater Use: Reported Pumpage

Hawaii County DWS P-160 System



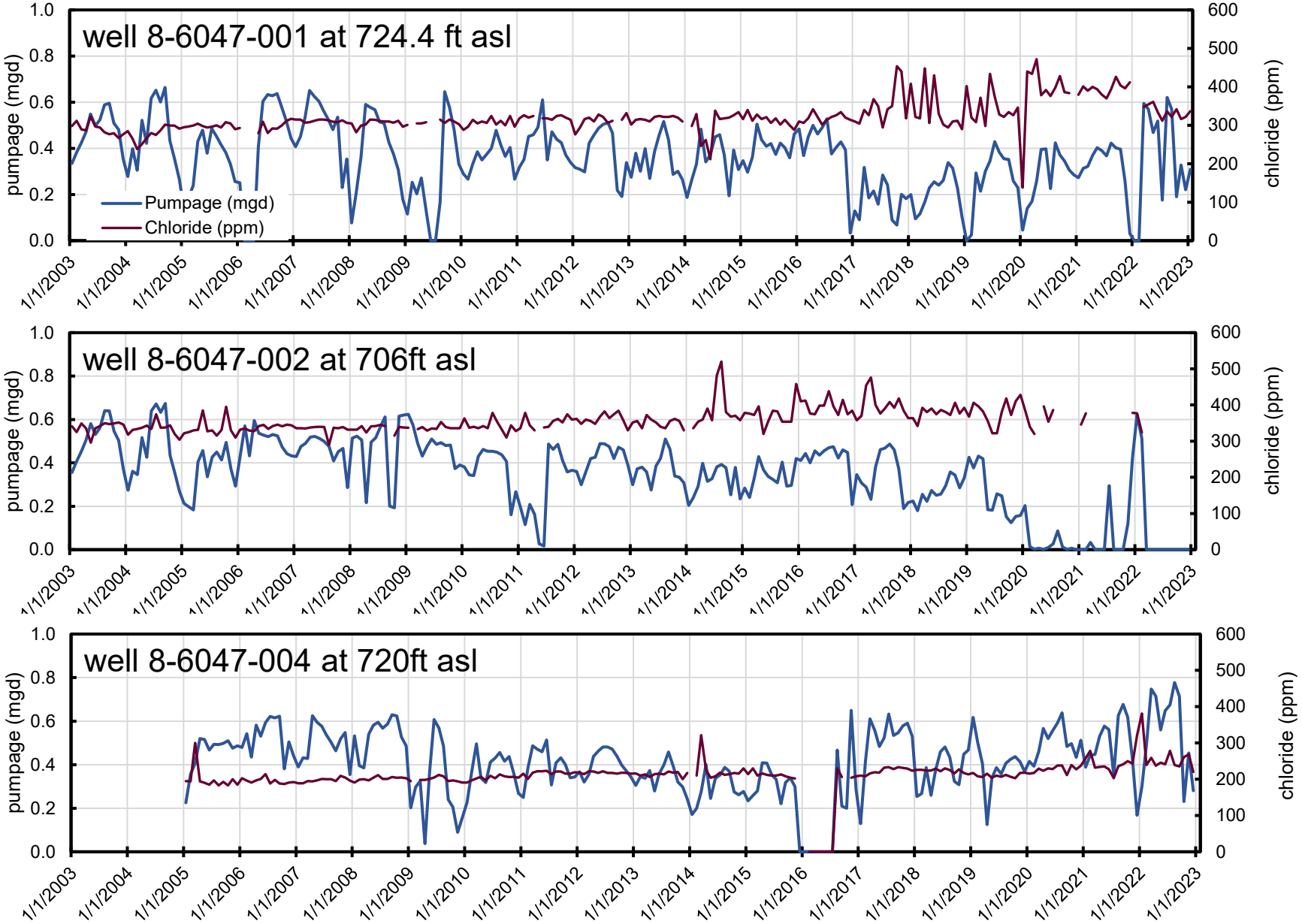
2010-2024 Pumpage

<u>Parker Wells</u>
Mean = 3.259 mgd
Median = 3.310 mgd
Maximum = 6.710 mgd

<u>Lalamilo Wells</u>
Mean = 1.762 mgd
Median = 1.753 mgd
Maximum = 3.675 mgd

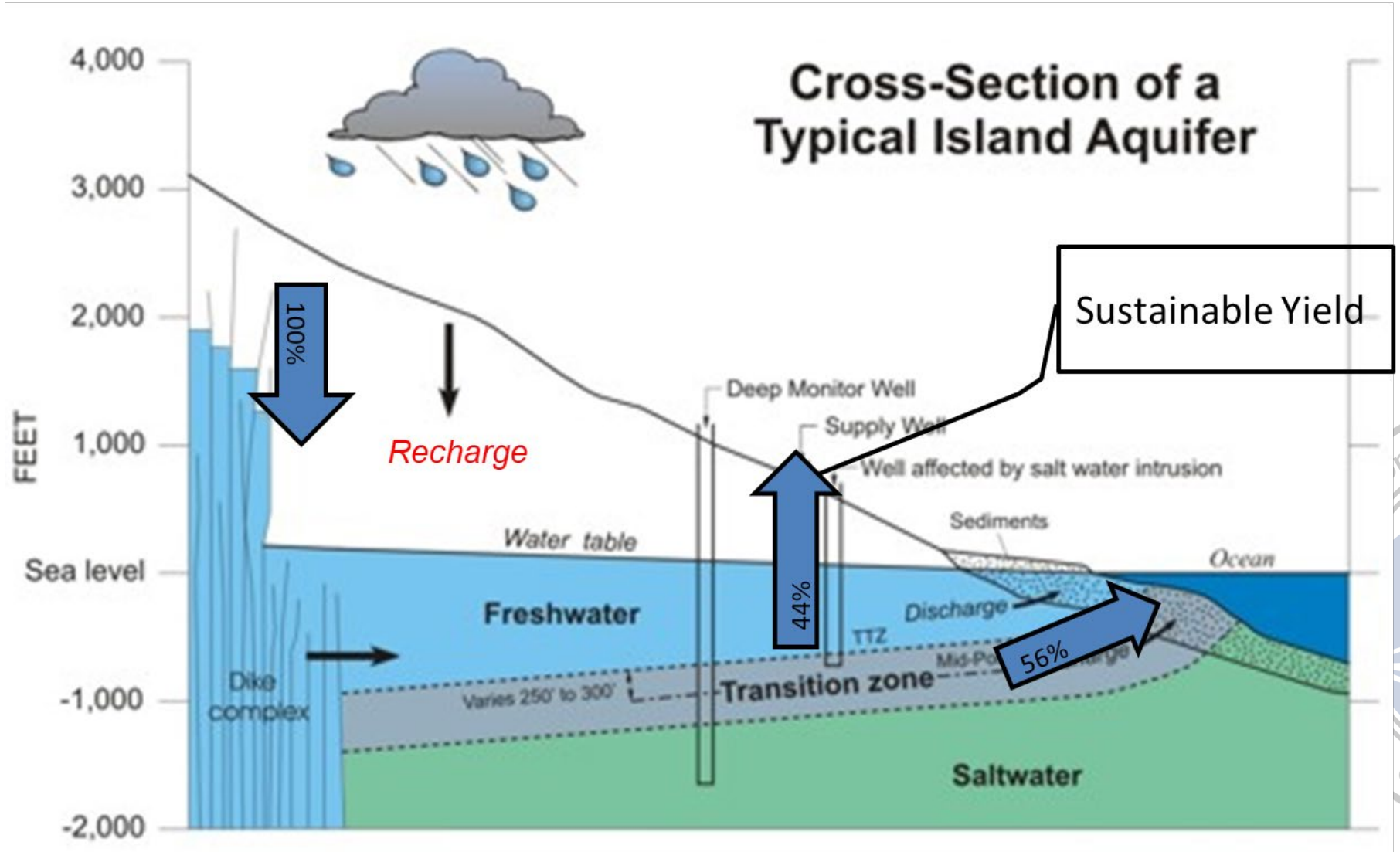
South Kohala Groundwater Use: Reported Pumpage

Mid-Elevation Wells



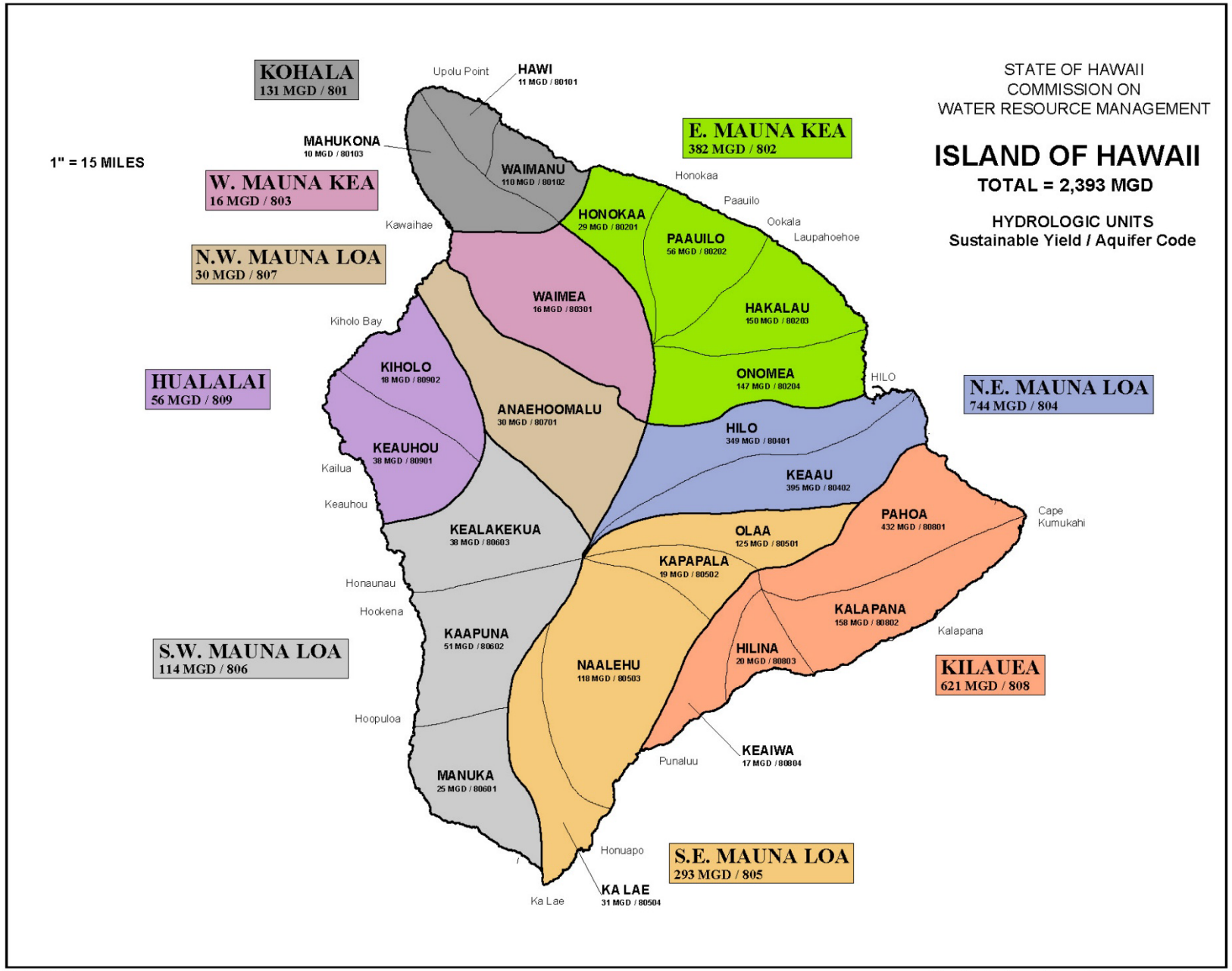
How is Groundwater protected?

Resource Assessments – Groundwater Sustainable Yields



Water Resource Management
State of Hawaii

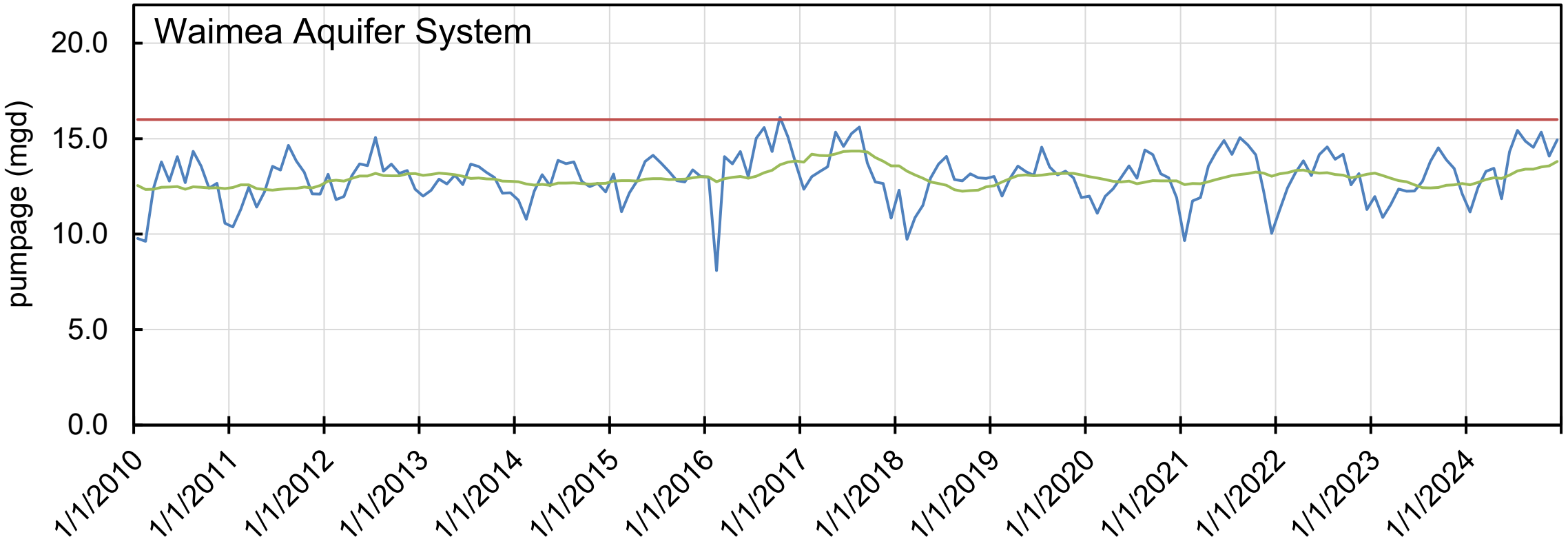
Sustainable Yield

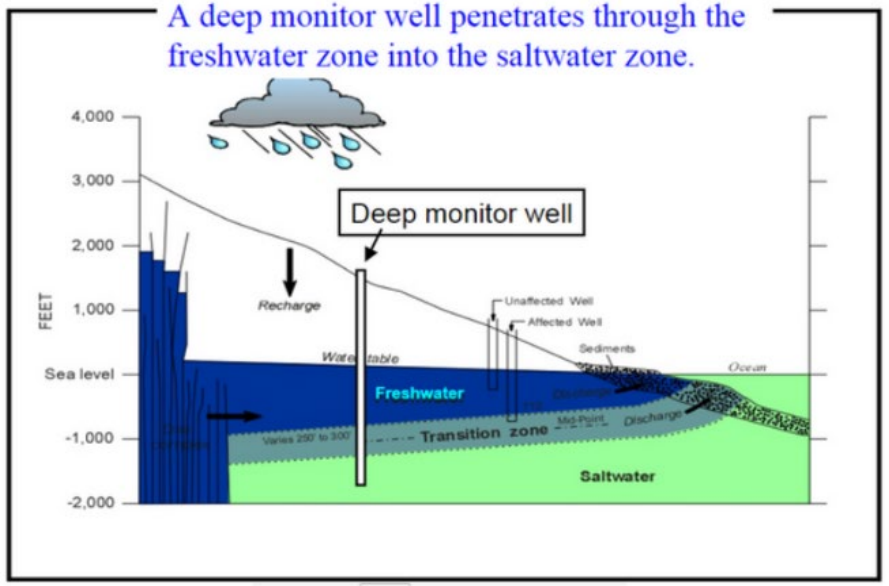


06/20/2018

Map Projection: Universal Transverse Mercator

Sustainable Yield





SURVEY BRANCH

- Water Use Reporting
- Ground water hydrologic monitoring
- Deep Monitor Well (“DMW”) Program

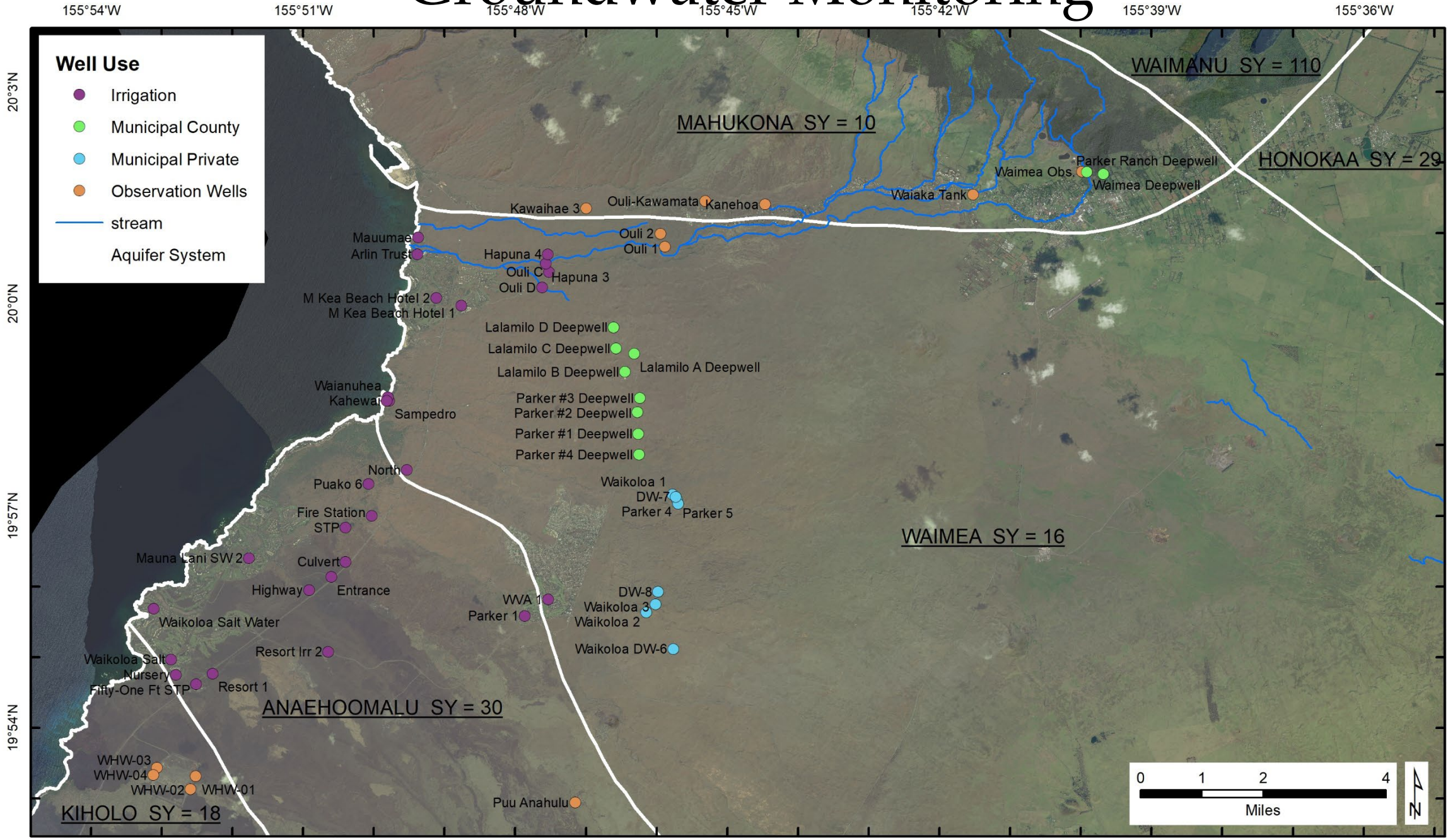
- CWRM currently monitors 12 DMWs:

6 on Oʻahu, 4 on Maui, and 2 on Hawaiʻi Island

- Ideally, there would be 3 DMWs in each Aquifer System Area (over 300 DMWs)

- Capital Improvement Project (“CIP”) for new DMWs statewide = ~ $2M/year

Groundwater Monitoring



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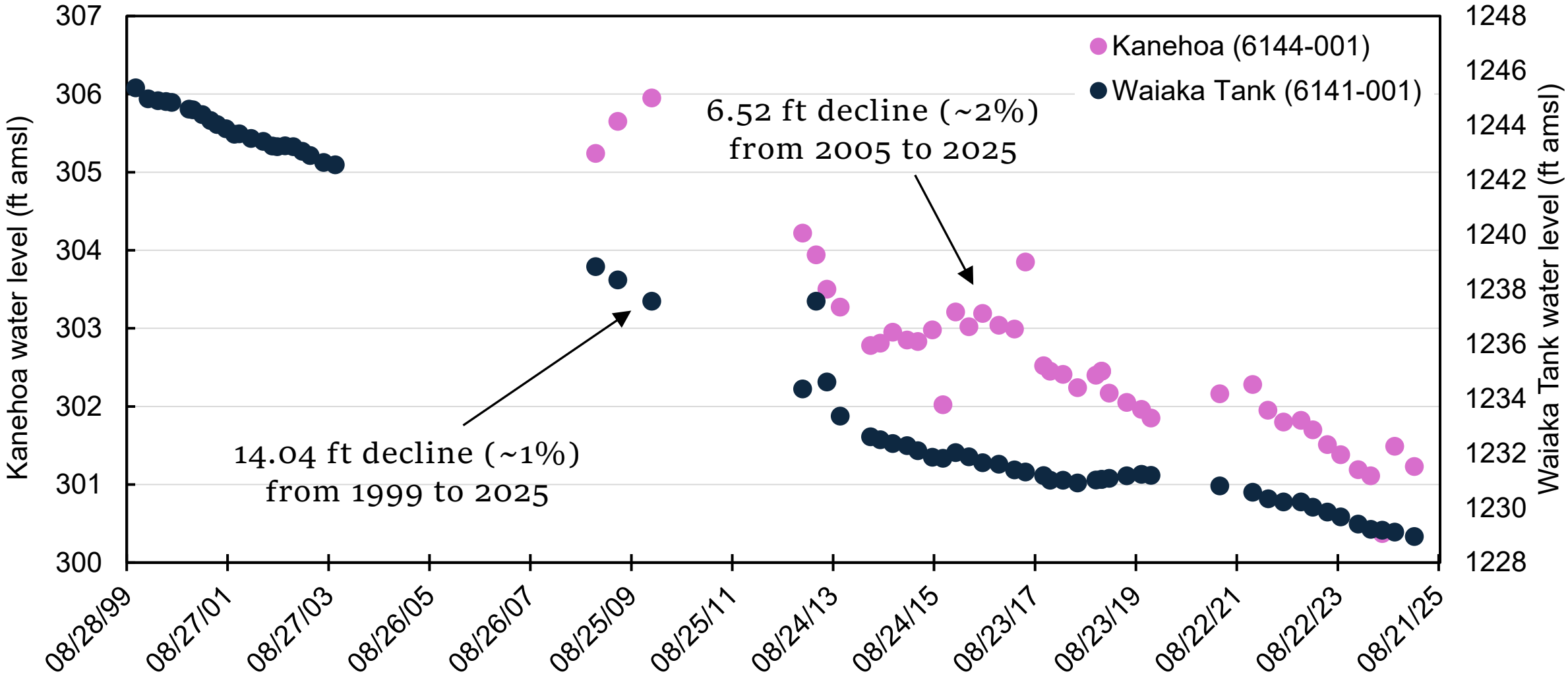
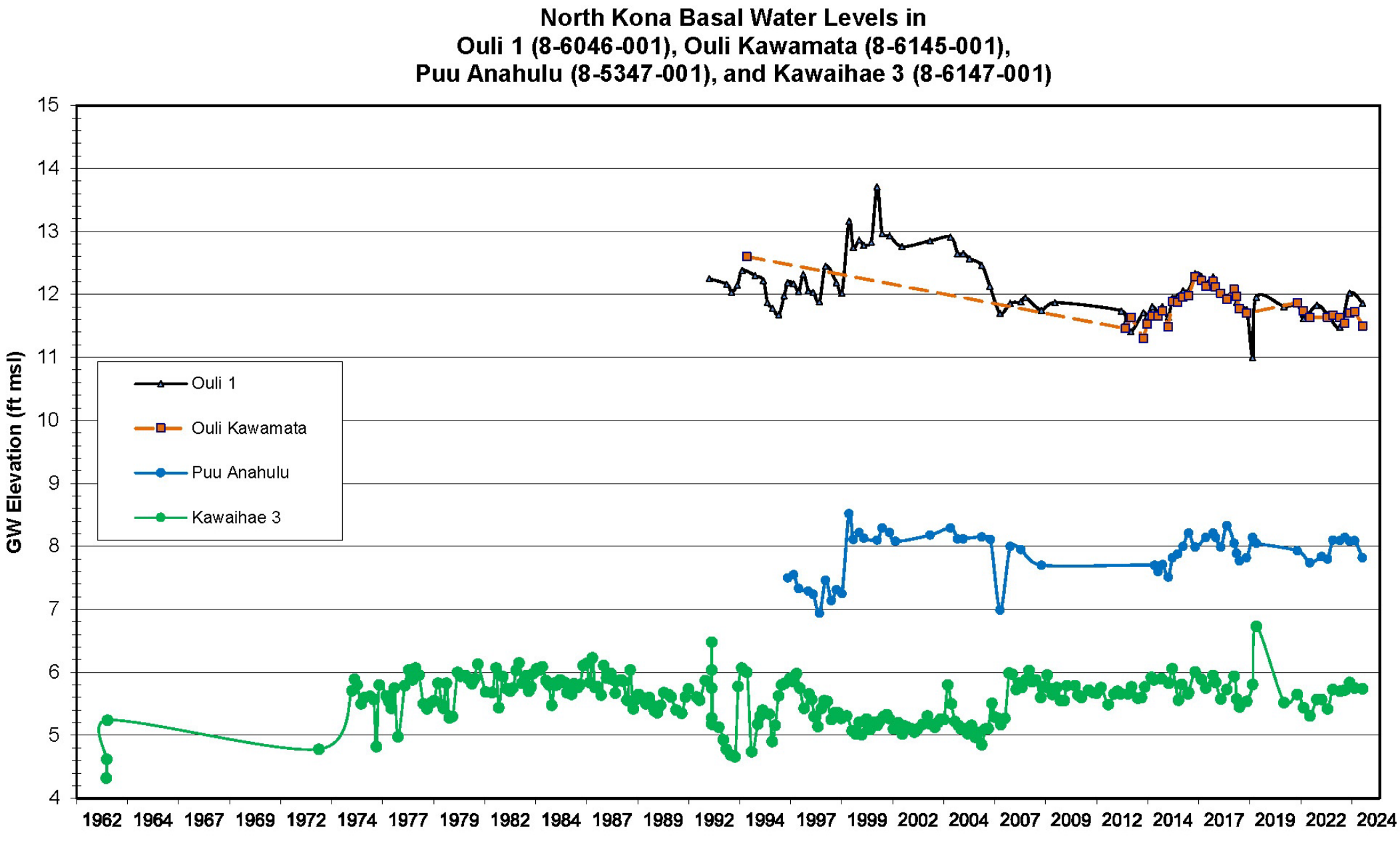
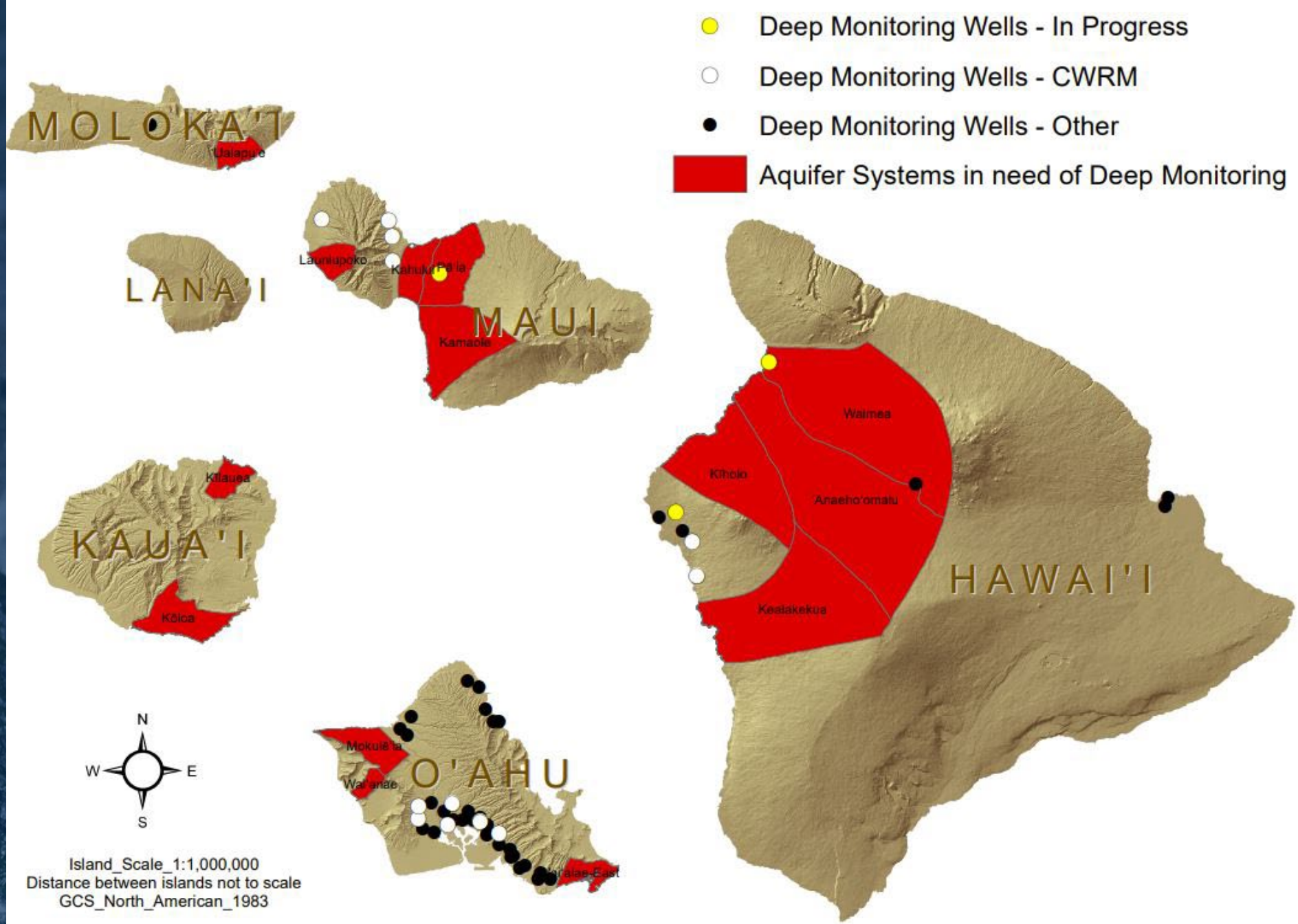


Groundwater Monitoring



Aquifer Systems in need of Deep Monitoring Wells



Questions on Groundwater?

STREAM PROTECTION AND MANAGEMENT

- 376 perennial streams
- ~1,300 stream diversions
- protect aquatic life, recreational values, and traditional and customary practices, etc

SURFACE WATER REGULATION

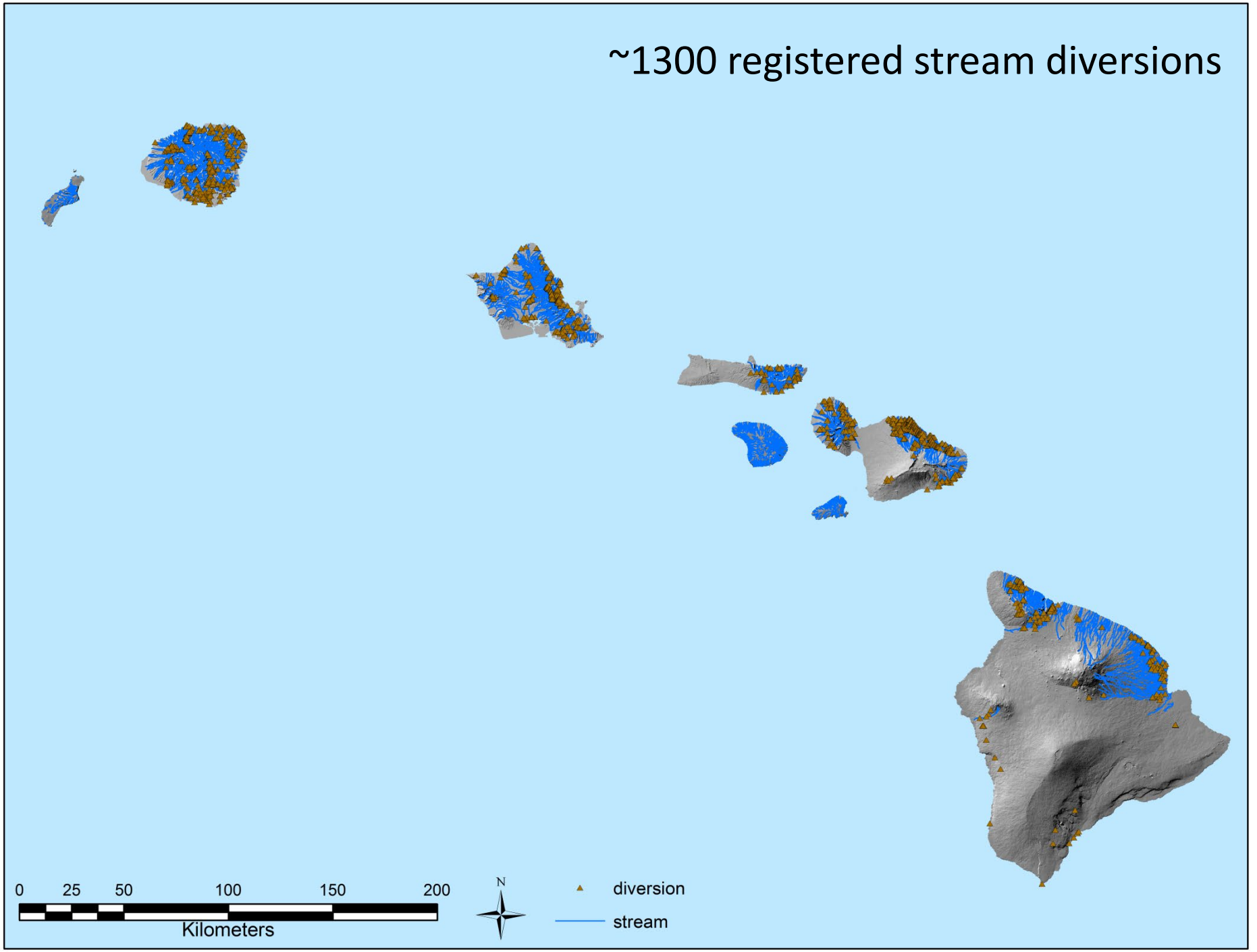
- Stream Diversion Works Permit (“SDWP”)
  - Surface water only (HRS § 174C-93)
- Stream Channel Alteration Permit (“SCAP”)
  - Surface water only (HRS § 174C-71)

INSTREAM USE PROTECTION

- Surface water hydrologic monitoring

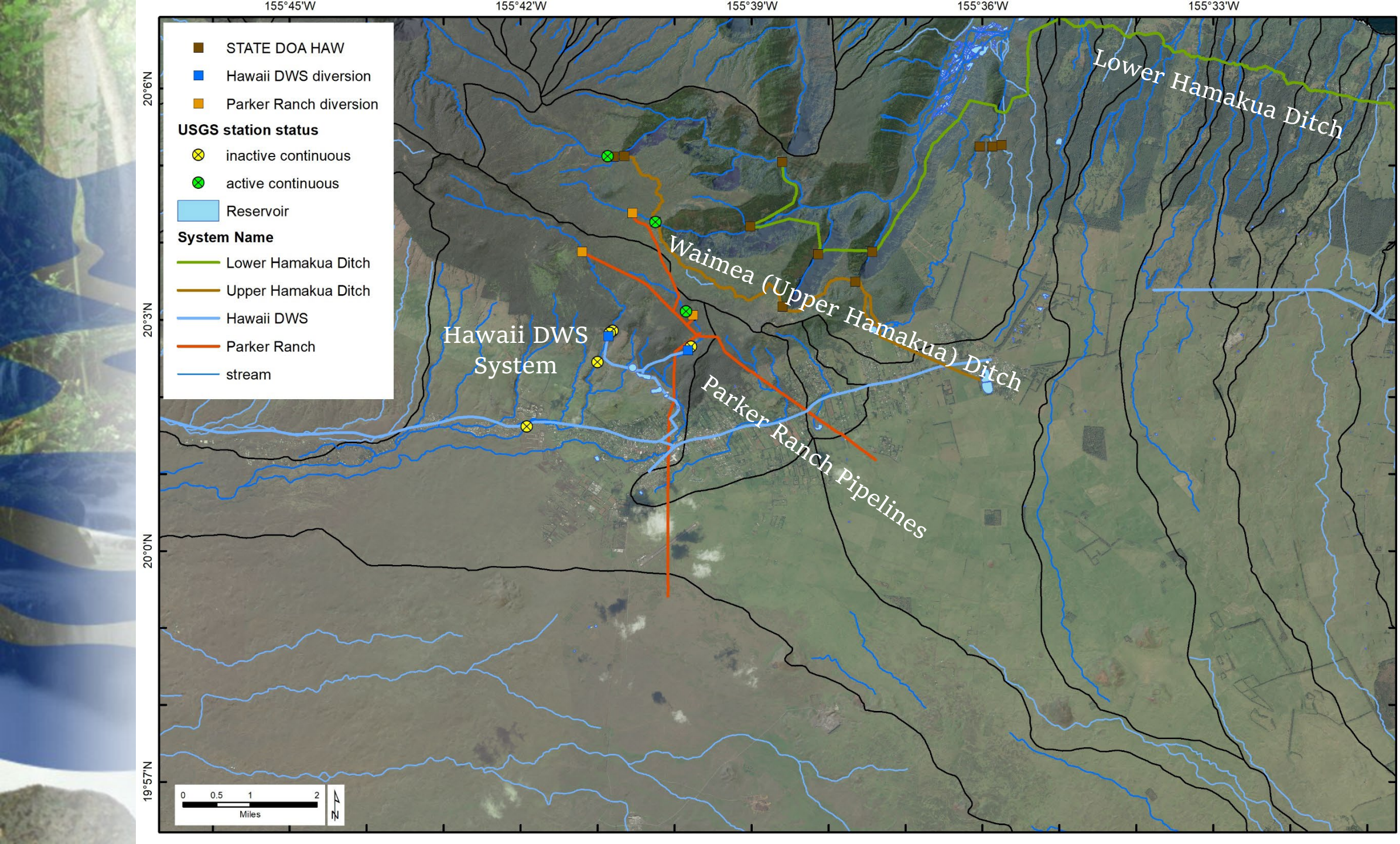
  streams and ditches
- Analyze current and historic USGS and other datasets
- Conducts biological assessments
- Coordinates the United States Geological Survey (“USGS”) Cooperative Agreement:

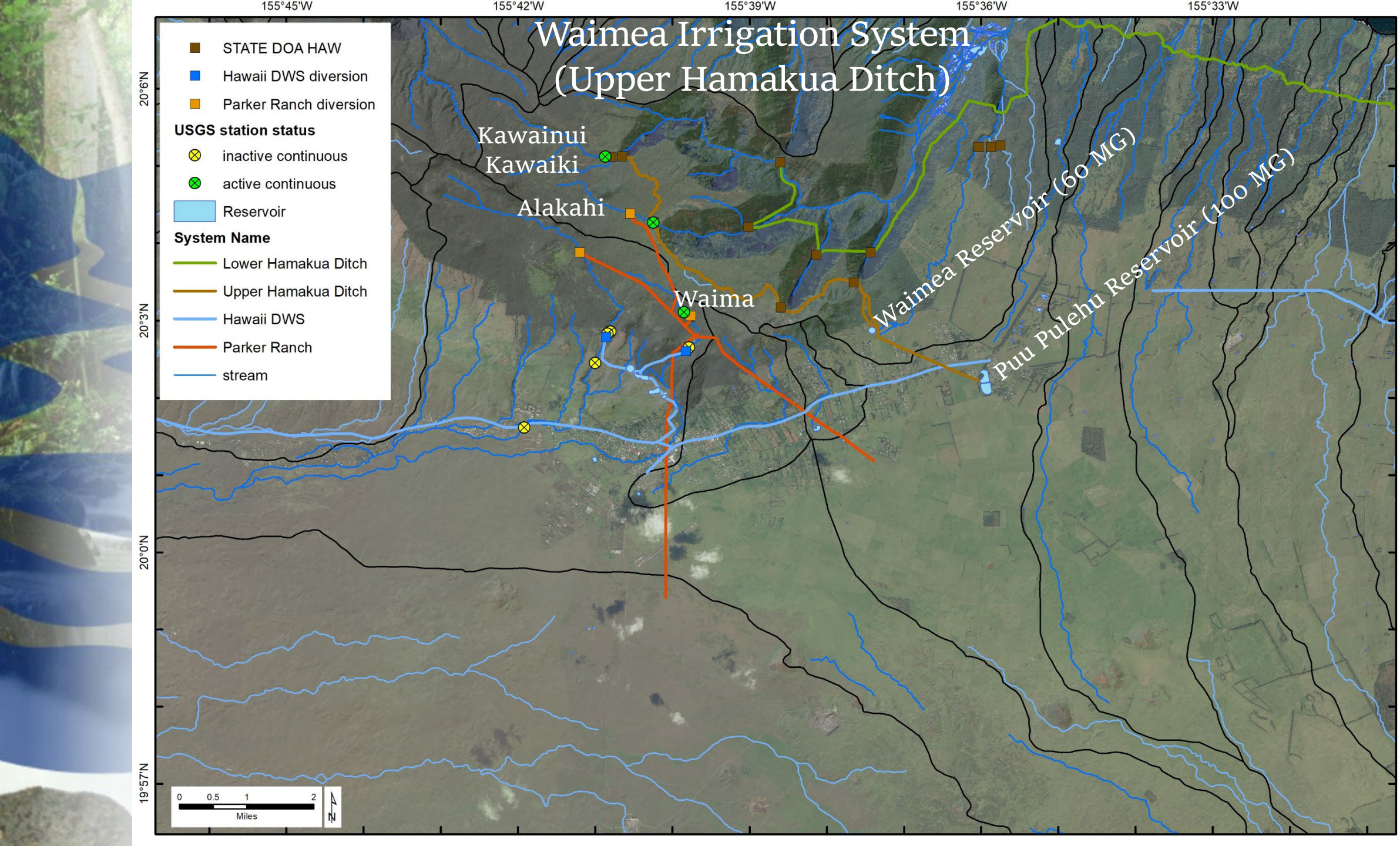
  →47 stream gages, 9 observation wells, 18 rain gages


~1300 registered stream diversions
0 25 50 100 150 200
Kilometers
N
diversion
stream

Surface Water Systems in South Kohala

- Waimea Irrigation System (Upper Hamakua Ditch)
- Parker Ranch System
- Hawaii DWS System


155°45'W
155°42'W
155°39'W
155°36'W
155°33'W
20°6'N
20°3'N
20°0'N
19°57'N
STATE DOA HAW
Hawaii DWS diversion
Parker Ranch diversion
USGS station status
inactive continuous
active continuous
Reservoir
System Name
Lower Hamakua Ditch
Upper Hamakua Ditch
Hawaii DWS
Parker Ranch
stream
Lower Hamakua Ditch
Waimea (Upper Hamakua) Ditch
Hawaii DWS System
Parker Ranch Pipelines
0 0.5 1 2
Miles
N


Waimea Irrigation System
(Upper Hamakua Ditch)
155°45'W
155°42'W
155°39'W
155°36'W
155°33'W
20°6'N
20°3'N
20°0'N
19°57'N
STATE DOA HAW
Hawaii DWS diversion
Parker Ranch diversion
USGS station status
inactive continuous
active continuous
Reservoir
System Name
Lower Hamakua Ditch
Upper Hamakua Ditch
Hawaii DWS
Parker Ranch
stream
Kawainui
Kawaiki
Alakahi
Waima
Waimea Reservoir (60 MG)
Puu Pulehu Reservoir (100 MG)
0 0.5 1 2
Miles
N

Waimea Irrigation System

Diversion dam on Kawainui Stream

Waimea Irrigation System

Minor diversion on unnamed stream

Diversion intake on Kawaiki Stream

Minor diversion on unnamed stream

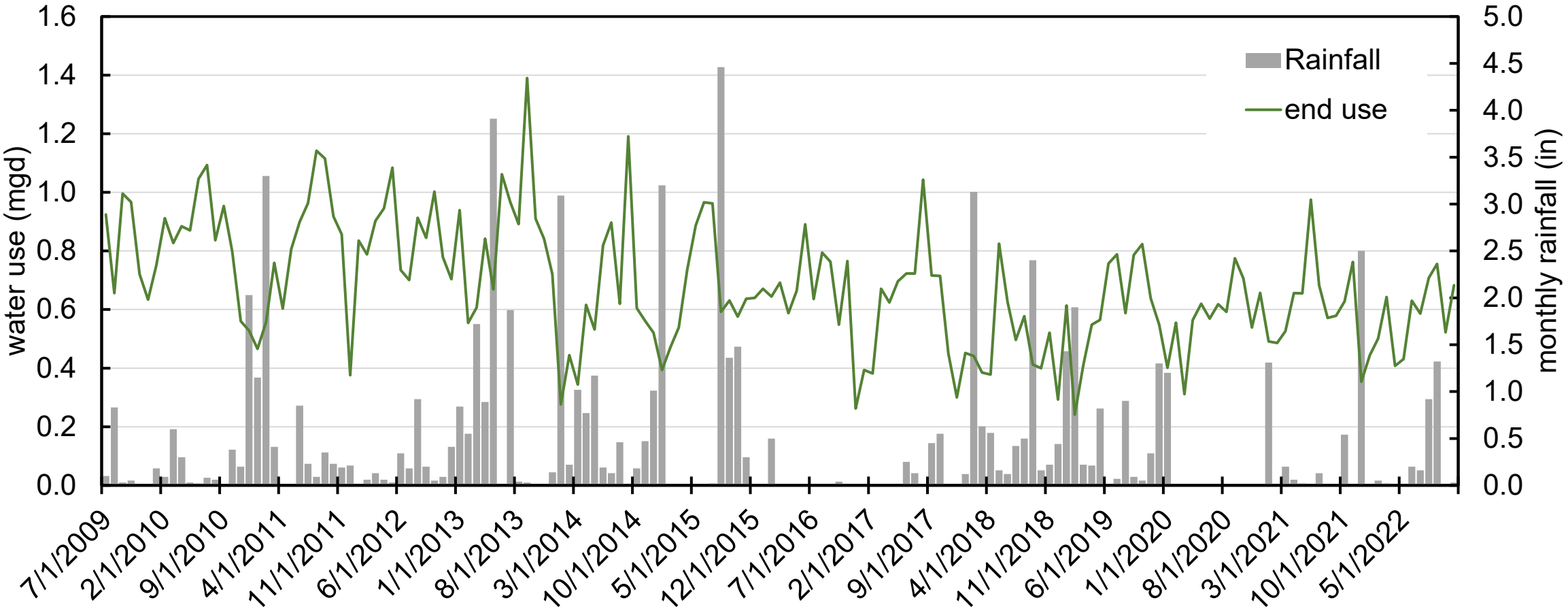
Waimea Irrigation System

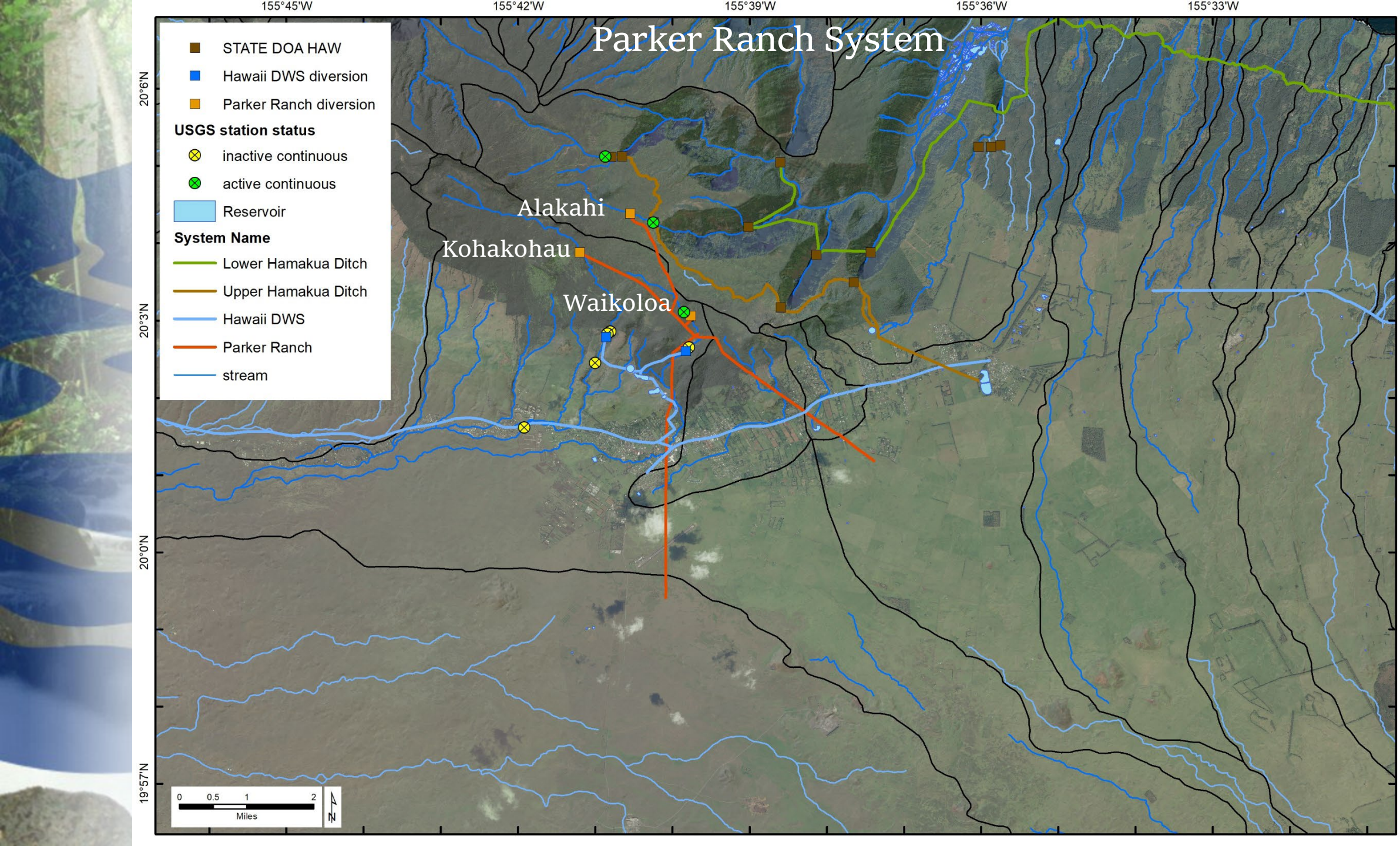
Diversion intake on Alakahi Stream

USGS Stream Gage
16725000

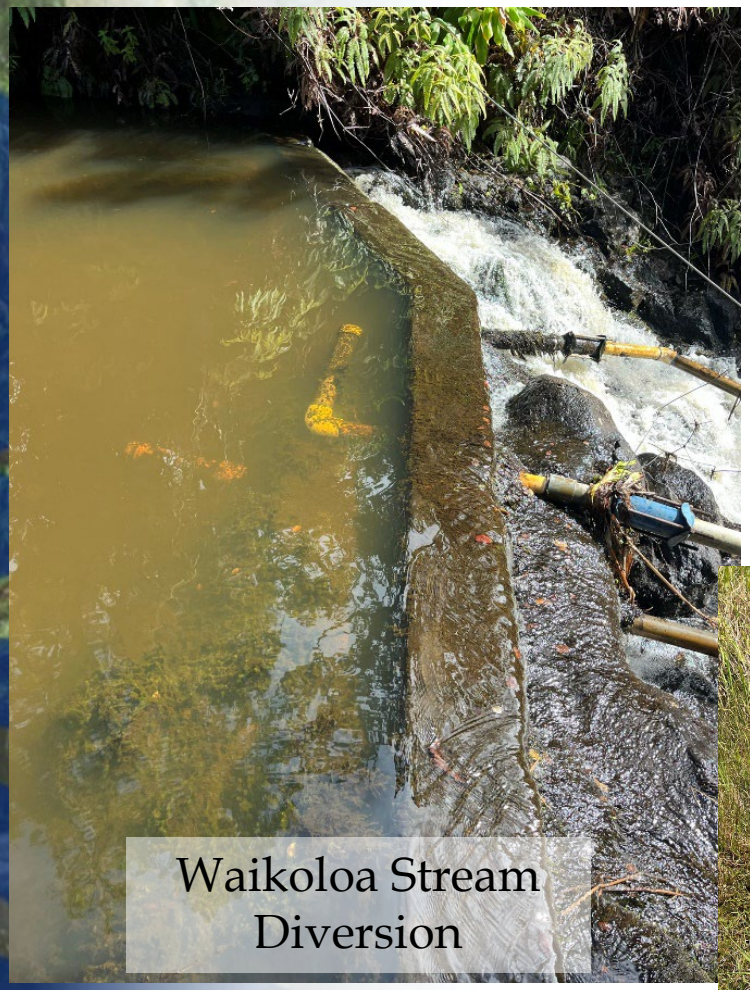
Waimea Reservoir (60 MG)

Waimea Irrigation System

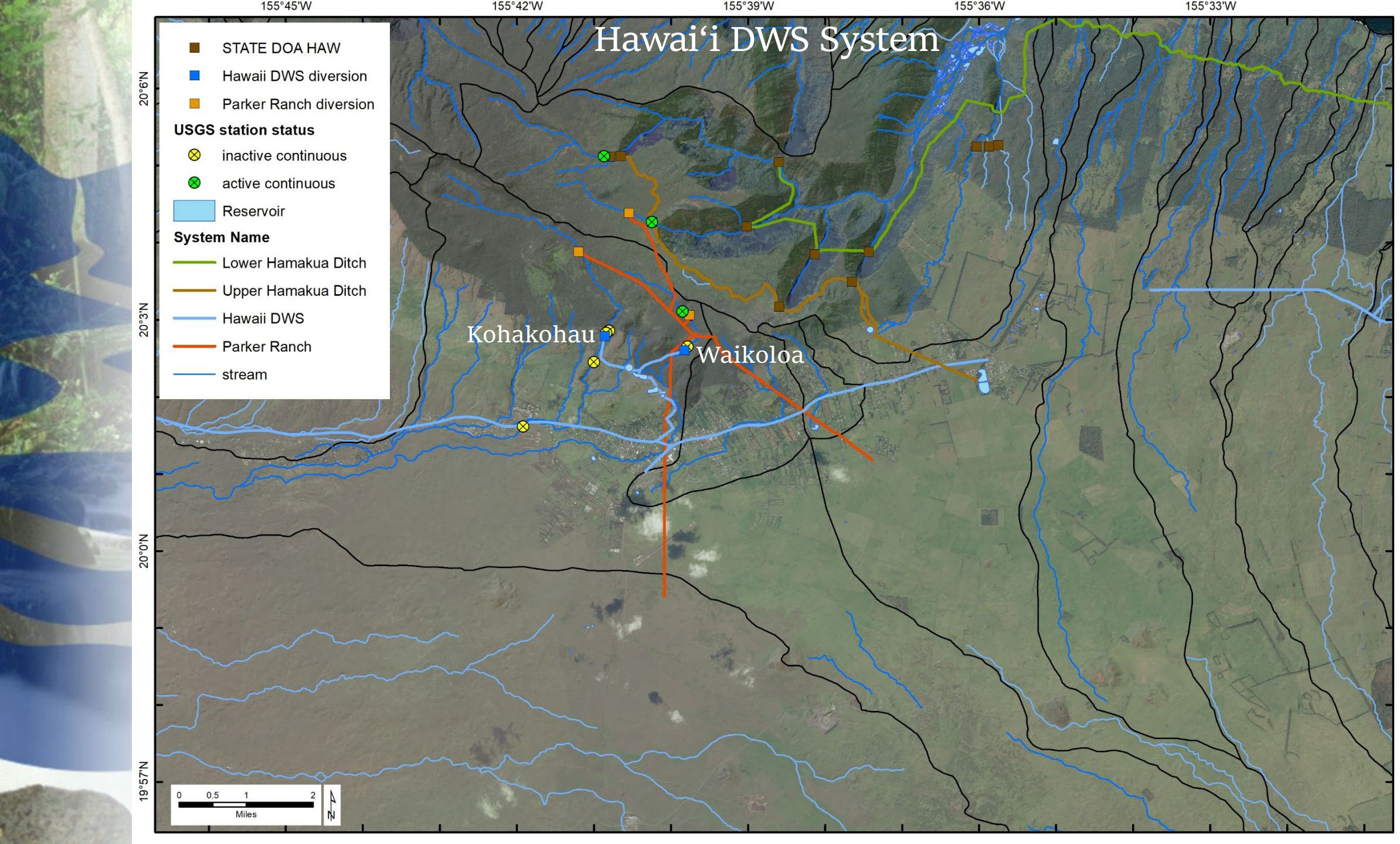



Parker Ranch System
155°45'W
155°42'W
155°39'W
155°36'W
155°33'W
20°6'N
20°3'N
20°0'N
19°57'N
STATE DOA HAW
Hawaii DWS diversion
Parker Ranch diversion
USGS station status
inactive continuous
active continuous
Reservoir
System Name
Lower Hamakua Ditch
Upper Hamakua Ditch
Hawaii DWS
Parker Ranch
stream
Alakahi
Kohakohau
Waikoloa
0 0.5 1 2
Miles
N

Parker Ranch System



Parker Ranch System


Hawai‘i DWS System
STATE DOA HAW
Hawaii DWS diversion
Parker Ranch diversion
USGS station status
inactive continuous
active continuous
Reservoir
System Name
Lower Hamakua Ditch
Upper Hamakua Ditch
Hawaii DWS
Parker Ranch
stream
Kohakohau
Waikoloa
155°45'W
155°42'W
155°39'W
155°36'W
155°33'W
20°6'N
20°3'N
20°0'N
19°57'N
0 0.5 1 2
Miles
N

Hawai‘i DWS Diversion on Waikoloa Stream at Marine Dam

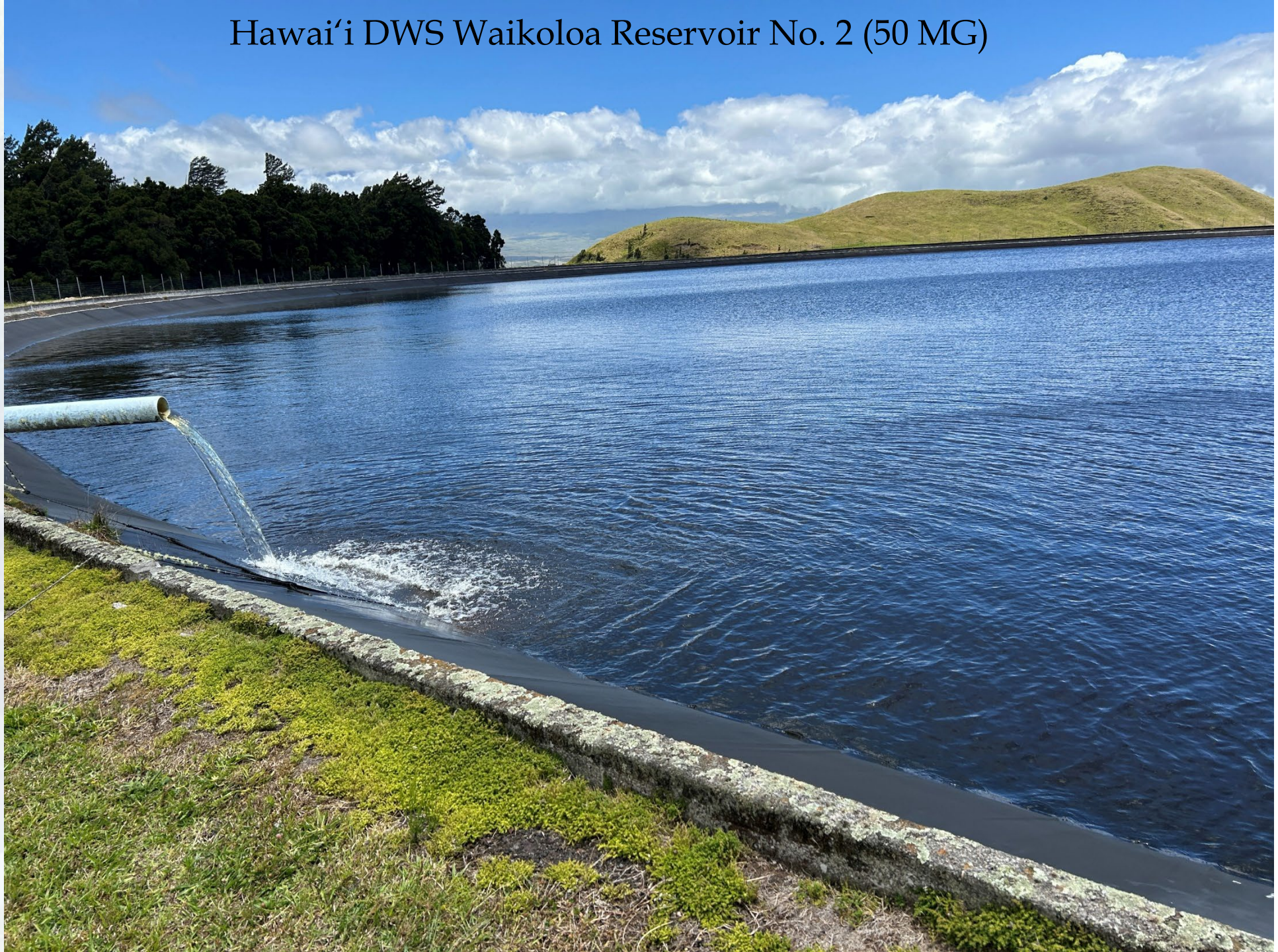
Hawai‘i DWS Diversion on Waikoloa Stream at Marine Dam

Hawai‘i DWS Diversion on Kohākōhau Stream

Hawai‘i DWS Diversion on Kohākōhau Stream

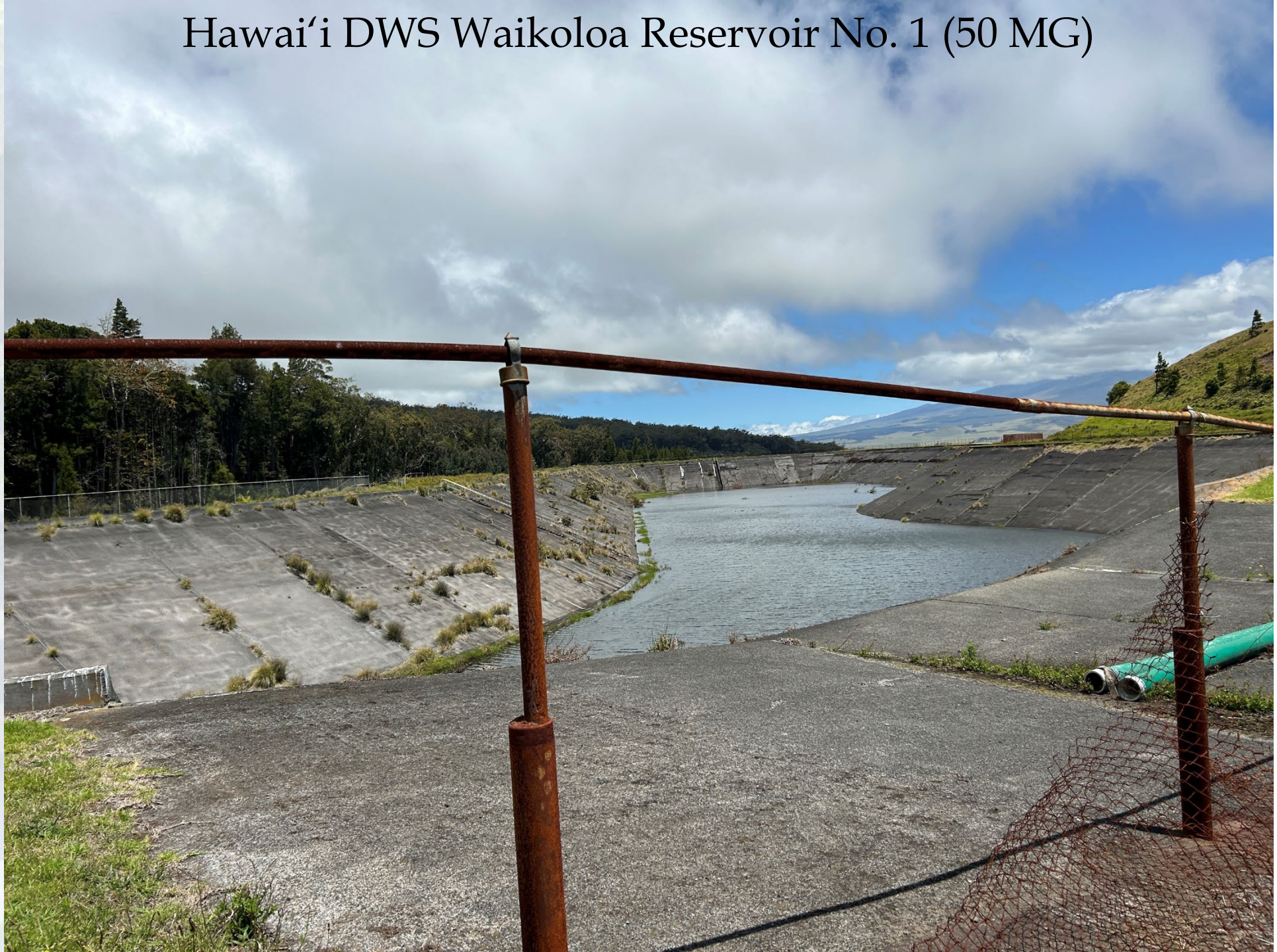
Hawai‘i DWS Waikoloa Reservoir No. 2 (50 MG)

Hawai‘i DWS Waikoloa Reservoir No. 2 (50 MG)



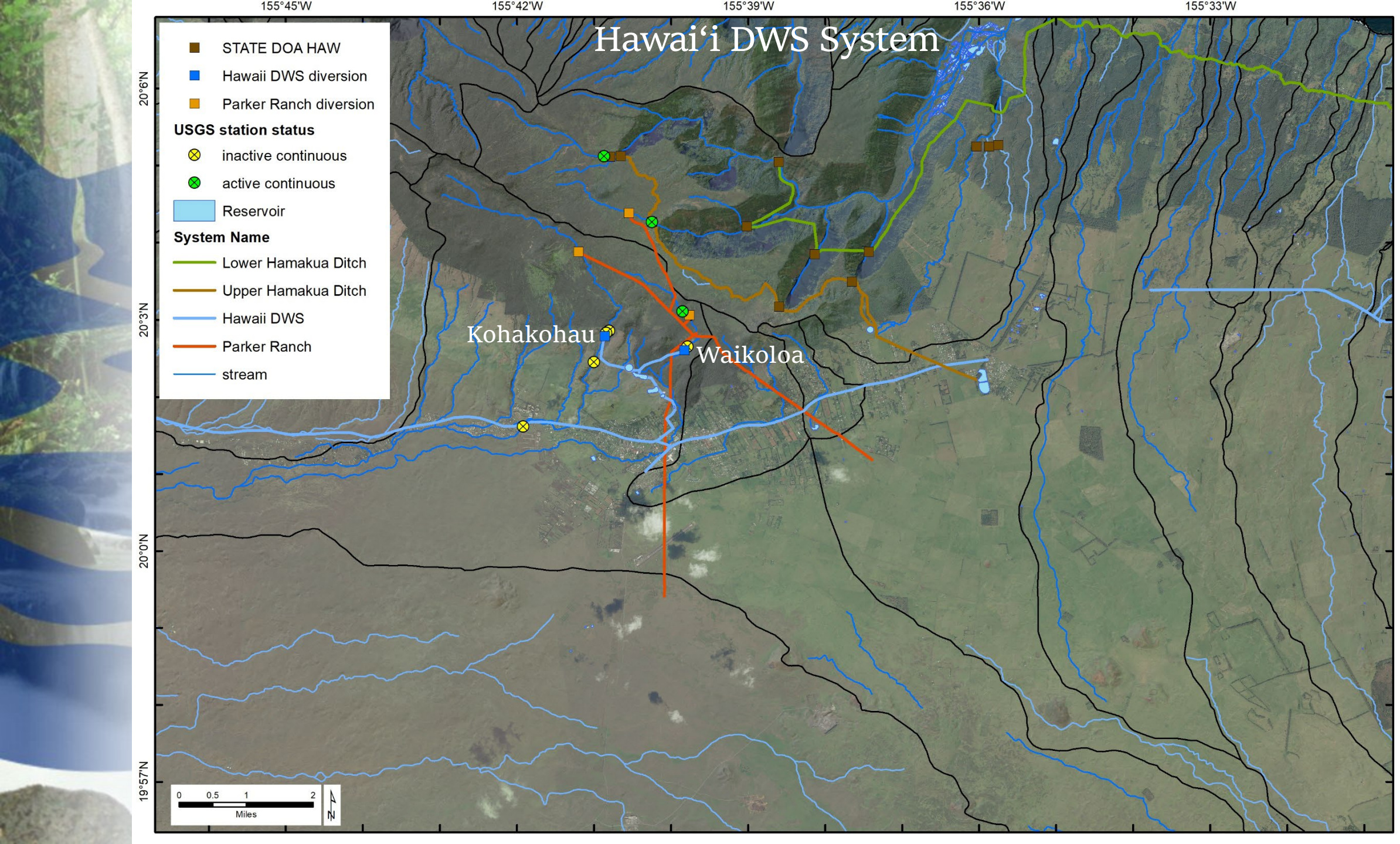
Hawai‘i DWS Waikoloa Reservoir No. 1 (50 MG)

Hawai‘i DWS Waikoloa Reservoir No. 1 (50 MG)



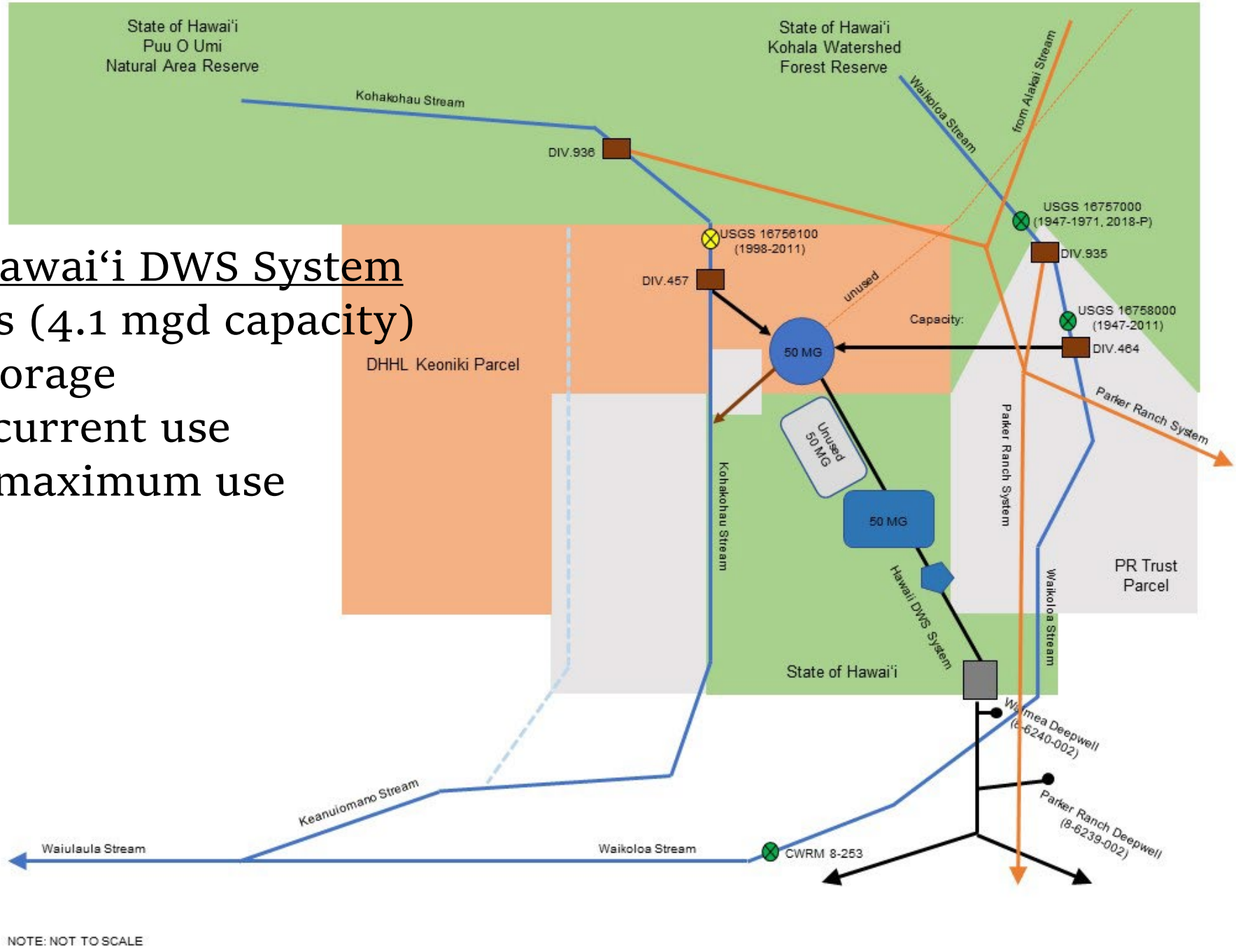
Hawai‘i DWS Waikoloa Reservoir No. 3 (50 MG)

Hawai‘i DWS Waikoloa Reservoir No. 2 Outflow

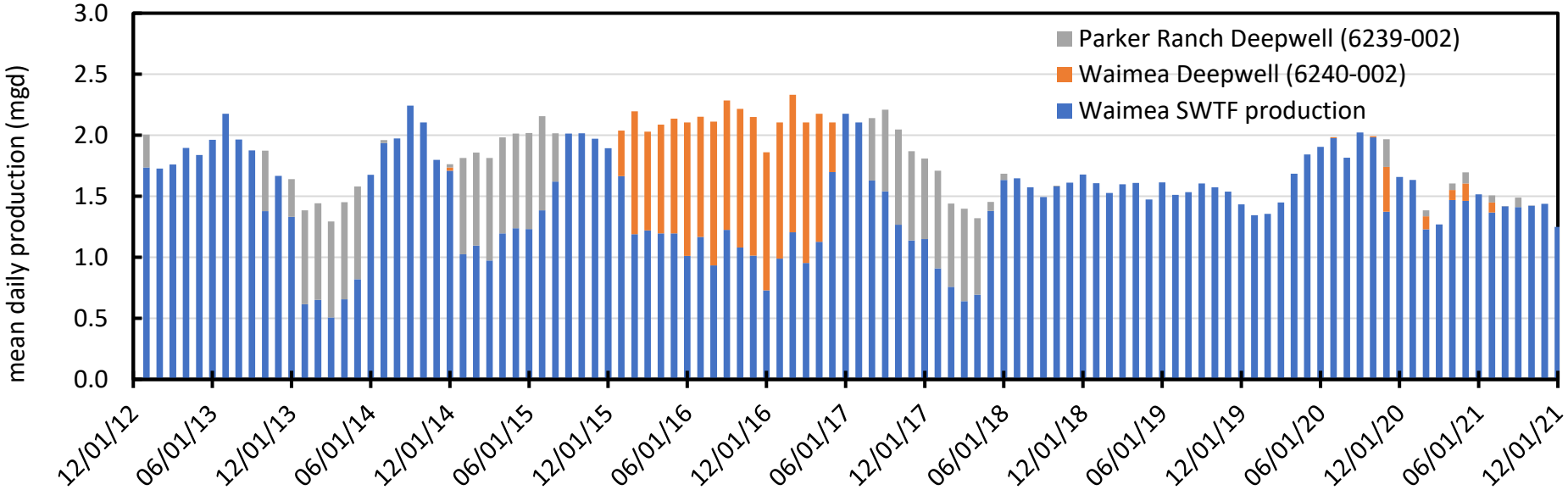

Hawai‘i DWS System
STATE DOA HAW
Hawaii DWS diversion
Parker Ranch diversion
USGS station status
inactive continuous
active continuous
Reservoir
System Name
Lower Hamakua Ditch
Upper Hamakua Ditch
Hawaii DWS
Parker Ranch
stream
Kohakohau
Waikoloa
155°45'W
155°42'W
155°39'W
155°36'W
155°33'W
20°6'N
20°3'N
20°0'N
19°57'N
0 0.5 1 2
Miles
N

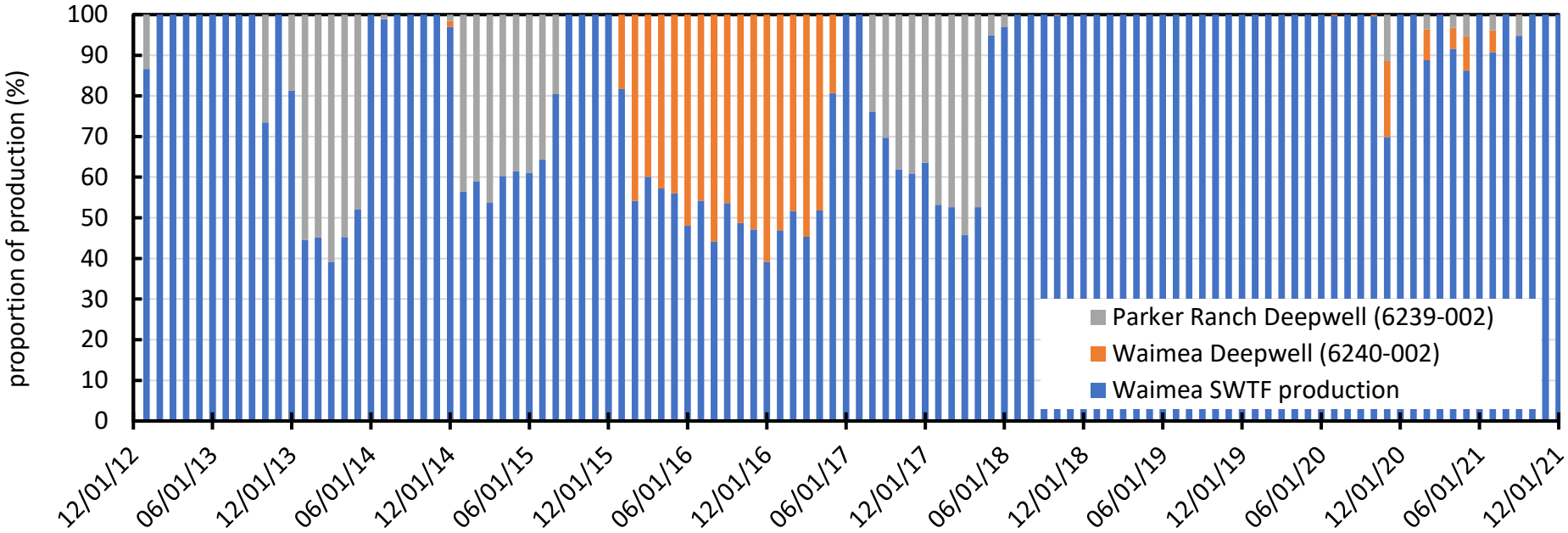
Hawai‘i DWS System

2 diversions (4.1 mgd capacity)
150+ MG storage
1.4 mgd of current use
1.8 mgd of maximum use



Hawai‘i DWS South Kohala System Sources





2013-2021 Statistics

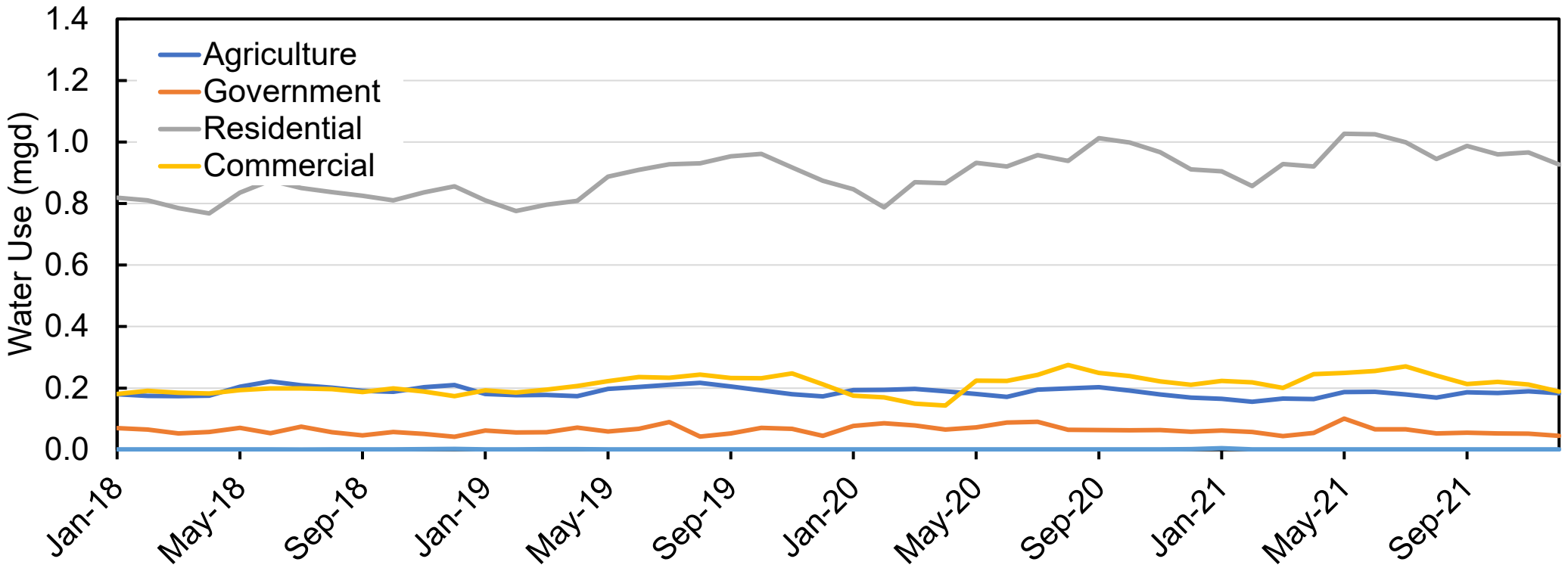
Waimea SWTF
Mean = 1.46 mgd
Median = 1.50 mgd
Min = 0.51 mgd
Max = 2.24 mgd

Waimea Deepwell
Mean = 0.16 mgd
Median = 0.00 mgd
Min = 0.00 mgd
Max = 1.18 mgd

Parker Ranch Well
Mean = 0.17 mgd
Median = 0.00 mgd
Min = 0.00 mgd
Max = 2.84 mgd

Total Production
Mean = 1.79 mgd
Median = 1.81 mgd
Min = 1.25 mgd
Max = 2.33 mgd

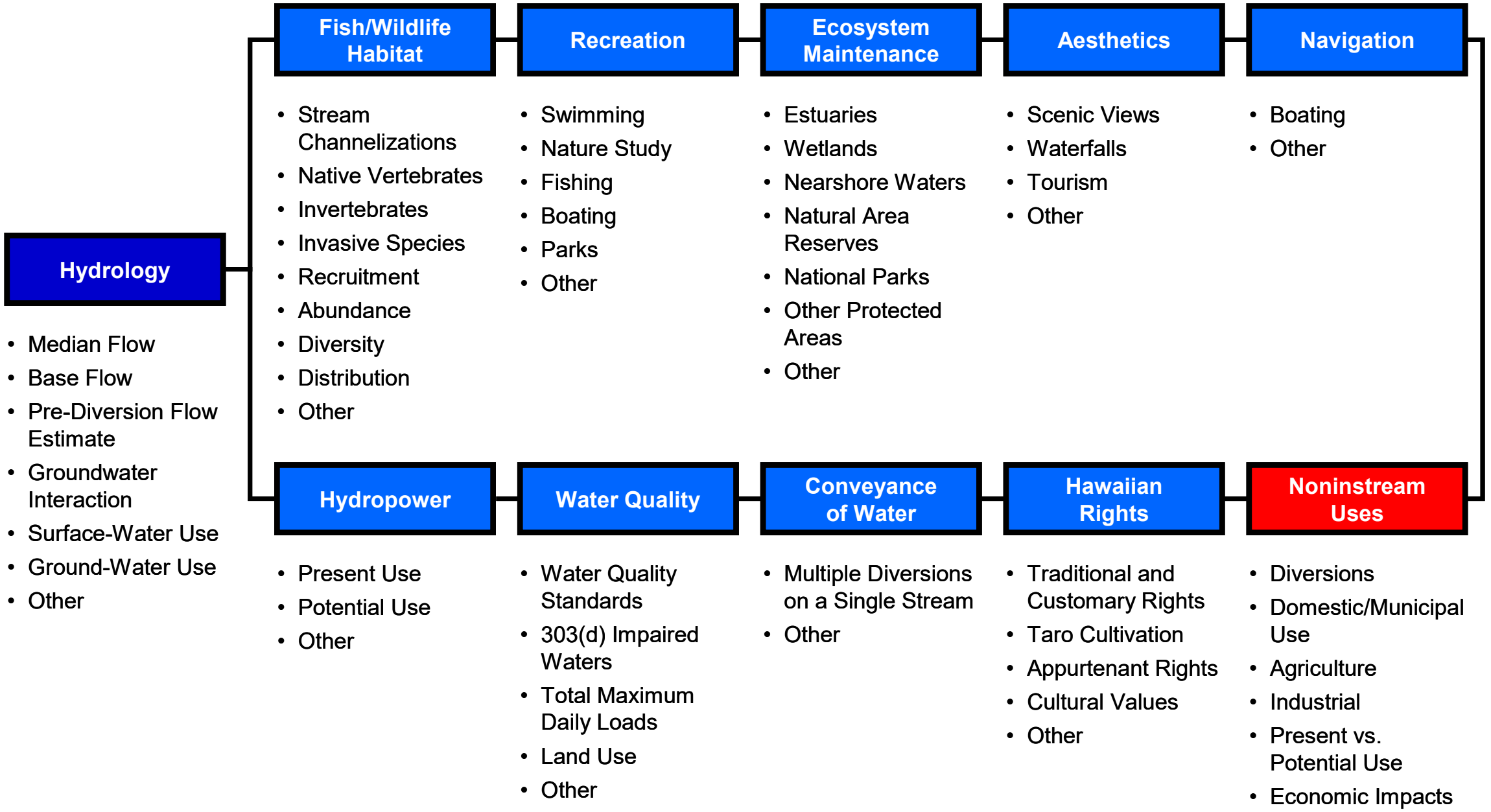
Hawai‘i DWS South Kohala System Uses



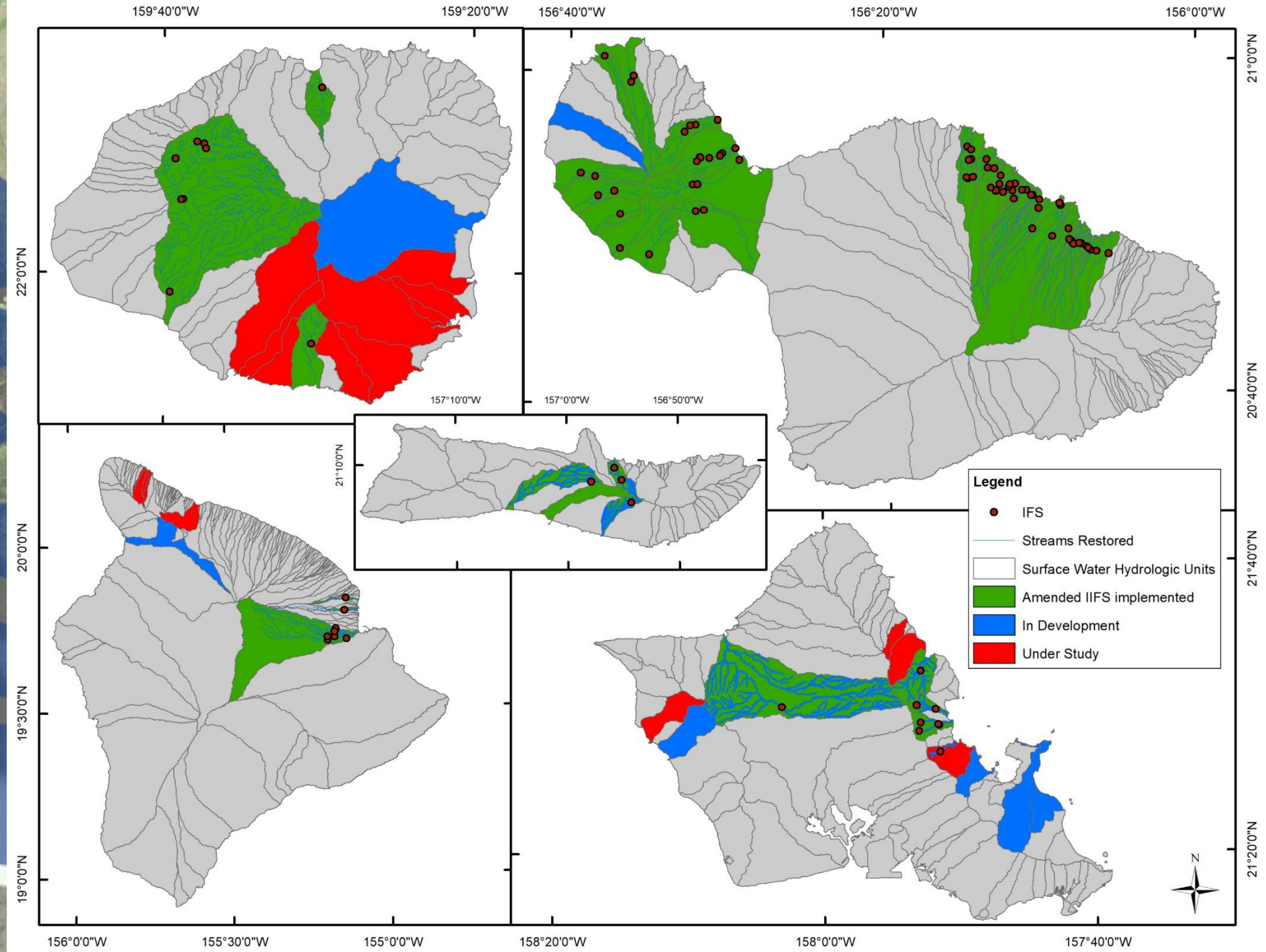
	Agriculture (mgd)	(%)	Government (mgd)	(%)	Residential (mgd)	(%)	Commercial (mgd)	(%)	DC meters (mgd)	(%)	Total (mgd)
mean	0.188	13.9	0.063	4.6	0.894	65.9	0.212	15.6	<0.001	0.1	1.357
median	0.188	13.9	0.062	4.4	0.907	65.6	0.212	15.7	<0.001	0.0	1.349
max	0.222	16.4	0.101	6.9	1.027	69.3	0.275	18.6	<0.001	0.3	1.565

State of Hawaii

Instream Water Uses

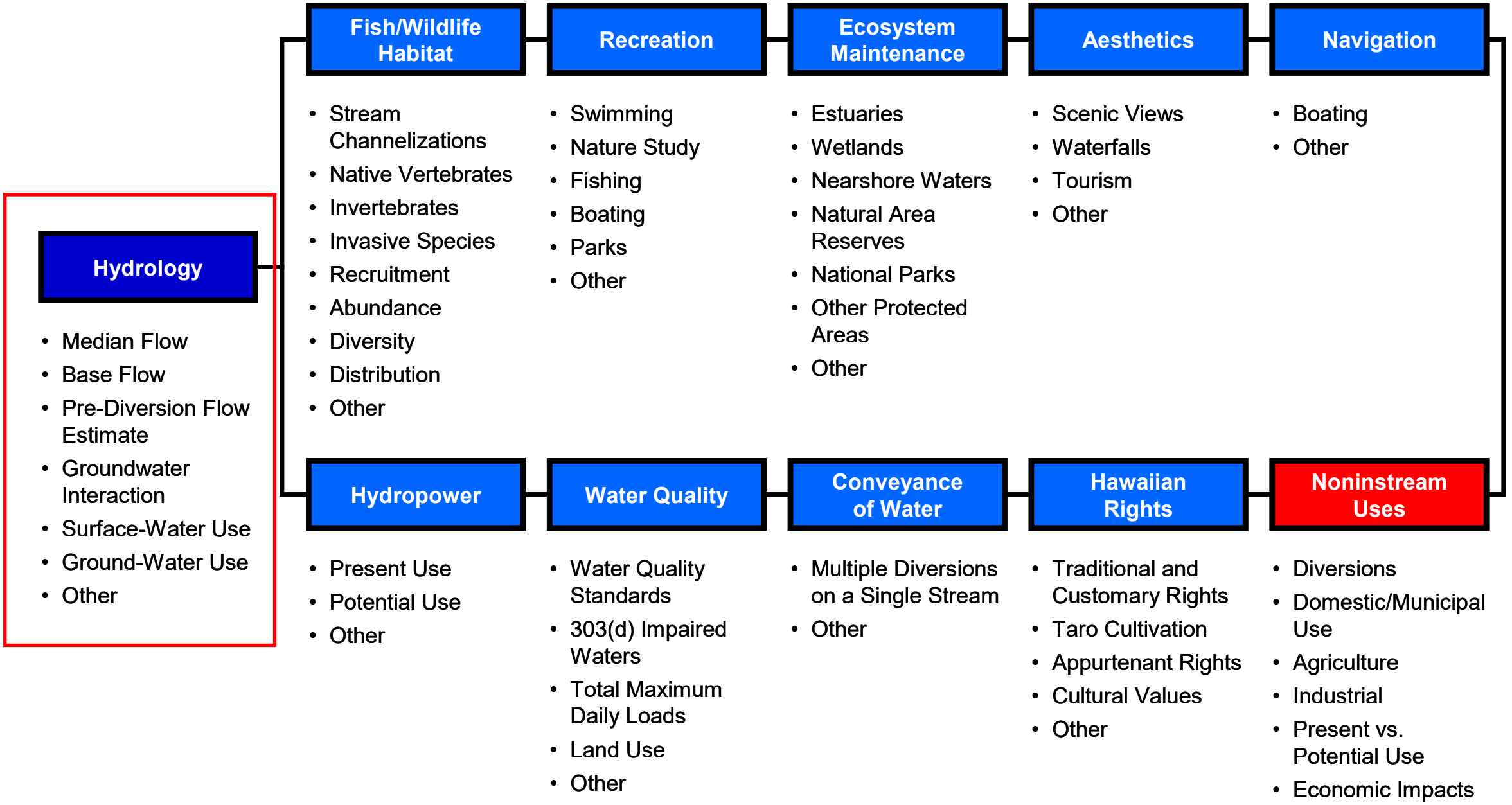


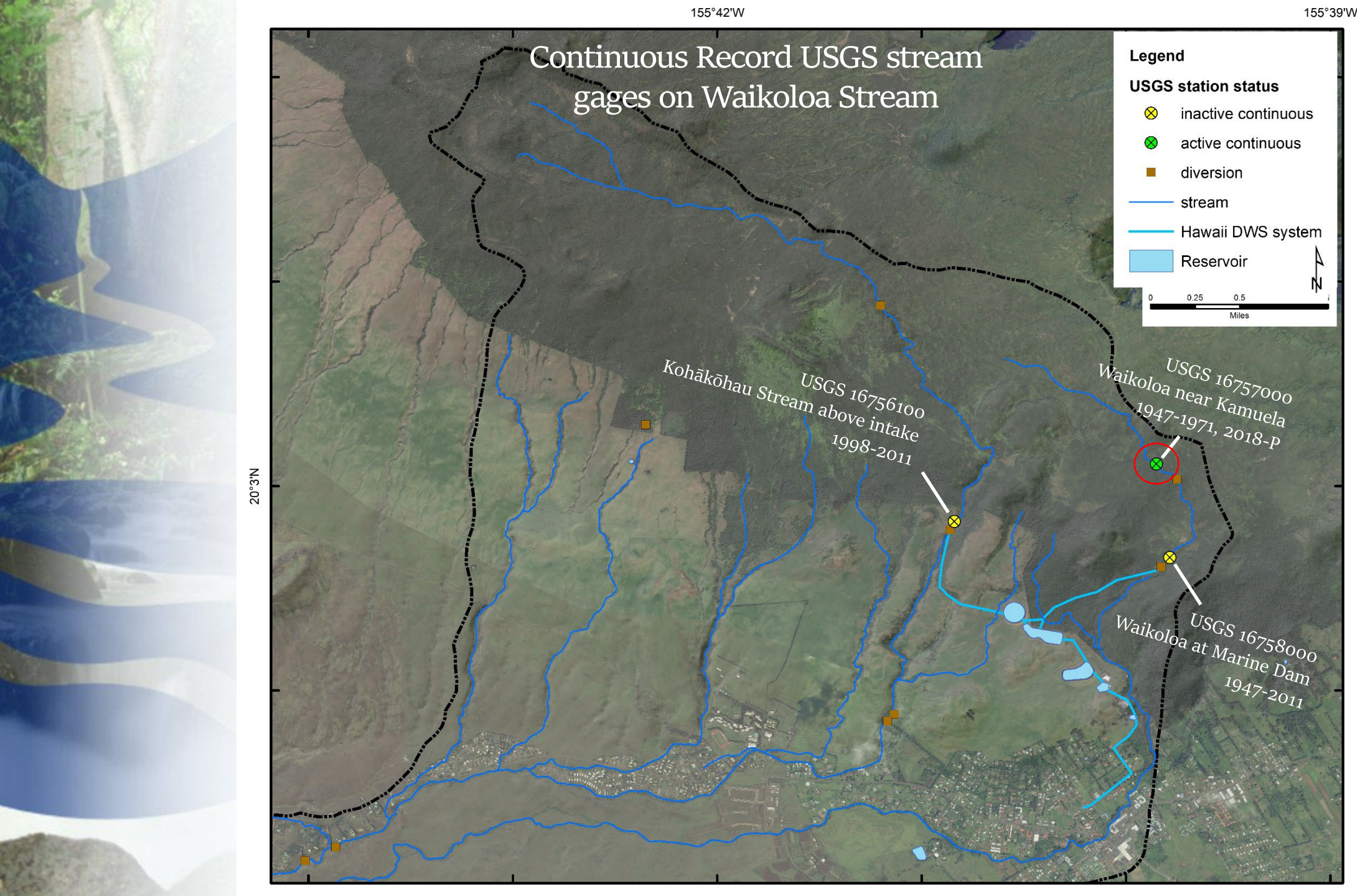
Amended Instream Flow Standards Implementation and development



Commission on Water Resource Management
State of Hawaii

Instream Water Uses

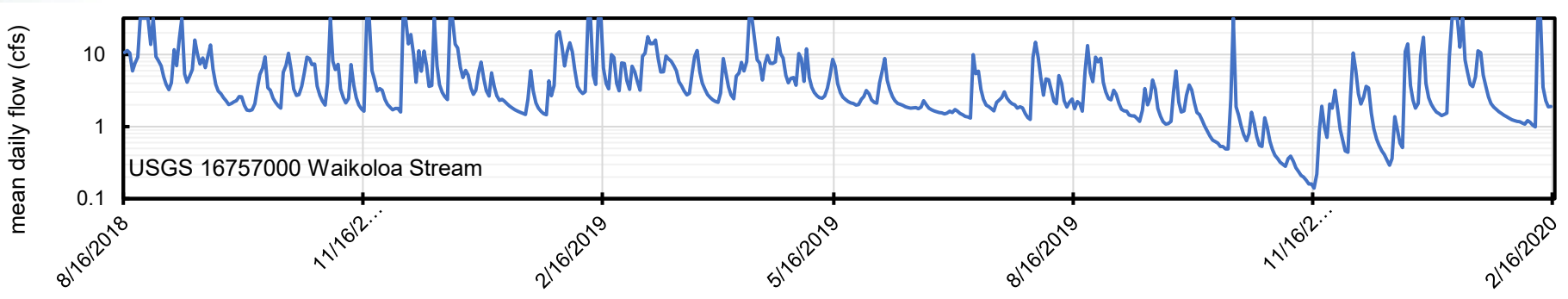


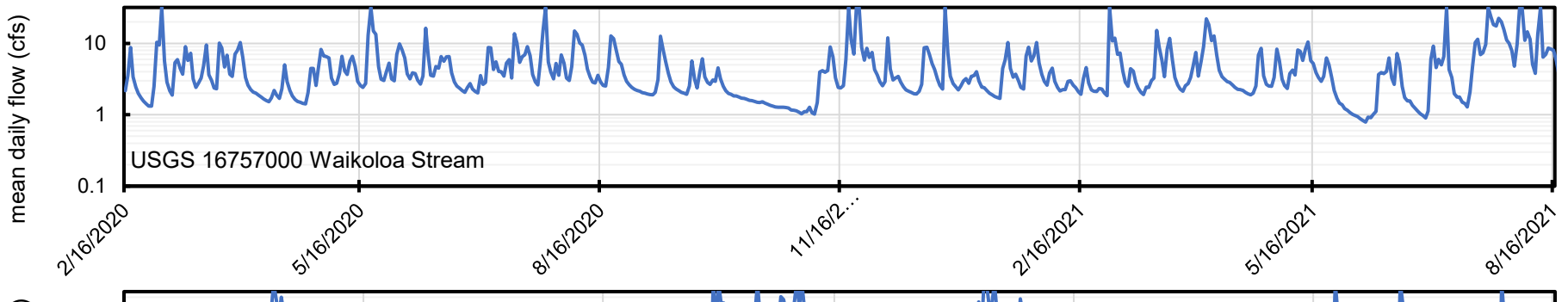

155°42'W
155°39'W
20°3'N
Continuous Record USGS stream gages on Waikoloa Stream
Legend
USGS station status
inactive continuous
active continuous
diversion
stream
Hawaii DWS system
Reservoir
N
0
0.25
0.5
Miles
Kohākōhau Stream above intake
USGS 16756100
1998-2011
USGS 16757000
Waikoloa near Kamuela
1947-1971, 2018-P
USGS 16758000
Waikoloa at Marine Dam
1947-2011

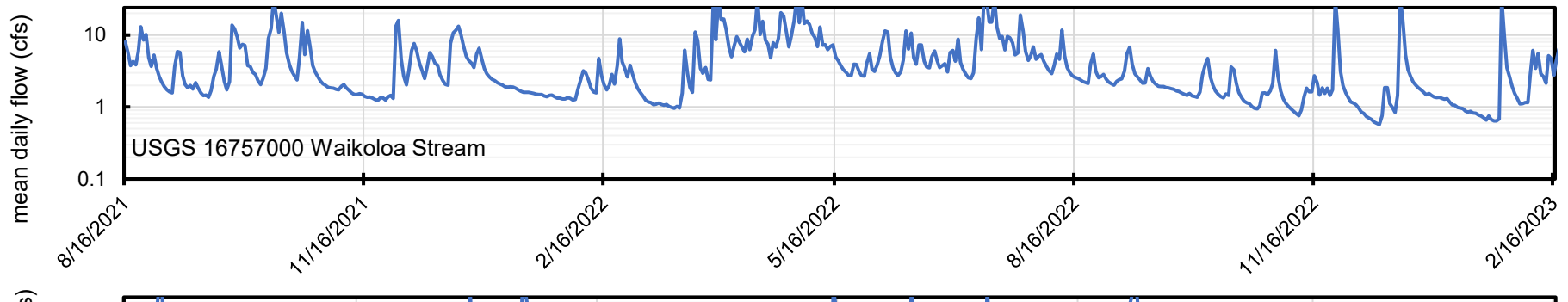
USGS station 16757000 Waikoloa Stream near Kamuela (above Parker Ranch Intake)

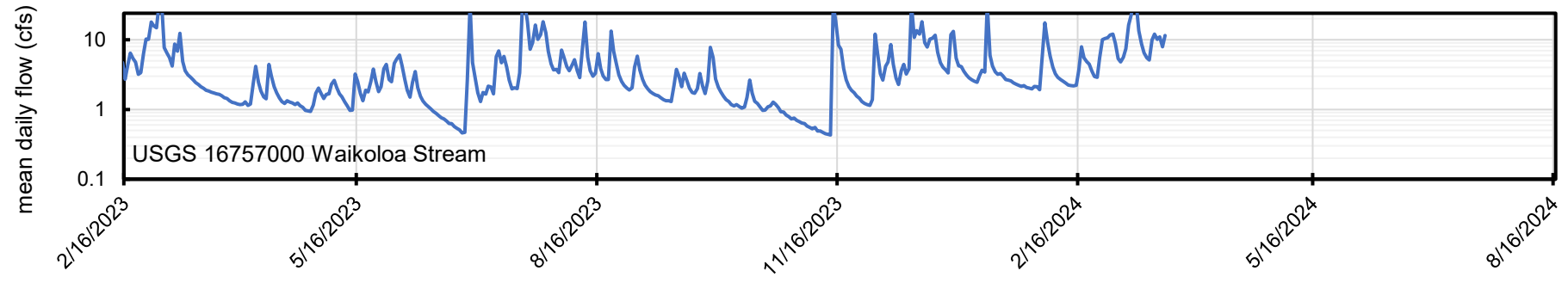
active from 1957-71 and 2018-present

Hydrologic Data for Waikoloa Stream at USGS 16757000

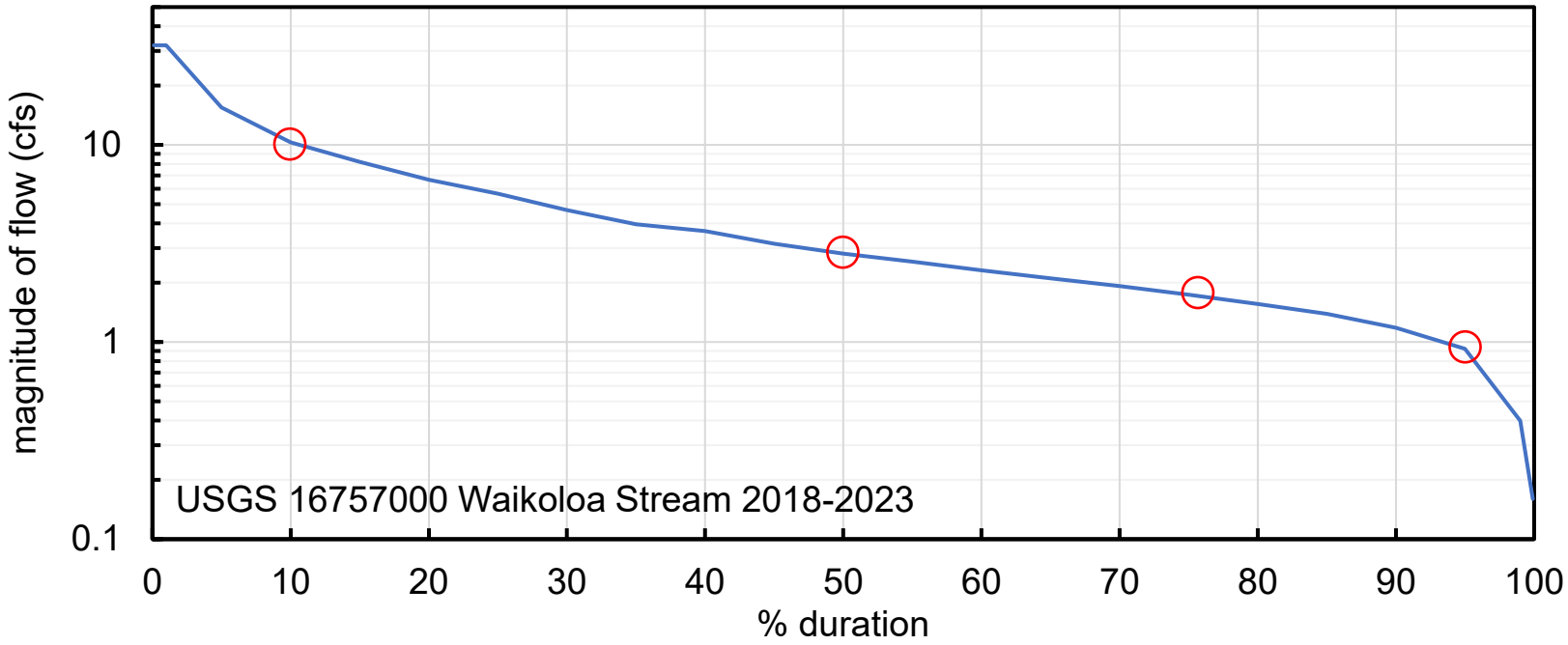




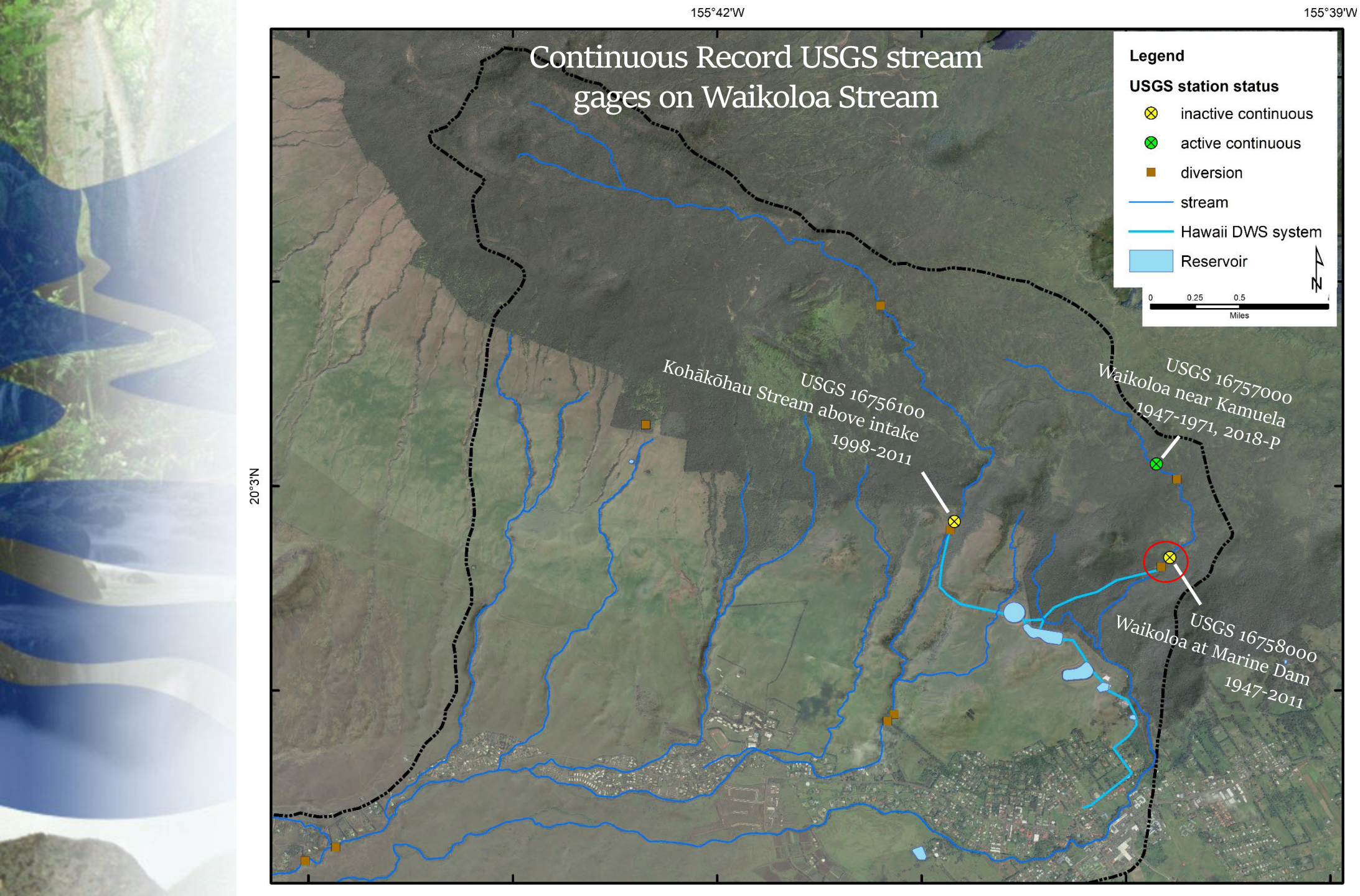




Flow Duration Curve for USGS 16757000 (2018-2023)
→above Parker Ranch diversion

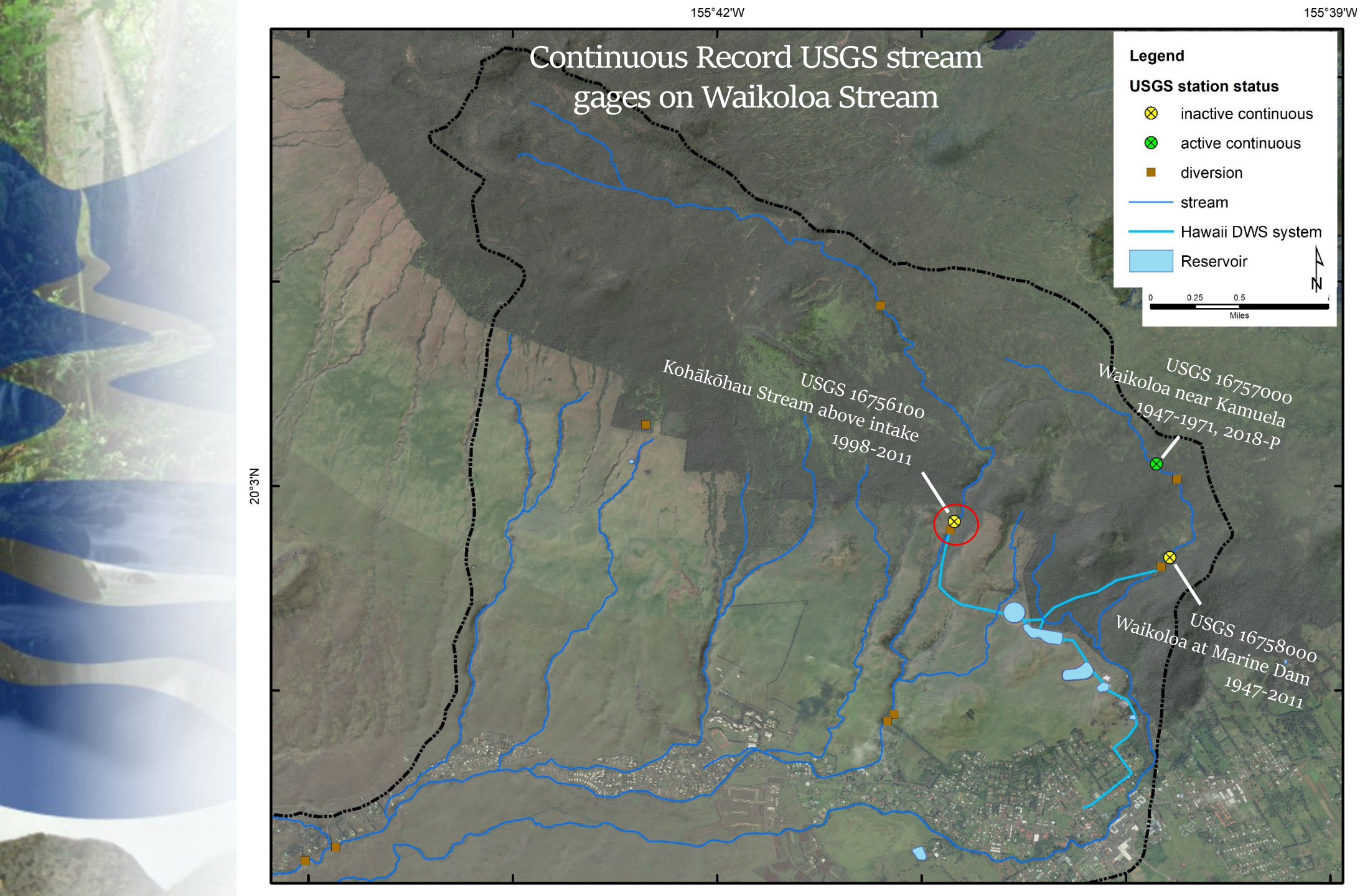


Flow Duration	Magnitude (cfs)	Magnitude (mgd)
mean daily flow	5.09	3.29
Q_{10} (high flow)	10.3	6.66
Q_{50} (median flow)	2.81	1.81
Q_{75} (base flow)	1.77	1.12
Q_{95} (low flow)	0.92	0.60


155°42'W
155°39'W
20°3'N
Continuous Record USGS stream gages on Waikoloa Stream
Legend
USGS station status
inactive continuous
active continuous
diversion
stream
Hawaii DWS system
Reservoir
N
0
0.25
0.5
Miles
Kohākōhau Stream above intake
USGS 16756100
1998-2011
Waikoloa near Kamuela
USGS 16757000
1947-1971, 2018-P
Waikoloa at Marine Dam
USGS 16758000
1947-2011

USGS 16758000 Waikoloa Stream

active from 1947-2011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Hawaii DWS system
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0
0.25
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Miles
Kohākōhau Stream above intake
USGS 16756100
1998-2011
Waikoloa near Kamuela
USGS 16757000
1947-1971, 2018-P
Waikoloa at Marine Dam
USGS 16758000
1947-2011

USGS 16756100 Kohakohau Stream

active from 1998-2011

The Hawai‘i Supreme Court emphasized that:

“instream flow standards serve as the primary mechanism by which the Commission is to discharge its duty to protect and promote the entire range of public trust purposes dependent upon instream flows.”

Recreational Value

Aesthetic Value

Navigation

Ecosystem Services

Traditional and Customary Practices

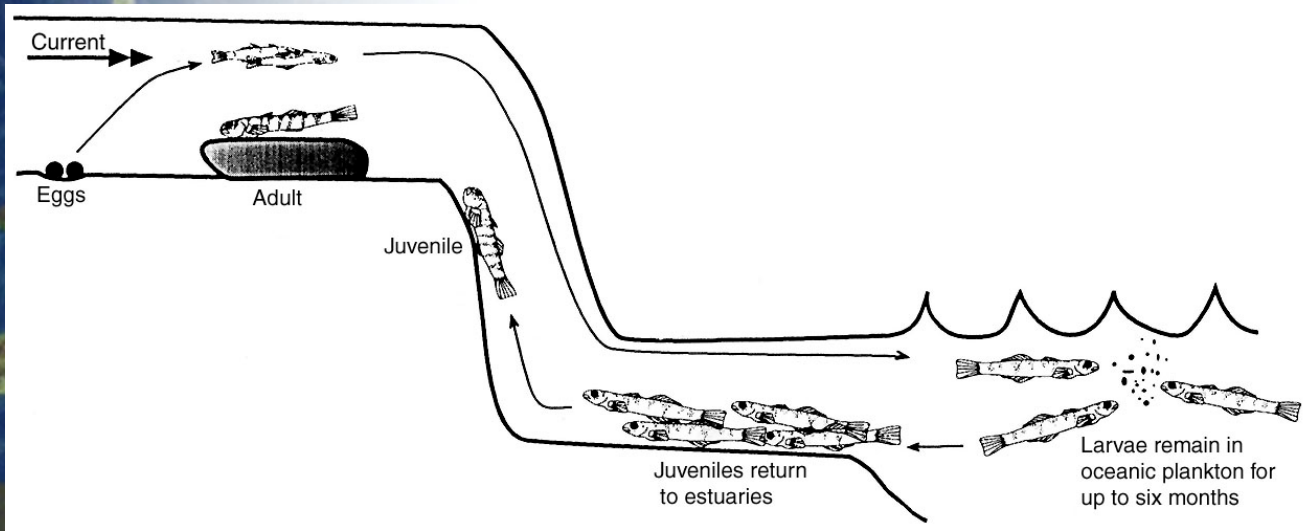
Traditional and Customary Practices

Traditional and Customary Practices


Water Quality


Hydropower

Native Hawaiian Freshwater Fish



Lentipes concolor

‘O‘opu Alamo'o

Sicyopterus stimpsoni

‘O‘opu Nopili

Awaous stamineus

‘O‘opu Nakea

Eleotris sandwicensis

‘O‘opu Akupa

Stenogobius hawaiiensis

‘O‘opu Naniha

Native Macroinvertebrates

1 prawn, 1 atyid, 2 snails

‘opae 'oeha'a
(*Macrobrachiam grandimanus*)

‘opae kala'ole
(Atyoida bisulcata)

Hihiwai
(*Neretina granosa*)

Hapawai
(*Neretina vespertina)*

•http://www5.pbrc.hawaii.edu/ccrt/taras/site/lconcolor

Waikoloa Stream flowing above Queen Ka‘ahumanu Hwy

Waikoloa Stream

Waikoloa Stream

Questions on Surface Water?


MAHALO!
http://dlnr.hawaii.gov/cwrm