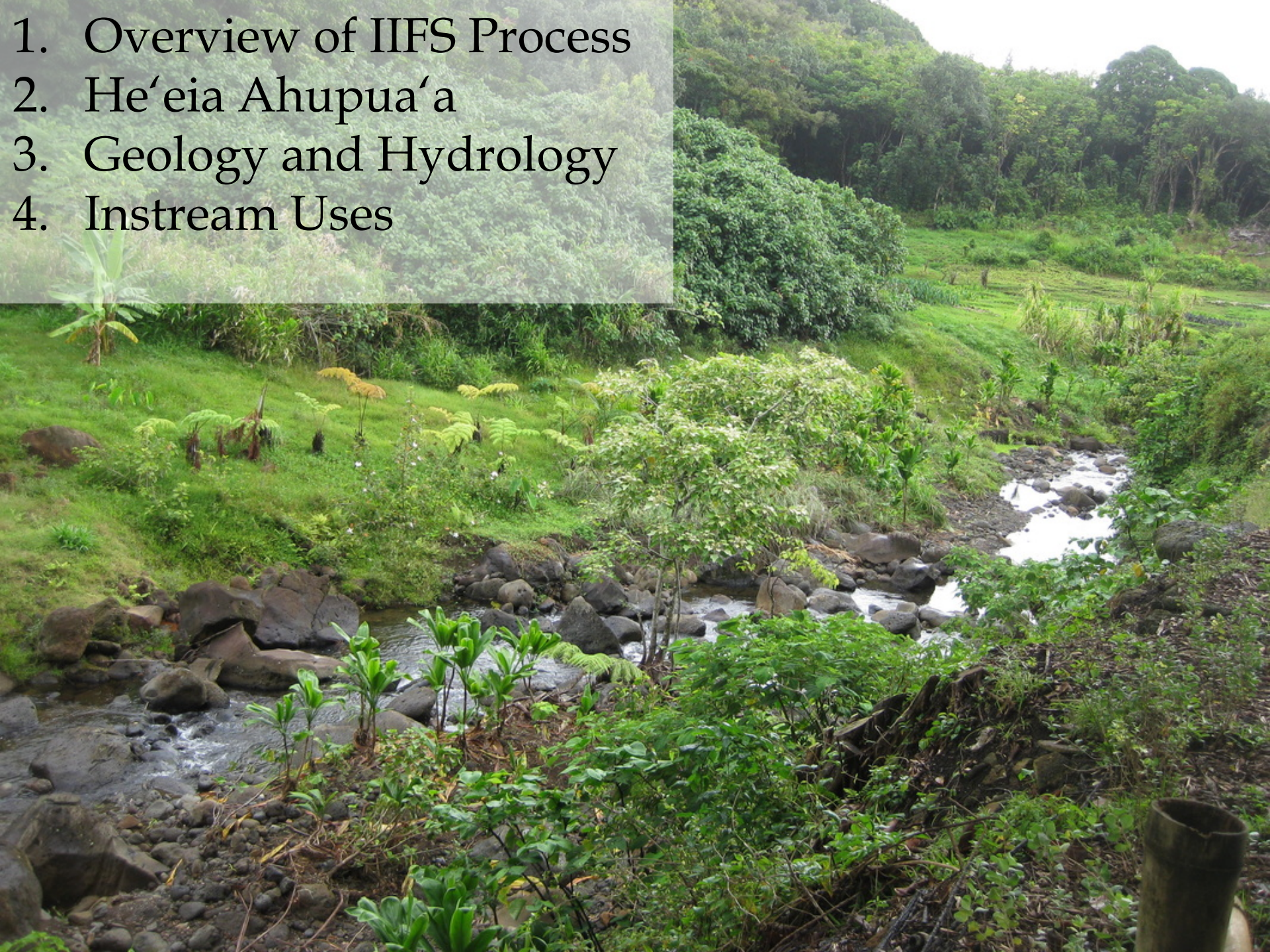
Informational briefing on developing an amended interim instream flow standard for He'eia Stream, O'ahu (SPAM)

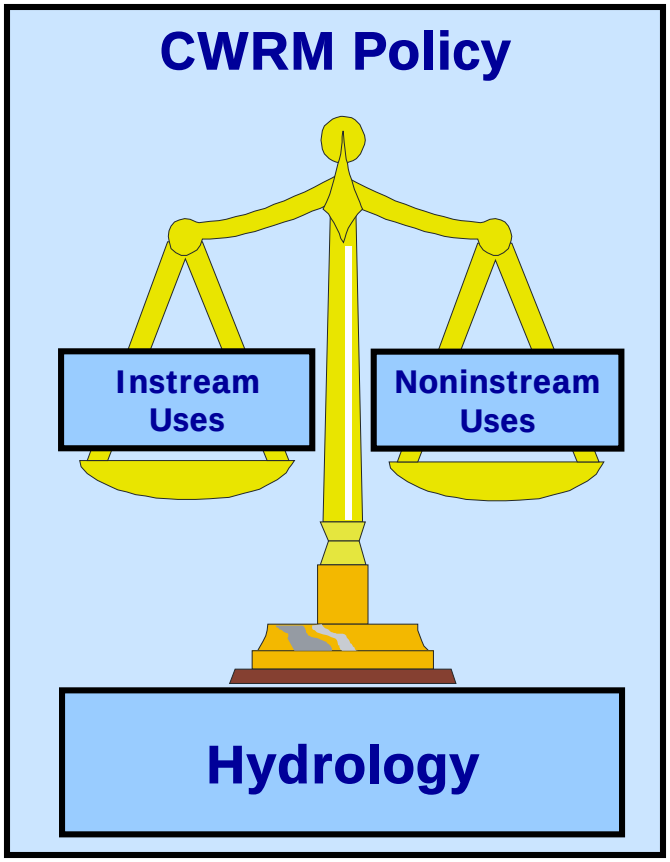
Ayron Strauch, Hydrologist
Stream Protection and Management Branch

1. Overview of IIFS Process
2. He‘eia Ahupua‘a
3. Geology and Hydrology
4. Instream Uses



State Water Code HRS 174C

"The Commission shall weigh the importance of the present or potential instream values with the importance of present or potential uses of water for noninstream purposes, including the economic impact of restricting such uses."



Interim IFS Process

CWRM Receives or Initiates a Petition to Amend the Existing IIFS (Status Quo)

↓

CWRM Staff Conducts an Inventory of Best Available Information

↓

Seek Agency Review and Comments

↓

Staff Issues a Public Notice and Conducts a Public Fact Gathering Meeting

NOT REQUIRED BY STATUTE

↓

Staff Compiles and Incorporates New Information

↓

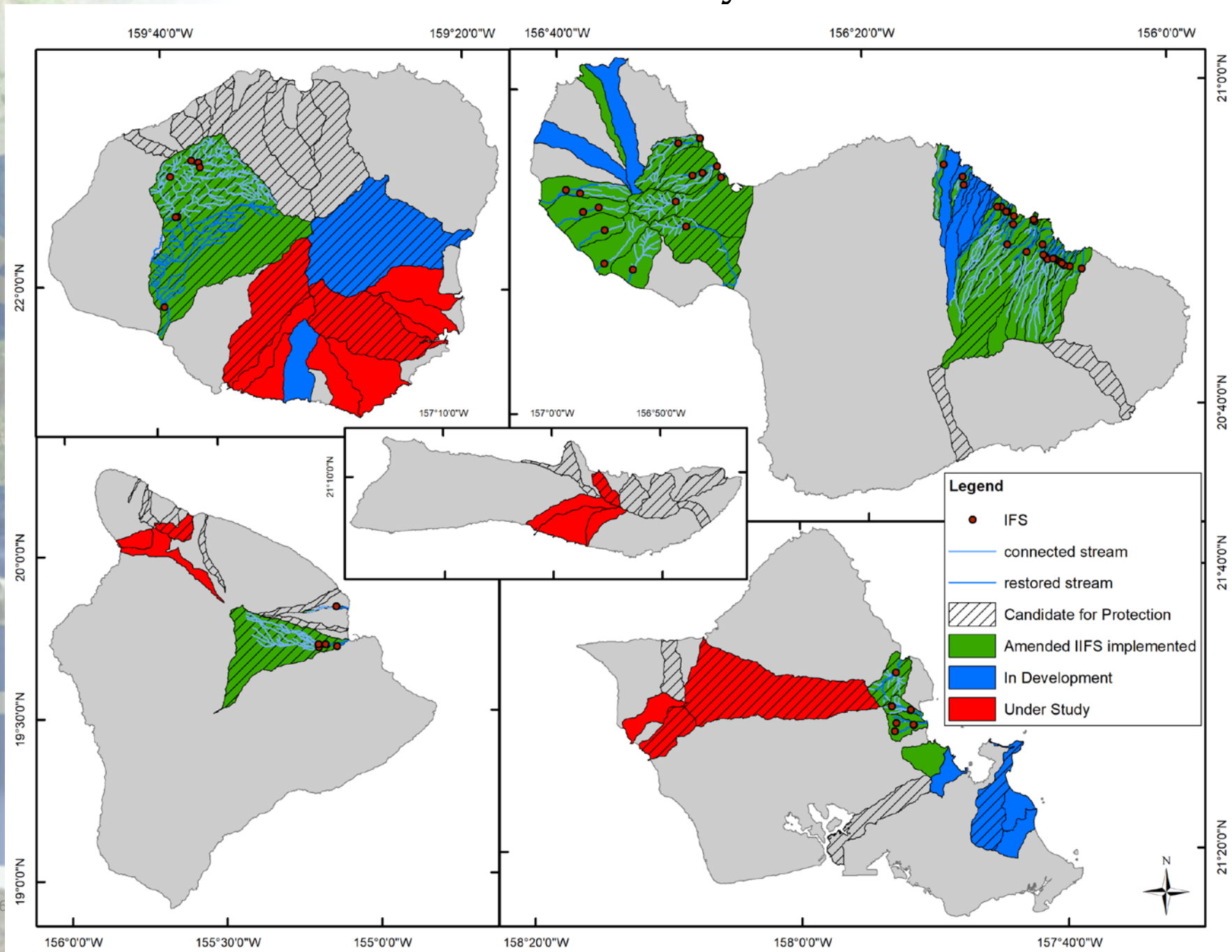
Staff Prepares a Recommendation for IIFS Amendment for Action at a CWRM Meeting

↓

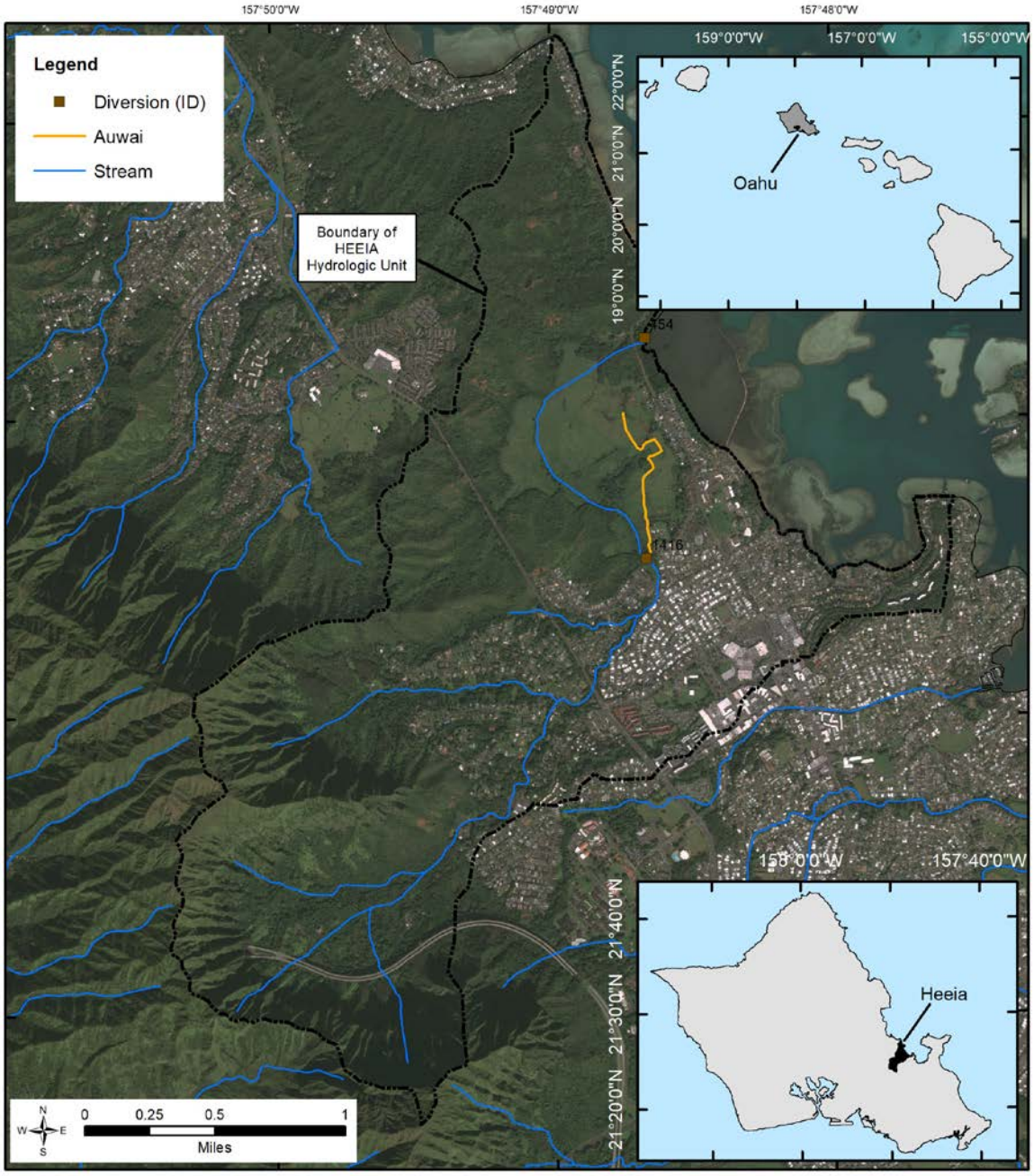
CWRM Action

Assessment of Instream and Non-Instream Uses

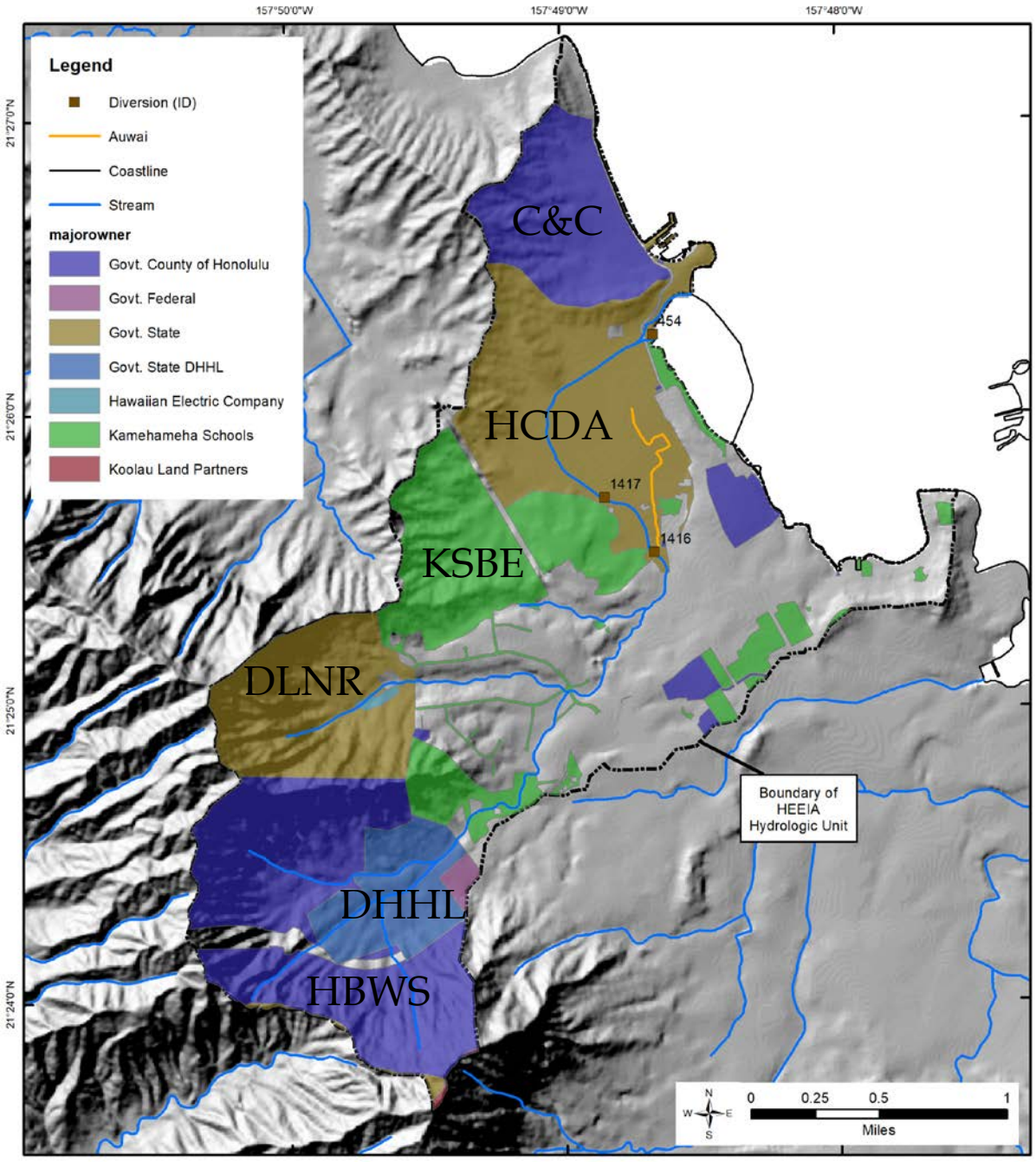
Statewide IIFS Priority Areas



Location


Legend
Diversion (ID)
Auwai
Stream
Boundary of HEEIA Hydrologic Unit
157°50'0"W
157°49'0"W
157°48'0"W
21°27'0"N
21°26'0"N
21°25'0"N
21°24'0"N
159°0'0"W
157°0'0"W
155°0'0"W
22°0'0"N
21°0'0"N
20°0'0"N
19°0'0"N
Oahu
154
116
158°0'0"W
157°40'0"W
21°40'0"N
21°30'0"N
21°20'0"N
Heeia
N
W
E
S
0
0.25
0.5
1
Miles

Land Stewardship



Past USGS Reports

Tunnels and Dikes of the Koolau Range, Oahu, Hawaii, and Their Effect On Storage Depletion and Movement of Ground Water

By G. T. HIRASHIMA

CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STAT

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1999

Prepared in cooperation with the City and County of Honolulu, Board of Water Supply, and State of Hawaii, Department of Land and Natural Resources, Division of Water and Land Development

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1

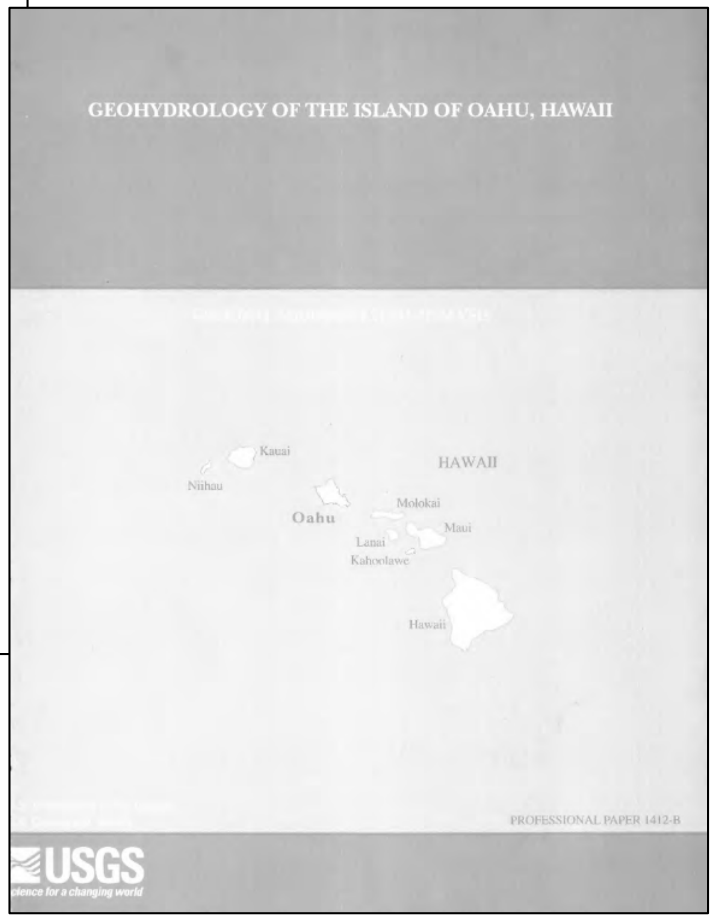
GEOHYDROLOGY AND POSSIBLE TRANSPORT ROUTES OF POLYCHLORINATED BIPHENYLS IN HAIKU VALLEY, OAHU, HAWAII

By Scot K. Izuka, Barry R. Hill, Patricia J. Shade, and Gordon W. Tribble

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations Report 92-4168

Prepared in cooperation with the
U.S. COAST GUARD,
CIVIL ENGINEERING UNIT,
HONOLULU, HAWAII

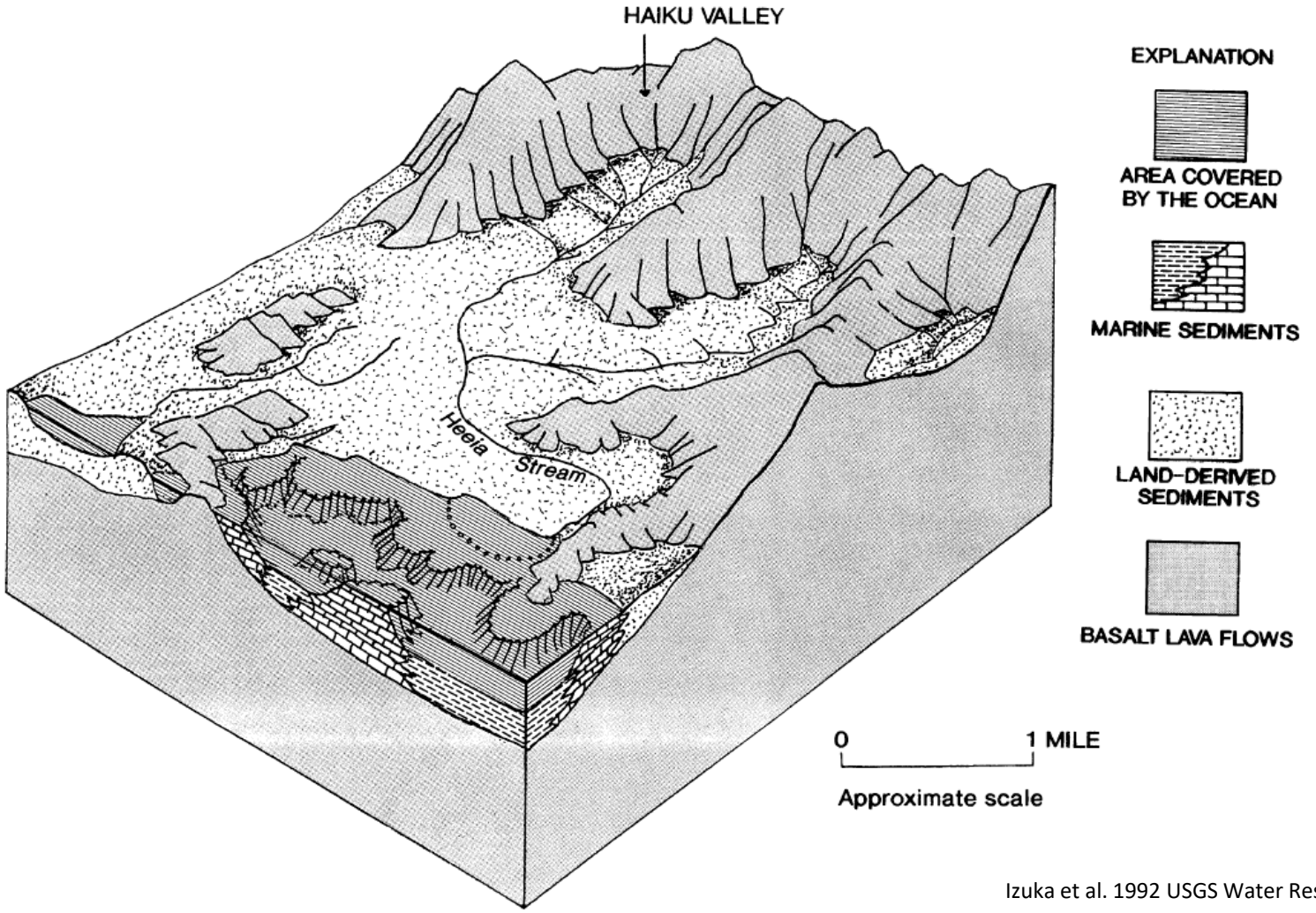
Honolulu, Hawaii
1993



Geology of Haʻikū Valley

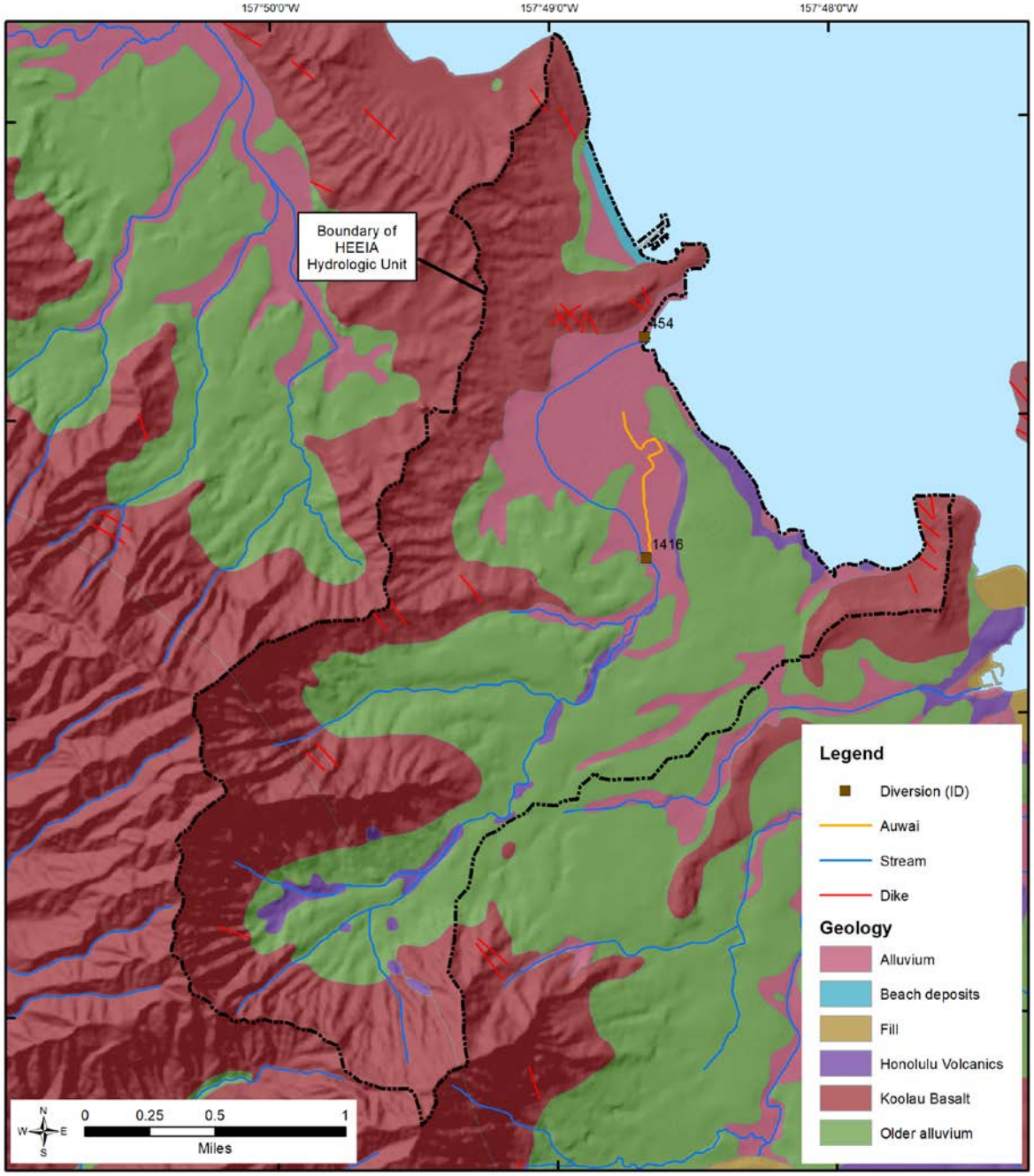
Four main layers of hydrogeology:

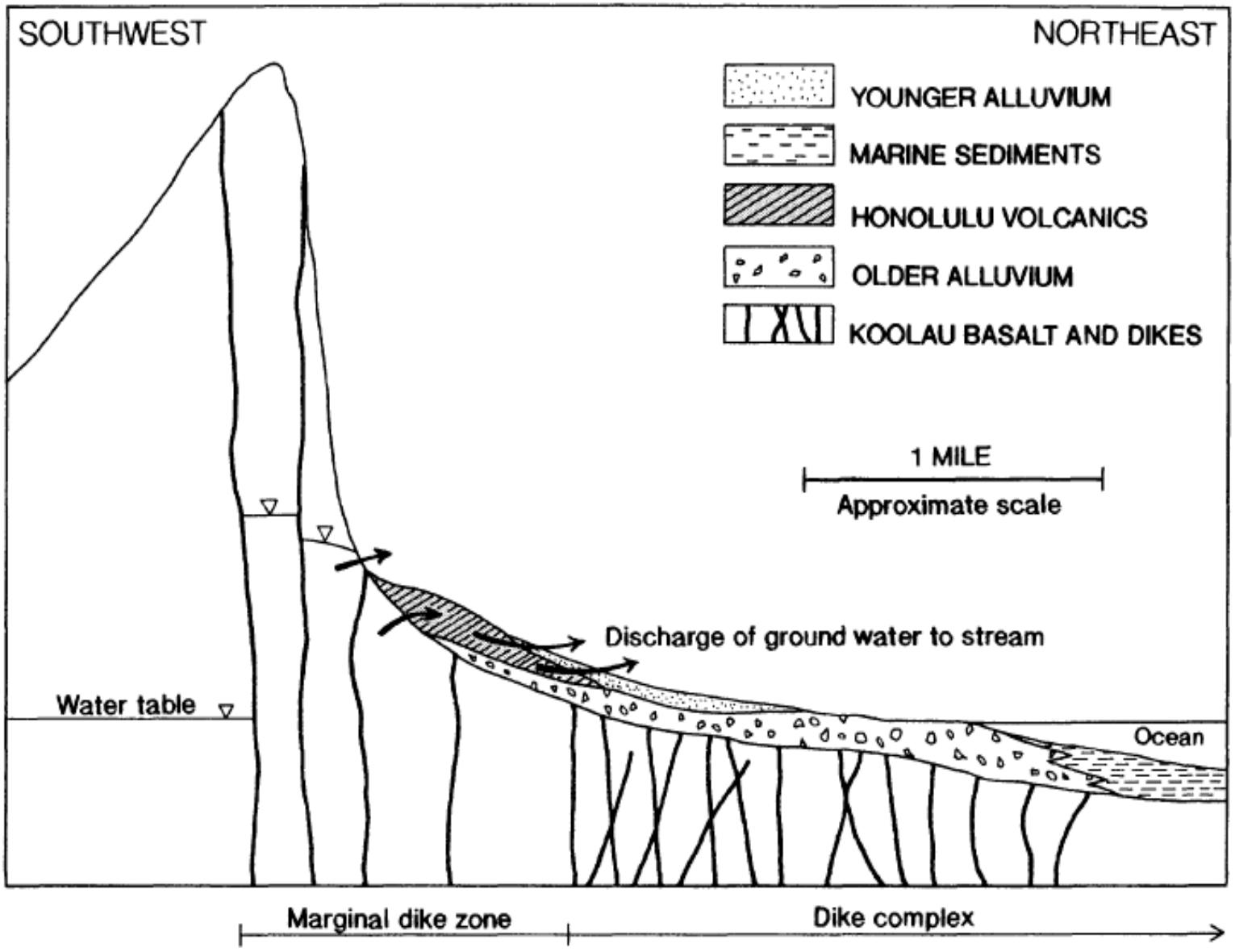
Young alluvium: eroded sediment
Honolulu Volcanics: rejuvenation phase
Older alluvium: eroded sediment
Koolau Basalt: shield building phase



Izuka et al. 1992 USGS Water Resources Investigations Report 91-4168

Geology of Haʻikū Valley



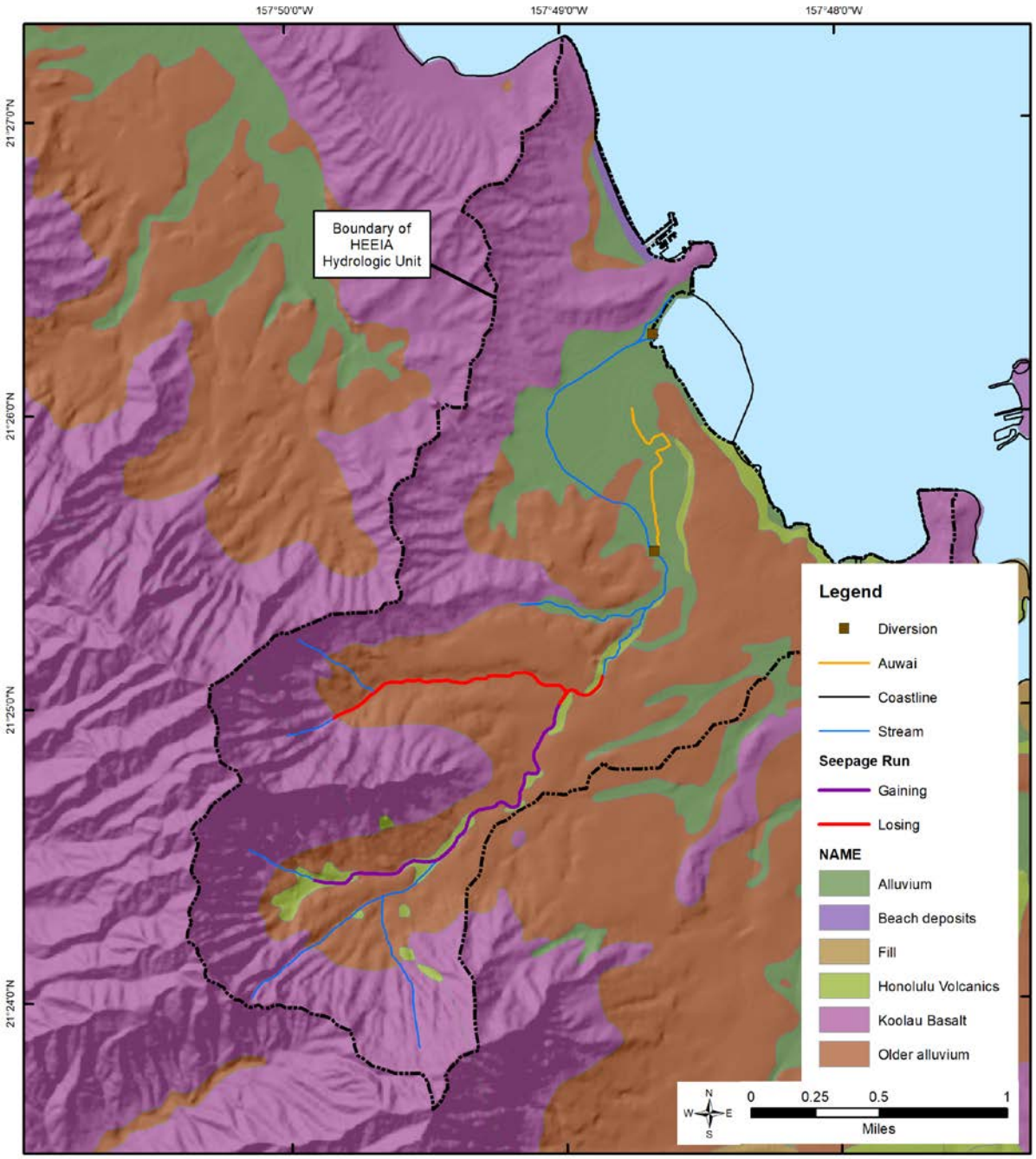


<100 dikes per linear mile
<5% of total rock volume

100-200 dikes per mile
>10%of the total rock volume

Izuka et al. 1992 USGS Water Resources Investigations Report 91-4168

Streamflow in He‘eia



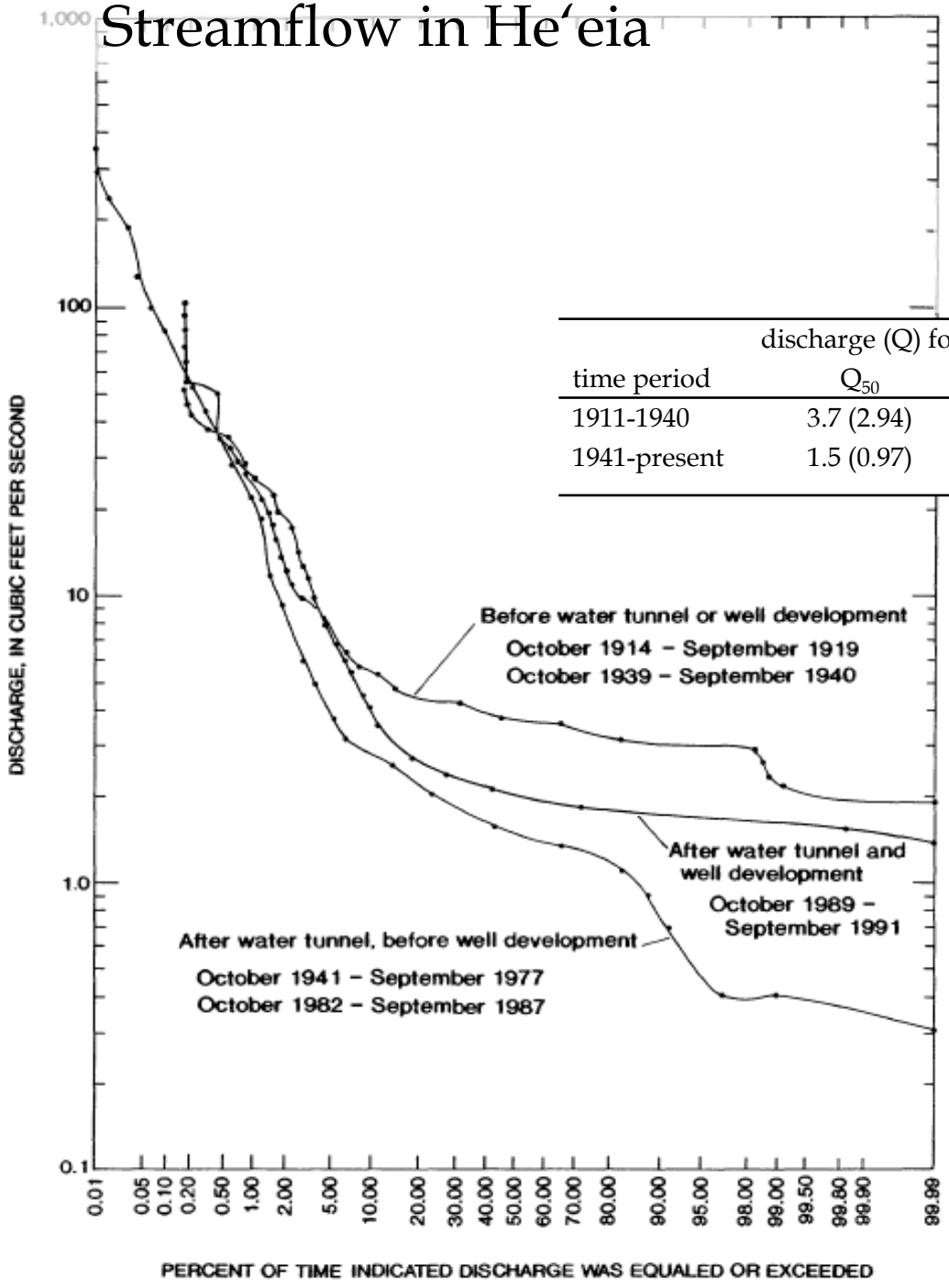
Streamflow in He‘eia

before and after
Ha‘ikū Tunnel Construction

time period	median baseflow	mean daily flow
1911-1940	3.28 (2.11)	4.5 (2.94)
1941-present	1.57 (1.02)	2.6 (1.68)

~1.6 cfs (1.1 mgd) decline

Streamflow in He‘eia

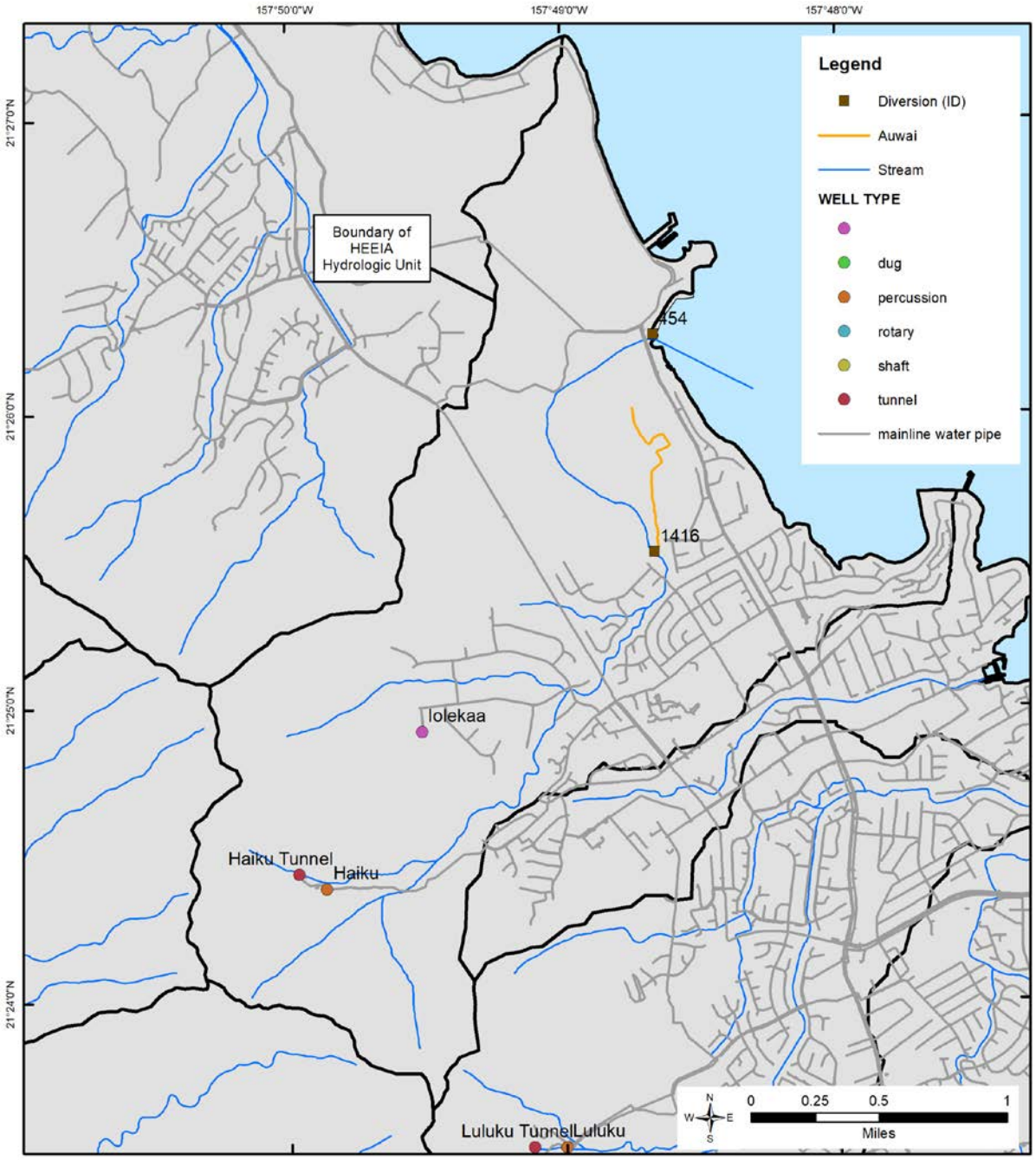


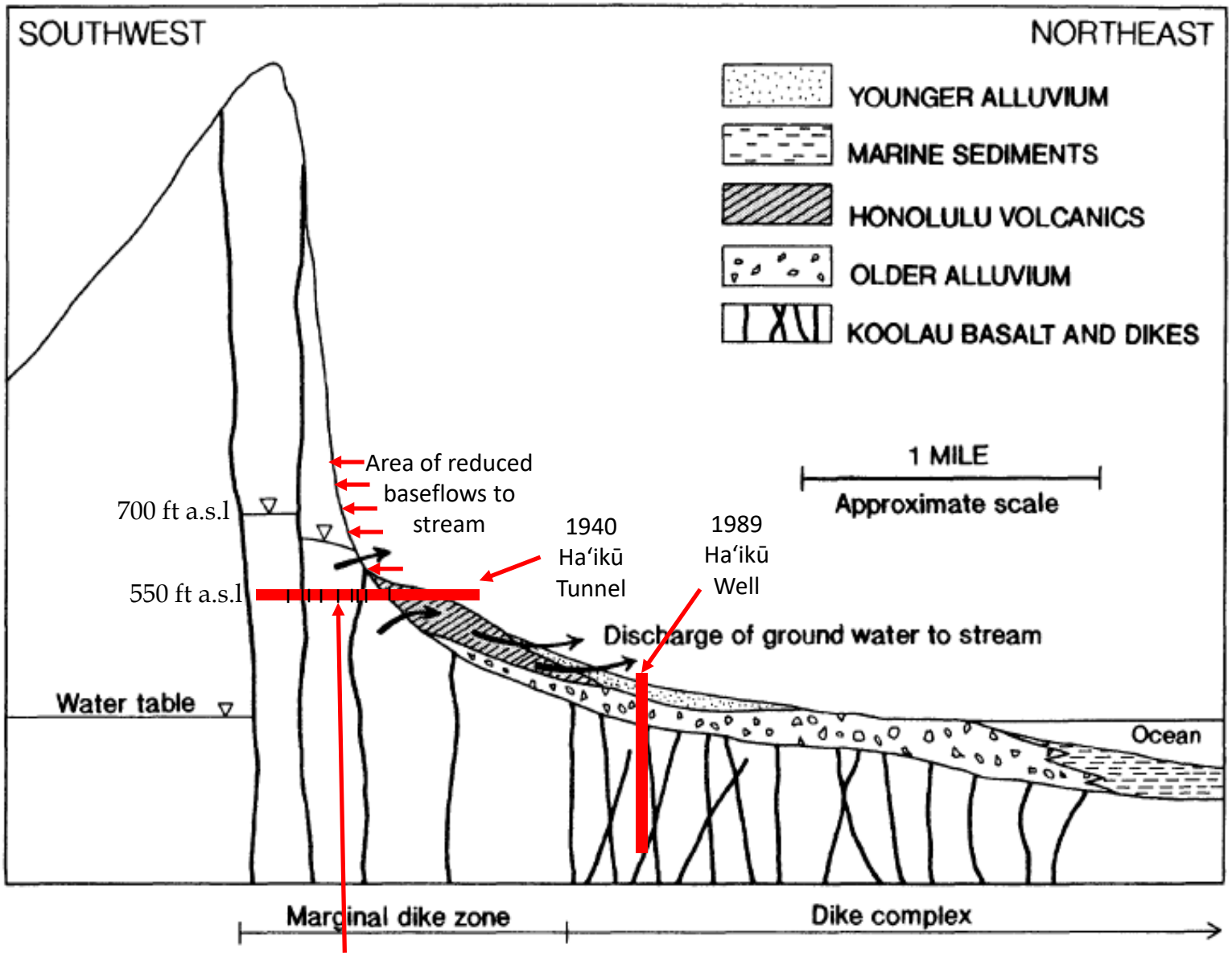
before and after Ha‘ikū Tunnel Construction

	discharge (Q) for a selected percentage ($_{xx}$) discharge was equaled or exceeded			
time period	Q_{50}	Q_{70}	Q_{90}	Q_{95}
1911-1940	3.7 (2.94)	3.3 (2.39)	2.9 (1.87)	2.9 (1.87)
1941-present	1.5 (0.97)	1.2 (0.78)	0.43 (0.28)	0.36 (0.23)

Izuka et al. 1992 USGS Water Resources Investigations Report 91-4168

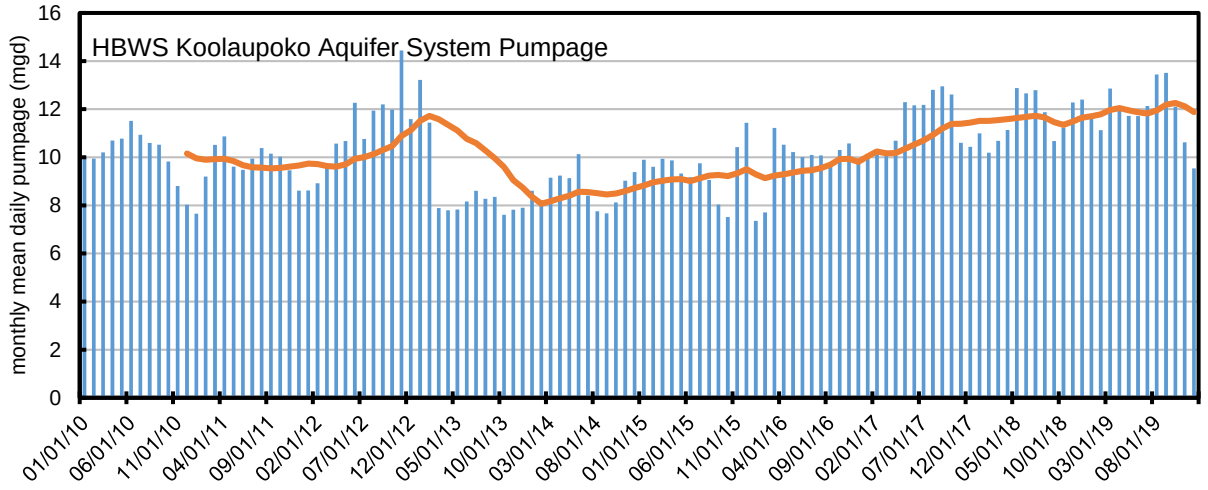
Wells in He‘eia





When a particular 10ft thick dike was cut, 11.3 mgd under pressure was released suggesting a water level of 700ft in elevation

Izuka et al. 1992 USGS Water Resources Investigations Report 91-4168



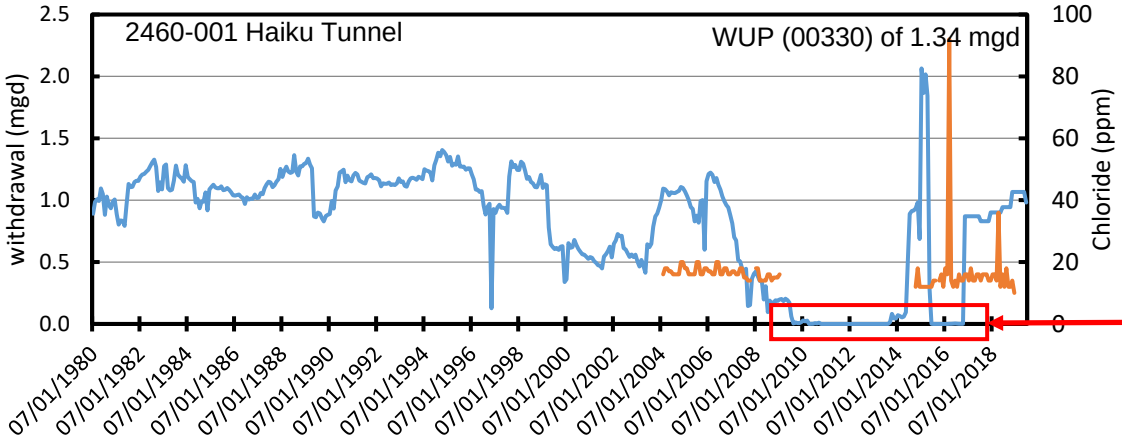
Honolulu BWS Koʻolaupoko Aquifer System

Groundwater pumpage from HBWS source wells for Koʻolaupoko

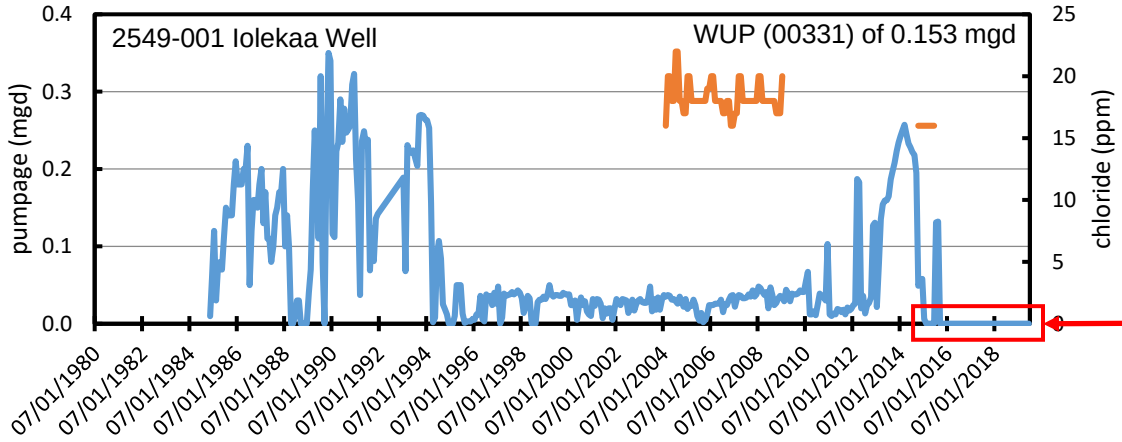
well ID	well name	Year drilled	Use	Pump capacity (mgd)	average monthly pumpage (mgd)	median monthly pumpage (mgd)	maximum monthly pumpage (mgd)
2247-001	Kamooalii II	1985	abandoned	n/a	n/a	n/a	n/a
2248-001	Kamooalii I	1985	unused	n/a	n/a	n/a	n/a
2348-002	Kuou I-1	1955	municipal	--	0.670	0.578	1.720
2348-003	Kuou I-2	1955	municipal	3.024	0.000	0.000	0.000
2549-001	Iolekaa	1966	municipal	0.302	0.057	0.000	0.257
2651-001	Kahaluu Tunnel	1947	municipal	n/a	1.846	1.842	2.575
2651-002	Waihee Tunnel	1955	municipal	n/a	3.770	4.260	7.721
2651-003	Kahaluu	1980	municipal	1.008	0.716	0.787	1.831
2652-002	Waihee Incline 1	1976	municipal	n/a	0.000	0.000	0.000
2652-003	Waihee Incline 2	1976	municipal	n/a	0.000	0.000	0.000
2652-001	Waihee Incline 3	1971	municipal	n/a	0.854	0.955	2.160
2652-004	Waihee Incline 4	1976	municipal	n/a	0.000	0.000	0.000
2751-002	Waihee I-1	1972	municipal	1.008	0.000	0.000	0.000
2751-003	Waihee I-2	1972	municipal	1.008	0.000	0.000	0.000
2348-005	Kuou II	1986	municipal	1.008	0.095	0.083	0.636
2348-006	Kuou III	1995	municipal	0.720	0.447	0.462	0.811
2349-001	Luluku Tunnel	1948	municipal	n/a	0.104	0.093	0.307
2349-002	Luluku	1984	municipal	1.008	1.001	1.006	1.180
2450-001	Haiku Tunnel	1940	municipal	n/a	0.525	0.594	2.064
2450-002	Haiku	1981	municipal	1.008	0.163	0.159	0.399
			Total =		10.248	10.819	21.661

used infrequently
WUP of 0.153 mgd

used more consistently
WUP of 0.457 mgd

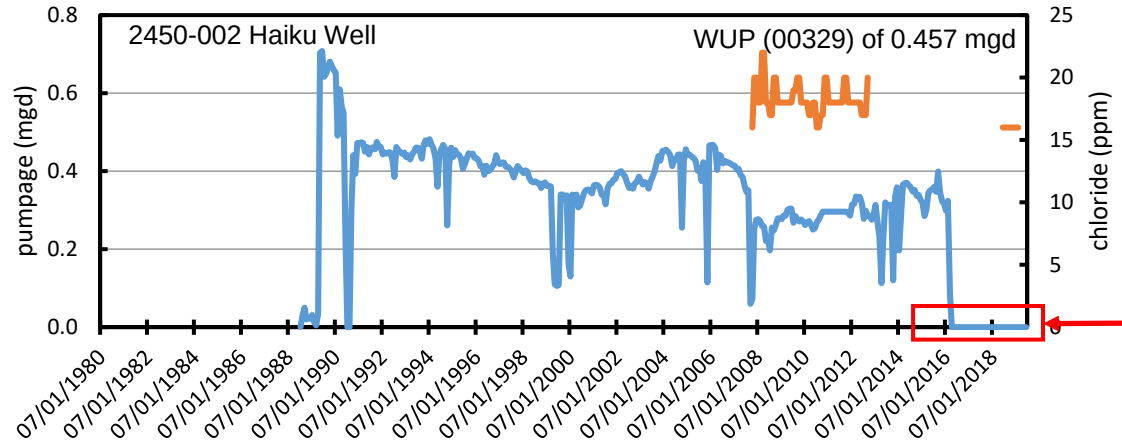


zero pumpage from tunnel



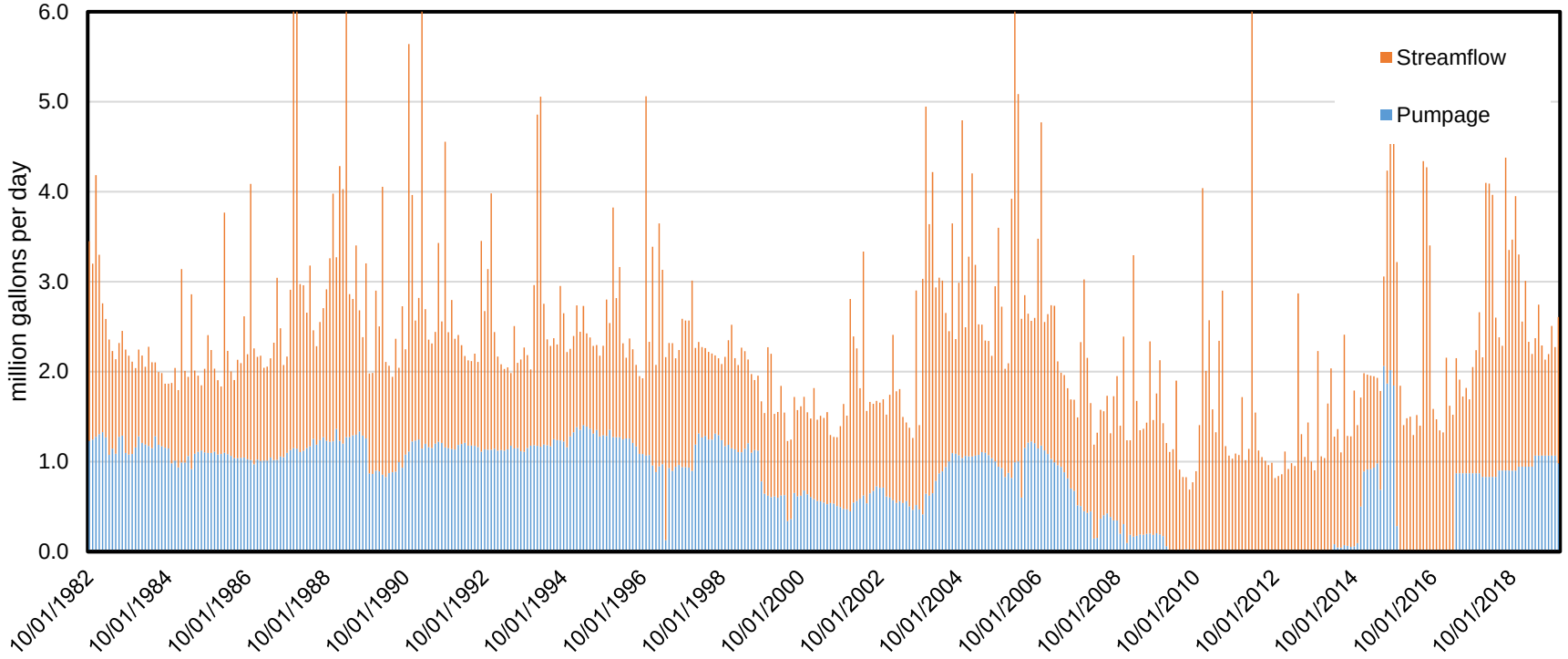
zero pumpage from well

Honolulu BWS
He‘eia Sources



zero pumpage from well

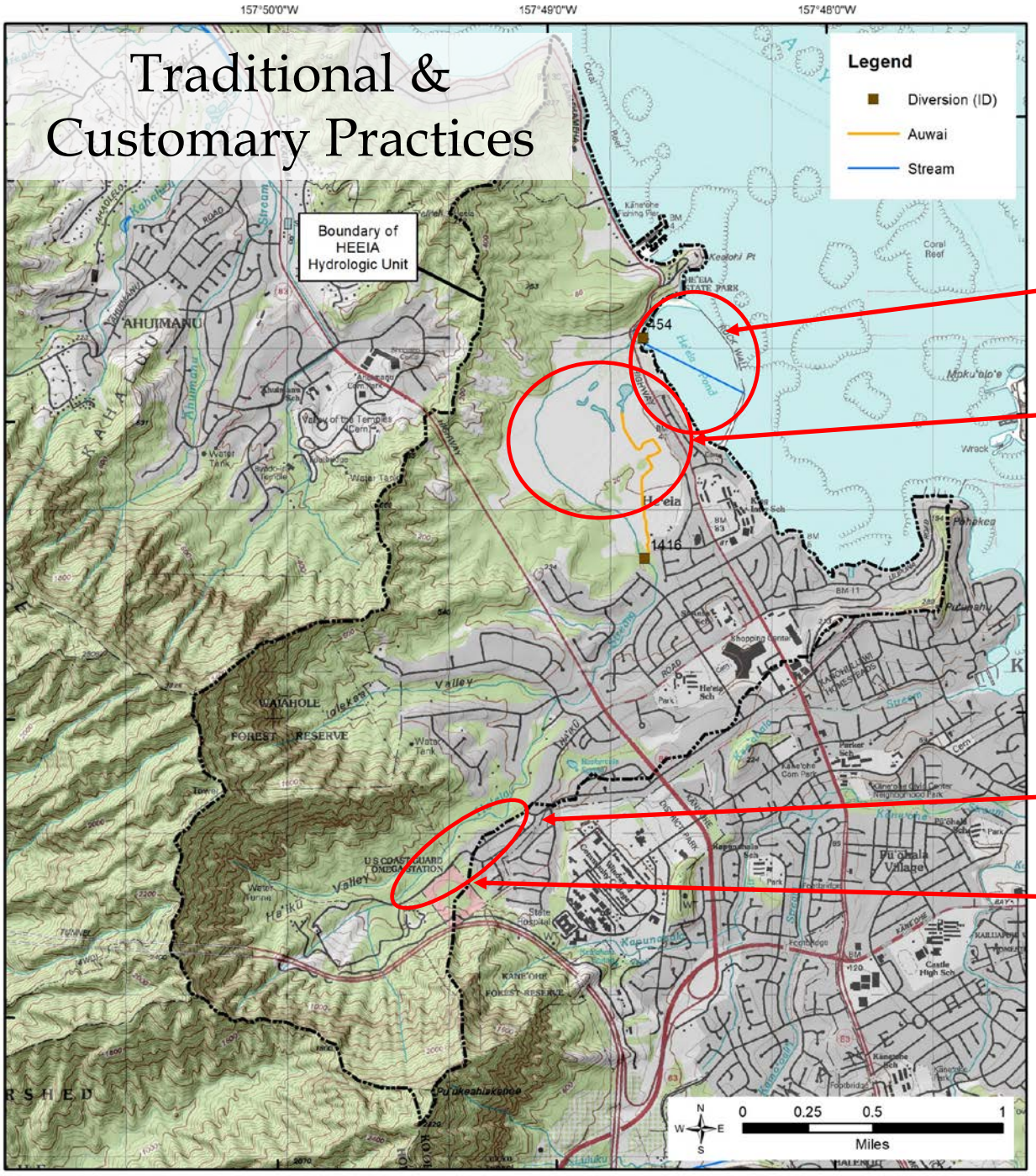
Recent (1982-2019) mean daily flow at USGS 16275000 on Heʻeia Stream and mean daily withdrawal from Haʻikū Tunnel



source	annual mean (±SD)	wet season mean (±SD)	dry season mean (±SD)
Heʻeia Stream at USGS 16275000	1.55 (±0.94)	1.78 (±1.13)	1.33 (±0.61)
Haʻikū Tunnel	0.80 (±0.46)	0.77 (±0.45)	0.83 (±0.47)
Total	2.35 (±1.06)	2.55 (±1.26)	2.15 (±0.76)

in million gallons per day, mgd

Traditional & Customary Practices



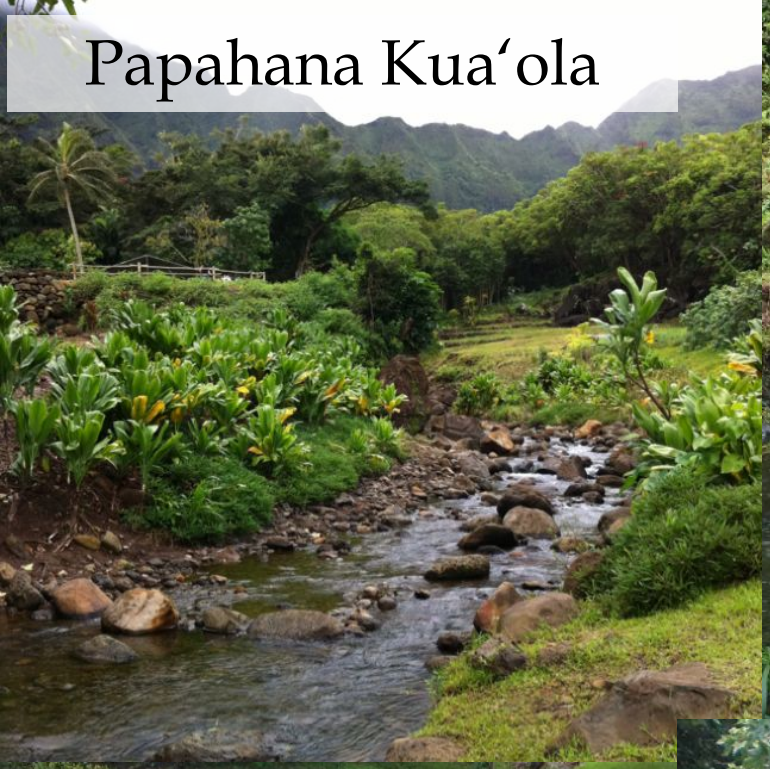
Fishpond
Paepae o He'eia

He'eia Wetland
Kāko'o 'Ōiwi

Ha'ikū Valley
Papahana Kua'ola

DHHL
Special District

Papahana Kua‘ola

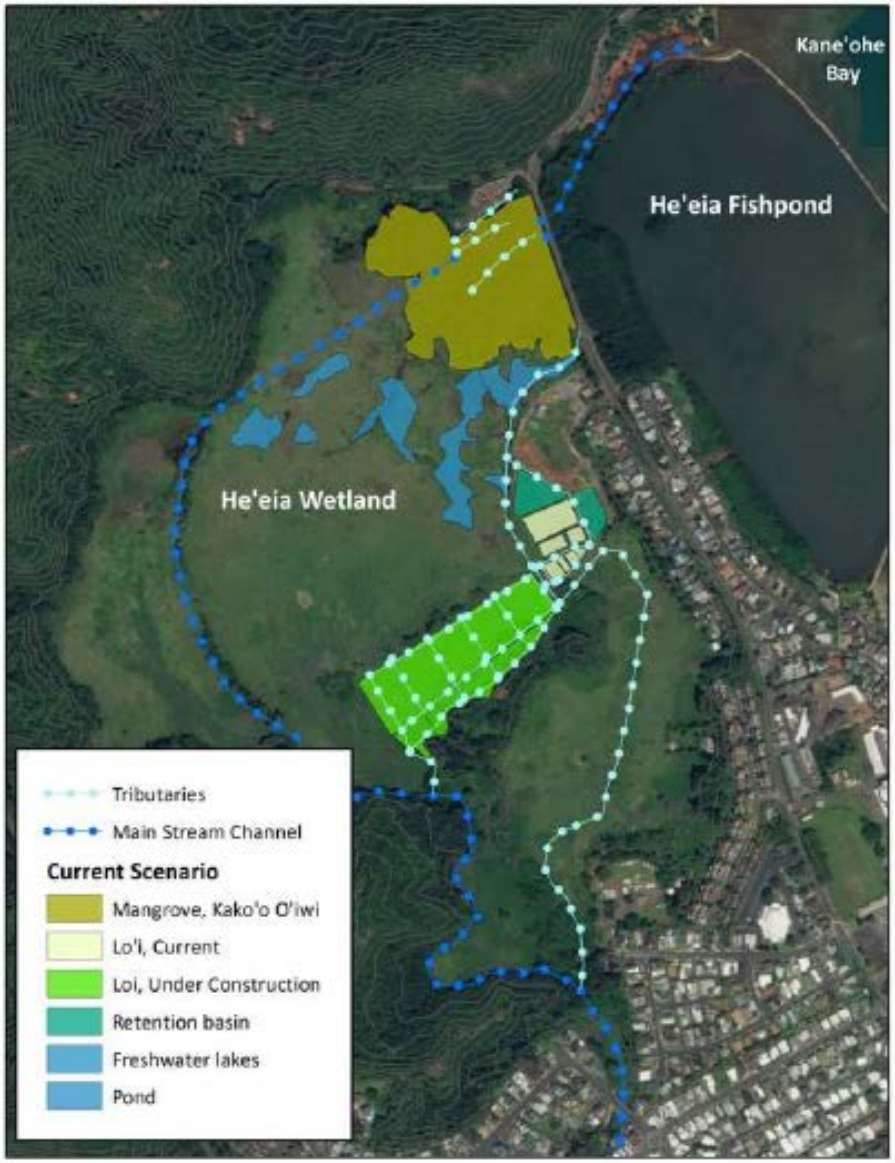


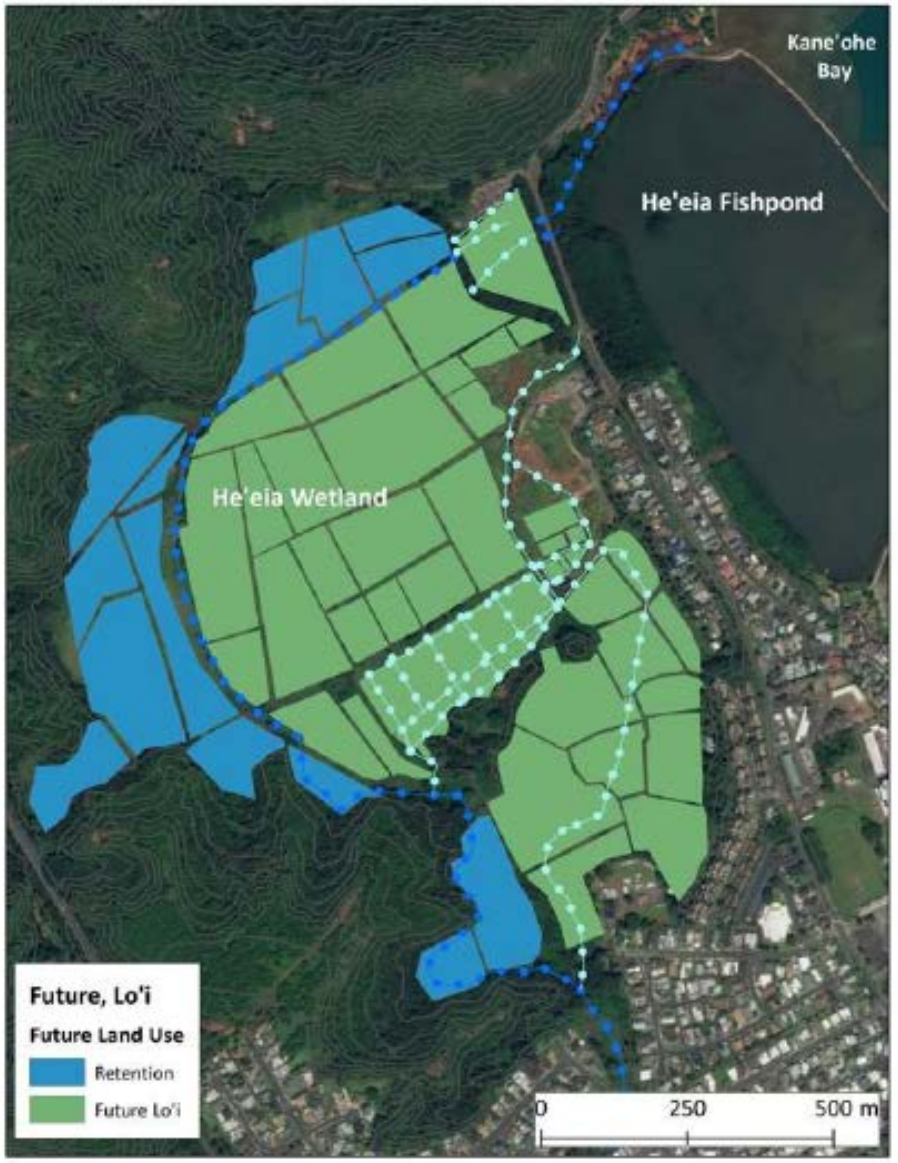
https://papahanakuaola.com
http://www.honolulumagazine.com

Kākoʻo ʻŌiwi

Kākoʻo ʻŌiwi

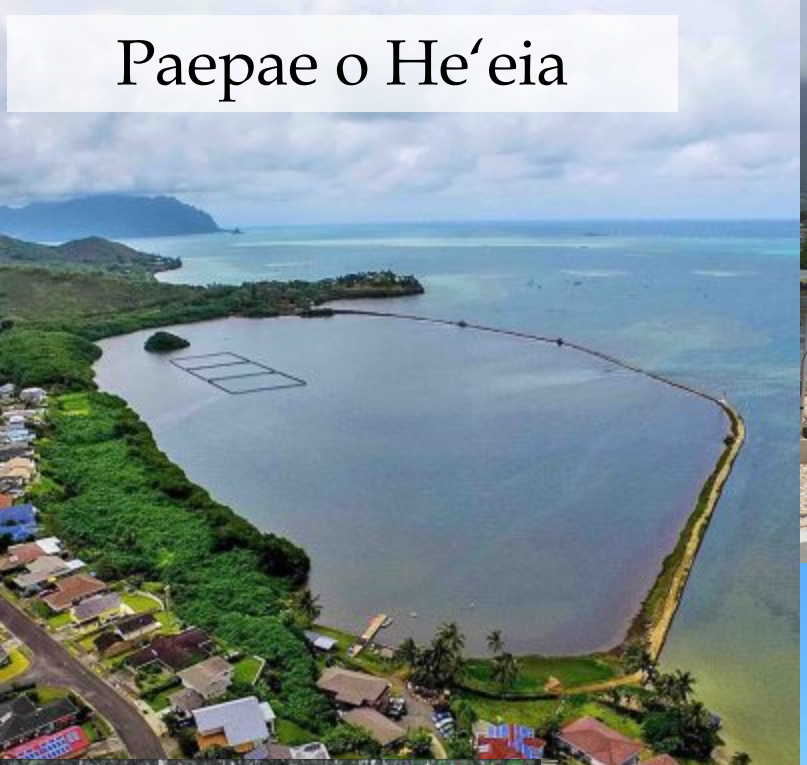
Kākoʻo ʻŌiwi





Current and Future Plans

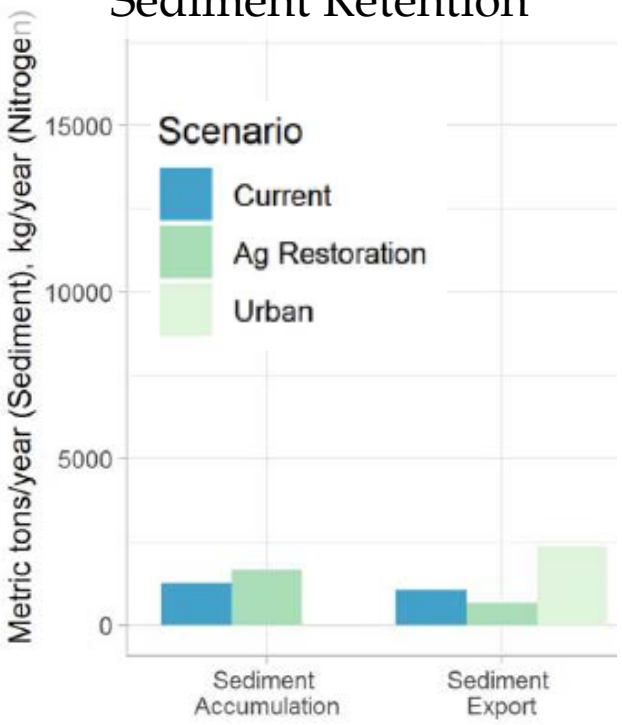
Paepae o He‘eia



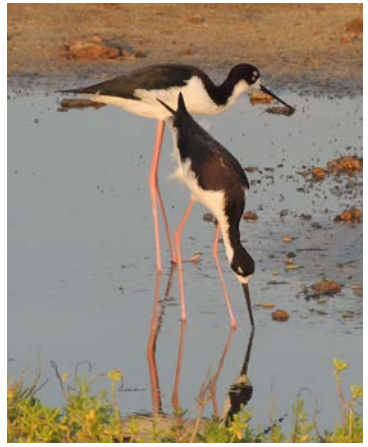
https://paepaeoheeia.org

Ecosystem Services

Sediment Retention



Wetland Bird Habitat



Riparian Vegetation Management

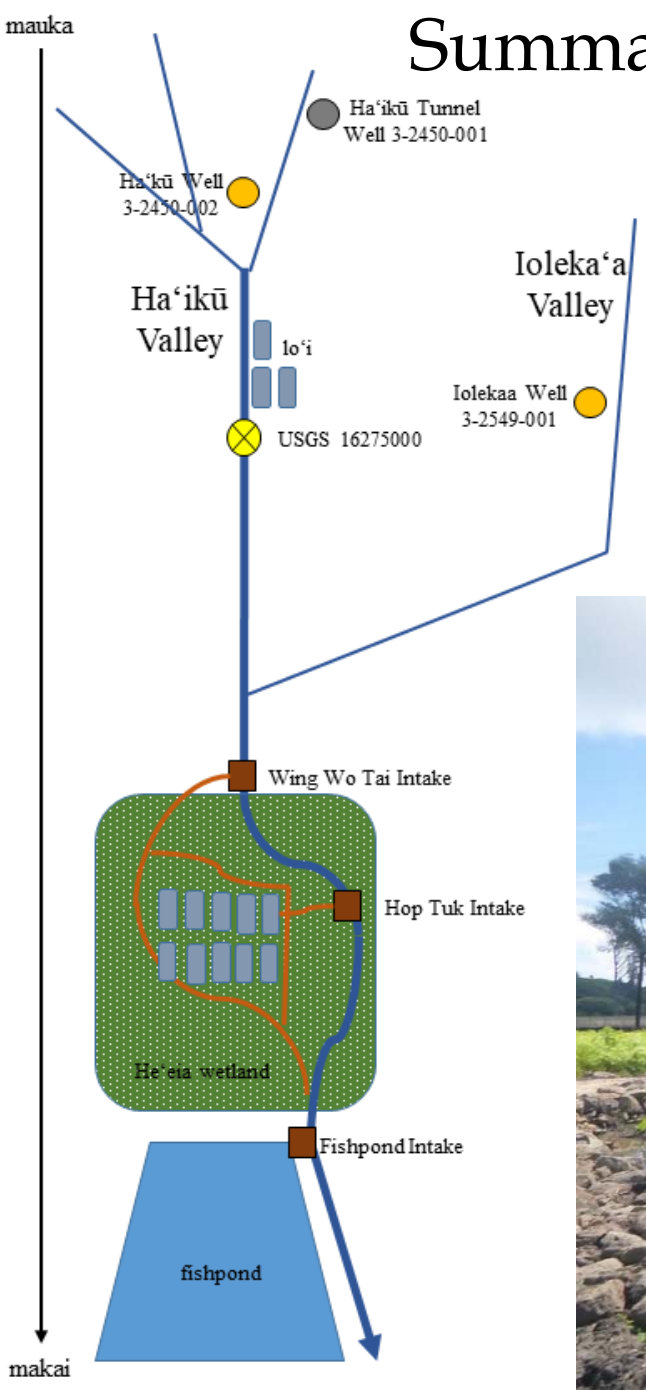
Freshwater Habitat

Summary of Instream Uses of Water

- Fish/Aquatic species habitat:
  - improved with increased flow (ranked moderate*; 7 native species found)
  - Populations of oʻopu nakea, ʻāholehole, oʻopu naniha, hihiwai
- Ecosystem Services:
  - Wetland habitat for endangered birds
  - Quality riparian habitat (ranked outstanding*)
  - Muliwai supports productive estuarine and nearshore ecosystems; fishponds
  - Buffers coral communities from peak SST
  - Management of invasive vegetation improving riparian and aquatic ecosystems
- Recreation:
  - Quality recreational resources (ranked substantial*)
  - Supports swimming, hiking
- Navigation: n/a
- Aesthetic:
  - flowing water is pleasant to look at
  - Viewpoints along trails, backyards, highways/roadways
- Water quality:
  - reduced temperature with increased flow
  - Improved water clarity with flow restoration
- Traditional and Customary Practices:
  - Loʻi kalo historically grown throughout ahupuaʻa
  - Fishpond aquaculture
  - Native biota and medicinal plants gathered

*ranking by Hawaii Stream Assessment in 1990

Summary Schematic



Next Steps

- Consultation with Board of Water Supply
- Consultation with Aha Moku Representatives
- Site Visit with Papahana Kuaʻola
- Public Meeting
- Compilation of public testimony
- Future Interim IFS