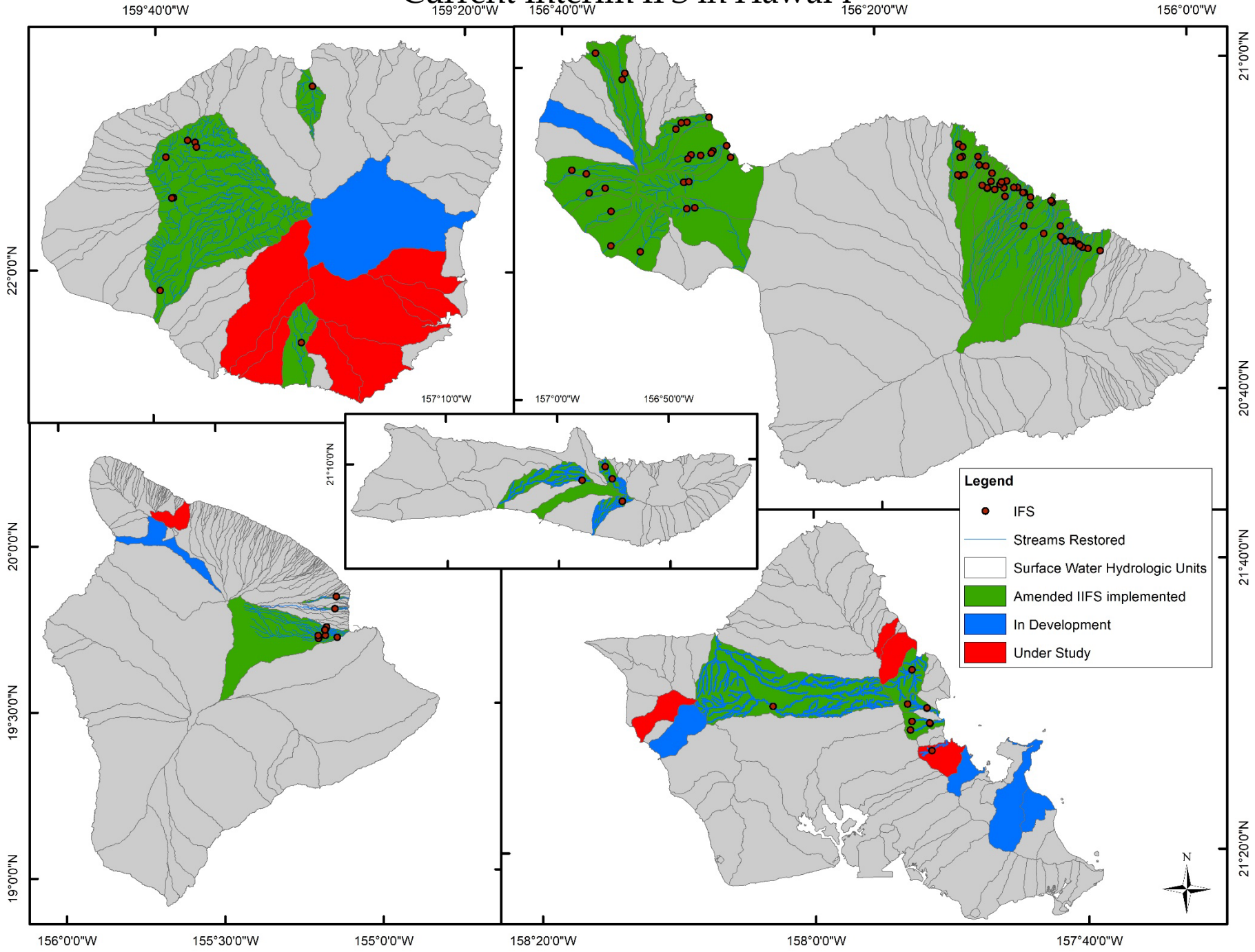
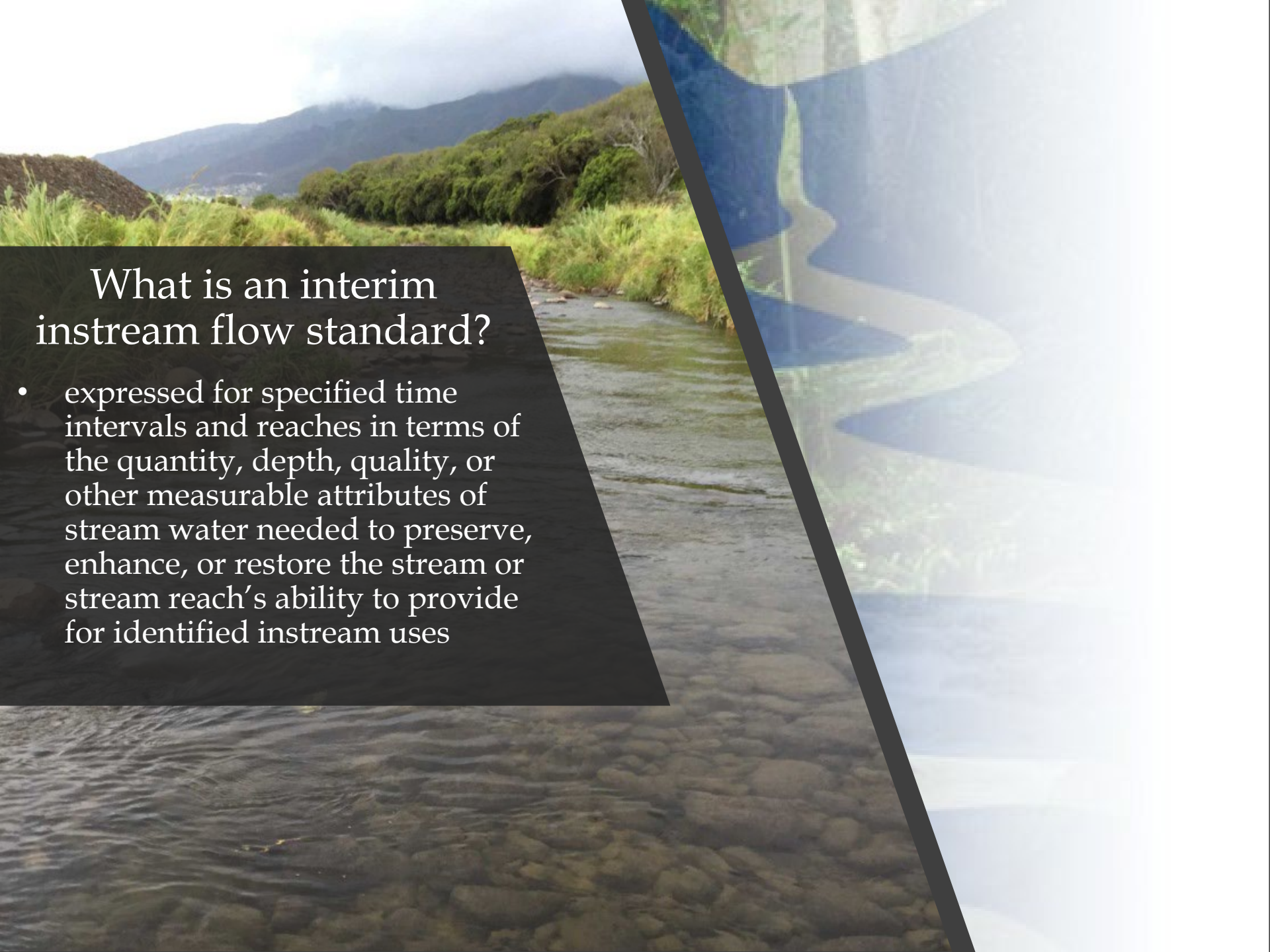
Summary of Hydrologic Conditions, Instream Values, and Surface Water Uses in the surface water hydrologic unit of Waikoloa (8161), Hawai‘i Island

C-2
Informational Briefing
March 19, 2024

Current Interim IFS in Hawai‘i



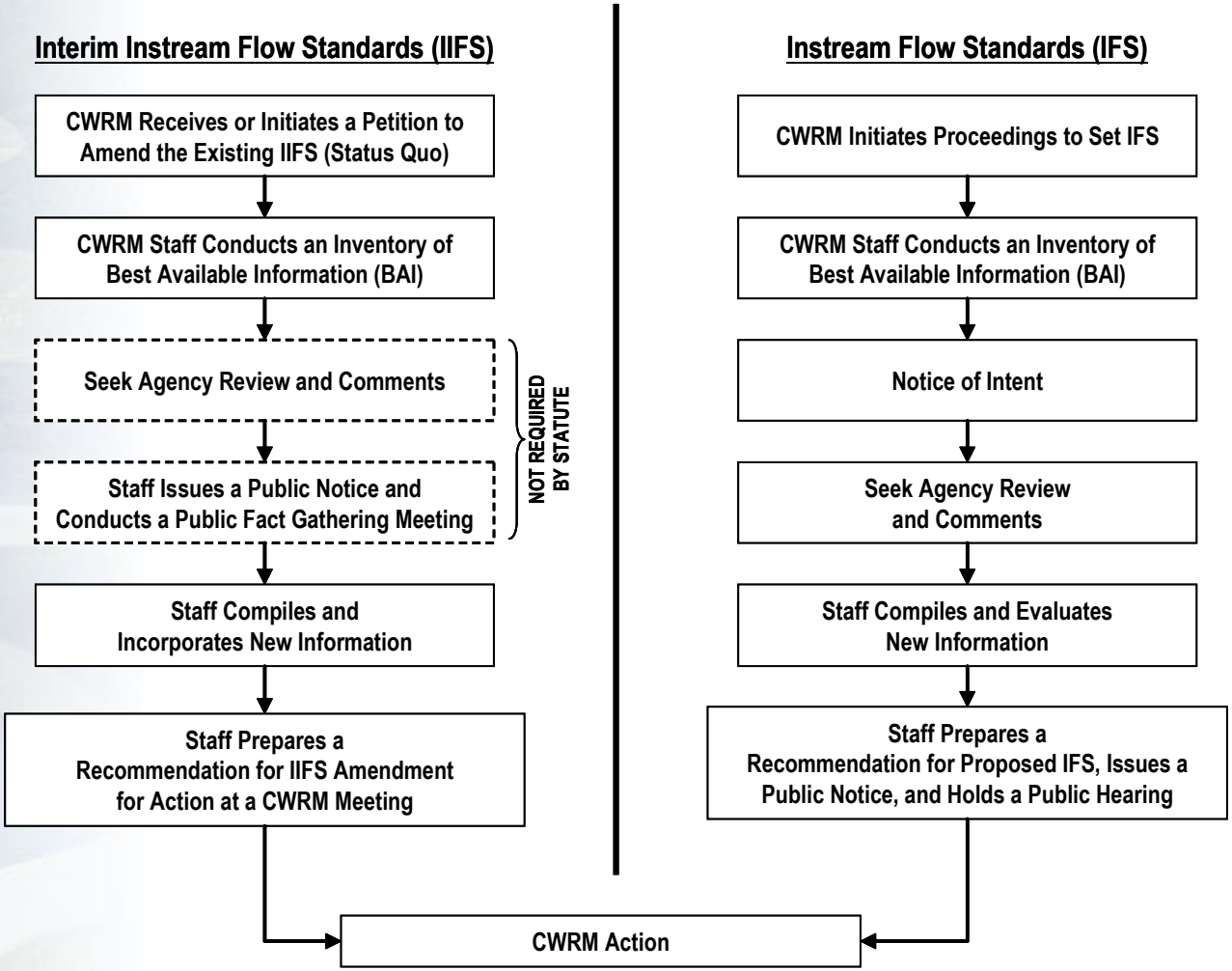


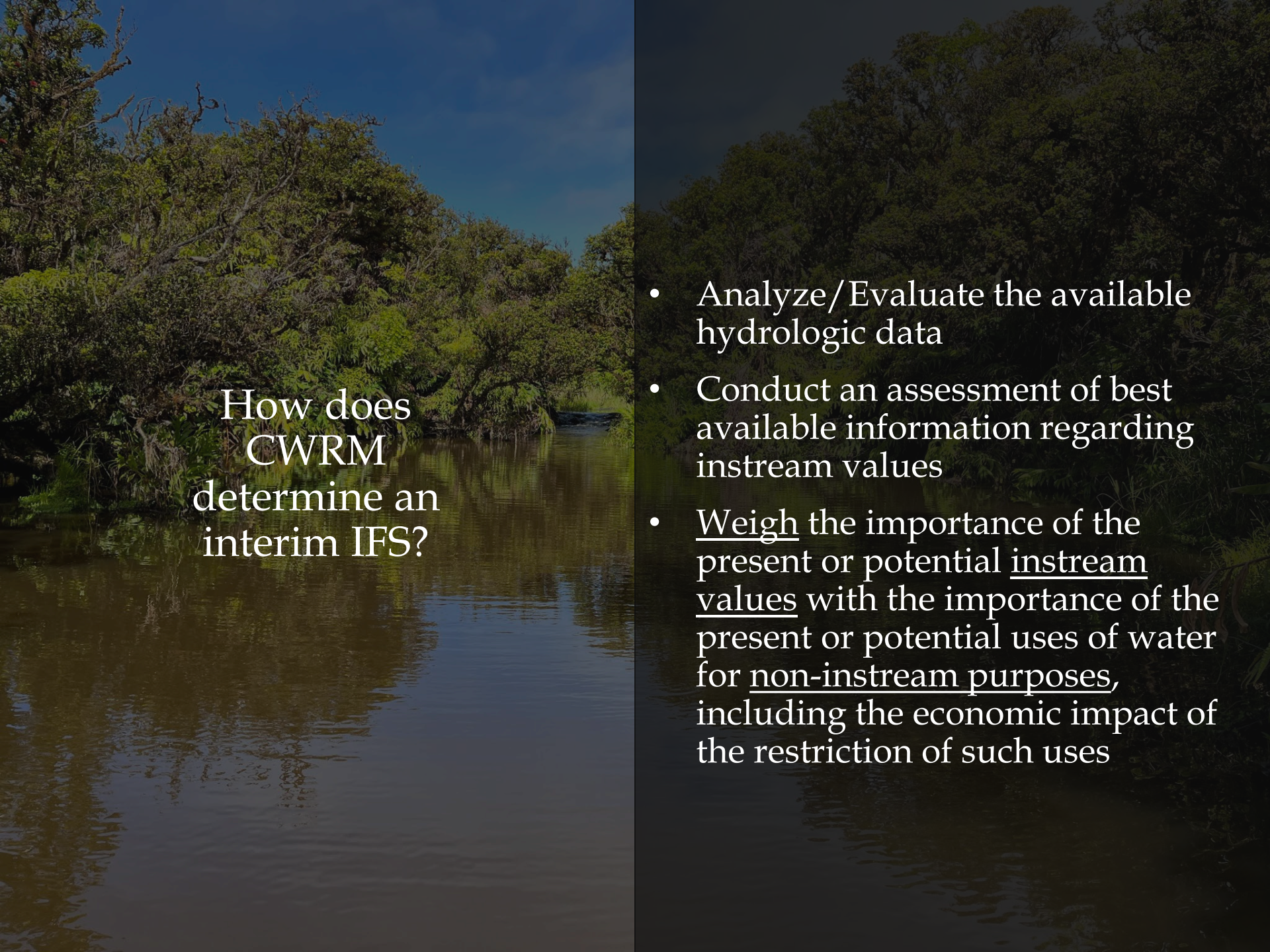
What is an interim instream flow standard?

- expressed for specified time intervals and reaches in terms of the quantity, depth, quality, or other measurable attributes of stream water needed to preserve, enhance, or restore the stream or stream reach's ability to provide for identified instream uses

Instream Flow Standard Process

The commission may initiate proceedings for the establishment of an instream flow standard for any stream or stream reach in the state. Instream flow standards shall be established on a stream-by-stream basis whenever necessary to protect the public interest in waters of the state. HRS §13-169-30

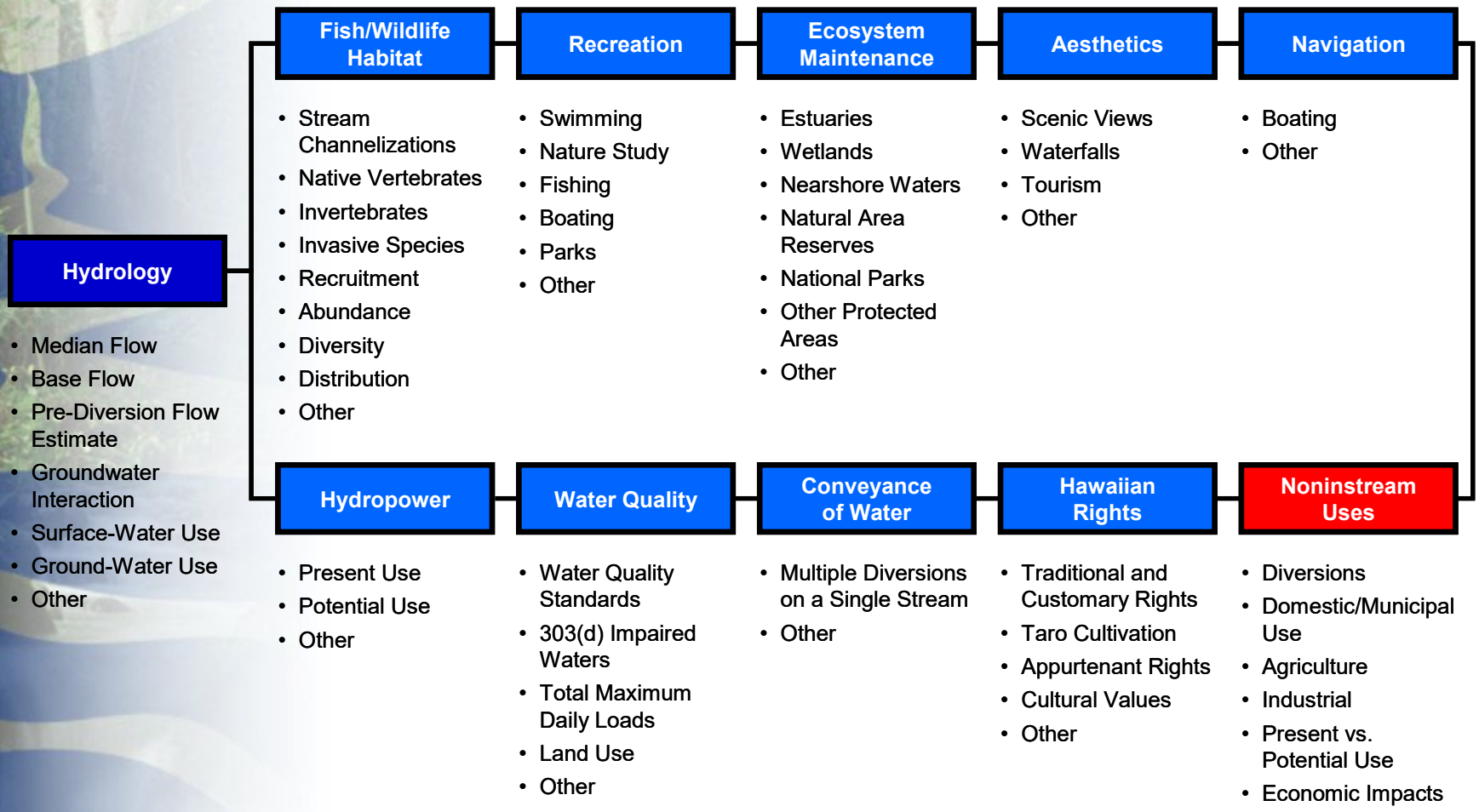


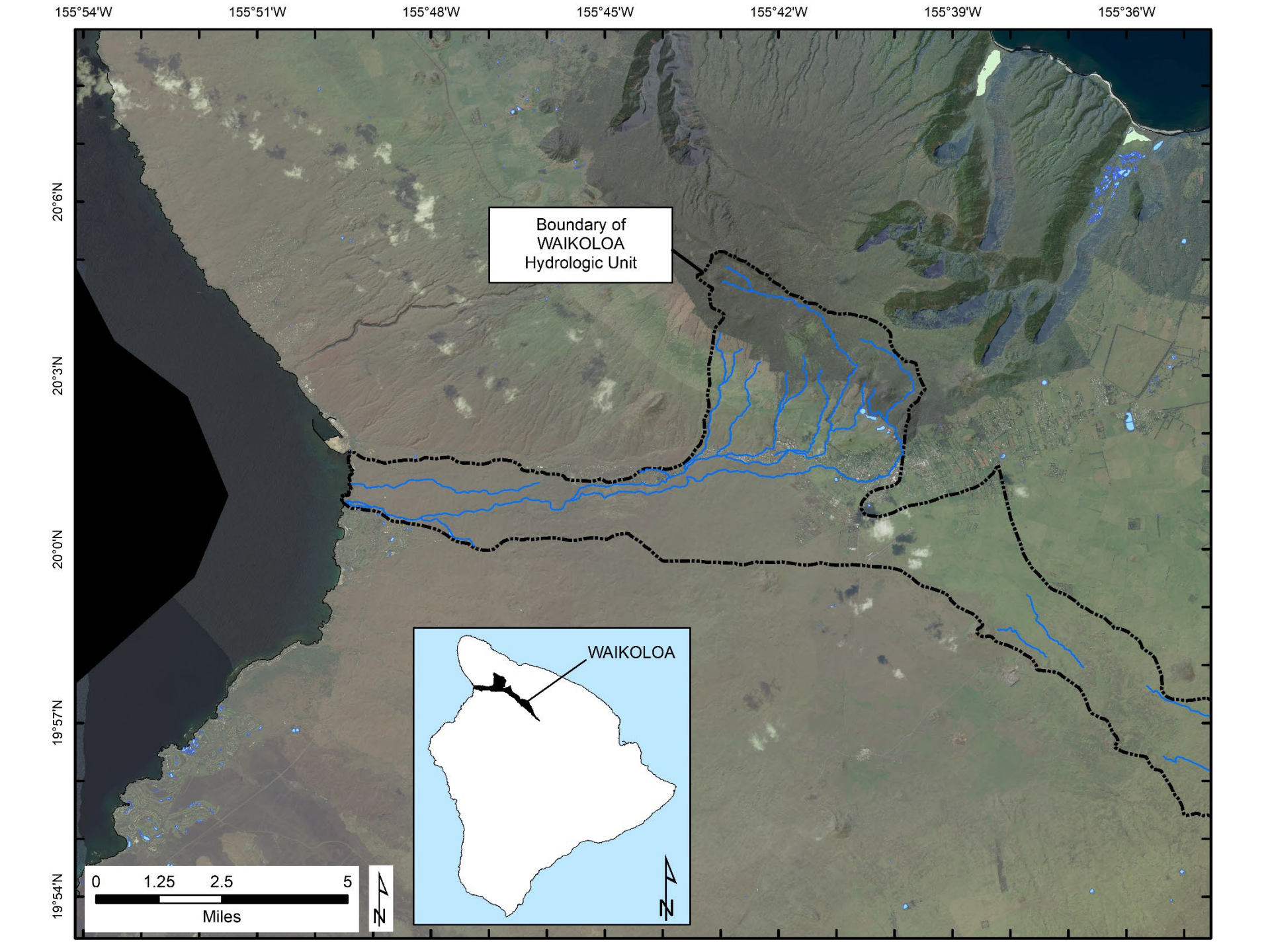


How does CWRM determine an interim IFS?

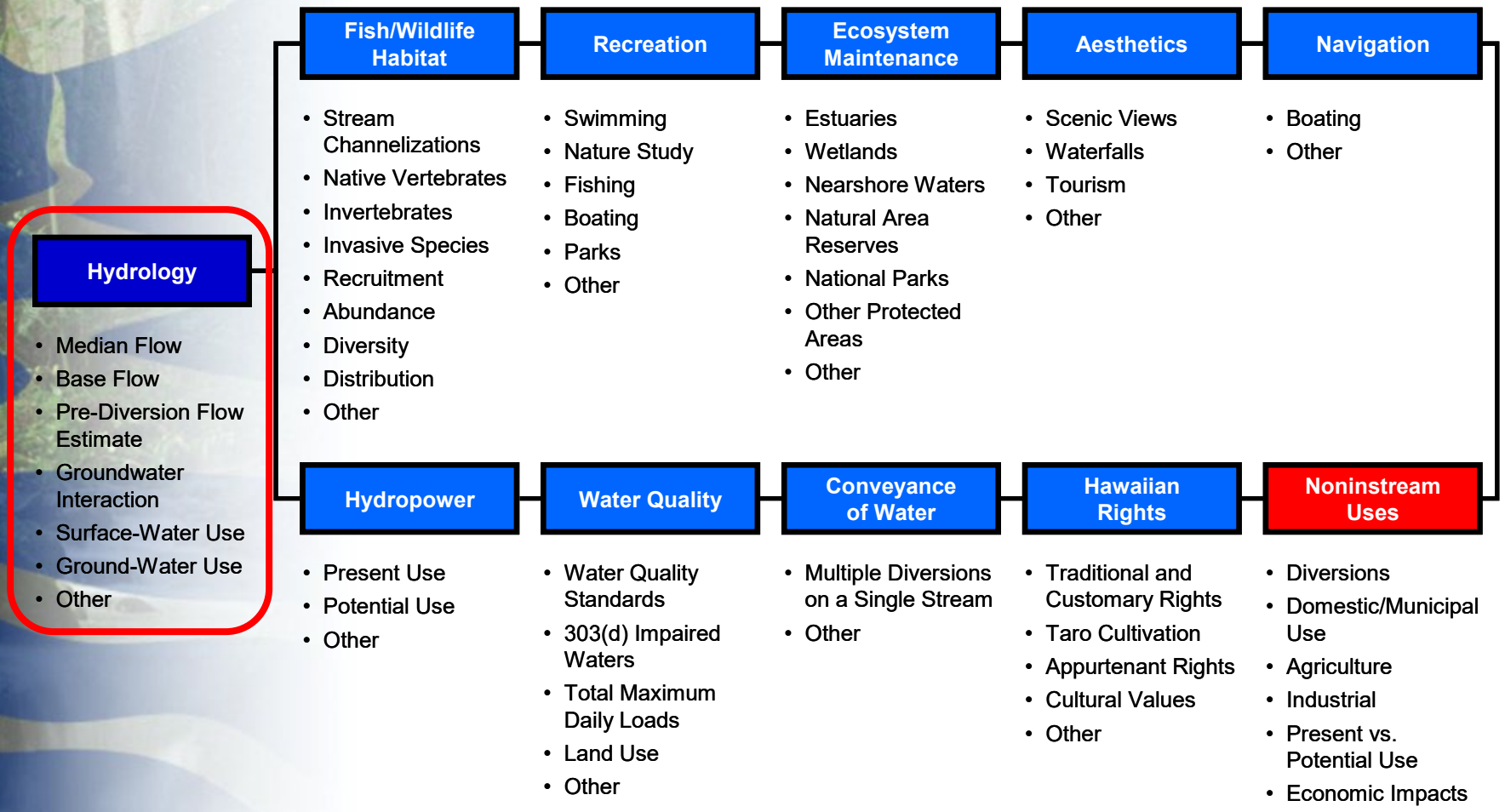
- Analyze/Evaluate the available hydrologic data
- Conduct an assessment of best available information regarding instream values
- Weigh the importance of the present or potential instream values with the importance of the present or potential uses of water for non-instream purposes, including the economic impact of the restriction of such uses

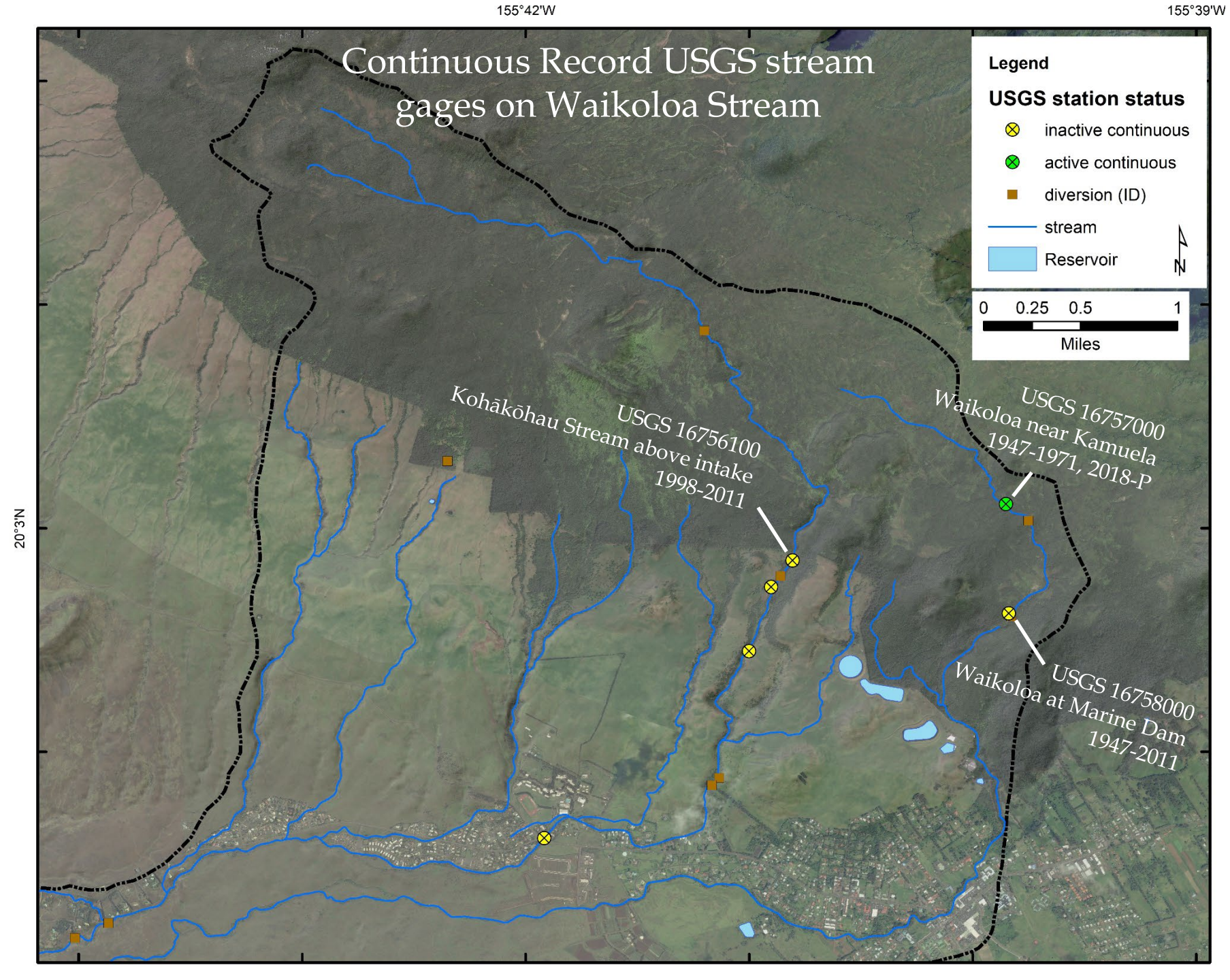
Instream and Non-instream Uses of Surface Water

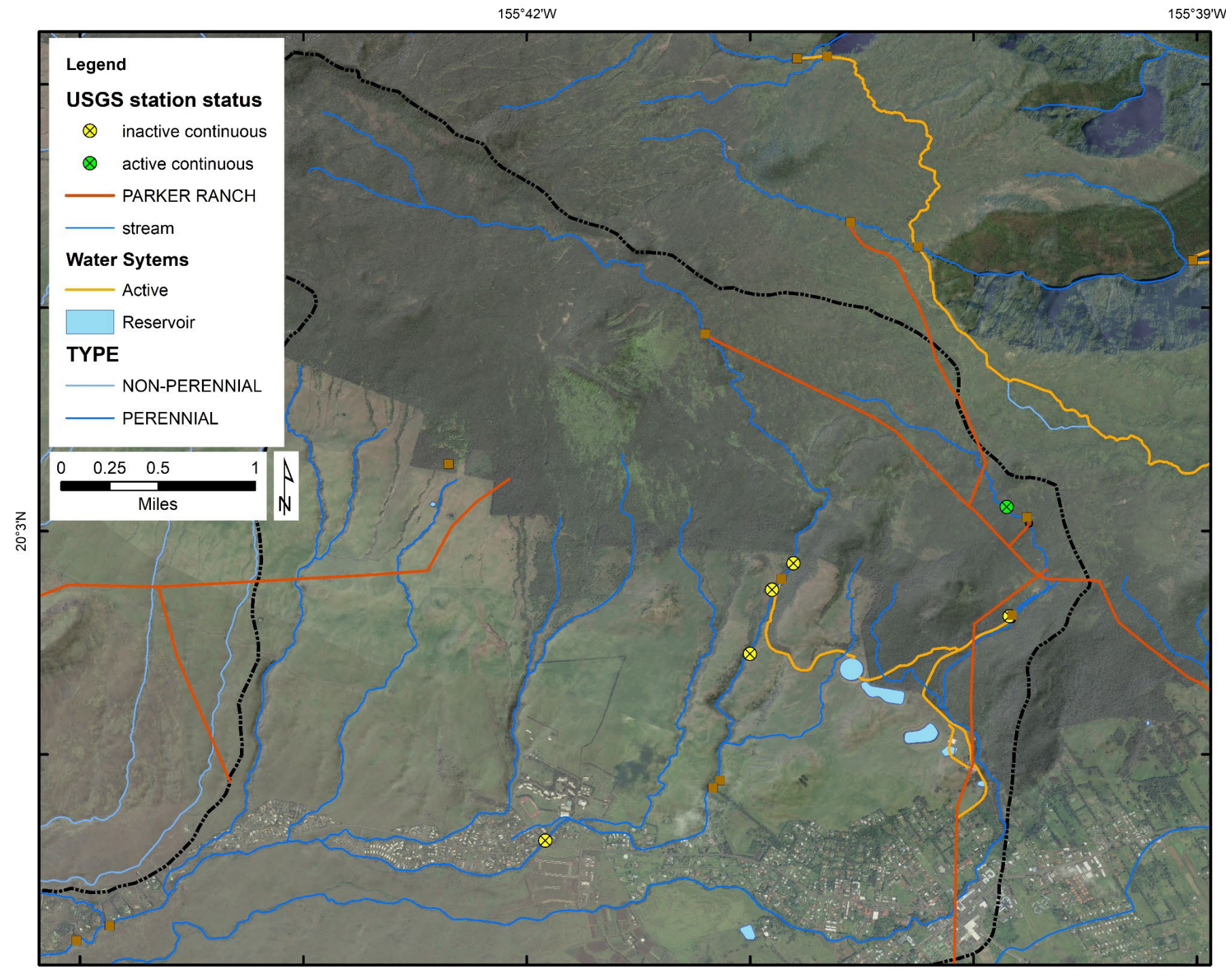



155°54'W
155°51'W
155°48'W
155°45'W
155°42'W
155°39'W
155°36'W
20°6'N
20°3'N
20°0'N
19°57'N
19°54'N
Boundary of
WAIKOLOA
Hydrologic Unit
WAIKOLOA
0
1.25
2.5
5
Miles
N
N

Instream and Non-instream Uses of Surface Water



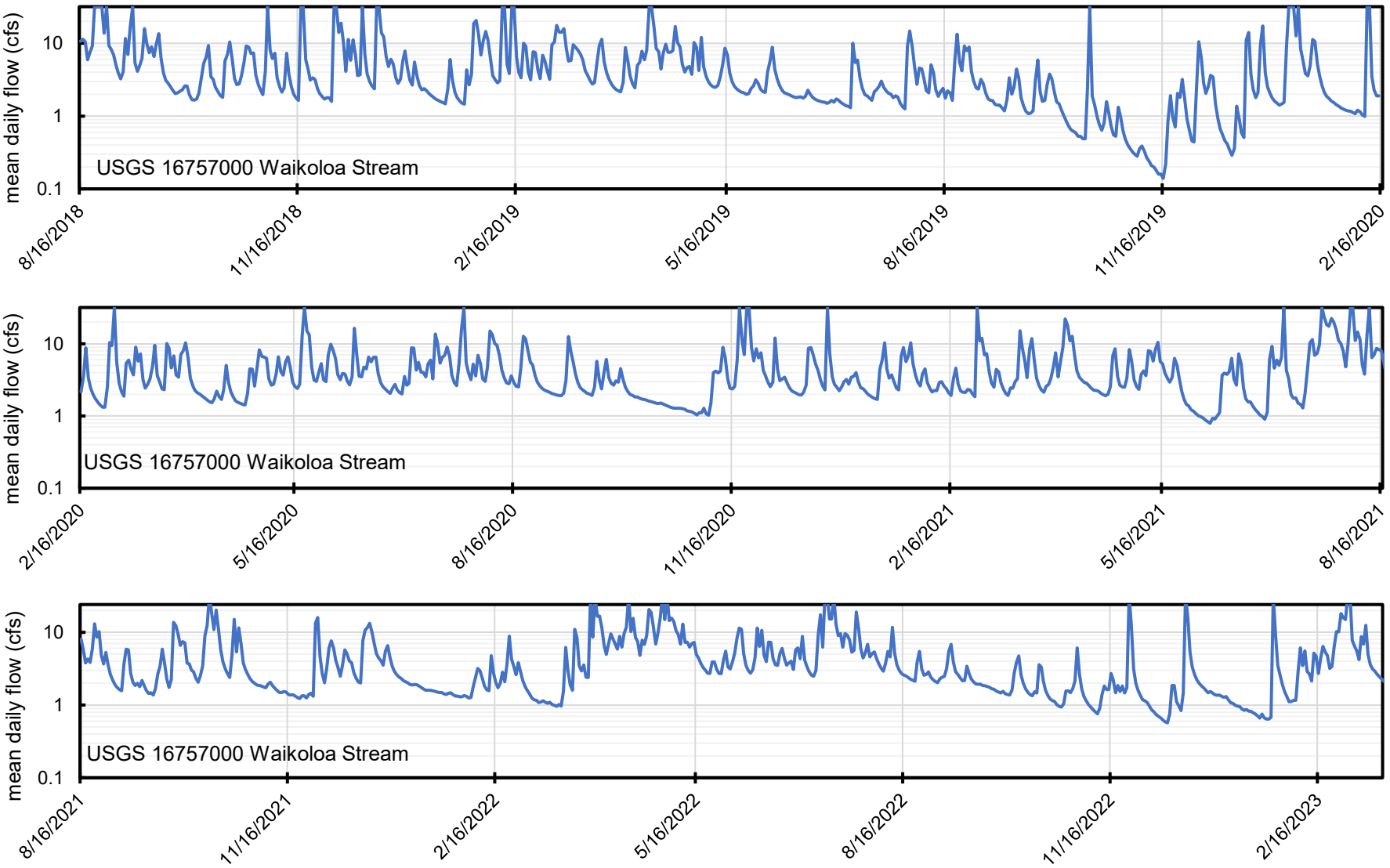

155°42'W
155°39'W
20°3'N
Continuous Record USGS stream gages on Waikoloa Stream
Legend
USGS station status
inactive continuous
active continuous
diversion (ID)
stream
Reservoir
N
0 0.25 0.5 1
Miles
USGS 16756100
Kohākōhau Stream above intake
1998-2011
USGS 16757000
Waikoloa near Kamuela
1947-1971, 2018-P
USGS 16758000
Waikoloa at Marine Dam
1947-2011


155°42'W
155°39'W
20°3'N
Legend
USGS station status
inactive continuous
active continuous
PARKER RANCH
stream
Water Sytems
Active
Reservoir
TYPE
NON-PERENNIAL
PERENNIAL
0 0.25 0.5 1
Miles
N

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

active from 1957-71 and 2018-present

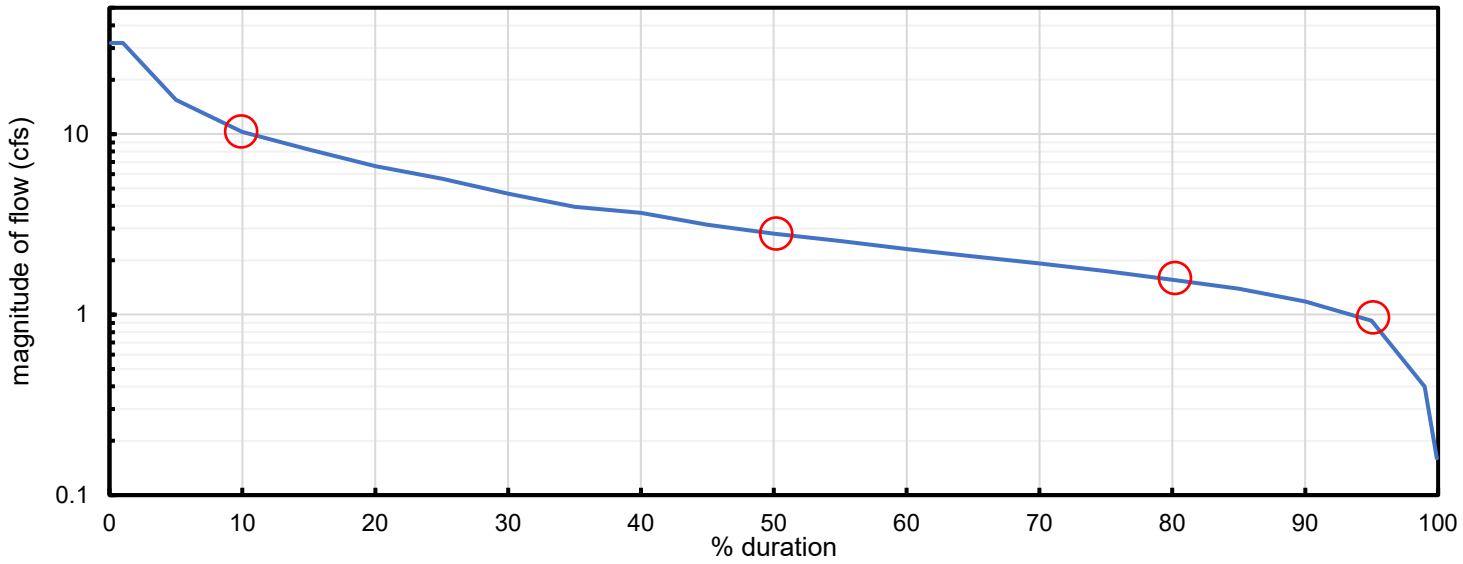
Hydrologic Data for Waikoloa Stream



Waikoloa Stream near Kamuela

(Natural Flow Above Parker Ranch Intake)

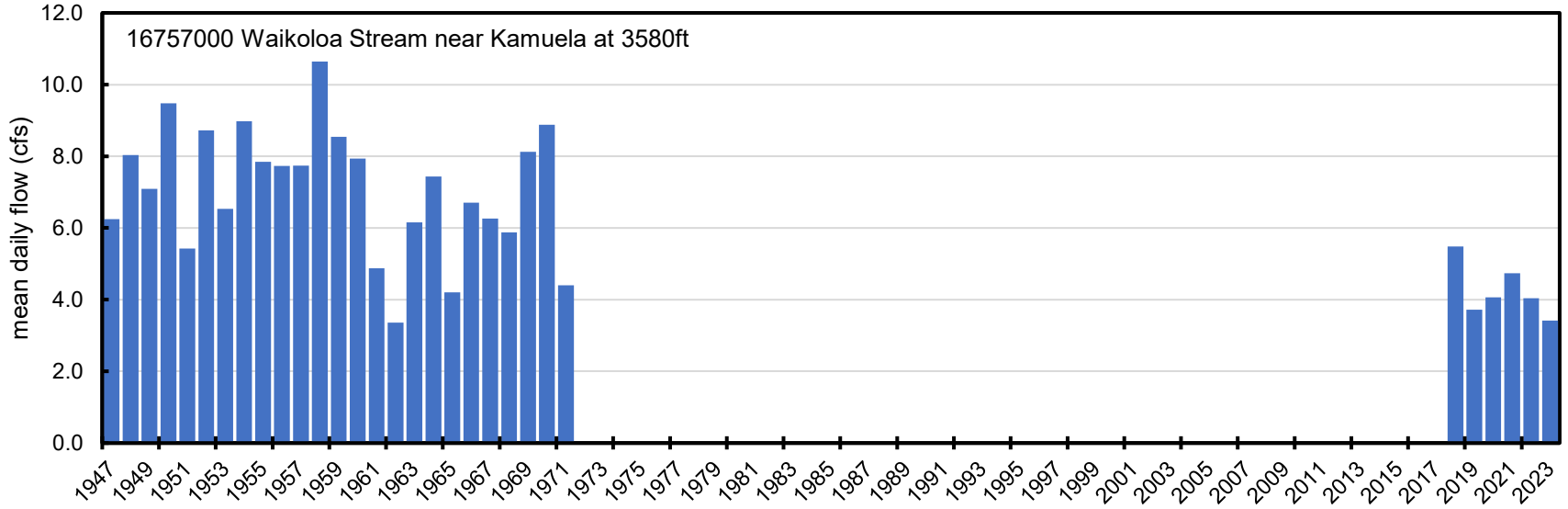
2018-2023

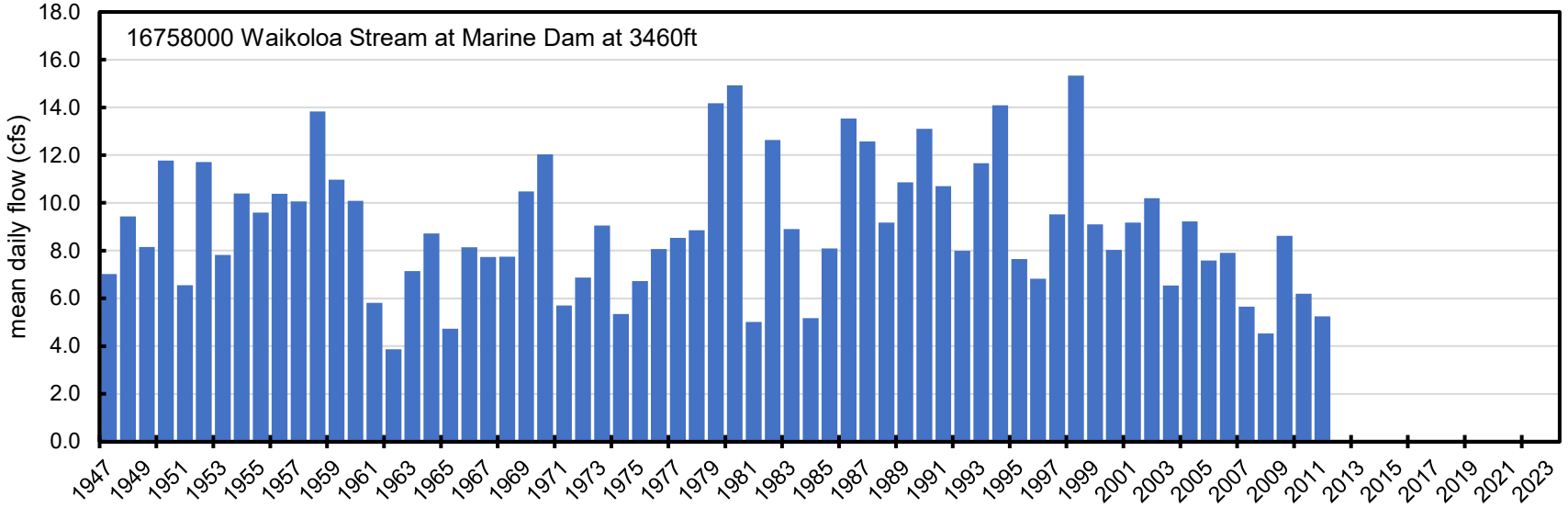


Flow Duration	16757000 Waikoloa abv Parker Ranch Intake cfs (mgd)
Q_{10} (high flow)	10.3 (6.66)
Mean daily flow	4.91 (3.17)
Q_{50} (median flow)	2.81 (1.81)
Q_{80} (base flow)	1.56 (1.01)
Q_{95} (low flow)	0.93 (0.60)

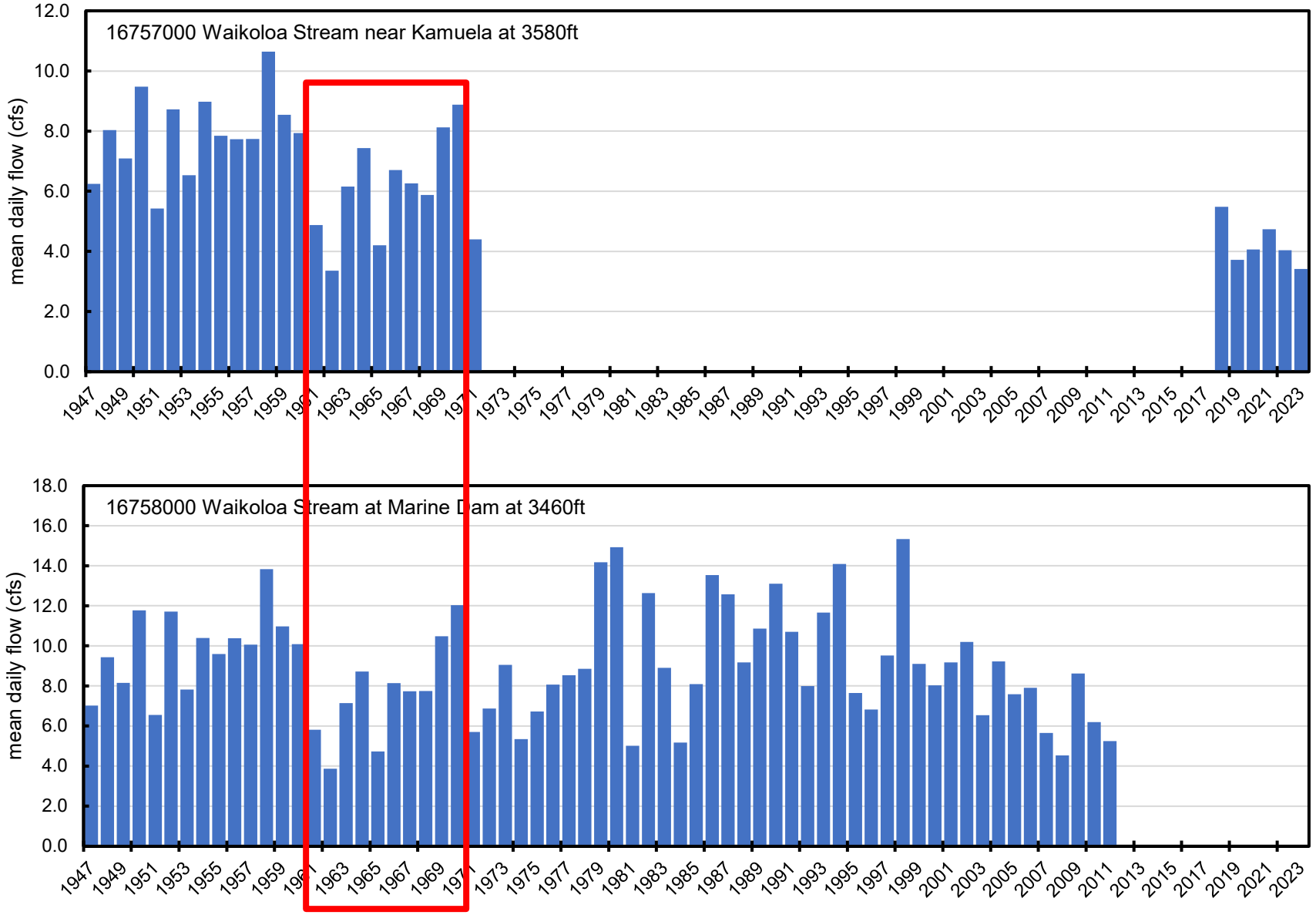
USGS station 16758000 Waikoloa Stream at Marine Dam

Hydrologic Data for Waikoloa Stream

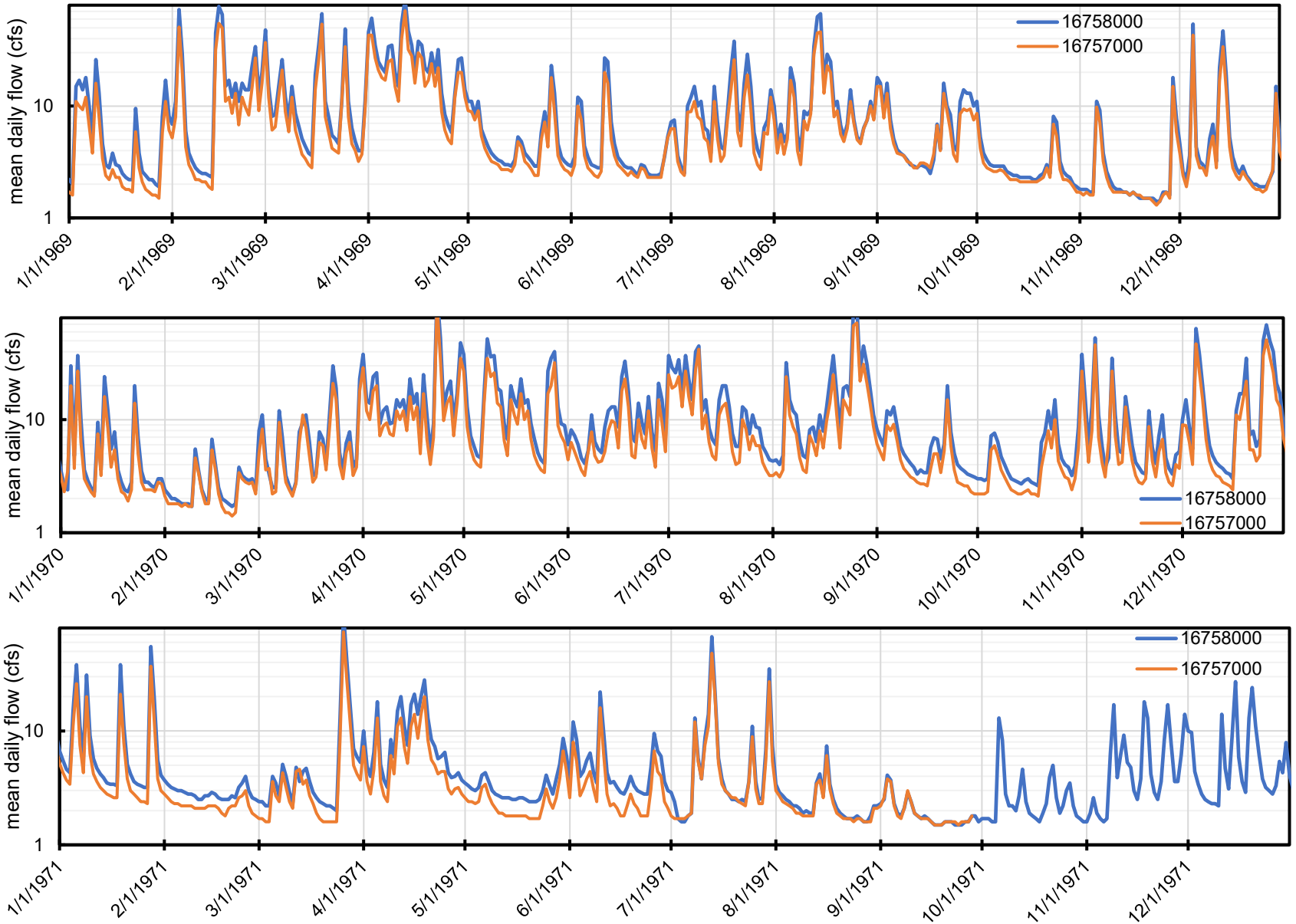




Hydrologic Data for Waikoloa Stream

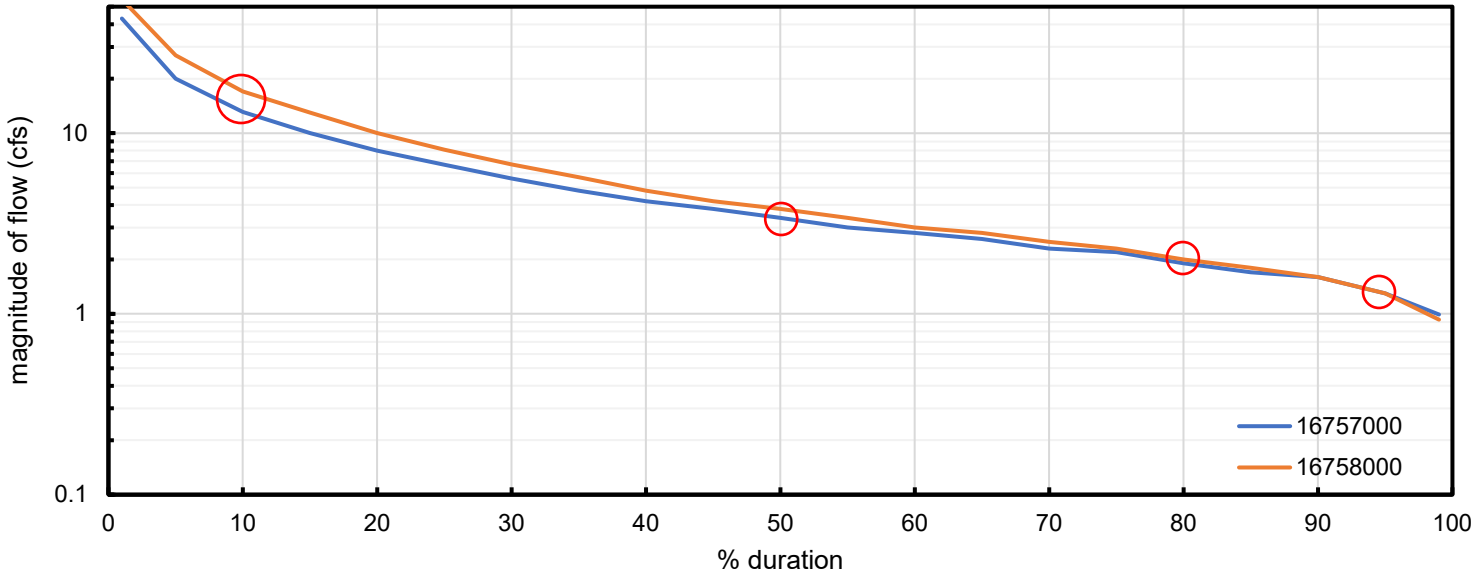


Overlapping streamflow records 1961-1971



Water Availability: Waikoloa Stream Flow Duration Curve

Parker Ranch diverts ~ 0.70 cfs (0.45 mgd) between stations + 1.5 cfs (0.97) average seepage gain
→ About 0.8 cfs (0.51 mgd) net gain below Parker Ranch intake

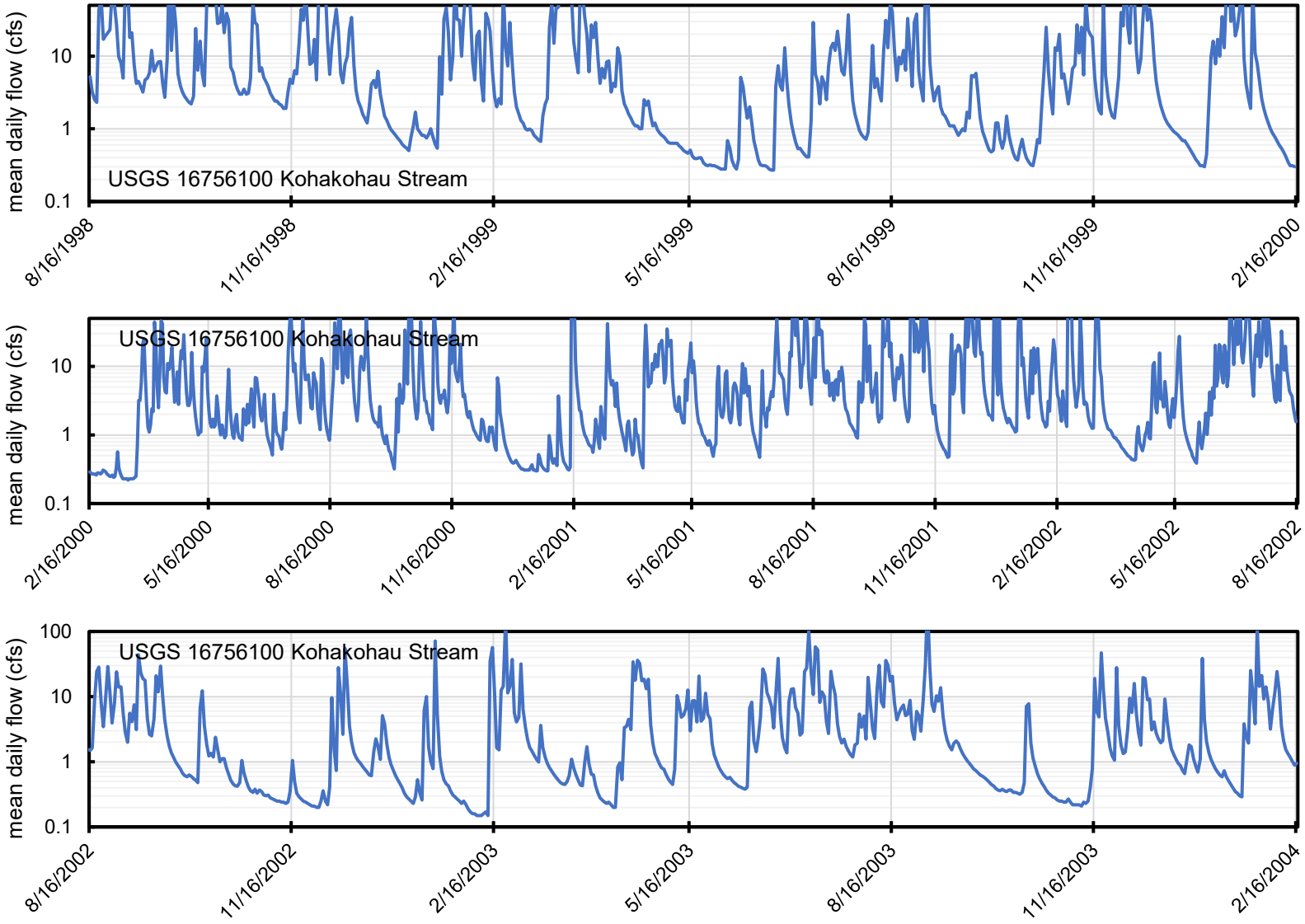


	16757000 Waikoloa abv Parker Ranch Intake	**16757000 Waikoloa at Marine Dam**
Flow Duration	**2018-2023 cfs (mgd)**	**2001-2011 cfs (mgd)**
Q_{10} (high flow)	10.3 (6.66)	16 (10.3)
Mean daily flow	4.91 (3.17)	7.38 (4.77)
Q_{50} (median flow)	2.81 (1.81)	3.8 (2.46)
Q_{80} (base flow)	1.56 (1.01)	1.85 (1.20)
Q_{95} (low flow)	0.93 (0.60)	1.1 (0.72)

USGS station 16756100 Kohākōhau Stream

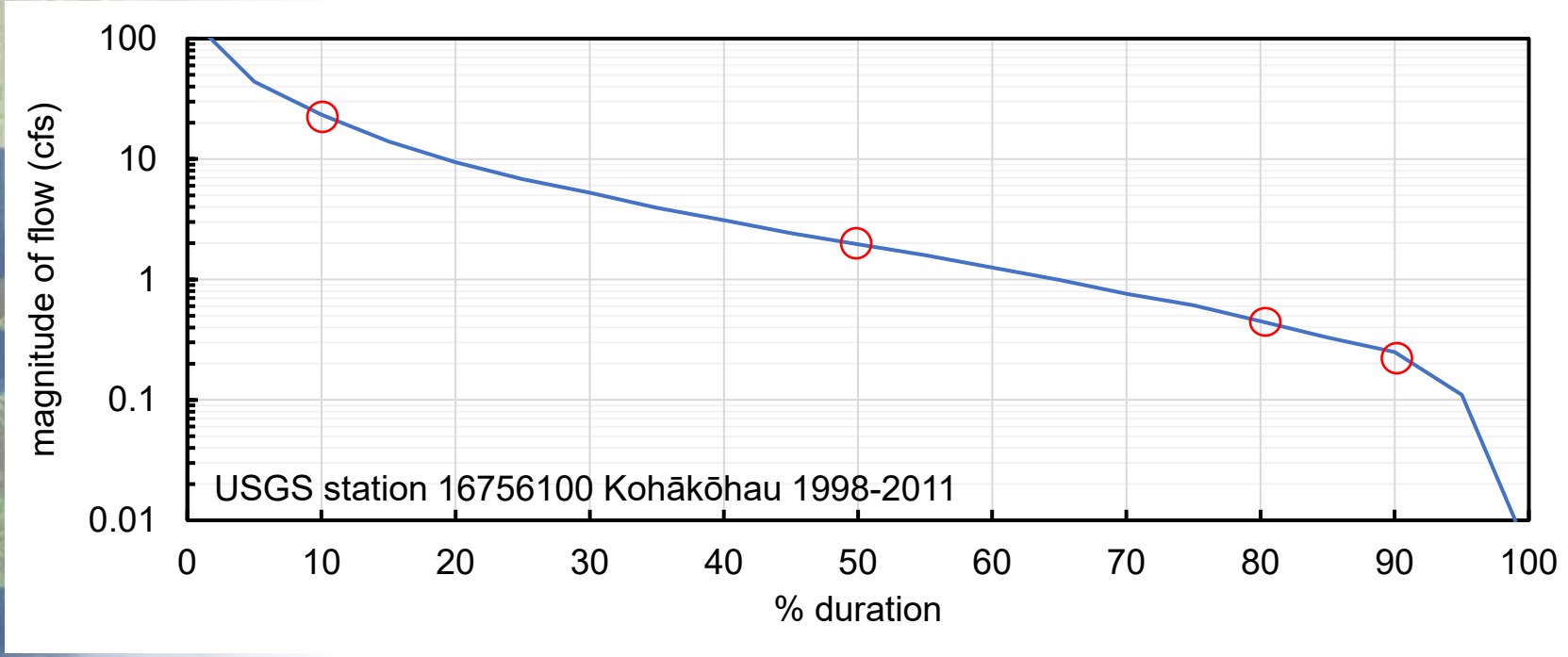
active from 1998-2011

Hydrologic Data for Kohākōhau Stream

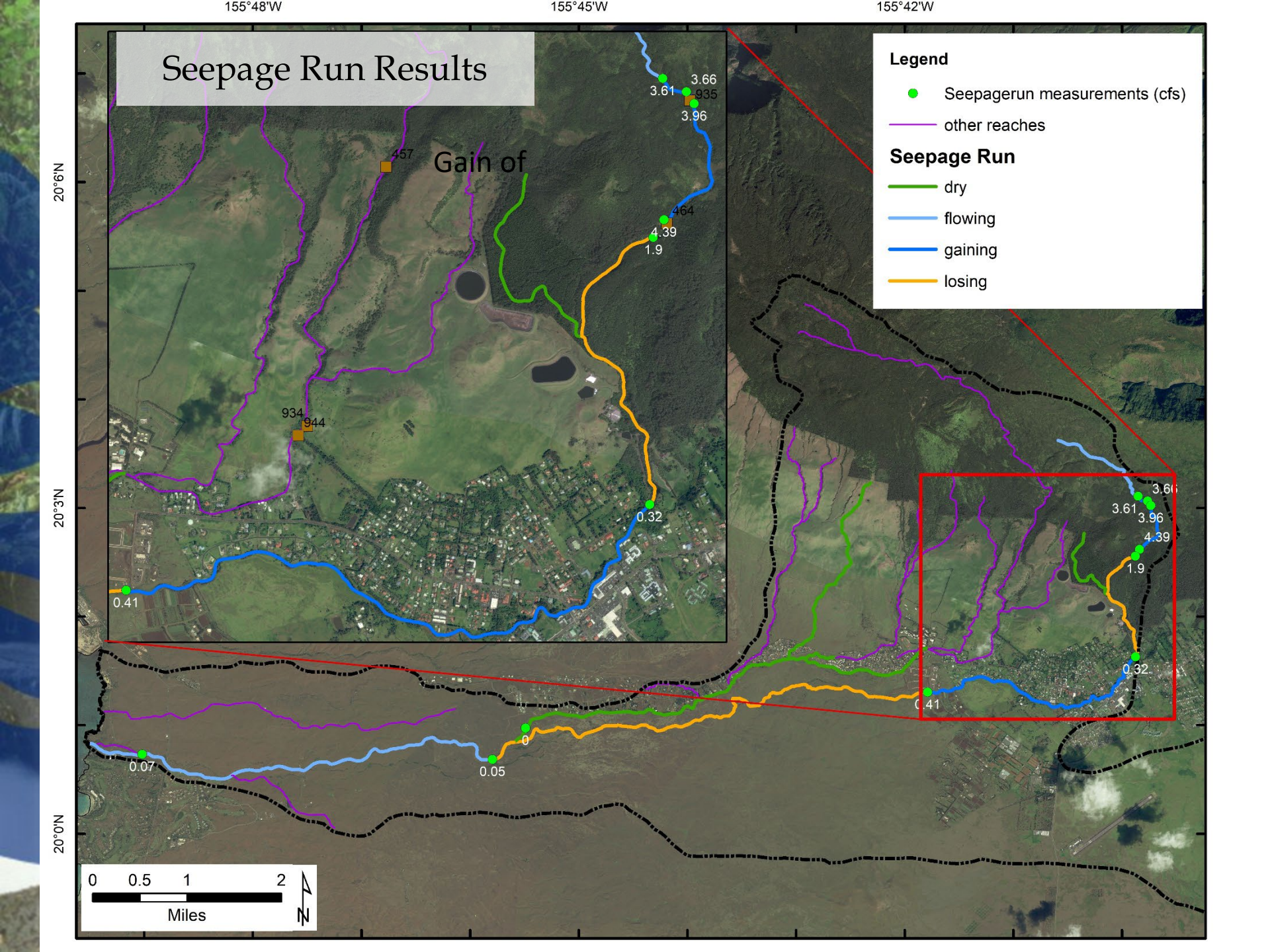


Hydrologic Data for Kohākōhau Stream above intake

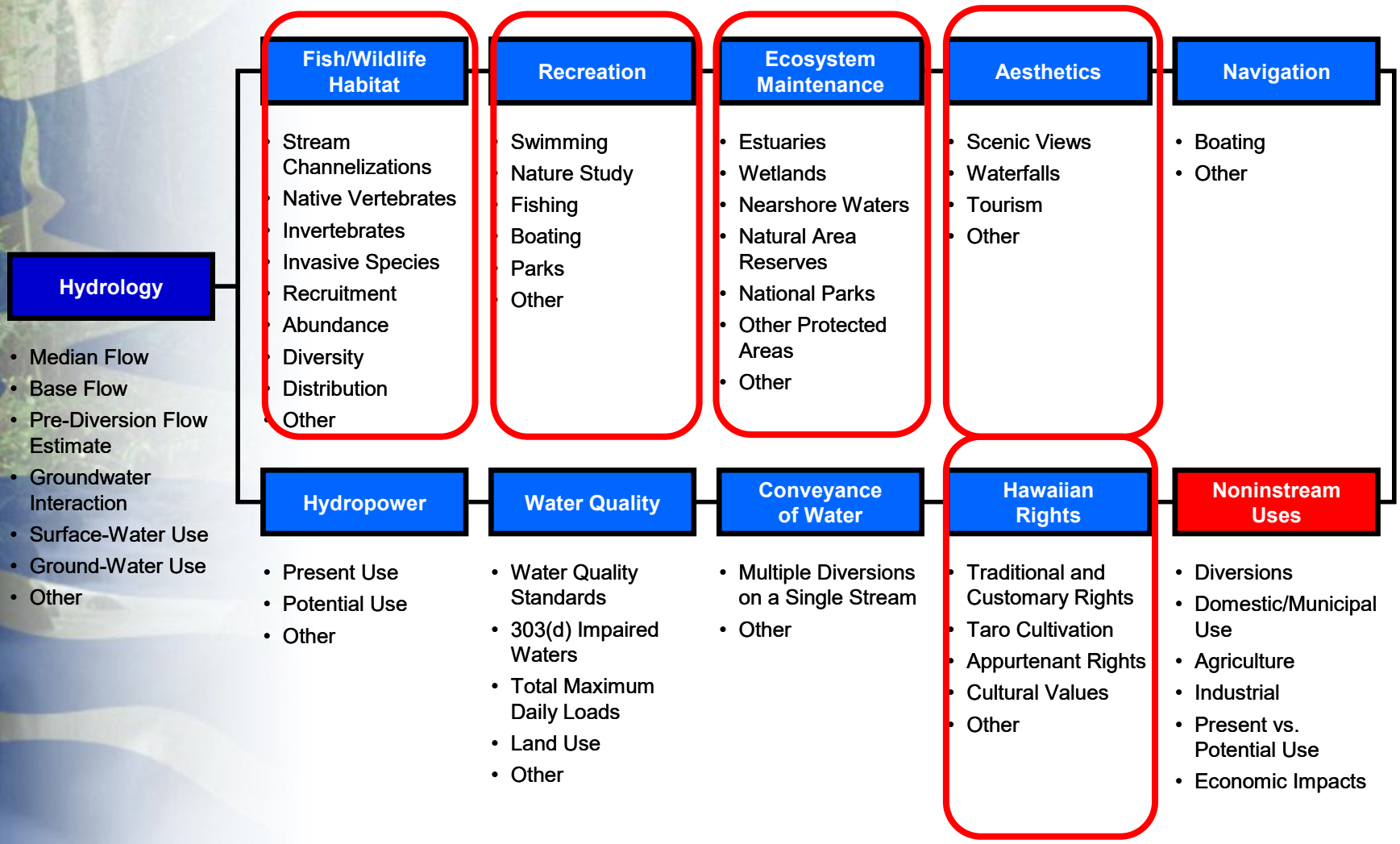
active from 1998-2011



Flow Duration	Magnitude cfs (mgd)
Q_{10} (high flow)	23.3 (15.1)
Mean daily flow	9.6 (6.19)
Q_{50} (median flow)	2.0 (1.26)
Q_{80} (base flow)	0.61 (0.39)
Q_{90} (low flow)	0.25 (0.16)


Seepage Run Results
Legend
Seepagerun measurements (cfs)
other reaches
Seepage Run
dry
flowing
gaining
losing
Gain of
155°48'W
155°45'W
155°42'W
20°6'N
20°3'N
20°0'N
3.66
3.61
935
3.96
457
464
4.39
1.9
934
944
0.32
0.41
0.07
0.05
0
0 0.5 1 2
Miles
N

Instream and Non-instream Uses of Surface Water

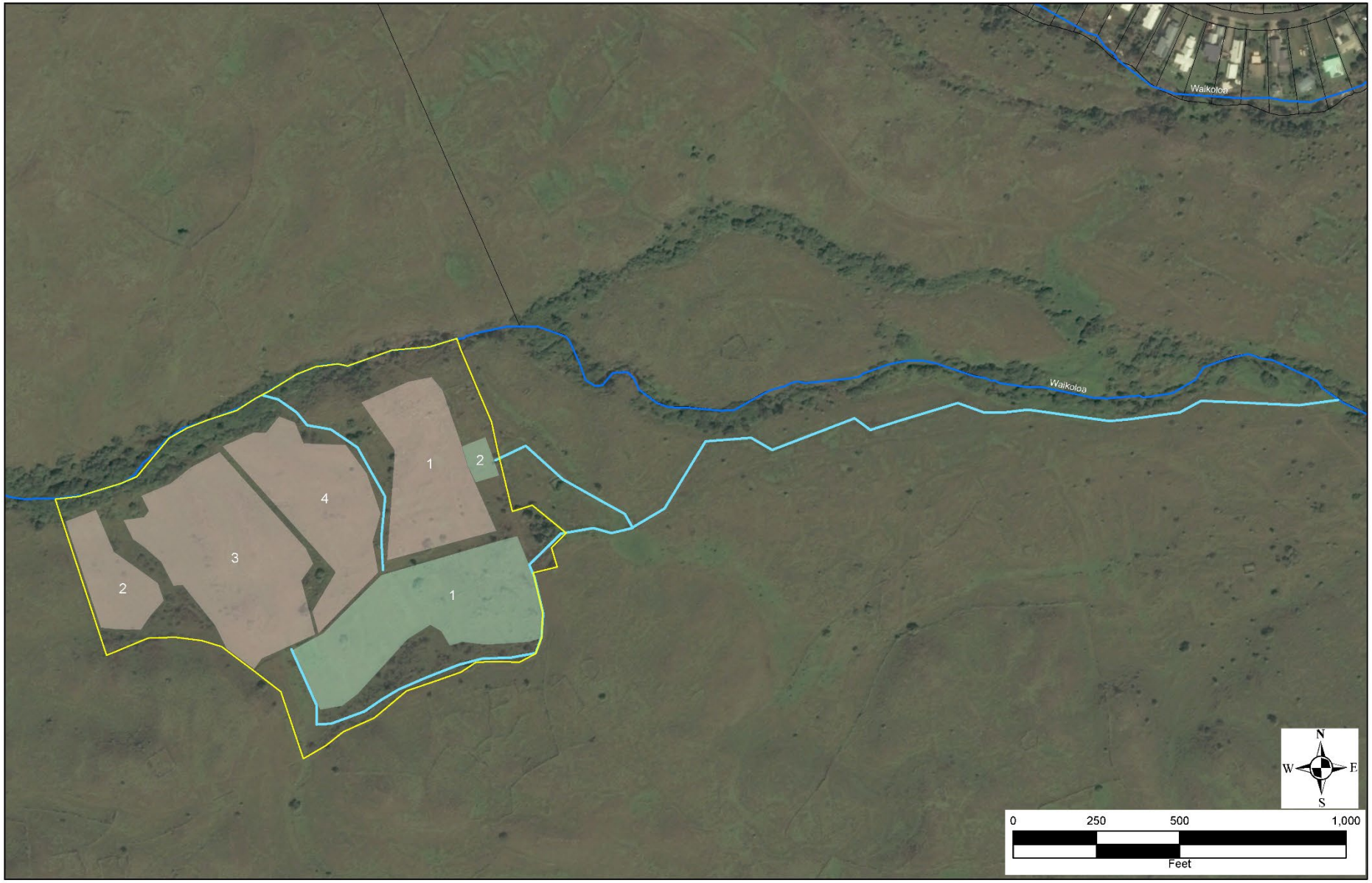


Traditional and Customary Practices

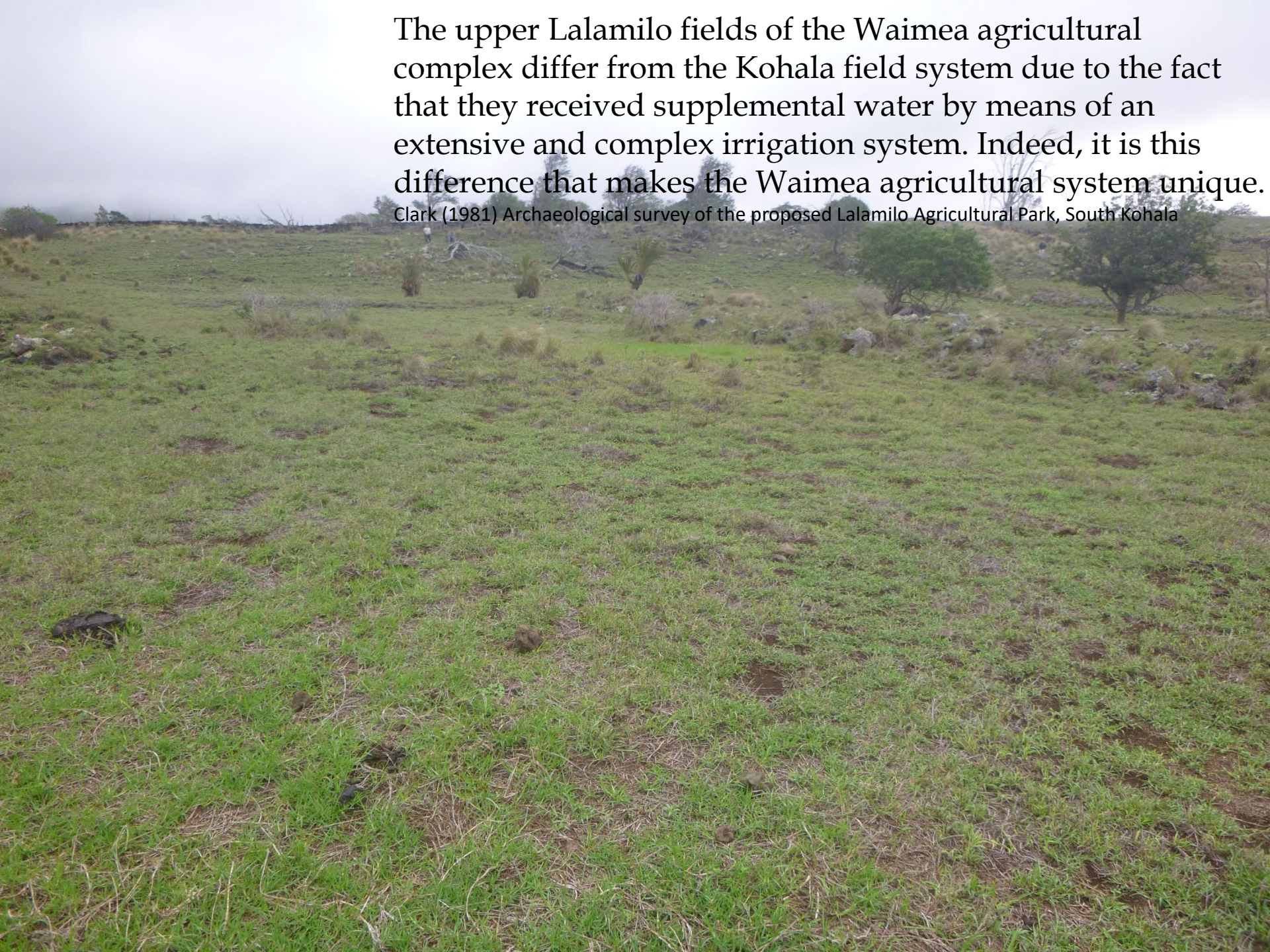
Traditional and Customary Practices

- Lālāmilo Field System: one of the largest mostly intact archaeological sites demonstrating habitation and agricultural practices including irrigated agriculture with extensive an ʻauwai system for wetland kalo production
- Waiaka Agricultural Complex: extensive terracing, habitation, and ʻauwai complex fed by water from Waikoloa Stream
- Waiʻulaʻula Estuary- Pelekane Bay: numerous habitation, ʻauwai and agricultural sites; historic and currently important fishing area; Puʻukohola Heiau Historic Site, Mailekini Heiau

regeneration of ‘auwai system



‘auwai below Lalamilo Farm Lots



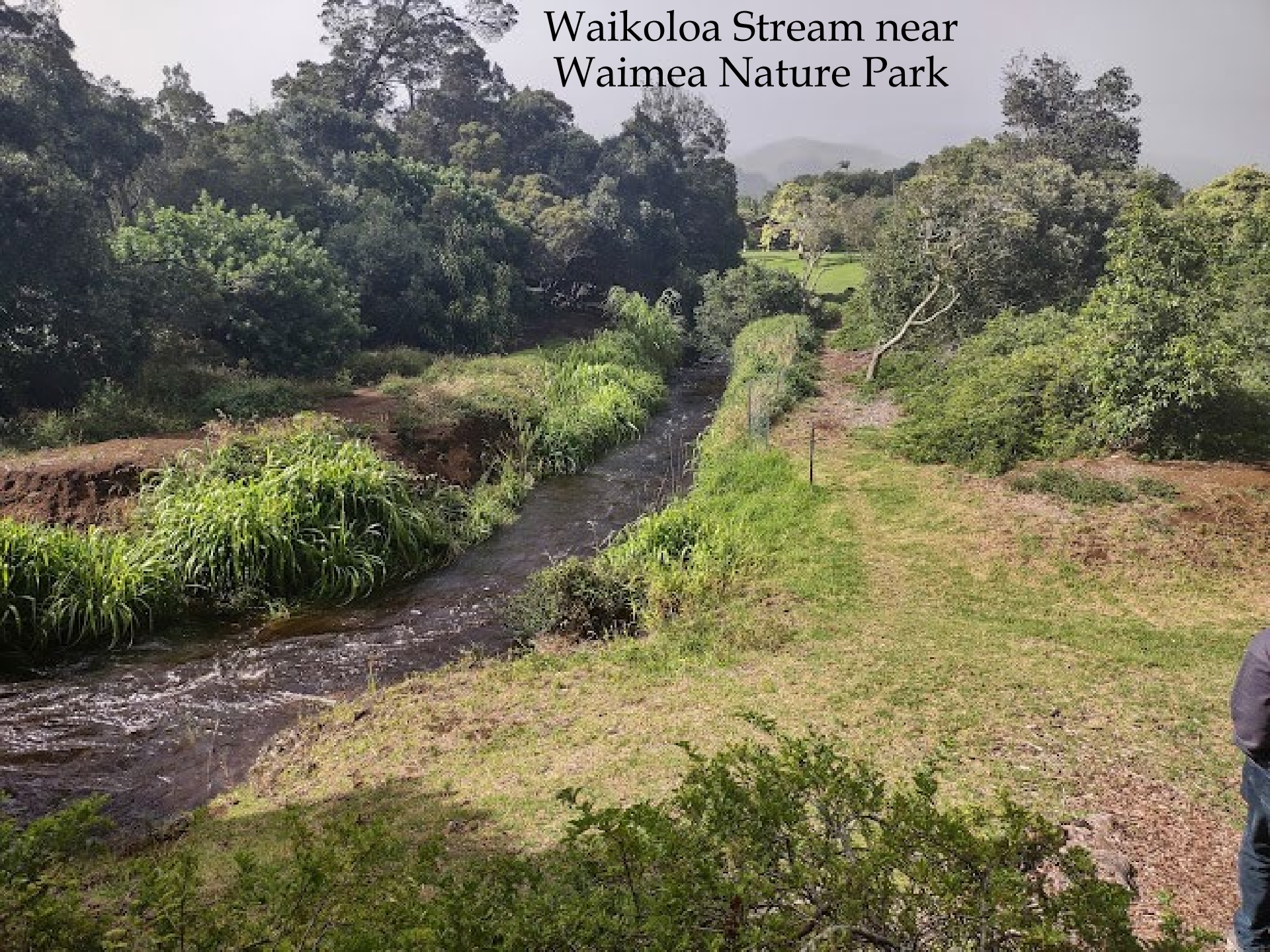
The upper Lalamilo fields of the Waimea agricultural complex differ from the Kohala field system due to the fact that they received supplemental water by means of an extensive and complex irrigation system. Indeed, it is this difference that makes the Waimea agricultural system unique.

Clark (1981) Archaeological survey of the proposed Lalamilo Agricultural Park, South Kohala

Recreational and Aesthetic Values


Waikoloa Stream near
Queen Kaʻahumanu Hwy

Waikoloa Stream near Waimea Nature Park

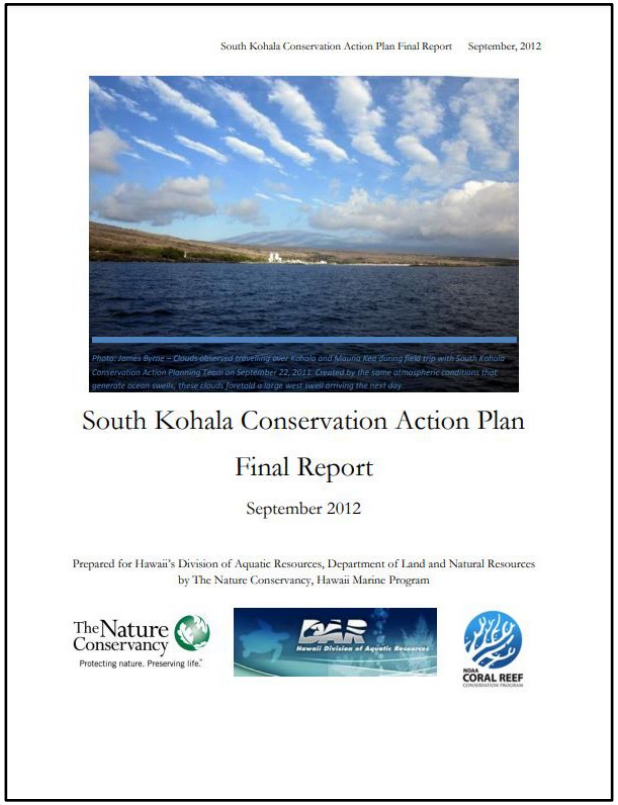

Waikoloa Stream near
Waimea Nature Park

Water Quality

- Temperature
- Turbidity

watershed of identified as important for restoration to reduce sediment and nutrient pollution to Pelekane Bay by:

- Hawai‘i DOH
- EPA
- NOAA Coral Reef Conservation
- The Nature Conservancy
- Hawai‘i DAR


South Kohala Conservation Action Plan Final Report September, 2012

South Kohala Conservation Action Plan

Final Report

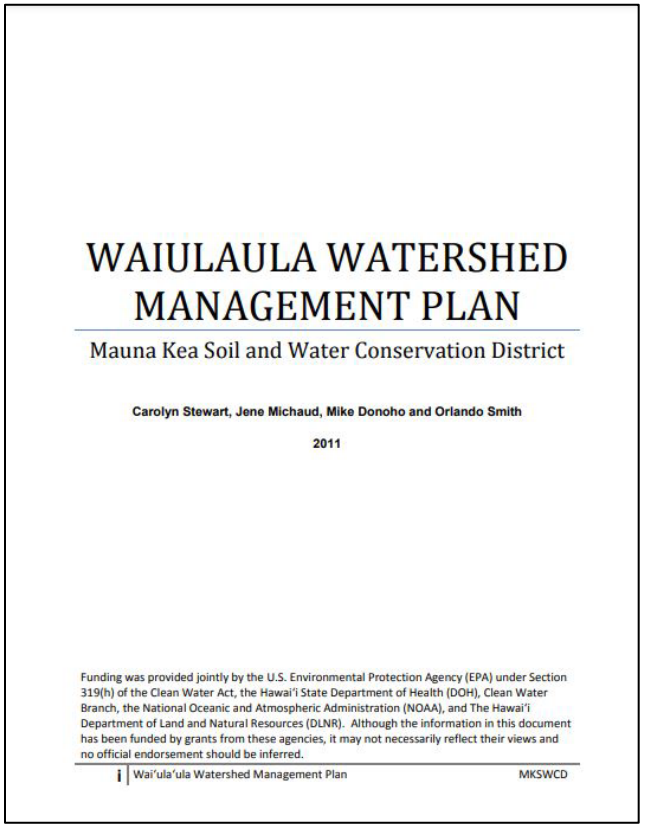
September 2012

Prepared for Hawaii's Division of Aquatic Resources, Department of Land and Natural Resources
by The Nature Conservancy, Hawaii Marine Program

The Nature Conservancy
Protecting nature. Preserving life.

Hawaii Division of Aquatic Resources

NOAA CORAL REEF CONSERVATION PROGRAM


WAIULAULA WATERSHED MANAGEMENT PLAN

Mauna Kea Soil and Water Conservation District

Carolyn Stewart, Jene Michaud, Mike Donoho and Orlando Smith

2011

Funding was provided jointly by the U.S. Environmental Protection Agency (EPA) under Section 319(h) of the Clean Water Act, the Hawai'i State Department of Health (DOH), Clean Water Branch, the National Oceanic and Atmospheric Administration (NOAA), and The Hawai'i Department of Land and Natural Resources (DLNR). Although the information in this document has been funded by grants from these agencies, it may not necessarily reflect their views and no official endorsement should be inferred.

Habitat for Freshwater Biota

Presence of native aquatic species

species	Estuary	Lower	Middle	Upper	Headwaters
Atyoida bisulcata			P	P	
Lentipes concolor				P	
Awaous stamineus		P	P	P	
Eleotris sandwicensis					
Sicyopterus stimpsoni		P	P	P	
Stenogobius hawaiiensis					
Macrobrachium grandimanus		P			

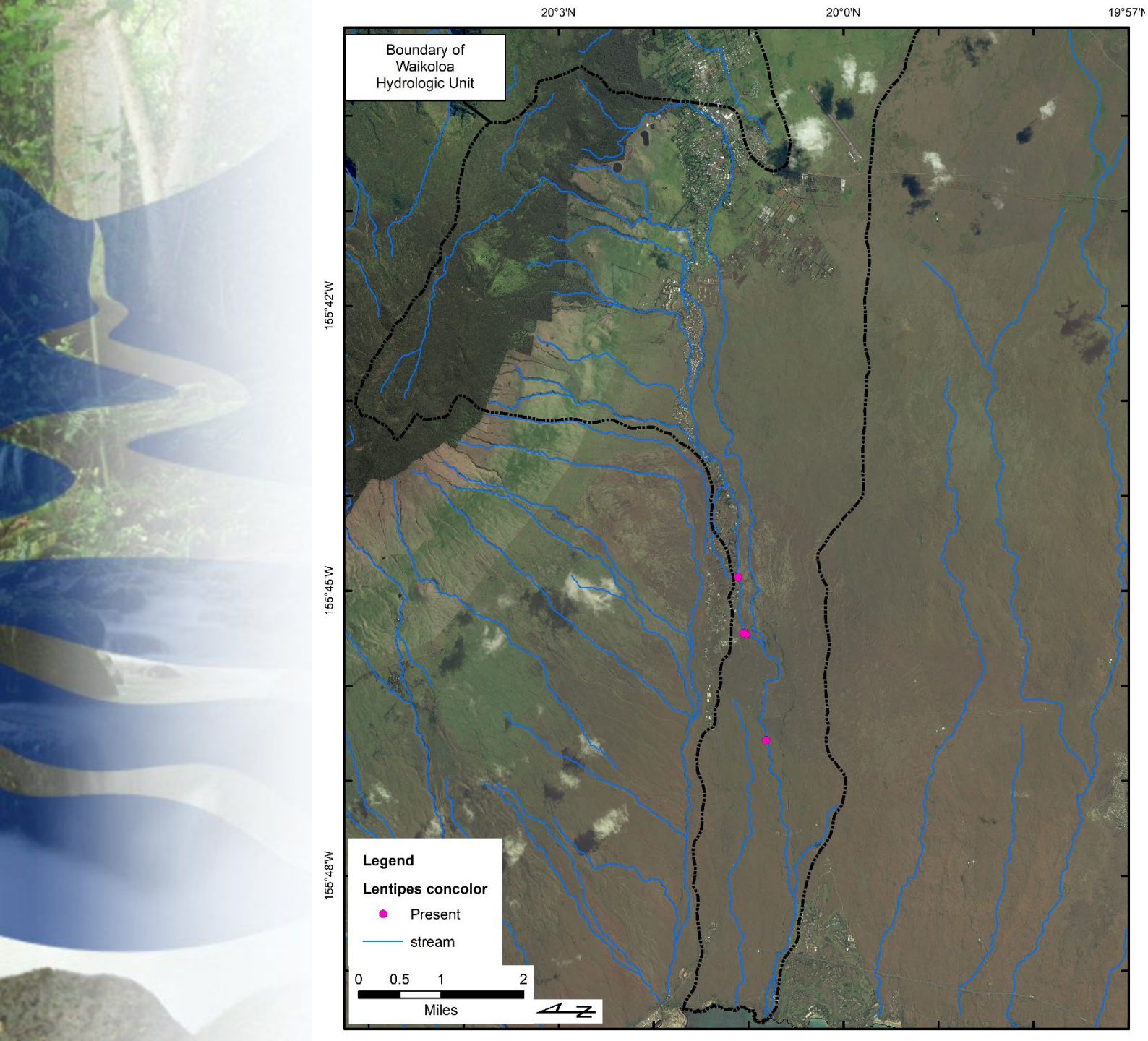
"Favorable habitats such as scoured bedrock channels with moderately sized cobble, large waterfalls and cascades, with clear water"

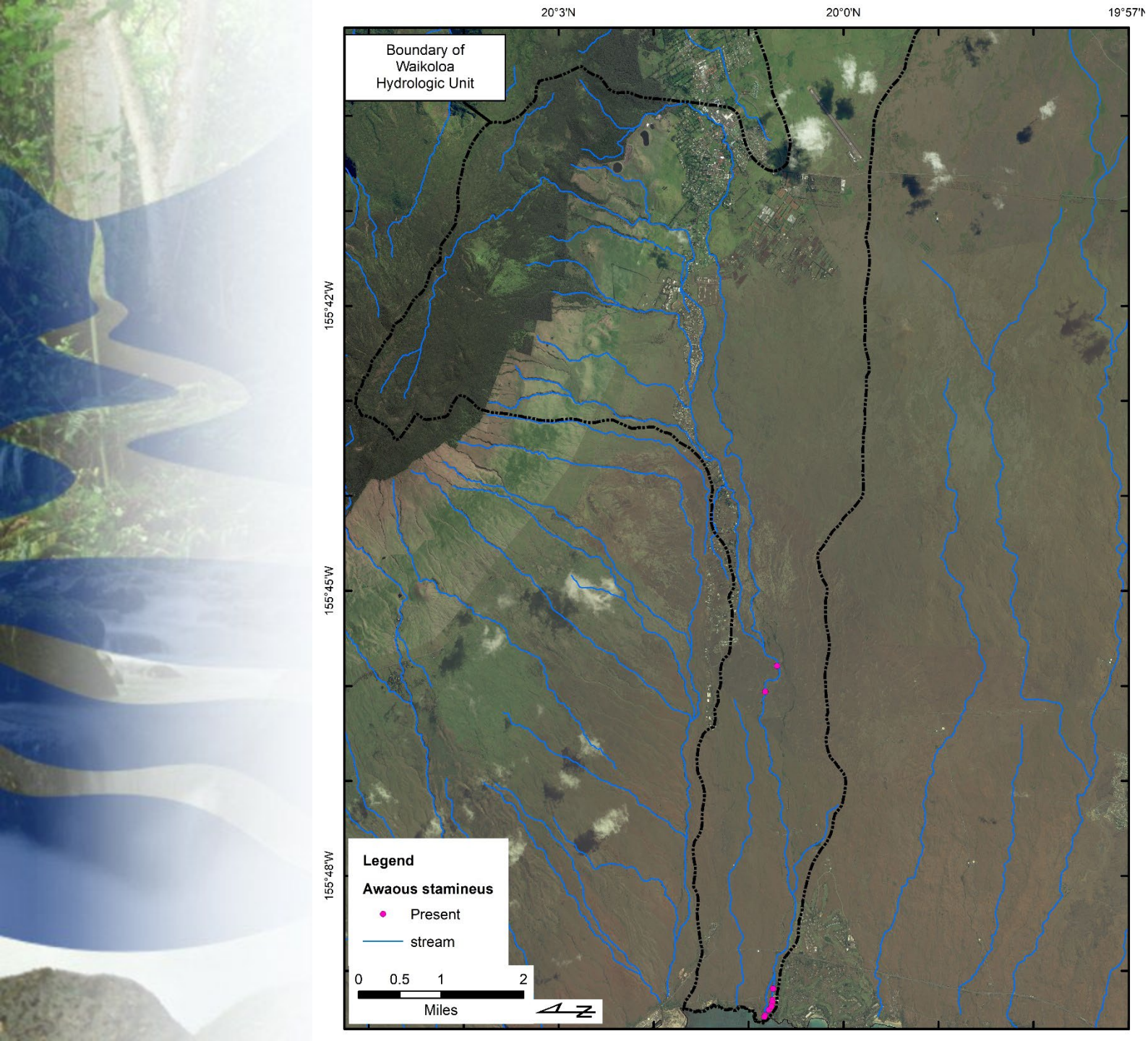
-Waiaulaula Watershed Management Plan

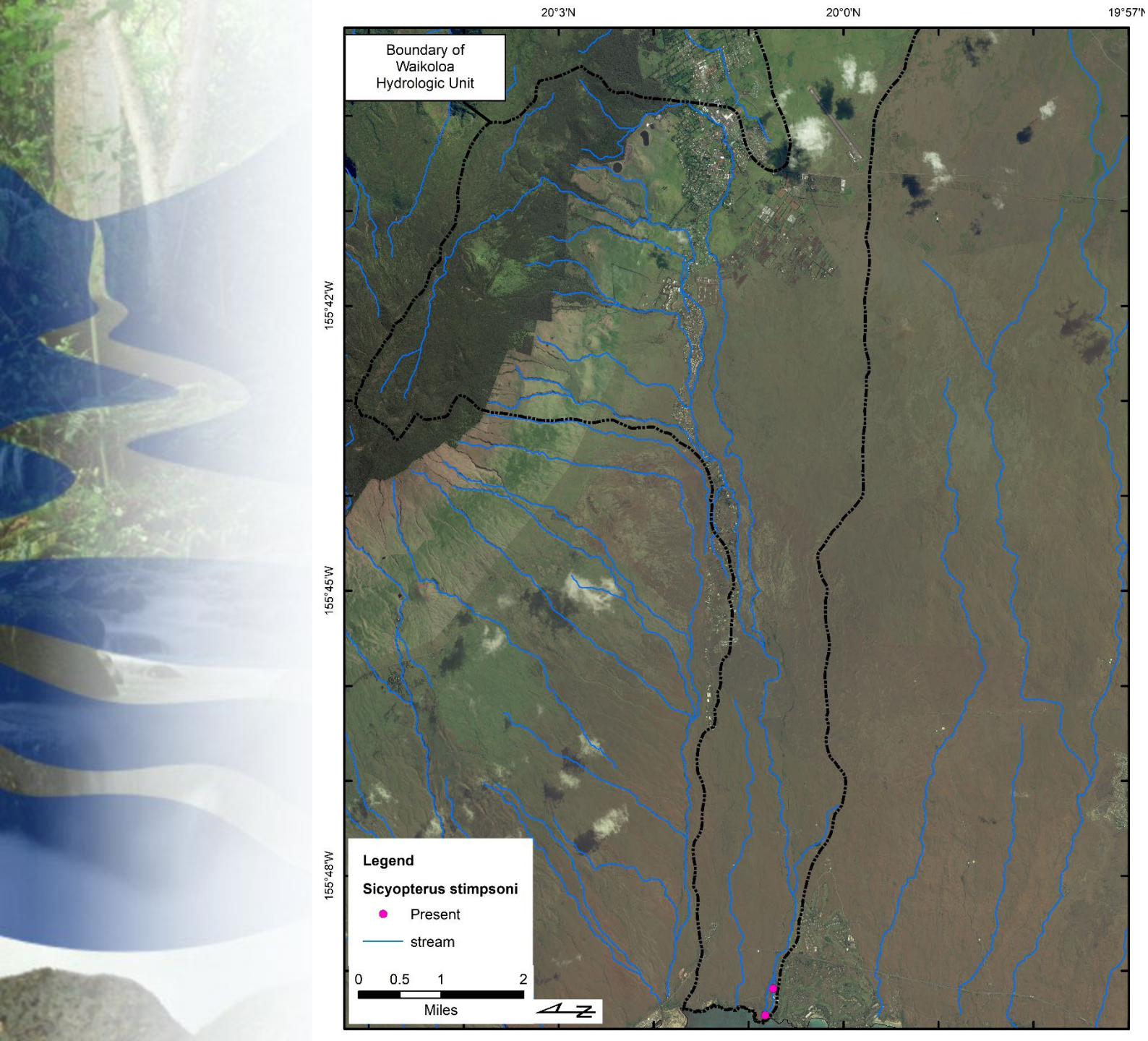
Mauna Kea Soil and Water Conservation District

"Permanent groundwater-fed pools are important stepping stones for native aquatic fish species as they travel upstream to access the upper reaches of the watershed"

Englund (2010)

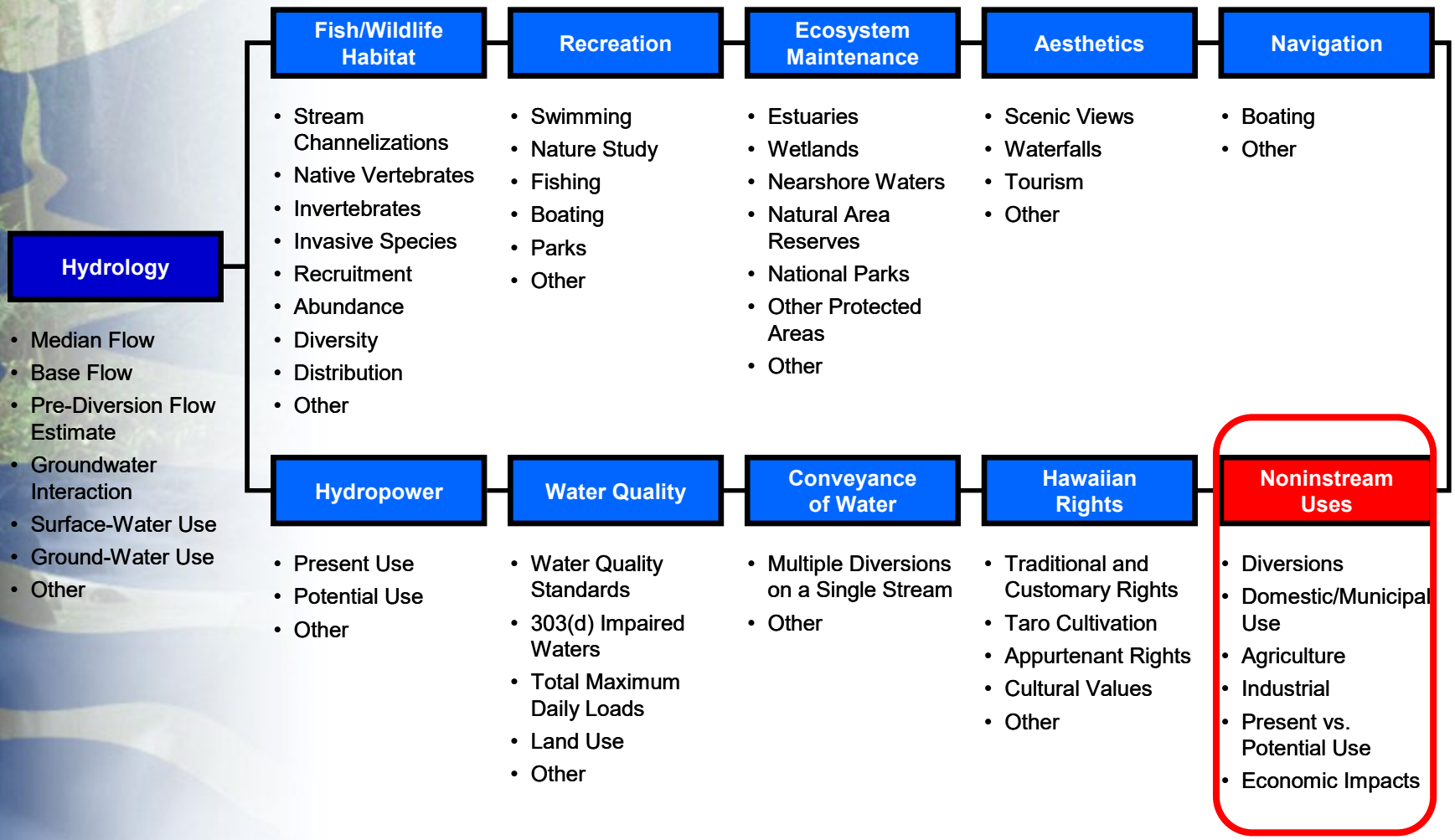

20°3'N
20°0'N
19°57'N
155°42'W
155°45'W
155°48'W
Boundary of
Waikoloa
Hydrologic Unit
Legend
Lentipes concolor
Present
stream
0 0.5 1 2
Miles


20°3'N
20°0'N
19°57'N
155°42'W
155°45'W
155°48'W
Boundary of
Waikoloa
Hydrologic Unit
Legend
Awaous stamineus
Present
stream
0 0.5 1 2
Miles

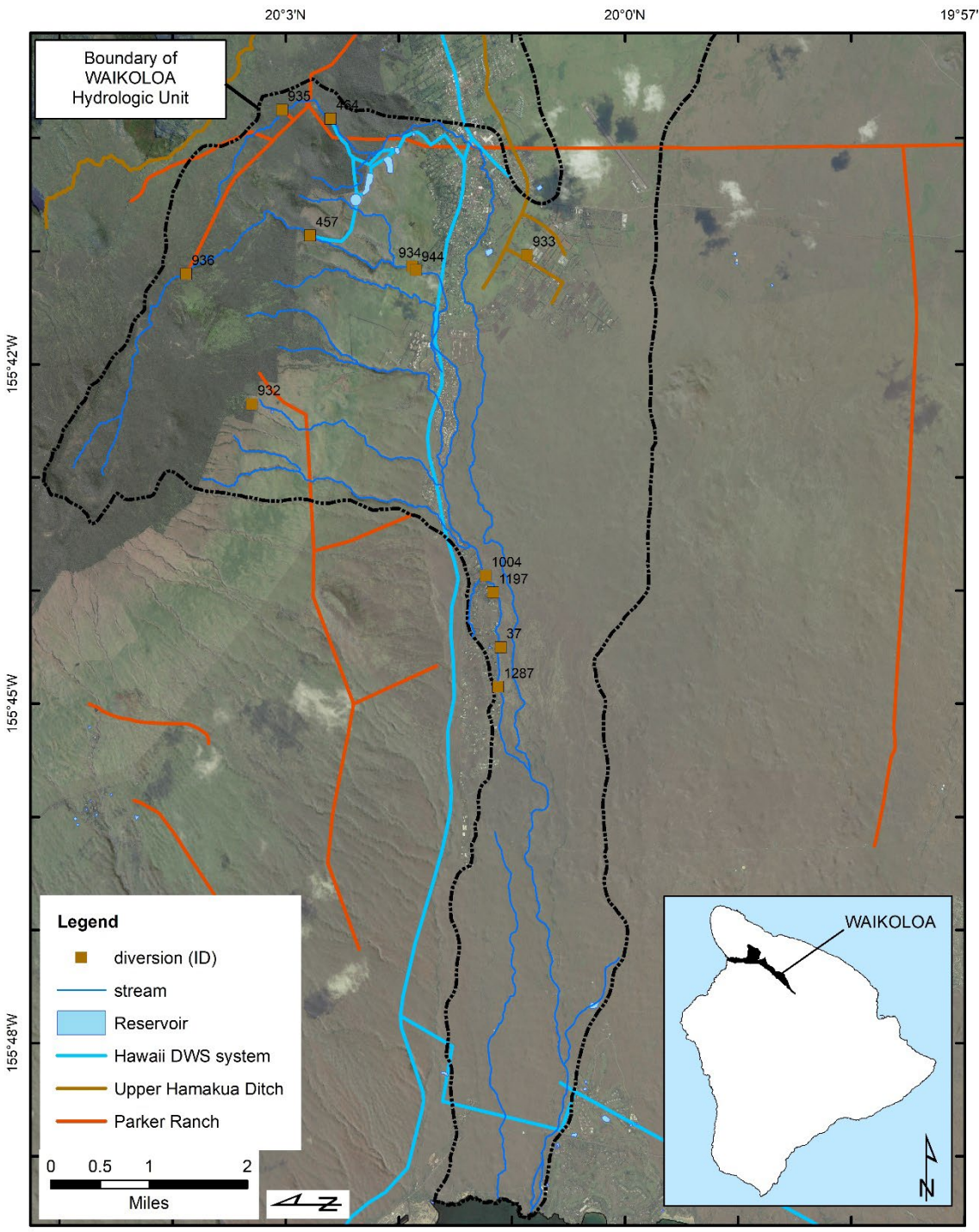

20°3'N
20°0'N
19°57'N
155°42'W
155°45'W
155°48'W
Boundary of
Waikoloa
Hydrologic Unit
Legend
Sicyopterus stimpsoni
Present
stream
0 0.5 1 2
Miles

Waiʻulaʻula Stream near Queen Kaʻahumanu Hwy

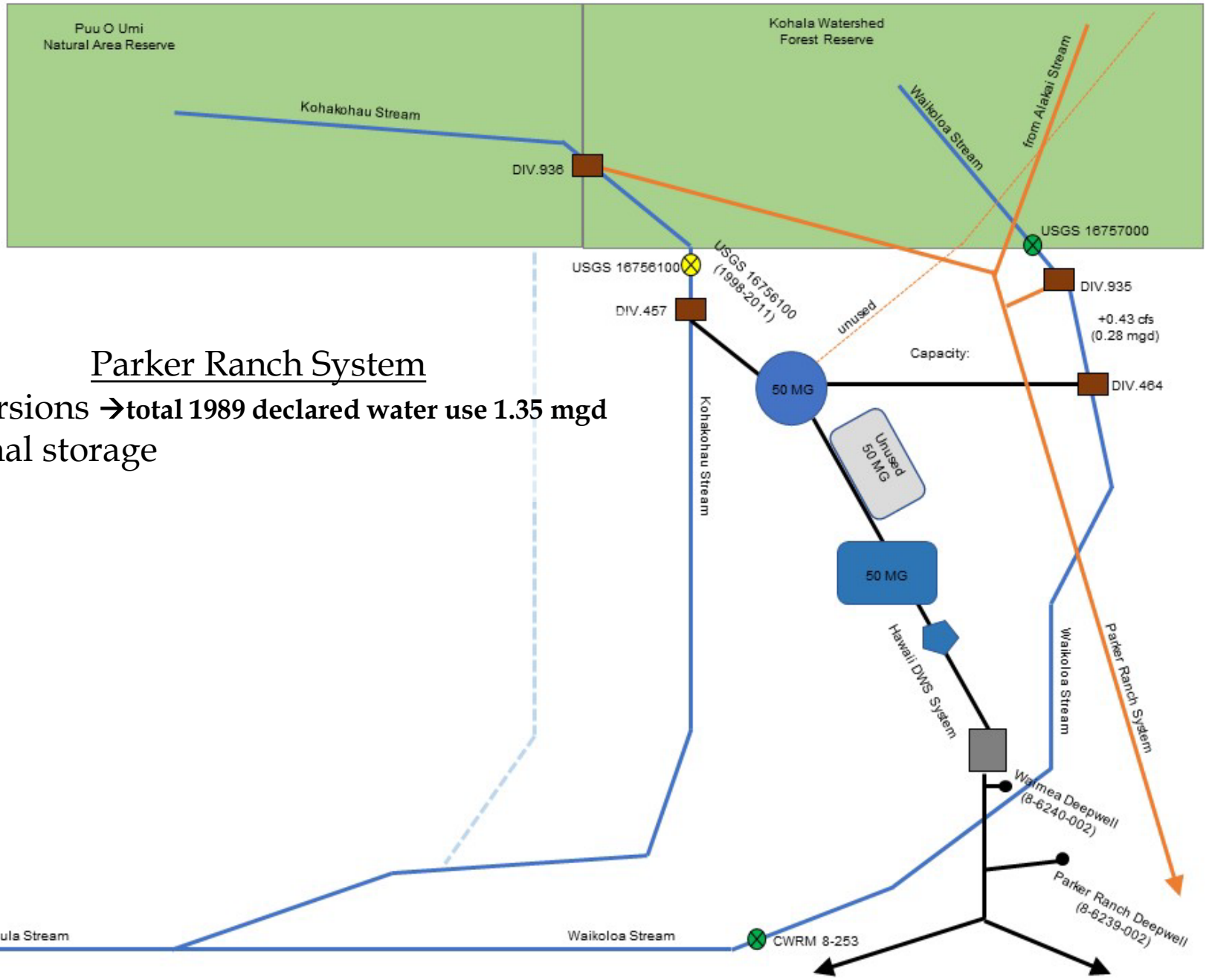
Instream and Non-instream Uses of Surface Water



Non-Instream Uses



Non-Instream Uses



Parker Ranch System

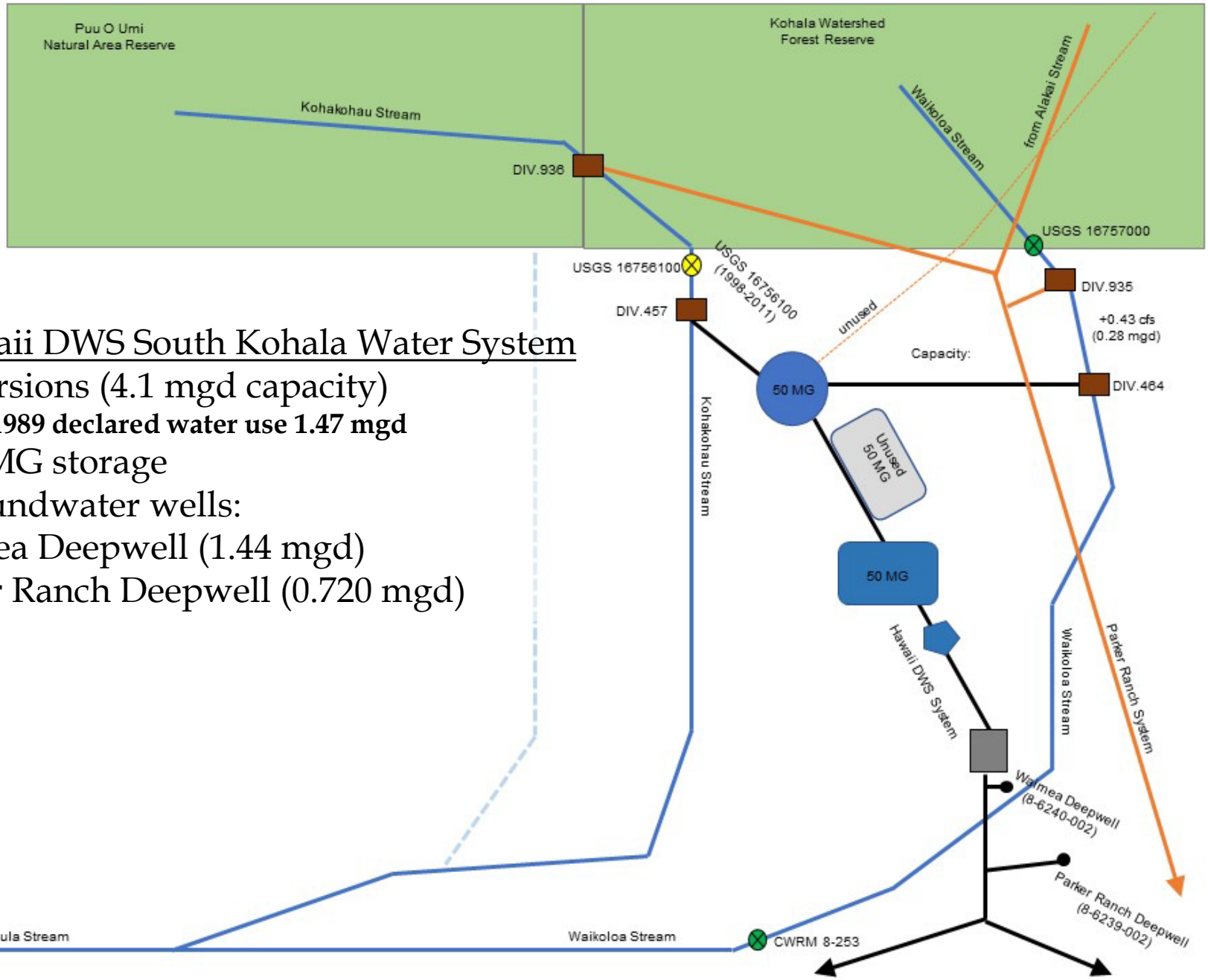
3 diversions →**total 1989 declared water use 1.35 mgd**

Minimal storage

Parker Ranch Intake on Waikoloa Stream

Parker Ranch Intake on Kohākōhau Stream

Non-Instream Uses



Hawaii DWS South Kohala Water System

2 diversions (4.1 mgd capacity)

→**total 1989 declared water use 1.47 mgd**

150+ MG storage

2 Groundwater wells:

Waimea Deepwell (1.44 mgd)

Parker Ranch Deepwell (0.720 mgd)

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

(State of Hawai‘i DHHL-owned land)

Hawai‘i DWS Diversion on Kohākōhau Stream
(State of Hawai‘i DHHL-owned)

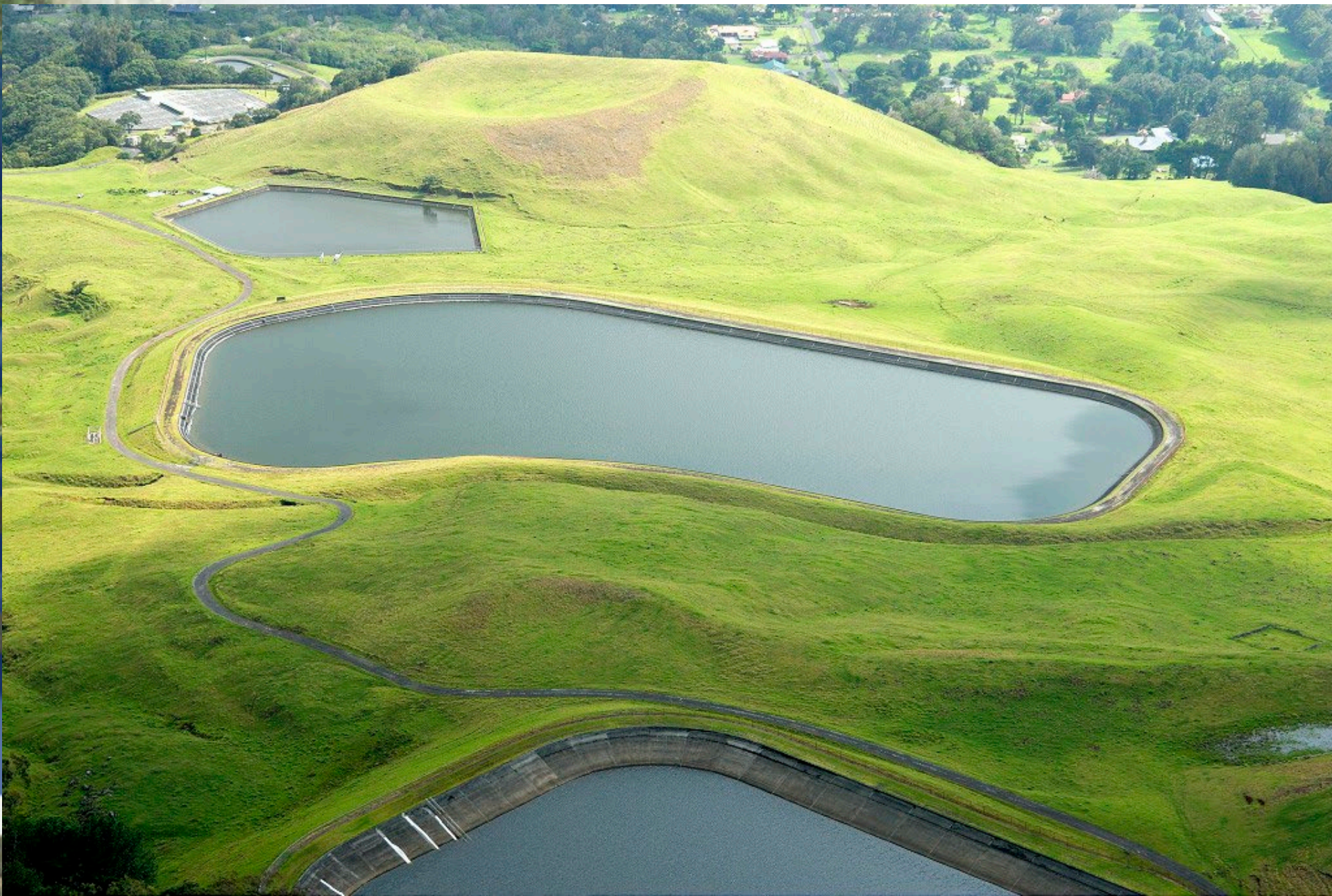
Hawai‘i DWS Diversion on Kohakohau Stream

(State of Hawai‘i DHHL-owned land)

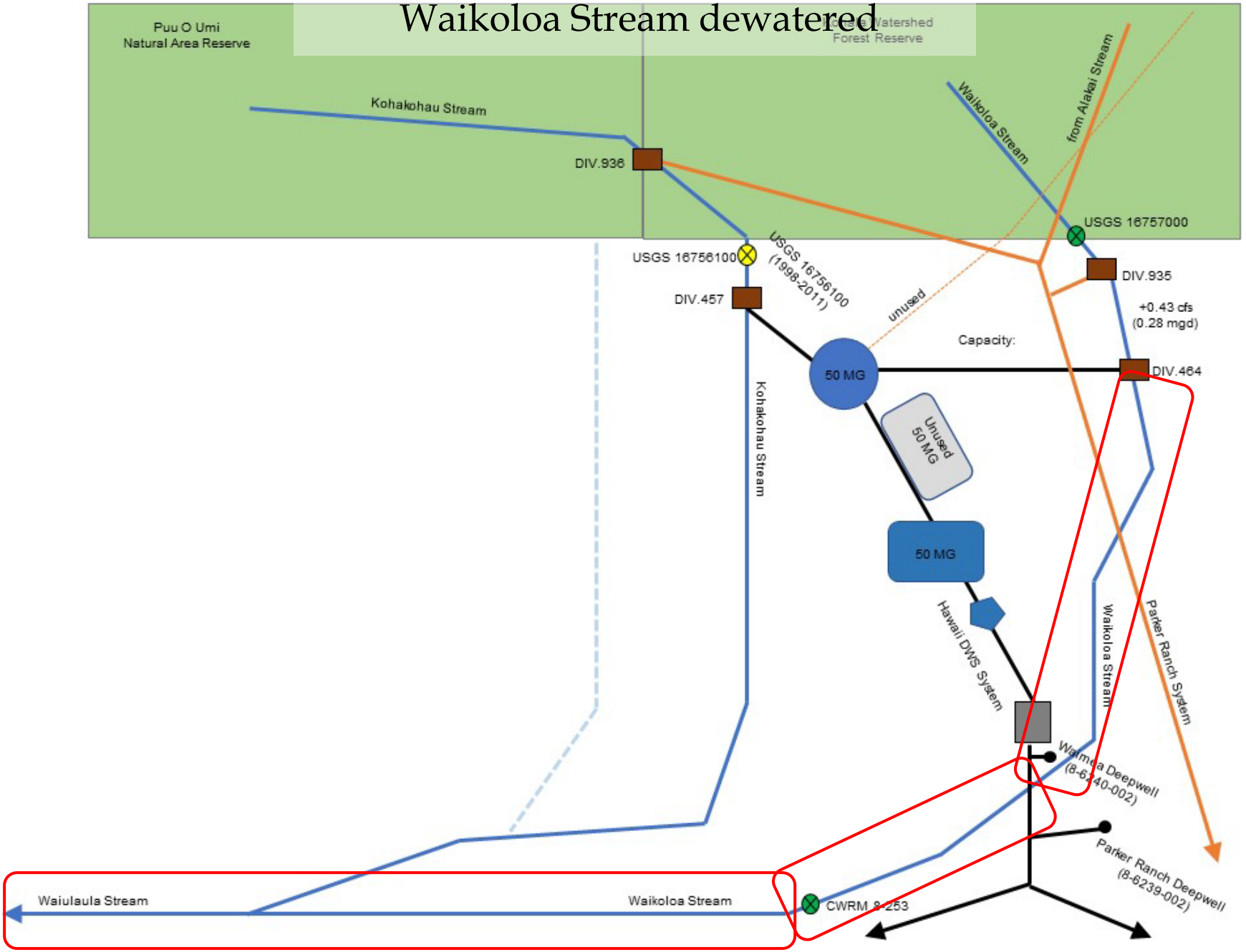
Hawai‘i DWS Waikoloa Reservoir No. 2 (50 MG)

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

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



Consequences of reduced streamflow
Waikoloa Stream dewatered



Consequences of reduced streamflow
Waikoloa Stream dewatered

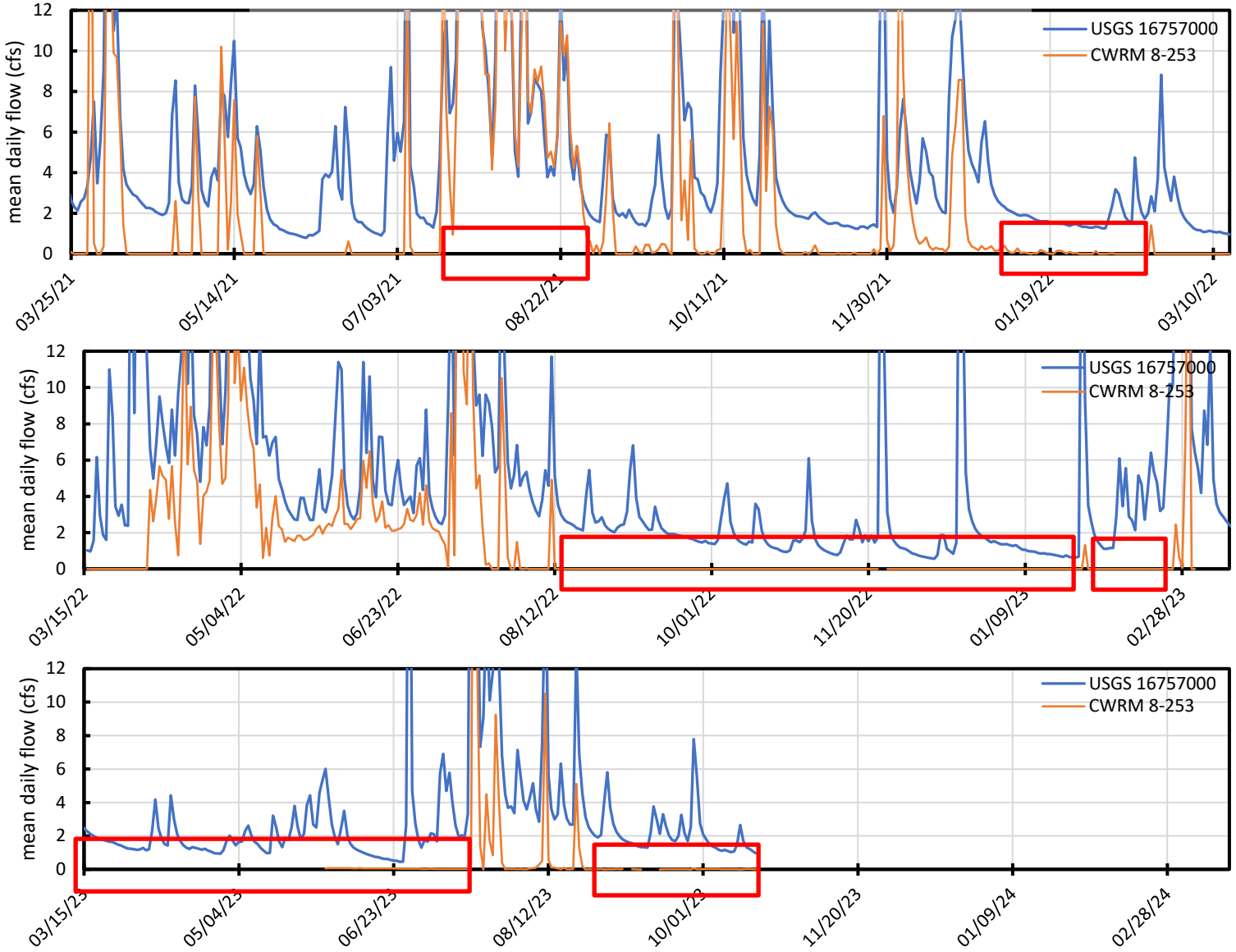
01/25/2023

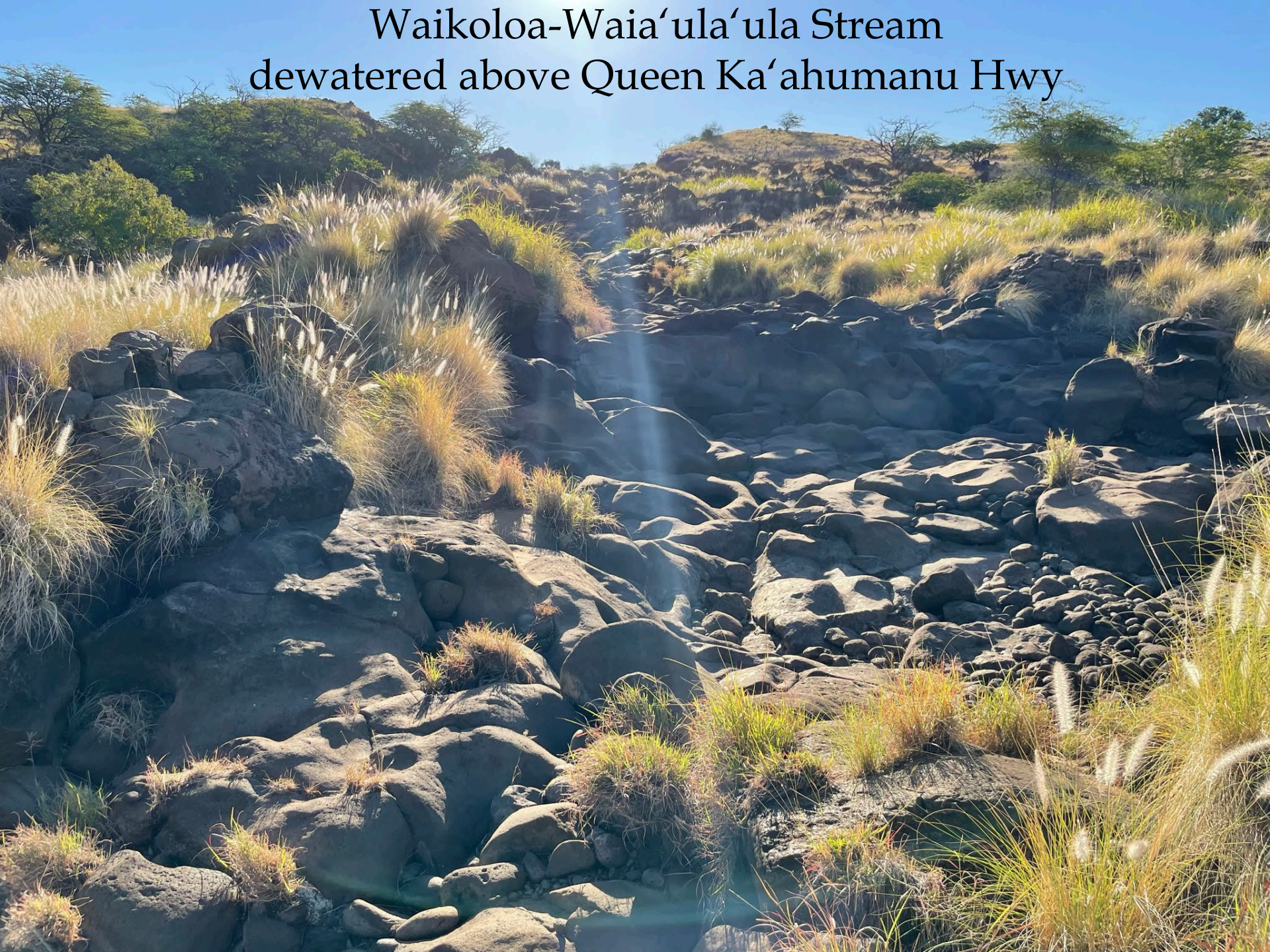
11/16/2022

02/22/2023

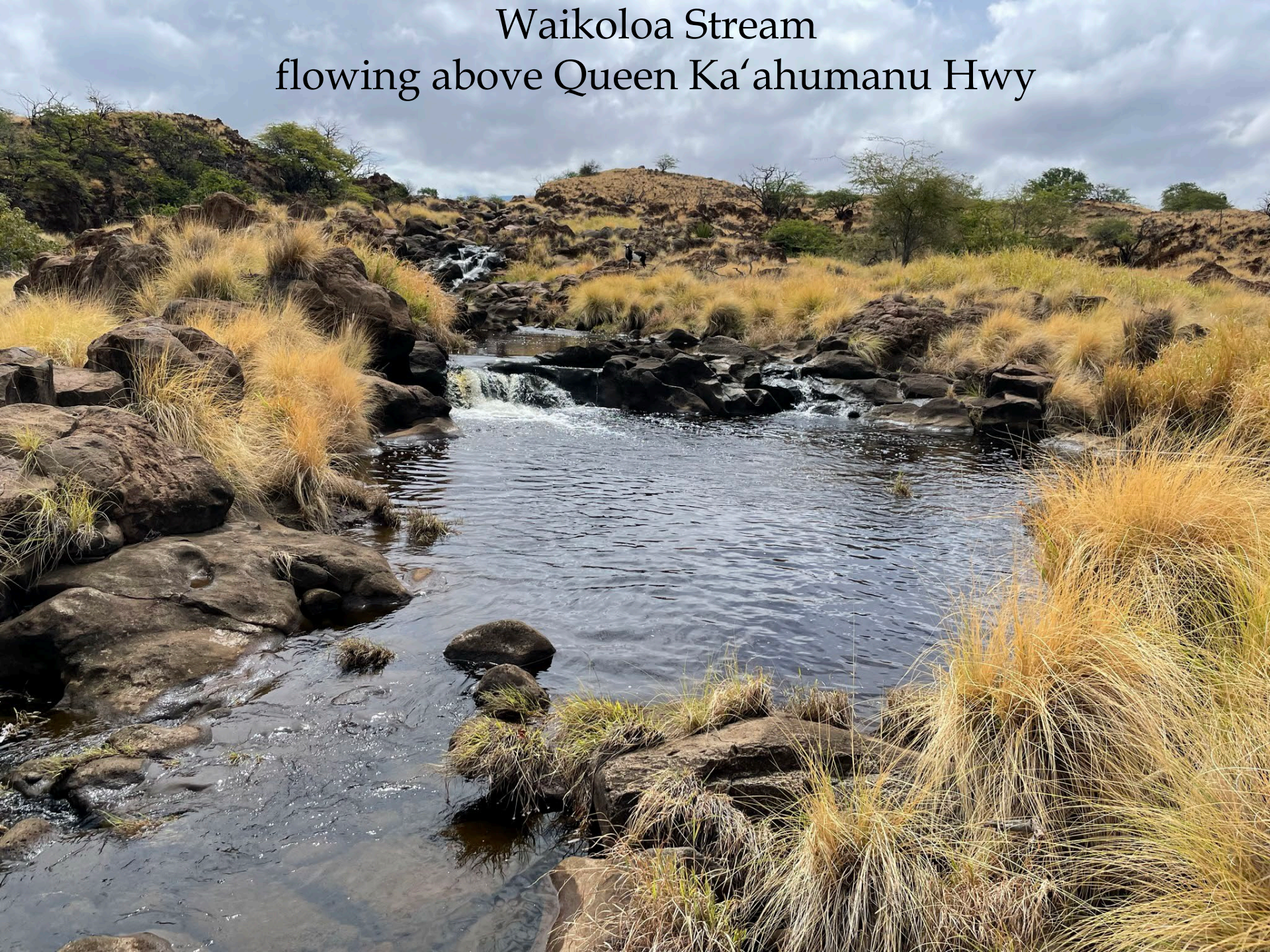
09/19/2022

Consequences of reduced streamflow
Waikoloa Stream dewatered

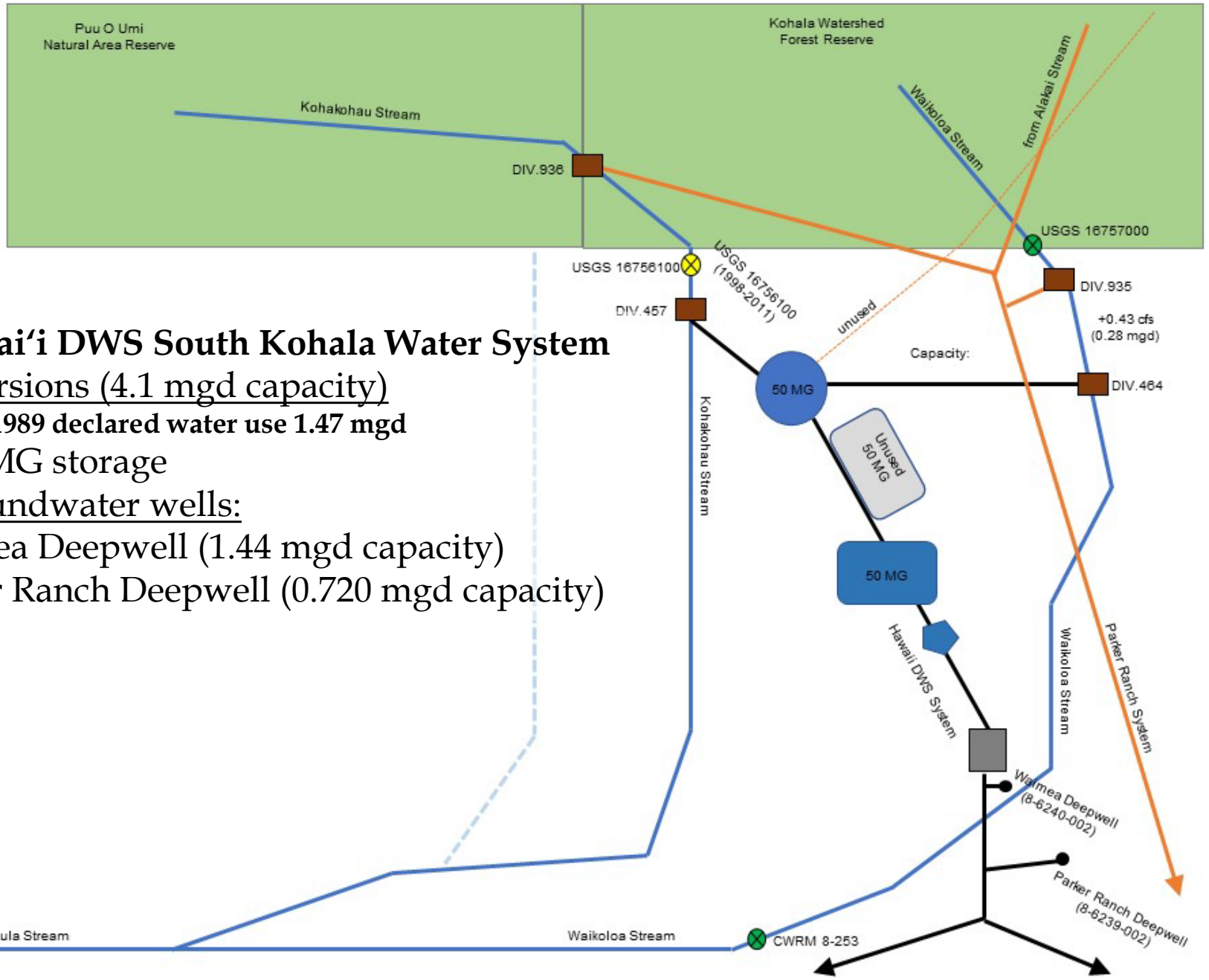



Waikoloa-Waiaʻulaʻula Stream
dewatered above Queen Kaʻahumanu Hwy

Waikoloa Stream
flowing above Queen Kaʻahumanu Hwy



Non-Instream Use Alternatives



Hawai'i DWS South Kohala Water System

2 diversions (4.1 mgd capacity)

→**total 1989 declared water use 1.47 mgd**

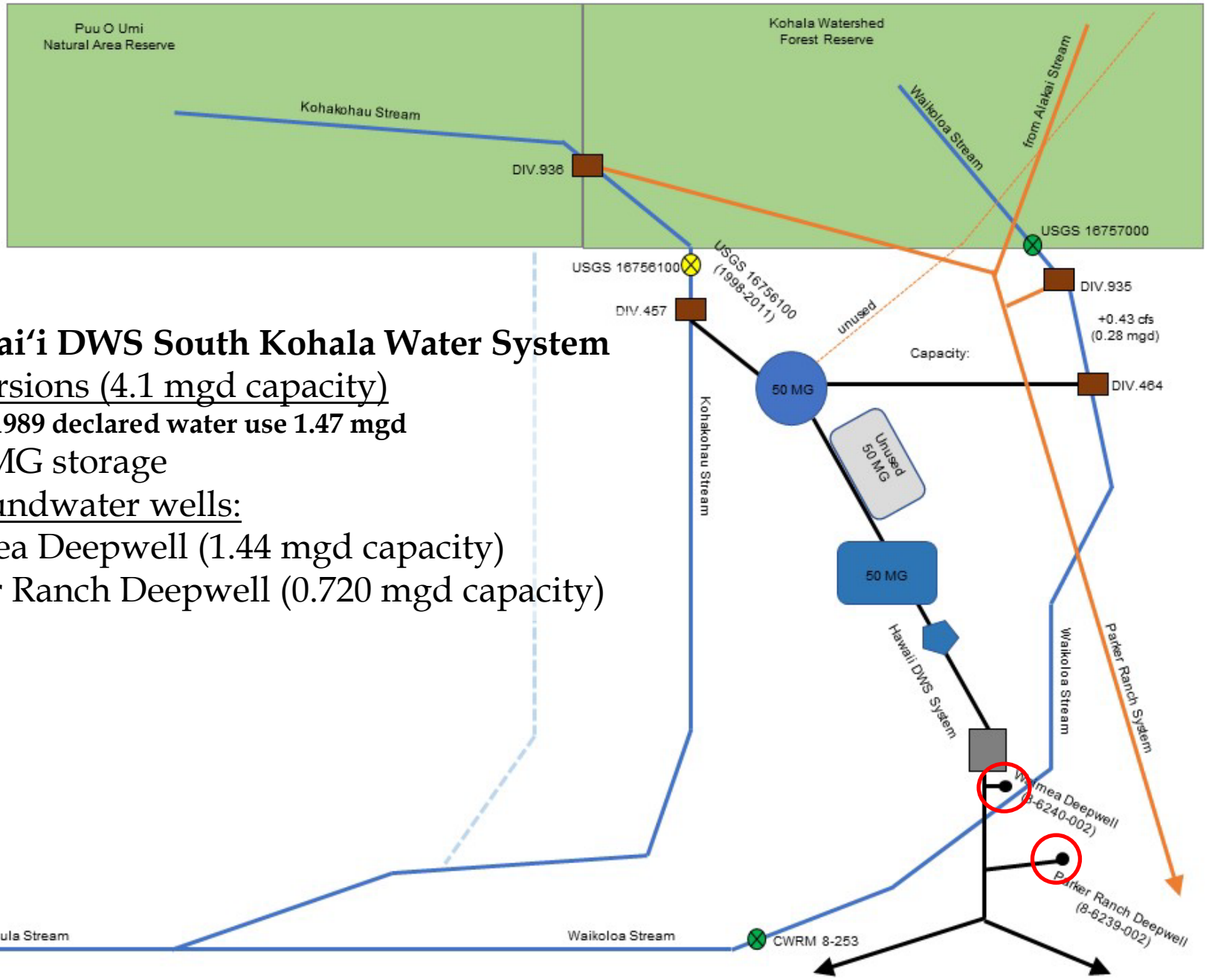
150+ MG storage

2 Groundwater wells:

Waimea Deepwell (1.44 mgd capacity)

Parker Ranch Deepwell (0.720 mgd capacity)

Non-Instream Use Alternatives



Hawai'i DWS South Kohala Water System

2 diversions (4.1 mgd capacity)

→**total 1989 declared water use 1.47 mgd**

150+ MG storage

2 Groundwater wells:

Waimea Deepwell (1.44 mgd capacity)

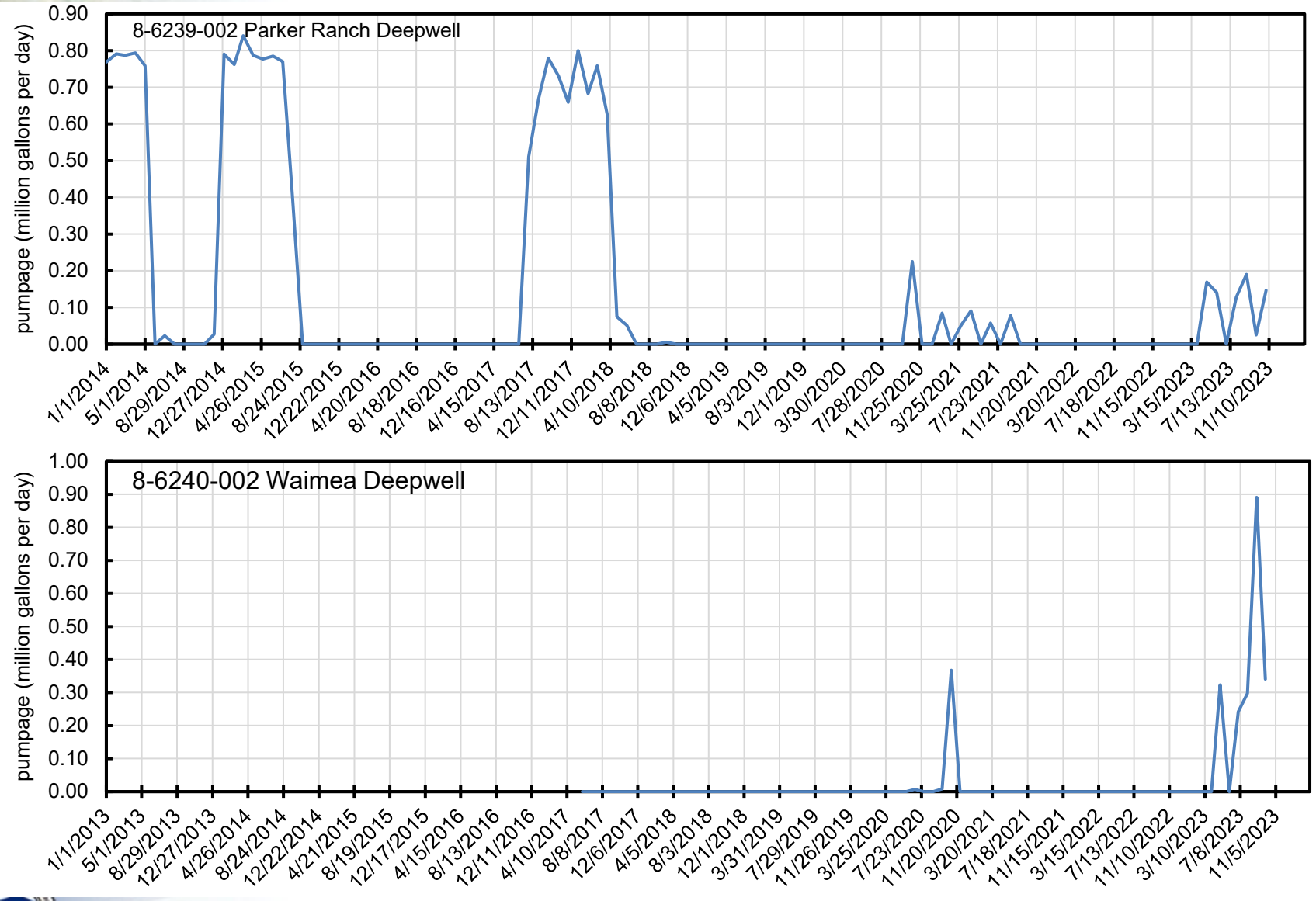
Parker Ranch Deepwell (0.720 mgd capacity)

Non-Instream Use Alternatives

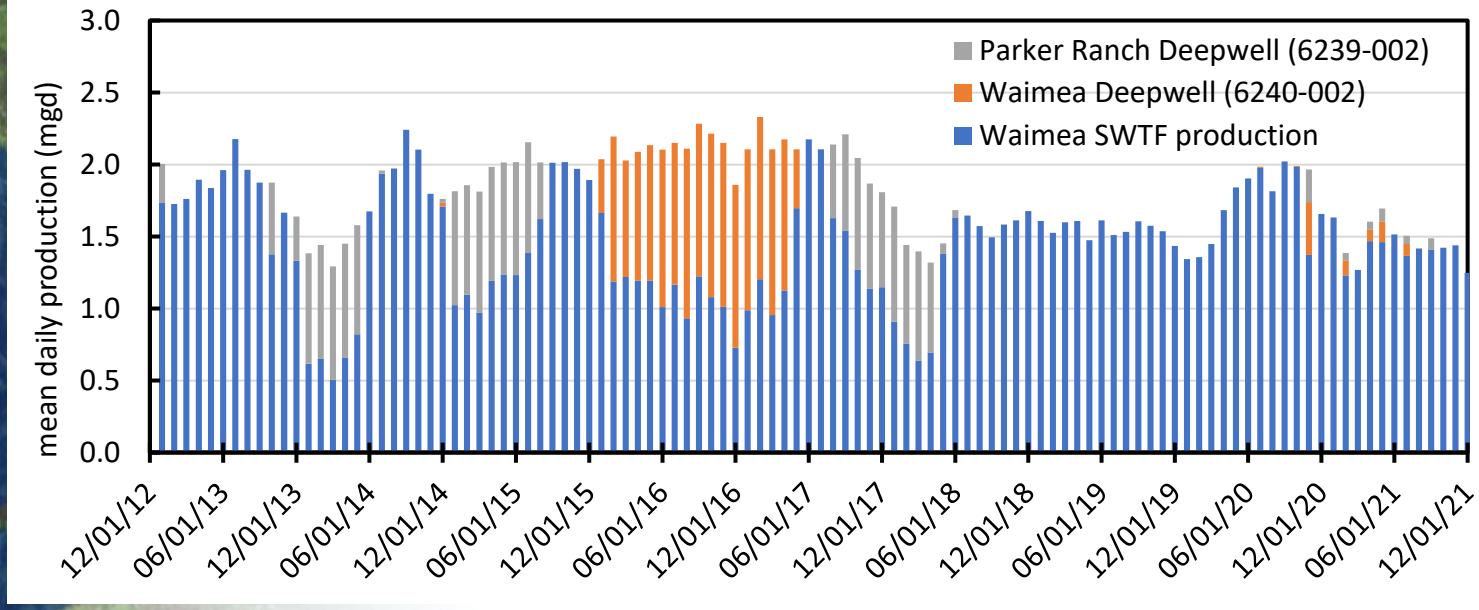
Hawai‘i DWS Parker Ranch Deepwell

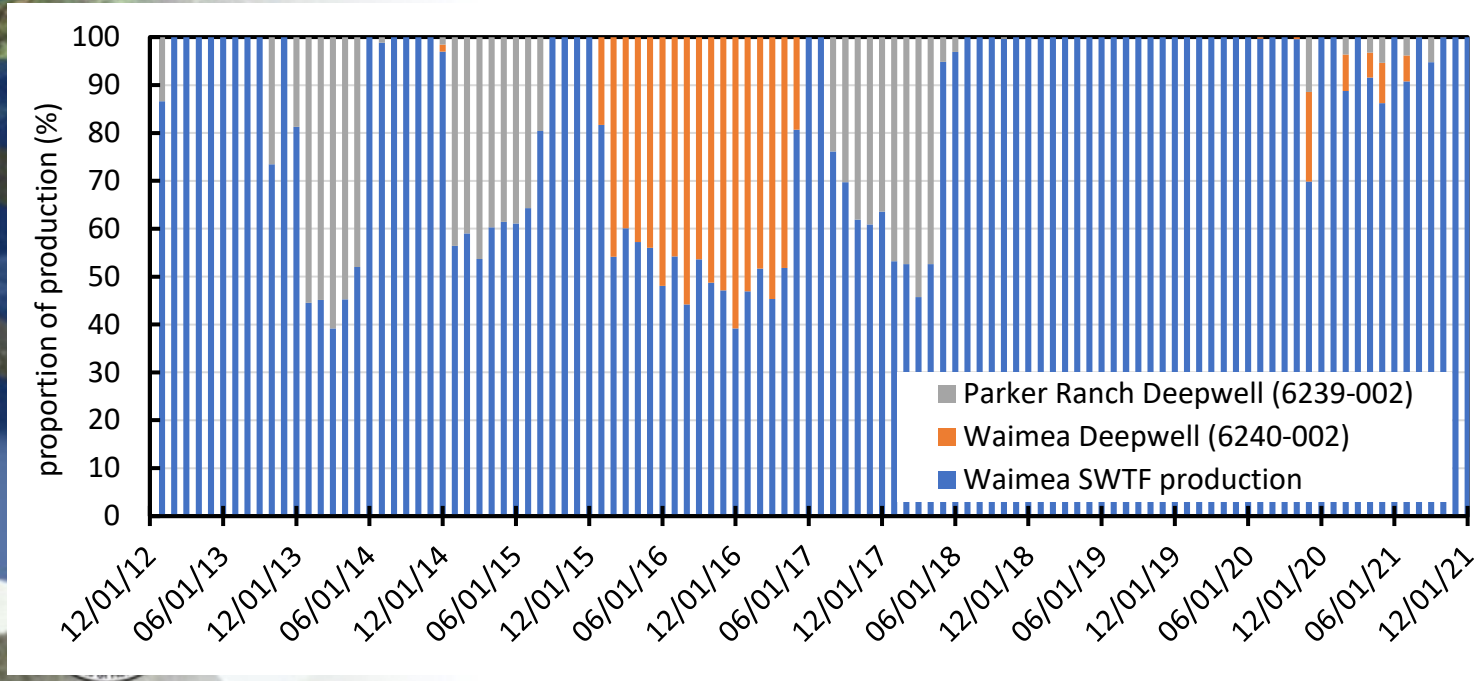
Hawai‘i DWS Waimea Deepwell

Hawai‘i DWS Alternative Groundwater Supplies



Hawai‘i DWS South Kohala System Sources





2013-2021 Statistics

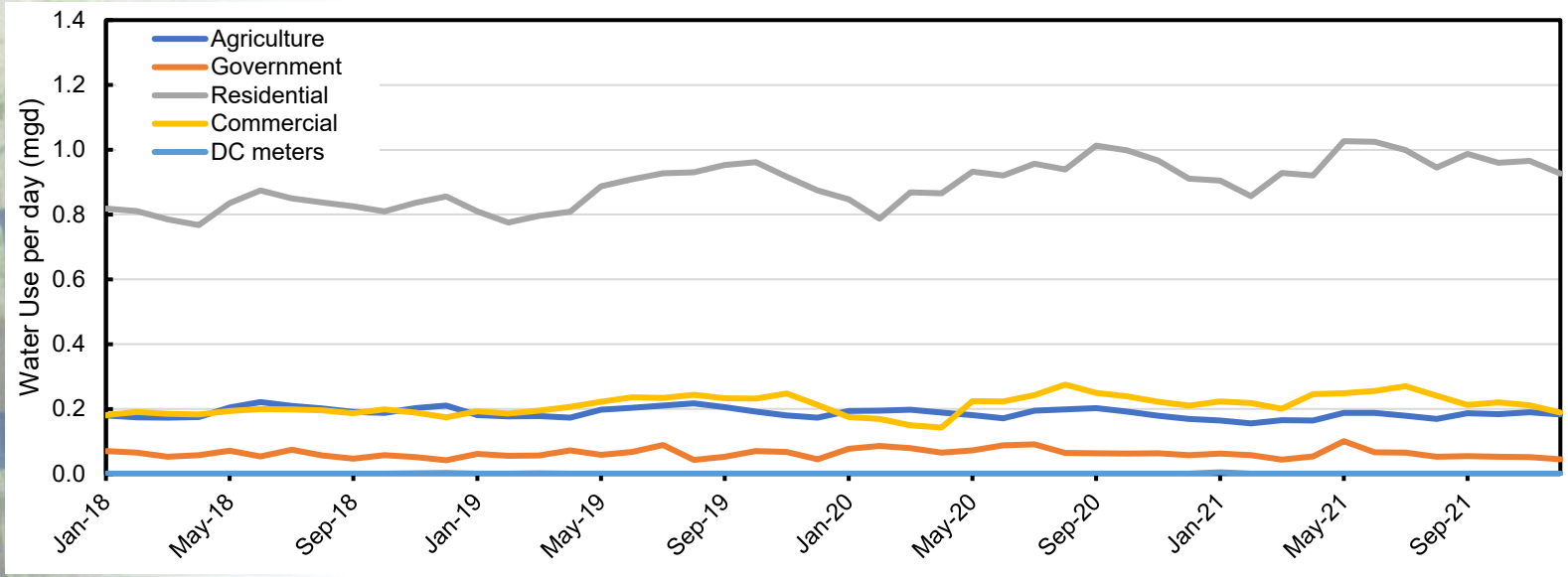
Waimea SWTF
Mean = 1.46 mgd
Median = 1.50 mgd
Min = 0.51 mgd
Max = 2.24 mgd

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

To Summarize

Waikoloa Stream above Parker Ranch Intake
Natural flow: MDF = 3.17 Q_{50} = 1.81 mgd Q_{80} = 1.01 mgd Q_{95} = 0.86 mgd

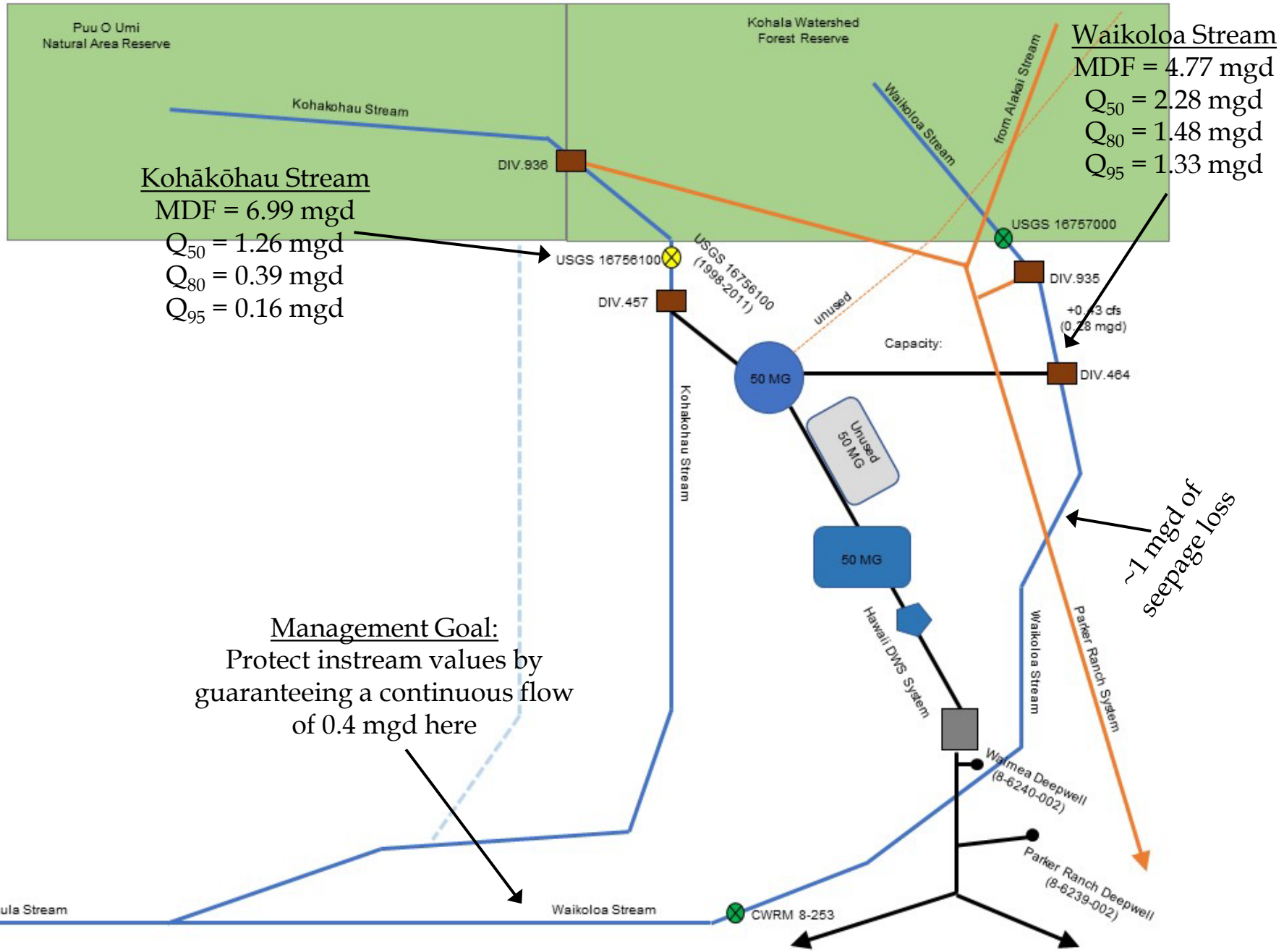
Waikoloa Stream above Hawai'i DWS Intake
Natural flow: MDF = 5.32 mgd Q_{50} = 2.73 mgd Q_{80} = 1.93 mgd Q_{95} = 1.78 mgd
Regulated flow: MDF = 4.77 mgd Q_{50} = 2.28 mgd Q_{80} = 1.48 mgd Q_{95} = 1.33 mgd

Kohākōhau Stream above Hawai'i DWS Intake
Regulated flow: MDF = 6.99 mgd Q_{50} = 1.26 mgd Q_{80} = 0.39 mgd Q_{95} = 0.16 mgd

Parker Ranch
2 diversions (up to 0.90 mgd capacity in total) in Waikoloa + Alakahi stream intake
Waikoloa Intake ~ 0.45 mgd
Kohākōhau Intake ~ 0.15 mgd

Hawai'i DWS South Kohala Water System demand = 1.8 mgd
2 diversions (combined registered use of 1.47 mgd)
150+ million gallons of storage (need to rehab one 50 MG reservoir)
Waikoloa Intake: Jul 23-Feb 24 diverted flow ~1.70 mgd
Kohākōhau Intake: Jul 23 – Feb 24 diverted flow ~ 0.70 mgd
2 Groundwater wells: up to 2.16 mgd available pumpage: Jul 23 – Feb 24 = 0.178 mgd

To Summarize




→ Need to restore a continuous flow to Waikoloa Stream
Recommendation: 1.4 mgd below Hawai‘i DWS intake

→ Need to restore a continuous flow to Waikoloa Stream
Recommendation: 1.4 mgd below Hawai‘i DWS intake

Consequences of Interim IFS

Waikoloa Stream above Hawai'i DWS Intake

Natural flow:	MDF = 5.32 mgd Q_{50} = 2.73 mgd Q_{80} = 1.93 mgd Q_{95} = 1.78 mgd
Regulated flow:	MDF = 4.77 mgd Q_{50} = 2.28 mgd Q_{80} = 1.48 mgd Q_{95} = 1.33 mgd
Interim IFS flow:	MDF = 1.40 mgd Q_{50} = 1.40 mgd Q_{80} = 1.40 mgd Q_{95} = 1.40 mgd
Divertible flow:	MDF = 3.37 mgd Q_{50} = 0.88 mgd Q_{80} = 0.08 mgd Q_{95} = 0.00 mgd

Kohākōhau Stream above Hawai'i DWS Intake

Regulated flow:	MDF = 3.17 mgd Q_{50} = 1.26 mgd Q_{80} = 0.39 mgd Q_{95} = 0.16 mgd
HDWS available:	MDF = 6.54 mgd Q_{50} = 2.14 mgd Q_{80} = 0.47 mgd Q_{95} = 0.16 mgd

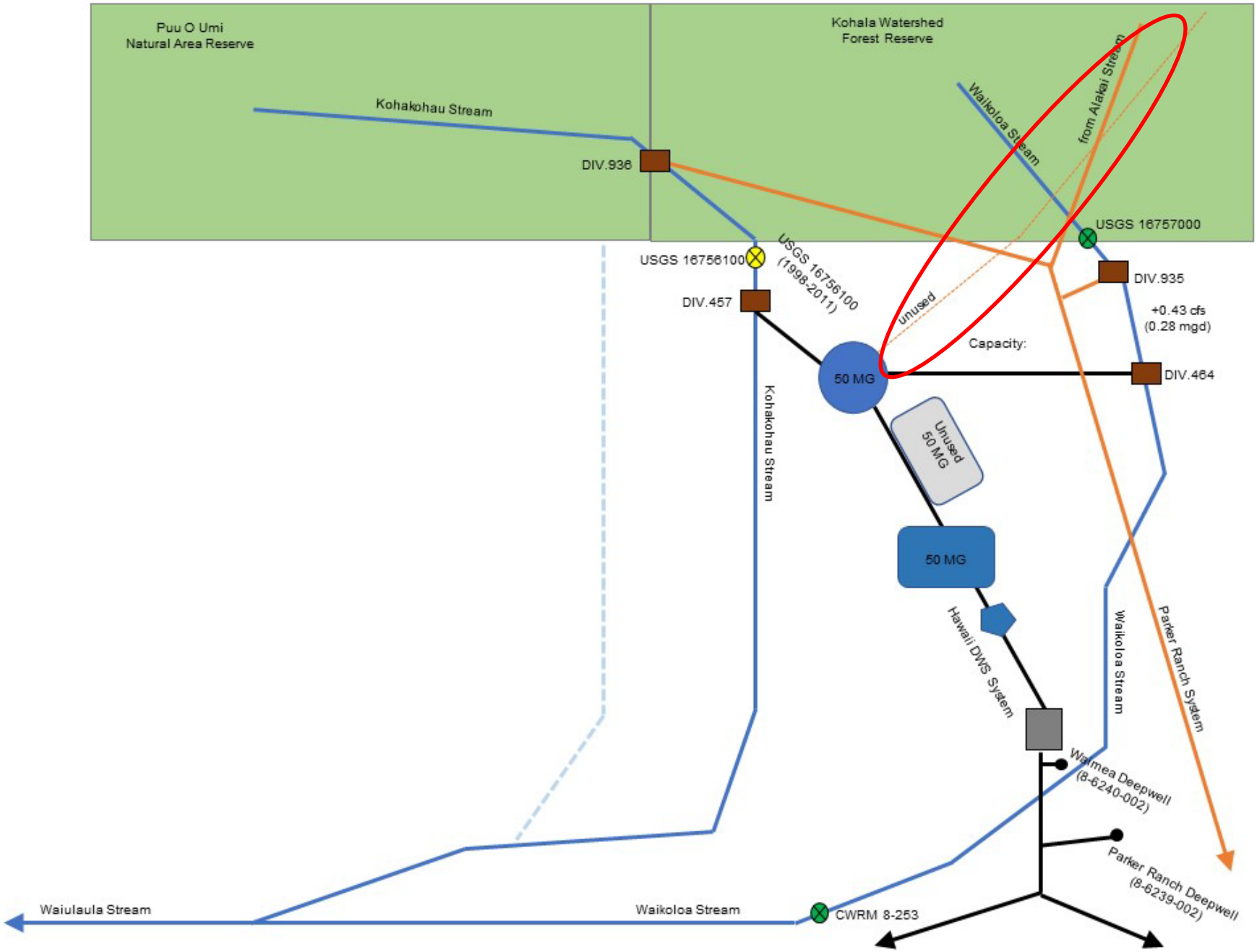
Hawai'i DWS South Kohala Water System demand = 1.8 mgd

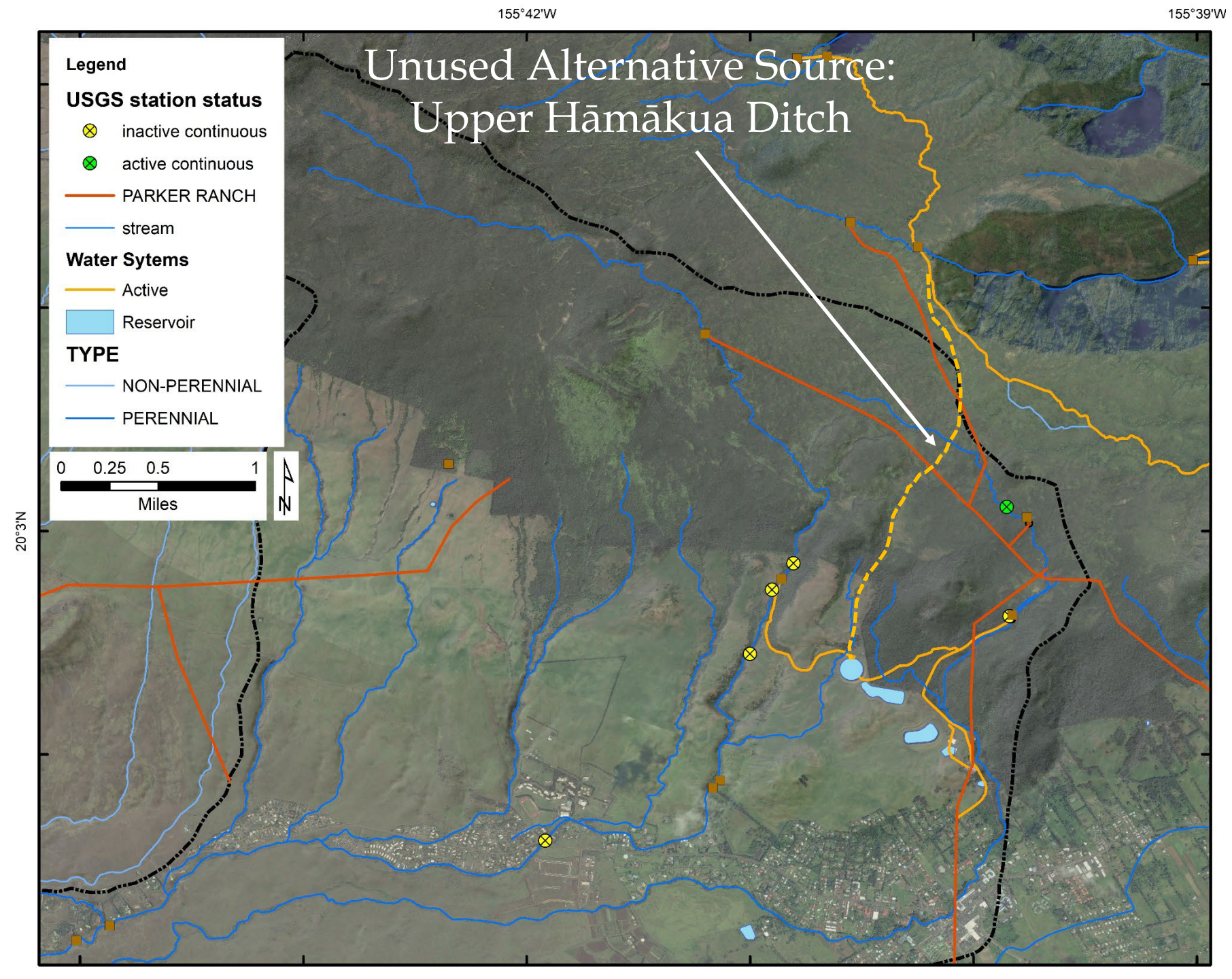
→ Under Q_{50} conditions, 100% of water demand can still be sourced from surface water

→ 50% of the time excess water can be stored for use during low-flow periods (150+ MG)

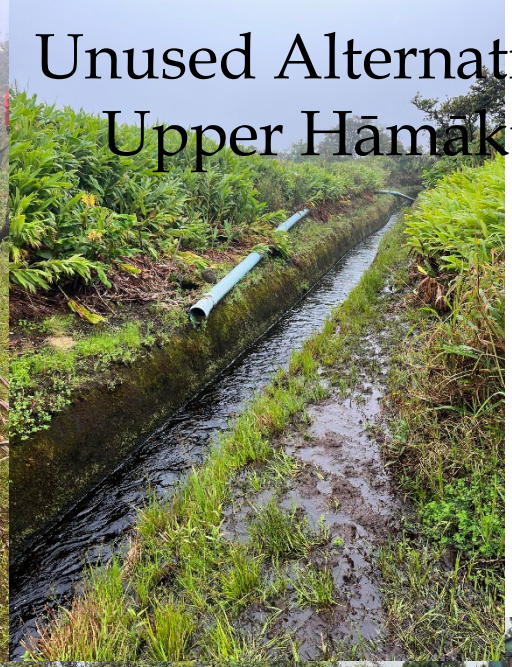
→ 2 Groundwater wells have up to 2.16 mgd available for extreme drought conditions

Unused Alternative Source

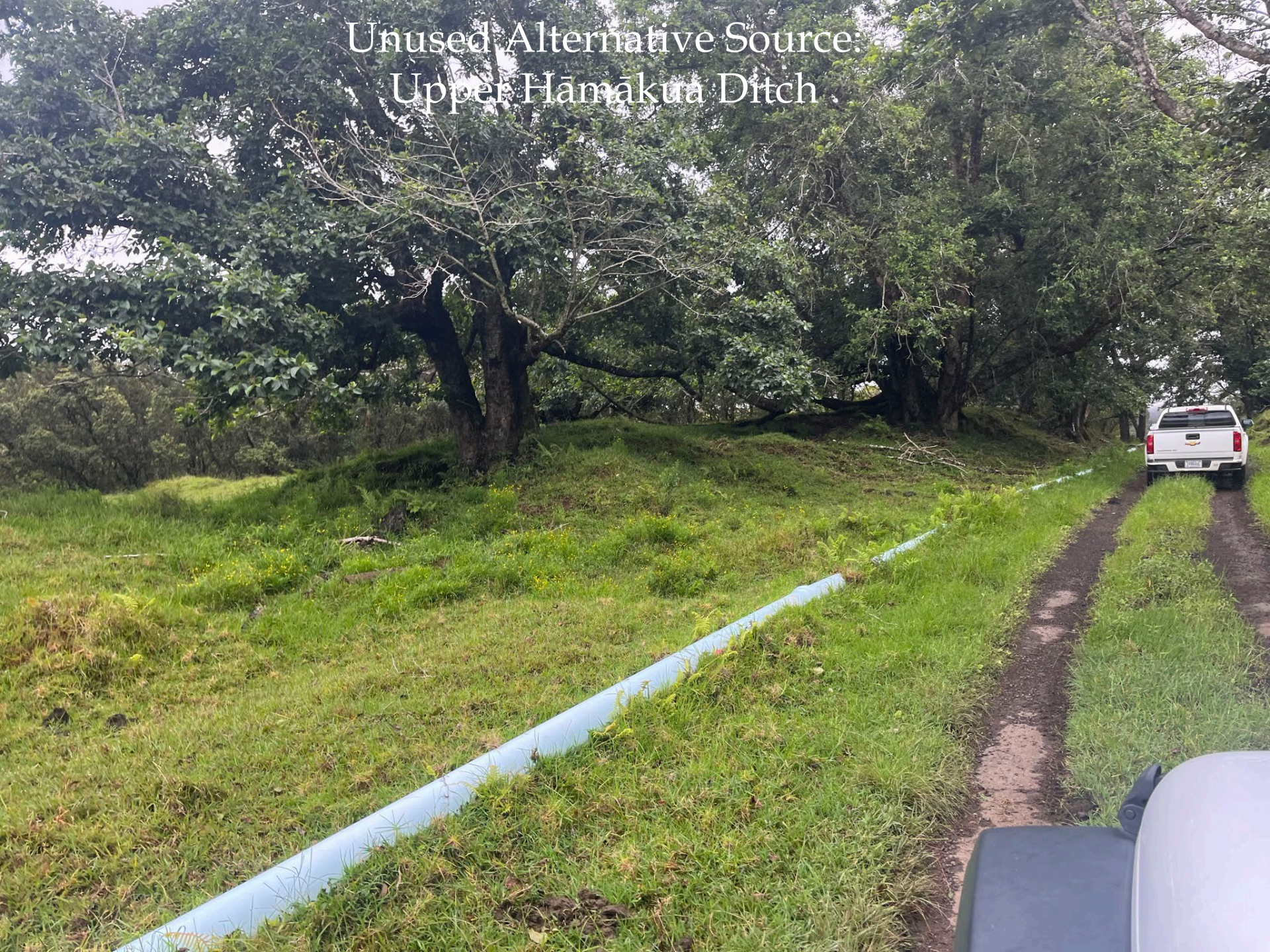



155°42'W
155°39'W
20°3'N
Unused Alternative Source:
Upper Hāmākua Ditch
Legend
USGS station status
inactive continuous
active continuous
PARKER RANCH
stream
Water Sytems
Active
Reservoir
TYPE
NON-PERENNIAL
PERENNIAL
0 0.25 0.5 1
Miles
N

Unused Alternative Source: Upper Hāmākua Ditch

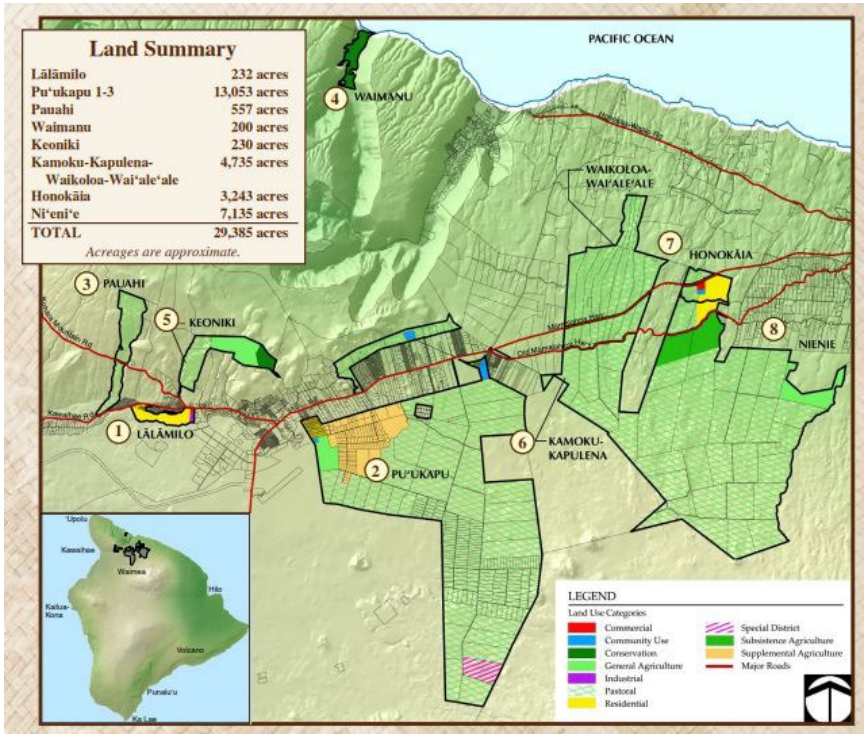


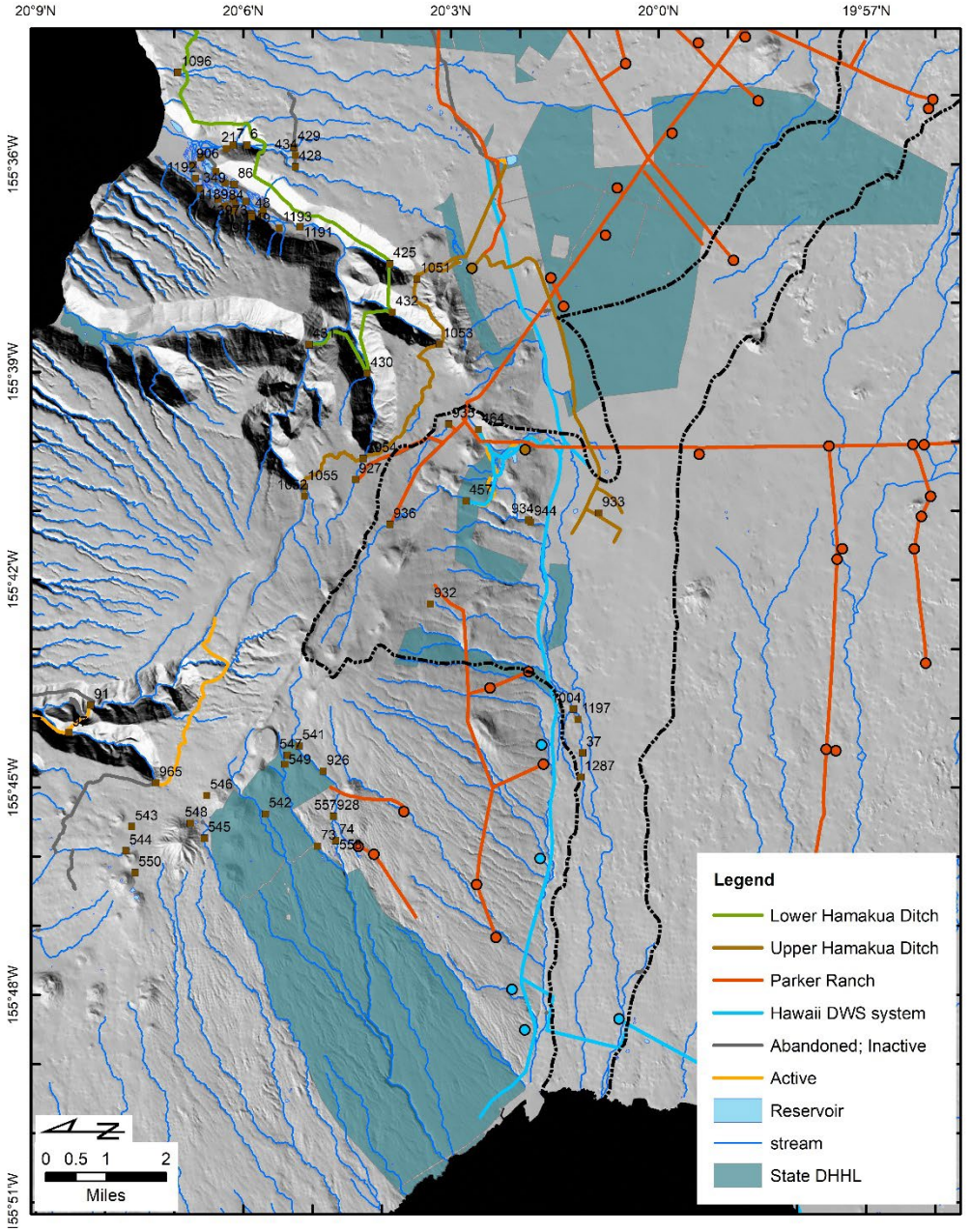
Unused Alternative Source: Upper Hāmākua Ditch



Unused Alternative Source: Upper Hāmākua Ditch

Potential Reservation of water for DHHL





Staff amendments to an instream flow standard…

DRAFT Instream Flow Standard Assessment Report

June 2023

Public Comments and Fact Gathering

April 2024

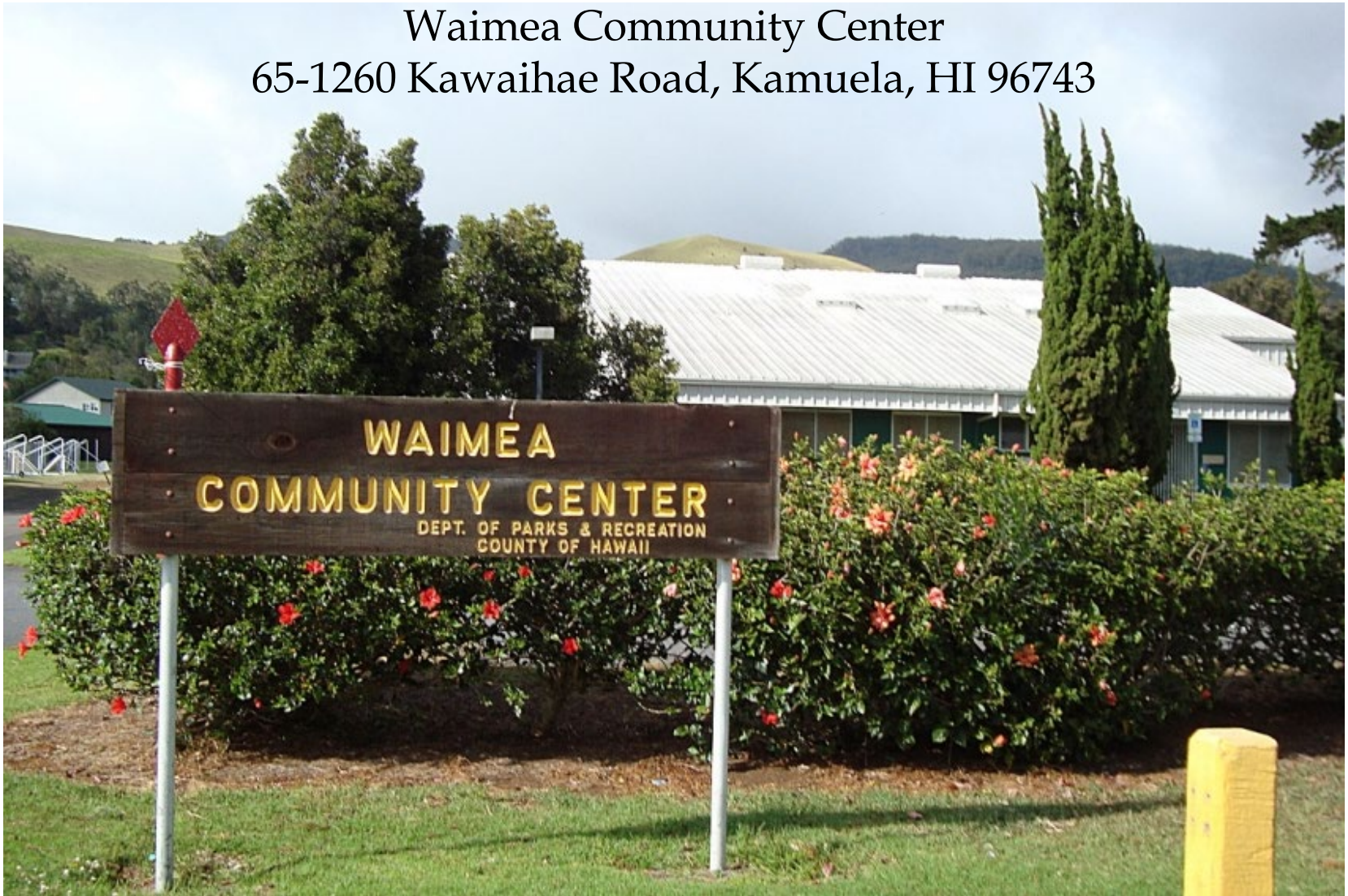
Update IFSAR
Compile public testimony
Submittal to Commission to Amend interim IFS
(additional public testimony accepted at Commission Meeting)

June 2024

Waikoloa IFSAR Public Fact Gathering Meeting

Thursday April 18
5:30pm-7:00pm

Waimea Community Center
65-1260 Kawaihae Road, Kamuela, HI 96743



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IFS: 8161 – WAIKOLOA, HAWAI'I

Instream Flow Standard: Hydrologic Unit of Waikoloa (8161)

The Commission on Water Resource Management is developing a proposal to amend the interim instream flow standard(s) for the surface water hydrologic unit of Waikoloa, Hawai'i. Please review the Draft Instream Flow Standard Assessment Report for Waikoloa (Information Updates Section below) and provide comments to the Commission staff.

Hawai'i Department of Water Supply diversion intake at Kohākōhau Stream.

Hawai'i Department of Water Supply diversion intake (Marine Dam) on Waikoloa Stream.

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