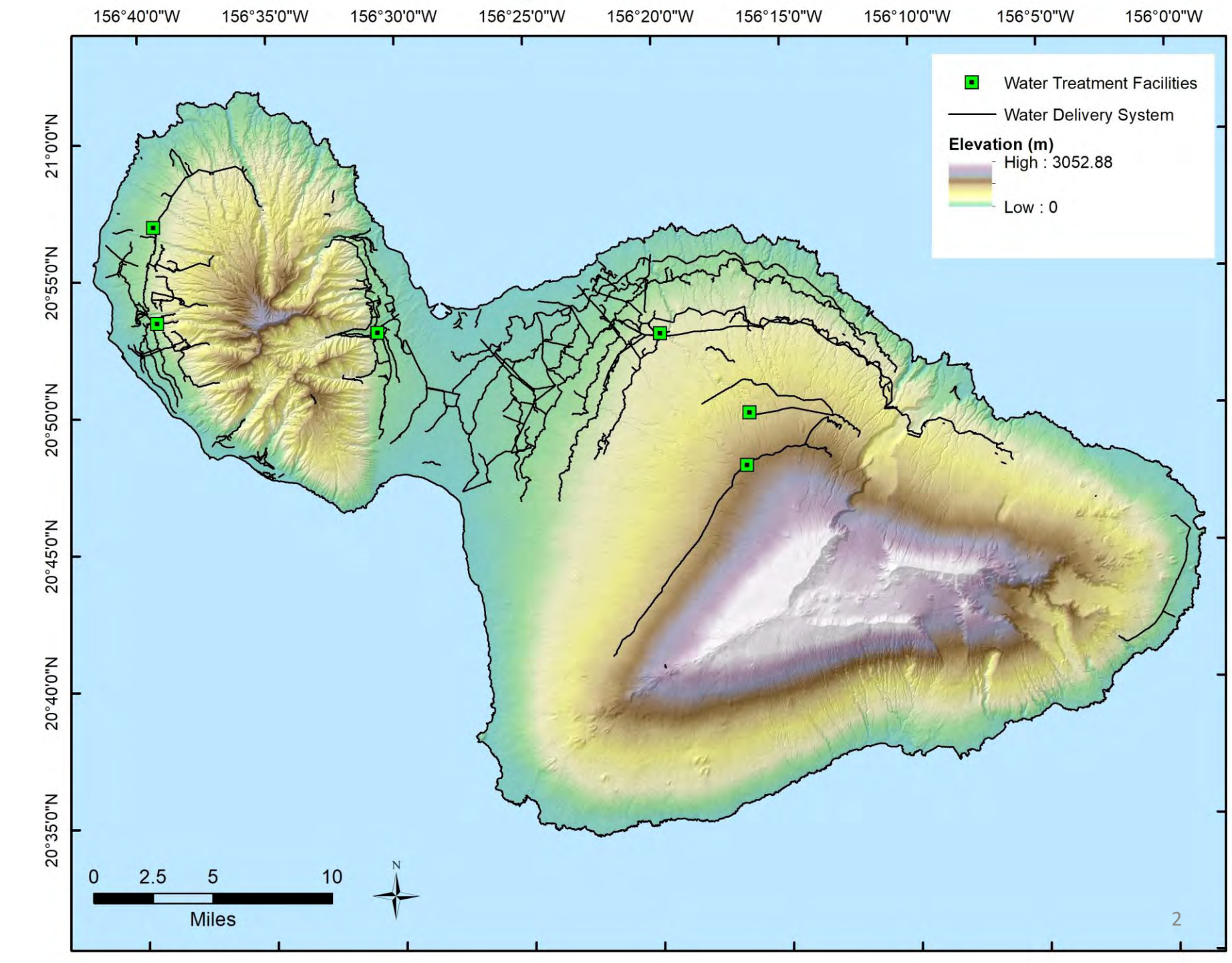
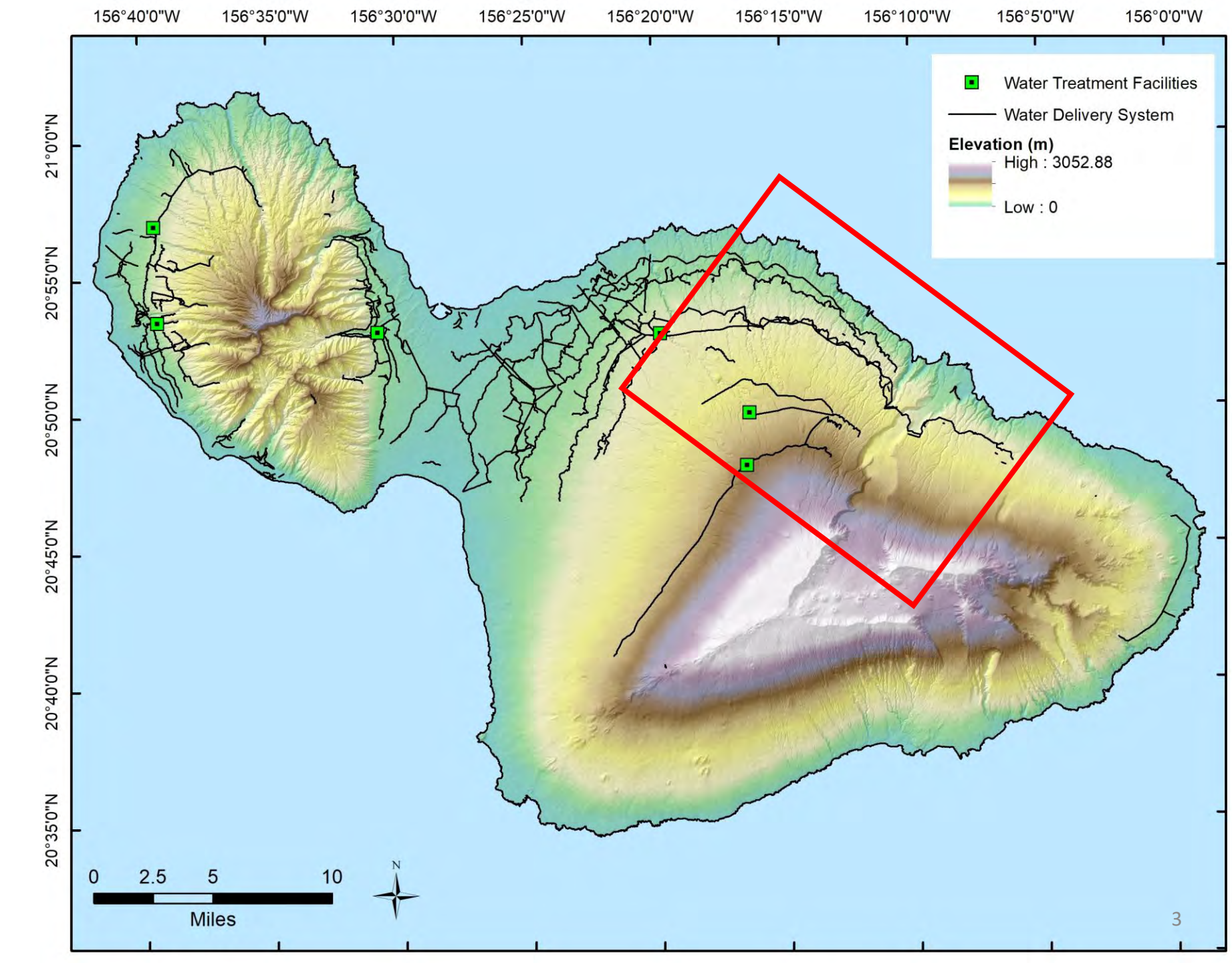
Address Portions of PAIFS.5784.6 by Amending the Interim Instream Flow Standards and Reserving a Portion of the Flow for the Department of Hawaiian Home Lands For the Surface Water Hydrologic Units of Hoʻolawa (6035), Waipiʻo (6036), Hoalua (6038), Hānawana (6039), Kailua (6040), Nailiilihaele (6041), Puehu (6042), ʻOʻopuola (6043), Kaʻaiea (6044), Punaluʻu (6045), Kōlea (6046), Maui

Item C-1
September 20, 2022

Ayron Strauch, Hydrologist
Stream Protection and Management Branch


156°40'0"W
156°35'0"W
156°30'0"W
156°25'0"W
156°20'0"W
156°15'0"W
156°10'0"W
156°5'0"W
156°0'0"W
21°0'0"N
20°55'0"N
20°50'0"N
20°45'0"N
20°40'0"N
20°35'0"N
Water Treatment Facilities
Water Delivery System
Elevation (m)
High : 3052.88
Low : 0
0
2.5
5
10
Miles
N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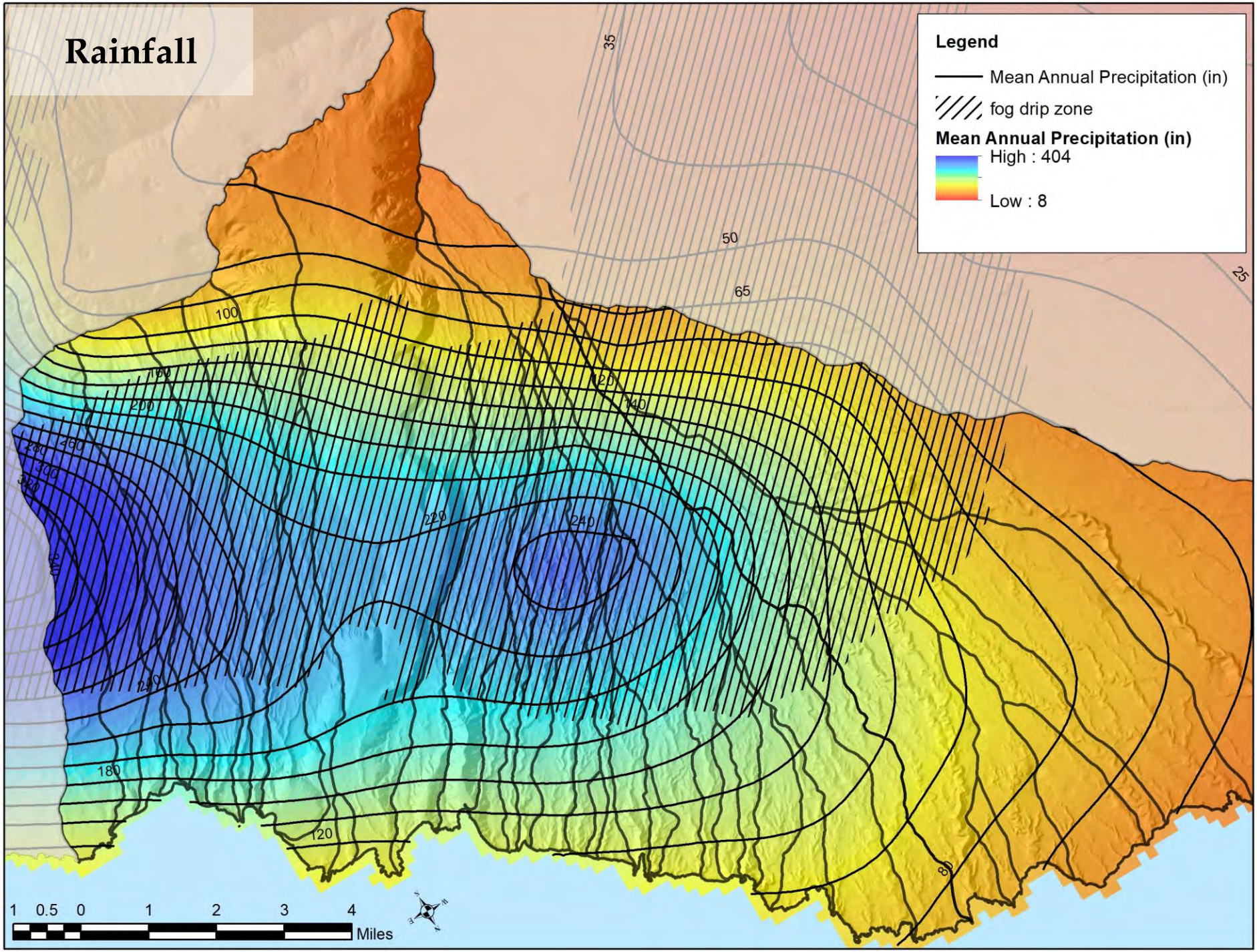
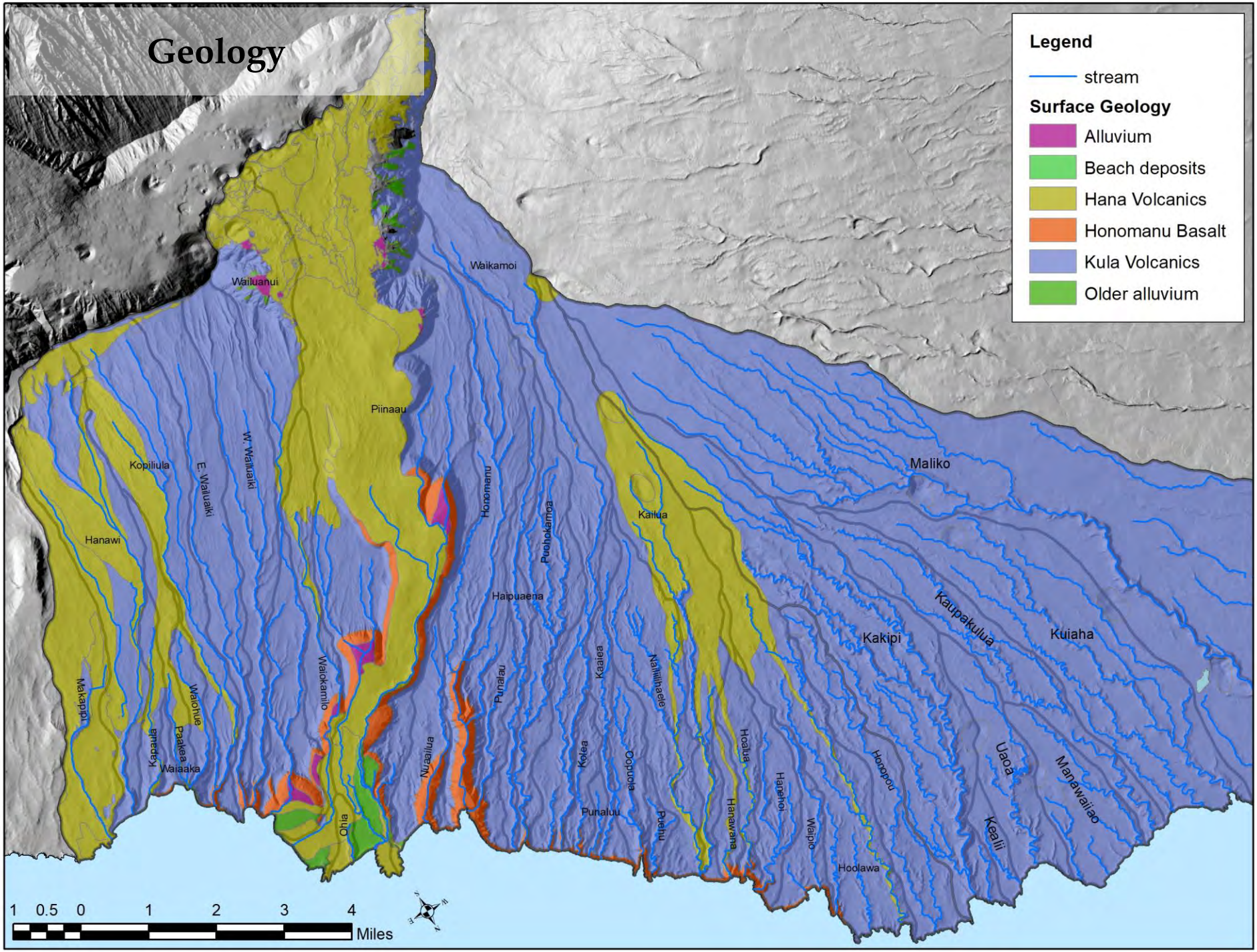
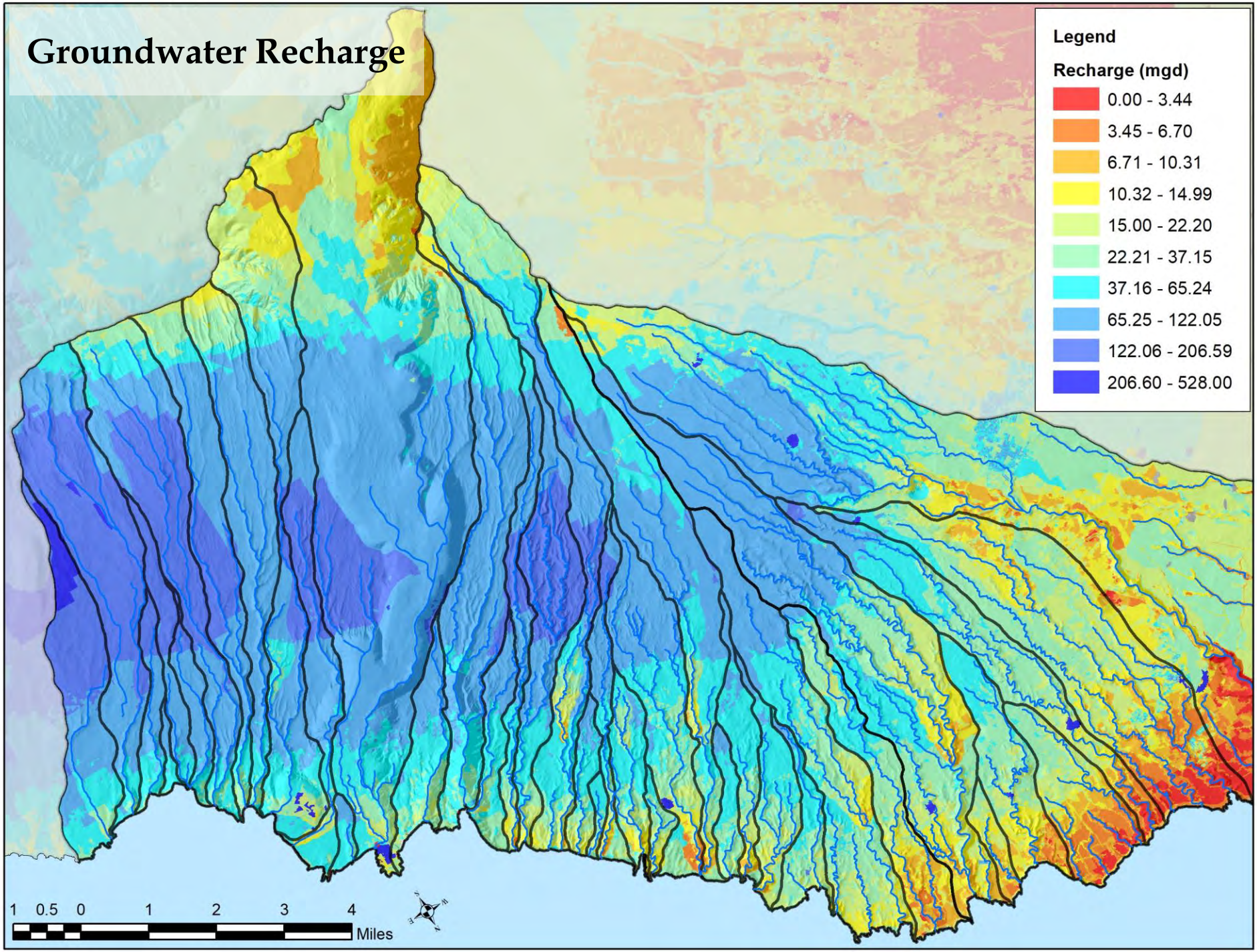
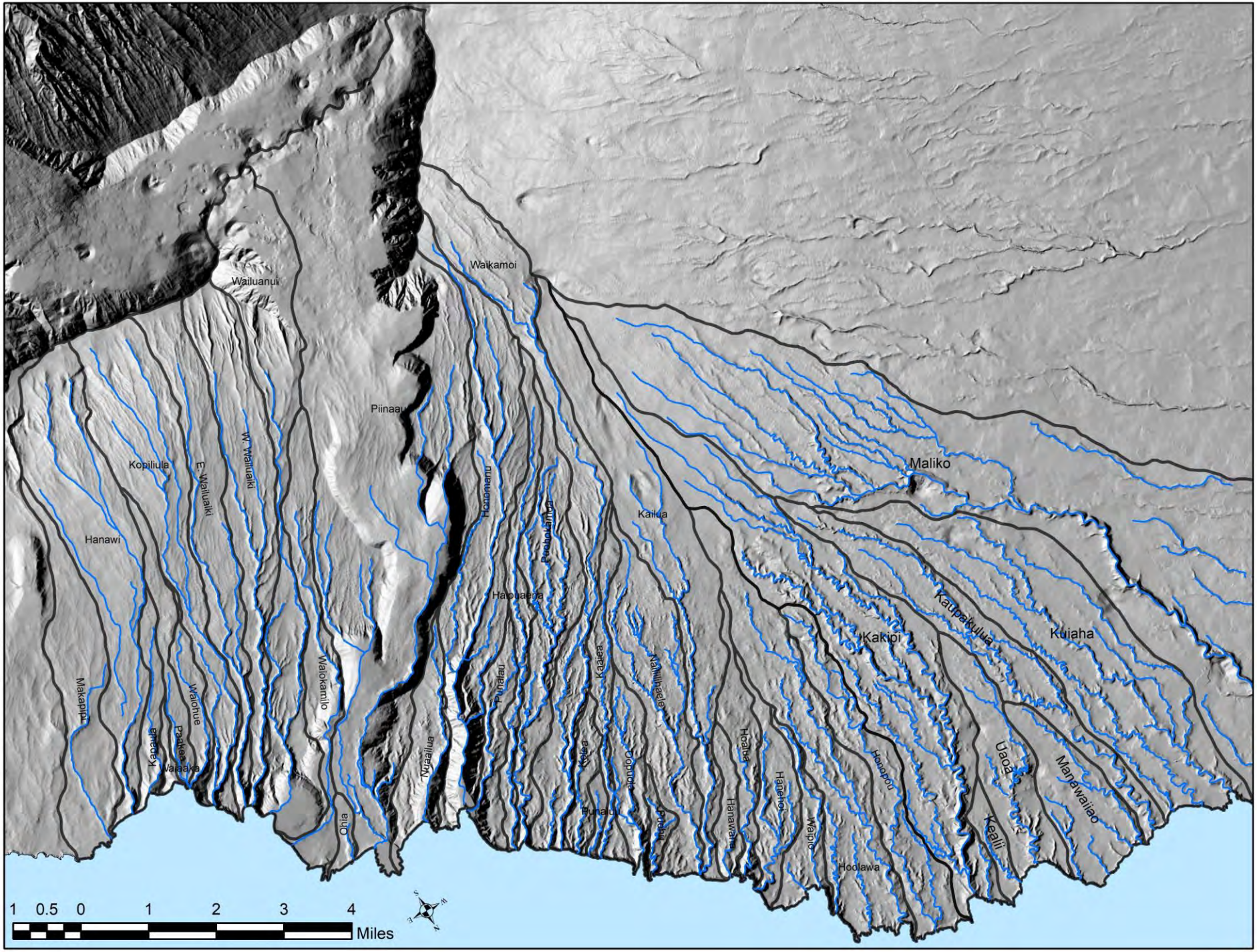
156°5'0"W
156°0'0"W
21°0'0"N
20°55'0"N
20°50'0"N
20°45'0"N
20°40'0"N
20°35'0"N
Water Treatment Facilities
Water Delivery System
Elevation (m)
High : 3052.88
Low : 0
0
2.5
5
10
Miles
N


Rainfall
Legend
Mean Annual Precipitation (in)
fog drip zone
Mean Annual Precipitation (in)
High : 404
Low : 8
35
50
65
25
100
160
200
260
300
320
340
220
240
240
180
120
80
1 0.5 0 1 2 3 4
Miles

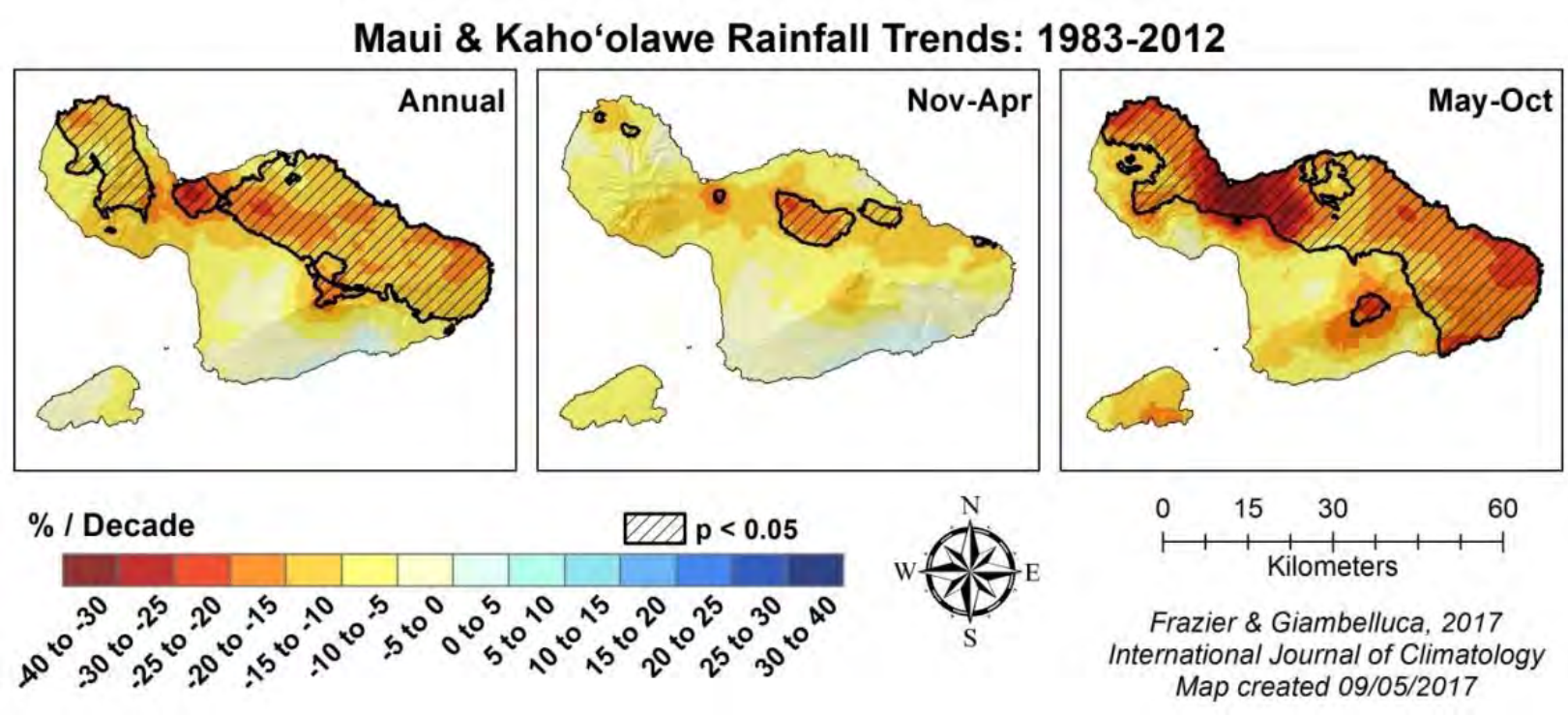

Geology
Legend
stream
Surface Geology
Alluvium
Beach deposits
Hana Volcanics
Honomanu Basalt
Kula Volcanics
Older alluvium
Waikamoi
Wailuanui
Piinaau
Kopiliula
E. Wailuaiki
W. Wailuaiki
Hanawi
Honomanu
Puohokamoa
Haipuaena
Kailua
Maliko
Kaupakulua
Kakipi
Kuiaha
Makapipi
Waiohue
Kapaula
Paakea
Waiaaka
Waiokamilo
Punalau
Kaaiea
Nailiilihaele
Nuaailua
Kolea
Oopuola
Punaluu
Puehu
Hoalua
Hanawana
Hanehoi
Waipio
Honopou
Hoolawa
Uaoa
Kealii
Manawaiiao
Ohia
1 0.5 0 1 2 3 4
Miles

Groundwater Recharge




Waikamoi
Wailuanui
Piinaau
Kopiliula
E. Wailuaiki
W. Wailuaiki
Hanawi
Honomanu
Puohokamoa
Kailua
Maliko
Hatouaena
Kaupakulua
Kuiaha
Kakipi
Makapipi
Waiohue
Waiokamilo
Punalau
Kaaiea
Nailiilihaele
Kapaula
Paakea
Waiaaka
Nuaailua
Kolea
Oopuola
Hoalua
Honopou
Uaoa
Manawaiiao
Ohia
Punaluu
Puohii
Hanawana
Hanehoi
Waipio
Kealii
Hoolawa
1 0.5 0 1 2 3 4
Miles

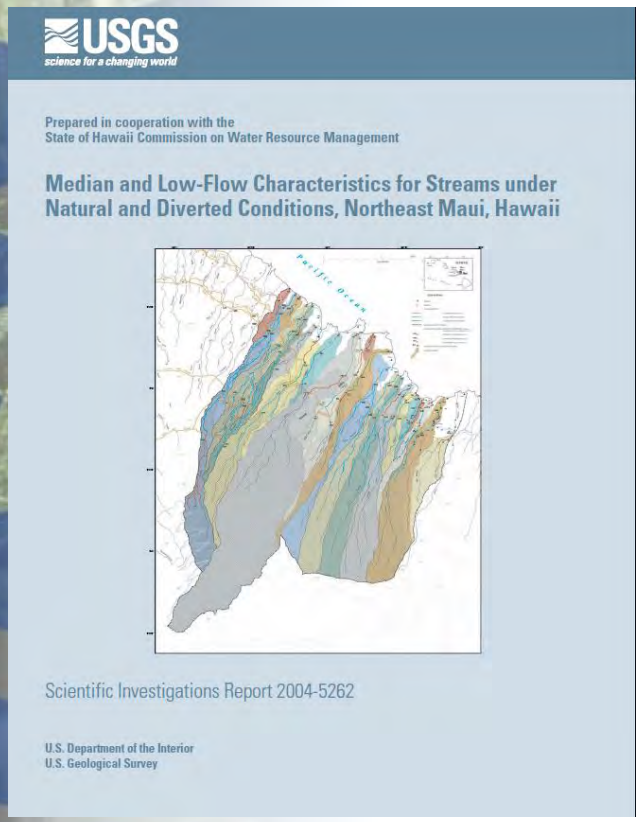
Declines in water available



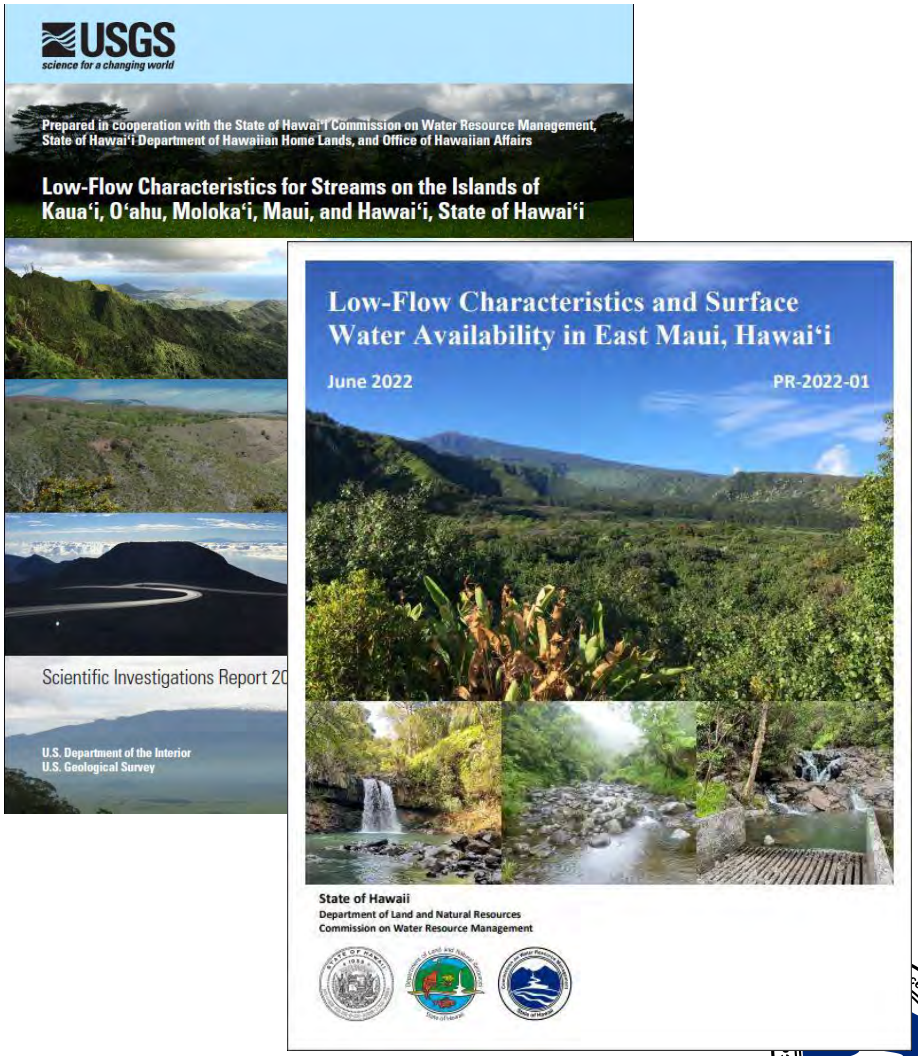
	West Wailuaiki USGS 16518000			Hanawi USGS 16508000		
Statistic	1942-2001	1984-2013	% change	1942-2001	1984-2013	% change
Total Flow Q_{50}	10	8.9	-11%	7.1	6.2	-13%
Total Flow Q_{95}	2.5	2.2	-12%	4.6	2.2	-52%

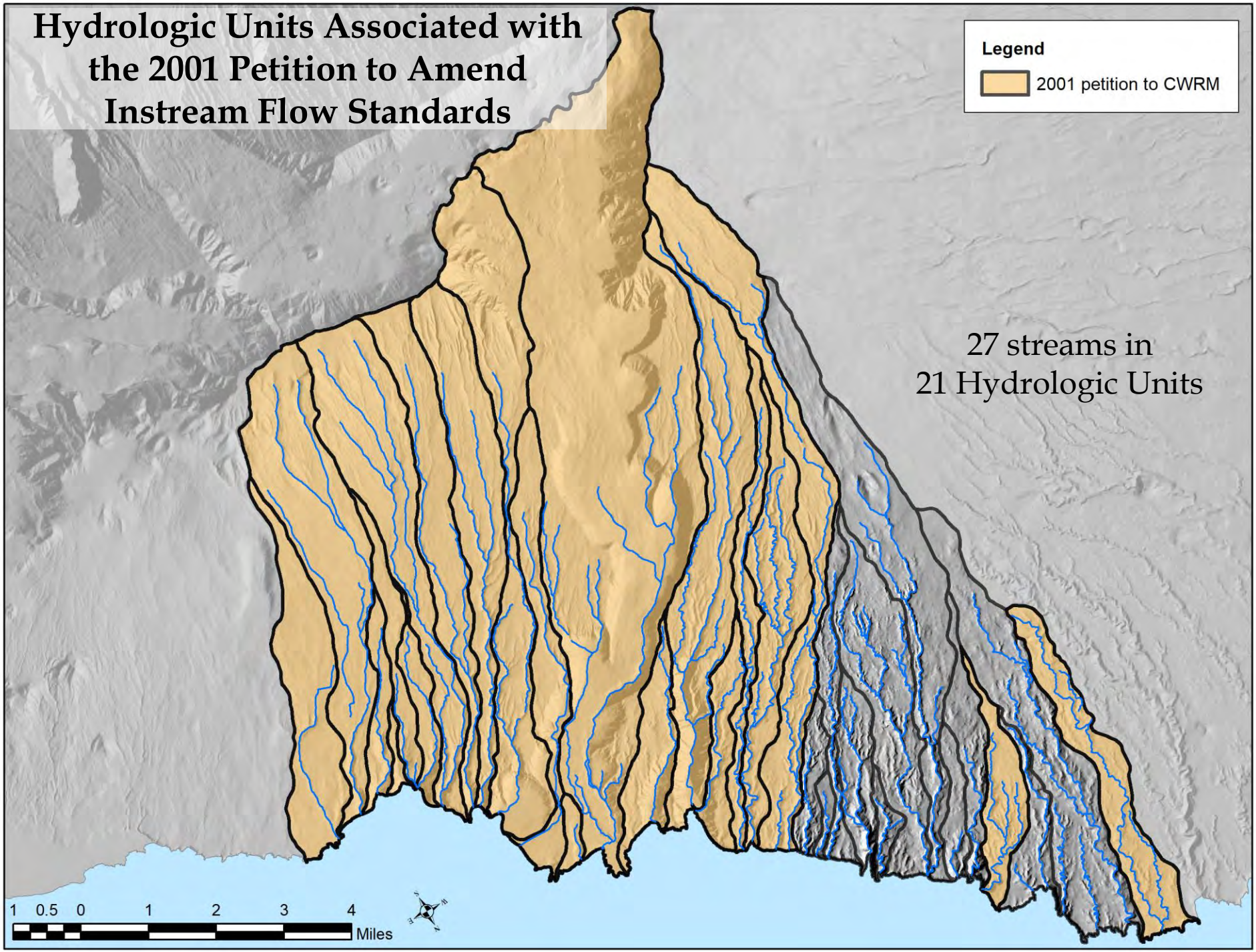
All values in cubic feet per second

2018 Decision & Order based on streamflow metrics using the 1942-2001 base period

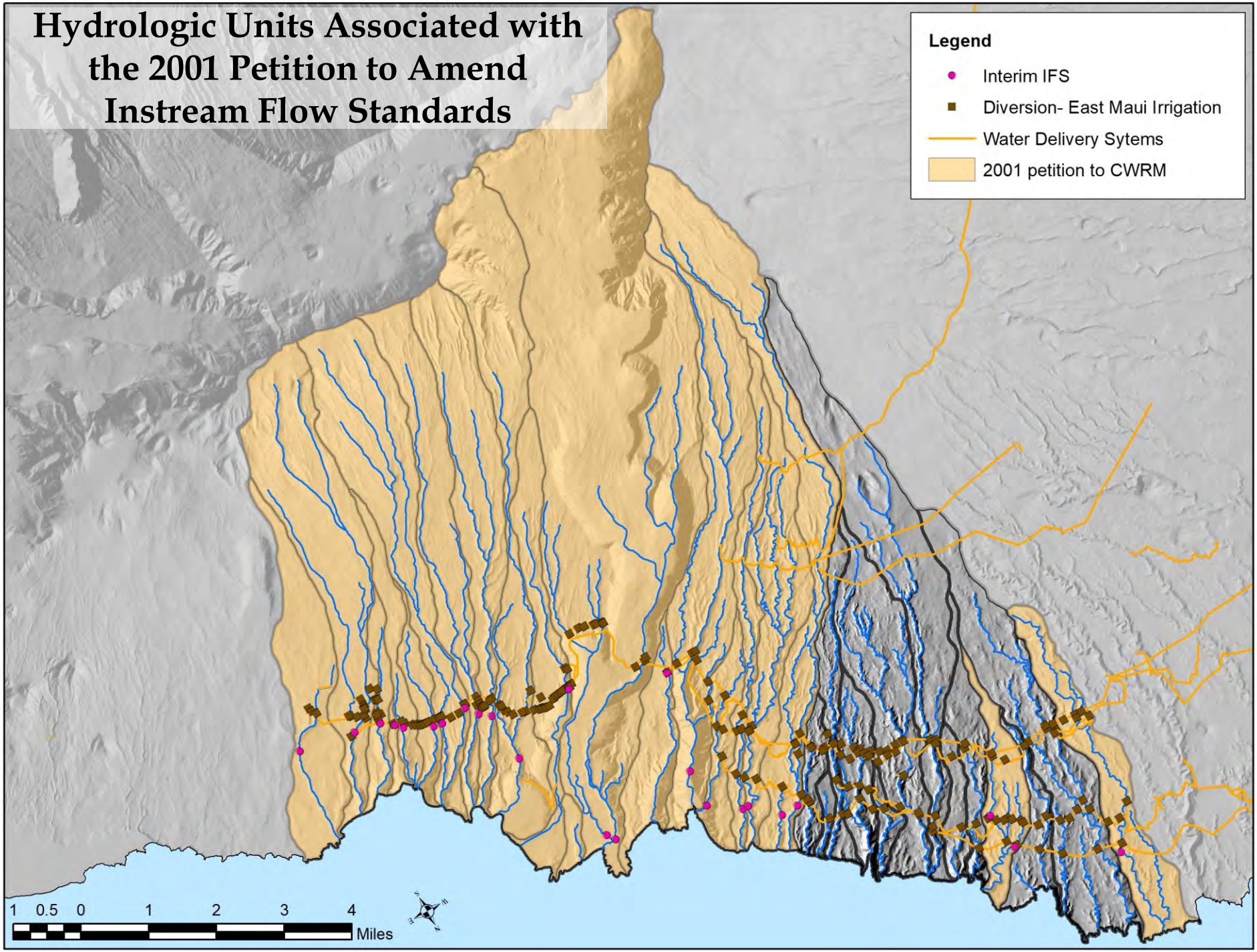


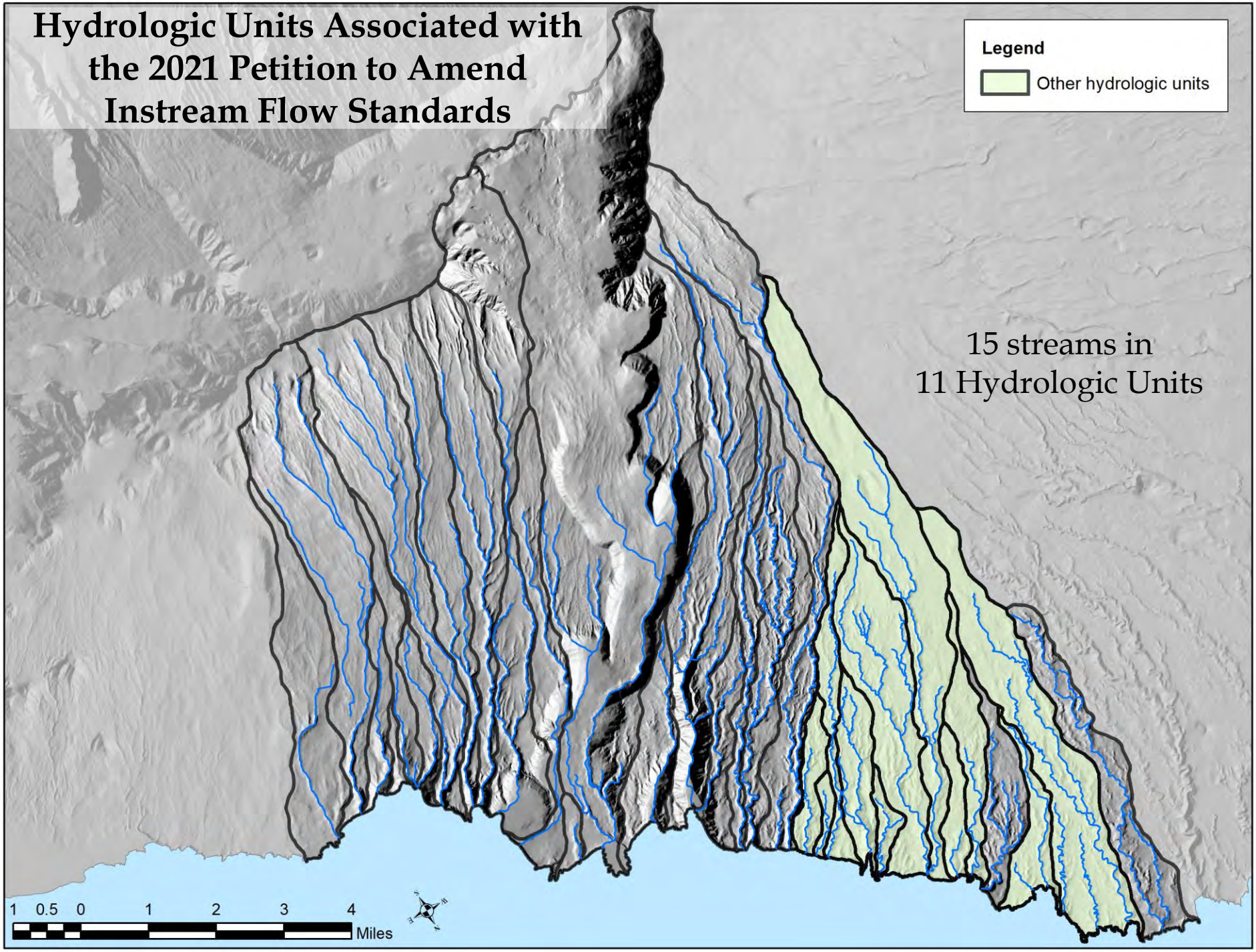
New reports with streamflow metrics updated for 1984-2013 base period



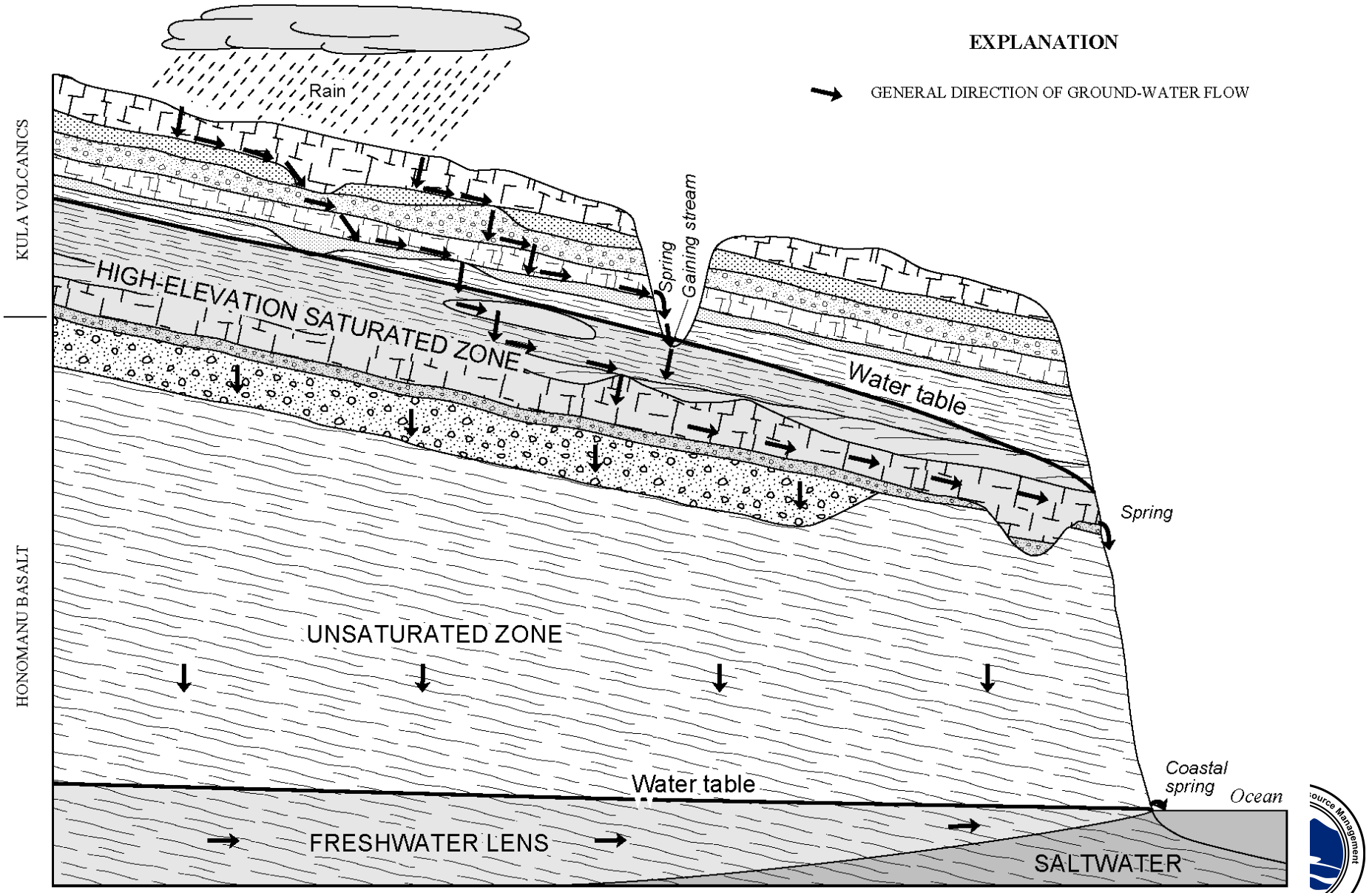

Hydrologic Units Associated with the 2001 Petition to Amend Instream Flow Standards
Legend
2001 petition to CWRM
27 streams in
21 Hydrologic Units
1 0.5 0 1 2 3 4
Miles

Hydrologic Units Associated with the 2001 Petition to Amend Instream Flow Standards

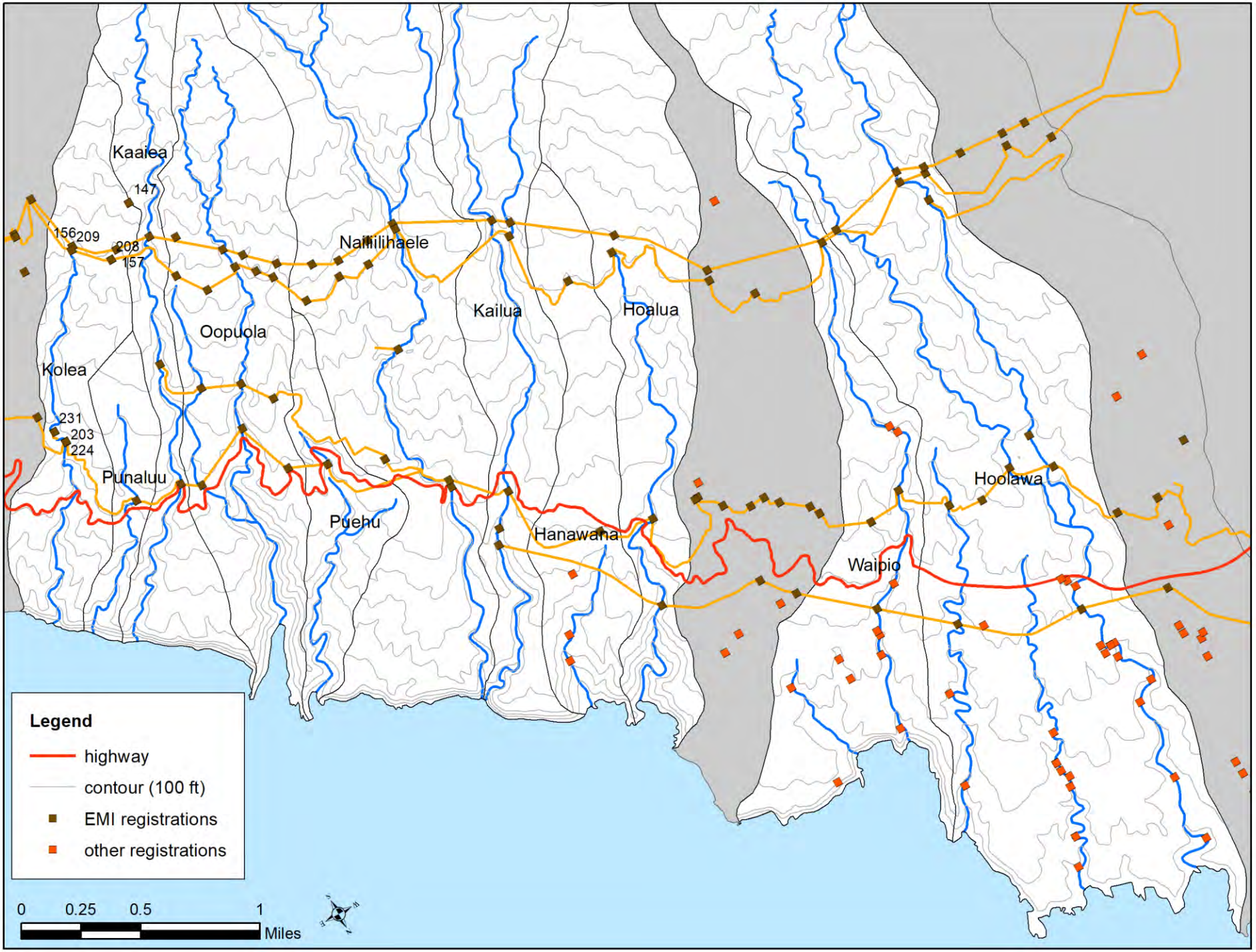


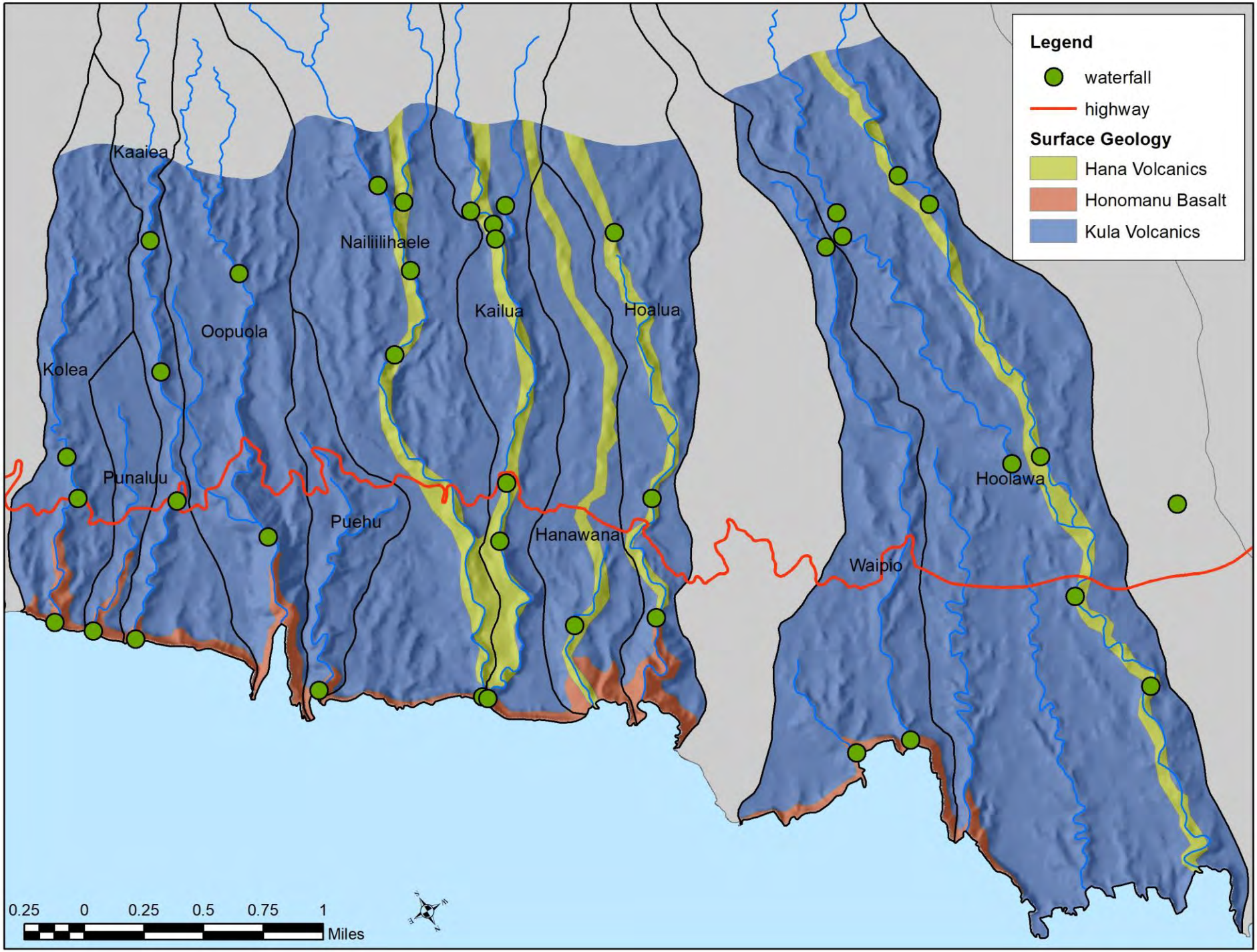

Hydrologic Units Associated with the 2021 Petition to Amend Instream Flow Standards
Legend
Other hydrologic units
15 streams in
11 Hydrologic Units
1 0.5 0 1 2 3 4
Miles

Geology: Variably Saturated Groundwater System West of Keanae Valley



USGS SIR 99-4090


Kaalea
147
156
209
208
157
Naiiilihaele
Kailua
Hoalua
Oopuola
Kolea
231
203
224
Punaluu
Puehu
Hanawana
Hoolawa
Waipio
Legend
highway
contour (100 ft)
EMI registrations
other registrations
0
0.25
0.5
1
Miles


Legend
waterfall
highway
Surface Geology
Hana Volcanics
Honomanu Basalt
Kula Volcanics
Kaaiea
Nailiilihaele
Kailua
Hoalua
Oopuola
Kolea
Punaluu
Puehu
Hanawana
Waipio
Hoolawa
0.25 0 0.25 0.5 0.75 1
Miles

Ho‘olawa Stream

Kailua Stream

Surface Geology

Stream	**Hāna** Volcanics (50-140 kya)	Percent of Unit	Kula Volcanics (140-780/950 kya)	Percent of Unit	**Honomanū** Basalt (950-1,300 kya)	Percent of Unit
Hoʻolawa	1.358	28.2	3.433	71.4	0.018	0.3
Waipiʻo	0.0	0.0	0.969	95.3	0.048	4.7
Hoalua	0.263	21.5	0.907	74.0	0.055	4.5
Hānawana	0.125	19.4	0.485	75.1	0.035	5.4
Kailua	3.073	59.1	2.107	40.5	0.017	0.3
Nailiilihaele	0.465	13.2	3.052	86.4	0.015	0.4
Puehu	0.0	0.0	0.342	96.6	0.012	3.4
Oopuola	0.0	0.0	1.180	96.2	0.044	3.6
Kaaiea	0.0	0.0	1.113	97.5	0.029	2.5
Punaluʻu	0.0	0.0	0.199	90.1	0.020	9.9
Kōlea	0.0	0.0	0.665	95.0	0.035	5.0

Hoolawaliilii Stream

Hoalua Stream

Assessment of Instream and Non-Instream Uses

Pūlehunui non-potable water reservation

2020 DHHL request for non-potable water

Pūlehunui Regional Plan requests 2.0536 cfs (1.3275 mgd) non-potable water for diversified agriculture

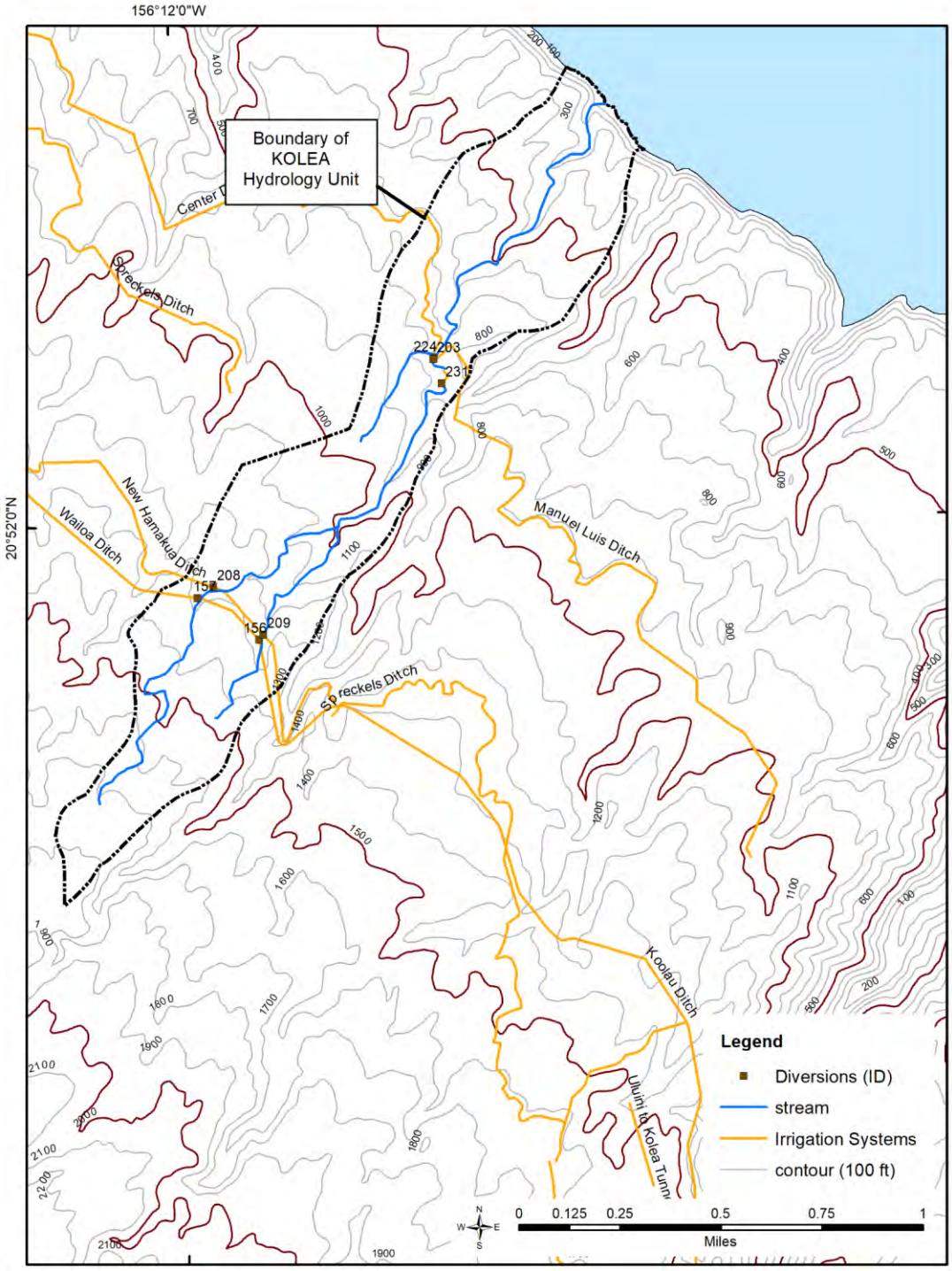
Kōlea Hydrologic Unit: Diversions

Watershed Characteristics:

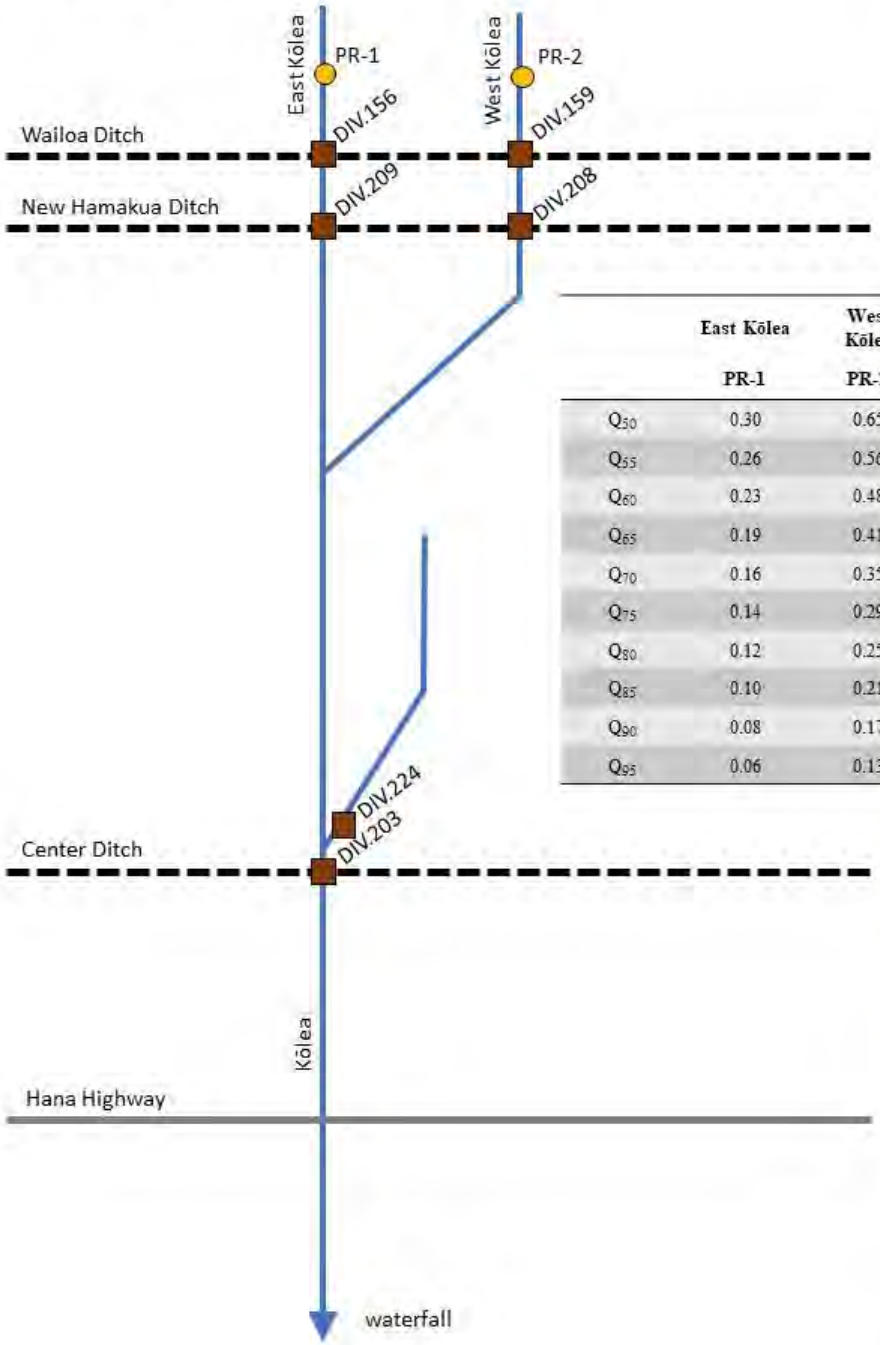
Area: 0.6 mi^2
Maximum elevation: 1864 ft
Land Use: 26.1% agriculture; 73.9% conservation
Total Stream Length: 1.8 mi
Terminal Order: 1
Terminal Reach: Waterfall

Watershed Rating:

Landcover: 9/10
Shallow Waters Rating: 0/10
Stewardship Rating: 4/10
Size Rating: 1/10
Wetness Rating: 6/10
Reach Diversity Rating: 2/10
Total Watershed Rating: 5/10



Kōlea Hydrologic Unit (6046)



	East Kōlea PR-1	West Kōlea PR-2
Q_{50}	0.30	0.65
Q_{55}	0.26	0.56
Q_{60}	0.23	0.48
Q_{65}	0.19	0.41
Q_{70}	0.16	0.35
Q_{75}	0.14	0.29
Q_{80}	0.12	0.25
Q_{85}	0.10	0.21
Q_{90}	0.08	0.17
Q_{95}	0.06	0.13

Kōlea Hydrologic Unit: Mouth

Kōlea Hydrologic Unit: Instream Uses

kalo not grown in watershed
No recognized trails
<u>Biotic Information:</u>
Terminal reach waterfall limits recruitment of amphidromous species
Small stream limits habitat availability
No native species observed in 16 site visits
20 point-quadrant biota surveys (1 reach) conducted at 710ft with flow restored past Center Ditch since 2016; no native species observed; many non-native (*Poecilia mexicana*)
**Megalagrion pacificum* (endangered) observed in East Kōlea above Wailoa Ditch (~1300ft)

Proposed Management
Increase the length of stream habitat available for *M. pacificum* without increasing the upstream movement of non-native fish in East Kōlea.

Proposed Modifications for Implementation
Modify DIV.156 (W-3) and DIV.209 (NH-2) intakes such that all flows up to 0.08 cfs remain in the stream without providing for connectivity.

Poecilia mexicana; Mexican molly/guppy
→commonly found in Kōlea Stream

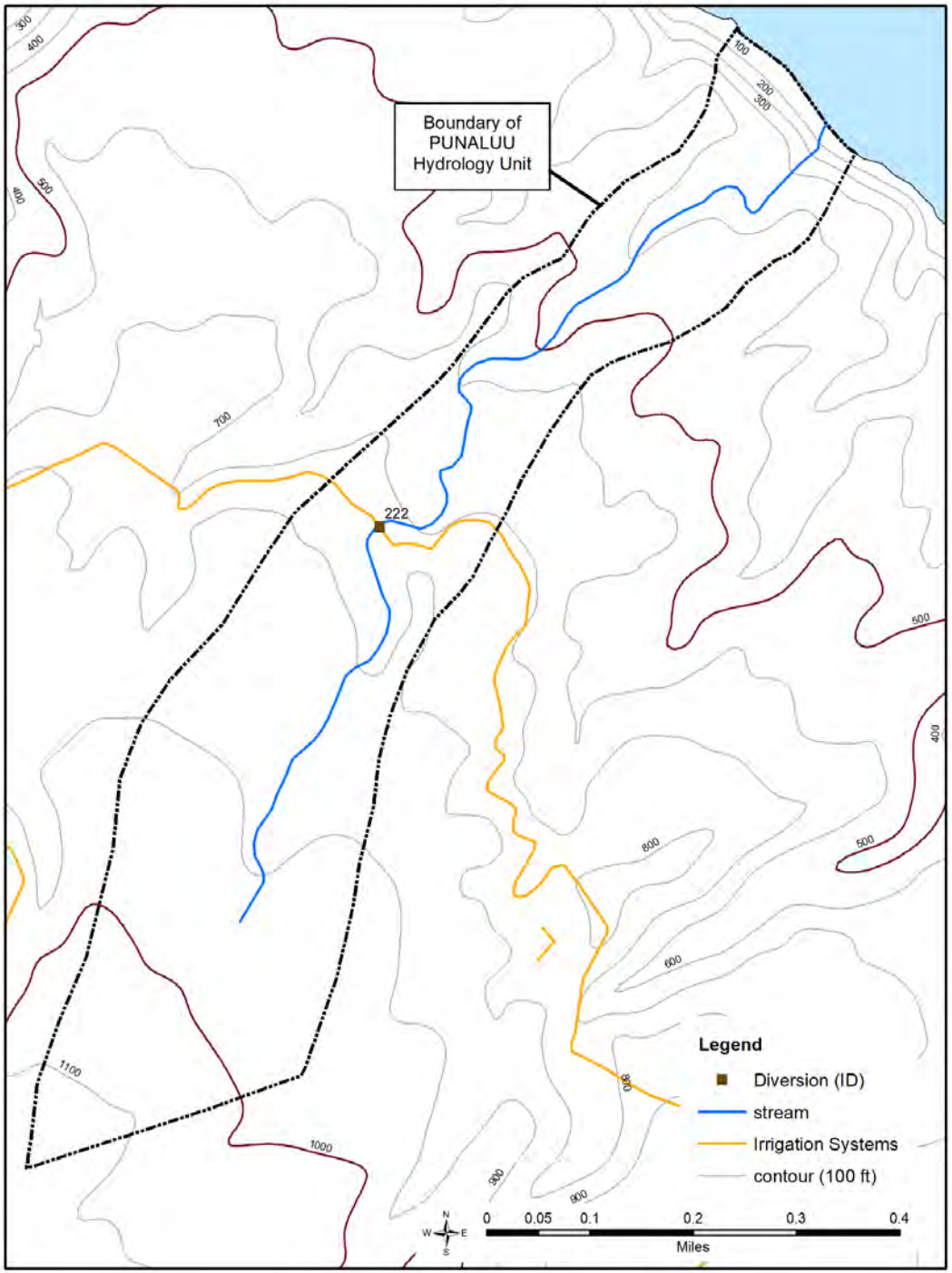
East Kōlea at Wailoa Ditch

East Kōlea at New Hāmākua Ditch

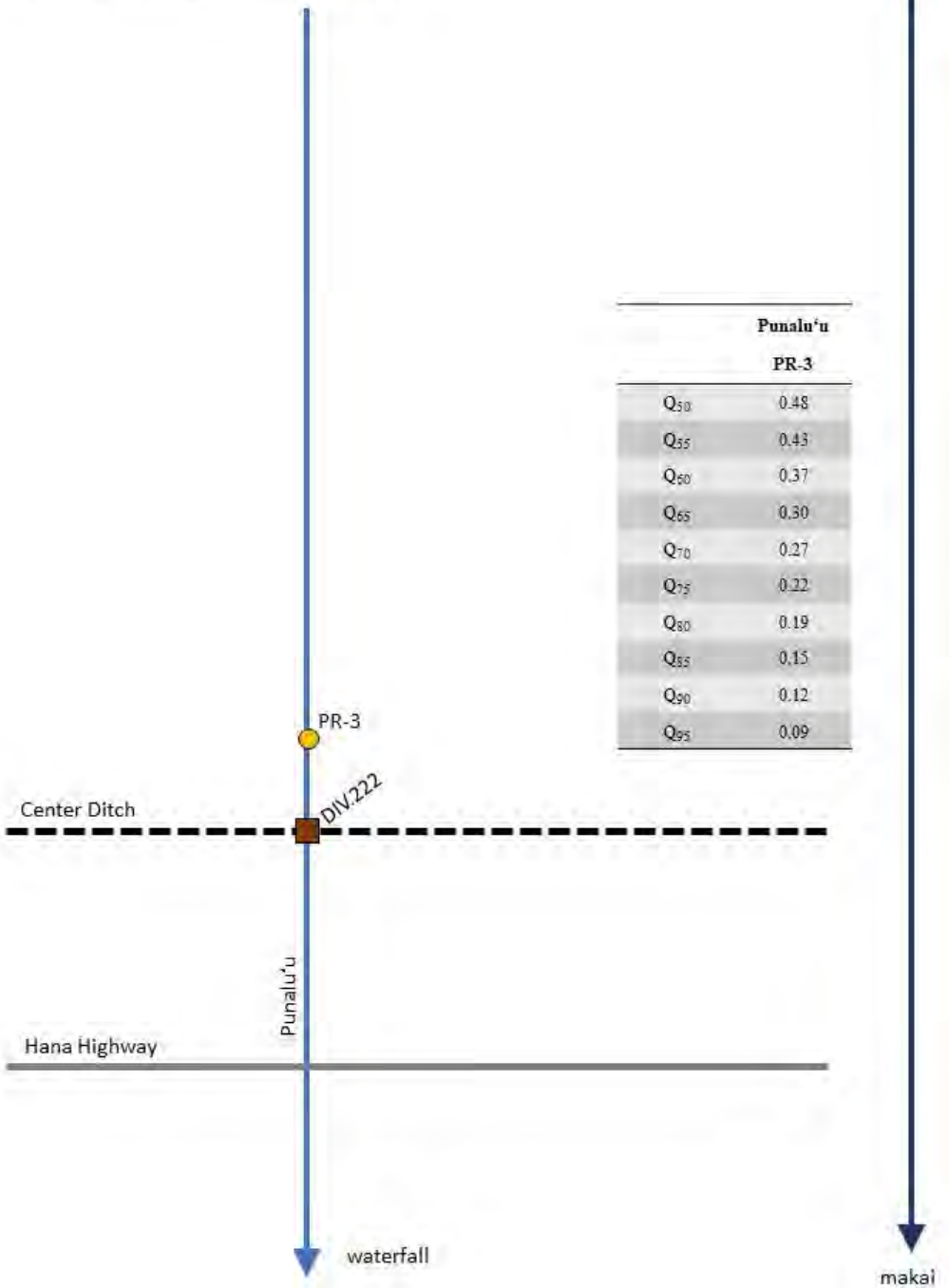
Recommendation:
provide continual flow to expand damselfly habitat without expanding invasive poecilid habitat

Punalu‘u Hydrologic Unit: Diversions

Watershed Characteristics:
Area: 0.20 mi^2
Maximum elevation: 1190 ft
Land Use: 68.5% conservation, 31.5% agriculture
Total Stream Length: 1.62 mi
Terminal Order: 1
Terminal Reach: Waterfall



Punalu'u Hydrologic Unit (6045)



	Punalu'u PR-3
Q_{50}	0.48
Q_{55}	0.43
Q_{60}	0.37
Q_{65}	0.30
Q_{70}	0.27
Q_{75}	0.22
Q_{80}	0.19
Q_{85}	0.15
Q_{90}	0.12
Q_{95}	0.09

Punalu‘u Hydrologic Unit:
Mouth

Punalu‘u Hydrologic Unit: Instream Uses

kalo not grown in watershed
No recognized trails
<u>Biotic Information:</u>
Terminal reach waterfall limits recruitment of amphidromous species
Small stream limits habitat availability
No native species observed in 15 site visits

Proposed Management
Non-instream water use

Proposed Modifications for Implementation
None

Ka‘aiea Hydrologic Unit: Diversions

Watershed Characteristics:

Area: 1.1 mi^2

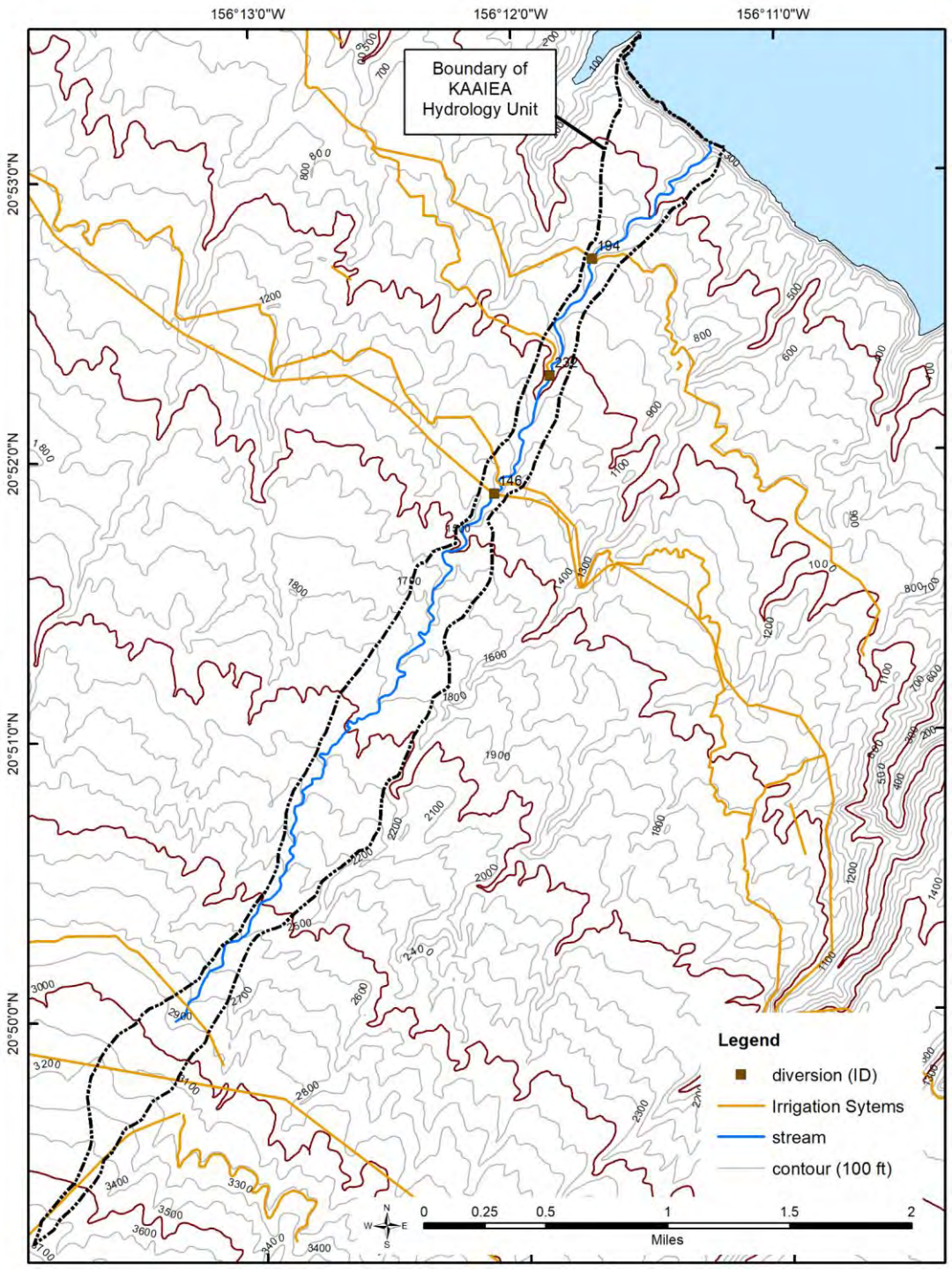
Maximum elevation: 2717 ft

Land Use: 19.9% agriculture; 80.1% conservation

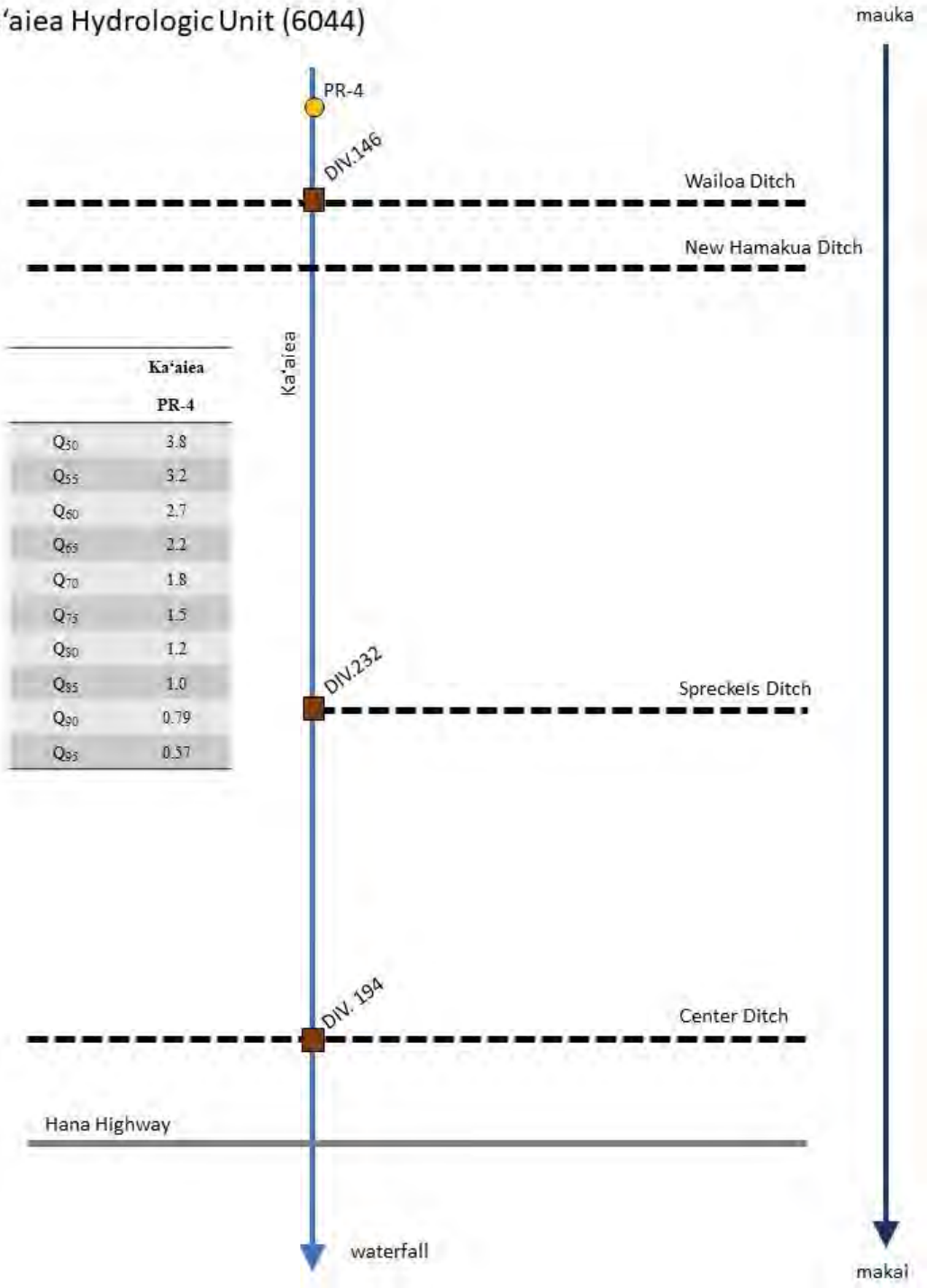
Total Stream Length: 5.3 mi

Terminal Order: 1

Terminal Reach: Waterfall

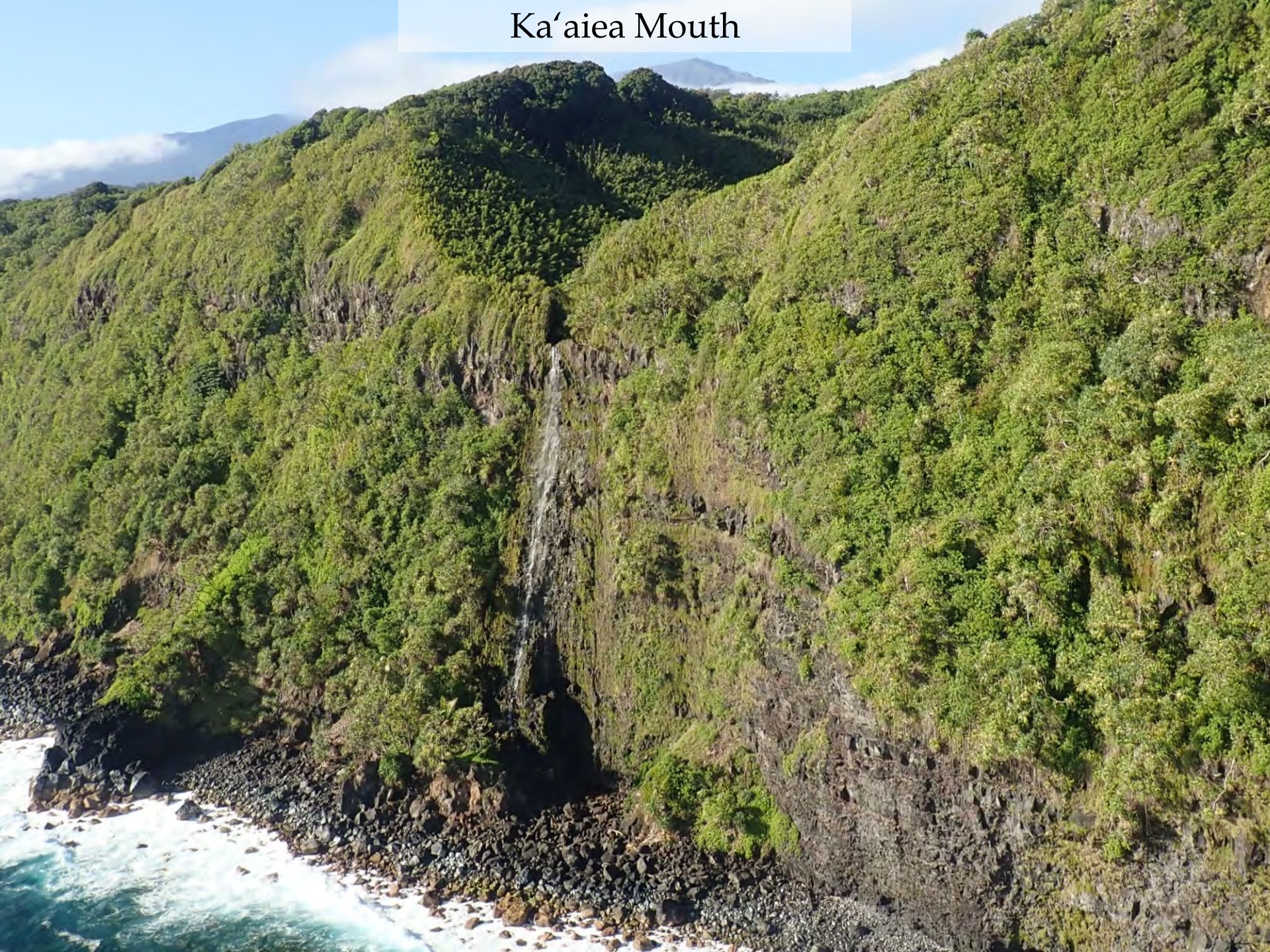


Ka'aiea Hydrologic Unit (6044)



	Ka'aiea
	PR-4
Q_{50}	3.8
Q_{55}	3.2
Q_{60}	2.7
Q_{65}	2.2
Q_{70}	1.8
Q_{75}	1.5
Q_{80}	1.2
Q_{85}	1.0
Q_{90}	0.79
Q_{93}	0.57

Kaʻaiea Mouth



Kaʻaiea Hydrologic Unit: Instream Uses

kalo not grown in watershed

Biotic Information:

Terminal reach waterfall limits recruitment of amphidromous species
20 point-quadrant biota surveys (1 reach) conducted at 680ft; no native species observed.
ʻōpae observed at 1250ft above Wailoa Ditch
No other native species observed in 19 site visits

Proposed Management

Continual flow past Spreckels and Center ditches for aquatic habitat

Proposed Modifications for Implementation

Continual flow past DIV.232 (S-11): 18-inch plate across grate to transport all baseflow up to 1.8 cfs; fix leaks in wing wall
Continual flow past DIV 194 (C-5): 18-inch plate across grate to transport all baseflow up to 1.8 cfs; fix leaks in upstream concrete and wing walls

Ka‘aiea Stream at Spreckels Ditch

Ka‘aiea Stream at Center Ditch

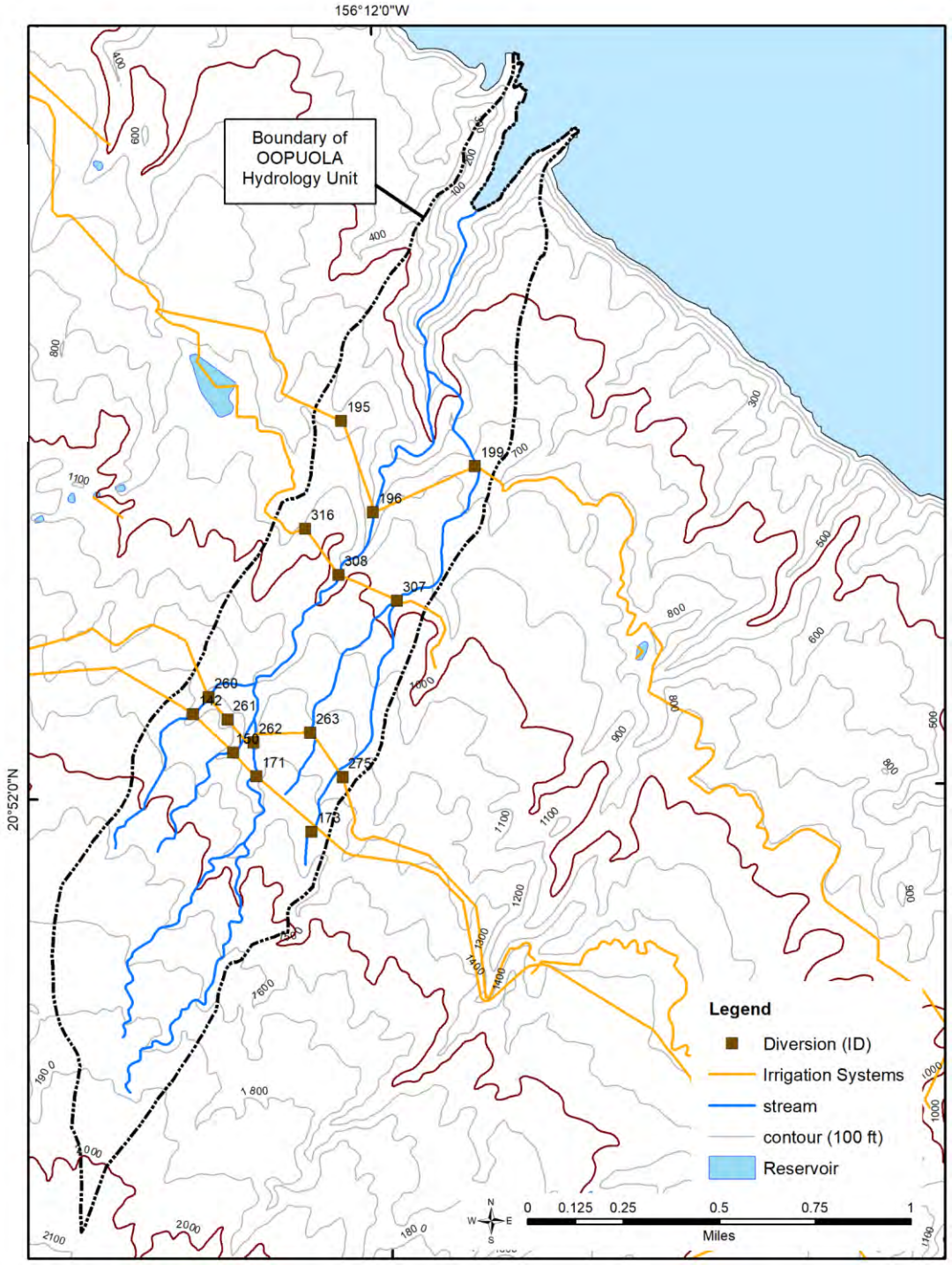
ʻOʻopuola Hydrologic Unit: Diversions

Watershed Characteristics:

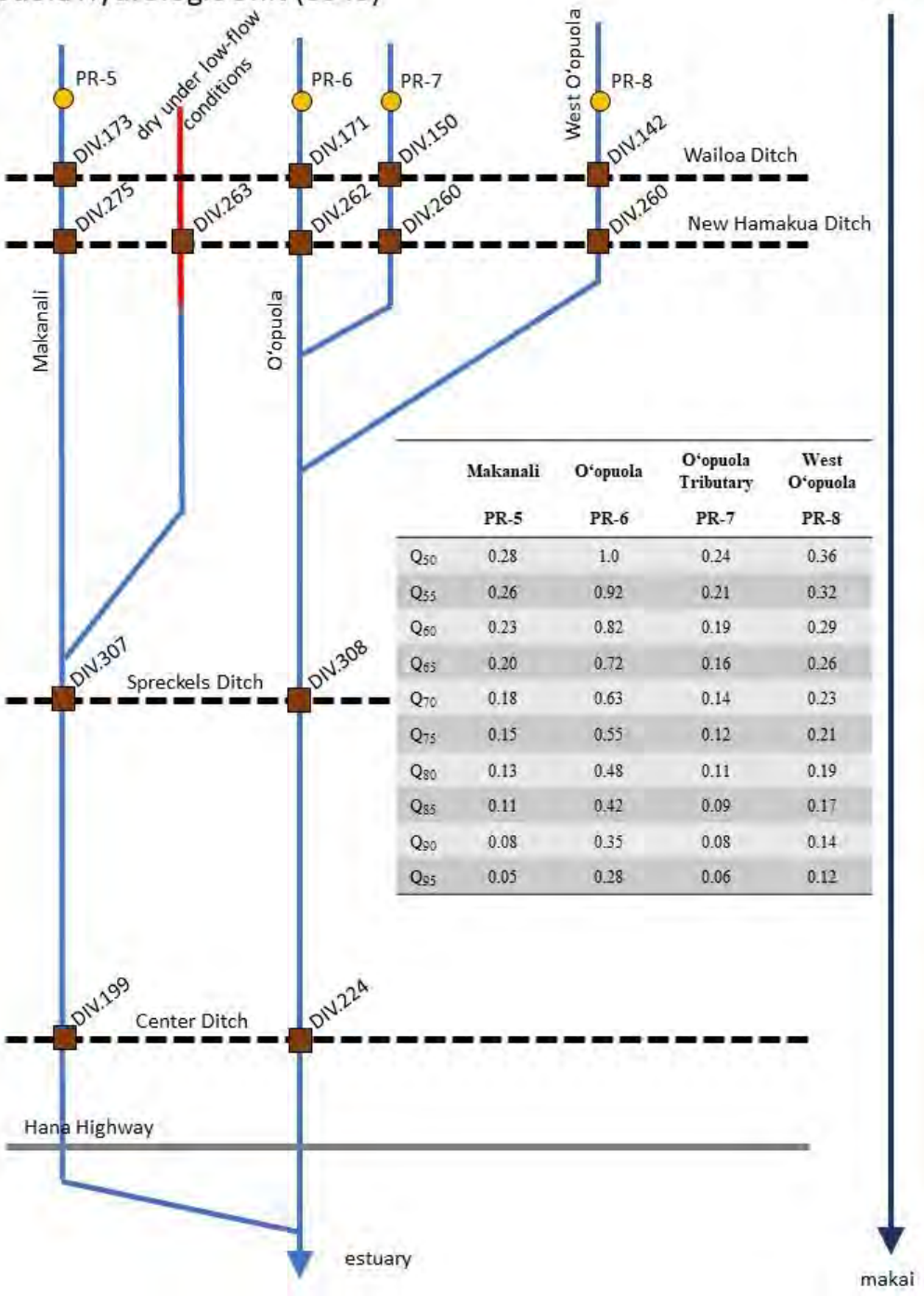
Area: 1.0 mi^2
Maximum elevation: 2057 ft
Land Use: 27.7% agriculture; 72.3% conservation
Total Stream Length: 4.4 mi
Terminal Order: 2
Terminal Reach: Estuary

Watershed Rating:

Landcover: 9/10
Shallow Waters Rating: 1/10
Stewardship Rating: 5/10
Size Rating: 2/10
Wetness Rating: 7/10
Reach Diversity Rating: 3/10
Total Watershed Rating: 7/10



O‘opuola Hydrologic Unit (6043)



	Makanali	O‘opuola	O‘opuola Tributary	West O‘opuola
	PR-5	PR-6	PR-7	PR-8
Q_{50}	0.28	1.0	0.24	0.36
Q_{55}	0.26	0.92	0.21	0.32
Q_{60}	0.23	0.82	0.19	0.29
Q_{65}	0.20	0.72	0.16	0.26
Q_{70}	0.18	0.63	0.14	0.23
Q_{75}	0.15	0.55	0.12	0.21
Q_{80}	0.13	0.48	0.11	0.19
Q_{85}	0.11	0.42	0.09	0.17
Q_{90}	0.08	0.35	0.08	0.14
Q_{95}	0.05	0.28	0.06	0.12

‘O‘opuola Hydrologic Unit: Mouth

ʻOʻopuola Hydrologic Unit: Instream Uses

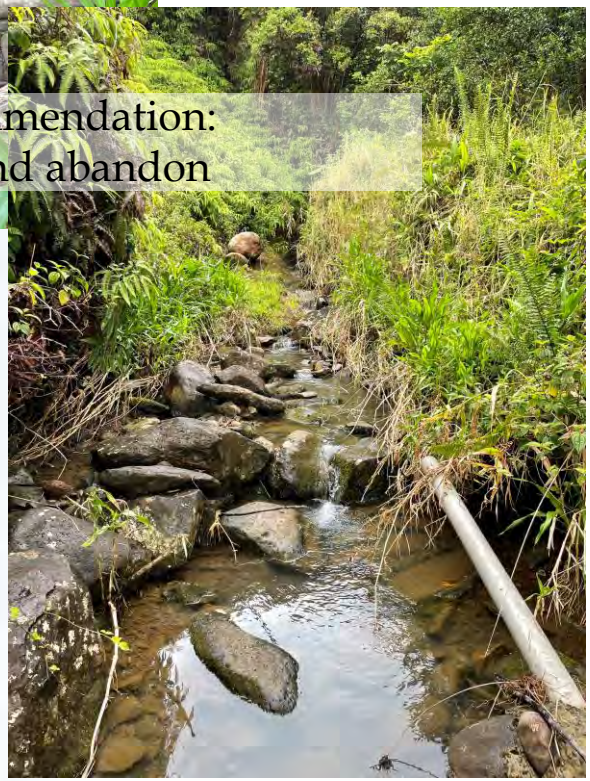
kalo not grown in watershed
Potential for ʻoʻopu in mid and lower elevations
<u>Biotic Information:</u>
Terminal reach estuary increases recruitment potential of amphidromous species
2008 DAR point quadrat survey
20 point-quadrant biota surveys (1 reach) conducted at 600ft with flow restored past Center Ditch since 2016; oʻopu alamoʻo observed

Proposed Management
Increased flow below Wailoa/New Hāmākua ditches for aquatic habitat
Continual flow past Spreckels and Center ditches for aquatic habitat

Proposed Modifications for Implementation
Abandonment of DIV 173 (W-7): remove PVC piping
Abandonment of DIV 150 (W-9): remove PVC piping, seal intake
Abandonment of DIV 262 (NH-6): remove PVC piping, seal intake
Continual flow past DIV 142 (W-10): pipe past intake from pool above to transport all flows up to 0.36 cfs
Abandonment of DIV 260 (NH-8): seal intake
Continual flow past DIV 308 (S-13): 18-inch plate across grate to transport all baseflow up to 1.8 cfs
Continual flow past DIV 196 (C-7): 18-inch plate across grate, seal leakage along upstream edge to transport all baseflow up to 1.8 cfs

Makanali at Wailoa Ditch

ʻOʻopuola Tributary at Wailoa Ditch

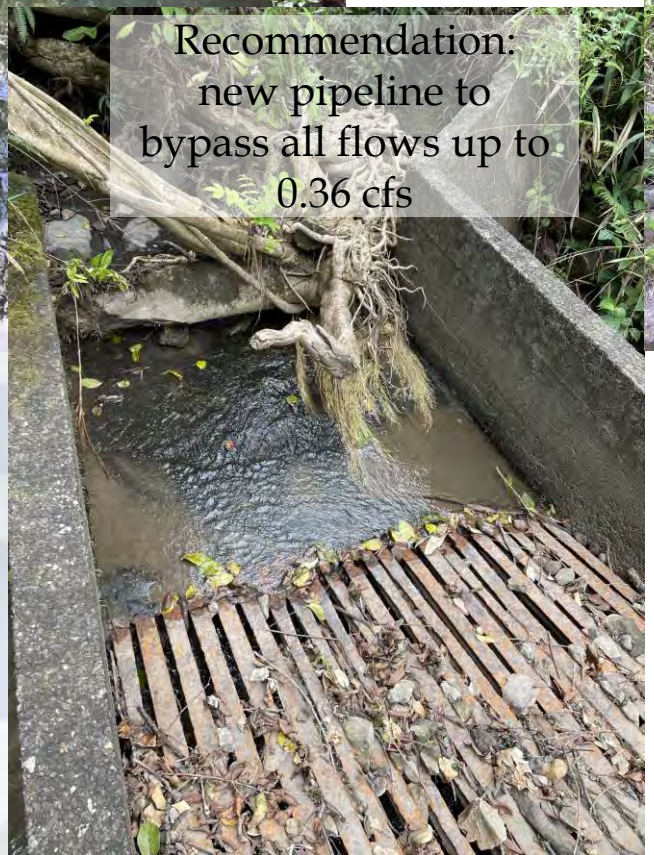


Recommendation:
seal and abandon

ʻOʻopuola Tributary at New Hāmākua Ditch

Recommendation:
seal and abandon

West ʻOʻopuola at Wailoa Ditch



Recommendation: new pipeline to bypass all flows up to 0.36 cfs

West ʻOʻopuola at New Hāmākua Ditch

Recommendation: seal and abandon

ʻOʻopuola Hydrologic Unit: Spreckels Ditch

Recommendation:
18-inch plate across grate to transport all baseflow up to 1.8 cfs

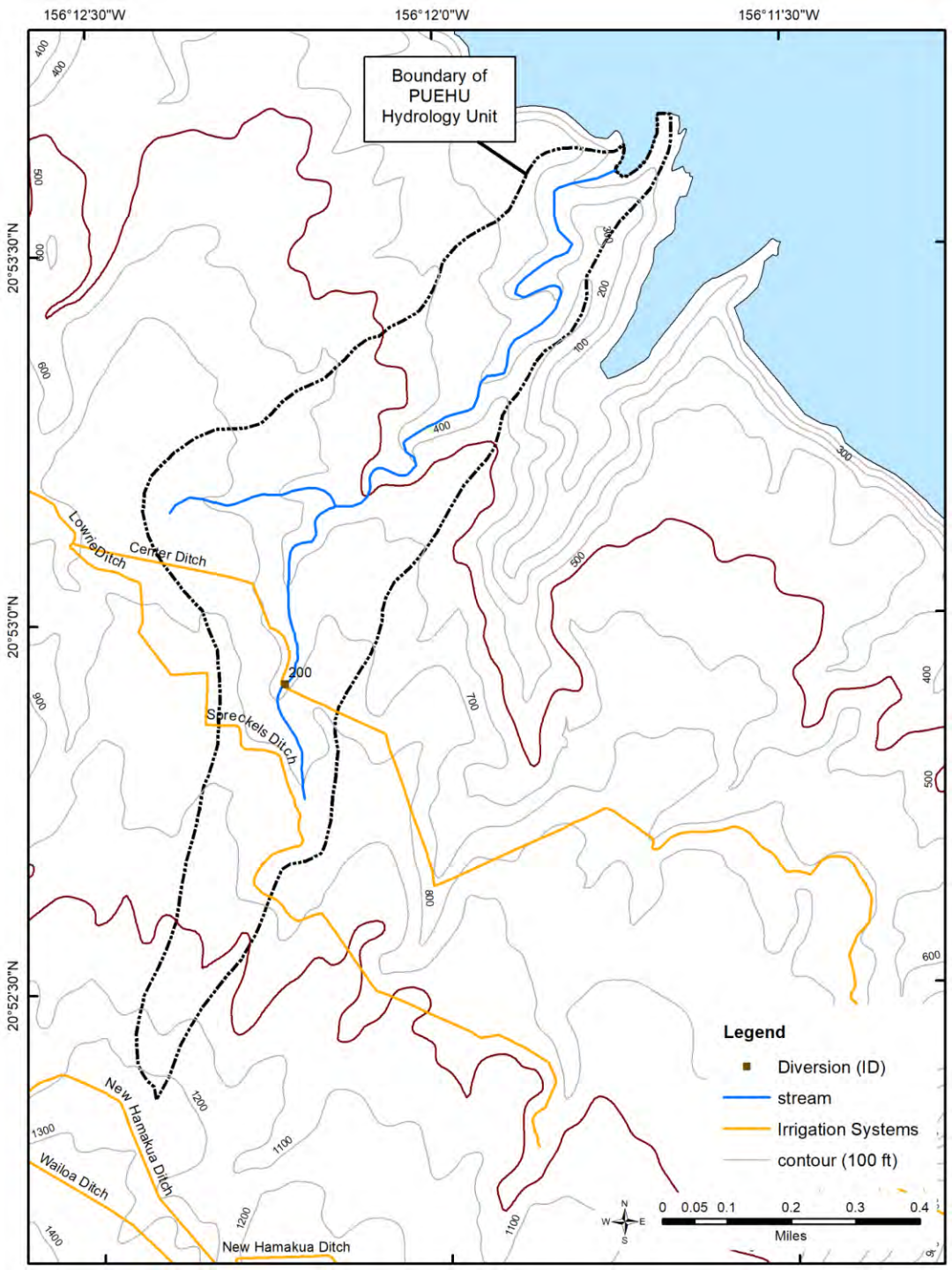
ʻOʻopuola Hydrologic Unit: Center Ditch

Recommendation:
18-inch plate across grate to transport all baseflow up to 1.8 cfs

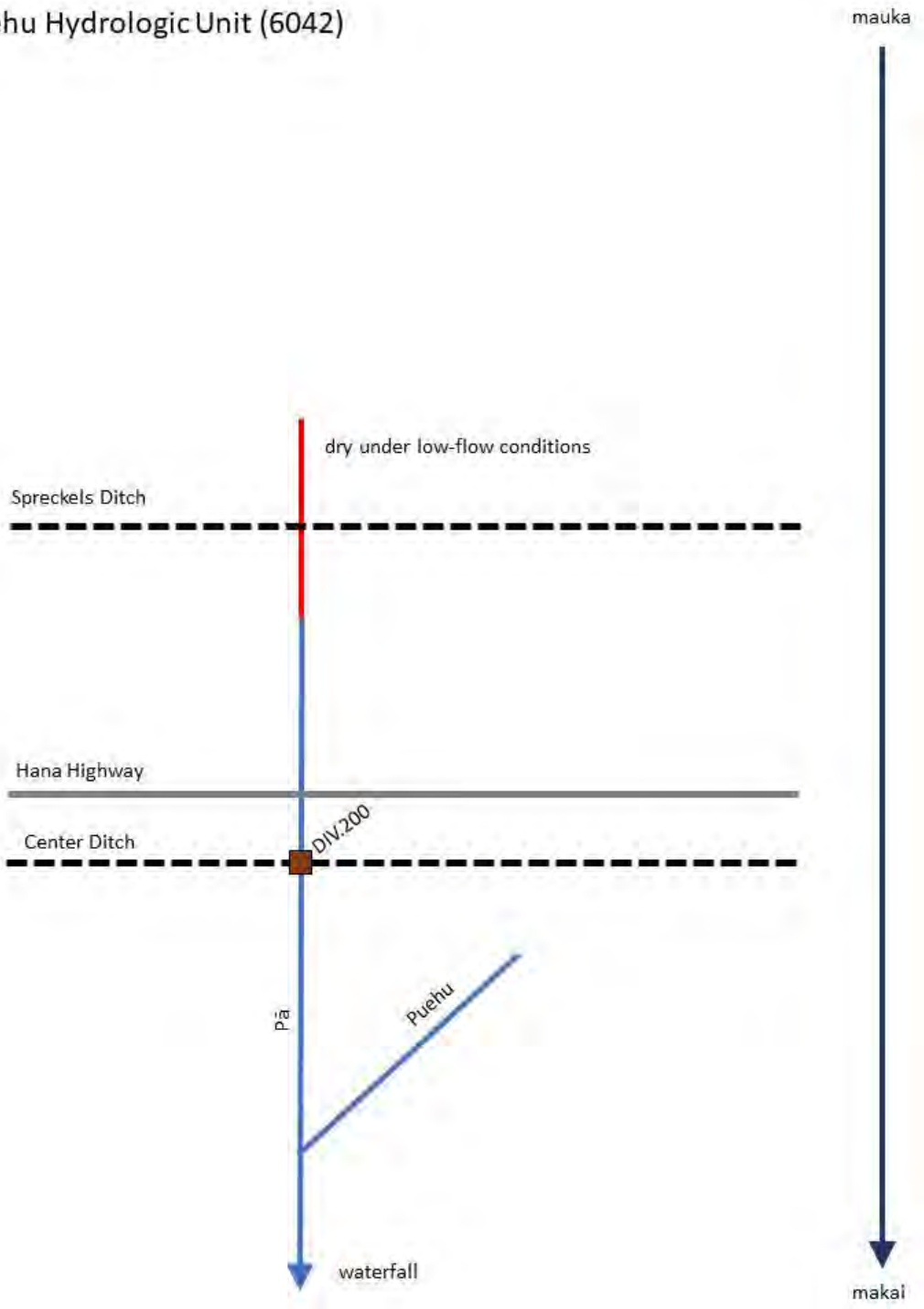
Puehu Hydrologic Unit: Diversions

Watershed Characteristics:
Area: 0.354 mi^2
Maximum elevation: 1680 ft
Land Use:
Total Stream Length: 2.94 mi
Terminal Order: 1

Biotic Information:
Terminal reach waterfall limits recruitment of amphidromous species
Small stream limits habitat availability
No native species observed in 7 site visits



Puehu Hydrologic Unit (6042)



Puehu Mouth

Puehu Hydrologic Unit: Instream uses

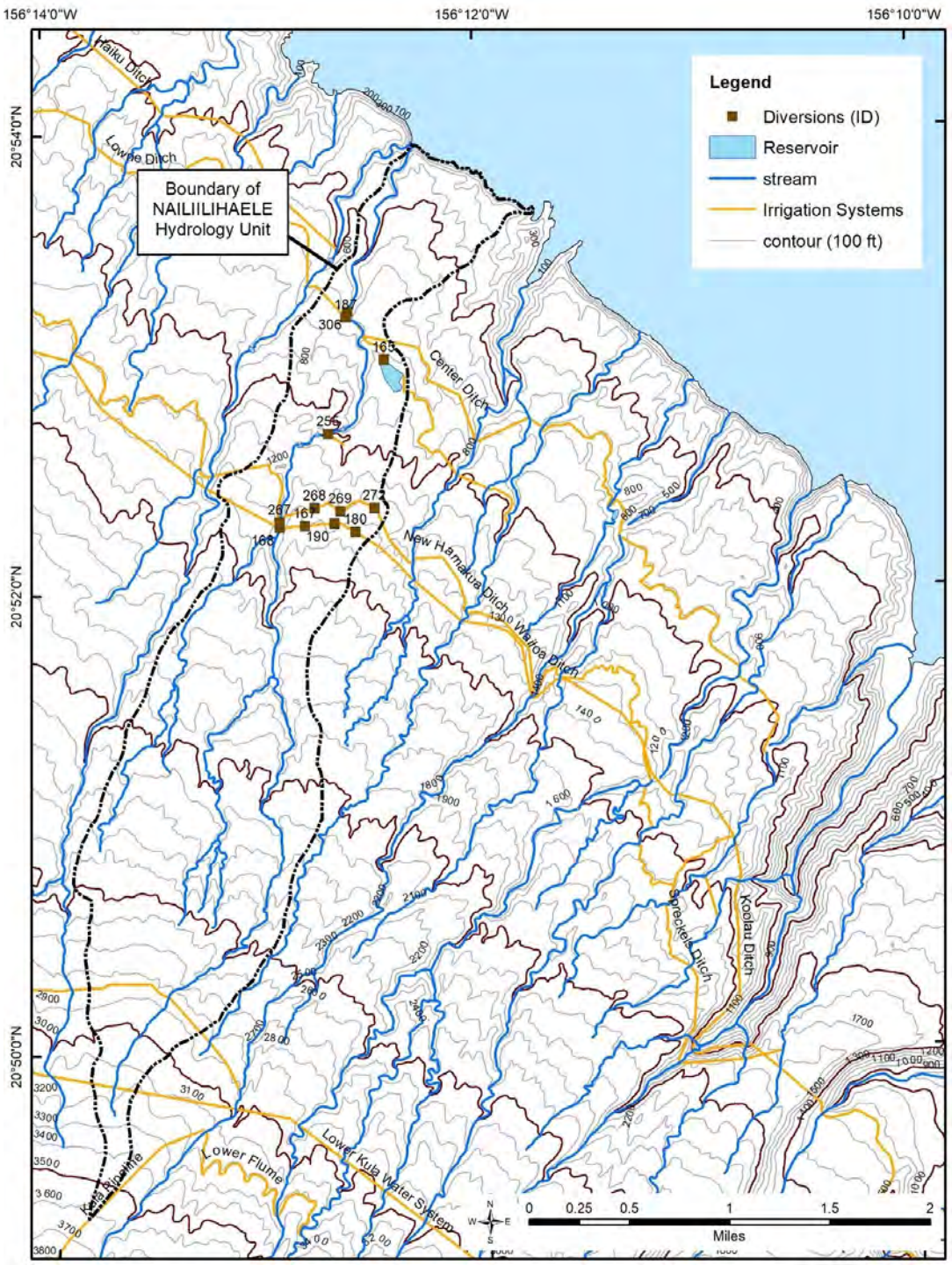
Limited instream uses
Recommendation: non-instream use

Nailiilihaele Hydrologic Unit: Diversions

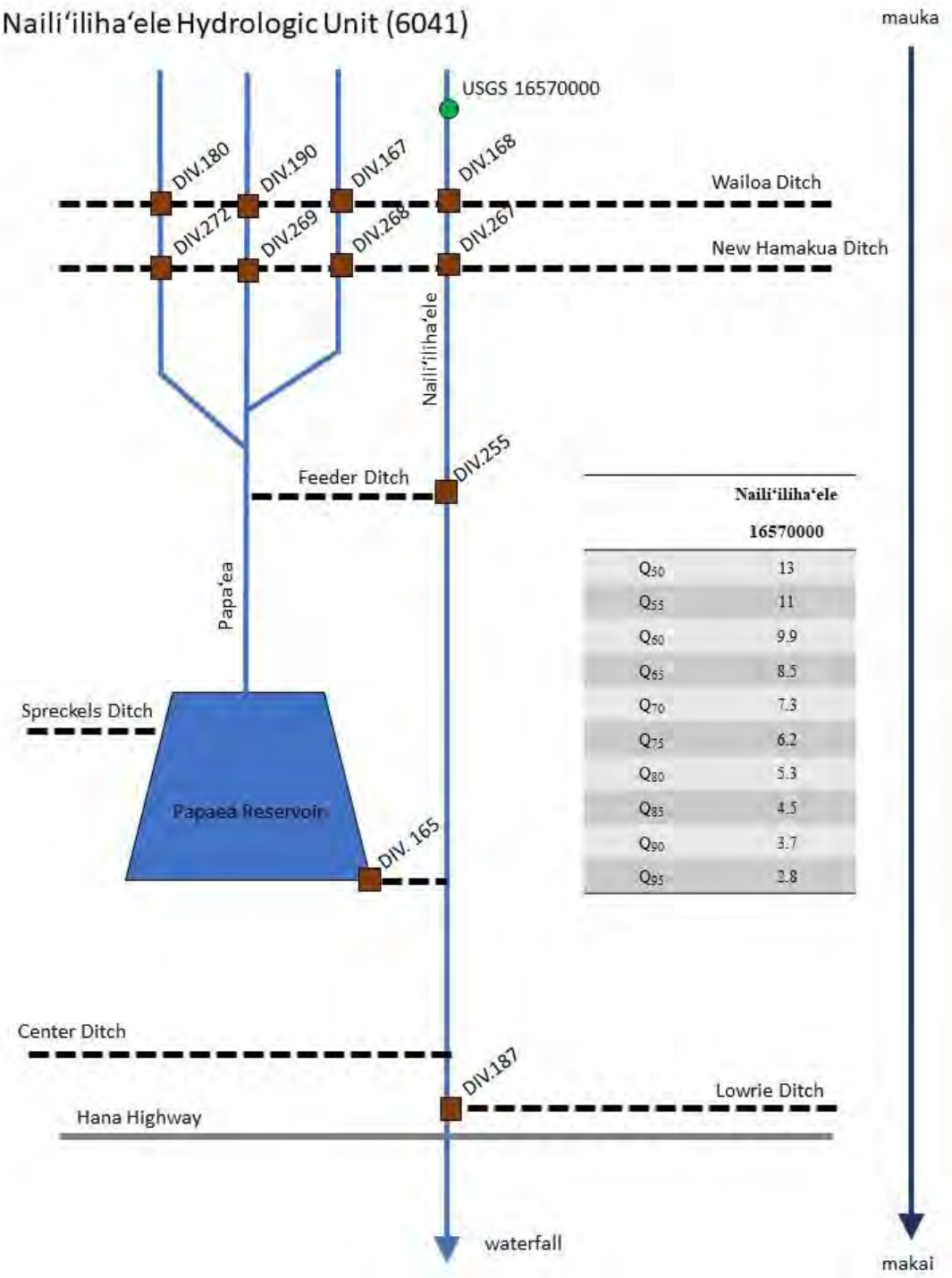
Watershed Characteristics:
Area: 3.53 mi^2
Maximum elevation: 5210 ft
Land Use: 8.2% agriculture; 91.8% conservation
Total Stream Length: 11.9 mi
Terminal Order: 3
Terminal Reach: multi-step waterfall

Watershed Rating:
Landcover: 10/10
Shallow Waters Rating: 0/10
Stewardship Rating: 6/10
Size Rating: 3/10
Wetness Rating: 8/10
Reach Diversity Rating: 5/10
Total Watershed Rating: 8/10

Hau bush encroachment above mouth
Watershed invaded with bamboo between 400 and 800 ft elevation

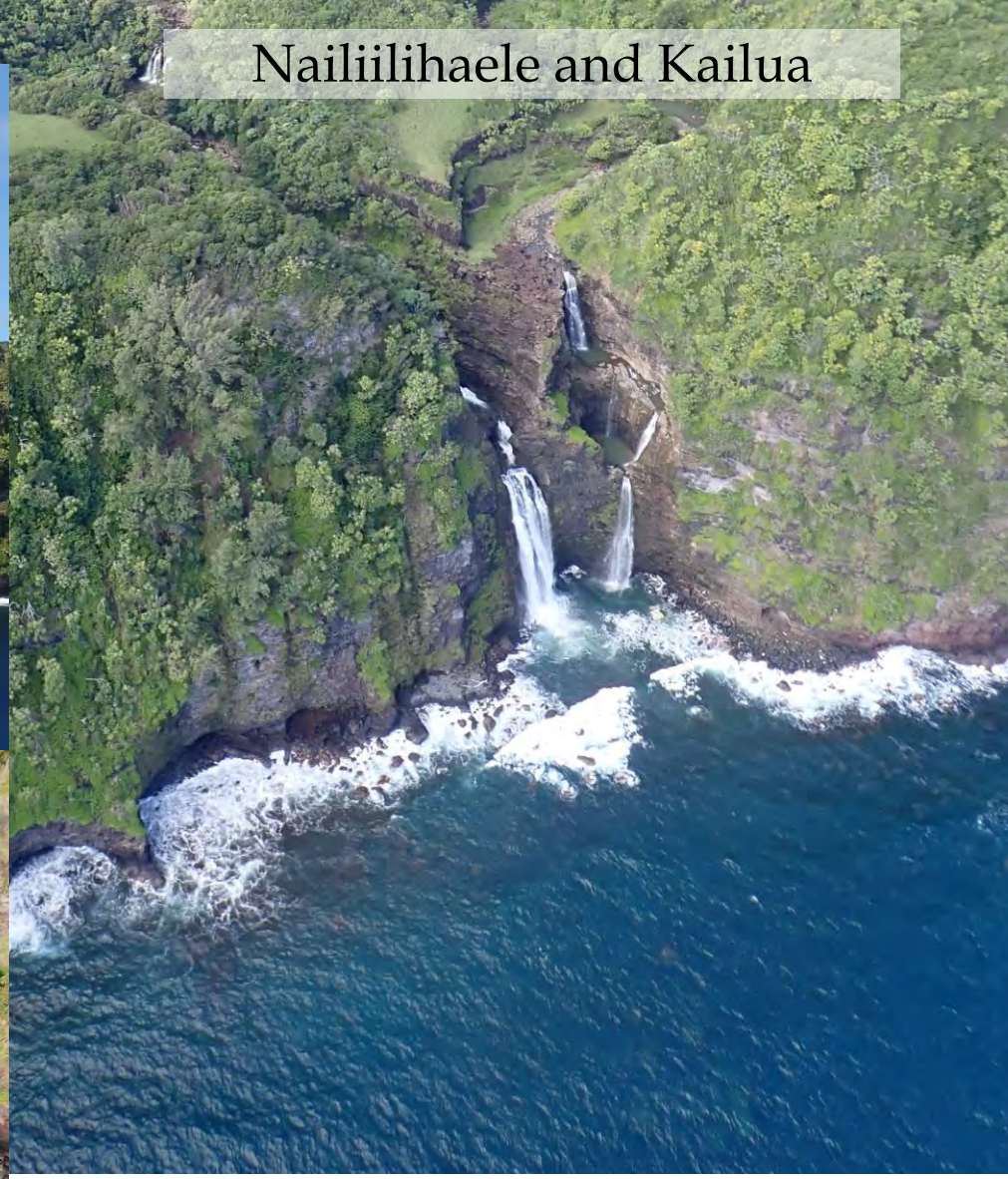


Naili'iliha'ele Hydrologic Unit (6041)



	Naili'iliha'ele 16570000
Q_{50}	13
Q_{55}	11
Q_{60}	9.9
Q_{65}	8.5
Q_{70}	7.3
Q_{75}	6.2
Q_{80}	5.3
Q_{85}	4.5
Q_{90}	3.7
Q_{95}	2.8

Nailiilihaele and Kailua



Commission on Water Resource Management
State of Hawaii

Nailiilihaele Hydrologic Unit: Instream Uses

kalo not grown in watershed
Popular for swimming
unofficial trail crisscrosses stream on private land
Biotic Information:
-Terminal reach waterfall limits recruitment of amphidromous species
-1961 DAR point quadrat survey:
Atyoida bisulcata in middle and upper reaches
-20 point-quadrant biota surveys (1 reach) conducted at 100ft near mouth (no native species), at 750ft above Lowrie Ditch (no native species), and at 1260ft above Wailoa Ditch (‘ōpae and ‘o‘opu alamo‘o observed) with flow restored past feeder ditch intake and Lowrie Ditch intake since 2016.

Proposed Management
Increased flow below the Wailoa/New Hāmākua ditches for aquatic habitat and recreational uses

Proposed Modifications for Implementation
Continual flow past DIV 185 (W-14): 18-inch plate across grate to provide connectivity
Continual flow past DIV 267 (NH-12): increase intake invert to maintain flow past dam (e.g., build a “chimney intake” or seal intake)
Continual flow past DIV 255 (NH-13): increased invert at intake (e.g., build a “chimney intake” or seal intake)
Continual flow past DIV 187 (L-1): maintain wetted path over dam via notch in concrete to transport all flows up to 5.2 cfs downstream

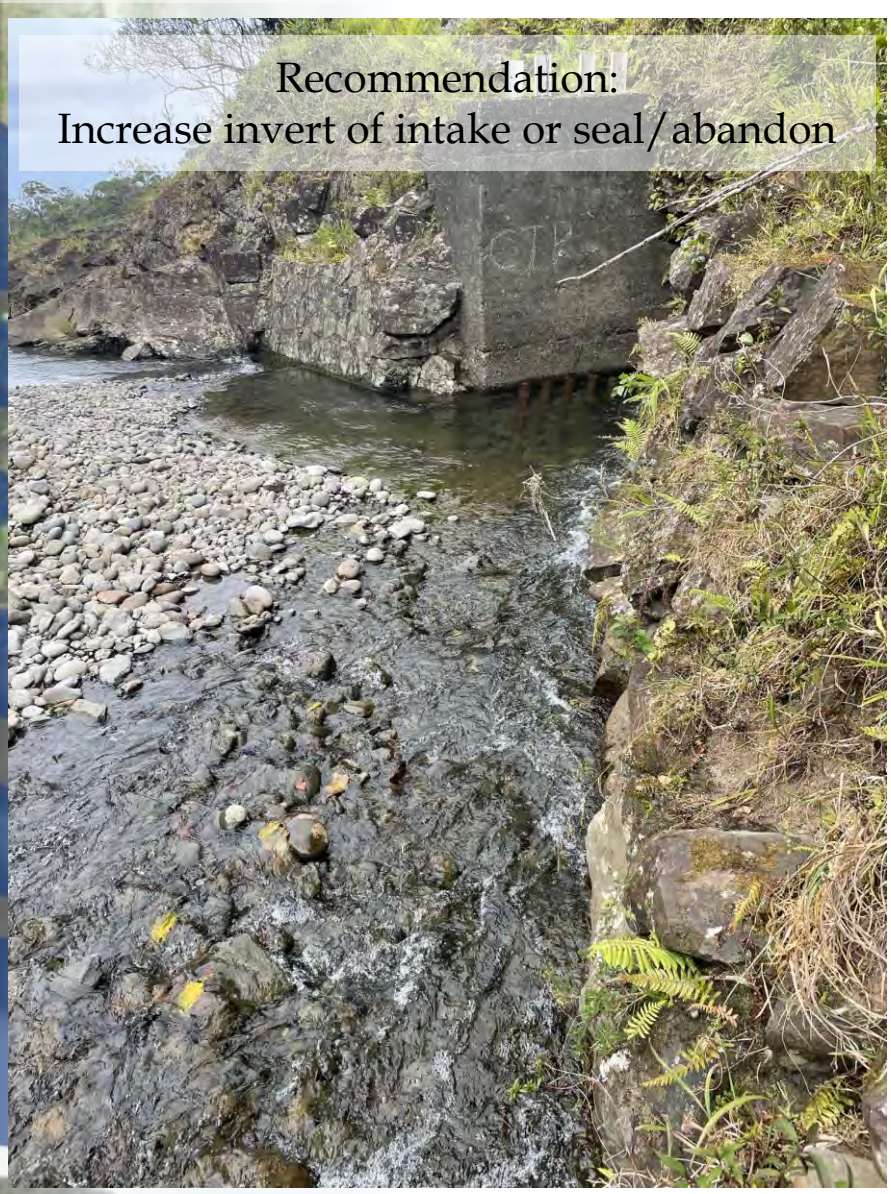
Nailiilihaele at Wailoa Ditch

Recommendation:
18-inch plate across grate to provide connectivity

Nailiilihaele at New Hāmākua Ditch

Recommendation:
Increase invert of intake or seal/abandon

Feeder Ditch Intake to Papaaea Reaservoir at Nailiilihaele



Papaaea Reservoir

Lowrie Ditch at Nailiilihaele

Recommendation:
Increase invert of intake and notch dam to pass flows up to 5.2 cfs

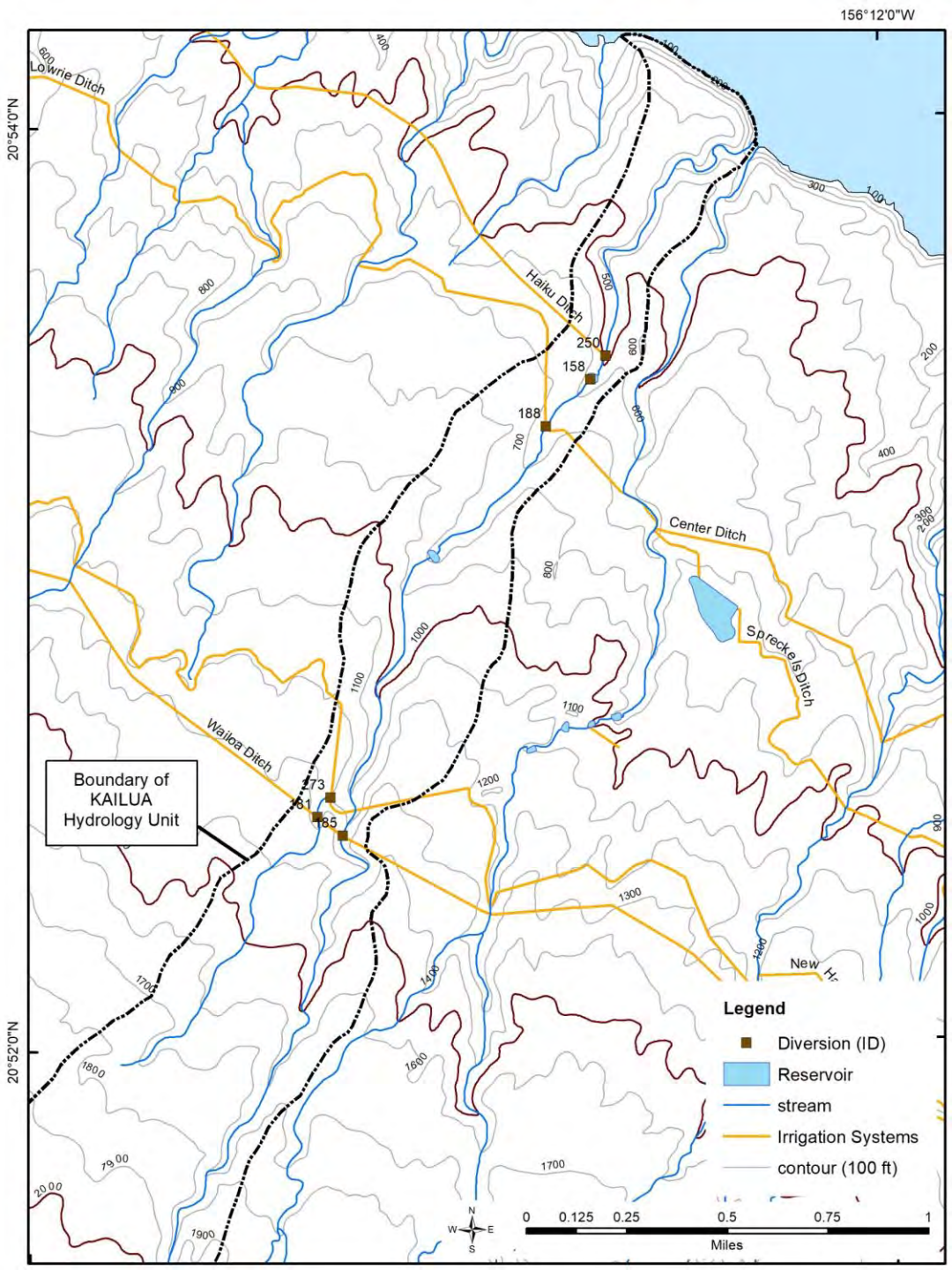
State of Hawaii

Kailua Hydrologic Unit: Diversions

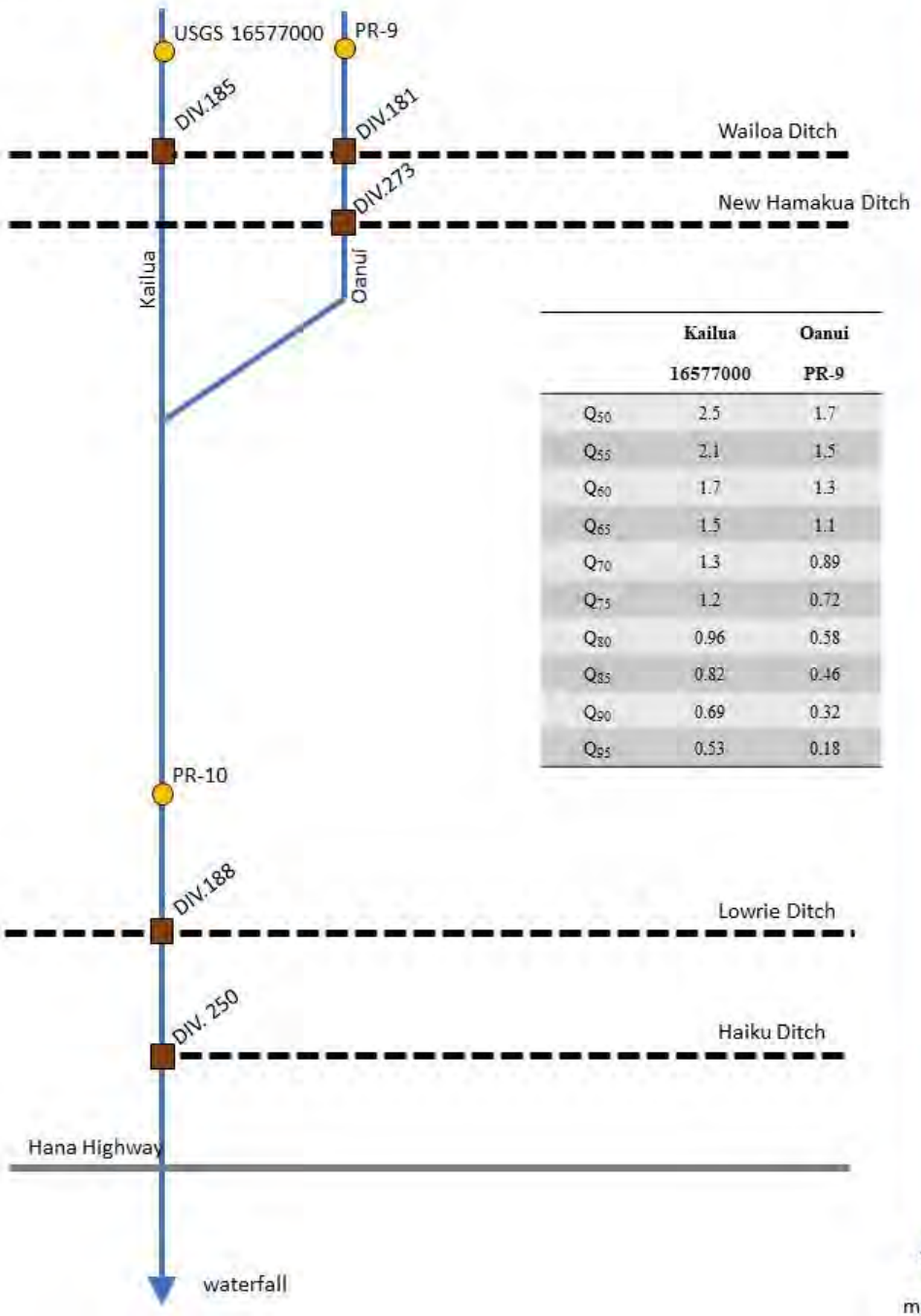
Watershed Characteristics:
Area: 4.9 mi^2
Maximum elevation: 6549 ft
Land Use: 17.9% agriculture; 82.1% conservation
Total Stream Length: 10.7 mi
Terminal Order: 2
Terminal Reach: waterfall

Watershed Rating:
Landcover: 10/10
Shallow Waters Rating: 1/10
Stewardship Rating: 7/10
Size Rating: 2/10
Wetness Rating: 7/10
Reach Diversity Rating: 5/10
Total Watershed Rating: 7/10

Riparian issues: hau bush encroachment above mouth and above Lowrie ditch

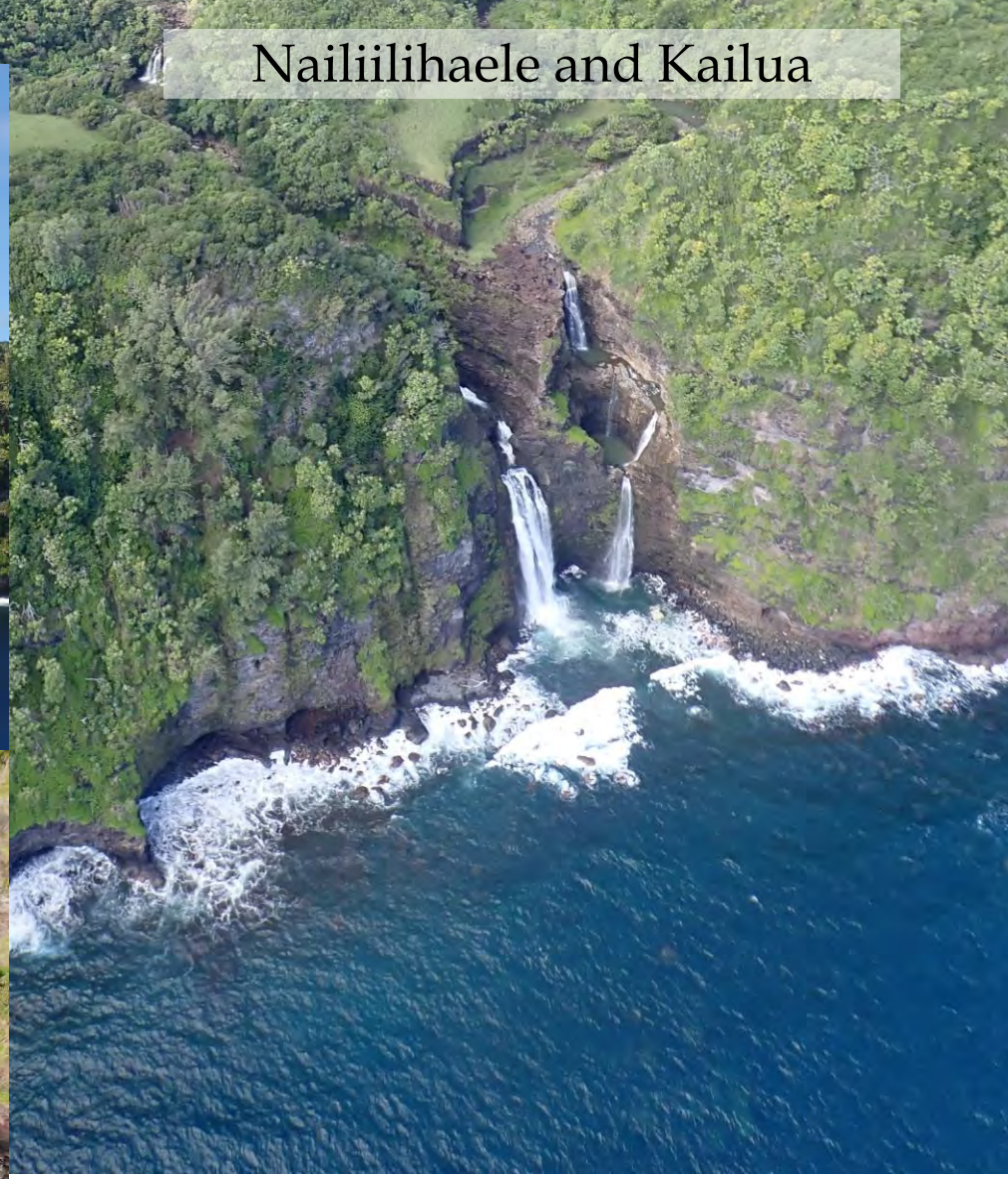


Kailua Hydrologic Unit (6040)



	Kailua 16577000	Oanui PR-9
Q_{50}	2.5	1.7
Q_{55}	2.1	1.5
Q_{60}	1.7	1.3
Q_{65}	1.5	1.1
Q_{70}	1.3	0.89
Q_{75}	1.2	0.72
Q_{80}	0.96	0.58
Q_{85}	0.82	0.46
Q_{90}	0.69	0.32
Q_{95}	0.53	0.18

Nailiilihaele and Kailua



Commission on Water Resource Management
State of Hawaii

Kailua Hydrologic Unit: Instream Uses

Kalo not grown in watershed
Popular for swimming
<u>Biotic Information:</u>
1961, 1962, 1988, 2003 surveys:
Atyoida bisulcata in middle and upper reaches
Sicyopterus stimpsoni in upper reaches
20 point-quadrant biota surveys (1 reach) conducted at 100 ft above mouth (no native species) and at 750 ft above Lowrie Ditch (no native species)

Proposed Management
Increased flow below Wailoa/New Hāmākua ditches for recreational uses

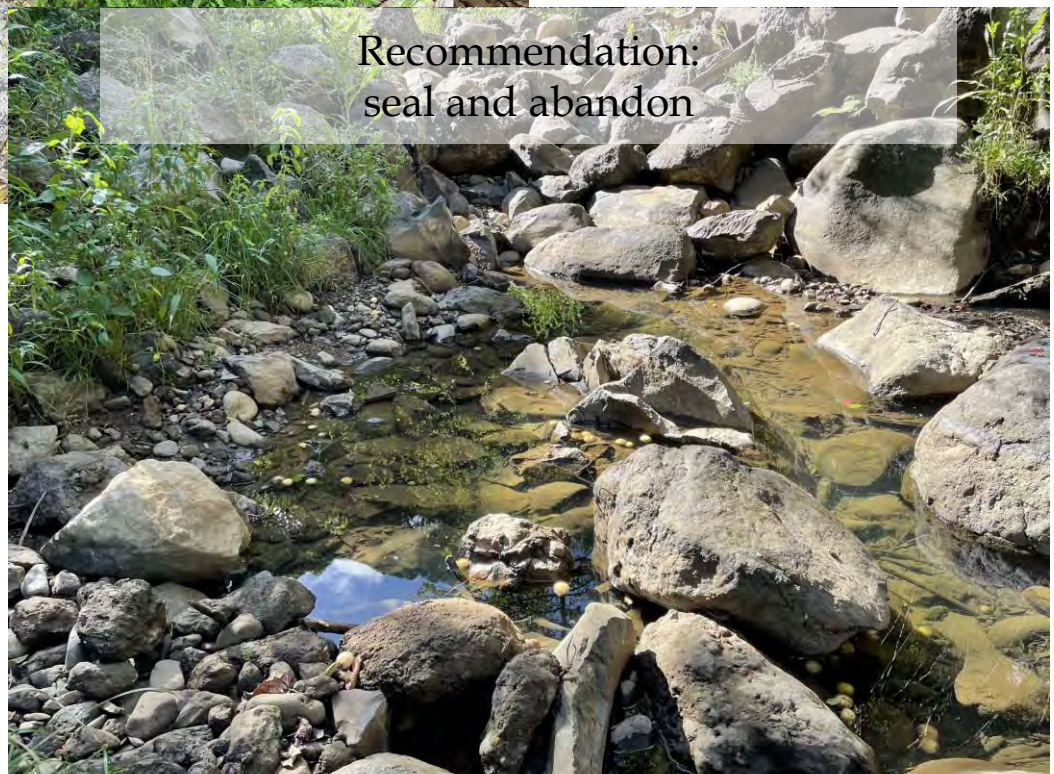
Proposed Modifications for Implementation
Continued flow past DIV 185 (W-15): 18-inch plate across grate to transport all flow up to 1.8 cfs
Abandon DIV 273 (NH-14): seal intake

Kailua Oanui

Kailua at Wailoa Ditch

Recommendation:
18-inch plate across grate to provide connectivity up to 1.8 cfs

Oanui at New Hāmākua Ditch



Recommendation:
seal and abandon

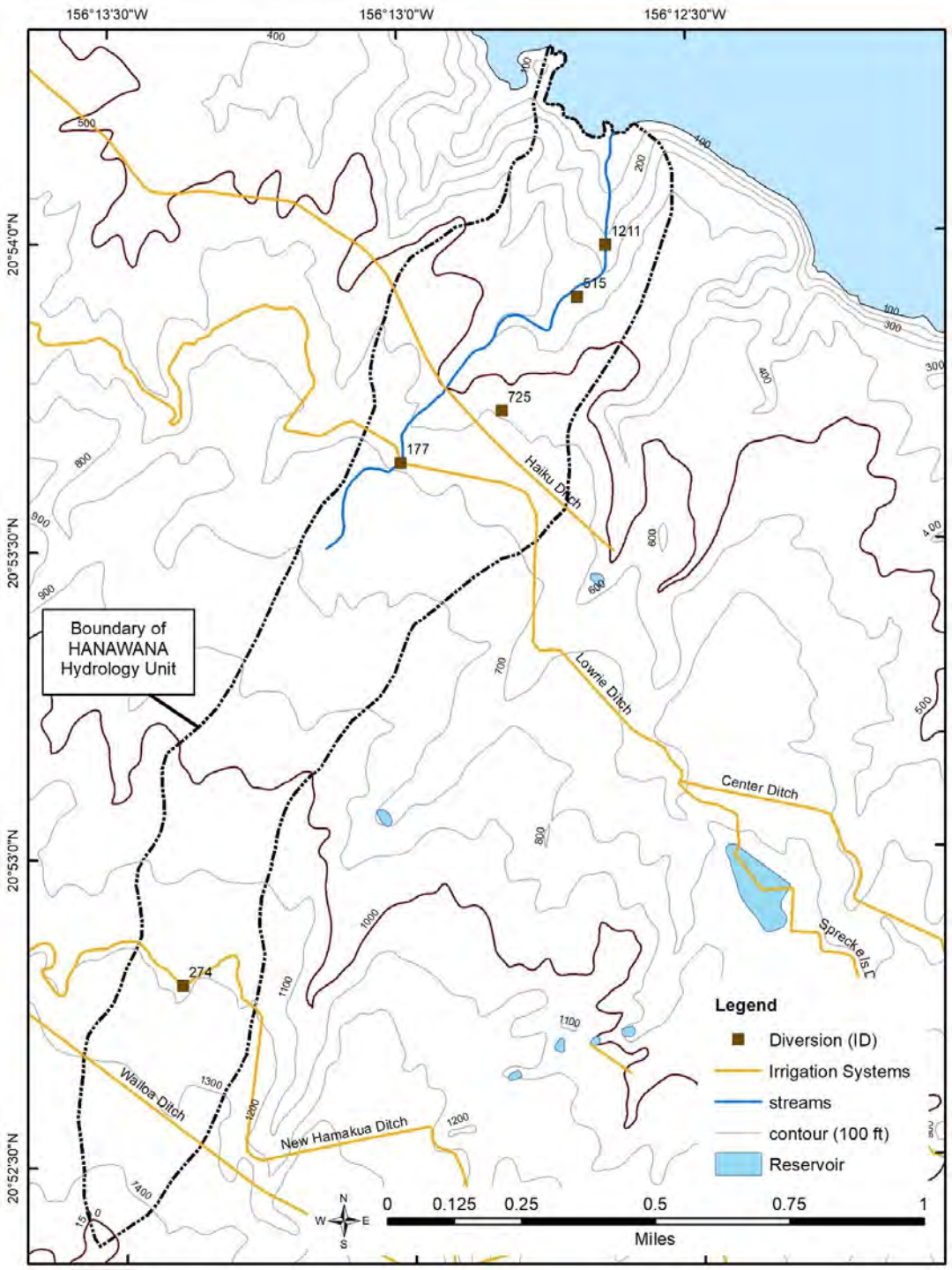
Hānawana Hydrologic Unit: Diversions

Watershed Characteristics:

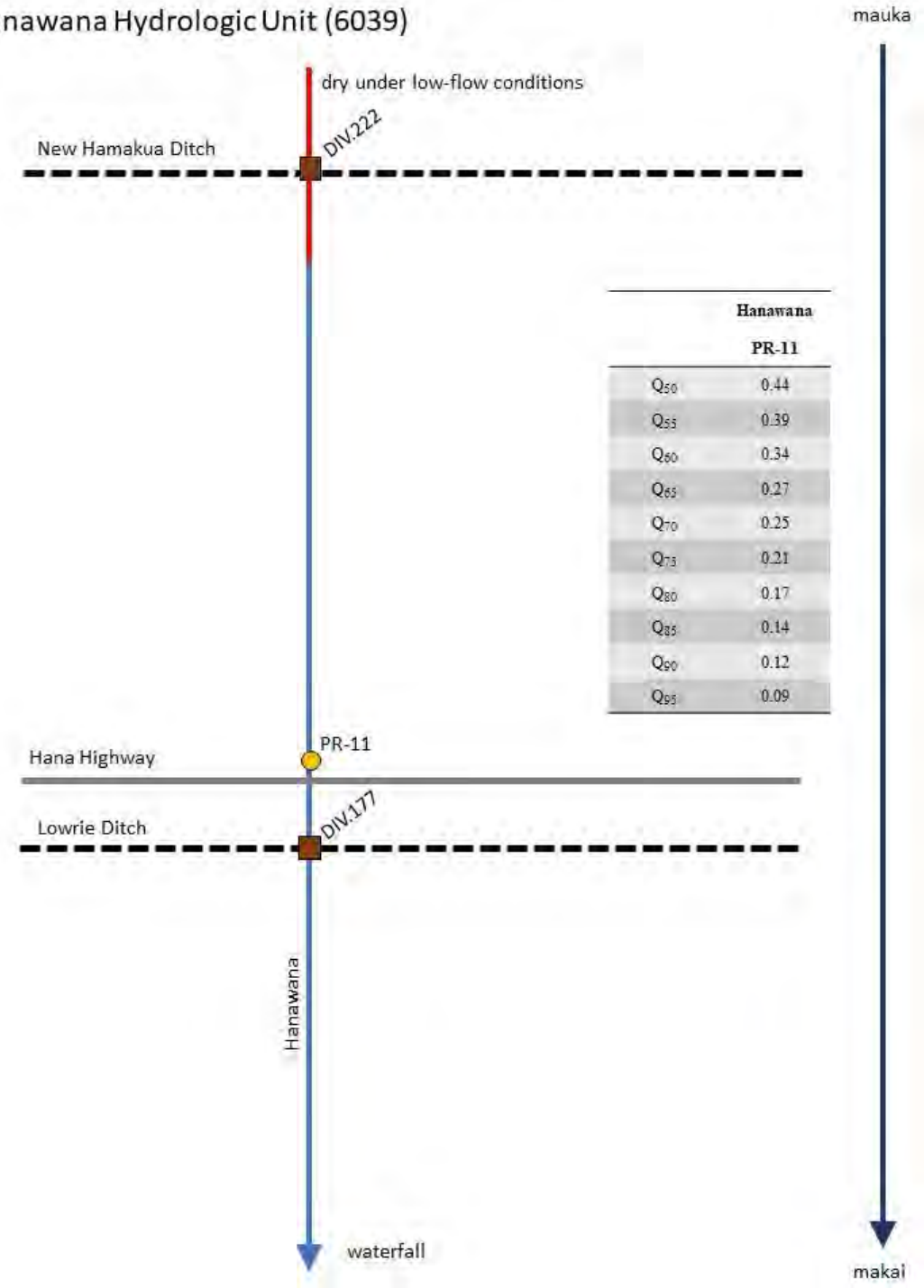
Area: 0.7 mi^2
Maximum elevation: 1535 ft
Land Use: 52.7% agriculture; 47.3% conservation
Total Stream Length: 0.8 mi
Terminal Order: 1

Watershed Rating:

Landcover: 9/10
Shallow Waters Rating: 0/10
Stewardship Rating: 3/10
Size Rating: 1/10
Wetness Rating: 5/10
Reach Diversity Rating: 1/10
Total Watershed Rating: 4/10



Hanawana Hydrologic Unit (6039)

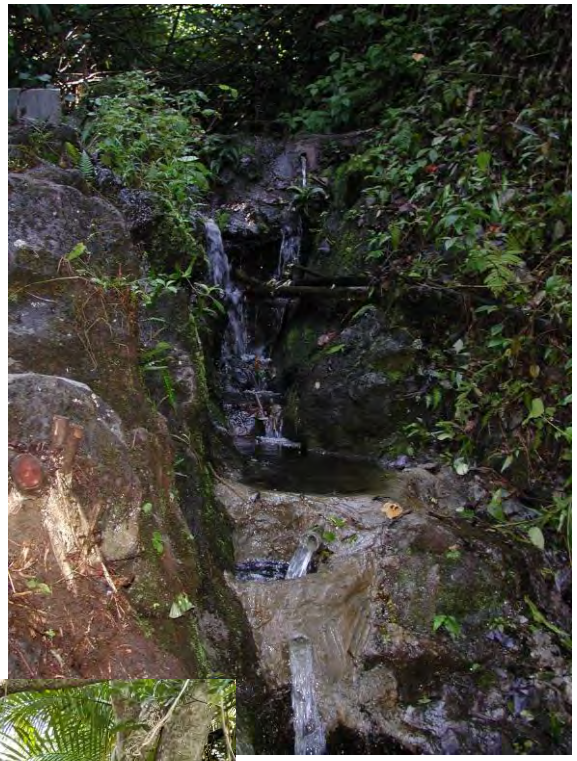


	Hanawana PR-11
Q_{50}	0.44
Q_{55}	0.39
Q_{60}	0.34
Q_{65}	0.27
Q_{70}	0.25
Q_{75}	0.21
Q_{80}	0.17
Q_{85}	0.14
Q_{90}	0.12
Q_{95}	0.09

Hānawana Hydrologic Unit: Instream Uses

Some recreational uses
Kalo historically grown below Lowrie Ditch
Downstream uses met with flow restored over Lowrie Ditch
→ Replace with flume that doesn't get plugged up with leaves

<u>Biotic Information:</u>
Small stream limits habitat availability
No native species observed in 20 site visits



Hānawana Lowrie Ditch Bypass

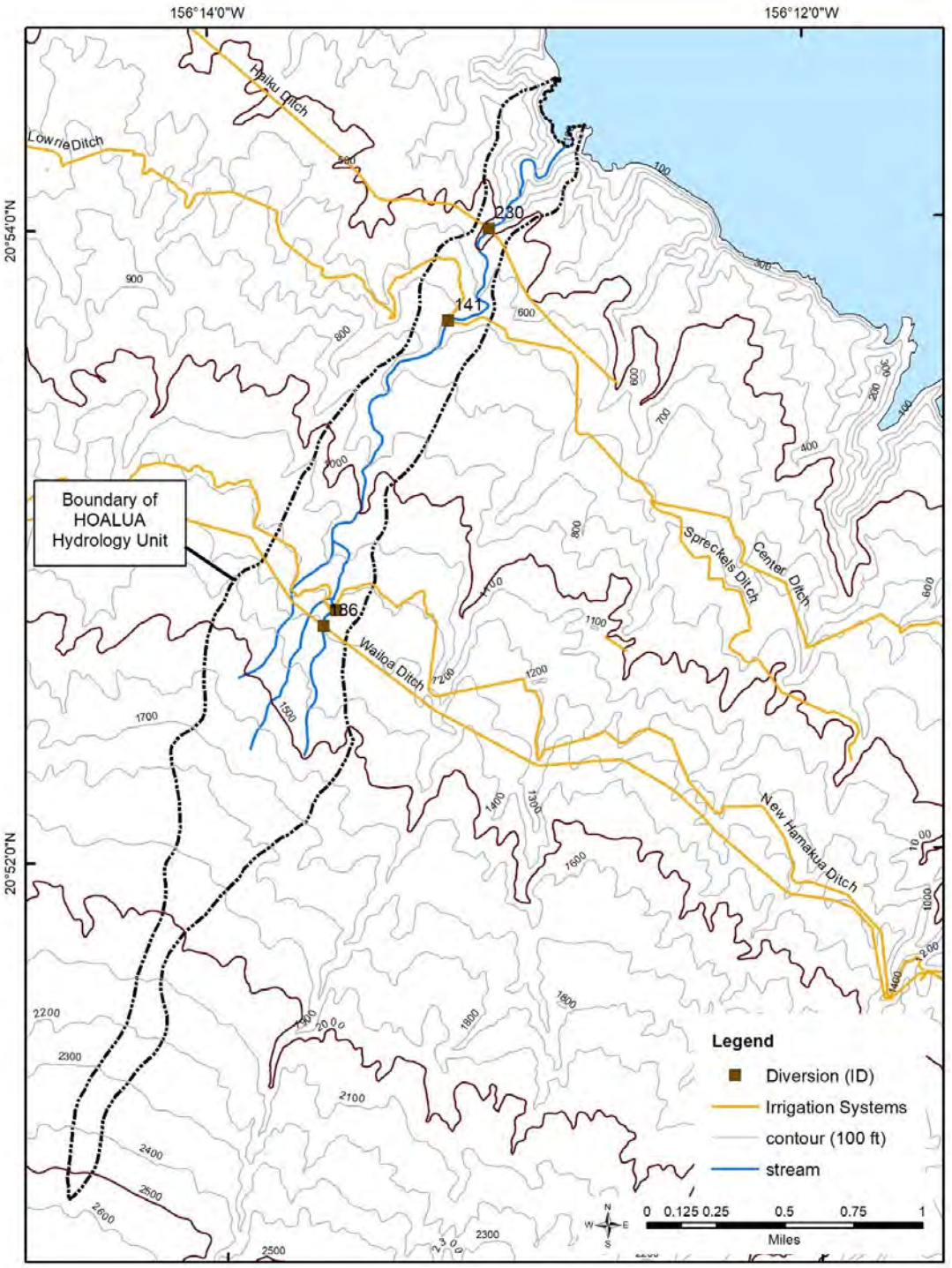
Non-EMI Hānawana Intakes

Hoalua Hydrologic Unit: Diversions

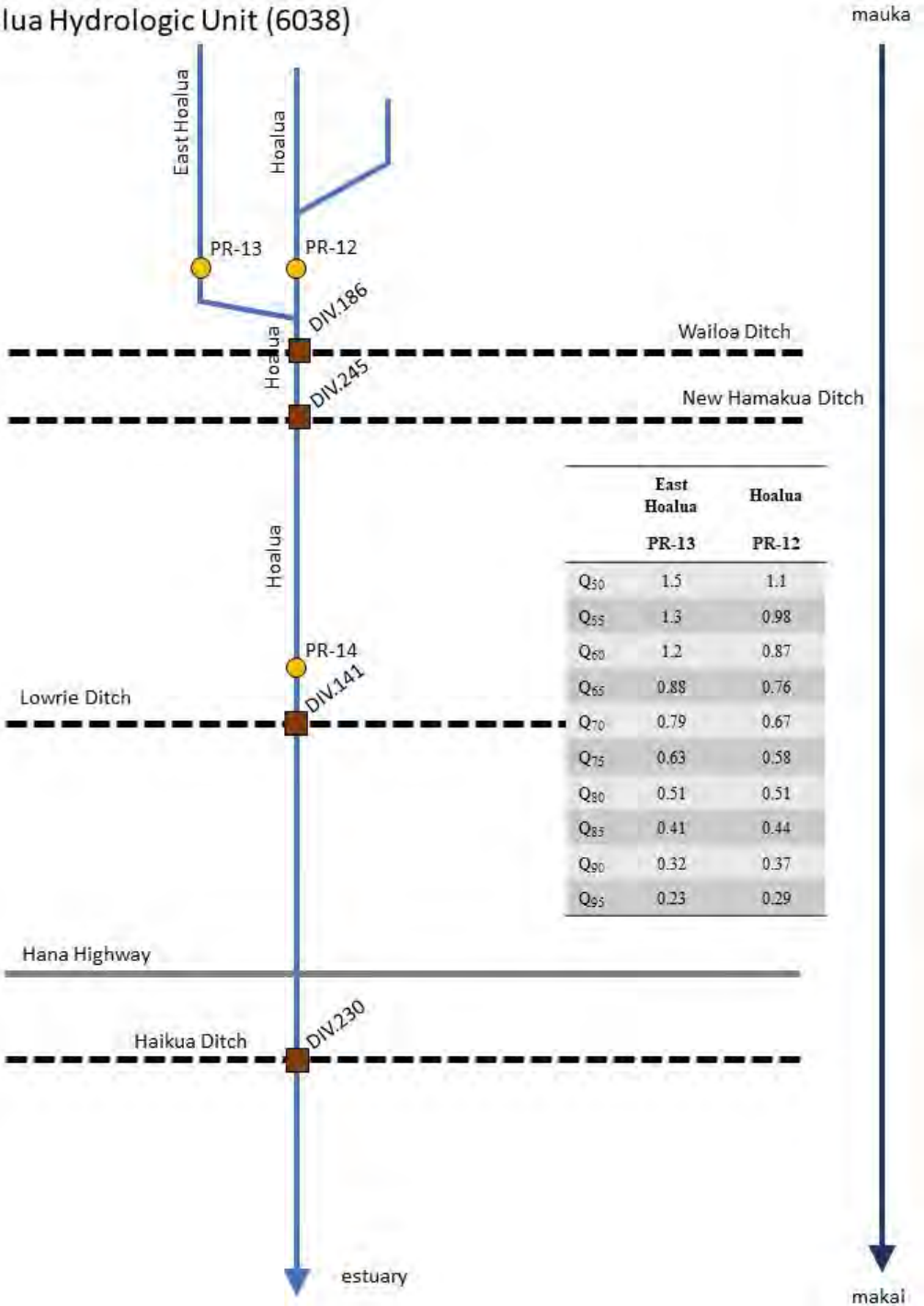
Watershed Characteristics:
Area: 1.3 mi^2
Maximum elevation: 2887 ft
Land Use: 14.6% agriculture; 85.4% conservation
Total Stream Length: 2.4 mi
Terminal Order: 1

Watershed Rating:
Landcover: 10/10
Shallow Waters Rating: 0/10
Stewardship Rating: 6/10
Size Rating: 1/10
Wetness Rating: 7/10
Reach Diversity Rating: 3/10
Total Watershed Rating: 7/10

Riparian vegetation: hau bush encroachment at mouth and at 600-700 feet; bamboo encroachment at 300-450 feet



Hoalua Hydrologic Unit (6038)



	East Hoalua PR-13	Hoalua PR-12
Q_{50}	1.5	1.1
Q_{55}	1.3	0.98
Q_{60}	1.2	0.87
Q_{65}	0.88	0.76
Q_{70}	0.79	0.67
Q_{75}	0.63	0.58
Q_{80}	0.51	0.51
Q_{85}	0.41	0.44
Q_{90}	0.32	0.37
Q_{95}	0.23	0.29

Hoalua Hydrologic Unit: Instream Uses

Kalo not grown in watershed
No recognized hiking trails
Biotic Information:
Terminal reach estuary
20 point-quadrant biota surveys (1 reach) conducted biota survey 100 ft above mouth (nothing observed) and at 700 ft below Lowrie Ditch (no native species observed) with continual flow restored below New Hamakua Ditch, Lowrie Ditch, and Haikua Ditch since 2016.

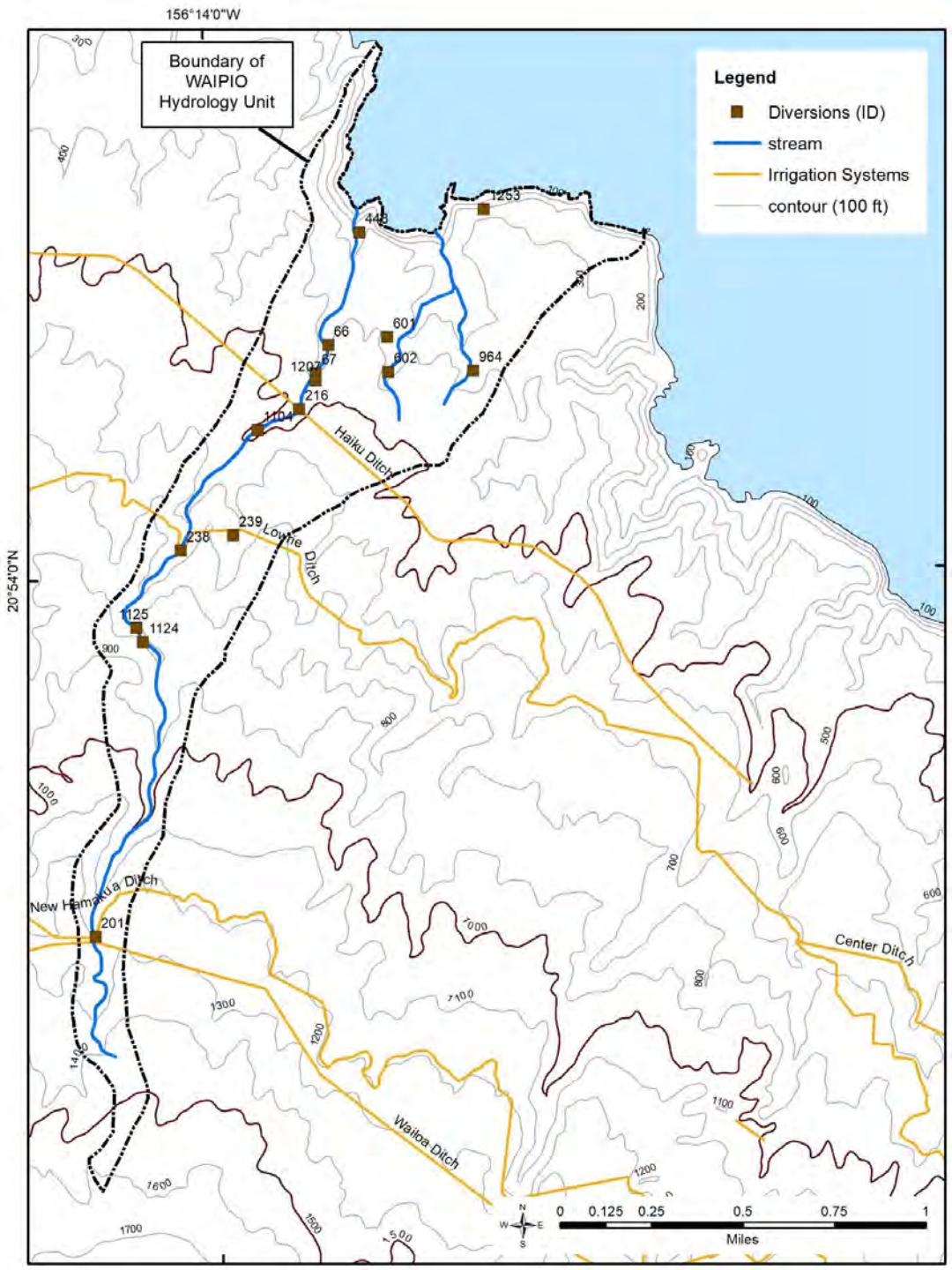
Proposed Management
Non-instream water use

Proposed Modifications for Implementation
none

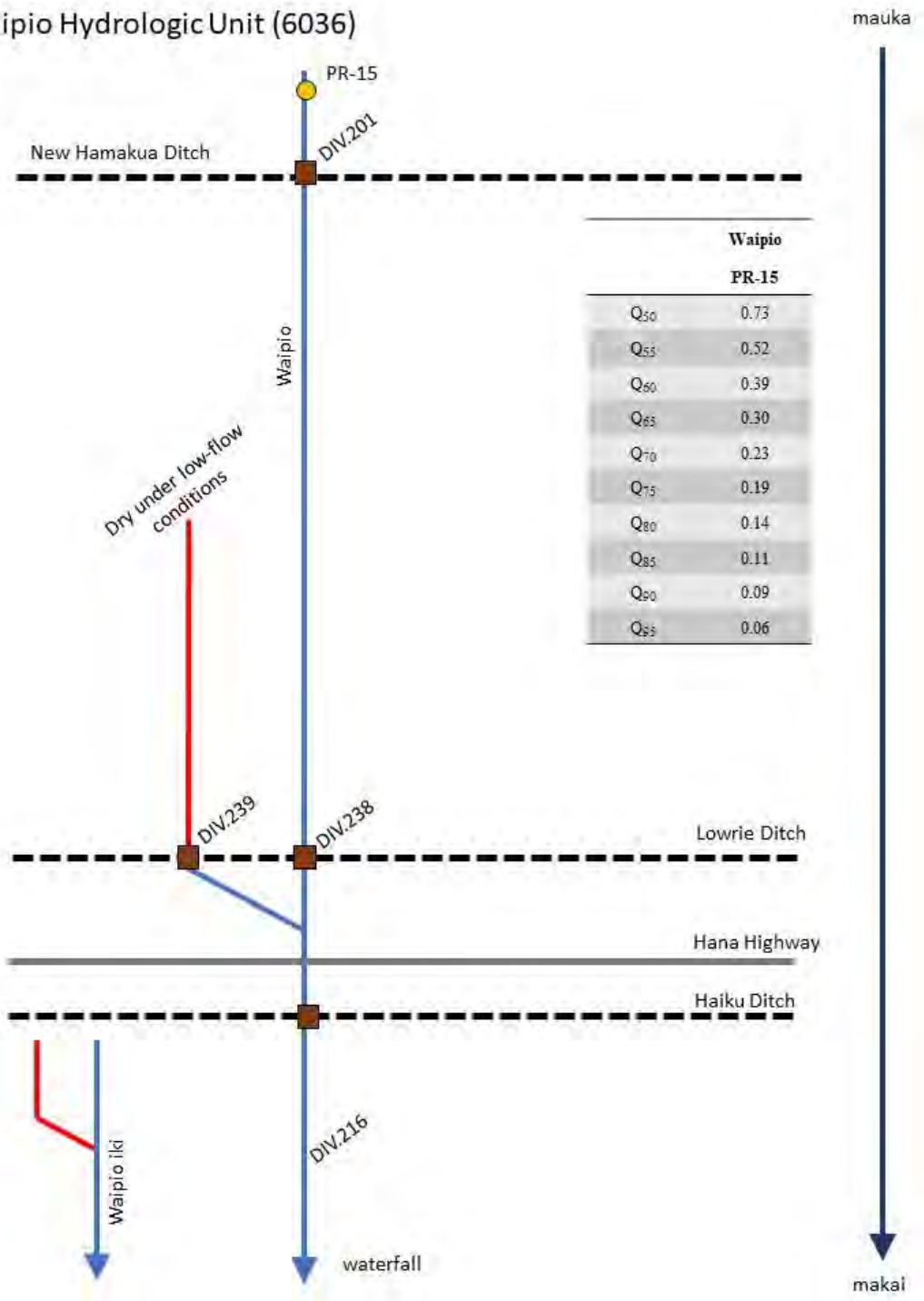
Waipi‘o Hydrologic Unit: Diversions

Watershed Characteristics:
Area: 0.6 mi^2
Maximum elevation: 1529 ft
Land Use: 39.7% agriculture; 60.3% conservation
Total Stream Length: 2.8 mi
Terminal Order: 1

Watershed Rating:
Landcover: 9/10
Shallow Waters Rating: 0/10
Stewardship Rating: 4/10
Size Rating: 1/10
Wetness Rating: 5/10
Reach Diversity Rating: 3/10
Total Watershed Rating: 5/10



Waipio Hydrologic Unit (6036)



	Waipio PR-15
Q_{50}	0.73
Q_{55}	0.52
Q_{60}	0.39
Q_{65}	0.30
Q_{70}	0.23
Q_{75}	0.19
Q_{80}	0.14
Q_{85}	0.11
Q_{90}	0.09
Q_{95}	0.06

Waipi‘o Hydrologic Unit: Instream Uses

No recognized trails
Registered riparian uses of water (agriculture, domestic)
kalo historically grown in watershed
<u>Biotic Information:</u>
Terminal reach waterfall
No native species observed in 18 site visits

Proposed Management
Increased flow below Lowrie ditch for riparian uses

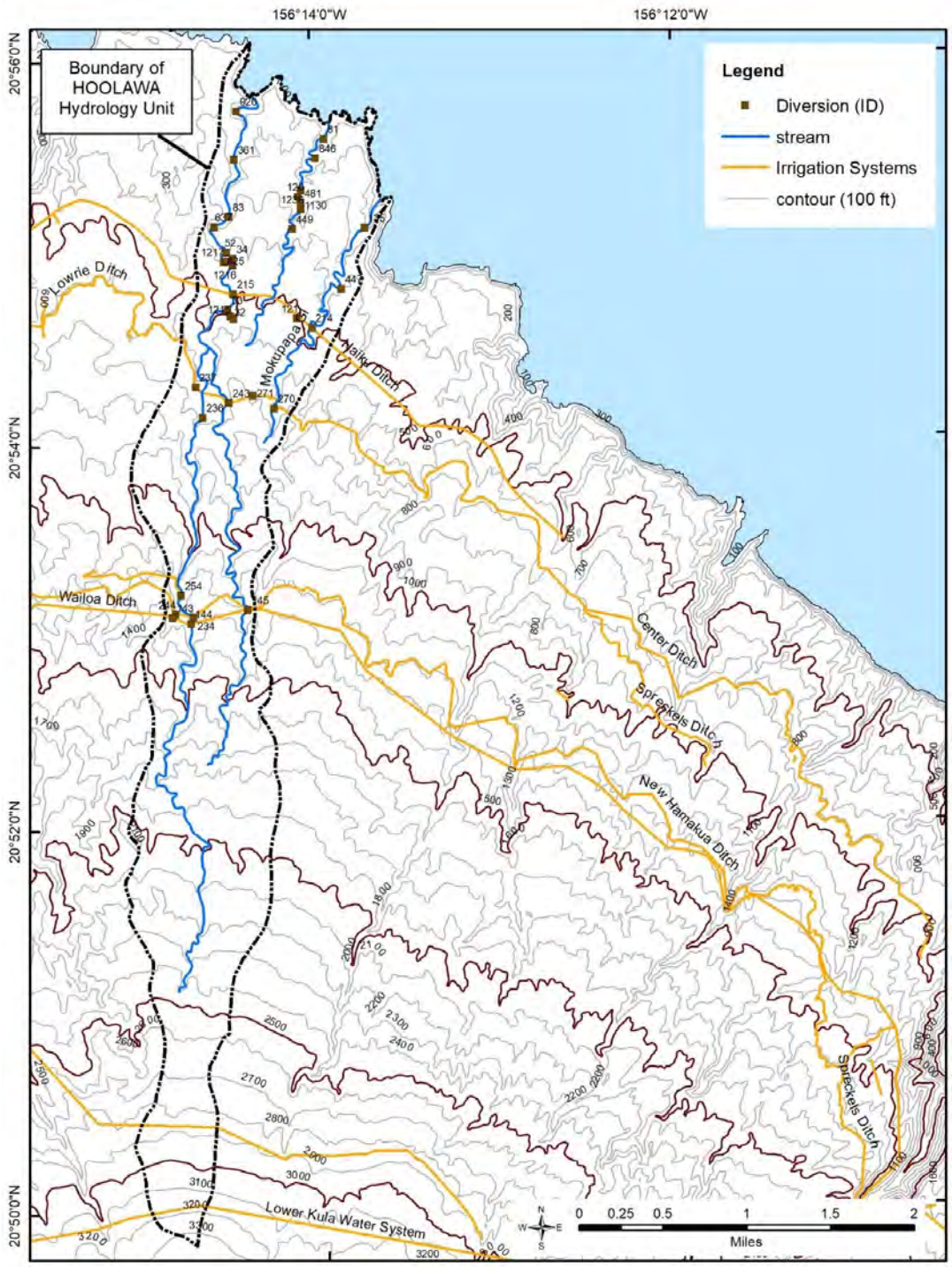
Proposed Modifications for Implementation
Abandon DIV.238 (L-8) on Waipi‘o stream

Waipiʻo at Lowrie Ditch

Ho‘olawa Hydrologic Unit: Diversions

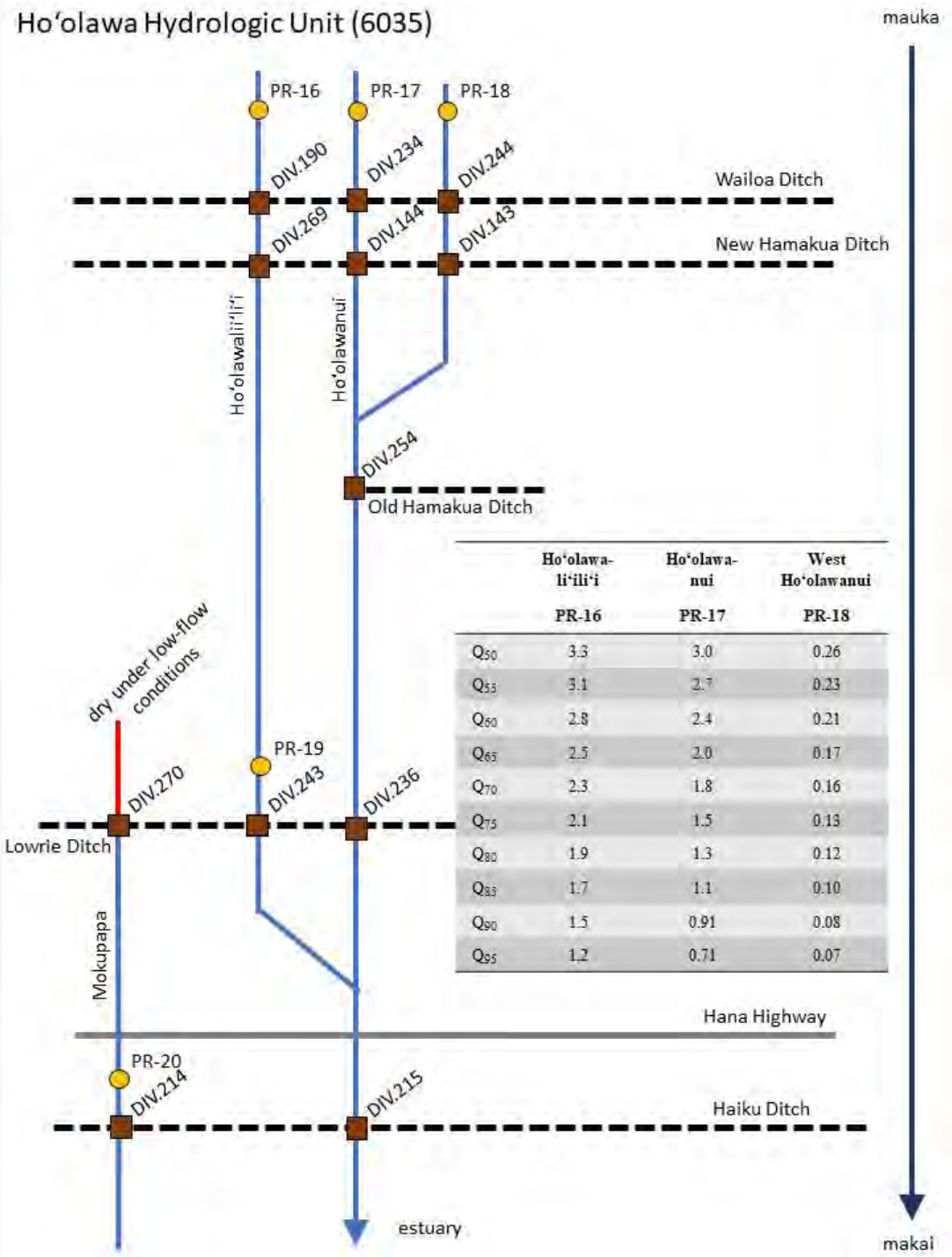
Watershed Characteristics:
Area: 3.6 mi^2
Maximum elevation: 3481 ft
Land Use: 14.6% agriculture; 85.4% conservation
Total Stream Length: 11.0 mi
Terminal Order: 2

Watershed Rating:
Landcover: 10/10
Shallow Waters Rating: 0/10
Stewardship Rating: 5/10
Size Rating: 2/10
Wetness Rating: 6/10
Reach Diversity Rating: 4/10
Total Score: 7/10



Hoʻolawa Mouth

Ho‘olawa Hydrologic Unit (6035)



	Ho‘olawa-li‘ili‘i	Ho‘olawa-nui	West Ho‘olawanui
	PR-16	PR-17	PR-18
Q_{50}	3.3	3.0	0.26
Q_{53}	3.1	2.7	0.23
Q_{60}	2.8	2.4	0.21
Q_{65}	2.5	2.0	0.17
Q_{70}	2.3	1.8	0.16
Q_{75}	2.1	1.5	0.13
Q_{80}	1.9	1.3	0.12
Q_{83}	1.7	1.1	0.10
Q_{90}	1.5	0.91	0.08
Q_{95}	1.2	0.71	0.07

Hoʻolawa Hydrologic Unit: Instream Uses

High value aesthetic and recreational stream
Many registered riparian uses of water (agriculture, domestic)
Biological Rating:
Terminal reach estuary which increases recruitment of amphidromous species
Multiple inland waterfalls preventing upstream recruitment
20 point-quadrant biota surveys (1 reach) conducted biota survey 10 ft above mouth (ʻoʻopu akupa and nākea observed) and at 400 ft above Haiku Ditch (no native species observed) with continual flow restored below Lowrie Ditch, and Haikua Ditch since 2016
Native Species Rating: 2/10
Introduced Genera Rating: 10/10
All Species Score: 5/10
Total Biological Rating: 5/10
Overall Rating: 6/10
Rating Strength: 5/10

Proposed Management
Increased flow below Wailoa/New Hāmākua ditches for recreational uses and aquatic habitat uses
Increased flow below Lowrie/Haiku ditches for recreational, riparian, and aquatic habitat uses

Proposed Modifications for Implementation
Continual flow past DIV 144 (W-19): 18-inch plate across grate
Continual flow past DIV 144 (W-20): 18-inch plate across grate
Abandon and seal DIV 234 (NH-19)
Continual flow past DIV 244 (NH-20): 18-inch plate
Abandon and seal DIV 254 (OH-1)
Continual flow past DIV 243 (L-12): support current leakage below dam with PVC piping from Lowrie ditch to ensure 0.7 cfs continues downstream
Continual flow past DIV 236 (L-13): support current bypass channel in bedrock by ensuring all flows up to 1.2 cfs continue downstream from the intake
Continual flow past DIV 215 (H-7): seal holes in intake wall and raise invert of ditch at intake such that all flows up to 3.0 cfs continue downstream.

Hoolawaliiilii abv Wailoa Ditch

Hoolawanui abv Wailoa Ditch

Hoolawanui abv New Hāmākua Ditch

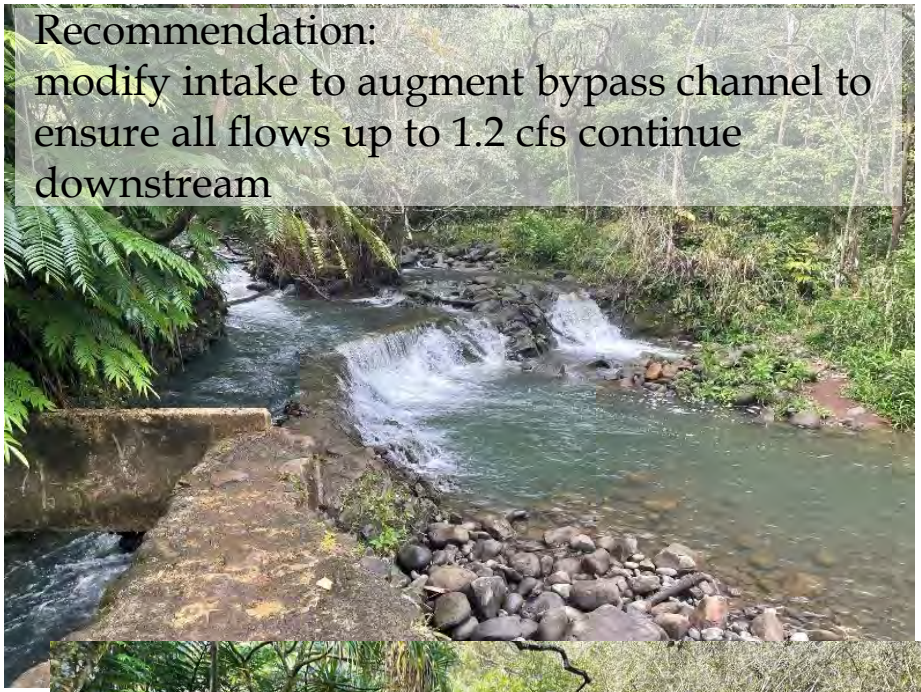
West Hoolawanui abv New Hāmākua Ditch

Hoolawaliilii abv Lowrie Ditch

Recommendation:
pipe flow from ditch to augment leakage to ensure at least 0.7 cfs flows below intake

Hoolawanui abv Lowrie Ditch

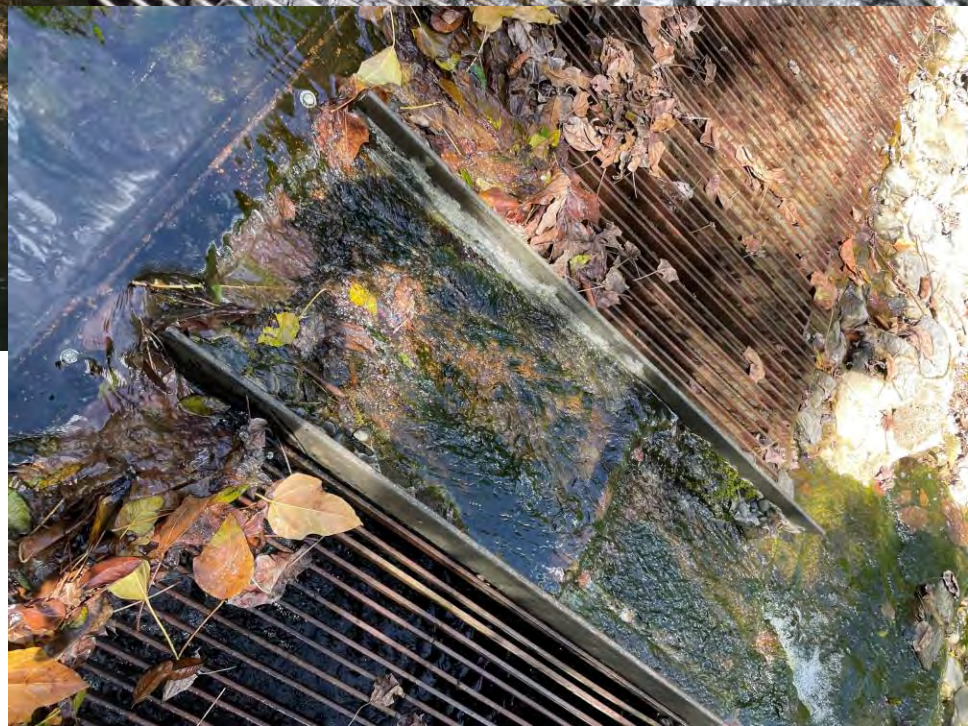
Recommendation:
modify intake to augment bypass channel to ensure all flows up to 1.2 cfs continue downstream



Hoʻolawa at Haʻikū Ditch

Recommendation:
Seal low-flow holes in intake wall;
Notch dam or raise intake invert to provide a continued wetted path for all flows up to 3.0 cfs

What does an 18-inch plate look like?

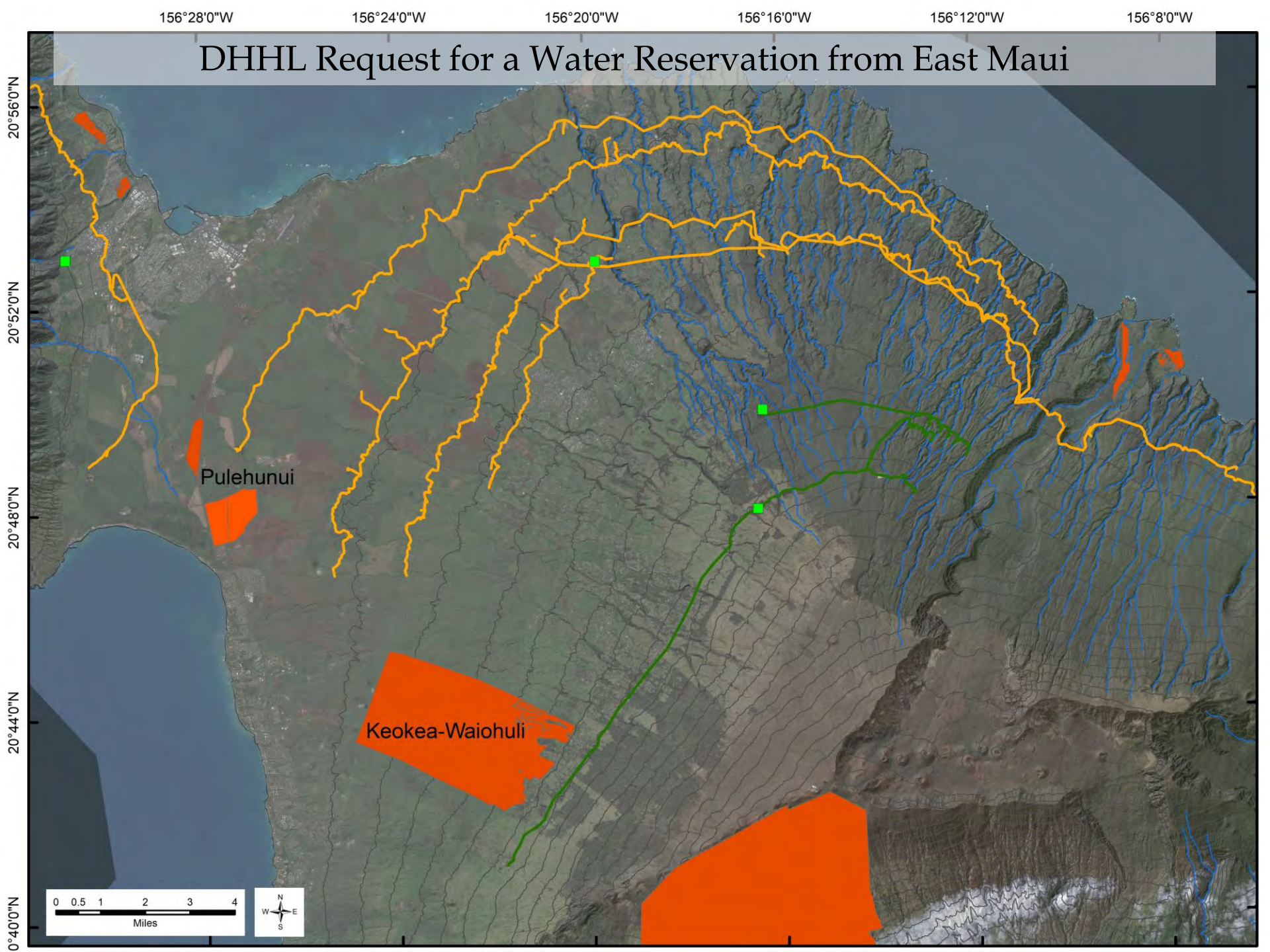


Prioritization of Modifications

Phase 1 (timeline to be developed in 180 days)

- Modification of C-5 on Ka‘aiea
- Modification of S-13 on ‘O‘opuola
- Modification of C-7 on ‘O‘opuola
- Modification of W-13 on Kailua
- Abandonment of NH-14 on Oanui
- Abandonment of L-8 on Waipi‘o stream
- Modification of H-7 on Ho‘olawa Stream

DHHL Request for a Water Reservation from East Maui



DHHL Request for a Water Reservation from East Maui: Pūlehunui Reservation Request

DAVID Y. IGE
GOVERNOR
STATE OF HAWAII

JOSH GREEN
LT. GOVERNOR
STATE OF HAWAII

WILLIAM J. AILA, JR.
CHAIRMAN
HAWAIIAN HOMES COMMISSION

TYLER I. GOMES
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P. O. BOX 1879
HONOLULU, HAWAII 96805

December 16, 2020

MEMORANDUM

TO: The Honorable Suzanne D. Case, Chairperson
Commission on Water Resource Management

FROM: William Ailā, Jr., Chair
Hawaiian Homes Commission

SUBJECT: Petition for Reservation of **11,177,500** gallons per day originating from the watershed of, and tributaries to, the East Maui streams diverted by the East Maui Irrigation system for non-potable water use in the Pūlehunui (**1,327,500 gallons per day)** and Kēōkea-Waiohuli Hawaiian Home Lands (**9,850,000 gallons per day)**.

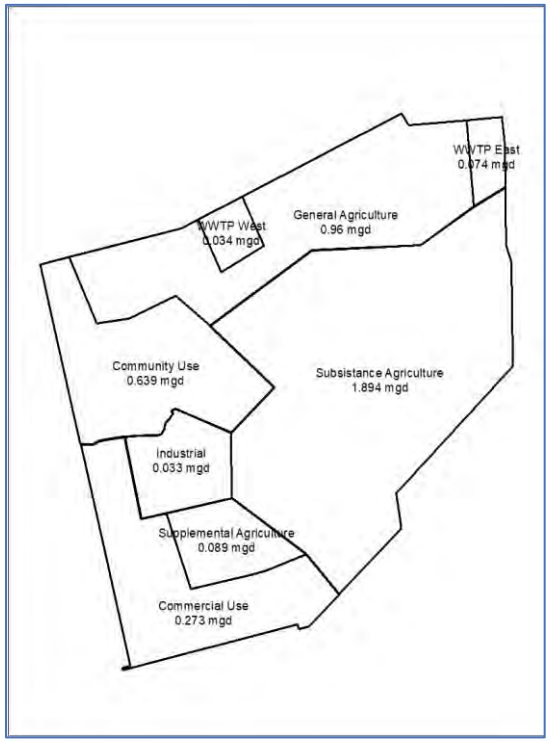
INTRODUCTION

The Department of Hawaiian Home Lands ("**DHHL**" or the "**Department**") hereby submits to the Commission on Water Resource Management ("**CWRM**") its Petition for Reservation of **11,177,500** gallons per day ("**gpd**") originating from the watersheds of East Maui and diverted by the East Maui Irrigation ("**EMI**") system for the current and foreseeable development and use of the Pūlehunui and Kēōkea-Waiohuli Hawaiian Home Lands, under the State Water Code, Hawaii Revised Statutes ("**HRS**") § 174C-101(a) and § 171-58(g) ("**Reservation Petition**").

Part II provides the legal basis for this Reservation Petition. Part III discusses the relevant background on Pūlehunui and Kēōkea-Waiohuli Hawaiian Home Lands, EMI system, and pending water lease giving rise to this Reservation Petition. Part IV describes the Department's methodology underlying its water demand for the current and foreseeable development and use of the Pūlehunui and Kēōkea-Waiohuli Hawaiian Home Lands. Part V provides a summary of beneficiary consultation on this Reservation Petition pursuant to HRS § 171-58(g). Appendix A is a list of exhibits attached to this Reservation Petition.

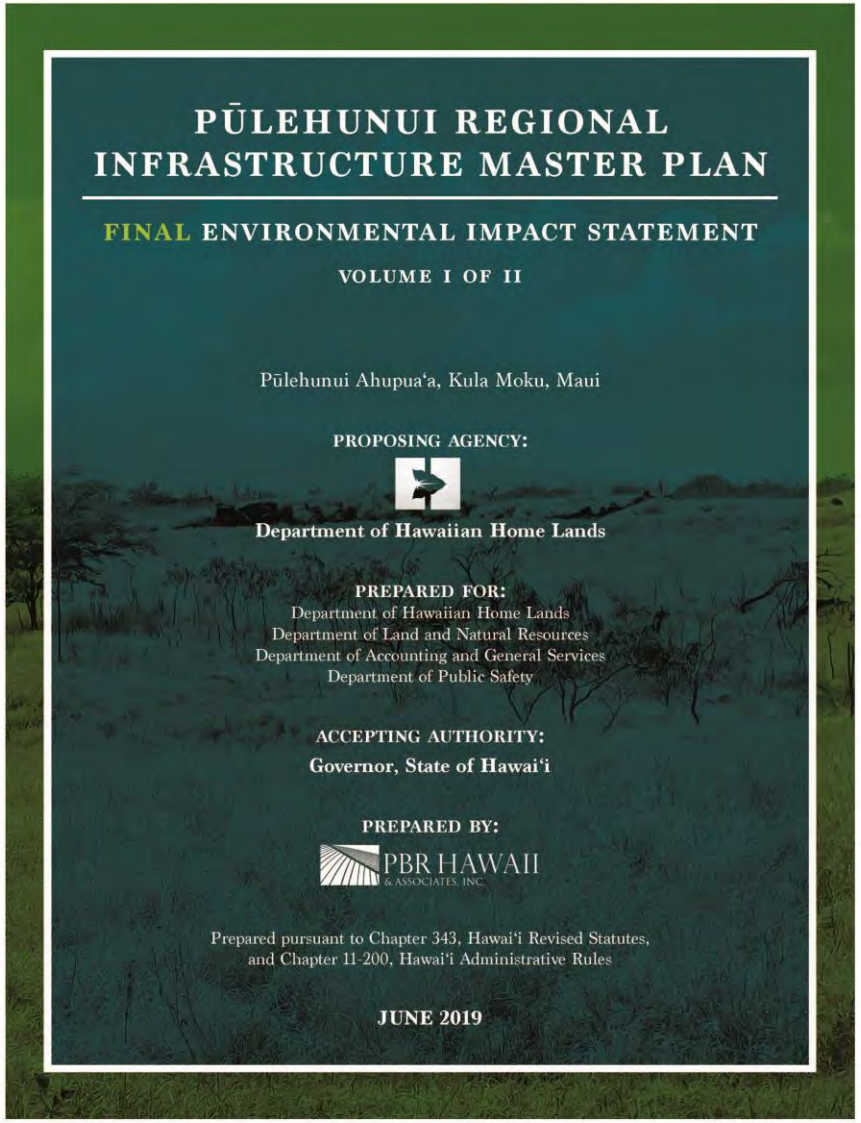
LEGAL BASIS

As trustees of the public trust in water, the CWRM has duties specifically related to the water needs of DHHL and its beneficiaries. Amongst these duties are the reservation of sufficient quantities of water for the Department for existing and future homestead uses.



Use	Acres	Demand (mgd)
Subsistance Agriculture	263.75	~0.897
General Agriculture	132.28	~0.450
Supplemental Agriculture	28.28	~0.096
non-potable reservation request		**1.3275 mgd**

DHHL Request for a Water Reservation from East Maui: Pūlehunui Regional Plan



PŪLEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN

FINAL ENVIRONMENTAL IMPACT STATEMENT

VOLUME I OF II

Pūlehunui Ahupuaʻa, Kula Moku, Maui

PROPOSING AGENCY:

Department of Hawaiian Home Lands

PREPARED FOR:
Department of Hawaiian Home Lands
Department of Land and Natural Resources
Department of Accounting and General Services
Department of Public Safety

ACCEPTING AUTHORITY:
Governor, State of Hawaiʻi

PREPARED BY:

PBR HAWAII & ASSOCIATES, INC.

Prepared pursuant to Chapter 343, Hawaiʻi Revised Statutes, and Chapter 11-200, Hawaiʻi Administrative Rules

JUNE 2019

DHHL Request for a Water Reservation from East Maui: Pūlehunui Regional Plan

LEGEND

- Pūlehunui South
- Maui Veterans Highway
- Intersection (Potential)
- Internal Access Roads (Assumed Primary)
- Future Kīhei Bypass (Concept)
- Future Keālia Pond Bypass (Concept)
- Mauka Connector Road (Concept)
- Prevailing Wind Direction
- Drainage Gulch
- Rocky Area / Not Recently Farmed
- Field Roads
- Man Made Objects
- Elevation Contours (5-ft intervals)

Flood Zones

- XS - 0.2% Annual Chance Flood
- A - 1% Annual Chance Flood
- AE - 1% Annual Chance Flood (BFE)
- AO - Flood Depths of 1-3'
- VE- Coastal Flood Zone, Wave Hazard (BFE)

Proposed Land Uses

	Farms	(±146 ac.)
	Ag Support	(±24 ac.)
	Subsistence Ag/Homesteads (2+ acre lots, approx. 80-100 lots)	(±238 ac.)
	Beneficiary Gardens	(±27 ac.)
	Commercial Enterprises	(±70 ac.)
	Farmers Market	(±11 ac.)
	Culture & Arts	(±18 ac.)
	Education	(±33 ac.)
	Roads	(±31 ac.)
	Open Space/Existing Gulch	(±48 ac.)
	Total Land Area	**646 ac.**

* WWTP Site Option (Other wastewater alternatives being evaluated.)

Source: USDA NRCS Aerial Basemap, 2016. National Flood Hazard Layer, Federal Emergency Management Agency, 2017. County of Maui, 2018.

Revised 7/3/2018

Figure 3-3: Pūlehunui South Conceptual Plan

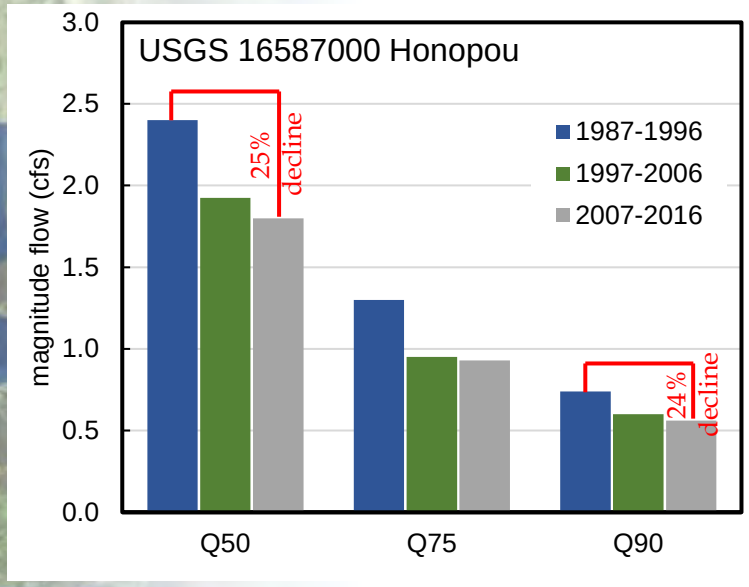
PŪLEHUNUI REGIONAL INFRASTRUCTURE MASTER PLAN

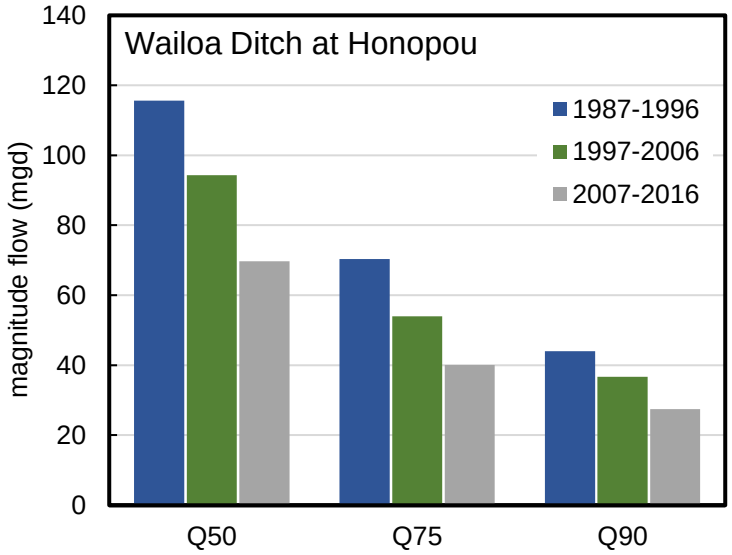
Department of Hawaiian Home Lands — Island of Maui

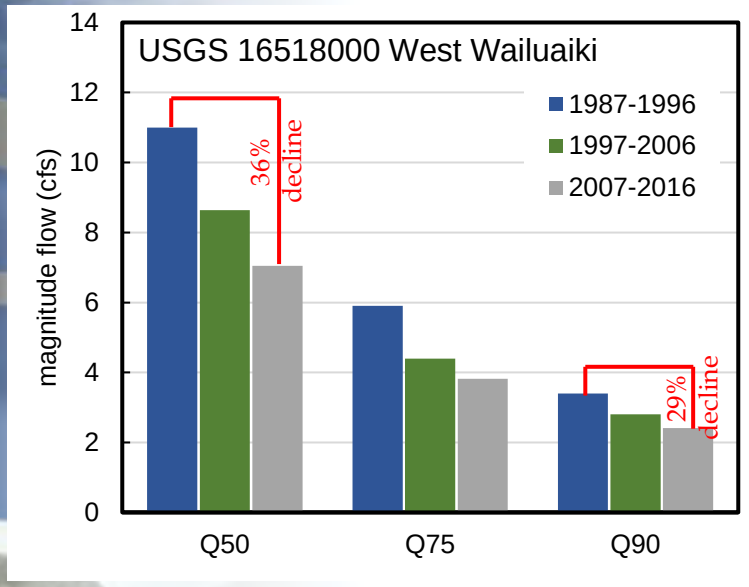
North — Linear Scale (feet) 0 500 1000

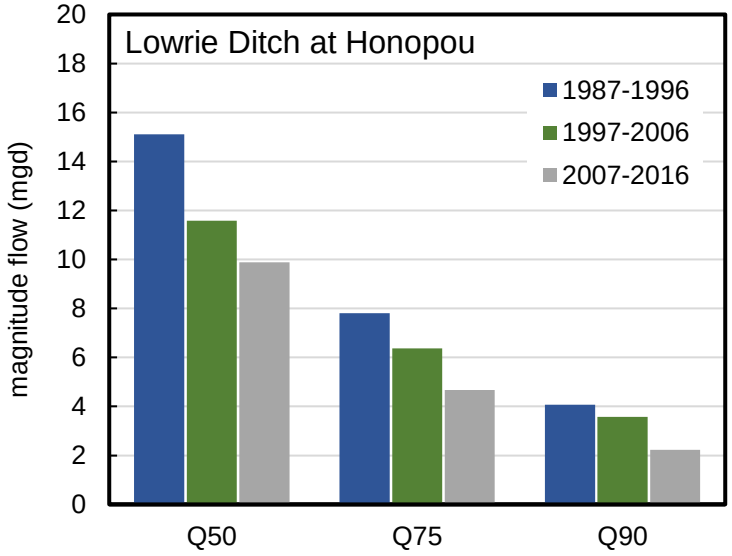
PBR HAWAII & ASSOCIATES, INC.

Observed Declines in Water Availability in East Maui Streams and Irrigation Ditches



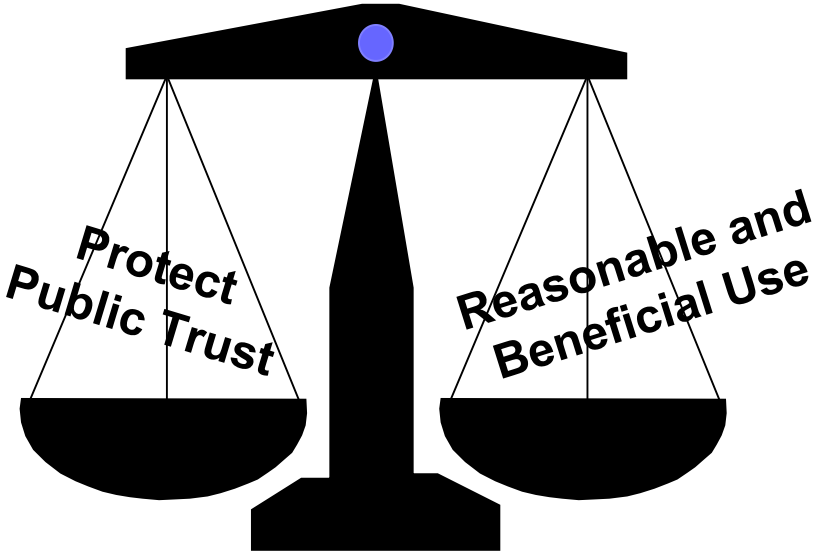






Availability of Stream Flows

1984-2013 (cfs)	Q_{50}	Q_{55}	Q_{60}	Q_{65}	Q_{70}	Q_{75}	Q_{80}	Q_{85}	Q_{90}	Q_{95}
Huelo Streams at Wailoa Ditch (without Hanehoi or Honopou)	39	34	30	25	22	19	16	14	11	8.4
Gains in flow between Wailoa and Lowrie remaining in stream	9.5	8.5	7.7	6.2	5.7	4.8	4.2	3.5	3.0	2.4
Total Water Available at Wailoa and Lowrie ditches	48	42	37	32	28	24	20	17	14	11
Estimated effects of recommended modifications to system at Wailoa Ditch	11.5	10.3	9.3	7.6	6.9	5.9	5.1	4.3	3.7	2.9
Estimated total flow kept in stream	21	20	19	17	16	15	9.3	7.9	6.6	5.3
Reservation for DHHL's Pūlehunui Tract	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05
Available for other non-instream uses (potable and non-potable use)	28	23	19	15	11.4	8.6	11.1	9.3	7.5	5.5

*values affected by rounding

Must Balance Protection of the Public Trust and Provide for Reasonable and Beneficial Uses