

Informational Briefing:  
Reservation of non-potable water for the  
Department of Hawaiian Home Lands  
from East Maui streams and amended  
interim instream flow standards for Waikamoi, Honomanū,  
Nua'ailua, West Wailuaiki, Waiohue  
in the Nāhiku, Ke'anae, and Honomanū regions, Maui

October 18, 2022

C-1

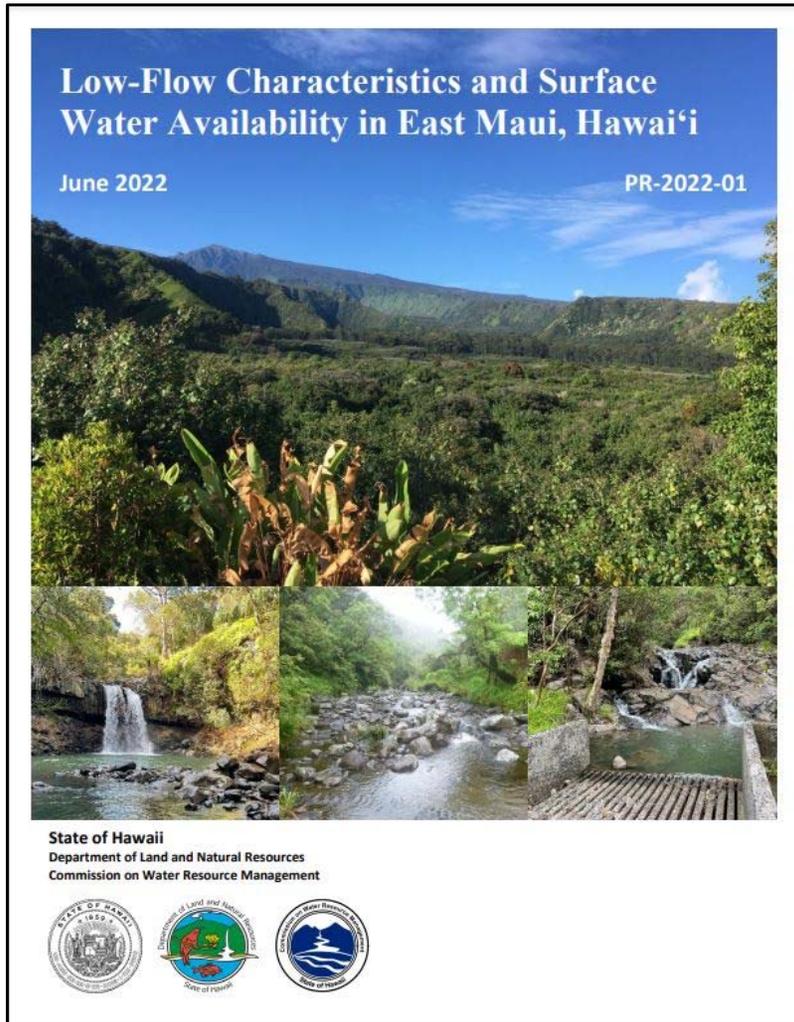
**Ayron M. Strauch, Hydrologist**  
**Stream Protection and Management Branch**



## Revisiting Interim Instream Flow Standards in East Maui

1. “Interim” standards are temporary and need to be revisited periodically
  - Every 4-5 years it’s worth revisiting
2. Original IIFS were established based on only the data available in the Contested Case Hearing
  - Hydrological data based on 1942-2001 period of record and didn’t consider the consequences of climate change
  - Shift in rainfall since the early 1970s; extended drought
3. Additional information not part of the Contested Case Hearing
  - The 2008-2011 DAR biota surveys were not designed to test hypotheses regarding recruitment and habitat use

# New Hydrological Data Available



<https://files.hawaii.gov/dlnr/cwrmpublishedreports/PR202201.pdf>

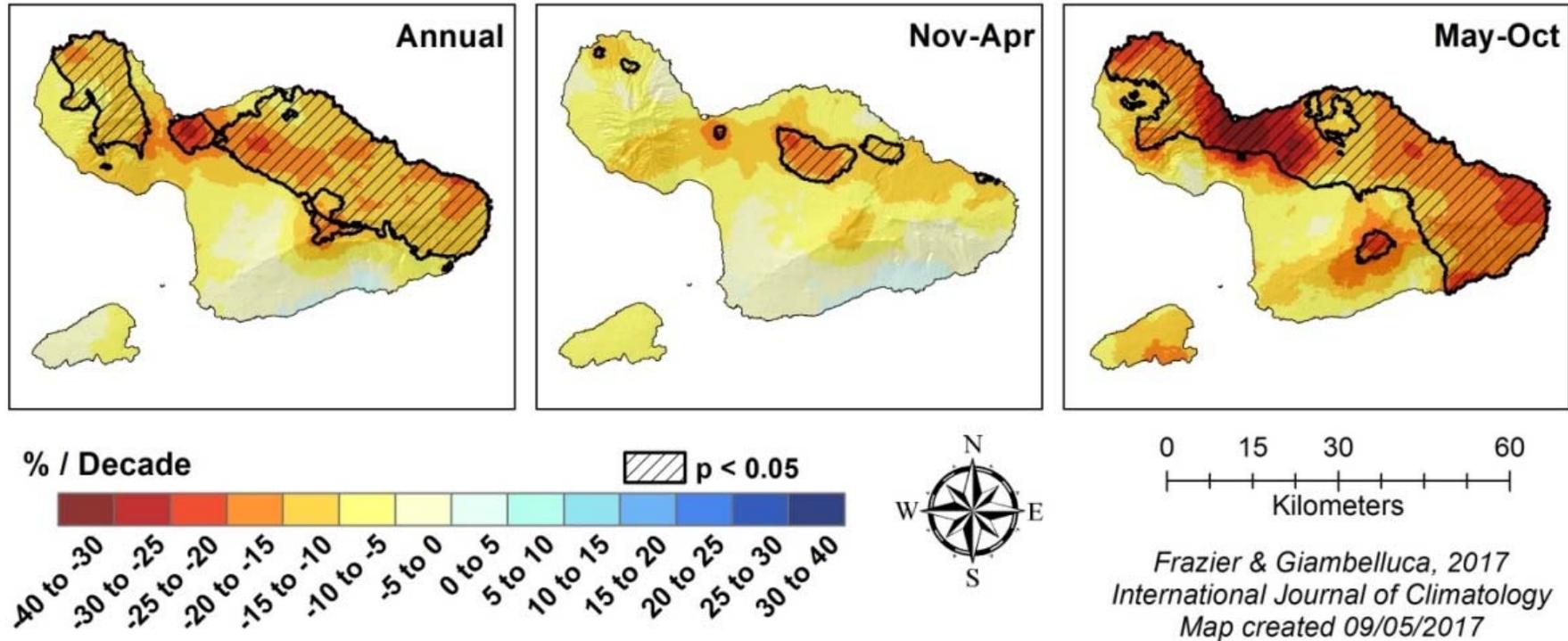


Cheng (2016) USGS SIR 2016-5103



# Why Do We Need Updated Statistics?

## Maui & Kaho'olawe Rainfall Trends: 1983-2012



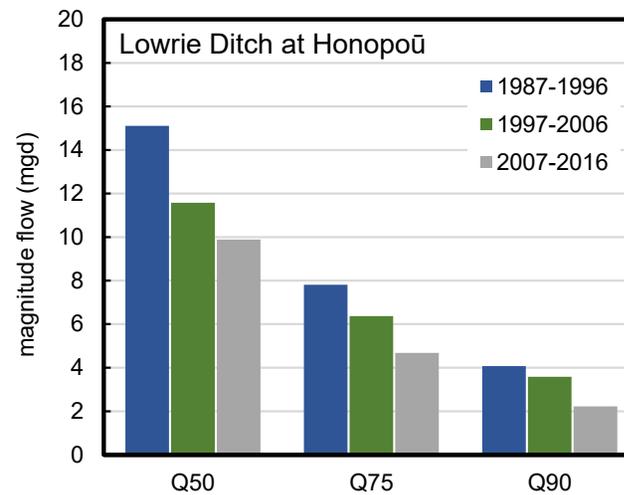
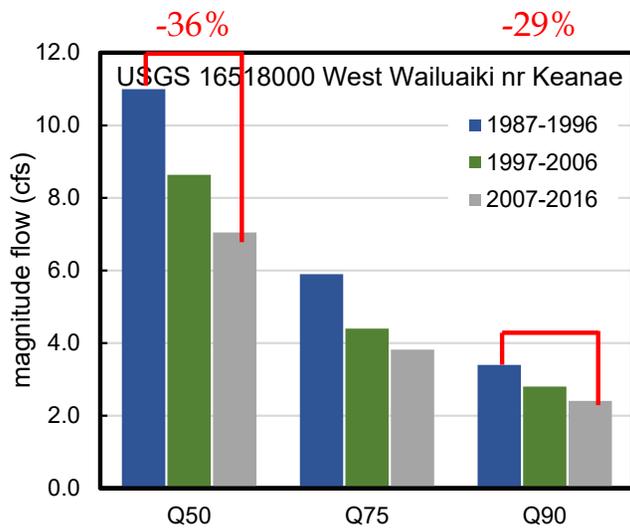
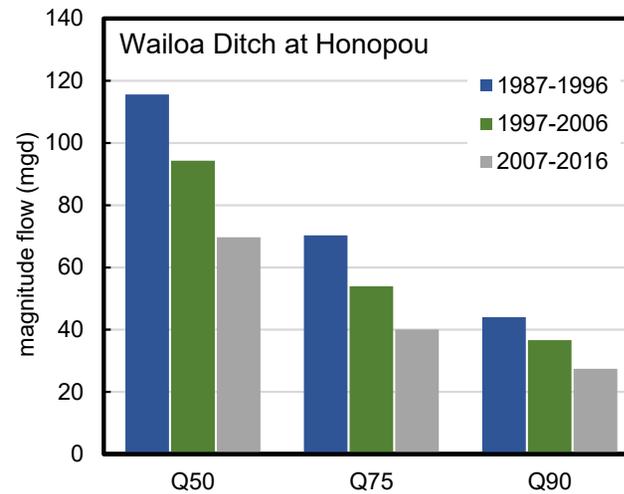
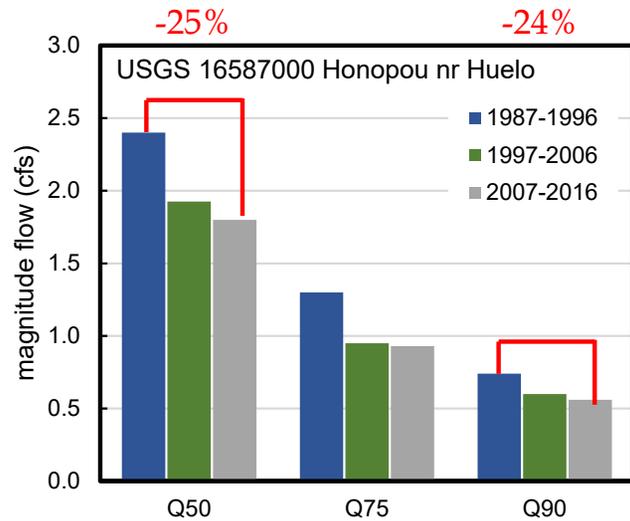
## 2018 East Maui CCH Decision & Order based on streamflow metrics using the 1942-2001 base period

Statistic	West Wailuaiki USGS 16518000			Hanawi USGS 16508000		
	1942-2001	1984-2013	% change	1942-2001	1984-2013	% change
Total Flow Q <sub>50</sub>	10	8.9	-11%	7.1	6.2	-13%
Total Flow Q <sub>95</sub>	2.5	2.2	-12%	4.6	2.2	-52%

All values in cubic feet per second



# Why Do We Need Updated Statistics?





## 2020-2022 DAR/CWRM biota surveys

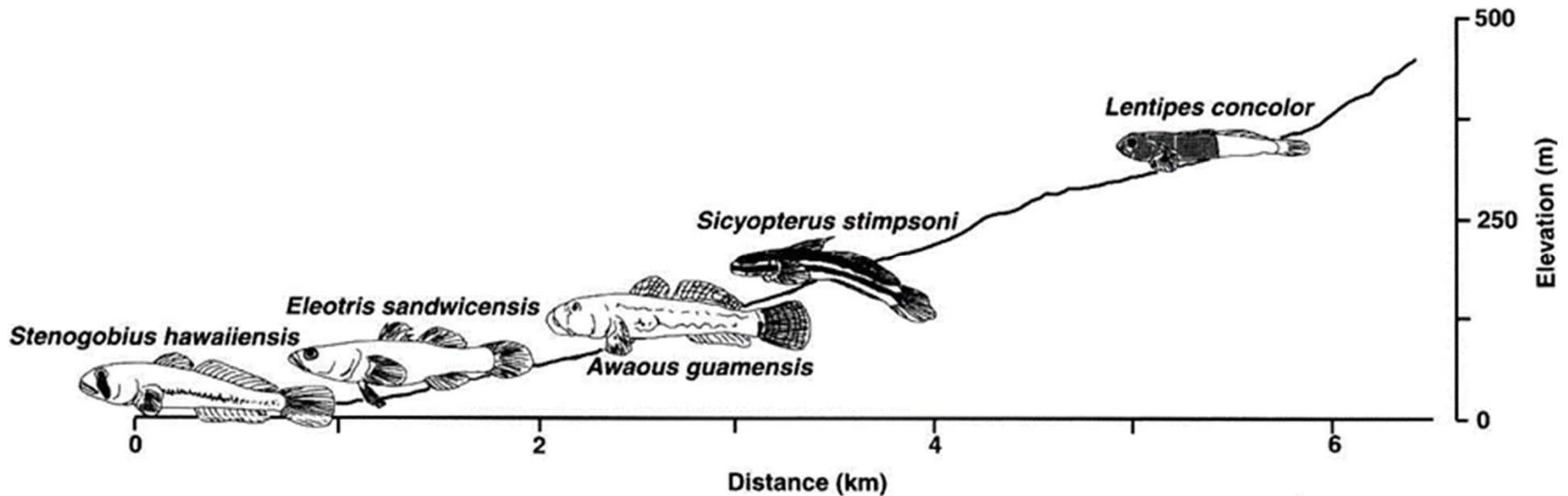
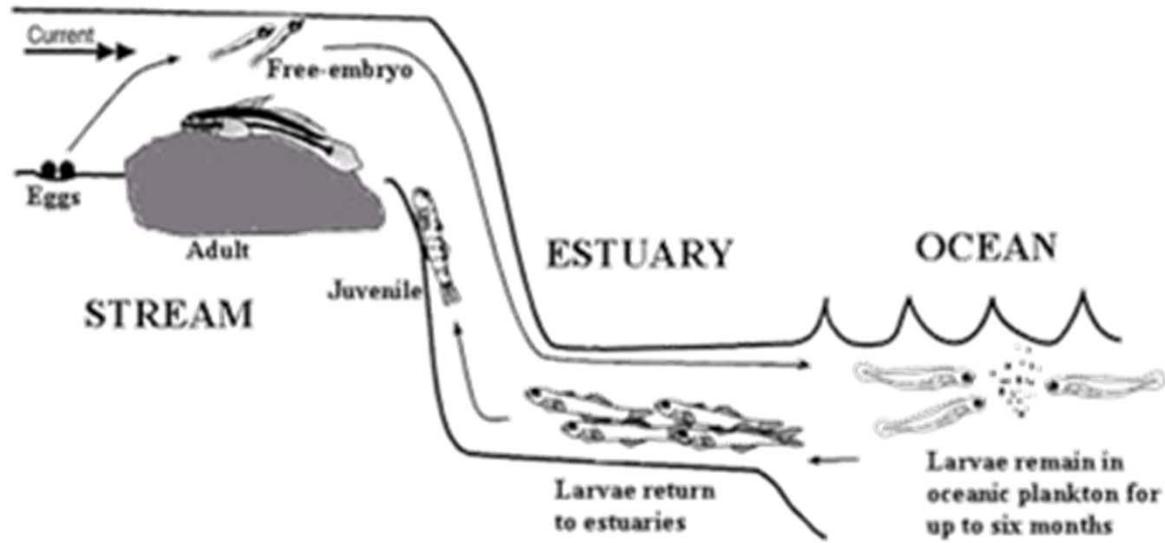
### **Goals:**

1. To quantify the current use of habitat by native biota under natural conditions
  - while streams East of Waikamoi are not being diverted
2. To evaluate the assumptions used in the Contested Case Hearing regarding the value of specific streams for aquatic habitat
3. To quantify the consequences of terminal waterfalls on upstream migration

# Life history and adaptations

species have an amphidromous life history

Migratory abilities differ based on physical adaptations  
(e.g., fused pelvic fins)





'o'opu 'akupa  
(*Eleotris sandwicensis*)



'o'opu naniha  
(*Stenogobius hawaiiensis*)

'o'opu nopili (female)  
(*Sicyopterus stimpsoni*)

'o'opu nopili (male)  
(*Sicyopterus stimpsoni*)

'o'opu nākea (male)  
(*Awaous stamineus*)



factors affecting species distribution:  
estuaries enhance recruitment

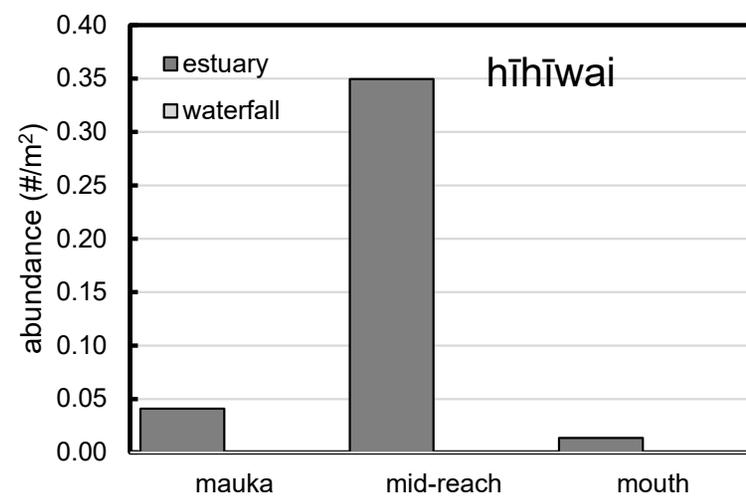
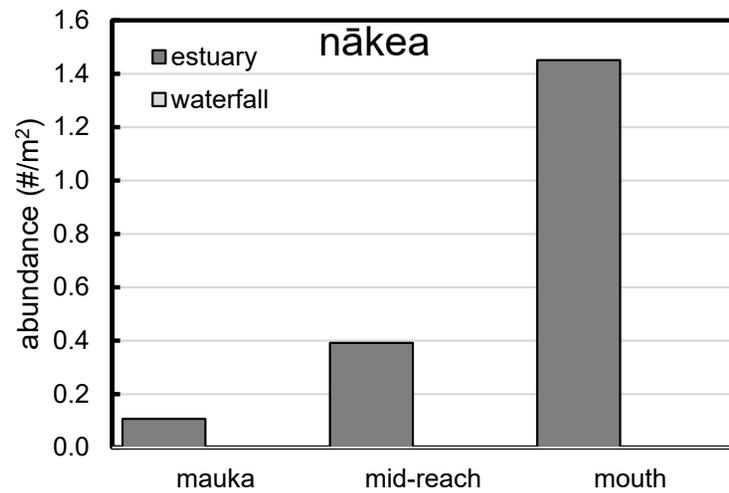
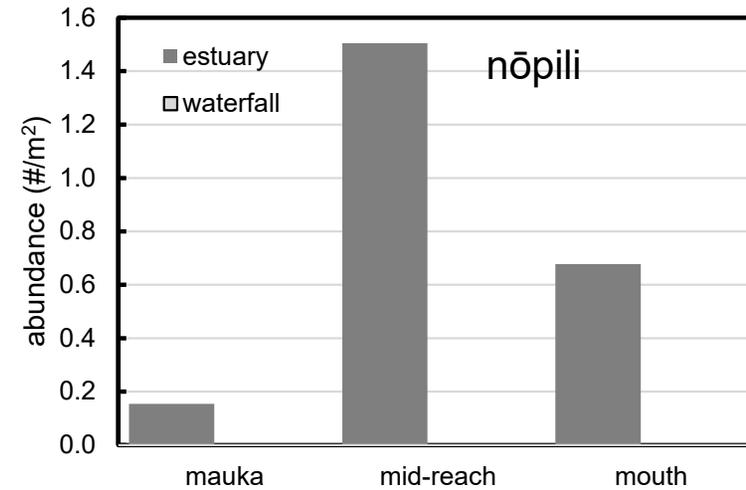
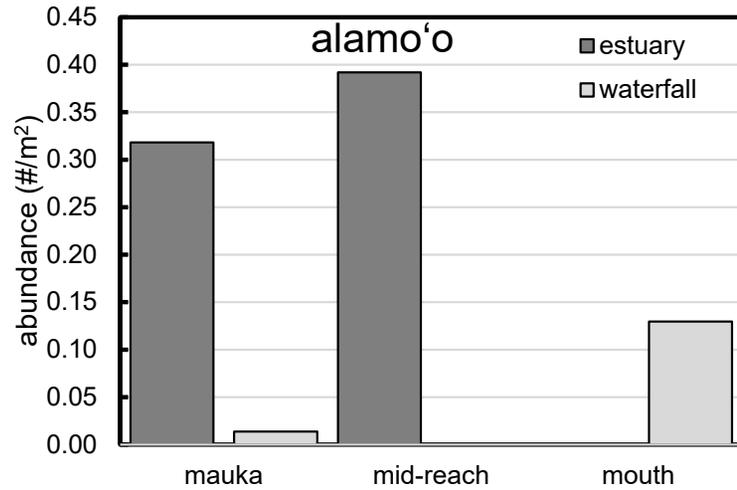


factors affecting species distribution:  
barriers to migration

Haipua'ena

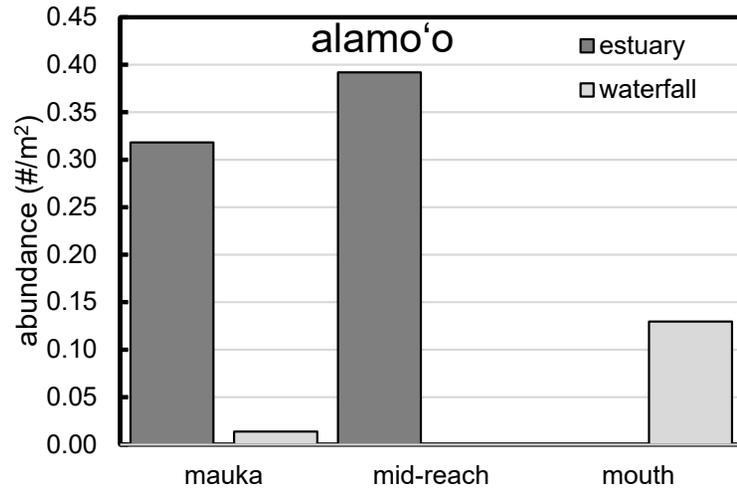


# Abundance of species within elevational ranges based on terminal reach (estuary vs. waterfall)

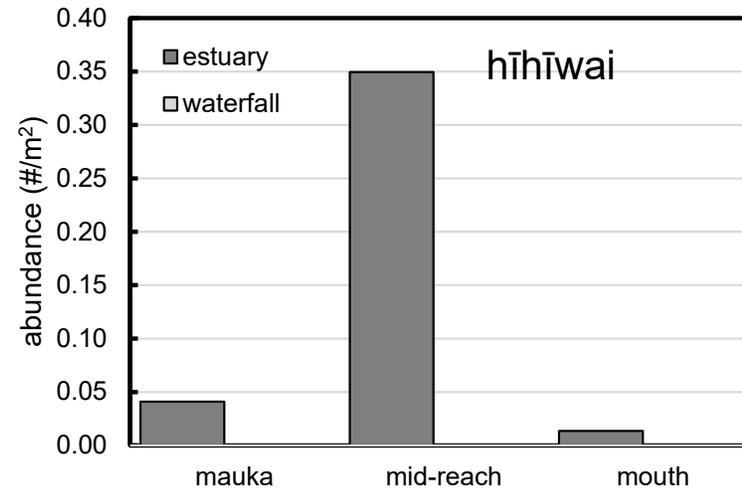
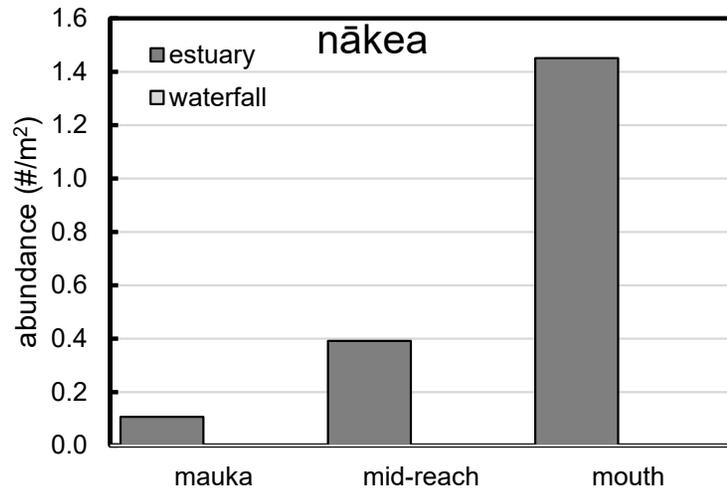
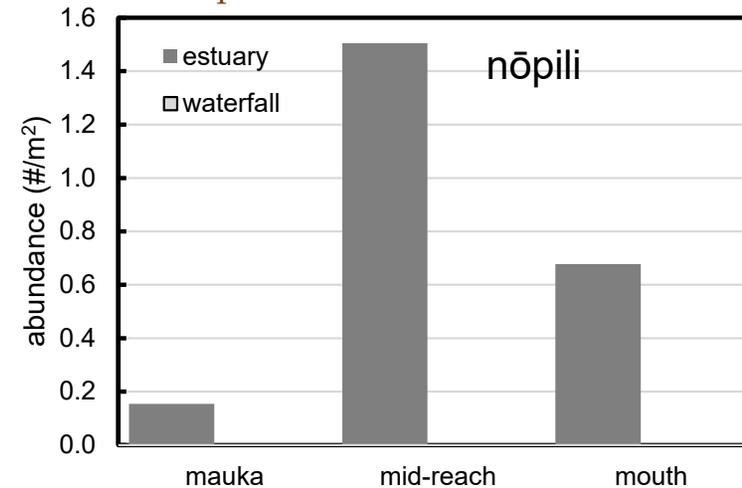


# Abundance of species within elevational ranges based on terminal reach (estuary vs. waterfall)

Found at higher elevations  
→ except where terminal waterfalls exist



Found at mid-elevations  
(predator escape or reduced competition)  
→ except where terminal waterfalls exist

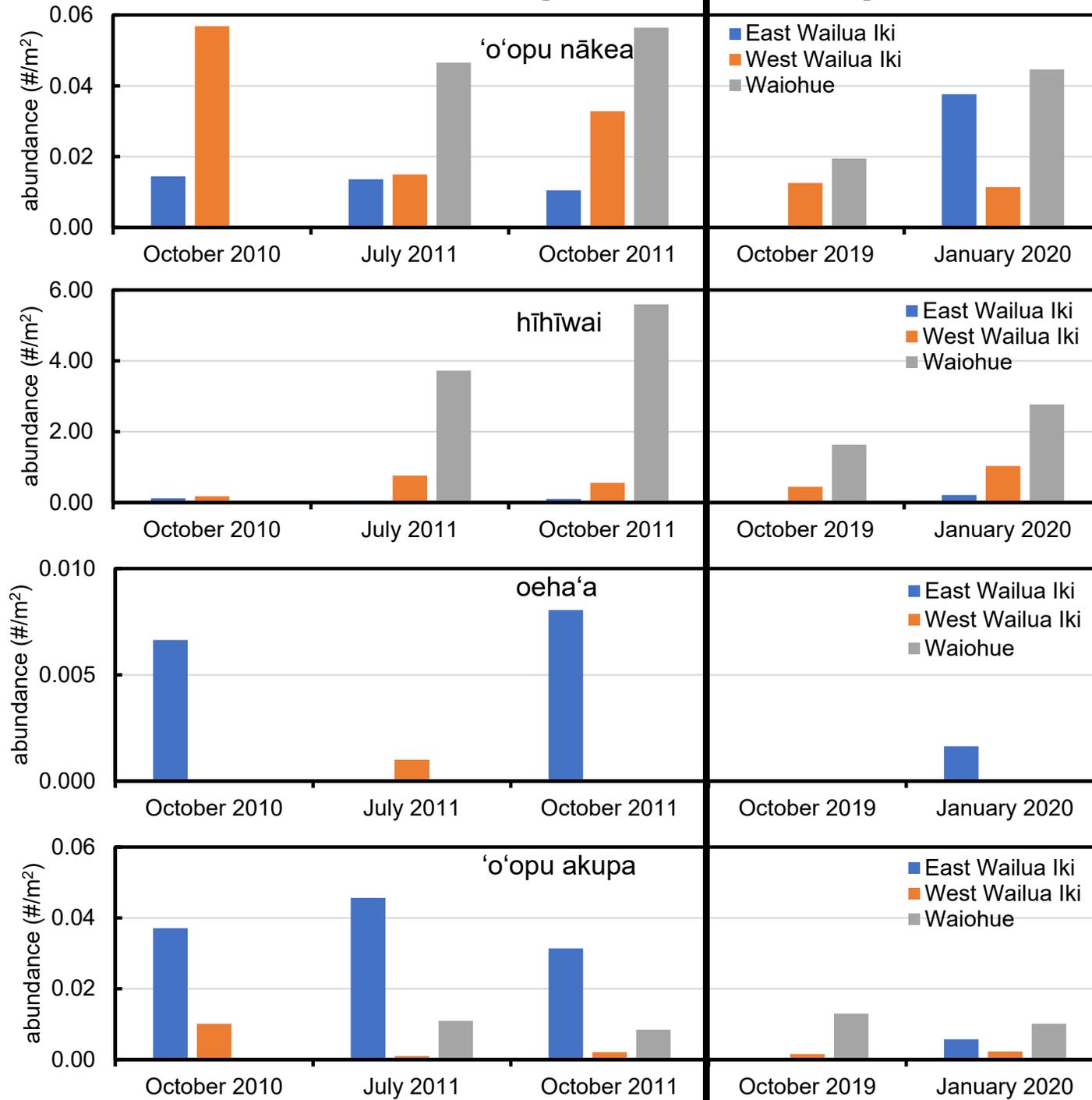


Factors affecting distribution include availability of estuary habitat, predator escape, resource competition, habitat suitability

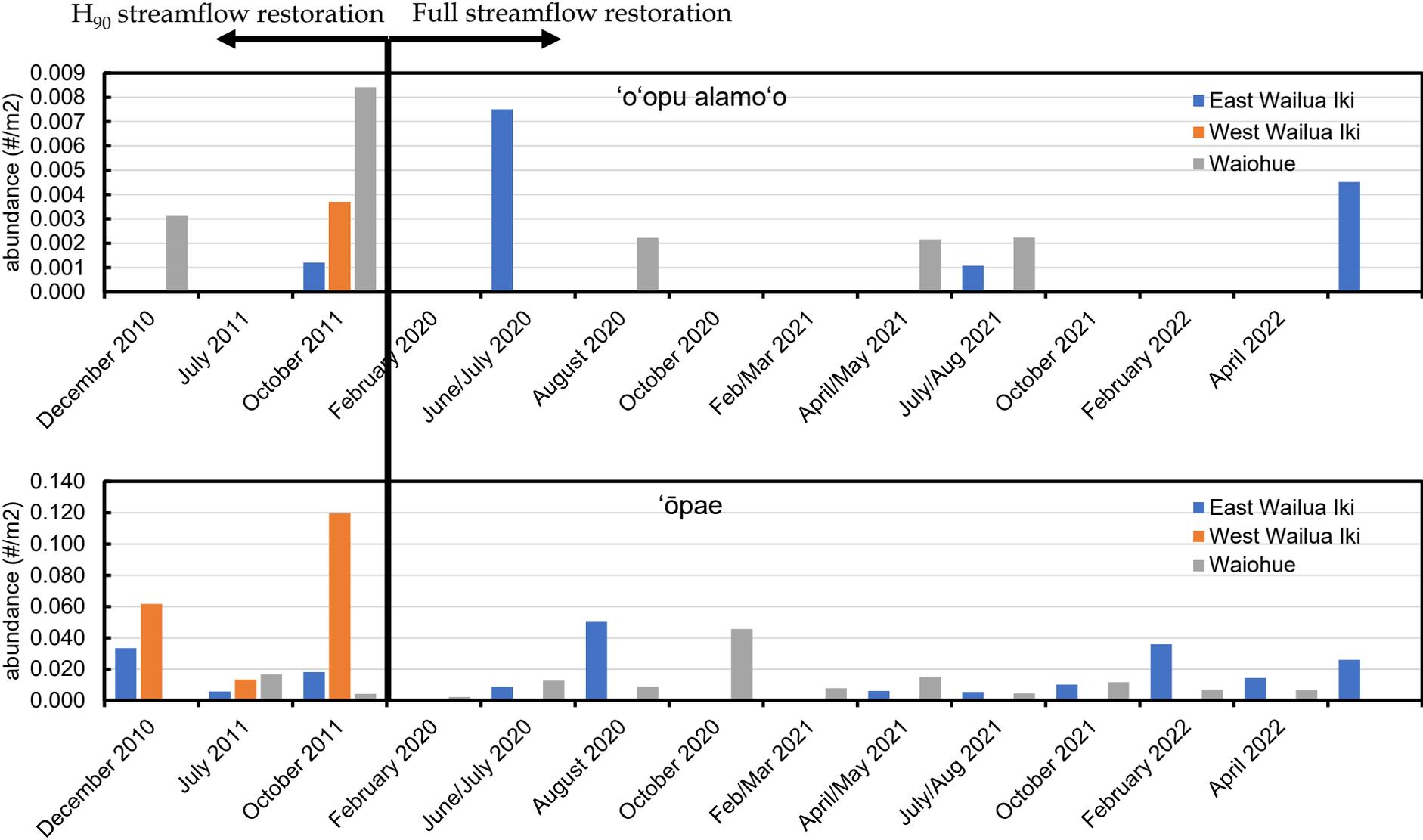
# mouth stream surveys

$H_{90}$  streamflow restoration

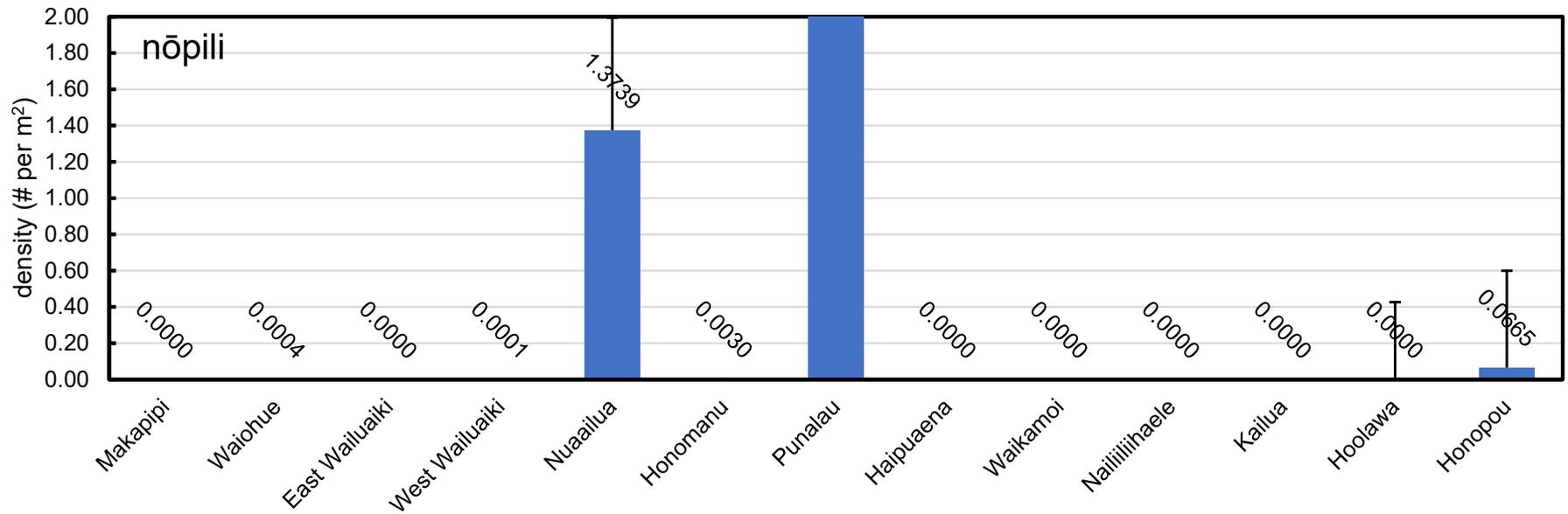
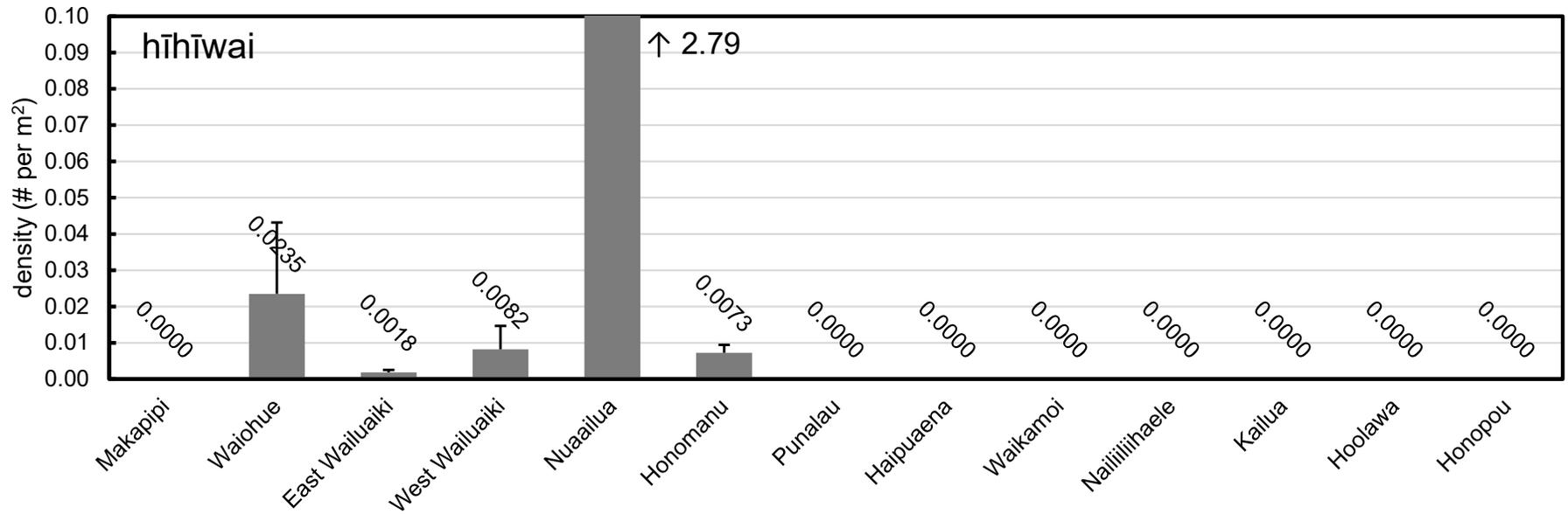
Full streamflow restoration



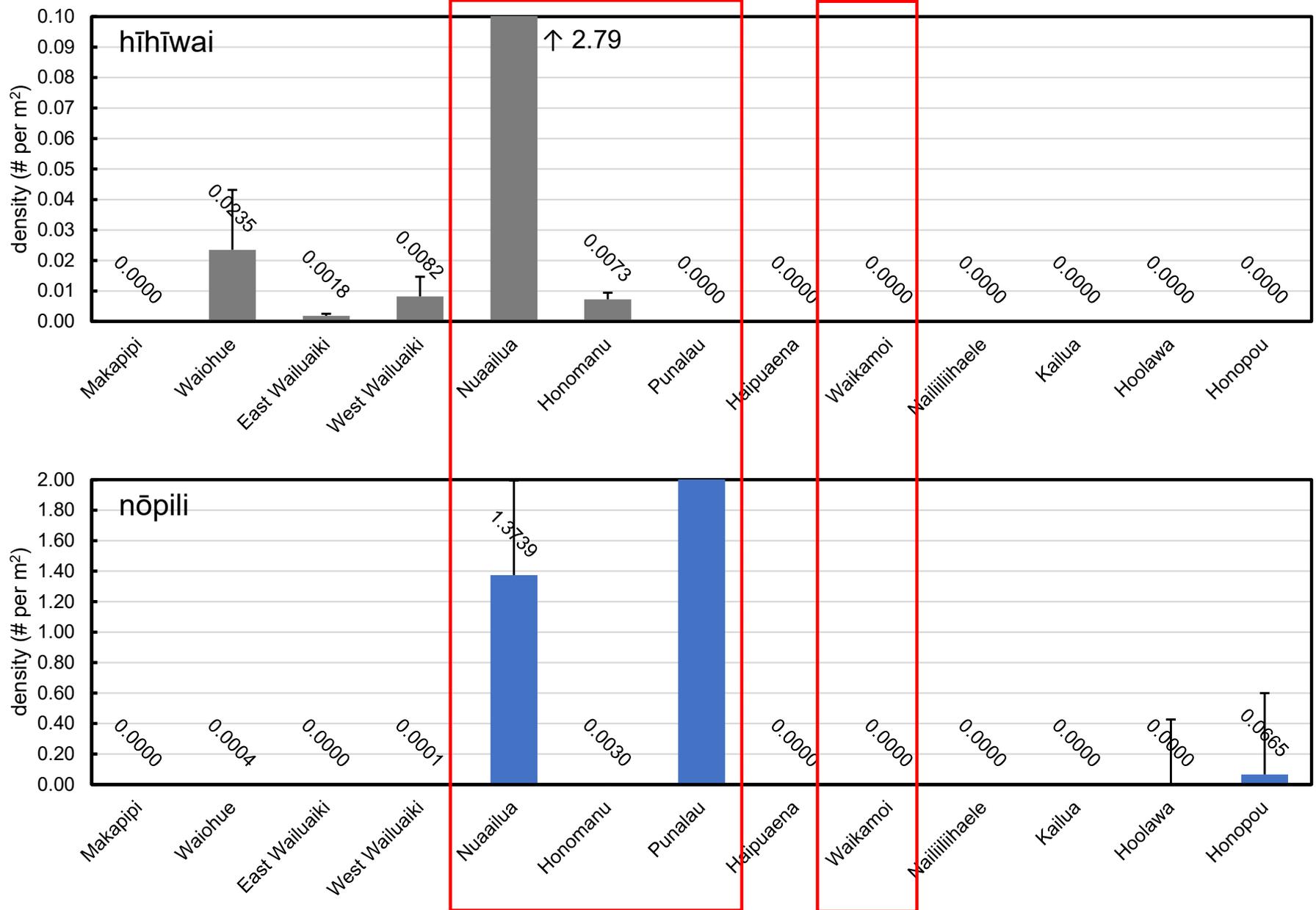
# mauka stream surveys



# 2020/2021 stream mouth surveys



# 2020/2021 stream mouth surveys

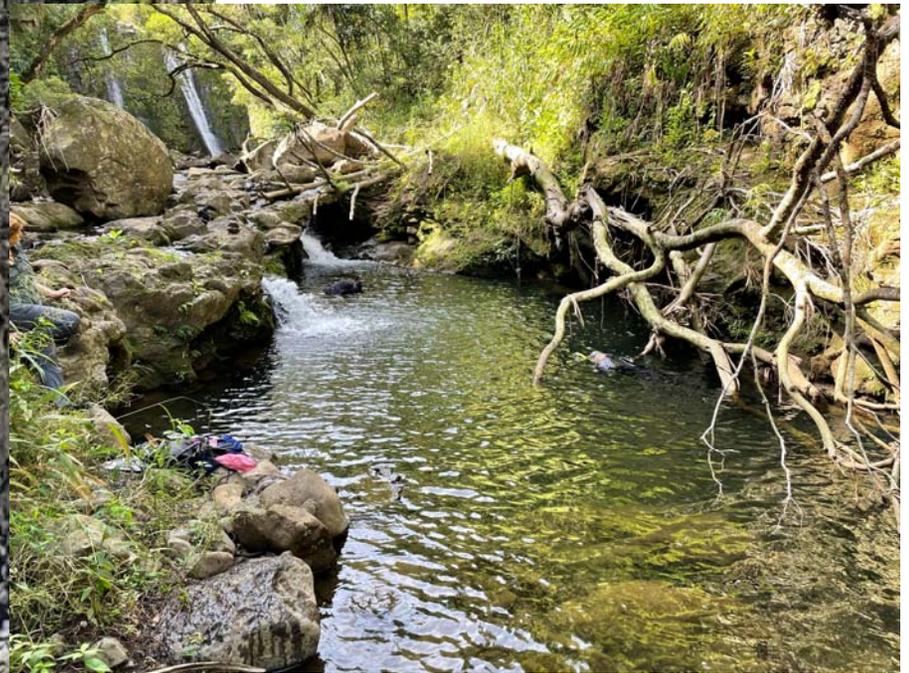


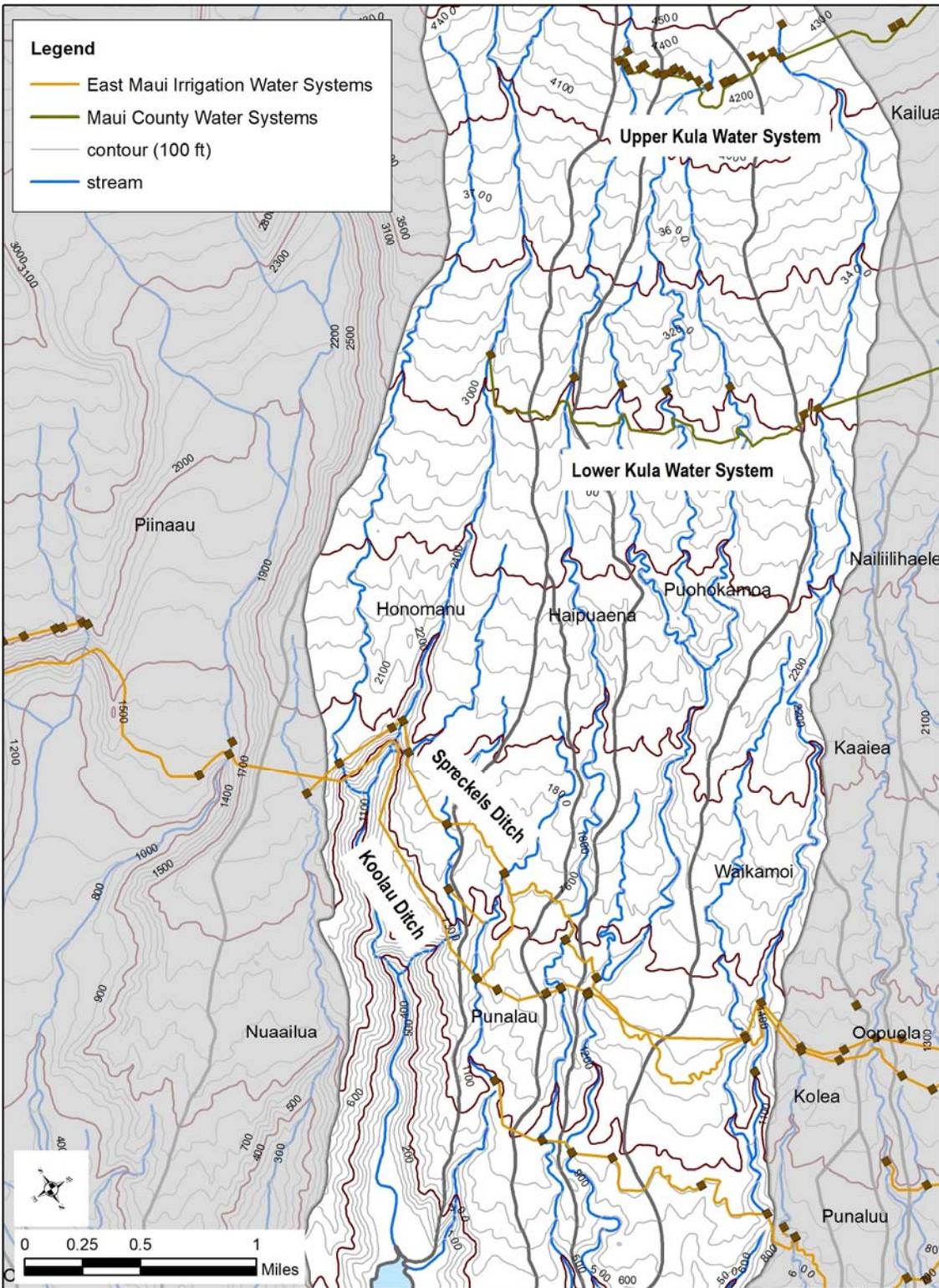
Large abundance of native species in Nua'ailua and Honomanū  
None in Waikamoi biota recruitment

## Conclusions from stream surveys

1. Full restoration has not changed the abundance of species in low- or high-elevation habitat in Waiohue, East Wailuaiki, or West Wailuaiki
2. Streams with greatest abundances of 'akupa, nākea, and nōpili at the stream mouth have estuaries  
→ Honomanū, Punalau, Nua'ailua, Honopou
3. Streams with greatest abundances of alamo'o and 'ōpae mauka have estuaries  
→ Pi'ina'au, Honomanū, Punalau, Nua'ailua, Honopou
4. Waikamoi support little to no recruitment of native biota

# Waikamoi mouth





# Honomanū

## 4 main intakes:

Banana Falls

Center Falls

Main Honomanū

High Falls

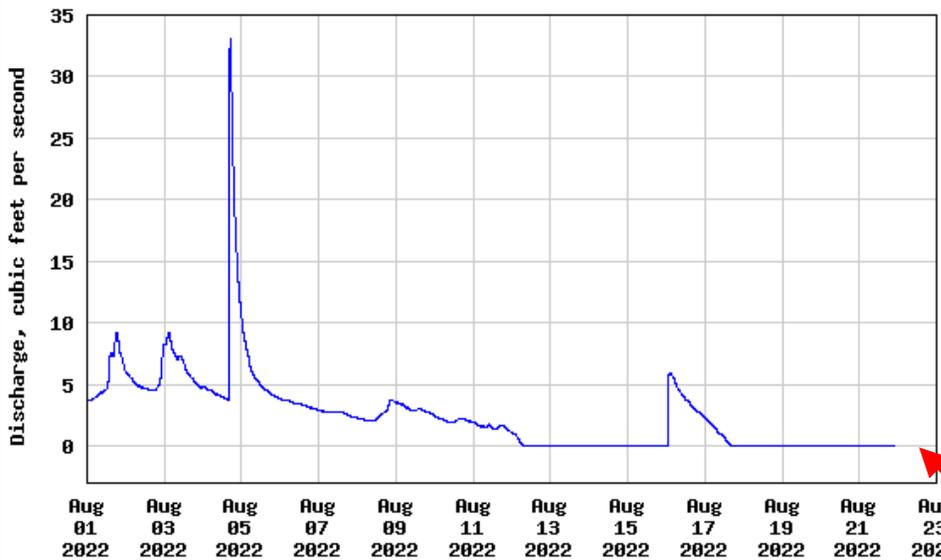
Current IIFS =  $H_{90} = 64\% \text{BFQ}_{50}$

\*Stream reach below waterfalls incises Honomanu volcanics and stream loses flow to groundwater recharge

Under drought conditions, stream dries up naturally



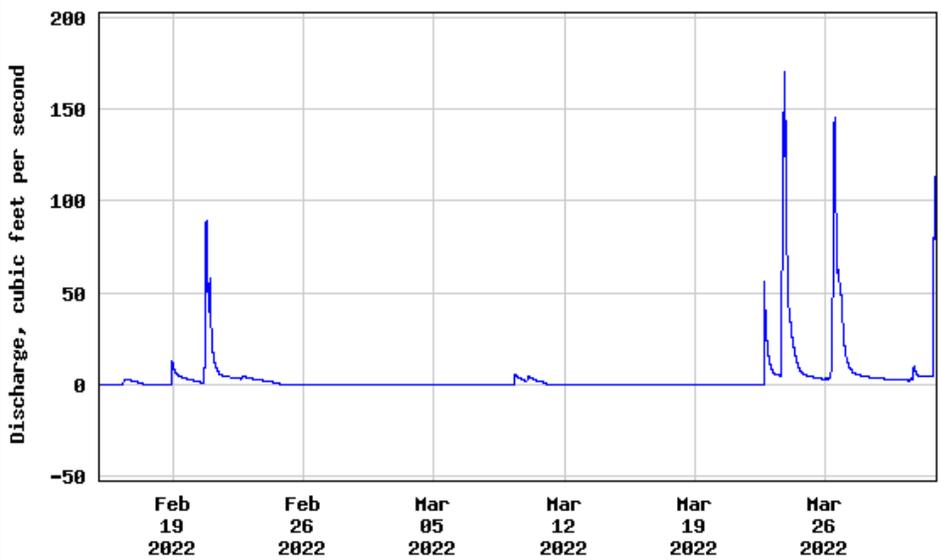
USGS 16527500 Honomanu Stream near Hana Hwy, Maui, HI



----- Provisional Data Subject to Revision -----



USGS 16527500 Honomanu Stream near Hana Hwy, Maui, HI



----- Provisional Data Subject to Revision -----

# Honomanu

4 main intakes:

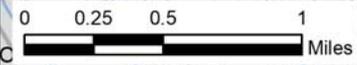
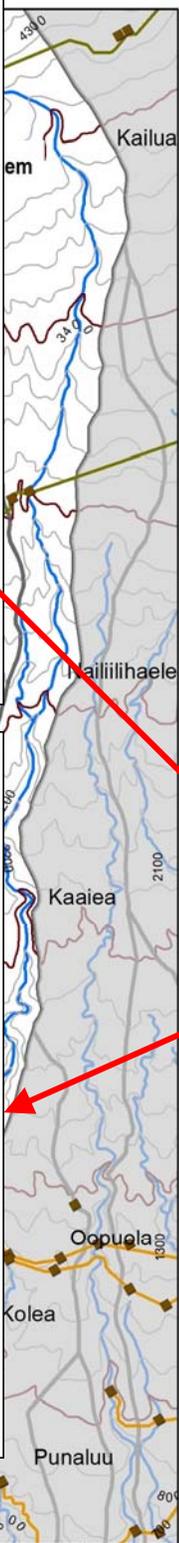
- Banana Falls
- Center Falls
- Main Honomanu
- High Falls

Current IIFS =  $H_{90} = 64\%$  BFQ<sub>50</sub>

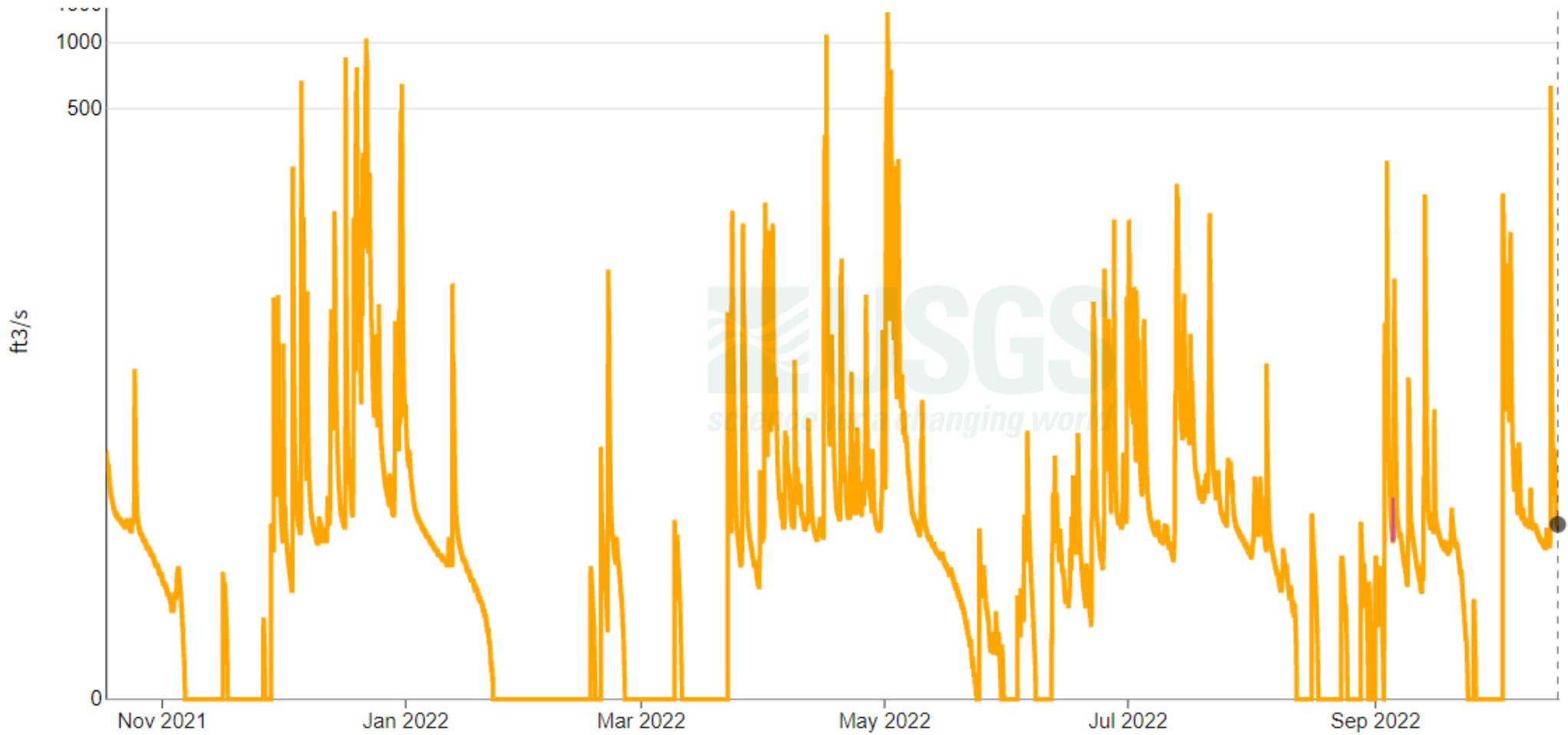
- \*Stream reach below waterfalls incises Honomanu volcanics
- Stream loses flow to groundwater

During drought periods, stream dries up naturally

\*can't enforce the numerical IIFS



# USGS 16527500 Honomanū at Hana Highway



Banana Intake → abandon



Center Falls Intake → abandon



Main Honomanū Intake → utilize



High Falls Intake → abandon



156°28'0"W

156°24'0"W

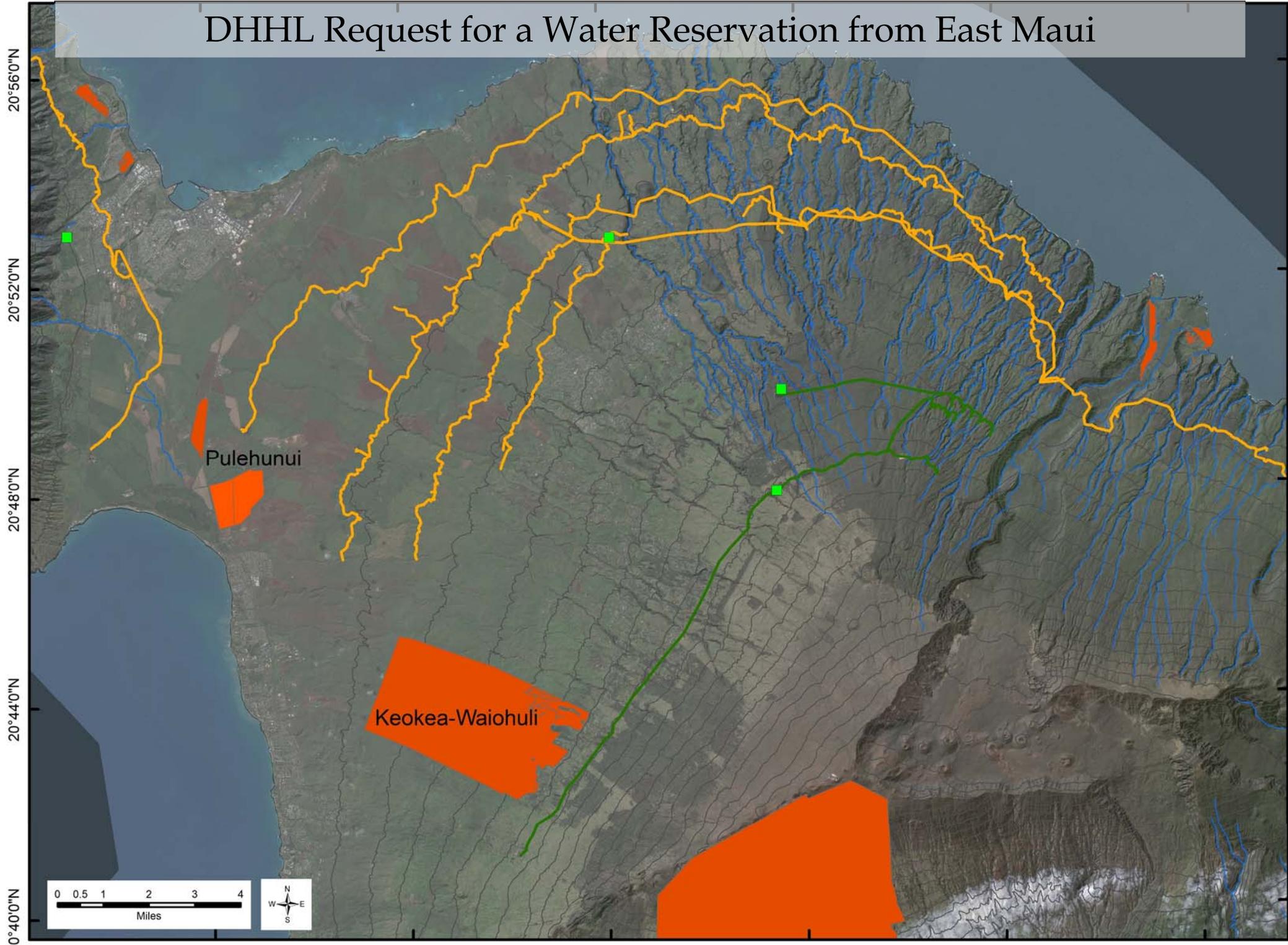
156°20'0"W

156°16'0"W

156°12'0"W

156°8'0"W

# DHHL Request for a Water Reservation from East Maui



# DHHL Request for a Water Reservation from East Maui: Pūlehunui and Kēōkea-Waiohuli Reservation Request

DAVID Y. ICE  
GOVERNOR  
STATE OF HAWAII

JOSH GREEN  
LT. GOVERNOR  
STATE OF HAWAII



WILLIAM J. AILĀ, JR.  
CHAIRMAN  
HAWAIIAN HOMES COMMISSION

TYLER L. 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.

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**non-potable reservation request**

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Pūlehunui **1.328 mgd**

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Kēōkea-Waiohuli **9.85 mgd**

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# East Maui Irrigation Ditch Flows vs. Stream Flows

Best available estimate for total surface water available between Makapipi and Maliko Gulch in the EMI system (i.e., from 1500ft-400ft elevation)

1984-2013	Q <sub>50</sub>	Q <sub>55</sub>	Q <sub>60</sub>	Q <sub>65</sub>	Q <sub>70</sub>	Q <sub>75</sub>	Q <sub>80</sub>	Q <sub>85</sub>	Q <sub>90</sub>	Q <sub>95</sub>
streamflow available at Koolau/Wailoa	152	129	113	100	88	77	66	58	49	38
Wailoa Ditch at Honopou (measured 1987-2016)	146	131	116	104	93	82	72	62	53	42
Instream gains between Wailoa and Lowrie ditches (cfs)	9.5	8.5	7.7	6.2	5.7	4.8	4.2	3.5	3.0	2.4
Gains between Honopou and Maliko Gulch (cfs)	6.4	5.4	4.7	4.0	4.0	3.6	2.8	1.5	1.4	0.95
1984-2013 natural flow conditions (cfs)	168	143	126	110	98	85	73	63	53	41
1984-2013 after 2018 D&O IIFS (cfs)	107	88	75	64	56	48	39	33	27	20
1984-2013 after 2018 D&O IIFS (mgd)	69	57	48	41	36	31	25	21	17	13



# Water Availability Balance

(in mgd)	Q <sub>50</sub>	Q <sub>55</sub>	Q <sub>60</sub>	Q <sub>65</sub>	Q <sub>70</sub>	Q <sub>75</sub>	Q <sub>80</sub>	Q <sub>85</sub>	Q <sub>90</sub>	Q <sub>95</sub>
1984-2013 natural flow	109	92	81	71	63	55	47	41	34	26
1984-2013 after 2018 D&O	69	57	48	41	36	31	25	21	17	13
Maui DWS Kamole Weir	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
DHHL Pūlehunui	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328	1.328
DHHL Kēōkea-Waiohuli	7.87	7.87	7.87	7.87	7.87	7.87	7.87	7.87	7.87	7.87
available	56.2	44.2	35.2	28.2	23.2	18.2	12.2	8.2	4.2	0.2
Mahi Pono Farm Plan	45.1	45.1	45.1	45.1	45.1	45.1	45.1	45.1	45.1	45.1
Kula ag park + other farms	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
balance	7.2	-4.8	-13.8	-20.8	-25.8	-30.8	-36.8	-40.8	-44.8	-48.8

→ Includes groundwater sources for Mahi Pono  
 other sources not included: ~ 5.0 mgd of recycled water (Kahului WWTF needs to be upgraded)



# Summary of Recommendations

## Waikamoi

→ Reduce interim IFS from H90 flow (2.46 mgd) to connectivity flow (0.17 mgd)

Reason: Stream does not support high quality habitat

Q <sub>50</sub>		Q <sub>75</sub>		Q <sub>95</sub>	
1942-2001	1984-2013	1942-2001	1984-2013	1942-2001	1984-2013
7.0	6.6	3.5	1.3	1.1	0.22
2010 Interim IFS		2018 Decision & Order		2022 Recommendation	
2.8 cfs (1.81 mgd) wet season 0.0 cfs (0.00 mgd) dry season		H <sub>90</sub> flow (64% of BFQ <sub>50</sub> ) = 3.8 (2.46)		20% BFQ <sub>50</sub> (regulated Q <sub>75</sub> ) for connectivity = 0.26 (0.17)	

## Honomanū

→ eliminate interim IFS at Hana Hwy

Abandon Banana Falls intake, Center Falls intake, High Falls intake

Reason: Interim IFS not achievable/enforceable

stream supports some of the highest quality, low-elevation habitat and estuary

Q <sub>50</sub>		Q <sub>75</sub>		Q <sub>95</sub>	
1942-2001	1984-2013	1942-2001	1984-2013	1942-2001	1984-2013
5.7	3.8	2.8	1.6	1.1	0.47
2010 Interim IFS		2018 Decision & Order		2022 Recommendation	
0.0 (0.00)		H <sub>90</sub> flow (64% of BFQ <sub>50</sub> ) = 4.2 (2.71)		Full restoration at 3 of 4 diversions	

## Nua'ailua

Abandon Spreckels Ditch intake (S-1)

Reason: stream supports some of the highest quality, low-elevation habitat and estuary

Q <sub>50</sub>		Q <sub>75</sub>		Q <sub>95</sub>	
1942-2001	1984-2013	1942-2001	1984-2013	1942-2001	1984-2013
0.56	0.46	0.28	0.22	0.19	0.19
2010 Interim IFS		2018 Decision & Order		2022 Recommendation	
3.1 (2.00)		Connectivity = 0.28 (0.18)		Full restoration	

# Summary of Recommendations

## West Wailuaiki

→ Reduce interim IFS from full restoration to H90 flow (2.62 mgd)

Reason: full restoration has not improved either low-elevation or high-elevation habitat compared to partial restoration

Q <sub>50</sub>		Q <sub>75</sub>		Q <sub>95</sub>	
1942-2001	1984-2013	1942-2001	1984-2013	1942-2001	1984-2013
10	8.9	6.0	2.5	3.0	2.2

2010 Interim IFS	2018 Decision & Order	2022 Recommendation
3.8 (2.46) wet season 0.4 (0.26) dry season	Full restoration	90% of Q <sub>75</sub> (BFQ <sub>50</sub> ) = 4.05 (2.62)

## Waiohue

→ Reduce interim IFS from full restoration to H90 flow (3.33 mgd)

Reason: full restoration has not improved either low-elevation or high-elevation habitat compared to partial restoration

Q <sub>50</sub>		Q <sub>75</sub>		Q <sub>95</sub>	
1942-2001	1984-2013	1942-2001	1984-2013	1942-2001	1984-2013
6.2	5.2	5.0	3.7	3.0	3.2

2010 Interim IFS	2018 Decision & Order	2022 Recommendation
3.2 (2.10) wet season 0.1 (0.06) dry season	Full restoration	90% of Q <sub>75</sub> (BFQ <sub>50</sub> ) = 3.33 (2.15)

