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# Compilation of Public Review Comments

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## Hydrologic Units:

He'eia (3028)

## Island of O'ahu

December 2020

PR-2020-15



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### State of Hawaii

Department of Land and Natural Resources  
Commission on Water Resource Management





## **INTRODUCTION**

**This document is a compilation of all comments submitted to the Commission on Water Resource Management (Commission) on the Instream Flow Standard Assessment Report for the Hydrologic Unit of He'eia (3028).**

**All comments have been separated into individual sections according to the submitting organization or individual, and the date of submission. Comments are listed in the order they were received by the Commission.**

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**1.0** City and County of Honolulu, Board of Water Supply  
Ernest Y. W. Lau, P.E.

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# BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU  
630 SOUTH BERETANIA STREET  
HONOLULU, HI 96843  
www.boardofwatersupply.com



November 23, 2020

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Ms. Suzanne D. Case, Chairperson and Members  
State Department of Land and Natural Resources  
Commission on Water Resource Management  
1151 Punchbowl Street, Board Room 132  
Honolulu, Hawaii 96813

Dear Ms. Case and Members:

Subject: Testimony on Draft Instream Flow Standard Assessment Report for the Hydrologic Unit of He`eia (3028)

The Board of Water Supply (BWS) requests consideration of the following comments, related to the Commission on Water Resource Management (CWRM) Draft Instream Flow Standard Assessment Report for the Hydrologic Unit of He`eia (3028), the related informational briefing during the CWRM Board Meeting of September 15, 2020, and the related CWRM/BWS meeting of October 12, 2020.

## Background

On September 15, 2020, BWS attended the virtual CWRM Board Meeting, which included an Informational Briefing on Developing an Amended Interim Instream Flow Standard for He`eia Stream, by CWRM staff. At the conclusion of this briefing, "next steps" were listed (consultation with BWS, consultation with Aha Moku representatives, site visit with Papahana Kuaola, etc.) but specific dates were not provided.

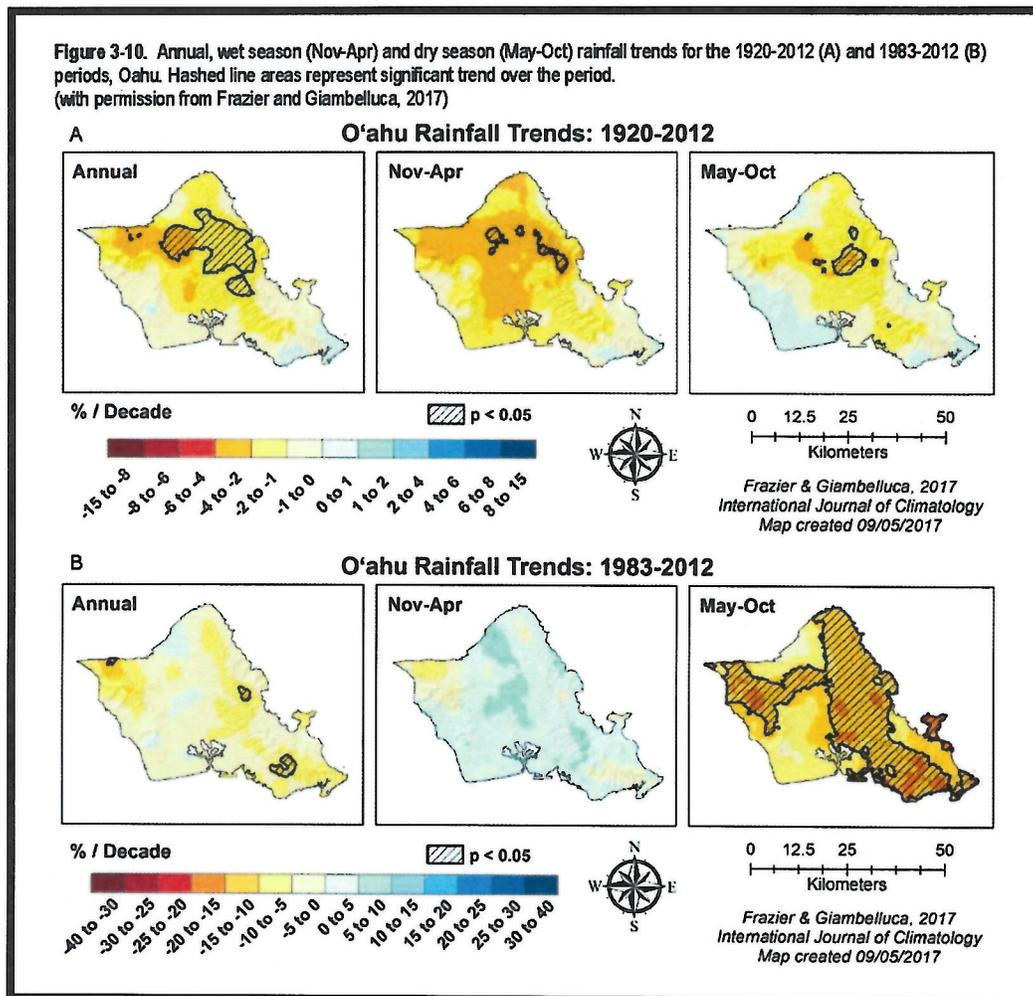
On October 12, 2020, CWRM staff held a virtual meeting with BWS staff to obtain information on BWS' Haiku Tunnel and groundwater production and use in the Koolau-poko region. During the course of the meeting, CWRM notified BWS of the existence of the Draft Instream Flow Standard Assessment Report for the Hydrologic Unit of He`eia (3028) (Draft Heeia IFS Report), and of the Public Fact Gathering Meeting scheduled for October 21, 2020. As the Draft Heeia IFS Report had been completed in June 2020, posted on September 24, 2020, and identified to BWS on October 12, 2020, BWS was obligated to review and provide comments within a timeframe of less than nine days.

Accordingly, BWS reviewed the September 15, 2020 Informational Briefing, meeting notes from the October 12, 2020 CWRM/BWS meeting, and the Draft He`eia IFS Report and compiled the following testimony for your consideration.

## Rainfall Contribution to Historic He`eia Streamflow

During the CWRM/BWS meeting, CWRM staff stated that CWRM has "rainfall data...specific for He`eia, that shows a zero to 1 percent decrease in rainfall, maybe even a 1 percent increase", since approximately the 1920s through 2010s, and suggested that rainfall was not a significant factor to consider when evaluating historic He`eia streamflow.

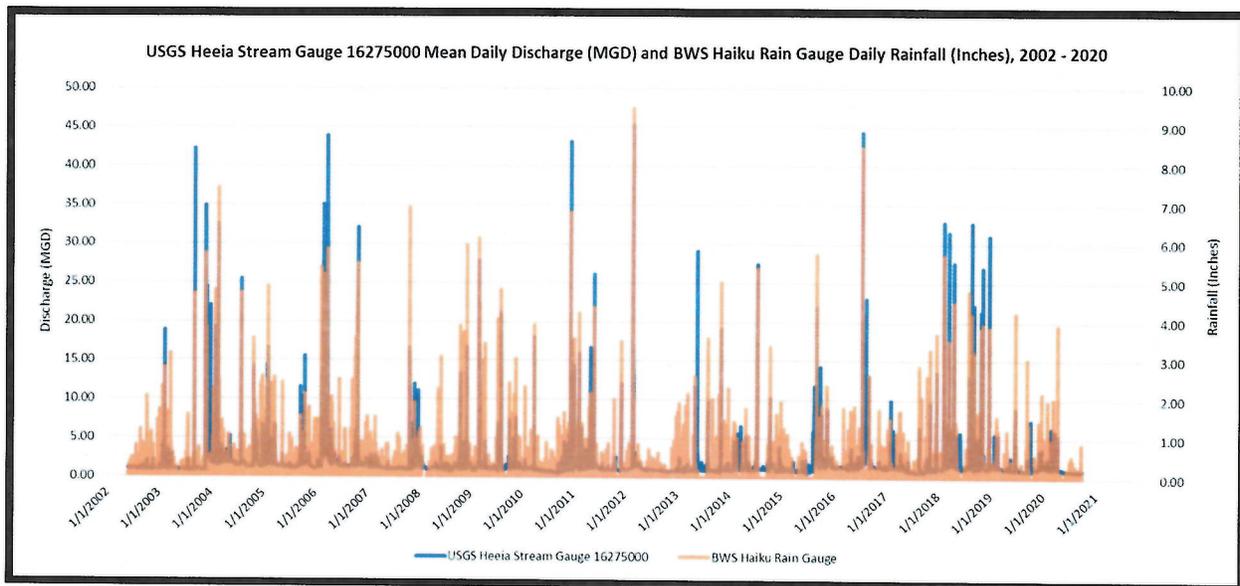
However, subsequent BWS research with the National Weather Service and the University of Hawaii confirmed that there were no rain gauges in He`eia with that duration of historic rainfall data. Instead, as shown on Figure 3-10 in the Draft Heeia IFS Report, CWRM referenced interpolated islandwide rainfall trends related to the University of Hawaii's Rainfall Atlas of Hawaii program. These interpolated trends indicate a zero to 1 percent rainfall decrease in the He`eia area per decade.



**This in fact may present a significant effect on He`eia streamflow. If rainfall decline is closer to 1 percent per decade, over the period of 1920 - 2012 this translates to a decrease of approximately 9 percent.**

Furthermore, the timing of the apparent He`eia streamflow decline should be compared to the timing of historic increases and decreases in rainfall, rather than relying solely on interpolated islandwide trends. Since 1920, there have been major swings in rainfall, with decades of relatively wet and relatively dry weather. Streamflow should be compared to these rainfall time series for those historic timeframes that have data for both parameters, to improve the understanding of factors affecting streamflow.

Accordingly, BWS compared U.S. Geological Survey (USGS) Stream Gauge 16275000 streamflow data, to rainfall data from BWS Haiku Rain Gauge (until mid-2019, located about 0.4 mile upstream of USGS 16275000, near Haiku Well; due to vandalism, relocated approximately 0.25 mile downstream of USGS 16275000, near Papahana Kuaola), for the shared historic time period of June 2002 through September 2020. The rainfall data are graphed with streamflow data below, in semitransparent color, to allow the common historical increases and decreases in rainfall and streamflow to display over the time period. **These data, spanning almost the past two decades, indicate there is a clear relationship between rainfall and streamflow in He`eia, and that historic and projected rainfall patterns should be considered as factors in assessing He`eia streamflow.**

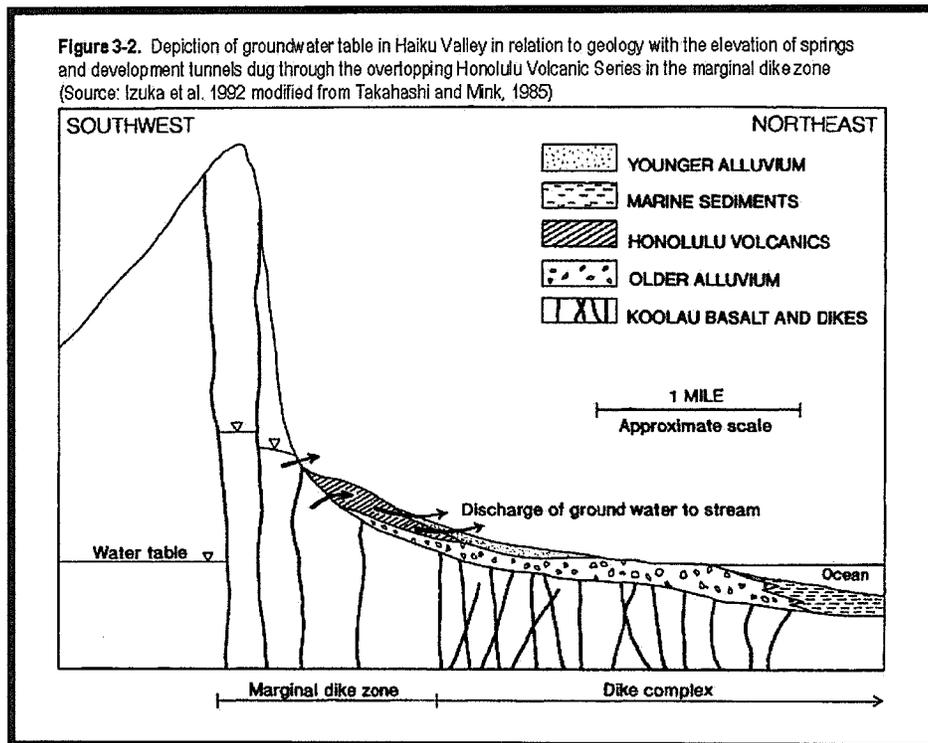


Finally, as noted in the Draft Heeia IFS Report and as a general trend for most watersheds on Oahu, the presence of non-native vegetation in the He`eia watershed has increased over the past century. **Non-native vegetation is associated with higher evapotranspiration characteristics, which may also divert overland flow and groundwater discharge that would otherwise contribute to He`eia streamflow; therefore, this factor should also be considered when evaluating streamflow.**

#### Groundwater Contribution to Historic He`eia Streamflow

During the CWRM Informational Briefing and the CWRM/BWS meeting, CWRM staff theorized that the BWS Haiku Tunnel was the sole factor in the apparent streamflow decrease of He`eia Stream since the tunnel's construction, c.1940. CWRM staff stated that the nearby BWS Haiku and Iolekaa Wells were thought to have no effect on streamflow, as they were "not in the same high-level dike complex as Haiku Tunnel".

BWS disagrees with this understanding. First, text from Page 33 of the Draft Heeia IFS Report describing the regional hydrogeology states, "...Where a dike complex exists, 100 or more dikes per mile, occupying 5% or more of the rock, is not uncommon and can hold substantial quantities of water in the permeable layers between the dikes". **This statement suggests an incomplete understanding of dike complexes and marginal dike zones. The marginal dike zone, with fewer than 100 dikes per mile and dikes constituting less than 5% of total rock volume, is more favorable than the dike complex for the occurrence of dike-impounded water** (Takasaki, K.J. and J.F. Mink, 1985, Evaluation of Major Dike-Impounded Ground-Water Reservoirs, Island of Oahu, U.S. Geological Survey Water-Supply Paper 2217). Figure 3-2 of the Draft Heeia IFS Report further illustrates this concept.



Second, the Draft Heeia IFS Report cites portions of **Geohydrology and Possible Transport Routes of Polychlorinated Biphenyls in Haiku Valley, Oahu, Hawaii / USGS Water-Resources Investigations Report 92-4168** (Izuka et al, 1993): “...an analysis of the drilling log of (Haiku Well)...(includes an aquifer) in the dike compartment of the Koolau Basalt.” This citation contradicts the aforementioned CWRM staff statements. Furthermore, the Izuka et al, 1993 report goes on to comment, “The difference in water levels between Haiku Tunnel and (Haiku) Well indicate that they penetrate different dike compartments, but water may be exchanged between compartments”.

Third, the **Iolekaa Well Environmental Impact Statement (EIS)**, as commented on c.1983 by the University of Hawaii (UH), U.S. Geological Survey (USGS), and State of Hawaii Department of Land and Natural Resources (DLNR), notes “**both the Iolekaa Well and the Haiku Well tap dike aquifers**”.

Fourth, historical reports and agency comments as noted above, demonstrate that the relationships between Haiku Tunnel, Haiku Well, Iolekaa Well and He`eia streamflow have not yet been fully investigated nor resolved. Izuka et al, 1993 states:

*The flow-duration curves indicate that the base flow of Heeia Stream decreased after 1940 when Haiku water-tunnel withdrawals began and increased in 1989 when withdrawals from well 2450-2 began. Whether water-tunnel and well withdrawals have caused the changes in base flow, or whether the changes are the result of climatic variations, is unclear. The Lower Luakaha rain gage (State number 782) located 6 mi to the southeast of Haiku Valley, is one of the few rain gages with a record long enough to compare with the Heeia stream-discharge record at station 16275000. During the 6 years of stream-discharge record prior to the development of the Haiku water tunnel, rainfall averaged 153 in/yr at the Lower Luakaha gage, but between 1940 and 1988, rainfall averaged only 116 in/yr, a decrease of approximately 24 percent. The decrease in base flow may thus be due to a decrease in rainfall. Even though base flow is sustained by ground-water discharge, a decrease in rainfall would decrease recharge and storage, which in turn decreases spring discharge and base flow. The recorded magnitude of the stream-discharge decrease is large, however:*

*base flow after tunnel development was only about one third of the base flow before tunnel development. A change of this magnitude indicates that the tunnel is at least partly responsible for the decrease in base flow of the stream*

*In 1980, the withdrawal from the tunnel decreased from about 1.9 Mgal/d to 1.7 Mgal/d. **The increase in streamflow in the period from 1989 to 1990 may be due to this decrease in tunnel withdrawal, but rainfall in this period also increased to 128 in/yr. Interpretation of the effects of ground-water withdrawals on base flow for a short 2-year record is tenuous, however. Additional analyses and an extended stream-discharge record are needed to establish the connection between base flow and ground-water development.***

Izuka et al, 1993 also described four seepage runs conducted by the USGS between November and December 1991. The report notes "The stream gains water along all of the reaches measured in the seepage runs". However, **these seepage runs were conducted along the upper reach of He'eia Stream only, above the confluence with Iolekaa Stream; therefore, the influence of Iolekaa Stream was not considered. It is also not clear whether Haiku Tunnel, Haiku Well or Iolekaa Well production was considered during the period of these seepage runs.** Instead, the report provides a general comment on this and prior seepage runs from the same measurement locations:

*Seepage runs from this study are compared...with seepage runs done in 1938 prior to the construction of the Haiku Tunnel, in 1961 after construction of the tunnel and prior to construction of (Haiku) Well, and in 1981, before and during aquifer testing of (Haiku) Well. Locations of measuring sites of the earlier seepage runs correspond closely to the site locations of this study. **The earlier seepage runs show that the large gain between sites 2 and 3 has been a persistent feature in the seepage of Hee'ia Stream, despite the withdrawal of water from the nearby well and water tunnel.***

In an August 20, 1981 comment letter to BWS concerning the Draft EIS for Iolekaa Well, the USGS stated:

*Paragraph (regarding Iolekaa Well short-term pumping test; probably referring to the 3-hour pumping test and stream gauging conducted during well installation, January 1966) is an oversimplification of a complex hydrologic system. **Short-term test pumping results of the Iolekaa Well cannot be used as criteria to indicate that the pumping has no effect on the baseflow of Iolekaa Stream and probably no effect on Haiku and Hee'ia Streams...Drawdown during a pumping test will be excessive in the well bore and in the immediate vicinity of the well. Drawdown will be small and slow in spreading away from the well. Thus, unless the channels intersect groundwater in close proximity to the well, its flow will not be noticeably affected, especially in the short term.***

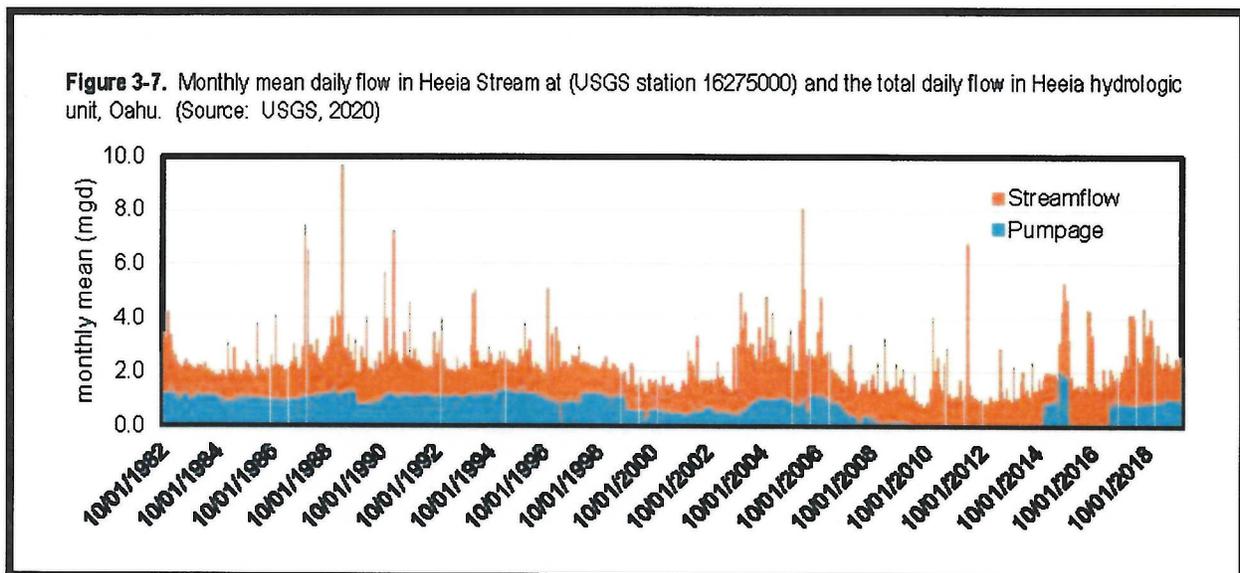
In a September 1, 1981 comment letter to BWS concerning the Draft EIS for Iolekaa Well, the DLNR provided a similar comment:

***The question of whether pumping of the Iolekaa Well will adversely affect streamflow's has not been satisfactorily discussed in the document. The EIS should address means by which a determination will be made as to whether pumping of the well will affect adjacent streamflow's. This would require gauging of streams over a period of time, and in particular, during low flows.***

At that time, BWS replied to these comments by noting that BWS was “working with USGS to establish permanent gauging stations along Haiku, Heeia, and Iolekaa Streams” to improve the understanding of the flow system. Unfortunately, this effort does not appear to have been achieved to that degree. As reflected in the Draft Heeia IFS Report, only USGS Stream Gauge 16275000 has remained as a permanent gauge. This gauge is located a short distance downstream of Haiku Tunnel and Haiku Well, along the upper reach of He`eia Stream.

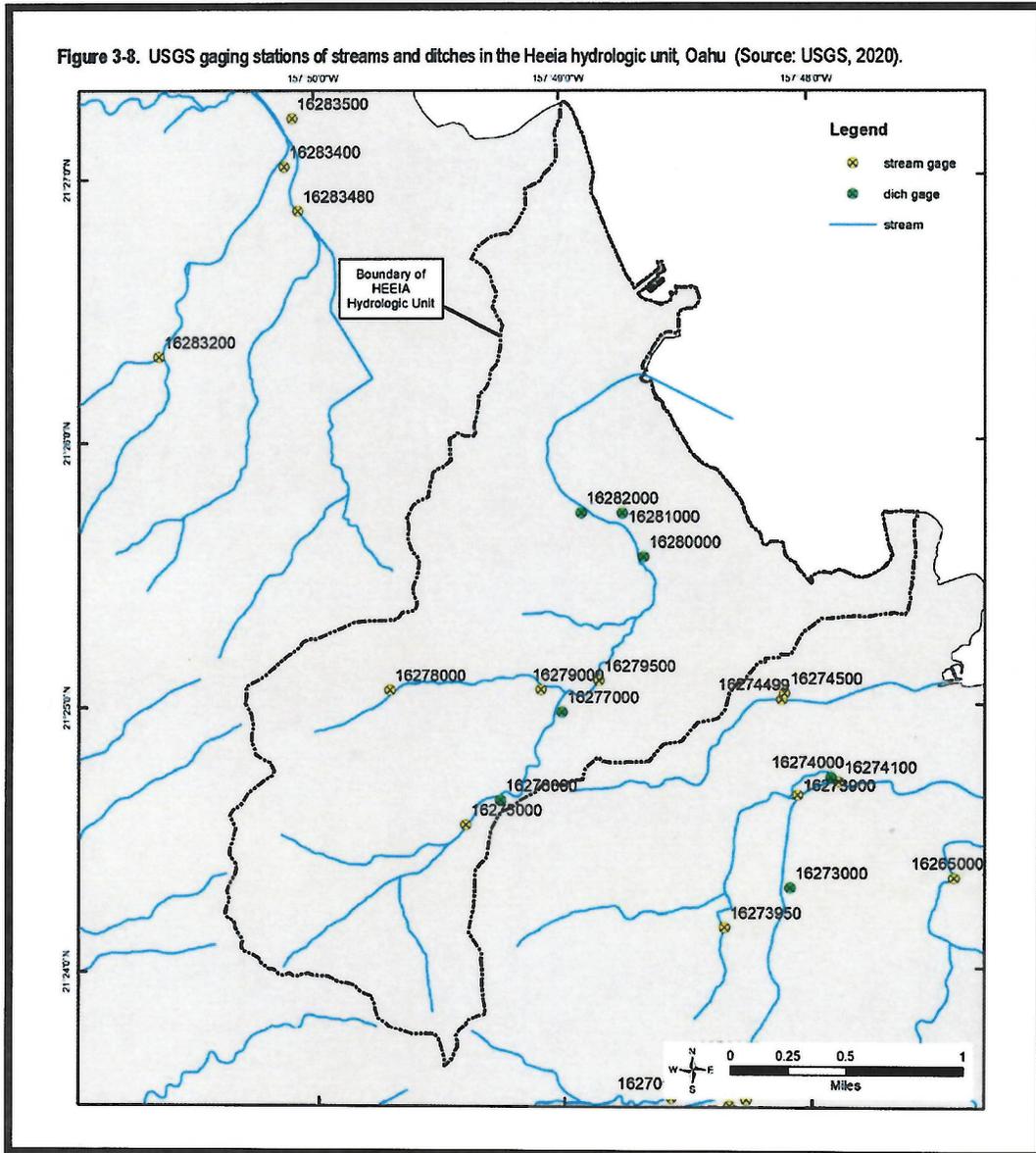
Finally, Figure 3-7 of the Draft Heeia IFS Report reflects the incomplete understanding of relationships between Haiku Tunnel, Haiku Well, Iolekaa Well and He`eia streamflow. **If, as previously suggested by CWRM staff, Haiku Tunnel is the sole factor influencing Heeia streamflow relative to Haiku Well, Iolekaa Well, or historic rainfall, then the lack of increase in streamflow between c.2010 - 2014 does not make sense. Haiku Tunnel was out of service during this period.**

**If rainfall were taken into account, the period c.2010 - 2014 at the BWS Haiku Rain Gauge was not characterized by unusually low rainfall. Consideration should therefore be given to Haiku Well (and by association, Iolekaa Well), both of which were in service during the period c.2010 – 2014.**



#### Historic Measurement of He`eia Streamflow

Page 31 of the Draft Heeia IFS Report notes limited long-term streamflow data along the entire reach of He`eia Stream. The only permanent stream gauge is USGS Stream Gauge 16275000. As noted above, this gauge is located a short distance downstream of Haiku Tunnel and Haiku Well, along the upper reach of He`eia Stream and above the confluence with Iolekaa Stream. One other stream gauge had more than a few years of historic data; USGS Stream Gauge 16278000, collected data between c.1940 – 1970 along the upper reach of Iolekaa Stream.



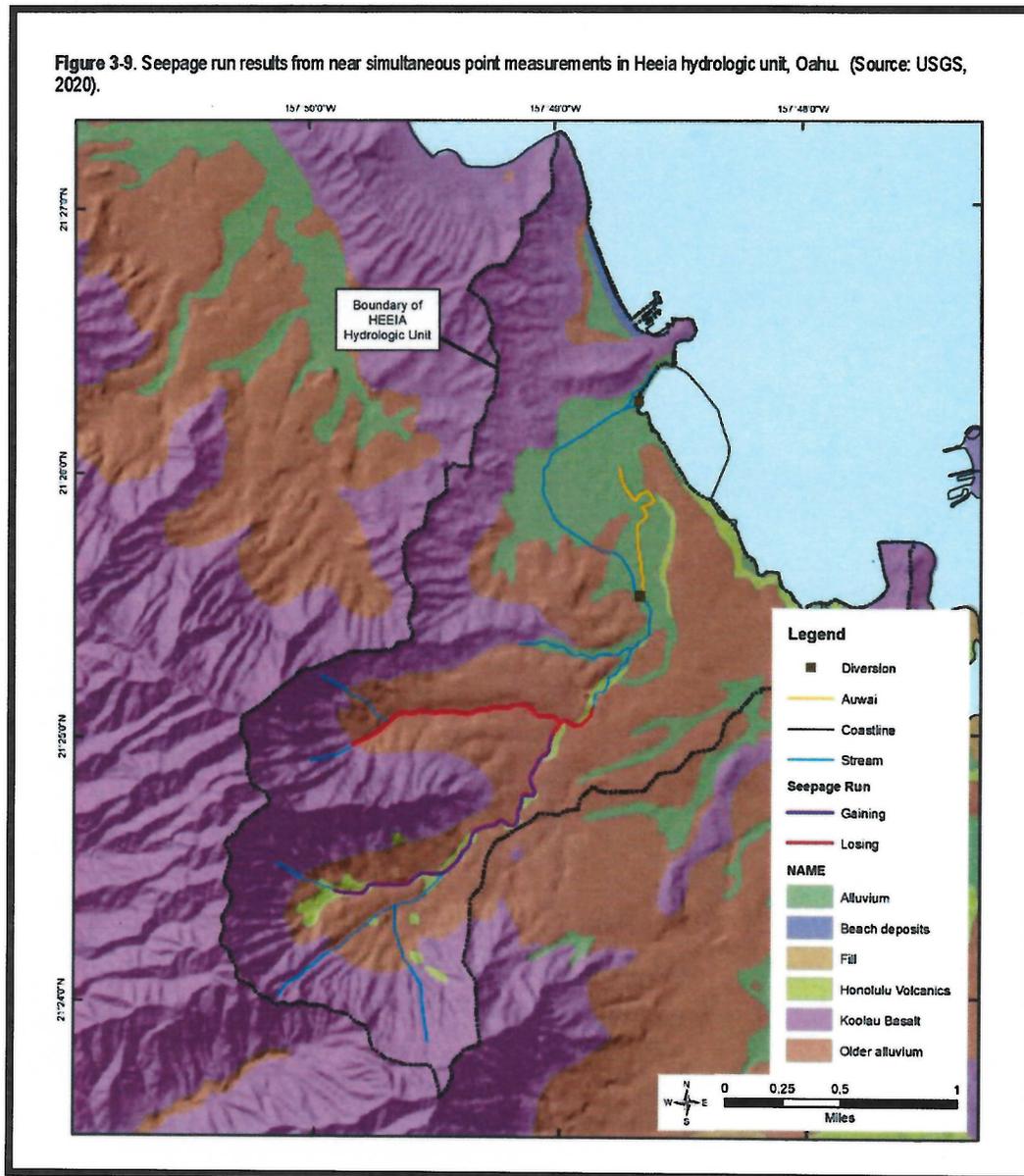
Subsequent BWS research with the USGS confirmed that the other stream/ditch gauges shown on Figure 3-8 of the Draft Heeia IFS Report, have very old and/or inapplicable flow data:

USGS Stream/Ditch Gauge ID	Dates of Available Data	Notes
16277000	1939, 1940	2 measurements
16279500	1965 - 1997	Annual peak flows, plus 6 discharge measurements during 1960 – 1963
16279000	1914 - 1916	Data available in historic USGS Surface Water Supply Reports
16270000	1914 - 1916	"
16277000	1914 - 1916	"
16280000	1914 - 1916	"
16281000	1914 - 1916	"
16282000	1914 - 1916	"

**Given the limited long-term streamflow data along the entire reach of He`eia Stream, it is unclear how CWRM’s determination of Iolekaa Stream as a losing stream was derived. This determination is shown on Figure 3-9 of the Draft Heeia IFS Report, with a citation that directs the reader to the USGS Web Site for “raw” water-related data, the National Water Information System (NWIS) Data Portal.**

**Accompanying text on Page 40 of the Draft Heeia IFS Report states, “By contrast, the north branch of Heeia Stream (*assumed here to be Iolekaa Stream*) was mostly a losing stream, with losses ranging from -0.34 to -3.2 cfs per mile...because the channel primarily incised older alluvium... Seepage gains and losses between specific elevations along stream reaches estimated from Izuka et al 1993 are described in detail in Table 3-6.” This text seems misleading, implying that the USGS seepage runs included Iolekaa Stream; they did not. Also, Table 3-6 does not cite Izuka et al, 1993, but (similar to Figure 3-9) includes a citation that directs the reader to the NWIS Data Portal. The source and timeframe of the streamflow data on Table 3-6, as well as the statements regarding Iolekaa Stream on Figure 3-9 and on Page 40 of the Draft Heeia IFS Report, should be clarified by CWRM.**

Turning to the related topic of current stream diversions, it appears that there are no ongoing diversion measurements based on the information presented in the Draft Heeia IFS Report. Only point-in-time measurements, field photographs and other identifying survey information collected by BWS to assist CWRM c.2009 – 2011, are included in Section 14 of the Report. Clearly, **if non-instream uses of He`eia Stream are to be assessed, such stream diversions should be subject to long-term measurement.**



**Table 3-6.** Distance between elevations (miles, mi), total mean gain/loss in flow (cubic feet per second, cfs), and mean seepage rate change (cfs per mi) for specific streams in the Heeia hydrologic unit, Oahu. (Source: USGS, 2020)

Heeia Stream				North Branch Heeia Stream/Iolekaa Stream			
Elevation (ft)	Distance (mi)	Seepage (cfs)	Seepage rate (cfs per mi)	Elevation (ft)	Distance (mi)	Seepage (cfs)	Seepage rate (cfs per mi)
570				430			
500	0.056	0.74	13.21	360	0.115	-0.04	-0.35
470				360			
430	0.077	0.86	11.11	320	0.237	-0.64	-2.70
430				320			
400	0.101	1.02	10.10	140	0.625	-0.21	-0.34
400							
340	0.06	0.36	6.00				
340							
272	0.299	0.07	0.23				
272							
240	0.293	0.75	2.56				
240							
160	0.413	1.26	3.05				
160							
150	0.799	1.99	2.49				
150							
95	0.263	-0.10	-0.37				

BWS Production and Operational Considerations with Respect to He`eia Streamflow

Haiku Tunnel and Well, Iolekaa Well and Luluku Tunnel and Well are essential sources that provide water supply to the Windward 500' water system extending from Haiku Valley to Maunawili Valley serving properties between the 172 foot and 400-foot elevations. The Kahaluu Tunnel and Well has been separated from the system because a connecting 16-inch water line across the Heeia wetland has been permanently taken out of service due to pipe corrosion, leakage and potential main breaks that would be inaccessible to repair. This water system change results in less flexibility to accommodate reductions in source production to increase streamflow while still meeting system water demands. Domestic use is a Public Trust Use equal to water in its natural state, traditional and customary use and DHHL use.

We note that the BWS water conservation program created in 1990, has increased water efficiency in the windward water system which has resulted in a reduction in source production compared to State permitted use. The water conservation savings in these dike sources equates to more groundwater storage for drought mitigation and stream restoration.

Thank you for the opportunity to provide testimony on the Draft Instream Flow Standard Assessment Report for the Hydrologic Unit of He`eia (3028). If you have questions, please contact Barry Usagawa, Water Resources Program Administrator at 748-5900 or Nancy Matsumoto, Hydrology-Geology Branch of our Water Resources Division, at 748-5938.

Very truly yours,

  
 ERNEST Y.W. LAU, P.E.  
 Manager and Chief Engineer

cc: B. Usagawa  
 N. Matsumoto

No Log #

**BOARD OF WATER SUPPLY  
WATER RESOURCES ROUTING SLIP**

To: Ernest Lau  
 From: Barry Usagawa Date: 11/16/20

**SUBJECT:**  
Testimony on Draft Instream Flow Standard Assessment Report for the Hydrologic Unit of He'eia (3028)  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**RUSH**

**ACTION REQUESTED:**  
 Review and Approval  
 Review and Comment  
 Information Only

TO:	NAME:	INITIALS	DATE
1	Water Resources Section N. Matsumoto	<i>NM</i>	<i>11/17/2020</i>
2	M. Chun	<i>mc w/EOIS</i>	<i>11/18/2020</i>
3	B. Usagawa	<i>BU</i>	<i>11/18</i>
	Legal Counsel		
	P. Kikuchi		
4	E. Lau	<i>EL</i>	<i>11/20</i>
	Other:		

For more info, please contact: Nancy Matsumoto at Ext. 5938

**COMMENTS:**  
 Please mail finalized testimony to CWRM.  
**Testimony must be received by CWRM no later than November 29, 2020.**  
 Thank you.

File name (clerical use): Suzanne Case - DRAFT BWS Testimony CWRM Heeia IFS Public Mtg - N. Matsumoto

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## **2.0 He'eia National Estuarine Research Reserve Kawika Winter, Ph.D., Yoshimi Rii, Ph.D., and Frederick Reppun, M.S.**

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# He'eia National Estuarine Research Reserve

*Ko'olaupoko, O'ahu, Hawai'i*

Date: November 30, 2020

To: Suzanne D. Case, Chairperson  
Commission on Water Resource Management  
State of Hawai'i Department of Land and Natural Resources  
Kalanimoku Building 1151 Punchbowl Street, Room 227 Honolulu, Hawaii 96813  
Email: [dlnr.cwrp@hawaii.gov](mailto:dlnr.cwrp@hawaii.gov)  
Fax: (808) 587-0219

From: Dr. Kawika Winter, Reserve Manager  
Dr. Yoshimi Rii, Research Coordinator  
Frederick Reppun, Education Coordinator  
He'eia National Estuarine Research Reserve

Re: Testimony in support of the amending the of instream flow standards of He'eia Stream (Ko'olaupoko, O'ahu, hydrologic unit 3028) to increase the available water in support of ahupua'a restoration

Aloha to Chair Case and Commissioners,

Thank you for the opportunity to provide testimony, on behalf of the He'eia National Estuarine Research Reserve. We ask the Commission to establish an Interim Instream Flow Standard for He'eia Stream that would increase the available water in support of ahupua'a restoration. Increasing the baseflow of He'eia stream is likely to have positive effects on biodiversity, and will also facilitate the perpetuation of Native Hawaiian traditional and customary practices that are being used to restore the ahupua'a. An intact biocultural system in He'eia will increase the resilience of the community—within and beyond Ko'olaupoko—to the economic, ecological, and social shocks and stressors that are on our doorstep.

The He'eia National Estuarine Research Reserve (NERR) covers 1,385 acres of the lower reaches of the ahupua'a of He'eia. It was established in 2017 as a collaborative management agreement among government agencies (National Oceanic and Atmospheric Administration, Department of Land and Natural Resources, Hawai'i Community Development Authority), the University of Hawai'i at Mānoa (Hawai'i Institute of Marine Biology), and Native Hawaiian-led non-profit organizations in the community (Ko'olaupoko Hawaiian Civic Club, Ko'olau Foundation, Kāko'o 'Ōiwi, Paepae o He'eia). The goals of the He'eia NERR are to support and conduct research to understand the ecological effects of ahupua'a restoration using Indigenous resource management practices – including Indigenous agro-ecology and aquaculture. Our research includes collaborations with several labs and institutions, as well as a water quality monitoring program that adheres to the highest national standards.

The restoration of the ahupua'a is conducted using Native Hawaiian traditional and customary practices, and is very much informed by archival maps and images and oral histories of

*Hawai'i Institute of Marine Biology (University of Hawai'i at Mānoa) • Kāko'o 'Ōiwi • Paepae o He'eia  
Ko'olaupoko Hawaiian Civic Club • Ko'olau Foundation • Department of Land and Natural Resources  
Hawai'i Community Development Authority • National Oceanic and Atmospheric Administration*

living and past kūpuna, which speak to the abundance that once existed and sustainably fed the people of Ko'olaupoko. An image of this is conveyed through an aerial photograph from 1928 (Figure 1). This allows us to see the Native Hawaiian forms of agro-ecology and aquaculture (lo'i kalo, loko kalo, loko wai, loko i'a) that were documented in the land claim awards (LCAs) of the 1850s. These agro-ecology and aquaculture systems were developed to manage, and depended on, a substantial flow of water and nutrients through the stream and the wetlands, and out into the estuary. These systems also provide habitat for native species. This image and the associated information provide the template for restoration activities that are currently underway.



*Figure 1. An aerial image from 1928 that captures the Native Hawaiian agro-ecology and aquaculture systems in He'eia that depended on and managed a substantial flow of water and nutrients through the stream and wetlands, and out into the estuary.*

Restoring Native Hawaiian agro-ecology and aquaculture systems (lo'i kalo, loko kalo, loko wai, loko i'a), and the habitat they provide for native species, is challenging today given the multiple stressors, historical and current: invasive species, fishing pressure, urban pollution, and climate change, to name a few. It is ultimately impossible, however, without a sufficient amount of water. We know from kama'āina testimonies that there was once much more water in the stream, which contributed an abundance of food on land and in the ocean, while maintaining key ecosystem services. We know from our co-management partners in the Reserve that there is not enough water for the lo'i and the loko i'a to function properly. Given the current base flow in He'eia stream, our co-management partners are not able to restore the agro-ecosystems and aquaculture systems that have been documented to exist. We therefore support an increased base flow to the fullest extent possible that will allow for the full restoration of those systems, as well as the habitat they provide for native species. The He'eia NERR's research and monitoring program is uniquely positioned to collect long-term data that will give us detailed insight into the effects of restoring base flow in the stream. Please find attached a summary of our current understanding of the need for stream restoration in He'eia. We would be happy to collaborate with CWRM to document the effects of stream restoration to inform adaptive management here and in other areas.

Thank you for your consideration,



Kawika Winter Ph.D.

Reserve Manager, He'eia NERR



Yoshimi Rii, Ph.D.

Research Coordinator, He'eia NERR

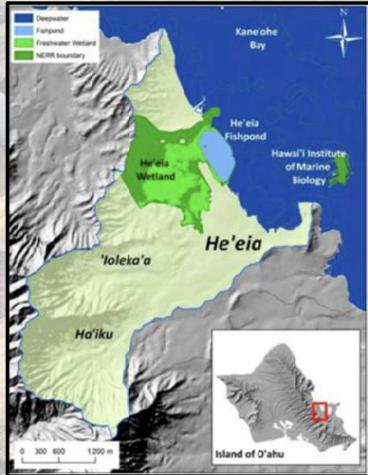


Frederick Reppun, M.S.

Education Coordinator, He'eia NERR

# Comments on He'eia Stream Instream Flow Standard (IFS) Assessment Report

Provided by the He'eia National Estuarine Research Reserve  
November 2020

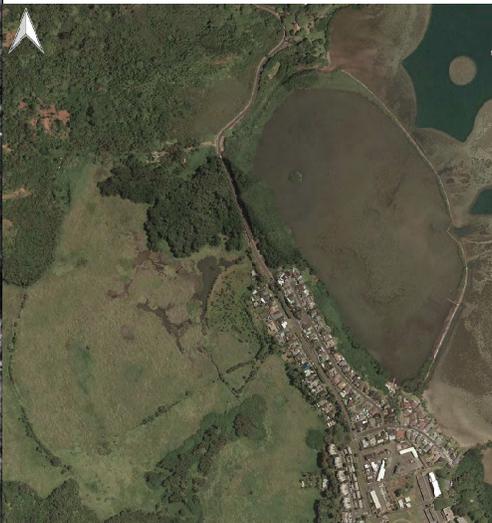


## He'eia Ahupua'a - Then and Now

1928



2005

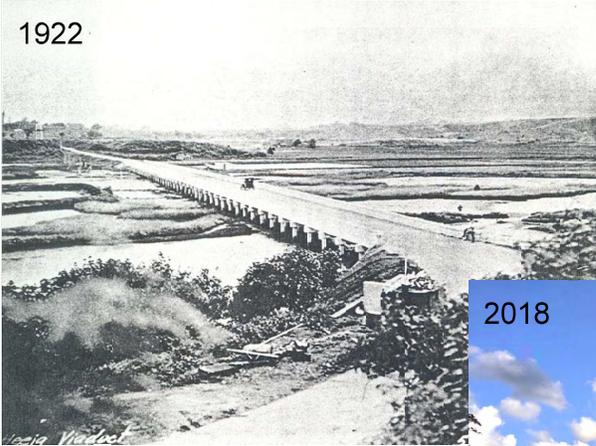


2019



## He'eia Ahupua'a - Then and Now

1922



2016



2018



## Why restore water to He'eia Stream?

1. Functional lo'i kalo and loko i'a depend on, and are currently limited by, the flow of fresh water.
2. Native species and ecosystems, important culturally and for economic and food security, would benefit directly by increased streamflow, and indirectly through the ecosystem services provided by lo'i and loko i'a
3. Increased streamflow can help to control growth of invasive wetland vegetation.
4. More freshwater would help to offset the effects of climate change.

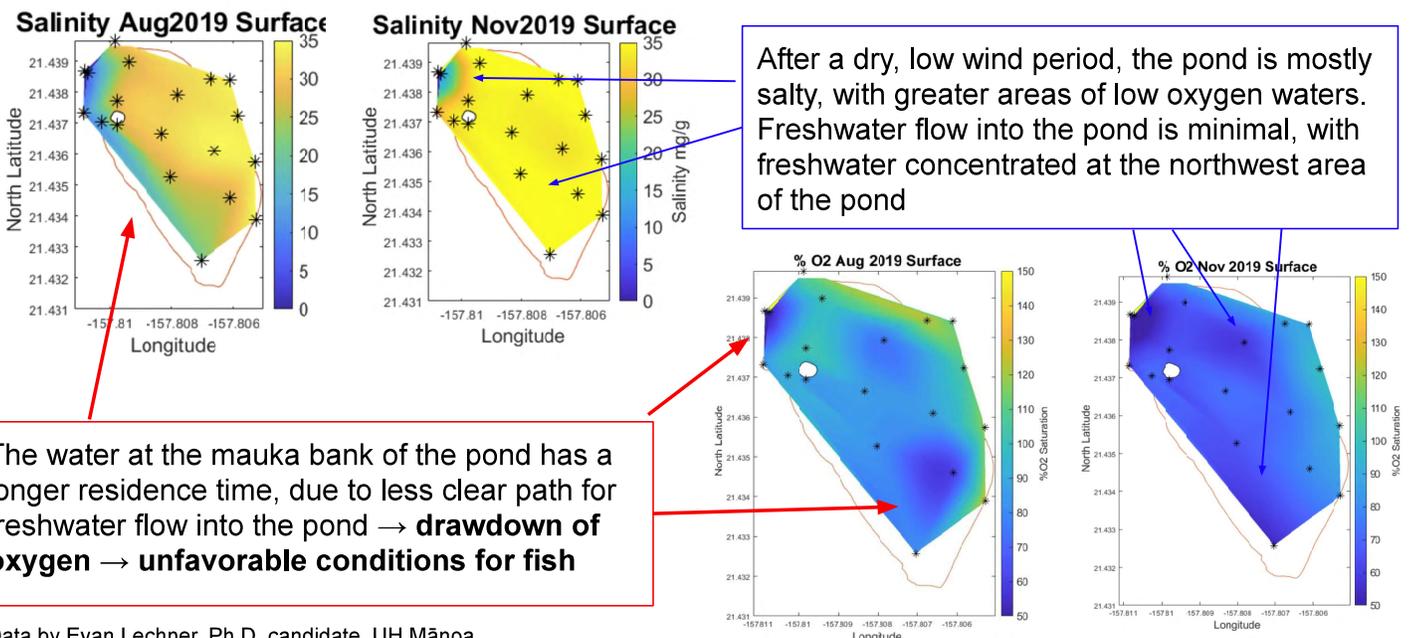
# Increasing streamflow would enable expansion of restored lo'i kalo at Kāko'o 'Ōiwi

- Currently the restoration of lo'i kalo is limited by water flow, particularly during the dry season
- In addition to the 14 acres already restored, 10 additional acres are ready for immediate reopening pending water availability
- Approximately 100 acres of land is suitable for lo'i within the wetland
- Increased flow would lower water temperatures, contributing to less kalo rot, higher yields, and lower incidence of water-borne diseases (e.g. swimmer's itch) that affect farmers

Map showing current lo'i and wetlands (light green) and areas available for immediate expansion (dark green) by K. Falinsky

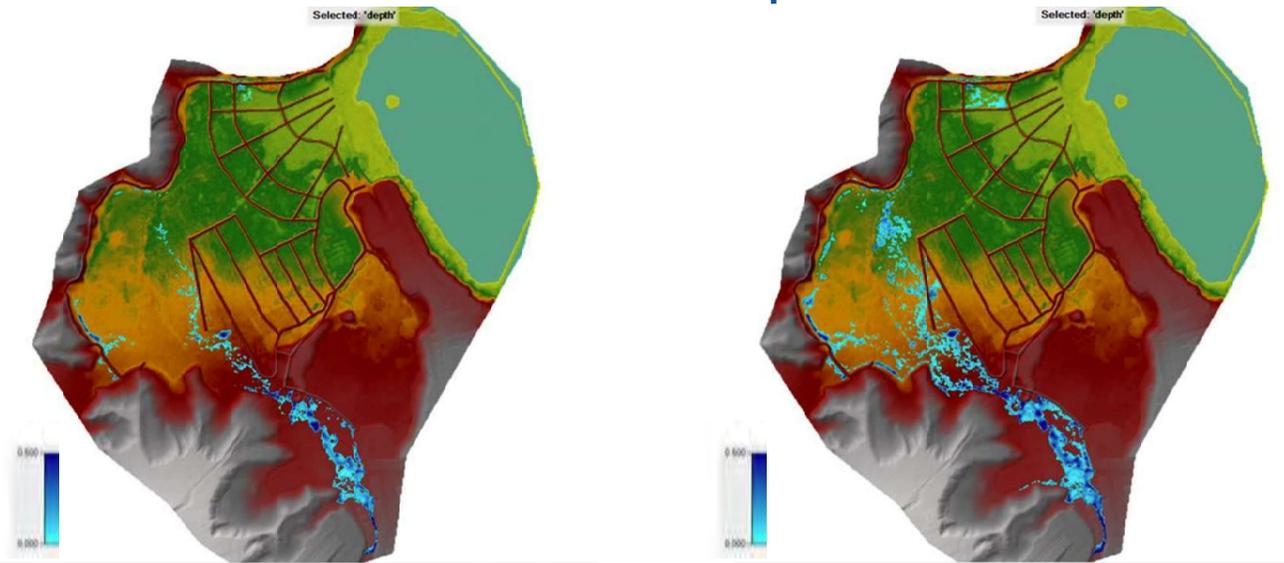


## He'eia Fishpond would benefit from more fresh water, which increases oxygen levels and decreases water residence time



Data by Evan Lechner, Ph.D. candidate, UH Mānoa

## Flood models indicate possible increase in natural wetland habitat if stream baseflow restored to pre-1940 levels



CURRENT average baseflow (3.99 cfs)  
→ inundation of **8 acres**

RESTORED average baseflow (7.98 cfs)  
→ inundation of **19 acres**

Flood models (constructed by USFS and Division of Aquatic Resources) indicates expanded natural wetlands with restored flow. While lo'i would temporarily divert water from some areas, the lo'i themselves would expand wetland habitat.

## Endangered Hawaiian waterbirds use natural wetland and lo'i habitat in He'eia

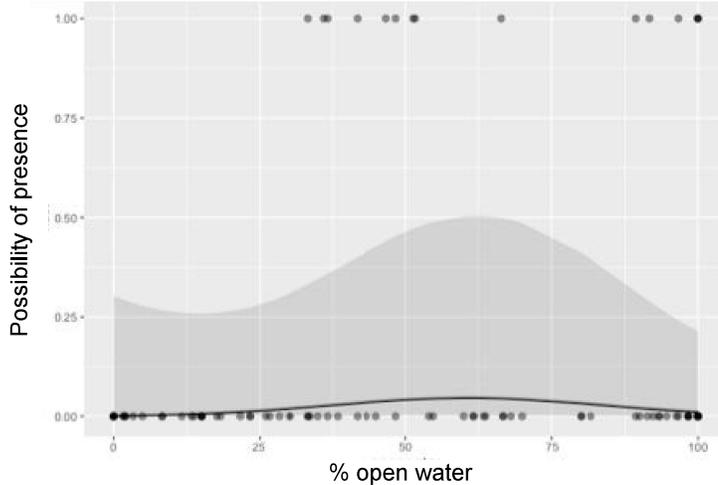
- 'Alae 'ula (Hawaiian gallinule, *Gallinula galeata sandvicensis*) - 1,000 individuals on O'ahu and Kaua'i (Sonsthagen et al. 2018)



Initial studies demonstrate that 'alae 'ula utilize all stages of lo'i cultivation for foraging and nesting (Eryn Opie, M.S. candidate, UH Mānoa, personal communication).

## Endangered Hawaiian waterbirds use natural wetland and lo'i habitat in He'eia

- 'Ae'o (Hawaiian stilt, *Himantopus mexicanus knudseni*) - 1,700 individuals statewide

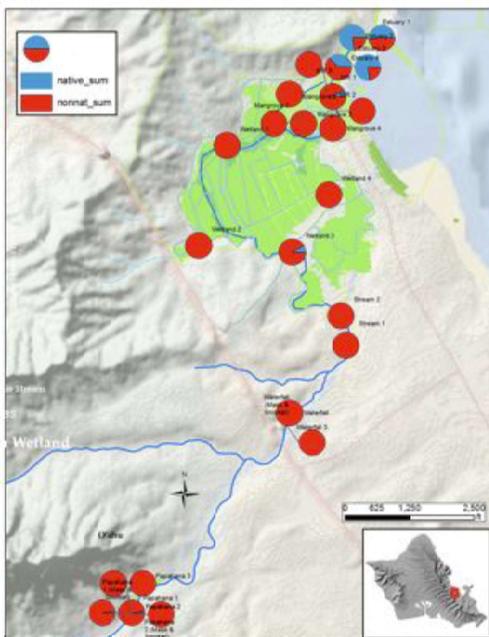


Initial studies in restored He'eia lo'i areas show that 'ae'o may prefer with **50-75% open water** and water depths around 5-10 cm. Areas fitting this description would increase under restored streamflow scenario due to increase in naturally inundated area and ability to open more lo'i.



Data contributed by Eryn Opie, M.S. candidate, UH Mānoa

## Decreased water quality correlates with fewer native fish



Recent fish monitoring in He'eia shows native populations only at the stream mouth, with almost 100% invasive aquarium fish detected through the wetland and He'eia Stream.

**Native fish, such as 'āholehole and 'ama'ama, were once found throughout the wetland.**

Data contributed by The Nature Conservancy, He'eia NERR, and Division of Aquatic Resources

## Juvenile mullet ('ama'ama) in He'eia would benefit from increased stream connectivity and water quality

- 'Ama'ama, an important food fish in the Kāne'ōhe Bay area, move between estuary and stream habitats on a daily basis in places where conditions allow.
- **An increase in streamflow would likely lead to more well-formed channels connecting the stream and estuary.**
- Mullet prefer deeper, wider channels that improve their ability to evade predators, and provide better temperature and dissolved oxygen conditions.
- In the estuary and fishpond, fresh water and the nutrients it carries lead to growth of algae on which mullet feed.

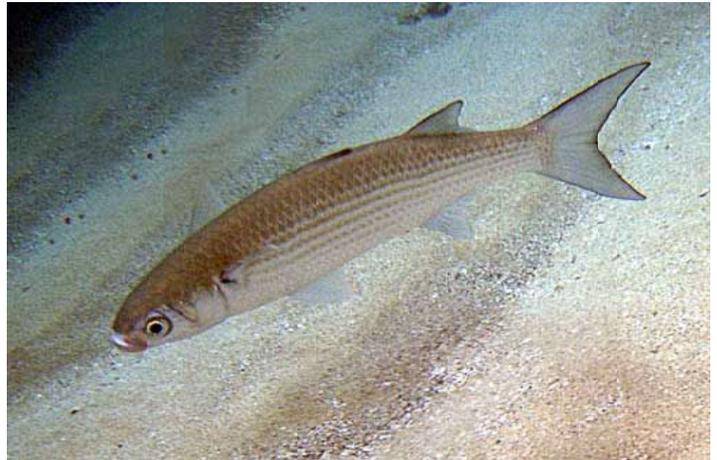


Photo: Bryan Harry. <http://www.botany.hawaii.edu>

Kauoa Fraiola, Ph.D., personal communication

## 'O'opu would benefit from increased stream connectivity and water quality

- 3 'o'opu species (nākea, 'akupa, & naniha) have been observed in He'eia, in low abundances. They are listed under Hawaii's Department of Natural Resources Species of Greatest Conservation Need (SGCN), which are species identified in need of conservation action from key threats potentially affecting their future survival.
- These native (endemic except for nakea) freshwater species utilize both brackish and freshwater habitats. Their distribution provides insight into fish passage and habitat health
- 'O'opu naniha, previously undocumented, have been observed returning to areas within He'eia wetlands due to mangrove removal and restoration of habitat (TNC, DAR, He'eia NERR).
- **These species would directly benefit from restoration of natural baseflow by creating more well-defined channels, increasing habitat connectivity necessary for their growth, reproduction, and survival (K. Fraiola, pers. comm., DAR)**

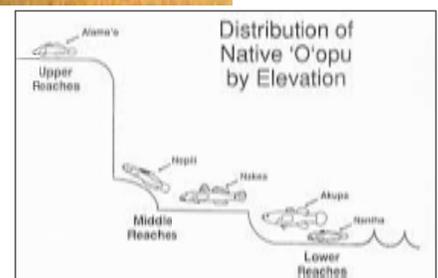


O'opu nakea  
(*Awaous guamensis*)

O'opu akupa  
(*Eleotris sandwichensis*)



O'opu naniha  
(*Stenogobius hawaiiensis*)



<http://www.nanfa.org/ac/native-stream-fishes-hawaii.pdf>

## Forage Fish (Mid-Trophic Level Species)

Two Hawaiian endemic forage fish species known as nehu (*Encrasicholina purpurea*) and 'iao (*Atherinomorus insularum*) utilize estuary habitats for survival. While 'iao are capable of inhabiting a range of nearshore marine habitats, nehu are exclusively found in estuaries. According to He'eia fishermen, Kāne'ohe Bay in general and the He'eia stream mouth and estuary specifically were important habitat for nehu (Greg Miranda and Fred Takebayashi, personal communication).

**Economic importance:** Both species were historically important as bait in the pole and line skipjack tuna fishery. Nehu were the preferred species and were highly sought after by subsistence and commercial fishermen.

**Ecological importance:** Forage fish occupy an important ecological role in Hawai'i estuaries by preying on lower trophic levels (i.e. zooplankton) and providing food for higher trophic level organisms (i.e. predatory fish, wetland birds) (Nakoa Goo, Ph.D. candidate, UH Mānoa, personal communication).



Nehu (*Encrasicholina purpurea*)



'iao (*Atherinomorus insularum*)

## Nehu would directly benefit from restoration of streamflow

Nehu populations have declined throughout their entire range, in part due to habitat loss, and are infrequently seen at the mouth of He'eia stream. When sighted, nehu are often observed being actively preyed upon by a variety of predatory fish and bird species. Restoring stream flow in He'eia would promote enhanced biological productivity and habitat suitable for supporting the replenishment and persistence of nehu and 'iao populations in He'eia .

Nakoa Goo, Ph.D. candidate, UH Mānoa, personal communication and Uchida, Richard "The fishery for Nehu, *Stolephorus purpureus*, a live bait used for Skipjack Tuna Fishing in Hawai'i" (US Dep. Commerce, NOAA Technical Rep, NMFS Circ. 408)

## Other federally listed endangered species in He'eia wetlands

### Blackline Hawaiian damselfly (*Megalagrion nigrohamatum nigrolineatum*)

- Found in the slow sections or pools along mid-reach and headwater sections of perennial streams and in seep-fed pools along overflow channels bordering the stream.
- Critical habitat exists in the middle upper reaches of the He'eia watershed.
- **Reductions in streamflow likely limit the available habitat for *Megalagrion***, particularly during drought periods and in the middle and upper stream reaches that are more prone to drying.



### 'Ope'ape'a or Hawaiian hoary bat (*Lasiurus cinereus semotus*)

- Hawaii's only native terrestrial mammal
- **Water courses and stream edges are important foraging areas**
- Food source tied to aquatic dependant invertebrates



## Low flow impact on native vegetation



Changes in vegetation in the He'eia wetland after mangrove removal indicate preference for terrestrial plant species. This is likely due to low water levels restricting habitat for native wetland vegetation species. More fresh water would help to control growth of invasive vegetation.

According to vegetation data collected by TNC and He'eia NERR

# Effects of climate change: storms and runoff

## Hawai'i trends:

- Increase in consecutive days with rainfall
- Increase in extreme precipitation events, leading to increased flooding, runoff, and erosion.

USGCRP, 2018: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*. doi: 10.7930/NCA4.2018



Lo'i kalo act as sediment traps during storm events. Some lo'i have recorded an accumulation of 15-30 mm of sediment per year (K. Falinsky). Increased stream base flow would enable expansion of lo'i, preventing sediment from reaching the fishpond and bay during floods.

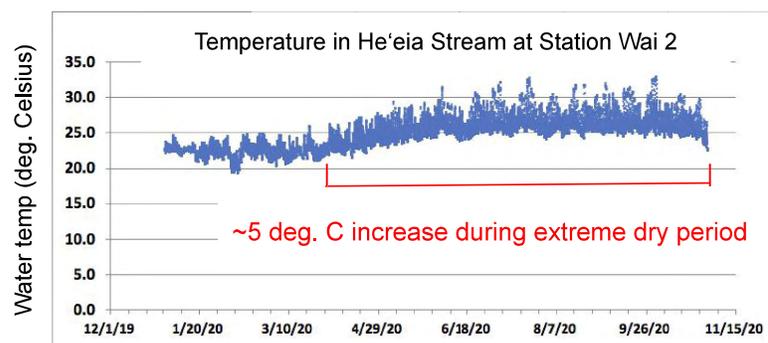
Data by TNC

# Effects of climate change: water temperature

## O'ahu trends:

- Increase in air temperatures
- Decrease in rainfall
- Decrease in streamflows
- Increase in consecutive dry days and drought frequency

USGCRP, 2018: *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* doi: 10.7930/NCA4.2018

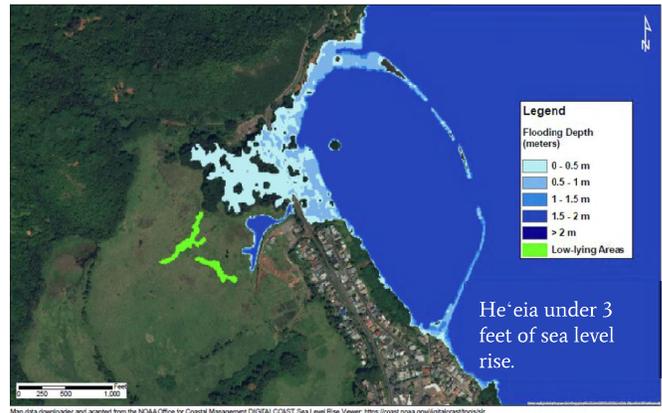
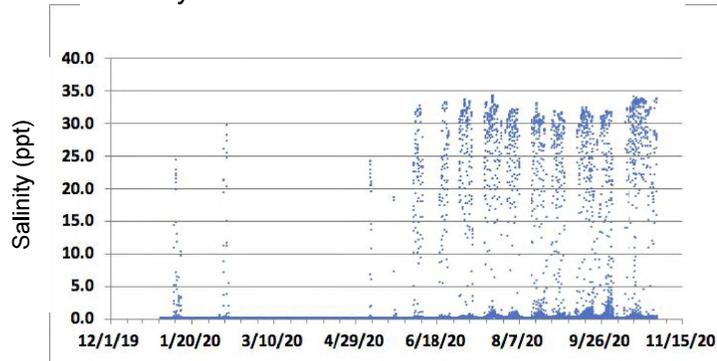


Low flow and high air temperatures **increase water temperature in He'eia Stream**, which is detrimental to kalo production and native fish species. Climate change will further lower stream volume and increase air temperatures.

Data by He'eia NERR

# Effects of climate change: saltwater intrusion

Salinity in He'eia Stream at Station Wai 2



Low “dry period” flow resulted in **increased saltwater intrusion during high tide events**. As these events increase they may lead to compression of habitat for freshwater and estuarine organisms. **More freshwater would increase resilience of the wetland to sea level rise.**

Data at Wai 2 by He'eia NERR

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## **3.0 Office of Hawaiian Affairs, Sylvia M. Hussey, Ed.D.**

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PHONE (808) 594-1888

FAX (808) 594-1938



**STATE OF HAWAII**  
**OFFICE OF HAWAIIAN AFFAIRS**  
560 N. NIMITZ HWY., SUITE 200  
HONOLULU, HAWAII 96817

November 25, 2020

M. Kaleo Manuel  
Deputy Director  
Commission on Water Resource Management  
State Department of Land and Natural Resources  
P.O. Box 621  
Honolulu, Hawai'i 96809  
Via E-mail: [dlr.cwrp@hawaii.gov](mailto:dlr.cwrp@hawaii.gov)

**RE: He'eia Stream Instream Flow Standard Assessment Report**

Aloha mai e Deputy Director Manuel,

The Administration of the Office of Hawaiian Affairs (OHA) **STRONGLY SUPPORTS** the Commission on Water Resources Management (CWRM) and its staff in their efforts to update the interim instream flow standard (IIFS) for the He'eia hydrologic unit, including the He'eia and 'Ioleka'a streams.

**The statewide instream use protection program under Hawai'i Revised Statutes § 174C-71, including the IIFS amendment process, is one of the few means by which CWRM is able to ensure that public trust purposes – such as ecosystem functions, Native Hawaiian traditional and customary practices, and appurtenant rights – and reasonable-beneficial instream uses are appropriately accounted for in the distribution of our finite public trust water resources.** Unfortunately, the IIFS for the vast majority of Hawai'i's streams have not been updated since they were initially set over thirty years ago, as the "status quo" levels of stream flows irregardless of offstream diversions or ongoing deprivations of public trust purposes and reasonable-beneficial instream uses. For example, the current interim IFS for He'eia stream has not been updated since it went into effect as the "status quo" of stream flow on

July 31, 1987.<sup>1</sup> As the Hawai‘i Supreme Court’s seminal decision in *In re Waiāhole*, 94 Hawai‘i 97 (2000) made clear, such “status quo” IIFS are inadequate to protect streams consistent with the public trust doctrine. CWRM actions to reassess and develop meaningful IIFS throughout the islands, as reflected in the He‘eia IIFS amendments contemplated here, are accordingly a much-needed and long-awaited step to upholding the public trust in water. Accordingly, OHA applauds the proactive efforts of CWRM in recent years to update IIFS for various streams, including the hydrological and ecological research, analysis, outreach, and consultations needed to develop this Draft Instream Flow Standard Assessment Report for beloved He‘eia.

As documented in the draft report, **a proper assessment of the He‘eia IIFS is vital to the protection and perpetuation of Native Hawaiian traditional and customary rights in this area, and to ensure the necessary mālama (maintenance and care) of the stream, riparian, and coastal resources that sustain Native Hawaiian traditional and customary practices as well as other public trust purposes and reasonable-beneficial instream water uses.**<sup>2</sup> Notably, He‘eia is host to a wide range of precious resources that may be further served by updated IIFS and restored stream flow in the region, with aquatic habitat for at least seven identified native species<sup>3</sup> (e.g. ‘ōpae ‘oeha‘a, ‘o‘opu nākea, ‘āholehole, and hīhīwai), wetland habitat for endangered birds, quality riparian habitat for native flora and fauna, and a buffer zone for nearby coral communities.<sup>4</sup> Further demonstrating the importance of He‘eia is the recent 2017 establishment of the He‘eia National Estuarine Research Reserve, encompassing 1,385 acres including the He‘eia estuary on Kāne‘ohe Bay.<sup>5</sup> This Reserve is home to endangered native species, such as ae‘o, ‘alae ‘ula, ‘alae kea, and koloa maoli, and aims to protect these native species and the unique ecosystems of He‘eia, including its streams, estuaries, coral reefs, sand flats, ancient loko i‘a (fishponds), and traditional agricultural and heritage lands. **The contemplated establishment of meaningful IIFS in the region will be consistent with, and further serve the aims of the Reserve.**

Instream water uses at He‘eia include Native Hawaiian traditional and customary practices such as historical and current lo‘i kalo cultivation, loko i‘a aquaculture, and native biota gathering for cultural, subsistence, medicinal, and religious purposes. Keeping these practices alive and well are the various community groups such as Paepae o He‘eia, Kāko‘o ‘Ōiwi, and Papahana Kuaola – organizations that not only contribute substantially to native ecosystem restoration and community engagement efforts, but that also continue to grow and evolve future plans to further ho‘omomona (fatten, enrich) He‘eia in innovative, sustainable, and culturally-grounded ways. OHA urges CWRM to continue to account for these and other Native Hawaiian

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<sup>1</sup> Instream Flow Standard Assessment Report, Island of O‘ahu, Hydrologic Unit 3028, He‘eia, Draft PR-2020-02 (June 2020), at 2, last accessed on Nov. 24, 2020 at <https://files.hawaii.gov/dlnr/cwrwm/ifsar/PR202002-3028-HeeiaDraft.pdf>.

<sup>2</sup> *See id.* at 72.

<sup>3</sup> *Id.* at 49.

<sup>4</sup> “Informational briefing on developing an amended interim instream flow standard for He‘eia Stream, O‘ahu,” Presentation by Dr. Ayron Strauch of CWRM Stream Protection and Management Branch (SPAM), last accessed on Nov. 24, 2020 at <https://files.hawaii.gov/dlnr/cwrwm/submittal/2020/sb20200915C3.pdf>.

<sup>5</sup> National Estuarine Research Reserve Association (NERRA) Website, He‘eia Reserve, Hawai‘i, last accessed on Nov. 24, 2020 at <https://www.nerra.org/project/heeia-national-estuarine-research-reserve/>.

traditional and customary practices and to acknowledge the unique opportunities for cultural perpetuation and resource protection found in He'eia, as CWRM further develops this draft Instream Flow Standard Assessment Report and its IIFS recommendations.

OHA greatly appreciates the commendable efforts of CWRM and its staff in this matter, and urges your continued work with various experts and community advocates to update and expeditiously implement IIFS throughout Hawai'i, as a critical means to restore and protect Native Hawaiian traditional and customary practices, riparian farming activities, stream and coastal ecosystems, and other public trust purposes and reasonable-beneficial instream uses of our precious public trust surface waters.

Mahalo nui for the opportunity to testify on this important effort.

'O wau iho nō,

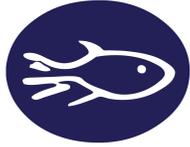
*Casey Brown for*

Sylvia M. Hussey, Ed.D.  
Ka Pouhana, Chief Executive Officer  
Office of Hawaiian Affairs

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## **4.0 Paepae o He'eia, Hi'ilei Kawelo**

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# Paepae o He'eia

*He'eia Fishpond, He'eia O'ahu*

*P.O. Box 6355, Kāne'ohe, HI 96744 • ph: (808) 236-6178 • admin@paepaeoheeia.org*

Date: November 30, 2020

To: Commission on Water Resource Management

From: Hi'ilei Kawelo  
Executive Director, Paepae o He'eia

Re: Testimony in support of the amending the Interim Instream Flow Standards for He'eia Stream (Ko'olaupoko, O'ahu) to increase the available water in support of ahupua'a restoration

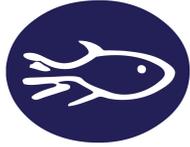
Aloha e Chair Case and members of the Commission on Water Resource Management,

I appreciate this opportunity to offer testimony in support of the Commission on Water Resource Management's ("Commission's") staff recommendations to amend the Interim Instream Flow Standards ("IIFSs") for He'eia Stream, Ko'olaupoko, O'ahu (3028).

Paepae o He'eia the non-profit organization dedicated to caring for He'eia Fishpond, the 88-acre, 800 year old ancient Hawaiian fishpond located in He'eia, Ko'olaupoko, O'ahu. Established in 2001 by a group of young Hawaiians, Paepae o He'eia works in partnership with landowner, Kamehameha Schools, to restore, manage and maintain He'eia Fishpond for the community and for its functional use through the cultivation of seafood.

Our vision is to perpetuate a foundation of cultural sustainability for communities ('ohana) of Hawai'i through education. Our mission is to implement values and concepts from the model of a traditional fishpond to provide intellectual, physical, and spiritual sustenance for our community. To reach our vision, we utilize the strengths of the fishpond as a place of learning to weave ancestral knowledge together with western ways of knowing in order to achieve our goals.

An abundance of clean, cool, flowing fresh water is essential to a fully functional He'eia Fishpond. Having spent the last twenty years restoring He'eia Fishpond, kūpuna and kupa'āina from He'eia have shared stories of what the stream used to look like. Visions of big, fat 'anae and 'ama'ama (Hawaiian Mullet), swimming upstream under Long Bridge being a normal occurrence, the stream being so wide, you used to be able to motor a flat-bottom boat upstream under the bridge. Today, the stream channel, originating from the muliwai (stream mouth), is so narrow, you can't even get a kayak upstream beyond our first fresh water mākāhā (fishpond gate). On a low tide, the stream channel width measures a meager two feet, this is how little fresh water flows through He'eia Stream, out to Kawahaokamanō (Kāne'ohe Bay). Knowing that fresh water is critical to estuary health, phytoplankton production, limu (seaweed) growth and ocean productivity, we need water returned to our stream.



# Paepae o He'eia

*He'eia Fishpond, He'eia O'ahu*

*P.O. Box 6355, Kāne'ohe, HI 96744 • ph: (808) 236-6178 • admin@paepaeoheeia.org*

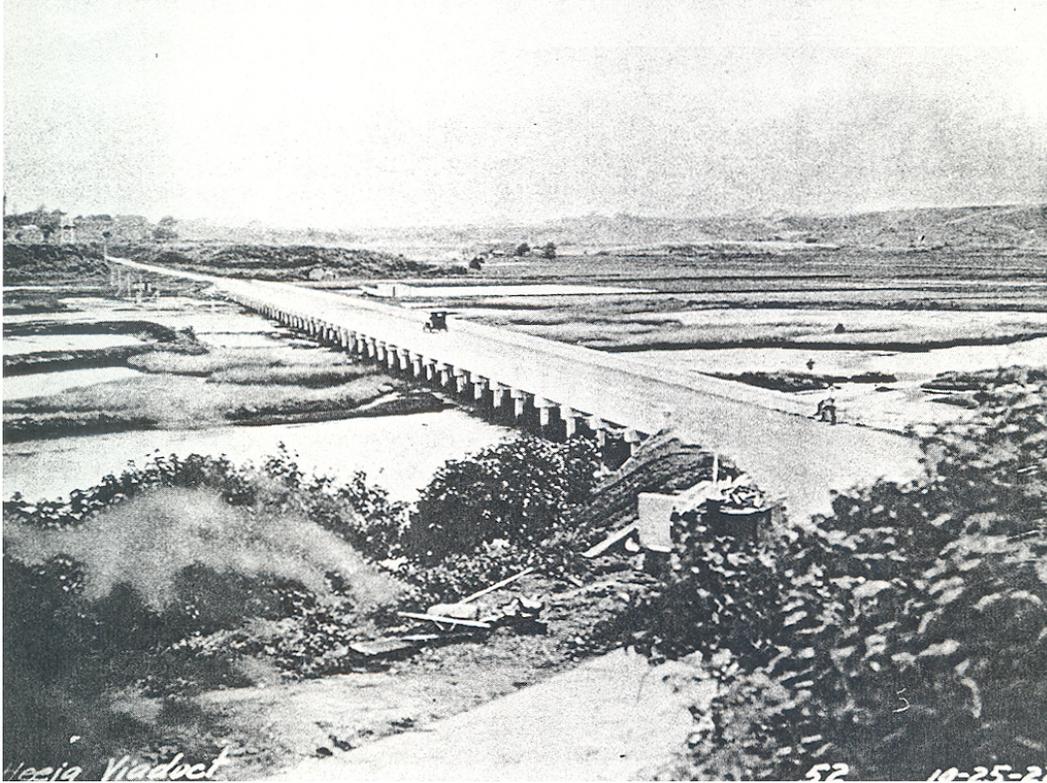


Figure 1: 1922 Photo (Bishop Museum Archives) of He'eia Viaduct ("Long Bridge") showing the abundance of fresh water present. A portion of He'eia Fishpond's wall is visible to the left of the bridge and to the right is the current location of Kāko'o 'Ōiwi.

He'eia Fishpond is rather large; the 1.3-mile long fishpond wall contains an 88-acre water space. There are four saltwater fishpond gates and three fresh water gates. Mākāhā were originally constructed within the fishpond wall, those along He'eia Stream, allow fresh water to enter the fishpond. The balance of fresh water and salt water input is what allows for phytoplankton production and algal growth, thus supplying herbivores like Mullet and Awa (Milkfish), the keystone fishpond fish, food to grow. In addition, there was an 'auwai (fresh water irrigation ditch) that was constructed traditionally to redirect the once abundant amounts of fresh water from He'eia Stream to the southeast corner of the fishpond. Today, not one of our freshwater gates, or the 'auwai, function fully to supply fresh water to the fishpond.

We always wondered why there is so little fresh water in the stream, thinking that through our years of restoration and the removal of invasive vegetation, we would see and increase in the amount of water in the stream. Just recently, it was brought to our attention that water is and has been diverted from He'eia Stream since the 1940s. With climate changing before our very eyes, we see sea level rising higher and higher every year. Rising sea levels



# Paepae o He'eia

*He'eia Fishpond, He'eia O'ahu*

*P.O. Box 6355, Kāne'ohe, HI 96744 • ph: (808) 236-6178 • [admin@paepaeoheia.org](mailto:admin@paepaeoheia.org)*

inundate He'eia stream all the way up to Long Bridge quite often. Now, more so than ever before, the amount of instream flow needs to be maximized to give us a fighting chance against the impacts of climate change and help us realize our vision of 'Āina Momona (abundance) for He'eia.

Me ka mahalo,

Hi'ilei Kawelo  
Execdutive Director

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## **5.0 Fred Takebayashi**

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Fred Takebayashi

November 25, 2020

Commission on Water Resource Management  
State of Hawai'i Department of Land and Natural Resources  
Kalanimoku Building 1151 Punchbowl Street, Room 227 Honolulu, Hawaii 96813  
Email: [dlnr.cwrmm@hawaii.gov](mailto:dlnr.cwrmm@hawaii.gov)  
Fax: (808) 587-0219

TESTIMONY RE:

INSTREAM FLOW STANDARD ASSESSMENT REPORT  
FOR THE HYDROLOGIC UNIT OF HE'EIA (3028), O'AHU  
Public Fact Gathering Meeting

Dear Chair Case,

I wish to offer my strong support for increasing the Interim Instream Flow Standard for He'eia Stream, which would improve habitat for native species and ensure that traditional and customary practices such as fishponds and taro cultivation can continue in He'eia.

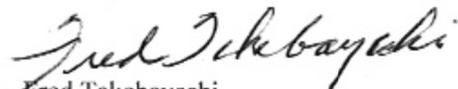
After I graduated high school from Benjamin Parker, I became the caretaker of He'eia Fishpond, living there from 1945-1950. Prior to that I lived with my family in Kokokahi where my dad was the caretaker of that pond. Fishponds need to have fresh water. This fresh water carried nutrients and created the right salinity for algae that the mullet like to eat. Fresh water was especially important for the pua pond where we would stock juvenile mullet.

Fresh water is needed for life outside the pond too. The stream mouth can be home to large schools of nehu and juvenile mullet, 'aholehole, and 'ōio. With enough fresh water, 'ōpae and crabs live in this area too, and native ogo thrives. In times past, many people were able to make a living from the resources that were available in these areas.

I have many fond memories from my time at He'eia fish pond, and I have tried to pass that on to my granddaughters by getting them involved in taking care of fishponds like He'eia and Waikalua. This is a wonderful pond. I hate to see it develop any other way. The people before us did a fantastic job designing this pond, so let's honor what they did by maintaining it. Ample fresh water is important for that. Currently there is insufficient amount of stream flow.

Thank you for this opportunity to comment.

Sincerely,

  
Fred Takebayashi

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## **6.0 Frank Kawaikapuokalani Hewett**

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Frank Kawaikapuokalani Hewett

November 30, 2020

Commission on Water Resource Management  
State of Hawai‘i Department of Land and Natural Resources  
Kalanimoku Building 1151 Punchbowl Street, Room 227 Honolulu, Hawaii 96813  
Email: [dlnr.cwrn@hawaii.gov](mailto:dlnr.cwrn@hawaii.gov)  
Fax: (808) 587-0219

TESTIMONY RE:

INSTREAM FLOW STANDARD ASSESSMENT REPORT  
FOR THE HYDROLOGIC UNIT OF HE‘EIA (3028), O‘AHU  
Public Fact Gathering Meeting

Aloha kākou,

I wish to offer my strong support for increasing the Interim Instream Flow Standard for He‘eia Stream, which would improve habitat for native species and ensure that traditional and customary practices such as lo‘i kalo and loko i‘a can be perpetuated in He‘eia.

My ‘ohana is deeply rooted in this ‘āina and in the spiritual mana of its streams that helped nurture me in my childhood years. I was born and raised in lower Ha‘ikū Valley. As a child, I often played in He‘eia stream, exploring up to its sources in the mountains, to the taro, rice, and watercress farms, and down to the wetlands and muliwai. We kids learned how to catch ‘o‘opu and ‘ōpae from our parents and grandparents, who had many ways of catching them, having relied on them as an important food source in their lifetimes. The beauty of He‘eia’s streams left a deep impression in my memory.

The richness of ‘ike (knowledge) still present in He‘eia is linked to the legacy of abundant water. The best explanation of the word “pono” is order, or the natural course of things, as the natural course of water is to flow from the mountains to the ocean. He waiwai nui ka pono o na kūpuna. Rich is the order that came down from our ancestors. E inu kākou i ka waiwai on na po‘e kūpuna, ka wai ola o ka ‘ike, ka wai ho‘ola, o wai o ka pono. We drink of the richness of the ancestors, of the water of knowledge, the water that gives life, the water of the natural function and order of things. The kūpuna in He‘eia had knowledge to pass on to us because their place had been rich with water.

He‘eia still has much to offer the broader community, as a place where knowledge of ahupua‘a—based on a deep understanding of the function of natural systems—can be re-learned. The future of this learning hinges, however, on the flow of water. I urge the Water Commission to please consider restoring streamflow to He‘eia.

Mahalo for this opportunity to comment.

Malama pono,

Frank Kawaikapuokalani Hewett

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## **7.0 Paepae o He'eia, Dane K. Bishop**

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Paepae o Heeia  
Koolaupoko, Hawaii

Date: November 27, 2020

To: Suzanne D. Case, Chairperson  
Commission on Water Resource Management  
State of Hawaii Department of Land and Natural Resources  
Kalanimoku Building 1151 Punchbowl Street, Room 227 Honolulu Hawaii 96813  
Email: [dlnr.cwrp@hawaii.gov](mailto:dlnr.cwrp@hawaii.gov)  
Fax: (808) 587-0219

From: Dane K. Bishop, Ka Ai Kamahao Coordinator, Paepae o Heeia

Re: Testimony in support of the amending of the instream flow standards of Heeia Stream (Koolaupoko, hydrologic unit 3028) to increase the amount of water available to the fullest potential.

Aloha to Chair Case and Commissioners,

Mahalo for allowing me to submit testimony on behalf of the Ka Ai Kamahao Education Program of Paepae o Heeia. I humbly ask the commission to restore as much water as possible to Heeia Stream. There are three reasons why I would like the stream restored to its' fullest flow capacity. The first reason being I want the best version of the Heeia muliwai to share with our students. At Heeia Fishpond we have over 5,000 school aged visitors annually. For many of these students, at the muliwai of Heeia is where they first hear the word estuary. The best version of Heeia muliwai is only achievable when all the water is restored. If Heeia Stream flows at half capacity, then the Heeia muliwai can only ever reach half its ecological potential. Restoring Heeia Stream flow to full capacity will provide the Heeia Muliwai the opportunity to reach the fullness of its' ecological potential. I want the best version of the Heeia Muliwai to share with our students. Please restore Heeia Stream flow to the fullest extent possible so that our students can experience the best version of the Heeia muliwai.



Image 1: Students about to explore the richness of the Heeia Muliwai

The second reason why I want Heeia Stream flow restored to its' full capacity is because I would like more fresh water to flow into Heeia fishpond. Generally speaking, fresh water brings nutrients that drives the growth of algae, and algae eventually provides food for higher trophic level organisms like fishpond fish. A fishpond's capacity to raise fish is limited by the amount of food available to the fishpond fish. The amount of food available to fishpond fish is limited by the amount of nutrient rich fresh water. Increasing the amount of fresh water entering the fishpond would increase the fishpond's fish raising capacity. Please restore Heeia Stream flow to the fullest extent possible so that Heeia Fishpond has the opportunity to function at it's highest capacity. Please see Image 2 which was taken on 11/28/2020. This picture shows the first inputs of stream water into Heeia Fishpond. You can see in the picture that the amount of surface water entering Heeia Fishpond is reduced to a trickle.



Image 2: Wai 2 Makaha, the most mauka point where stream water flows into the fishpond

The third reason why I would like Heeia Stream restored to its fullest capacity is because I am native Hawaiian and my kupuna would demand that of me. There is a spiritual connection that I have to these fresh waters and salt waters of Heeia. My culture and my spirituality tell me that all streams across Hawaii should flow freely from the mountains to the ocean, Heeia Stream should be no different. Please respect my culture and spirituality, and restore Heeia Stream flow to its fullest capacity.

Thank you for your consideration,



Dane K. Bishop  
Paepae o Heeia

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## **8.0**    **Kauaoa Fraiola, Ph.D.**

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12/2/2020

Suzanne D. Case, Chairperson  
Commission on Water Resource Management  
State of Hawai'i Department of Land and Natural Resources  
Kalanimoku Building 1151 Punchbowl Street, Room 227 Honolulu, Hawaii 96813  
Email: [dlnr.cwrn@hawaii.gov](mailto:dlnr.cwrn@hawaii.gov)  
Fax: (808) 587-0219

TESTIMONY RE:

INSTREAM FLOW STANDARD ASSESSMENT REPORT  
FOR THE HYDROLOGIC UNIT OF HE'EIA (3028), O'ahu  
Public Fact Gathering Meeting

Aloha Chair Case,

As a trained aquatic ecologist and lifelong resident of the Kāne'ohe Bay watershed, I strongly support increasing the Interim Instream Flow Standard for He'eia Stream. Such an action would improve habitat for native species and ensure that traditional and customary practices such as lo'i kalo and loko i'a can be perpetuated in He'eia.

My academic training is in stream and estuary ecology, with a focus on the ecology of the native Hawaiian striped mullet, *Mugil cephalus*. Juvenile mullet in the Kāne'ohe Bay area move between estuary and stream habitats on a daily basis in places where conditions allow. An increase in streamflow would likely lead to more well-formed channels connecting the stream and estuary. Mullet seem to select streams with deeper, wider channels and higher water velocity. In the estuary itself, fresh water and the nutrients it carries lead to growth of algae on which mullet feed.

Mullet are one of many economically, culturally, and ecologically important species that could benefit from increased streamflow. With this broad perspective on the health of the community in mind, I urge the Commission to consider restoring water to He'eia stream.

Mahalo for this opportunity to comment.

Sincerely,



Kaua Fraiola, Ph.D.

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**9.0 Kāneʻohe Neighborhood Board No. 30, Mo Radke,  
Daniel Kaʻanana, Mahealani Cypher, Elena Bryant**

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December 7, 2020

Kāneʻohe Neighborhood Board No. 30  
c/o Neighborhood Commission Office  
Kapalama Hale  
925 Dillingham Boulevard, Suite 160  
Honolulu, HI 96817  
[kaneohenb@gmail.com](mailto:kaneohenb@gmail.com)

**VIA U.S. MAIL AND ELECTRONIC MAIL**

Suzanne D. Case, Chairperson  
Commission on Water Resource Management  
State of Hawaiʻi, Department of Land and Natural Resources  
Kalanimoku Building  
1151 Punchbowl Street, Room 227  
Honolulu, HI 96813  
Email: [dlnr.cwrn@hawaii.gov](mailto:dlnr.cwrn@hawaii.gov)

Aloha Chair Case,

Thank you for the opportunity to provide testimony regarding the *Draft Instream Flow Standard Assessment Report* issued June 2020 for the Heʻeia Hydrologic Unit (IFSAR). The Kāneʻohe Neighborhood Board is in **strong support of establishing an Interim Instream Flow Standard that would increase streamflow in Heʻeia Stream** in order to support ahupuaʻa restoration, to ensure proper maintenance of native species, habitat and ecosystems, and to increase food security.

The Heʻeia ahupuaʻa has the incredible potential to be one of the most biocultural landscapes on the Island of Oʻahu that features traditional Native Hawaiian practices and complete restoration from mauka to makai. Over the past decade, there has been remarkable community-led restoration of the Heʻeia ahupuaʻa by Native Hawaiian-led non-profit organizations in the community such as Kākoʻo ʻŌiwi, Paepae o Heʻeia, Koʻolaupoko Hawaiian Civil Club and the Koʻolau Foundation. Increased streamflow is crucial to the realization of the collective visions of these community groups to promote Hawaiian cultural and environmental practices, preservation, education and sustainability.

Increased streamflow is consistent with and supports the vision of the *Koʻolau Poko Sustainable Communities Plan* (SCP), adopted by the City Council in August 2017. The SCP was adopted with the intent to guide public investment in infrastructure and other regulatory procedures for the windward coastal and valley areas of Oʻahu from Makapuʻu Point to Kaoio Point at the northern end of Kāneʻohe Bay, including the communities of Kāneʻohe, Kahaluʻu and Heʻeia. The SCP intended to adapt the traditional ahupuaʻa concept in land use and natural resource management in the Koʻolaupoko region. The ahupuaʻa system recognizes the interconnected relationship between land based and marine based natural resources, focusing on

streams as the connecting element from mauka to makai. The preservation and promotion of open space and agricultural uses is a focus of the SCP **with the goal of preservation, continuation, and potential expansion of agricultural land use that, among other things, promotes food security and subsistence culturally-based farming.** Fishpond restoration and restoration of lo'i kalo (irrigated taro fields) fit squarely within the goals of the Ko'olau Poko SCP.

Paepae o He'eia is a private non-profit organization in our community working in partnership with landowner, Kamehameha Schools, to manage and maintain the He'eia fishpond for the benefit of the community. By allowing both fresh and salt water to enter the He'eia fishpond, the pond is able to maintain a brackish water environment that creates the ideal habitat for limu (algae) to proliferate and, in turn, herbivorous fish that can be used to feed and sustain our community. **Paepae's mission to build and maintain a thriving and abundant He'eia Fishpond cannot be fully realized without freshwater resources from He'eia Stream.**

In 1991, approximately 405 acres within the He'eia Wetlands were acquired by the State and remain under the jurisdiction of the Hawai'i Community Development Authority (HCDA). In 2010, Kāko'o 'Ōiwi was granted a long-term lease for the 405-acre parcel to implement activities related to and supportive of cultural practices, agriculture, education, and natural-resources restoration and management. Since 2010, Kāko'o 'Ōiwi has restored productivity to 14 acres of land and, **with additional water resources**, is prepared to immediately begin active cultivation on at least 10 more acres of land. It is the long-term goal of Kāko'o 'Ōiwi to cultivate all of the approximately 100 acres of land suitable for lo'i within the He'eia Wetland; however, community groups are grappling with the very real fact that He'eia water resources are finite and **even with full (100%) stream restoration, there will still remain a need for freshwater resources in order to realize the full productivity potential of the He'eia Wetland and nearshore fisheries.**

As part of the *Ko'olau Poko Watershed Management Plan* developed by the Honolulu Board of Water Supply and finalized in September 2012, the He'eia stream watershed is identified as a critical watershed "selected because of its complex of natural resources and opportunities for cultural and resource management programs, from *mauka* forest lands to streams, the He'eia wetlands, the great He'eia fish pond, and the marine resources of Kāne'ohe Bay." By its own designation of the He'eia watershed as a critical watershed deserving of protection, BWS acknowledges the importance of the preservation, restoration and balanced management of ground and surface water resources in the He'eia watershed. Based on the information presented to this Board, it appears that BWS's actual demand for water resources in the He'eia hydrological unit are below existing permitted uses. At a minimum, these waters should be returned to He'eia Stream and the interim instream flow standard for He'eia Stream should be increased accordingly. Moreover, according to the IFSAR and the pumpage records reported by BWS, it appears that BWS did not pump at all from Ha'ikū Tunnel, and/or the Ha'ikū and 'Ioleka'a Wells for months-long, if not years-long, stretches at a time. During these time periods, it is unclear how BWS was able to meet County municipal and domestic needs, and it would be worthwhile to determine if there is an alternative water source that is available to meet those needs.

In sum, our community groups have worked tirelessly to realize the vision for restoration of the He‘eia ahupua‘a, the preservation and continuation of Hawaiian cultural and environmental practices, education and food sustainability, but the missions of these organizations cannot be fully realized without increased streamflow. In support of our constituents and the hard work of the organizations in our community, the Kāne‘ohe Neighborhood Board strongly urges the Commission to carefully weigh the County’s actual needs, the availability of alternate water resources to satisfy State and County demands, and the ability of water-saving and conservation measures to reduce demand in establishing an Interim Instream Flow Standard for the He‘eia hydrologic unit. In so doing, the Kāne‘ohe Neighborhood Board fully supports the restoration of streamflow to He‘eia Stream to the greatest extent possible to support instream uses including the maintenance of the He‘eia Wetlands, the protection of traditional and customary Hawaiian rights and practices, and food security.

Mahalo for the opportunity to provide testimony regarding the *Draft Instream Flow Standard Assessment Report* issued June 2020 for the He‘eia Hydrologic Unit. Please do not hesitate to contact our Board if you have any questions or require additional information.

Mahalo nui,

**Mo Radke**

Digitally signed by Mo Radke  
DN: cn=Mo Radke, o, ou=KNB 330,  
email=moradke@gmail.com, c=US  
Date: 2020.12.11 10:20:55 -10'00'

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Mo Radke, Chair  
Kaneohe Neighborhood Board, No. 30



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Daniel Ka‘anana, Vice-Chair  
Kaneohe Neighborhood Board, No. 30



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Mahealani Cypher, Planning Committee Chair  
Kaneohe Neighborhood Board, No. 30



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Elena Bryant, Environmental Committee Co-Chair  
Kaneohe Neighborhood Board, No. 30

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## **10.0 Kahaluu Neighborhood Board No. 29, Amy Luersen**

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KAHALU'U NEIGHBORHOOD BOARD NO. 29

(He'eia Kea, 'Āhuimanu, Kahalu'u, Waihe'e, Ka'alaea, Waiāhole, Waikāne, Hakipu'u, Kualoa)

Neighborhood Commission Office • 925 Dillingham Boulevard, Suite 160 • Honolulu, Hawaii 96817  
PHONE (808) 768-3710 • FAX (808) 768-3711 • INTERNET: <http://www.honolulu.gov/nco>

December 14, 2020

Suzanne D. Case, Chairperson  
Commission on Water Resource Management  
State of Hawai'i, Department of Land and Natural Resources  
Kalanimoku Building  
1151 Punchbowl Street, Room 227  
Honolulu, HI 96813  
Email: [dlnr.cwrn@hawaii.gov](mailto:dlnr.cwrn@hawaii.gov)

RE: TESTIMONY IN SUPPORT OF COMMISSION ON WATER RESOURCE MANAGEMENT  
AMENDING THE INSTREAM FLOW STANDARDS FOR HE'EIA STREAM TO INCREASE  
STREAMFLOW IN HE'EIA STREAM TO OPTIMAL LEVELS WITHIN A YEAR.

Aloha Chair Case and Commissioners,

Thank you for the opportunity to comment on the instream flow standards for Heeia Stream. Kahaluu Neighborhood Board #29 has demonstrated tireless commitment to preserving and restoring the He'eia ahupua'a for decades and feels this is a critical step on that journey.

At our Board meeting on December 9, 2020, the Board unanimously passed a resolution that stated ***“the Kahalu'u Neighborhood Board #29 is in strong support of the Commission on Water Resource Management establishing an Interim Instream Flow Standard that would increase streamflow in He'eia Stream to optimal levels within a year in order to support land and water based ahupua'a restoration from the summit to the breakers; to protect and promote native species, habitat and ecosystems; to increase food security especially traditional forms of agriculture and aquaculture; and to contribute to resilience in the face of climate change.”***

As you know, the Kāne'ohē Bay watershed, including the ahupua'a of He'eia, was considered to be one of the most productive areas of O'ahu. Increasing streamflow in He'eia stream is a critical element of restoring the ahupua'a and thereby, building on traditional Hawaiian cultural and natural resource practices, to increase community sustainability and resilience.

Over the years, the community has collaboratively worked to establish plans and policies that would contribute to preserving the He'eia ahupua'a including the following:

- **1992**-Kāne'ohē Bay Master Plan was adopted by the Office of State Planning. Most of Kāne'ohē Bay is designated Class AA waters and the amount and quality of the water flowing through adjacent watersheds directly affects this unique natural resource.
- **2011**-State Legislature created the He'eia Community Development District of the Hawai'i Community Development Authority (HCDA). The purpose is *“to facilitate culturally*

*appropriate agriculture, education, and natural-resource restoration and management of the He[ʻ]eia wetlands...*” on over 400 acres. Increased streamflow in Heʻeia Stream would support these efforts.

- **2017**-The National Estuarine Research Reserve (NERR) was established to “*support and conduct research to understand the ecological effects of ahupuaʻa restoration using Indigenous resource management practices.*” Increased streamflow in Heʻeia Stream would support these efforts.
- **2017**- The City and County of Honolulu adopted the Koʻolaupoko Sustainable Communities Plan that recognizes the traditional ahupuaʻa concept in land use and natural resource management, with a specific goal of “*...potential expansion of agricultural land use that, among other things, promotes food security and subsistence culturally-based farming*” Heʻeia is a prime location to increase agriculture within Koʻolaupoko and increased stream flow is critical to expansion efforts.

These plans and policies provide a foundation for the vision that we strive for within the community. Progress is being made through the work of community-based nonprofit organizations:

- **Kākoʻo ʻŌiwi** is developing culturally appropriate agriculture by reopening loʻi kalo and other diversified agriculture crops.
- **Paepae o Heʻeia** is working to restore the Heʻeia fishpond and culturally appropriate aquaculture.
- **Education**- numerous educational groups help our keiki understand the importance of the ahupuaʻa system of land management.

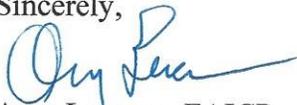
We applaud the Commission on Water Resource Management for considering increasing stream flow in Heʻeia Stream. On behalf of our community, we fully support increasing the stream flow to optimal levels to allow restoration of the natural resources and restoration of Hawaiian agro-ecology and aquaculture. With climate change already impacting our islands, time is of the essence. We urge you to act quickly so that there is as much opportunity for restoration as possible.

In summary, increasing streamflow will promote community sustainability and resilience by:

- supporting sustainable agriculture, particularly loʻi kalo, and allow more loʻi to be opened, which will contribute to food security;
- providing increased fresh water critical to restoration of the fishpond;
- expanding the area of high quality estuary within Kāneʻohe Bay, supporting fisheries;
- protecting and supporting native species habitats and ecosystems; and
- increasing the area of wetlands and loʻi kalo that will act as sediment traps during extreme precipitation events caused by climate change, protecting the fishpond and the Kāneʻohe Bay from sediment.

Thank you for your consideration.

Sincerely,



Amy Luersen, FAICP

Chair, Kahaluu Neighborhood Board #29

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# 11.0 Greg Miranda

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Greg Miranda

December 12, 2020

Commission on Water Resource Management  
State of Hawai'i Department of Land and Natural Resources  
Kalanimoku Building 1151 Punchbowl Street, Room 227 Honolulu, Hawaii 96813  
Email: [dlnr.cwrn@hawaii.gov](mailto:dlnr.cwrn@hawaii.gov)  
Fax: (808) 587-0219

TESTIMONY RE:

INSTREAM FLOW STANDARD ASSESSMENT REPORT  
FOR THE HYDROLOGIC UNIT OF HE'EIA (3028), O'AHU  
Public Fact Gathering Meeting

Aloha kākou,

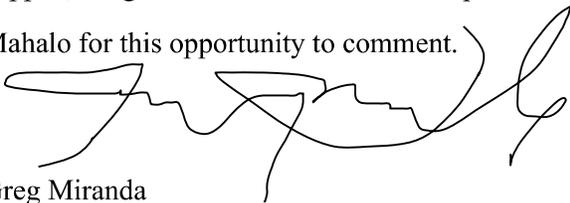
I wish to offer my strong support for increasing the Interim Instream Flow Standard for He'eia Stream, which would improve habitat for native species and ensure that practices such as lo'i kalo, loko i'a, and fishing can be perpetuated in He'eia.

I was born and raised on Moku o Lo'e and continue to work there today. My family fished in the waters of He'eia, and I remember the importance of the stream mouth to fish species like nehu, mullet, and āholehole, and would attract big predator fish as well. These areas were different even from the waters slightly farther out at Moku o Lo'e, and deserve special attention. Fresh water flowing into Kāne'ohe Bay is extremely important in supporting its various fisheries.

In the future I would like to see fish going up and coming down that stream again, congregating in the mouth. I would like to see people able to have a livelihood raising fish in the pond. I would like to see the younger generation learn those kind of fishing skills again, and grow to love that work. For this to happen, I urge the Water Commission to please consider restoring streamflow to He'eia.

Mahalo for this opportunity to comment.

Greg Miranda

A handwritten signature in black ink, appearing to read 'Greg Miranda', written over a white background.

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**12.0 Hawaii Community Development Authority,  
Deepak Neupane, P.E., AIA**

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**HAWAII COMMUNITY  
DEVELOPMENT AUTHORITY**

547 Queen Street, Honolulu, Hawaii 96817  
Telephone: (808) 594-0300 Fax: (808) 587-0299  
Web site: <http://dbedt.hawaii.gov/hcda/>

RECEIVED  
COMMISSION ON WATER  
RESOURCE MANAGEMENT

2021 JAN -4 AM 11: 20

DAVID Y. IGE  
GOVERNOR

JOHN WHALEN  
CHAIR

DEEPAK NEUPANE, P.E., AIA  
EXECUTIVE DIRECTOR

December 29, 2020

Suzanne D. Case, Chairperson  
Commission on Water Resources Management  
Department of Land & Natural Resources  
1151 Punchbowl Street, Room 227  
Honolulu, HI 96813

Dear Chairperson Case:

At its December 9, 2020 meeting the Hawaii Community Development Authority (HCDA) voted to support the Commission on Water Management's (CWRM) consideration of amending instream flow standards for Heeia stream and authorized its Executive Director to transmit a letter of support to the CWRM. As the Executive Director of the HCDA I am submitting this letter of support for CWRM's consideration of amending instream flow standards for Heeia stream.

Heeia stream flows through the approximately 400 acres of the Heeia Community Development District (HCDD), which was established by the Legislature in July 2011 and is located within the surface water hydrological unit of Heeia. Increased stream flow will contribute to HCDA's ability to fulfill the purpose of the district which is "*to facilitate culturally appropriate agriculture, education, and natural-resource restoration and management of the Heeia wetlands...*", as provided in Hawaii Revised Statutes §206E-202. Increased stream flow within the HCDD will contribute to restoring the Heeia wetlands; support sustainable agriculture, particularly loi kalo; protect and support native species habitats and ecosystems; and increase resilience of the wetland by partially mitigating effects of climate change on the ecosystem.

Thank you for CWRM's consideration of amending instream flow standards for Heeia stream. If you have any question please do not hesitate to contact me at (808) 594-0300 or by email at [deepak.neupane@hawaii.gov](mailto:deepak.neupane@hawaii.gov).

Sincerely,

Deepak Neupane, P.E., AIA  
Executive Director

c: John Whalen, HCDA Chair  
HCDA Heeia Board Members