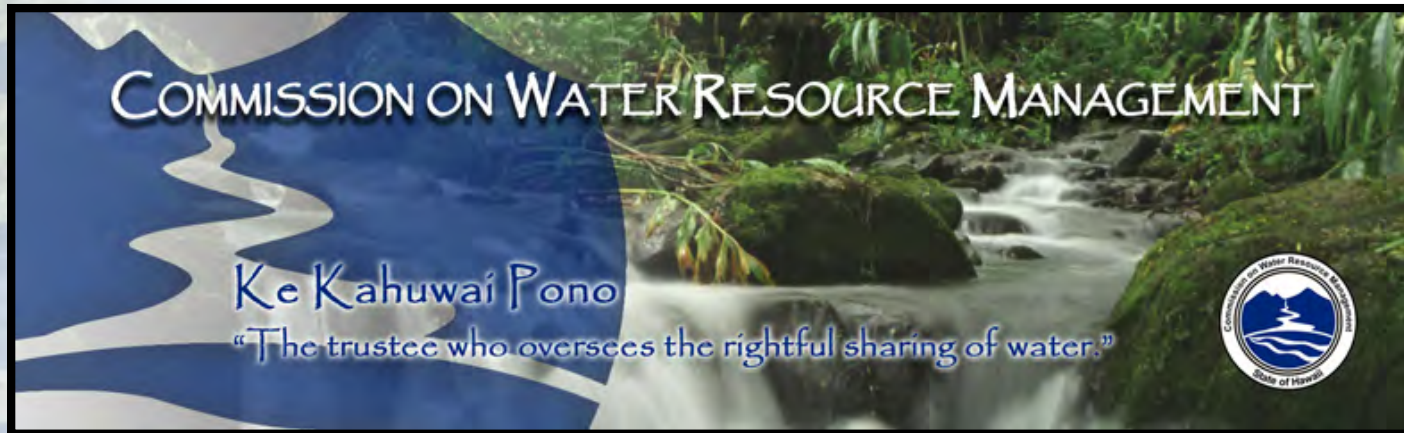
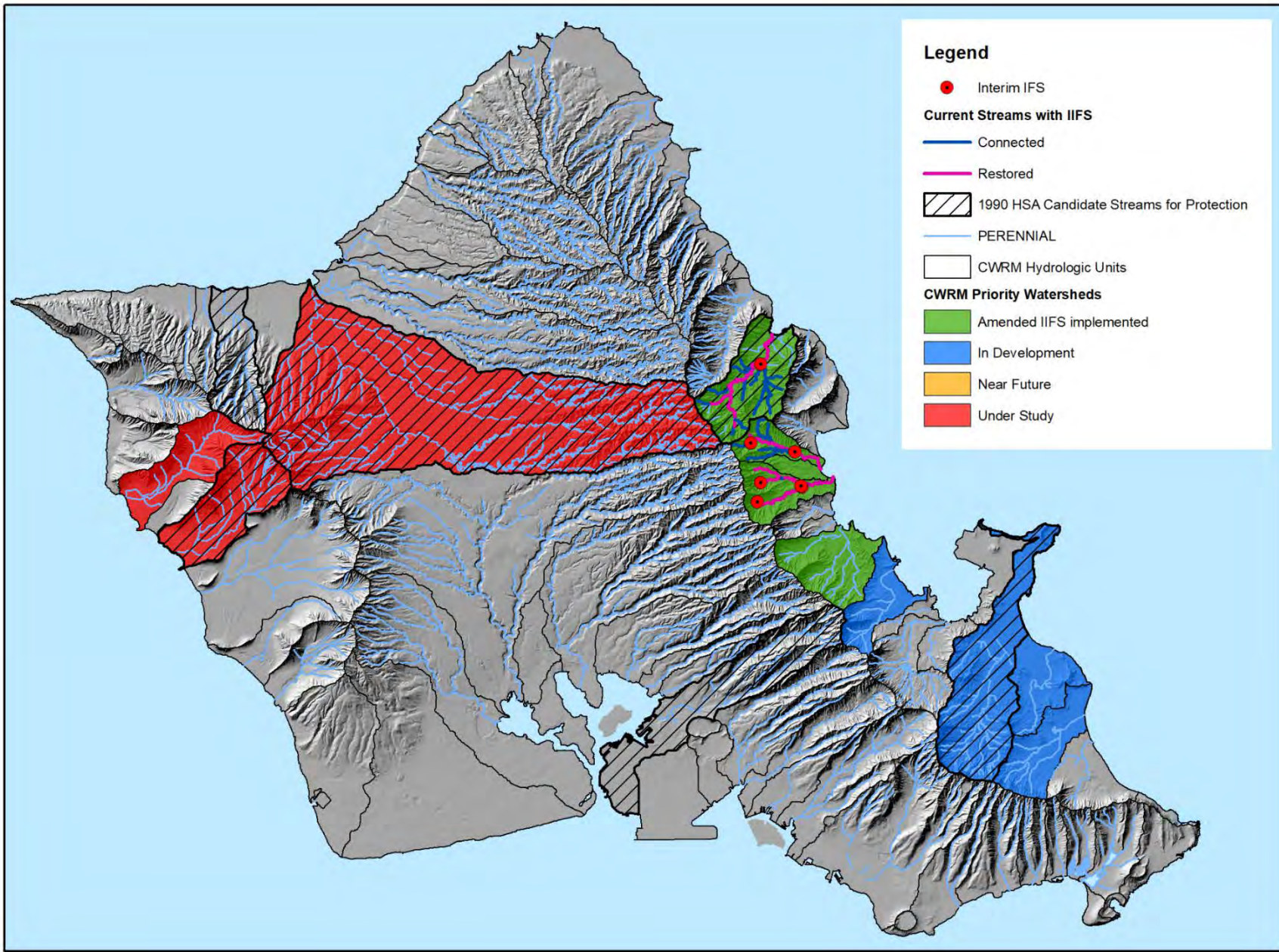


# Overview of Instream Use Protection Assessment for the Kawainui Stream (O'ahu) and results from 2015 trial flow restoration

Ayron M. Strauch  
Stream Protection and Management Branch



# Priority Watersheds for Protecting Instream Values on O'ahu





# 1881 Map of O'ahu

Notes.

- T. Triangulation stations.
- A. Towns.
- G. Grant, or sale of Gov's Land.
- L.C. Land Commission Award.
- R. Royal Hotel in a line of it.

Initials of grantees are often inserted.  
Heights are indicated in feet above mean sea level.  
The Land Office records here furnished a large amount of material for this map.  
Soundings are in fathoms.

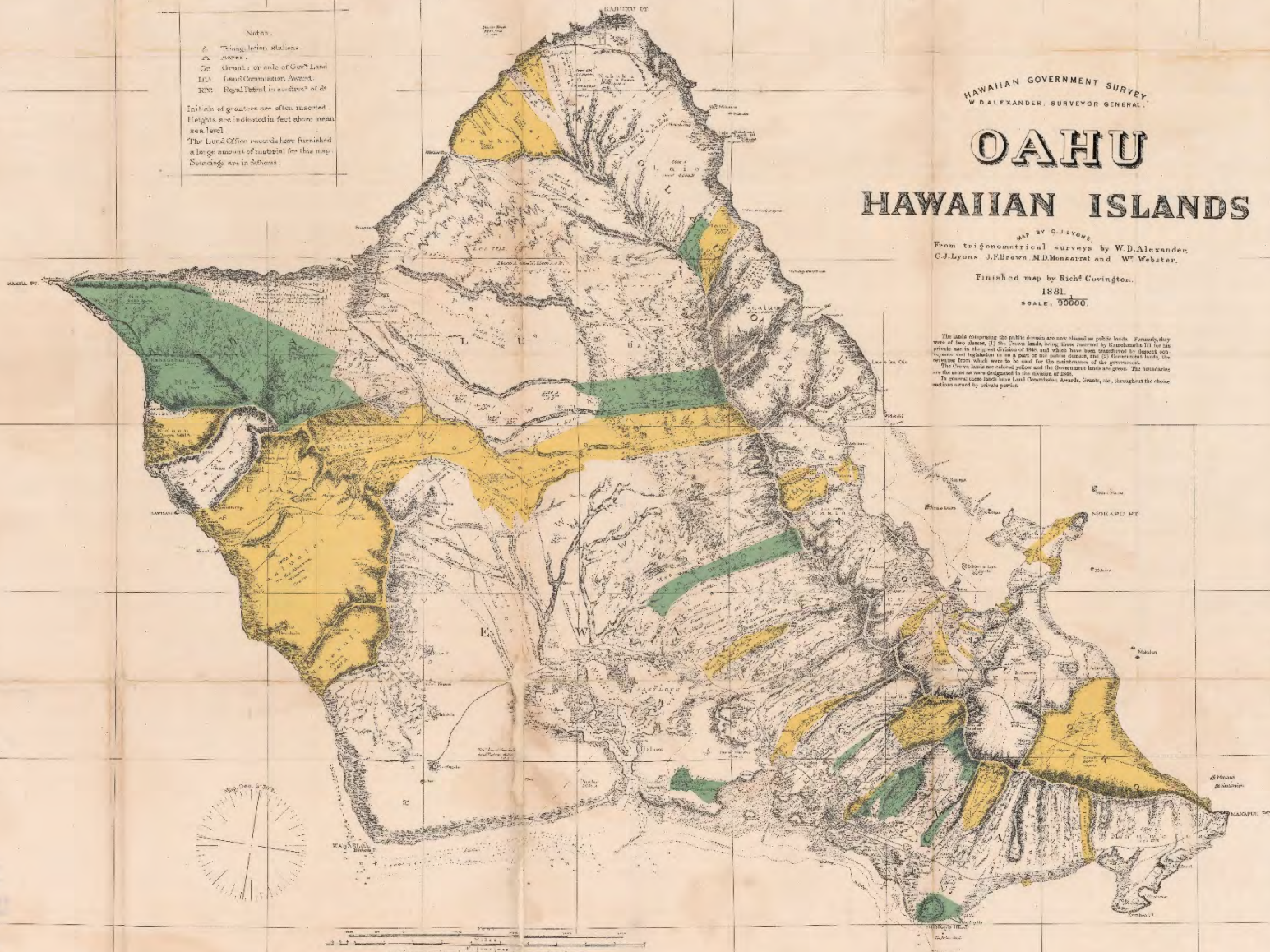
HAWAIIAN GOVERNMENT SURVEY.  
W. D. ALEXANDER, SURVEYOR GENERAL.

## OAHU HAWAIIAN ISLANDS

MAP BY C. J. LYONS.  
From trigonometrical surveys by W. D. Alexander,  
C. J. Lyons, J. E. Brown, M. D. Messersmith and W. Webster.

Finished map by Richd. Cuvington.  
1881.  
SCALE, 90000.

The lands occupying the public domain are now classed as public lands. Formerly they were of two classes, if the Crown lands being those reserved to Kamehameha III by the private act in the great division of 1819 and which have been respectively by descent, non-descent and limitation to be a part of the public domain, the Government lands, the private lands which were to be sold for the maintenance of the government.  
The Crown lands are now one order and the Government lands are green. The boundaries are the same as were designated in the division of 1819.  
In general Crown lands have Land Commission Awards, Grants, etc., throughout the whole sections owned by private parties.









War Department- Corps of Engineers, U.S. Army  
Department Engineer, Territory of Hawaii. 1943  
Kailua Quadrangle. N2120.95- W15738.8/5.4X6.9  
Scale: 1/20000.



As recent as 1943, Kailua was a single watershed with an outlet at Ka'elelepu

# Kawainui/Ka'elepulu Rough Timeline

Pre-contact: large Hawaiian population; much terracing for agriculture; natural fishponds of legendary importance; home to the *ali'i* Kualii regional center for high chiefs of Ko'olaupoko

1880s-1940s: Waimanalo Sugar Co & Kaneohe Ranch utilized land and water resources

1910s-1950s: Diversified agriculture (truck crops) grown in area

1940s-1970s: Urbanization, expansion of Kailua as a suburb of Honolulu; decline in agriculture; need to protect community against flooding

→ 1952 construction of Oneawa Canal

→ 1964 construction of the levee

→ 1960s dredging Ka'elepulu wetland to convert into a recreational lake for the Enchanted Lake development

1987/1988: flood water overtopped levee resulting in flooding of Coconut Grove Community

1990s: Modifications to levee to increase size that included a concrete floodwall

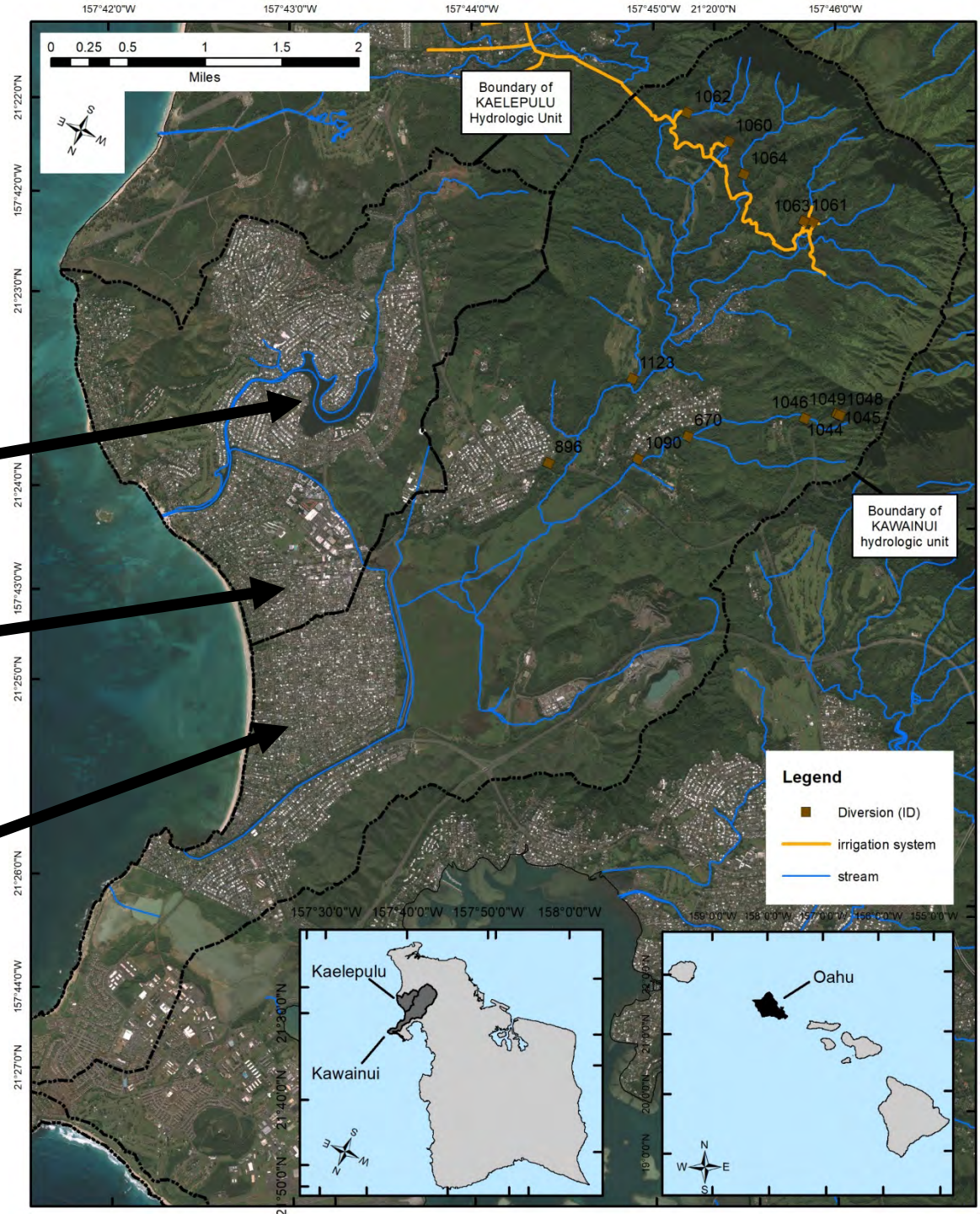


# Kailua Urbanization

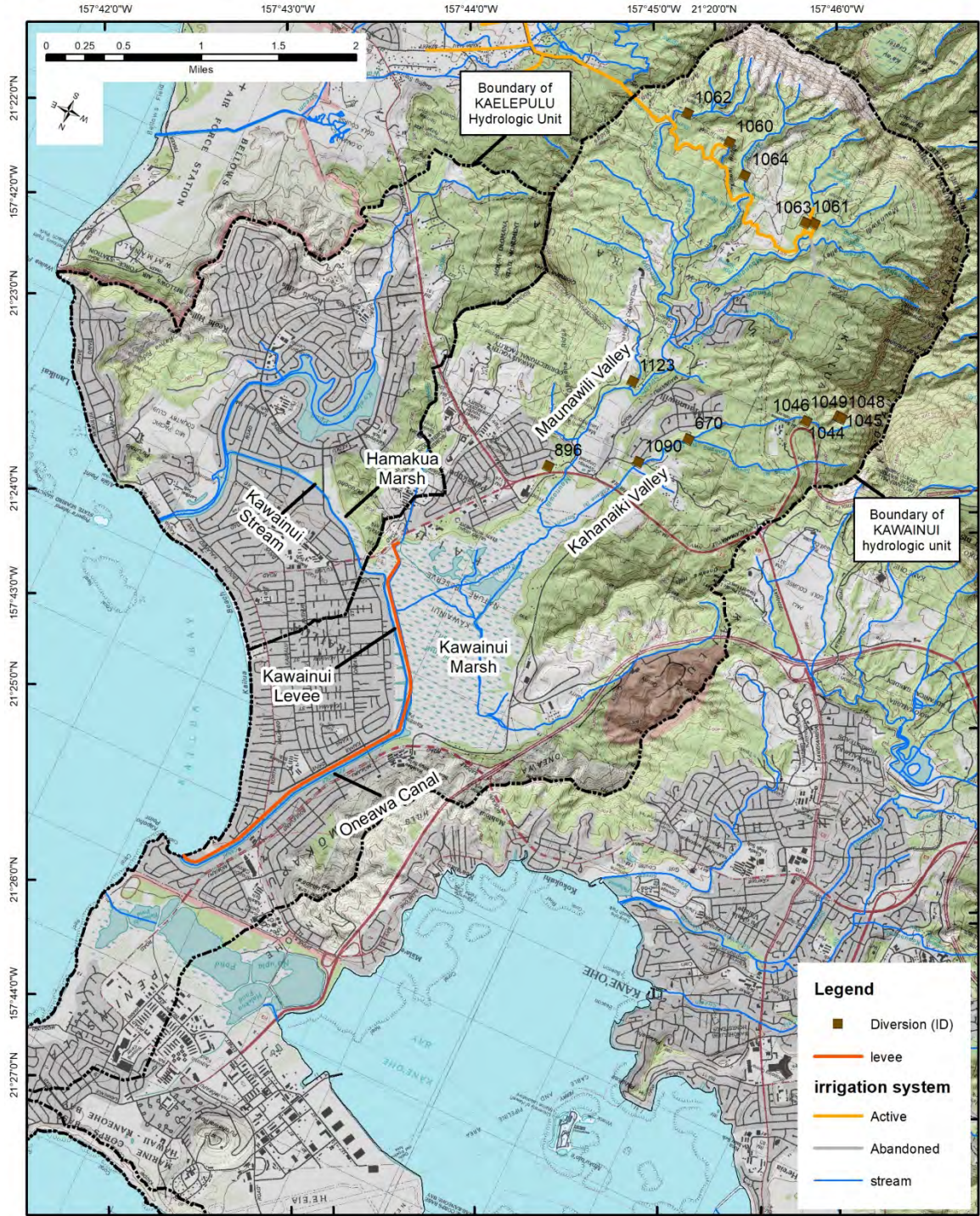
1950s:  
ENCHANTED  
LAKES

1940s:  
KAILUA  
TOWN

1930s:  
COCONUT  
GROVE







Boundary of  
KAELEPULU  
Hydrologic Unit

Boundary of  
KAWAINUI  
hydrologic unit

- Legend**
- Diversion (ID)
  - levee
  - irrigation system**
  - Active
  - Abandoned
  - stream

157°42'0"W 157°43'0"W 157°44'0"W 157°45'0"W 21°20'0"N

0 0.25 0.5 1 1.5 2 Miles

21°22'0"N 157°42'0"W

21°23'0"N 157°43'0"W

21°24'0"N 157°44'0"W

21°25'0"N 157°45'0"W

21°26'0"N 157°46'0"W

21°27'0"N 157°42'0"W

21°28'0"N 157°43'0"W

21°29'0"N 157°44'0"W

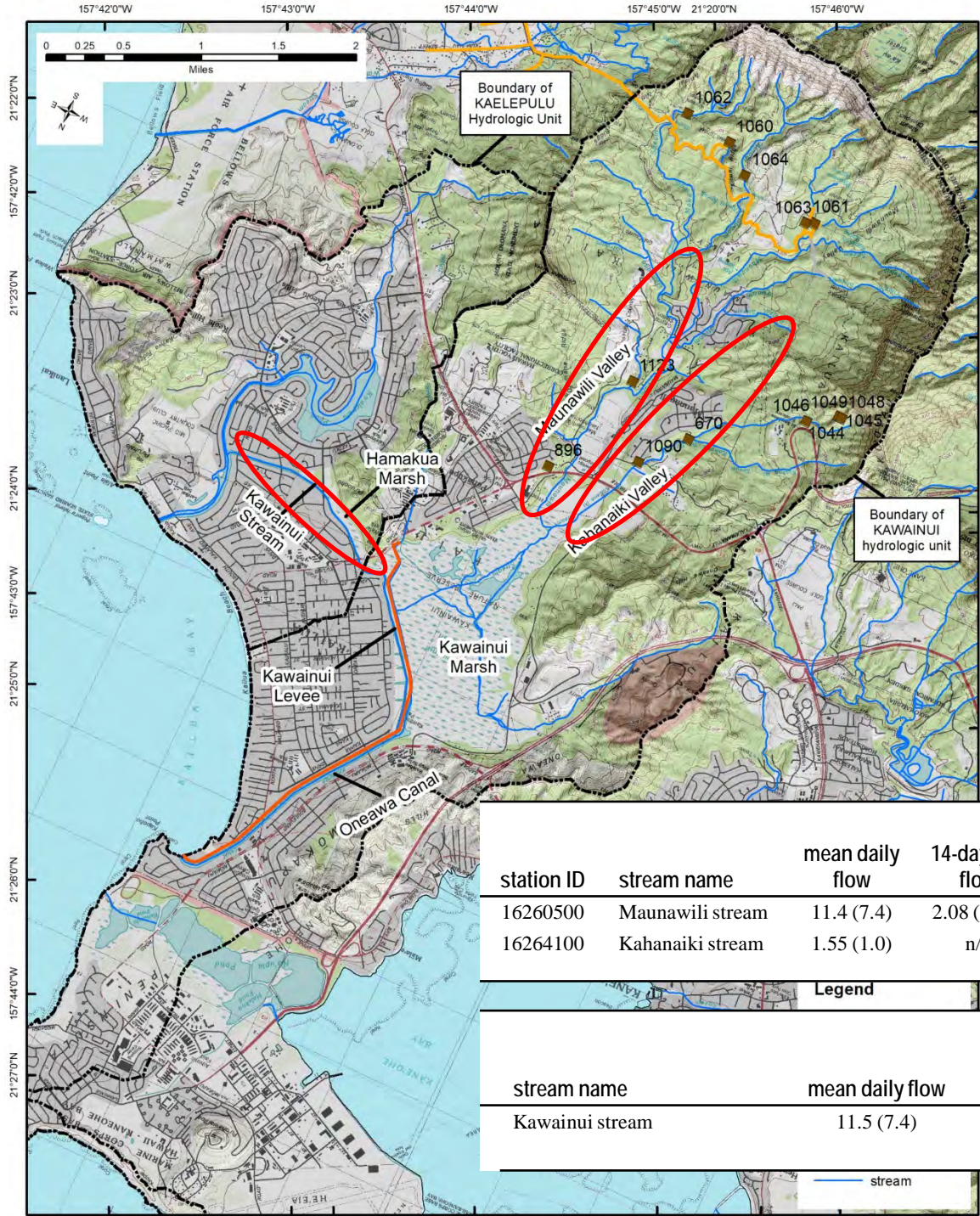
21°30'0"N 157°45'0"W

21°31'0"N 157°46'0"W

21°32'0"N 157°42'0"W

21°33'0"N 157°43'0"W





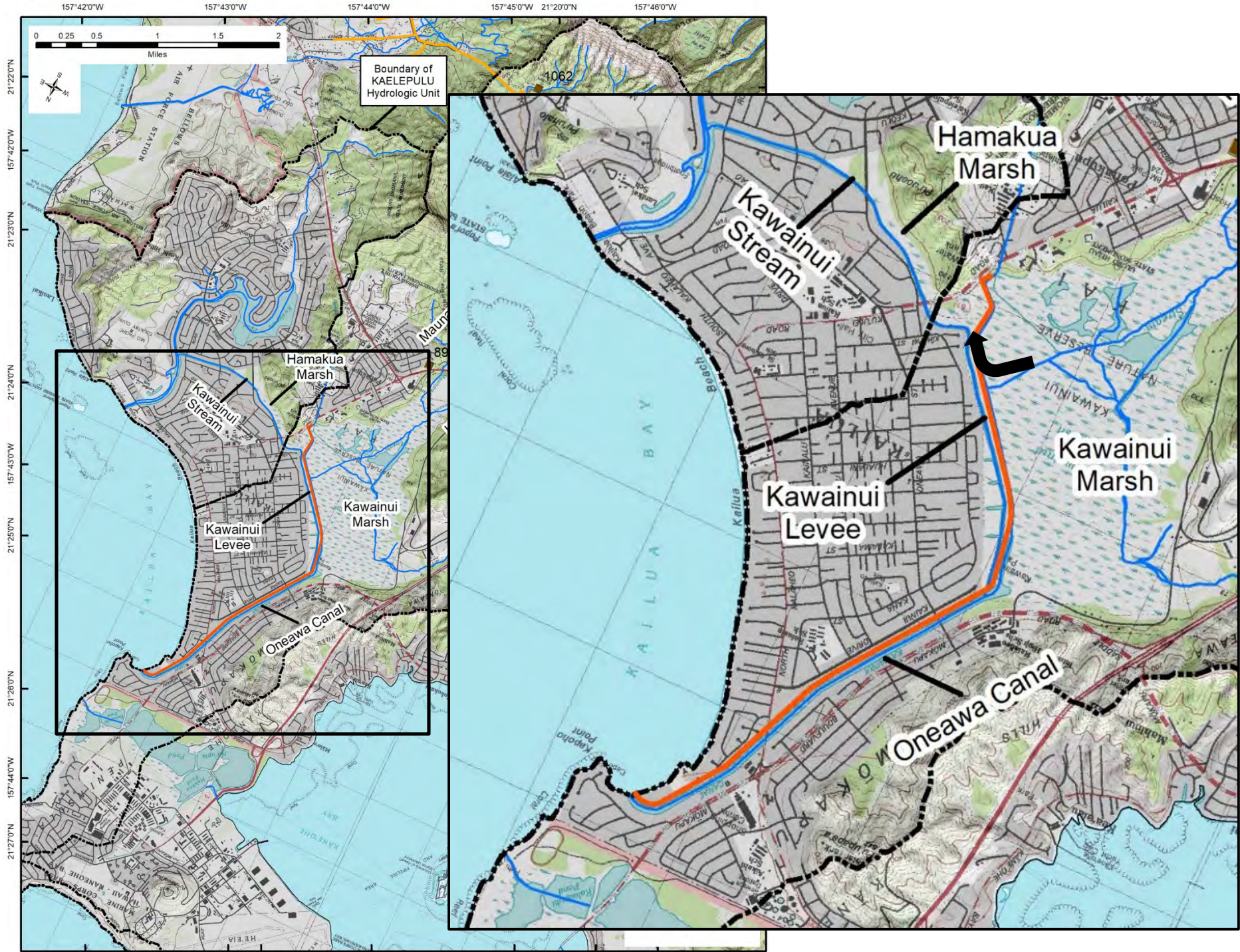
station ID	stream name	mean daily flow	14-day low flow	discharge (Q) for a selected percentage ( $w_x$ ) discharge was equaled or exceeded			
				$Q_{50}$	$Q_{70}$	$Q_{90}$	$Q_{95}$
16260500	Maunawili stream	11.4 (7.4)	2.08 (1.35)	6.79 (4.39)	5.41 (3.49)	4.12 (2.66)	3.63 (2.34)
16264100	Kahanaiki stream	1.55 (1.0)	n/a	0.79 (0.51)	0.51 (0.33)	0.28 (0.18)	0.23 (0.15)

Legend

stream name	mean daily flow	discharge (Q) for a selected percentage ( $w_x$ ) discharge was equaled or exceeded			
		$Q_{50}$	$Q_{70}$	$Q_{90}$	$Q_{95}$
Kawainui stream	11.5 (7.4)	6.12 (3.96)	4.45 (2.88)	2.94 (1.94)	2.4 (1.55)

— stream





Boundary of KAELEPULU Hydrologic Unit

Hamakua Marsh

Kawaiinui Stream

Kawainui Marsh

Kawainui Levee

Oneawa Canal

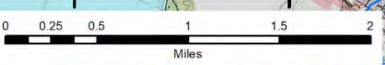
Kawaiinui Stream

Hamakua Marsh

Kawainui Levee

Kawainui Marsh

Oneawa Canal



21°22'0" N  
157°42'0" W  
21°23'0" N  
21°24'0" N  
157°43'0" W  
21°25'0" N  
21°26'0" N  
157°44'0" W  
21°27'0" N

157°45'0" W 21°20'0" N

157°46'0" W



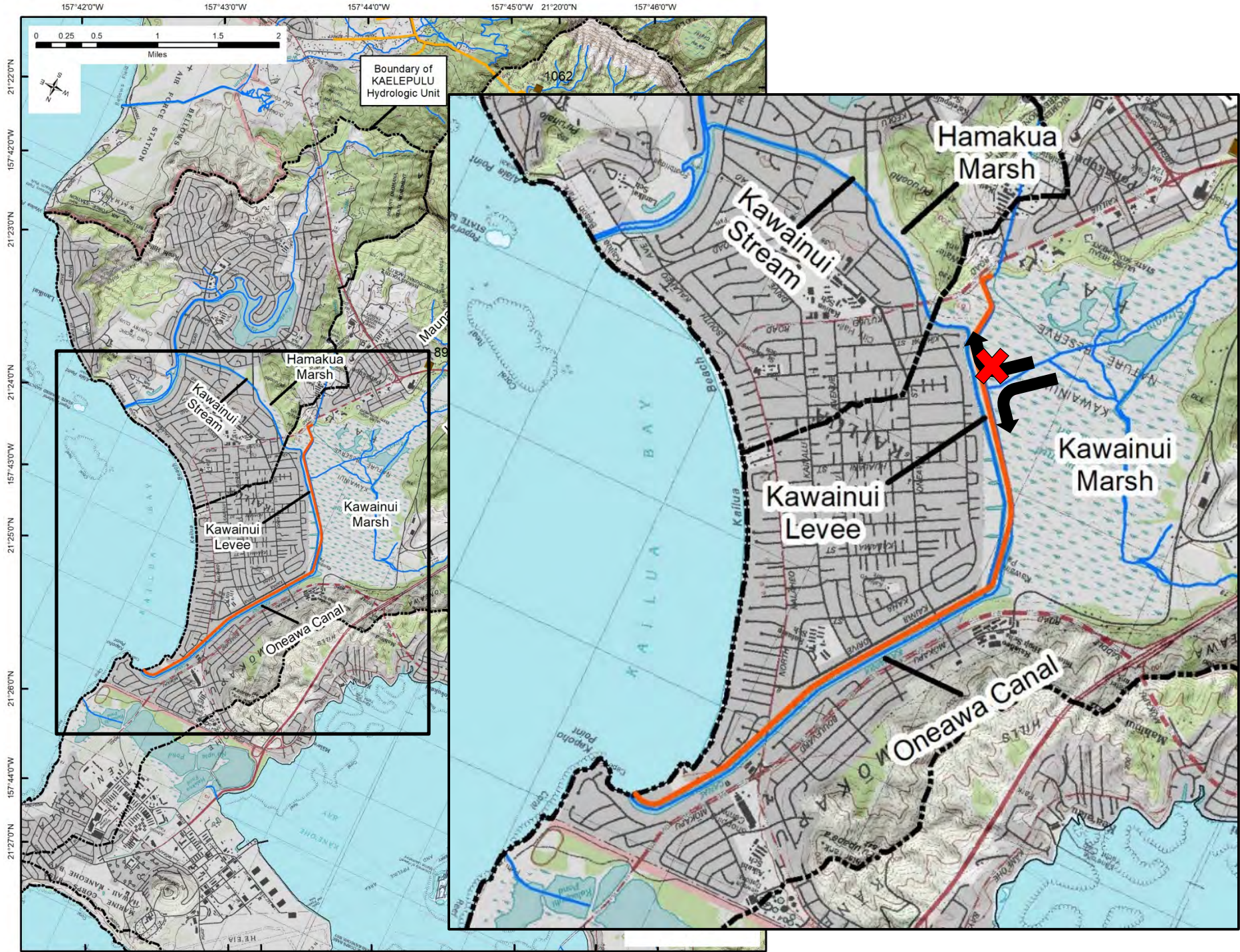






Photo courtesy of USACOE





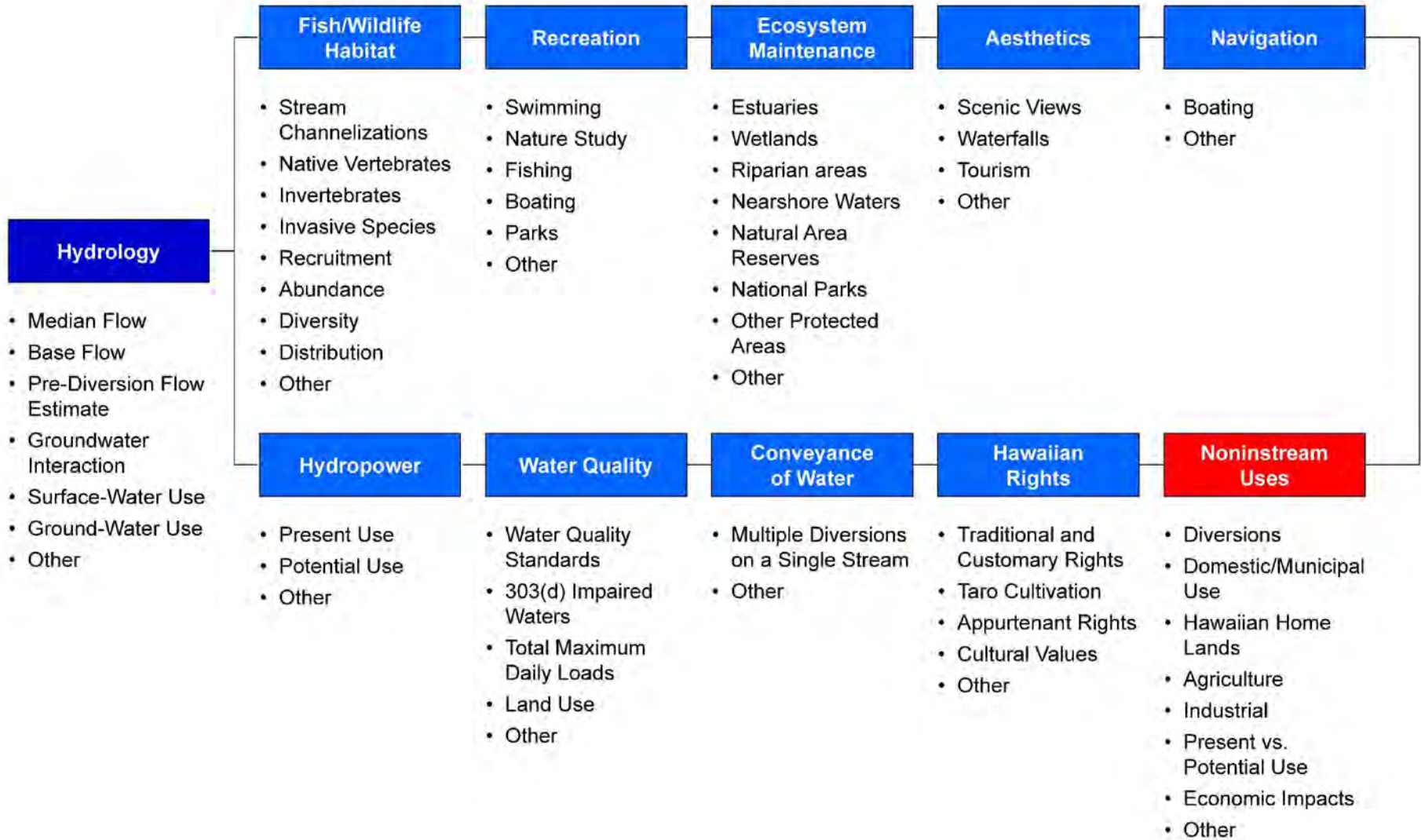
Photo courtesy of USACOE







# Assessment of Instream and Non-Instream Uses





# Assessment of Instream and Non-Instream Uses





# Many Archeological Sites of Cultural Significance





# Area has "Blue Ribbon" Cultural Resources (rated one of the highest in the state)



<http://hikaalani.website/activities-blog/archives/08-2016>

<http://www.conservationconnections.org>



# Recreational/Aesthetic Uses of Kawainui/Kaelepulu Stream





# Hawaii DOH and US EPA Priority Watershed

## DRAFT SAMPLING AND ANALYSIS PLAN

### Kaelepulu Stream System Oahu, Hawaii



Prepared by:

Roger Babcock, PhD, PE  
University of Hawaii

Prepared for:

U.S. Environmental Protection Agency, Region IX  
75 Hawthorne Street  
San Francisco, California

and

Hawaii Department of Health  
919 Ala Moana Boulevard  
Honolulu, Hawaii

June 2005

### f) Kaelepulu Pond Watershed Study

DFM-SWQ is in the process of conducting a water quality watershed planning study (Phase IV) for the Kaelepulu Pond area. The intent of the study is to identify the potential sources of the pollutants within the watershed and recommend various BMP improvements that could be feasibly implemented to improve the overall health of Kaelepulu Pond over the long haul. As part of the Kaelepulu watershed analysis study, DFM-SWQ is developing a calibrated water quality model (Phase III) using the HSPF program to identify and quantify pollutant sources, as well as prepare various simulations for different BMP scenarios that could be used in tracking specific changes within the watershed. Included within the modeling is a monitoring and sampling sub-task (Phase II) to install, operate and monitor a number of field sampling sites to test for various water quality parameters such as TSS, Ammonia Nitrogen, Nitrate+Nitrite Nitrogen, Total Phosphorus, and Enterococci. The study started in FY14 and is scheduled to continue through FY18.

The screenshot shows the EPA website for the Kaelepulu Watershed. The header includes the EPA logo and navigation links. The main content area is titled 'Kaelepulu Watershed, Oahu, Hawai'i'. It features a 'Watershed Features' section with a map and text describing the watershed's location and characteristics. A 'Federal large capacity cesspool closure' section is also visible, mentioning a list of impaired waters.



Additional information on TMDLs can be found on the [U.S. Environmental Protection Agency TMDL](#) website.

#### Kaelepulu/Enchanted Lake Assessment Project

The Hawaii State Department of Health (HDOH) Clean Water Branch (CWB) is conducting a water quality assessment project in the Kaelepulu watershed. We are working to determine the current status of the water quality in the region and will be collecting water samples from the shoreline of the stream and lake. We will be testing the water for fecal indicator bacteria (*enterococci*, *Clostridium perfringens*), nutrients (total nitrogen, total phosphorus, nitrate nitrite), chlorophyll *a*, silicates, turbidity, and total suspended solids. The data will be used to help determine which course(s) of action are best to address the water quality issues in region.

Assessment is the first step in water quality restoration. For restoration to be successful, CWB is seeking the cooperation and participation of all community members and stakeholders. Please attend the local community meetings so your concerns and feedback are heard. Consider participating in events dedicated to improving water quality such as the removal of invasive species and the cultivation of rain gardens.

This webpage will be updated as meeting information and project updates become available.

Any questions can be directed to [sierra.payne@doh.hawaii.gov](mailto:sierra.payne@doh.hawaii.gov)

Mahalo for your assistance in restoring, protecting, and preserving Hawaii's treasured water resources.

#### Turbidity, Sediment and Nutrient TMDL for the Waialeale Watershed, Oahu, Hawaii

The TMDLs for the Waialeale watershed have formally been accepted by EPA as of May 9, 2019. The following links provide downloads of the TMDL, TMDL Checklist, and TMDL EPA Acceptance letter.

<https://health.hawaii.gov/cwb/files/2019/06/Waialeale-TMDL-2019.pdf>

- o Section 401 Water Quality Certification (WQC)
  - Blanket Section 401 WQC
  - Vessel General Permit (VGP)
  - Small Vessel General Permit (SVGP)
- Hawaii Administrative Rules (HAR)
  - o 11-54, Water Quality Standards
  - o 11-55, Water Pollution Control
- Polluted Runoff Control Program
  - o Watershed Plans
  - o 319 Grant Program
  - o Agriculture
  - o Hawaii's Implementation Plan
  - o Wastewater
  - o What You Can Do
- Public Notices and Updates
- Water Quality
  - o Water Quality Notifications
  - o General Health Advisory
  - o Integrated Report and Total Maximum Daily Loads
  - o Ocean Recreation Links
  - o Sample Sites (Index & Descriptions)
  - o Water Quality Data
  - o Water Quality Standards Maps



# Hawaii DOH and US EPA Priority Watershed: Kaelepulu

Table 1. 303(d) List of Impaired Inland Waters

Assessed Water Body	Water Body Type	Scope of Assessment	Water Body ID	Season	Impairment(s)	TMDL
Ala Wai Canal & Harbor (McCully Bridge Stn)	Estuary	EE	HIW00086	NA	Enterococci	
Ala Wai Canal & Harbor (Palolo Stream Fork)	Estuary	EE	HIW00034	NA	TN, Turbidity, Fecal	
Anahulu	Estuary	EE	3-6-08-E		TN, NO <sub>3</sub> +NO <sub>2</sub> , TP, Turbidity	
Halawa	Stream	EN	3-4-02		TN, NO <sub>3</sub> +NO <sub>2</sub> , TP, Turbidity	
Heeia	Stream	EN	3-2-08	Dry	TN, NO <sub>3</sub> +NO <sub>2</sub>	
Helemano	Stream	EN	3-6-07.02		TN, NO <sub>3</sub> +NO <sub>2</sub> , TP, Turbidity	
Kaaawa	Stream	EN	3-1-19		TN, NO <sub>3</sub> +NO <sub>2</sub> , TP, Turbidity	
Kaalaea	Stream	EN	3-2-05	Dry	TN, NO <sub>3</sub> +NO <sub>2</sub> , Turbidity	L
Kaelepulu	Stream	EN	3-2-14		TN, NO <sub>3</sub> +NO <sub>2</sub> , TP, Turbidity	M
Kaelepulu Stream-Kailua Beach	Estuary	EE	HIW00182	NA	Enterococci, TN, TP, Turbidity, Chl <i>a</i>	M
Kahaluu	Stream	EN	3-2-07.02	Dry	Enterococci, NO <sub>3</sub> +NO <sub>2</sub> , Turbidity,	L
Kahaluu	Stream	EN	3-2-07.02	Wet	Enterococci	
Kahana	Stream	EN	3-1-18	Dry	NO <sub>3</sub> +NO <sub>2</sub> , Turbidity	M

2018 STATE OF HAWAII WATER QUALITY MONITORING AND ASSESSMENT REPORT:  
 Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress  
 Pursuant to §303(d) and §305(b), Clean Water Act (P.L. 97-117)



The Hawaii State Department of Health  
 Clean Water Branch  
 Honolulu, Hawaii  
 Final  
 July 11, 2018



# Impaired Water Quality: Nutrient Loading, Eutrophication

Hawai'i's Department of Health  
ASO Log No. 05-080  
Finalized Plan

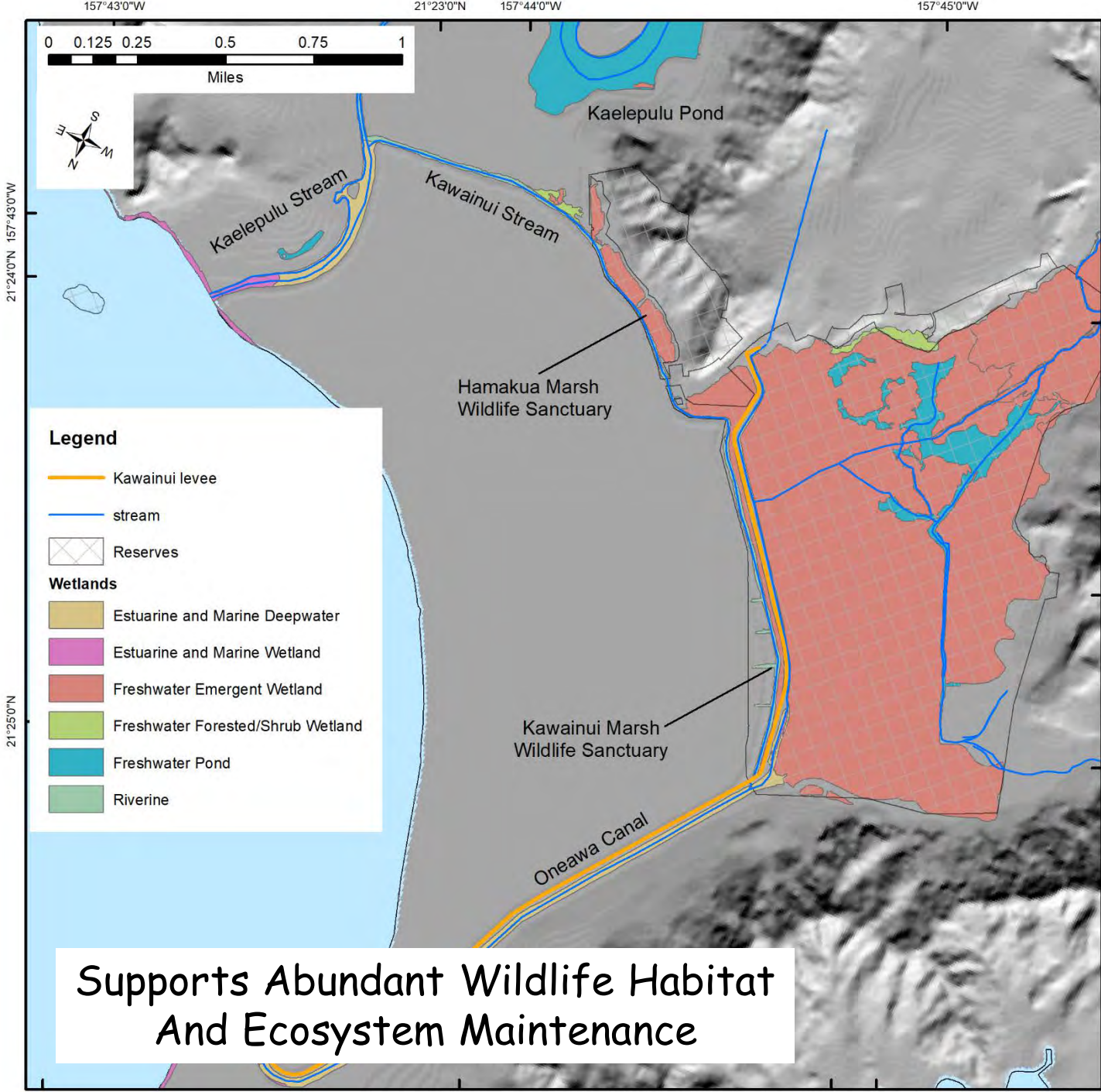
Ko'olaupoko Watershed Restoration Action Strategy  
Kailua Bay Advisory Council (KBAC)  
-June 2007-



  
Kailua Bay Advisory Council







**Legend**

- Kawainui levee
- stream
- Reserves
- Wetlands**
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Supports Abundant Wildlife Habitat  
And Ecosystem Maintenance



# Hamakua Marsh





# Endemic Wetland Birds in Kawainui/Hamakua Marsh



Hawaiian Stilts or Ae'o (*Himantopus mexicanus knudseni*)



Hawaiian Coot or 'alae kea (*Fulica alai*)



Hawaiian Duck or Koloa (*Anas wyvilliana*)



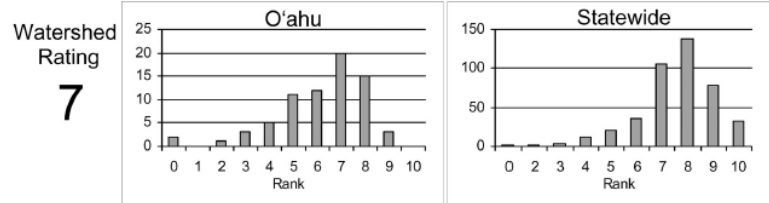
Hawaiian Moorhen or 'alae'ula (*Gallinula galeata sandvicensis*)



# DAR Watershed Classification

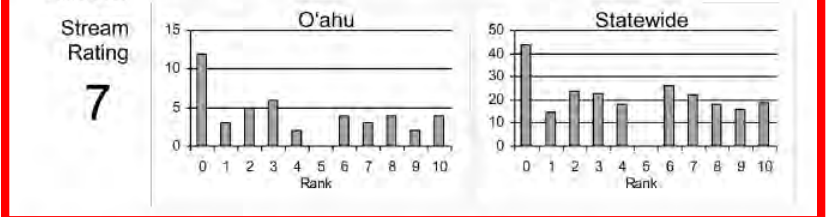
## WATERSHED RATING: Kawainui, O'ahu

**Land Cover Rating:** Rating is based on a scoring system where in general forested lands score positively and developed lands score negatively.

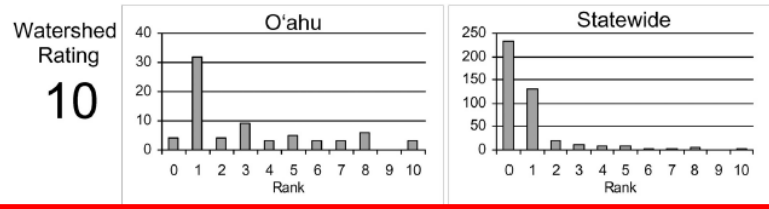


## BIOLOGICAL RATING: Kawainui, O'ahu

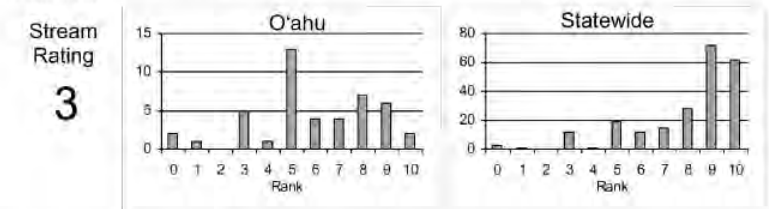
**Native Species Rating:** Rating is based on the number of native species observed in the watershed.



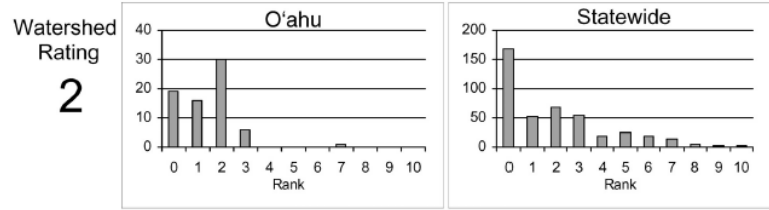
**Shallow Waters Rating:** Rating is based on a combination of the extent of estuarine and shallow marine areas associated with the watershed and stream.



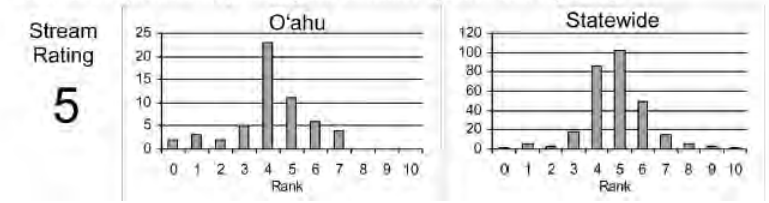
**Introduced Genera Rating:** Rating is based on the number of introduced genera observed in the watershed.



**Stewardship Rating:** Rating is based on a scoring system where higher levels of land and biodiversity protection within the watershed score positively.



**All Species' Score Rating:** Rating is based on the Hawaii Stream Assessment scoring system where native species score positively and introduced species score negatively.





# Media Attention for Kawaiinui and Kaelepulu Stream

HAWAII NEWS  
**Volunteers clear path for Kaelepulu to reach sea**



JAMM AQUINO / JAGUINO@STARADVERTISER.COM  
Kailua resident Mike Rogers, front, joined others in carving a path to the ocean for Kaelepulu Stream on Sunday at Kailua Beach.

Monday, June 9, 2019

**Hawaii IN REAL LIFE**  
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**Hamakua Marsh**

Our class has been learning about wetlands. We visited the Hamakua Marsh with the Hawaii Nature Center for a Learning Trip. Later, we discovered plans to develop the Hamakua Marsh and Kawaiinui Marsh. Below are responses to the development plans. -Mrs. V.



by: Adam Demand  
Posted: Oct 9, 2017 / 08:18 AM H

Click on CONTINUE

Click on CONTINUE

Click on CONTINUE

Click on CONTINUE

Click on CONTINUE

Starbulletin.com  
Monday, August 21, 2018



Restoring Kailua's other swamp

The state is working to clear out a habitat for native waterfowl at Hamakua Marsh



NORACORA

WILD KIDS

HOME HAWAII MONTANA WILD L.A.N.D.S. MERCHANDISE WILD NEWS ABOUT

How to Stay Getting Started X's Labours | Rice 4660ND02E Per 66

Hawaii Public Radio  
Radio with vision. Listen and see.

DONATE

Users Live - HPR-1 News and Information On Point

Home HPR News/Talk HPR Music Programs Events About Support Contact Search

Two stations are off the air: HPR-1 98.5 FM and HPR-2 100.7 FM.

**Rare Native Hawaiian Plant Thrives in Hamakua Marsh**

By Catherine Lutz • July 16, 2017

Share  
Tweet  
Email



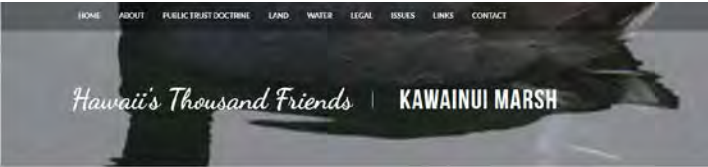
## SENIORS AND FRESHMAN - HELPING OUT AT HAMAKUA MARSH

While the sophomores and juniors were taking the PSAT last week, three seniors and the freshman class went to Hamakua Marsh to help. They planted native species of Hawaiian plants, pulled weeds and learned about indigenous birds! It was a beautiful day and seniors: Stella Hess, Lily McDermott, and Chloe Kaminskas helped lead with the teachers. It was an awesome day of hard work and we are eager to help out again!





# Community Groups Interested in Kawainui/Kaelepulu Stream



Site survey conducted in 1990, we have worked for the protection of the Kawainui Marsh and it has remained one of our core issues. Over the years, FITT has fought to protect the integrity of this cultural, archaeological, and historic district; prevent harmful development in and around the marsh; and sought proper management, protection, and recognition. With the Ramsar designation in 2007 as a Wetland of International Importance, Kawainui has finally gained the recognition and workable recognition it deserves. It is culturally significant marsh that is home to many endangered native waterbirds.



## Wetlands of International Importance

On April 24, 2007, the official Ramsar Certification of Kawainui and Hamakua Marshlands as "Wetlands of International Importance" was presented by Mr. Herb Ruffell, Chief, U.S. Fish and Wildlife International Conservation Division. The Ramsar designation was announced on World Wetlands Day, February 2nd, 2005.



## Kawainui Marsh



On this page, please scroll down to find:

~ LKOC History in Kawainui Marsh - 1950 to Present

~ LKOC Board Resolution Regarding Kawainui Marsh - February 2011

~ LKOC Position on Kawainui-Hamakua Marsh Master Plan Project - Overview and Details

~ LKOC Alternative Master Plan for Kawainui-Hamakua Marsh - September 2016

~ LKOC Comments in Response to DEIS for Kawainui-Hamakua Marsh Master Plan - January 2018

Rotary Home About Events & Speakers Visit Us Become a Member Scholarships Contact Us

### SERVICE PROJECT- HAMAKUA MARSH

**07 Mar**

Context: Aloha Day!

**ONLINE REGISTRATION**

Registration for this event is now closed.

**GET IT!**

**Kailua Senior Center**  
 Thu 07, 2020 10:00 AM - 1:00 PM  
 Gazebo Hamakua Marsh Wetland  
 268 Hamakua Drive  
 Kailua, HI 96754  
 United States of America

**Dear LKOCs,**

As a part of Rotary Give Thanks day in 2020, our club came together to give out trees and plant trees at Hamakua Marsh in Kailua with the non-profit group Healthy Climate Communication. We want to go back and do some volunteer work in the area where we planted and help in any other way needed. We hope you can join us to help us work, maintain our trees and help at the Hamakua Marsh. Family and friends encouraged to join us!

Date: Saturday, March 7, 2020  
 Work Project Time: 9am - 11am  
 Lunch afterwards at Enchanted Lake Community Park, 11am - 1pm.  
 Project Site Gaze Enclosed Next to 268 Hamakua Drive, Kailua, HI 96754

Join the stream and walk over a gaze. Here is a direct link to the gaze web property. We will have the RxCES license on the house.  
<https://www.google.com/maps/place/268+Hamakua+Dr,+Kailua,+HI+96754,+Hawaii/@19.87924,-155.0748629,17t/data=!4m2!3m1!1s268+Hamakua+Drive,+Kailua,+HI+96754,+Hawaii/@19.87924,-155.0748629,17t>

Home General Information Environmental Issues Board/Meeting Association Contact Page

## Ka'elepulu Pond

Enchanted Lake Residents Association

### Environmental Issues

The waterways of Kailua cover a water area of nearly 120 acres, and serve as

**Quick Links**

[Lake Rules](#)

[Lake History](#)

[Board Minutes](#)

[Facebook](#)

[Lake Safety Phone \(808\) 267-1158](#)

**Latest Additions**

January 2020 Board Meeting Minutes

December 2019 Board Meeting Minutes

November 2019 Board Meeting Minutes

October 2019 Board Meeting Minutes

September 2019 Board Meeting Minutes

**Archives**

Kailua Minutes

Kailua Newspaper

### Hamakua Wetlands

By My Kailua - February 1, 2016

**KAILUA, US**

Light Rain

81.6

80° 76° 78° 78° 77°

The Hamakua Group

## Hamakua Marsh Water Flow Restoration

How to Restore Hamakua Marsh Water Flow as Rainfall Changes with the Seasons. Click image once to enlarge.

Historically, prior to Owens Canal and construction of the Levee, Kawainui Marsh discharged its water seaward through Hamakua Marsh, which was then a drained. Modern agriculture starts now a flow of water from its waterways north and south in Hamakua Marsh and its outflow, plus the ability to respond to current rainfall and flood risk.





# DLNR Cooperation



The State of Hawai'i, DLNR  
**Engineering Division**



**KAWAI NUI STREAM FLOW RESTORATION PROJECT**  
 SIPHON FLOW RESTORATION EXPERIMENT REPORT




MAY 2018  
 Prepared For:  
 State of Hawaii, Department of Land and Natural Resources,  
 Engineering Division




Prepared By:  
 Oceanit Laboratories Inc.  
**oceanit**

**KAWAI NUI STREAM FLOW RESTORATION PROJECT**  
 PRELIMINARY ENGINEERING REPORT



JULY 2018  
 Prepared For:  
 State of Hawaii, Department of Land and Natural Resources,  
 Engineering Division



Prepared By:  
**oceanit**

**Instream Flow Standard Assessment Report**  
 Island of Oahu  
 Hydrologic Units 3033 & 3034  
 Kawainui & Kaelepulu

June 2020 DRAFT PR 2020-01



State of Hawaii  
 Department of Land and Natural Resources  
 Commission on Water Resource Management






**WETLAND RESTORATION AND HABITAT ENHANCEMENT PLAN**  
 KAWAINUI MARSH  
 KAUAI, OAHU  
 MARCH 2011

