

Current Issues with Surface Water Resources in Kaua'i

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3rd Annual Joint State Water Conference
Līhu'e, Kaua'i
August 4, 2015

Stream Protection & Management Branch

Introduction

- **Regulate stream channel alterations and stream diversion works statewide via permits**
- **Set measurable interim instream flow standards**
- **Respond to requests for determination**
- **Respond to surface water-related complaints**
- **Administration of surface water use permits in surface water management areas and claims of appurtenant rights**
- **Manage the Hawaii portion of the National Hydrography Dataset**



Brief History of Surface Water Management

- **1987 State Water Code Developed (HRS 174C)**
 - HRS 13-169 Protection of Instream Uses of Water
- **1989 Commission requested all surface water diversions be registered by May 30**
 - Database of stream diversions established...but many unverified
→ Most complete on O‘ahu, Moloka‘i and Maui
- **1990 Hawaii Stream Assessment**
 - Inventoried hydrological, ecological, cultural, economic resources
- **2001 Stream Protection and Management Branch Created**
 - Focus has been responding to petitions/Contested Case Hearings
 - East Maui, Na Wai Eha (Central Maui)
- **2010 Began monitoring amended IIFS on Maui**



Uses of Surface Water

Hydrology

- Median Flow
- Base Flow
- Pre-Diversion Flow Estimate
- Groundwater Interaction
- Surface-Water Use
- Ground-Water Use
- Other

Fish/Wildlife Habitat

- Stream Channelizations
- Native Vertebrates
- Invertebrates
- Invasive Species
- Recruitment
- Abundance
- Diversity
- Distribution
- Other

Recreation

- Swimming
- Nature Study
- Fishing
- Boating
- Parks
- Other

Ecosystem Maintenance

- Estuaries
- Wetlands
- Nearshore Waters
- Natural Area Reserves
- National Parks
- Other Protected Areas
- Other

Aesthetics

- Scenic Views
- Waterfalls
- Tourism
- Other

Navigation

- Boating
- Other

Hydropower

- Present Use
- Potential Use
- Other

Water Quality

- Water Quality Standards
- 303(d) Impaired Waters
- Total Maximum Daily Loads
- Land Use
- Other

Conveyance of Water

- Multiple Diversions on a Single Stream
- Other

Hawaiian Rights

- Traditional and Customary Rights
- Taro Cultivation
- Appurtenant Rights
- Cultural Values
- Other

Noninstream Uses

- Diversions
- Domestic/Municipal Use
- Agriculture
- Industrial
- Present vs. Potential Use
- Economic Impacts









Current Focuses of the SPAM Branch

- **East Maui Contested Case Hearing**
 - Spring 2008: Established IIFS for 8 streams
 - Spring 2010: Established IIFS for additional 19 streams
 - Spring 2015: Revisiting IIFS for all 27 streams
- **Na Wai Eha Contested Case Hearing**
 - Spring 2014: Mediation established IIFS
 - Spring 2015: Determination of appurtenant rights
 - Fall 2015: Quantification phase of appurtenant rights
 - Winter 2015: Allocation Phase of water use permits
- **IIFS monitoring and restoration of habitat connectivity—Maui**
- **West Kauai (Waimea-Kekaha System) Petition—Kauai**
 - Waimea Hydrologic Unit In-Stream Flow Standard Assessment
- **Surface water diversion reporting—Statewide**
- **Update diversion and ditch database—Statewide**



West Kauai Complaint and Petition

Timeline

- **July 2013** –Po'ai Wai Ola and West Kauai Alliance through Earthjustice filed
 - 1) a petition to amend the interim instream flow
 - 2) a complaint and petition for a declaratory order against waste
- **August 2013** – Commission approves appointment of an investigator to gather facts to assist staff
- **June 2014** – Commission issues Contract Notice to Proceed to Element Environmental (E2) to initiate an investigation
- **July 2014** – Commission staff and E2 conducts initial site visit to Waimea/Kekaha region
 - September 2014-present E2 gathering data across systems



West Kauai Complaint and Petition

Timeline

- **February 18, 2015** – Commission Meeting: E2 provides an overview presentation the Kokee and Kekaha Ditch systems and initial of surface water measurements
- **April 28, 2015** – Commission conducted a site visit to view portions of the Kokee and Kekaha Ditch systems
- **April 29, 2015** – Commission had briefings by the Kekaha Agricultural Association and the Kauai Island Utility Cooperative
- **May 11, 2015** – Commission sent a Request for Information for water and hydropower use to Agriculture Development Corporation
- **July 13, 2015** – Commission received Request for Information reply



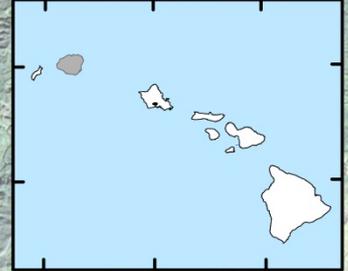
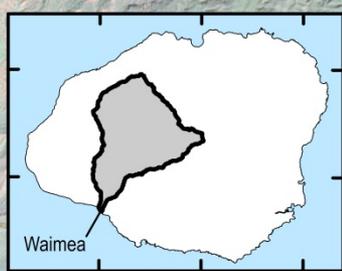
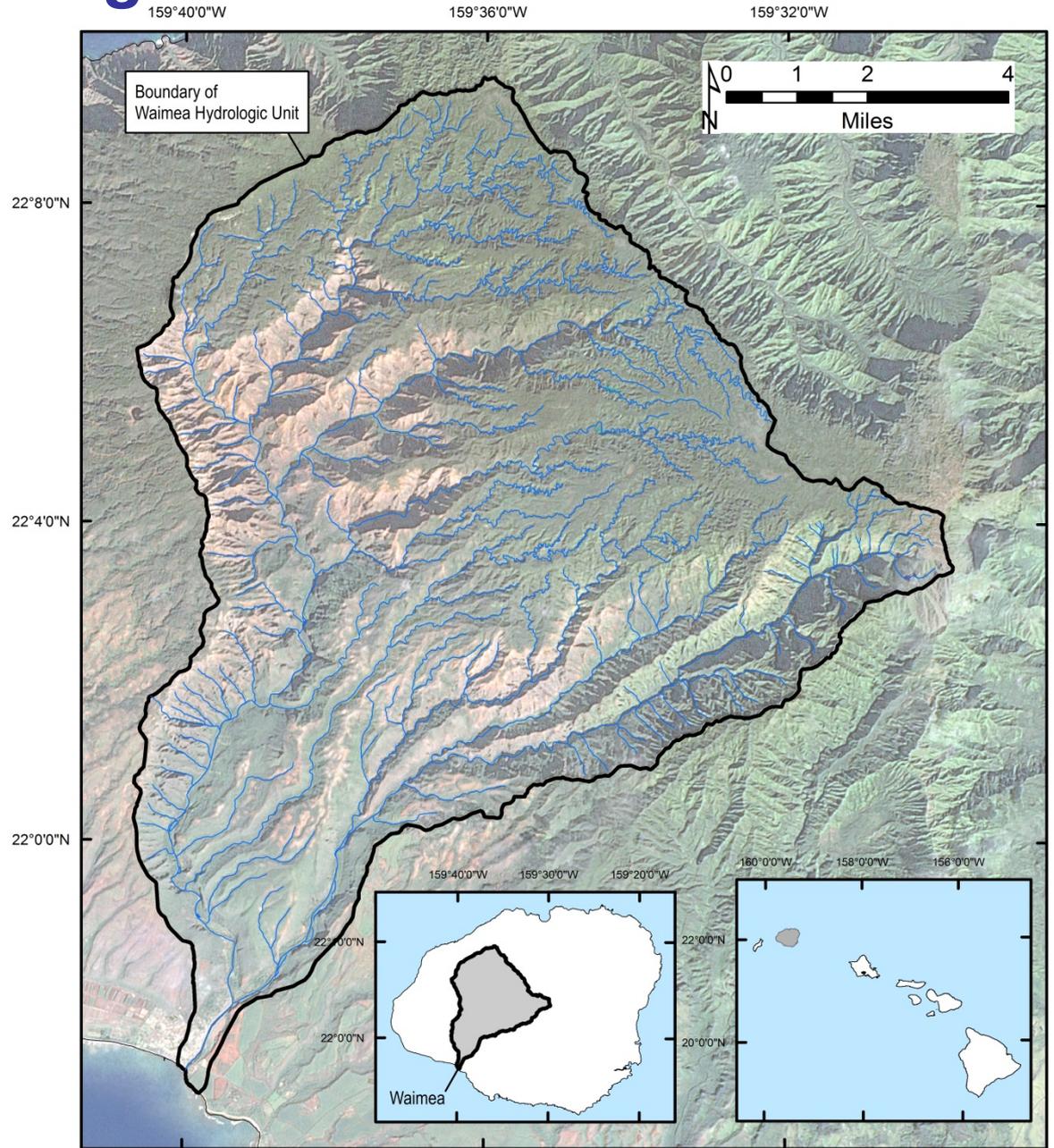
West Kauai Complaint and Petition

Timeline

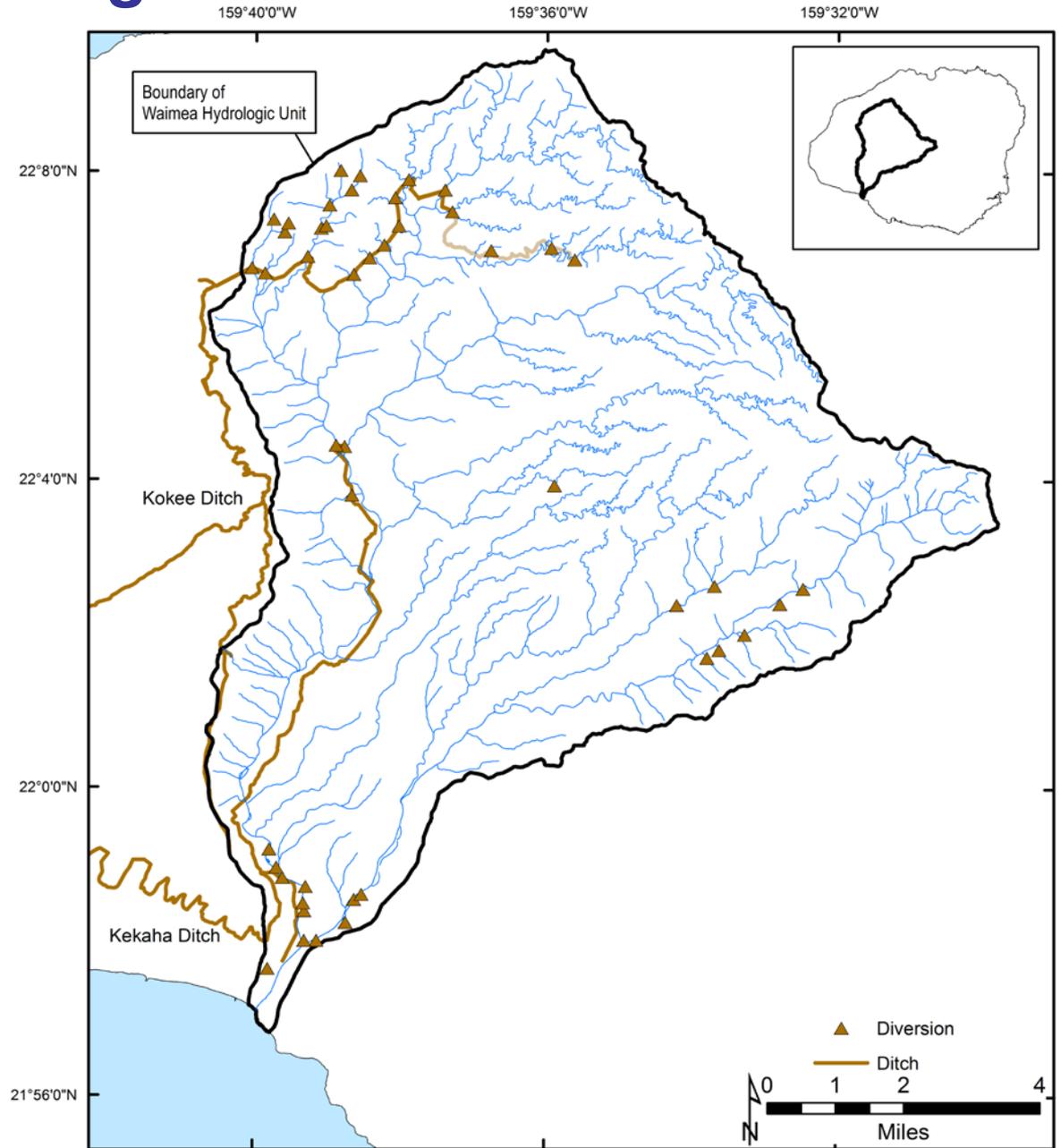
- **Fall 2015** – Commission returns for second site visit
- **Fall 2015** – Commission approves Instream Flow Assessment Report
- **Winter 2015?** – Commission establishes measurable Instream Flow Standard



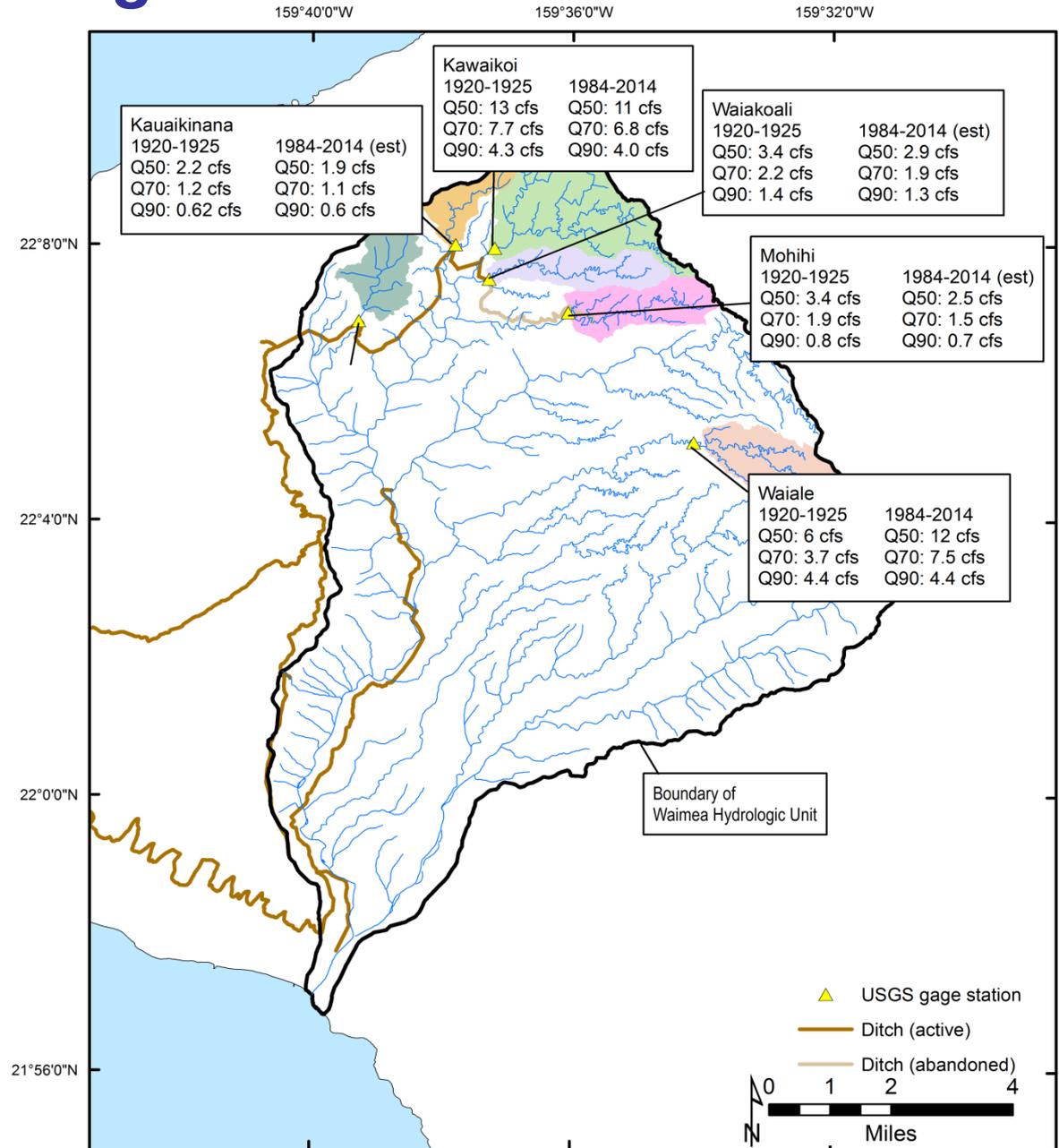
Waimea Hydrologic Unit



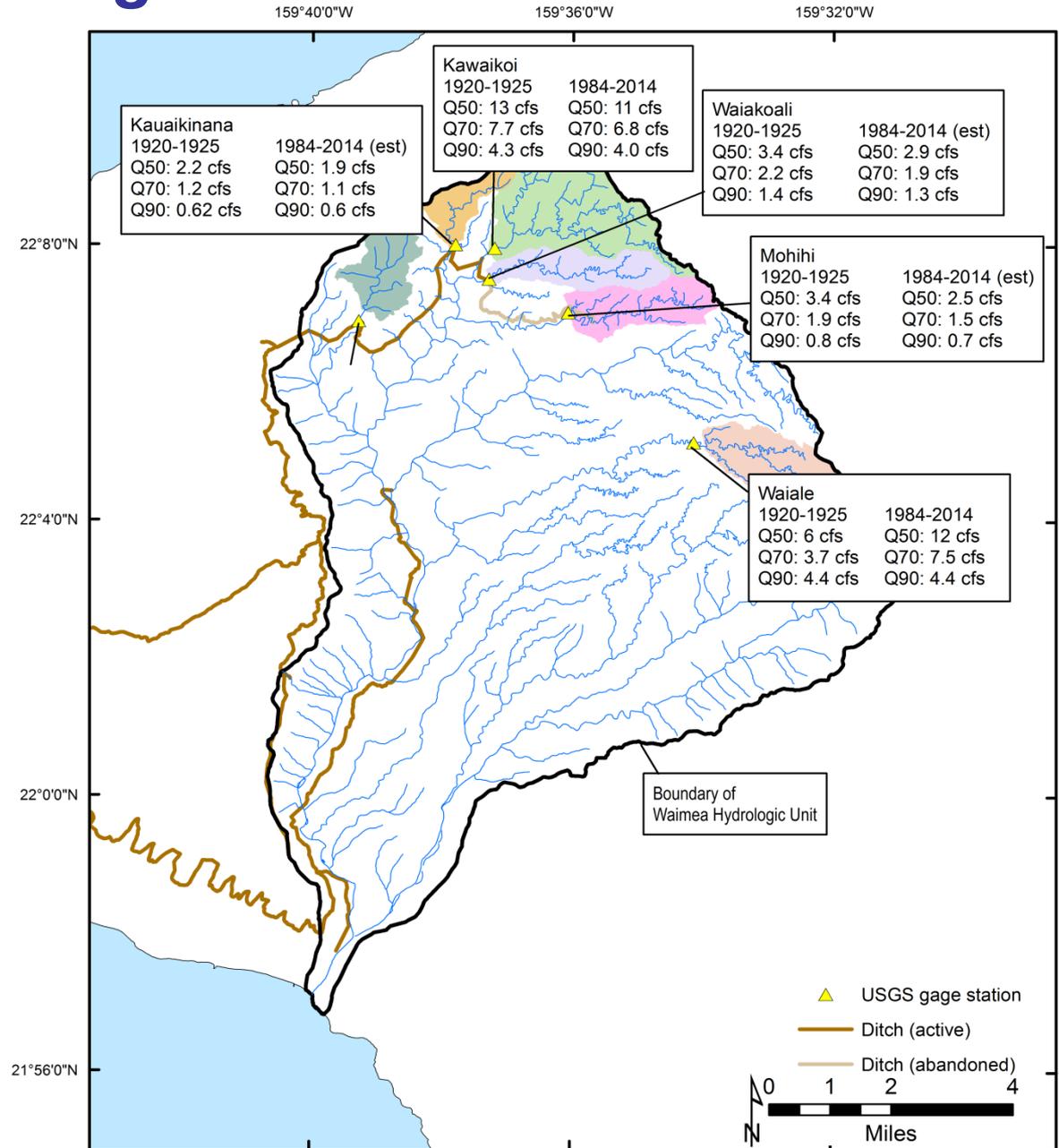
Waimea Hydrologic Unit



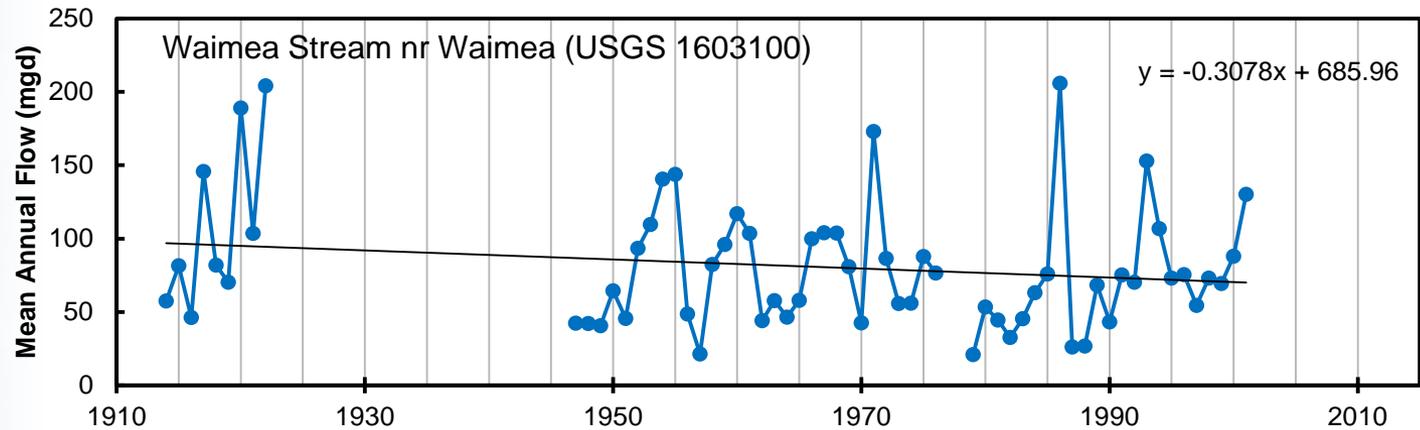
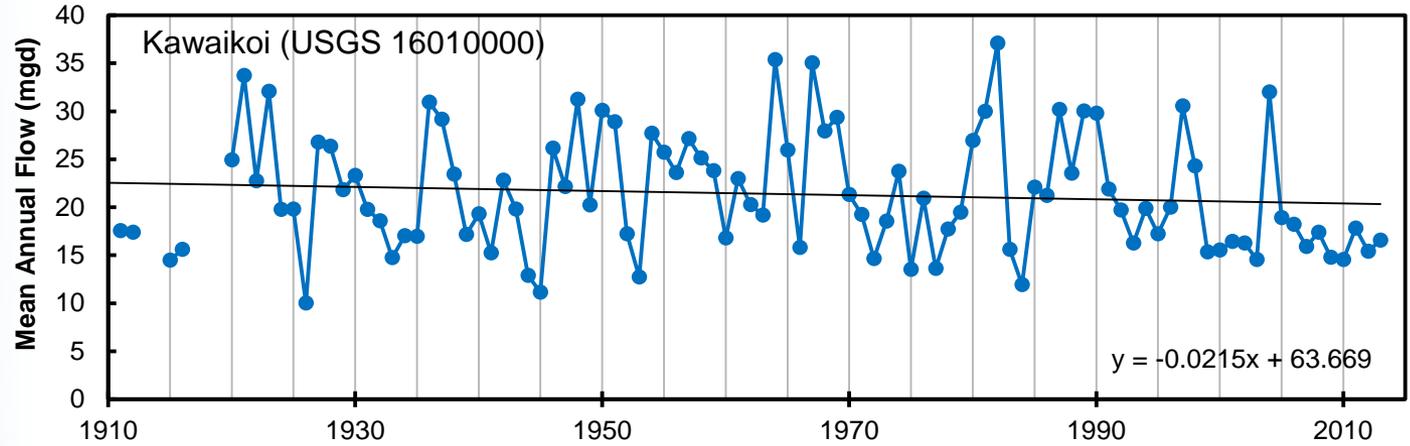
Waimea Hydrologic Unit



Waimea Hydrologic Unit



Trends in Streamflow in Waimea

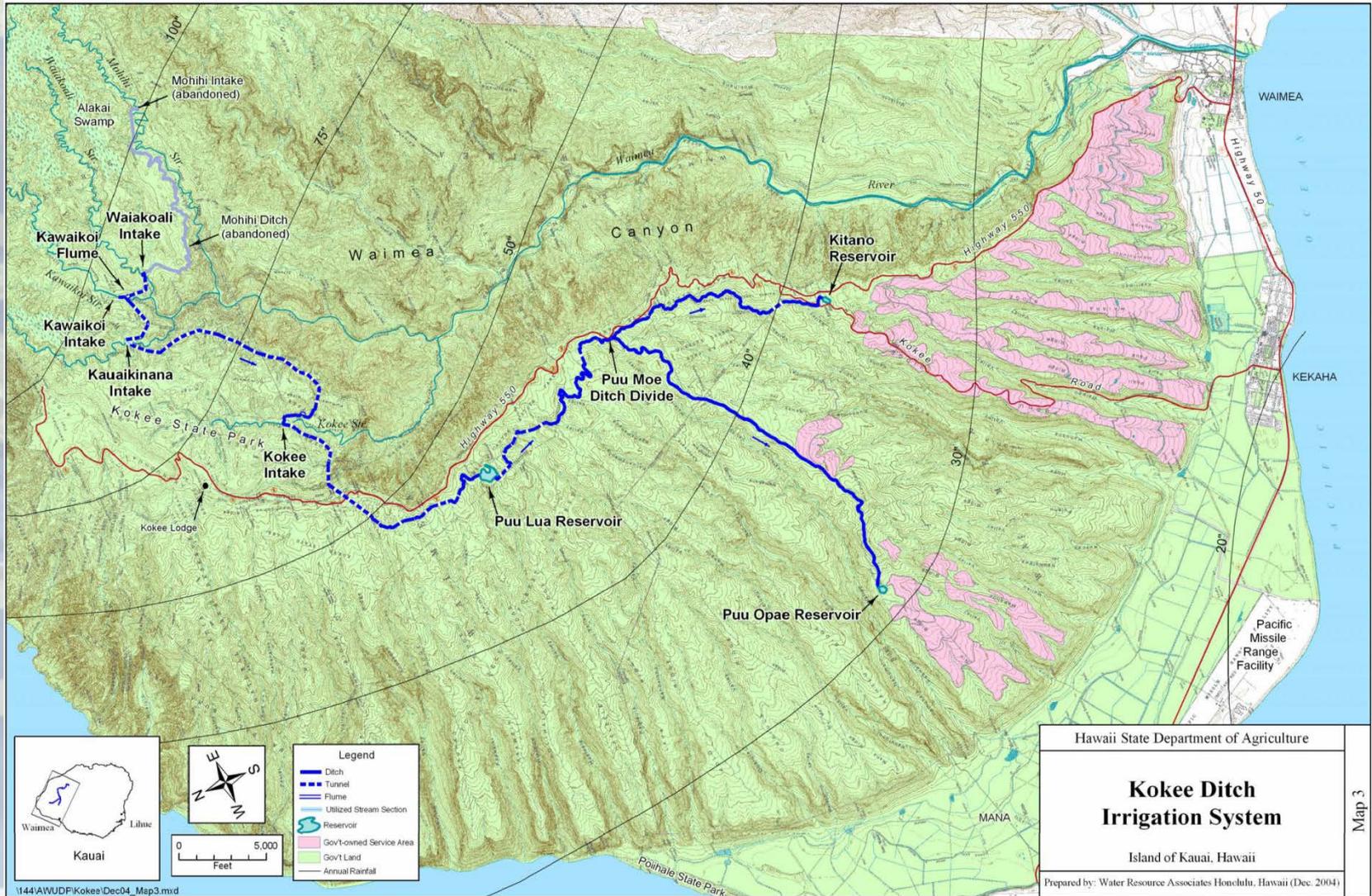


Kokee Ditch Irrigation System (KODIS)

- **Ditch was started in 1923**
- **Four (4) active intakes:**
 - **Waiakoali Intake**
 - **Kawaikoi Intake**
 - **Kauaikinana Intake**
 - **Kokee Intake**
- **26 miles of ditches, tunnels, and flumes**
- **Three (3) Reservoirs**
 - **Puu Lua Reservoir = 260 MG**
 - **Puu Opaе Reservoir = 88 MG**
 - **Kitano Reservoir = 36 MG**
- **Maximum capacity of 55 mgd up to Puu Lua Reservoir (average of 15 mgd)**



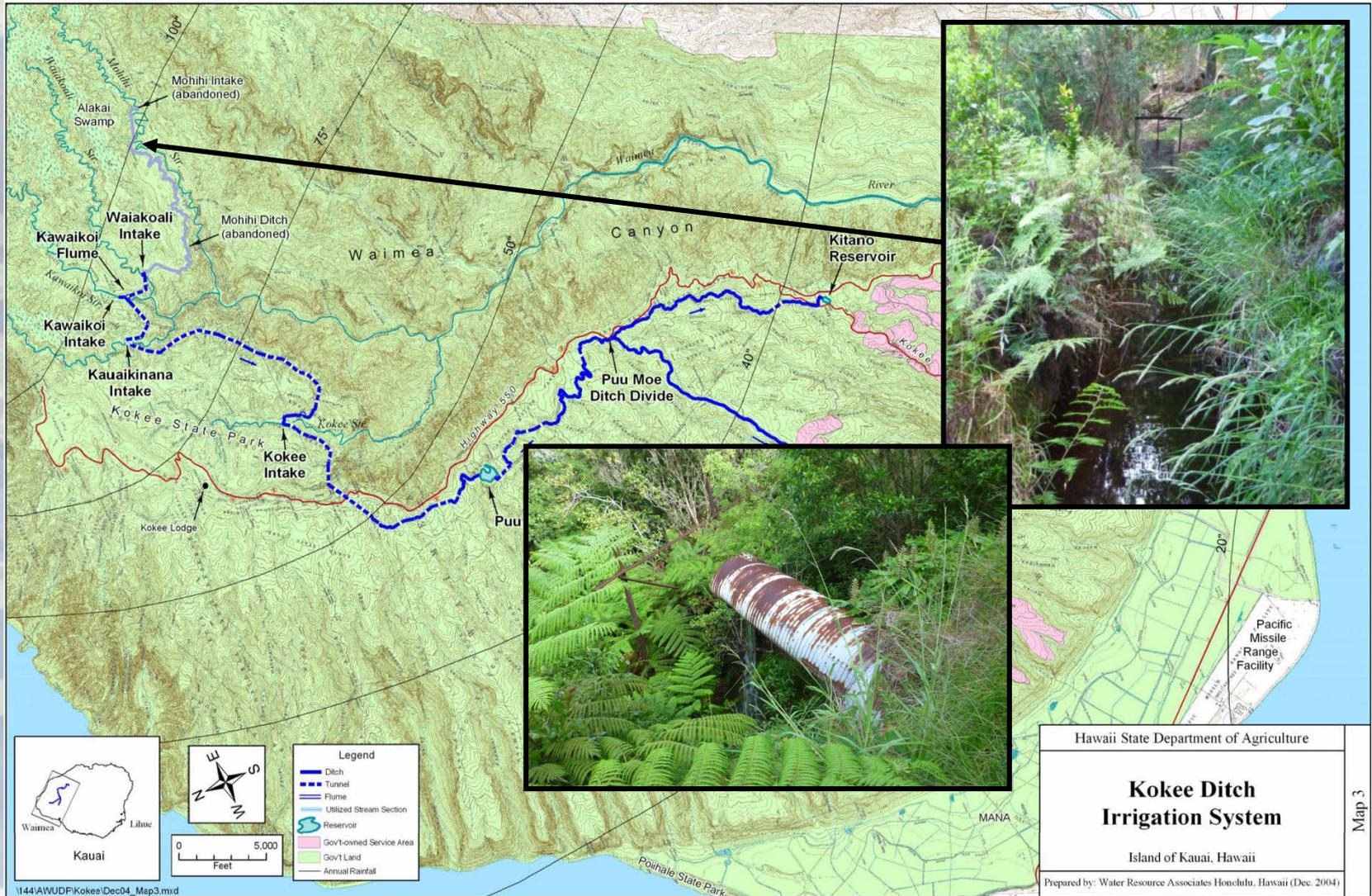
Kokee Ditch Irrigation System (KODIS)



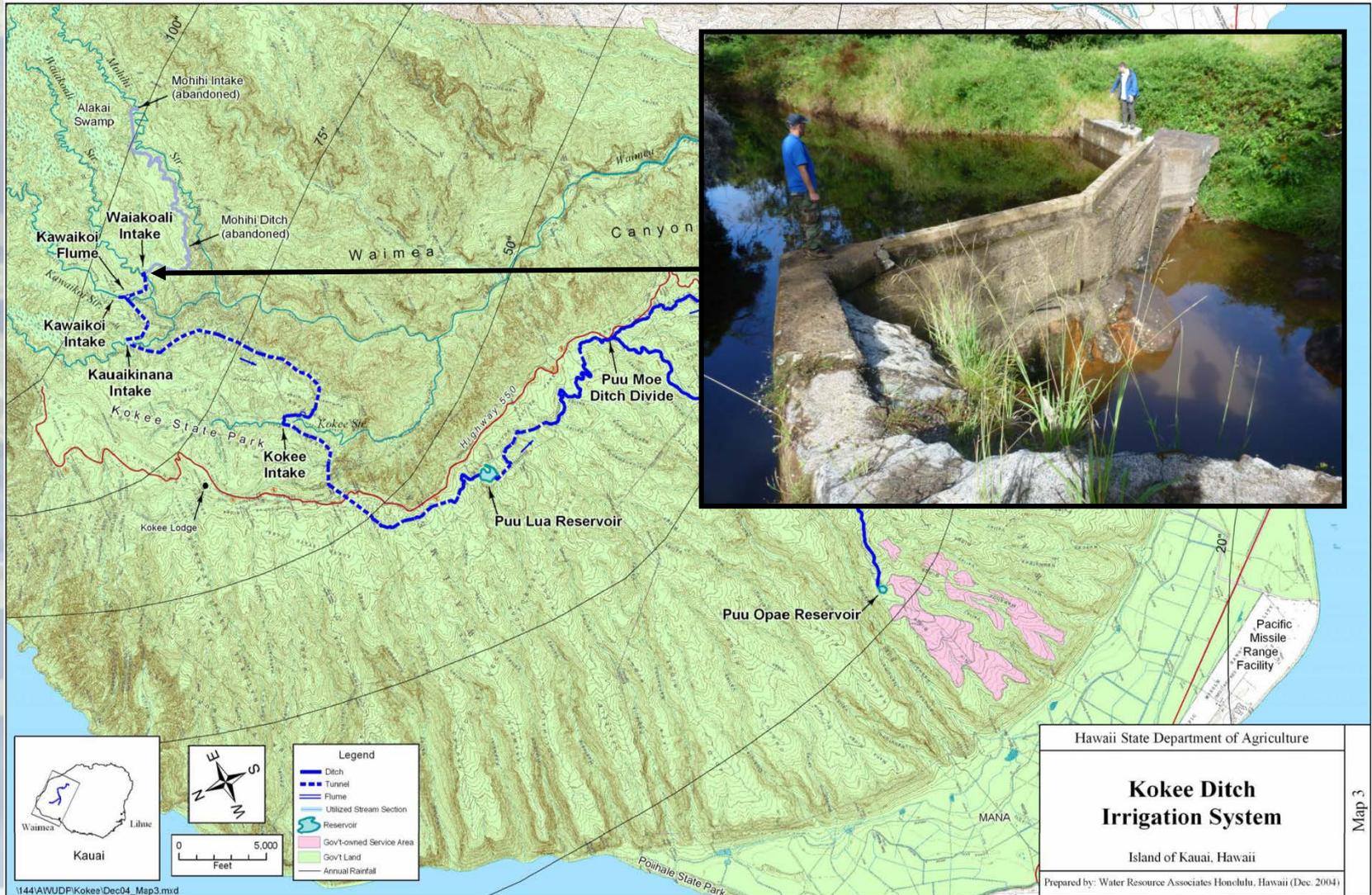
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Hawaii State Department of Agriculture	
Kokee Ditch Irrigation System	
Island of Kauai, Hawaii	
Prepared by: Water Resource Associates Honolulu, Hawaii (Dec. 2004)	

Kokee Ditch Irrigation System (KODIS)

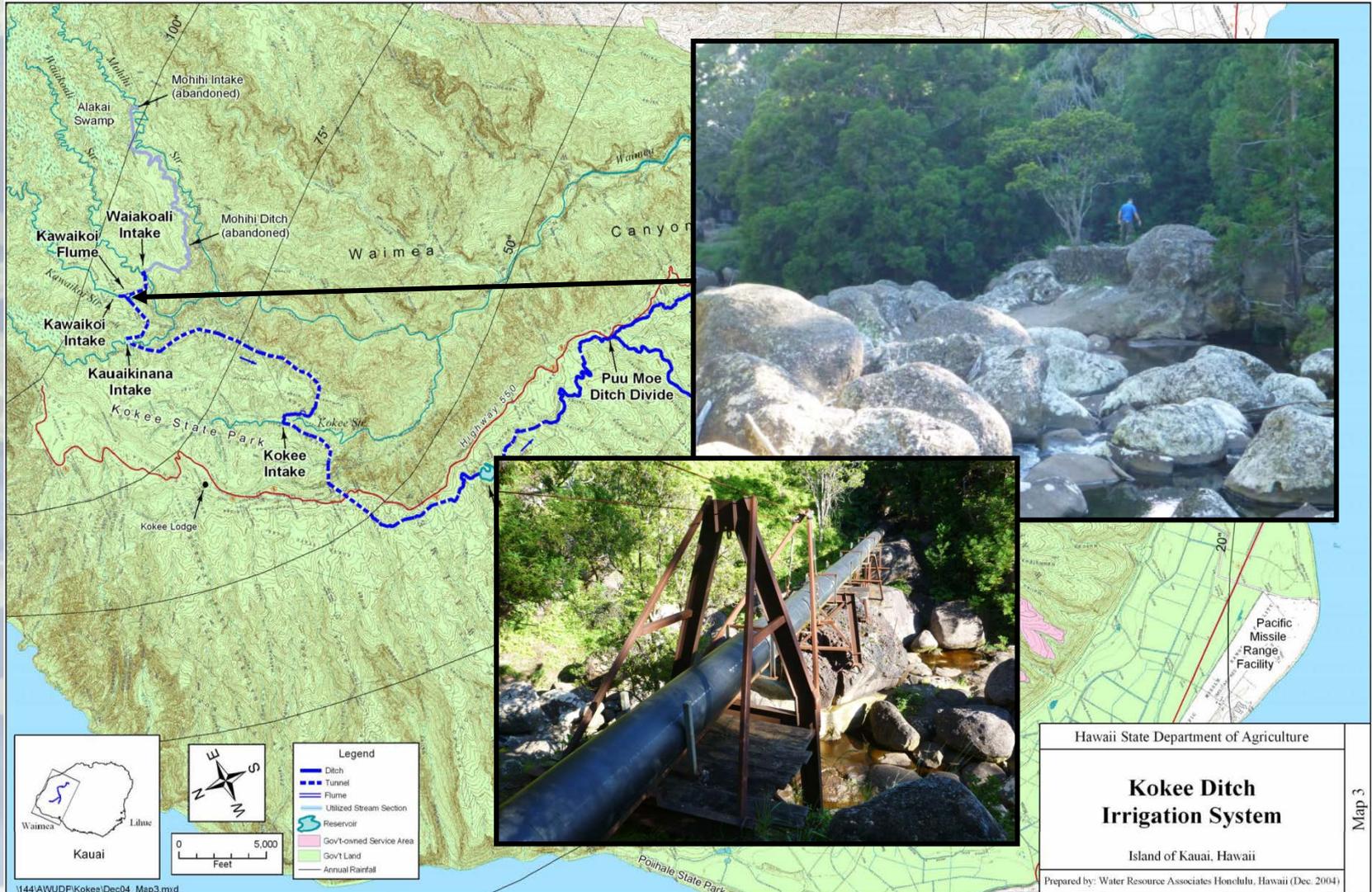


Kokee Ditch Irrigation System (KODIS)



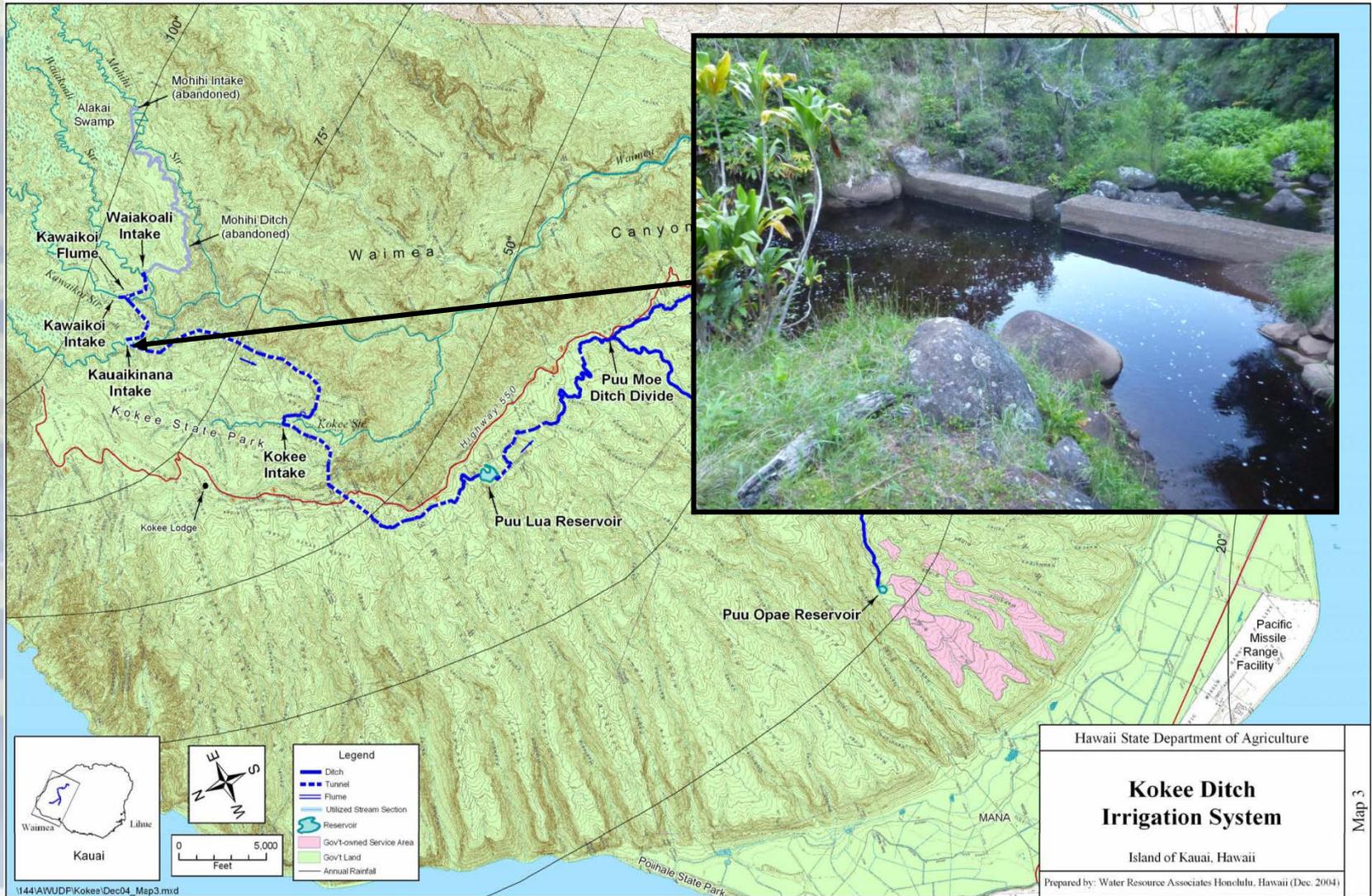
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Kokee Ditch Irrigation System (KODIS)

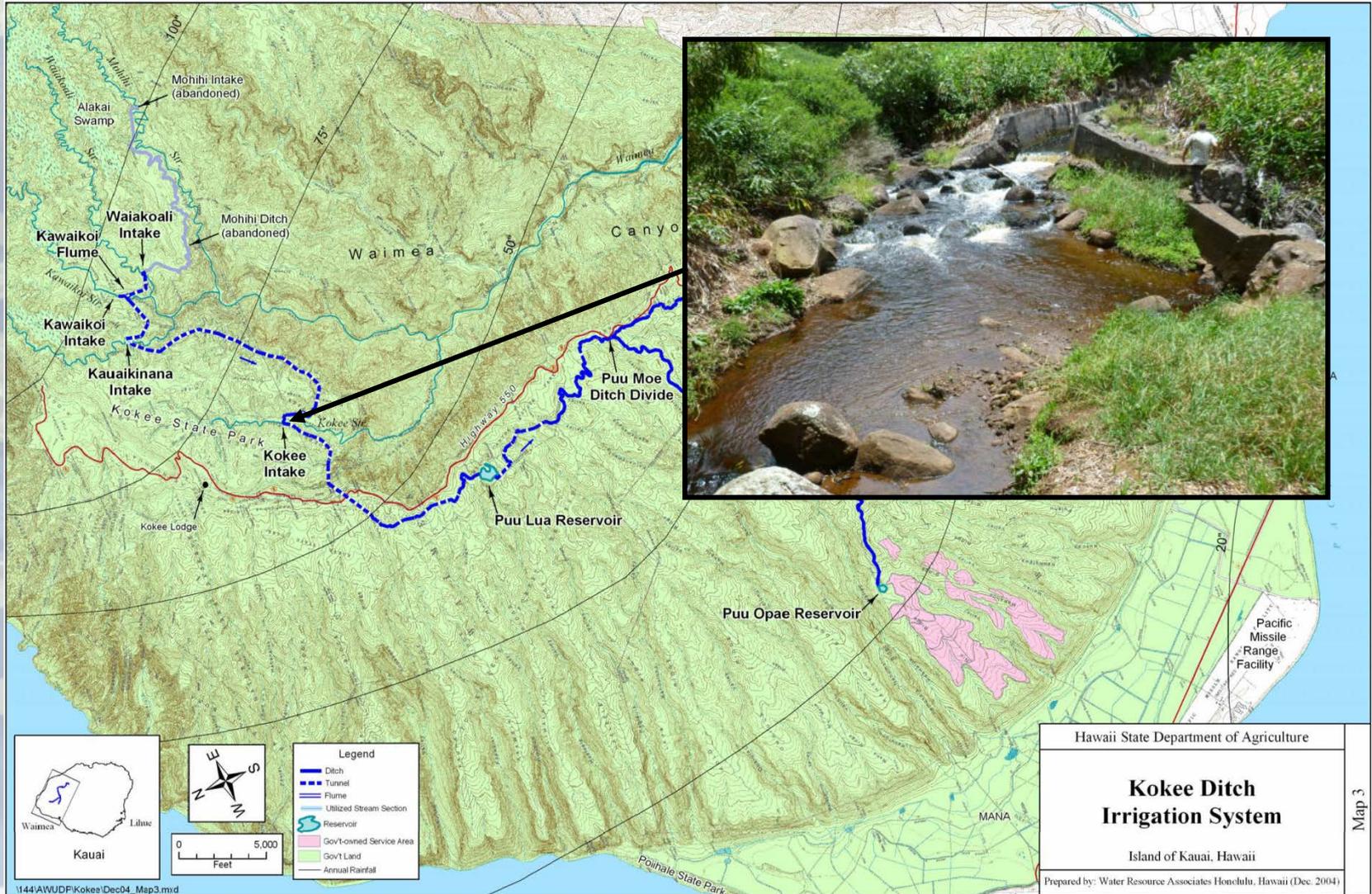


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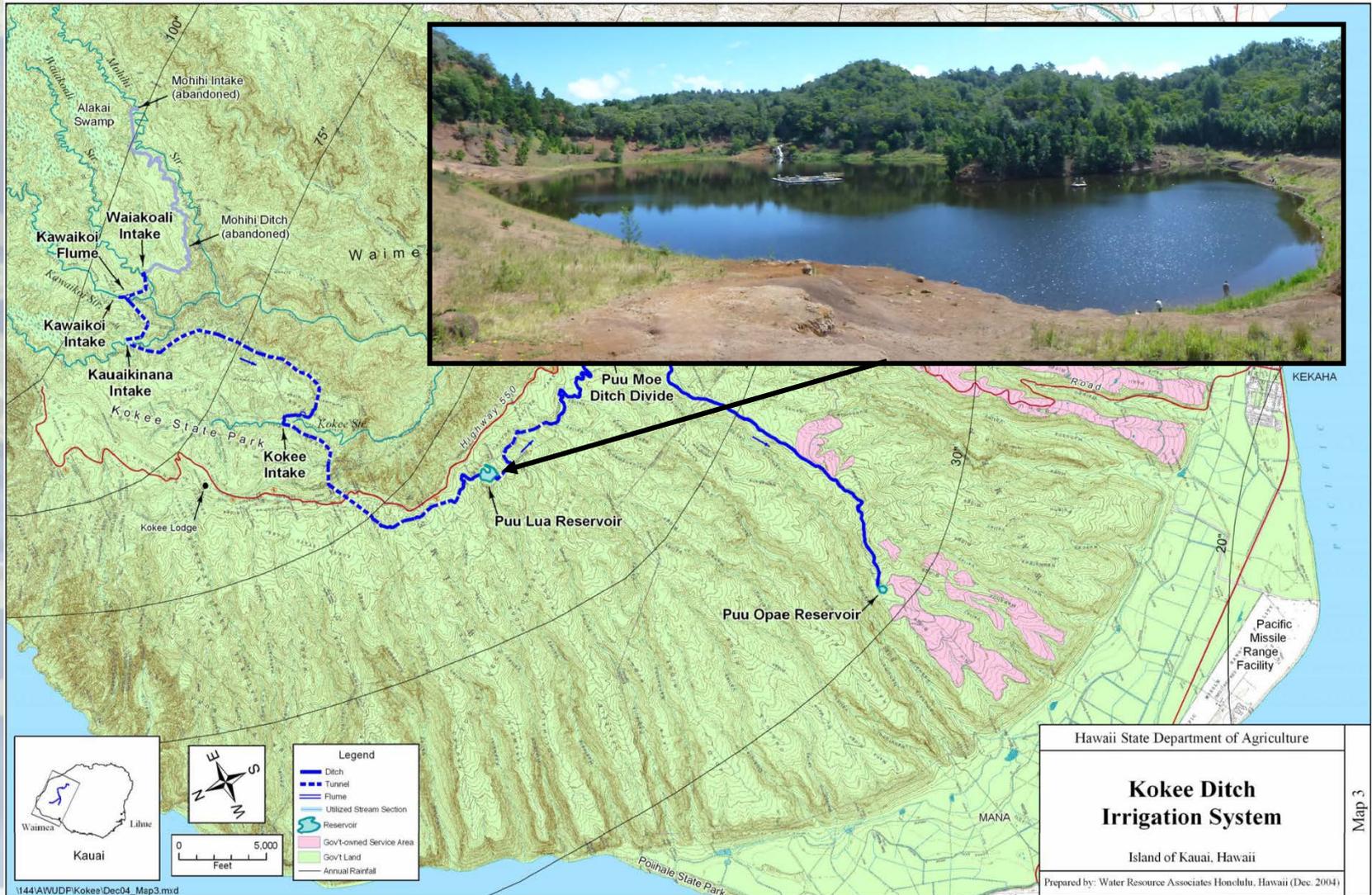
Kokee Ditch Irrigation System (KODIS)



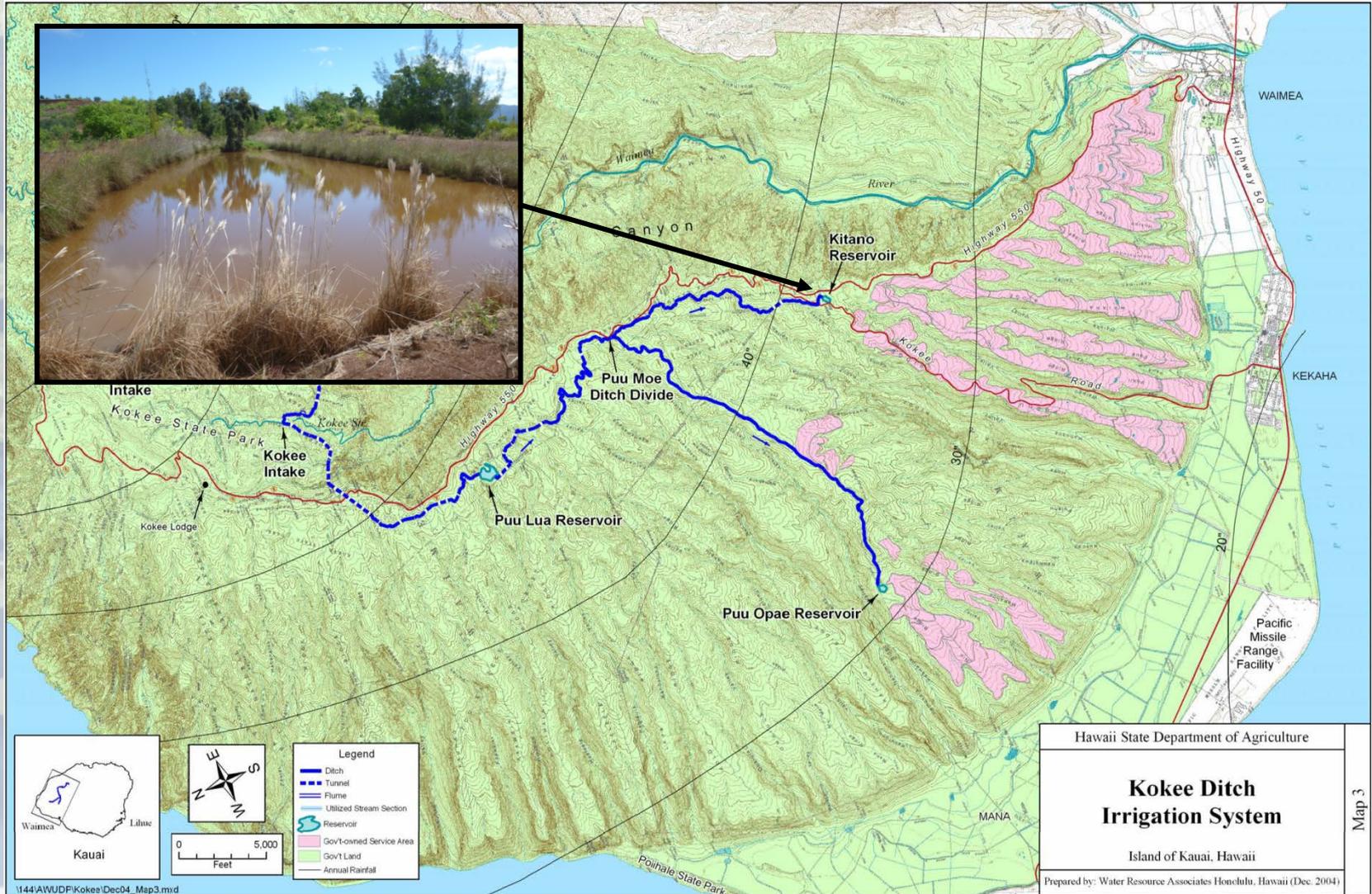
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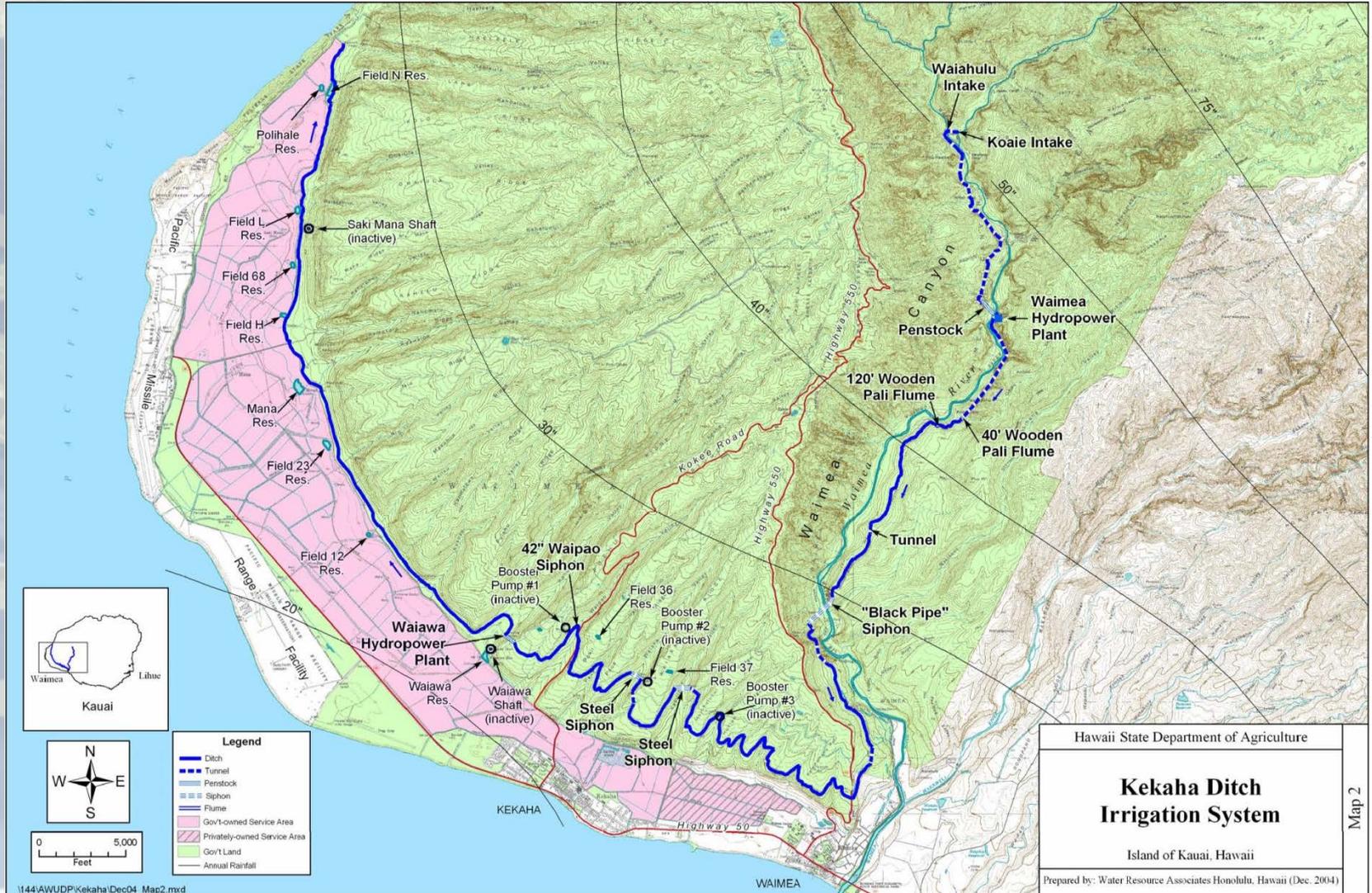
Kokee Ditch Irrigation System (KODIS)



Kokee Ditch Irrigation System (KODIS)



Kekaha Ditch Irrigation System (KEDIS)



Hawaii State Department of Agriculture

Kekaha Ditch Irrigation System

Island of Kauai, Hawaii

Prepared by: Water Resource Associates Honolulu, Hawaii (Dec. 2004)

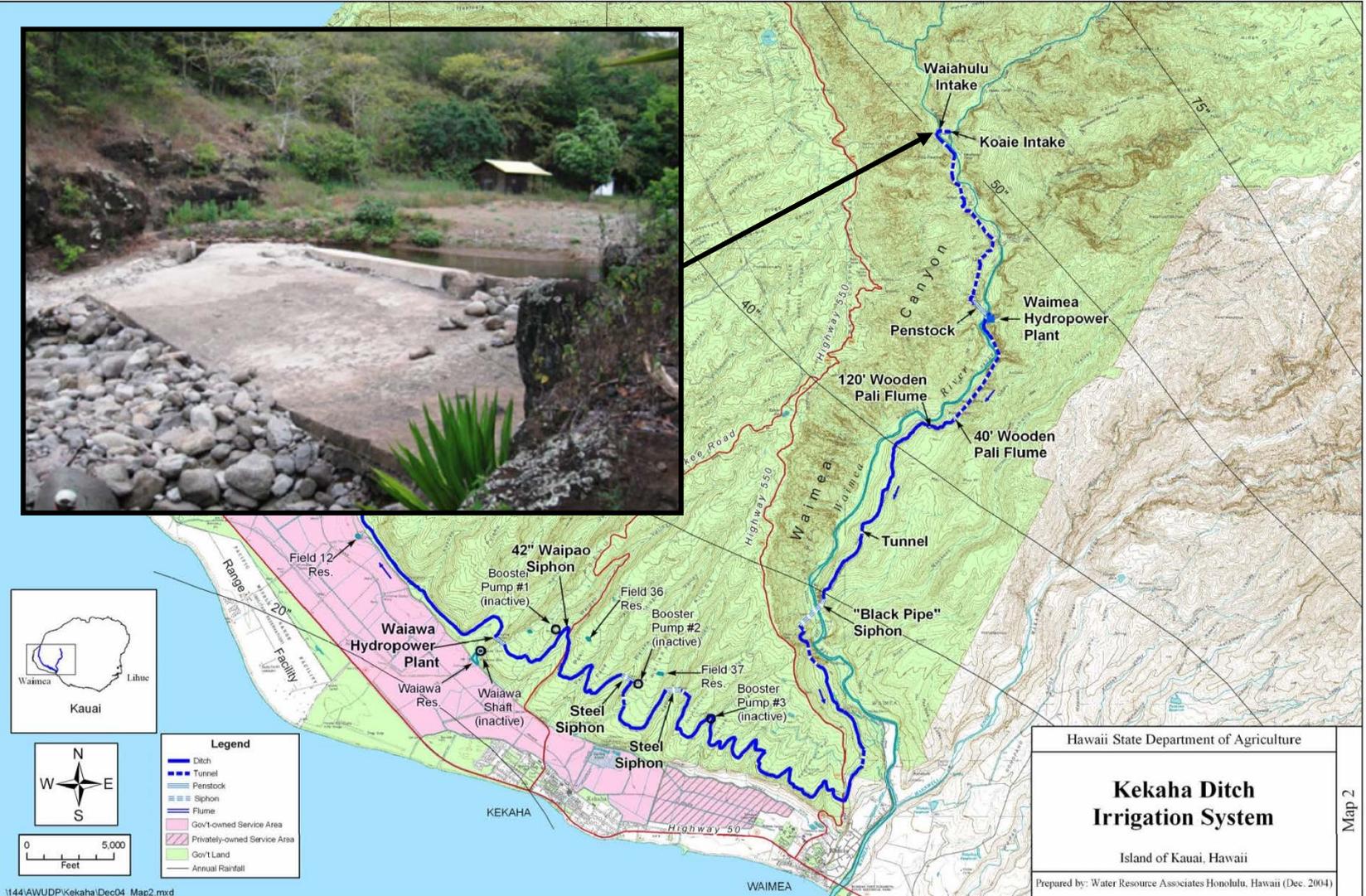


Kekaha Ditch Irrigation System (KEDIS)

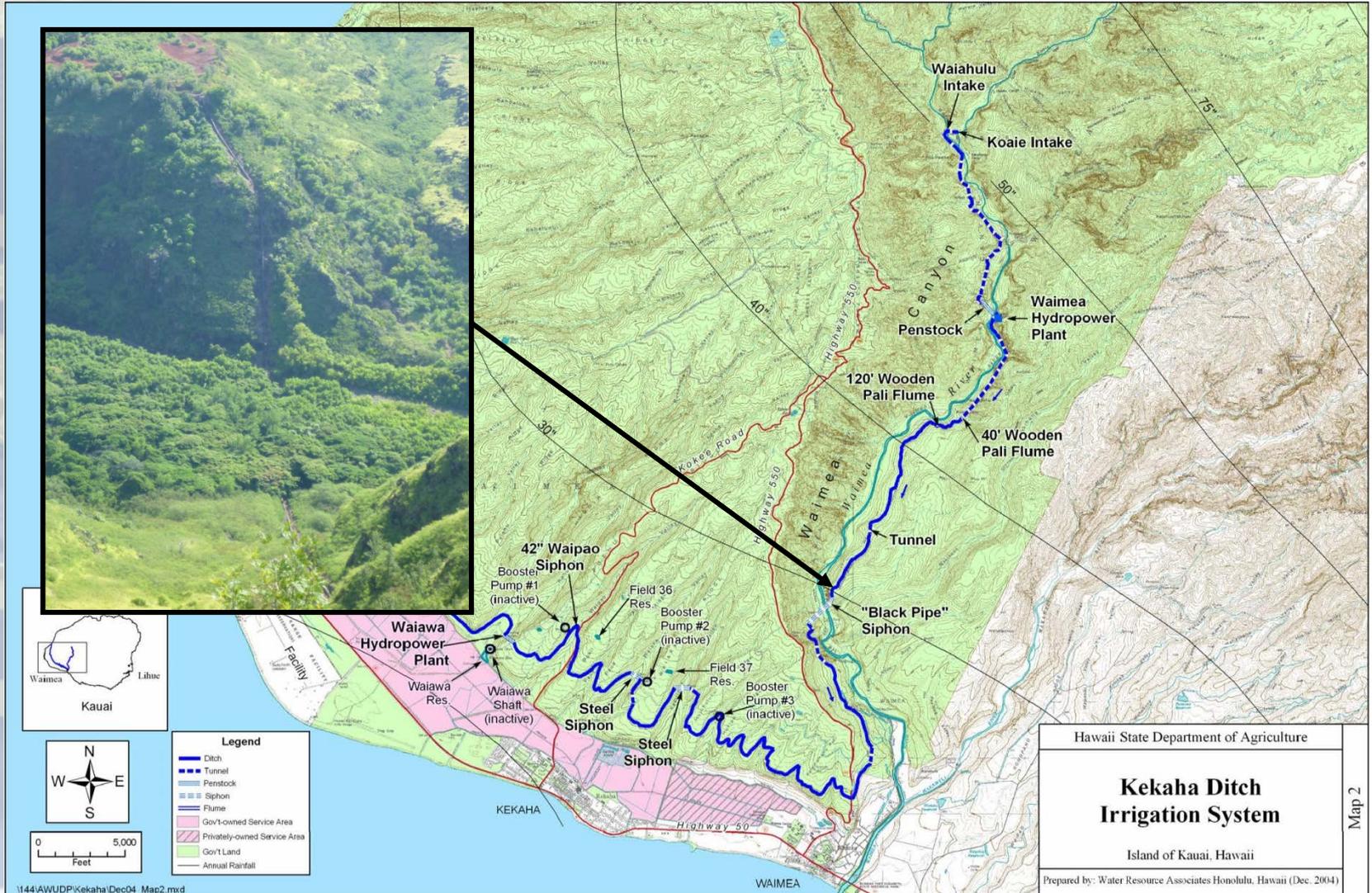
- **Ditch was started in 1906.**
- **Three (3) intakes:**
 - **Koai'e Intake (~850')**
 - **Waiahulu Intake (~850')**
 - **Mauka Powerhouse Intake (~550')**
- **20 miles of ditches, tunnels, flumes, and siphons**
- **System was later extended 8 miles to Polihale.**
- **Two (2) Hydropower Plants**
 - **Waimea Hydropower = 1,200 kW**
 - **Waiawa Hydropower = 550 kW**
- **Maximum capacity of 50 mgd (35 mgd in the 1920s)**
- **Owned by the State Agribusiness Development Corp.**
- **Operated by Kekaha Agriculture Association**



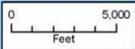
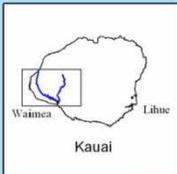
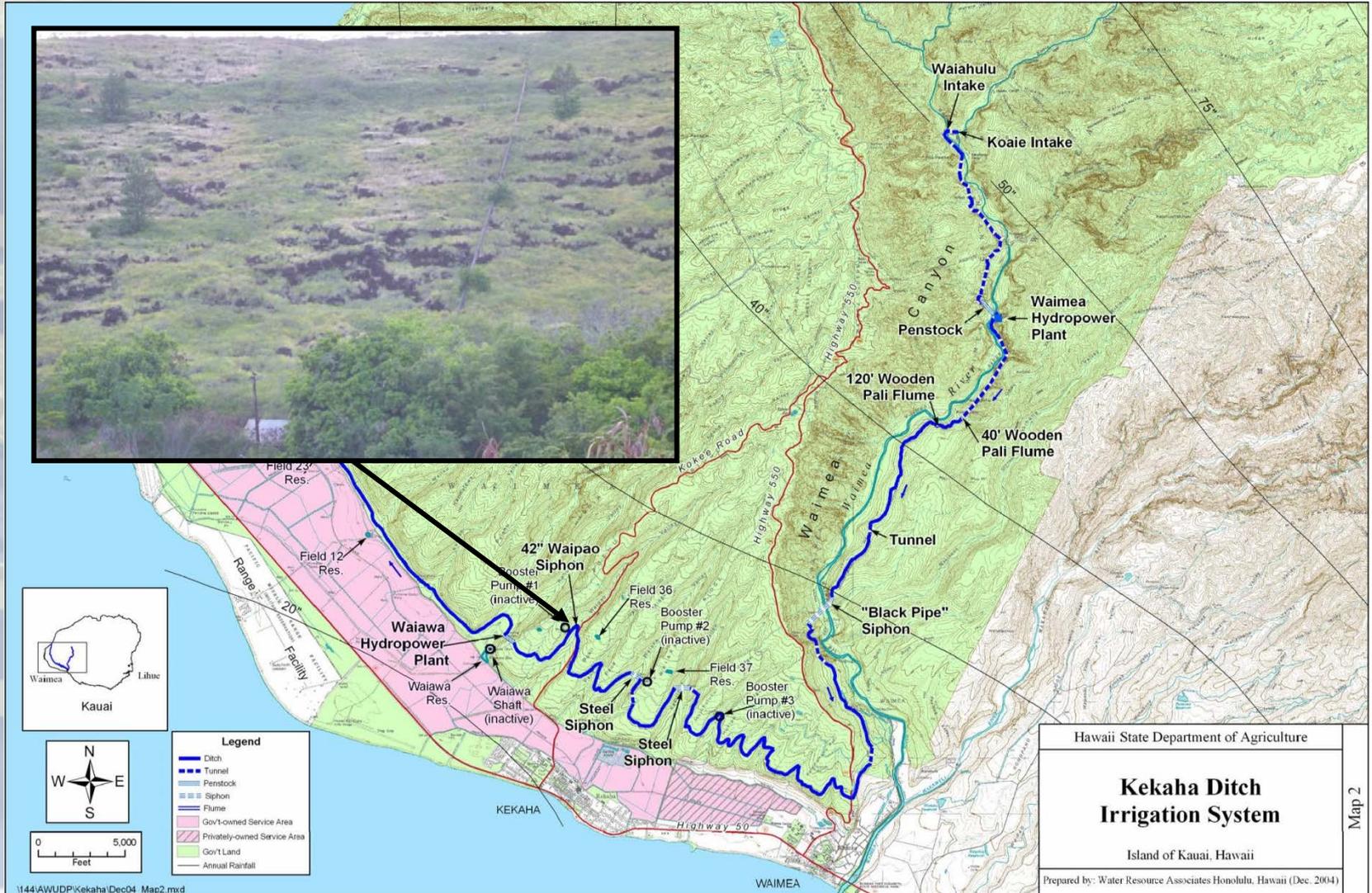
Kekaha Ditch Irrigation System (KEDIS)



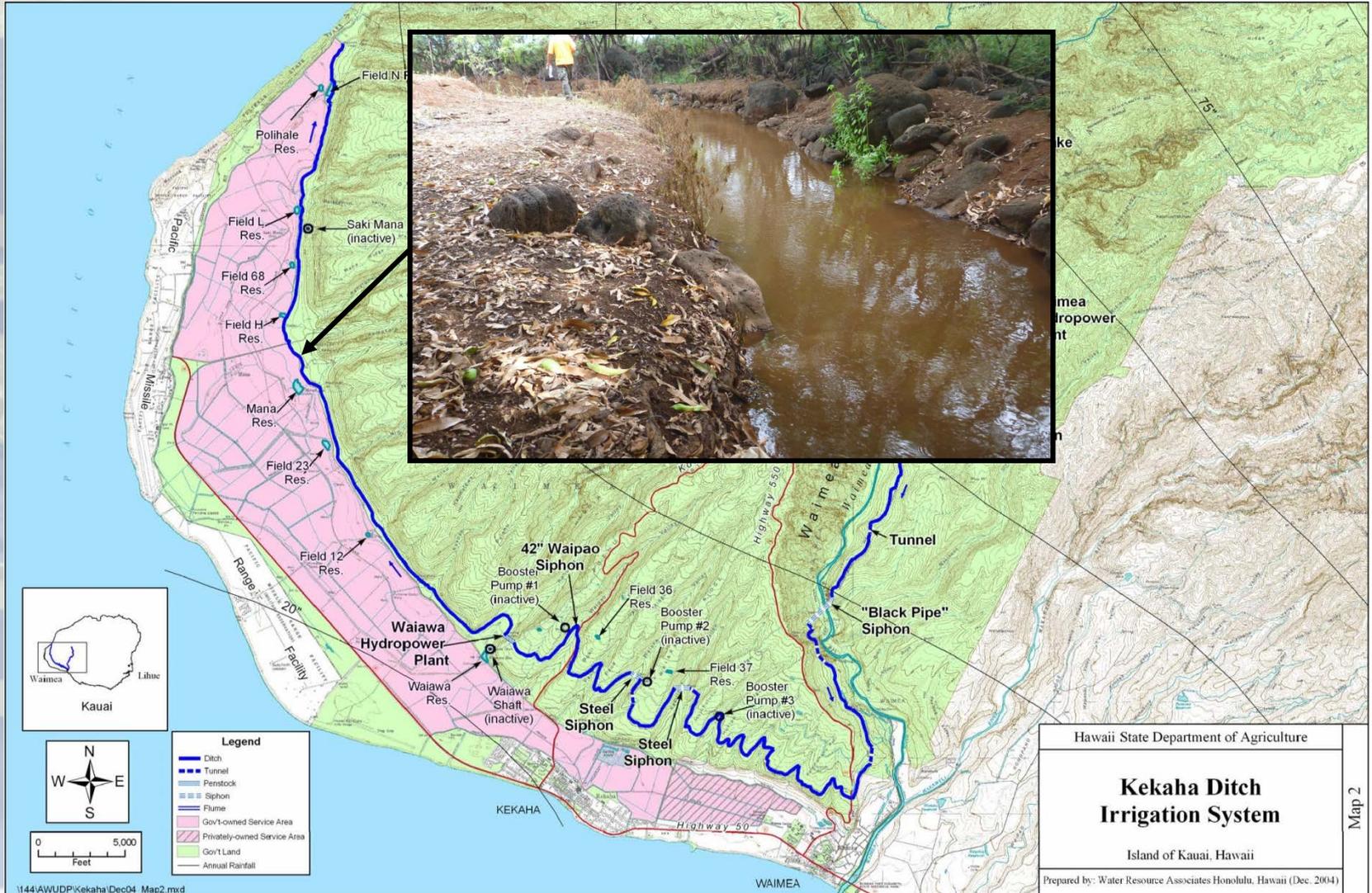
Kekaha Ditch Irrigation System (KEDIS)



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Kekaha Ditch Irrigation System (KEDIS)



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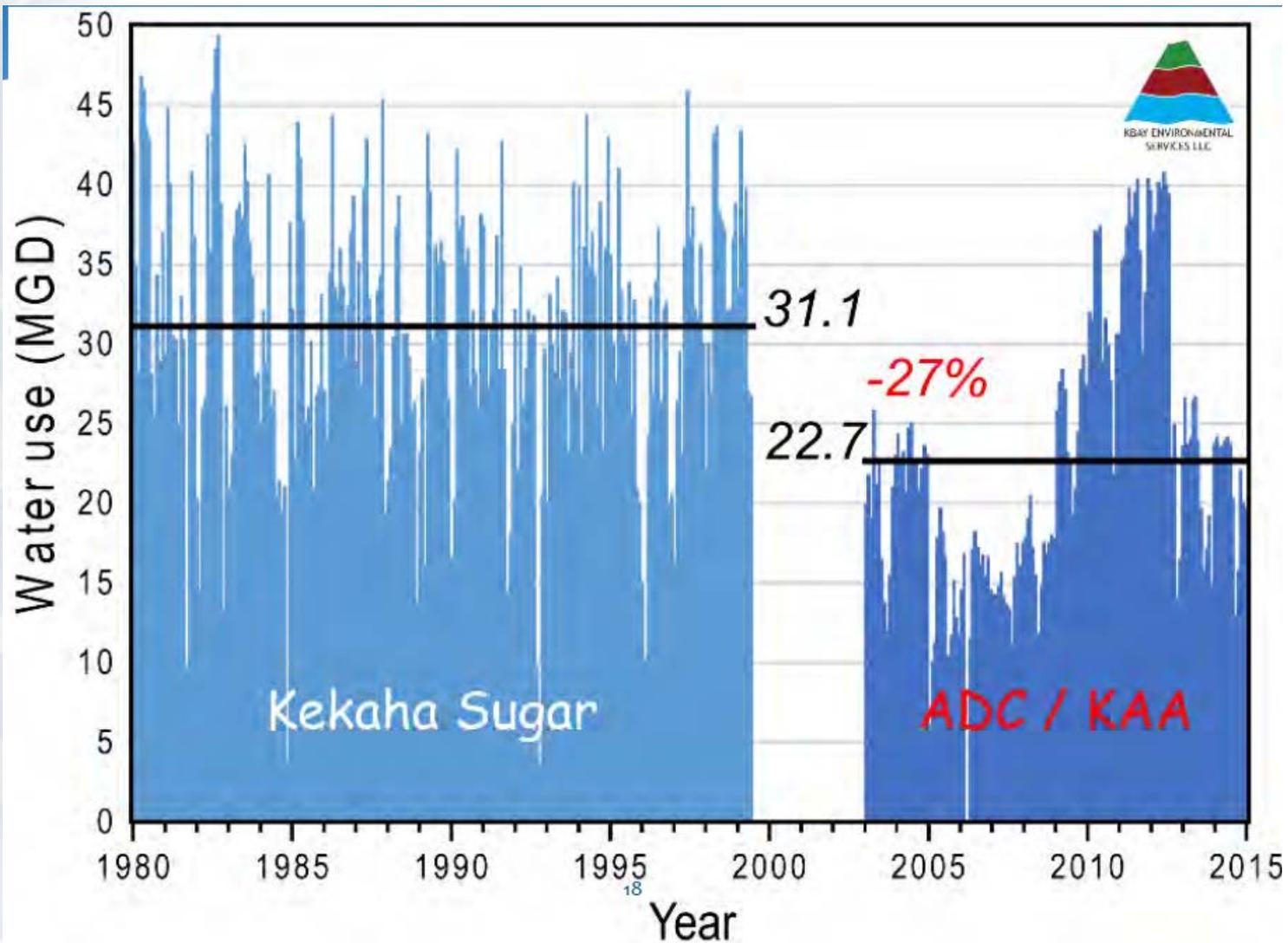
Kekaha/Kokee Ditch Irrigation Systems

Allegations of Waste

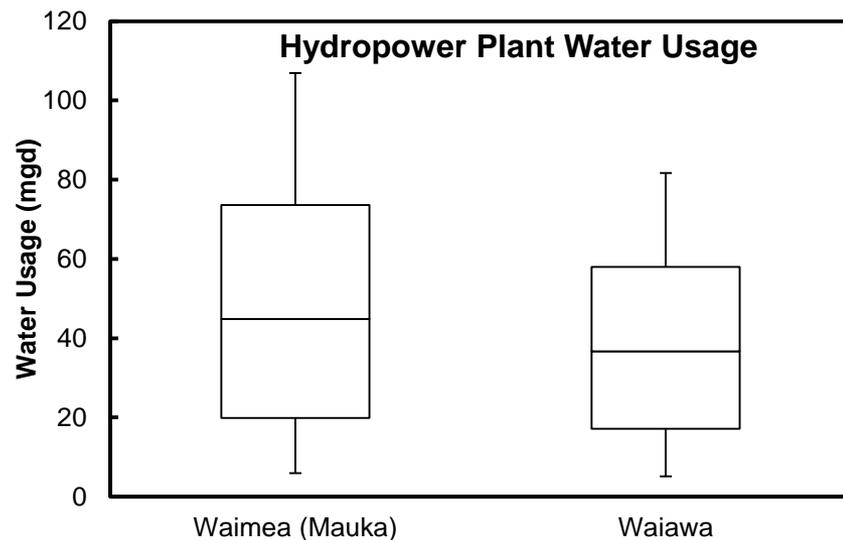
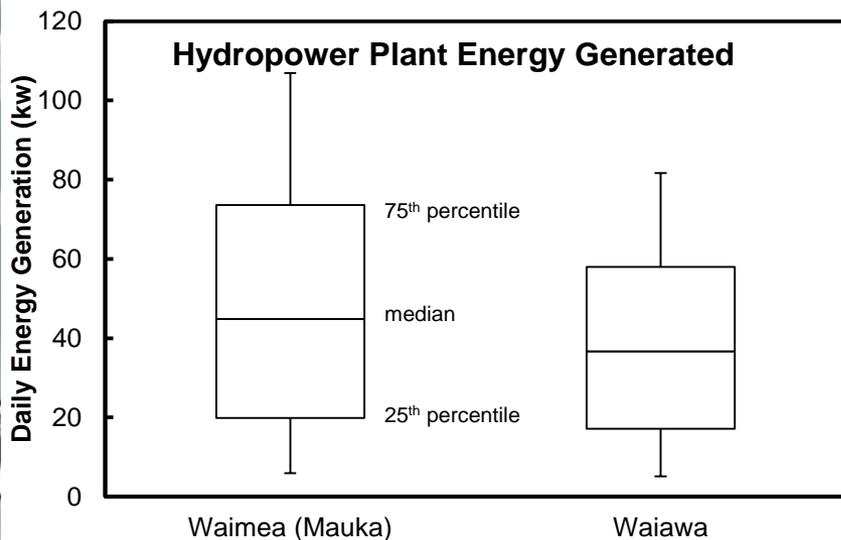
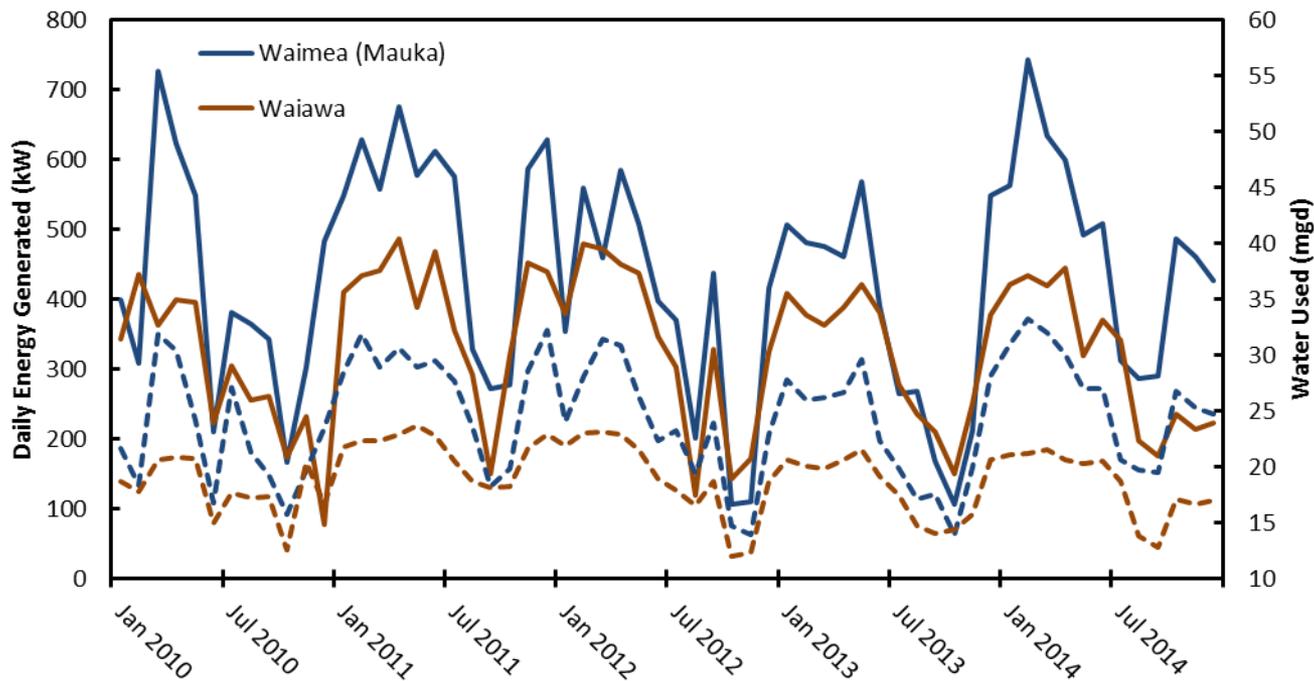
- **Kokee Ditch water runs down Kauhao Gulch before reaching Puu Lua Reservoir**
- **Water at the end of Kokee Ditch**
- **Portions of the Kekaha Ditch in the Kekaha-Mana Plain**



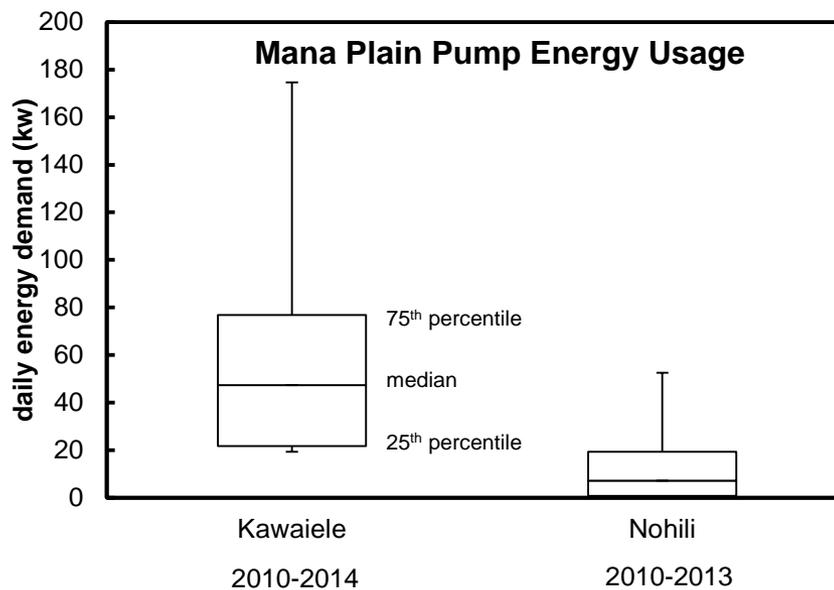
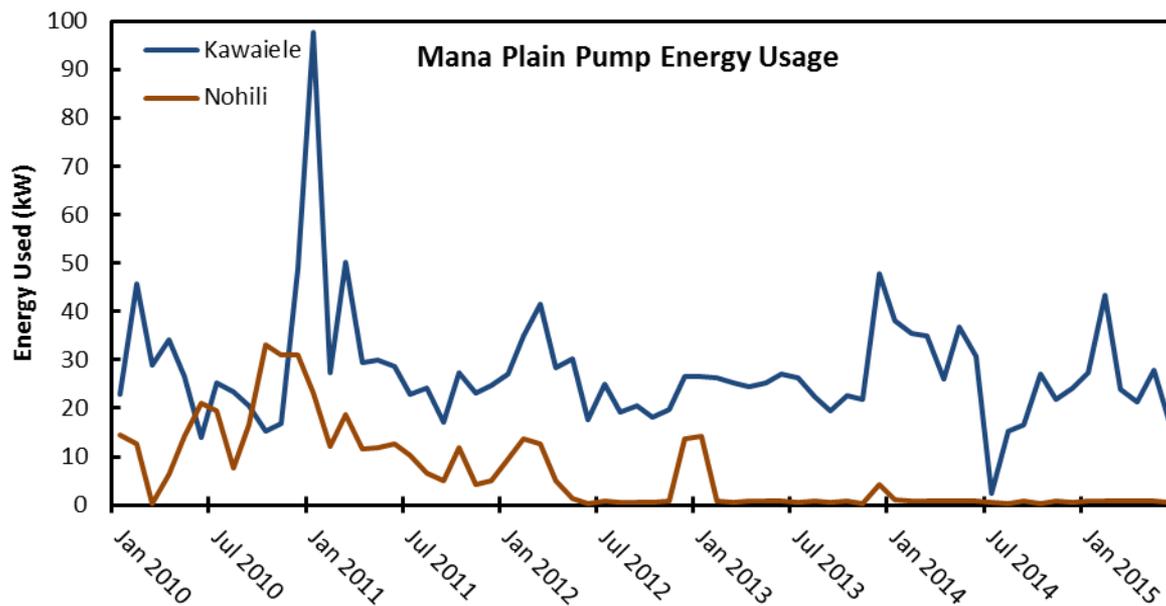
Kekaha diversion reduction



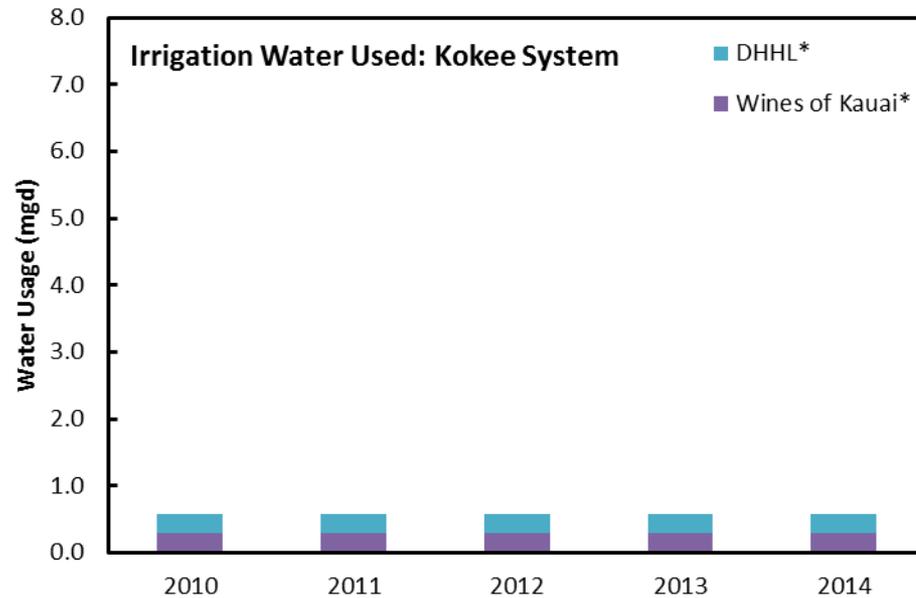
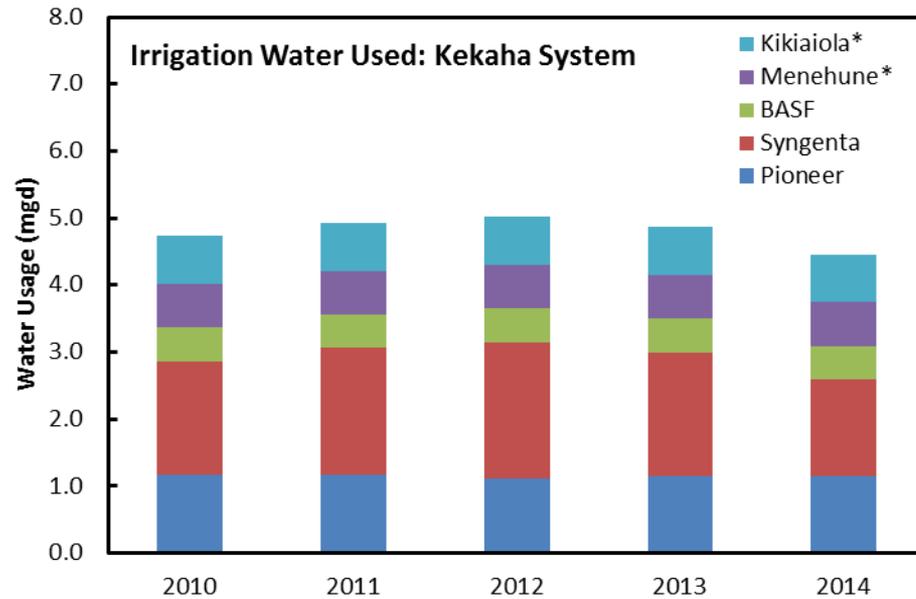
Summary from Request for Information



Summary from Request for Information



Summary from Request for Information



**estimated*



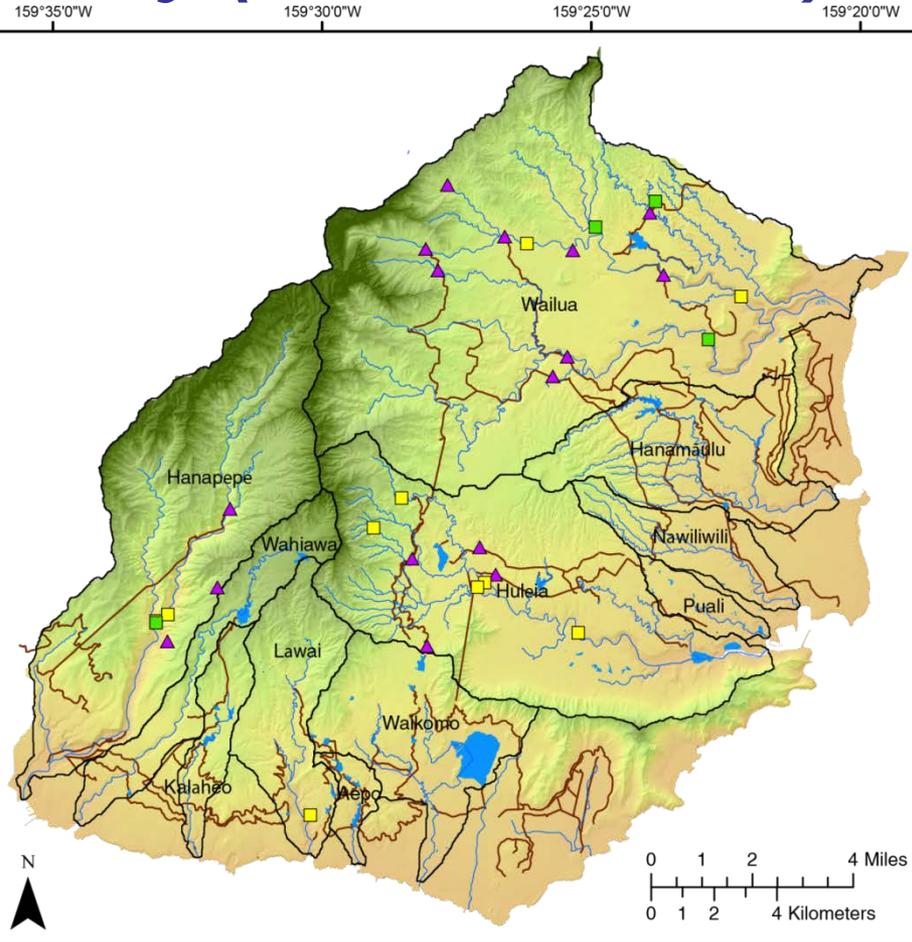
CWRM-USGS Research in Kauai

- **Southeast Kauai Natural Flow Conditions Study**
 - Establish partial record gaging stations to develop natural low-flow statistics for streams
 - Establish seepage-run monitoring stations to understand surface water-groundwater interactions
- **Statewide Low-Flow Characteristics Phase 2**
 - Field work to fill in gaps in low-flow records identified in Phase 1
 - Develop a GIS platform (streamstats) for low-flow characteristics



SE Kauai Low-Flow Study (USGS-CWRM)

Need: little information is currently available to understand natural flow conditions in SE Kauai



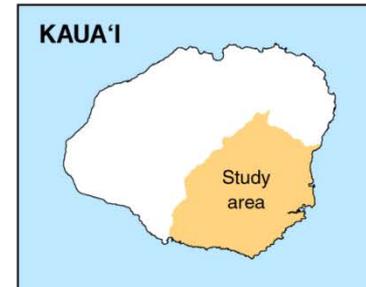
Station no.	Station name	Period of record	Years of record ¹	Flow
16047000	Koula River at Koula near Eleele	1910-1939	6	Regulated
16049000*	Hanapepe River below Manuahi Stream near Eleele	1917-2014	90	Regulated
16052500	Lawai Stream near Koloa	1963-1972	9	Regulated
16053000	Kamooloa Stream near Koloa	1939-1941	-	Natural
16053800	Kamooloa Stream near Puhi	1963-1970	5	Regulated
16054000	Kuia Stream near Koloa	1939-1941	-	Natural
16054500	Kuia Stream near Puhi	1963-1966	1	Regulated
16055000	Huleia Stream near Lihue	1912-1970	6	Regulated
16060000*	South Fork Wailua River near Lihue	1912-2014	97	Regulated
16063000	North Fork Wailua River at altitude 650 ft near Lihue	1914-1985	69	Regulated
16068000*	East Bank of North Fork Wailua River near Lihue	1912-2014	99	Natural
16071000	North Fork Wailua River near Kapaa	1952-2003	51	Regulated
16071500*	Left Branch Opaekaa Stream near Kapaa	1960-2014	54	Natural

EXPLANATION

- Drainage basins within study area
- Diversion systems

Selected USGS gaging stations

- Surface-water gage, active
- Surface-water gage, inactive
- Diversion intake, inactive



SE Kauai Low-Flow Study (USGS-CWRM)

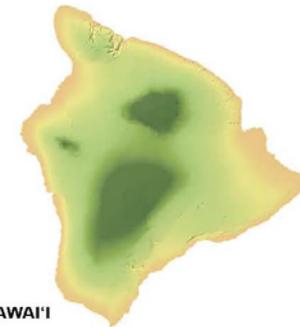
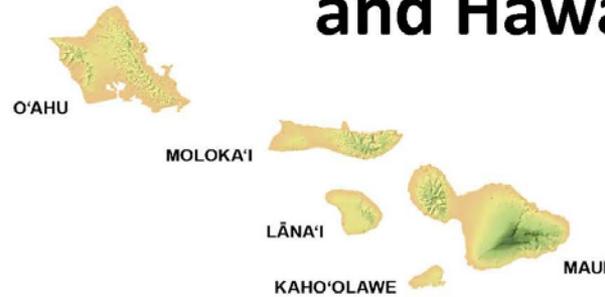
Timeline:

	2015			2016				2017				2018				2019	
	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr												
PHASE 1																	
Background research	█																
Reconnaissance		█															
Partial-record sites			█	█	█	█	█	█	█	█	█	█	█	█			
PHASE 2																	
Seepage runs				█	█	█	█	█	█	█	█	█	█	█			
Data analysis										█	█	█	█	█			
Report writing													█	█	█	█	█
Report review																█	█
Publication																	█





Low-Flow Characteristics for Streams on Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i



Phase 1 in cooperation with



U.S. Department of the Interior
U.S. Geological Survey

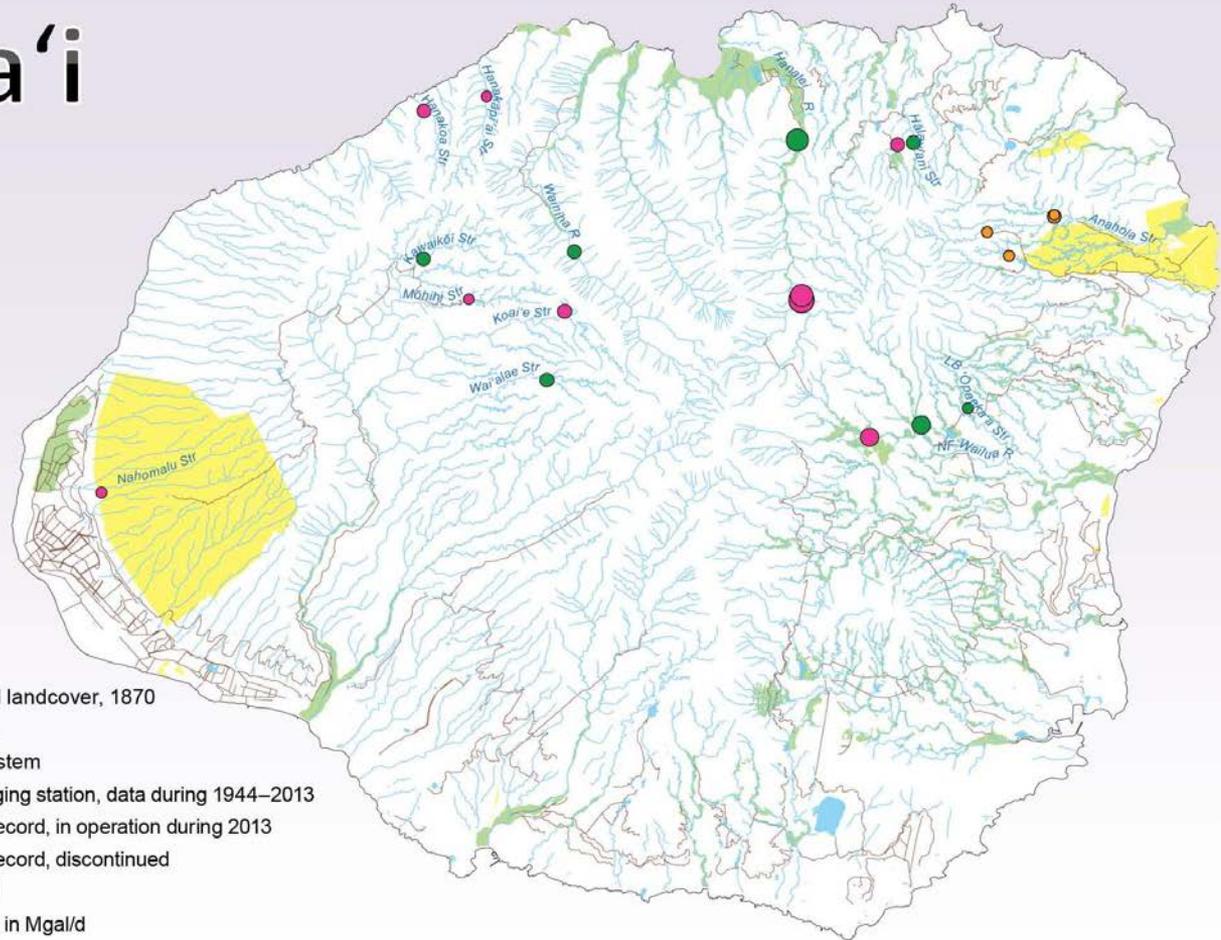
This information is preliminary or provisional and is subject to revision. It is being provided to meet the need for timely best science. The information has not received final approval by the U.S. Geological Survey (USGS) and is provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information.



Previous USGS studies



Kaua'i



EXPLANATION

- Taro/wetland landcover, 1870
- DHHL lands
- Diversion system

USGS streamflow-gaging station, data during 1944–2013

- Continuous record, in operation during 2013
- Continuous record, discontinued
- Partial record

Magnitude of Q_{50} flow, in Mgal/d

- 0
- 88



Preliminary Information—Subject to Revision. Not for Citation or Distribution



Scope of Phase 1

Compilation of available data

- > 6,000 streamflow measurements
- > 1,000 measurement sites

Quantify low flows ($Q_{50} - Q_{95}$)

Estimates of low-flow statistics at gaged sites

Identify data gaps

Identify and prioritize sites for data collection



Statewide study scope

PHASE 1

Provide estimates of natural low flows for streams with existing data at gaged sites

PHASE 2

Develop a tool to estimate natural low flows for streams at ungaged sites

StreamStats

StreamStats is a web-based GIS database that computes basin and streamflow characteristics.



Phase 1 deliverables

- USGS Scientific Investigations Report (in review)
- Low-flow estimates accessible in StreamStats

Station ID	Discharge, in ft ³ /s, for selected percentages of time (from 50 to 95) the indicated discharge was equaled or exceeded ^a					
	50	60	70	80	90	95
16010000	11	8.4	6.7	5.2	3.9	3.1
16017000	7.4	5.6	4.3	3.3	2.6	2.2
16063000 ^c	43	38	34	29	25	22 ^b
16081500	0.71	0.63	0.54	0.47	0.39	0.34
16085500	3.8	3.1	2.5	2.0	1.6	1.3
16088500	2.2	2.0	1.7	1.5	1.3	1.2

^aFont color reflects statistical accuracy of the discharge estimate

blue indicates "Good";

black indicates "Satisfactory";

red indicates "Poor"

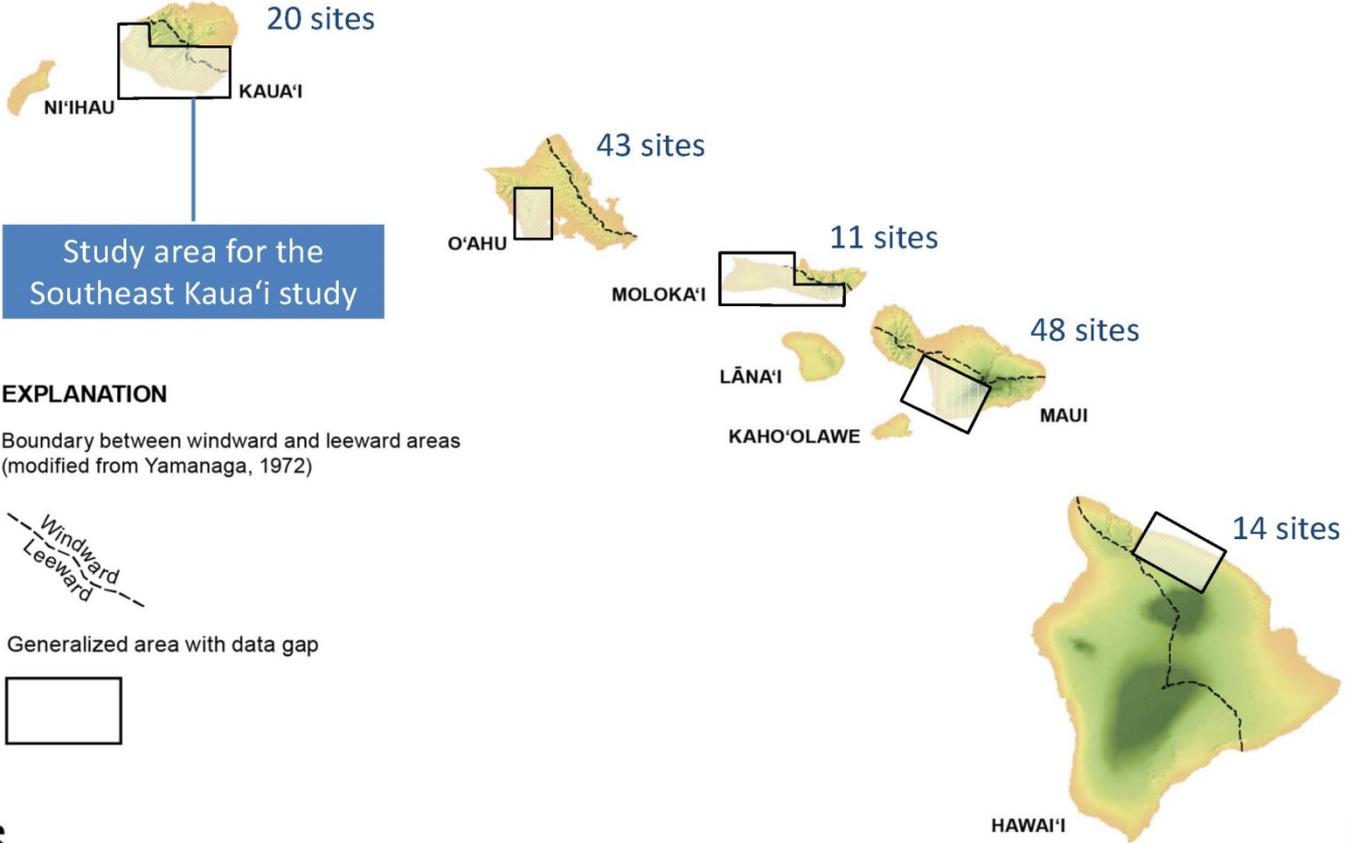
^bDischarge estimated using the graphical-correlation record-augmentation method is italicized

^cNatural-flow record based on combined concurrent records at stations 16061000, 16062000, 16063000, and 16100000



Summary of results

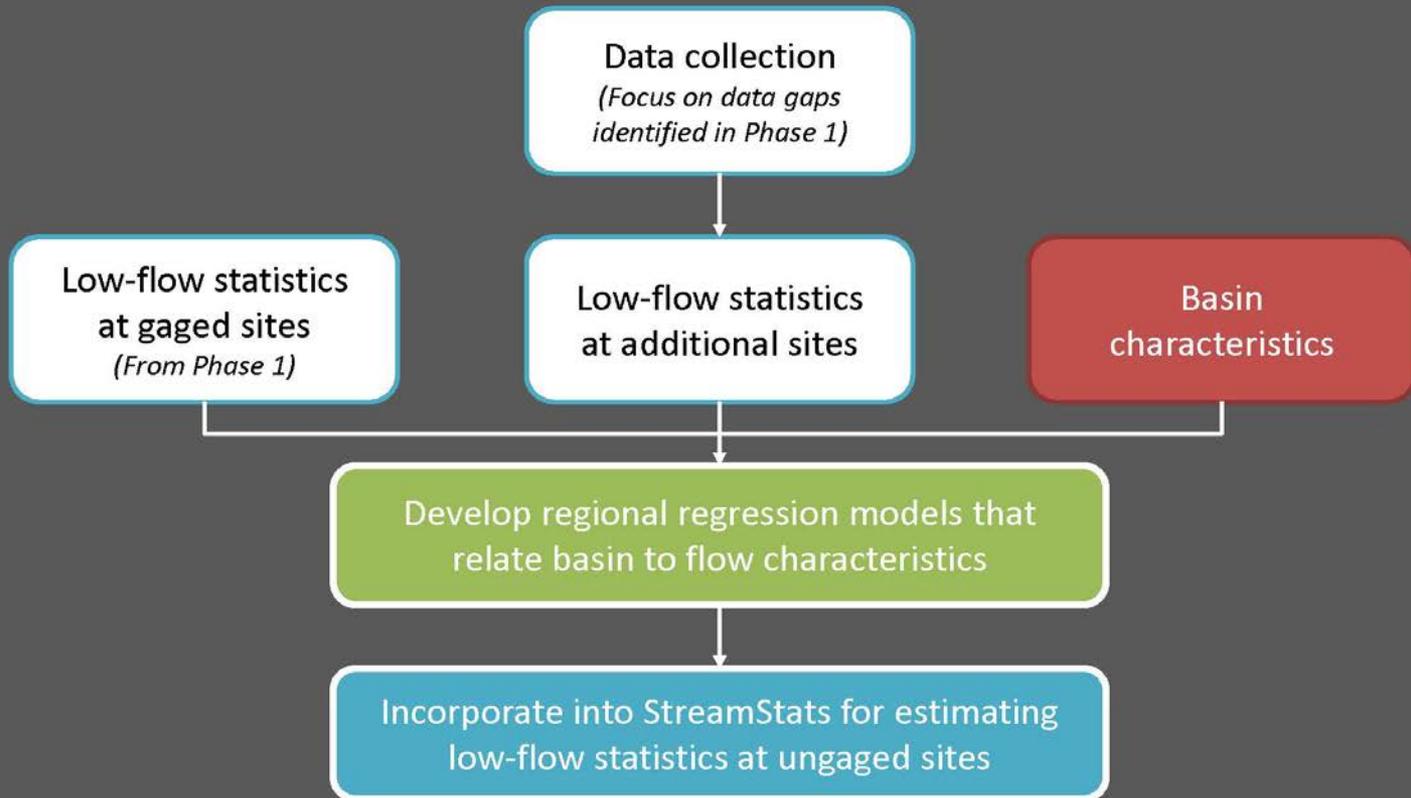
Number of sites with low-flow estimates



Preliminary Information—Subject to Revision. Not for Citation or Distribution



Scope of Phase 2



Why is Phase 2 needed?

Information on natural flows is important for managing water resources sustainably and for preserving the cultural values of the land

Low-flow characteristics can help determine flows for aquatic biota and cultural uses

StreamStats

Meets varying needs of different agencies by allowing users to estimate low flows at any point along the stream

Provides reproducible results - different users will arrive at the same estimates for a selected stream location

Information on natural flows can help with appurtenant water-rights decisions

Study is less costly than to continuously gage all streams statewide



Funding status of statewide study

Budget and timeline

	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Phase 1		Funded at \$350,000						
Phase 2				Preliminary budget \$2,000,000				

Phase 2: USGS cost share \$600,000 (30%), partners \$1,400,000 (70%)

Phase 2 potential partners:

- Commission on Water Resource Management
- Office of Hawaiian Affairs

Phase 2 additional partners:

- Department of Hawaiian Home Lands
- Department of Health
- Department of Agriculture
- DLNR, Division of Forestry and Wildlife
- DLNR, Land Division
- County Water Departments
- County Planning Departments
- U.S. Army Corps of Engineers
- Private entities



Search this site

Online Resources for Private Well Owners

WELL CONSTRUCTION & PUMP INSTALLATION STANDARDS
Read More

- Commission Meetings
- Applications & Forms
- Hawaii Water Plan
- Contact Us

WEBSITE UPDATES

As of July 24, 2015

- Second Commission Meeting Scheduled for Tuesday, August 11 on Oahu, DLNR Board Room
- May 20, 2015 Commission Meeting Minutes
- Public Notice: Application for Water Use Permit, Mokuleia Ground Water Management Area, Oahu. WUPA No. 01002
- July Water Resource Bulletin
- Meet Commission Member William D. Balfour, Jr.
- August Commission Meeting rescheduled to 8/17/2015
- New: Surface Water Monitoring Page

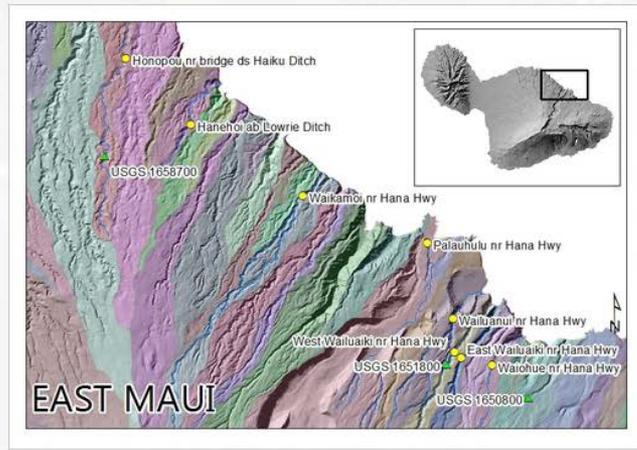




Search this site

Home » Surface Water » Monitoring

MONITORING



East Maui Gage Sites

Honopu nr bridge ds Haiku Ditch					
2011	2012	2013	2014		
Palauhulu nr Hana Highway					
2011	2012	2013	2014	2015	

SURFACE WATER INDEX

- Surface Water
- Surface Water Activities
- Hydrologic Units
- Instream Flow Standards
 - East Maui
 - Na Wai Eha, Maui
 - Petition to Amend IIFS West Kauai and Complaint Against Waste
- Permit Application Review
- Regulations & Permits
- Water Management Areas
 - Na Wai Eha, Maui
 - CCH-MA13-02
 - Na Wai Eha Surface Water Use Permits
- Monitoring
- Water Use Reporting





Questions?
ayronmstrauch@hawaii.gov

Index-streamgage approach

INDEX GAGE

Long-term continuous-record station, in operation 1984-2013

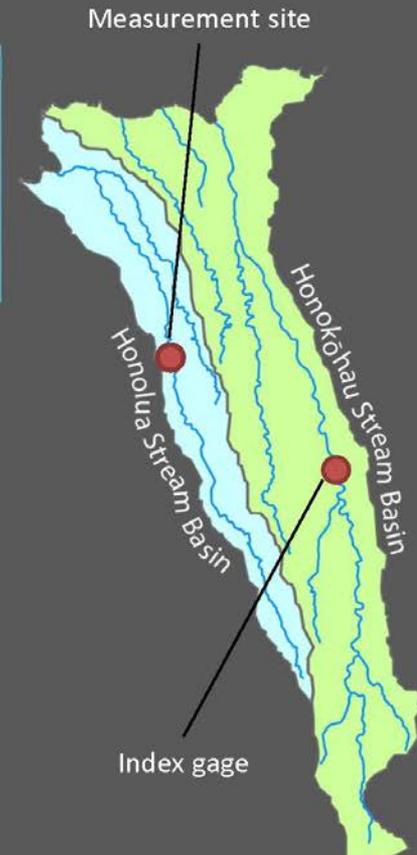
MEASUREMENT SITE

Continuous-record / partial-record station

STATISTICAL / GRAPHICAL MODEL

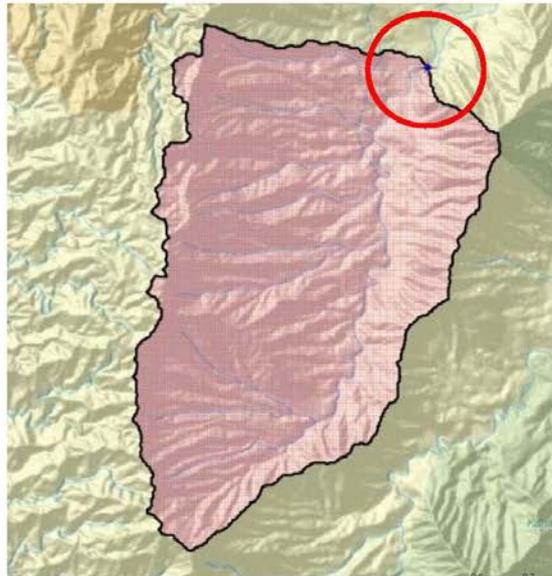
Developed from correlation between concurrent data at index gage and measurement site.

Model used to estimate low-flow statistics at measurement site.



Phase 2 deliverables

- USGS Scientific Investigations Report
- A new tool within StreamStats will be developed for estimating natural low-flow characteristics at ungaged sites



Streamstats Ungaged Site Report

Date: Mon Jan 28 2013 11:10:01 Mountain Standard Time
 Site Location: Hawaii
 OLD HAWAIIAN DATUM Latitude: 21.5688 (21 34 08)
 OLD HAWAIIAN DATUM Longitude: -157.8974 (-157 53 51)
 NAD83 Latitude: 21.5656 (21 33 56)
 NAD83 Longitude: -157.8946 (-157 53 41)
 Drainage Area: 4.3 mi²
 Percent Urban: 3.28 %
 Percent Impervious: 0.35 %

Peak-Flows Basin Characteristics

100% Peak Region 4 2D10 5035 Oahu windward (4.3 mi²)

Parameter	Value	Regression Equation Valid Range	
		Min	Max
Drainage Area (square miles)	4.3	0.04	5.44

Peak-Flows Streamflow Statistics

Statistic	Flow (ft ³ /s)	Prediction Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
				Minimum	Maximum
PK2	1750	63			
PK5	3300	51			
PK10	4560	47			
PK25	6350	46			
PK50	7830	46			
PK100	9370	48			
PK500	13400	54			

Trends in Rainfall in Waimea

