STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

STAFF SUBMITTAL

for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

December 16, 2015
Honolulu, Hawaii

Delegation of Authority to the Chairperson to Hire a Mediator for the Complaint and Petition for Declaratory Order Against Waste Filed By Po'ai Wai Ola and West Kaua'i Watershed Alliance (through Earthjustice), Waimea, Kaua'i, Hawai'i

SUMMARY OF REQUEST:

Staff requests that the Commission on Water Resource Management (Commission) delegate authority to the Chairperson to hire a Mediator, should one be needed, to address the Complaint and Petition for Declaratory Order Against Waste (Waste Complaint) filed by Po'ai Wai Ola and West Kaua'i Watershed Alliance (through Earthjustice). Staff also requests that the Commission find the expenditure of state funds for this mediation effort is exempted from Hawaii Revised Statutes §343 for preparing an Environmental Assessment (EA).

BACKGROUND:

On July 24, 2013, Po'ai Wai Ola and West Kaua'i Watershed Alliance, through their attorneys Earthjustice, filed 1) a Complaint for Dispute Resolution; 2) a Petition to Amend Interim Instream flow Standard; and 3) a Complaint and Petition for Declaratory Order Against Waste in the Waimea River and its tributaries, Waimea, Hawai'i (Complaint & Petition).

On May 27, 2014, the Commission entered into a Contract for Professional Services with Element Environmental, LLC to: 1) Provide project management services including coordination and meetings; 2) Conduct a literature search compiling the physical characteristics and historic records for the Kōke'e and Kekaha Ditch Irrigations Systems; 3) Conduct a physical condition survey of the existing irrigation infrastructure; 4) Prepare a water budget analysis including flow measurements, and estimations of seepage loss and water storage capacity; and 5) Prepare a report of findings to the Commission.

On November 25, 2014, the Commission staff, serving as intermediary, forwarded a fully executed copy of a right-of-entry agreement for Element Environmental, LLC, on behalf of the Commission, to conduct an assessment and investigation of the Kōke'e and Kekaha Ditch Irrigation Systems.

Approved by Commission on
Water Resource Management
at the meeting held on
12/16/2015

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On February 18, 2015, Steve Spengler of Element Environmental, LLC provided a project update to the Commission including an overview of the physical conditions of the Kōke'e and Kekaha Ditch Irrigation Systems and preliminary findings of ditch flow measurements.

On April 28, 2015, the Commission voted to conduct a limited site visit to view aspects of the Kōke'e and Kekaha ditch irrigation system. Sites visited on this trip included views of the augmented flow in the Kōke'e Stream, Pu'u Lua Reservoir, the Pu'u Moe ditch divide, the end of the Kōke'e ditch outflow and two views of the Kekaha Ditch. Public testimony was received at the beginning and end of the day, but not at each site location.

On May 11, 2015, the Commission sent a Request for Information Regarding and Related to Water Use and Request for Assistance with Monitoring Efforts to James Nakatani, Executive Director for the Agribusiness Development Corporation (ADC), and Landis Ignacio, Director for the Kekaha Agriculture Association (KAA) (Exhibit 1). In addition to the request for information and assistance, the Commission asked if ADC and KAA were willing to participate in mediation for this matter, as provided for under Hawaii Revised Statutes (HRS) §174C-11 and Hawaii Administrative Rules (HAR) §13-167-23(d).

On June 3, 2015, the Commission received a letter from Deputy Attorney General Myra Kaichi, representing ADC, stating that ADC is willing to participate in mediation (Exhibit 2).

On June 5, 2015, the Commission received an email (with letter attached) from Douglas Codiga, of Schlack Ito LLC representing KAA, stating that KAA is willing to participate in mediation for this matter (Exhibit 3).

On June 23, 2015, the Commission received a letter from County Attorney Mauna Kea Trask, representing the County of Kaua'i, that, "although the County is not requesting to be admitted as a party to this proceeding at this time, the County does reserve the right to be admitted as a party in the future upon its request as further provided for in HRS §174C-11(c)" (Exhibit 4).

Earthjustice, Kaua'i Island Utility Cooperative (KIUC), and Department of Hawaiian Home Lands (DHHL), through informal discussions with Commission staff, have also expressed an interest in mediation. However, the Commission staff and those named in the Petition, also recognize that mediation efforts may be contingent upon the information received from ADC and KAA, as requested in the Commission's letter dated May 11, 2015. Information is expected to be submitted on July 13, 2015 (July 11, 2015 is a Saturday) or sooner.

On August 11, 2015, the Commission discussed an approach to mediation in this matter. Following the discussion, Chair Case suggested that no action be taken on the agenda item (Item C8), but rather that the Commission asks the parties to move forward in a meaningful discussion and report back on its progress.

On September 14 and October 6, 2015, Commission staff met with Earthjustice, ADC KAA, DHHL, and KIUC, to begin discussions on mediation and identify specific issues to be addressed.

On September 24, 2015, the Commission sent a memo to DHHL requesting additional information on all current water users on DHHL lands that receive water from the Kokee Ditch System and a list of future water use demand projections (Exhibit 5).

On September 30, 2015, the Commission sent a letter to ADC and KAA requesting additional information on: 1) Estimates of water use by Sunrise Capital, Inc. other licensees receiving water from KAA; 2) Water use data not submitted by Pioneer Hi-Bred for calendar years 2013 and 2014; and 3) Amount of electricity produced by KAA which is subsequently used by KAA and/or sold to KIUC (Exhibit 6).

On October 20 and 21, 2015, the Commission conducted a Limited Meeting of various sites in West Kaua'i to view portions of the Kōke'e and Kekaha Ditch Irrigation Systems, including stream diversions, transfer ditches, hydroelectric power plants, water end-users, and associated infrastructure.

On October 28, 2015, the Commission received a response from KAA to the September 30 request for information (Exhibit 7).

On November 6 and December 4, 2015, Commission staff hosted a working group meeting of hydrologists representing Earthjustice, KAA, and KIUC. The objective of the meeting was to seek agreement on the estimation of natural streamflow rates and the availability of water upstream of existing diversions. This information would serve as a baseline, or starting point, for further discussions as part of mediation.

On November 26, 2015, the Commission received a response from DHHL to the September 24, 2015 request for information (Exhibit 8). Concurrently, on November 27, 2015, through the Chair's Office, the Commission received from DHHL a Petition for Reservation of Surface Water of 33.145 Million Gallons Per Day originating from the watershed of, ad tributary to, the Waimea River and diverted by the Kōke'e and Kekaha Ditch Systems (including water originating in Waiakoali, Kawaikōi, Kauaikinana, and Kōke'e Streams and other tributaries of the Waimea River) for use in the Waimea, Kaua'i Hawaiian Home Lands (Exhibit 9).

ANALYSIS/ISSUES:

The Commission staff, through information from its contracted investigator, several site visits and meetings with those named in the Petition, believe that mediation is a viable option to help address both the Waste Complaint and Petition. There are a multitude of complex and interrelated issues between the Kekaha and Kōke'e Ditch Irrigation Systems, the Mānā Plain, and the towns of Waimea and Kekaha. Those named in the Petition include Earthjustice, ADC, KAA, and Department of Hawaiian Home Lands.

HRS §174C-10 provides for dispute resolution as follows:

> **§174C-10 Dispute resolution.** The commission shall have jurisdiction statewide to hear any dispute regarding water resource protection, water permits, or constitutionally protected water interests, or where there is insufficient water to meet competing needs for water, whether or not the area involved has been

> designated as a water management area under this chapter. The final decision on any matter shall be made by the commission.

HRS §174C-11(e) provides that, "In order to facilitate dispute resolution, the commission may employ mediation methods where practicable including the use of masters."

HAR §13-167-23(d) provides for dispute resolution as follows:

> **§13-167-23 Dispute resolution.** (a) The commission shall have jurisdiction statewide to hear any dispute regarding water resource protection, water permits, or constitutionally or otherwise legally protected water interests, or where there is insufficient water to meet competing needs for water, whether or not the area involved has been designated as a water management area under this title. The final decision on any matter shall be made by the commission.
>
> (b) Pursuant to its authority to resolve disputes regarding water, the commission may accept for consideration and decision:
>
> (1) cases or controversies referred to it by a court; or
>
> (2) questions certified to it by a court.
>
> (c) To resolve disputes properly before it, the commission shall have all the powers necessary and proper to effectuate its decisions and orders and grant relief consistent with law.
>
> (d) In order to facilitate dispute resolutions, the commission may employ the use of special hearing officers or special masters for the purposes of mediation, fact finding, and/or arbitration.

The Commission staff holds that, due to the complex nature and interrelatedness of the Kekaha and Kōke'e Ditch Irrigation Systems with the local community and surrounding regions, mediation is a viable option to seeking both short-term solutions to complaints of alleged waste and long-term solutions to balancing instream needs and non-instream uses.

By letter, ADC (Exhibit 2) and KAA (Exhibit 3) have expressed a willingness to participate in mediation. Subsequent meetings with Earthjustice, ADC, KAA, DHHL, and KIUC, on September 14 and October 6, 2015, further helped to identify specific issues and data needs. Commission staff, along with representatives from Earthjustice, KAA, and KIUC, have begun to the lay the hydrologic groundwork for mediation efforts.

FUNDING

Funding for the mediator is estimated not to exceed $40,000 based on the recent $13,000 expenditure for the Nā Wai 'Ehā mediation effort. For Na Wai Eha, much of the information and issues had been determined by the time of mediation as well as a Commission decision and subsequent remand by the Supreme Court. Since much of the information is still to be determined in this Petition and Waste Complaint then staff is estimating a larger funding requirement.

The funds for a mediator are available from the Commission's FY 2016 Budget, LNR 404, Water Resources Program and will come from the Commission's general fund, special fund, or a combination of both, depending upon available funding.

ENVIRONMENTAL REVIEW CHAPTER 343, HAWAII REVISED STATUTES

Under §343-5(a), HRS, an Environmental Assessment (EA) is triggered with the use of state funds but may be declared exempt from the process if falling into certain exempted classes of action. The proposed action is exempt from an EA, falling under Department of Land and Natural Resources' Exemption Class 10 (No. 2, Contracts for small purchases, professional services, competitive sealed proposals, competitive sealed bidding, or purchase of goods and services which are exempt from Haw. Rev. Stat. Chapter 103D.)

The procurement of mediator services is exempt from Chapter 103D, HRS, The Hawaii Public Procurement Code, pursuant to Chapter 3-120, HAR, Exemption Number 12.

RECOMMENDATION:

Staff recommends that the Commission:

1. Delegate authority to the Chairperson to hire a Mediator to address the Complaint and Petition for Declaratory Order Against Waste filed by Po'ai Wai Ola and West Kaua'i Watershed Alliance (through Earthjustice).

2. Authorize the Chairperson to enter into a mediation services contract to conduct the mediation and expend up to $40,000 for this purpose.

3. Find and determine that the proposed mediation work is exempt from preparing an EA.

Respectfully submitted,

JEFFREY T. PEARSON, P.E.
Deputy Director

Exhibit 1. Letter to James Nakatani, Executive Director, ADC, and Landis Ignacio, Director for the KAA, dated May 11, 2015.
Exhibit 2. Letter from Deputy Attorney General Myra Kaichi, representing ADC, dated June 2, 2015.
Exhibit 3. Letter from Douglas Codiga of Schlack Ito LLC, representing KAA, dated June 5, 2015.
Exhibit 4. Letter from County Attorney Mauna Kea Trask, representing the County of Kaua'i, dated June 17, 2015.
Exhibit 5. Memo to William Aila, Jr., Deputy Director, DHHL, dated September 24, 2015
Exhibit 6. Letter to James Nakatani, Executive Director, ADC, and Landis Ignacio, Director for the KAA, dated September 30, 2015.

Exhibit 7. Letter from Douglas Codiga of Schlack Ito LLC, representing KAA, dated October28, 2015, Response to the Commission's September 30, 2015 Letter.

Exhibit 8. Letter from Chairman Jobie M. K. Masagatani, Hawaiian Homes Commission, dated November 17, 2015, Response to the Commission's September 24, 2015 Letter.

Exhibit 9. Petition for Reservation of Surface Water of 33.145 Million Gallons Per Day originating from the watershed of, ad tributary to, the Waimea River and diverted by the Kōke'e and Kekaha Ditch Systems (including water originating in Waiakoali, Kawaikōi, Kauaikinana, and Kōke'e Streams and other tributaries of the Waimea River) for use in the Waimea, Kaua'i Hawaiian Home Lands, from DHHL, dated November 17, 2015.

Exhibit 10. 343 Exemption Notification.

APPROVED FOR SUBMITTAL

SUZANNE D. CASE
Chairperson

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

May 11, 2015

James Nakatani, Executive Director
Agribusiness Development Corporation
235 S. Beretania Street, Room 205
Honolulu, HI 96813

Landis Ignacio, Director
Kekaha Agriculture Association
8315 Kekaha Road, Suite E
Kekaha, HI 96752

Dear Messrs. Nakatani and Ignacio:

Request for Information Regarding and Related to Water Use and
Request for Assistance with Monitoring Efforts,
Kokee and Kekaha Ditch Irrigation Systems, Waimea, Kaua'i

As you are well aware, on July 24, 2013, Po'ai Wai Ola/West Kaua'i Watershed Alliance, through its attorney Earthjustice (Complainant), filed a combined Petition to Amend the Interim Instream Flow Standards for Waimea River its headwaters and tributaries (Petition), and a Complaint and Petition for Declaratory Order against Waste (Complaint) with the Commission on Water Resource Management (Commission). The Complaint specifically identifies the Agribusiness Development Corporation (ADC) and the Kekaha Agriculture Association (KAA).

The State Water Code, Chapter 174C, Hawaii Revised Statutes (HRS) and its Hawaii Administrative Rules (HAR), gives the Commission statewide jurisdiction to hear and investigate any dispute regarding water resources.

To aid in its investigation of the Complaint and to help support the information needs for the Petition, the Commission requests that you provide detailed information on the following items as it relates to the combined use of water from the Kokee and Kekaha Ditch Irrigation Systems.

1. List of all users that receive water from the Kokee Ditch System and / or the Kekaha Ditch System. For each user, provide the amount of water used, types and acreages of crops cultivated (excluding or breaking out fallow acreage), and details of any other uses, for the last five years (calendar years 2010 to 2014). Indicate how the amount of use was measured or estimated. If this information is not available or cannot be readily determined, please explain why and when that information will be available.

2. Estimates of water diverted from each stream that supplies the Kokee Ditch System (Waiakoali, Kawaikoi, Kauaikinana, and Kokee Streams) and the Kekaha Ditch System (Waimea River, Koaie and Kukui Streams), and estimates of water released at each of the

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DOC ID: 12932

EXHIBIT 1

Kauaikinana and Kokee Stream diversions. Indicate how and when the estimate was obtained, and how and whether diversion flows are routinely monitored.

3. Status, condition, and flow of other registered stream diversions on the Kokee Ditch System (Mohihi #1, Mohihi #2, Mohihi #3, Kumuwela #1, Kumuwela #2, Kumuwela #3, Kumuwela #4, Kumuwela #5, Nawaimaka, Halemanu, and Kapue Valley Dam), Kekaha Ditch System (Kukui Trail #1), and the Kikiaola Ditch System. Indicate how and when the information was obtained, and how and whether these diversion flows are routinely monitored.

4. Estimate of average daily water released at the Kokee Ditch sluice gate to Kauhao Gulch. Indicate how this information was obtained.

5. Estimate of average daily water diverted towards Puu Opae Reservoir at the Puu Moe Ditch Divide. Indicate how this information was obtained.

6. Estimate of average daily water released via the white PVC pipe at the end of the Kokee Ditch System (along Hwy 550). Indicate how this information was obtained.

7. A brief history of the construction and maintenance of the Kokee Ditch downstream of the Kitano Reservoir.

8. Daily amount of water flowing through and electric energy generated from both the Waimea and Waiawa Hydropower Plants, along with the daily amount of water flowing past the Waihulu Dam, Koaie Dam, and Mauka Powerhouse Dam on the Waimea River, for the last five years. Indicate how and when the data were obtained.

9. Summary of water quantity and quality data for the Kawaiele and Nohili Pump Stations for the last five years, daily electric energy consumption along with information on the current status of National Pollutant Discharge Elimination System (NPDES) Permit No. 000086.

10. Estimated storage capacities, average daily actual water storage, locations of the irrigation pumps at the various storage reservoirs in the Mana Plain that receive water from the Kekaha Ditch. Data should either be provided in latitude and longitude coordinates, GPS, or identified on a hardcopy map.

11. Summary of electricity use for last five years and pump capacity (in gallons per minute), and average daily flow, of each individual irrigation pump that draws water from the storage reservoirs on the Mana Plain that receives water from the Kekaha Ditch. Indicate the ownership of the pumps and the users who use the water from each pump.

12. Explanation of the association and role of KAA, if any, in the operations of the County of Kauai's Waimea Wastewater Treatment Plant facility.

13. Potential modifications or solutions that may help to address waste concerns and dry streams sections raised by the Complainants.

14. Any information regarding the past, current, or future potential for use of groundwater resources and pumping in the Mana Plain for uses currently served by water from the Kokee and Kekaha Ditch Irrigation Systems.

15. Any other information that would be helpful to determine whether or not the water in the Kokee and Kekaha Ditch Irrigation Systems is being put to reasonable-beneficial use.

The Commission asks that you provide the above information within **60 days** of the date of this letter.

The Commission also asks for your consent and cooperation in the following monitoring efforts by its principal investigator, Steve Spengler of Element Environmental, LLC.

1. Installation of a pressure transducer at the existing concrete flume structure located within the Kekaha Ditch (Coordinates: N 21.9766°, W -159.68298°). The transducer will be anchored to the wall of the flume stilling well with a secured lid (to be installed by KAA) to prevent tampering. The transducer will be programmed to measure water depth and temperature at 15 minute intervals.

   A rating curve will be established for the flume by making a series of ditch flow measurements using a pygmy meter (applying standard U.S. Geological Survey methods) over a range of ditch flow rates and identifying corresponding gage heights.

   We ask for the assistance of KAA in the development of the rating curve through the manual manipulation of flow rates within the Kekaha Ditch by temporarily diverting water from the ditch back into the Waimea River at up-gradient release points.

2. Installation of a pressure transducer at the existing ditch flow monitoring structure located within the Kokee Ditch (Coordinates: N 22.09313°, W -159.67614°). Some minor alterations to the existing stilling well may be necessary to allow for measurement of the current low flow volumes. The transducer will be programmed to measure water depth and temperature at 15 minute intervals.

   A rating curve will be established for the flume by making a series of ditch flow measurements using a pygmy meter (applying standard U.S. Geological Survey methods) over a range of ditch flow rates and identifying corresponding gage heights.

   We ask for the assistance of KAA in the development of the rating curve through the manual manipulation of flow rates within the Kokee Ditch, if possible, by temporarily diverting water from the ditch at up-gradient release points.

3. Conducting a series of synoptic ditch flow measurements in the lower portion of the Kekaha Ditch system downstream of the Waiawa Hydropower Plant for the purpose of measuring the major diversions to reservoirs and open canals within the Mana Plain.

4. Estimating the evaporative losses from the storage reservoirs receiving water from Kekaha Ditch on the Mana Plain.

Mr. Spengler will be asked to initiate the above proposed work as soon as the Commission staff receives an affirmative response from KAA via mail or electronic mail within 30 days of the date of this letter. Mr. Spengler will coordinate with Mr. Landis Ignacio directly for access as needed and any work that must be completed by KAA.

Lastly, the Commission asks that if you are willing to participate in mediation for this matter, as provided for under HRS §174C-11 and HAR §13-167-23(d), that you also respond in the affirmative within **30 days** of this letter. Commission staff will contact Earthjustice, Department of Hawaiian Home Lands, and Kauai Island Utility Cooperative to discuss their consideration of mediation as well.

The Commission and its staff appreciate your continued cooperation in this matter and looks forward to hearing from you.

If you have any questions, please contact Dean Uyeno of the Stream Protection and Management Branch at 587-0249 or dean.d.uyeno@hawaii.gov.

Sincerely,

SUZANNE D. CASE
Chairperson

c: Myra Kaichi, Esq., Department of the Attorney General
Doug Codiga, Esq., Attorney for Kekaha Agriculture Association
David Henkin and Isaac Moriwake, Esq., Earthjustice
William Aila & Kaleo Manuel, Department of Hawaiian Home Lands
David Bissell, Kauai Island Utility Cooperative
Yvonne Izu, Esq., Attorney for Kauai Island Utility Cooperative
Jason Hines and Dawn Huff, Joule Group, Kauai Island Utility Cooperative
Steve Spengler, Element Environmental, LLC

DAVID Y. IGE
GOVERNOR

DOUGLAS S. CHIN
ATTORNEY GENERAL

RUSSELL A. SUZUKI
FIRST DEPUTY ATTORNEY GENERAL

STATE OF HAWAII
DEPARTMENT OF THE ATTORNEY GENERAL
COMMERCE AND ECONOMIC DEVELOPMENT DIVISION
425 QUEEN STREET
HONOLULU, HAWAII 96813
(808) 586-1500

June 2, 2015

The Honorable Suzanne D. Case
Chairperson
State of Hawaii
Department of Land and Natural Resources
Commission on Water Resource Management
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Madame Chairperson:

Re: Request for Information Regarding and Related to Water Use and Request for Assistance with Monitoring Efforts, Kokee and Kekaha Ditch Irrigation Systems, Waimea, Kauai

We are in receipt of your letter to James Nakatani and Landis Ignacio dated May 11, 2015 requesting, among other things, that the parties agree to participate in mediation of the issues in this matter. Please be advised that the Agribusiness Development Corporation is willing to participate in mediation.

Very truly yours,

Myra M. Kaichi
Deputy Attorney General

c: James Nakatani, Agribusiness Development Corporation
Douglas Condiga, Esq., Attorney for Kekaha Agriculture Association
David Henkin, Esq. and Isaac Moriwake, Esq., Attorneys for Petitioners
William Aila and Kaleo Manuel, Department of Hawaiian Home Lands
David Bissell, CEO, Kauai Island Utility Cooperative
Yvonne Izu, Esq., Attorney for Kauai Island Utility Cooperative
Jason Hines and Dawn Huff, Joule Group
Steve Spengler, Element Environmental

EXHIBIT 2

SCHLACK ITO
A LIMITED LIABILITY LAW COMPANY

Douglas A. Codiga
Attorney at Law
DIRECT 808.523.6047
dcodiga@schlackito.com

MAIN 808.523.6040
FAX 808.523.6030
Topa Financial Center
745 Fort Street • Suite 1500
Honolulu, Hawaii 96813

June 5, 2015

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VIA ELECTRONIC MAIL AND U.S. MAIL
The Honorable Chair and Commissioners
State of Hawaii Commission on Water Resource Management
Kalanimoku Building
1151 Punchbowl Street, Room 227
Honolulu, HI 96813

Re: Po'ai Wai Ola Petitions and Complaint filed July 24, 2013
Response to Commission's May 11, 2015 Letter

Dear Chair and Commissioners:

On behalf of the Kekaha Agriculture Association ("KAA"), this responds to certain items identified in the Commission's May 11, 2015 letter to the KAA and the Agribusiness Development Corporation ("ADC").[1] Specifically, the letter requests the consent and cooperation of KAA (and ADC) with regard to monitoring efforts by the Commission's principal investigator, Steve Spengler of Element Environmental, LLC ("Investigator"). These monitoring efforts consist of the four items described on page 3 of the May 11, 2015 letter. KAA hereby consents to these monitoring efforts and will work cooperatively with the Investigator in the manner requested. The letter also asks if KAA is willing to participate in mediation for this matter. The response is affirmative, i.e., KAA is willing participate in mediation.

Thank you for your attention to the foregoing.

Very truly yours,

SCHLACK ITO
A LIMITED LIABILITY LAW COMPANY

Douglas A. Codiga

DAC:mpm

[1] This response is timely submitted. The May 11, 2015 letter requests KAA to respond to these items within thirty days of the date of the letter, or by June 10, 2015.

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CPR. 3841.2
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EXHIBIT 3

Copy via electronic mail:

Myra Kaichi, Esq., Department of the Attorney General
William Aila and Kaleo Manuel, Department of Hawaiian Home Lands
David Henkin and Isaac Moriwake, Esq., Earthjustice
David Bissell, Kauai Island Utility Cooperative
Yvonne Izu, Esq., Attorney for Kauai Island Utility Cooperative
Jason Hines and Dawn Huff, Joule Group, for Kauai Island Utility Cooperative
Steve Spengler, Element Environmental, LLC

Bernard P. Carvalho, Jr.
Mayor

Nadine K. Nakamura
Managing Director

Mauna Kea Trask
County Attorney

Stephen F. Hall
First Deputy

OFFICE OF THE COUNTY ATTORNEY
County of Kaua'i, State of Hawai'i
4444 Rice Street, Suite 220, Līhu'e, Hawai'i 96766-1300
TEL (808) 241-4930 FAX (808) 241-6319

June 17, 2015

Suzanne D. Case, Chairperson
Commission on Water Resource Management
Kalanimoku Building
1151 Punchbowl Street, Room 227
Honolulu, Hawai'i 96813

Re: SOLICITATION AND CONSIDERATION OF THE VIEWS OF APPROPRIATE COUNTY OFFICIALS RELATED TO PO'AI WAI OLA/WEST KAUA'I WATERSHED ALLIANCE'S COMBINED PETITION TO AMEND THE INTERIM INSTREAM FLOW STANDARDS FOR WAIMEA RIVER AND ITS TRIBUTARIES, AND COMPLAINT AND PETITION FOR DECLARATORY ORDER AGAINST WASTE

Dear Ms. Case:

The County of Kaua'i ("County") was recently made aware of your May 11, 2015, "Request for Information" to James Nakatani, Executive Director of the State of Hawai'i Agribusiness Development Corporation and Landis Ignacio, Director of the Kekaha Agriculture Association regarding and related to water use and request for assistance with monitoring efforts, Koke'e and Kekaha Ditch Irrigation Systems, Waimea Kaua'i.

Near the close of your request you asked if both Mr. Nakatani and Mr. Ignacio are willing to participate in mediation for the subject matter, as provided for under HRS §174C-11 and HAR § 13-167-23(d).

Although the County is not clear as to what stage the subject proceeding is currently at, in an abundance of caution the County hereby notifies you that to the extent applicable in this particular case, HRS § 174C-11(c) generally requires that in conducting a hearing on any matter referred by the Commission, "a hearings officer shall solicit and consider the views of the appropriate county officials responsible for planning, economic development, and resource management and such other county officials and others as the commission shall direct." To my knowledge no such County officials have been solicited as of yet.

EXHIBIT 4

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DOC ID: 13281

Furthermore, Although the County is not requesting to be admitted as a party to this proceeding at this time, the County does reserve the right to be admitted as a party in the future upon its request as further provided for in HRS § 174C-11(c).

The County appreciates your time and consideration in this matter. If you have any questions, you can reach me at (808) 241-4930 or mtrask@kauai.gov.

Sincerely,

Mauna Kea Trask
County Attorney, County of Kaua'i

Cc: James Nakatani, Agribusiness Development Corporation
Landis Ignacio, Kekaha Agriculture Association
Myra Kaichi, Esq., Department of the Attorney General
Doug Codiga, Esq., Attorney for Kekaha Agriculture Association
David Henkin and Isaac Moriwake, Esq., Earthjustice
William Aila & Kaleo Manuel, Department of Hawaiian Home Lands
David Bissel, Kaua'i Island Utility Cooperative
Yvonne Izu, Esq., Attorney for Kauai Island Utility Cooperative
Jason Hines and Dawn Huff, Joule Group, Kaua'i Island Utility Cooperative
Steve Spengler, Element Environmental, LLC

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

September 24, 2015

TO: William J. Aila, Jr.
Deputy to the Chair, Department of Hawaiian Home Lands

FROM: Jeffrey T. Pearson, P.E.
Deputy Director, Commission on Water Resource Management

SUBJECT: Request for Information Regarding Department of Hawaiian Home Lands Water Use from the Kokee and Kekaha Ditch Irrigation Systems, Waimea, Kaua'i

Thank you for attending the September 14, 2015 meeting with Commission on Water Resource Management (Commission) staff and others regarding the combined Petition to Amend the Interim Instream Flow Standards for Waimea River its headwaters and tributaries (Petition) and Complaint and Petition for Declaratory Order against Waste (Complaint) filed by Po'ai Wai Ola/West Kaua'i Watershed Alliance, through its attorney Earthjustice (Complainant).

The primary purpose of the meeting was to discuss the potential for mediation in this matter. However, as discussed, there are some outstanding data needs that will lay the foundation for a more productive mediation effort.

The Commission respectfully asks for assistance from the Department of Hawaiian Home Lands (DHHL) in its investigation of the Complaint and to help support the information needs for the Petition. The Commission requests that you provide detailed information on the following items as it relates to the combined use of water from the Kokee and Kekaha Ditch Irrigation Systems.

1. List of all current water users on DHHL lands that receive water from the Kokee Ditch System. For each user, provide the amount of water used, types and acreages of crops cultivated, and details of any other types of uses, if possible, for the last five years (calendar years 2010 to 2014). Indicate how the amount of water use was measured or estimated.

2. List of future water use demand projections and information to substantiate each demand.

The Commission and its staff appreciate your continued cooperation in this matter and looks forward to hearing from you.

If you have any questions, please contact Dean Uyeno of the Stream Protection and Management Branch at 587-0249 or dean.d.uyeno@hawaii.gov.

c: Myra Kaichi, Esq., Department of the Attorney General
Doug Codiga, Esq., Attorney for Kekaha Agriculture Association
David Henkin and Isaac Moriwake, Esq., Earthjustice
Yvonne Izu, Esq., Attorney for Kaua'i Island Utility Cooperative

PAF 5.3836.2
FILE ID: CDR. 3841
DOC ID: 13464

EXHIBIT 5

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

September 30, 2015

James Nakatani, Executive Director
Agribusiness Development Corporation
235 S. Beretania Street, Room 205
Honolulu, HI 96813

Landis Ignacio, Director
Kekaha Agriculture Association
8315 Kekaha Road, Suite E
Kekaha, HI 96752

Dear Messrs. Nakatani and Ignacio:

Request for Additional Information Regarding and Related to Water Use,
Kokee and Kekaha Ditch Irrigation Systems, Waimea, Kaua'i

Thank you for attending the September 14, 2015 meeting with Commission on Water Resource Management (Commission) staff and others regarding the combined Petition to Amend the Interim Instream Flow Standards for Waimea River its headwaters and tributaries (Petition) and Complaint and Petition for Declaratory Order against Waste (Complaint) filed by Po'ai Wai Ola/West Kaua'i Watershed Alliance, through its attorney Earthjustice (Complainant).

The primary purpose of the meeting was to discuss the potential for mediation in this matter. However, as discussed, there are some outstanding data needs that will lay the foundation for a more productive mediation effort.

The Commission asks for your assistance to help support its Complaint investigation and additional information needs for the Petition with the following requests:

1. Estimates of current water use by Sunrise Capital, Inc. and "other licensees" identified in the Kekaha Agriculture Association (KAA) response dated July 10, 2015. Other licensees identified include Taiwain Gu, LBD Coffee, LLC, and Steve Pionowski dba Phoenix Farms.

2. Water use data not submitted by Pioneer Hi-Bred for calendar years 2013 and 2014 from KAA response dated July 10, 2015.

3. Amount of electricity produced by KAA which is subsequently used by KAA and/or sold to Kaua'i Island Utility Cooperative.

The Commission and its staff appreciate your continued cooperation in this matter and looks forward to hearing from you.

PAIFS. 3836.2
FILE ID: CDR. 3841.2
DOC ID: 13449

EXHIBIT 6

If you have any questions, please contact Dean Uyeno of the Stream Protection and Management Branch at 587-0249 or dean.d.uyeno@hawaii.gov.

Sincerely,

SUZANNE D. CASE
Chairperson

c: Myra Kaichi, Esq., Department of the Attorney General
David Henkin and Isaac Moriwake, Esq., Earthjustice
William Aila, Jr. and Kaleo Manuel, Department of Hawaiian Home Lands
Yvonne Izu, Esq., Kauai Island Utility Cooperative
Jason Hines and Dawn Huff, Joule Group, Kauai Island Utility Cooperative
Steve Spengler, Element Environmental, LLC

SCHLACK ITO
A LIMITED LIABILITY LAW COMPANY

Douglas A. Codiga
Attorney at Law
DIRECT 808.523.6047
dcodiga@schlackito.com

MAIN 808.523.6040
FAX 808.523.6030
Topa Financial Center
745 Fort Street • Suite 1500
Honolulu, Hawaii 96813

October 28, 2015

VIA ELECTRONIC MAIL AND U.S. MAIL
The Honorable Chair and Commissioners
State of Hawaii Commission on Water Resource Management
Kalanimoku Building
1151 Punchbowl Street, Room 227
Honolulu, HI 96813

Re: Po'ai Wai Ola Petition and Complaint filed July 24, 2013
Response to Commission's September 30, 2015 Letter

Dear Chair and Commissioners:

On behalf of the Kekaha Agriculture Association ("KAA"), enclosed for submission to the Commission are the responses to the Information Requests set forth in the Commission's September 30, 2015 letter to the KAA and the Agribusiness Development Corporation ("ADC").[1] It is KAA's understanding that ADC will defer to the KAA with regard to responses to these Information Requests and will not submit separate responses.

The KAA appreciates the opportunity to provide these responses to the Commission's requests for information. Should there be any questions please do not hesitate to contact the undersigned.

Very truly yours,
SCHLACK ITO
A LIMITED LIABILITY LAW COMPANY

Douglas A. Codiga

DAC:mpm

[1] These responses are made subject to, restate, and incorporate by reference the "General Objections" set forth in KAA's response to the Commission's May 11, 2015 Information Requests submitted on July 10, 2015. The responses are timely submitted by October 28, 2015. KAA first became aware of the September 30, 2015 letter on October 6, 2015 during a meeting with Commission staff which requested KAA to respond by October 28, 2015. KAA wishes to clarify for future reference that its correct mailing address is Kekaha Agriculture Association, P.O. Box 940, Waimea, Kauai, HI 96796 (the September 30, 2015 letter was mailed to a street address, 8315 Kekaha Road, Suite E, Kekaha, HI 96752, and mail in Kekaha is delivered to post office boxes rather than street addresses, hence the KAA did not receive a copy of the letter in the mail). KAA thanks the Commission's for its understanding and attention to these matters.

PAIF5.3836.2
FILE ID: CDR.3841.2
DOC ID: 13477

EXHIBIT 7

SCHLACK ITO
A LIMITED LIABILITY LAW COMPANY

Copy via U.S. Mail and Electronic Mail:

Myra Kaichi, Esq., Department of the Attorney General
William Aila and Kaleo Manuel, Department of Hawaiian Home Lands
David Henkin, Esq., Isaac Moriwake, Esq., and Kylie Wager, Esq., Earthjustice
David Bissell, Kauai Island Utility Cooperative
Yvonne Izu, Esq., Attorney for Kauai Island Utility Cooperative
Jason Hines and Dawn Huff, Joule Group, for Kauai Island Utility Cooperative
Mayor Bernard Carvalho, County of Kauai
Mauna Kea Trask, Esq., County of Kauai
Steve Spengler, Element Environmental, LLC

SCHLACK ITO
A LIMITED LIABILITY LAW COMPANY

CWRM-IR-16[2]

1. Estimates of current water use by Sunrise Capital, Inc. and "other licensees" identified in the Kekaha Agriculture Association (KAA) response dated July 10, 2015. Other licensees identified include Taiwan Gu, LBD Coffee, LLC, and Steve Pionowski dba Phoenix Farms.

RESPONSE:

KAA restates and incorporates by reference Kekaha Agriculture Association's ("KAA") July 10, 2015 response to the Commission's May 11, 2015 Information Request ("IR") No. 1 ("CWRM-IR-1").

There is no estimate of current water use for Sunrise Capital, Inc. ("Sunrise") because Sunrise does not use water from the Kekaha system and/or Kokee system. Sunrise conducts aquaculture, specifically, shrimp and oyster farming. Sunrise does not utilize irrigation water from the Kekaha system and/or Kokee system for its operations. Sunrise uses brackish water drawn from brackish water well for its non-potable water needs.

As explained in the KAA's responses to the Commission's prior IRs, the Kekaha and Kokee systems are comprised of highly integrated and interdependent irrigation, drainage and electrical power infrastructure systems (collectively, "agricultural infrastructure"). Irrigation water is only one component of the agricultural infrastructure. The demand for water is created not only by irrigation needs, but also by critically important drainage and electrical power needs. The combined irrigation, drainage and hydropower uses of the resource provide major economic benefits and protect vital public health and safety interests. *See* KAA Response to CWRM-IR-1. The electrical power infrastructure supplies electricity to Sunrise to sustain its aquaculture operations. *Id.*; *see also* KAA Response to CWRM-IR-15.

There is no estimate of current water use for Taiwan Gu and Steve Pionowski dba

[2] Numbering continues from the Commission's May 11, 2015 IRs, i.e., CWRM-IR-1 through CWRM-IR-15.

Phoenix Farms because both have terminated their farming operations and are not currently using, or expected to use in the future, any water from the Kekaha system and/or Kokee system.

There is no estimate of current water use for LBD Coffee, LLC ("LBD") because LBD is not conducting farming operations at this time and thus is not currently using any water from the Kekaha system and/or Kokee system. Although not currently farming, LBD is maintaining vegetative cover on its sublicensed lands which is watered by natural precipitation.

KAA is not aware of any other licensees (i.e., agricultural operations sublicensing land from KAA members) currently using Kekaha and/or Kokee system water.

CWRM-IR-17

2. Water use data not submitted by Pioneer HI-Bred for calendar years 2013 and 2014 from KAA response dated July 10, 2015.

RESPONSE:

KAA restates and incorporates by reference KAA's response to CWRM-IR-1, including but not limited to Section I, "Preliminary Statement," and the response of Pioneer Hi-Bred International, Inc. ("Pioneer") set forth in Exhibit B to KAA's response to CWRM-IR-1 in its entirety ("Exhibit A").

Pioneer has at all times sought to be responsive to the Commission's requests and offered specific and plausible reasons for declining to develop and submit data for calendar years 2013 and 2014, as noted in Exhibit A which states, "Pioneer is not providing estimates of water use for calendar years 2013 and 2014 because Pioneer's water use during these years in the Kekaha area was atypical. Estimates for these years would yield skewed results, thus they are not reasonably calculated to lead to the discovery of admissible evidence." *Id.*

In response to the Commission's further request, and without waiving any objections, Pioneer has developed water use estimates for calendar years 2013 and 2014 which are attached

as Exhibit A to these IR responses.

CWRM-IR-18

3. Amount of electricity produced by KAA which is subsequently used by KAA and/or sold to Kaua'i Island Utility Cooperative.

RESPONSE:

Please see Exhibit B, attached.

Exhibit A

2013 Pioneer Hi-Bred, Kekaha Water Use Estimates

lease farmable acres	estimated gallons / acre / day	estimated water use of cover crop per acre assuming a 2week irrigation cycle to establish cover crop
1,400.00	3,999.04	67,183.87

month	days / month	acres of crop growing in field per month	estimated water use/day for crop	estimated water use/month for crop	estimated acres of cover crop growing in field	estimated water use of cover crop per month
Jan	31	257.50	1,029,752.80	31,922,336.80	1,142.50	76,757,573.76
Feb	28	246.22	984,643.63	27,570,021.61	1,153.78	
Mar	31	133.63	534,391.72	16,566,143.17	112.59	7,564,232.15
Apr	30	54.87	219,427.32	6,582,819.74	78.76	5,291,401.76
May	31		0.00	0.00	54.87	3,686,379.06
Jun	30		0.00	0.00	0.00	0.00
Jul	31		0.00	0.00	1,400.00	94,057,420.80
Aug	31		0.00	0.00	1,400.00	
Sept	30	44.97	179,836.83	5,395,104.86	44.97	3,021,258.72
Oct	31	134.67	538,550.72	16,695,072.22	89.70	6,026,393.32
Nov	30	248.22	992,641.71	29,779,251.26	113.55	7,628,728.67
Dec	31	295.86	1,183,155.97	36,677,835.21	47.64	3,200,639.66

2013 estimated crop planting (acres)	2013 estimated annual water use for crop (gallons)	2013 estimated annual water use for cover (gallons)	2013 estimated total water use for crop area (gallons)
295.86	171,188,584.88	207,234,027.89	378,422,612.77

2014 Pioneer Hi-Bred, Kekaha Water Use Estimates

lease farmable acres	estimated gallons / acre / day	estimated water use of cover crop per acre assuming a 2week irrigation cycle to establish cover crop
1,400.00	3,999.04	67,183.87

month	days / month	acres of crop growing in field per month	estimated water use/day for crop	estimated water use/month for crop	estimated acres of cover crop growing in field	estimated water use of cover crop per month
Jan	31	295.86	1,183,155.97	36,677,835.21	1,104.14	74,180,400.43
Feb	28	250.89	1,003,319.15	28,092,936.08	1,149.11	
Mar	31	161.19	644,605.26	19,982,762.99	89.70	6,026,393.32
Apr	30	47.64	190,514.27	5,715,427.97	113.55	7,628,728.67
May	31		0.00	0.00	47.64	3,200,639.66
Jun	30		0.00	0.00	0.00	0.00
Jul	31		0.00	0.00	1,400.00	94,057,420.80
Aug	31		0.00	0.00	1,400.00	
Sept	30	9.50	37,990.88	1,139,726.40	9.50	638,246.78
Oct	31	28.00	111,973.12	3,471,166.72	18.50	1,242,901.63
Nov	30	74.00	295,928.96	8,877,868.80	46.00	3,090,458.11
Dec	31	94.00	375,909.76	11,653,202.56	20.00	1,343,677.44

2014 estimated crop planting (acres) carryover from 2013	2014 estimated annual water use for crop (gallons)	2014 estimated annual water use for cover (gallons)	2014 estimated total water use for crop area (gallons)
94.00	115,610,926.72	191,408,866.84	307,019,793.56

KBAY ENVIRONMENTAL SERVICES LLC

		Waiawa	Average		Waimea	Average		Produced	Consumed	Sold
		(kWh)	(MGD)		(kWh)	(MGD)		(kWh)	(kWh)	(kWh)
2010	Jan	254,880	18.7		297,530	21.7		552,410	185,365	367,045
	Feb	292,401	17.8		207,629	18.4		500,030	138,290	362,040
	Mar	270,288	20.7		540,825	31.9		811,113	146,078	665,035
	Apr	287,959	20.9		448,460	30.4		737,419	153,304	584,115
	May	294,541	20.8		408,302	24.2		702,843	232,793	470,050
	June	160,881	15.0		*151,030*	16.8		*311,911*	*92,321*	219,590
	July	226,868	17.7		284,413	27.1		511,281	118,126	393,155
	Aug	190,051	17.2		271,522	21.3		461,603	77,233	384,370
	Sept	187,560	17.3		247,522	19.3		435,082	126,557	308,525
	Oct	128,999	12.6		124,315	15.8		253,314	159,085	94,229
	Nov	167,140	20.4		217,952	19.7		385,092	1,807	383,285
	Dec	58,051	16.7		360,065	23.5		418,116	133,251	284,865
2011	Jan	304,936	21.8		407,905	28.5		712,841	200,231	512,610
	Feb	291,561	22.4		422,075	31.9		713,636	177,642	535,994
	Mar	328,568	22.3		415,158	29.0		743,726	240,881	502,845
	Apr	350,076	22.9		486,993	30.7		837,069	268,332	568,737
	May	289,013	23.7		430,149	29.0		719,162	116,602	602,560
	June	337,950	22.8		440,983	29.5		778,933	95,818	598,115
	July	264,930	20.5		428,089	27.7		693,019	192,274	500,745
	Aug	217,420	18.7		244,997	23.6		462,417	70,868	391,549
	Sept	107,841	18.1		196,486	18.2		304,327	94,607	209,720
	Oct	237,502	18.3		206,786	19.8		444,288	144,163	300,125
	Nov	325,558	21.7		423,061	28.6		748,619	274,072	474,592
	Dec	326,990	22.9		467,804	32.3		794,794	309,099	485,695
2012	Jan	281,970	21.9		262,966	24.1		544,936	71,421	473,515
	Feb	334,350	23.0		389,280	28.0		723,630	273,670	449,960
	Mar	351,295	23.2		342,126	31.5		693,421	231,351	462,070
	Apr	324,675	22.9		421,063	30.9		745,738	201,523	544,215
	May	325,869	21.5		378,075	26.3		703,944	265,184	438,760
	June	250,311	18.9		286,955	22.3		537,266	219,921	317,345
	July	226,024	17.9		275,559	23.3		501,583	160,333	341,250
	Aug	88,643	16.6		149,880	19.4		238,523	79,553	158,970
	Sept	237,127	18.7		314,746	23.9		551,873	233,093	318,780
	Oct	106,110	12.0		79,901	14.7		186,011	100,366	85,645
	Nov	124,486	12.4		79,061	13.9		203,547	138,202	65,345
	Dec	241,669	18.7		309,876	22.9		551,545	269,900	281,645

Kekaha Agricultural Association Hydropower Production, 2010 – 2014

EXHIBIT B

		Waiawa	Average		Waimea	Average		Produced	Consumed	Sold
		(kWh)	(MGD)		(kWh)	(MGD)		(kWh)	(kWh)	(kWh)
2013	Jan	303,729	20.7		376,706	27.8		680,435	252,980	427,455
	Feb	253,591	20.1		323,538	26.0		577,129	219,814	357,315
	Mar	269,800	19.9		354,266	26.2		624,066	340,006	284,060
	Apr	280,125	20.7		332,062	26.7		612,187	178,222	433,965
	May	314,145	21.5		423,771	29.6		737,916	286,276	451,640
	June	274,161	19.2		281,176	22.3		555,337	317,512	237,825
	July	207,029	17.5		197,072	19.9		404,101	218,216	185,885
	Aug	175,185	14.7		199,938	17.1		375,123	253,183	121,940
	Sept	152,060	14.1		121,854	17.6		273,914	153,934	119,980
	Oct	111,600	14.4		79,901	13.9		191,501	191,501	0
	Nov	*180,752*	15.8		152,178	20.0		*332,930*	*180,612*	152,318
	Dec	280,395	20.7		407,902	28.2		688,297	221,521	466,776
2014	Jan	313,313	21.1		418,960	31.0		732,273	89,906	642,367
	Feb	291,416	21.2		*500,128*	33.3		*791,544*	*196,206*	595,338
	Mar	311,805	21.5		*472,506*	32.0		*784,311*	*122,955*	661,356
	Apr	320,485	20.7		*431,367*	30.1		*751,852*	*159,523*	592,329
	May	237,487	20.3		*366,943*	27.0		*604,430*	*83,204*	521,226
	June	266,379	20.5		*365,986*	27.0		*632,365*	*147,205*	485,160
	July	253,295	18.7		*232,472*	20.6		*485,767*	*182,713*	303,054
	Aug	147,458	13.8		*212,895*	19.7		*360,353*	*216,239*	144,114
	Sept	126,113	12.8		*208,595*	19.5		*334,708*	*143,296*	191,412
	Oct	175,230	17.1		*362,193*	26.8		*537,423*	*144,039*	393,384
	Nov	154,696	16.7		*331,803*	25.3		*486,499*	*206,677*	279,822
	Dec	165,758	17.0		*317,336*	24.7		*483,094*	*190,402*	292,692
5 year average		**239,342**	**19.0**		**314,851**	**24.5**		**554,210**	**178,158**	**374,642**

Kekaha Agricultural Association Hydropower Production, 2010 – 2014 (continued)

Notes: kWh are monthly metered totals *(Consumed = Produced – Sold)*. Average (MGD) is the monthly average of the daily noon readings made at each power plant. Italics indicate estimated values for power production (Waiawa, Nov 2013, and Waimea, June 2010 and February through December 2014) derived from the relations between the average flow and total monthly power production (Waiawa $R^2 = 0.90$; Waimea $R^2 = 0.88$). N.B. Average amounts consumed and sold respectively represent 32% and 68% of the average amount of energy produced.

EXHIBIT B

DAVID Y. IGE
GOVERNOR
STATE OF HAWAII

SHAN S. TSUTSUI
LT. GOVERNOR
STATE OF HAWAII

JOBIE M. K. MASAGATANI
CHAIRMAN
HAWAIIAN HOMES COMMISSION

WILLIAM J. AILA, JR.
DEPUTY TO THE CHAIRMAN

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

November 17, 2015

MEMORANDUM

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

FROM: Jobie M. K. Masagatani, Chairman
Hawaiian Homes Commission

SUBJECT: Request for Information Regarding Department of Hawaiian Home Lands Water Use from Kōke`e and Kekaha Ditch Irrigation Systems, Waimea, Kaua`i dated September 24, 2015

By letter dated September 24, 2015, the Commission on Water Resource Management ("**CWRM**") requested the assistance of the Department of Hawaiian Home Lands ("**DHHL**" or "**the Department**") in its efforts to investigate and resolve the Complaint and Petition for Declaratory Order against Waste ("**Complaint**") and the Petition to Amend the Interim Instream Flow Standards ("**IIFS**") for Waimea River its headwaters and tributaries ("**Petition**") filed by Earthjustice on behalf of Pō`ai Wai Ola. In particular, CWRM requests detailed information from the DHHL on (1) current water uses on the DHHL lands that receive water from the Kōke`e Ditch System and (2) future water use demand projections and information to substantiate each demand.

Regarding item (1) above, the CWRM is well aware that ditch management (currently the Kekaha Agriculture Association) has historically controlled water delivery via the Kōke`e Ditch System to the DHHL's lands at the Pu`u Moe divide. Because the Department faces considerable challenges in delivering consistent and sufficient amounts of water to its current users, it is limited in its ability to precisely report to the CWRM on its current water consumption and/or existing uses. The DHHL is aware that in 1990, the Circuit Court of the Fifth Circuit entered an order (Kekaha Sugar Ltd v. Manini, Civil No. 88–0156) that included findings that DHHL's lessee of two of the five existing pastoral lots had permissively diverted waters from the Koke`e ditch through a two (2) inch pipe and could continue to do so. DHHL records reference a 1979 Kekaha Sugar Company, Ltd. study on water consumption, which determined a maximum flow of 1.5 million gallons per month or 34,000 gallons per minute for a two (2) inch system, which equates to 0.049 MGD. The lessee contends he also has a legal right to a six (6) inch pipe of water that the DHHL believes would allow the diversion of 0.72 MGD, though DHHL records do not contain such documentation.

EXHIBIT 8

Regarding item (2) above, the DHHL concurrently submits its petition for surface water reservation of 33.145 MGD pursuant to Hawaii Revised Statutes section 174C-101(a). The Department's primary goal is to carry out its trust obligation to its beneficiaries by fulfilling the goals of the Hawaiian Homes Commission Act on its lands. This water reservation, if granted, will secure sufficient amounts of water to ensure the productivity of the Department's lands, a public trust use of water under Hawai`i law. Consistent with its Water Policy Plan, the Department also acknowledges the instream uses advocated by Pō`ai Wai Ola, another public trust purpose, and therefore has put forth a conservative estimate of the DHHL's future needs rooted in and consistent with legal authorities, Hawaiian Homes Commission policy and plans, and beneficiary consultation in an effort to support a pono balance between the two public trust uses of water.

The DHHL looks forward to working with all interested stakeholders to cooperatively move forward in the context of mediation.

Enc.

DAVID Y. IGE
GOVERNOR
STATE OF HAWAII

SHAN S. TSUTSUI
LT. GOVERNOR
STATE OF HAWAII

JOBIE M. K. MASAGATANI
CHAIRMAN
HAWAIIAN HOMES COMMISSION

WILLIAM J. AILA, JR.
DEPUTY TO THE CHAIRMAN

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

November 17, 2015

MEMORANDUM

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

FROM: Jobie M. K. Masagatani, Chairman
Hawaiian Homes Commission

SUBJECT: **Petition for Reservation of surface water of 33.145 Million Gallons Per Day originating from the watershed of, and tributary to, the Waimea River and diverted by the Kōke`e and Kekaha Ditch Systems (including water originating in Waikoali, Kawaikōī, Kauaikinana, and Kōke`e Streams and other tributaries of the Waimea River) for use in the Waimea, Kaua`i Hawaiian Home Lands**

INTRODUCTION & BACKGROUND

The Department of Hawaiian Homes Lands ("**DHHL**" or the "**Department**") hereby submits to the Commission on Water Resource Management ("**CWRM**") its Petition for Reservation of surface water of 33.145 Million Gallons Per Day ("**MGD**") originating from the watershed of, and tributary to, the Waimea River and diverted by the Kōke`e and Kekaha Ditch Systems (including water originating in Waikoali, Kawaikōī, Kauaikinana, and Kōke`e Streams and other tributaries of the Waimea River) for use in the Waimea, Kaua`i Hawaiian Home Lands ("**Reservation Petition**").

This Reservation Petition carries out the Department's trust obligation to its beneficiaries by fulfilling the goals of the Hawaiian Homes Commission Act ("**HHCA**") on these lands and flows from a number of actions by the Hawaiian Homes Commission ("**HHC**") and the CWRM related to waters tributary to the Waimea River as well as related to the Department's rights to water. The relevant procedural background is discussed below.

At its January 15, 2013, meeting the HHC unanimously approved item G-2, which authorized the Chairman to "[f]ormally request a Water Reservation from the Commission on Water Resource Management to adequately reserve water for current and foreseeable development and use of Hawaiian home lands in Waimea, Kauai (State Water Code §174C-101(a).)." This authorization is attached hereto as ***Exhibit 1***.

On July 22, 2014, the HHC adopted a Water Policy Plan ("**WPP**") to provide strategic, proactive, comprehensive and consistent guidance and direction to the HHC, the DHHL staff, and its beneficiaries on water-related issues, actions, and decisions. The WPP was developed using existing legal authorities, previously approved policies and plans (e.g., General Plan 2002), and two years of extensive beneficiary input and consultation in compliance with the DHHL's Beneficiary Consultation Policy (2009). One of the four primary goals in the WPP is to "[a]ggressively, proactively, consistently and comprehensively advocate for the kuleana of the beneficiaries, the DHHL, and the HHC to water before all relevant agencies and entities."

On August 17, 2015, the CWRM approved the HHC's water reservation request under Hawaii Revised Statutes ("**HRS**") section 174C-101(a) for the DHHL lands in the Keauhou Aquifer System Area ("**KASA**") on Hawai`i Island. The CWRM Staff Submittal for that action noted at page 5 that "[d]ue to the interest in the KASA petition to designate the area as a ground water management area, DHHL filed the petition for reservation request." This Staff Submittal is attached hereto as ***Exhibit 2***. CWRM staff also noted that granting this reservation in the KASA would help the CWRM promote its approach to "managing the resource and protecting the public trust" through the collaboration and consistency framework provided by the Hawai`i Water Plan.

In September 2015, the CWRM through its staff, initiated discussions among key parties to explore potentially mediating some issues raised by the Pō`ai Wai Ola Petition and Complaint.[1] As part of those efforts, by letter dated September 24, 2015, the CWRM staff requested from the DHHL information on its existing uses as well as its "future water use projections and information to substantiate each demand." The CWRM staff explained that this information would "lay the foundation for a more productive mediation effort" on the Petition and Complaint.

Similar to the manner in which concerns over the future use of water in the KASA prompted the DHHL's water reservation request in that area, this Reservation Petition is made in the context of significant concern as to the future use of waters tributary to the Waimea River. Like the granting of DHHL's KASA reservation request, a grant of this petition will promote the CWRM's approach to managing the resource and protecting the public trust, both through its updates to elements of the Hawai`i Water Plan as well as its immediate desire to pursue alternative dispute resolution of the Pō`ai Wai Ola Petition and Complaint.

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[1] On July 24, 2013, Earthjustice on behalf of its clients, Pō`ai Wai Ola and the West Kaua`i Watershed Alliance, filed a petition to amend the Interim Instream Flow Standard ("**IIFS**") for the Waimea River and its tributaries ("**Petition**"), as well as a Complaint And Petition For A Declaratory Order Against Waste ("**Complaint**"), related to the same waters. In the Matter of Pō'ai Wai Ola/West Kaua`i Watershed Alliance's Combined Petition to Amend the Interim Instream Flow Standards for Waimea River and its Headwaters and Tributaries, and Complaint and Petition for Declaratory Order Against Waste, *available at* http://earthjustice.org/sites/default/files/files/WaimeaRiverFlowPetition.pdf. At page 44, Pō`ai Wai Ola stated that it "supports a reasonable and pono (just) balance between parallel public trust uses for the Waimea-Kekaha Hawaiian home lands, and the protection and restoration of Waimea River system's instream uses."

In this context, the DHHL requests this reservation pursuant to the legal authorities discussed below.

LEGAL AUTHORITIES

Congress passed the HHCA on July 9, 1921, thereby establishing a homesteading program for native Hawaiians. Section 4 of the Admission Act of 1959 adopted the HHCA, as amended, as a provision of the Hawai`i State Constitution. Sections 5(b) and 5(f) of the Admission Act reaffirm the State's obligation to manage the Hawaiian home lands and fulfill the purposes of the HHCA, as part of a compact with the United States accepted as a condition for admission into the Union. Thus, as fiduciary, the State must fulfill the enumerated purposes of the HHCA, which includes "[p]roviding adequate amounts of water and supporting infrastructure, so that homestead lands will always be usable and accessible." HHCA § 101(b)(4).[2]

There are numerous legal provisions that serve to carry out the State's broad mandate to provide "adequate amounts of water and supporting infrastructure" for Hawaiian home lands. One such provision is through water reservations to protect the Department's future water needs under the State Water Code (HRS chapter 174C). In particular, the Water Code directs the CWRM to incorporate and protect adequate reserves of water for Hawaiian home lands as set forth in section 221 of the HHCA.[3] HRS § 174C-101(a). HRS section 174C-101(a) states, in relevant part:

> Provisions of this chapter shall not be construed to amend or modify rights or entitlements to water as provided for by the Hawaiian Homes Commission Act, 1920, as amended, and by chapters 167 and 168, relating to the Molokai irrigation system. **Decisions of the commission on water resource management** relating to the planning for, regulation, management, and conservation of water resources in the State **shall, to the extent applicable and consistent with**

[2] The Hawai`i State Constitution Article XII, sections 1 through 4 further define the State's responsibility to carry out and fulfill the purposes of the HHCA. Article XII, section 2 states: "The State and its people do further agree and declare that the spirit of the Hawaiian Homes Commission Act looking to **the continuance of the Hawaiian homes projects** for the further rehabilitation of the Hawaiian race **shall be faithfully carried out**." (Emphases added).

[3] The clear intent of HHCA section 221 was that the Department should have a priority claim to water above any private users in accordance with the Act's mandate. See e.g., HHCA § 221(b) (stating that all water licenses issued shall be subject to the condition that the DHHL is entitled to use, without charge, any water that DHHL deems necessary in order to "adequately to supply the livestock, aquaculture operations, agriculture operations, or domestic needs of individuals upon any tract"); HHCA § 221(c) (stating that the Department may use, without charge water not covered by a water license, or covered by a water license issued after passage of the HHCA in order "adequately to supply the livestock, aquaculture operations, agriculture operations, or domestic needs of individuals upon any tract,"); HHCA § 221(d) (stating that the Department has specific rights to water, without charge, from tributaries to the Waimea River, regardless of whether it is licensed for the *additional* purpose of adequately irrigating any tract).

> **other legal requirements and authority, incorporate and protect adequate reserves of water for current and foreseeable development and use of Hawaiian home lands as set forth in section 221 of the Hawaiian Homes Commission Act.**

(Emphases added).

In addition to the DHHL's legal rights to water that are enshrined in federal and state law, DHHL water uses are public trust uses,[4] a fundamental principle of Hawai`i water law more fully described in a series of significant Hawai`i Supreme Court decisions including In re Kukui (Moloka`i) Inc., 116 Hawai`i 481, 486, 174 P.3d 320, 325 (2007) ("**Kukui**"), and Kauai Springs, Inc. v. Planning Commission of County of Kauai, 133 Hawai`i 141, 173-75, 324 P.3d 951, 982-85 (2014) ("**Kaua`i Springs**"). Thus, the Hawai`i Constitution, the Water Code, the HHCA and case law recognize, affirm and protect the water rights of the Department and its beneficiaries. See In re Wai`ola o Moloka`i, 103 Hawai`i 401, 431, 83 P.3d 664, 694 (2004) (recognizing home land water entitlements as a public trust purpose), HRS §§ 174C-101(a), -49(a), - 49I, -31(q); HHCA §§ 101(b)(4), 220(d); see also HAR §§ 13-171-60 to -63.

Moreover, the Hawai`i Supreme Court has consistently held that as a public trust use of water, the DHHL's uses and reservations are not subject to the heightened standard applied to "private commercial uses." To illustrate, the Hawai`i Supreme Court noted in Waiāhole:

> Thus, insofar as the public trust, by nature and definition, establishes use consistent with trust purposes as the norm or "default" condition, we affirm the Commission's conclusion that it effectively prescribes a "higher level of scrutiny" for private commercial uses such as those proposed in this case. In practical terms, this means that the burden ultimately lies with those seeking or approving such uses to justify them in light of the purposes protected by the trust.

Waiāhole, 94 Hawai`i at 142, 9 P.3d at 454; see also Kaua`i Springs, 133 Hawai`i at 173, 324 P.3d at 983 ("In accordance with the fundamental principles of the public trust and the fact that private commercial use is not one of the uses the public trust protects, a "higher level of scrutiny" is therefore employed when considering proposals for private commercial use."). Here, the water uses advocated by Pō`ai Wai Ola and the DHHL are public trust uses and purposes whereas the remaining water uses are private commercial uses of water subject to the "higher level of scrutiny" standard, including the evaluation of their reasonable-beneficial nature.

In summary, the Department's priority claim to water and the review standards are clearly set forth in the aforementioned authorities, which serve to accomplish the State's broad mandate to provide adequate water and infrastructure to homestead lands so that they are usable and accessible. The methodological process by which the HHC and the DHHL has determined their future water needs is described next.

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[4] Other public trust purposes include (1) water resource protection, (2) domestic water use, and (3) the exercise of Native Hawaiian and traditional and customary rights. Public trust uses do not include private commercial uses. Kukui, 116 Hawai`i at 791 n.6, 174 P.3d at 330 n.6; see also In re Waiāhole Ditch Combined Contested Case Hr'g, 94 Hawai`i 97, 136-37, 9 P.3d 409, 448-49 (2000) ("**Waiāhole**").

GENERAL METHODOLOGY FOR CALCULATING WATER DEMANDS

The Department owns 15,061 acres of land at Waimea, Kaua`i (hereinafter, referred to as the "**Waimea lands**"). These lands, which are part of the original lands set aside by Congress in 1921 for this trust in the HHCA, comprise of 73 percent of the Department's land holdings on Kaua`i. As described in detail below, the HHC has determined through its established land planning and designation process that these lands shall be used for homesteading and related beneficiary uses. Thus, the purpose of this Reservation Petition is to reserve water for the Department's current and foreseeable development of these lands.

DHHL Planning System and Planned Land Uses

The Department has developed a three-tiered planning system to guide development and management of its land holdings for the benefit of current and future beneficiaries. The planning system includes its over-arching General Plan, followed by its second tier of Strategic Program Plans and Island Plans (which includes the Kaua`i Island Plan ("**KIP**") and the WPP), followed again by Regional and Development Plans in its third tier.

DHHL General Plan (2002)

The General Plan (GP), approved by the HHC in February 2002, is the first tier of the Department's planning system.[5] It is a statewide plan with a long-term perspective that establishes seven categories of goals and objectives to meet the Department's mission. The seven categories are: Land Use Planning; Residential Uses; Agricultural and Pastoral Uses; Water Resource; Land Resource Management; Economic Development; and Building Healthy Communities.

The General Plan also establishes ten land use designations that may be applied to land (akin to state and county land use designation and zoning). There are four homesteading designations: Residential, Subsistence Agriculture, Supplemental Agriculture and Pastoral. The remaining six non-homesteading designations are: General Agriculture, Special District, Community Use, Conservation, Commercial and Industrial.[6] These land designations, similar to county zoning, are a valid basis for determining water demands. See Exhibit 2.

Water Policy Plan (2014)

The Reservation Petition is consistent with the vision, mission, values and policies of the WPP and specifically furthers Goal 2 of the WPP to "[a]ggressively, proactively, consistently, and comprehensively advocate for the kuleana of the beneficiaries, the DHHL, and the HHC to water before all relevant agencies and entities." It is also consistent with the WPP policy to

[5] The DHHL General Plan can viewed online at http://dhhl.hawaii.gov/wp-content/uploads/2012/05/Island_Plan_General_2002.pdf.

[6] These non-homesteading land use designations allow for land to be utilized for generation of revenue to support the DHHL.

"[d]evelop, manage, and steward water in a manner that balances cost, efficiency measures, and Public Trust uses in the short and long term."[7]

DHHL Energy Policy (2009)

The Reservation Petition is also consistent with the five objectives of the DHHL Hoʻomaluō Energy Policy[8] and specifically furthers Objective 2, which is "Koʻo: Facilitate the use of diverse renewable energy resources" as well as the second listed activity for that Objective, which is to

> Pursue the leasing of those lands that are identified as suitable for renewable energy projects. (First priority should be given to entities that would provide "firm" renewable energy power such as garbage-to-energy (mass-burn), geothermal, pump-storage hydropower, solar-thermal and second priority to "as-available" renewable energy power such as wind, solar-photovoltaic, and wave.)

Kauaʻi Island Plan (2004)

Island Plans are the second tier and have a longer-term perspective (around twenty years with an update at ten years) and establish land use goals and objectives based on the GP, apply land use designations to meet the needs of the Department, and ensure proper stewardship of the ʻāina. These plans are developed through a process focused on identifying the needs and opportunities of the DHHL beneficiaries by surveys, focus groups, open houses, community consultations, workshops with the HHC, and other community based planning tools. They are also "living documents" in the sense that they remain applicable if funding or other constraints prevent their implementation within stated timeframes, until such time a superseding Island Plan is approved.

The KIP was approved in 2004 and provides recommendations for future uses of the Department's land holdings on Kauaʻi to meet the needs of the Department and its beneficiaries, with particular focus on the next twenty years.[9] For Kauaʻi in particular, the relevant planning objectives include the following:

- Deliver at least 840 Residential homesteads, or an average of 42 homesteads per year;
- Provide agriculture and pastoral homestead lots for subsistence and supplemental purposes;
- Provide general lease agriculture and pastoral lots of adequate size for commercial farming or ranching business purposes by native Hawaiians.

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[7] The DHHL Water Policy Plan can be viewed online at http://dhhl.hawaii.gov/wp-content/uploads/2013/09/HHC-Water-Policy-Plan-140722.pdf.

[8] The DHHL Hoʻomaluō Energy Policy can be viewed online at http://dhhl.hawaii.gov/wp-content/uploads/2011/05/DHHL-Energy-Policy.pdf.

[9] The Kauaʻi Island Plan can be viewed online at http://dhhl.hawaii.gov/wp-content/uploads/2012/05/Island_Plan_Kauai_2004.pdf.

- Identify and establish a clear understanding of existing water resources available to the Hawaiian Home Trust;
- Preserve and protect significant natural, historic and community resources on Trust lands;
- Allow native Hawaiian use of natural resources on Trust lands for traditional and customary purposes;

Following land analysis and intensive community engagement by beneficiaries, the Department assigned its Waimea lands the following land use designations in the KIP:[10]

Land Use Designation	Acreage
Residential Homestead	202
Subsistence Agriculture	214
General Agriculture	12,527
Pastoral Homestead	475
Special District	1,258
Community Use	42
Conservation	343
TOTAL	**15,061**

The Department further refined each land use designation into specific uses that are set forth in the KIP and explained below:

General Agriculture Lands Available for General Leasing (2,617 acres)

The Department plans to use these lands for agriculture and tropical forestry. Based on proposals for use of the 12,527 acres of General Agriculture lands, the Department determined that 3,326 acres are arable and can be utilized for crop production – generally the ridge tops dissected by valleys and served by roads, including formerly cultivated cane lands. Of these 3,326 acres, 709 acres are accounted for in the Pu`u `Ōpae Makai projected use (explained below), and thus, the total acreage of this category is 2,617 acres.

Subsistence Agriculture/Residential/Community Use - Mauka Village (458 acres)

The Department plans the Mauka Village as the center of residential and subsistence agricultural homesteading activities. It will feature 50 subsistence agricultural lots at three acres each (on 214 acres) and 141 residential lots at one acre each (on 202 acres). The Department also plans that 42 acres be set aside for not-yet-specified community uses by the Mauka Village. Thus, the total acreage of the planned Mauka Village (residential and subsistence agriculture homesteads) is 458 acres.

[10] KIP page 3-3. These land use designations are based on several factors such as environmental, natural resource, and cultural attributes, physical characteristics, infrastructure improvements, adjacent existing and planned uses as well as intensive community engagement by beneficiaries. As noted in the attached Item G-2 at page 2, these land use designations are broad categories that can encompass multiple kinds of uses, as is appropriate for a statewide land use classification scheme.

Special District - Pu`u `Ōpae Mauka (523 acres)

The Department envisions the 523 acres of Pu`u `Ōpae Mauka as a cultural pu`uhonua (a place of refuge) where Hawaiians and others may reconnect with land and water resources and learn and share farming and pastoral skills to ensure self-sufficiency. Planned uses for this area include agriculture, aquaculture, pastoral, and community uses, and includes 15 acres for kalo cultivation (of which 10 acres would be in cultivation at any given time).

Special District - Wai`awa Valley Arable (178 acres)

The Department designated 735 acres in this valley as a Special District to preserve cultural resources as well as create opportunities for kalo cultivation at the valley floor. Of these 735 acres, 178 acres sit below the 200-foot contour line and are suitable for kalo cultivation (of which 120 acres would be in cultivation at any given time). Currently, portions of the 178 acres of arable land in Wai`awa Valley are cultivated on a month-to-month revocable permit.

Future Use Homestead - Pu`u `Ōpae Makai (709 acres)

The 709 acres of Pu`u `Ōpae Makai comprise areas of gentler slopes, which were previously used for sugarcane cultivation. Currently, some portions of these lands are used for diversified agriculture on a month-to-month revocable permit. The Department's beneficiaries desire access to these lands for farming and ranching. Beneficiary planning for the use of these lands is discussed more in Section 5, below.

Pastoral - Pu`u `Ōpae Pastoral (475 acres)

The Pu`u `Ōpae Pastoral lands encompass five existing pastoral lots totaling 475 acres. Three of the five lots are currently leased to one beneficiary. Stock and pastoral irrigation water for the existing lessee is provided via the Pu`u Moe diversion stemming from the Kōke`e Ditch. The Department does not contemplate expansion of additional pastoral lots in this area.

No Foreseeable Use with a Water Demand (10,079 acres)

The Department concluded that 10,079 acres of land have no foreseeable use with a water demand for various reasons including topography and access/infrastructure challenges. Lands may be used for conservation purposes including reforestation with native vegetation. Therefore, the Department is not seeking water for these lands.

West Kaua`i Regional Plan (2011) & Draft Beneficiary Plan (2014)

Regional Plans, the third tier of the Department's land use planning, are developed through a series of meetings with beneficiaries and stakeholders to identify issues and opportunities that affect a particular region. Regional Plans generally have a short-term focus of two to four years, however, as with the Island Plans, they are also "living documents" in the sense that they remain applicable if funding or other constraints prevent their implementation within stated timeframes, until such time a superseding Regional Plan is approved.

The Department developed the West Kaua`i Regional Plan following an extensive regional planning process with its Waimea, Kekaha, and Hanapēpē beneficiaries. The HHC

approved this plan in November 2011.[11] Throughout the regional plan process, beneficiaries expressed their desire to utilize lands for agricultural homestead purposes. As a result of this process, the Department identified several priority projects for the West Kaua`i region, including the development of an agricultural and water plan and the development of renewable energy projects compatible with agriculture.

A major milestone in the effort to develop an agricultural and water plan has been met in the form of the submission by the Kekaha Hawaiian Homestead Association of a working draft Project Master Plan for the Pu`u `Ōpae Farm and Irrigation Project. While that plan has not yet been approved by the HHC, the proposed uses in that plan are generally consistent with the land use designations for these areas, and this Reservation Petition would secure adequate water for the realization of that plan.

[11] The West Kaua`i Regional Plan can be viewed online at http://dhhl.hawaii.gov/wp-content/uploads/2011/05/DHHL_West_Kauai_Regional_Plan_030111_small.pdf.

Water Use – Total Water Demand

The Department's 33.145 MGD reservation request is summarized in the table below.

Specific Land Use	*Description*	*Units*	*Duty*	*Basis for Duty*	*Demand (MGD)*
General Agriculture	Agriculture	2,617 acres	3,400 GAD	Hawai`i DOA Agricultural Water Use and Development Plan, 2004 (**"AWUDP"**).	**8.9**
Mauka Village	Residential	141 dwelling units	500 GPU per day	Kaua`i County Water System Standards	**0.07**
	Agriculture (ag subsistence lots)	150 acres	3,400 GAD	AWUDP	**0.51**
		50 dwelling units	500 GPU per day	Kaua`i County Water System Standards	**0.025**
	Community Use	42 acres	4000 GAD	"Table 3.4: SWPP Potable Water Demand Unit Rates by Land Use Designation" October 2014 Draft Report, State Water Projects Plan Update – DHHL, Fukunaga & Associates for the Department of Land and Natural Resources	**0.168**
Pu`u `Ōpae Mauka	Agriculture	508 acres	3,400 GAD	AWUDP	**1.72**
	Kalo Cultivation	15 acres total, max 10 acres in cultivation at any given time	150,000 GPD	Gingerich, S.B., Yeung, C.W., Ibarra, T.N., and Engott, J.A., 2007, Water use in wetland kalo cultivation in Hawai`i: U.S. Geological Survey Open-File Report 2007-1157, 68 p. [http://pubs.usgs.gov/of/2007/1157/] (**"USGS Kalo Study"**)	**1.5**
Wai`awa Valley	Kalo Cultivation	178 acres total, max. 120 acres in cultivation at any given time	150,000 GPD	USGS Kalo Study	**18.0**
Pu`u `Ōpae Makai	Agriculture	709 acres	3,400 GAD	**AWUDP**	**2.41**
Pu`u `Ōpae Pastoral	Pastoral	475 acres	20 GPD	A Literature Compilation of Water Usage for Hawaii (Draft Report), Gee and Murabayshi, May 1994. Calculating Minimum Grazing Lease Rates for Hawai`i, Mark Thorne, Linda J. Cox, and Matthew H. Stevenson, Pasture and Range Management Report, University College of Tropical Agriculture and Human Resources, June 2007.	**0.01**
Total					**33.145**

As explained below, the Department's fundamental water needs for homesteading and beneficiary agricultural uses are based on conservative, reasonable, and fact-based estimates. To the extent possible, the demand standards and their application, including the level of planning detail and justification, are identical to those utilized in other CWRM-approved planning documents (e.g., the various county Water Use and Development Plans). Where the CWRM has not adopted applicable standards (e.g., the watering needs of livestock), the Department sought the best available information for the standards it applied and furnishes this authority to the CWRM as part of its Reservation Petition.

The Department relied upon and utilized County Standards for residential and the domestic demands of subsistence homesteads, an accepted standard for County Water Use and Development Plans. Specifically, the Kaua`i County Water System domestic consumption guideline for residential use is 500 gallons per unit ("**GPU**") per day. Thus, the Department requires 0.095 MGD for the domestic needs of the 191 dwelling units planned in the Mauka Village.

The 2004 HDOA Agricultural Water Use and Development Plan ("**AWUDP**") standard of 3,400 gallons per acre per day ("**GAD**") is accepted as the best available estimate for diversified crop farming in Hawai`i. Notably, the CWRM commonly accepts this methodology in its planning as the AWUDP has been incorporated into the CWRM's Hawai`i Water Plan. Relying upon this duty, the Department calculated that it requires 8.9 MGD for its 2,617 acres of general agriculture lands, 0.51 MGD for its 150 acres of subsistence agriculture lots planned for the Mauka Village, 1.72 MGD for its 508 acres of general agriculture in Pu`u `Ōpae Mauka, and 2.41 MGD for general agriculture for its 709 acres in Pu`u `Ōpae Makai.[12]

Where AWUDP or County Standards are not applicable (e.g., the AWUDP does not have a planning estimate for pastoral uses, although livestock watering is necessary even in rain-fed pasture), the Department relied upon and utilized other acceptable standards. Moreover, the Department intentionally utilized the conservative range of estimates whenever possible, which is consistent with the Department's policy to emphasize conservation measures in its development and use of water. See HHC Water Policy Plan, Policy 3 ("Develop, manage, and steward water in a manner that balances cost, efficiency measures, and Public Trust uses in the short and long term.").

The Department calculated its water needs for the 475 acres of Pu`u `Ōpae Pastoral lands by relying on two authorities: A Literature Compilation of Water Usage for Hawaii (Draft Report), Gee and Murabayshi, May 1994 and Calculating Minimum Grazing Lease Rates for Hawai`i, Mark Thorne, Linda J. Cox, and Matthew H. Stevenson, Pasture and Range Management Report, University of Hawai`i College of Tropical Agriculture and Human

[12] The Department considers this base of 3,400 GAD to be a conservative estimate for its agricultural uses on Waimea's dry, exposed leeward slopes and understands that actual water demand will depend on the crops planted, rainfall month-to-month and year-to-year, and other factors.

Resources, June 2007. Estimation of livestock watering needs requires knowledge of the acres available for grazing, the Animal Unit Months of Forage (AUM, defined as the amount of forage required to sustain one animal unit for one month), and the livestock watering needs per head. The University of Hawai`i College of Tropical Agriculture and Human Resources ("**CTAHR**") notes that "Stocking rates per acre in Hawai`i also vary widely, from more than 24 AUMs in highly productive lands to a low of 0.48 AUMs in dry leeward rangelands." The pastoral lands subject to this water reservation are located in cooler, higher elevations. CTAHR also indicated that the average animal units per acre in Hawai`i, taking into account all pasturelands, is one animal unit per acre per year. Based on these figures, the Department calculated that its 475 acres of pastoral lands could sustain 475 animal units. Estimates of water demand per cow, including in approved water use permit applications from CWRM, range from 20 to 40 gallons per day. Thus, the Department utilized a conservative livestock watering basis of 20 GAD and calculated its reservation request to be 0.01 MGD.

Similarly, the water demand for diversified agriculture is not applicable to kalo grown in lo`i (flooded fields). A duty of 150,000 GPD for the areas planned for kalo cultivation is based on the U.S. Geological Survey's 2007 study entitled Water Use in Wetland Kalo Cultivation in Hawai`i, which studied kalo water demands state-wide ("**USGS Kalo Study**").[13] The USGS Kalo Study is attached hereto as ***Exhibit 3***. According to the study, the average inflow value for the 19 lo`i complexes studied was 260,000 GAD, and the median inflow value was 150,000 GAD. Using the median value of all complexes in Hawai`i is a conservative estimate of flow through needs, and is consistent with the low end of historic estimates of lo`i flow through needs. In other studies reviewed by the USGS, consumptive use of water in kalo cultivation has historically estimated to range from 20,000 to 80,000 GAD.

The Department relied upon the lower duty of 150,000 GAD to calculate that it required 1.5 MGD for its 15 acres planned for kalo cultivation in Pu`u `Ōpae Mauka (of which 10 acres would be cultivated at any given time) and 18.0 MGD for its 178 acres in Wai`awa Valley (of which 120 acres would be cultivated at any given time). A significant amount of water would flow through these complexes in Wai`awa Valley and would be available for other uses on the Mānā Plain. Thus, water discharge after consumption to down-slope water users from Wai`awa can be estimated at 80,000 GAD, assuming a very high consumptive water use of 70,000 GAD. At a minimum, this would provide approximately 9.6 MGD for potential downstream, private commercial uses of water in the Mānā plain.

CONCLUSION

In 1991 when passing Act 325 (which was later codified in part as HRS section 174C-101(a)), the Hawai`i Legislature sought to remedy what it recognized as historical challenges the Department has faced to access water and in turn, its significant effect on the Department's ability to provide beneficiaries with useable and accessible homestead lands:

> Since the passage of the Hawaiian Homes Commission Act of 1921, the shortage of available water has been one of the primary reasons for the failure of administrators to settle Native

[13] The USGS Kalo Study is also available online at http://pubs.usgs.gov/of/2007/1157/.

> Hawaiians on Hawaiian homesteads ... [This] inability to access water resources in an economic and efficient manner has been a major obstacle to the settlement of large tracts of homestead land. In many cases, competing water users have been able to assert claims to water long before the Department has been able to. In some instances, the failure of different state agencies to coordinate their activities has led to the commitment of government sources of water to private interests without regard for the water needs of current and future homesteaders.
>
> This problem has been exacerbated by the potentially long delays in providing supporting infrastructure to Hawaiian homestead areas. During these periods of delay, other water users are seeking to commit water resources for other competing uses.
>
> This threat still exists today....**Accordingly, the legislature finds that further amendments to laws affecting the allocation of water must be enacted to assure that adequate amounts of water are reserved for the future use of Hawaiian homesteaders.**[14]

Here, in order to implement agricultural homesteading, the Department must secure adequate surface water for irrigation as well as capital investments for existing inadequate or proposed infrastructure development. Additionally, operating funds will be required to cover system repairs, improvements, and maintenance. The Department is actively exploring the viability of partnership(s) with non-consumptive water uses that are compatible with agricultural homesteading (i.e., hydroelectric generating facilities, including pumped storage and/or solar renewable energy projects) that will assist with financing the infrastructure (e.g., access, roads, water systems) and operations required to implement the Department's planned agricultural uses as envisioned in the KIP.[15] The ability of the Department to secure such a partnership or to meaningfully implement its plans for its Waimea Lands depends, in large part, on the outcome of this Reservation Petition.

The Department has put forth a conservative estimate of its foreseeable needs, rooted in and consistent with legal authorities, HHC policy and plans, and beneficiary consultation. Therefore, the Department humbly requests that the CWRM consider and grant this petition in light of its duties to the beneficiaries of the HHCA as enshrined in the HHCA, State Constitution, and Water Code.

Enc.

[14] Act 325, 16th Leg., 1991 Reg. Sess., 1991 Haw. Sess. Laws 1013).

[15] In particular, because the Department's bonding capacity is at its ceiling, the Department is limited in its ability to invest in large infrastructure projects without assistance from Legislative CIP or partnerships.

STATE OF HAWAII

DEPARTMENT OF HAWAIIAN HOME LANDS

JANUARY 15, 2013

To: Chairman and Members, Hawaiian Homes Commission

Through: Darrell Yagodich, Planning Program Administrator

From: Kaleo Manuel, Planner

Subject: Authorize the Chairman to Take Actions to Secure the Control and Use of Water in Waimea, Kauai, Through State Administrative Actions

RECOMMENDED MOTION/ACTION

That the Hawaiian Homes Commission (HHC) authorizes the Chairman to:

1. Formally request use, free of all charge, government-owned water in Waimea, Kauai (HHCA §221(c) and §221(d));

2. Formally request a Water Reservation from the Commission on Water Resource Management to adequately reserve water for current and foreseeable development and use of Hawaiian home lands in Waimea, Kauai (State Water Code §174C-101(a));

3. Formally request a Water License from the Board of Land and Natural Resources (BLNR) for control of water and facilities in Waimea, Kauai (HHCA §221(c) and §221(d)); and

4. Take other actions as necessary to effectuate these requests.

EXHIBIT L

ITEM NO. G-2

DISCUSSION

KAUAI ISLAND PLAN
PLANNED LAND USES

The Department of Hawaiian Home Lands (DHHL) holds in trust 15,061 acres of lands at Waimea, Kauai, which comprise of 73% of its land holdings on the island of Kauai. Under DHHL's Kauai Island Plan (KIP) approved by the Hawaiian Homes Commission (HHC) in 2004, these lands have the following land use designations based on a thorough land use analysis as well as intensive community engagement by beneficiaries.

TABLE I: WAIMEA LAND USE DESIGNATIONS

LAND USE DESIGNATION	TOTAL ACRES
Residential	202
Subsistence Agriculture	214
General Agriculture	12,527
Pastoral	475
Special District	1,258
Community Use	42
Conservation	343
Total	15,061

Source: Kauai Island Plan 2004

These land use designations utilized by the HHC are broad categories that can encompass multiple kinds of uses, as is appropriate for a statewide land use classification scheme. The designations allow for the fundamental trust purposes of developing homesteads while taking into account the characteristics of these lands (e.g. high slopes, no infrastructure, cultural resources). The list below and attached map (EXHIBIT A) describes in greater detail the specific uses identified for each designation in this particular area.

1. GENERAL AGRICULTURE LANDS
(ARABLE LANDS = APPROXIMATELY 2,300 ACRES)

In the KIP, lands with this designation are to be used for agriculture and tropical forestry. Based

on proposals received for use of these lands, 2,800 acres of the 12,527 acres of General Agriculture lands are arable and can be utilized for crop production - generally on the ridge tops dissected by valleys and served by roads, including formerly cultivated cane lands.

Of these 2,800 acres, approximately 500 acres of these arable lands are already accounted for in the Special District (Puu Opae Mauka), Future Use Homestead (Puu Opae Makai), and Pastoral (Puu Opae Pastoral) acreage below. The remaining portion of the 12,527 acres is most likely suited for more passive and interim uses without associated currently foreseeable water demands.

2. SUBSISTENCE AGRICULTURE
MAUKA VILLAGE (214 ACRES)

In the Subsistence Agriculture designation, approximately 50 lots, at 3 acres each, can be developed for subsistence agricultural homesteads on a total of 214 acres.

3. SPECIAL DISTRICT
PUU OPAE MAUKA (523 ACRES)

Puu Opae Mauka is envisioned as a cultural puuhonua (a place of refuge) where Hawaiians will be able to reconnect with the land and water and learn and share farming and pastoral skills that can ensure self sufficiency. Uses include agriculture, aquaculture, pastoral, and community uses.

4. SPECIAL DISTRICT
WAI`AWA VALLEY (APPROXIMATELY 200 ACRES)

This valley is designated as a Special District to preserve cultural resources as well as create opportunities for groups to cultivate taro. Approximately 20 acres are currently under a month to month revocable permit for agriculture and kalo

cultivation. Based on an assessment of the valley floor, topographic maps and archaeological reports, approximately 200 acres of lands could be utilized for kalo cultivation or agriculture.

5. FUTURE USE HOMESTEAD
PUU OPAE MAKAI (795 ACRES)

These areas of gentler slopes, previously used for sugarcane cultivation, have the potential to be utilized for future homesteads. Currently, portions of these lands are used for diversified agriculture on a month to month revocable permit. The beneficiary community has indicated a desire to access these lands for farming and ranching.

6. PASTORAL
PUU OPAE PASTORAL (475 ACRES)

There are 5 existing pastoral lots totaling 475 acres. Only one lot is currently leased. Stock water for the existing lessee is provided via the Puu Moe diversion.

WEST KAUAI REGIONAL PLAN
REGIONAL PLAN PRIORITY PROJECTS

The West Kauai Regional Plan was developed through an extensive regional planning process with Waimea, Kekaha, and Hanapepe beneficiaries and approved by the HHC in November 2011. Five (5) priority projects were identified as a result of this process for the West Kauai region:

- Develop an Agricultural and Water Plan
- Develop a Multi-Purpose, Evacuation, and Education Center/Shelter
- Support the Development of the Kekaha Enterprise Center
- Develop Renewable Energy Projects Compatible with Agriculture

- Develop Agricultural Uses for Hanapepe Farm Lots/Lease Areas

Throughout the regional plan process, beneficiaries expressed their desire to utilize DHHL lands for agricultural homesteading purposes.

1. It was recognized that the first step to support and implement agricultural homesteading is to secure adequate low-cost surface water for irrigation.

2. Secondly, capital investments are needed for existing inadequate or proposed infrastructure development. Operating funds are needed to cover system repairs, improvements, and maintenance.

3. Partnering with non-consumptive water uses that are compatible with agricultural homesteading (i.e. hydroelectric generating facilities or solar renewable energy projects) can assist with financing the infrastructure (e.g. access, roads, water systems) and operations needed for the planned agricultural uses envisioned in the KIP. Waimea has a unique set of resources to support this approach.

4. There are a number of actions taking place which put more emphasis on joint ventures and partnerships to provide lease rent and royalty payments:

   - Act 14 settlement funds of $30 million annually to DHHL are ending in 2014

   - DHHL has a limited bonding ability to finance large infrastructure and capital improvement projects

   - The Nelson Supreme Court decision is expected to provide State support for DHHL operations, thus allowing use of DHHL-generated revenues to support homestead development that will help to ensure that adequate amounts of water and supporting

infrastructure will make homestead lands usable and accessible.

WATER USE

Based on the land use designations of the KIP and further specific land uses, water demands for 4,507 acres out of DHHL's total 15,061 acres in Waimea, Kauai, will be used for the formal request for water use. The implementation of the priority projects in the West Kauai Regional Plan are consistent with the proposed land uses and are therefore accounted for in the water use demand projections.

LEGAL AUTHORITIES

There are a number of established legal authorities that empower the HHC to direct its chairman to secure water in the manner that is recommended.

The State of Hawaii has the obligation as a fiduciary to fulfill the enumerated purposes of the Hawaiian Homes Commission Act (HHCA) of 1920, including of "Providing adequate amounts of water and supporting infrastructure, so that homestead lands will always be usable and accessible" HHCA §101(b)(4).

The Admission Act of 1959 §4 adopts the HHCA as a provision of the Constitution of the State of Hawaii. The Admission Act §5(b) and §5(f) reaffirms the obligation of the State of Hawaii to manage the lands and fulfill the purposes of the HHCA, as part of a compact with the United States accepted as a condition for admission into the Union.

The Hawaii State Constitution Article XII Sections 1 through 4 further define the State of Hawaii's responsibilities to carry out and fulfill the purposes of the HHCA.

Specifically related to the claims of the Department to water, HHCA §221(c)(1) states that:

"In order adequately to supply livestock, the aquaculture operations, the agriculture

operations, or the domestic needs of individuals upon any tract, the department is authorized (1) to use, free of all charge, government-owned water not covered by any water license or covered by a water license issued after the passage of this Act but containing a reservation of such water for the benefit of the public…"

HHCA §221(d) specifically identifies DHHL's authority to use water tributary to the Waimea river on the island of Kauai:

"The department is authorized, for the additional purpose of adequately irrigating any tract, to use, free of all charge, government-owned surplus water tributary to the Waimea river upon the island of Kauai, not covered by a water license or covered by a water license issued after July 9, 1921. Any water license issued after that date and covering any such government-owned water shall be deemed subject to the condition, whether or not stipulated therein, that the licensee shall, upon the demand of the department, grant to it the right to use, free of all charge, any of the surplus water tributary to the Waimea river upon the island of Kauai, which is covered by the license and which the department deems necessary for the additional purpose of adequately irrigating any tract."

The phrase "government owned surplus water" reflects the legal understanding of water that existed when Hawaii was a territory and the HHCA was written. At that time, Hawaii courts, influenced by the sugar planters who dominated economic life, opined that water could be privately owned and sold like land, and that any water not being diverted for agriculture and left in a stream was "surplus." That view was contradictory to traditional and customary understandings and Kingdom law, which held that water, was held in a trust by the ruling alii and was to be managed for the benefit of the people. Legal decisions since the 1970's and the Water Code have returned the legal understanding of water to its traditional cultural roots.

Nonetheless, the clear intent of section 221 was that the DHHL should have a priority claim to water above any private users.

HHCA §221(e) highlights that the department has the ability to use, contract for, or acquire water transmission systems for its use:

> "All rights conferred on the department by this section to use, contract for, or acquire the use of water shall be deemed to include the right to use, contract for, or acquire the use of any ditch or pipeline constructed for the distribution and control of such water and necessary to such use by the department."

To help effectuate the purpose of the HHCA by reserving water for DHHL, the State Water Code §174C-101(a) requires that:

> "Decisions of the commission on water resource management relating to the planning for, regulation, management, and conservation of water resources in the State shall, to the extent applicable and consistent with other legal requirements and authority, incorporate and protect adequate reserves of water for current and foreseeable development and use of Hawaiian home lands as set forth in section 221 of the Hawaiian Homes Commission Act."

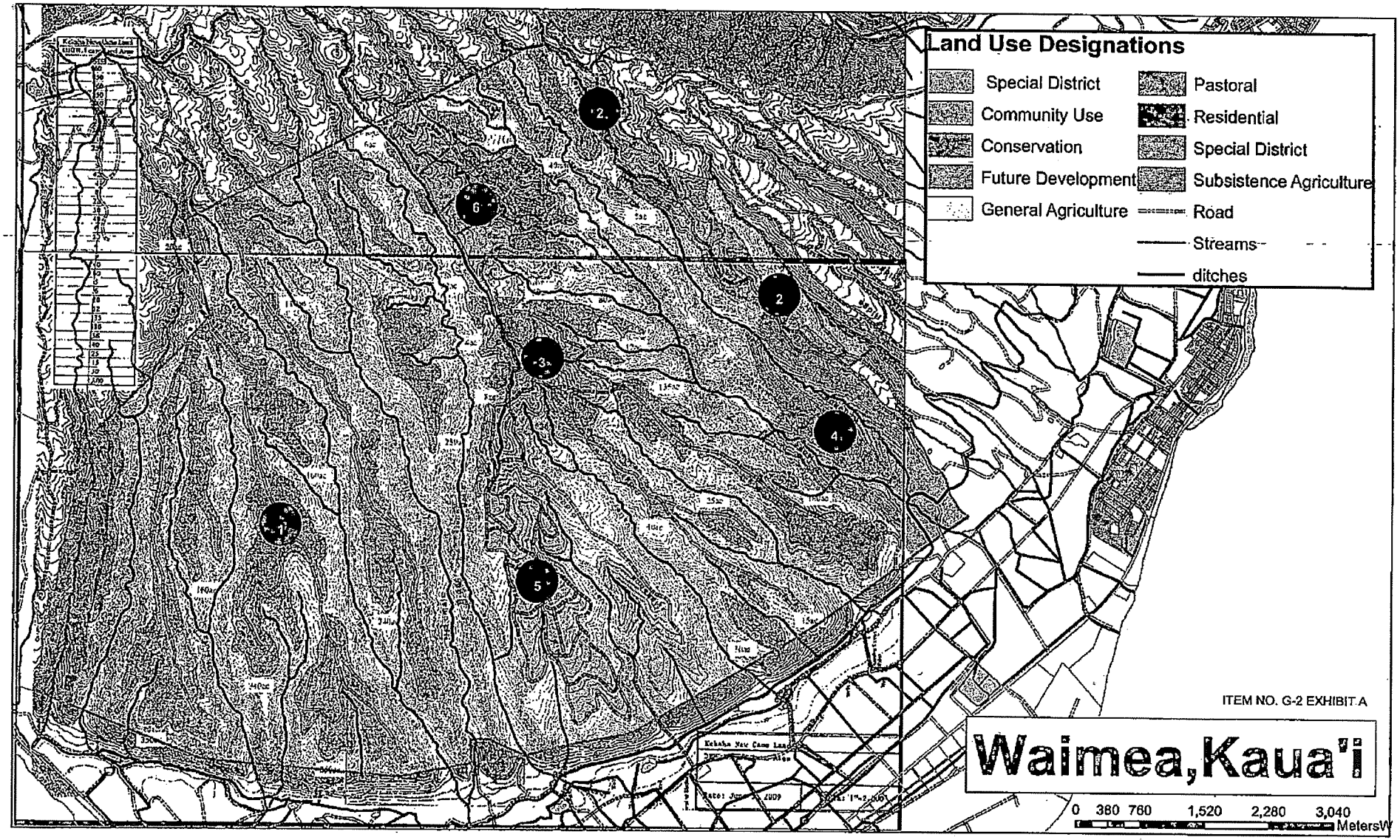
RECOMMENDATION

Staff respectfully requests that the Hawaiian Homes Commission approve the recommended motion/action based on the following considerations:

1. To secure adequate reserves of water for current and foreseeable planned development and use of Hawaiian home lands in Waimea, Kauai as set forth in section 221 of the Hawaiian Homes Commission Act;

2. To ensure that DHHL and the State of Hawaii will provide adequate amounts of water and supporting infrastructure, in partnership with others, so that homestead lands will be usable and accessible; and

3. To initiate the process to ensure that water is available for planned purposes of the HHCA at Waimea, Kauai, as articulated in the HHC-approved Kauai Island Plan and West Kauai Regional Plan.


Land Use Designations
Special District
Community Use
Conservation
Future Development
General Agriculture
Pastoral
Residential
Special District
Subsistence Agriculture
Road
Streams
ditches
ITEM NO. G-2 EXHIBIT A
Waimea, Kaua'i
0 380 760 1,520 2,280 3,040
Meters

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

STAFF SUBMITTAL

for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

August 17, 2015
Kona, Hawaii

Department of Hawaiian Home Lands,
Request for Reservation of
3.398 Million Gallons per Day of Water from the
Keauhou Aquifer System Area, Kona, Hawaii

SUMMARY OF REQUEST:

Staff requests that the Commission on Water Resource Management (Commission) approve the request by the Department of Hawaiian Home Lands (DHHL) to reserve 3.398 million gallons per day (mgd) of ground water from the Keauhou Aquifer System Area for DHHL's existing and foreseeable future needs (Exhibit 1).

LOCATION: Keauhou Aquifer System Area (KASA), Kona, Hawaii (Exhibit 2).

DHHL WATER RESERVATION REQUEST:

On December 5, 2014, DHHL submitted via email the subject reservation request, dated November 24, 2014 (Exhibit 1). The purpose of the request is to establish an adequate reserve of water for current and foreseeable development and use of Hawaiian home lands in the KASA (see Exhibit 2 for location map).

DHHL currently holds 1,510 acres of land in the KASA. Breakdowns of the land use designations and planned uses are provided in Tables I and II of Exhibit 1, which also includes a project map. A total of 2,279 units are either existing or planned. DHHL plans include the development of four new wells, each having a capacity of 1 mgd, as well as appropriate storage and transmission to meet future needs. An additional 359 acres are in the process of being transferred to DHHL. Upon completion of the transfer, DHHL will own approximately 1,869 acres of land in Keauhou.

EXHIBIT 2

DHHL utilized the Domestic Consumption Guidelines in the County Water System Standards to estimate demand for residential, commercial, and industrial acreages. Agricultural demands were estimated to be 3,400 gallons per acre per day, based on the recommended duty for diversified agriculture established in the 2004 Agricultural Water Use and Development Plan. Water demands, totaling 3.728 mgd, are summarized in Table III of Exhibit 1. After subtracting out areas already constructed and those having water allocations, the unmet demand is 3.398 mgd.

LEGAL AUTHORITY:

The State Water Code provides for reservations of water in both designated and non-designated water management areas. In designated areas, water reservations may be made pursuant to §174C-49(d) Hawaii Revised Statutes (HRS), which states:

> *The commission, by rule, may reserve water in such locations and quantities and for such seasons of the year as in its judgment may be necessary. Such reservations shall be subject to periodic review and revision in the light of changed conditions; provided that all presently existing legal uses of water shall be protected.*

Subchapter 6 includes Administrative Rule §13-171-60 that provides further guidance for water reservations in water management areas:

> *(a) As provided in HRS §174C-49(d), the commission, by rule, may reserve water in such locations and quantities and for such seasons of the year as in its judgment may be necessary.*
>
> *(b) The commission shall adopt within this subchapter specific reservations of water in water management areas in such quantities as are deemed necessary for purposes which are consistent with the public interest, including the provision of water for current and foreseeable development and use of Hawaiian home lands pursuant to section 221 of the Hawaiian Homes Commission Act and HRS §174C-101(a).*
>
> *(c) Proceedings for the establishment of a reservation of water resources within a designated water management area by the commission may be initiated:*
>
> *(1) Upon recommendation by the chairperson; or*
>
> *(2) Upon written petition to the commission by any interested person with proper standing.*
>
> *(d) Reserved water shall not be allocated from water management areas by the commission except upon application for a water use permit by the party, or parties, for whom the water was reserved.*
>
> *(e) All reservations shall be subject to periodic review and revision in light of changed conditions.*

Thus far, the Commission has only established three water reservations by rule in water management areas. All three are for DHHL. Hawaii Administrative Rules §§13-171-61 to 13-171-63 are shown in Exhibit 3 and summarized below in Table 1.

Table 1. Summary of Water Reservations in Water Management Areas

Administrative Rule	Island	Water Management Area	Effective Date	Initial Reservation (mgd)	Current Reservation (mgd)
§13-171-61	Oahu	Waipahu-Waiawa	2/18/94	1.724	1.358
§13-171-62	Oahu	Waimanalo	2/18/94	0.124	0.124
§13-171-63	Molokai	Kualapuu	6/10/95	2.905	2.905

HRS §174C-101(a) also authorizes water reservations for DHHL, whether or not the area has been designated a water management area:

> *Decisions of the commission on water resource management relating to the planning for, regulation, management, and conservation of water resources in the State shall, to the extent applicable and consistent with other legal requirements and authority, incorporate and protect adequate reserves of water for current and foreseeable development and use of Hawaiian home lands as set forth in section 221 of the Hawaiian Homes Commission Act.*

While administrative rules have not yet been promulgated for this statutory provision, staff has been advised by legal counsel that, pursuant to this provision, the Commission may reserve water for DHHL statewide, whether or not the area has been designated as a water management area, in regular meetings under HRS §92. It is under this authority that staff is recommending the Commission reserve water for DHHL in the KASA, which has not been designated as a water management area.

IMPLICATIONS OF WATER RESERVATION:

Should the Commission approve this request; the water reservation will be documented in the Water Resource Protection Plan (WRPP), along with the prior approved water reservations. If in the future the KASA is designated as a water management area, staff will initiate review and rule-making pursuant to HRS §174C-49(d) HRS and Hawaii Administrative Rule §13-171-60(b). Staff is further recommending that the Commission clarify and direct that any water reservations made pursuant to HRS §174C-101(a), be incorporated in the calculation of authorized planned use, as defined in HRS §174C-3 & §174C-44(1) and corresponding HAR §13-171-2 & §13-171-7(1) for the respective aquifer system area.

The reservation is for ground water from the KASA and its aquifer resources therein.

CONSISTENCY WITH THE HAWAII WATER PLAN (HWP):

The Hawaii Water Plan (HWP) is the State's long-range water plan, and staff believes it is important that water reservations be consistent with, and have basis in, the HWP. The appropriate parts of the HWP that justify reservations are the County Water Use and Development Plans (WUDPs) and State Water Projects Plan (SWPP). Of the two, staff feels the appropriate HWP component in which to include full buildout demands is the County WUDP.

While Hawaii Administrative Rule §§13-170-32(b)(3) and 13-170-42(c), as well as the Commission's Framework for Updating the Hawaii Water Plan, direct that a twenty-year projection period be considered for analysis purposes for the County WUDPs and the SWPP, respectively, it is important that the counties recognize the buildout needs of DHHL and give appropriate consideration to those needs as long-range plans for water development are developed. It is at the County WUDP planning stage that coordination of State water needs, including DHHL, and the needs of other use sectors (i.e., military, municipal, private, and agriculture) are integrated into a comprehensive resource development strategy and implementation plan.

The State Water Projects Plan (SWPP) is the component of the Hawaii Water Plan that documents the water needs of all State agencies, including DHHL, over a 20-year planning horizon. The Engineering Division of the Department of Land and Natural Resources is responsible for the development and updating of the SWPP. In additional to inventorying the existing and future water needs for State projects, through the SWPP, Engineering Division also promotes partnerships and cost sharing to coordinate water development projects and water infrastructure improvements of potentially competing State agencies. Based on the SWPP, Engineering Division pursues legislative funding to support new source development through Capital Improvement Project requests and allocates water credits to participating State agencies. Implementation of the SWPP in close coordination with the County Water Use and Development Plan is needed to ensure orderly authorization and development.

Initially adopted in 1990 and revised in 2003, a third revision of the SWPP is underway and near completion. Due to funding constraints, Engineering Division is focusing this SWPP update exclusively on DHHL. DHHL was selected because: 1) they are the largest landowner amongst State agencies and thus could have the most significant impact on water resource development and use, and 2) DHHL water needs are an identified public trust purpose and have priority under the State Constitution and Water Code.

A preliminary draft of the SWPP was made available to the Commission staff; the document has not yet been released for public review. In accordance with the requirements of the Statewide Framework for Updating the Hawaii Water Plan, a range of forecasts was developed (high, medium, and low) over the 20-year planning period. Water use unit rates, or duties, were kept constant, while development data (e.g., unit density rates for residential areas) were adjusted to achieve variability in demand projections. There is very little non-potable demand (i.e., agriculture) projected for DHHL lands in the KASA. The October 2014 SWPP Draft Report shows a range in 2031 projected potable water demand from a low of 1.818 mgd to a high of 3.375 mgd. The medium demand projection, on which source and infrastructure planning will be based, is 2.413 mgd.

More recently, Engineering Division has also received funding to update the SWPP for the West Hawaii area, as well as for a comprehensive statewide update. Therefore, there are currently three separate SWPP update efforts ongoing at this time, with the update for DHHL being the farthest along. The statewide update will incorporate the DHHL partial update as well as the regional update for West Hawaii in order to develop final comprehensive water development strategies that consider and coordinate the needs of all State water projects and plans.

Due to the interest in the KASA petition to designate the area as a ground water management area, DHHL filed the petition for reservation request. Since then, the County of Hawaii and Commission staff have viewed the buildout projection as part of the authorized planned use criteria for designation analysis specified under HRS §§174C-3 and -44, and the County of Hawaii will include the 3.398 buildout projection in its update of the WUDP for the KASA (defined as the Keauhou ASYA in the WUDP). Therefore, combined with the proposed framework twenty-year projection in both the WUDP and SWPP, the proposed buildout water reservation in the County of Hawaii WUDP will be consistent with the HWP for the KASA for reservation purposes. This reservation promotes the Commission's approach to managing the resource and protecting the public trust through the collaboration and consistency framework provided by the HWP.

RECOMMENDATION:

Staff recommends that the Commission:

1. Find the reservation request for 3.398 mgd from the Keauhou Aquifer System Area for the Department of Hawaiian Home Lands is consistent with the HWP,

2. Approve a water reservation for 3.398 mgd from the Keauhou Aquifer System Area for the Department of Hawaiian Home Lands, and

3. Direct that this water reservation, and all future reservations made pursuant to HRS §174C-101(a), be incorporated in the calculation of authorized planned use.

Respectfully submitted,

W. Roy Hardy

W. ROY HARDY
Acting Deputy Director

Exhibit 1 November 24, 2014 DHHL Request for Water Reservation
Exhibit 2 Location map
Exhibit 3 §§13-171-61 to 13-171-63 Hawaii Administrative Rules

APPROVED FOR SUBMITTAL:

SUZANNE D. CASE
Chairperson

NEIL ABERCROMBIE
GOVERNOR
STATE OF HAWAII

JOBIE M. K. MASAGATANI
CHAIRMAN
HAWAIIAN HOMES COMMISSION

DARRELL T. YOUNG
DEPUTY TO THE CHAIRMAN

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

November 24, 2014

MEMORANDUM

TO: The Honorable William J. Aila, Jr., Chairperson
Commission on Water Resource Management

FROM: Jobie M. K. Masagatani, Chairman
Hawaiian Homes Commission

SUBJECT: Request for Water Reservation
of 3.398 Million Gallons Per Day of Water in the
Keauhou Aquifer System Area, Kona, Hawaii

At its November 17 and 18, 2014, meeting, the Hawaiian Homes Commission (HHC) unanimously approved item G-1 (attached), which authorized the Chairman to formally request a Water Reservation of 3.398 million gallons per day (MGD) in the Keauhou Aquifer System Area (ASA) from the Commission on Water Resource Management (CWRM). The purpose of this request is to adequately reserve water for current and foreseeable development and use of Hawaiian home lands in the Keauhou ASA, Kona, Hawaii, per the State Water Code §174C-101(a).

This memorandum serves as the formal request of the Department of Hawaiian Home Lands for a water reservation of 3.398 MGD in the Keauhou ASA.

We humbly ask CWRM to reserve, incorporate, and protect this adequate reserve of water for current and foreseeable development and use of Hawaiian home lands.

Enc.

c: David Kaapu, Commissioner - West Hawaii
Jim Du Pont, District Office Manager - West Hawaii

STATE OF HAWAII

DEPARTMENT OF HAWAIIAN HOME LANDS

NOVEMBER 17-18, 2014

To: Chairman and Members, Hawaiian Homes Commission

From: Kaleo Manuel, Acting Planning Program Manager

Subject: Authorize the Chairman to Request and Pursue a Water Reservation in Keauhou, Kona, Hawaii

RECOMMENDED MOTION/ACTION

That the Hawaiian Homes Commission (HHC) authorizes the Chairman to:

1. Formally request a Water Reservation of 3.398 MGD in the Keauhou Aquifer System Area (ASA) from the Commission on Water Resource Management (CWRM) to adequately reserve water for current and foreseeable development and use of Hawaiian home lands in the Keauhou ASA, Kona, Hawaii (State Water Code §174C-101(a));

2. Testify and participate in the water management area designation process on behalf of the Hawaiian Homes Commission specific to item 1 above; and

3. Take other actions as necessary to effectuate these requests.

DISCUSSION

WEST HAWAII ISLAND PLAN UPDATE - PLANNED LAND USES

The Department of Hawaiian Home Lands (DHHL) currently holds in trust approximately 1,500 acres of lands in the Keauhou ASA which comprise of approximately one percent of its lands holdings on the island of Hawaii. These lands were not part of the original trust inventory and were acquired from the Department of Land and Natural Resources (DLNR), Hawaii Housing and Finance Development Corporation (HHFDC) and Queen Liliuokalani Trust (QLT). Per the Hawaii Island Plan (HIP) approved by the HHC in 2002 and the West Hawaii Island Plan Update (WHIP) approved by the HHC in 2009, these lands have the following land use designations

based on a thorough land use analysis as well as intensive community engagement with beneficiaries.

TABLE I: LAND USE DESIGNATIONS

LAND USE DESIGNATION	TOTAL ACRES
Residential	600
Community Use	30
General Agriculture	100
Commercial	667
Industrial	100
Total	1,497

Source: HIP 2002 & WHIP 2009

These land use designations utilized by the HHC are broad categories that can encompass multiple kinds of uses, as is appropriate for a statewide land use classification scheme. The designations allow for the fundamental trust purposes of developing homesteads while taking into account the characteristics of these lands (e.g. high slopes, no infrastructure, cultural and natural resources).

Since 2009, there have been very little changes to the overall planned land uses in the region. At full build out, over 2,000 residential homestead lots will be developed. Table II below and the attached maps (EXHIBIT A) details DHHL's Keauhou ASA lands in 4 distinct areas (Kalaoa, Honokohau, Kealakehe, and Keahuolu), their land use designations, approximate acreage, and existing and planned units.

TABLE II: PLANNED LAND USES

AREA	LAND USE DESIGNATION	ACRES	EXISTING OR PLANNED UNITS
Kalaoa	Commercial	384	
Kalaoa	Industrial	100	
Kalaoa	General Ag	100	
Kalaoa	Residential	130	283 units
Honokohau	Commercial	200	
Kealakehe 1	Residential	50	260 units
Kealakehe 2	Residential	50	256 units
Kealakehe 3	Residential	50	225 units
Kealakehe 4	Residential	55	220 units
Kealakehe 5	Residential	23	116 units
Kealakehe 6	Community Use	26	
Kealakehe 6	Commercial	26	
Kealakehe 7	Residential	11	61 units
Kealakehe 8	Commercial	34	
Kealakehe 11	Residential	24	126 units
Kealakehe	Preserves	97	
Keahuolu	Residential	140	732 units
Keahuolu	Community Use	10	
TOTAL		1,510	2,279 units

Source: Village of Lai Opua Water Master Plan 2006 & WHIP 2009

In October 2010, the Board of Land and Natural Resources (BLNR) approved the conveyance of an additional 359 acres of land in Kalaoa, Kona, Hawaii to DHHL. Once subdivided and officially transferred to DHHL, DHHL will own approximately 1,869 acres in the Keauhou ASA.

WATER POLICY PLAN

In July 2014, the HHC adopted a Water Policy Plan (WPP) to provide strategic, proactive, comprehensive and consistent guidance and direction to the HHC, DHHL staff, and beneficiaries on water related issues, actions, and decisions. This WPP was developed using existing legal authorities, previously approved policies and plans (e.g. General Plan 2002), and extensive beneficiary input and consultation in compliance with DHHL's Beneficiary Consultation Policy (2009).

The recommended motion/action is consistent with the vision, mission, values, and policies of the WPP. More specifically, by requesting and securing a water reservation in the Keauhou ASA, Goal 2 of the WPP is being implemented:

> "Aggressively, proactively, consistently, and comprehensively advocate for the kuleana of the beneficiaries, the DHHL, and the HHC to water before all relevant agencies and entities."

KEALAKEHE REGIONAL PLAN

The Kealakehe Regional Plan was developed through a regional planning process with beneficiaries and approved by the HHC in 2009. Five (5) priority projects were identified as a result of this process for the Kealakehe region, and one of the five is specific to water: "North Kona Water Source Development and Storage."

The priority project focuses on working collaboratively with various stakeholders in the region to develop additional water sources in order to meet the needs of DHHL's Lai Opua lands and adjacent projects. It is estimated that four (4) additional wells each with a capacity of one million gallons/day, as well as appropriate storage and transmission, would need to be developed. Initial planning and design phases of the project were estimated at $14.4 million.

WATER USE - TOTAL WATER DEMAND & EXISTING ALLOCATIONS

Utilizing DHHL's planned land uses and designations, water demands for the 1,510 acres of DHHL's lands in the Keauhou ASA can be calculated using water system standards average gallon per day consumption per unit or acre (gdp/acre or gdp/unit). The total water demands are detailed in Table III below.

Tied to the acquisition of the lands in the Keauhou ASA, DHHL received 392 water credit allocations (5/8" residential meters calculated at an average of 400 gpd) as part of a transfer agreement with HHFDC and a tri-party agreement between Hawaii Electric Light Company and the Department of Water Supply (DWS). These water credits and their use is detailed in TABLE IV below.

The remaining balance of DHHL's 221 water credits is being applied to Village 4 of Lai Opua. The lot plan for Village 4 was reconfigured (decreased) to stay within the 221 remaining water credits, which at one time was planned for 251 lots.

To summarize, approximately 3.398 MGD (Million Gallons/Day) of water is still needed for full build out of DHHL lands in the Keauhou ASA.

TABLE III. DHHL WATER DEMAND FOR LANDS IN KEAHUOU ASA

AREA	LAND USE DESIGNATION	ACRES	WATER SYSTEM STANDARDS DEMANDS	EXISTING OR PLANNED UNITS OR ACRES	TOTAL WATER DEMAND (MGD)
Kalaoa	Commercial	384	3,000 gpd/acre	384 acres	1.152
Kalaoa	Industrial	100	4,000 gpd/acre	100 acres	0.400
Kalaoa**	General Ag	100	3,400 gpd/acre	100 acres	0.340
Kalaoa	Residential	130	400 gpd/unit	283 units	0.113
Honokohau	Commercial	200	3,000 gpd/acre	200 acres	0.600
Kealakehe 1	Residential	50	400 gpd/unit	260 units	0.104
Kealakehe 2	Residential	50	400 gpd/unit	256 units	0.102
Kealakehe 3*	Residential	50	400 gpd/unit	225 units	0.090
Kealakehe 4*	Residential	55	400 gpd/unit	220 units	0.088
Kealakehe 5*	Residential	23	400 gpd/unit	116 units	0.046
Kealakehe 6*	Community Use	26	4,000 gpd/acre	26 acres	0.104
Kealakehe 6	Commercial	26	3,000 gpd/acre	26 acres	0.078
Kealakehe 7	Residential	11	400 gpd/unit	61 units	0.024
Kealakehe 8	Commercial	34	3,000 gpd/acre	34 acres	0.102
Kealakehe 11	Residential	24	400 gpd/unit	126 units	0.050
Kealakehe*	Preserves	97		97 acres	0.002
Keahuolu	Residential	140	400 gpd/unit	732 units	0.293
Keahuolu	Community Use	10	4,000 gpd/acre	10 acres	0.040
TOTAL		1,510		2,279 units	3.728

Sources: Update of State Water Projects Plan (underway), Village of Lai Opua Water Master Plan 2006, WHIP 2009, Special Report #2 Water Resources Hawaii Island 2012
**These areas have water allocations or are already constructed.*
***This is a non-potable water demand*

TABLE IV: EXISTING WATER ALLOCATIONS (WATER CREDITS)

Villages of Laiopua DHHL Available Water Allocation as of 8/31/10	Water Credits	Reference	Notes
Water Credits per HHFDC Transfer Agreement	241	Transfer Agreement between HHFDC & DHHL dated 12/30/04	
Water Commitments Tri-Party Agreement	151	Tri-Party Agmnt between HELCO, Water Board, & DHHL dated 9/28/04	
Assign one (1) credit to TMK: 7-4-21: 005 (Aupaka Preserve)	(1)	Meter No. 0032640328, Acct No. 007-67500004-10	In service
Assign one (1) credit to TMK: 7-4-20: 006 (Lessor Aupaka Preserve)	(1)	Meter No. 0065830010, Acct No. 007-67500003-10	In service
Reserve 117 credits for Laiopua Village 5	(117)	Subdivision Application No. SUB-05-000171	Under construction; first service expected 12/10
One (1) credit to Uhiuhi Preserve; TMK: 7-4-21: 011	(1)	SUB -08-000806, DHHL letter dated 8/30/10	To be constructed; service expected 9/10
One (1) credit to Village 4 parcel; TMK: 7-4-21: 012	(1)	SUB -08-000806, DHHL letter dated 8/30/10	DHHL requests that service be deferred
One (1) credit to Village 2 parcel; TMK: 7-4-21: 018	(1)	SUB -08-000806, DHHL letter dated 8/30/10	DHHL requests that service be deferred
One (1) credit to Archaeological Preserve; TMK: 7-4-21: 016	(1)	DHHL letter dated 8/31/10	To be constructed; service expected 9/10
16 credits to TMK: 7-4-20: 003 (Laiopua 2020 Community Center, Ph 1)	(16)	Memo to DWS dated 12/11/09, DWS Letter dated 2/11/10	To be constructed; service expected 2011
One (1) credit for TMK: 7-4-21: 023; future Commercial Center.	(1)	SUB -09-000866 (subdivision of former Village 6)	DHHL requests that service be deferred
31 credits to TMK: 7-4-21: 002 (Kamehameha Schools Pre-school)	(31)	Memo to DWS dated 4/9/10	To be constructed; service expected 2011
BALANCE =	221		

**Note: DHHL is currently reimbursing HHFDC $1.7 million/year for infrastructure investments they developed in Lai Opua, Hawaii, Lealii, Maui, and Waiahole, Oahu, including water infrastructure, so the water credits DHHL received, is being paid for by DHHL.*

LEGAL AUTHORITIES

There are a number of established legal authorities that empower the HHC to direct its chairman to secure water in the manner that is recommended.

As a general background, the State of Hawaii has the obligation as a fiduciary to fulfill the enumerated purposes of the Hawaiian Homes Commission Act (HHCA) of 1920, including "Providing adequate amounts of water and supporting infrastructure, so that homestead lands will always be usable and accessible" HHCA §101(b)(4).

The Admission Act of 1959 §4 adopts the HHCA as a provision of the Constitution of the State of Hawaii. The Admission Act §5(b) and §5(f) reaffirms the obligation of the State of Hawaii to manage the lands and fulfill the purposes of the HHCA, as part of a compact with the United States accepted as a condition for admission into the Union.

The Hawaii State Constitution Article XII Sections 1 through 4 further defines the State of Hawaii's responsibilities to carry out and fulfill the purposes of the HHCA. It is important to note that Article XII, Section 2 of the State Constitution specifies:

> "The State and its people do further agree and declare that the spirit of the Hawaiian Homes Commission Act looking to the continuance of the Hawaiian homes projects for the further rehabilitation of the Hawaiian race shall be faithfully carried out."

There are numerous legal provisions in state law that effectuates the broad mandate to provide "adequate amounts of water and supporting infrastructure." In this particular instance being considered by the HHC, two legal provisions are particularly relevant: the rights to reservations of water for DHHL under the state Water Code, and the status that DHHL uses of water and reservations for the future use of water are protected "Public Trust" uses of water under Hawaii law.

DHHL WATER RESERVATIONS

The State Water Code (HRS 174C) is the guiding framework for the management and allocation of water in the islands. The Code fulfills the provisions of the State Constitution that relate to water, in particular Sections 1

and 7 of Article XI, which respectively enumerate that "All public natural resources are held in trust by the State for the benefit of the people," and that there shall be a "water resources agency which, as provided by law, shall set overall water conservation, quality and use policies; define beneficial and reasonable uses; protect ground and surface water resources, watersheds and natural stream environments; establish criteria for water use priorities while assuring appurtenant rights and existing correlative and riparian uses and establish procedures for regulating all uses of Hawaii's water resources."

In the Water Code, the commitment to protect DHHL's future water needs is to be executed in significant part through the creation of "reservations" of water. "Reservations" are water held by CWRM for future uses. Reservations are an identified purpose of the water resources trust and may not be used or interfered with by other parties. "Reservations" of water are discussed in Parts IV and IX of the Code.

Part IV of the Water Code, "REGULATION OF WATER USE," deals with CWRM duties related to the establishment of water management areas and permitting in those areas. HRS §174C-49 addresses permitting in water management areas, and subsection (d) notes that:

> "The commission, by rule, may reserve water in such locations and quantities and for such seasons of the year as in its judgment may be necessary. Such reservations shall be subject to periodic review and revision in the light of changed conditions; provided that all presently existing legal uses of water shall be protected."

Under the authority of this part of the Code, the Commission established administrative rules for reserving water in designated areas, codified as HAR §13-171-60. This rule specifically calls out in part (b):

> "The commission shall adopt, within this subchapter specific reservations of water in water management areas in such quantities as are deemed necessary for purposes which are consistent with the public interest, including the provision of water for current and foreseeable development and use of Hawaiian home lands pursuant to section 221 of the Hawaiian Homes Commission Act and HRS §174C-101(a)."

Thus reservations of water can and should be made for DHHL in designated water management areas by rule making as described in HAR §13-171-60. Such reservations have been made by the Commission for water management areas on Oahu and Molokai.

Part IX of the Code, "NATIVE HAWAIIAN WATER RIGHTS", addresses water rights under the HHCA, revenue from water licenses, traditional and customary rights, and appurtenant rights. HRS §174C-101(a) provides that:

> "Provisions of this chapter shall not be construed to amend or modify rights or entitlements to water as provided for by the Hawaiian Homes Commission Act, 1920, as amended, and by chapters 167 and 168, relating to the Molokai irrigation system. Decisions of the commission on water resource management relating to the planning for, regulation, management, and conservation of water resources in the State shall, to the extent applicable and consistent with other legal requirements and authority, incorporate and protect adequate reserves of water for current and foreseeable development and use of Hawaiian home lands as set forth in section 221 of the Hawaiian Homes Commission Act."

To be "consistent with other legal requirements and authority," under the direction of this section, reservations of water can and should continue to be made for DHHL in designated water management areas by rule making as described in HAR §13-171-60.

Outside of designated water management areas, however, it is clear that this section of the Code requires the Commission to provide "adequate reserves of water" for the uses of water in Section 221 of the HHCA as well. The section is also broad in terms of what decisions by the Commission should incorporate reservations. There are many "applicable" decisions made by the Commission that affect DHHL and its needs for water for present and future use.

With that point noted, however, two other issues are clear. First, the Water Commission has <u>never</u> reserved water for DHHL outside of a Water Management Area since their creation in 1987. Second, even if the Commission were to reserve water as a matter of policy in their decision making, there are no clear mechanisms

to enforce DHHL's reservations when they are not passed by the administrative rule making process provided for in designated water management areas.

DHHL WATER USES & RESERVATIONS ARE "PUBLIC TRUST" USES OF WATER

In addition to the provisions for reserving water under the State Water Code for DHHL's future uses, a number of Hawaii Supreme Court Cases have clarified that DHHL's water uses and reservations are a "Public Trust" use of water.

In Hawaii law, all water is considered to be a Public Trust resource, meaning it is not held as private property but is held in trust for the benefit of the public. The origins of the Public Trust in Hawaii water law include Kingdom Law, common law, and relevant state constitutional provisions. In water law in particular, the Hawaii Supreme Court has provided extensive guidance as to what Public Trust uses of water are, and how they should be protected (especially in the Waiahole, Kukui O Molokai, Wai Ola, and Kauai Springs cases).

The Public Trust uses of water enumerated by the Court are the maintenance of waters in their natural state, the protection of domestic water use (meaning the use of water by individuals in their homes), the protection of water in the exercise of Native Hawaiian and traditional and customary rights, and the existing and future uses of water under Section 221 of the HHCA, where those future uses of water are covered by reservations of water under the State Water Code.

The significance of being a Public Trust use of water is that there is supposed to be, any time the CWRM or another agency makes a decision affecting water, a presumption in favor of public trust uses of water. In addition, if there is a private commercial use of water proposed that is competitive with a Public Trust use of water, the decision-making agency is supposed to apply a "high level of scrutiny" to the request. Furthermore, as described by the Hawaii Supreme Court in the 2014 Kauai Springs case,

> "Applicants have the burden to justify the proposed water use in light of the trust purposes.

a. Permit applicants must demonstrate their actual needs and the propriety of draining water from public streams to satisfy those needs.

b. The applicant must demonstrate the absence of a practicable alternative water source.

c. If there is a reasonable allegation of harm to public trust purposes, then the applicant must demonstrate that there is no harm in fact or that the requested use is nevertheless reasonable and beneficial.

d. If the impact is found to be reasonable and beneficial, the applicant must implement reasonable measures to mitigate the cumulative impact of existing and proposed diversions on trust purposes, if the proposed use is to be approved."

Just as it is not clear that the Water Commission has any legal mechanism to enforce reservations of water for the DHHL in an area not designated as a water management area (even if such reservations had been made), it is similarly not clear that the Commission, when issuing permits in undesignated areas, has a mechanism to require the analyses described by the Court in Kauai Springs. Similarly, the County Boards of Water Supply, which make most on-the-ground allocation decisions for water meters, and do so without any Water Commission guidance in undesignated areas, do not seem to have any mechanisms in place for undertaking this analysis.

RECOMMENDATION

Staff respectfully requests that the Hawaiian Homes Commission approve the recommended motion/action based on the following considerations:

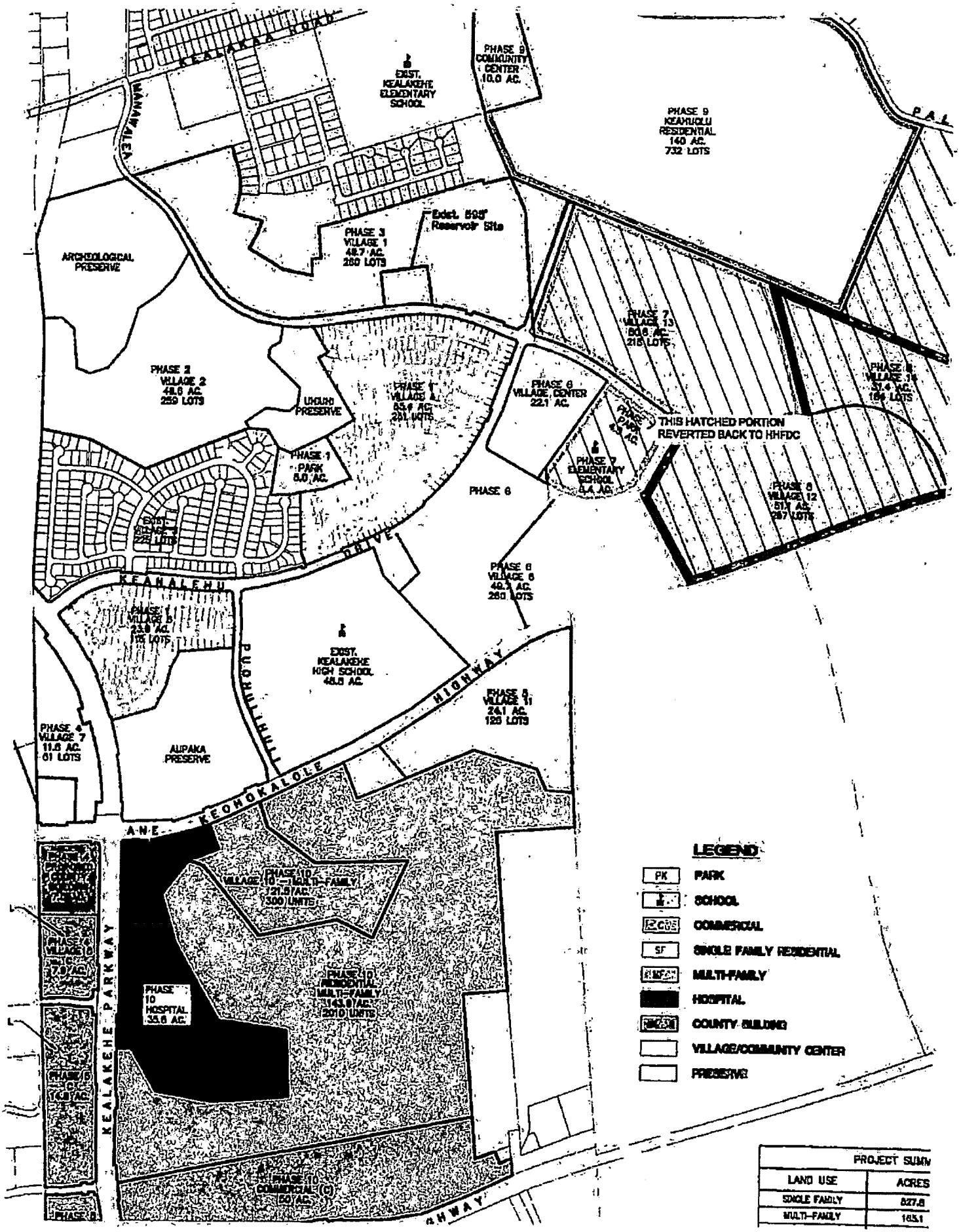
1. To secure adequate reserves of water for current and foreseeable planned development and use of Hawaiian home lands in the Keauhou ASA, Kona, Hawaii as set forth in section 221 of the Hawaiian Homes Commission Act;

2. To ensure that in our testimony, DHHL seeks confirmation or assurance from CWRM that DHHL's reservations will be protected in a non-designated

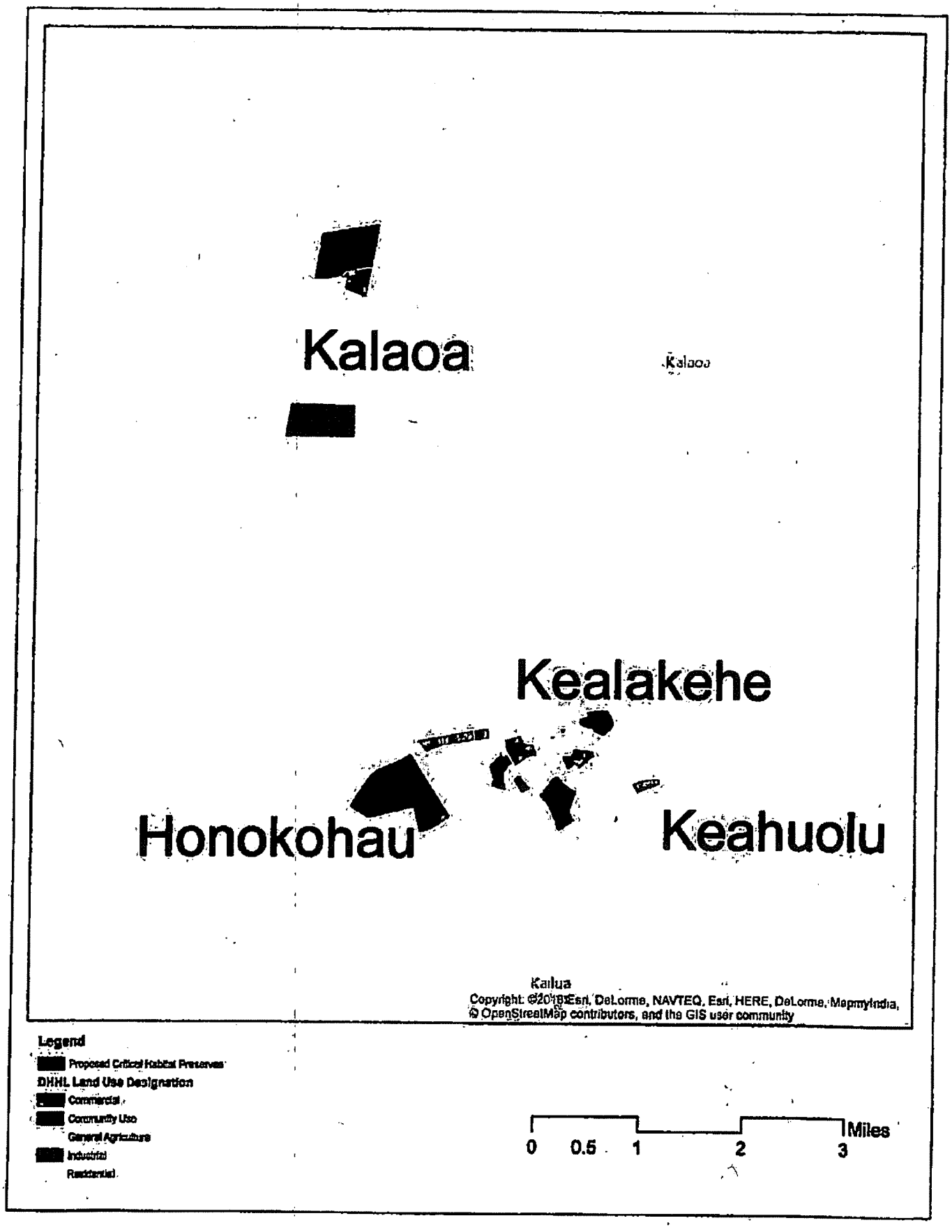
water management area to the same standard as it would in a designated water management area;

3. To ensure that DHHL and the State of Hawaii will provide adequate amounts of water and supporting infrastructure, in partnership with others, so that homestead lands will be usable and accessible; and

4. To initiate the process to ensure that water is available for planned purposes of the HHCA at Keauhou ASA, Kona, Hawaii, as articulated in the HHC-approved HIP 2002 and WHIP 2009.



PROJECT SUMM	
LAND USE	ACRES
SINGLE FAMILY	527.8
MULTI-FAMILY	165.1



HHC ITEM G-1 EXHIBIT A

KEAUHOU AQUIFER SYSTEM AREA, KONA, HAWAII

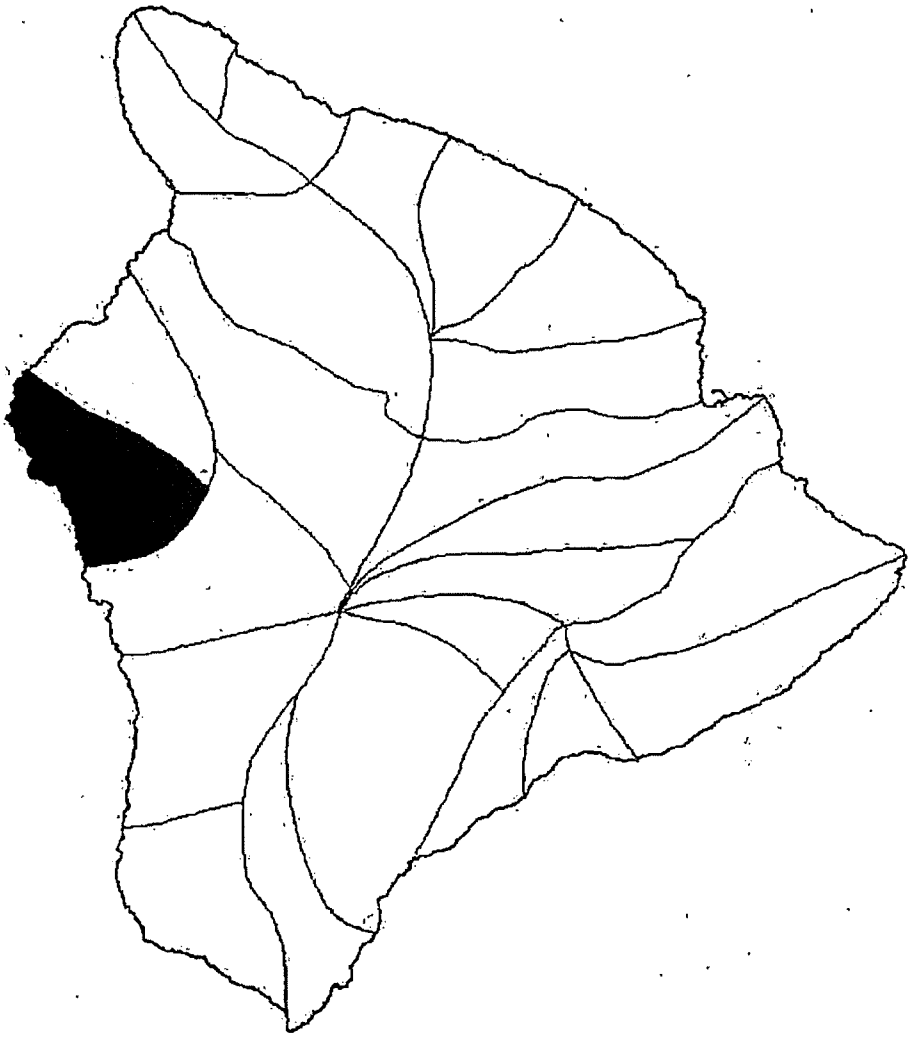


Exhibit 2

§13-171-61 Department of Hawaiian home lands reservation for Honolulu and Leeward Oahu. The commission hereby reserves 1.724 million gallons per day of ground water from state lands in the Waipahu-Waiawa aquifer system for use in the Papakolea, Nanakuli, and Waianae-Lualualei Hawaiian homestead areas. This amount shall be in excess of the existing uses of water on Hawaiian home lands as of the effective date of this rule. [Eff. Feb. 18, 1994] (Auth: HRS §§174C-49(d), 174C-101(a)) (Imp: HRS §§174C-49(d), 174C-101(a), HHCA §221)

§13-171-62 Department of Hawaiian home lands reservation for Windward Oahu. The commission hereby reserves 0.124 million gallons per day of ground water from state lands in the Waimanalo aquifer system for use in the Waimanalo Hawaiian homestead area. This amount shall be in excess of the existing uses of water on Hawaiian home lands as of the effective date of this rule. [Eff. Feb. 18, 1994] (Auth: HRS §§174C-49(d), 174C-101(a)) (Imp: HRS §§174C-49(d), 174C-101(a), HHCA §221)

§13-171-63 Department of Hawaiian home lands reservation for Kualapuu, Molokai. The commission hereby reserves 2.905 million gallons per day of ground water from state lands in the Kualapuu aquifer system for use on Hawaiian home lands on Molokai. This amount shall be in excess of the existing uses of water on Hawaiian home lands as of the effective date of this rule. [Eff. June 10, 1995] (Auth: HRS §§174C-49(d), 174C-101(a)) (Imp: HRS §§174C-49(d), 174C-101(a), HHCA §221)

USGS
science for a changing world

Prepared in cooperation with the Office of Hawaiian Affairs, State of Hawai'i

Water Use in Wetland Kalo Cultivation in Hawai'i

Open-File Report 2007–1157

EXHIBIT 3

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

COVER

Kalo or taro (Colocasia esculenta (L.) Schott) typically in Hawai'i is grown in wetland patches (lo'i) directly irrigated with water from rivers or streams. Nearly 300 forms of Hawaiian kalo have been recorded. As a food source it was so important that it was referred to simply as 'ai, which means food in Hawaiian. Practically the entire plant is edible.

Photo by Chiu W. Yeung, U.S. Geological Survey.

Water Use in Wetland Kalo Cultivation in Hawai'i

By Stephen B. Gingerich, Chiu W. Yeung, Tracy-Joy N. Ibarra, and John A. Engott

Prepared in cooperation with the
Office of Hawaiian Affairs, State of Hawai'i

Open-File Report 2007–1157

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

U.S. Department of the Interior
DIRK KEMPTHORNE, Secretary

U.S. Geological Survey
Mark D. Myers, Director

U.S. Geological Survey, Reston, Virginia: 2007

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Conversion Factors

Multiply	By	To obtain
	Area	
acre	4,047	square meter (m^2)
	Volume	
million gallons (Mgal)	3,785	cubic meter (m^3)
	Flow rate	
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

°F=(1.8×°C)+32

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:

°C=(°F-32)/1.8

Vertical coordinate information is referenced to mean sea level.

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Water Use in Wetland Kalo Cultivation in Hawai'i

By Stephen B. Gingerich, Chiu W. Yeung, Tracy-Joy N. Ibarra, and John A. Engott

Abstract

Ten cultivation areas (8 windward, 2 leeward) were selected for a kalo water-use study, primarily on the basis of the diversity of environmental and agricultural conditions under which wetland kalo is grown and landowner permission and availability. Flow and water-temperature data were collected at the lo'i complex level and at the individual lo'i level. To ensure that flow and temperature data collected at different lo'i reflect similar irrigation conditions (continuous flooding of the mature crop), only lo'i with crops near the harvesting stage were selected for water-temperature data collection. The water need for kalo cultivation varies depending on the crop stage. In this study, data were collected during the dry season (June - October), when water requirements for cooling kalo approach upper limits. Flow measurements generally were made during the warmest part of the day, and temperature measurements were made every 15 minutes at each site for about a 2-month period.

Flow and temperature data were collected from kalo cultivation areas on four islands—Kaua'i, O'ahu, Maui, and Hawai'i. The average inflow value for the 19 lo'i complexes measured in this study is 260,000 gallons per acre per day, and the median inflow value is 150,000 gallons per acre per day. The average inflow value for the 17 windward sites is 270,000 gallons per acre per day, and the median inflow value is 150,000 gallons per acre per day. The average inflow value for the two leeward sites is 150,000 gallons per acre per day. The average inflow value measured for six individual lo'i is 350,000 gallons per acre per day, and the median inflow value is 270,000 gallons per acre per day. The average inflow value for the five windward lo'i is 370,000 gallons per acre per day, and the median inflow value is 320,000 gallons per acre per day. The inflow value for the one leeward lo'i is 210,000 gallons per acre per day. These inflow values are consistent with previously reported values for inflow and are significantly higher than values generally estimated for water consumption during kalo cultivation. These measurements of inflow are important for future considerations of water-use requirements for successful kalo cultivation.

Of the 17 lo'i complexes where water inflow temperature was measured, only 3 had inflow temperatures that rose above 27°C, the threshold temperature above which wetland kalo is more susceptible to fungi and associated rotting diseases. The coldest mean inflow temperature was 20.0°C and the warmest inflow temperature was 24.9°C. All 15 of the sites where outflow temperatures were measured had some temperatures greater than 27°C. Outflow temperatures exceeded 27°C between 2.5 percent and about 40 percent of the time. Mean outflow temperatures ranged from 23.0°C to 26.7°C.

Introduction

Wetland kalo or taro (*Colocasia esculenta* (L.) Schott) is a vital part of the cultural and agricultural traditions of native Hawaiians. In some locations in Hawai'i, significant competition between instream and offstream uses for limited surface-water resources has led to litigation about rights to water for kalo cultivation and other uses. Appurtenant water rights of kuleana (private land awards to commoners) and kalo lands are preserved under the State Water Code, Hawai'i Revised Statutes Ch. 174C. Although irrigation flows for kalo cultivation have been measured with varying degrees of scientific accuracy, there is disagreement regarding the amount of water used and needed for successful kalo cultivation, with water temperature recognized as a critical factor. Most studies have focused on the amount of water consumed rather than the amount needed to flow through the irrigation system for successful kalo cultivation. In 2002, the Office of Hawaiian Affairs, State of Hawai'i, cosponsored the "No Ka Lo'i Conference" at the Kamakakūokalani Center for Hawaiian Studies, University of Hawai'i at Mānoa. One of the outcomes of the conference was kalo farmers' expressed desire to document current water use and to protect and enhance kalo

cultivation. The study documented in this report was pursued to help fulfill the priorities identified during that conference.

Wetland kalo is cultivated throughout Hawai'i in groups of shallow, watery terraces and pondfields, which native Hawaiians call lo'i kalo (fig.1). In this report, lo'i refers to an individual pondfield and lo'i complex refers to a group of lo'i. Wetland cultivation is the primary and preferred source for kalo corms (food-bearing underground stem), which are processed into poi, a popular Hawaiian staple food. Wetland kalo requires cool water flowing over its roots to ensure the health and productivity of the crop. Irrigation, therefore, needs to provide more water than just what is consumed in the lo'i through evaporation from open water, transpiration through the kalo leaves, and percolation through the lo'i bottom and sides. Irrigation flow must be controlled to provide enough cold water to keep the lo'i adequately cool throughout the growing cycle. Water-temperature management in individual lo'i is recognized as a water-management priority. Water temperature is generally considered the most critical physical factor in kalo cultivation water use, but rarely is it systematically measured or analyzed. Various studies suggest that it is best to keep lo'i water temperatures at about 25°C (77°F) or lower (Reppun v. Board of Water Supply, 1982; Penn, 1997). In general, a higher irrigation rate should dampen water heating and lower irrigation outflow temperature (Penn, 1997).

In cooperation with the Office of Hawaiian Affairs, State of Hawai'i, the U.S. Geological Survey (USGS) undertook an investigation to evaluate current water use for commercial wetland kalo cultivation in Hawai'i. The objectives of this 2-year study are (1) to document current water use for selected lo'i complexes of various sizes on the islands of Kaua'i, O'ahu, Maui, and Hawai'i; and (2) to monitor the variation in inflow and outflow water temperatures of selected lo'i and lo'i complexes. Water-use and water-temperature data collected as part of this study provides baseline information on wetland kalo irrigation practices

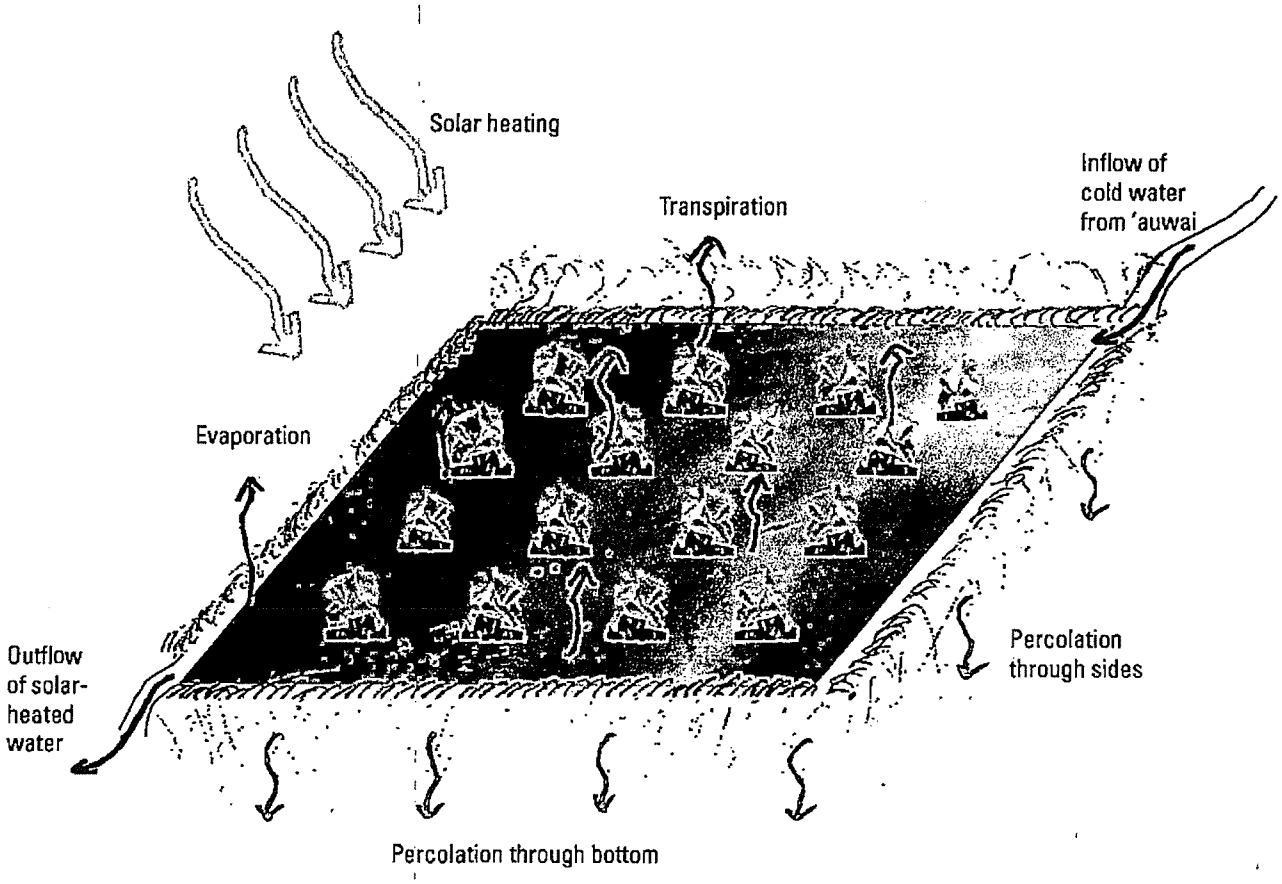


Figure 1. General movement of irrigation water in a lo'i kalo.

for a variety of geographic settings in the Hawaiian Islands.

The 'auwai, or irrigation ditch system, constructed at each lo'i complex transports water from streams to flood each lo'i. The design of the 'auwai and lo'i complexes varies from place to place, and from simple to complicated. An example of a simple lo'i complex design is where an 'auwai supplies water to a lo'i and flow is returned directly back to the stream. An example of a more complicated design exists in Ke'anae, Maui, where an 'auwai distributes water to multiple lo'i staggered along the 'auwai, and most lo'i throughflow is returned to the 'auwai and mixed for reuse in downstream lo'i irrigation. Flow is ultimately released to the ocean at various locations around the Ke'anae Peninsula and is too diffuse to accurately measure.

The most rigorous documented measurements of water used for wetland kalo cultivation were made in the 1930s at Hanapēpē, Kaua'i, by the University of Hawai'i and McBryde Sugar Company (Miles, 1931). Various water uses were measured including percolation in the lo'i and 'auwai, transpiration, and evaporation. The highlighted results of 50,000 to 80,000 gallons per acre per day (gad) represent net loss or consumption (the difference between the amount of water flowing into a lo'i complex and the amount flowing out) in the lo'i and the researchers recognized "that a considerably greater amount would have to be diverted in order to successfully grow taro [kalo] with proper circulation of water." This statement is based on inflow measurements that ranged from 290,000 to 1,100,000 gad (Penn, 1997). The results of this Hanapēpē study were used by the Hawai'i courts to determine the water rights in connection with the various lands involved in the case. This was the last time that a final court decision was reached on this water rights issue. Some of the most frequently relied on flow-rate measurements were made by Watson (1964) and were presented as evidence in several seminal water-rights cases (Reppun v. Board of Water Supply, 1982; State of Hawai'i, 2000). Watson reported kalo water requirements of 40,000 gad, a figure also arrived at through a net loss determination. No consideration was given to the amount of throughflow needed to meet the cooling requirements of the lo'i. Penn (1997) reinterpreted Watson's findings to suggest that throughflow results for that study would be 100,000 to 250,000 gad. At Hanalei, Kaua'i, the U.S. Forest Service measured average inflow rates to a lo'i complex of 87,500 gad and estimated consumptive use for 220 acres in kalo production to be about 23,600 gad (Berg and others, 1997).

Site Selection

Twenty-eight geographic areas with significant kalo cultivation on the islands of Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i were initially identified (fig. 2). Each of the islands can be divided into two primary physiographic zones, windward and leeward, which relate to the exposure of these areas to the northeasterly trade winds and orographic rainfall. In general, windward areas receive higher rainfall than leeward areas. Twenty-one of the identified kalo cultivation areas receive rainfall consistent with the windward sides of the islands and seven cultivation areas receive rainfall consistent with the leeward sides of their respective islands. Of these areas, 10 were selected for this study (8 windward, 2 leeward), primarily on the basis of the diversity of environmental and agricultural conditions under which wetland kalo is grown and on the basis of landowner availability. In some areas, more than one complex was studied. Final site selection was made in consultation with the Office of Hawaiian Affairs, State of Hawai'i, Onipa'a Nā Hui Kalo, and the State of Hawai'i Department of Health.

The USGS collected flow and water-temperature data at the lo'i complex level and at the lo'i level. Data collection was designed to measure and document the amount of water being used by kalo farmers in a variety of geographic areas. The study was not designed to measure the consumption of water during kalo growth, but rather the throughflow of water used in lo'i complexes where commercial cultivation generally is viable. For consistency in site selection, lo'i with crops near harvesting stage were selected for the lo'i water-temperature data collection. Farmers stagger planting dates to obtain year-round production. Due to differences in water availability and irrigation-system configuration, irrigation practices vary. Farmers generally allocate a greater amount of water to lo'i with crops at harvesting stage and less water to lo'i with crops at earlier stages to maximize the use of limited water resources. The selection of lo'i with crops at harvesting stage ensured that flow and temperature data collected at different lo'i reflect similar irrigation conditions (continuous flooding of the mature crop). During field visits, farmers were interviewed about their irrigation practices and about their perceptions of their water supply. In general, most farmers believed that their supply of irrigation water was insufficient for proper kalo cultivation.

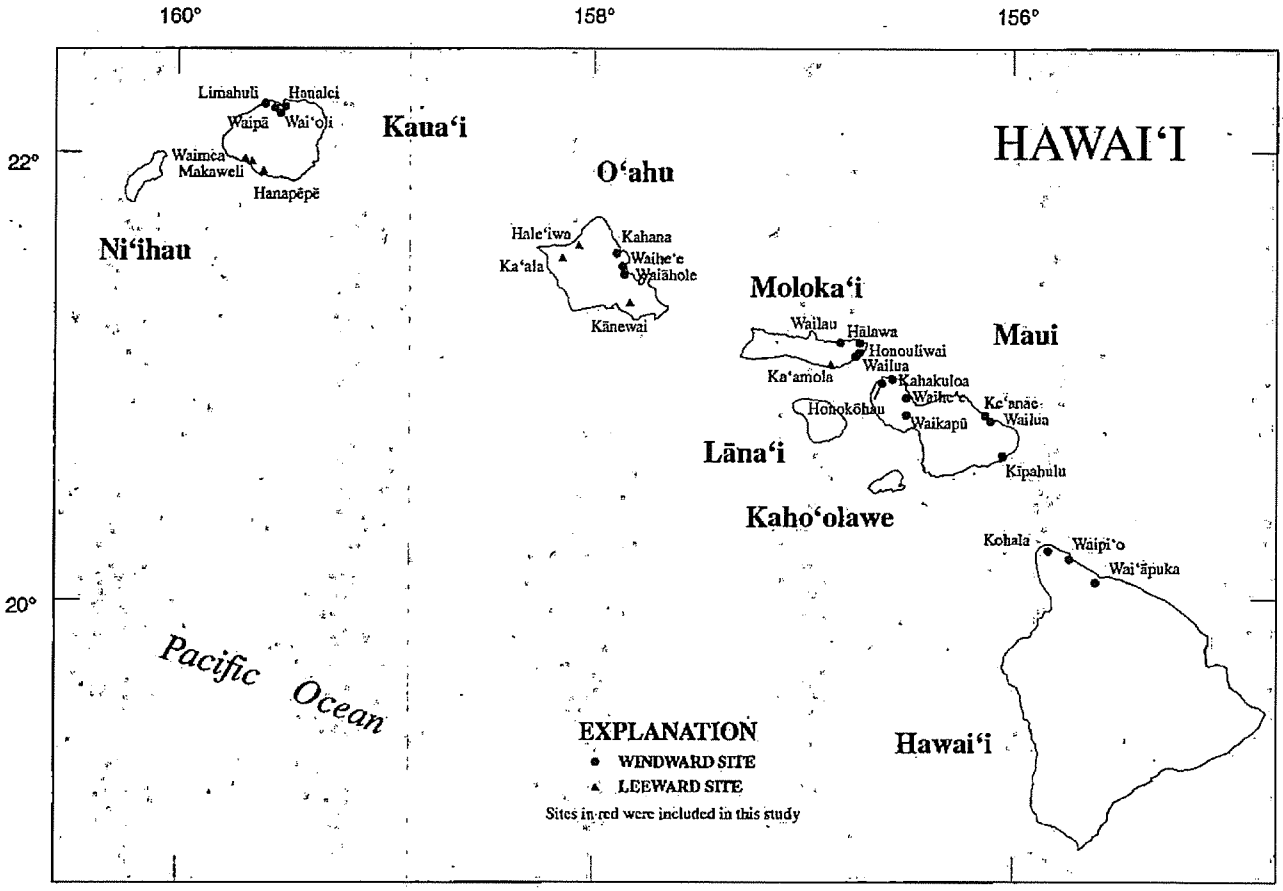


Figure 2. Location of significant areas of kalo cultivation, State of Hawai'i.

Acknowledgments

The authors wish to thank the stakeholders who helped to initiate and define the scope of this study—Dr. Jonathan Scheuer of the Office of Hawaiian Affairs, State of Hawai'i, Charlie and Paul Reppun and other members of Onipa'a Nā Hui Kalo, and David Penn of the State of Hawai'i Department of Health. We also thank the many kalo farmers who provided lodging (and sometimes food), access to their lo'i, knowledge of their irrigation systems, descriptions of their farming practices, and aloha during this study. We owe a special debt of gratitude to Charlie and Paul Reppun for providing volunteer help during visits to all of the study areas, for being the liaisons to all the kalo farmers, and for their general insight from more than 30 years of experience in kalo farming. David Reppun also provided volunteer help during the initial visits to Maui and Hawai'i.

Discharge, Water-Temperature, and Area Data-Collection Methods

Data collection was done during the dry season (June–October) when water requirements for cooling kalo are higher. In general, surface-water temperatures in the Hawaiian Islands begin to rise in April and remain elevated through September, mainly due to increased solar heating (Brasher and others, 2004; Gingerich and Wolff, 2005; Oki and others, 2006). Flow measurements generally were made during the warmest part of the day; temperature measurements were made every 15 minutes at each site for about a two-month period.

Discharge Measurements

Measurements of the amount of water flowing into or out of the lo'i complexes were made by using current-meter, volumetric-flow, or portable Parshall flume methods. Where channel conditions in the 'auwai permitted (for example, straight channels, non-turbulent flow, and relatively greater flow volumes), current-meter measurements were made. In the current-meter method, observations of width, depth, and velocity are collected at intervals in a cross section of the channel while the measurer wades in the channel (Rantz and others, 1982). Velocity measurements were made by using an acoustic Doppler velocimeter attached to a top-setting wading rod (fig. 3). Volumetric measurements were made where channel conditions did not permit current-meter measurements, where flow volumes were relatively low, or where volumetric measurements were more convenient than current-meter measurements. Volumetric measurements were made by repeated timed fillings of a calibrated five-gallon bucket and averaging the results (fig. 3). Typically, 10 independent measurements were made by using the calibrated bucket. Although relatively simple, the volumetric measurement is considered the most accurate way to measure low flows (Rantz and others, 1982). Parshall flume measurements were made in selected 'auwai where flow was too low for current-meter measurements but where the channel was narrow and flow was uniform. At these sites, the Parshall flume was installed and leveled, and repeated measurements were made in the flume stilling well after flow in the flume stabilized. At all sites, regardless of the method of measurement, a reference mark was set and checked at the beginning and ending of each workday to determine if the overall flow conditions changed during the day.

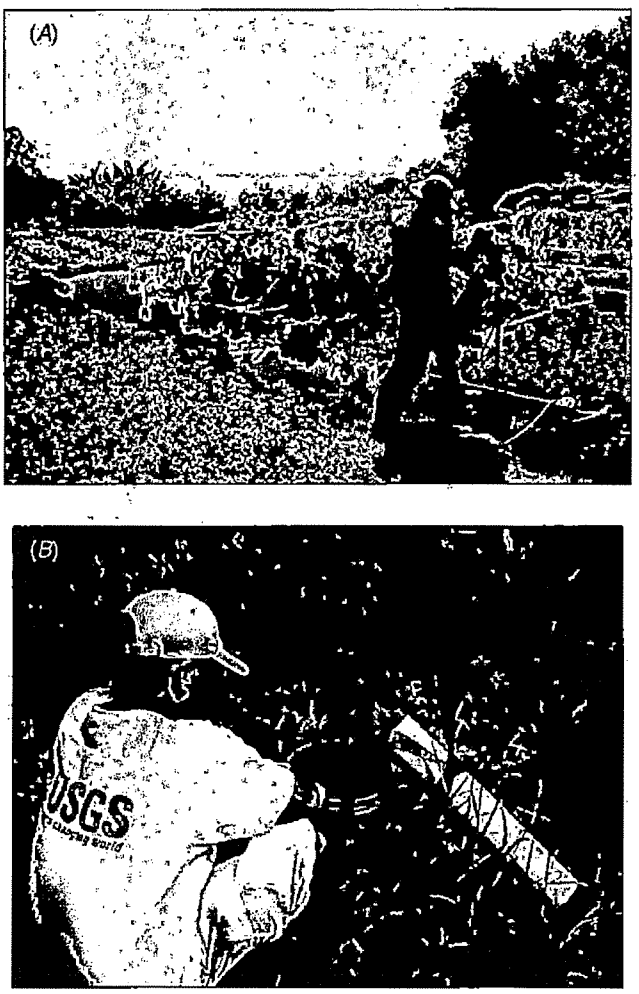


Figure 3. Flow measured by U.S. Geological Survey staff in lo'i kalo 'auwai with (*A*) an acoustic Doppler velocimeter and (*B*) the volumetric method.

Water-Temperature Measurements

Water temperatures were measured every 15 minutes by using StowAway® Tidbit® thermistors from Onset Computer Corporation that were designed to operate in the -20°C–50°C temperature range. Each thermistor was calibrated in the laboratory following USGS procedures (U.S. Geological Survey, 1997 to present) before installation in the field. Each thermistor was installed inside a 6-in. length of 1.25-in. diameter PVC pipe staked below the lowest expected water level in the 'auwai or lo'i being monitored (fig. 4). Monitoring locations were in the shade, where possible, and chosen to avoid potentially stagnant flow. Each thermistor was field checked in place when deployed and again when retrieved by using a laboratory-calibrated field thermistor. Because field checks of the thermistors were within acceptable tolerances, no adjustments to the data were needed. A table showing equivalent temperature values in °C and °F is included (table 1).

Area Measurements

Measurements of the selected lo'i and lo'i complex areas were made by walking the perimeter of each lo'i complex while recording the track with a handheld Global Positioning System (GPS) unit. Each perimeter track was uploaded from the GPS unit to a geographic information system (GIS) program and, where necessary, adjusted to overlay aerial images showing the appropriate lo'i com-

Figure 4. Thermistor and PVC housing used for collecting temperature measurements.

plexes. The areas, determined from the GIS program, include the cultivated and fallow lo'i banks, pathways, and 'auwai inside the perimeter of the track. Removing the area of these non-water-covered parts of the lo'i complexes from the total area was determined to be too difficult and subjective. The emphasis was, therefore, directed toward treating each lo'i complex consistently.

Discharge and Water-Temperature Data

As part of this study, 62 flow measurements and 46 sets of temperature data were collected from kalo cultivation areas on four islands—Kaua'i, O'ahu, Maui, and Hawai'i. The flow and temperature measurement data collected as part of this study are available on the World Wide Web. Data from each station listed in the following tables can be retrieved

Table 1. Selected temperature conversions.

Temperature (degrees Celsius)	Temperature (degrees Fahrenheit)
18.0	64.4
18.5	65.3
19.0	66.2
19.5	67.1
20.0	68.0
20.5	68.9
21.0	69.8
21.5	70.7
22.0	71.6
22.5	72.5
23.0	73.4
23.5	74.3
24.0	75.2
24.5	76.1
25.0	77.0
25.5	77.9
26.0	78.8
26.5	79.7
27.0	80.6
27.5	81.5
28.0	82.4
28.5	83.3
29.0	84.2
29.5	85.1
30.0	86.0
30.5	86.9
31.0	87.8
31.5	88.7
32.0	89.6
32.5	90.5
33.0	91.4
33.5	92.3
34.0	93.2
34.5	94.1
35.0	95.0
35.5	95.9
36.0	96.8
36.5	97.7
37.0	98.6
37.5	99.5
38.0	100.4
38.5	101.3
39.0	102.2
39.5	103.1
40.0	104.0

from the *USGS National Water Information System database* (NWIS) by clicking on the linked station name.

The flow and area tables in the following sections, presented by island, provide dates and times of measurements, flow rates in 'auwai irrigating the lo'i and lo'i complexes, the GPS-measured areas of the selected lo'i and lo'i complexes, and water use based on the flow and area measurements. The temperature tables summarize (1) the dates of temperature-logger deployment; (2) the mean, maximum, and minimum temperature over the entire period of measurement; (3) the mean of the daily range in temperatures; (4) the range of times the highest temperature in any day occurred; (5) the percentage of measurements greater than 27°C; and (6) the earliest and latest times during the day that the temperatures were greater than 27°C. A temperature of 27°C is cited as the threshold temperature above which wetland kalo is more susceptible to fungi and associated rotting diseases (Ooka, 1994, Penn, 1997).

Two plots are presented for each temperature record collected in the study. One plot shows the entire record of 15-minute temperature data measurements for the length of time each temperature thermistor was deployed. These plots are useful for displaying how the temperature changed over time due to factors such as a period of cloudiness, increased or decreased irrigation caused by rainfall, or 'auwai problems. The other temperature plots provided show all of the temperature data plotted against the time of day each measurement was recorded. These plots indicate the daily pattern of temperature variation and are also useful for displaying the earliest and latest times of the day when the temperature reached the 27°C threshold.

Kaua'i

Three areas were measured on Kaua'i—Wai'oli and Hanalei (windward sites) and Makaweli (leeward site). Flow measurements were made on August 7-9, 2005, when the temperature-loggers were deployed, and on September 21-23, 2005, when the temperature loggers were removed (tables 2 and 3). The Wai'oli area is supplied through the Wai'oli 'Anwai with water diverted from the Wai'oli River (fig. 4). Of the numerous lo'i complexes supplied by the Wai'oli 'Auwai, four independent lo'i complexes were studied. Twelve flow measurements were made, and ten temperature loggers were deployed at selected inflow and outflow locations (figs. 5 and 6).

The Hanalei area is supplied through the "China Ditch" with water diverted from the Hanalei River (fig. 7). One lo'i complex was studied in this area. Four flow measurements were made, and three temperature loggers were deployed in the Hanalei area (figs. 8 and 9).

The Makaweli area is supplied through the Pu'ulima Ditch with water diverted from the Makaweli River; one lo'i complex was studied in this area (fig. 10). One flow measurement was made, and three temperature loggers were deployed in the Makaweli area (figs. 11 and 12). A flow measurement was not made during the second visit to the Makaweli area because of damage to the diversion structure.

Table 2. Summary of discharge measurements and areas for selected lo'i complexes, Island of Kaua'i.

[Mgal/d, million gallons per day; gad, gallons per acre per day; --, not available; average water use is determined by summing the averages of each lo'i or lo'i complex and dividing by the number of lo'i or lo'i complexes]

		Complex						Lo'i					
Geographic designation	Area	Station	Irrigation area (acre)	Date	Measurement time	Discharge (Mgal/d)	Water use (gad)	Station	Irrigation area (acre)	Date	Measurement time	Discharge (Mgal/d)	Water use (gad)
Windward	Wai'oli	Ka01A-CI	32.39	8/8/2005	0850	4.2	130,000						
				9/21/2005	1147	4.2	130,000						
		Ka01B-CI	2.98	8/8/2005	1000	0.36	120,000	Ka01B-LI	0.21	8/8/2005	1400	0.076	370,000
				9/21/2005	1246	0.55[a]	180,000			9/21/2005	1337	0.047	230,000
		Ka01C-CI	5.46	8/8/2005	1132	0.54	100,000	Ka01C-LI	0.16	8/8/2005	1030	0.028	170,000
				9/22/2005	1211	0.38[b]	70,000			9/22/2005	1255	0.019	120,000
		Ka01D-CI	4.18	8/8/2005	1505	0.15	36,000						
				9/22/2005	1510	0.25	60,000						
Windward	Hanalei	Ka02-CI	53.63	8/7/2005	1708	3.7[c]	69,000	Ka02A-LO	0.51	8/9/2005	0910	0.10	--
				9/21/2005	1604	4.2[d]	78,000			9/21/2005	1722	0.15	--
Leeward	Makaweli	Ka03-CI	0.68	8/9/2005[e]	1241	0.090	260,000						
				9/23/2005[f]	--	--	--						
number			6				6		3				2
minimum			0.68				36,000		0.16				120,000
maximum			53.63				260,000		0.51				370,000
average			16.55				120,000		0.29				220,000

[a]Flow higher than normal due to leakage at field inlet gate.

[b]Flow lower than normal due to damaged upstream diversion dam.

[c]Intake gate was not fully open.

[d]Higher flow because intake gate was fully open.

[e]Two intake pipes (4-inch and 3-inch diameter) are used to divert water from the 'auwai to the lo'i. Flow measurement only was made at the the 4-inch-intake pipe on 8/9/2005. Farmer indicated that the 3-inch-pipe will be replaced eventually with a 4-inch-pipe, so two times the 4-inch-pipe measurement would be a reasonable estimate of typical flow to the lo'i.

[f]Flow was not measured because flow in the 'auwai was much lower than normal due to damaged upstream diversion dam.

Table 3. Water-temperature statistics based on measurements collected at 15-minute intervals for lo'i complexes on the Island of Kaua'i.
[°C, degrees Celsius; na, not applicable]

Geographic designation	Area	Station	Period of record	Temperature (°C)			Range of times daily peak temperatures occurred	Temperature measurements greater than 27°C		
				Mean	Range	Mean daily range		Percent	Earliest time of day	Latest time of day
Windward	Wai'oli	Ka01A-LI	8/8/05 - 9/22/05	21.4	19.5 - 23.3	1.2	1315 - 1830	0.0	na	na
		Ka01A-LO	8/8/05 - 9/22/05	25.5	19.7 - 34.1	5.5	1200 - 1700	32.6	0930	2045
		Ka01B-CI	8/8/05 - 9/22/05	21.4	19.5 - 23.6	1.2	1315 - 1815	0.0	0000	0000
		Ka01B-LI	8/8/05 - 9/22/05	22.6	19.6 - 28.1	2.8	1130 - 1645	0.8	1415	1700
		Ka01B-LO	8/8/05 - 9/22/05	24.7	20.5 - 30.7	3.5	1330 - 1845	16.8	1215	2045
		Ka01C-LI	8/8/05 - 9/22/05	23.5	19.7 - 30.6	3.1	1145 - 1645	8.1	1045	1800
		Ka01C-LO	8/8/05 - 9/22/05	25.9	20.0 - 33.5	4.3	1145 - 1545	31.3	1000	2100
		Ka01D-CI	8/8/05 - 9/22/05	21.8	19.5 - 24.1	1.5	1130 - 1745	0.0	na	na
		Ka01D-LI	8/8/05 - 9/22/05	23.5	19.2 - 31.8	4.6	1145 - 1630	14.9	1130	1815
		Ka01D-LO	8/8/05 - 9/22/05	26.2	22.1 - 30.8	3.3	1400 - 1730	33.5	1115	2245
Windward	Hanalei	Ka02-CI	8/8/05 - 9/21/05	23.7	21.3 - 26.9	2.2	1445 - 2030	0.0	0000	0000
		Ka02-LI	8/8/05 - 9/21/05	24.2	21.5 - 27.4	2.3	1245 - 1815	0.2	1445	1600
		Ka02-LO	8/8/05 - 9/21/05	26.7	21.9 - 33.5	6.3	1215 - 1700	40.4	1045	2345
Leeward	Makaweli	Ka03-CI	8/9/05 - 9/23/05	24.8	21.5 - 28.3	2.6	1400 - 1815	9.0	1330	2115
		Ka03-LI	8/9/05 - 9/23/05	25.8	21.3 - 36.9	3.8	1030 - 1930	23.8	0830	2330
		Ka03-LO	8/9/05 - 9/23/05	24.5	19.7 - 35.7	3.9	0945 - 2045	10.5	0930	1930

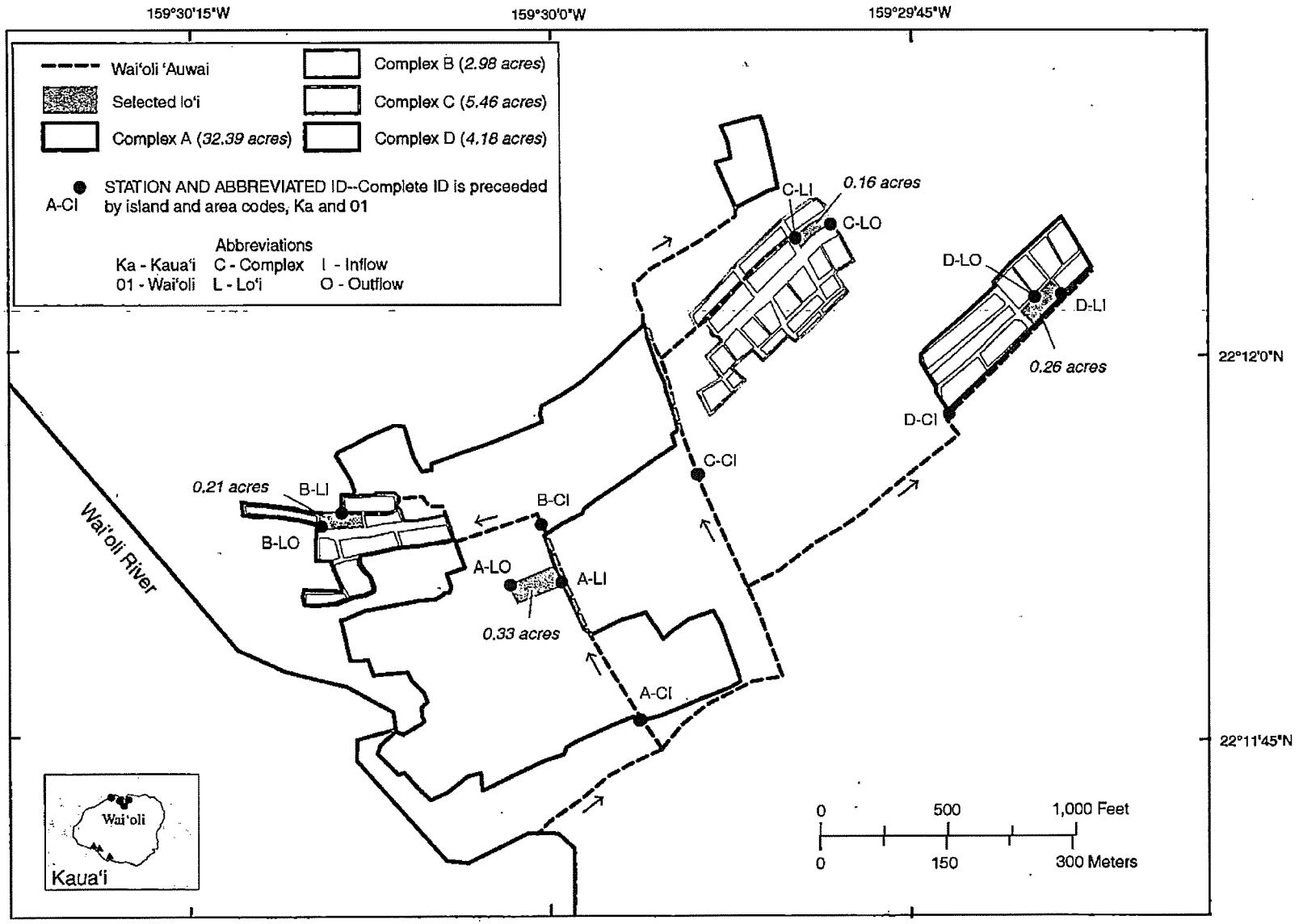
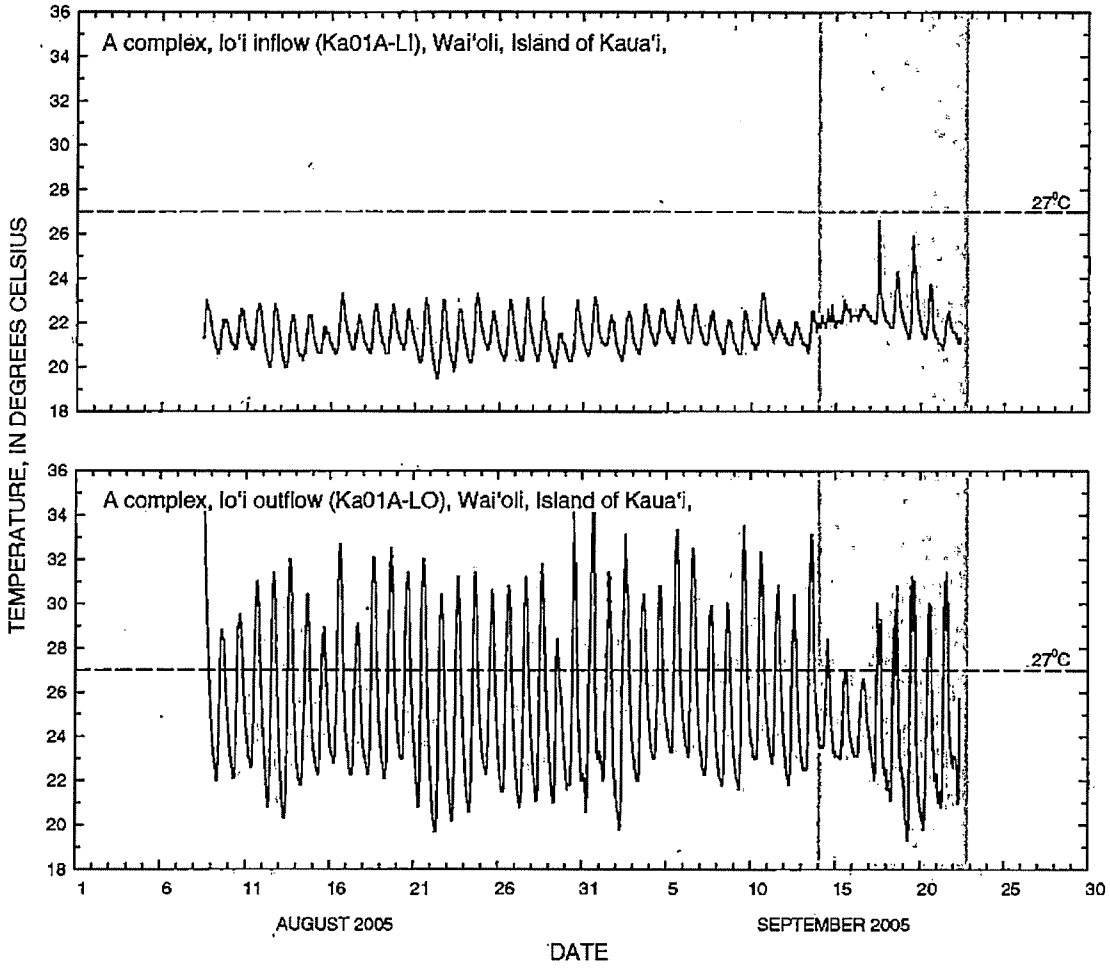
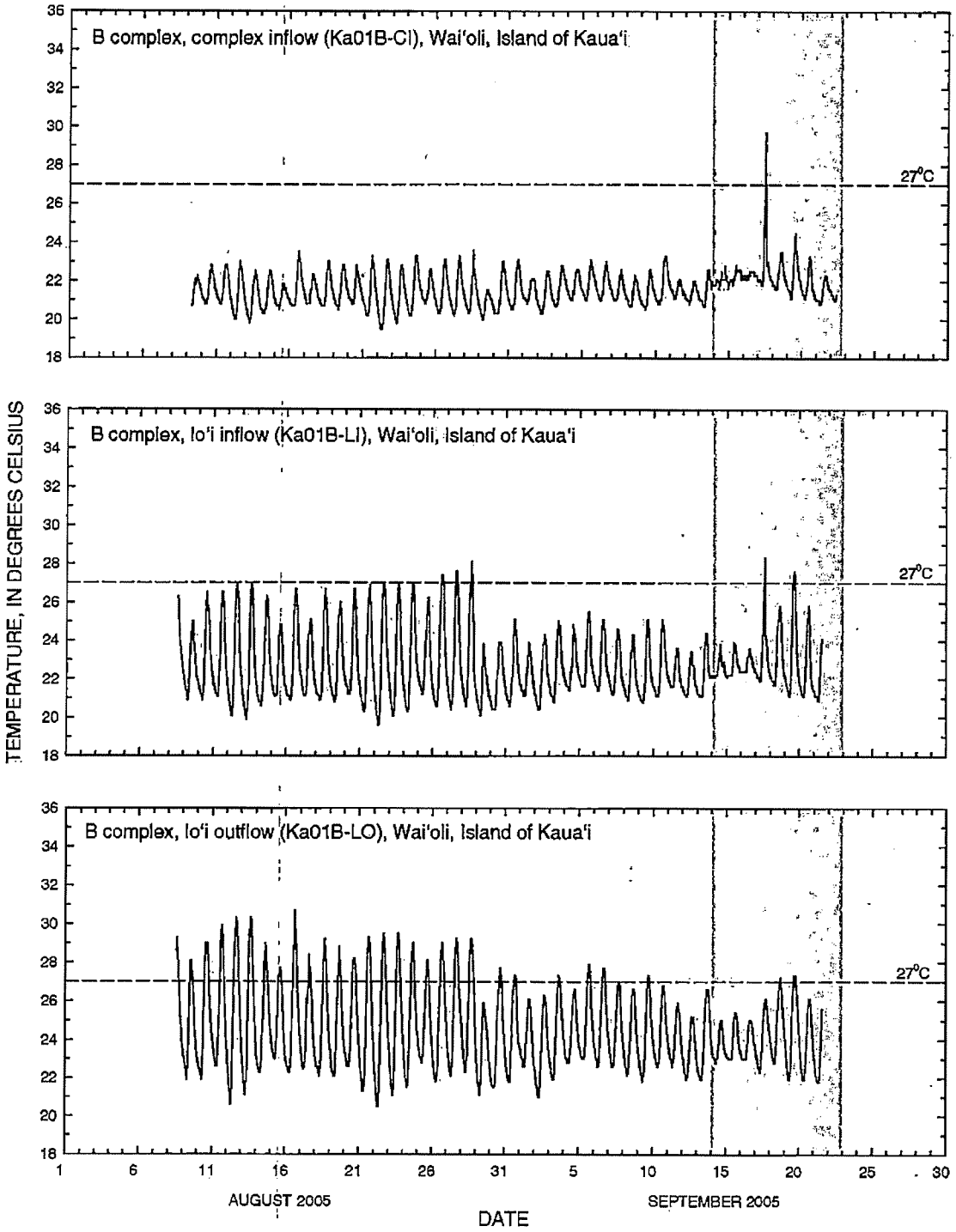


Figure 5. Wai'oli lo'i complex, Island of Kaua'i.



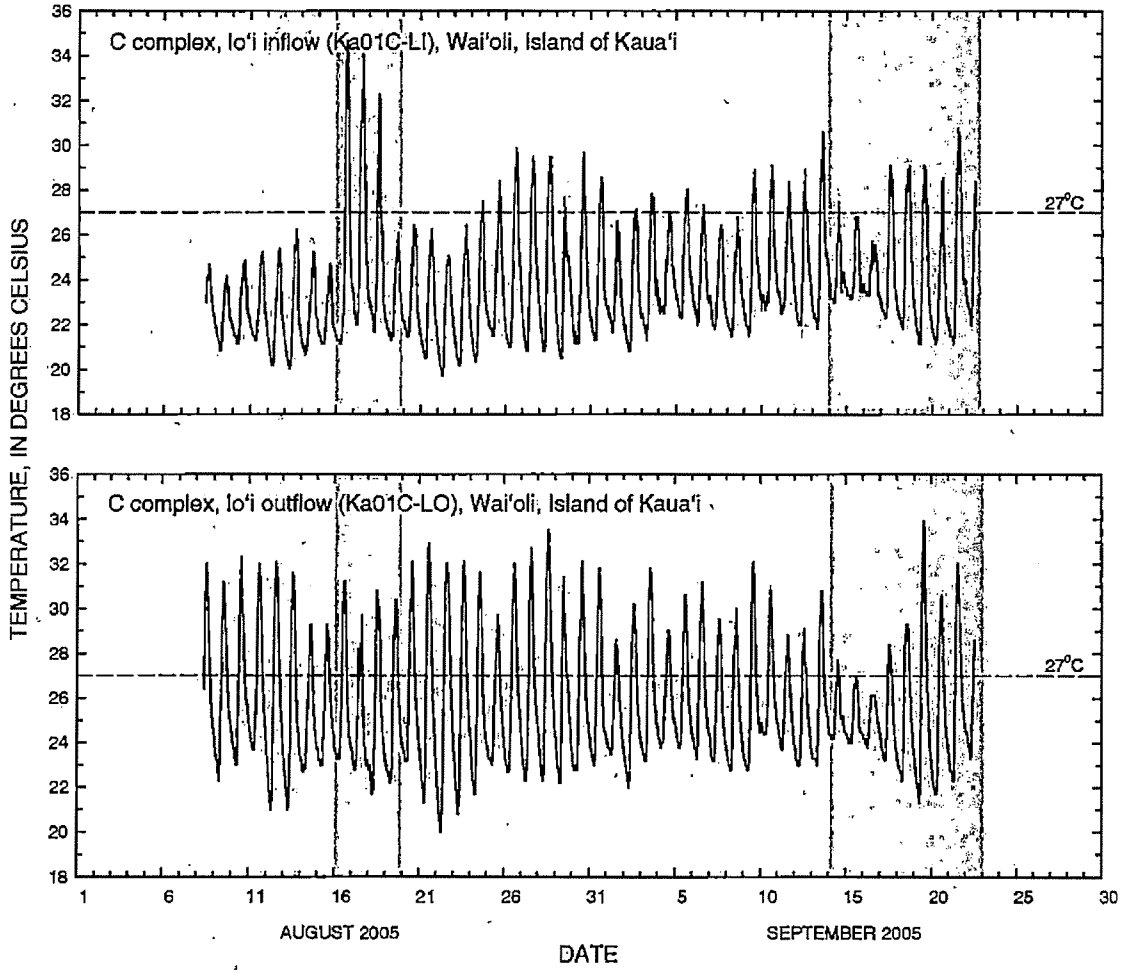
Highlighted periods indicate atypical irrigated conditions. During September 14-15, 2005, a heavy rainstorm flooded the complex and caused damage in the Wai'oli irrigation system by depositing heavy debris around the diversion dam and 'auwai. During the following period, the diversion dam and the 'auwai were being repaired, which significantly altered flow conditions in the irrigation system. During September 18-22, 2005, the farmer indicated that inflow to the selected lo'i was reduced because the kalo was ready to be harvested.

Figure 6. Water temperature in Wai'oli lo'i complex, Island of Kaua'i.



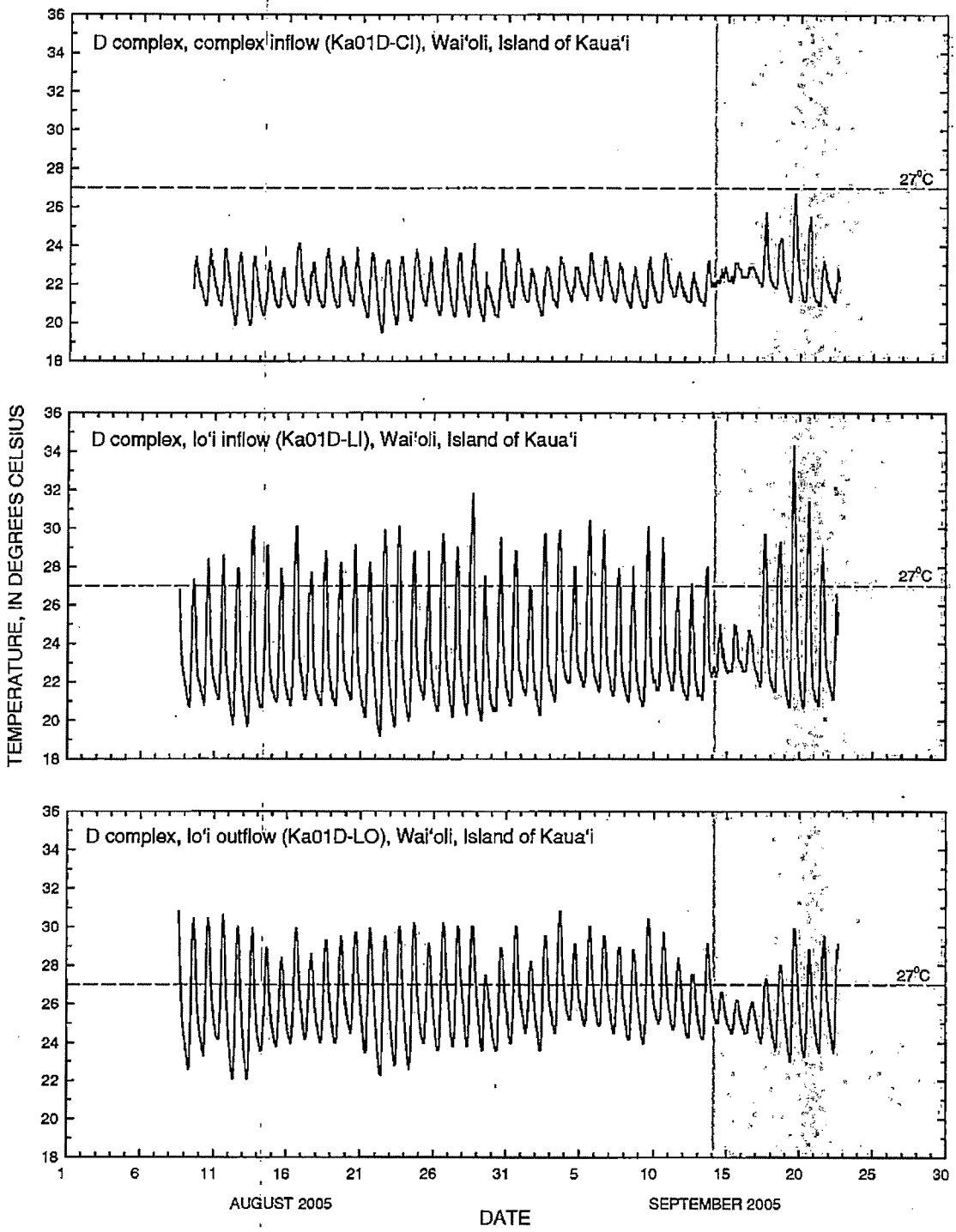
Highlighted periods indicate atypical irrigated conditions. During September 14-15, a heavy rainstorm flooded the complex and caused damages in the Wai'oli irrigation system by depositing heavy debris around the diversion dam and 'auwai. Afterward, the diversion dam and the 'auwai were being repaired, which significantly altered flow conditions in the irrigation system.

Figure 6. *Continued.*



Highlighted periods indicate atypical irrigated conditions. During August 16-19, Io'i was dried out. During September 14-15, a heavy rainstorm flooded the complex and caused damages in the Wai'oli irrigation system by depositing heavy debris around the diversion dam and 'auwai. During the following period, the diversion dam and the 'auwai were being repaired which significantly altered flow conditions in the irrigation system.

Figure 6. *Continued.*



Highlighted periods indicate atypical irrigated conditions. During September 14-15, a heavy rainstorm flooded the complex and caused damages in the Wai'oli irrigation system by depositing heavy debris around the diversion dam and 'auwai. During the following period, the diversion dam and the 'auwai were being repaired which significantly altered flow conditions in the irrigation system.

Figure 6. *Continued.*

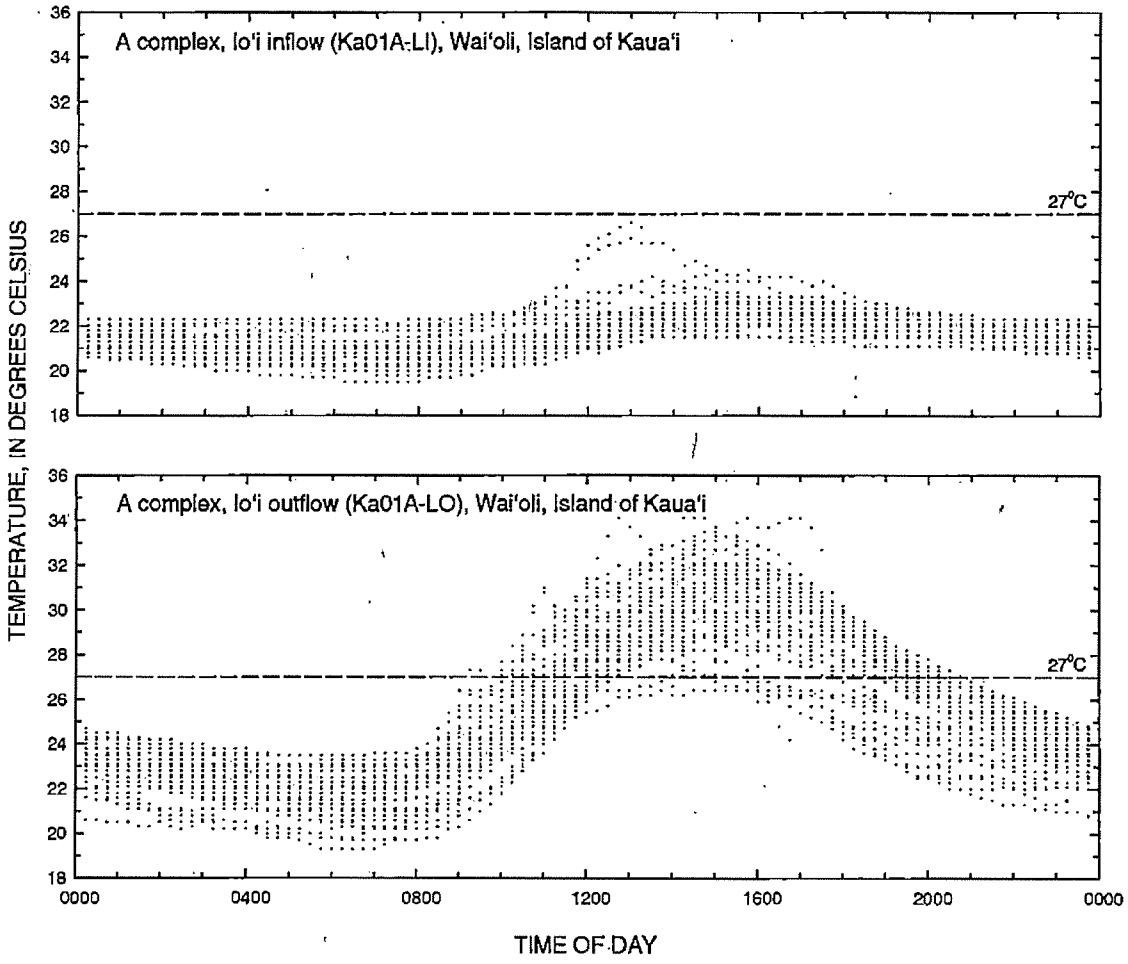


Figure 7. Daily pattern of water temperature in Wai'oli lo'i complex, Island of Kaua'i. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

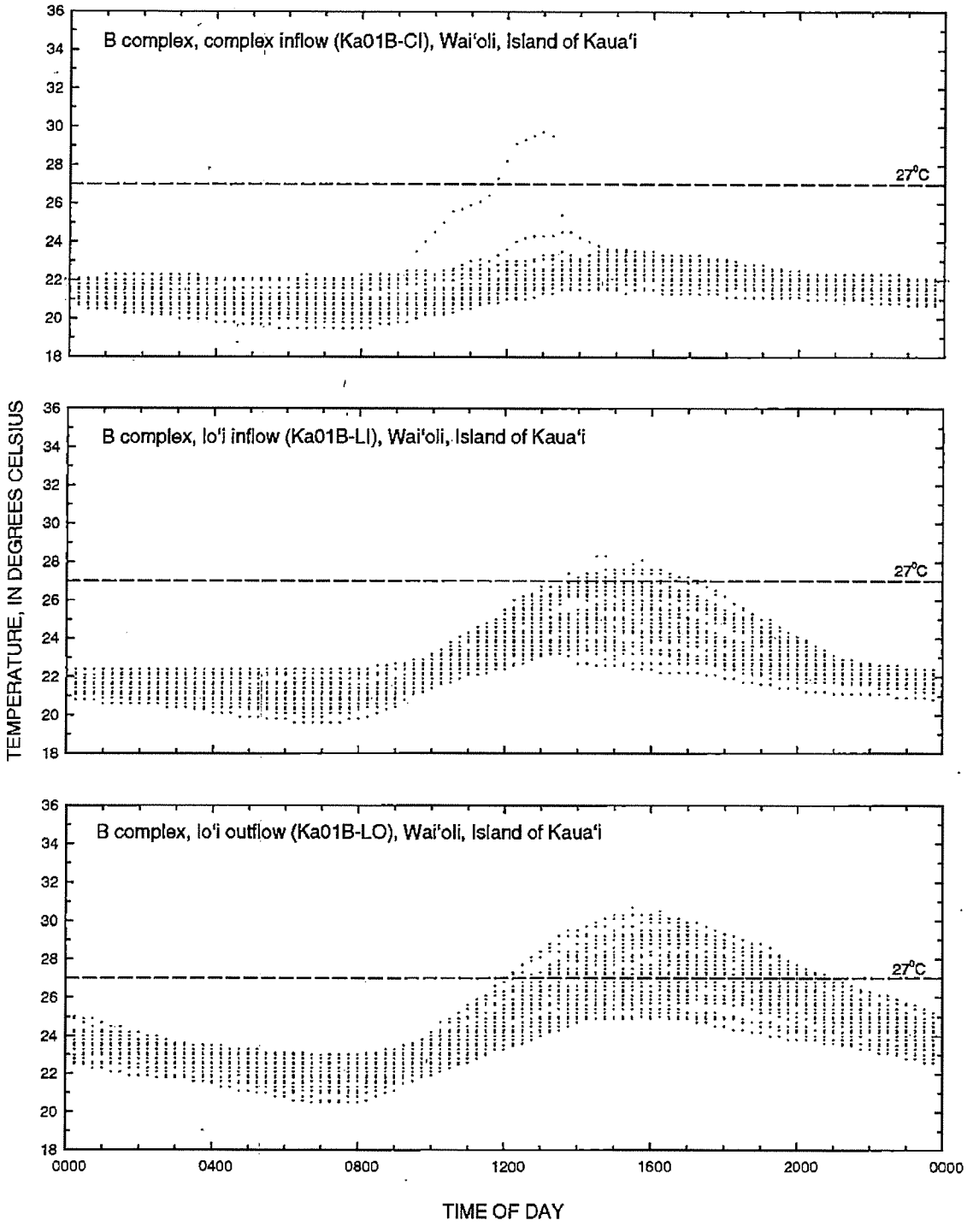


Figure 7. *Continued.*

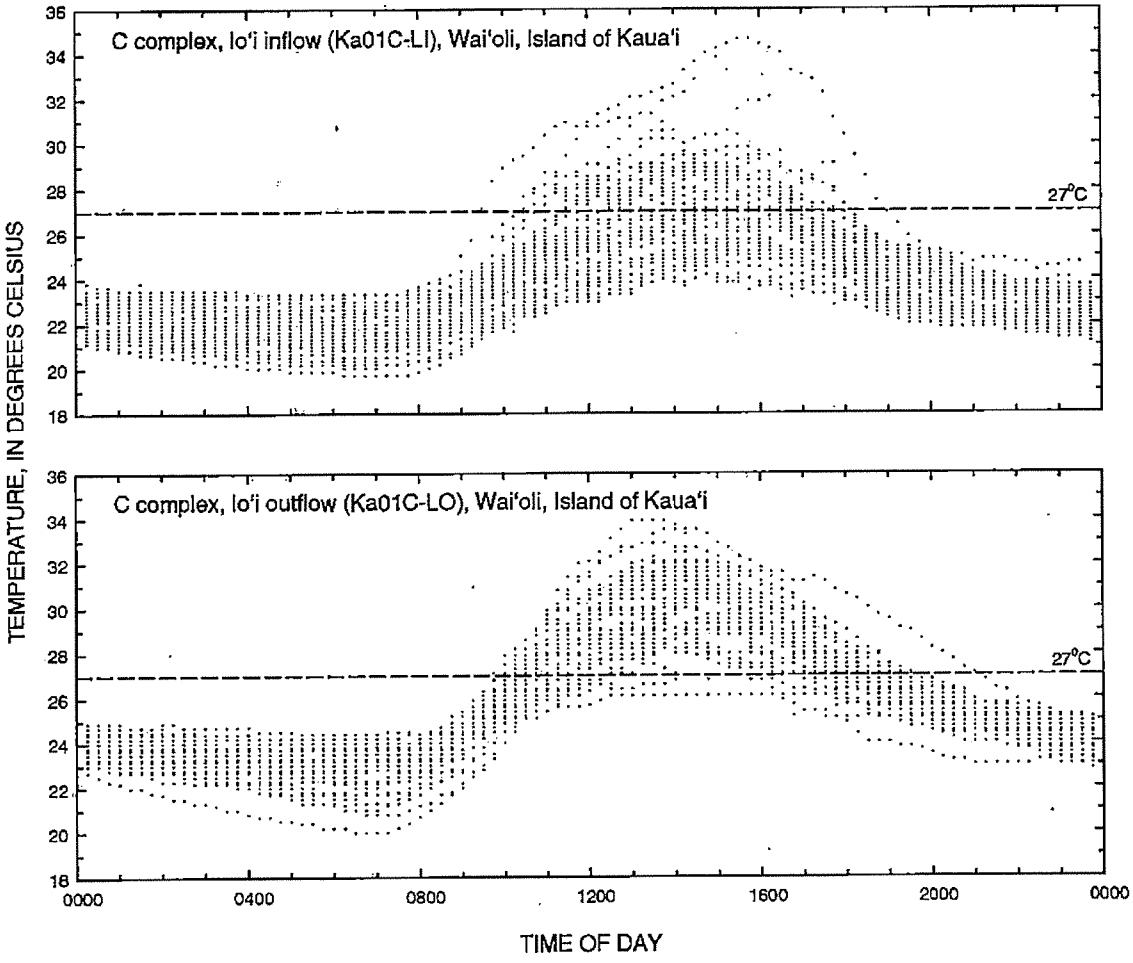


Figure 7. *Continued.*

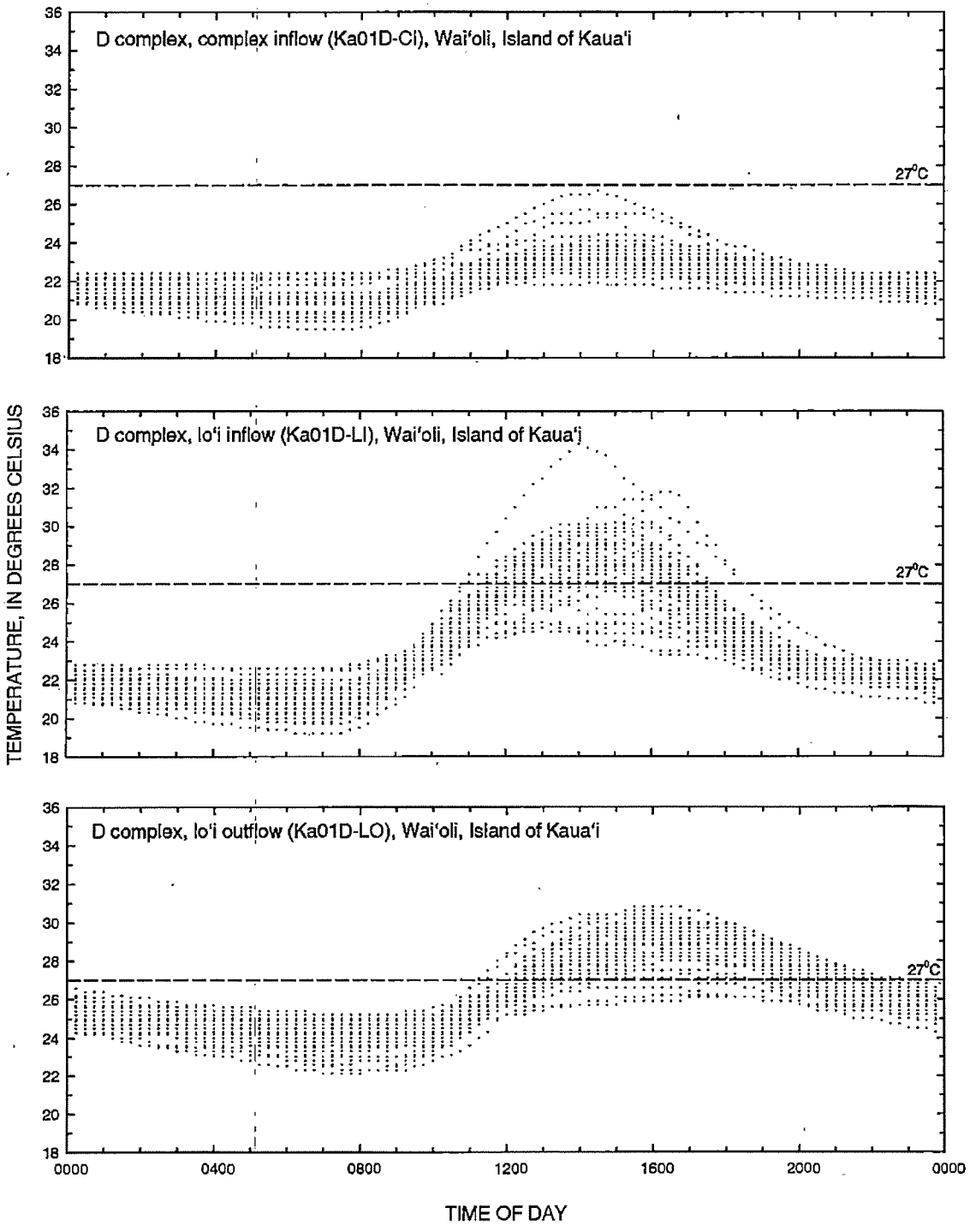


Figure 7. *Continued.*

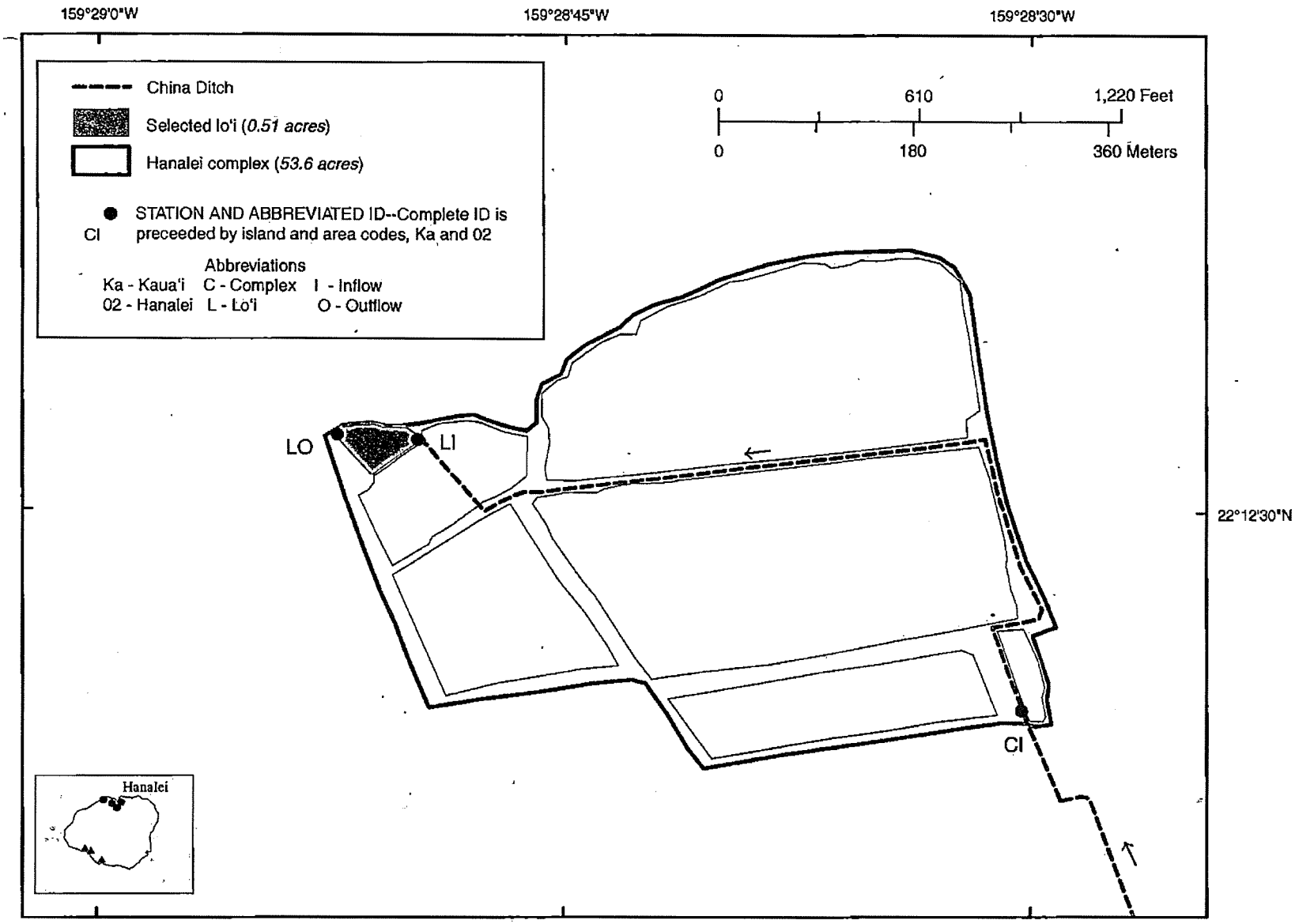
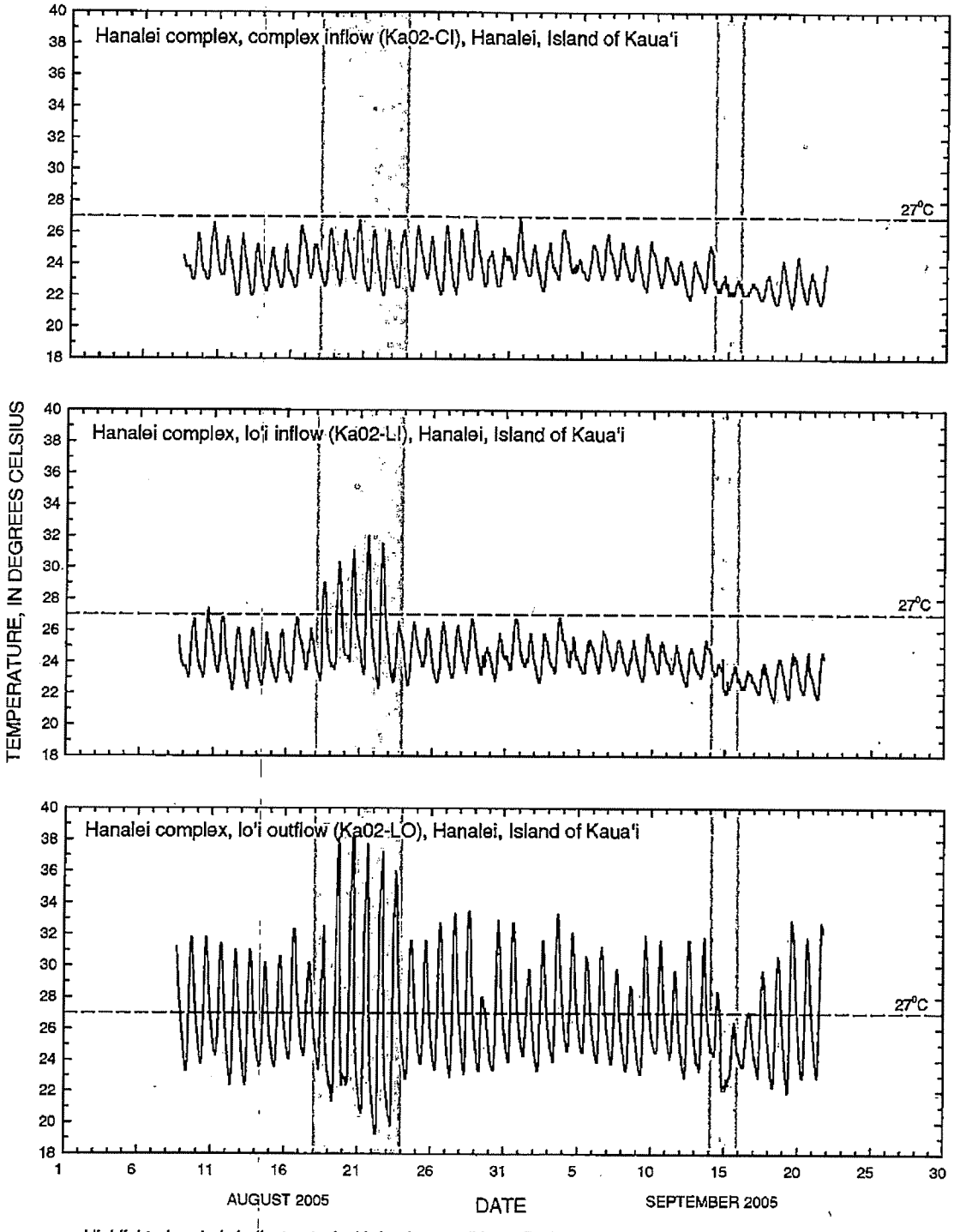


Figure 8. Hanalei lo'i complex, Island of Kaua'i.



Highlighted periods indicate atypical irrigation conditions. During August 18-23, the selected lo'i was dried out for fertilization. During September 14-15, entire complex was flooded by heavy rainstorm.

Figure 9. Water temperature in Hanalei lo'i complex, Island of Kaua'i.

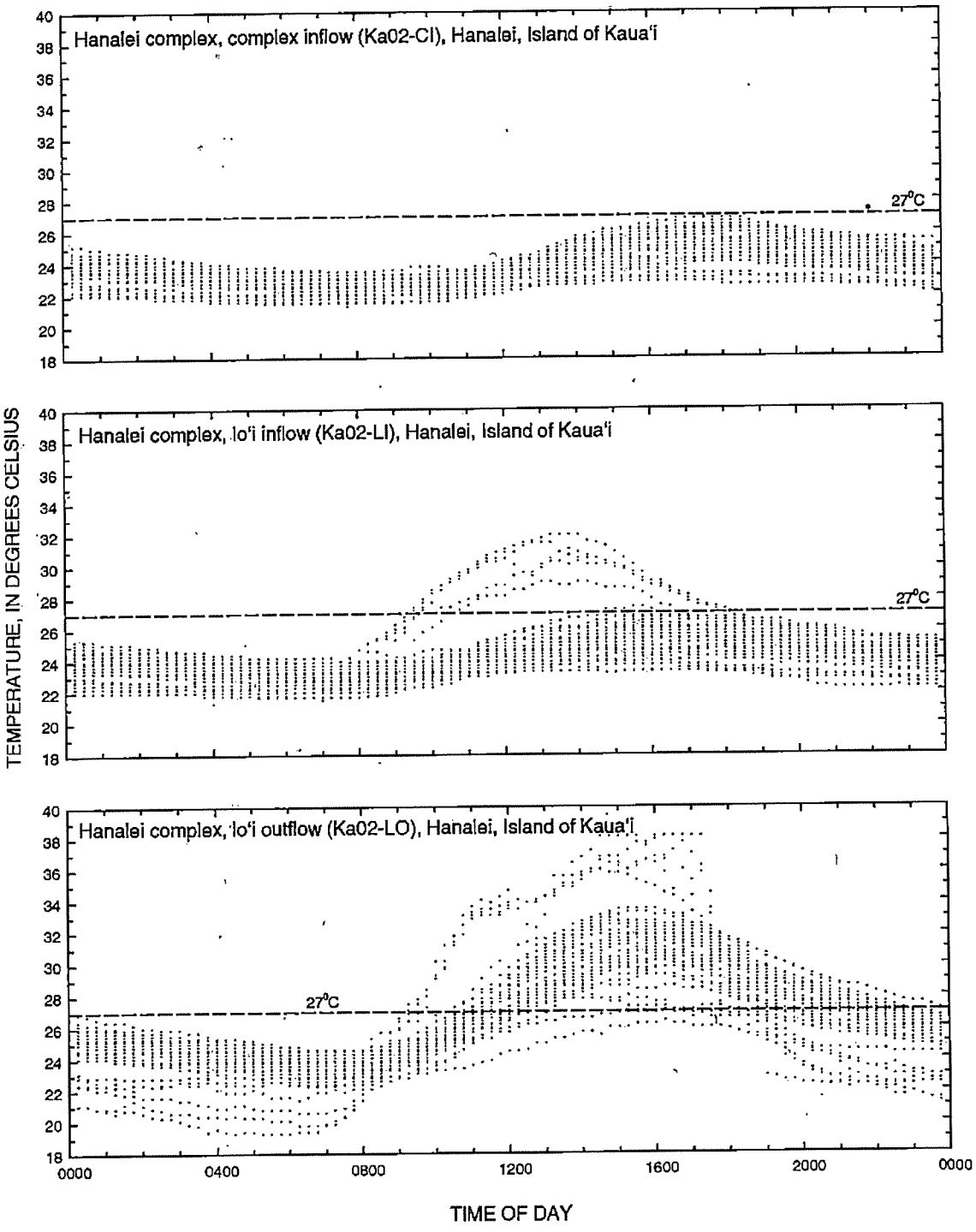


Figure 10. Daily pattern of water temperature in Hanalei lo'i complex, Island of Kaua'i. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

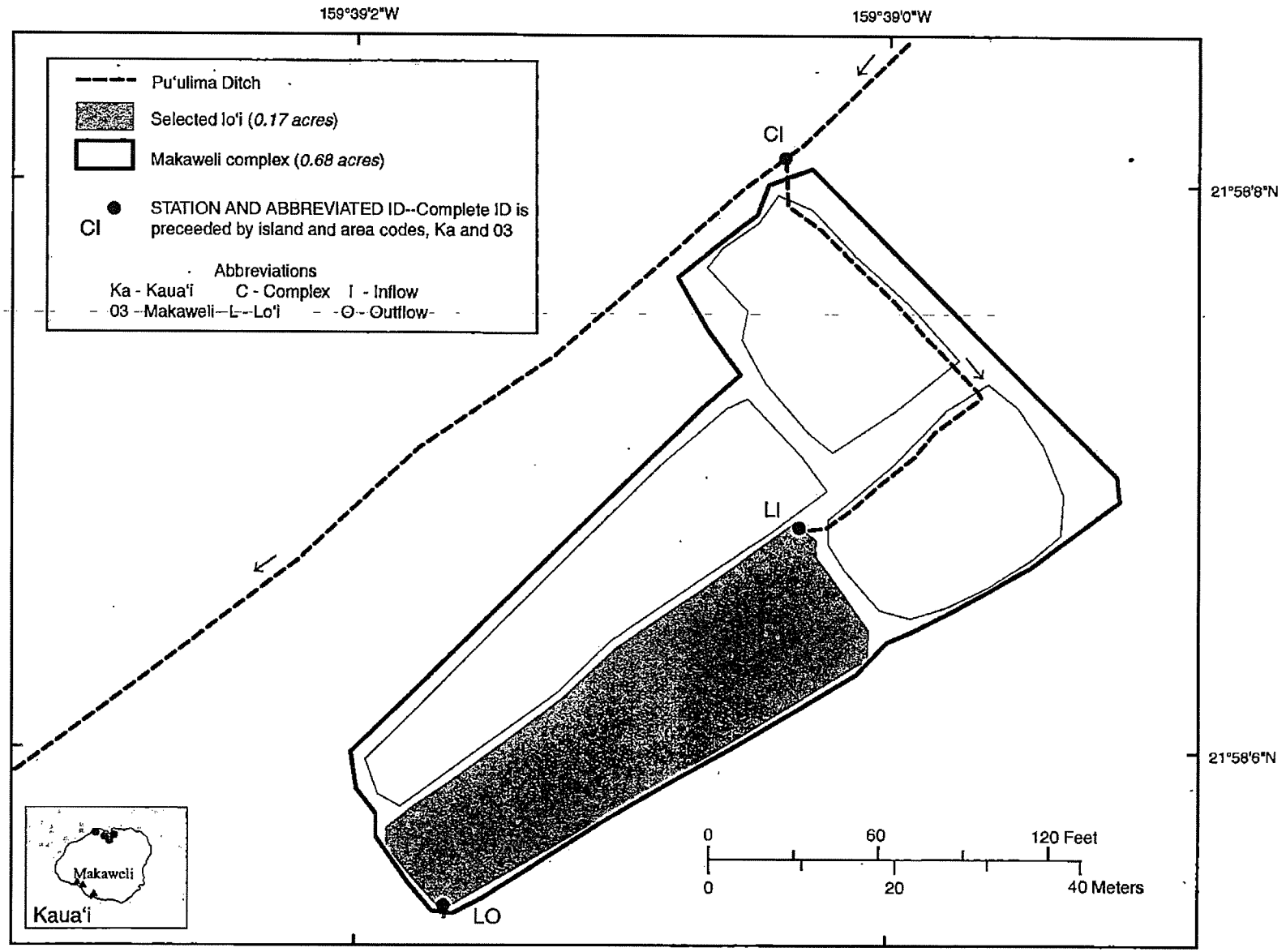
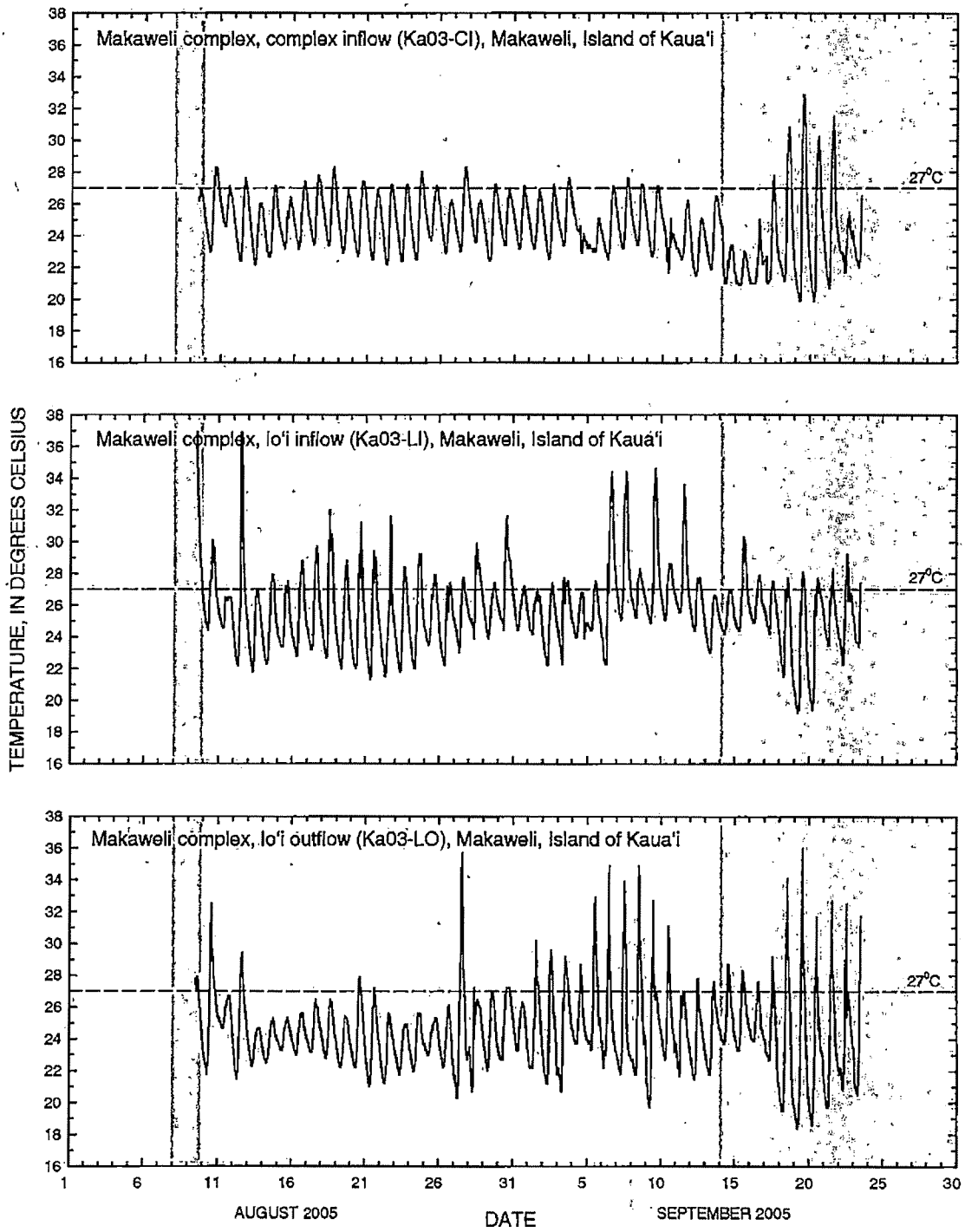


Figure 11. Makaweli lo'i complex, Island of Kaua'i.



Highlighted periods indicate atypical irrigated conditions. On August 9, at the time of first visit, no flow was going into the selected lo'i. During September 14-15, a rainstorm deposited heavy debris upstream of the main diversion dam which significantly reduced flow in the 'auwai for the following period.

Figure 12. Water temperature in Makaweli lo'i complex, Island of Kaua'i.

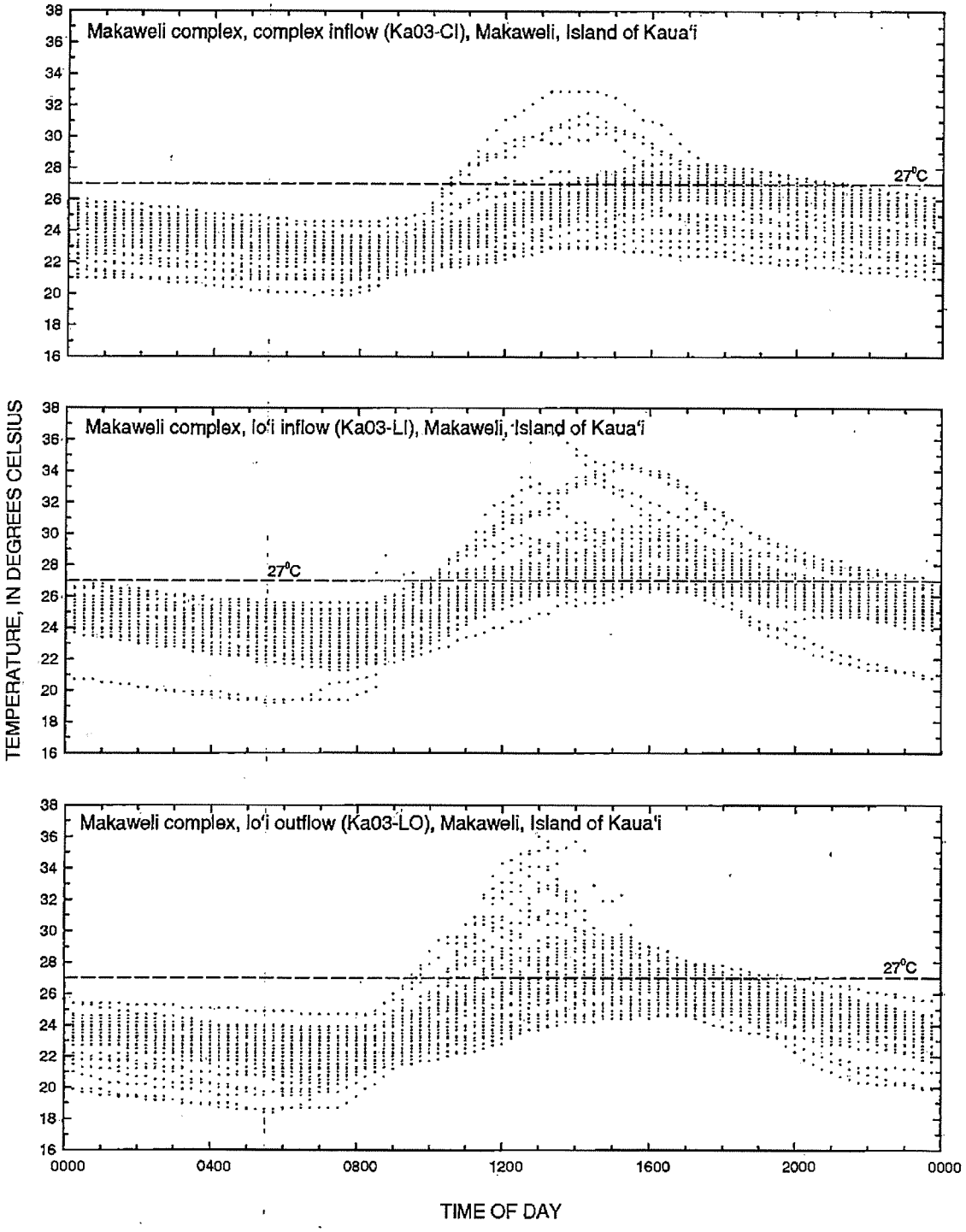


Figure 13. Daily pattern of water temperature in Makaweli lo'i complex, Island of Kaua'i. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

O'ahu

Three areas were measured on O'ahu—Waiāhole and Waihe'e (windward sites) and Hale'iwa (leeward site). Flow measurements were made in Waiāhole on August 15, 2005, when the temperature loggers were deployed, and on October 17, 2005, when the temperature loggers were removed (tables 4 and 5). The Waiāhole area is supplied through an unnamed 'auwai with water diverted from Waianu Stream (fig. 13). Two independent complexes were studied. Ten flow measurements were made, and seven temperature loggers were deployed at selected inflow and outflow locations (figs. 14 and 15).

Flow measurements were made in Waihe'e on August 23, 2005, when the temperature loggers were deployed, and on October 18, 2005, when the temperature loggers were removed (tables 4 and 5). The Waihe'e area is supplied through the Waihe'e Ditch with water diverted far upstream from Waihe'e Stream (fig. 16). Two lo'i complexes were available for study in this area. Eight flow measurements were made, and four temperature loggers were deployed in the Waihe'e area (figs. 17 and 18).

The Hale'iwa area is supplied by ground water pumped from nearby springs and was considered to be one lo'i complex for this study (fig. 19). No flow measurements were made because of difficulty finding places to make measurements, but the kalo farmer estimated the flow to be 1.08 Mgal/d (table 4). Three temperature loggers were deployed in the Hale'iwa area from August 10, 2006, to September 26, 2006 (table 5; figs. 20 and 21).

Table 4. Summary of discharge measurements and areas for selected lo'i complexes, Island of O'ahu.

[Mgal/d, million gallons per day; gad, gallons per acre per day; na, not applicable, average water use is determined by summing the averages of each complex or lo'i and dividing by the number of complexes or lo'i]

		Complex						Lo'i					
Geographic designation	Area	Station	Irrigation area (acre)	Date	Measurement time	Discharge (Mgal/d)	Water use (gad)	Station	Irrigation area (acre)	Date	Measurement time	Discharge (Mgal/d)	Water use (gad)
Windward	Waiāhole	Oa04A-CI	1.00	8/15/2005	1019	0.35	350,000	Oa04A-LI	0.12	8/15/2005	1045	0.080	660,000
				10/17/2005a	0932	0.25	250,000			10/17/2005	1009	0.033	270,000
		Oa04B-CI	0.71	8/15/2005	1325	0.42	590,000	Oa04B-LI	0.12	8/15/2005	1420	0.045	390,000
				10/17/2005b	1252	0.72	1,000,000			10/17/2005	1327	0.080	690,000
								Oa04B-LO		8/15/2005	1516	0.012	na
										10/17/2005	1345	0.060	na
Windward	Waihe'e	Oa05A-CI	1.94	8/23/2005	1340	0.59	300,000	Oa05B-LI	0.21	8/23/2005	1258	0.11	520,000
				10/18/2005	1439	0.52	270,000			10/18/2005	1047	0.047	230,000
		Oa05B-CI	1.02	8/23/2005	1318	0.15	150,000	Oa05B-LO		8/23/2005	1204	0.047	na
				10/18/2005	1021	0.12	120,000			10/18/2005	1604	0.030	na
Leeward	Hale'iwa	Oa06-CI	25.14	na	na	1.08c	44,000	Oa06-LI	0.70	9/26/2006	1023	0.15	210,000
number			5				5		4				4
minimum			0.71				44,000		0.12				210,000
maximum			25.14				1,000,000		0.70				690,000
average			1.17				310,000		0.29				400,000

[a]'auwai overflow upstream of measurement site resulting from backwater conditions caused by debris in the 'auwai; reason for lower flow.

[b]'auwai had just been cleaned; reason for higher flow.

[c]Estimated pumping rate of 750 gal/min (by farmer) from nearby spring to irrigate lo'i complexes

Table 5. Water-temperature statistics based on measurements collected at 15-minute intervals for lo'i complexes on the Island of O'ahu.

[°C, degrees Celsius; na, not applicable]

Geographic designation	Area	Station	Period of record	Temperature (°C)			Range of times daily peak temperatures occurred	Temperature measurements greater than 27°C		
				Mean	Range	Mean daily range		Percent	Earliest time of day	Latest time of day
Windward	Waiāhole	Oa04A-CI	8/15/2005 – 10/17/2005	21.4	20.5 – 23.3	1.4	1030 – 2345	0.0	na	na
		Oa04A-LI	8/15/2005 – 10/17/2005	21.5	20.4 – 23.4	1.5	0945 – 2345	0.0	0000	0000
		Oa04A-LO	8/15/2005 – 10/17/2005	24.6	20.8 – 35.7	8.5	1100 – 1730	21.6	1030	1845
		Oa04B-CI	8/15/2005 – 10/17/2005	21.7	20.5 – 24.2	1.5	1100 – 2345	0.0	0000	0000
		Oa04B-LI	8/15/2005 – 10/17/2005	21.9	20.5 – 24.5	1.7	1100 – 1730	0.0	na	na
		Oa04B-LO	8/15/2005 – 10/17/2005	24.5	20.5 – 35.3	7.6	1015 – 1530	21.4	0915	1915
			8/15/2005 – 10/17/2005	23.0	20.5 – 29.7	4.1	1045 – 1600	2.5	1130	1645
Windward	Waihe'e	Oa05A-CI	8/23/2005 – 10/18/2005	21.6	20.7 – 22.7	0.7	1045 – 2345	0.0	0000	0000
		Oa05B-CI	8/23/2005 – 10/18/2005	21.8	20.7 – 23.9	1.2	1030 – 1545	0.0	0000	0000
		Oa05B-LI	8/23/2005 – 10/18/2005	22.0	20.7 – 24.9	1.5	1030 – 1500	0.0	0000	0000
		Oa05B-LO	8/23/2005 – 10/18/2005	25.0	21.4 – 35.3	4.9	1030 – 1700	22.3	0900	2200
Leeward	Hale'iwa	Oa06-CI	8/10/2006 – 9/26/2006	23.2	22.6 – 24.2	0.7	0700 – 1800	0.0	na	na
		Oa06-LI	8/10/2006 – 9/26/2006	25.2	21.7 – 31.0	4.1	0930 – 1830	23.2	1100	2145
		Oa06-L	8/10/2006 – 9/26/2006	26.3	21.9 – 35.1	5.4	1315 – 1730	34.5	1000	2215

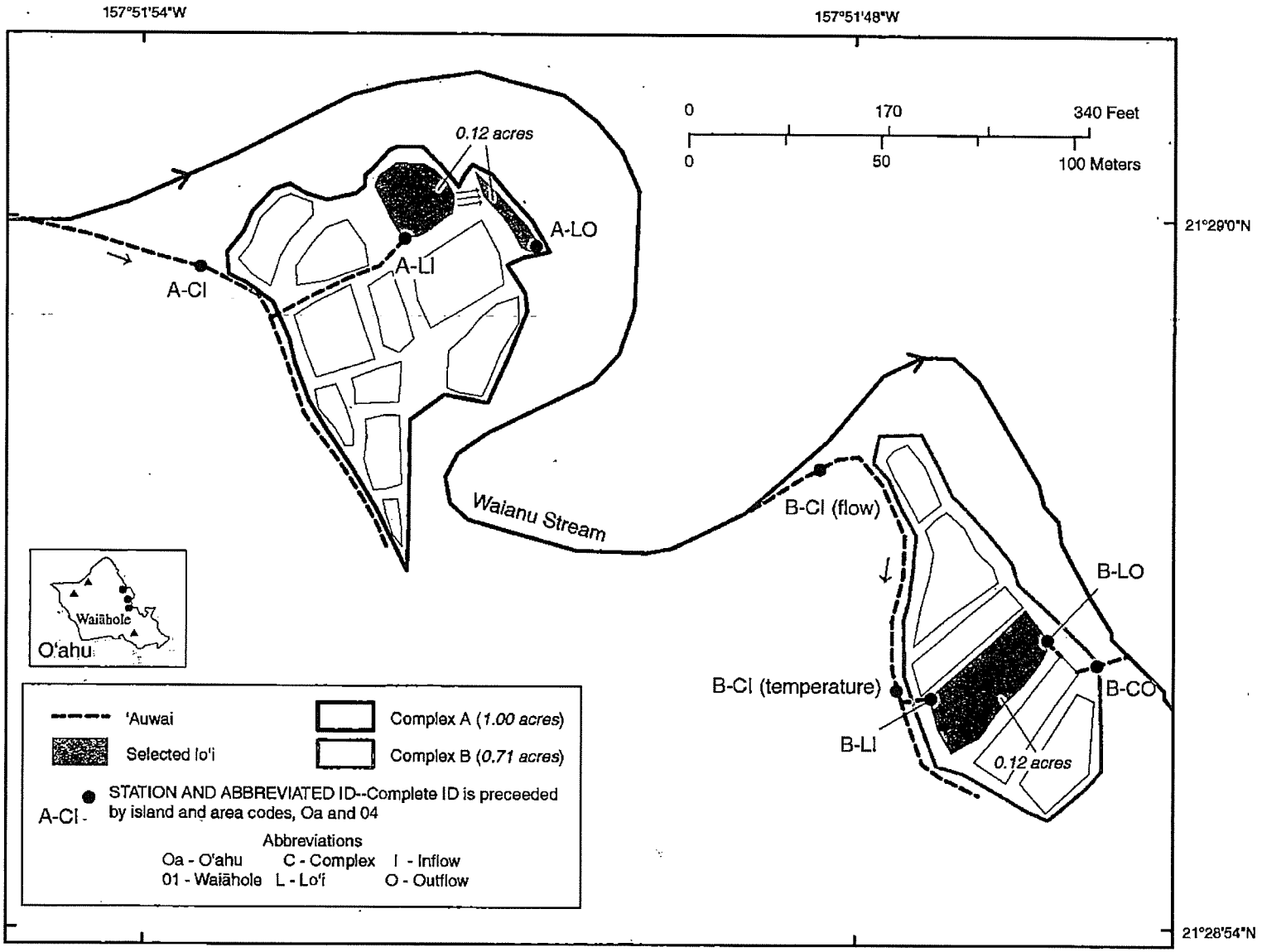
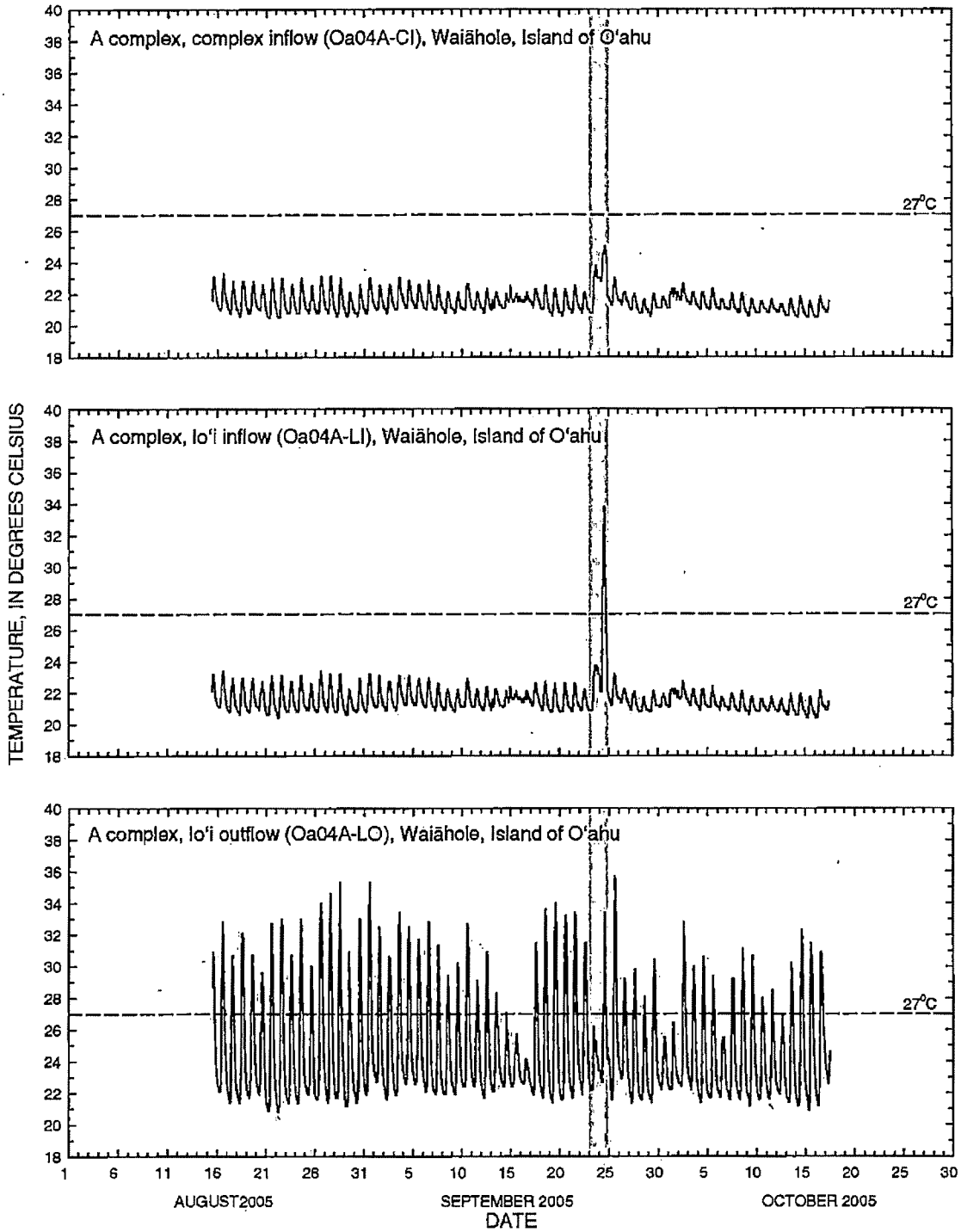
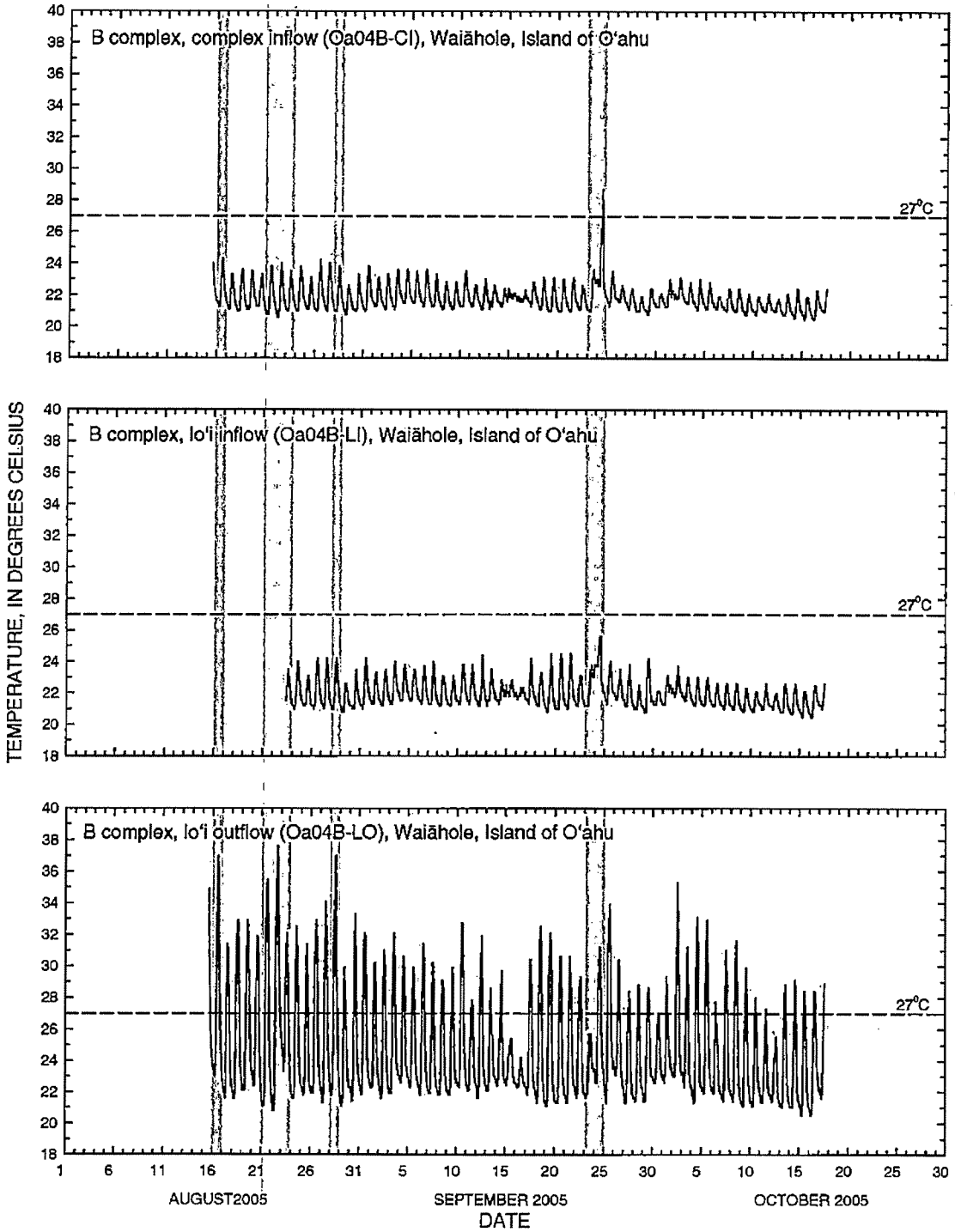


Figure 14. Waiāhole lo'i complexes, Island of O'ahu.



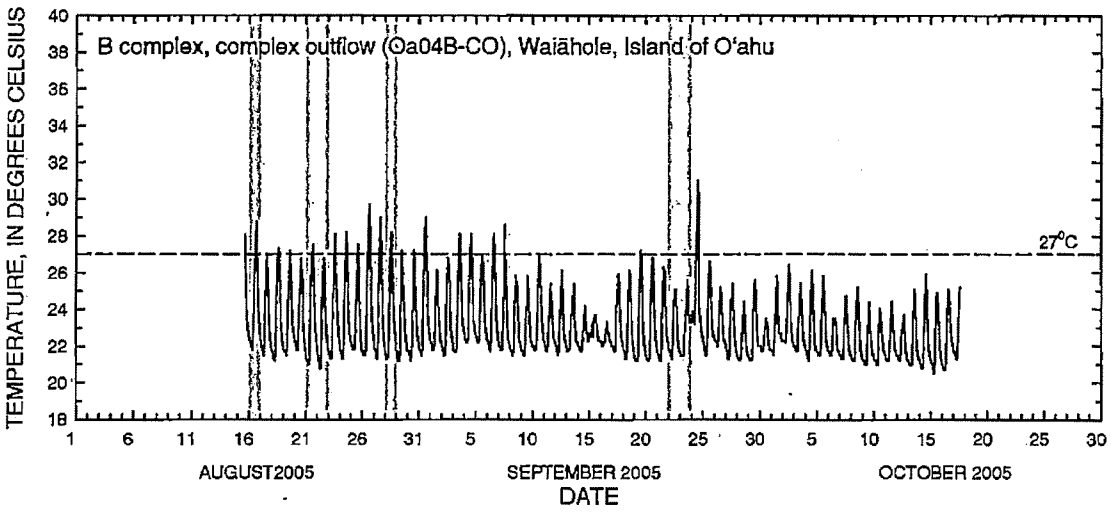
Highlighted periods indicate atypical irrigated conditions. On September 23, a heavy rainstorm flooded the complex and deposited debris around diversion dam and 'auwai which significantly reduced inflow on the following day and caused the water temperature to rise.

Figure 15. Water temperature in Waiāhole Io'i complexes, Island of O'ahu.



Highlighted periods indicate atypical irrigated conditions. On August 16, 21-23, farmer noted that intake pipe to the selected lo'i was shut off for weeding. On August 28, field inflow was lower than normal. On September 23, heavy rainstorm flooded the complex and deposited debris around diversion dam and 'auwai which significantly reduced inflow on the following day and caused water temperature to rise.

Figure 15. *Continued.*



Highlighted periods indicate atypical irrigated conditions. On August 16, 21-23, farmer noted that intake pipe to the selected lo'i was shut off for weeding. On August 28, field inflow was lower than normal. On September 23, heavy rainstorm flooded the complex and deposited debris around diversion dam and 'auwai which significantly reduced inflow on the following day and caused water temperature to rise.

Figure 15. *Continued.*

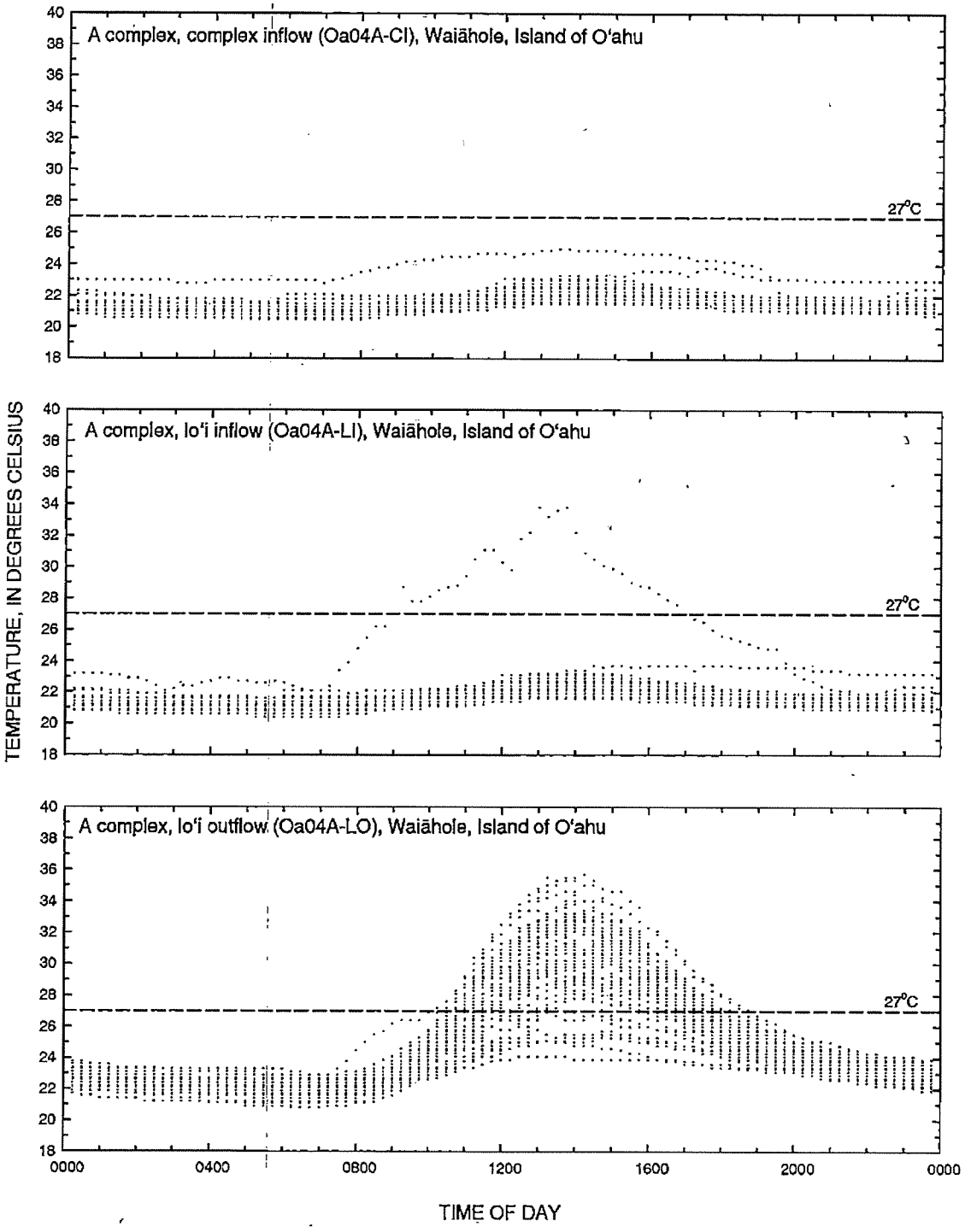


Figure 16. Daily pattern of water temperature in Waiāhole lo'i complexes, Island of O'ahu.

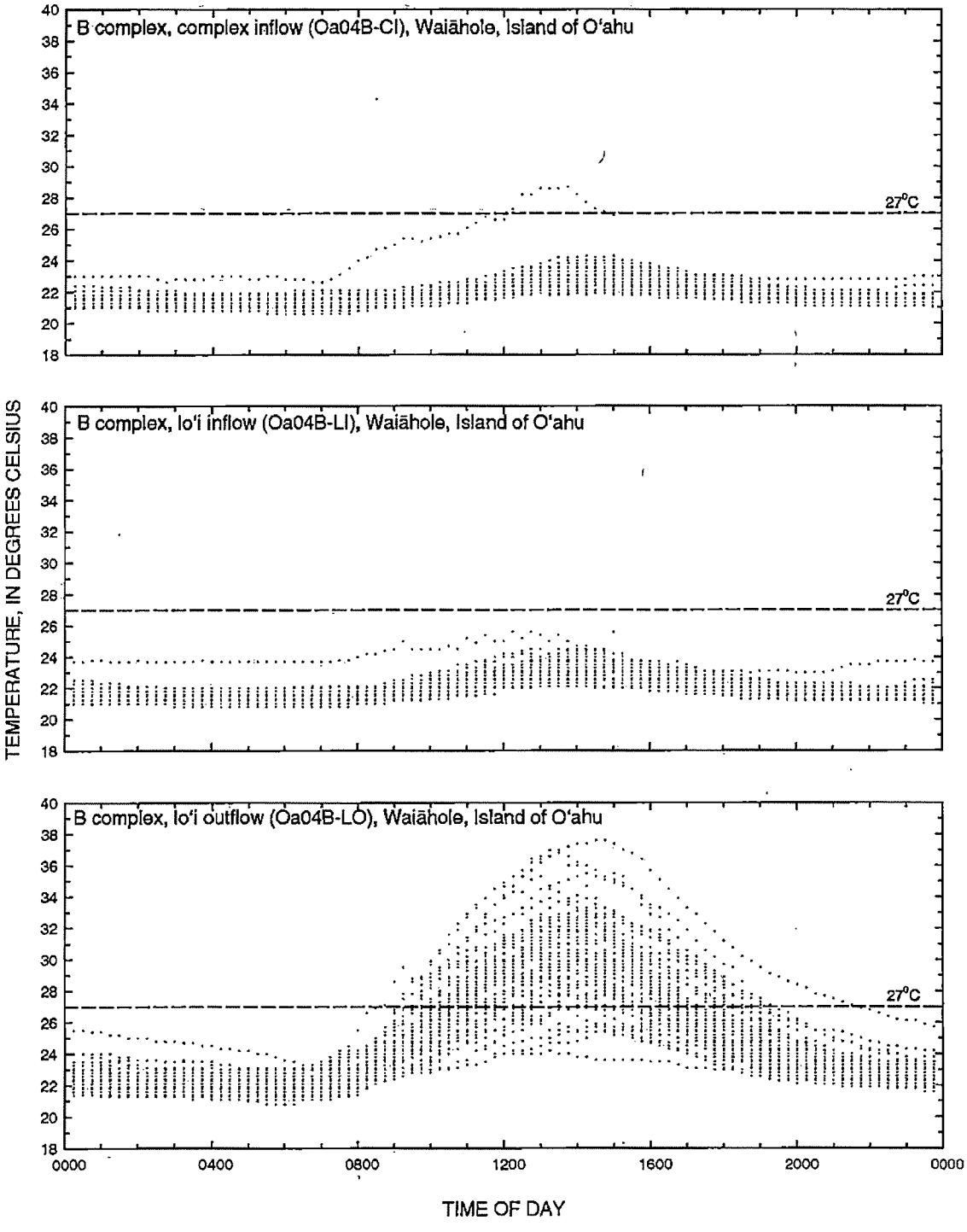


Figure 16. *Continued.*

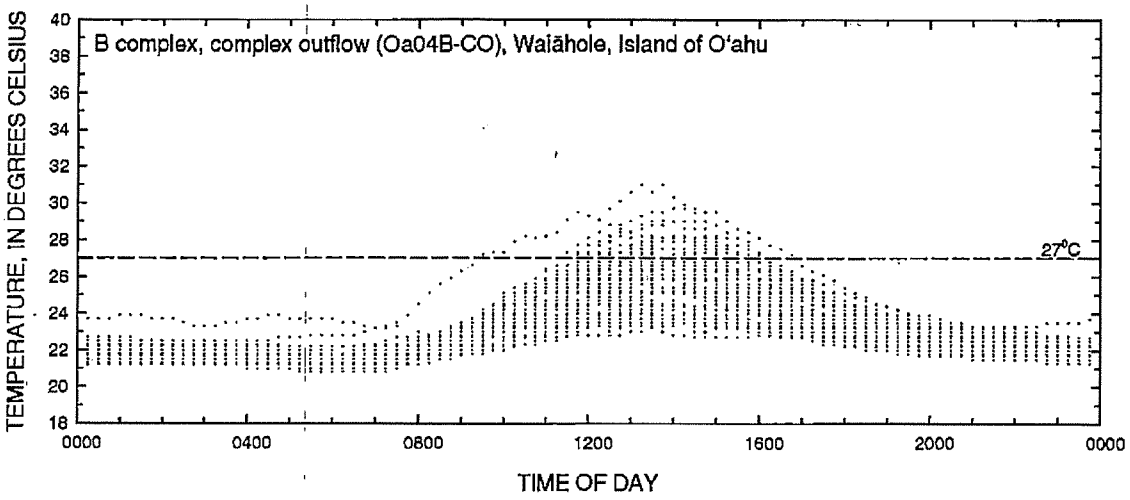


Figure 16. *Continued.*

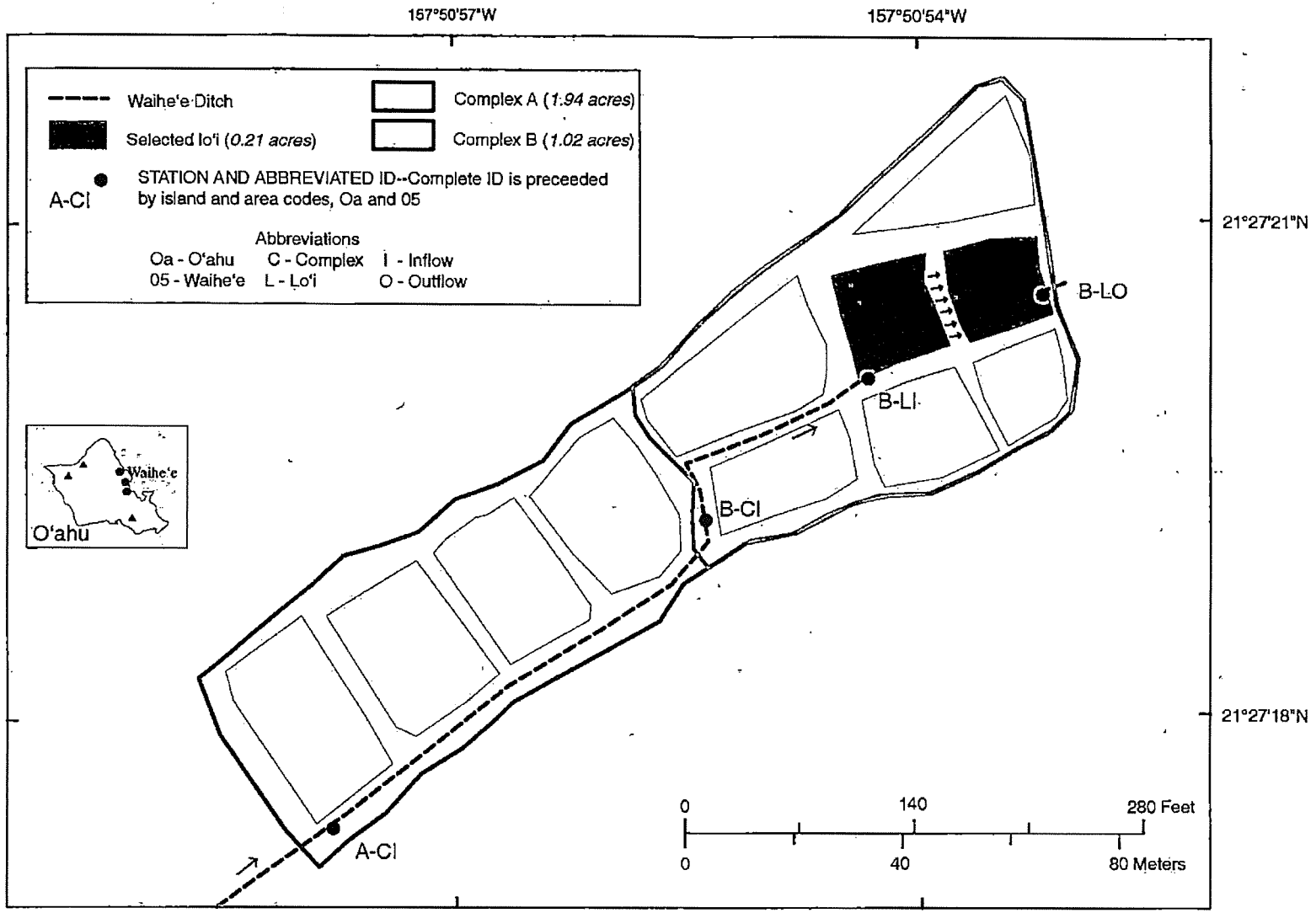
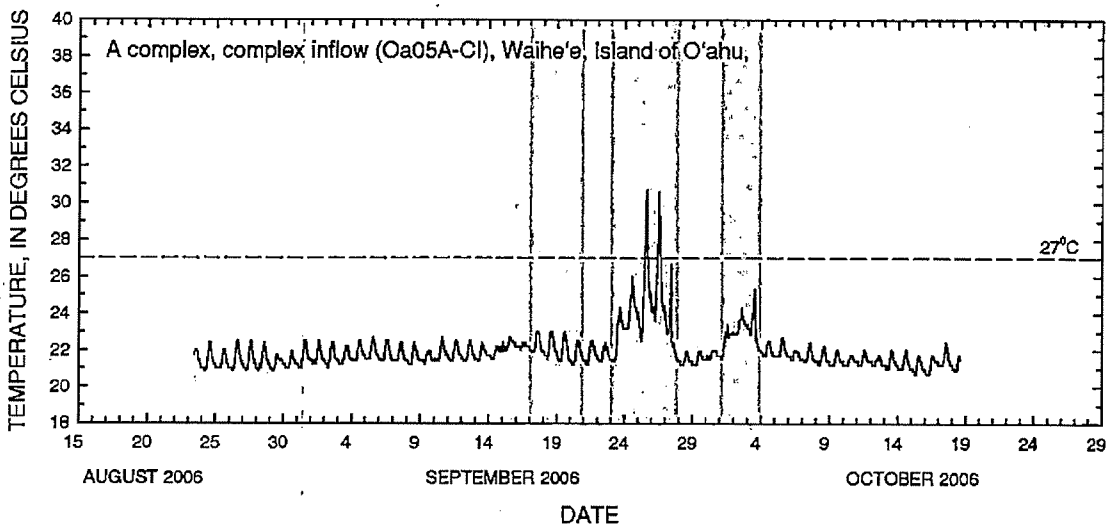
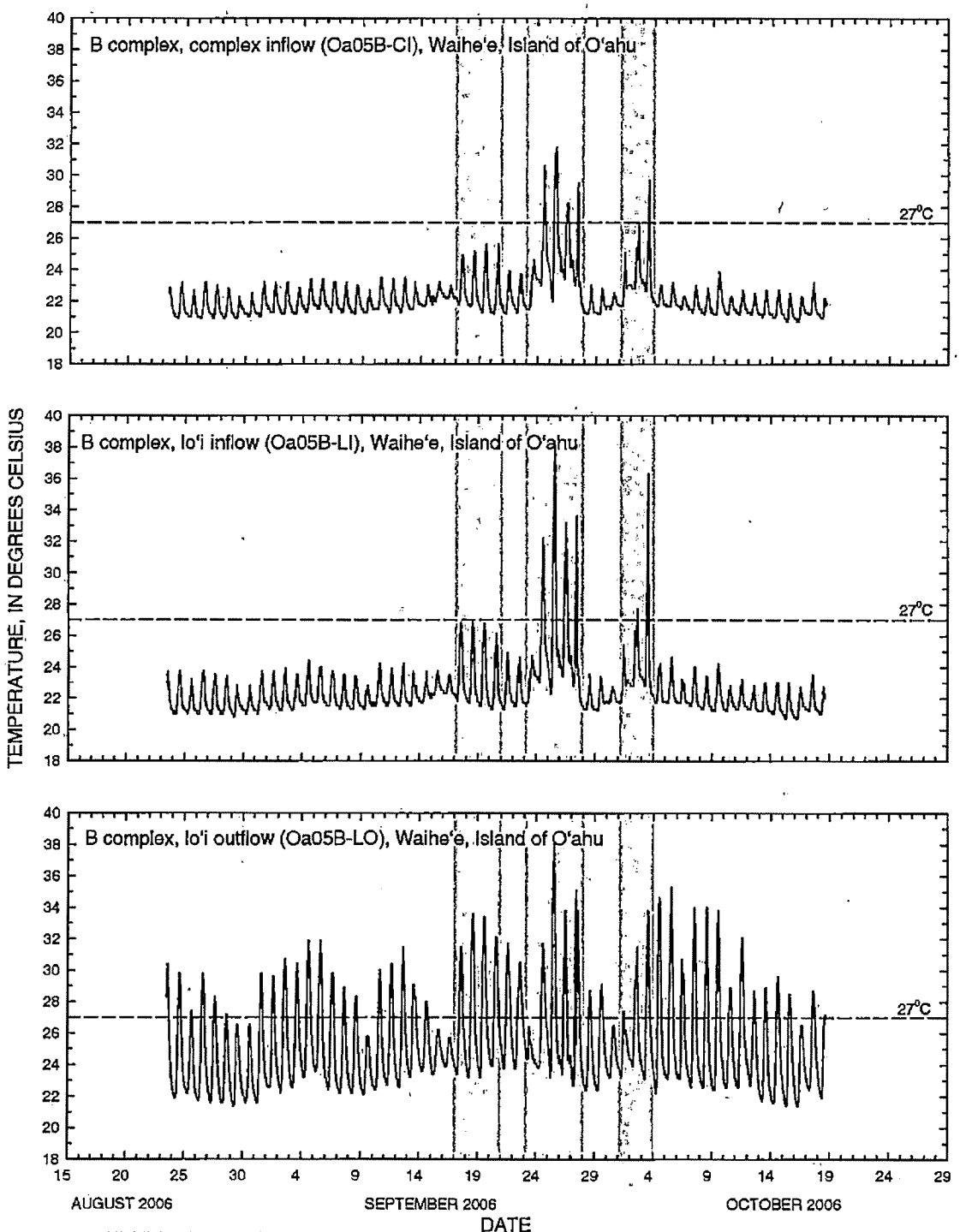


Figure 17. Waihe'e lo'i complex, Island of O'ahu.



Highlighted periods indicate atypical irrigated conditions. Heavy rain, prior to September 17-20, probably clogged intake and reduced flow to complex which caused the rise in water temperatures. On September 23, heavy rainstorm flooded the complex and deposited debris to upstream diversion dam and 'auwai which significantly reduced inflow to complex and caused water temperatures to rise. During October 1-4, upstream diversion dam was being repaired which probably caused the reduction in flow and rise in water temperatures.

Figure 18. Water temperature in Waihe'e lo'i complexes, Island of O'ahu.



Highlighted periods indicate atypical irrigated conditions. Heavy rain, prior to September 17-20, probably clogged intake and reduced flow to complex which caused the rise in water temperatures. On September 23, heavy rainstorm flooded the complex and deposited debris to upstream diversion dam and 'auwai which significantly reduced inflow to complex and caused water temperatures to rise. During October 1-4, upstream diversion dam was being repaired which probably caused the reduction in flow and rise in water temperatures.

Figure 18. *Continued.*

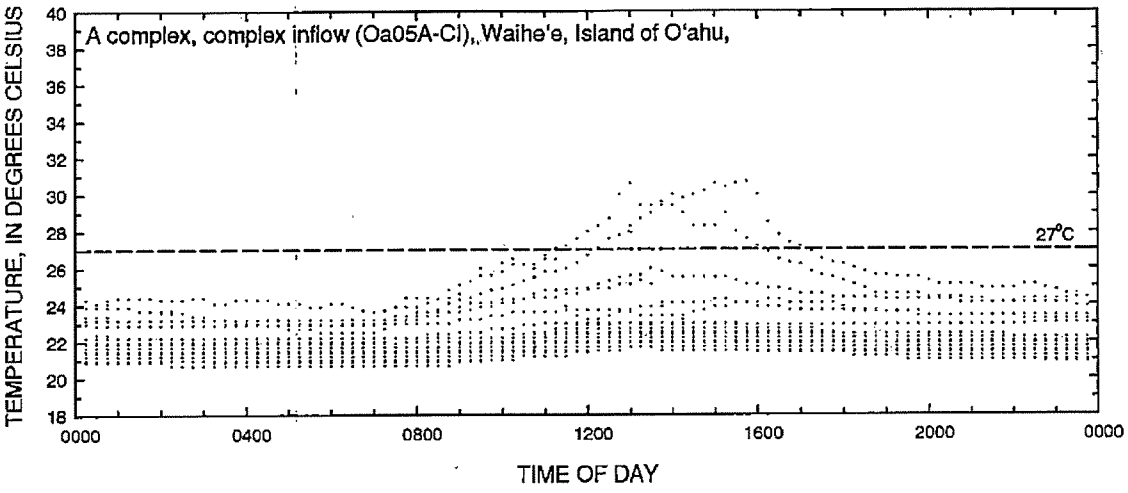


Figure 19. Daily pattern of water temperature in Waihe'e lo'i complex, Island of O'ahu. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

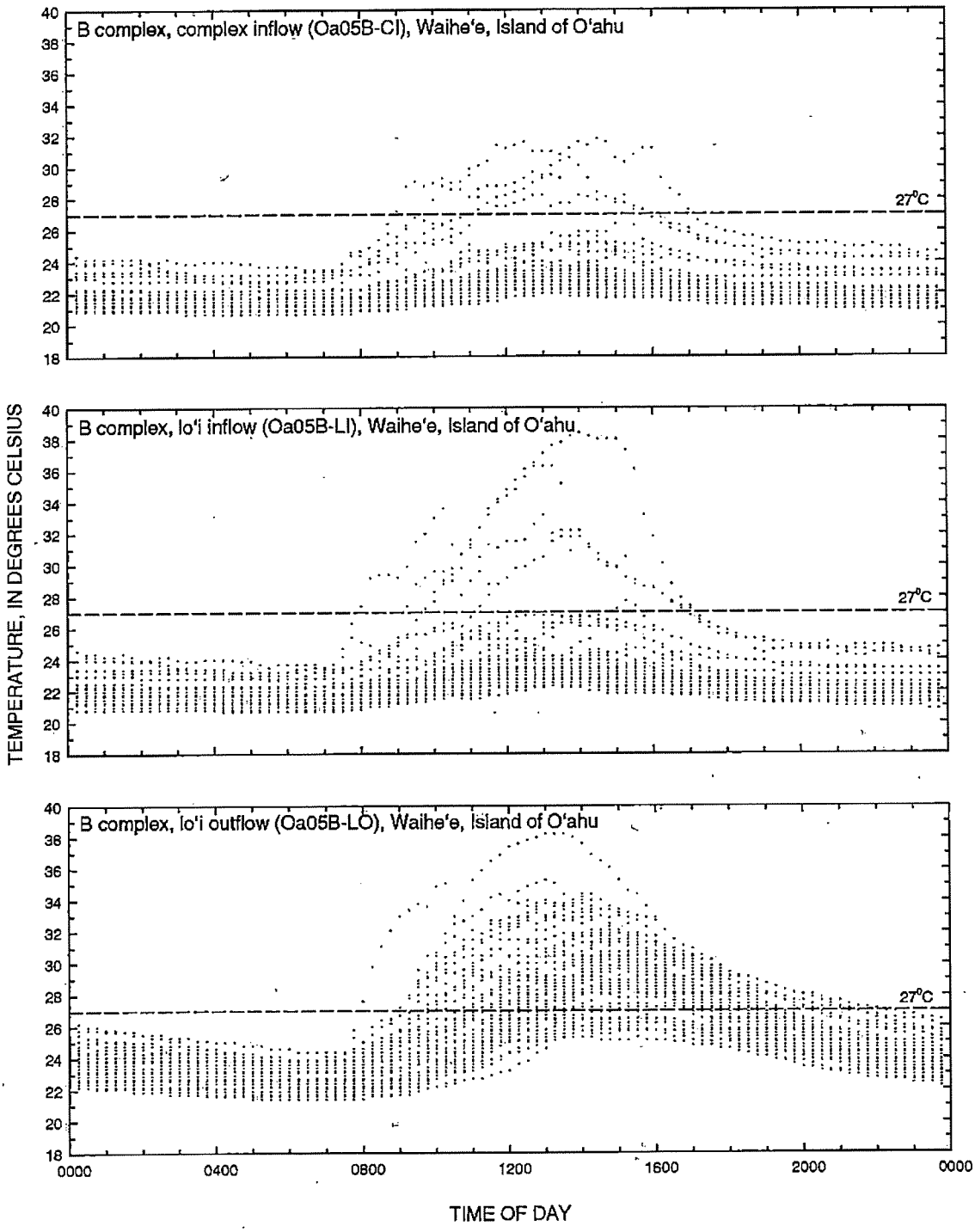


Figure 19. *Continued.*

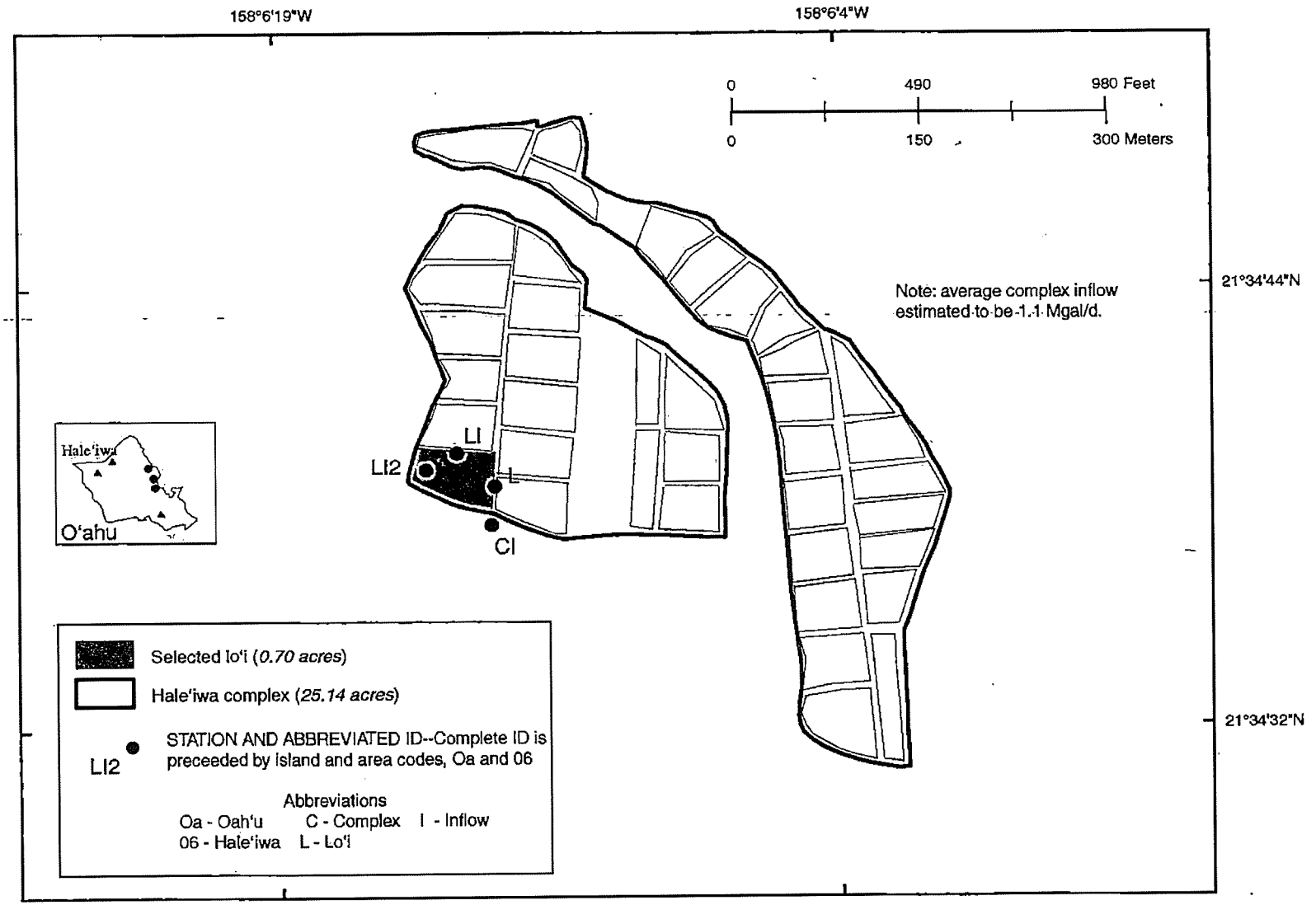


Figure 20. Hale'iwa lo'i complex, Island of O'ahu.

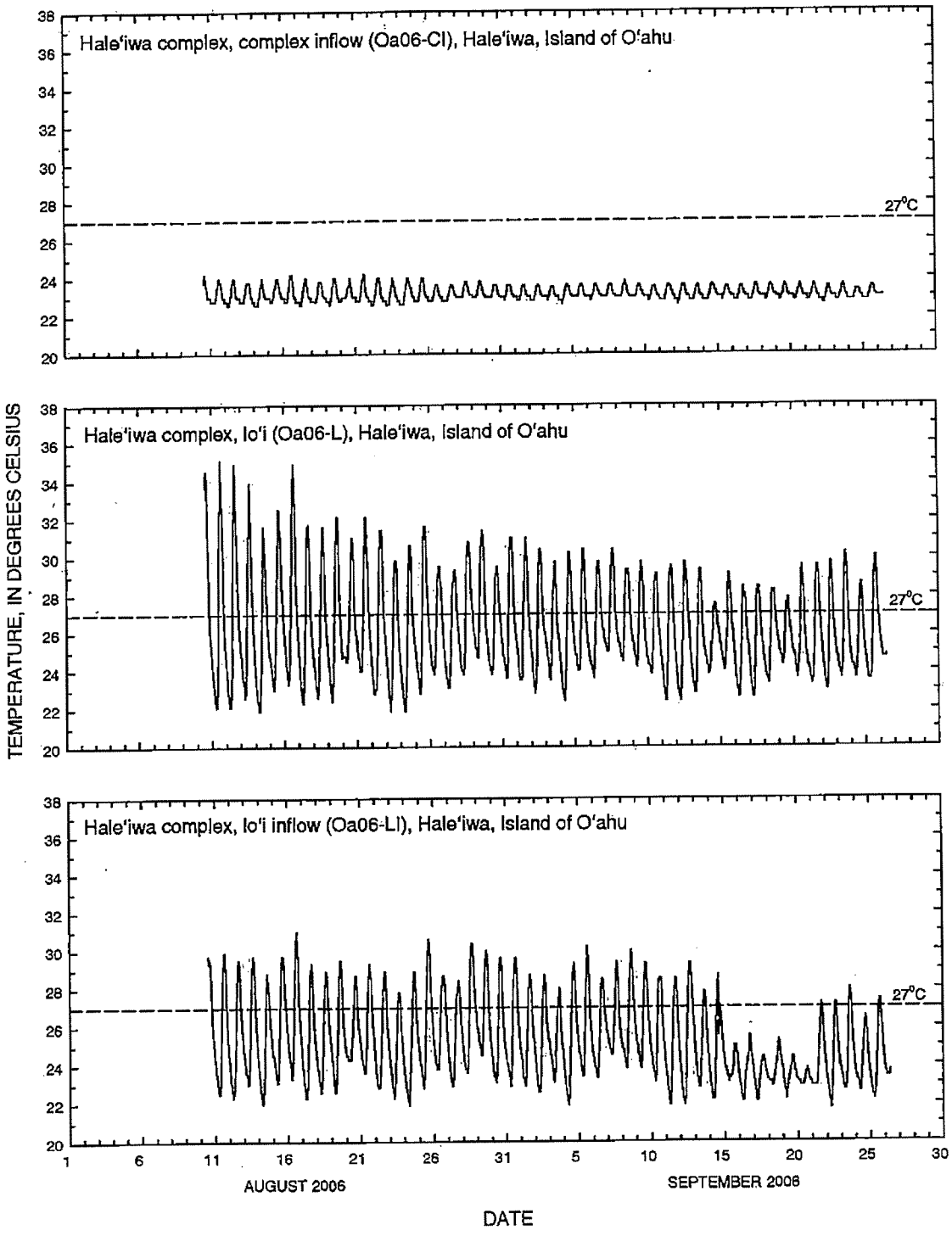


Figure 21. Water temperature in Hale'iwa lo'i complexes, Island of O'ahu.

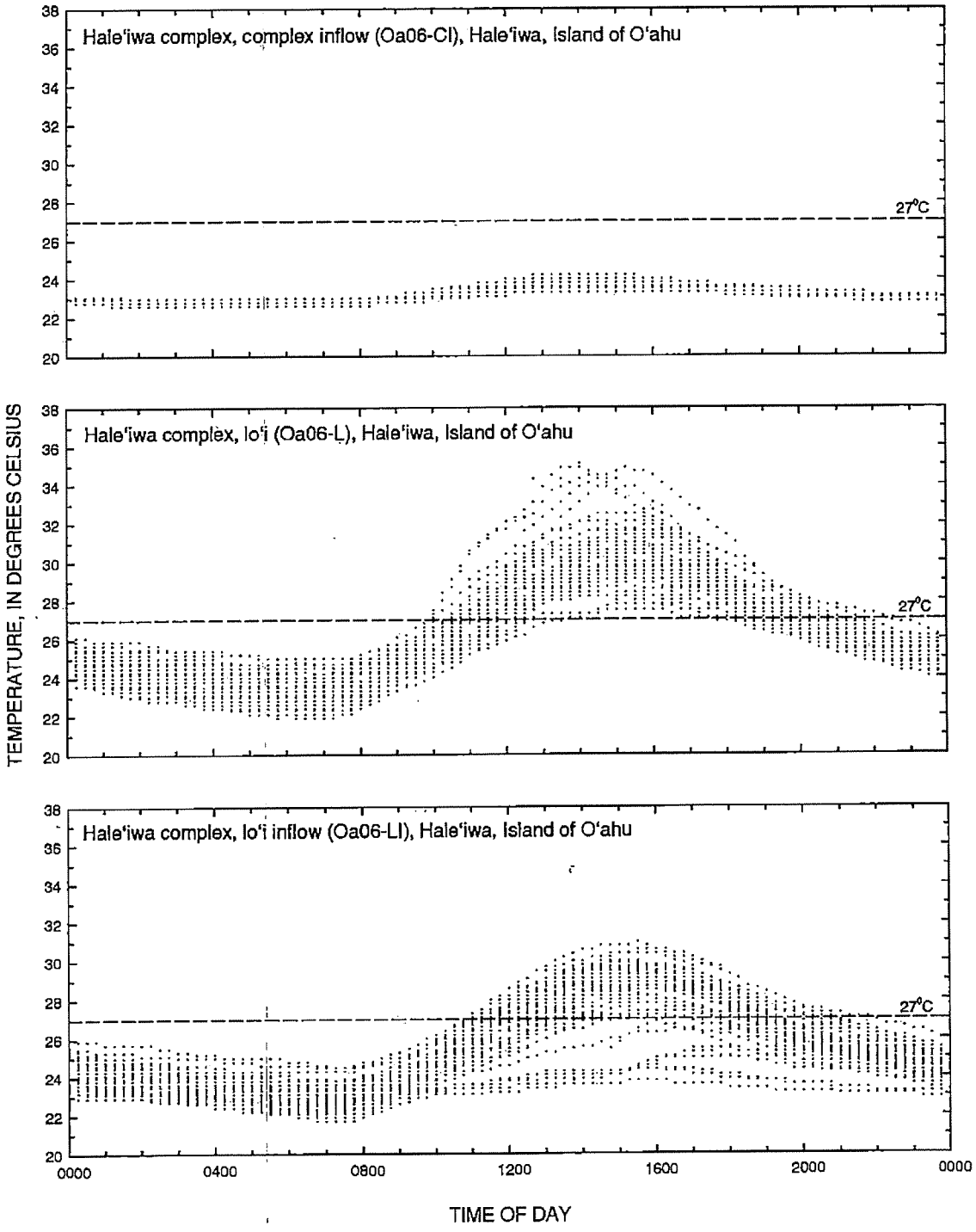


Figure 22. Daily pattern of water temperature in Hale'iwa lo'i complex, Island of O'ahu. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

Maui

Three areas were measured on Maui—Waihe'e, Wailua, and Ke'anae, all windward sites. Flow measurements were made July 29-31, 2006, when the temperature loggers were deployed, and September 21-22, 2006, when the temperature loggers were removed (tables 6 and 7). The Waihe'e area gets water through an 'auwai supplied by Spreckel's Ditch with water diverted from the Waihe'e River (fig. 22). The Waihe'e area was considered to be two lo'i complexes (an upper and a lower complex), both of which were studied. Eight flow measurements were made, and three temperature loggers were deployed at selected inflow and outflow locations (figs. 23 and 24).

The Wailua area contains numerous lo'i complexes, three of which were available for study—Lakini, Wailua, and Waikani. The Lakini lo'i complex is supplied through an 'auwai with water diverted from Hamau Stream. Hamau Stream receives diverted water from Waiokomilo Stream further upstream (fig. 25). The Lakini area was considered to be one lo'i complex in this study. Eight flow measurements were made, and two temperature loggers were deployed in the Lakini area (figs. 26 and 27). In addition to the five flow measurements made to determine flow directly into the complex, two measurements were made in the 'auwai upstream of all lo'i complexes to determine the amount of flow available for all downstream lo'i complexes (July 30, 2006, 2.31 Mgal/d and September 21, 2006, 1.37 Mgal/d), and one measurement was made in Hamau Stream (*NWIS link*) downstream of the 'auwai diversion to determine how much water remained in the stream (July 30, 2006, 0.54 Mgal/d).

The lo'i complex named Wailua in this study is supplied through an 'auwai with water diverted from Waiokomilo Stream (fig. 28). Two flow measurements were made, and one temperature logger was deployed in the Wailua area (figs. 29 and 30).

The Waikani area is supplied through an 'auwai with water diverted from Wailuanui Stream (fig. 31). Two flow measurements were made, and two temperature loggers were deployed in the Waikani area (figs. 32 and 33).

The Ke'anae area has numerous lo'i and all active lo'i were treated as one lo'i complex supplied by the Ke'anae Flume, which diverts water from Pālauhulu Stream (fig. 34). Two flow measurements were made, and two temperature loggers were deployed in the Ke'anae area (figs. 35 and 36) but the lo'i complex outlet temperature logger (Ma12-CO) failed to collect data during the deployment. Flow measurements were made near the flume intake at the site of a former USGS streamflow gaging station (Taro patch feeder ditch at Ke'anae, Maui, station *16522000*) where the median flow from 1934 to 1968 was 2.2 Mgal/d.

Table 6. Summary of discharge measurements and areas for selected lo'i complexes, Island of Maui.

[Mgal/d, million gallons per day; gad, gallons per acre per day; na, not applicable; average water use is determined by summing the averages of each complex or lo'i and dividing by the number of complexes or lo'i]

Geographic designation	Area	Complex						
		Station	Irrigation area (acre)	Date	Measurement time	Discharge (Mgal/d)	Water use (gad)	Remarks
Windward	Waihe'e	Ma08A-CI	2.30	7/29/2006	1501	0.34	150,000	total flow for upper and lower complexes
				9/22/2006	1158	0.30	130,000	total flow for upper and lower complexes
		Ma08B-CIR	na	7/29/2006	1500	0.025		
		Ma08B-CIL	na			0.060		
			0.76		na	0.085	110,000	combined right and left complex inflows
		Ma08B-CIR	na	9/22/2006	1150	0.058		
		Ma08B-CIL	na		1055	0.067		
			0.76		na	0.13	160,000	combined right and left complex inflows
Windward	Wailua (Lakini)	Ma09-CIR	na	7/30/2006	1004	0.26		
		Ma09-CIL	na		0947	0.30		
			0.74		na	0.56	750,000	combined right and left complex inflows
		Ma09-CIR	na	9/21/2006	1015	0.16		
		Ma09-CIL	na		1049	0.058		
		Ma09-CIM	na		1206	0.19		
			0.74		na	0.41	550,000	combined right, left, and middle complex inflows
Windward	Wailua	Ma10-CI	3.32	7/30/2006	1136	0.59	180,000	
				9/21/2006	0845	0.46	140,000	
Windward	Wailua (Waikani)	Ma11-CI	2.80	7/30/2006	1236	0.54	190,000	
				9/21/2006	1608	0.26	93,000	
Windward	Ke'anae	Ma12-CI	10.53	7/31/2006	0836	1.9	180,000	former U.S. Geological Survey streamflow-gaging station
				9/21/2006	1415	1.6	150,000	
number			6				6	
minimum			0.74				93,000	
maximum			10.53				750,000	
average			3.41				230,000	

Table 7. Water-temperature statistics based on measurements collected at 15-minute intervals for lo'i complexes on the Island of Maui.

[°C, degrees Celsius; na, not applicable]

Geographic designation	Area	Station	Period of record	Temperature (°C)			Range of times daily peak temperatures occurred	Temperature measurements greater than 27°C		
				Mean	Range	Mean daily range		Percent	Earliest time of day	Latest time of day
Windward	Waihe'e	Ma08A-CI	7/29/2006 – 9/22/2006	21.6	19.9 – 24.0	2.0	1015 – 1845	0.0	na	na
		Ma08B-CIL	7/29/2006 – 9/22/2006	24.9	20.3 – 34.0	7.6	1130 – 1615	25.4	0930	1915
		Ma08B-CO	7/29/2006 – 9/22/2006	25.5	20.0 – 35.5	5.7	1115 – 1645	27.0	0945	2115
Windward	Wailua (Lakini)	Ma09-CIT	7/30/2006 – 9/21/2006	20.7	18.5 – 23.4	2.3	1300 – 1815	0.0	na	na
		Ma09-CO	7/30/2006 – 9/21/2006	23.2	18.4 – 31.7	7.4	1130 – 1645	16.9	1015	1800
Windward	Wailua	Ma10-CI	7/30/2006 – 9/21/2006	22.5	20.5 – 25.9	1.9	1200 – 1900	0.0	na	na
Windward	Wailua (Waikani)	Ma11-CI	7/30/2006 – 9/21/2006	22.2	21.0 – 24.0	0.7	0700 – 2345	0.0	na	na
		Ma11-CO	7/30/2006 – 9/21/2006	26.1	22.1 – 31.8	3.3	1400 – 2045	29.1	0000	2345
Windward	Ke'anae	Ma12-CI	7/31/2006 – 9/21/2006	20.0	19.0 – 21.9	1.0	1345 – 2330	0.0	na	na
		Ma12-CO	equipment malfunction	na	na	na	na	na	na	na

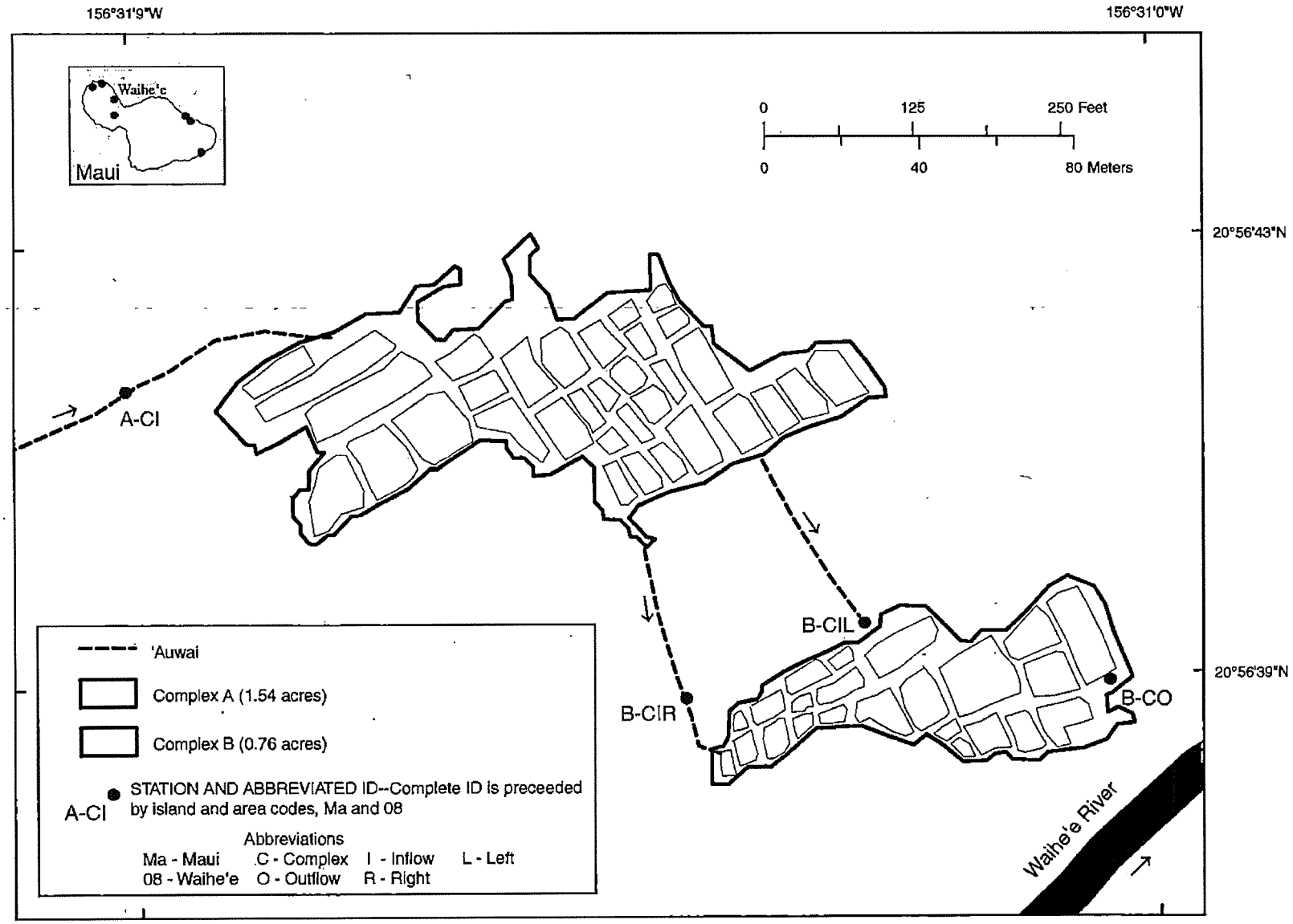


Figure 23. Waihe'e lo'i complexes, Island of Maui.

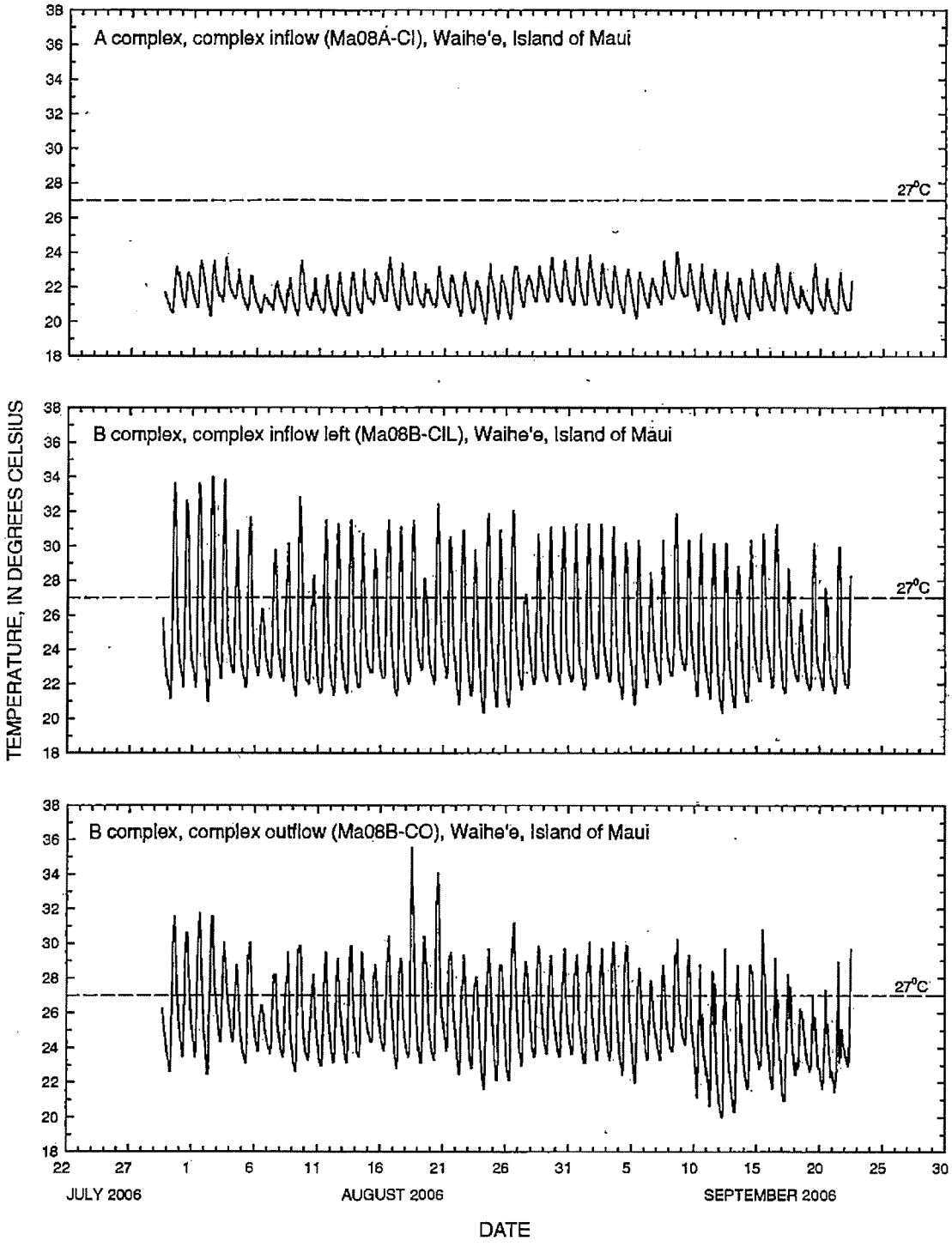


Figure 24. Water temperature in Waihe'e lo'i complexes, Island of Maui.

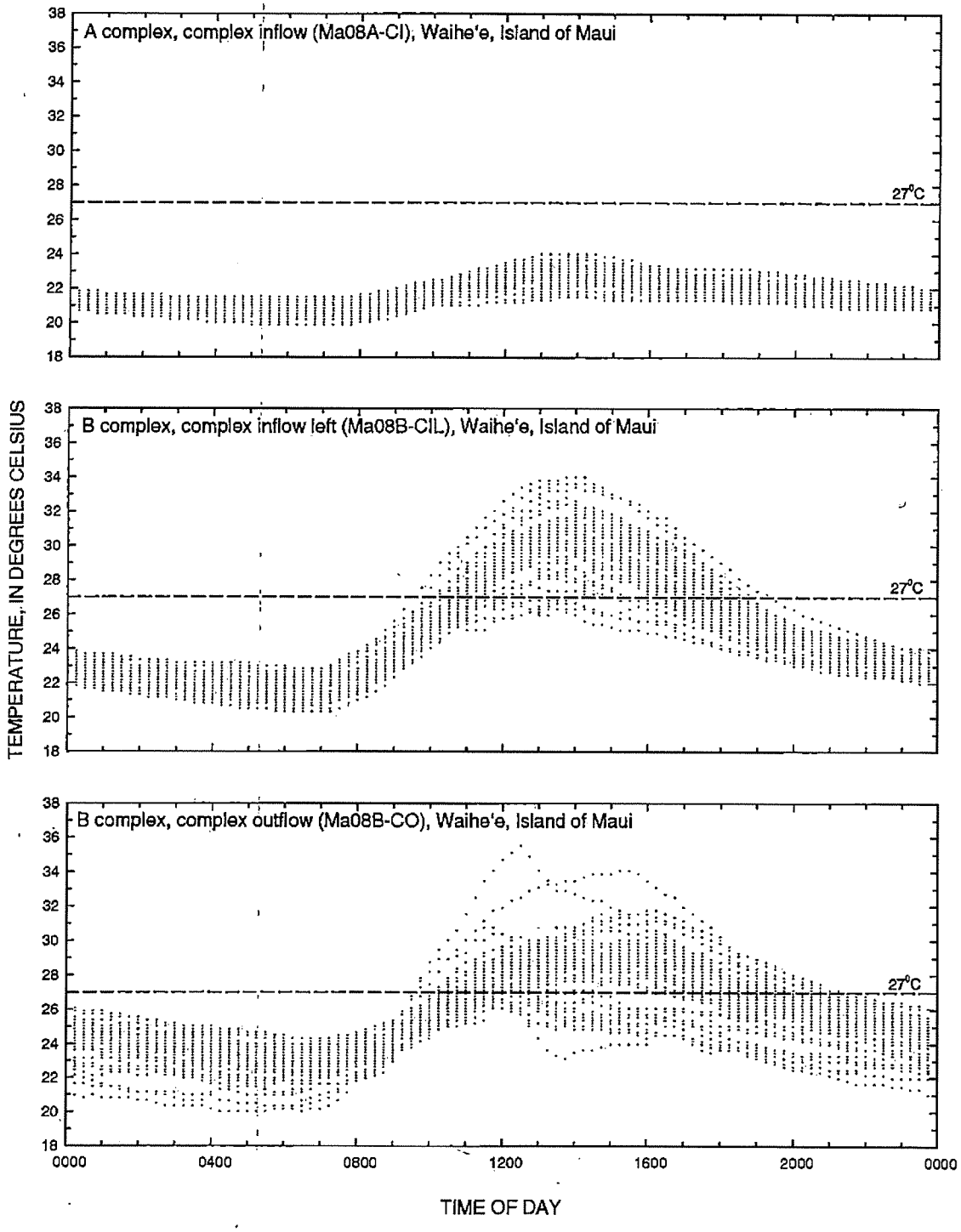


Figure 25. Daily pattern of water temperature in Waihe'e lo'i complexes, Island of Maui. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

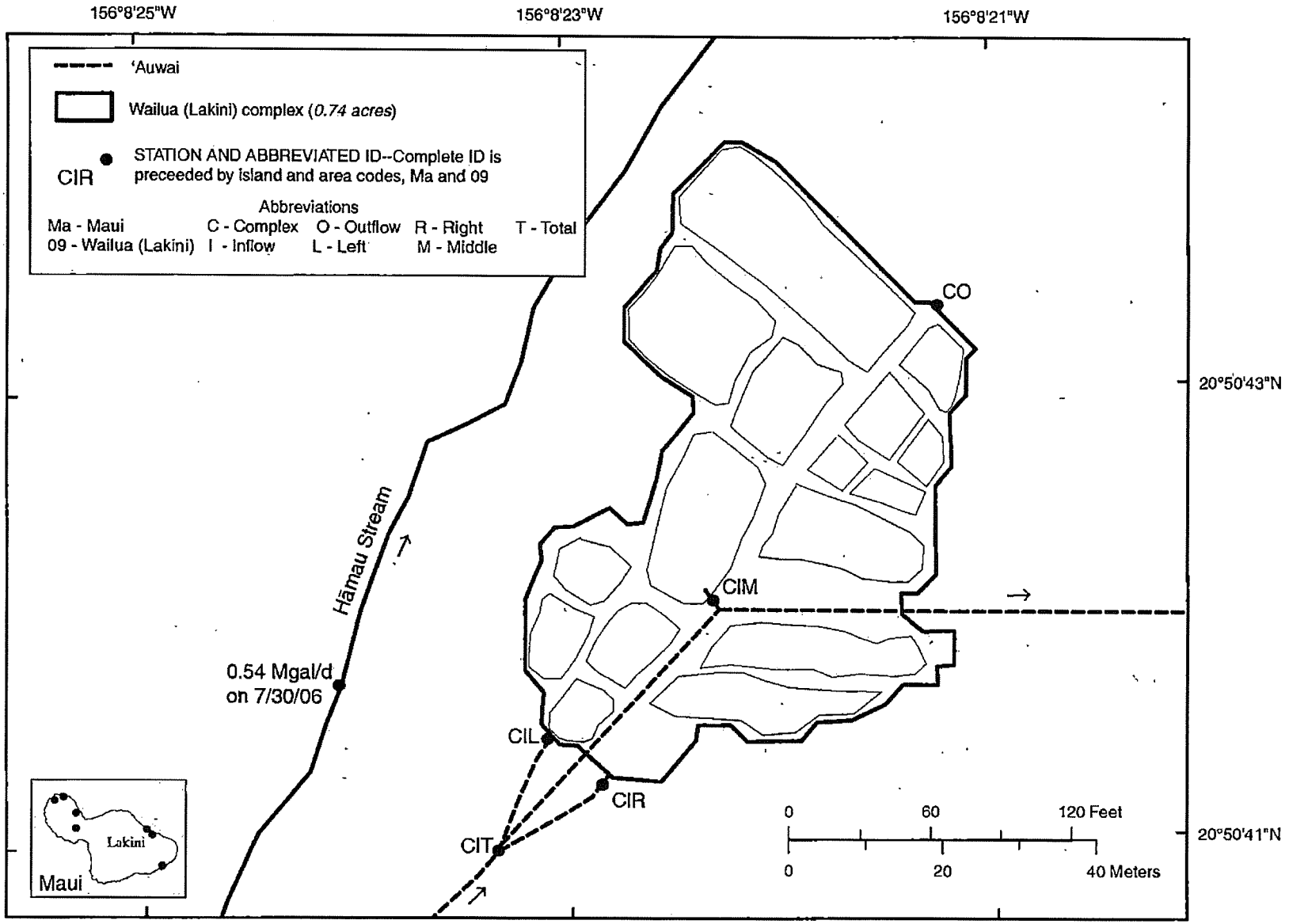


Figure 26. Wailua (Lakini) lo'i complex, Island of Maui.

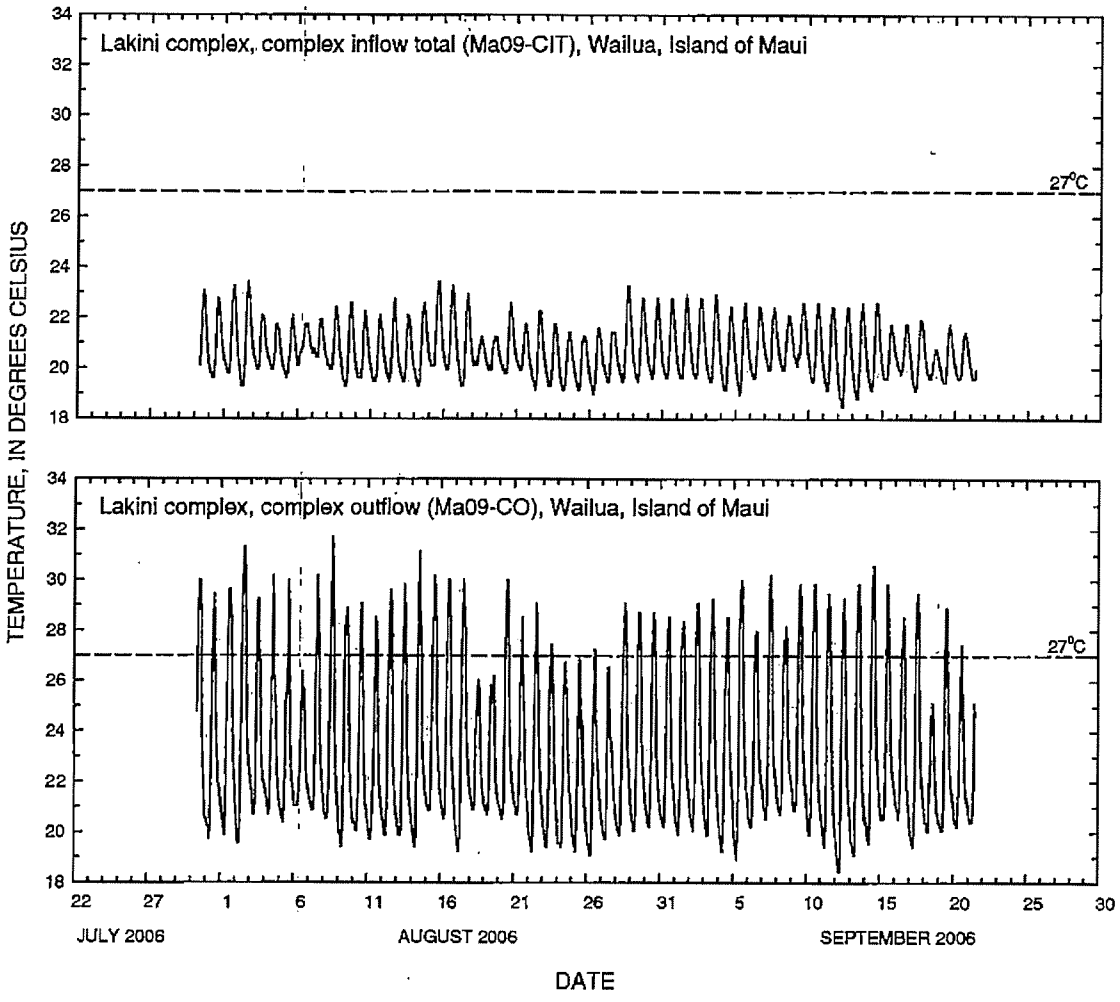


Figure 27. Water temperature in Wailua (Lakini) lo'i complex, Island of Maui.

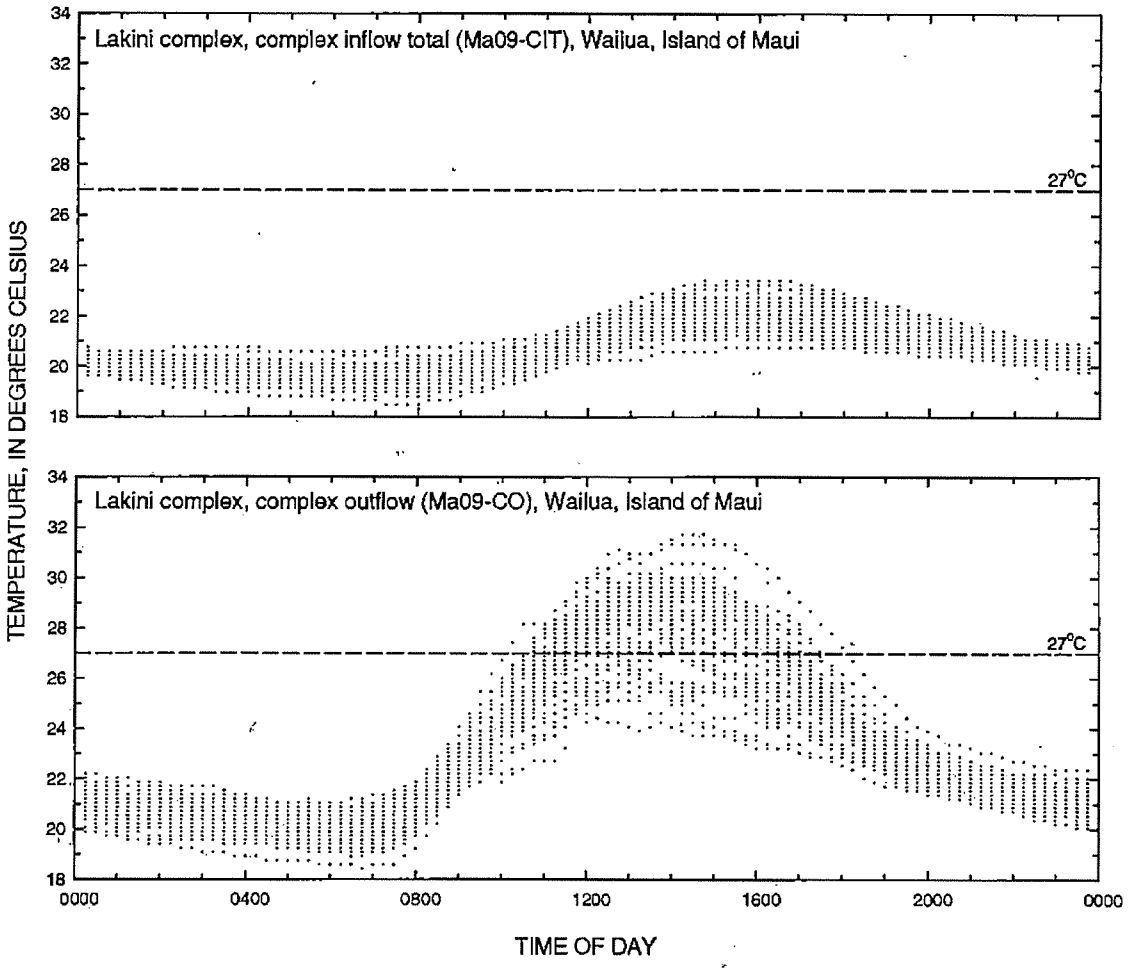


Figure 28. Daily pattern of water temperature in Wailua (Lakini) lo'i complex, Island of Maui. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

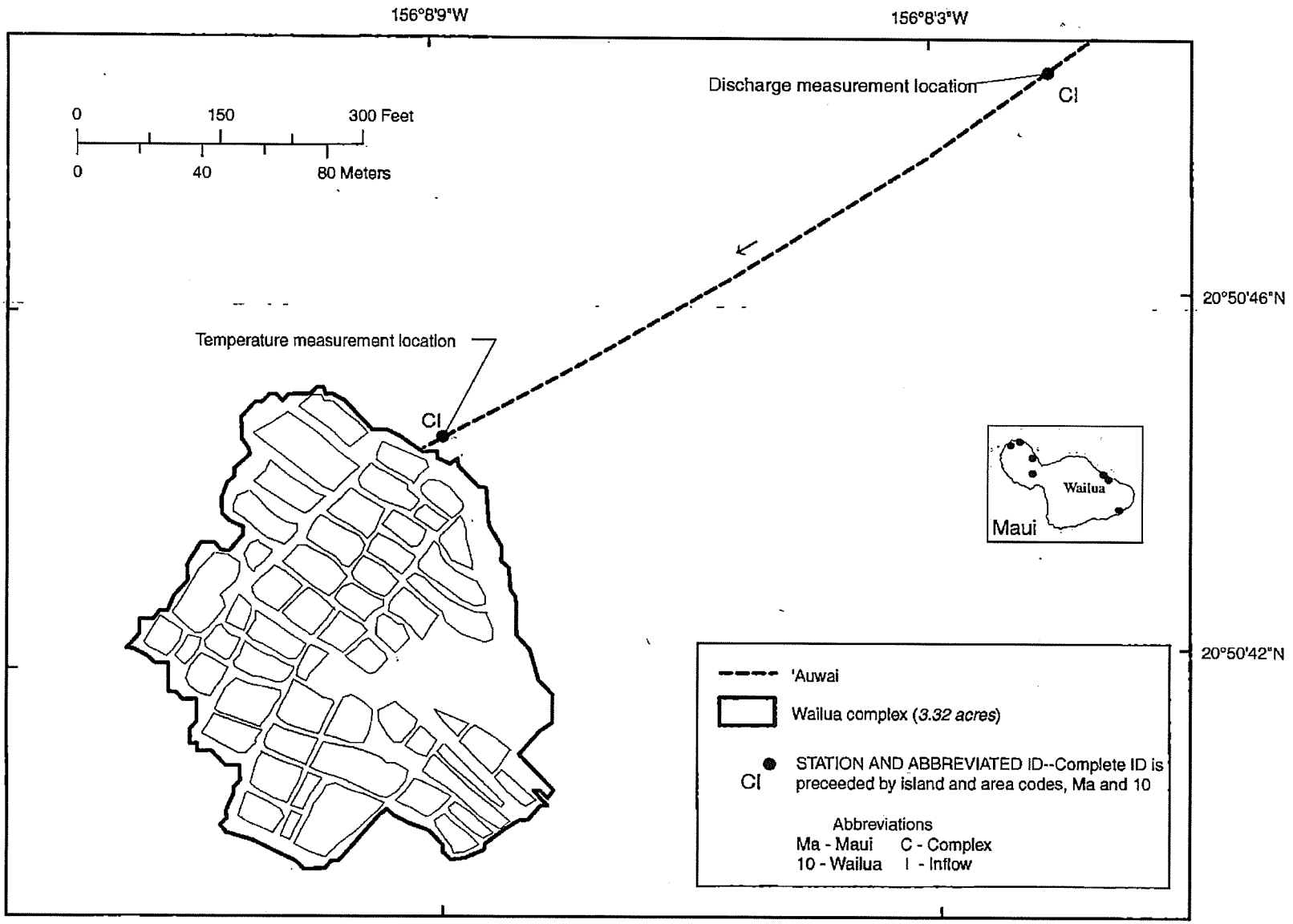


Figure 29. Wailua lo'i complex, Island of Maui.

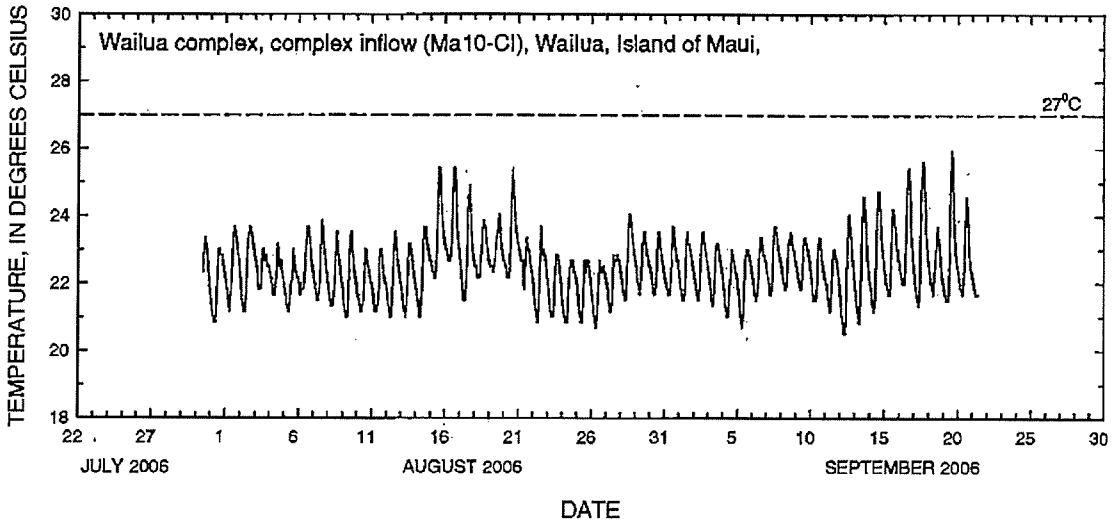


Figure 30. Water temperature in Wailua lo'i complex, Island of Maui.

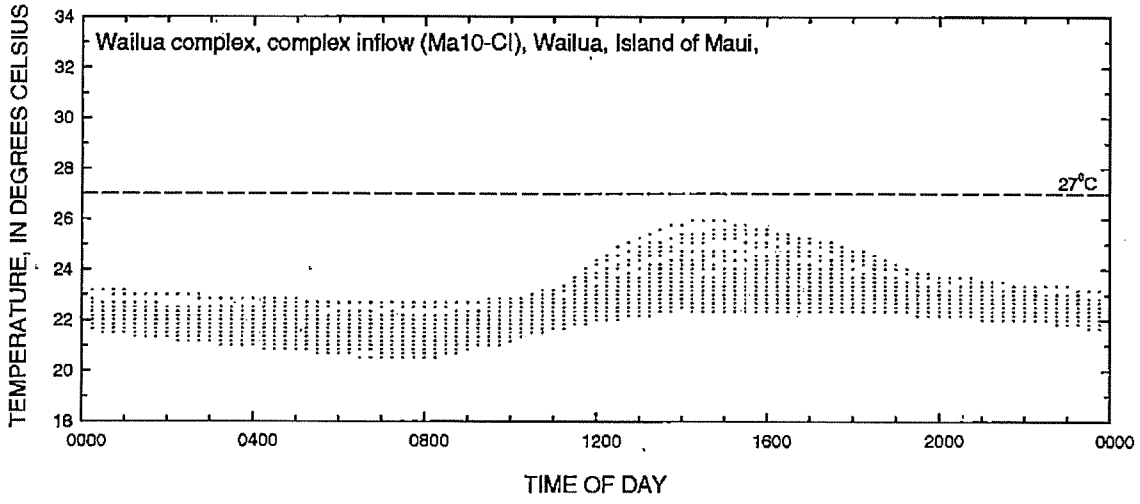


Figure 31. Daily pattern of water temperature in Wailua lo'i complex, Island of Maui. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

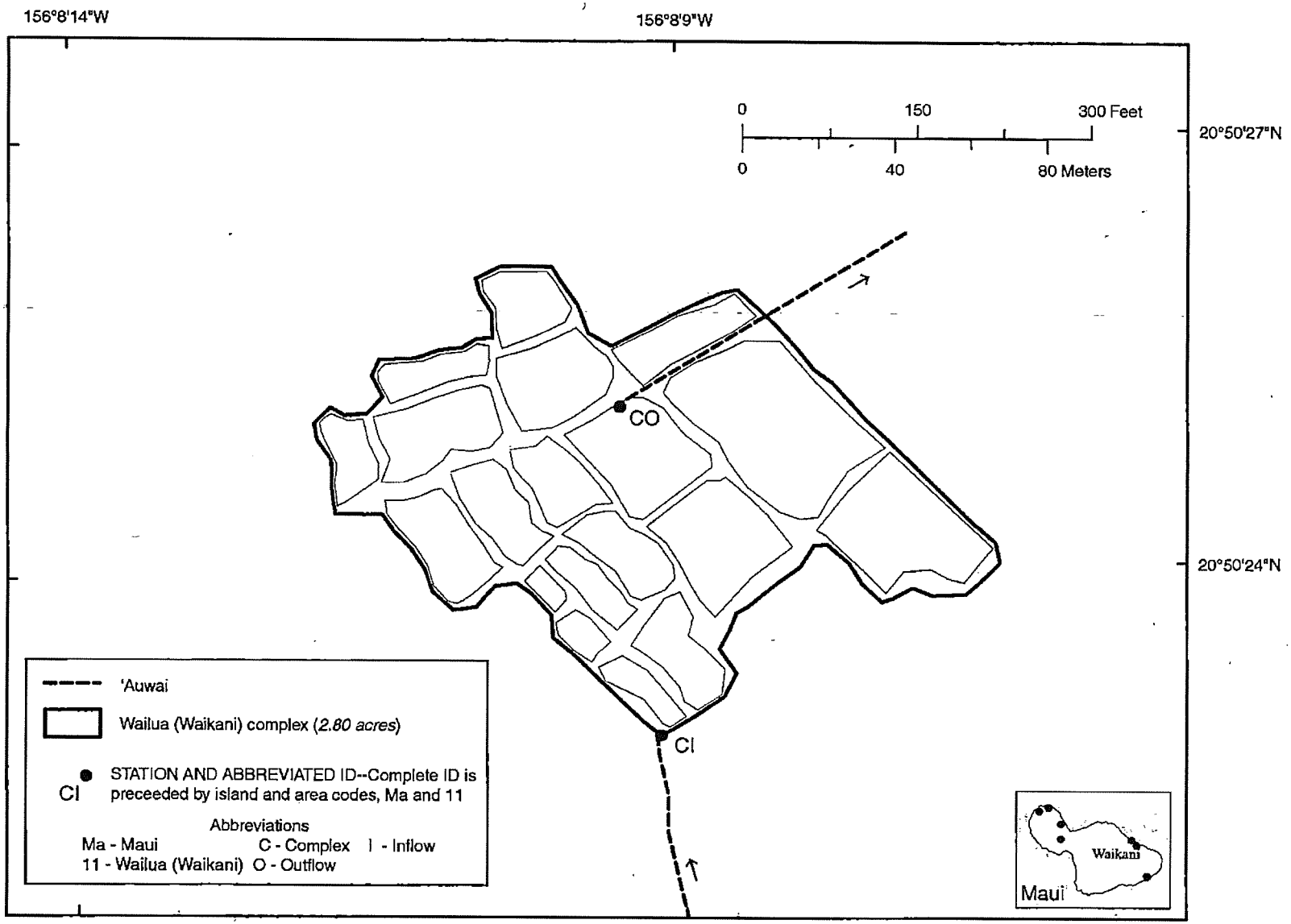


Figure 32. Wailua (Waikani) lo'i complex, Island of Maui.

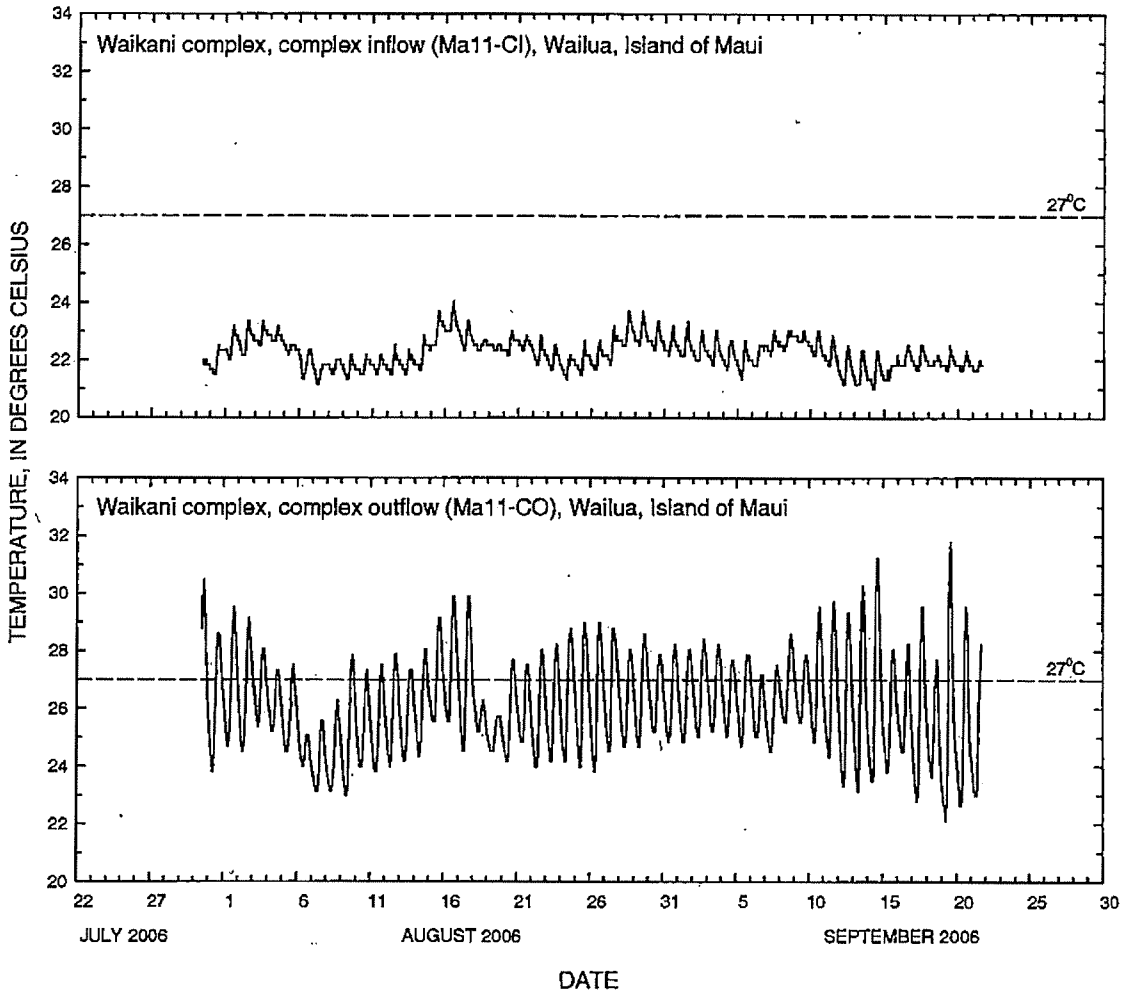


Figure 33. Water temperature in Wailua (Waikani) lo'i complex, Island of Maui. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

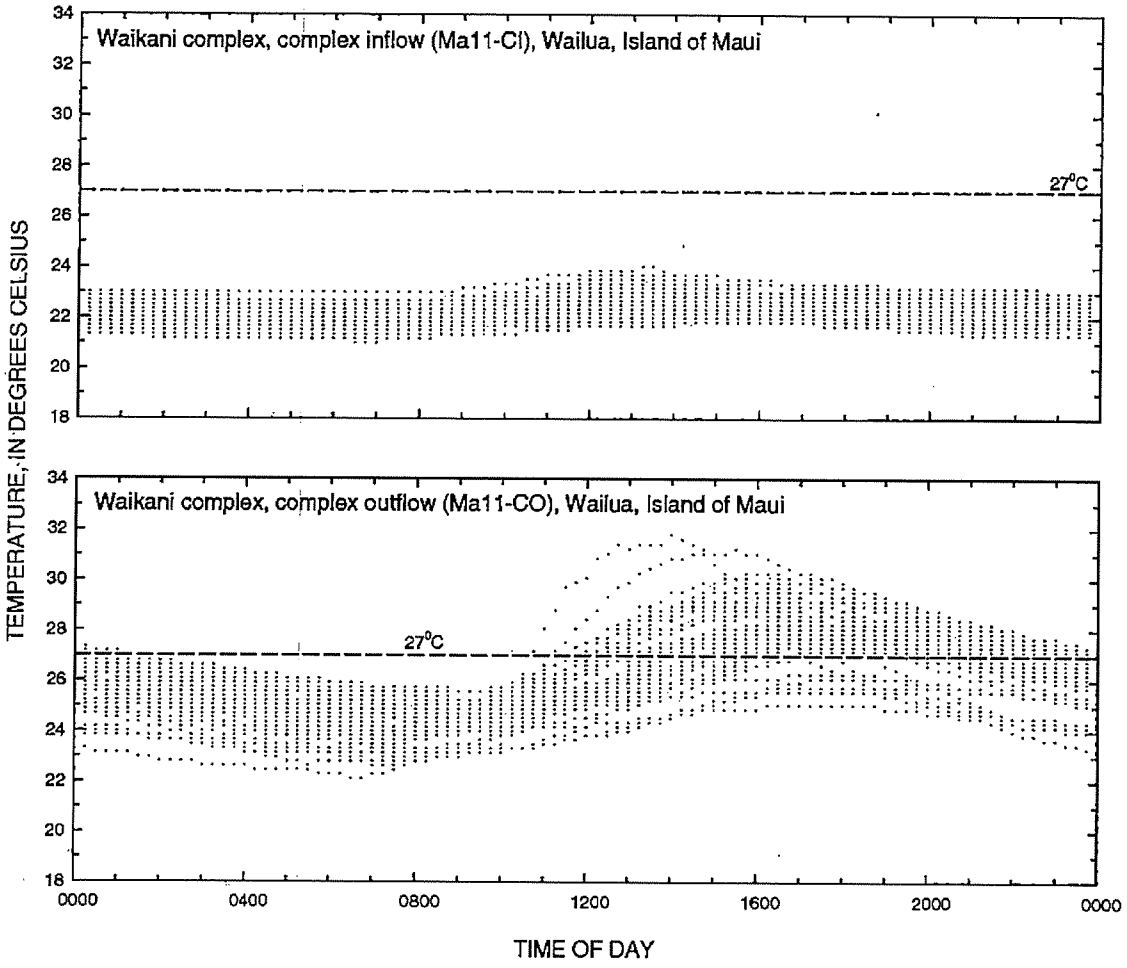


Figure 34. Daily pattern of water temperature in Wailua (Waikani) Io'i complex, Island of Maui.

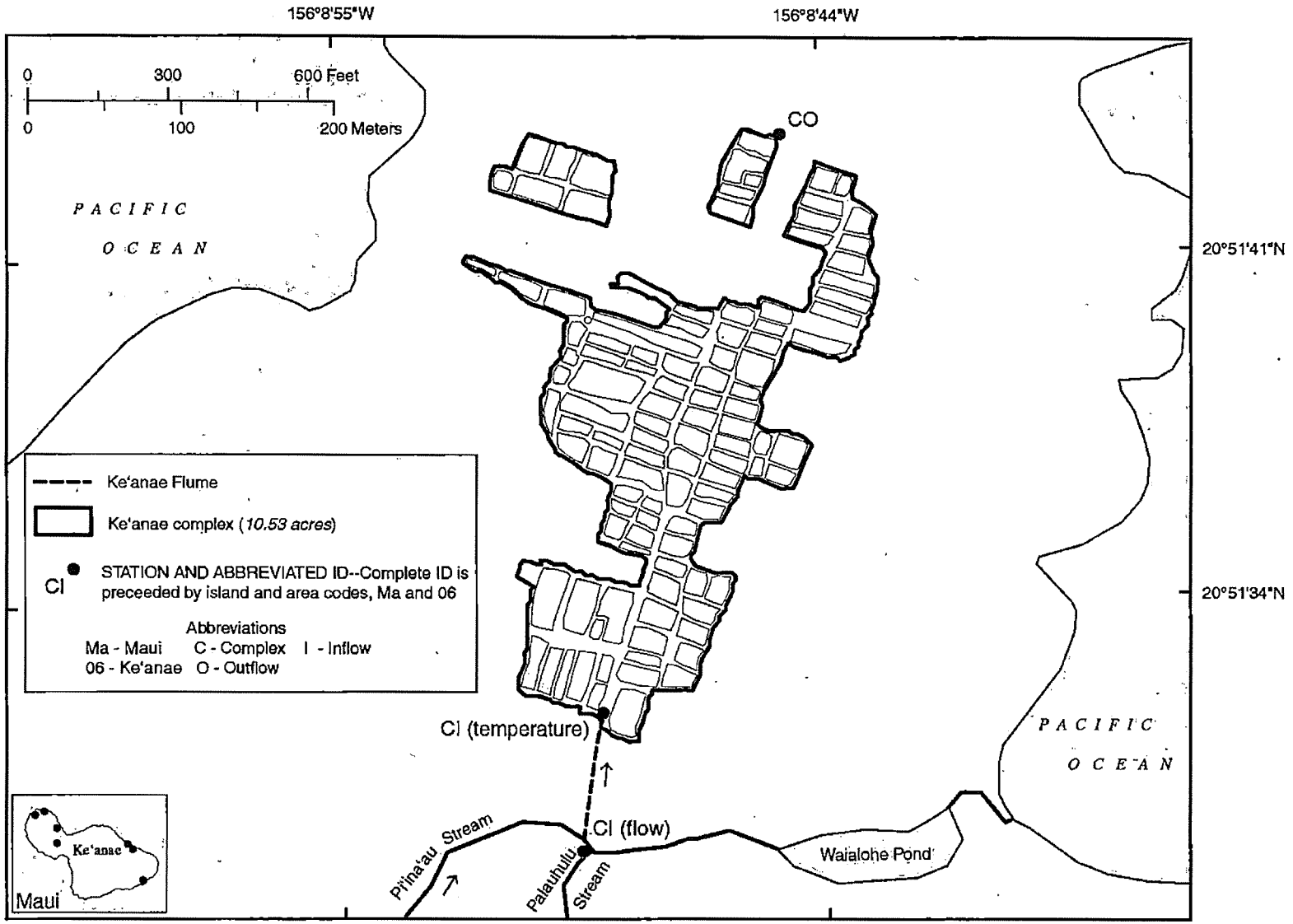


Figure 35. Ke'anae lo'i complex, Island of Maui.

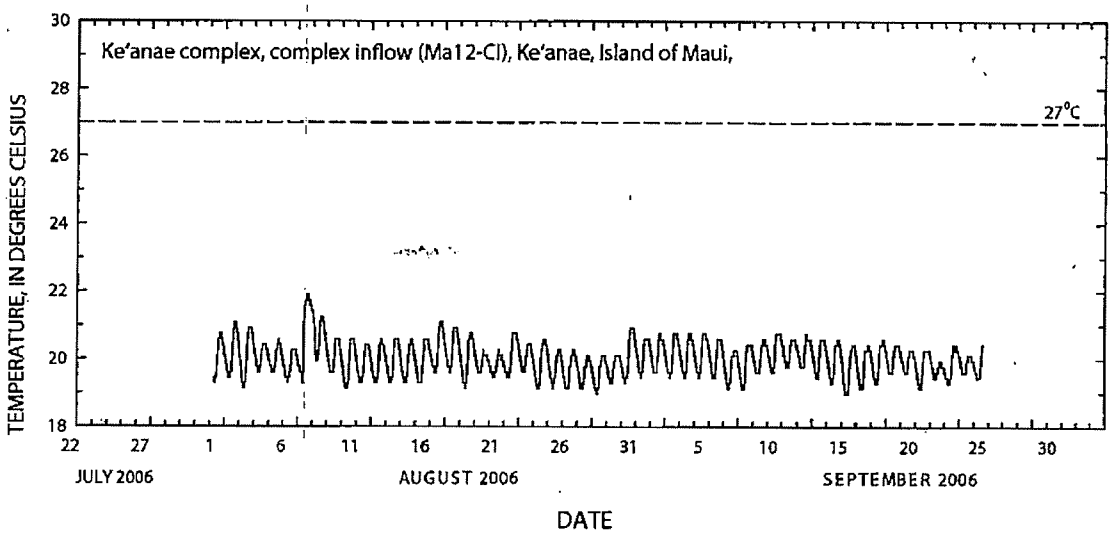


Figure 36. Water temperature in Ke'anae lo'i complex, Island of Maui.

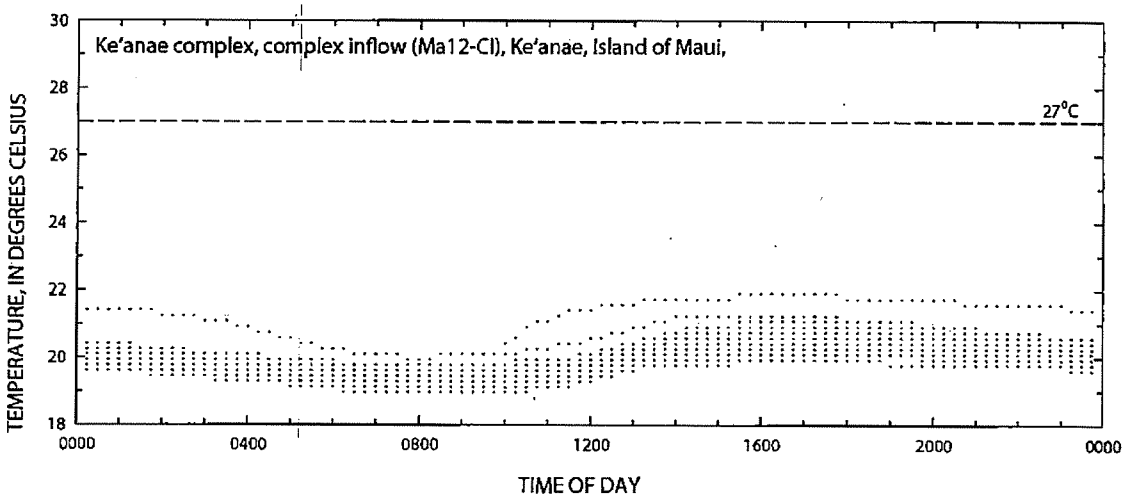


Figure 37. Daily pattern of water temperature in Ke'anae lo'i complex, Island of Maui. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

Hawai'i

On the Island of Hawai'i, the windward site of Waipi'o had two complexes available for study. Flow measurements were made on June 11, 2006, when the temperature loggers were deployed, and on August 8, 2006, when the temperature loggers were removed (tables 8 and 9). The Waipi'o area is supplied through several 'auwai with water diverted from Wailoa Stream (figs. 37 and 38). Five flow measurements were made, and six temperature loggers were deployed at selected inflow and outflow locations (figs. 39–42).

Summary

Ten kalo cultivation areas (out of an initial count of 28 areas) were selected for study (8 windward areas, 2 leeward areas), mainly on the basis of the diversity of environmental and agricultural conditions under which wetland kalo is grown and on the basis of landowner permission and availability. Flow and water-temperature data were collected at the lo'i and lo'i complex level. For consistency in site selection, lo'i with crops near harvesting stage were selected for the lo'i water-temperature data collection to ensure that flow and temperature data collected at different lo'i reflect similar irrigation conditions (continuous flooding of the mature crop). Data collection was done during the dry season (June–October), when water requirements for cooling kalo are higher. Flow measurements generally were made during the warmest part of the day, and temperature measurements were made every 15 minutes at each site for about a 2-month period.

As part of this study, 62 flow measurements and 46 sets of temperature data were collected from kalo cultivation areas on four islands—Kaua'i, O'ahu, Maui, and Hawai'i. (the data summarized in this report are available on the World Wide Web at *http://waterdata.usgs.gov/hi/nwis/sw*. The average inflow for the 19 lo'i complexes measured in this study is 260,000 gad, and the median inflow is 150,000 gad (table 10). The average inflow for the 17 windward sites is 270,000 gad, and the median inflow is 150,000 gad. The average inflow for the two leeward sites is 150,000 gad. The average inflow measured for 6 lo'i is 350,000 gad, and the median inflow is 270,000 gad. The average inflow for the 5 windward lo'i is 370,000 gad, and the median inflow is 320,000 gad. The inflow value for the 1 leeward lo'i is 210,000 gad. These values are consistent with previously reported values for inflow and are significantly higher than values generally estimated for consumption during kalo cultivation. These measurements of inflow are important for future considerations of water-use requirements for successful kalo cultivation.

Of the 17 lo'i complexes where water inflow temperature was measured, only 3 lo'i complexes had inflow temperature values greater than 27°C. These sites were Makaweli, Kaua'i (9 percent of time), Waihe'e, Maui (about 25 percent of time at the lower lo'i complex), and Waipi'o, Hawai'i (about 8 percent of time at B site). The coldest mean inflow temperature was at the Ke'anae complex (20.0°C), and the warmest mean inflow temperature recorded was at the lower Waihe'e lo'i complex (24.9°C), both on Maui. The lo'i complexes with the most stable inflow temperatures were Waihe'e and Hale'iwa on O'ahu, and Waikani on Maui (0.7°C mean daily range). The complex with the most variable inflow temperature value was the Waihe'e lower (B) lo'i complex on Maui (7.6°C mean daily range). All 15 of the sites (11 lo'i sites, 4 lo'i complex sites) where outflow temperature was measured had some temperature values greater than 27°C. The percentage of time that outflow temperature values exceeded 27°C ranged from 2.5 percent (Waiāhole lo'i complex, O'ahu) to about 40 percent (Hanalei lo'i, Kaua'i). Mean outflow temperature values ranged from 23.0°C (Waiāhole lo'i complex, O'ahu) to 26.7°C (Hanalei lo'i, Kaua'i).

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Table 8. Summary of discharge measurements and areas for selected lo'i complexes, Island of Hawai'i.

[Mgal/d, million gallons per day; gad, gallons per acre per day; average water use is determined by summing the averages of each complex or lo'i and dividing by the number of lo'i or lo'i complexes]

Complex							
Geographic designation	Area	Station	Irrigation area (acre)	Date	Measurement time	Discharge (Mgal/d)	Water use (gad)
Windward	Waipi'o (A)	Ha07A-CI	7.66	6/11/2006	1022	8.5	1,100,000
				8/8/2006	1325	6.3	820,000
Windward	Waipi'o (B)	Ha07B-CI	5.47	6/11/2006[a]	1335	0.56	100,000
				8/8/2006[b]	0906	1.7	310,000
				8/8/2006[c]	1021	1.5	270,000
number			2				2
minimum			5.47				100,000
maximum			7.66				1,100,000
average			6.57				710,000

[a]Farmer indicated that flow was substantially less than normal because upstream diversion was damaged by recent flooding.

[b]Upstream diversion remained unrepaired, but the flow was increased due to rain over night.

[c]Second measurement.

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Table 9. Water-temperature statistics based on measurements collected at 15-minute intervals for lo'i complexes on the Island of Hawai'i.

[°C, degrees Celsius; na, not applicable]

Geographic designation	Area	Station	Period of record	Temperature (°C)			Range of times daily peak temperatures occurred		Temperature measurements greater than 27°C		
				Mean	Range	Mean daily range			Percent	Earliest time of day	Latest time of day
Windward	Waipi'o (A)	Ha07A-CI	6/11/2006 – 8/8/2006	21.4	19.3 – 24.8	1.6	1000 – 2200		0.0	na	na
		Ha07A-LI	6/11/2006 – 8/8/2006	21.8	19.4 – 28.6	3.0	0900 – 2015		0.4	1230	1515
		Ha07A-LO	6/11/2006 – 8/8/2006	23.8	20.8 – 29.8	3.9	1030 – 1800		5.3	1115	1900
Windward	Waipi'o (B)	Ha07B-CI	6/11/2006 – 8/2/2006	23.4	19.8 – 31.2	5.4	1030 – 1715		7.7	1045	1845
		Ha07B-LI	6/11/2006 – 8/2/2006	24.3	20.3 – 36.2	7.1	1000 – 1700		15.7	1000	2100
		Ha07B-LO	6/11/2006 – 8/2/2006	25.6	21.1 – 38.1	8.6	1030 – 1630		21.7	0930	2145

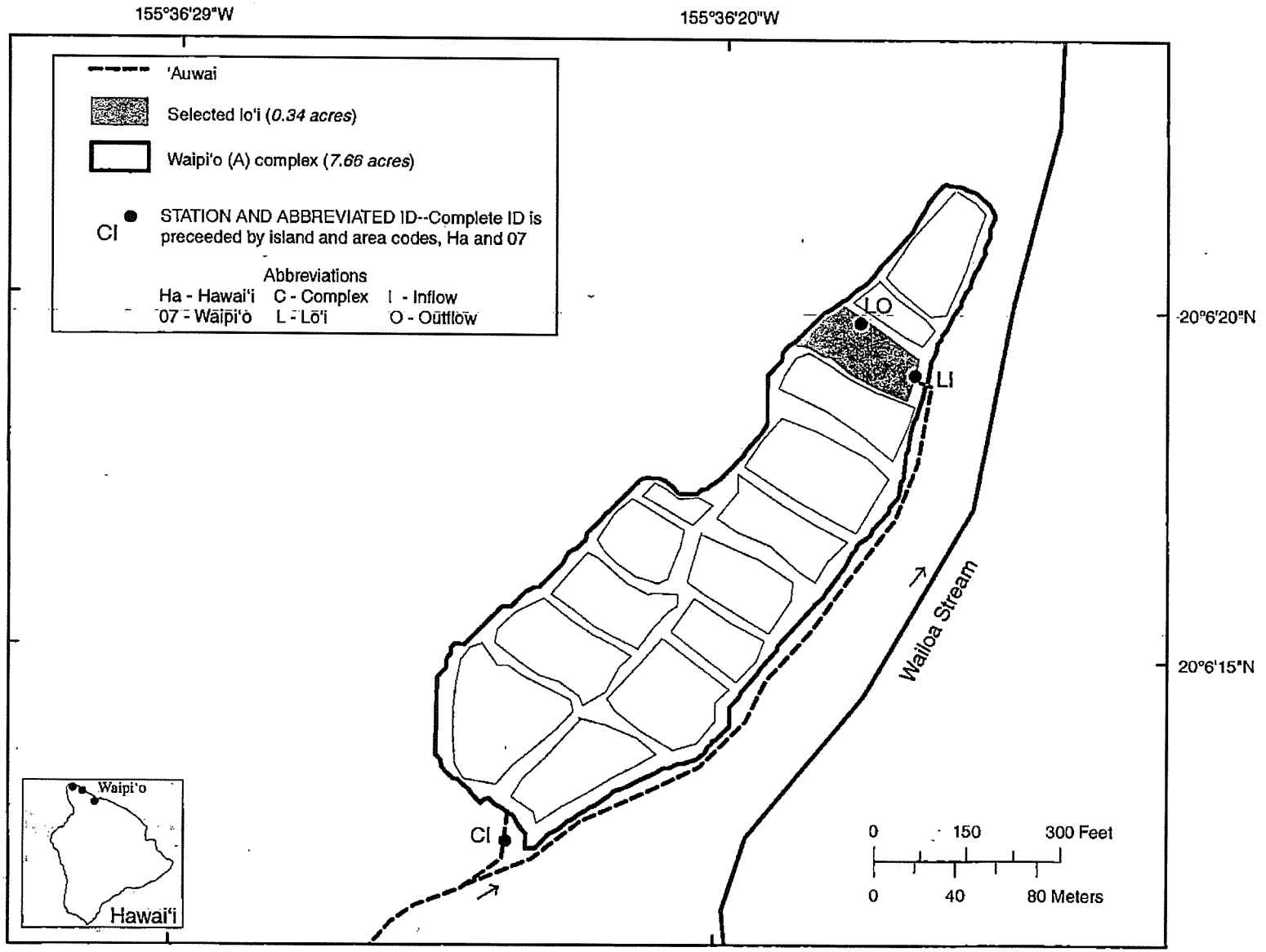

Figure 38. Waipi'o (A) lo'i complex, Island of Hawai'i.

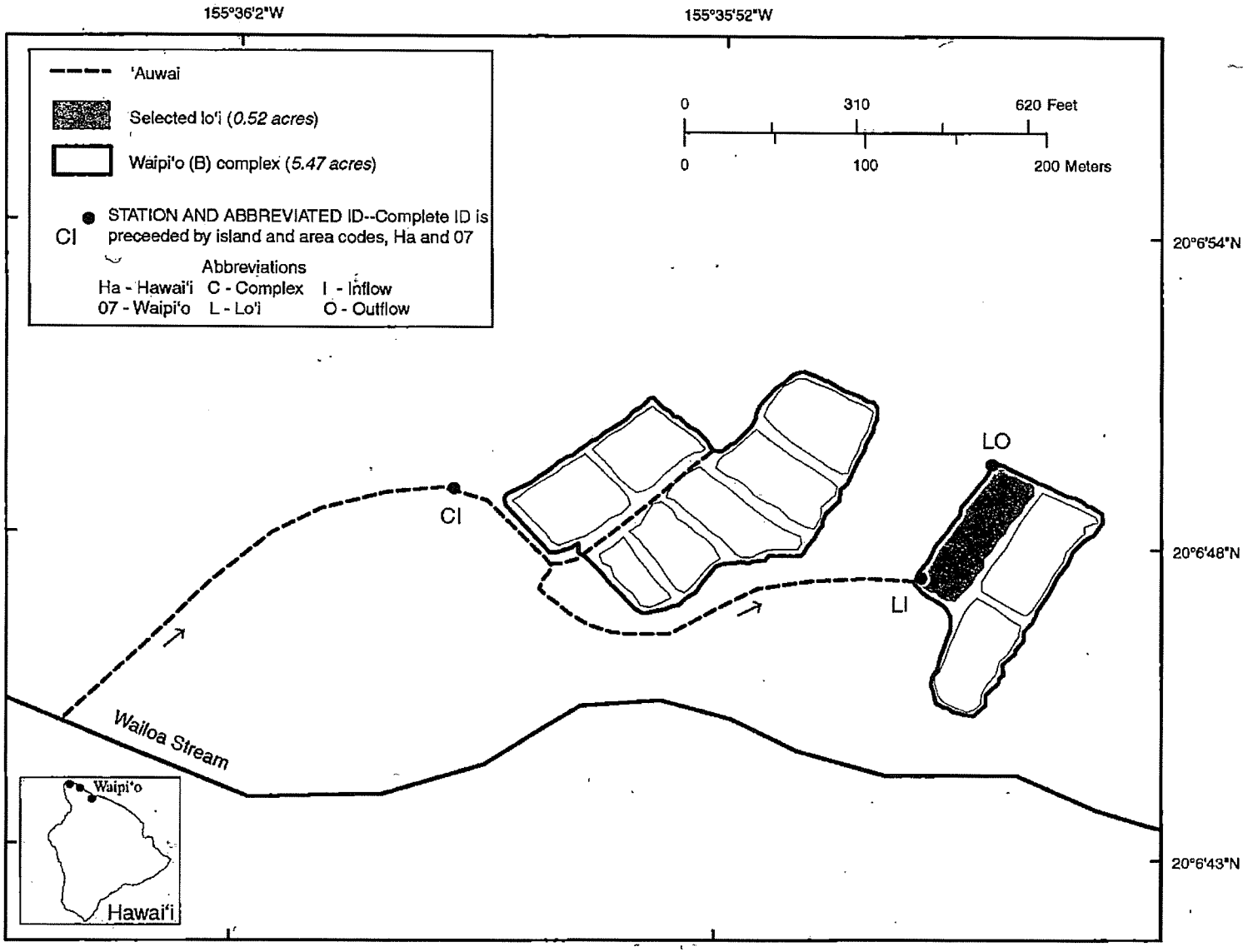

Figure 39. Waipi'o (B) lo'i complex, Island of Hawai'i.

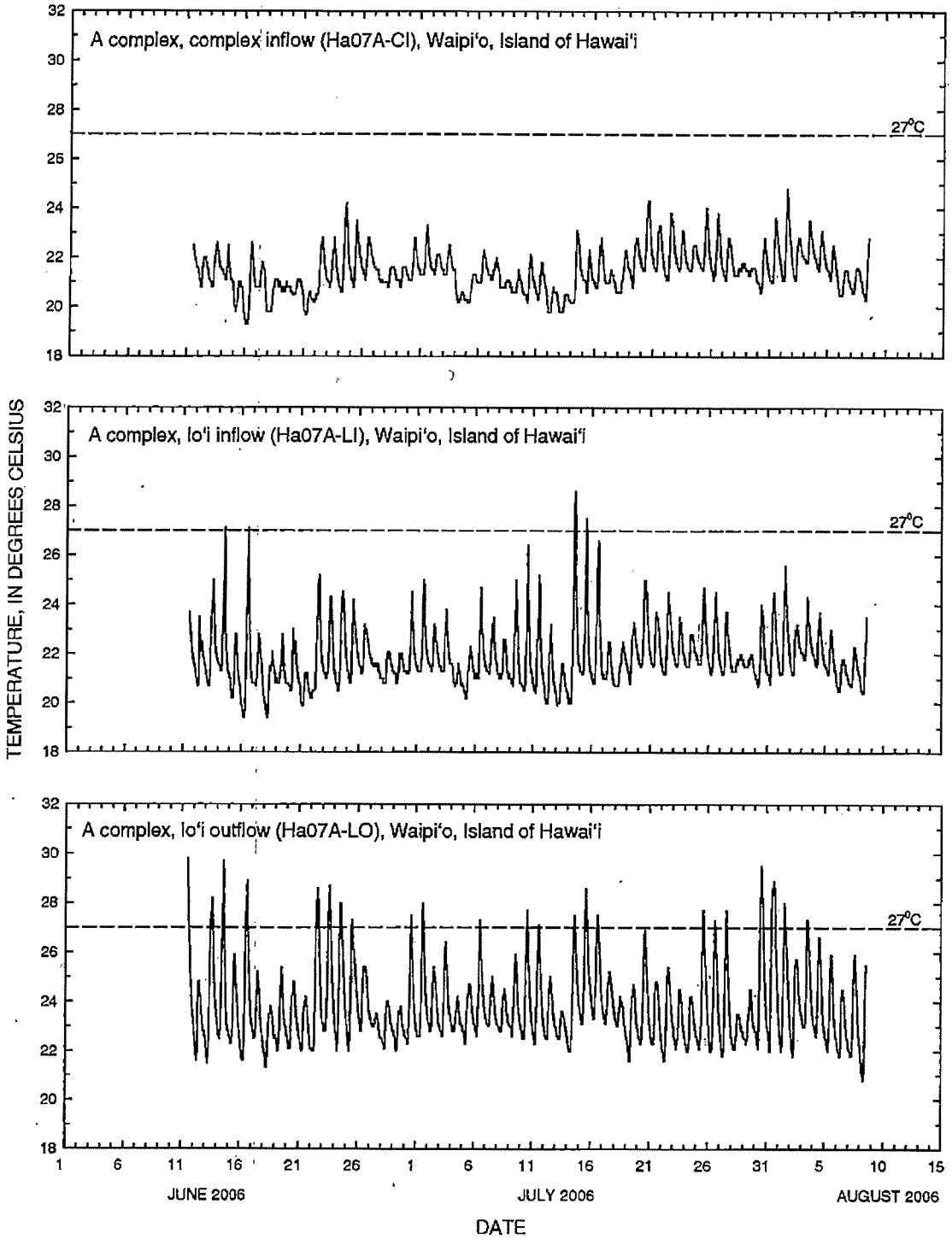

Figure 40. Water temperature in Waipi'o (A) lo'i complex, Island of Hawai'i.

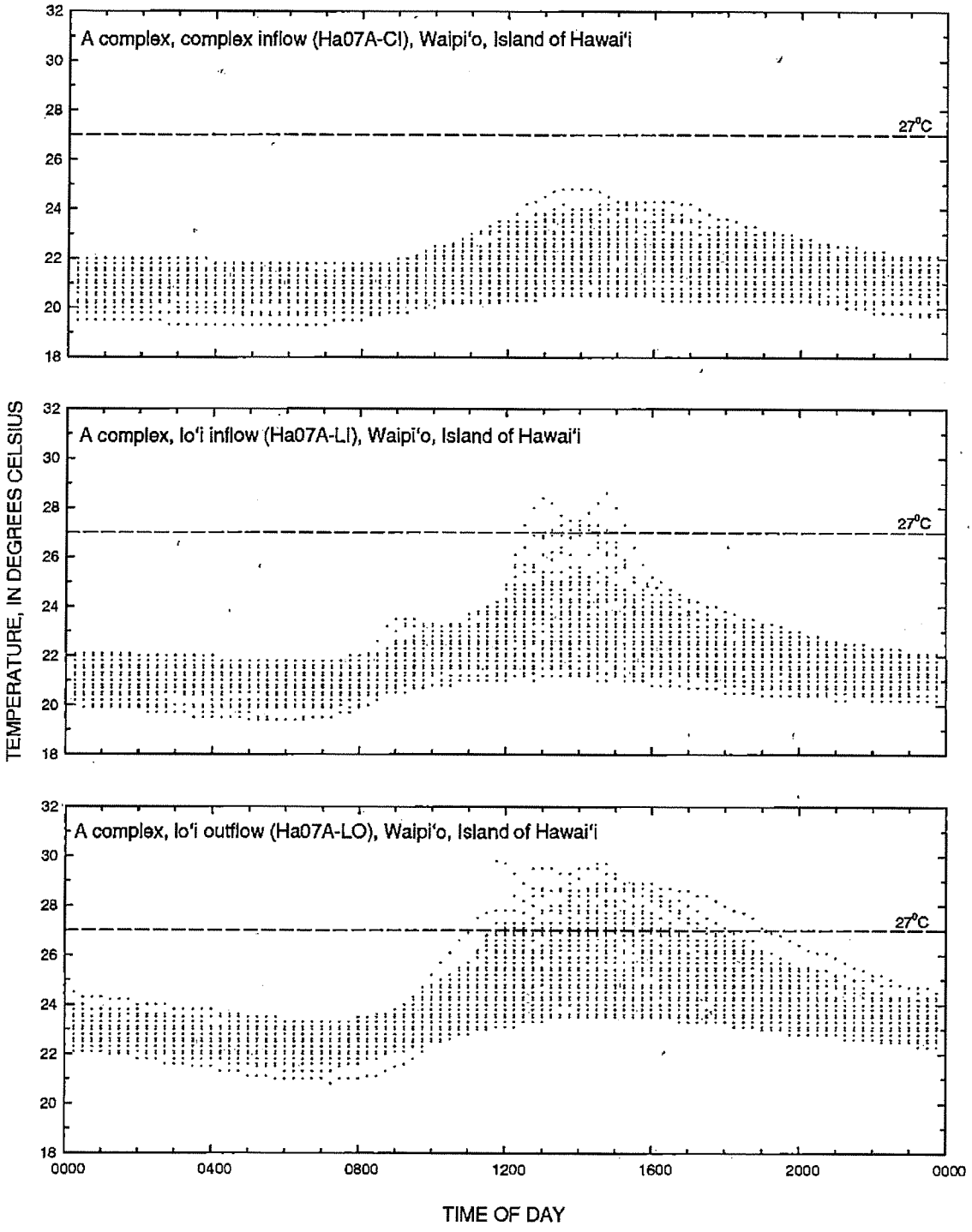

Figure 41. Daily pattern of water temperature in Waipi'o (A) lo'i complex, Island of Hawai'i. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

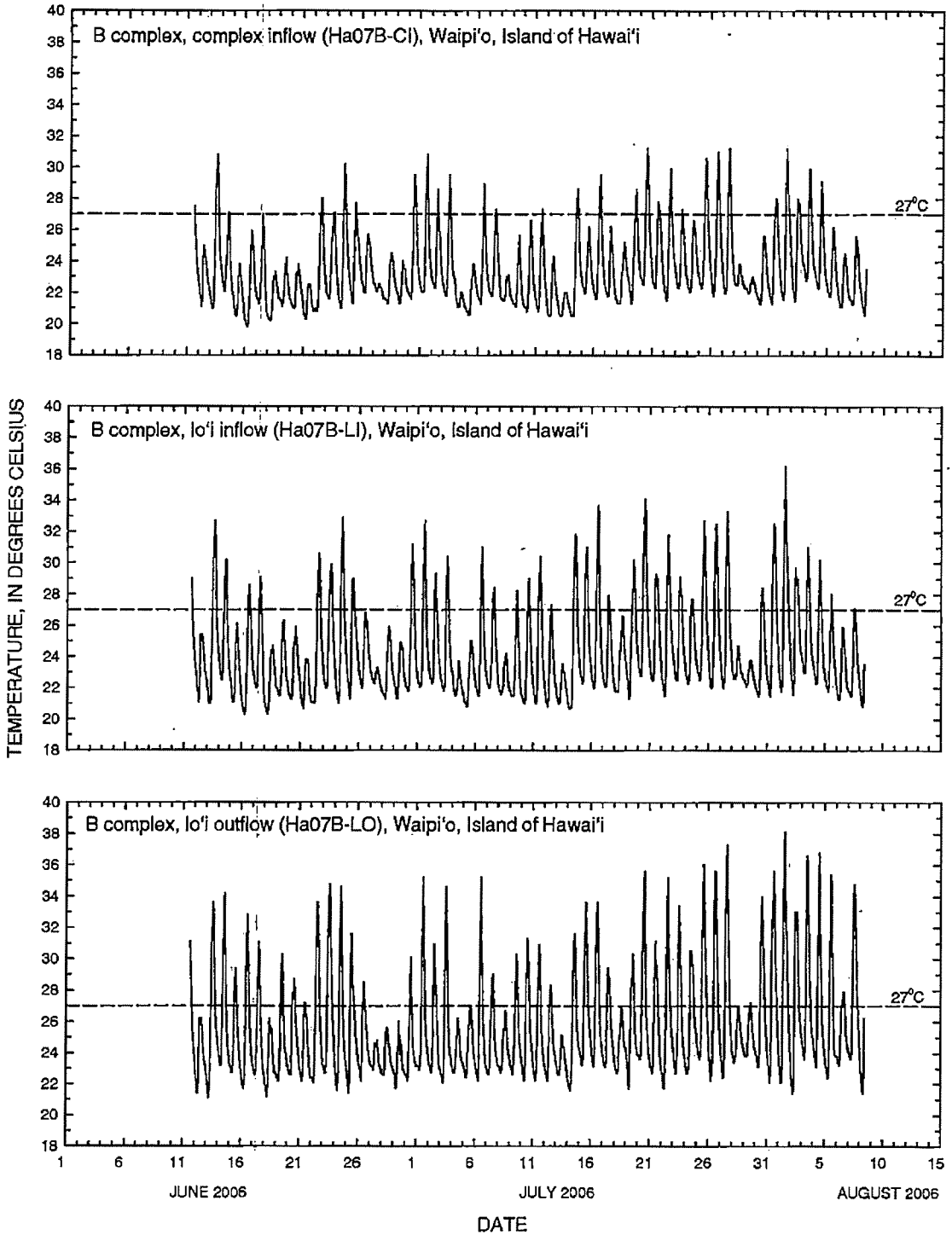

Figure 42. Water temperature in Waipi'o (B) lo'i complex, Island of Hawai'i.

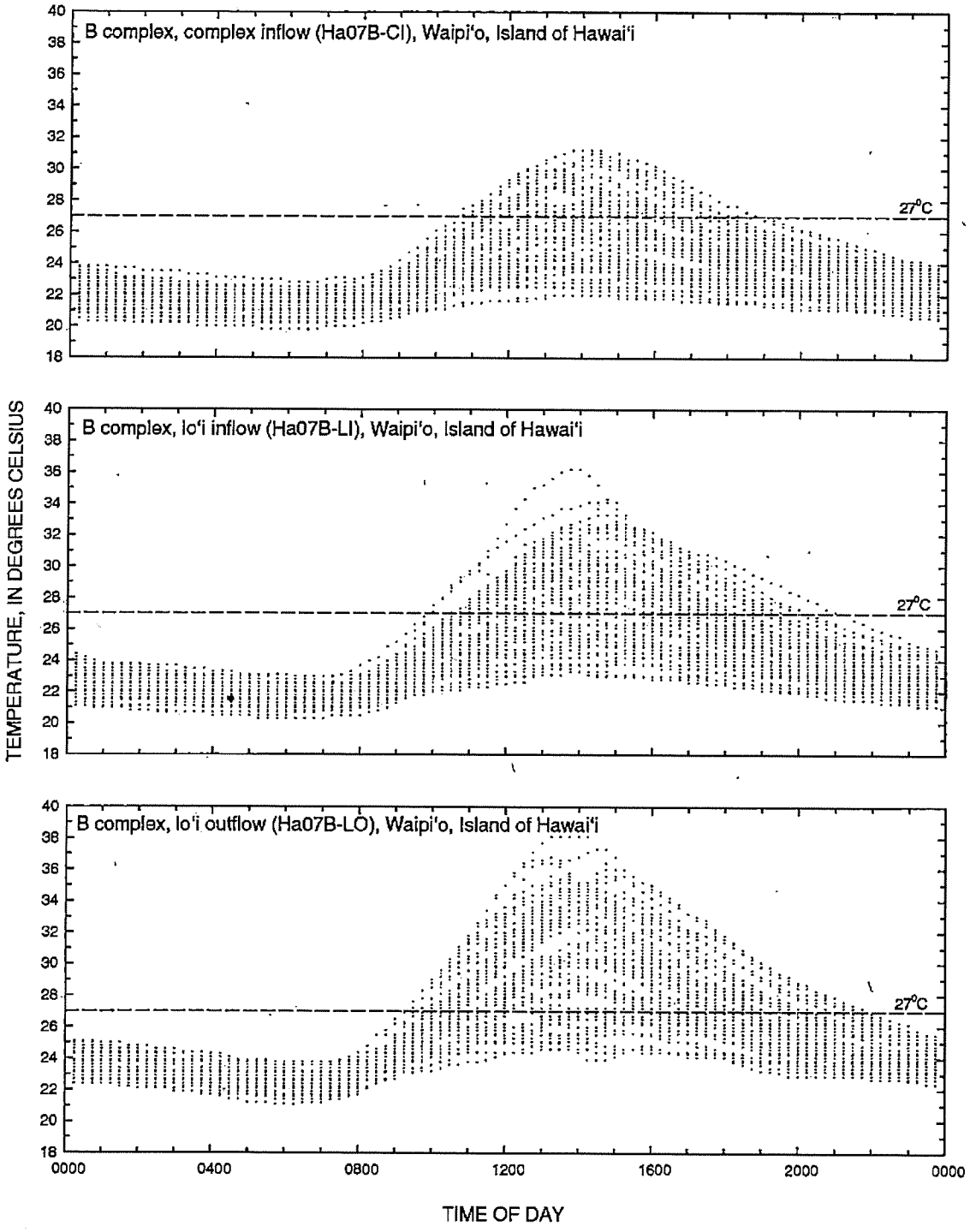

Figure 43. Daily pattern of water temperature in Waipi'o (B) lo'i complex, Island of Hawai'i. Plot shows all temperature data plotted against the time of day that each measurement was recorded.

Table 10. Summary of water use calculated for lo'i and lo'i complexes by island, State of Hawai'i.

[gad, gallons per acre day; na, not available]

Island	Complex				Lo'i			
	Number	Average water use (gad)	Average windward water use (gad)	Average leeward water use (gad)	Number	Average water use (gad)	Average windward water use (gad)	Average leeward water use (gad)
Kaua'i	6	120,000	97,000	260,000	2	220,000	220,000	na
O'ahu	5	310,000	380,000	44,000	4	400,000	460,000	210,000
Maui	6	230,000	230,000	na	na	na	na	na
Hawai'i	2	710,000	710,000	na	na	na	na	na
Average of all measurements		260,000	270,000	150,000		350,000	370,000	210,000
Median of all measurements		150,000	150,000	150,000		270,000	320,000	210,000

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EXEMPTION NOTIFICATION

Regarding the preparation of an environmental assessment pursuant to Chapter 343, HRS and Chapter 11-200, HAR

Project Title:	Mediation Services for the Complaint and Petition for Declaratory Order Against Waste Filed By Po'ai Wai Ola and West Kaua'i Watershed Alliance (through Earthjustice), Waimea, Kaua'i.
Project / Reference No.:	Not applicable
Project Location:	Waimea, Kaua'i
Project Description:	Procurement of mediation services to address the Complaint and Petition for Declaratory Order Against Waste for Waimea, Kaua'i.
Chap. 343 Trigger(s):	Use of State Funds
Exemption Class No.:	In accordance with Hawaii Administrative Rule Section 11-200-8(a)(5)(1), the subject request is exempt from the preparation of an environmental assessment pursuant to Exemption Class No. 10, that states, "Contracts for small purchases, professional services, competitive sealed proposals, competitive sealed bidding, or purchase of goods and services which are exempt from Haw. Rev. Stat. Chapter 103D."
Consulted Parties:	Not applicable.
Recommendation:	It is recommended that the Commission find that this project will have minimal or no significant effect on the environment and is presumed to be exempt from the preparation of an environmental assessment.

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Suzanne D. Case, Chairperson
Date:

EXHIBIT 10