

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Honolulu, Hawaii 96813

May 25, 2018

Board of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii

18HD-009

Hawaii

Issuance of Right-of-Entry Permit to Big Island Resource Conservation and Development Council for the Purpose of Conducting Research on the Efficacy of Indigenous Microorganisms to Confer Resistance to Ohia against Rapid Ohia Death on State Lands Located at Keonopoko Iki, Puna, Hawaii, Portion of TMK: (3) 1-5-009:009.

APPLICANT:

Big Island Resource Conservation and Development Council, a Hawaii non-profit corporation and an Internal Revenue Code Section 501(c)(3) entity.

LEGAL REFERENCE:

Section 171-55, Hawaii Revised Statutes, as amended.

LOCATION:

Portion of Government lands situated at Keonepoko Iki, Puna, Hawaii, identified by Tax Map Key: (3) 1-5-009:009, as shown on the attached map labeled Exhibit A.

PROJECT AREA:

Approximately 50 acres of the 798.79 acre parcel.

ZONING:

State Land Use District: Agriculture
County of Hawaii CZO: A-5a (Agriculture, 5 acre minimum)

TRUST LAND STATUS:

Section 5(b) lands of the Hawaii Admission Act
DHHL 30% entitlement lands pursuant to Hawaii State Constitution: NO

CURRENT USE STATUS:

Encumbered by Land Office Deed No. 28,100, a non-exclusive electrical transmission line easement granted to Hawaii Electric Light Company, Inc. (HELCO).

CHARACTER OF USE:

For research on utilizing indigenous microorganisms to confer resistance to Ohia Lehua (*Metrosiderous polymorpha*) against the effects of Rapid Ohia Death (*Cyrtocystis fimbriata*) purposes.

TERM OF RIGHT-OF-ENTRY:

One year.

CONSIDERATION:

Gratis.

CHAPTER 343 - ENVIRONMENTAL ASSESSMENT:

In accordance with Hawaii Administrative Rule Sections 11-200-8(a)(1) & (4) and the Exemption List for the Department of Land and Natural Resources approved by the Environmental Council and dated June 5, 2015, the subject request is exempt from the preparation of an environmental assessment pursuant to Exemption Class 5, No. 1, that states " Permission to enter State lands for the purpose of basic data collection, research, experimental management and resources evaluation activities such as archaeological survey, topographic survey, test borings for soil test, ground cover survey inspection of property for appraisal and development feasibility study purposes" and Item No. 13 "Research or experimental management actions that the Department declares are designed specifically to monitor, conserve, or enhance native species or native species' habitat." Refer to attached Exhibit B.

DCCA VERIFICATION:

Place of business registration confirmed:	YES <u>X</u>	NO <u>__</u>
Registered business name confirmed:	YES <u>X</u>	NO <u>__</u>
Applicant in good standing confirmed:	YES <u>X</u>	NO <u>__</u>

APPLICANT REQUIREMENTS:

Applicant shall be required to:

1. Coordinate access over the powerline road through HELCO;
2. Attend HELCO powerline safety training;
3. Follow standard DLNR ROD protocol for entering forested area;
4. Provide results of the research to DOFAW;
5. Follow research methods as outlined in project proposal (Exhibit C).

REMARKS:

Metrosideros polymorpha (Ohia) is the foundation of many of Hawaii's native forests and is central to Hawaiian culture. It plays a critical role in watersheds and provides habitat and food for many native birds and arthropods. Ohia trees are suffering an attack from the fungal pathogen *Ceratocystis fimbriata* which causes what is commonly known as Rapid Ohia Death (ROD).

Based on aerial surveys conducted in 2017, it is estimated that over 75,000 acres of Ohia forest show symptoms of ROD disease on the island of Hawaii. Confirmed cases of ROD have been discovered from Kalapana to Hilo, between Hilo and Volcano, south from Volcano to Naalehu, from Naalehu north to Kona and most recently along the windward coast from Hilo to North Kohala.

The virulence of this disease has prompted a multi-agency approach to investigate, analyze, research, and develop methods and practices to aid in mitigating the resultant effects of ROD. The Applicant is proposing to conduct research testing the efficacy of indigenous microorganisms (IMO) to confer ROD disease resistance to Ohia trees.

The project consists of spraying ROD infected Ohia trees with a solution of IMO made in-house. The IMO solution is a "tea" made from the soaking of soil gathered from around mango, bamboo or ohia trees in freshwater with a little seawater and half of a potato. This solution is applied to the tree and a 3-4 foot area surrounding the tree using a pressure tank sprayer as used for the application of the lime solution for coqui frog control. The spraying is performed twice a week for 6 months and all trees will be monitored for 1 year. The IMO solution will be screened for ROD to ensure it tests negative at the USDA laboratory under the supervision of pathologist Lisa Keith.

Approximately 40 trees will be selected for the project. Half of the trees will receive the treatment and the other half will serve as project controls. All trees selected will be under 30 feet tall, within 50 feet of the poleline access road, of the same size class and variety, show similar stages of ROD symptoms and test positive for ROD.

The project is being funded by County of Hawaii, Council District 4 & 5 council members, who have provided letters of support (Exhibit D). Supporters, collaborators and advisors are listed at the end of the project proposal (Exhibit C).

Inquiries for comments were sent to various agencies and are summarized in the table below:

Agency	Response
UH-Hilo	See comments below
DLNR - Forestry & Wildlife	No Objections
USFS-Pacific Studies Coop	No Comments
Hawaii Dept. of Agriculture	No Comments
HELCO	See comments below

Dr. Patrick Hart (project advisor) was asked to review the research methods of the project to ensure that the project was designed with sufficient scientific rigor to produce reliable results. His written opinion is attached as Exhibit E.

HELCO stated it has no problem allowing access to this area over the poleline easement, however, all project personnel accessing the area must take safety training through HELCO due to the use of spraying equipment near the powerlines.


After consultation with William Stormont, who is a Service Forester with DOFAW working on ROD mitigation, staff believes this project will not have a significant effect on the environment or alter the existing conditions in a significant manner.

RECOMMENDATION: That the Board

1. Declare that, after considering the potential effects of the proposed disposition as provided by Chapter 343, HRS, and Chapter 11-200, HAR, this project will probably have minimal or no significant effect on the environment and is therefore exempt from the preparation of an environmental assessment.
2. Authorize the issuance of a right-of-entry permit to Big Island Resource Conservation and Development Council covering the subject area under the terms and conditions cited above, which are by this reference incorporated herein and further subject to the following:
 - A. The standard terms and conditions of the most current right-of-entry permit form, as may be amended from time to time; and

- B. Such other terms and conditions as may be prescribed by the Chairperson to best serve the interests of the State.

Respectfully Submitted,


Candace M. Martin

APPROVED FOR SUBMITTAL:

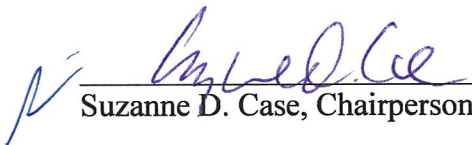
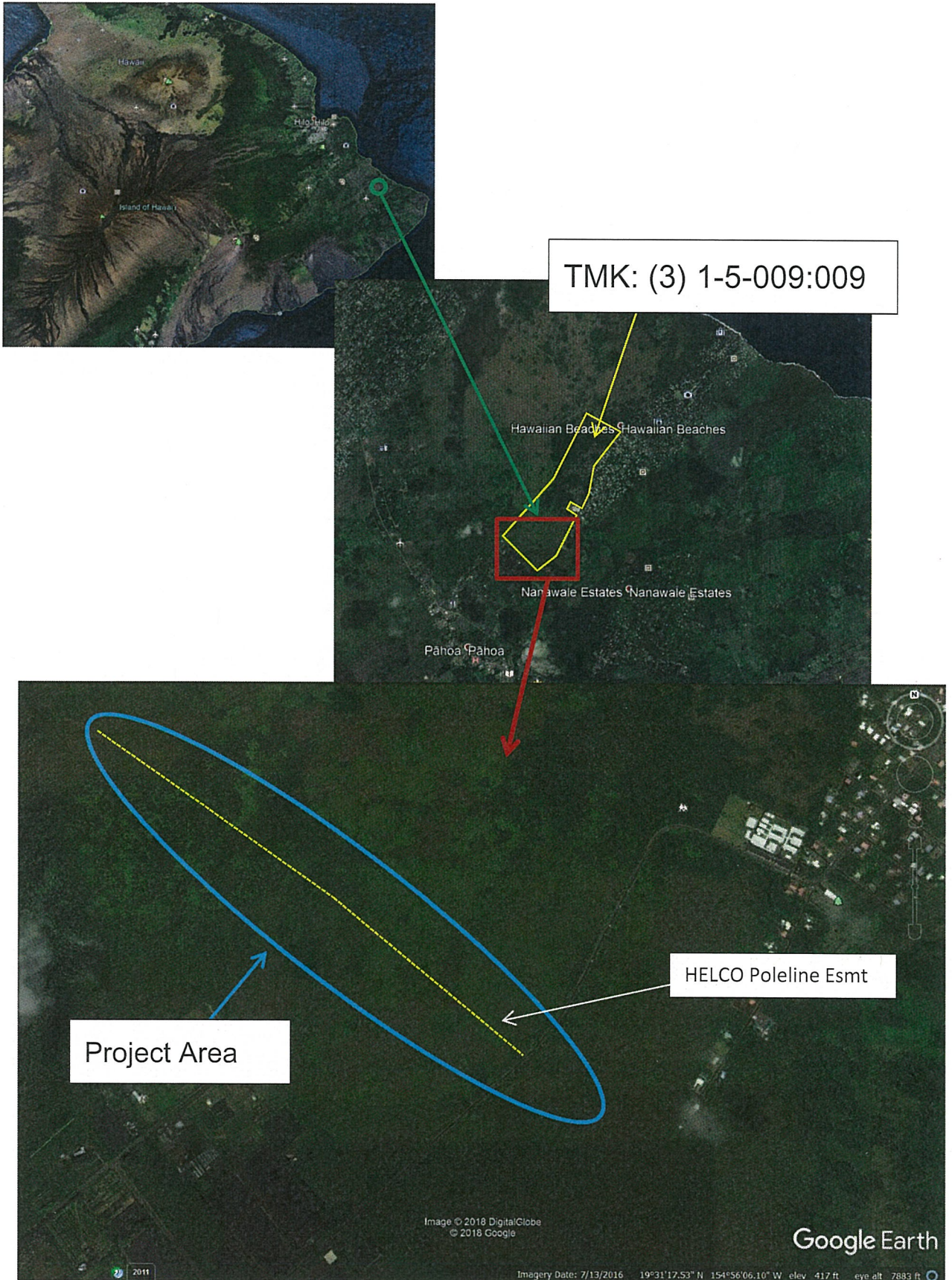

Suzanne D. Case, Chairperson

EXHIBIT A



TMK: (3) 1-5-009:009

Project Area

HELCO Poleline Esmt

Image © 2018 DigitalGlobe
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Google Earth

Imagery Date: 7/13/2016 19°31'17.53" N 154°56'06.10" W elev 417 ft eye alt 7883 ft

DAVID Y. IGE
GOVERNOR OF HAWAII

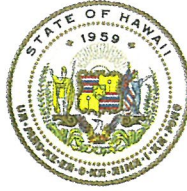


EXHIBIT B

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

JEFFREY T. PEARSON, P.E.
DEPUTY DIRECTOR - WATER

**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES**

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

May 25, 2018

EXEMPTION NOTIFICATION

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

Project Title: Issuance of Right-of-Entry Permit to Big Island Resource Conservation and Development Council for the Purpose of Conducting Research on the Efficacy of Indigenous Microorganisms to Confer Resistance to Ohia against Rapid Ohia Death on State Lands.

Project / Reference No.: PSF 18HD-009

Project Location: Keonopoko Iki, Puna, Hawaii, Portion of TMK: (3) 1-5-009:009

Project Description: Big Island Resource Conservation and Development Council proposes to conduct field trials using a solution of indigenous microorganisms to confer resistance to Ohia trees against Rapid Ohia Death (ROD). Half of the selected infected trees will be sprayed with the solution twice weekly for 6 months and half the trees will serve as controls receiving no treatment. All trees will be monitored for one year.

Chap. 343 Trigger(s): Use of State Land.

Exemption Class No.: In accordance with Hawaii Administrative Rule Sections 11-200-8(a)(1) & (4) and the Exemption List for the Department of Land and Natural Resources approved by the Environmental Council and dated June 5, 2015, the subject request is exempt from the preparation of an environmental assessment pursuant to Exemption Class 5, No. 1, that states " Permission to enter State lands for the purpose of basic data collection, research, experimental management and resources evaluation activities such as archaeological survey, topographic survey, test borings for soil test, ground cover survey inspection of property for appraisal and development feasibility study purposes" and Item No. 13 "Research or experimental management actions that the Department declares are designed specifically to monitor, conserve, or enhance native species or native species' habitat."

Analysis: This project is being conducted within an existing powerline/poleline easement which consists of previously disturbed ground. The activities of the project will not further alter the existing conditions of the project area. The project is seeking to analyze a solution to a serious threat to an essential native species.

Cumulative Impact of Planned Successive Actions in Same Place Significant?: There are no planned successive actions in this area.

Action may have Significant Impact on Particularly Sensitive Environment?: Consultation with William Stormont, Service Forester with the Division of Forestry and Wildlife working on ROD mitigation for DLNR revealed no significant impacts on a sensitive environment.

Consulted Parties: University of Hawaii at Hilo, Hawaii Department of Agriculture, DLNR-Division of Forestry and Wildlife, USDA Forest Service and Hawaiian Electric Light Company .

These agencies were consulted on the propriety of the HRS Chapter 343 exemption and expressed no comments in opposition to the exemption.

Recommendation: That the Board find this project will probably have minimal or no significant effect on the environment and is presumed to be exempt from the preparation of an environmental assessment.

EXHIBIT C

Mālama 'Ōhi'a

Testing Indigenous Microorganisms' ability to confer resistance to 'Ōhi'a
(*Metrosideros polymorpha*) against *Ceratocystis fimbriata*

Introduction

'Ōhi'a Lehua is the backbone of Hawai'i's native forests and is central to Hawaiian culture. This endemic tree plays a critical role in watersheds and provides food and habitat for many native birds and arthropods. To date, fungal pathogen *Ceratocystis fimbriata* (aka 'Ōhi'a Wilt and Rapid 'Ōhi'a Death/ROD) has killed approximately 50,000+ acres of 'Ōhi'a Lehua (*Metrosideros polymorpha*), the majority of which has been in the Puna district on the southeastern portion of Hawai'i island. This research study was initiated in response to the growing crisis after individual community members witnessed a revival in tree health subsequent to applying solutions of Indigenous Microorganisms (IMO's) to 'Ōhi'a trees dying in their yard. This pilot study is being conducted with the scientific rigor needed to objectively document the efficacy of IMO's to confer resistance to *Metrosideros polymorpha* against *Ceratocystis fimbriata*.

Methods

Study Site

Forty trees showing ROD symptoms will be selected; 20 of these trees will receive JADAM IMO treatment and 20 will be left alone as a control. Treatment and Control Trees will be spaced across the landscape with a yet to determined distance to prevent control trees from receiving IMO's via wind drift or natural propagation of microbes through the substrate. Each treatment tree and 3-4 ft. of surrounding ground will be sprayed with JADAM IMO solutions twice per week (Wednesdays and Saturdays) over a six-month period. Spray will be applied in the late afternoon/early evening hours to prevent extreme sun exposure immediately after application. IMO concentrate solutions are being made one day before application at the Maku'u Farmers Association Community Center on Maku'u Hawaiian Home Lands on Fridays and at Kua O Ka La Public Charter School on Tuesdays.

JADAM Indigenous Microorganism Solution (JMS)

Fill a five-gallon bucket to 2-3" below the rim with fresh, non-chlorinated water (chlorine can be off-gassed by allowing the water to sit uncovered for 24-36 hours). Add to the water: 22 ounces of clean seawater; one small palmful of IMO rich soil (a.k.a. Leaf Mold) collected under Mango, Bamboo or 'ōhi'a trees - IMO's are found in highest densities directly under leaf litter in the surface soil; and one half of a boiled Russet potato (skin on). Suspend the potato and Leaf Mold

in separate paint strainer bags in the diluted seawater/freshwater solution. Thoroughly massage the contents of both bags while submerged under the water to release soil particles and carbohydrates into the water. Cover the solution with a loose-fitting lid and allow to sit in full sun and ferment for 24-96 hours; fermentation time varies according to environmental conditions. JMS is ready to use when maximum small bubbling occurs. Solution must be applied within 1-3 hours. Dilute JMS at a ratio of 1:10 with non-chlorine water and spray on trees and soil until both are thoroughly covered.

Data Collection

Each tree will be uniquely identified and monitored bi-weekly using the following protocols. Treatment and control trees will be photographed from a stationary point corresponding the North and South cardinal direction; these points will be marked by stone ahu (piles). Symptomatic/Dead (S/D) branches will be tagged and counted at the beginning of the study; additional S/D branches will be tracked in this manner as the study progresses. Percent of healthy foliage per tree will be monitored using plexiglass percent cover viewers.

Implementation

The project is being implemented by three leaders, and has four primary advisors (see leadership doc). Volunteers are being recruited to assist with the high frequency application regimen; there are currently 40+ registered volunteers. Training sessions will be conducted in June/July to prepare trial batches of IMO's and test application protocols with research treatments beginning in August. There are three youth groups participating in the project, Lanakila Learning Center (based out of Hilo High School), Kua O Ka Lā's high school science class and Orange Moon Homeschool Cooperative. HCC Forest TEAM students will also participate in the project. The outreach/educational component currently includes 42 youth/students, five teachers and two additional adult chaperones. We feel that having the energy of Hawai'i's youth infused into this project is paramount for success.

References

Giambelluca, T.W., Q. Chen, A.G. Frazier, J.P. Price, Y.-L. Chen, P.-S. Chu, J.K. Eischeid, and D.M. Delaparte, 2013: Online Rainfall Atlas of Hawai'i. *Bull. Amer. Meteor. Soc.* 94, 313-316, doi: 10.1175/BAMS-D-11-00228.1.

Mālama 'Ōhi'a Project Leadership and Supporters

LEADERS

Leila Kealoha, Pāhoa, HI 96778,

A.S., Tropical Forest Ecosystems & Agroforestry Management, Hawaii Community College 2003

A.A, Liberal Arts, Hawaii Community College 2003

Teaching Certification, Halau Wānana (UH-Hilo) 2008

B.S., Environmental studies, Ashford University 2013

HQT (Highly Qualified Teacher) licensure, Science and Natural Resources 2014

2003-2017 Forest TEAM Advisory Board member

2013-Present Puna Community Development Plan Action Committee member

2013-Present KAPONO, Red Road Scenic Byway Steering Committee

2015-Present, Master's in Educational Administration, Chaminade University

2016-Present OHA Wao Kele O Puna 'Aha Kūkā (Advisory Board) Member

Jennifer Johansen, Pāhoa HI 96778,

A.S., Tropical Forest Ecosystem & Agroforestry Management, Hawaii Community College 2006

B.A., Ecology, Evolution & Conservation Biology, UH Hilo, 2008

2016-Present Jr. Forest TEAM Coordinator, www.irforestteam.org

2011-2016 Ho'oulu Lehua Program Coordinator

2010-2016 UHH Field Tech. studying diversity and distribution of 'Ōhi'a across the Hawaiian Islands

2015-Present OHA Wao Kele O Puna 'Aha Kūkā (Advisory Board) Member

Drake Weinert, Papaikou HI 96781,

B.S., Computer Science, Montana State University, 2007

CGNF-H Board of Directors Secretary, Certification Committee Chair, Level 4 Expert Instructor

Certified JADAM 5 times, interned under Young-San Cho for 2 months

2008-present Natural Farming Hawai'i club leader, www.naturalfarminghawaii.net

2011-2016 Project Co-Leader Let's Grow Hilo, Edible landscaping & beautification of streets

2012-2017 Garden Coordinator & Agriculture Instructor, Kalaniana'ole Elementary,

www.uluae.com

2017 President, Hawaii Farmers Union United, East Hawaii Chapter, www.hfuuhi.org

PRIMARY ADVISORS

Patrick Hart Ph.D., UH Hilo Professor of Biology,

Lisa Kieth PhD., USDA-ARS, Pathologist,

Youngsang Cho Founder and President of JADAM Organic Farming (J.O.F.) in South Korea

Rei Yoon J.O.F. Member/English Translator for Youngsang Cho,

Chris Trump CGNF-H Certified Advanced KNF

Kim CS Chang, CGNF-H. Board of Directors, Certified CGNF instructor and practitioner since 2008 to present.

SUPPORTERS

Orlo Steele Ph.D., H.C.C. Forest TEAM Director,

County of Hawai'i Coqui Frog Control Program, Glenn Sako,

Hawaii County Contingency Funds Relief Program, with special thanks to Puna County Council Representatives Jen Ruggles and Eileen Ohara

Maku'u Farmers Association

Lauae Kekahuna, Treasurer/Secretary
Market Manager; Miles Kajiya, Assistant.

Paula K. Kekahuna, President;
Ioane Kekahuna,

EDUCATIONAL ADVISORS

Michael W. DuPonte, Extension Agent in Natural Farming & Livestock at the University of Hawai'i at Manoa, CTahr Komohana Research & Extension Center 875 Komohana St., Hilo, HI 96720, FAX (808) 981-5211,

Simon Russell, Maui County Rep. to the Hawai'i Board of Agriculture (responsible to eradicate invasive species like R.O.D.), K.N.F. Certified Natural, Biological & Organic Farmer, H.F.U.

Foundation President www.hfuf.org, HFUU Haleakala Chapter President

<http://www.mauifarmershaleakala.com/>, HFUU State Legislative Committee Chair

Dana Keawe

Pahoa, Hawai'i 96778,

COLLABORATORS

East Hawai'i 4H: Komohana Research and Extension Center, 875 Komohana St. Hilo, HI 96720.
Assoc. Extn. Agent: Rebecca Settlage,

Lanakila Learning Center (LLC): Program Director: Wendy Hamane

Kua O Ka Lā: This rural Public Charter School near Kapoho is a Jr. Forest TEAM satellite campus.
Kumu: Leila Kealoha

Orange Moon Homeschool Cooperative: Priscilla Lee,

Eileen O'Hara
Council Member
Council District 4

Chair: Environmental
Management Committee



Fax: (808) 961-8912

Vice Chair: Planning Committee and
Agriculture, Water & Energy
Sustainability Committee

County of Hawaii

Hawaii County Council

25 Aupuni Street, Suite 1402 • Hilo, Hawai'i 96720

January 29, 2018

The Board of Land and Natural Resources
Kalanimoku Building
1151 Punchbowl St.
Honolulu, HI 96813

RE: Support for permit application requested by the Malama Ohi`a Project for the Puna District, County of Hawai'i to be heard at a 2018 BLNR board meeting.

Aloha Board Members,

I am writing in support of the Malama Ohi`a project which is focused on finding alternative methods of stemming the spread of Rapid Ohia Death (ROD) on the Big Island. Research of this nature is very much needed to help identify means to improve our success in reducing the impacts of this devastating fungal disease on our lowland Ohi`a forests.

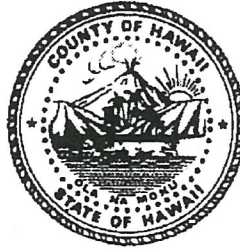
This permit request is most appropriate as the track of state land under consideration is within the area of the Puna District where we've seen a rapid advance of this disease. There is a sufficient number of specimens to comply with the protocols set up for this research project involving the use of Indigenous Microorganisms (IMOs). My office, representing Council District 4 (Lower Puna), along with the office of Council District 5, have provided the funding for this research. We are anxious to see this project get underway so that we soon learn whether the application of IMOs is beneficial in reducing the incidence of disease in healthy trees and/or diminishes the impact of the disease on already affected Ohi`a specimens.

Again, please consider granting this permit request as the disease ROD will have a long standing negative impact on the island's flora and fauna if we are unable to discover ways to prevent its spread and stem the devastating impacts on our islands Ohi`a forests. Please act on this request as soon as you are able and provide us with notice of the upcoming meeting date and time.

Sincerely,

Eileen O'Hara, Councilmember
Hawai'i County Council, District 4

JEN RUGGLES
Council Member
District 5 – Puna Mauka,
Pāhoa Mauka, Kalapana



*Public Works & Parks and Recreation
Committee Chair
Public Safety & Mass Transit
Committee Chair*

Fax: 808-961-8912

*Hawai'i County Building
25 Aupuni St. Suite 1402
Hilo, HI 96720*

HAWAI'I COUNTY COUNCIL

September 5, 2017

Chairperson Suzanne Case
Department of Land and Natural Resources
Kalanimoku Building
1151 Punchbowl St.
Honolulu, HI 96813

2018 FEB 26 A 8:33
RECEIVED
LAND DIVISION
HILO, HAWAII

LETTER OF RECOMMENDATION

Dear Honorable Chairperson Suzanne Case,

I am writing to you to express my full support for a vital project for the health of our island community. This project would further scientific research of Rapid 'Ohi'a Death (ROD), and to trial remedies for this devastating disease.

As you know, the 'Ohi'a Lehua, (*Metrosideros polymorpha*), is the backbone of Hawai'i's native forests and is central to Hawaiian culture. According to the University of Hawaii at Manoa, ROD has caused approximately 50,000 acres of 'Ohi'a forest to be affected.

The Malama 'Ohi'a Project, which is supported and sponsored by the Big Island Conservation and Development Council (BIRCD), has been tasked with trialing solutions to ROD. Preliminary results are reporting that trees treated with indigenous micro-organism solutions, (IMO), are demonstrating resistance to the disease.

The Malama 'Ohi'a Project has partnered with professionals in the University of Hawaii at Hilo to oversee a study to scientific method standards and The County of Hawaii has provided funding. What is now needed is an appropriate parcel of land, which has been identified as DLNR land. We want to express our continued full support by recommending DLNR allow The Malama 'Ohi'a Project to use this parcel for continuing this important research in order to preserve our unique native 'Ohi'a forests. Thank you very much for your time and consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Jen Ruggles".

EXHIBIT E



UNIVERSITY
of HAWAII®
HILO

March 16, 2018

MEMORANDUM

TO: Candace Martin
State of Hawaii, DLNR
Hawaii District Land Office

FROM: Patrick Hart

SUBJECT: Mālama `ōhi`a research

Dear Candace

This is to confirm that, in my opinion, the experimental design to test the effectiveness of a new IMO-based treatment for ROD infected `ōhi`a trees is an adequate first step. The study design includes identifying 20 naturally infected trees in the wild and 20 non-infected trees. The application rate of indigenous microorganisms to all trees will be twice weekly for one to three months. Signs of disease and mortality will be monitored and compared among treatments with a two-sample T test. This experiment should allow for a determination of whether these procedures are sufficient to treat ROD in infected trees and even shed some light on whether healthy trees can be treated to prevent ROD.

Sincerely,

Patrick Hart

Professor and Chair, Department of Biology
University of Hawaii at Hilo
200 W. Kawili St., Hilo HI 96720

fax 808-932-7295

<https://sites.google.com/a/hawaii.edu/hart-lab-3/>