

State of Hawai'i  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
Division of Forestry and Wildlife  
Honolulu, Hawai'i 96813

December 14, 2015

Chairperson and Members  
Natural Area Reserves System Commission  
State of Hawai'i  
Honolulu, Hawai'i

NARS Commission Members:

SUBJECT: SPECIAL USE PERMIT APPLICATION FROM DR. MICHAEL THOMAS, TO COLLECT SEEDS IN O'AHU NATURAL AREA RESERVES FOR LONG-TERM STORAGE OF SEEDS AT THE UNIVERSITY OF HAWAI'I.

BACKGROUND:

While seed storage is of vital importance, lack of sufficient information on seed storage requirements for the majority of the flora make this application not appropriate. There are too many questions that have not been sufficiently answered.

STAFF ANALYSIS:

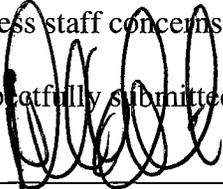
Staff of the O'ahu Branch, Division of Forestry and Wildlife (DOFAW), as well as collaborating partners have expressed strong concerns about this project and its many factual errors.

Attached is a letter from O'ahu staff representing both the Forest Reserves and Natural Area Reserves, demonstrating their overall concerns about lack of collaboration, and misrepresentation of information.

RECOMMENDATION:

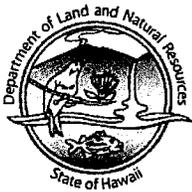
That the Natural Area Reserves System Commission deny this application, and recommend that he work with the Hawai'i Seed Conservation community, and that he reapply once he can address staff concerns.

Respectfully submitted,

  
\_\_\_\_\_  
David Smith, Acting Administrator  
Division of Forestry and Wildlife

Item 4.a.

DAVID Y. IGE  
GOVERNOR OF  
HAWAII



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

POST OFFICE BOX 621  
HONOLULU, HAWAII 96809

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CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES  
COMMISSION ON WATER RESOURCE MANAGEMENT

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FIRST DEPUTY

JEFFREY T. PEARSON  
DEPUTY DIRECTOR - WATER

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

MEMORANDUM

DATE: December 1, 2015

TO: Natural Area Reserves System Commission

FROM: Marigold Zoll, Natural Area Reserves Manager, O'ahu Branch *Marigold Zoll*  
Division of Forestry and Wildlife, Department of Land and Natural Resources

SUBJECT: Staff Recommendation regarding Dr. Michael Thomas Special Use Permit Application

Dr. Thomas has applied for a Special Use Permit (SUP) to collect an initial 500 to 5,000 (up to 20,000 total within the next 5 years) seeds from each of 100+ common species of plants in the O'ahu Natural Area Reserves (NAR) with the purpose of placing them in long term storage. He is working with the Royal Botanic Garden's Kew Millennium Seed Bank and the National Center for Genetic Resource Preservation (NCGRP) in Fort Collins, Colorado.

BACKGROUND

While I am well aware that Hawai'i desperately needs more of its flora represented in appropriate seed storage and that we currently lack sufficient information on the seed storage requirements for the majority of the flora, I cannot support issuance of a SUP for this request at this time for the following reasons:

- 1) Dr. Thomas' application is fraught with errors and lacking in specifics making adequate assessment of the project necessary for the scale of such an endeavor impossible. For example:
  - Non-orthodox seeds included on the target species list for collection (i.e., outdated science being used);
  - Threatened and Endangered species on target species list for collection when the permit is for common species collections;
  - Specifics that are lacking: specific species targeted for collection in the NARS to justify collecting from the NARS rather than within Forest Reserves; Specifics relating to storage site(s) (University of Hawaii St. John building, College of Tropical Agriculture and Human Resources, NGCRP); time horizon for storage, use of seeds, and ownership of seeds;
  - Evidence of staff training and experience

An important note is that the O'ahu Branch of the Division of Forestry and Wildlife (DOFAW)/NARS was not consulted during the development stages of or involved in the Memorandum of Understanding for this project, and only learned about the project when the permit application was submitted in early August.

2) Dr. Thomas' responses to questions posed by email and in person in an attempt to clarify issues were inadequate and the full picture of the project remains unclear. In addition, staff found similar issues with his request to collect in all of the O'ahu Forest Reserves (FR) that came to light after the issuance of a permit and, as such, his FR permit was suspended and a list of concerns provided to him that require addressing.

3) Dr. Thomas has misrepresented his collaboration and working relationships with established members of the Hawai'i seed conservation community and the Plant Extinction Prevention Program (PEPP) (listing himself as a manager with Joan Yoshioka under a section of the website he manages titled "Plant Extinction Prevention Program Species." It is unclear why he has listed himself as a manager there and why the PEPP species are included under the project's research checklists). This misrepresentation calls into question the integrity of the project and the validity of the information he is providing.

#### RECOMMENDATION

I and other DOFAW staff strongly recommend that Dr. Thomas withdraw his application, that he strive to forge a positive working collaboration with the Hawaii Seed conservation community, and that he reapply once he can address staff concerns.

O'ahu DOFAW/NARS staff are available to meet with Dr. Thomas to answer any questions he has related to the concerns we outlined for him.

**Department of Land and Natural Resources**  
**Division of Forestry and Wildlife**  
1151 Punchbowl St., Room 325; Honolulu, HI 96813  
(808) 587-0063, (808) 587-0064 (Fax)  
**Application for NARS Special Use Permit**



Name: Michael B. Thomas, PhD  
Title of Proposed Activity: Seed and Voucher Collecting of Native Hawaiian Flora

**The following activities require a Special Use Permit under HAR §13-209-5. If your work in the Natural Area Reserve (NAR) will involve one or more of the following, please indicate with an 'X' below:**

- remove**, injure, or kill any form of **plant** or animal **life**, except game mammals and birds hunted according to department rules\*
- introduce any form of plant or animal life\*
- remove, damage, or disturb any geological or paleontological features or substances\*
- remove, damage or disturb any historic or prehistoric remains\*
- engage in any construction or improvement\*
- engage in any camping activity
- establish a temporary or permanent residence
- start or maintain a fire
- litter, or to deposit refuse or any other substance
- operate any motorized or nonmotorized land vehicle or air conveyance in any area (including roads and trails) not designated for its use
- operate any motorized water vehicle of any shape or form in freshwater environments or marine waters, except as otherwise provided by DLNR's boating rules
- enter into, place any vessel or material on, or otherwise disturb a lake or pond
- engage in commercial activities, defined as "the use of or activity on state lands for which compensation is received by any person for goods or services or both rendered to customers or participants in that use or activity"
- have or possess the following tools, equipments or implements: fishing gear or devices (in `Ahihi-Kina`u NAR), cutting or harvesting gear (in any NAR), and hunting gear or tools (except as permitted by the hunting rules of the department)
- hike or conduct nature study **with a group larger than 10**
- presence in an area closed pursuant to HAR §13-209-4.5 or after visiting hours established by §13-209-4.6
- anchor any motorized or non-motorized water vehicle in the marine waters of `Ahihi-Kina`u NAR
- other (please explain): \_\_\_\_\_

\* May require additional State or Federal permits. Applicants are responsible for identifying and securing all approvals that may be required.

\*\* The NARS rules and recent rule amendments can be viewed on-line at <http://www.state.hi.us/dlnr/dofaw/Unofficial%20compilation%20HAR%2013.209.pdf>

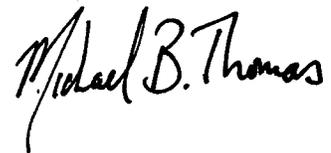
\*\*\* Please allow for a minimum permit processing time of three months\*\*\*

All permits will have the following standard conditions, pursuant to HAR § 13-209-5.

Additional conditions may apply.

- 1) The permittee shall adhere to the specifications given in the permit application
- 2) Disturbance of vegetation and wildlife shall be avoided as much as possible
- 3) Precautions shall be taken to prevent introductions of plants or animals not naturally present in the area. The permittee is responsible for making sure that participants' clothing, equipment, and vehicles are free of seeds or dirt to lessen the chance of introducing any non-native plants or soil animals. Should an infestation develop attributable to the permittee, the permittee is responsible for eradication by methods specified by the department
- 4) Once approved, the permit is not transferable
- 5) Once approved, the permit does not exempt the permittee from complying with any other applicable rule or statute
- 6) The State of Hawaii shall be released and held harmless from any and all liability for injuries or death, or damage or loss of property however occurring during any activity related to the permit

I certify that the information contained in this application is true and correct.



Applicant's Signature

If approved, copies of the permit will be provided to:

- Applicant
- NARS Commission Executive Secretary
- NARS Branch staff
- DLNR-DOCARE

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For internal use only:

Application received on: \_\_\_\_\_

Distributed to District staff for review on: \_\_\_\_\_

Approval  recommended  not recommended by NARS Commission or authorized representative on: \_\_\_\_\_  with the attached special conditions.

Approved

Not Approved

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Chairperson, DLNR

---

Date

**Applicant Contact Information**

You may either enter the information directly onto this form; if you need more space or need to attach additional pages, please indicate that there are attachments.

**Name:** Michael B. Thomas, PhD

**If you are applying on behalf of an organization, the organization and your title:**

Curator/Collections Manager  
Botany Department  
Joseph F. Rock Herbarium  
University of Hawaii at Mānoa

**Title of Proposed Activity:** Seed Collecting of the Native Hawaiian Flora for the University of Hawaii Seed Bank.

**Primary contact person for this permit application:** Michael B. Thomas, PhD

**Mailing Address:**

Joseph F. Rock Herbarium  
Botany Department  
University of Hawaii at Mānoa  
3190 Maile Way, Rm 101  
Honolulu, HI 96822

**Phone:** 808 956-4168

**Fax:** 808 956-1111

**E-mail:** mbthomas@hawaii.edu

**Principal local contact, reference, or collaborator:** Michael B. Thomas

**Mailing Address:** Same as above....

**Phone:**

**Fax:**

**E-mail:**

**Supporting Information**

Please provide the following information about your proposed activity that requires a special-use permit ("proposed special-use"). Failure to provide responses to the following questions may result in your application being rejected or taking longer to review and process.

1. **What is the period of time for which the permit is requested (e.g., the date of a proposed single event or an ongoing research project, from beginning time or date until end of the event or project, for group hikes the number of hikers and leaders)?**

*\* Please note: permits are limited to one year in length, except where waived for permits to other governmental agencies where the board determines the waiver to be in the best interest of the State. Proposals for multi-year projects are advised of the need to apply for a new permit EACH year.*

On-going research project. 1 year. Beginning date: October 15<sup>th</sup>, 2015.

2. **List the individual Natural Area Reserve(s) involved:** *Please note that Laupahoehoe is now has an overlay under the jurisdiction of the US Forest Service as part of the Hawai'i Experimental Tropical Forest (HETF). Applicants wishing to work in this Natural Area Reserve will need to apply for a separate permit by going to [http://www.hetf.us/page/conducting\\_research/](http://www.hetf.us/page/conducting_research/) You will **not** need to submit an additional application fee, but you will have to have it pass thorough the HETF review process. Permits are issued off of the Big Island DOFAW Branch.*

*Kahauale`a is currently closed due to continuing volcanic activity; entry is prohibited, but may be granted under special use request made directly to the Big Island NARS Manager and issued off of the Big Island DOFAW Branch (also subject to approval of Hawaiian Volcano Observatory to insure safety).*

*The majority of `Ahihi-Kina`u is closed to public access; entry for research or other purposes may be made under a Special Use Permit.*

**Oahu only.**

Ka'ena Point

Kaluanui

Mount Ka'ala

Pahole

3. **Attach a map that illustrates where in the Natural Area Reserve(s) you propose to conduct your special-use.** *The map should be legible and reproducible in black and white. The map should also be at the appropriate scale for the type of activity proposed and of sufficient detail to allow the Division to identify activity sites within 10 meters. For any activity off established trails, entry and exit routes should be marked.*

See enclosed maps.

4. **Provide a thorough and detailed description of the proposed special use, including names of field assistants and other collaborators.** *The description should be detailed enough so that those reviewing your application understand what you propose to do and the scope of your proposal. As part of your description, please include: a) a description of the planned method of transportation to and within the Natural Area Reserve, and b) if other people than you will participate in the proposed special-use, please note how many people, and whether they are volunteers, students, research assistants, paying customers, etc.*

***For research proposals,***

- a) *please explain your objectives, your methods, and why the proposed special-use is necessary to your research;*
- b) *if the research is part of your undergraduate or graduate studies, please include the name and affiliation of your major professor;*
- c) *if you are seeking permission to remove or introduce any form of plant or animal life, please list all species involved and specifically identify which are threatened, endangered, or candidate species.*
- d) *if you are seeking permission for the collection of any specimens, please note type of specimen (species and parts collected, if less than entire specimen), quantities to be collected, storage methods, and ultimate disposition.*

*Failure to provide sufficient information may result in your application being returned for additional information or rejected. Please feel free to attach additional sheets as necessary.*

The University of Hawaii's Joseph F. Rock Herbarium (HAW) has initiated a new research endeavour to collect and preserve seeds of native Hawaiian plants. Expeditions will include a small team of trained seed collectors to locate and identify target species, collect mature seeds in bags, and voucher specimens. Seeds will be cleaned and processed for storage at the Botany Department's Seed Bank. Our effort will result in minimum impact. We are targeting only endemic plants which are **not endangered or threatened species** to ensure we do not duplicate similar statewide efforts. We are working with all interested parties and programs on collaborative capacity building in the areas of *ex situ* plant conservation to ensure greater long-term conservation of plant genetic resources in Hawaii. We plan to target known endemic species with orthodox seeds, and culturally important species. Our preliminary checklist is enclosed. We will travel by 4 wheel drive vehicle (5 person) and hike on foot.

**Estimated total number of seeds they would like to collect from each target species**

This project is a 5-year initiative. Collections of between 500 and 5000 seeds are targeted. As a rule collect no more than 20% of the available seed on the day of collection. This ensures that the population sampled is not influenced by the planned seed collecting.

**Estimated number of individuals and populations they intend to collect from for each target species**

It is recommended to sample from at least 50 individuals from within a single population, when available. Although a significant proportion of the genetic variation of many outbreeding species can be adequately conserved in this way, it is hoped that this strategy will also form the basis for much wider future sampling across the genotypic range of these species in Hawaii.

**Number of vouchers we intend to collect for each target species (e.g., one voucher from one individual in each population?)**

Only 2 vouchers (1 duplicate) in each population.

### **Storage methods, and ultimate disposition**

Seeds will be stored in refrigeration at the University of Hawaii at Mānoa campus. The USDA Agriculture Research Service (Fort Collins, CO) will serve only as a security back-up of the UH Mānoa seed bank.

#### **5. Please answer the following questions about your proposed special use:**

##### **a. Can your proposed special use be conducted elsewhere? If not, why not?**

No, the NARs areas possess natural wild populations of our species of interest in the most pristine environments. It is important to note that within pristine environments the wild naïve species have significant genetic and physiological heterogeneity than plants found in parks and reserves. We are focusing only on Oahu.

##### **b. Is your proposed special-use consistent with the purpose and objectives of the Natural Area Reserves System (the purpose and objective of the NARS is to protect in perpetuity specific land and water areas which support communities, as relatively unmodified as possible, of the natural flora and fauna of Hawai`i)? If so, how?**

Yes, long-term conservation of genetic material through seed collection and banking is consistent with the purpose and objectives of the Natural Area Reserves System.

##### **c. Is your proposed special-use consistent with the management plan developed for the individual Reserve(s) (*Management plans are available for review at [www.dofaw.net/nars](http://www.dofaw.net/nars) or by contacting the NARS office*)?**

Yes

##### **d. Does your proposed special-use provide a benefit (direct or indirect) to the Natural Area Reserves System or to the individual Reserve(s) or both? (*For research, please note whether any studies have previously been made similar to the one proposed and how you will convey your research findings to the Department*).**

Yes, long-term conservation of genetic material through seed collection and banking. Annual final report can be submitted.

##### **e. Will the proposed special-use damage or threaten to damage the integrity or condition of the natural, geological, or cultural resources in the individual Natural Area Reserve(s) and adjacent area or region? If so, how? If not, why not?**

No, seed will only be collected from populations of high number of individuals.

**Estimated total number of seeds they would like to collect from each target species**

This project is a 5-year initiative. Collections of between 500 and 5000 seeds are targeted. 10,000 seeds are suggested to be collected for long-term storage and conservation over the next 5 years. As a rule collect no more than 20% of the available seed on the day of collection. This ensures that the population sampled is not influenced by the planned seed collecting.

**Estimated number of individuals and populations they intend to collect from for each target species**

It is recommended to sample from at least 50 individuals from within a single population, when available. Although a significant proportion of the genetic variation of many outbreeding species can be adequately conserved in this way, it is hoped that this strategy will also form the basis for much wider future sampling across the genotypic range of these species in Hawaii.

- f. **Does the proposed special-use comply with the provisions and guidelines contained in HRS Chapter 205A, entitled ‘Coastal Zone Management,’ where applicable? *HRS Chapter 205A can be accessed at:***  
[http://www.capitol.hawaii.gov/hrscurrent/Vol04\\_Ch0201-0257/HRS0205A/](http://www.capitol.hawaii.gov/hrscurrent/Vol04_Ch0201-0257/HRS0205A/)

Yes

- g. **Have you (the applicant) previously received a NARS Special Use Permit? If so, did you comply with the conditions of any previously approved permit (including providing a final report as requested)?**

No, never received a permit.

- h. **Do you (the applicant) have any other current NARS special-use permits? If so, please list and state whether you are currently in compliance with the conditions of those permits.**

No.

6. **Is the proposed special-use expected to have an environmental impact on the Natural Area Reserve(s) or the surrounding area? If, so please elaborate. If not, why not? *Please include discussion of any off-trail work, such as mist-netting, setting of traps, removal of vegetation, etc. and any measures planned to mitigate any short and long-term damage.***

No, our seed harvesting will be low impact and be using telescopic poles to sample fruit.

7. **For research proposals, please list any local collaborators and their contact information (if any).**

Our team comprises:

Casey Jones, PhD Candidate, UH Mānoa, Botany Dept. Honolulu, HI

Reko Libby, student, UH Mānoa, Botany Dept. Honolulu, HI

Leo Louis, student, UH Mānoa, Botany Dept. Honolulu, HI

Coral Bielecki, student, UH Mānoa, Botany Dept. Honolulu, HI

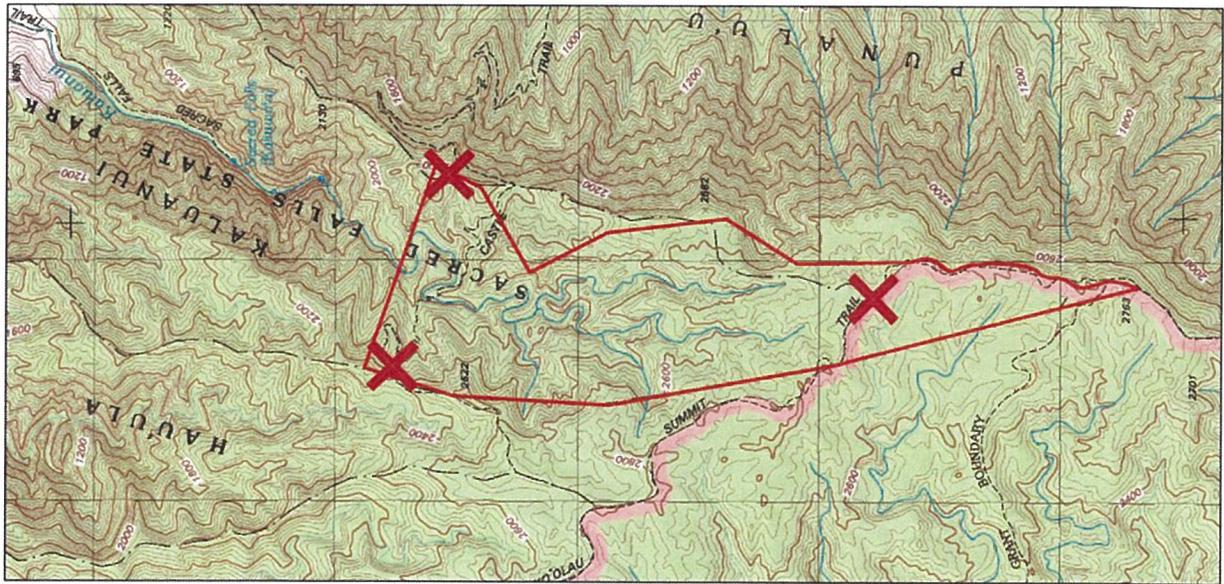
Jacob Suissa, student, UH Mānoa, Botany Dept. Honolulu, HI

Raphael Hausenfluck-Poli, student, UH Mānoa, Botany Dept. Honolulu, HI

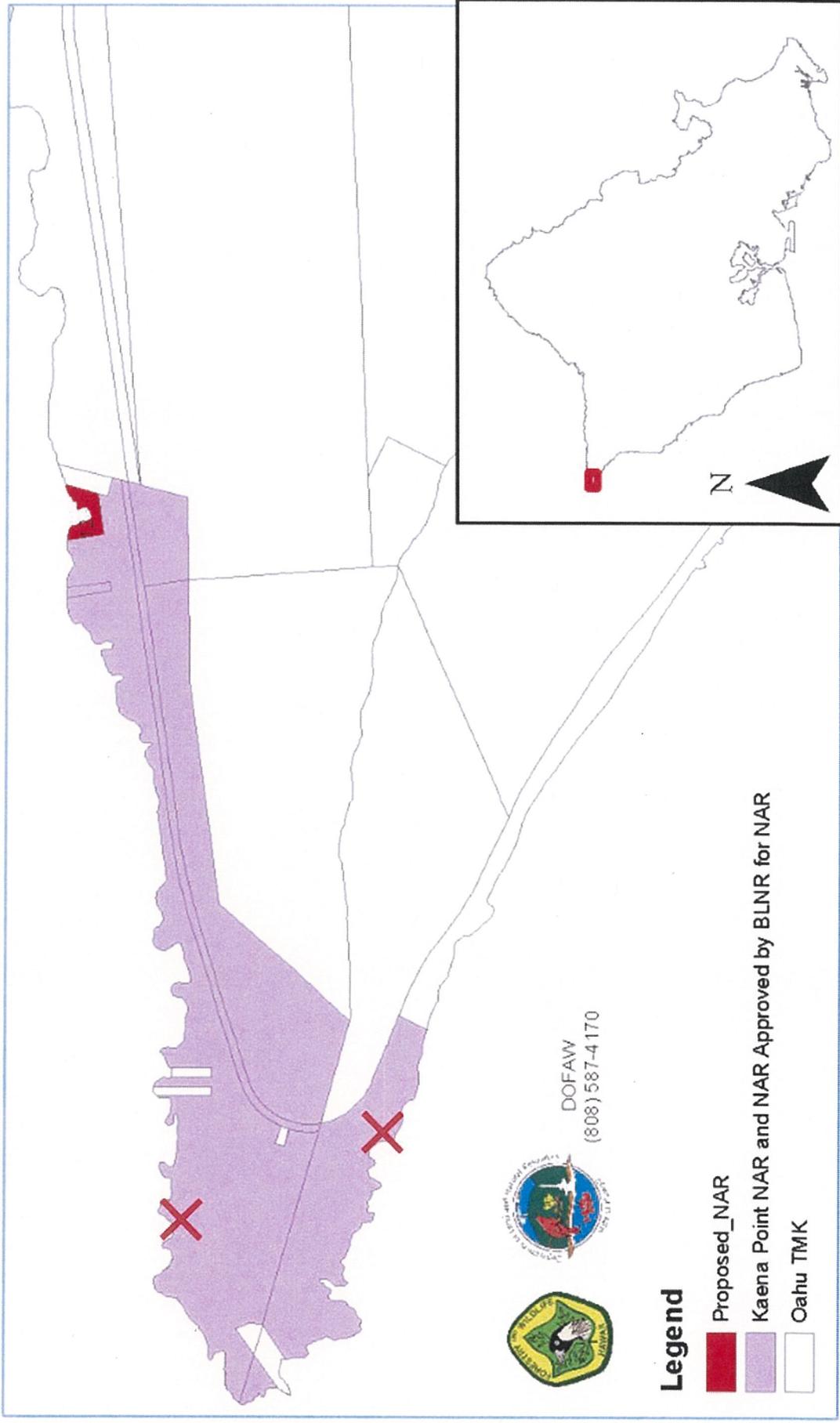
Julie K. Kirk, Seed collecting assistant, Honolulu, HI



# Kaluanui Natural Area Reserve

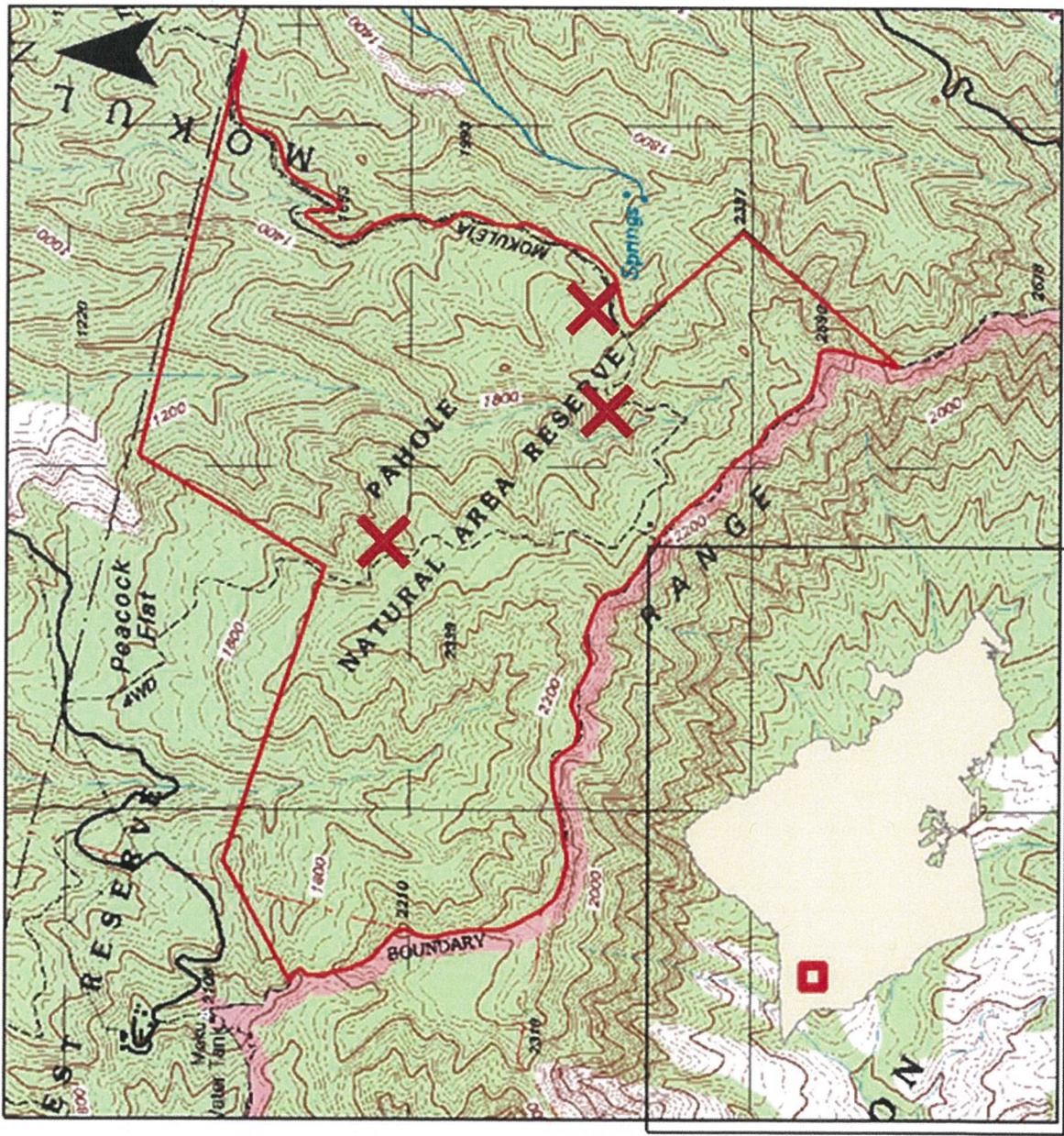


# Proposed Extension to Ka`ena Point NAR





# Pahole NAR



Map Created 8.12.08  
Emma.Yuen@hawaii.gov

**Legend**  
[Red Square] NAR



| Group   | family          | scientificName  |
|---------|-----------------|---|
| Dicot   | Amaranthaceae   | Rhus sandwicensis A. Gray                                   |
| Dicot   | Amaranthaceae   | Chenopodium oahuense (Meyen) Aellen                         |
| Dicot   | Amaranthaceae   | Charpentiera obovata Gaudich.                               |
| Dicot   | Amaranthaceae   | Nototrichium sandwicense (A. Gray) Hillebr.                 |
| Dicot   | Anacardiaceae   | Peucedanum sandwicense Hillebr.                             |
| Dicot   | Apocynaceae     | Pteralyxia macrocarpa (Hillebr.) K. Schum.                  |
| Dicot   | Apocynaceae     | Rauvolfia sandwicensis A. DC.                               |
| Dicot   | Araliaceae      | Artemisia australis Less.                                   |
| Dicot   | Araliaceae      | Polyscias kavaensis (H. Mann) Lowry & G. M. Plunkett        |
| Dicot   | Araliaceae      | Polyscias oahuensis (A. Gray) Lowry & G. M. Plunkett        |
| Monocot | Asparagaceae    | Chrysodracon halapepe (H. St. John) P. L. Lu & Morden       |
| Monocot | Asteliaceae     | Astelia menziesiana Sm.                                     |
| Dicot   | Asteraceae      | Bidens macrocarpa (A. Gray) Sherff                          |
| Dicot   | Asteraceae      | Bidens molokaiensis (Hillebr.) Sherff                       |
| Dicot   | Asteraceae      | Dubautia sherffiana Fosberg                                 |
| Dicot   | Asteraceae      | Lipochaeta succulenta (Hook. & Arn.) DC.                    |
| Dicot   | Asteraceae      | Melanthera integrifolia (Nutt.) W. L. Wagner & H. Rob.      |
| Dicot   | Asteraceae      | Melanthera tenuis (O. Deg. & Sherff) W. L. Wagner & H. Rob. |
| Dicot   | Asteraceae      | Bidens asymmetrica (H. Lév.) Sherff                         |
| Dicot   | Asteraceae      | Bidens cervicata Sherff                                     |
| Dicot   | Asteraceae      | Bidens torta Sherff   |
| Dicot   | Asteraceae      | Hillebrandia sandwicensis Oliv.                             |
| Dicot   | Boraginaceae    | Nama sandwicensis A. Gray                                   |
| Dicot   | Brassicaceae    | Clermontia fauriei H. Lév.                                  |
| Dicot   | Campanulaceae   | Trematolobelia kaalae (O. Deg.) Lammers                     |
| Dicot   | Campanulaceae   | Trematolobelia macrostachys (Hook. & Arn.) Zahlbr.          |
| Dicot   | Campanulaceae   | Capparis sandwichiana DC.                                   |
| Dicot   | Campanulaceae   | Clermontia keakeana Meyen                                   |
| Dicot   | Campanulaceae   | Lobelia gaudichaudii A. DC.                                 |
| Dicot   | Campanulaceae   | Lobelia hypoleuca Hillebr.                                  |
| Dicot   | Campanulaceae   | Clermontia persicifolia Gaudich.                            |
| Dicot   | Caryophyllaceae | Schiedea ligustrina Cham. & Schtdl.                         |
| Dicot   | Caryophyllaceae | Schiedea mannii H. St. John                                 |

|         |                  |  |
|---------|------------------|--|
| Dicot   | Gesneriaceae     | <i>Cyrtandra rivularis</i> H. St. John & Storey                            |
| Dicot   | Gesneriaceae     | <i>Cyrtandra sandwicensis</i> (H. Lév.) H. St. John & Storey               |
| Dicot   | Gesneriaceae     | <i>Cyrtandra grandiflora</i> Gaudich.                                      |
| Dicot   | Gesneriaceae     | <i>Cyrtandra waianaensis</i> H. St. John & Storey                          |
| Dicot   | Goodeniaceae     | <i>Scaevola gaudichaudii</i> Hook. & Arn.                                  |
| Dicot   | Goodeniaceae     | <i>Scaevola glabra</i> Hook. & Arn.  |
| Dicot   | Goodeniaceae     | <i>Scaevola mollis</i> Hook. & Arn.  |
| Dicot   | Goodeniaceae     | <i>Scaevola gaudichaudiana</i> Cham.                                       |
| Dicot   | Goodeniaceae     | <i>Gunnera petaloidea</i> Gaudich.   |
| Dicot   | Gunneraceae      | <i>Broussaia arguta</i> Gaudich.   |
| Monocot | Hydrocharitaceae | <i>Halophila hawaiiiana</i> Doty & B. C. Stone                             |
| Dicot   | Lamiaceae        | <i>Phyllostegia grandiflora</i> (Gaudich.) Benth.                          |
| Dicot   | Lamiaceae        | <i>Phyllostegia lantanoidea</i> Sherff                                     |
| Dicot   | Loganiaceae      | <i>Labordia fagraeoides</i> Gaudich.                                       |
| Dicot   | Loganiaceae      | <i>Labordia hirtella</i> H. Mann   |
| Dicot   | Loganiaceae      | <i>Labordia sessilis</i> A. Gray   |
| Dicot   | Loganiaceae      | <i>Labordia waiolani</i> Wawra   |
| Dicot   | Malvaceae        | <i>Gossypium tomentosum</i> Nutt. ex Seem.                                 |
| Dicot   | Myrtaceae        | <i>Boerhavia herbstii</i> Fosberg  |
| Dicot   | Myrtaceae        | <i>Metrosideros rugosa</i> A. Gray   |
| Dicot   | Myrtaceae        | <i>Metrosideros macropus</i> Hook. & Arn.                                  |
| Dicot   | Myrtaceae        | <i>Metrosideros tremuloides</i> (A. Heller) Knuth                          |
| Dicot   | Myrtaceae        | <i>Syzygium sandwicense</i> (A. Gray) Mull. Berol.                         |
| Dicot   | Nyctaginaceae    | <i>Nestegis sandwicensis</i> (A. Gray) O. Deg., I. Deg. & L. A. S. Johnson |
| Dicot   | Nyctaginaceae    | <i>Pisonia sandwicensis</i> Hillebr.                                       |
| Dicot   | Phyllanthaceae   | <i>Antidesma pulvinatum</i> Hillebr.                                       |
| Dicot   | Phyllanthaceae   | <i>Phyllanthus distichus</i> Hook. & Arn.                                  |
| Dicot   | Phyllanthaceae   | <i>Phytolacca sandwicensis</i> Endl.                                       |
| Dicot   | Piperaceae       | <i>Peperomia ellipticibacca</i> C. DC.                                     |
| Dicot   | Piperaceae       | <i>Peperomia macraeana</i> C. DC.  |
| Dicot   | Piperaceae       | <i>Peperomia oahuensis</i> C. DC.  |
| Dicot   | Piperaceae       | <i>Peperomia remyi</i> C. DC.  |
| Dicot   | Piperaceae       | <i>Peperomia sandwicensis</i> Miq.   |
| Dicot   | Piperaceae       | <i>Pittosporum confertiflorum</i> A. Gray                                  |

|         |             |  |
|---------|-------------|--|
| Dicot   | Rubiaceae   | <i>Coprosma ochracea</i> W. R. B. Oliv.                                      |
| Dicot   | Rubiaceae   | <i>Gynochthodes trimera</i> (Hillebr.) Razafim. & B. Bremer                  |
| Dicot   | Rubiaceae   | <i>Kadua acuminata</i> Cham. & Schitdl.                                      |
| Dicot   | Rubiaceae   | <i>Kadua elatior</i> (H. Mann) A. Heller                                     |
| Dicot   | Rubiaceae   | <i>Kadua littoralis</i> Hillebr.   |
| Dicot   | Rubiaceae   | <i>Psychotria fauriei</i> (H. Lév.) Fosberg                                  |
| Dicot   | Rubiaceae   | <i>Psychotria kaduana</i> (Cham. & Schitdl.) Fosberg                         |
| Dicot   | Rubiaceae   | <i>Psychotria mariniana</i> (Cham. & Schitdl.) Fosberg                       |
| Dicot   | Rubiaceae   | <i>Kadua affinis</i> DC.   |
| Dicot   | Rubiaceae   | <i>Bohea elatior</i> Gaudich.  |
| Dicot   | Rubiaceae   | <i>Kadua centranthoides</i> Hook. & Arn.                                     |
| Dicot   | Rubiaceae   | <i>Kadua fosbergii</i> (W. L. Wagner & D. R. Herbst) W. L. Wagner & Lorence  |
| Dicot   | Rutaceae    | <i>Melicope clusiifolia</i> (A. Gray) T. G. Hartley & B. C. Stone            |
| Dicot   | Rutaceae    | <i>Melicope elliptica</i> A. Gray  |
| Dicot   | Rutaceae    | <i>Melicope hosakae</i> (H. St. John) W. L. Wagner & R. K. Shannon           |
| Dicot   | Rutaceae    | <i>Melicope kaalaensis</i> (H. St. John) T. G. Hartley & B. C. Stone         |
| Dicot   | Rutaceae    | <i>Melicope oahuensis</i> (H. Lév.) T. G. Hartley & B. C. Stone              |
| Dicot   | Rutaceae    | <i>Melicope ovata</i> (H. St. John & E. P. Hume) T. G. Hartley & B. C. Stone |
| Dicot   | Rutaceae    | <i>Melicope peduncularis</i> (H. Lév.) T. G. Hartley & B. C. Stone           |
| Dicot   | Rutaceae    | <i>Melicope rotundifolia</i> (A. Gray) T. G. Hartley & B. C. Stone           |
| Dicot   | Rutaceae    | <i>Melicope wawraeana</i> (Rock) T. G. Hartley & B. C. Stone                 |
| Dicot   | Rutaceae    | <i>Platydesma spathulata</i> (A. Gray) B. C. Stone                           |
| Dicot   | Rutaceae    | <i>Xylosma hawaiiense</i> Seem.  |
| Dicot   | Rutaceae    | <i>Zanthoxylum kauaense</i> A. Gray  |
| Dicot   | Santalaceae | <i>Korthalsella cylindrica</i> (Tiegh.) Engl.                                |
| Dicot   | Santalaceae | <i>Korthalsella latissima</i> (Tiegh.) Danser                                |
| Dicot   | Santalaceae | <i>Korthalsella remyana</i> Tiegh.   |
| Dicot   | Santalaceae | <i>Santalum ellipticum</i> Gaudich.  |
| Dicot   | Santalaceae | <i>Santalum freycinetianum</i> Gaudich.                                      |
| Dicot   | Sapindaceae | <i>Planchonella sandwicensis</i> (A. Gray) Pierre                            |
| Dicot   | Sapindaceae | <i>Sapindus oahuensis</i> Hillebr. ex Radlk.                                 |
| Monocot | Smilacaceae | <i>Smilax melastomifolia</i> Sm.   |
| Dicot   | Solanaceae  | <i>Nothoecstrum longifolium</i> A. Gray                                      |
| Dicot   | Solanaceae  | <i>Solanum nelsonii</i> Dunal  |