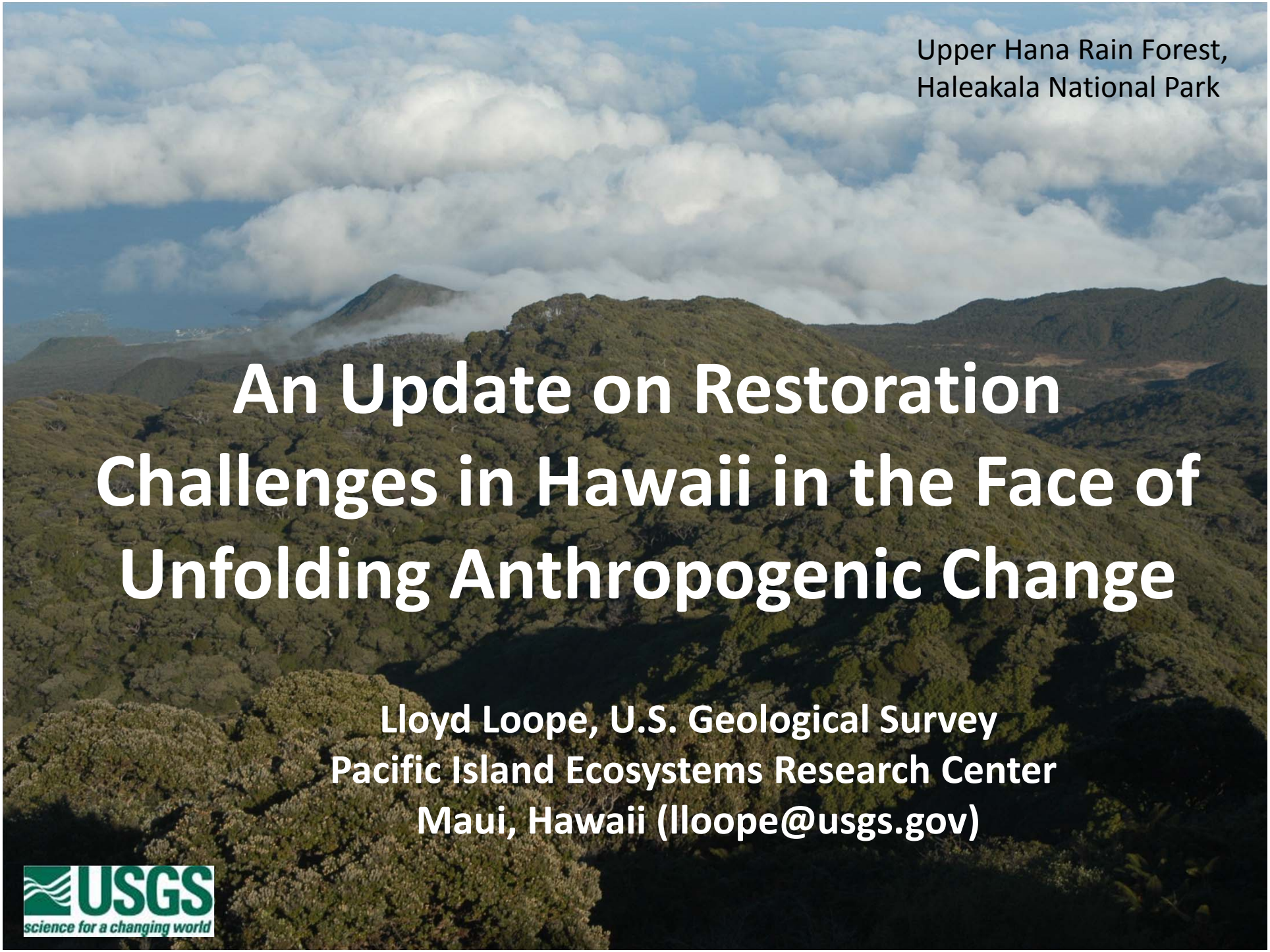

An Update on Restoration Challenges in Hawaii in the Face of Unfolding Anthropogenic Change

Lloyd Loope, U.S. Geological Survey
Pacific Island Ecosystems Research Center
Maui, Hawaii (lloope@usgs.gov)

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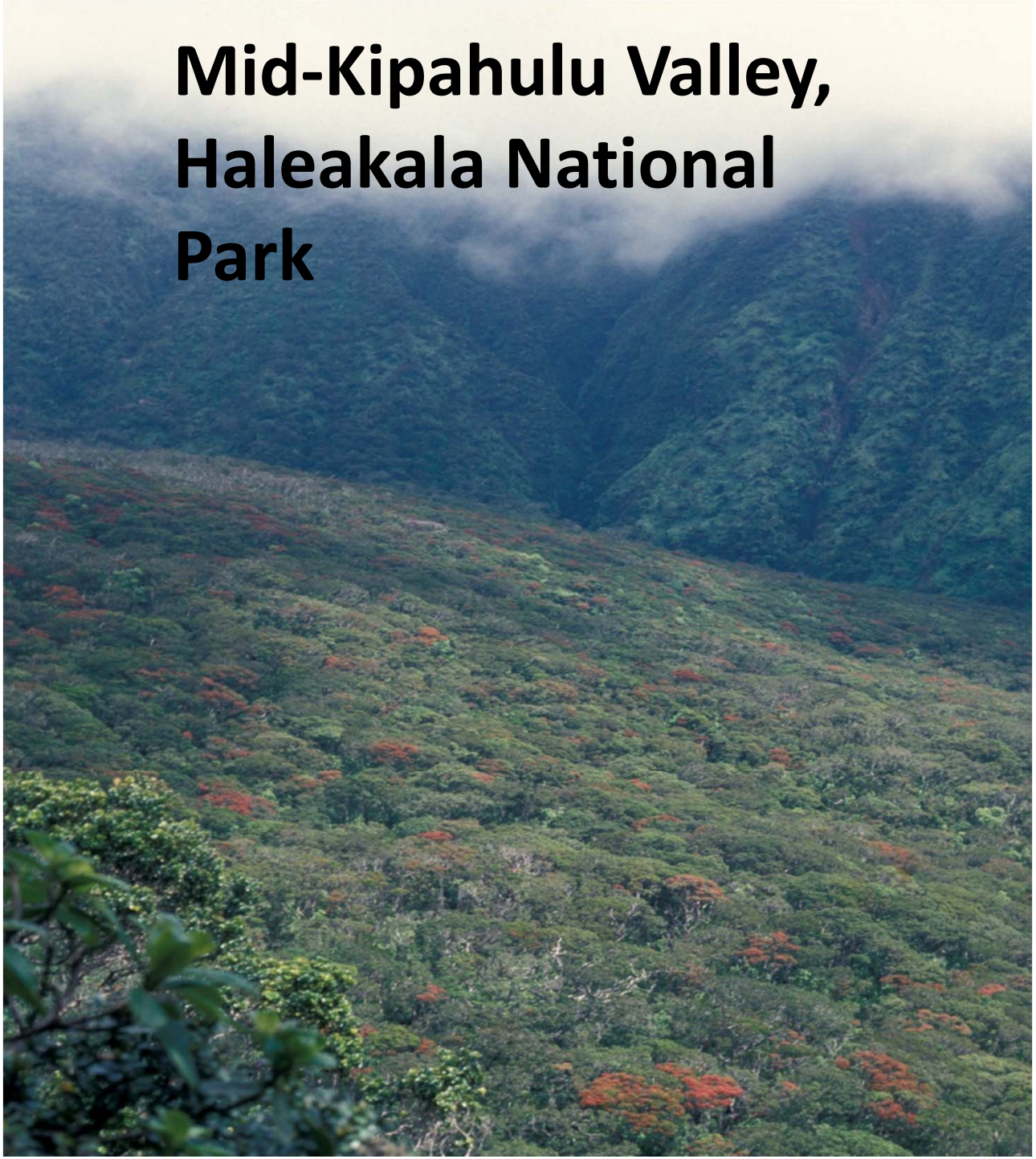
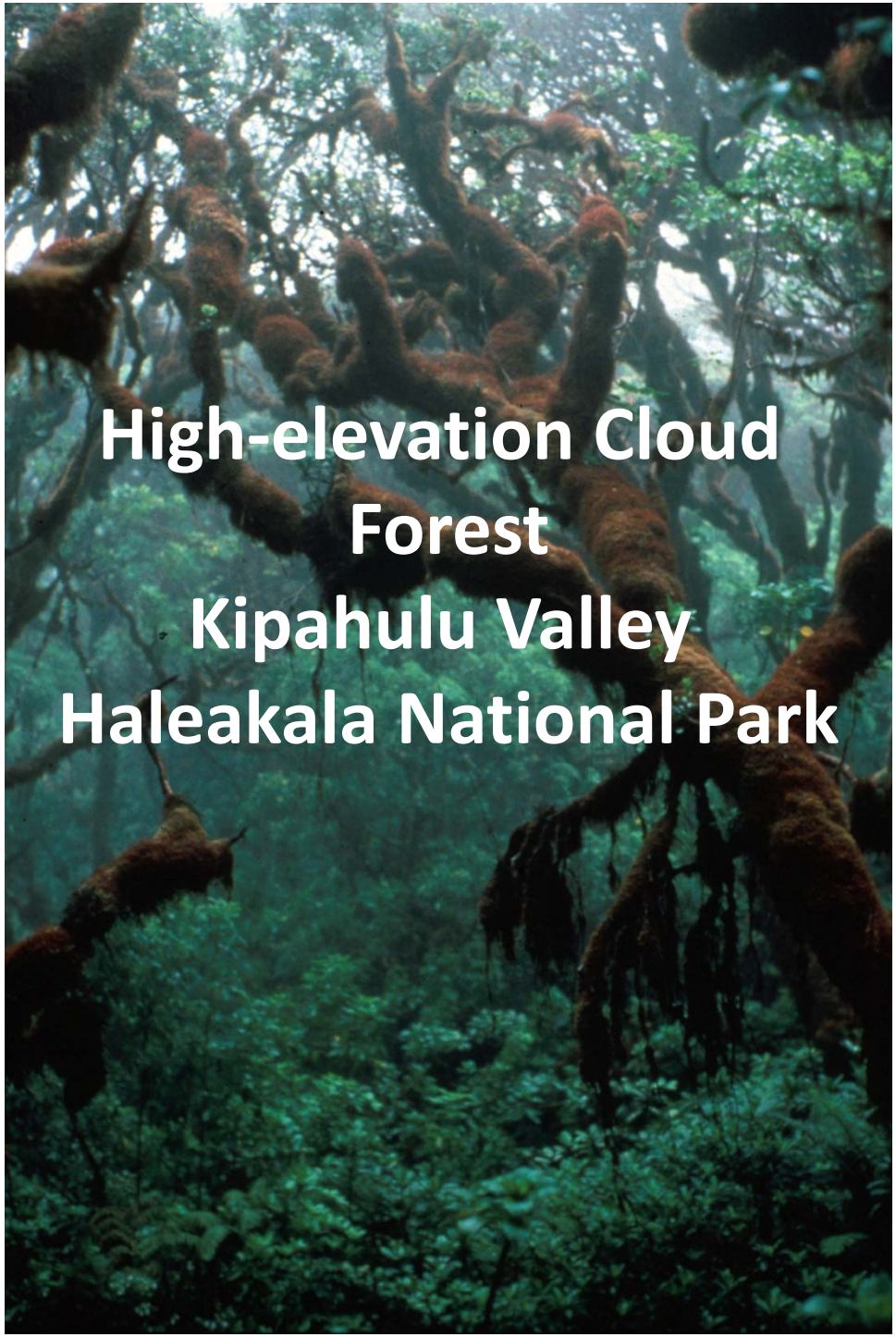
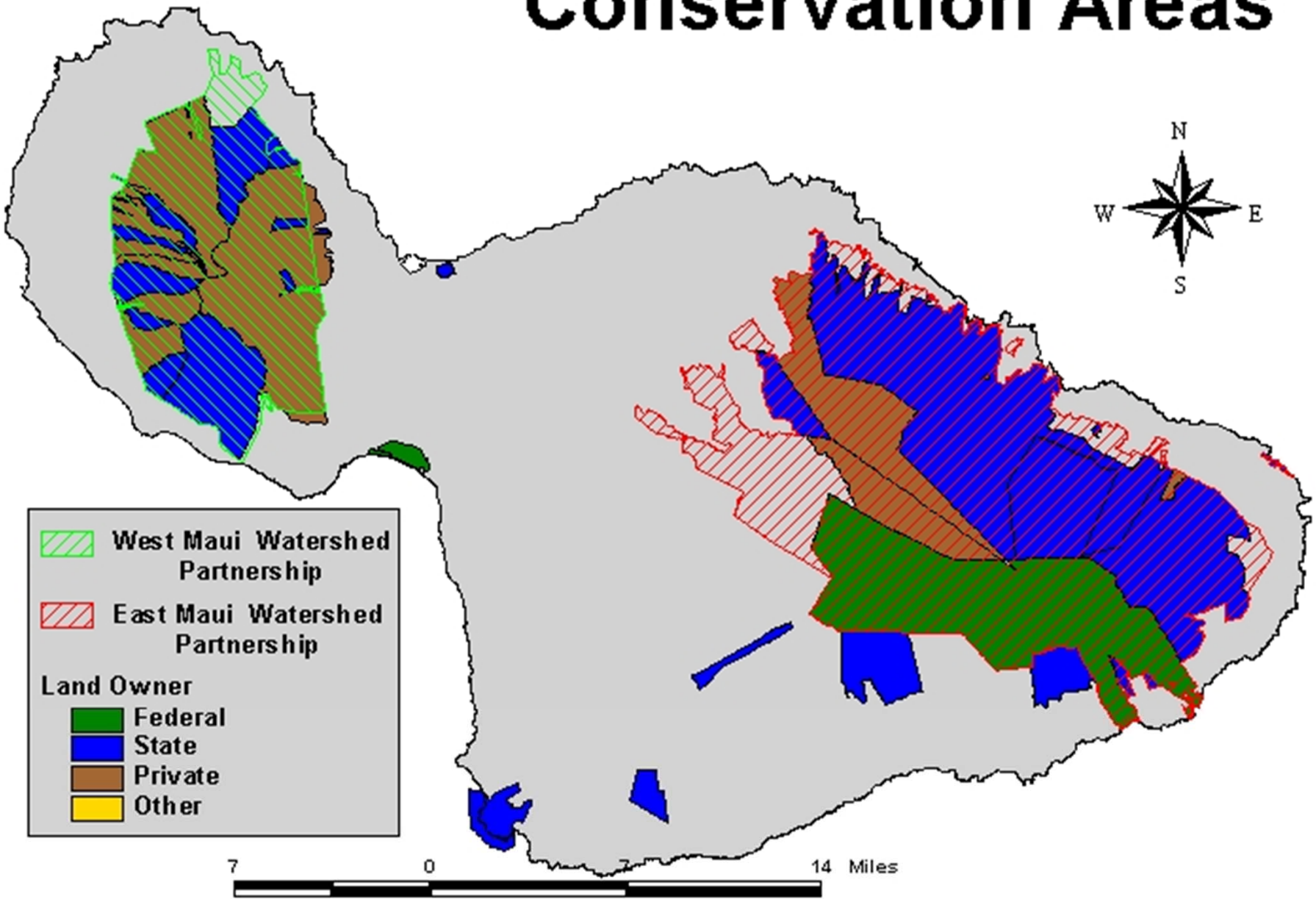

Mid-Kipahulu Valley,
Haleakala National
Park


Crested Honeycreeper (*Palmeria dolei*), found only in high-elevation rainforests of Maui


High-elevation Cloud
Forest
Kipahulu Valley
Haleakala National Park


West Maui
Watershed Partnership

Conservation Areas



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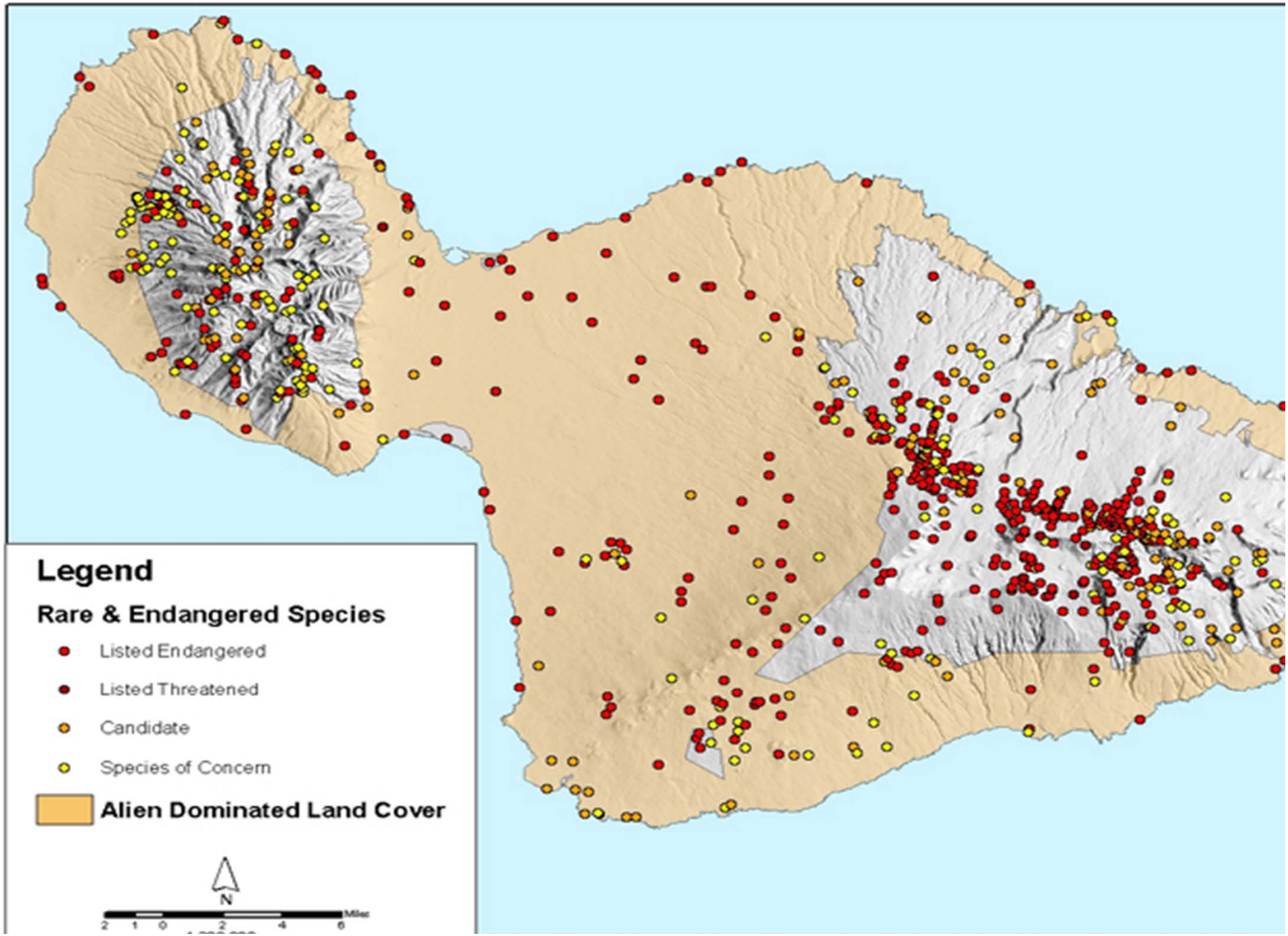
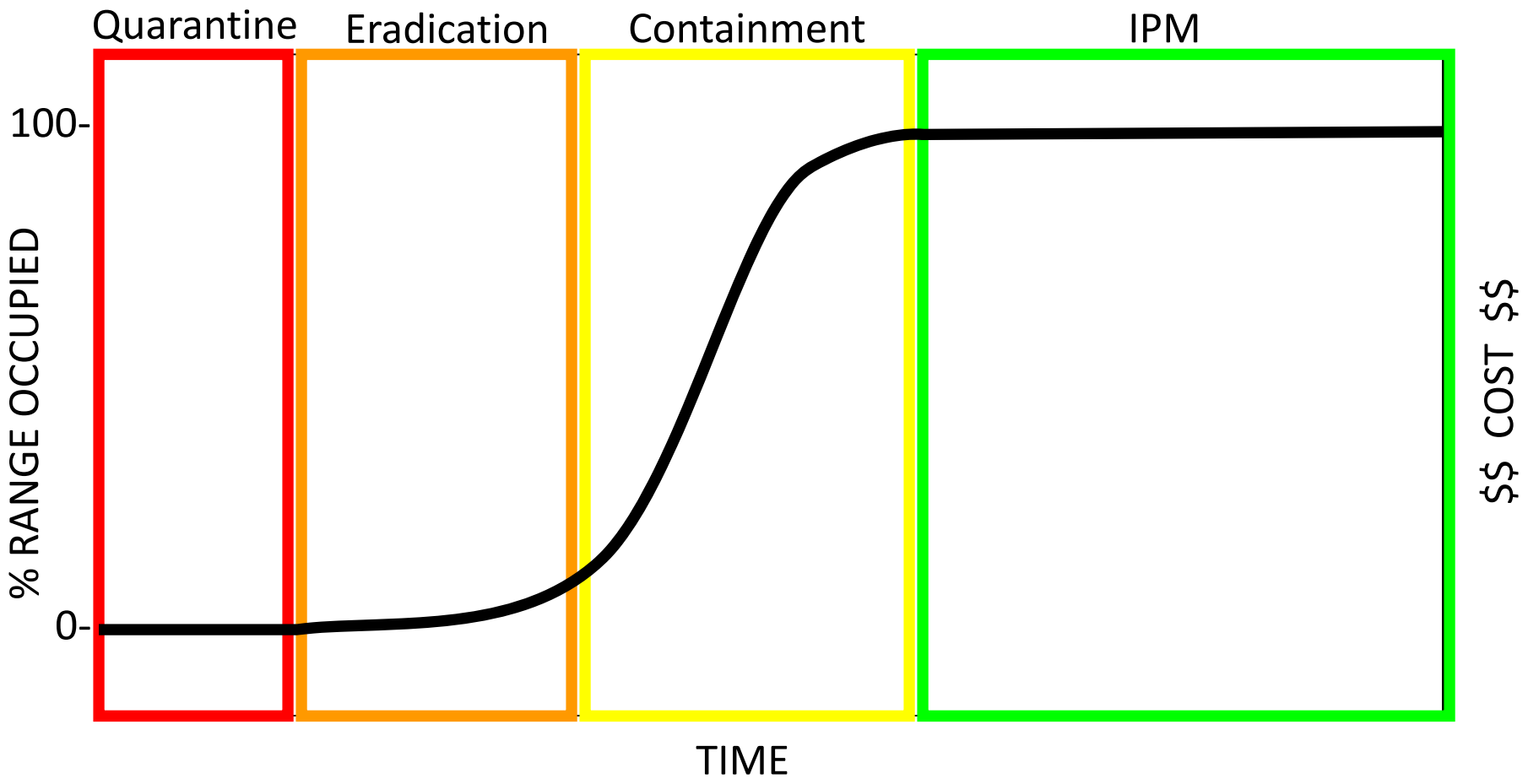
2/15/01 ajk

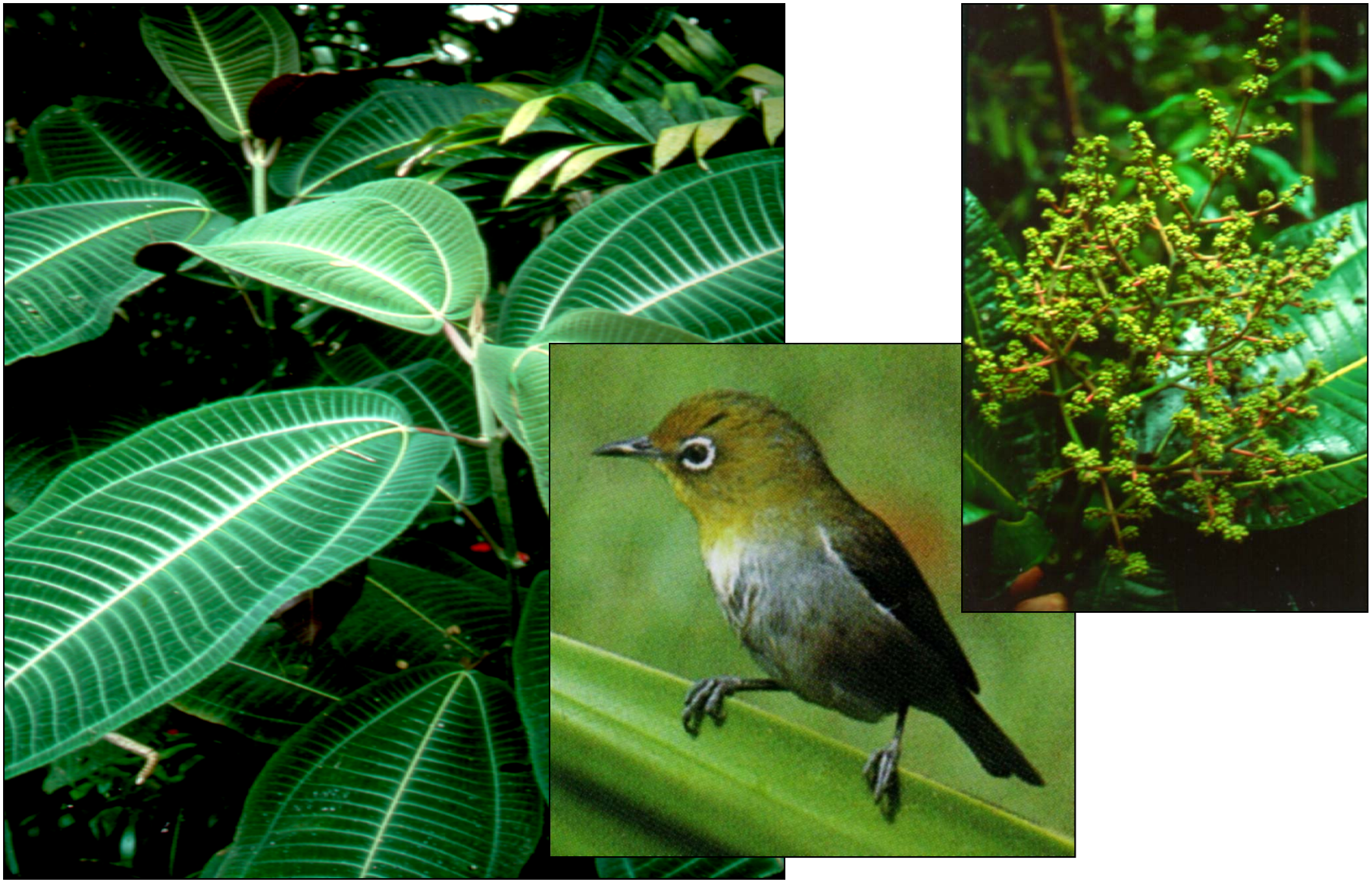

Legend
Rare & Endangered Species
Listed Endangered
Listed Threatened
Candidate
Species of Concern
Alien Dominated Land Cover
N
2 1 0 2 4 6
Miles

Phases of Weed Invasion

and associated control strategies



Miconia calvescens

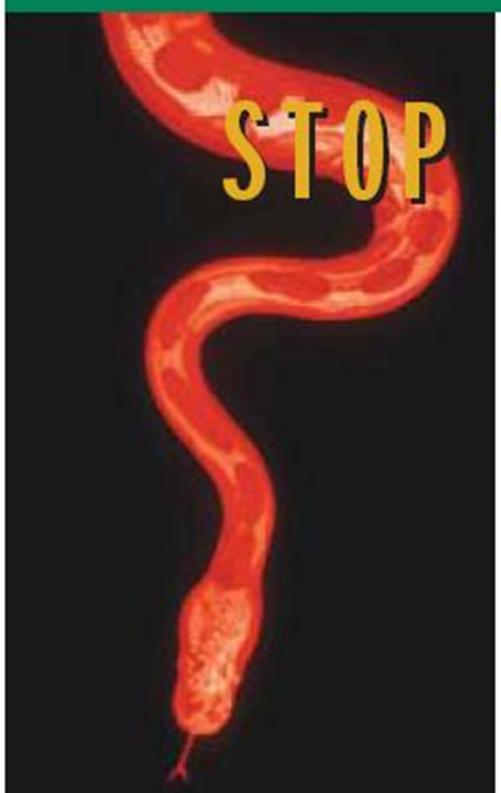


1992

The Nature Conservancy of Hawaii/
Natural Resources Defense Council

The alien pest invasion in Hawaii:
background study and
recommendations for interagency planning.
123 pp.

http://www.hear.org/articles/pdfs/
nrdctnch1992.pdf



STOP THE SILENT INVASION

Five Things We Must Do to Protect our Economy, Health, and

The headlines have become all too familiar. An invasive weed called **Miconia** is spreading into our forests and watersheds. Agricultural pests such as **papaya ringspot virus** and **banana bunchytop disease** are invading our farms. Screeching **tree frogs** are in our back yards. And now, bringing it all closer to home, a statewide outbreak of **dengue fever**. While these events may seem unrelated, all are in fact symptoms of a larger problem—the uncontrolled silent invasion of Hawai'i by destructive alien pests and disease organisms.

In the aftermath of the September of terrorism. "It's a triple whammy," is how Harry Hasegawa, president of Hana's Hasegawa's General Store in East Maui, described the dengue outbreak to the *Honolulu Advertiser*. "September is a slow month, then we had the attack on New York. Now this. What's next?"

The reality is that the worst may be yet to come. State inspectors now fear the arrival of the dreaded red-imported **fire ant**, which recently invaded California and has already been intercepted twice in Hawai'i. Experts also warn that Hawai'i could soon have established **snake** populations if several practical steps are not taken now. More than 200 credible snake sightings were reported in the islands during the

Coordinating Group on Alien Pest Species (CGAPS)

Hawaii statewide collaborative focus since 1996

How to achieve political will to attain an appropriate level of prevention and response?

How to best translate political will into effective action?

Government Agencies Involved with Quarantine Inspection in Hawaii

- **HDOA**
  Hawaii Department of Agriculture, Plant Quarantine Branch

- **APHIS-PPQ**
  U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection Quarantine

after March 1, 2003

- **DHS-CBP-AQI**
  U.S. Department of Homeland Security, Customs and Border Protection, Agriculture Quarantine Inspection

HDOA -- Protecting Hawaii's…

ENVIRONMENTAL SCIENCE & POLICY 10 (2007) 685–696

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journal homepage: www.elsevier.com/locate/envsci

Potential economic impact of introduction and spread of the red imported fire ant, *Solenopsis invicta*, in Hawaii

John J. Gutrich [a,*], *Ellen VanGelder* [b], *Lloyd Loope* [c]

[a] *Environmental Science Program, Hawaii Pacific University, 45-045 Kamehameha Highway Kaneohe, HI 96744, USA*
[b] *Pacific Cooperative Studies Unit, University of Hawaii, Department of Botany, 3190 Maile Way, St. John 408, Honolulu, HI 96822, USA*
[c] *U.S. Geological Survey, Pacific Island Ecosystems Research Center, Haleakala Field Station, P.O. Box 369, Makawao, (Maui) HI 96768, USA*

State of Hawaii
DEPARTMENT OF AGRICULTURE

New Pest Advisory
No. 05-04 Updated December 2005

Figure 1. Early symptoms of rust disease on ohia

A Rust Disease on Ohia

Puccinia psidii Winter

Eloise M. Killgore and Ronald A. Hau

Introduction. In April 2005, an ohia plant, *Metrosideros* sp., infected by a rust disease was submitted to the University of Hawaii (UH), College of Tropical Agriculture and Human Resources (CTAHR), Agricultural Diagnostic Service Center's (ADSC) Plant Disease Diagnostician Desmond Ogata by a Waimanalo (Oahu) grower who specializes in native plants. There are no records of a rust disease on ohia in Hawaii or elsewhere. In May 2005, rose apple, *Syzygium jambos*, heavily infected with a similar rust disease was observed on the Maunawili Trail by Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (DOFAW) staff. In July 2005, two species of *Eugenia* – *E. koolauensis* and *E. reinwardtiana*, and guava *Psidium guejava* were observed in Makiki with a similar rust disease. Infected ohia plants have since been observed in Manoa, Makiki, and Kalihi. All the confirmed reports of this rust disease are from the island of Oahu.

Symptoms. Symptoms of the disease first begin as tiny bright yellow powdery eruptions in a circular pattern on the leaf or stem surface (Fig. 1). These infection loci or spots expand and become necrotic (Fig. 2), and spread over the entire leaf, stem, or shoot. Leaves and stems can be deformed by the disease (Fig. 3 and 4), and growing tips can die back if the infection is severe. These symptoms are more likely to be seen on tender, young growing points.

Figure 2. Rose apple with typical symptoms of yellow ring patterns on foliage followed by necrosis.

Figure 3. Rose apple with rust infection on new growth.

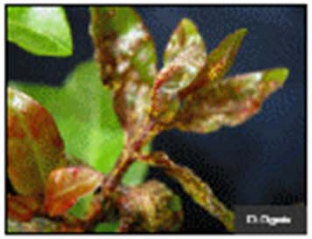

Figure 4. Advanced disease condition on ohia plant.

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Pacific Island Ecosystems Research Center

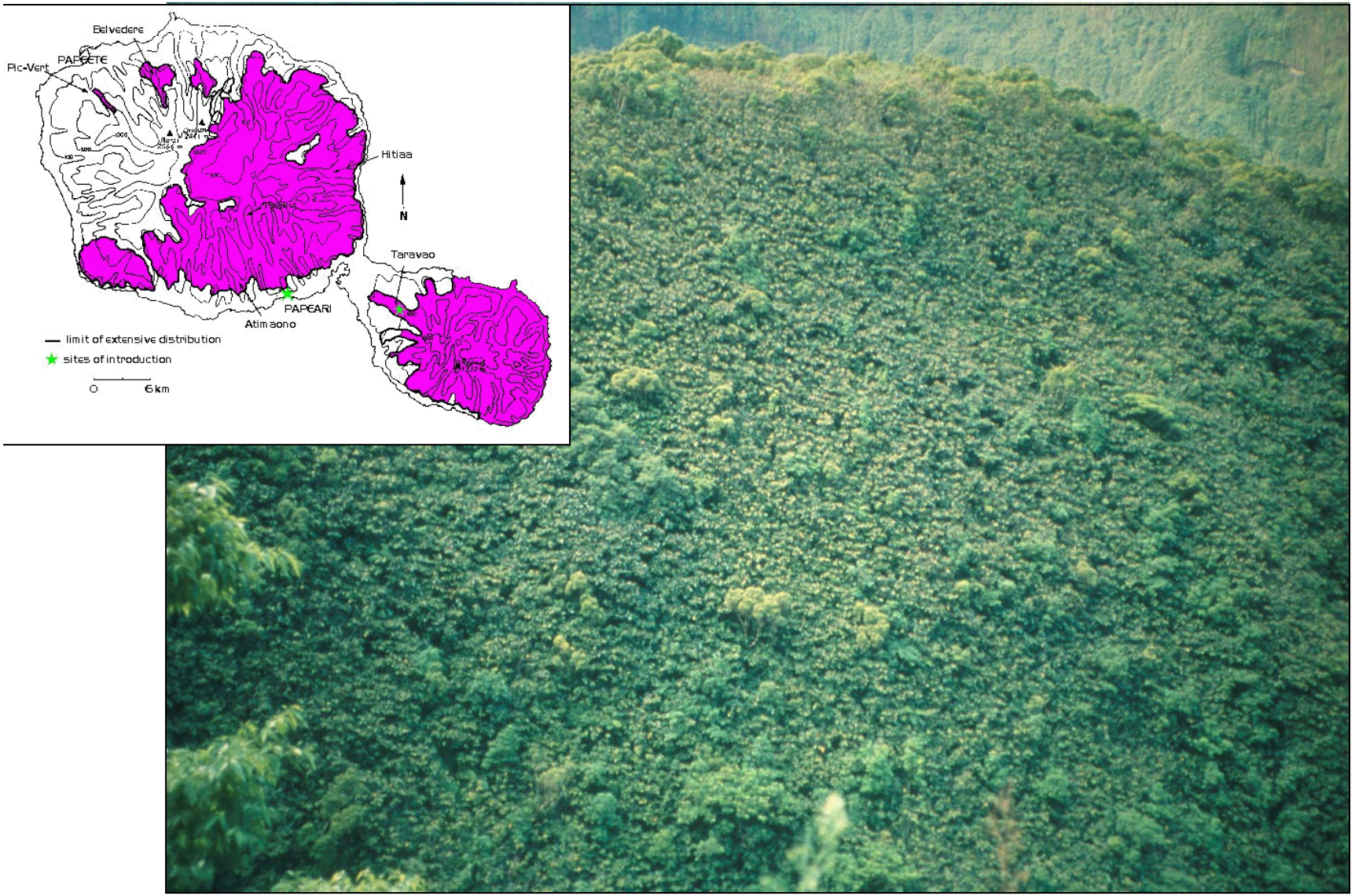
An Analysis of the Risk of Introduction of Additional Strains of the Rust *Puccinia psidii* Winter (`Ohi`a Rust) to Hawai`i

Lloyd Loope, US Geological Survey, Pacific Island Ecosystems Research Center, Makawao, Hawai`i

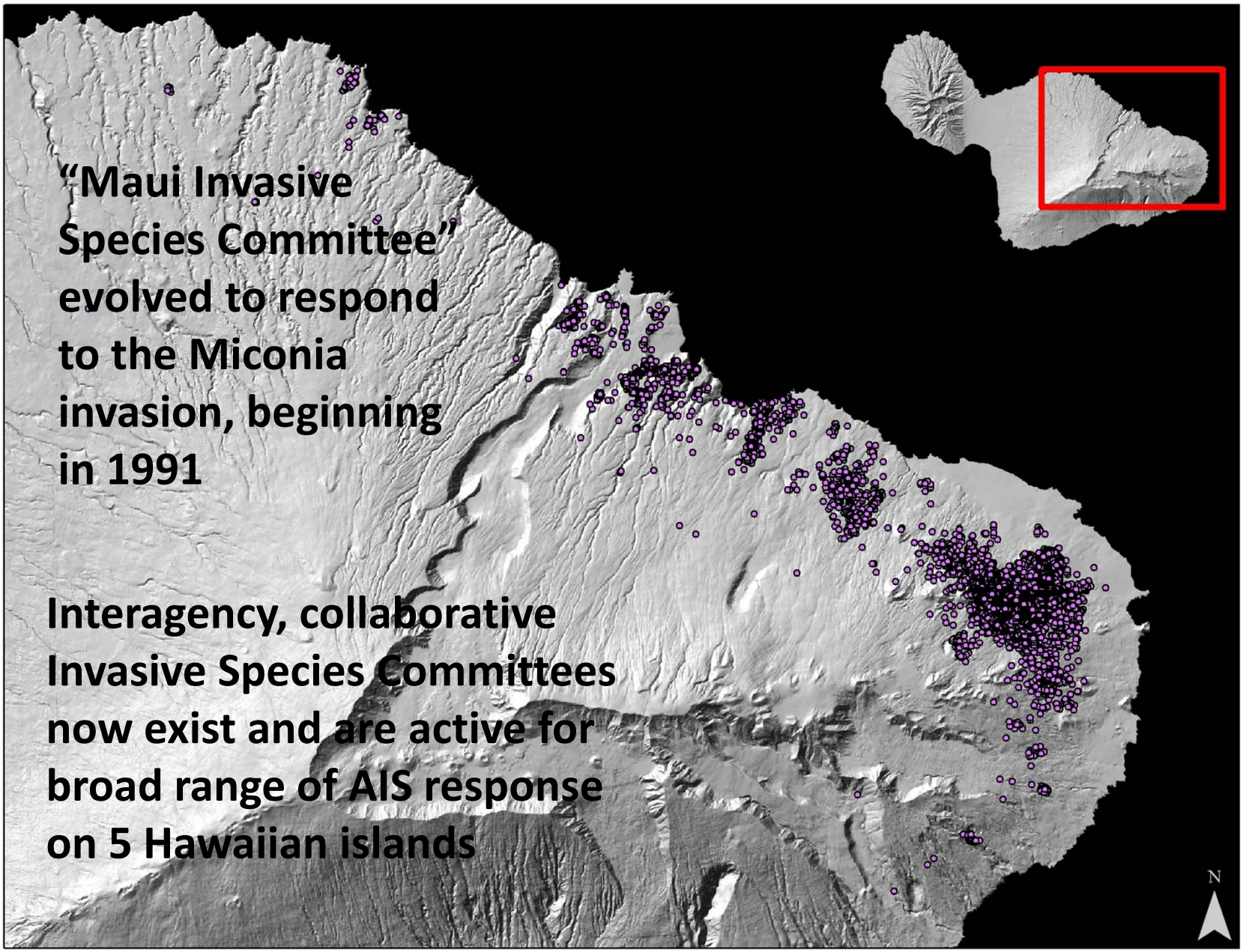
and

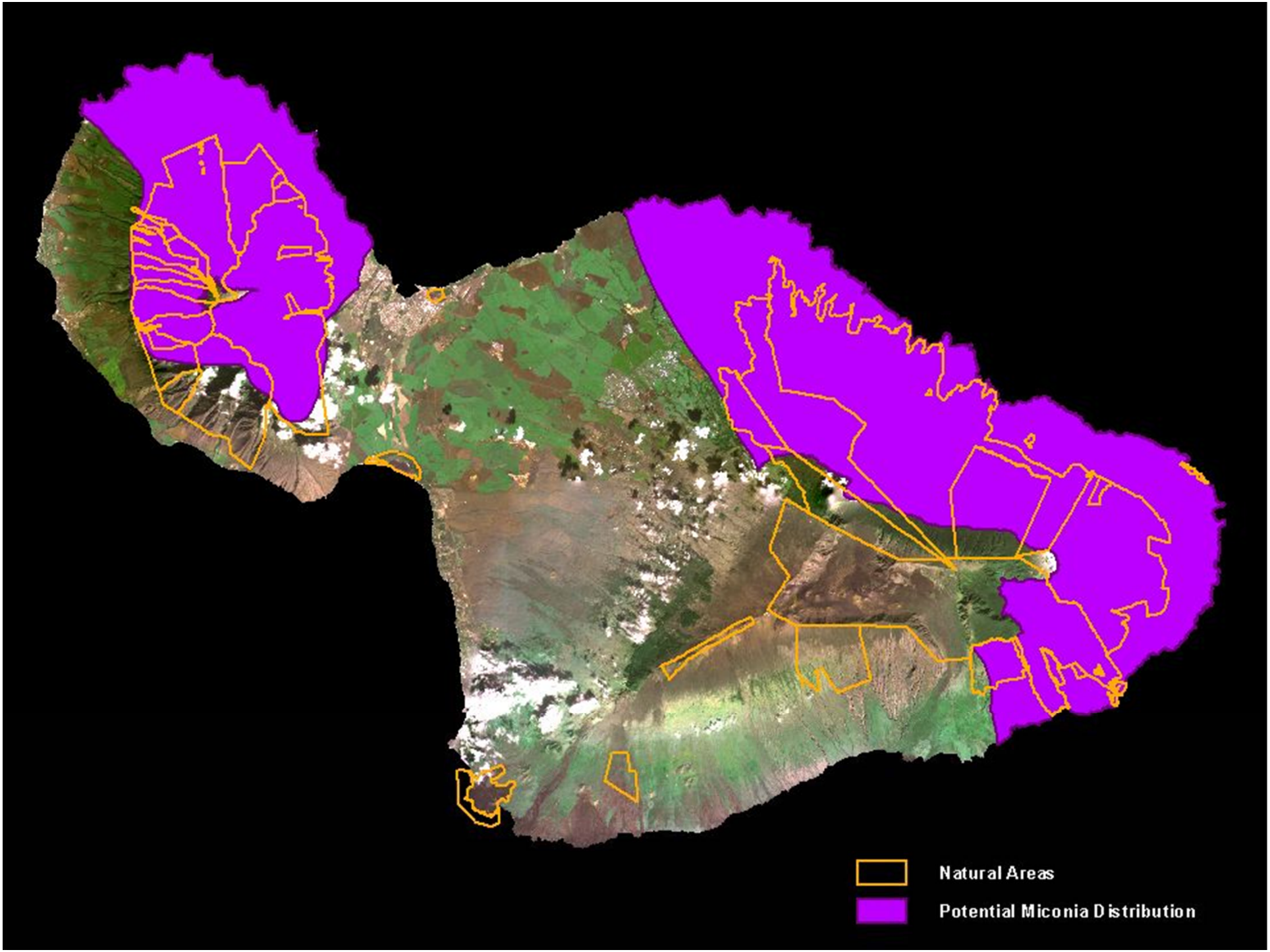
Anne Marie La Rosa, USDA Forest Service, Institute of Pacific Islands Forestry, Hilo, Hawai`i

Miconia invasion in Tahiti



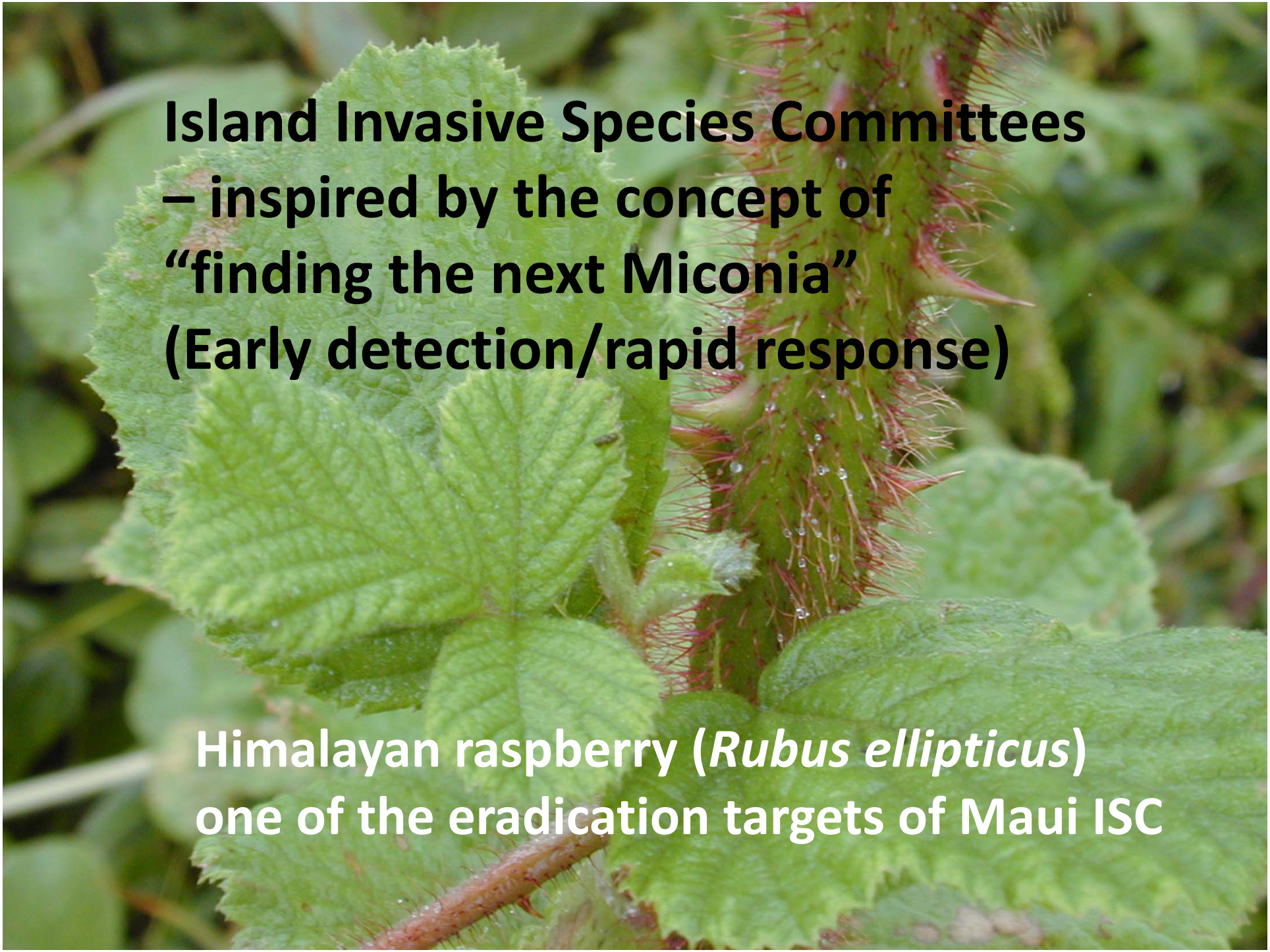
Current Distribution – Miconia on Maui



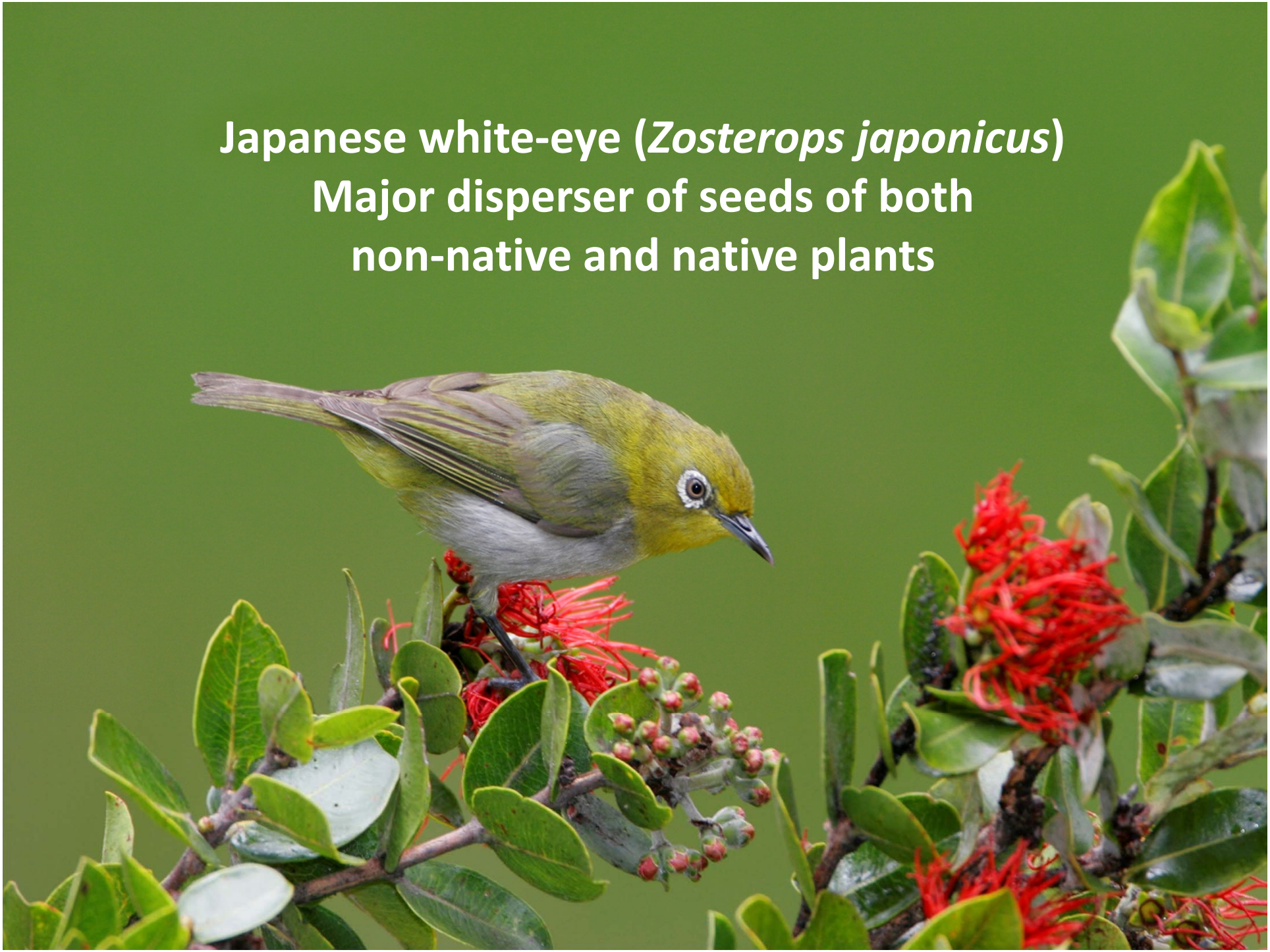

Natural Areas
Potential Miconia Distribution

Aerial herbicide treatment of miconia infestation costs > $1 million annually

Photo: Maui Invasive Species Committee


Island Invasive Species Committees
– inspired by the concept of
“finding the next Miconia”
(Early detection/rapid response)
Himalayan raspberry (*Rubus ellipticus*)
one of the eradication targets of Maui ISC


“Kipahulu Valley has been free of feral pigs since the mid-1980s with ongoing manual/chemical invasive plant control. This near unique situation in the archipelago allows us to explore an important question:
“Namely, is long term success in conservation of Hawaiian rain forests possible just with ungulate removal and manual/chemical weed control?”
From a presentation by A.C. Medeiros


Japanese white-eye (*Zosterops japonicus*)
Major disperser of seeds of both
non-native and native plants


strawberry guava
(*Psidium cattleianum*)


Himalayan ginger (*Hedychium gardnerianum*)
Threatening to displace a rare lobeliad species
Kipahulu Valley, Haleakala National Park


"Koster's curse" (*Clidemia hirta*)
en route to becoming ubiquitous

Auwahi, Maui, dryland forest restoration project (on land owned by Ulupalakua Ranch)

Realize Your Roots

Help restore Maui's native Hawaiian forest

Hana pono? (correct work)

Monthly service trip.

Maui Restoration Group

auwahi@yahoo.com

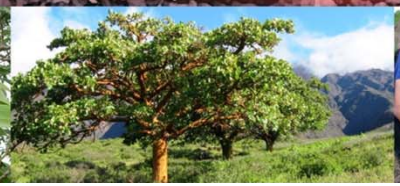
572-4471

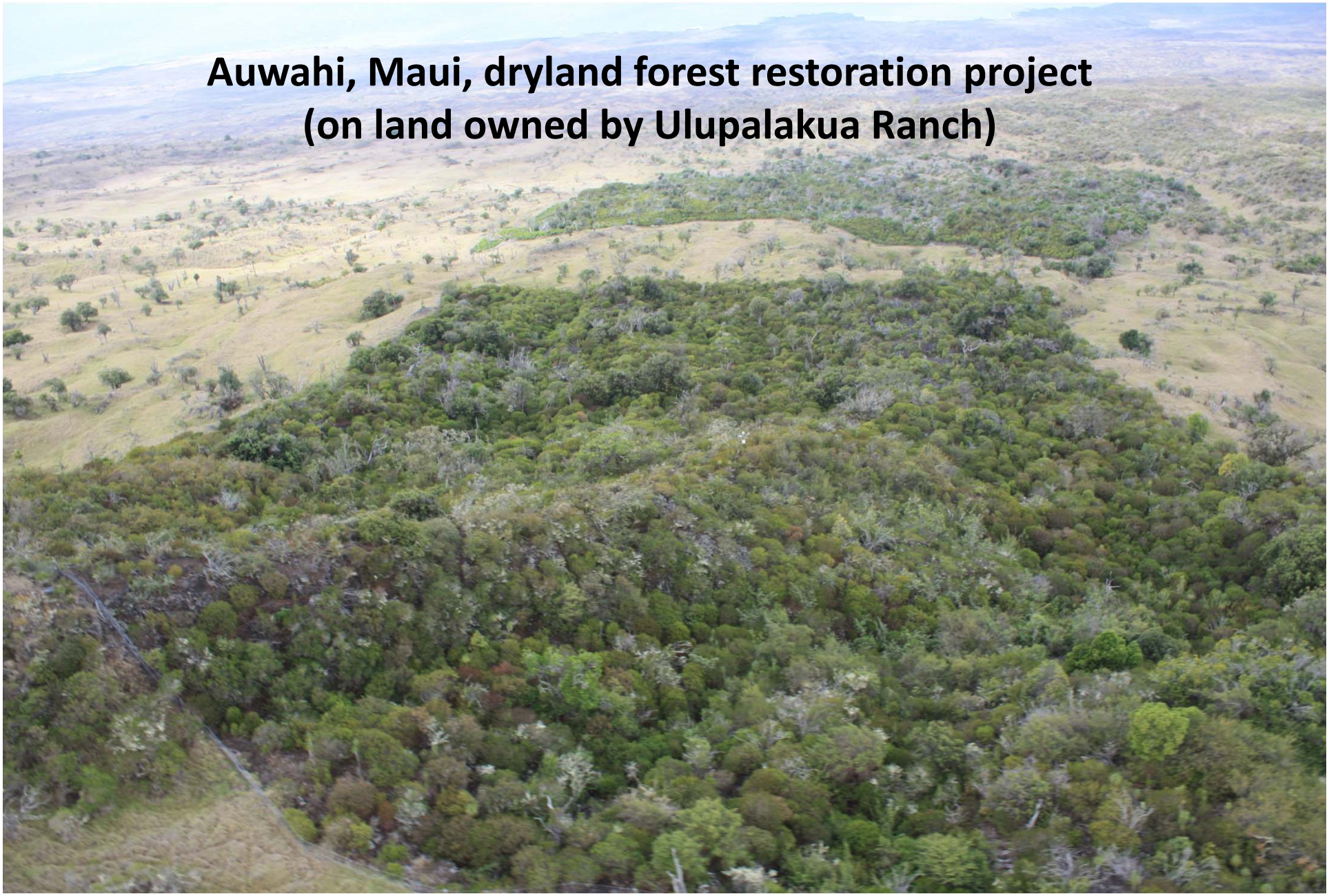
Must be able to hike steep and rough terrain.

By the mid 1990's , the rare native Hawaiian tree *alani* was reduced to only a single wild tree. In May of 2005, we returned eight *keiki* back to the wild in conjunction with Fleming Arboretum.
E komo mai.

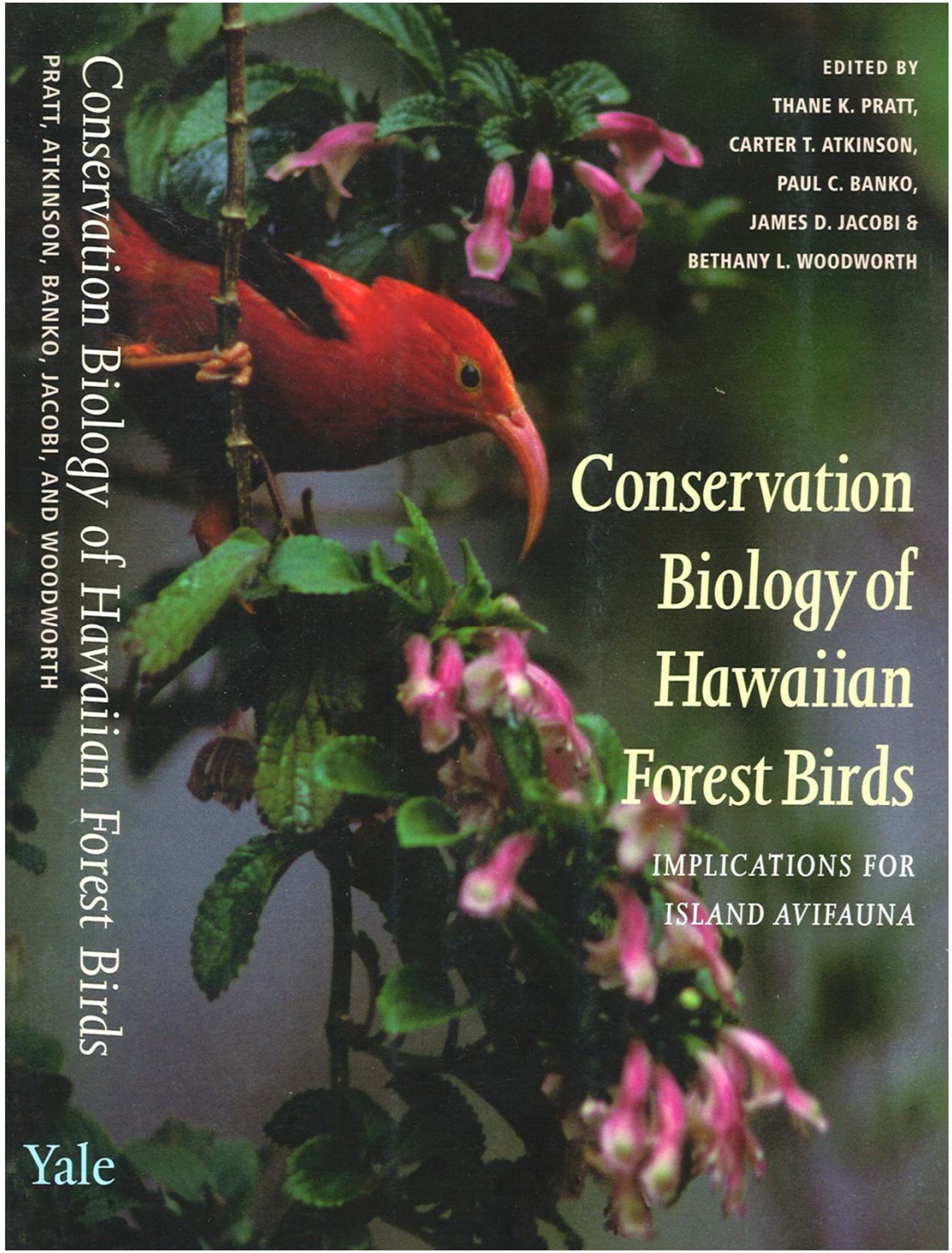







Auwahi, Maui, dryland forest restoration project
(on land owned by Ulupalakua Ranch)

- Adaptive radiation in Hawaiian Honeycreepers
- Specialization
  - Seed & fruit
  - Arthropod
  - Nectar


Conservation Biology of Hawaiian Forest Birds
PRATT, ATKINSON, BANKO, JACOBI, AND WOODWORTH
Yale
EDITED BY
THANE K. PRATT,
CARTER T. ATKINSON,
PAUL C. BANKO,
JAMES D. JACOBI &
BETHANY L. WOODWORTH
Conservation Biology of Hawaiian Forest Birds
IMPLICATIONS FOR ISLAND AVIFAUNA

Threats to Forest Birds

Food Competitors






Predators



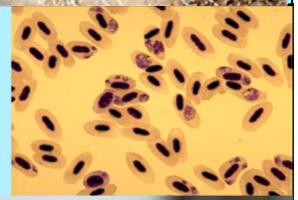
Habitat Degraders

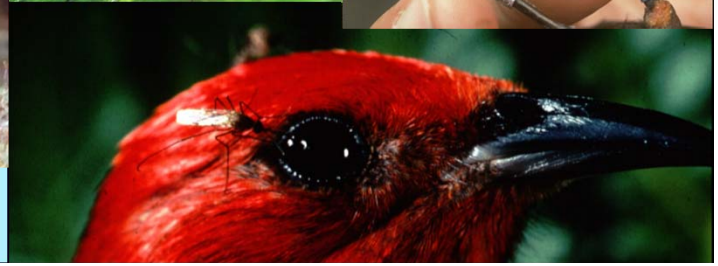




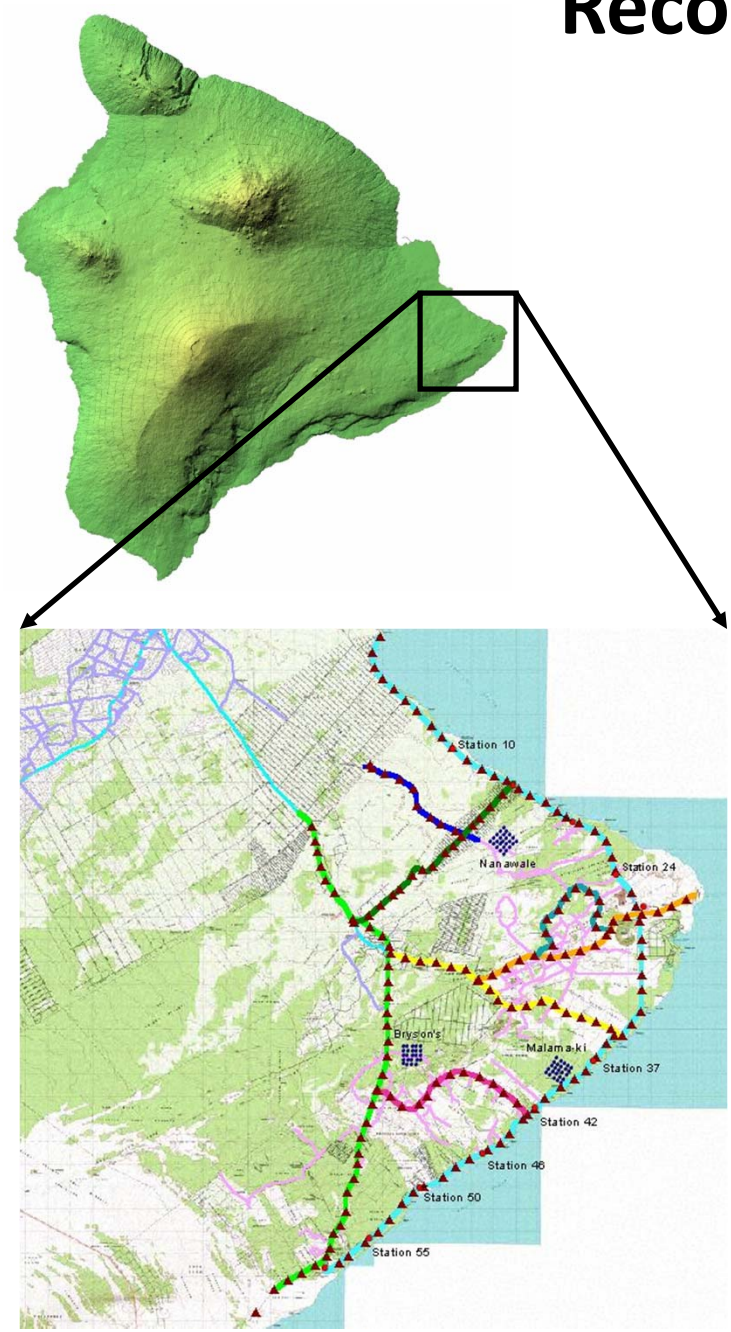


Diseases & Vectors



Recovery of Low Elevation `Amakihi



1994-1995: NO `Amakihi detected at 90 stations

2004: 75 `Amakihi at 37 of 90 stations

(p<0.001)

Spiegel et al., 2006. Bird Conservation International 16:175

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Photo by Keith Swindle
MAHALO