

The Importance of Forests for Fresh Water

Department of Land and Natural Resources
Division of Forestry and Wildlife

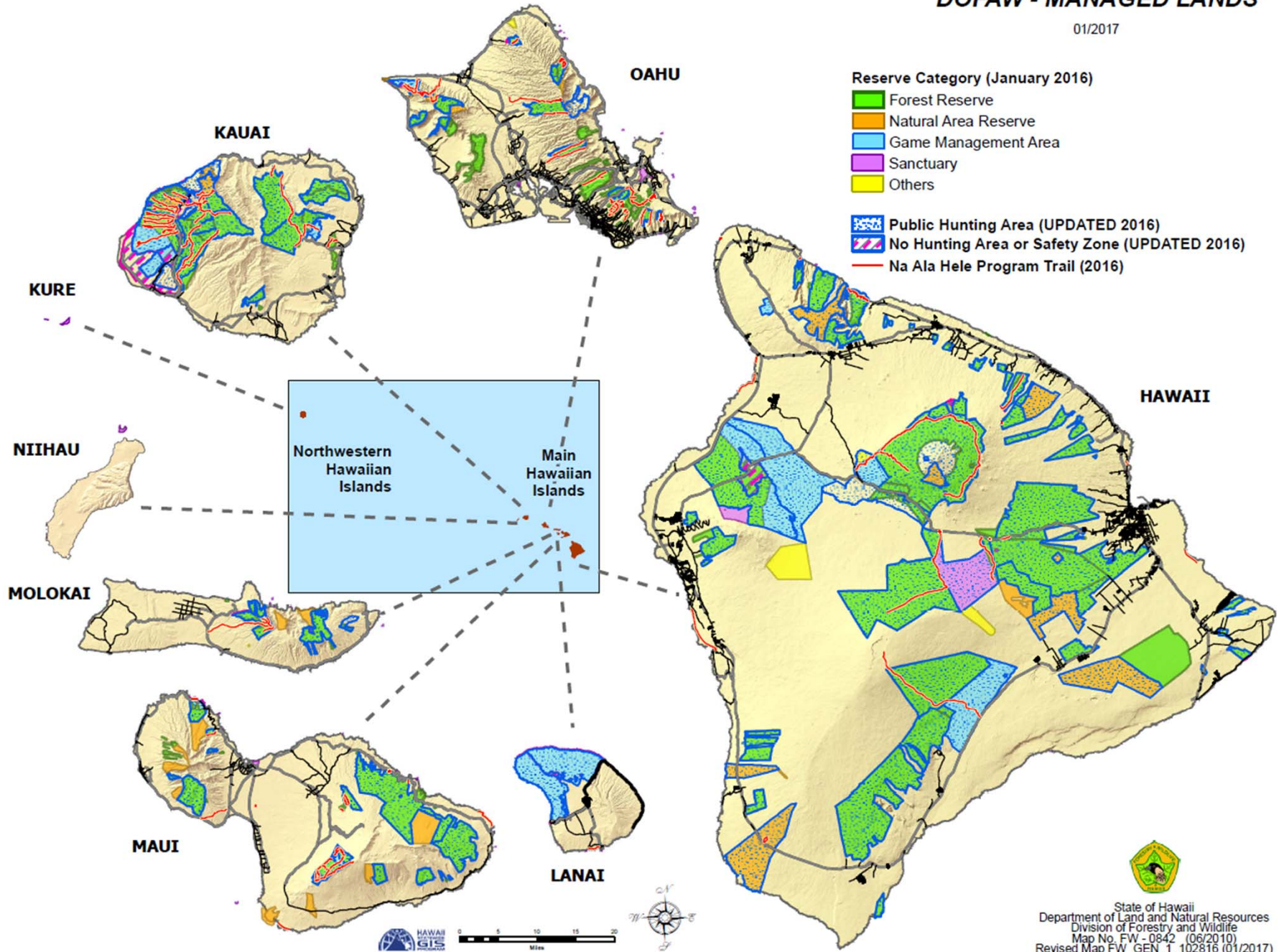


July 26, 2018
2018 4th Joint Government Water Conference
"Protecting Hawaii's Groundwater"

Photo: Christian Kahahawai

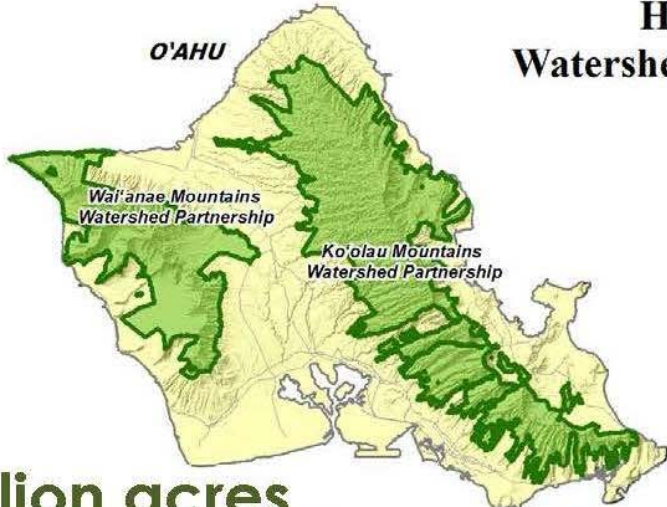
DOFAW - MANAGED LANDS

01/2017

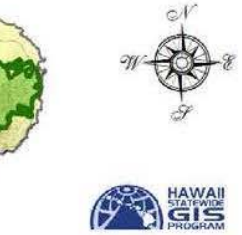
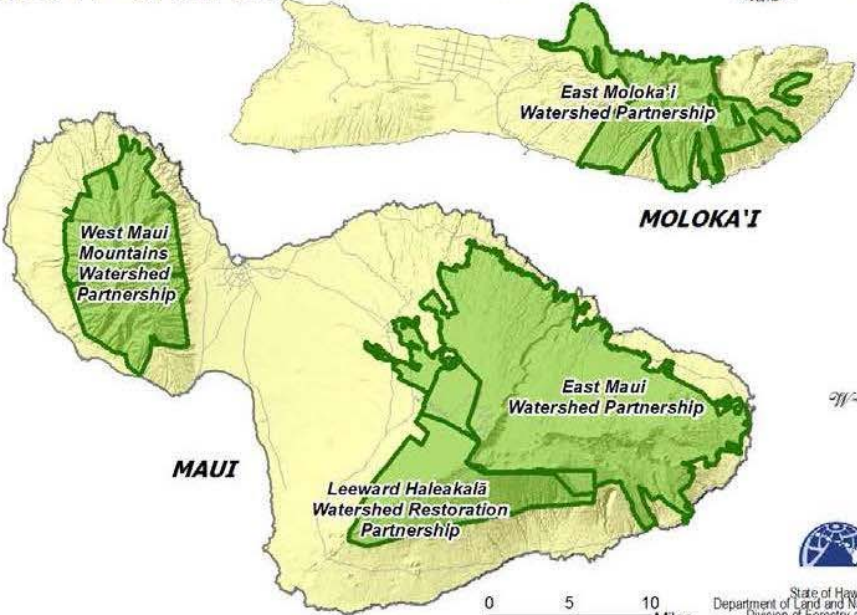
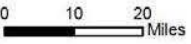
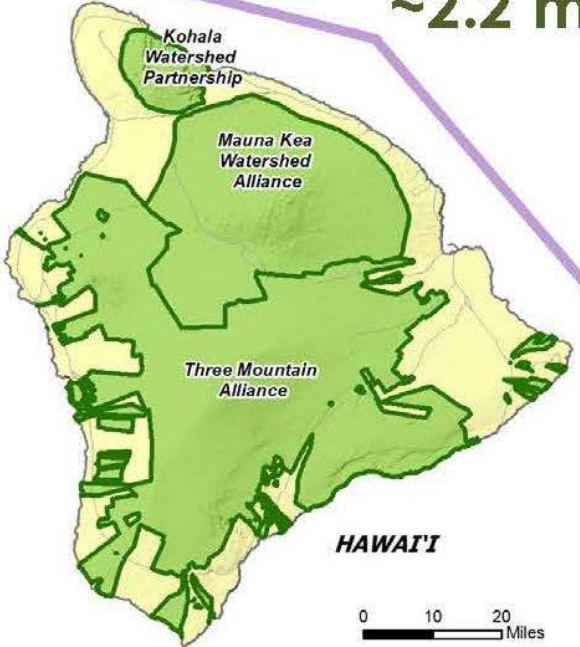


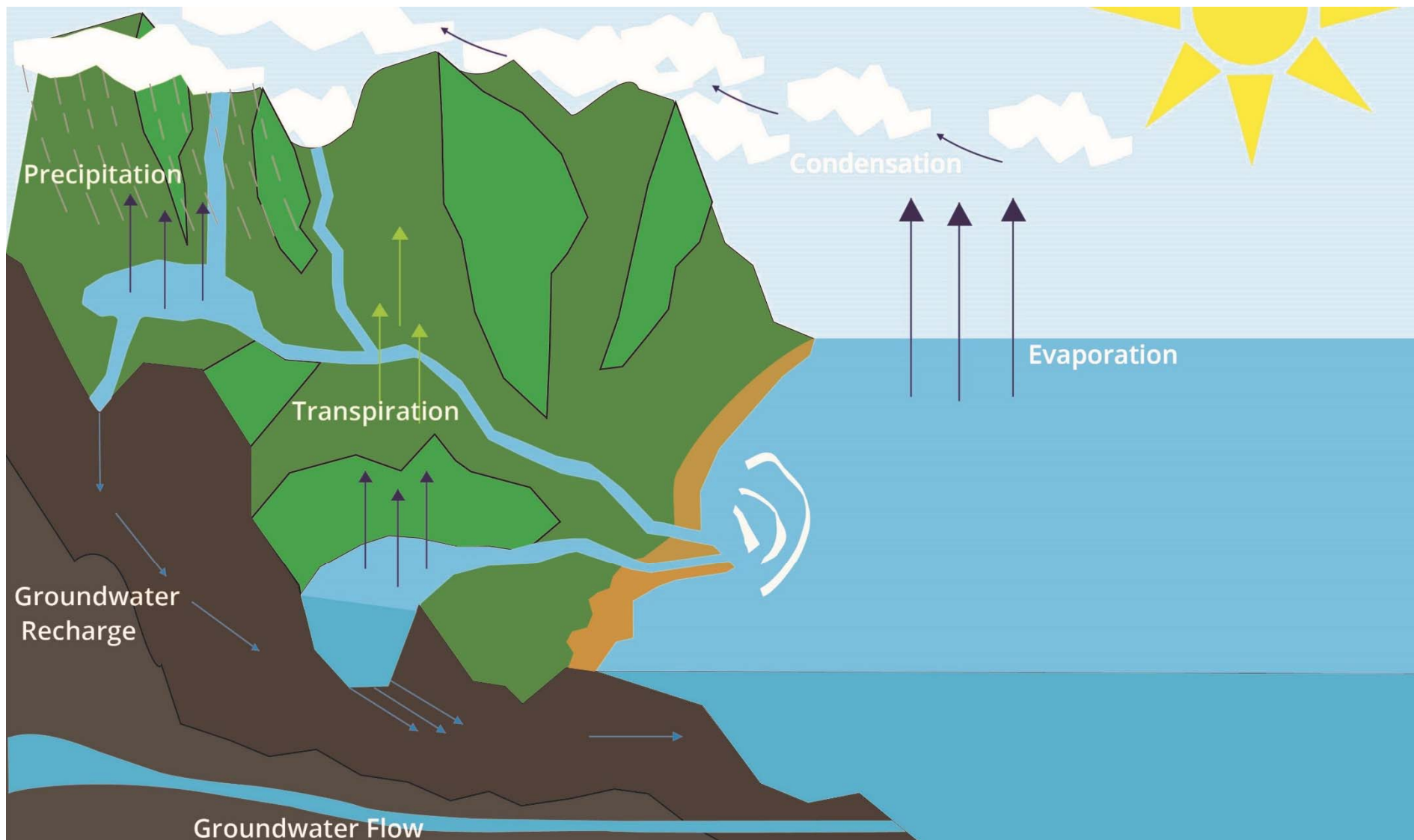
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
Map No. FW-0842 (06/2010)
Revised Map FW_GEN_1_102816 (01/2017)

HAWAII Watershed Partnerships 2015



~2.2 million acres





Source



Pipeline



Faucet



The Source!

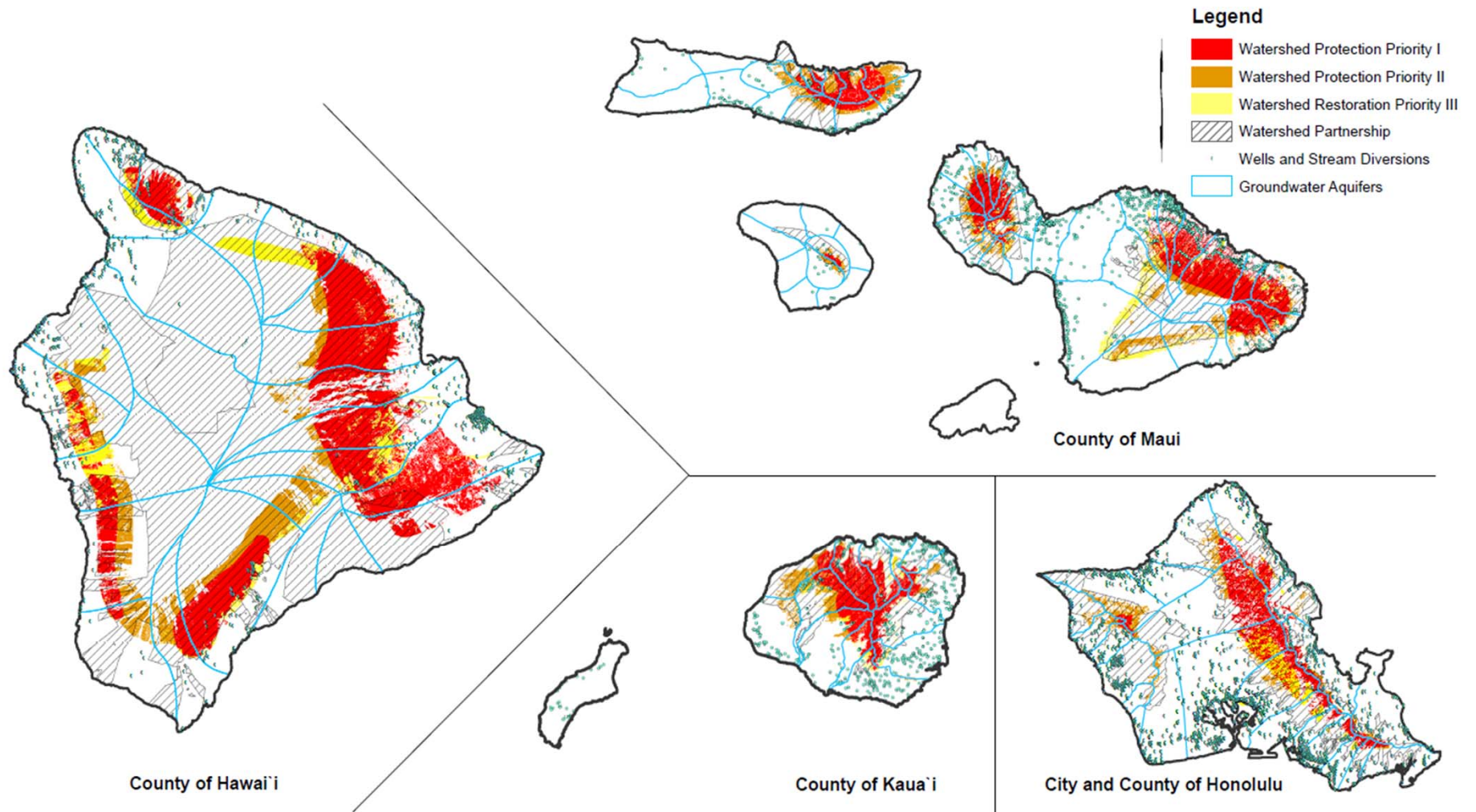








Priority Watershed Areas



See Appendix II for methodology.
Map created November 2011. DLNR (808) 587-4170.



Governor Ige's SUSTAINABLE HAWAI'I INITIATIVE

Strengthening our waters, land and food for Hawaii's communities

double
local food
production



100% increase in local
agricultural production
by 2020

Hawai'i
interagency
biosecurity plan



Stronger invasive species
policy, infrastructure and
capacity by 2027

30 x 30
watershed
protection



30% of priority
watersheds protected by
2030

30 x 30
marine
management



30% of nearshore marine
areas effectively managed
by 2030

100%
renewable
energy



Complete transfer to
clean, renewable energy
by 2045

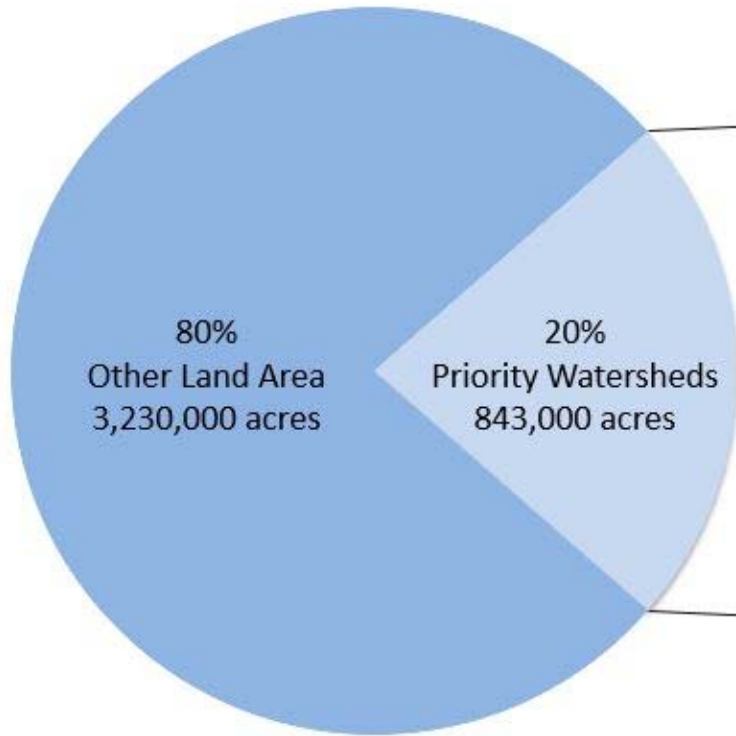


Aloha+ CHALLENGE

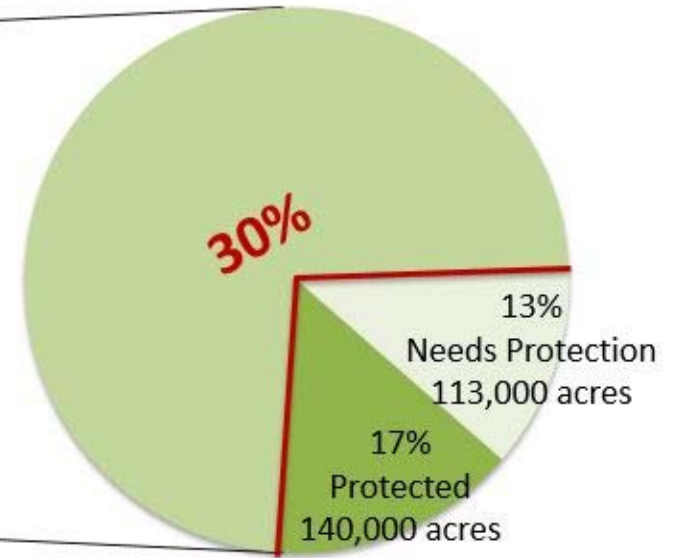


Hawaii's Priority Watersheds Acres Protected

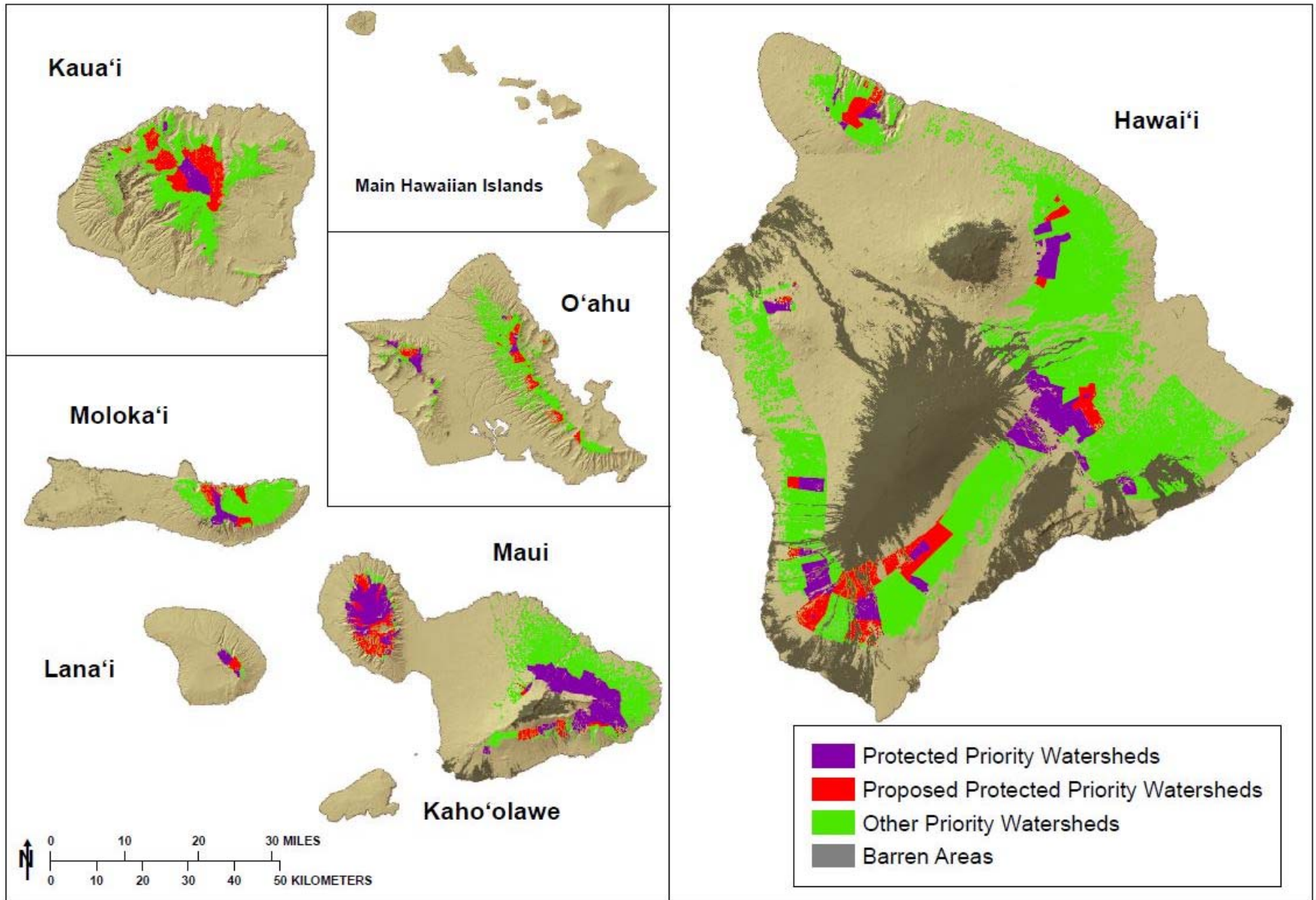
Statewide Acres



Priority Watershed Acres



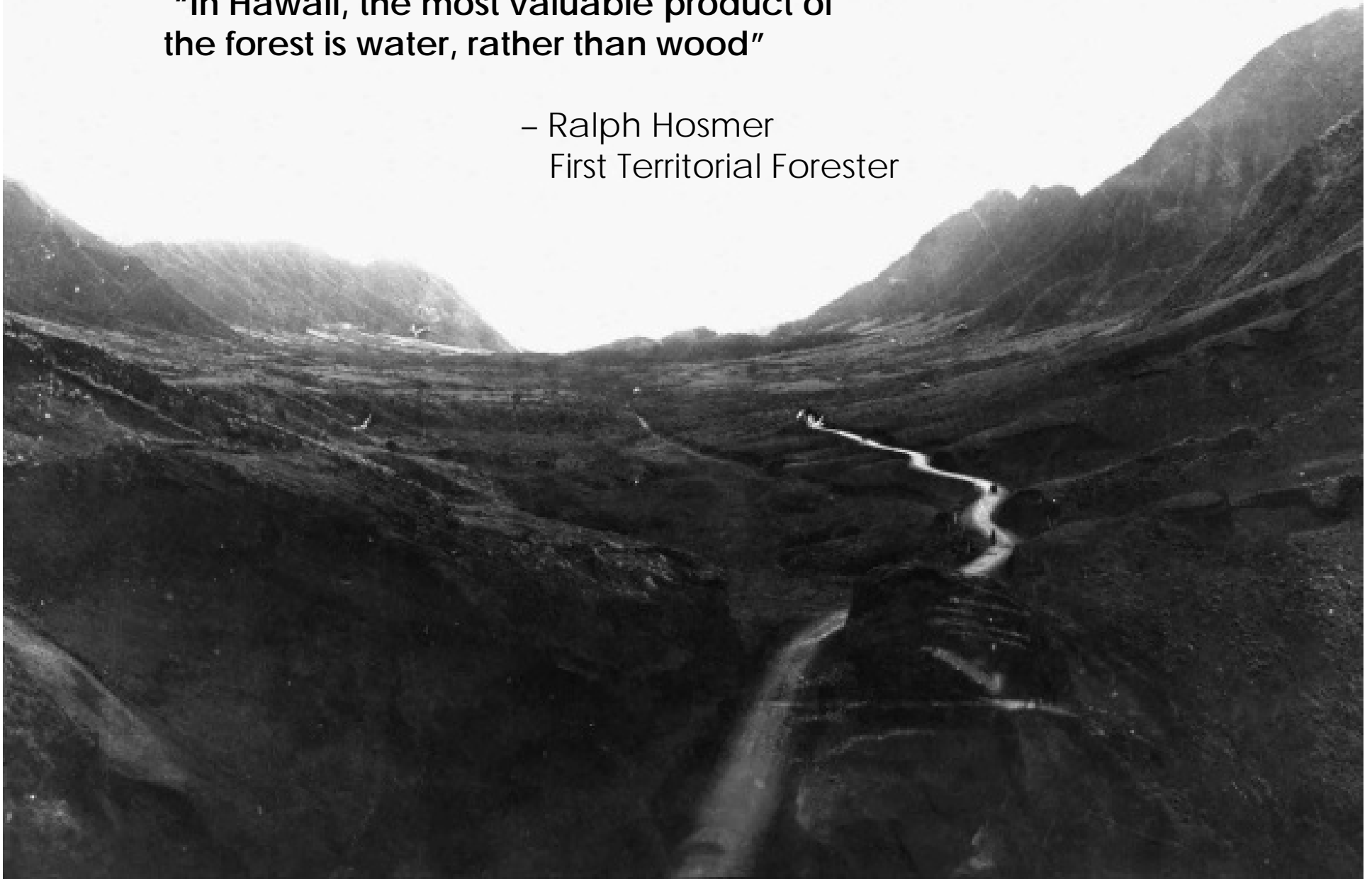
30x30 Watershed Plan

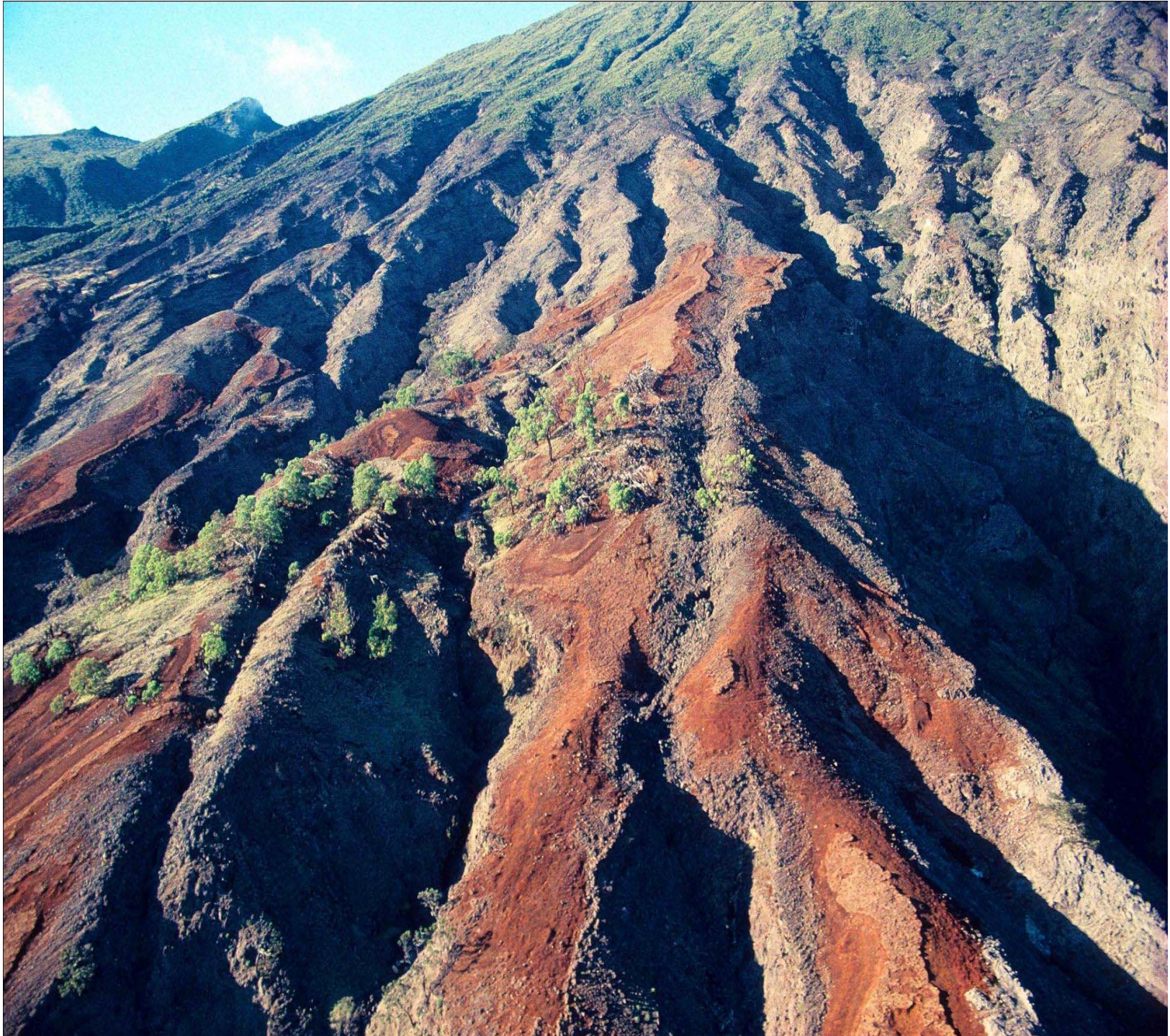


Features approximate and subject to change. DOFAW 587-4170.

**“In Hawaii, the most valuable product of
the forest is water, rather than wood”**

– Ralph Hosmer
First Territorial Forester







Kawela, Moloka'i – April 2009



Kawela, Moloka'i – February 2014





Photo: Ryan Chang



Photo: Tom Giambelluca presentation

Figure 1. Study site and simulated conversion of native to non-native forest over time in the absence of management. Without management actions, complete invasion of existing native forest is projected to occur in 65 years in year 2072.

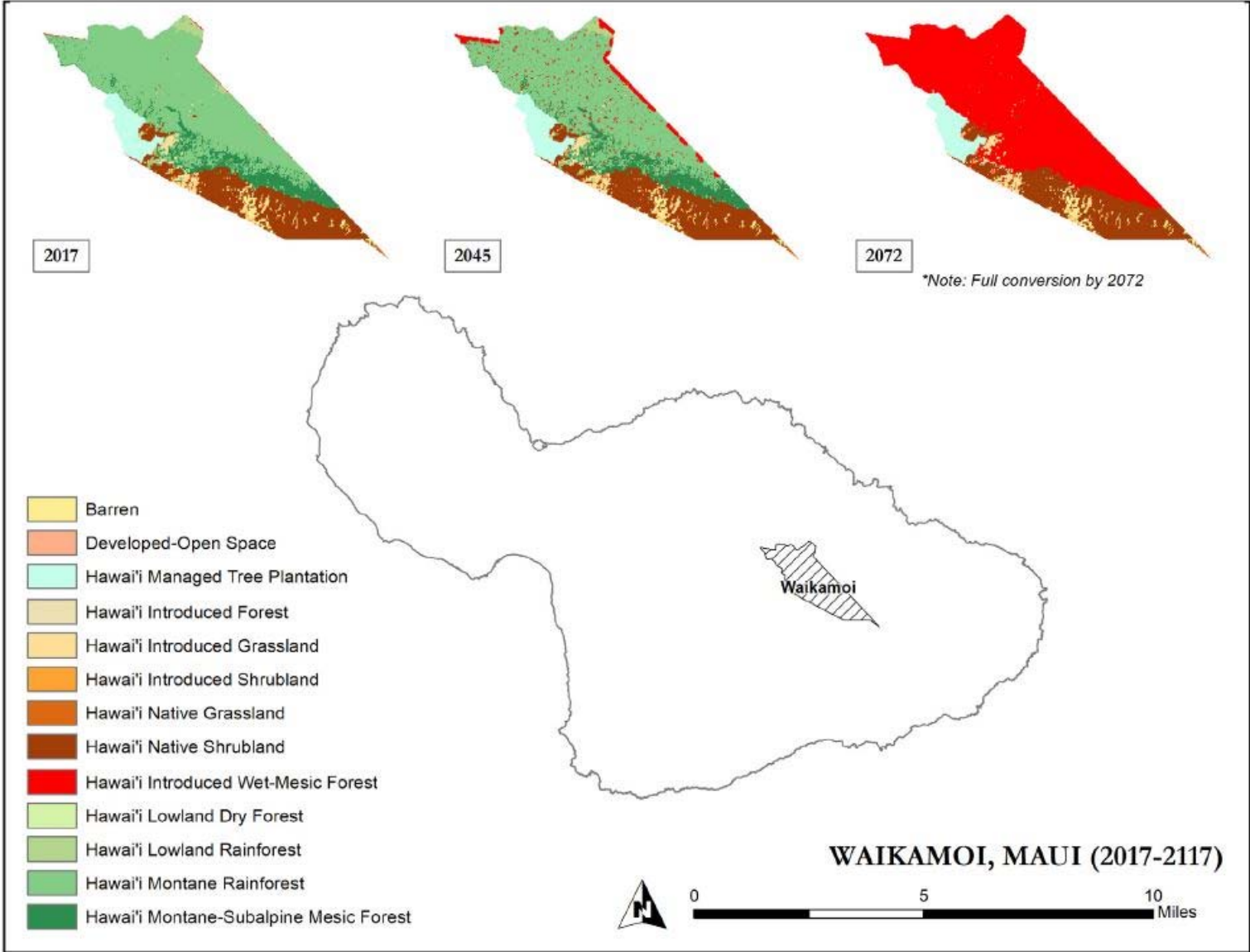
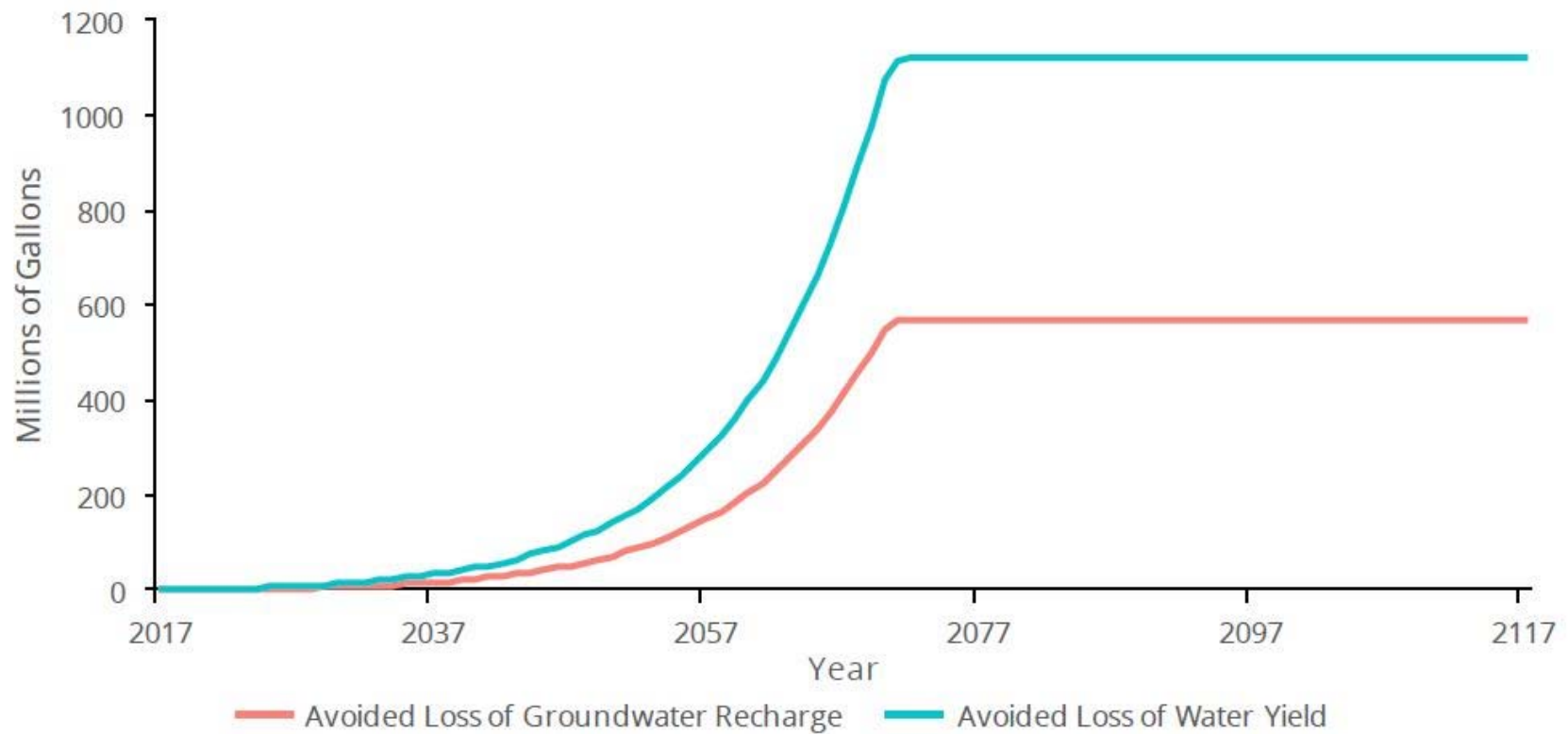
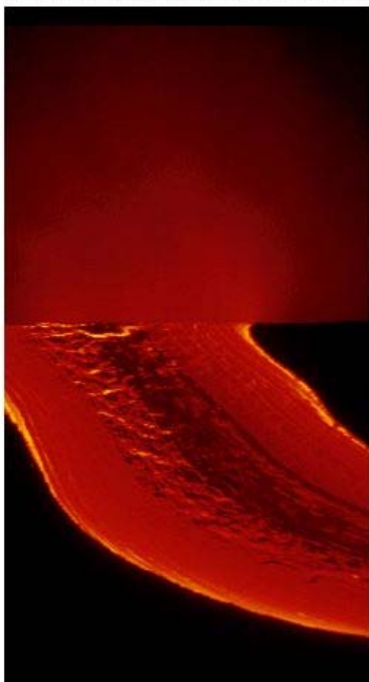
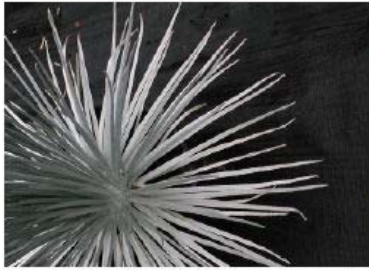


Figure 4. Annual avoided loss of freshwater yield overall (blue) and annual avoided loss of groundwater recharge (red). Groundwater recharge is estimated as 51% of freshwater yield.





Value of Protecting Waikamoi Forest:

- Recharge 32.5 billion gallons of groundwater over next 100 years
- Produce \$36.2 million worth of fresh water
- Prevent 4,300 tons of sediment per year from washing into ocean by 2072



Photo: The Nature Conservancy

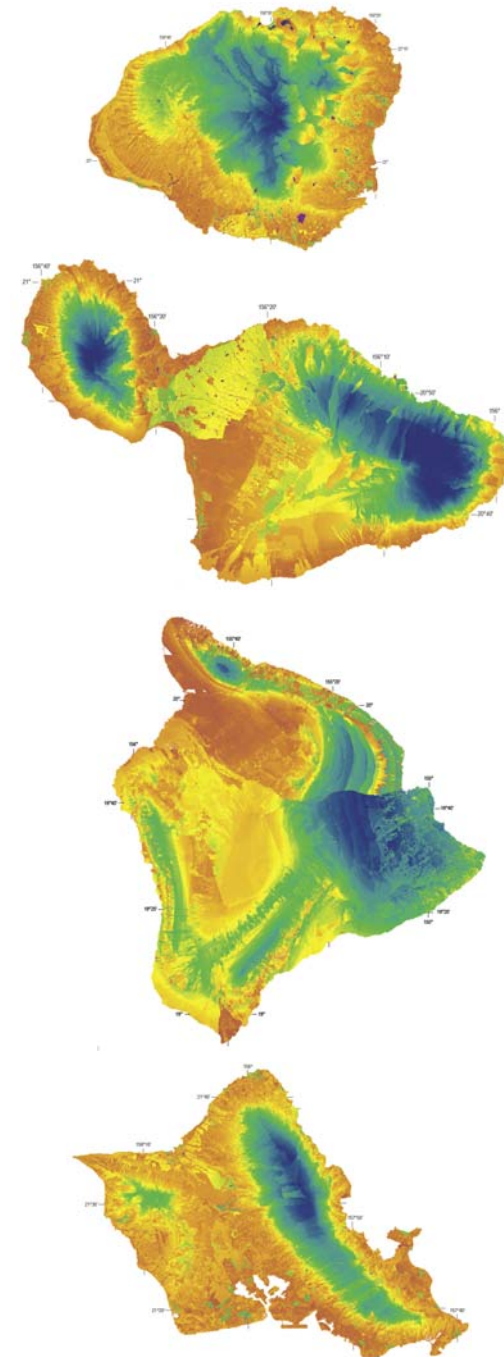
Water Availability and Use Science Program

Volcanic Aquifers of Hawai'i—Hydrogeology, Water Budgets, and Conceptual Models



Scientific Investigations Report 2015–5164

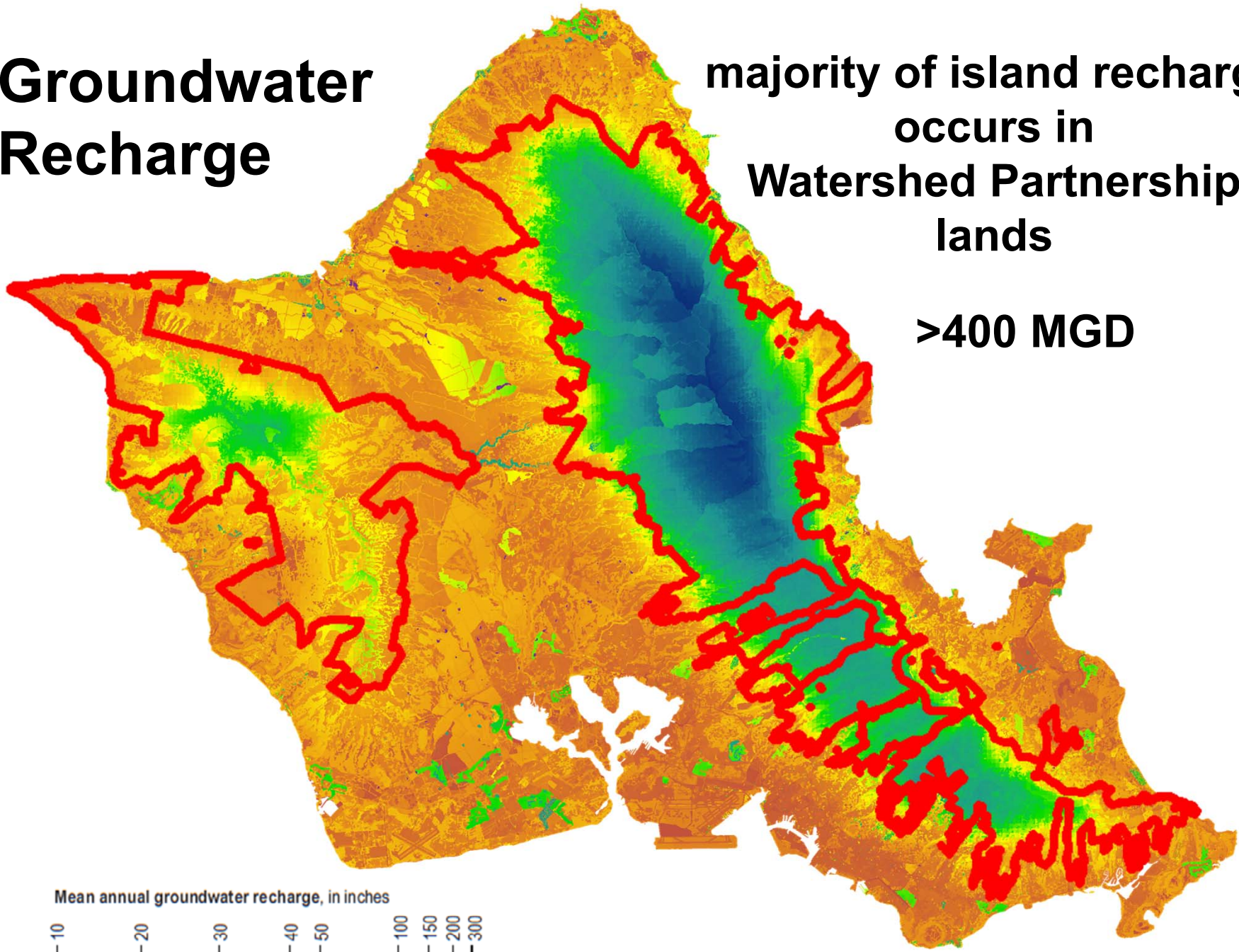
U.S. Department of the Interior
U.S. Geological Survey



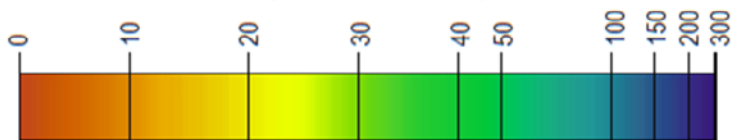
Groundwater Recharge

majority of island recharge occurs in Watershed Partnership lands

>400 MGD



Mean annual groundwater recharge, in inches



Analysis of Groundwater Recharge and Proposed Fencing Projects

Waianae Mountains
Watershed Partnership
40 MGD
7% of Island Recharge

Central Opaepala
10 MGD

Koolau Mountains
Watershed Partnership
373 MGD
63% of Island Recharge

Kaala 1 MGD

Waiawa 11 MGD

Moanalua 10 MGD

Konahuanui 3 MGD

- 30 x 30 Proposed Fences
- Watershed Partnership Boundary (2015)

Mean annual groundwater recharge, in inches.

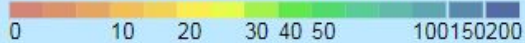




Photo: Nate Yuen

Mahalo

Katie Ersbak
DOFAW, Watershed Planner
Katie.C.Ersbak@Hawaii.gov

Hawai'i Association of Watershed Partnerships



HAWAI'I ASSOCIATION OF WATERSHED PARTNERSHIPS

HAWP is comprised of 10 island-based Watershed Partnerships that work collaboratively with more than 74 public and private partners on five islands to protect over 2.2 million acres of forested mauka watershed lands important for water recharge and home to a vast number of biologically diverse native Hawaiian flora and fauna.

HAWP's mission is to increase the effective management and protection of mauka (upper elevation) watershed areas by raising the capacity of Watershed Partnerships, facilitating sharing of watershed management expertise, building public support for protecting watershed values, and developing sustainable funding sources.

HAWP is led by four officers (Chair, Vice Chair, Secretary and Treasurer), and a Board of Directors who represent the ten watershed partnerships.

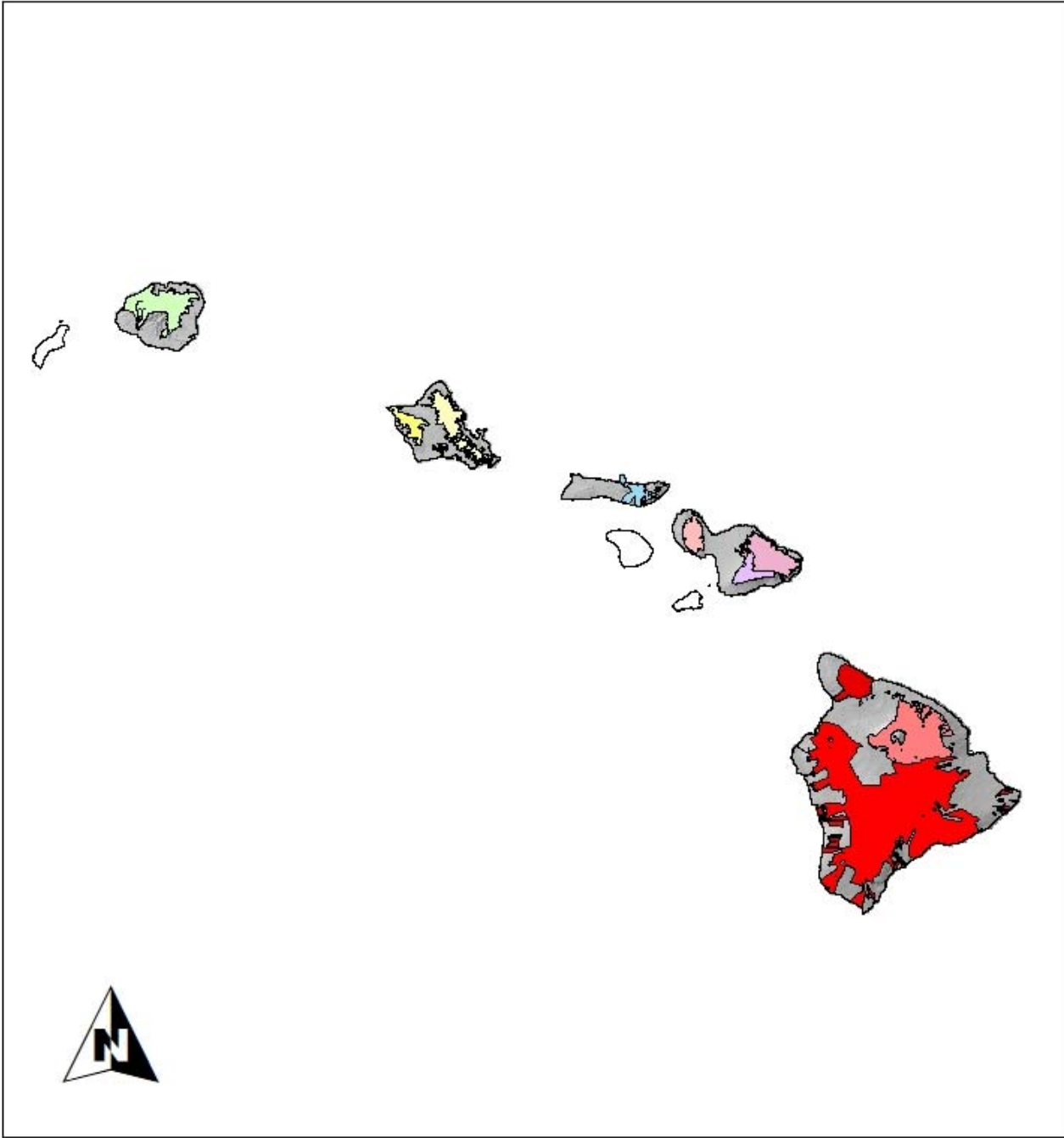
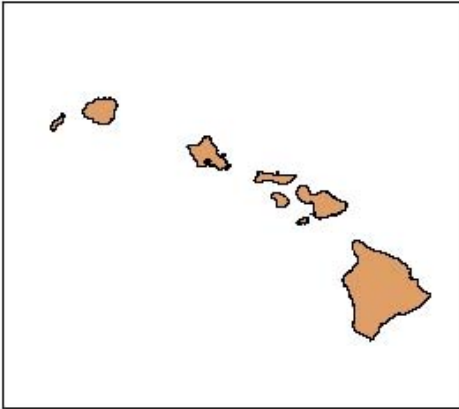
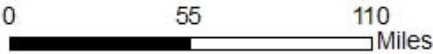


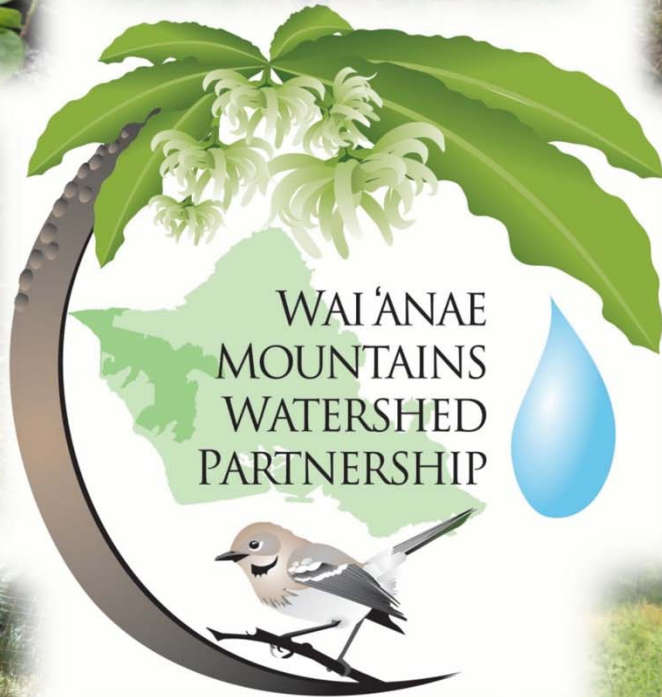
Hawai'i's Watershed Partnerships



Legend

- UnitName**
- Kauai Watershed Alliance
 - Koolau Mountains Watershed Partnership
 - Waianae Mountains Watershed Partnership
 - East Molokai Watershed Partnership
 - West Maui Mountains Watershed Partnership
 - Leeward Haleakala Watershed Restoration Partnership
 - East Maui Watershed Partnership
 - Mauna Kea Watershed Alliance
 - Kohala Watershed Partnership
 - Three Mountain Alliance





What is WMWP?

WMWP is a voluntary partnership between major landowners and stakeholders in the Waianae Mountains. The partnership was formed on April 22, 2010 with 7 original partners signing a Memorandum of Understanding.

Partners:

- Department of Land and Natural Resources
- Gill Ewa Lands
- Honolulu Board of Water Supply
- Ka'ala Farms Inc.
- MA'O Organic Farm
- Oahu Army Natural Resources Program
- Navy Region Hawaii

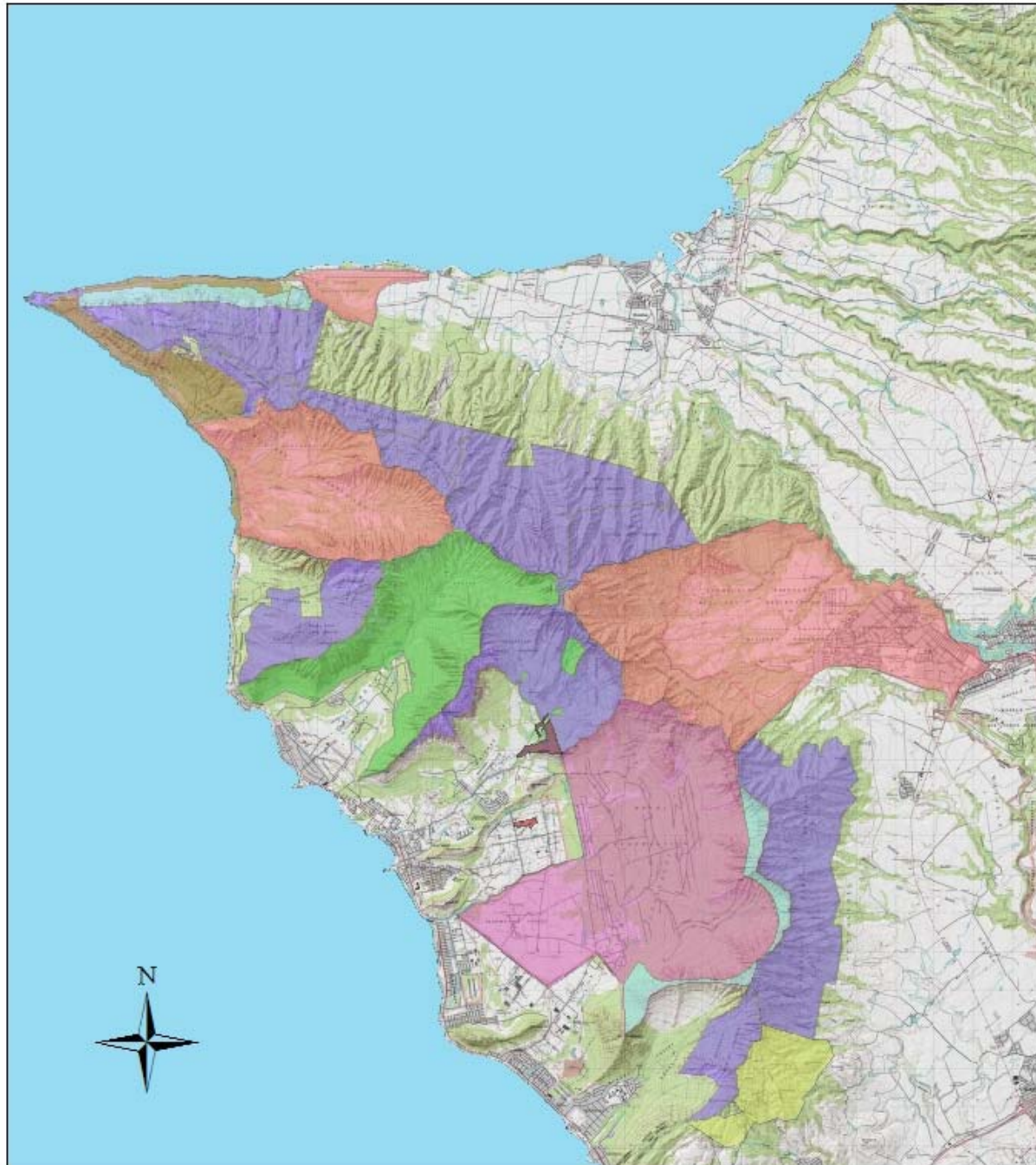
Associate Partners:

- Malama Learning Center
- Oahu Invasive Species Committee
- Oahu Plant Extinction Prevention Program
- US Fish and Wildlife

46,518 acres of mauka conservation land in the Waianae Mountains



WMWP Landowners

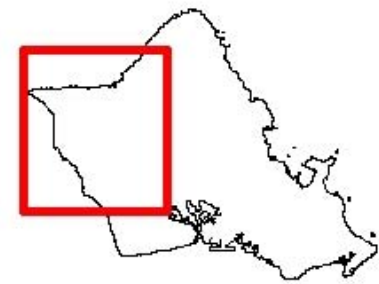


Legend

WMWP Landowners

- DLNR F&W
- DLNR Land Division
- DLNR State Parks
- Gill Olson
- HBWS
- Kaala Farms
- NAVY
- USAG-HI
- WCRC (Ma'o Farms)

0 1 2 3 4 Miles



What is WMWP?

“The overall goal of the Waianae Mountains Watershed Partnership (WMWP) is to cooperatively develop and implement management strategies for the Waianae Mountains, mauka to makai.

The partnership will bring people together to responsibly manage watershed areas, native species and their habitats and historical, cultural and socio-economic resources for all who benefit from the continued health of all of the Waianae Mountains ahupua‘a.”



How are we funded?

- WMWP is a project under the University of Hawaii on behalf of the College of Natural Sciences for the Pacific Cooperative Studies Unit
- 100% Grant funded
- Funding sources:
 - Division of Forestry and Wildlife – Oahu Branch
 - Honolulu Board of Water Supply
 - Water Security Advisory Group Grant (Commission of Water Resource Management)
 - Wildland Urban Interface Grant (Council of Western State Foresters)
 - Watershed Partnership Program
 - Navy Region Hawaii
 - US Fish and Wildlife Service
 - Gill Ewa Lands, LLC.

Healthy Watersheds

Native vs. Non-native Invasive Species

HEALTHY WATERSHEDS ACT AS A SPONGE, COLLECTING WATER THROUGH DENSE, DIVERSE LAYERS OF NATIVE VEGETATION

- **Native** - Organisms brought to a location without the help of man, such as by wind, water or wings.
 - **Endemic** – Organisms that are native and can be found ONLY in that location.
 - **Indigenous** - Organisms that are native but can be found elsewhere.
- **Non-native (alien)** – organisms introduced either intentionally or unintentionally by man
 - **Invasive** - a species that, when introduced into an ecosystem aggressively establishes itself at the expense of native plants or animals.



Healthy vs Unhealthy Watersheds

- **Healthy**

- Dense, diverse native forests
 - Canopy, sub-canopy, shrubs, understory, ground cover
- Water quality
- Sustainable filtration and groundwater recharge
- Best management practices, collaboration

- **Unhealthy**

- Invasive alien species (monotypic stands/populations lacking the dense layers described above)
- Poor water quality
- Runoff/Erosion/Sedimentation
- Poor resource management/heavy human impact



Threats to Our Watersheds

- Invasive, non-native plant species
- Feral ungulates
- Human impacts
- Drought
- **WILDFIRE!!!**




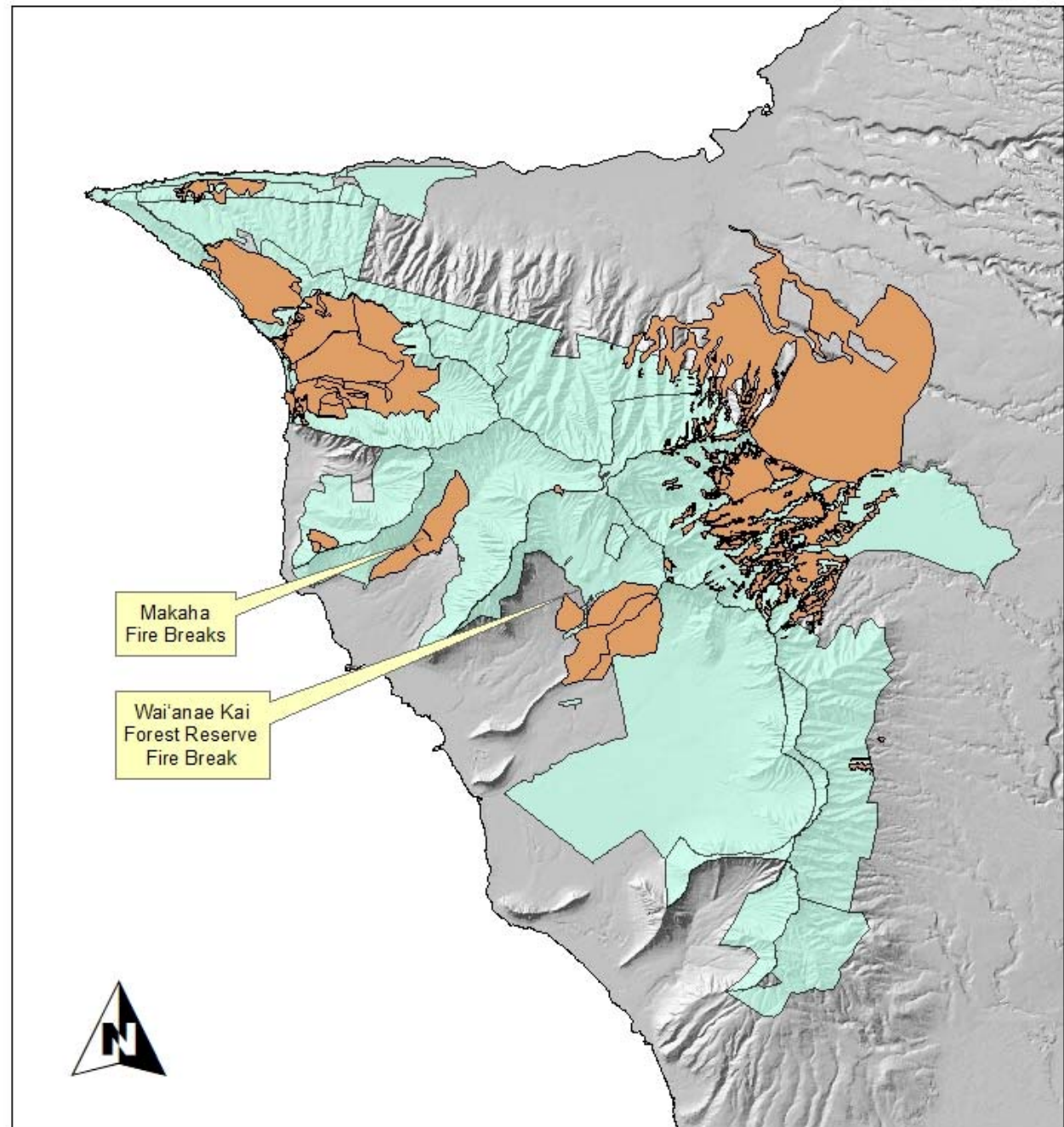
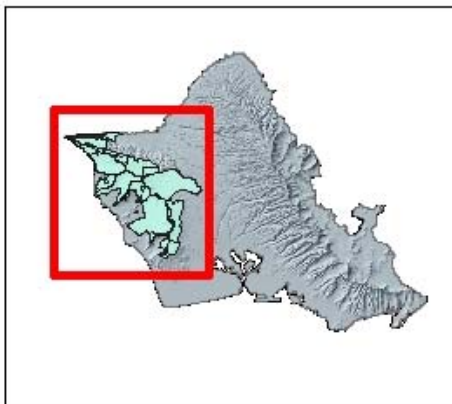
Fire Management Areas

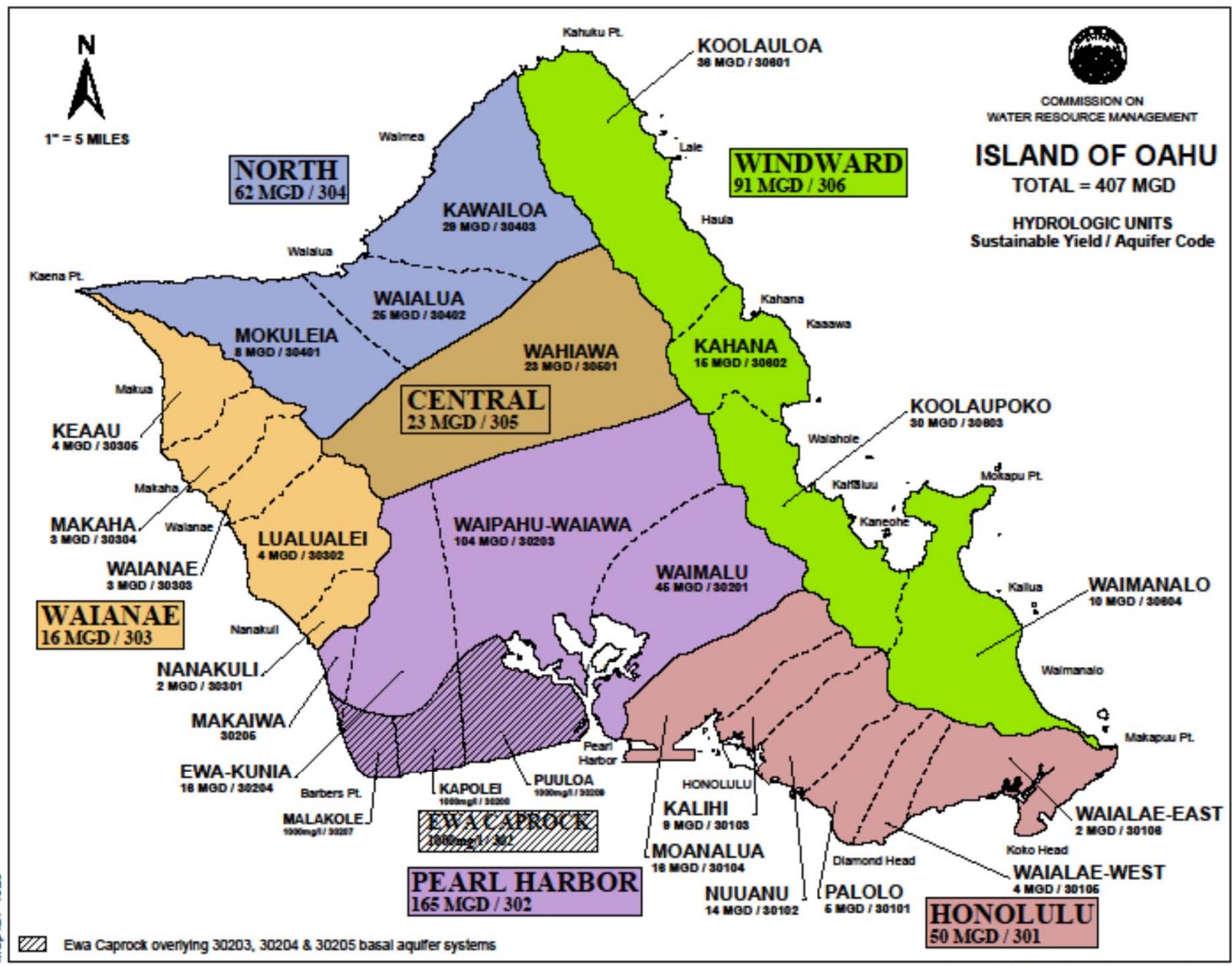


Legend

-  WMWP
-  Fire History

0 2.5 5 Miles

A horizontal scale bar with markings at 0, 2.5, and 5 miles.



1" = 5 MILES



COMMISSION ON WATER RESOURCE MANAGEMENT

ISLAND OF OAHU
TOTAL = 407 MGD

HYDROLOGIC UNITS
Sustainable Yield / Aquifer Code

NORTH
62 MGD / 304

WINDWARD
91 MGD / 306

CENTRAL
23 MGD / 305

WAIANAË
16 MGD / 303

EWA CAPROCK
1000mg/l / 307

PEARL HARBOR
165 MGD / 302

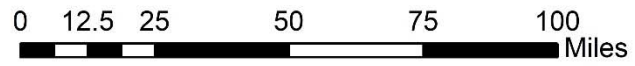
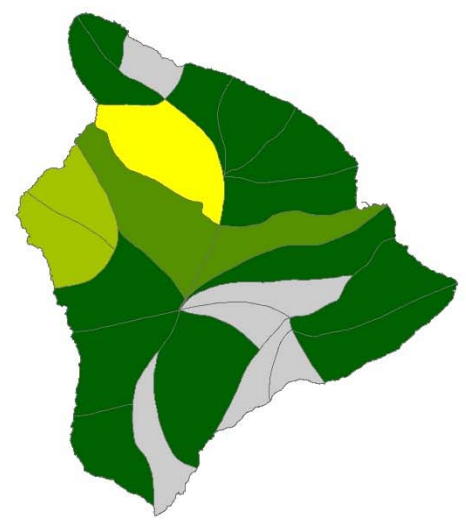
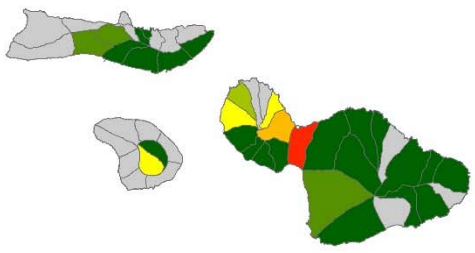
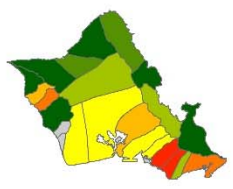
HONOLULU
50 MGD / 301

▨ Ewa Caprock overlying 30203, 30204 & 30205 basal aquifer systems









Map ID: 1026

08/28/2008

Map Projection: Universal Transverse Mercator



2016 Reported Ground Water Use vs Sustainable Yield

-  No reports of ground water use to CWRM
-  0-10%
-  11-30%
-  31-49%
-  50-79%
-  80-89%
-  90-99%
-  100% +



Our Kuleana

- Ecosystem Protection Fencing
- Fire Pre-suppression
- Invasive Weed Control
- Reforestation Program
 - School Nursery and Service Learning Trips
 - Volunteer Program
 - Seed collection
- Feral Goat Aerial Survey and Control
- Aerial Imagery Analysis
- Management Plan Implementation






WMWP Project Areas

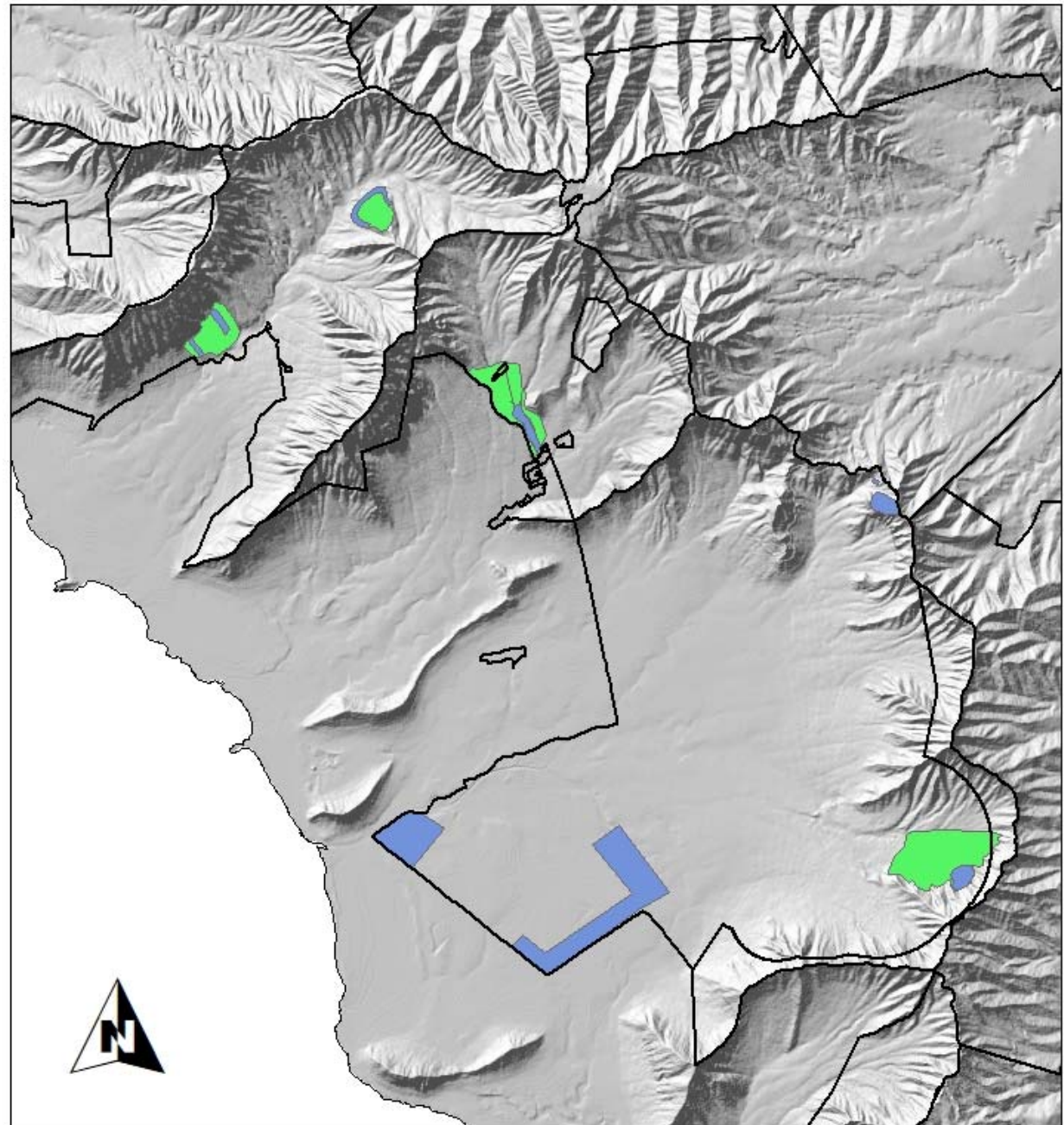
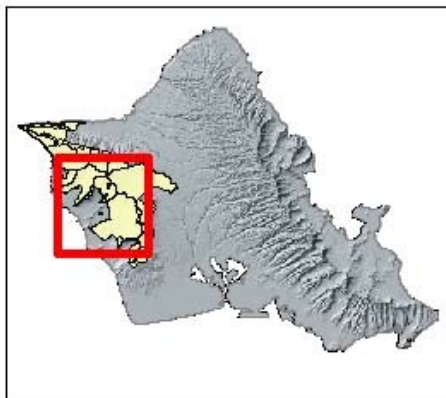


Legend

Projects

-  Current Management
-  Future Management
-  WMWP Landowners

0 1.25 2.5
Miles





8/29/2018



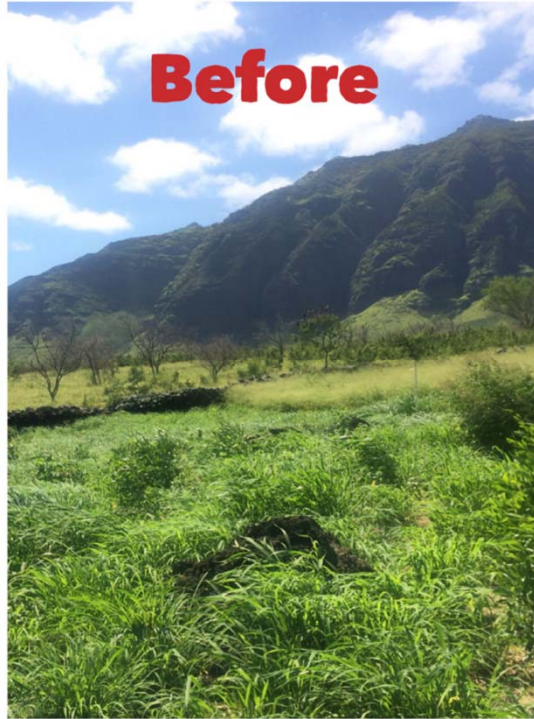
44



Mililani Middle School Nursery and WMWP Base Yard Nursery



















8/29/2018



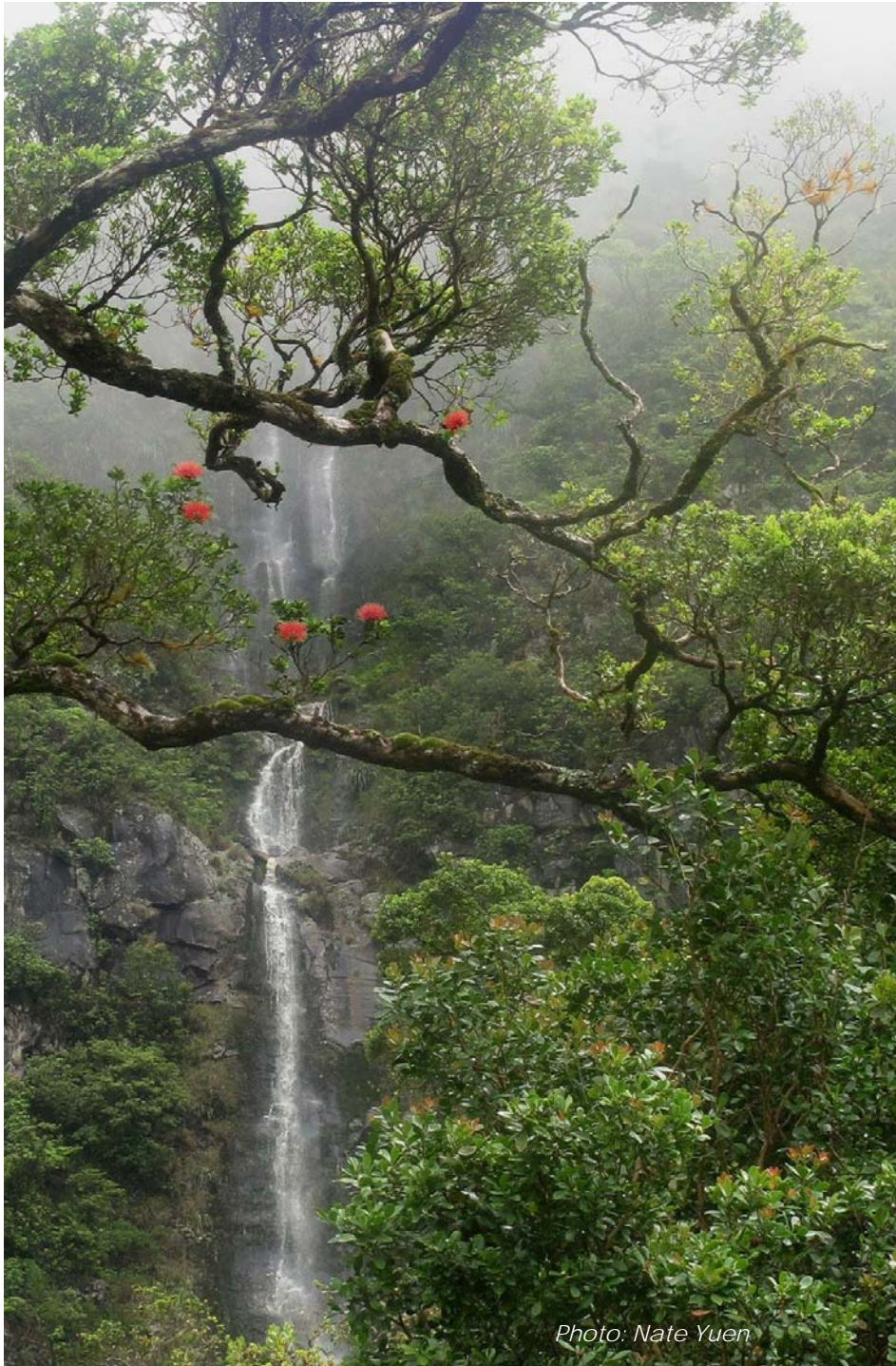


Photo: Nate Yuen

Mahalo

Yumi Miyata
Coordinator, Waianae Mountains
Watershed Partnership
wmpcoordinator@gmail.com