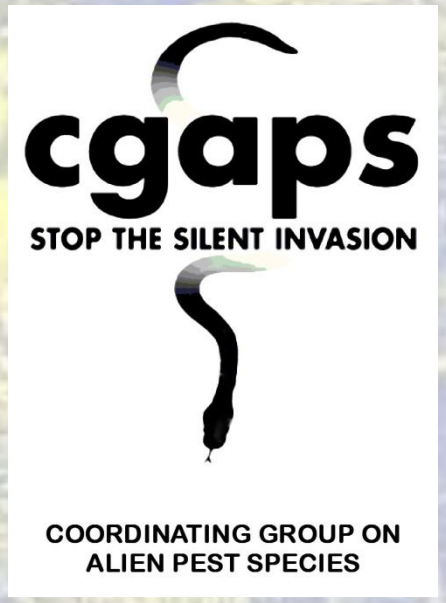
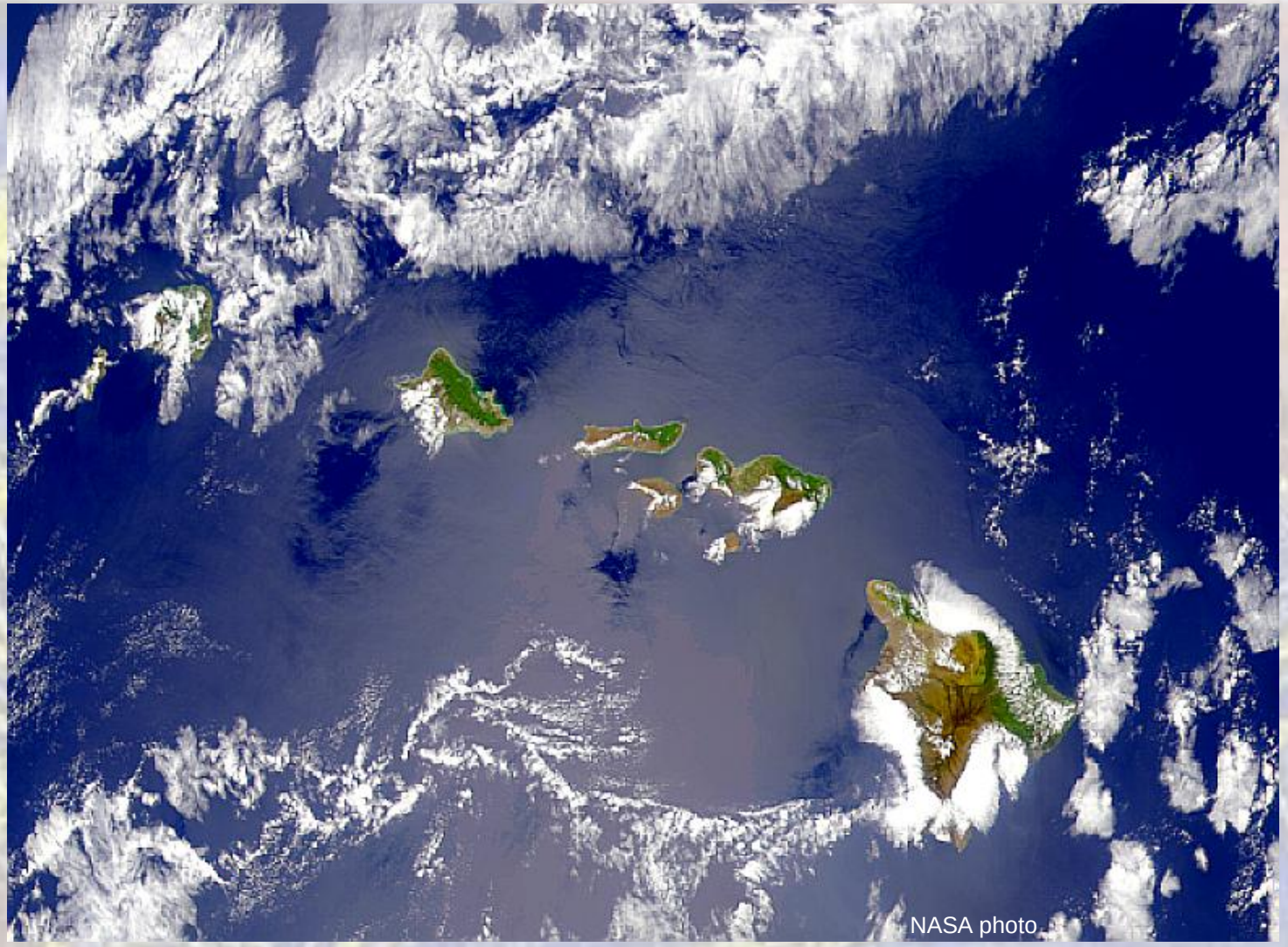


You think you have problems?

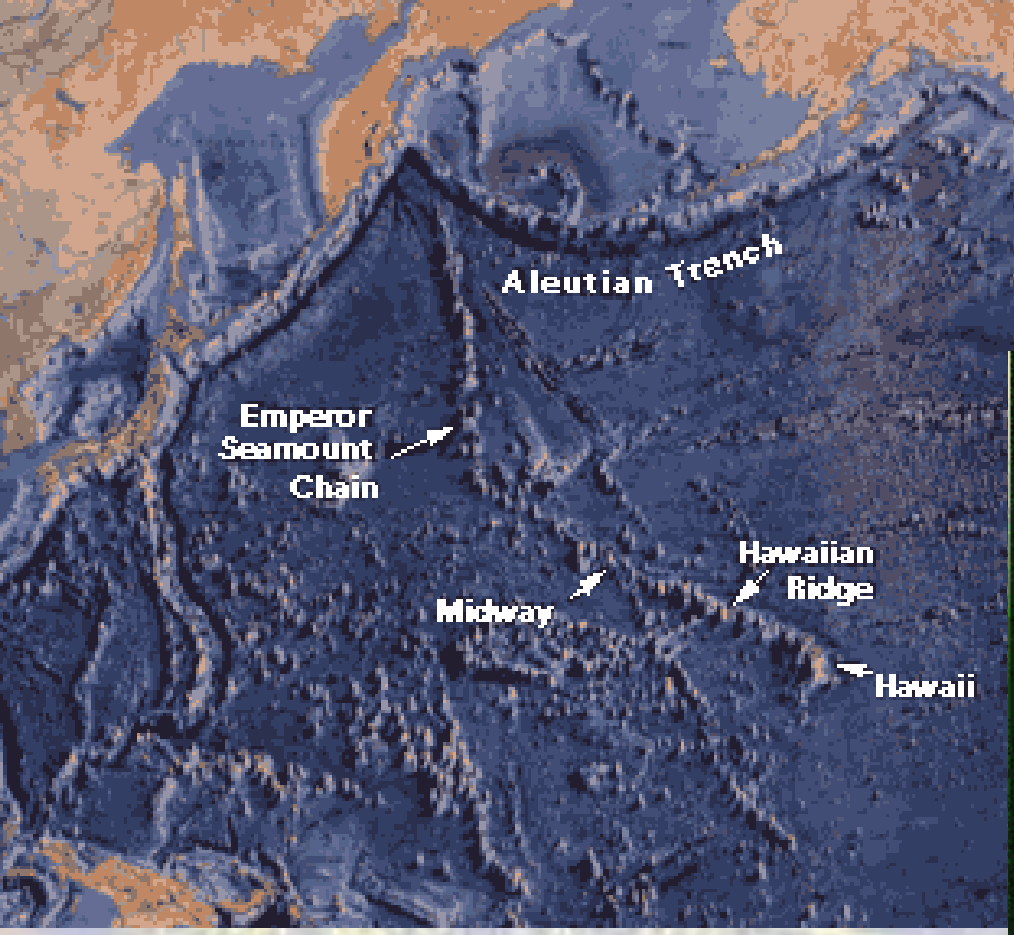
The Crisis in Hawai‘i

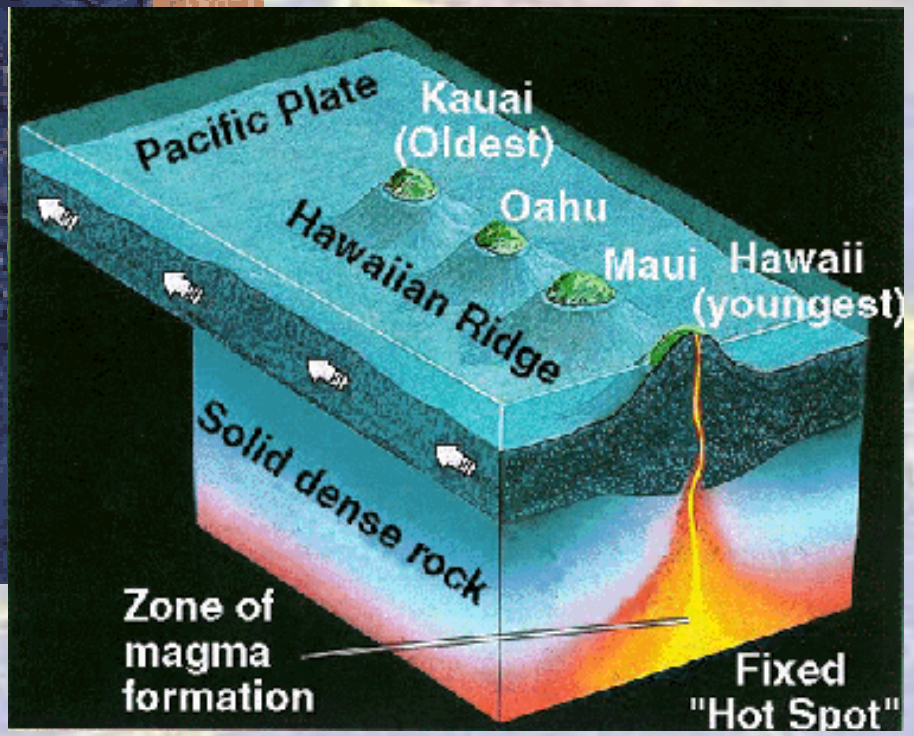
Honolulu, Hawai‘i APS IAPPC
Aug. 6-10, 2011

Presented by:
Christy Martin
Pacific Cooperative Studies Unit/
Hawai‘i Coordinating Group on Alien Pest Species
www.cgaps.org
(808) 722-0995



The Hawaiian islands are physically the most isolated islands on Earth. For millions of years, the Pacific ocean has functioned like a moat, keeping out many plants and animals that may be common on continents or other islands.





Islands were formed when lava poured out of a hole in the Pacific plate—a “hot spot”.

The Hawaiian Island chain was never attached to a continent or close to any island.

Hawaii and its nearshore environment was a blank slate. There were no seeds in the soil, no animals walking across a land bridge to our islands, and no “living reef”.

With a lot of luck…

Some seeds, spores and insects arrived on the wind.

Some birds flew or were blown off course. In them or stuck to their feathers were more seeds.

Some seeds managed to float here on ocean currents or waves.

Some freshwater and marine species with long larval stages were able to drift here with the currents.

Starting 70 million or more years ago…

Plants and animals arrive & thrive


Jack Jeffrey photo


TNC photo

isolation
wide variety of habitats
millions of years
changes over time

\+

20,000 native Hawaiian species

Examples of change over time

These honeycreepers are all descended from a handful of original colonists that flew or were blown across the ocean millions of years ago.

Slowly, over uncountable generations, birds spread out into different areas, different habitats, and they started eating different foods.

With millions of years came slow, incremental changes.

D. Pratt

Note the curved bill of the ‘i‘iwi…

And the curved flower of the trematolobelia…

They fit perfectly. The curved bill allows it to feed on the nectar, and the plant benefits from being pollinated.

Change over time: The ancestor of this “stink bug” arrived millions of years ago. Over time, these bugs lost the ability to produce a stinky smell because it’s predators weren’t present.

Today, Hawai‘i has stinkless stink bugs, called koa bugs.

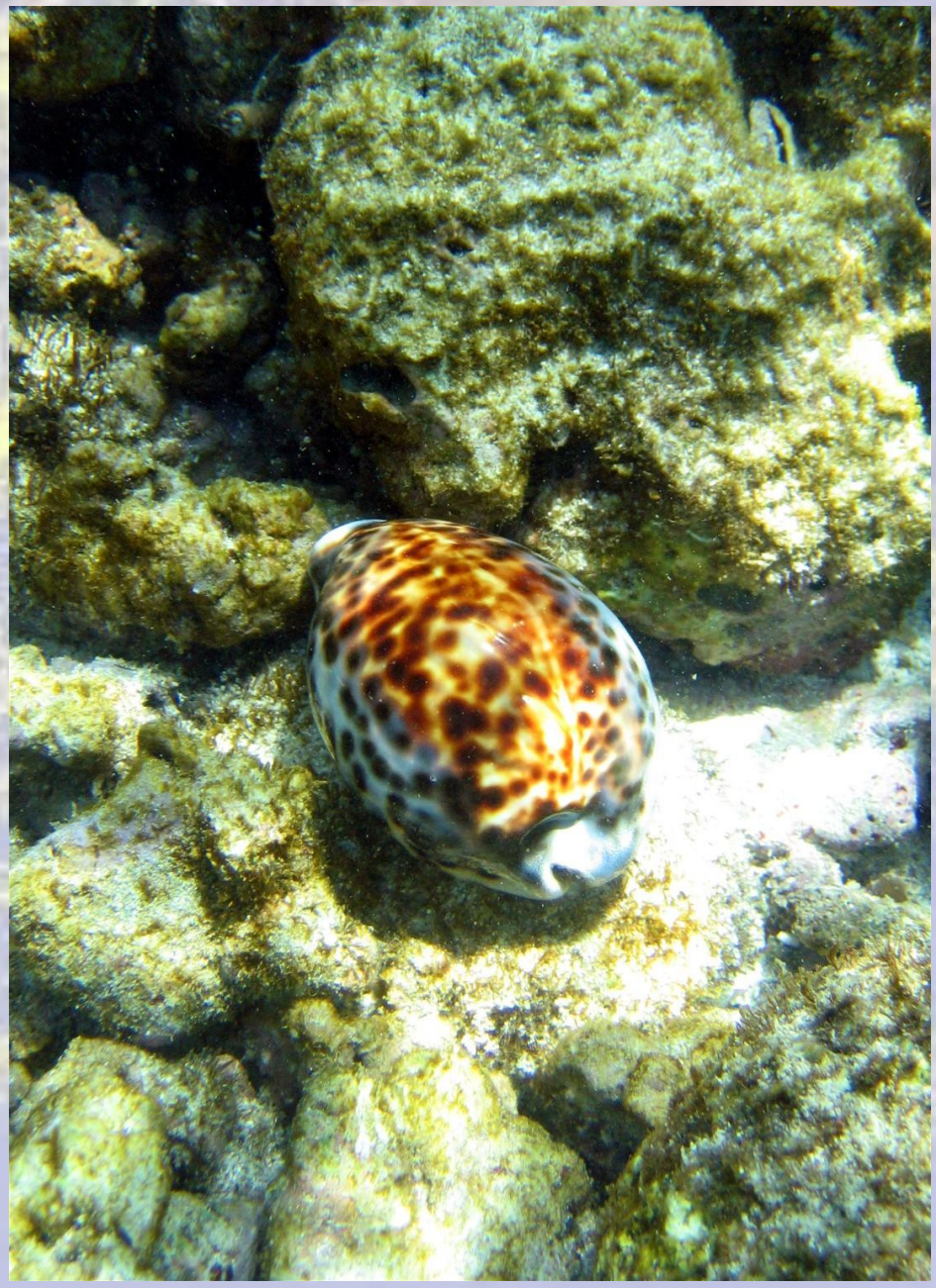
Change over time: This is a mintless mint. When its ancestor arrived, there were none of its regular predators, and therefore no need to produce a minty flavor.

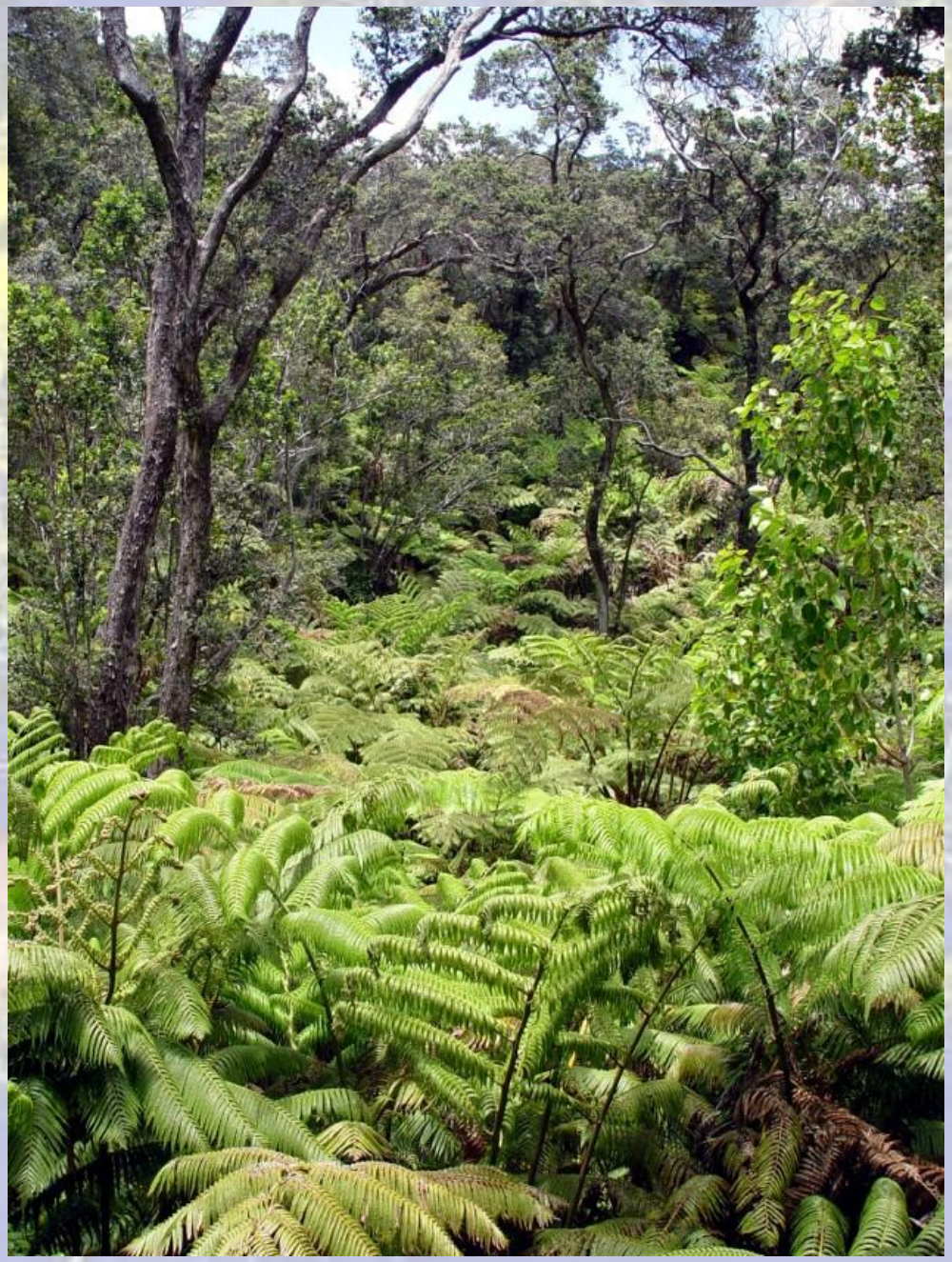
After millions of years, Hawai‘i has mintless mint. It also has a curved flower and is pollinated by ‘i‘iwi.

Change over time:
This is a tiger cowrie.

Although Hawai‘i’s nearshore environment is connected to Indo-Pacific island waters, arrival, survival, and colonization of marine species was rare.

This isolation (and unknown circumstances) lead to Hawai‘i’s tiger cowries being twice as large as tiger cowries from Africa to the Indo-Pacific.





Hawaii's native ecosystems are the result of 70 million years of isolation and very slow change.

And then…
Hawaii got an incurable case of…

HUMANS.

70 million years ago…

1500 years ago

First non-native (alien) species arrive = 34

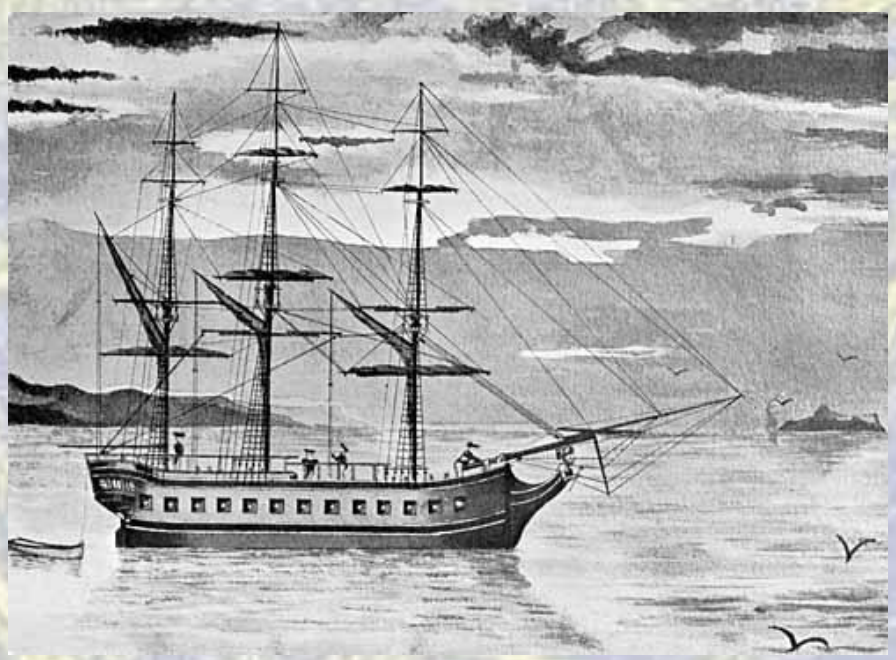
...a few, like rats, proved to be invasive

70 million years ago…

1500 years ago

232 years ago

More non-native (alien) species = 500?



...a few of these proved to be invasive, including goats, mosquitoes and mosquito-borne diseases

70 million years ago…

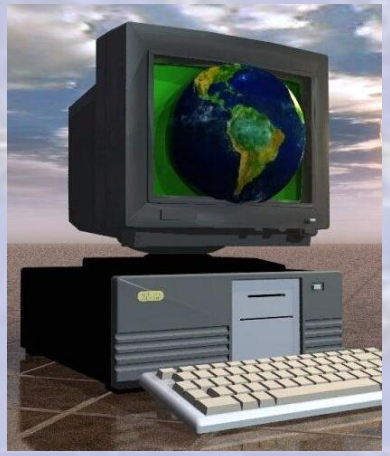
232 years ago

1500 years ago

10 y/a

Today: More non-native species arrive alive

- 343 new marine/brackish water species
- Hawaii went from 0 to 40 land reptiles
- 0 to 6 amphibians (including coqui)
- 10,000+ plant species introduced; 1,200 spread to natural areas
- 20+ insects/year (or, at least 1/day if you consider the KARA)



Are all aliens BAD???

No!

But we should be concerned about invasive species

But we should be concerned if it is INVASIVE.

So what is INVASIVE?

An alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health (Exec. Order 13112)

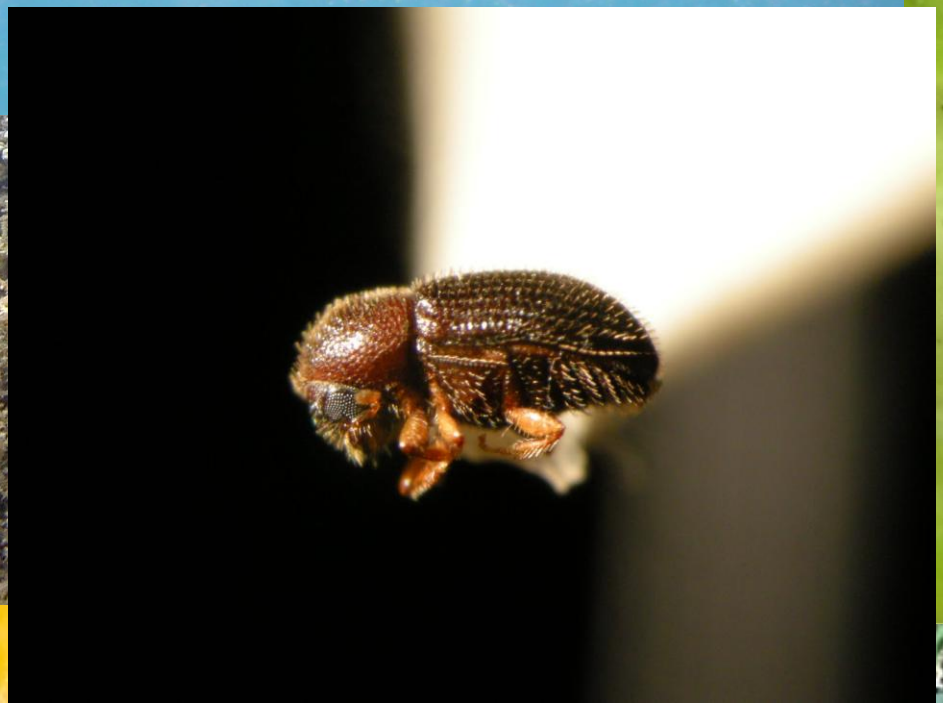








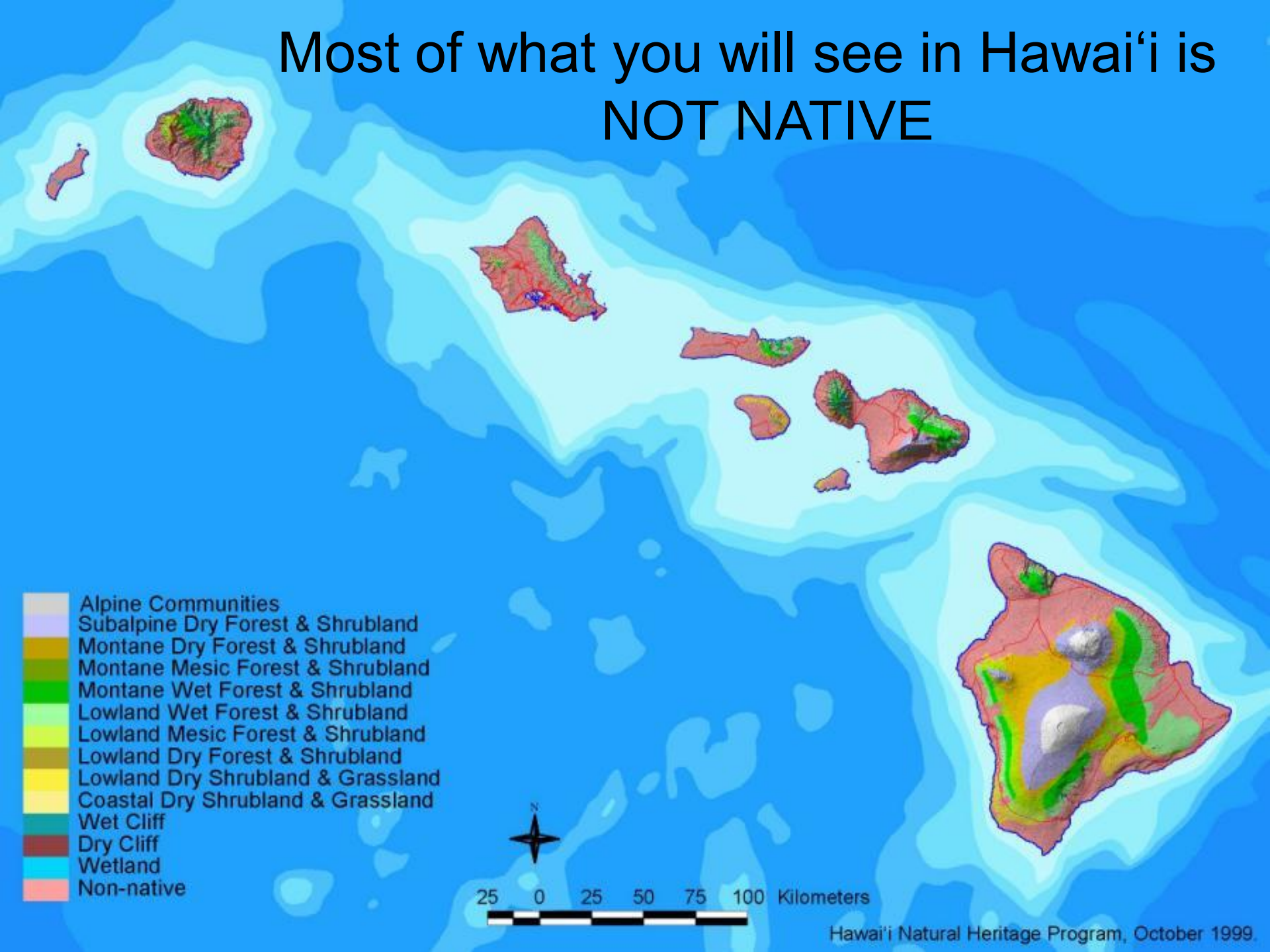




2006 LED

Most of what you will see in Hawai‘i is NOT NATIVE



Strawberry guava

Psidium cattleianum

Photo courtesy of Carnegie Airborne Observatory

- Shrub or tree up to 60' tall, introduced as an ornamental
- Spread by animals, it outcompetes and replaces other plants
- Compared with native ʻōhiʻa forests, strawberry guava-infested forests lose 27% more water, with the difference rising to 53% during dry periods.
- Changed hydrology = change in nearshore ecosystems

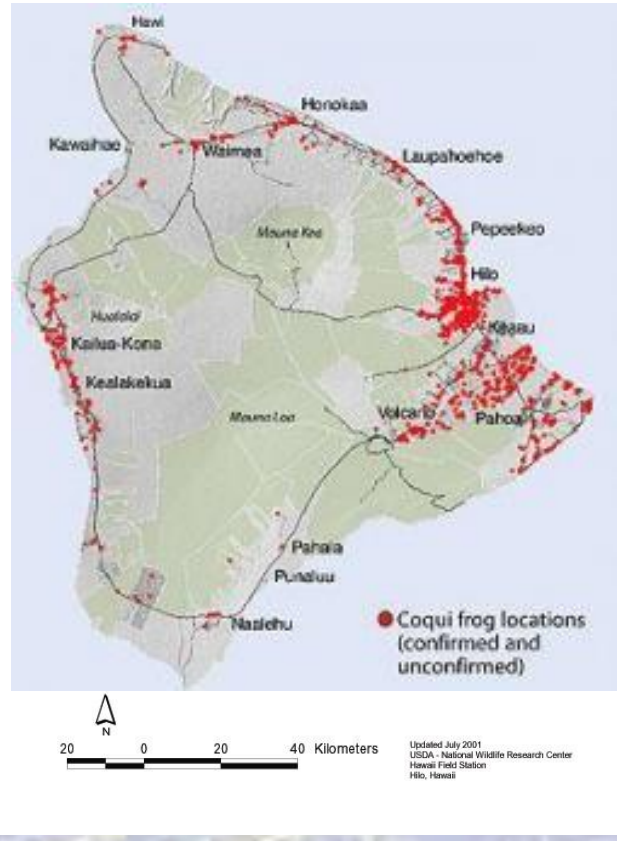
Little Fire Ant (LFA)

Wasmannia auropunctata

- Small stinging ants native to Central and South America, accidentally introduced as hitchhikers on nursery plants
- Infests yards, agricultural fields, and nurseries, where they damage crops, and sting people.
- Also known to sting eyes of pets and other animals, causing blindness
- Infestations known on Hawai‘i island. One small infestation on Kaua‘i and Maui (eradicated!!! Woo hoo!)

Coqui Frogs

Eleutherodactylus coqui



- Native to Puerto Rico, arrived hidden in plants in the late 1980s
- Can reach densities of 10,000 per acre, eat 40,000 insects a night
- Can move into higher elevations, will eat native insects
- Loud (70-90 decibels). Reduces property values; effect on visitor industry?; health effects

Invasive species arrive in the U.S. carried by:

Airplanes

Ships & vessels

Trains (mainland U.S.)

Vehicles (mainland U.S.)

The movement of ships alone (photo above) shows how connected we are to each other and other nations. Add planes, trains, and vehicles for a full picture of opportunities for species movement.

Protecting Ourselves from Invasive Species

Pre-entry (laws & agreements)		**Port-of-entry** (federal and state inspection)		**Rapid-response** (response crews/regional containment)	
World's Biota	Arrivals		Escapes		Widespread

Options:
- Do nothing (accept impact)
- Eradication
- Regional containment

Options:
- Do nothing (accept impact)
- Protect high value areas
- Biocontrol

Increasing Ease ← → **Increasing Cost**

Puccinia psidii as a case study:

- *Puccinia psidii* (AKA guava/eucalyptus rust, ‘ōhi‘a rust) first described in 1884 in Brazil; native to South America
- Also present in the Caribbean, Mexico, Florida, California, Japan (2007). April 2010 in Australia
- First reported on Oahu (2005) when new growth of introduced rose apple trees started dying
- Had already spread statewide

Forest & Kim Starr photo

Puccinia psidii as a case study:

Large swaths of dead rose apple statewide

Puccinia psidii as a case study:

Resource managers and scientists were extremely concerned that the rust would prove to be equally (or more) virulent on ʻōhiʻa.

- ʻŌhia = water. *Hahai nō ka ua I ka ulu lāʻau Rains always follow the forest* ʻōlelo noeʻau (ancient Hawaiian proverb)
- ʻŌhia = keystone of the forest, over 1 million acres of ʻōhiʻa that other species depend on
- ʻŌhia = Hawaiʻi. Integral part of Hawaiian culture

Puccinia psidii as a case study:

- Hawai‘i Department of Agriculture (HDOA) set up a 1-year interim rule restricting myrtle family imports in 2007, but this was allowed to expire
- Unknown method of introduction; subsequent interceptions on cut myrtle in bouquets
- Federal: ‘ōhi‘a rust is “actionable” when intercepted (seen) on materials bound for Hawai‘i
- Majority of cut flowers come into Florida “unconsolidated,” put into bouquets, then sent to states

Puccinia psidii as a case study:

- 2010 molecular study of *Puccinia psidii* by Rodrigo Neves Graça, of the Universidade de Viçosa in Brazil confirmed the risk to Hawai‘i from multiple strains of the rust
- HDOA rulemaking to restrict myrtle family imports in Fall 2011
- Will use the rule to apply for federal recognition and assistance (and we’ll need to do the same thing for the next pest that comes along.)

Take home message: There is still so much that we can and should protect.

- Support each other's efforts to protect borders
- Support regional coordination to reduce movement of invasive species
- Wherever possible, provide comments on federal regulations such as USDA APHIS' Q37
- Federal preemption should be challenged. Enabling and empowering individual states enhances national and international protection
- For Hawai‘i, we request federal recognition and support for special biosecurity protection

Mahalo!

Mahalo to the following for information, guidance, slides and/or photos: Lloyd Loope (USGS-BRD), Dorothy Alontaga (USDA-APHIS), Carol Okada (HDOA-PQ), Janice Uchida (UH-CTAHR), Rob Hauff (DLNR-DOFAW), and Fred Kraus (Bishop Museum), Philip Thomas (HEAR.org), Forest & Kim Starr (PCSU), USDA-NWRC, Jack Jeffrey Photography, The Nature Conservancy of Hawai‘i, HDOA Plant Pest Control, and the Pacific Cooperative Studies Unit.

cgaps
STOP THE SILENT INVASION
COORDINATING GROUP ON ALIEN PEST SPECIES

Christy Martin
christym@rocketmail.com
www.cgaps.org
(808) 722-0995