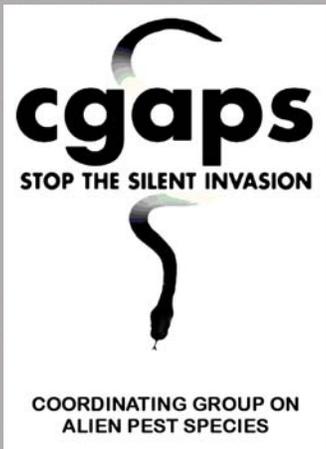


Gaps in Hawaii's Biosecurity System: Protecting Hawaii from Invasive Species



Presented by:

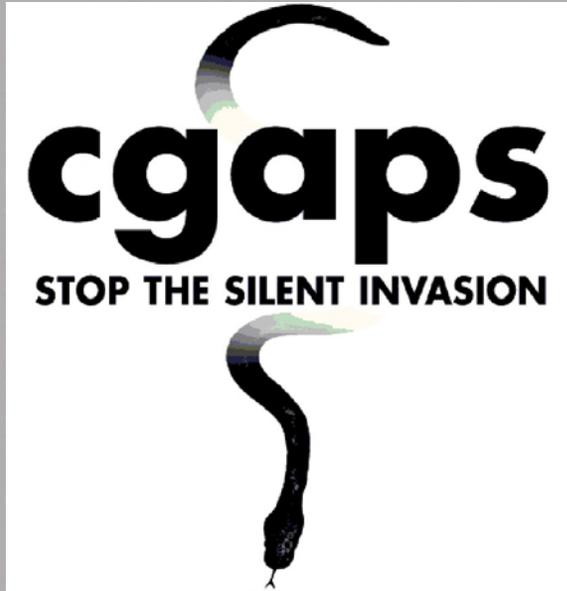
Christy Martin

Public Information Officer

CGAPS--Coordinating Group on Alien Pest Species &
the ISCs--Invasive Species Committees of Hawaii

www.hear.org/cgaps

Invasive Species Partnerships



CGAPS:

Coordinating Group on Alien Pest Species

- CGAPS is a statewide partnership of agencies and organizations working together to promote policy and procedural change to close the gaps in Hawaii's biosecurity.
- 1992 report by The Nature Conservancy of Hawaii and the Natural Resources Defense Council examined the system for pest prevention and control, and highlighted gaps in the system. Gaps could be fixed through better coordination of agencies and noted the need for early detection and rapid response to newly introduced pests.
- 1994 formation of CGAPS.
- CGAPS partners also coordinate actions on existing pests and works to raise public awareness of invasive species issues.



ISCs: Invasive Species Committees

ISCs are island-based, grassroots partnerships of government agencies, private businesses and non-profit organizations working together to control or eradicate the worst pest species that threaten each island.

ISCs have field crews on each island that survey, map and conduct control work on the most threatening pests. ISC field crews act as rapid response teams to control or eradicate new invasive pests before they spread.

The Silent Invasion

Snakes, mosquitoes and mosquito-borne diseases, Miconia, coqui frogs, Red Imported Fire Ants, alien seaweed—Hawaii is under siege by invasive alien pests that impact our economy, environment, human health and our quality of life.

Hawaii's invasive species problem is the most severe of any state, but the future will be much more dire if we do not act boldly and promptly. Together, we can make the changes necessary to protect Hawaii.



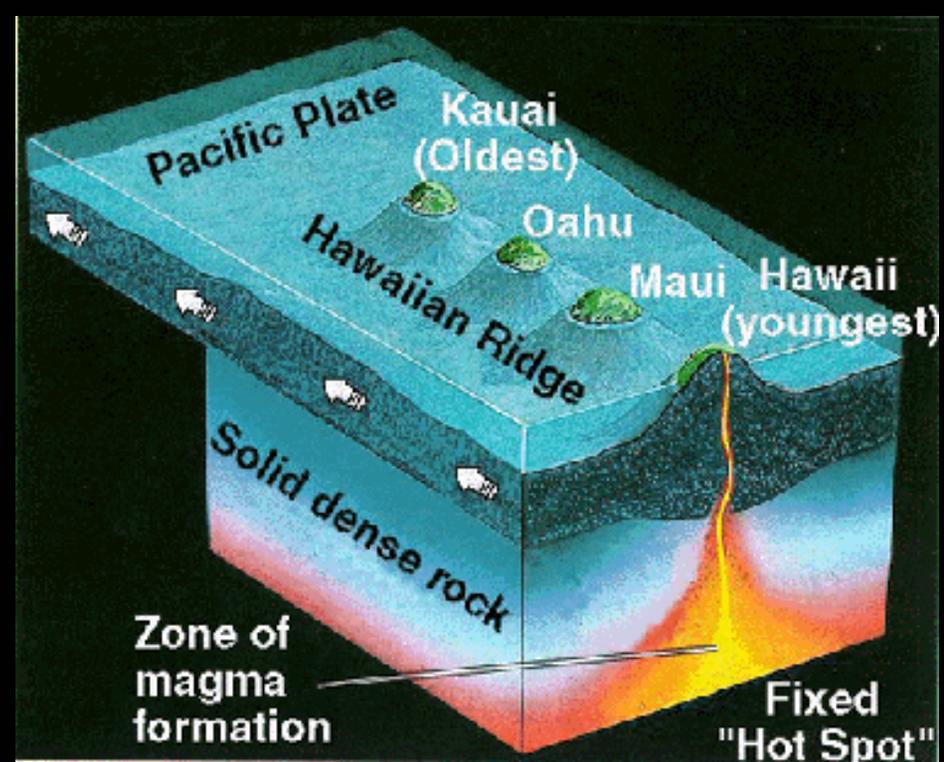
Some Terms...

Native: plants or animals that arrived at a location through non-human means, or ones that have evolved into new species from those ancestors



Hawaii is the most isolated group of islands on Earth, lying over 2,400 miles from the nearest continent.

The Hawaiian Island chain was never attached to a continent.



This means that Hawaii was a blank slate. There were no seeds in the soil, no animals walking across any land bridge to our islands.

So, how did plants and animals first get here?

Wind, Wings and Waves.



Some seeds, spores and insects arrived on the wind.

A few 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.

Slowly, over millions of years in isolation, these original plant and animal species changed.



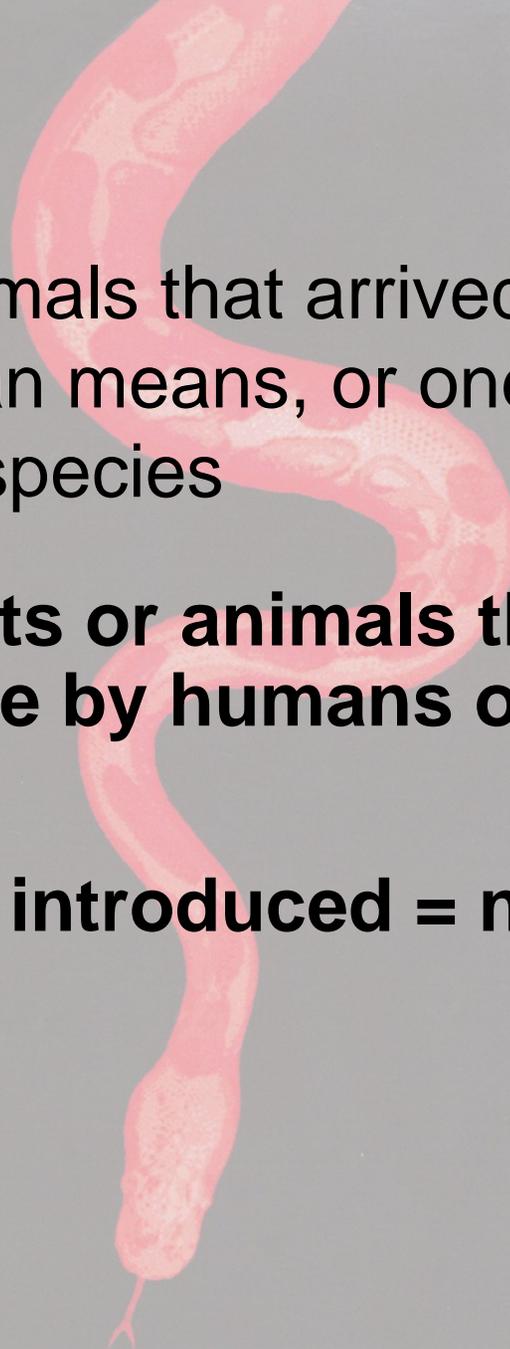


Some Terms...

Native: plants or animals that arrived at a location through non-human means, or ones that evolved into new species

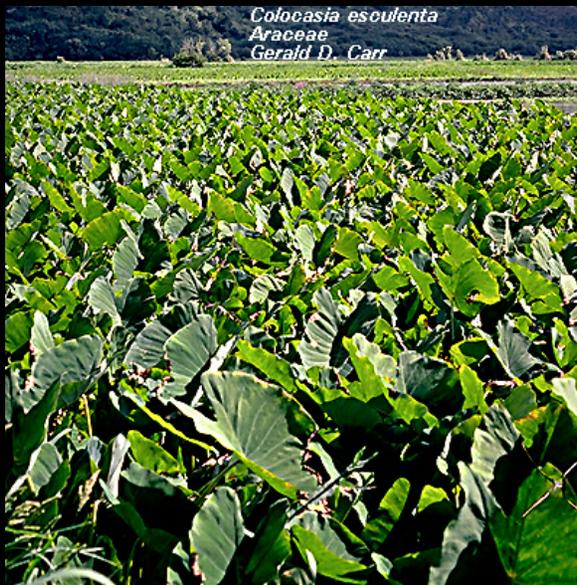
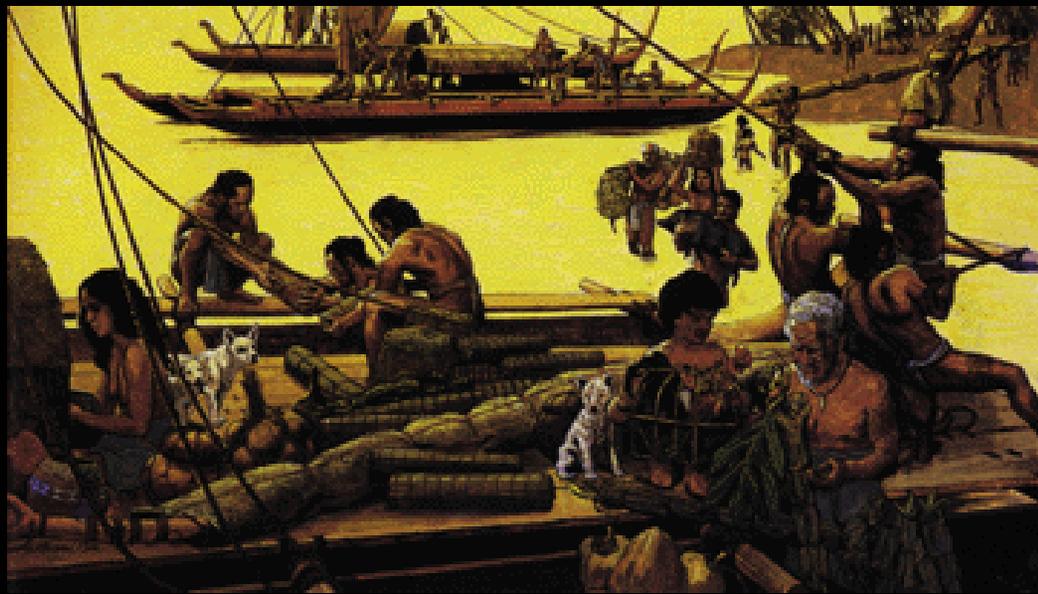
Alien species: plants or animals that were brought to a place by humans or through human activity

Alien = exotic = introduced = non-native



The first alien species arrived with Polynesians in the year 300 A.D. or so. They brought...

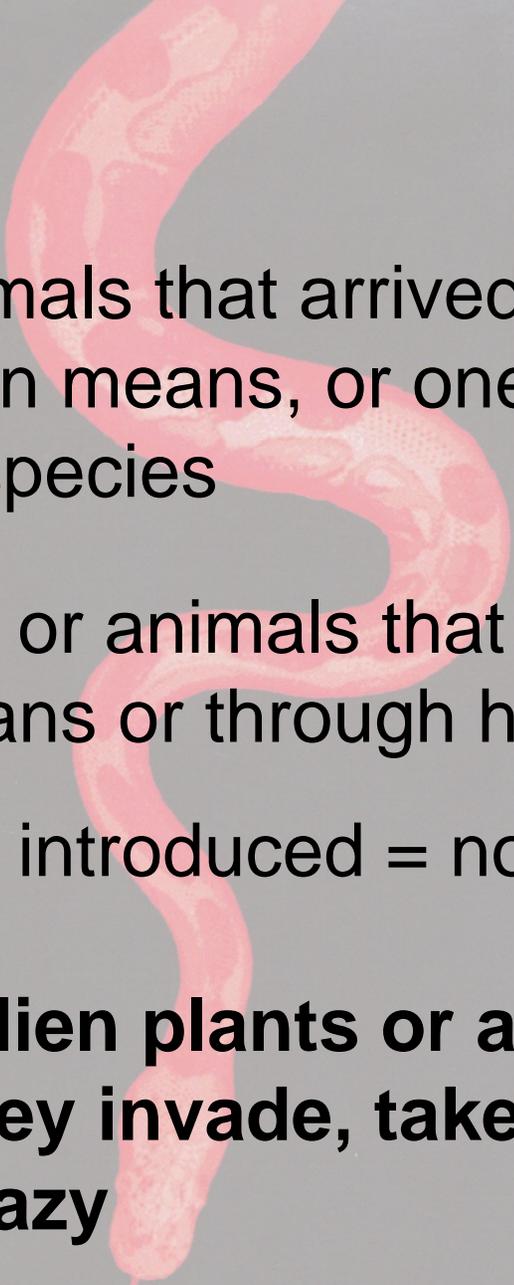
Kalo
Coconut
Kukui
Noni
Moa
Dog



More aliens were brought starting in 1778, like plumeria and pineapples.



Some Terms...



Native: plants or animals that arrived at a location through non-human means, or ones that evolved into new species

Alien species: plants or animals that were brought to a place by humans or through human activity

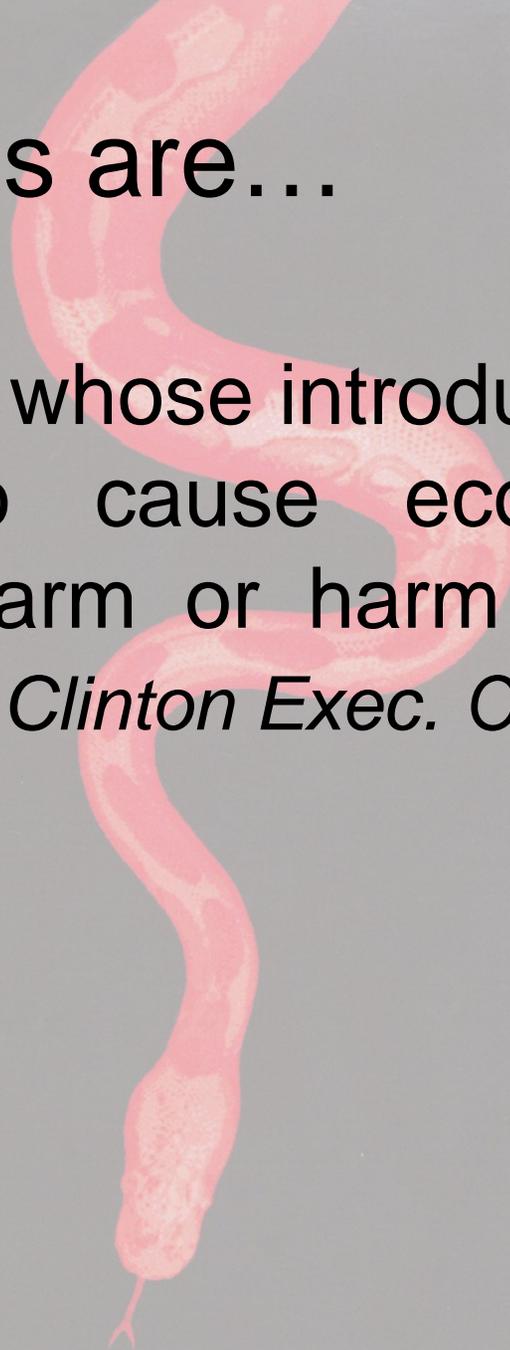
Alien = exotic = introduced = non-native

Invasive species: alien plants or animals that don't stay put; they invade, take over, reproduce like crazy

Invasive = pest = nuisance species

Invasive species are...

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



Salvinia molesta



- Water fern native to South America.
- Introduced as an ornamental, via the pet trade & by accident as hitchhiker.
- Able to double the size of its mats in 7-10 days, volume in 2-3 days.
- Destroys habitat for native birds, reduces oxygen for aquatic species.
- Present on Oahu, Kauai, Big Island, Maui



Alien Algae



- 24 species—some intentionally introduced to Hawaii, others were unintentional.
- Grow faster than coral, covers and kills it.
- Reduces diversity and changes ecosystem.
- Perhaps impossible to eradicate once here.



Miconia calvescens



- 30-50 ft. tall tree native to Central and South America
- Each tree can produce millions of sand-grained sized seeds per year.

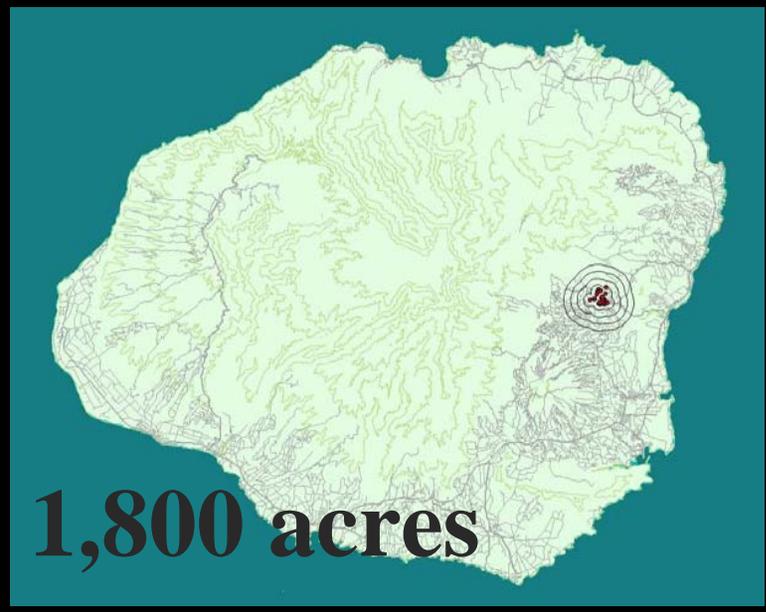
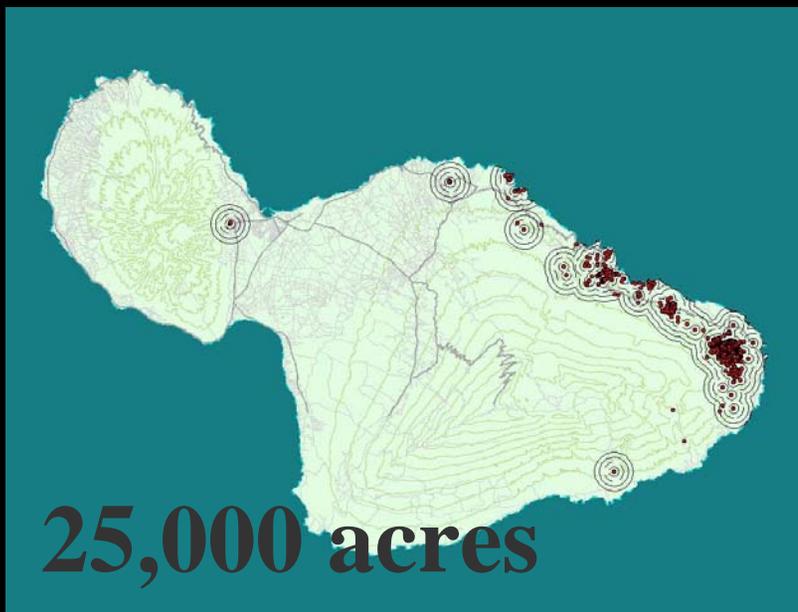
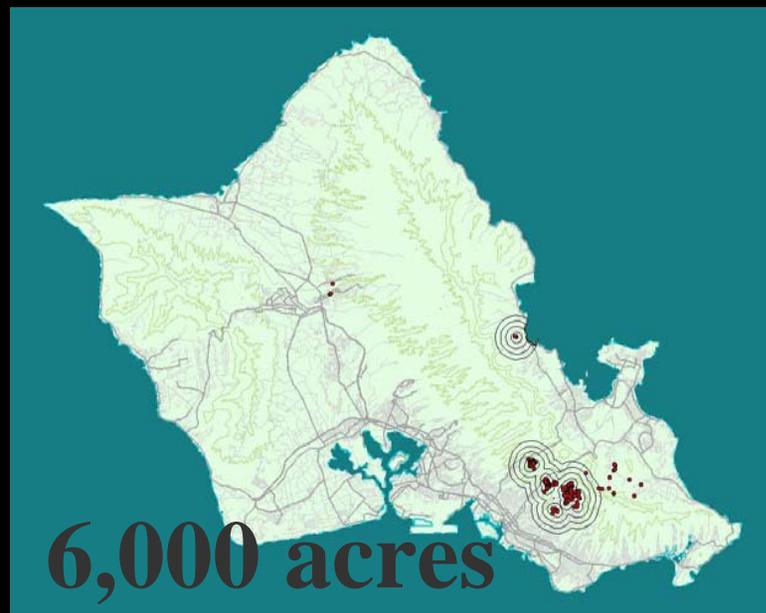
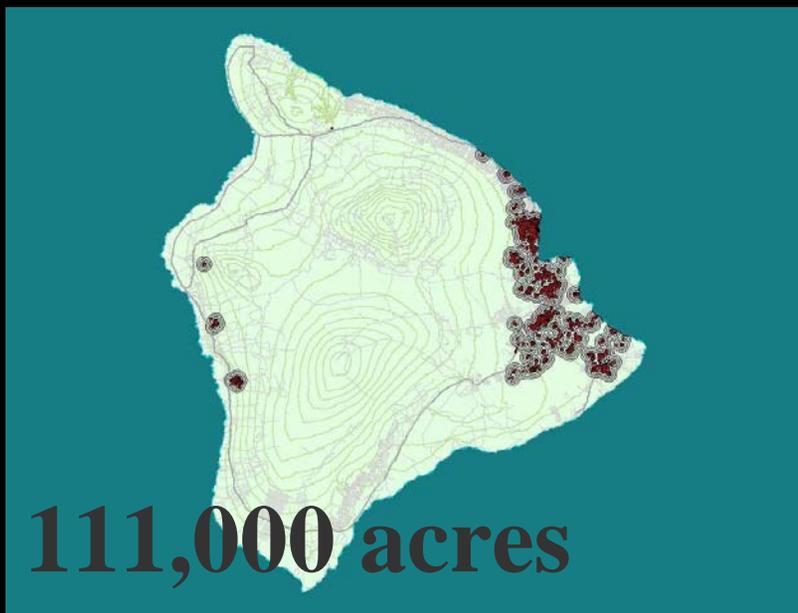
Threat to Native Forests and Watersheds



- Grows close together forming dense, 100% Miconia forests
- Deep shade eliminates other plants and prevents water from reaching the forest floor and soaking into the watershed

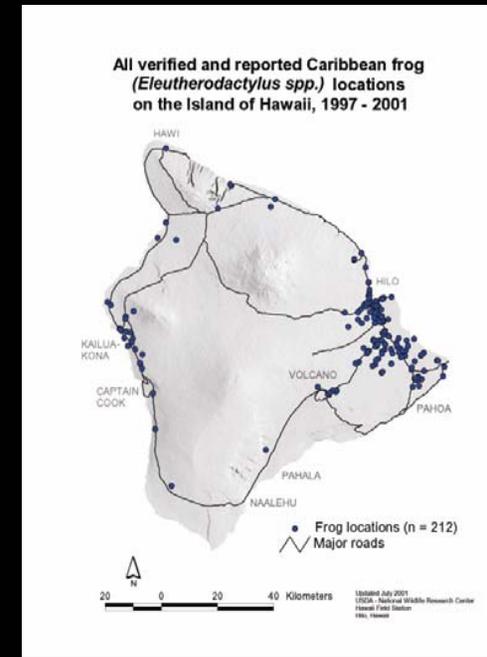
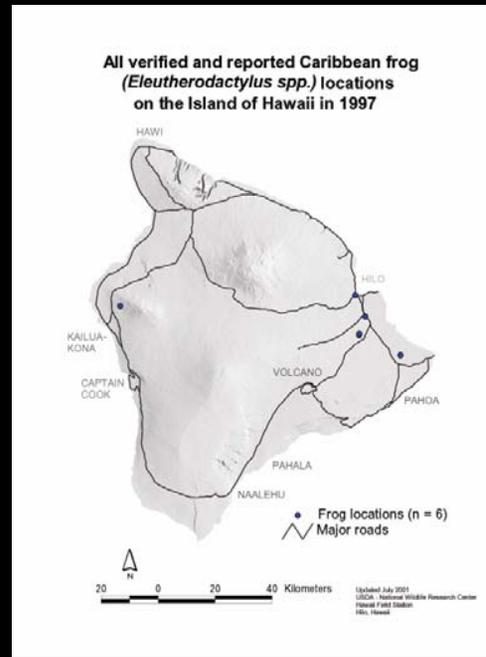


Miconia Infestation in Hawaii

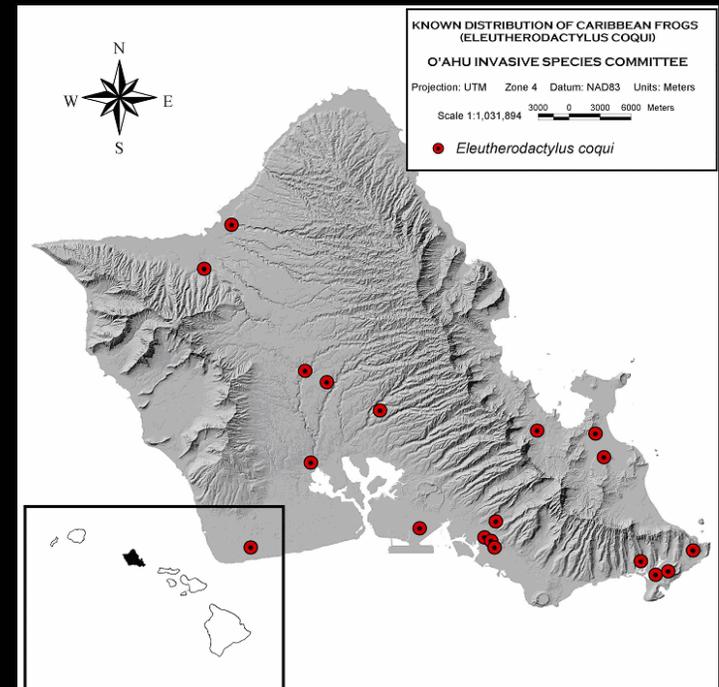


Coqui Frogs

Eleutherodactylus coqui



- Native to Puerto Rico
- Can reach densities of 10,000 per acre
- 10,000 frogs can eat 40,000 insects a night (they don't eat mosquitoes)
- Can move into higher elevations, will eat native insects
- Loud (90 decibels)



Other Invasive Species



Future Threats

RIFA--Red Imported Fire Ant (*Solenopsis invicta*)



- RIFA form “supercolonies” and infest areas like electrical boxes, yards, school grounds, parks, pastures and golf courses.
- RIFA stings send 33,000 people to seek medical attention each year in S. Carolina.
- Costs exceed \$300 million in Texas alone.



Future Threats

Brown Tree Snake (All snakes)



- Brown Tree Snakes introduced to Guam in the 1950s. In less than 20 years they decimated bird, bat and lizard populations.
- On Guam--Caused one power outage every four days
- Estimated cost to Hawaii: \$123 million

What are the costs of invasive species?

Economic (direct & indirect)

- Agricultural revenues = \$300 million/year
- Miconia in 2001 = Over \$3 million
- Salvinia = Over \$1 million
- Termite damage in 1995 = \$150 million/year
- Cost of safeguarding tourism = **Priceless** (\$18.9 billion at risk from biting sand flies, malaria and more)



What are the costs of invasive species?

Loss of Ecosystem Services

- Reduced volume and reliability of freshwater flow associated with invasive trees¹
- Potential for reduced watershed capacity and increased erosion and runoff

Loss of Native Species

- Over 80% of endangered plants in Hawaii are threatened by invasive species²
- Ecosystems are interdependent. Decline or loss of one member has a huge impact on others



¹Pimentel et al. 2000

²Wilcove et al. 1998

What are the costs of invasive species?

Health and Quality of Life

- The arrival of a single pregnant *Anopheles* mosquito could bring Malaria.
- Swarms of biting sand flies can inflict 10,000 bites per person.
- Alien algae cover coral and change reef ecosystem. Shorelines covered in decomposing algae stink.
- Snakes bite.



Invasive Species Pathways

Purposeful introduction via legal and illegal means; Unintentional introduction

aircraft and air cargo

ship hulls, ballast water and ship cargo

hand-carry/luggage

mail

forestry activities

horticulture trade

aquaculture

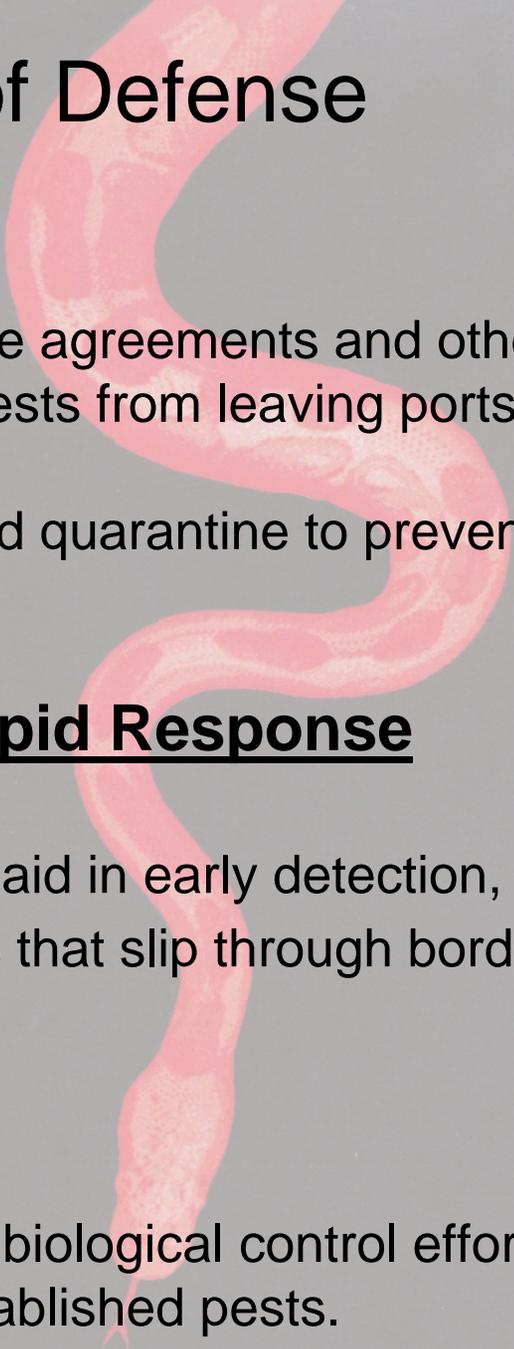
pet trade

botanical gardens

agriculture experiment stations



Biosecurity: Lines of Defense



Prevention

Pre-entry: International trade agreements and other federal mechanisms that prohibit pests from leaving ports en route to Hawaii.

Port-of-Entry: Inspection and quarantine to prevent pests from crossing Hawai`i's borders.

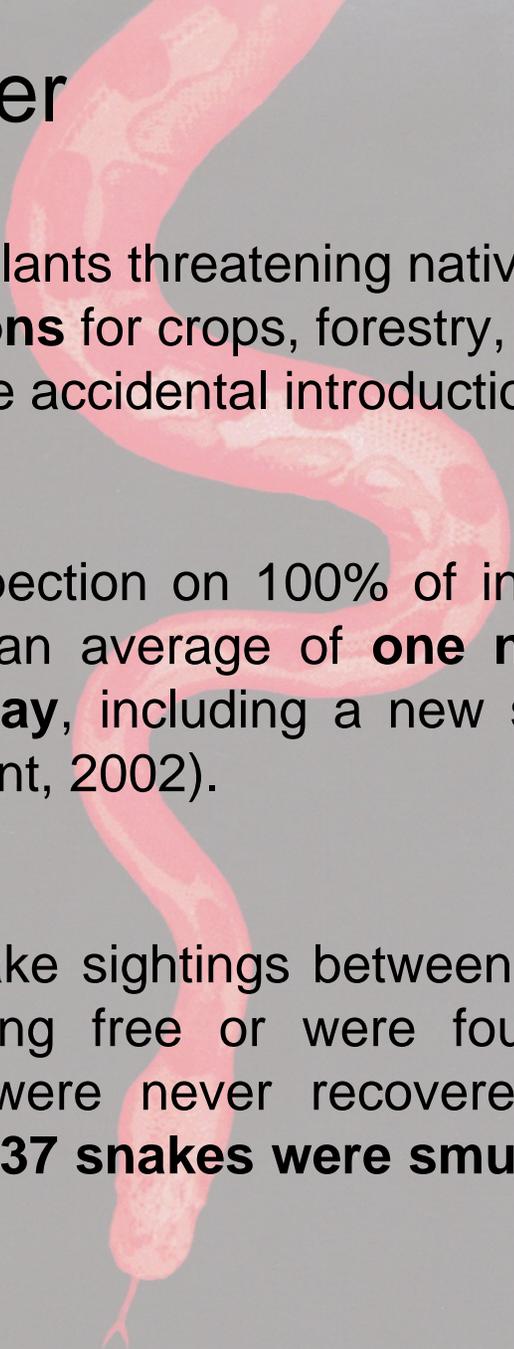
Early Detection and Rapid Response

Monitoring for new pests to aid in early detection, followed by rapid response to eradicate pests that slip through border defenses.

On-Going Control

Chemical, mechanical, and biological control efforts to limit spread and damage caused by established pests.

Statistics to Consider



Of 107 of the worst invasive plants threatening native species, **90% were purposeful introductions** for crops, forestry, ornamental, or other uses, the remaining 10% were accidental introductions (Smith 1985).

When HDOA conducted inspection on 100% of incoming air cargo at Kahului Airport, they found an average of **one new insect species arriving in Hawai`i every day**, including a new species of mosquito (Kahului Pest Risk Assessment, 2002).

There were 236 credible snake sightings between 1990 and 2000. 63 were either captured roaming free or were found dead, 74 were surrendered pets and 99 were never recovered. Only **22 were unintentional hitchhikers--137 snakes were smuggled in** (Kraus and Cravalho, 2001).

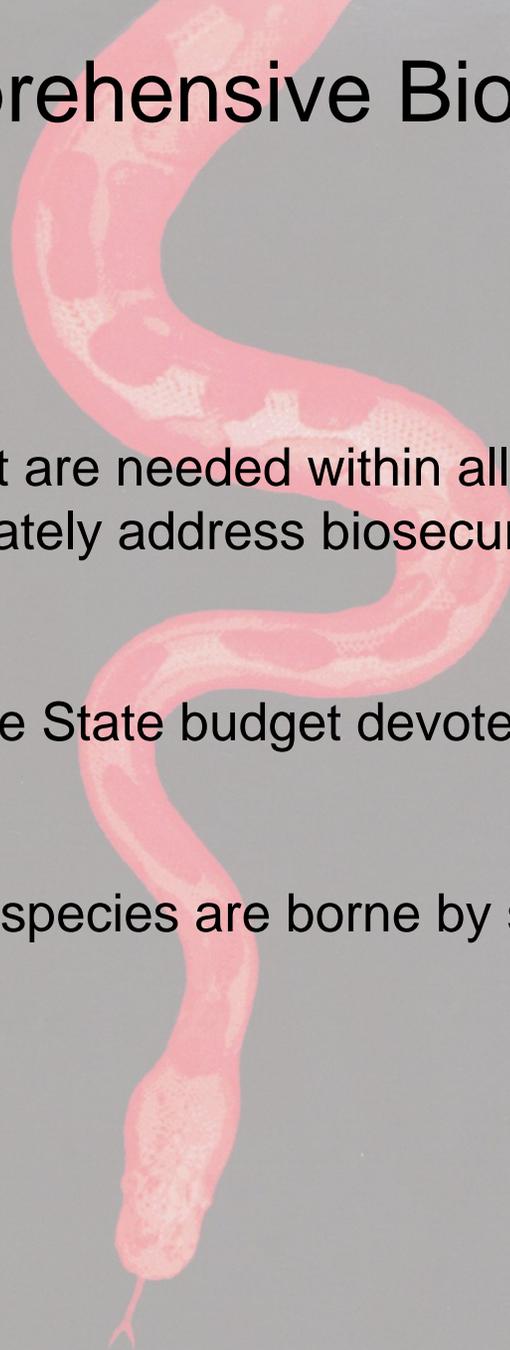
Developing a Comprehensive Biosecurity System

Overarching Issues

Leadership and commitment are needed within all sectors of Hawai'i State Government to adequately address biosecurity issues related to invasive alien species.

There are no programs in the State budget devoted exclusively to invasive alien species.

Most costs of invasive alien species are borne by society at large.



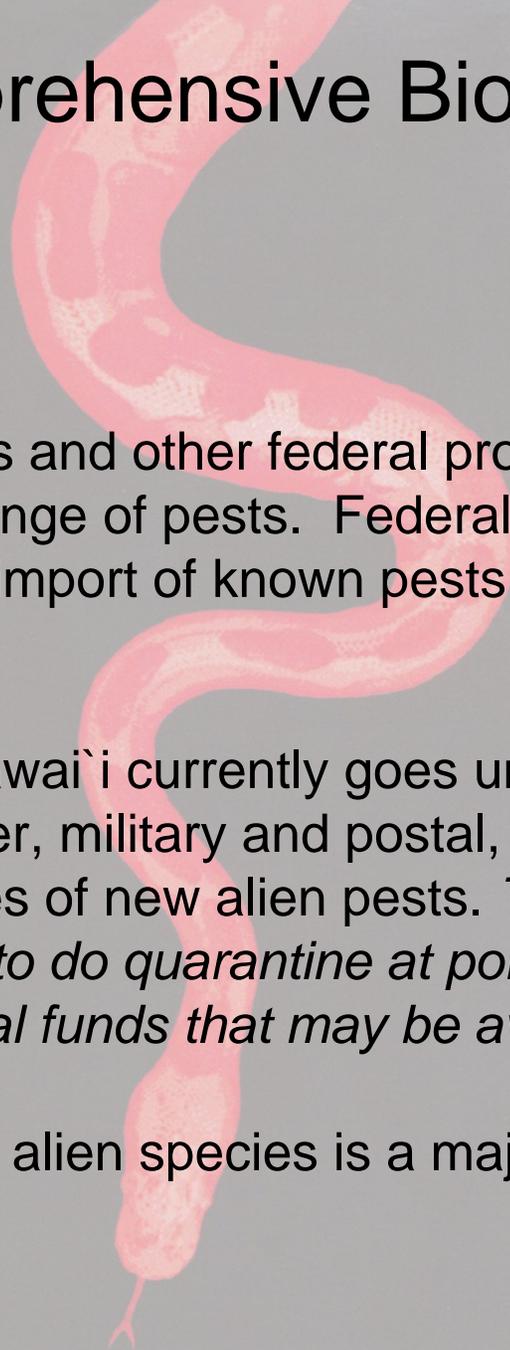
Developing a Comprehensive Biosecurity System

Prevention Issues

International trade agreements and other federal programs do not protect Hawai`i from the full range of pests. Federal trade agreements pre-empt state laws, allowing import of known pests despite the State of Hawai`i's formal objections.

Much of the traffic entering Hawai`i currently goes uninspected—passenger, cargo, ballast water, military and postal, including materials known to be significant sources of new alien pests. *The State of Hawai`i doesn't have adequate funds to do quarantine at ports of entry but there are currently sources of federal funds that may be available.*

Inter-island spread of invasive alien species is a major, largely unregulated problem.



Developing a Comprehensive Biosecurity System

Prevention Issues (continued)

Penalties are inadequately enforced for illegal introductions of invasive alien species. State and federal laws allow for significant fines and imprisonment, but stiff penalties are rarely imposed.

There are opportunities to get federal law enforcement agencies to enforce Hawai`i State Law related to invasive alien species.

Jurisdictional and organizational problems delay responses to new alien pest species infestations, allowing pests to become established or to spread beyond control.

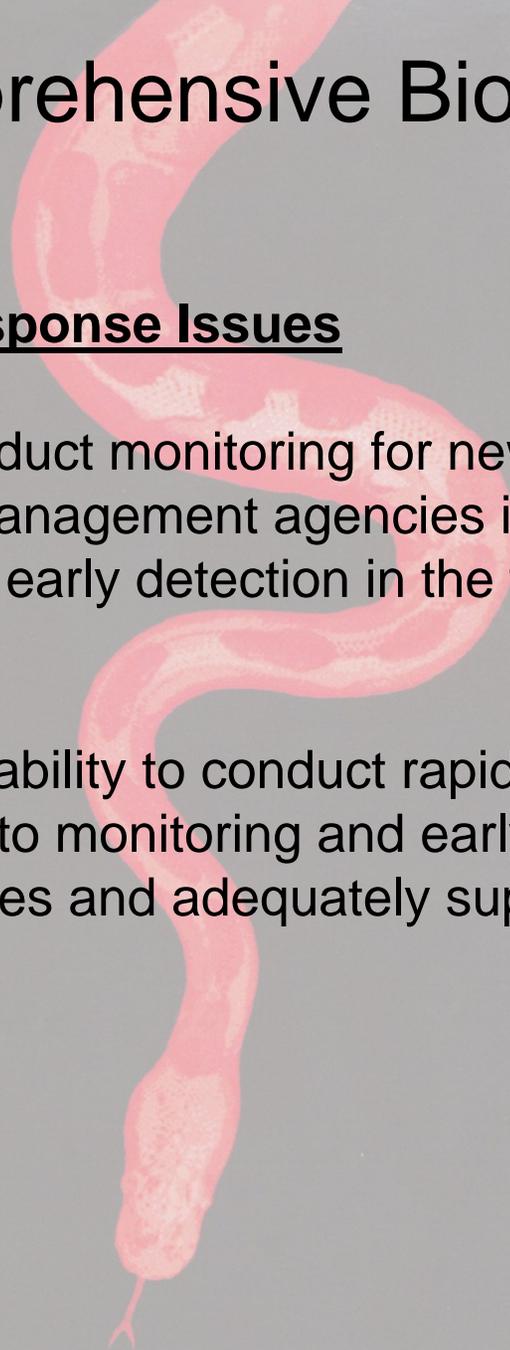
The current prohibited species review process for plants is complex and cumbersome, allowing known invasive plants to be imported, sold, or spread to new areas.

Developing a Comprehensive Biosecurity System

Early Detection & Rapid Response Issues

There are no programs to conduct monitoring for new pests around ports of entry. State and Federal management agencies in Hawai`i do not have the capability to conduct early detection in the field at the scale that is needed.

Agencies do not have the capability to conduct rapid response to newly arrived pests. Efforts relating to monitoring and early eradication need to be formalized between agencies and adequately supported.

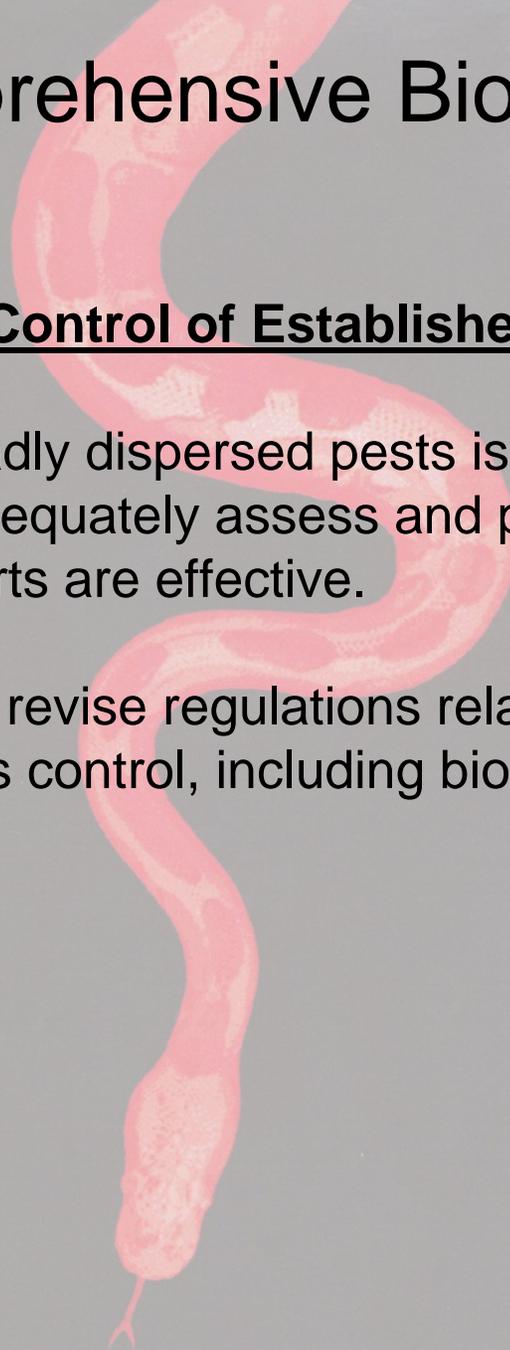


Developing a Comprehensive Biosecurity System

Issues Regarding Ongoing Control of Established Pests

Funding for the control of broadly dispersed pests is grossly underfunded. There is a need to adequately assess and provide the proper resources to insure these efforts are effective.

There is a need to review and revise regulations related to techniques used for invasive alien species control, including biocontrol techniques.



The Good News

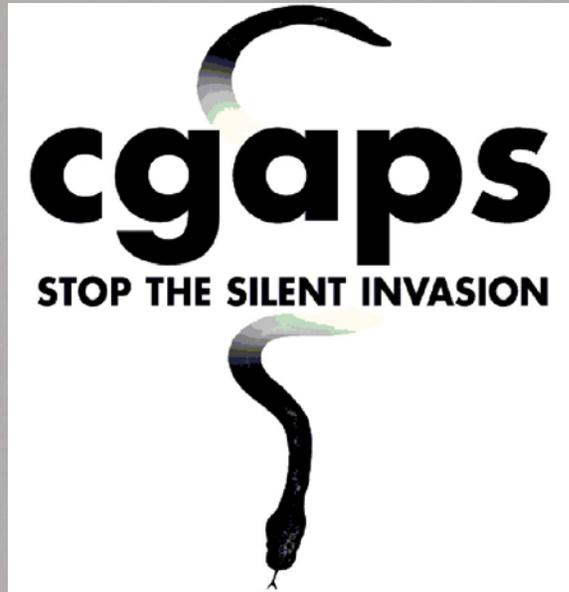
We have examples to follow—we know what an effective program would look like.

The groundwork is set, partnerships are in place, individuals and agencies are committed to addressing this problem.

We share a common goal. Whether your concern is in having enough water, or healthy reefs, or a diverse forests, a healthy economy or a healthy family, we all want the same thing: to protect Hawai`i. One of the greatest threats to our Hawai`i is invasive alien species.



Pau. Mahalo!



Mahalo to TNC, Jack Jeffrey, Susan Middleton and David Liittschwager, USDA-WS, USDA-ARS, USDA-APHIS, USGS-BRD, Art Medeiros, HDOA, National Geographic, HCC and others for the use of their photos.

