

Biology and control of invasive Brown Treesnakes on Guam, USA

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Outline of presentation

- Brown Treesnake (BTS) biology
- Impacts to native species
- Review of control tools
- Control tool validation
- Interdiction
- Rapid Response



USGS Invasive Reptiles Project

- Brown Treesnake on Guam
- Burmese Python in Florida
- Boa Constrictor in Puerto Rico
- Watersnakes in California



USGS Invasive Reptiles Project

- Brown Treesnake **CONTROL TOOLS**
- Burmese Python **DETECTION**

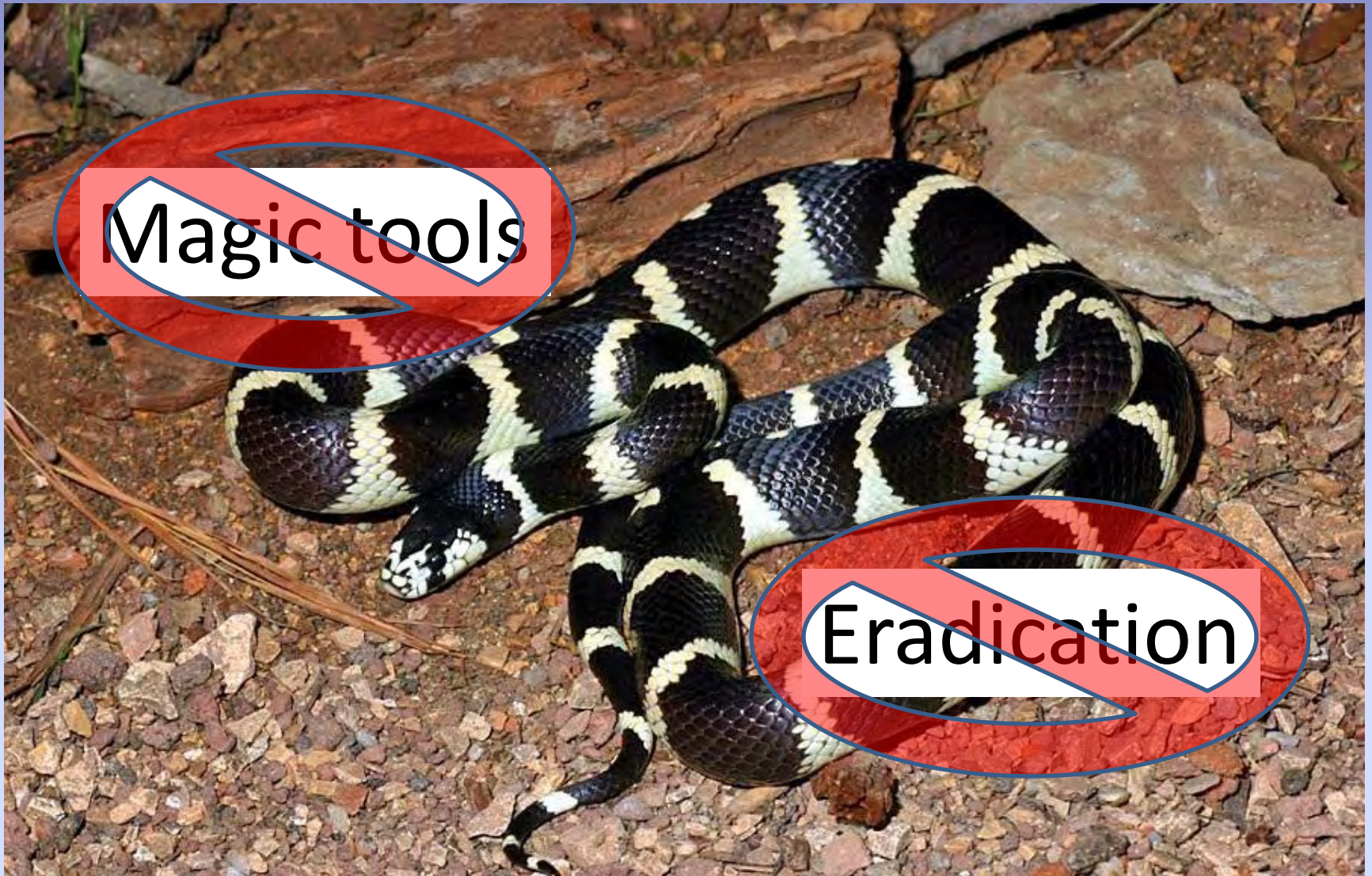




A photograph of a black and white striped snake, possibly a banded krait, coiled on a rocky, reddish-brown ground. The snake has a black body with prominent white bands. The text "Magic tools" is overlaid in a white box on the left side of the image.

Magic tools

Eradication

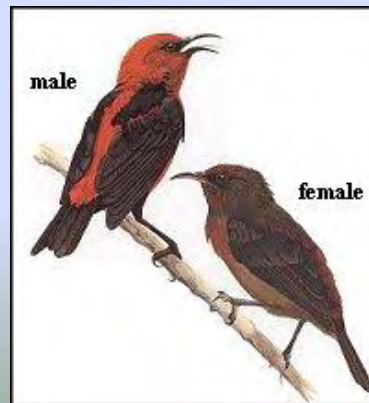


Brown Treesnake, *Boiga irregularis*



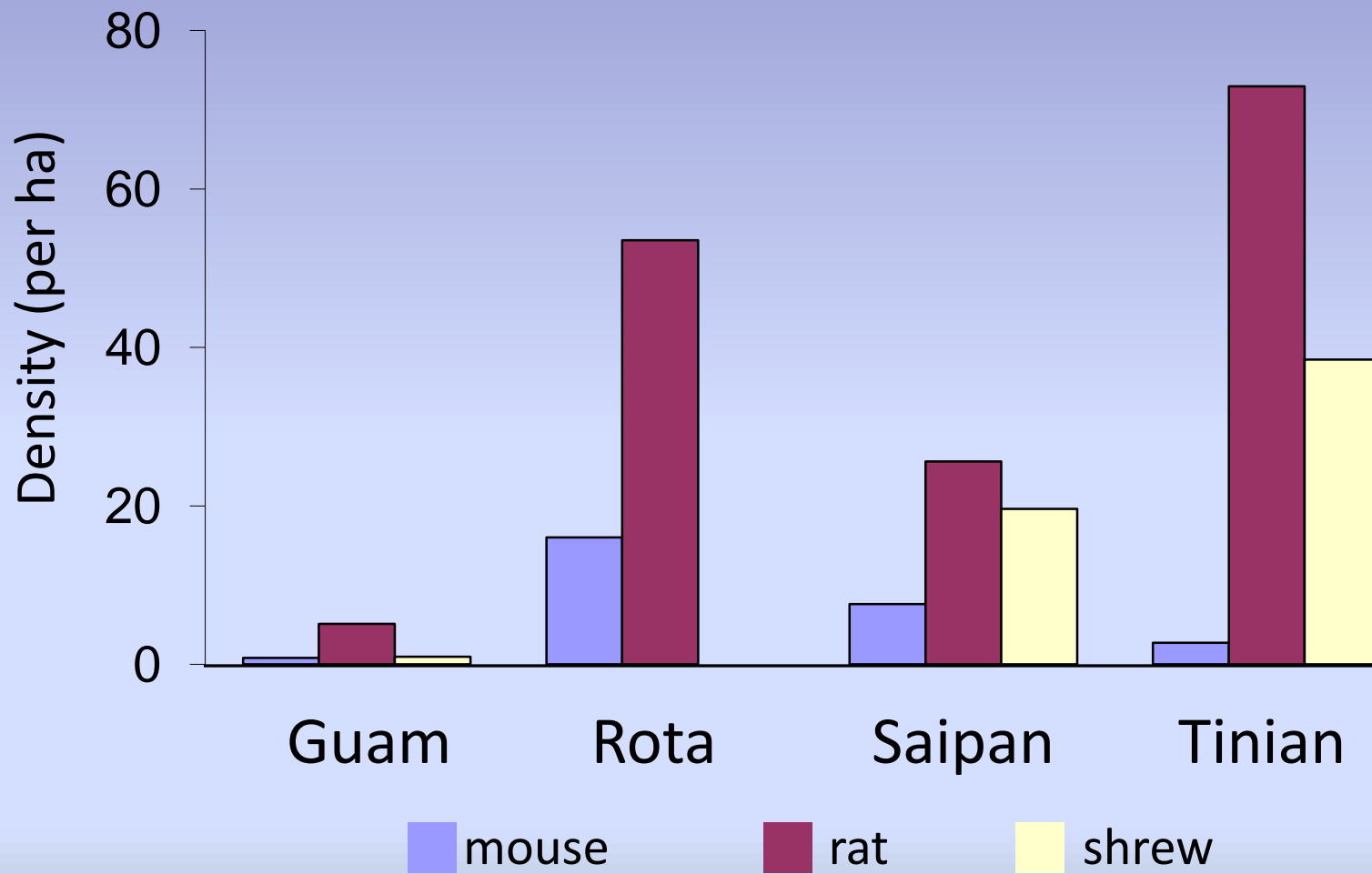
- Nocturnal, arboreal
- Arrived on Guam with WWII surplus
- Native to Australopapuan region
- Mean body size 1.2 m
- Generalist predator on vertebrates



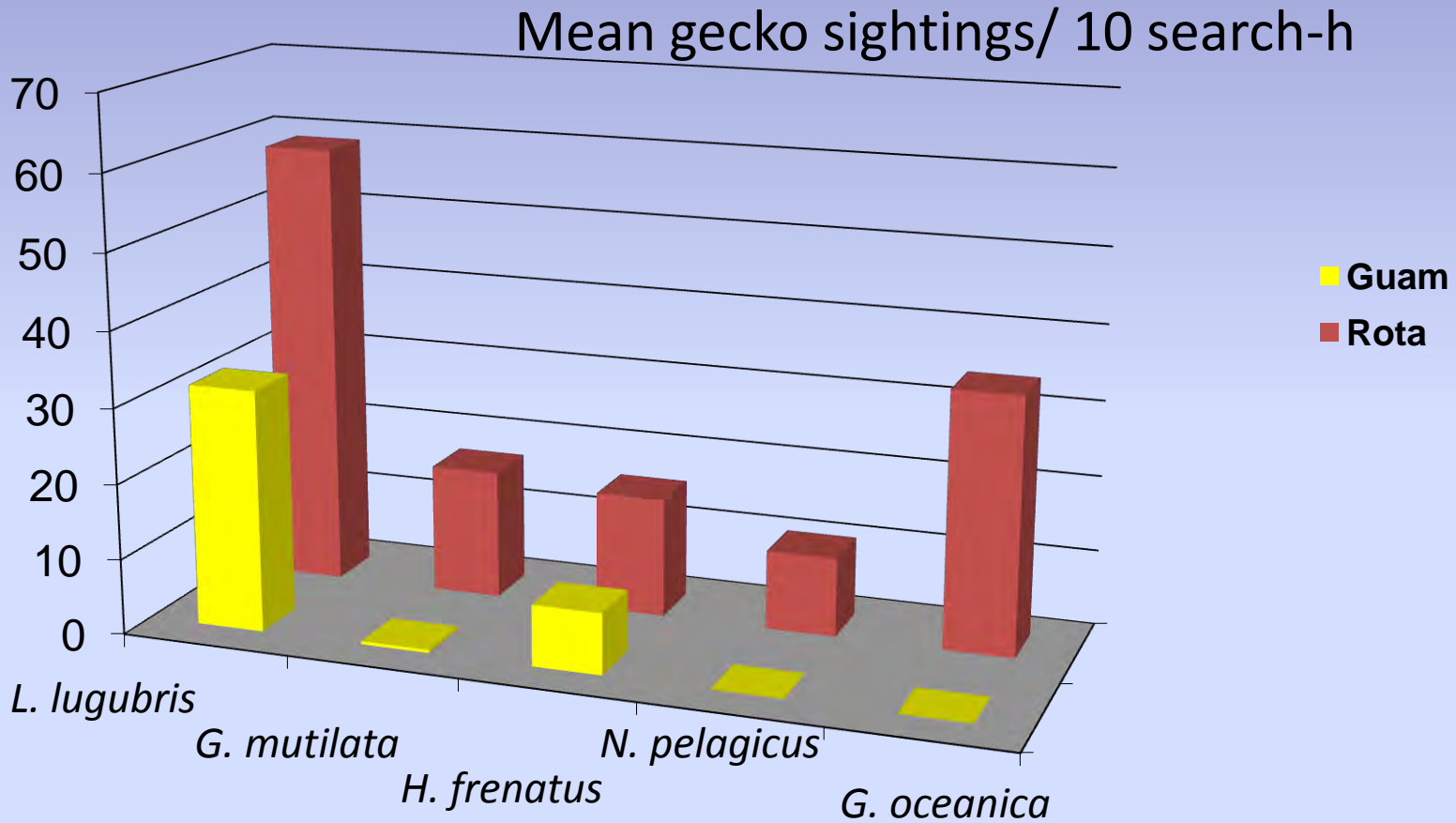




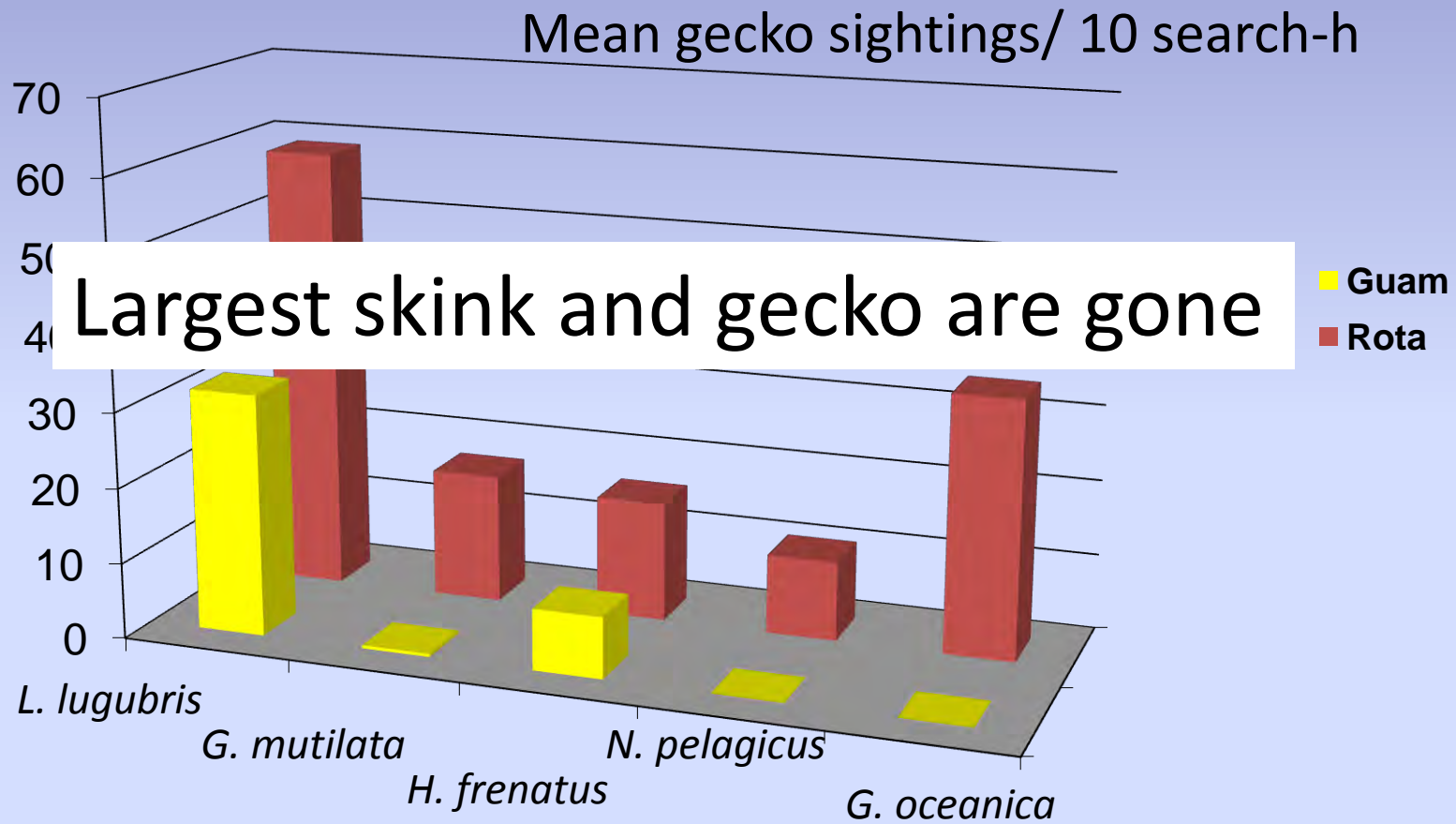
BTS suppress small mammals on Guam



BTS suppress geckos on Guam



BTS suppress geckos on Guam



Ecosystem effects





- Most birds eliminated
- Rodents reduced by ~90%
- Several lizards eliminated

How do snakes maintain populations?



6,000 - 12,000/ha



Invasive snakes can act as low-energy
apex predators on islands



Control tools



Research funding for BTS control

1990-2014

Research funding for BTS control 1990-2014

\$25 million

Control tools

*How do we know if control tools are effective
for all animals in a population?*

Validating control tools

- 5 ha (12.3 acre) enclosure
- Closed to BTS immigration and emigration
- Average densities 27 snakes/ha (11/acre)
- 9050 captures of 410 individuals since 2004



Validating control tools

***Which snakes did we CATCH?
Which snakes did we NOT catch?***

***Without validating control tools, you have no idea
if your control program is effective***



Traps



Brown Treesnake traps

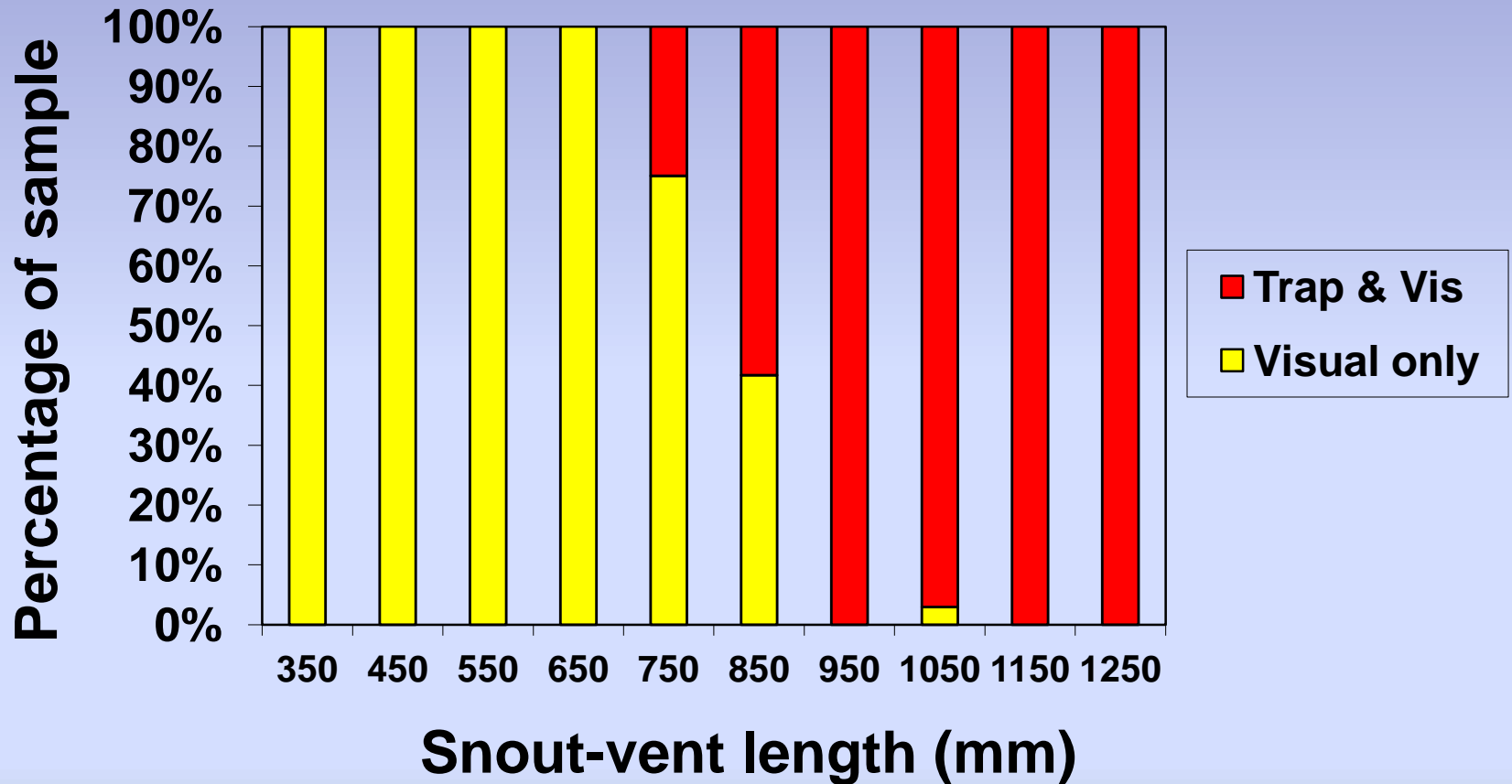


Bushnell

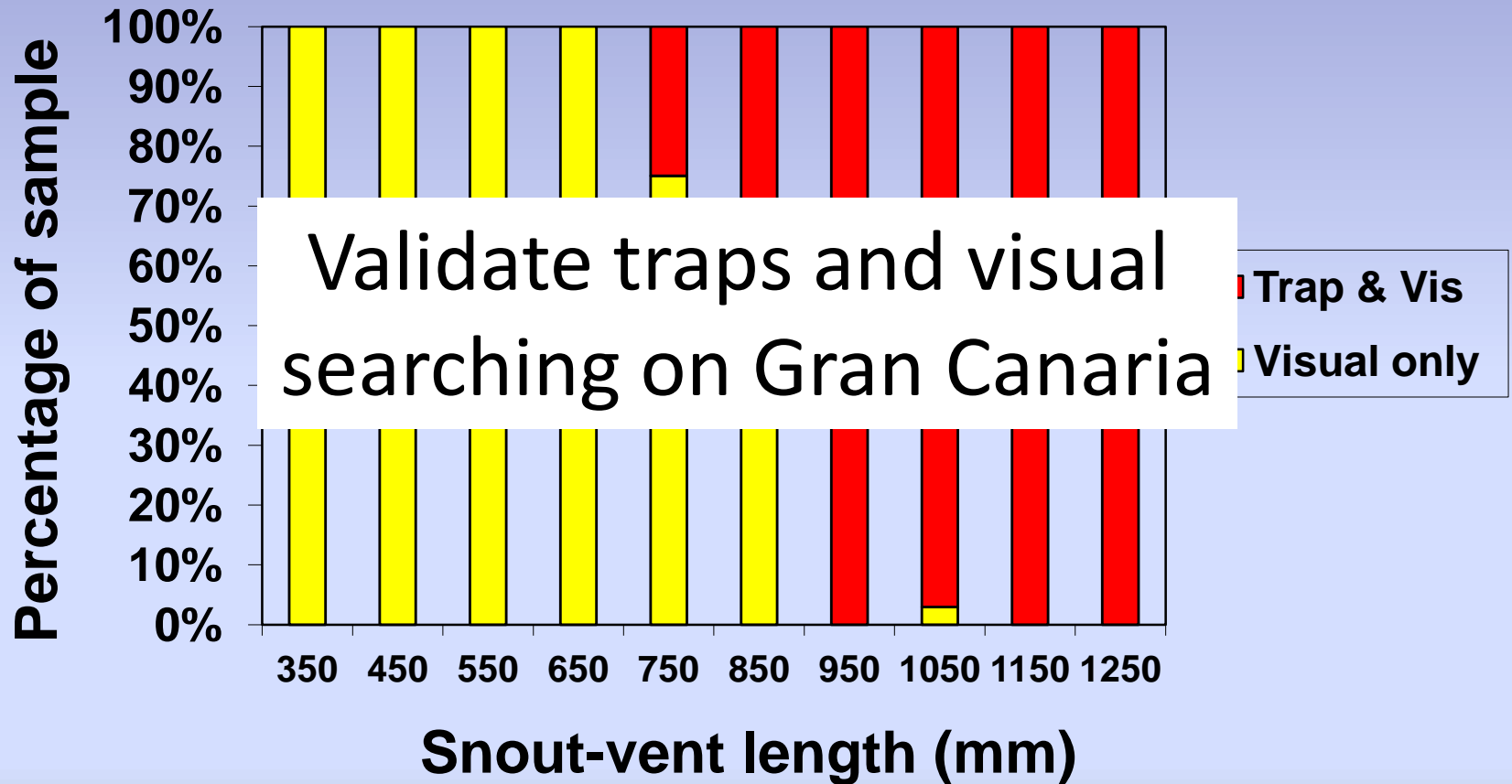
Visual surveys



Traps are size-selective, visual searching is not



Traps are size-selective, visual searching is not



Toxicants

Toxicants for large-scale BTS suppression

80 mg acetaminophen tablet inserted in dead juvenile mouse, aerial or ground delivery



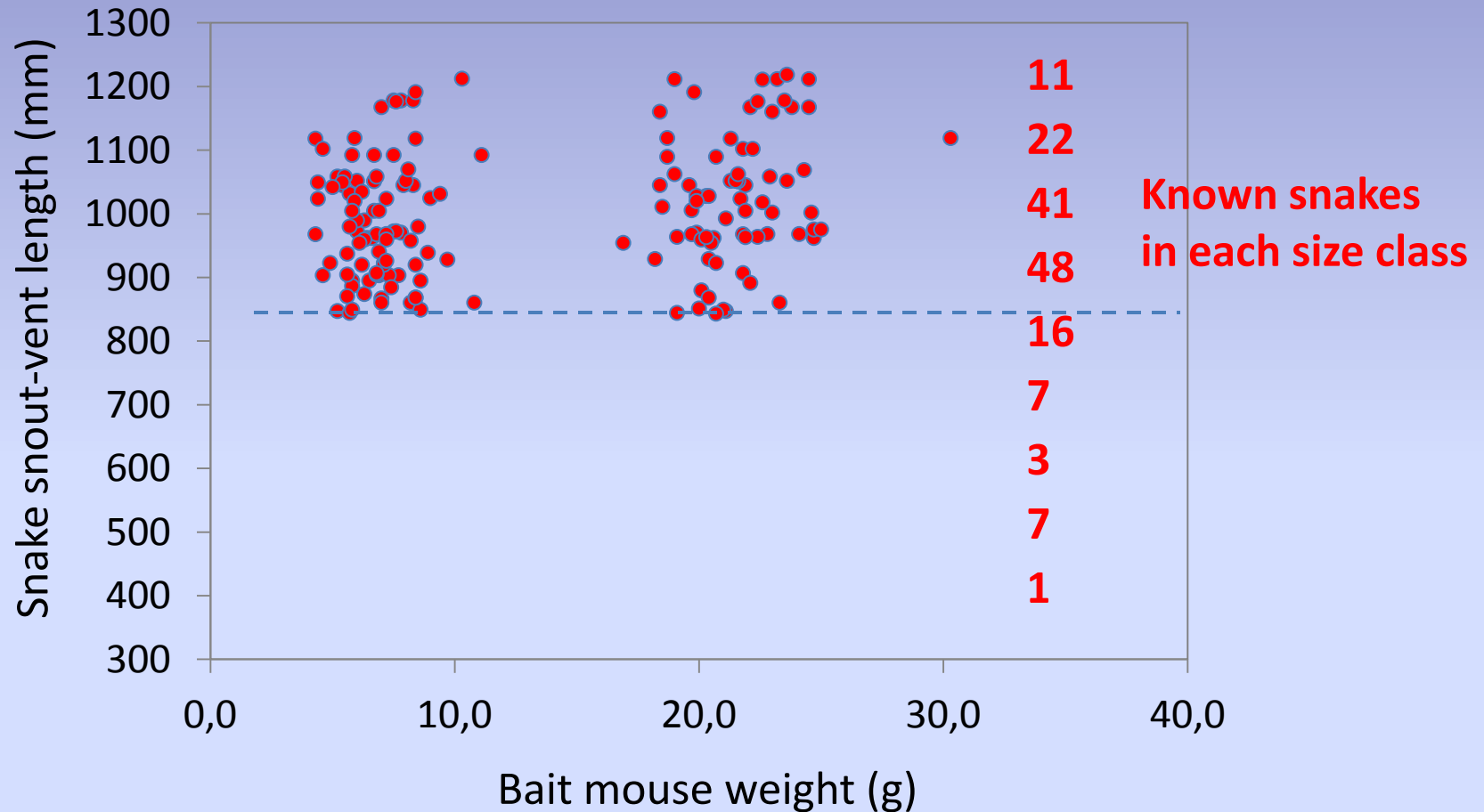
Validating population-level control via toxicants



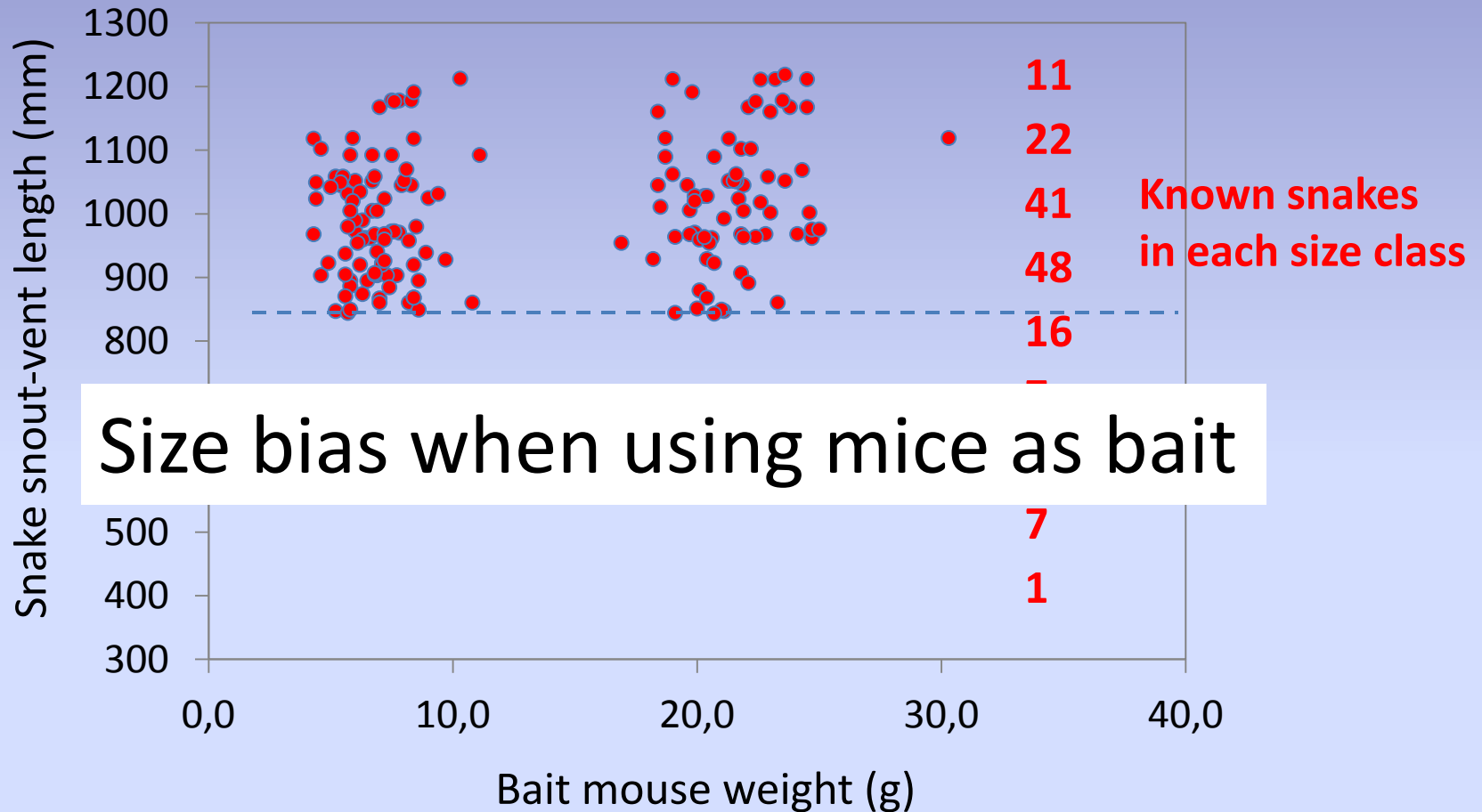
N = 164 snakes in trial



Results



Results



Detector Dogs



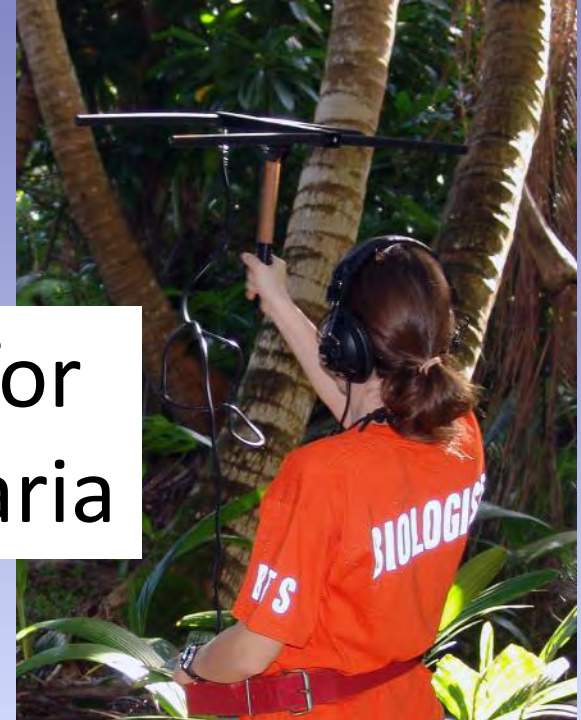
Validation of detector dogs

- 85 trials with radiotelemetered snake in forest
- 35% success at localizing to 5m x 5m area
- Success increased with humidity
- Detection does not equal capture!



Validation of detector dogs

Similar validation needed for canine teams on Gran Canaria



Interdiction

U.S. Department of Agriculture

- 3,000 snake traps around ports and airports
- Fence-line searches at night
- 16 canine teams
- 100% inspection of outgoing cargo and aircraft



Rapid Response Team

Rapid Response Team

- Team members receive two weeks of training on Guam
- Team members on snake-free islands at risk of receiving BTS
- Outreach and education on islands throughout Pacific
- Large searches organized in response to credible snake sightings



Rapid Response Team

Team deployments: Goal is NOT to find the snake that was observed

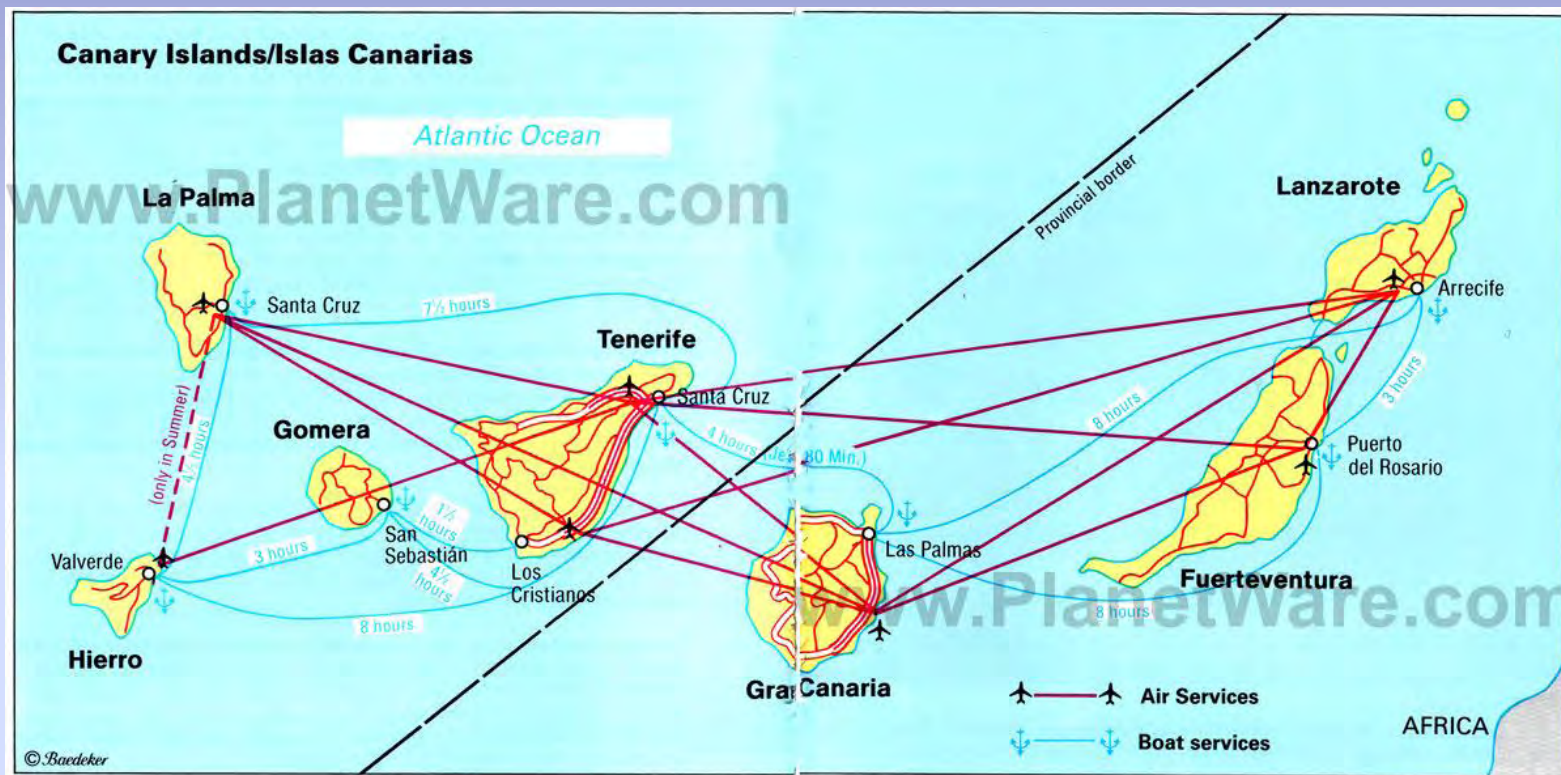


Rapid Response Team

Team deployments: Goal is to determine whether POPULATION of snakes present



Interdiction and Rapid Response for Canary Islands



Interdiction and Rapid Response for Canary Islands

- Develop and train a Rapid Response Team
- Increase biosecurity measures
- Investigate snake sightings on Tenerife
- Public awareness campaign

Annual funding for Brown Treesnakes

Annual funding for Brown Treesnakes

Research: \$1.3 million

Rapid Response Team: \$200,000

Interdiction: \$5 million

Total: \$6.5 million per year

Prioritizing management actions on Gran Canaria

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€250K: Biosecurity (interdiction), Rapid Response

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€1M: Biosecurity, Rapid Response, research, control

Prioritizing management actions on Gran Canaria

€250K: Biosecurity (interdiction), Rapid Response

€500K: Biosecurity, Rapid Response, research

€1M: Biosecurity, Rapid Response, research, control

Captive assurance colonies, local resource protection

A photograph of a brown snake, possibly a Brown Tree Snake, coiled around several white plumeria flowers with yellow centers. The snake is positioned in the center of the frame, with its head raised and facing right. The background is dark, and a large green leaf is visible on the right side.

Thank you!

Funding acknowledgments:

DOI Office of Insular Affairs

USGS Invasive Species Program

Department of the Navy