

# Overview of Invasive Species Issues on Guam

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<https://github.com/aubreymoore/PESC-OIA-overview/raw/main/guam-overview.pdf>

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# How bad is Guam's invasive species problem?

- Guam has 33 species listed in **100 of the World's Worst Invasive Species**
- Guam has 5 species listed in the **Top 10 World's Most Costly Invasive Species**.
- Guam's natural ecosystems, especially Guam's forests, are rapidly being destroyed by invasive species.

# How bad is Guam's invasive species problem?

Dominant Trees in Guam's Forests are Threatened by Asian Cycad Scale (ACS) and Coconut Rhinoceros Beetle (CRB)

Threat	Species	Status	Tree count <sup>1</sup>	% of total tree count
ACS	<i>Cycas micronesica</i>	endemic	1,571,556	16%
CRB	<i>Cocos nucifera</i>	native	1,162,494	12%
CRB	<i>Heterospathe elata</i>	introduced	1,075,552	11%
	<i>Vitex parviflora</i>	introduced	902,990	9%
	<i>Leucaena leucocephala</i>	introduced	890,217	9%

Tree census data source: J. A. Donnegan et al. 2004. Guam's Forest Resources, 2002. Available from:

[http://www.fs.fed.us/pnw/pubs/pnw\\_rb243.pdf](http://www.fs.fed.us/pnw/pubs/pnw_rb243.pdf)

# Priority Issue 1: Brown treesnake



Courtesy of USGS

# Forest Birds before BTS



# Forest Birds after BTS



## Priority Issue 1: Brown treesnake - Impacts

- Following predation by BTS, Guam's forest bird species are either extinct or on the endangered species list.
- Forest health is severely impacted by the ecosystem services that these birds provided: seed dispersal, insect control, pollination, etc.
- Restoration of Guam's avifauna is unlikely without control of BTS populations.

## Priority Issue 1: Brown treesnake - Current status

- Arrived on Guam in the late 1940s.
- Guam is the only place in the world where BTS has established as an invasive species
- Millions of dollars per year are spent on preventing BTS from leaving Guam.
- Some funds are being used for control methods development: snake-proof barriers and "pinkies on parachutes".
- Attempts at eradicating BTS from Cocos Island have not yet succeeded.

## Priority Issue 2: Asian Cycad Scale



## Priority Issue 2: Asian Cycad Scale



## Priority Issue 2: Cycad aulacaspis scale - Impacts

- Cycad aulacaspis scale, and other invasive species, have killed about 90% of Guam's endemic *Cycas micronesica* plants and the population is not recovering because natural reproduction is not occurring.
- *C. micronesica* went from being the most numerous tree in Guam's forests in 2002 to being placed on the National Endangered Species list in 2016

## Priority Issue 2: Cycad aulacaspis scale - Current status

- Detected on Guam in 2003; Also in Hawaii, Guam, CNMI, Palau; Endemic cycad population on Yap at great risk.
- Cycad aulacaspis scale is partially controlled by introduced predators and parasites on Guam, but almost all seeds and seedlings are being killed by the scale insect.

## Priority Issue 3: Coconut rhinoceros beetle



## Priority Issue 3: Coconut rhinoceros beetle - Impacts



## Priority Issue 3: Coconut rhinoceros beetle - Impacts

- A severe, uncontrolled outbreak of coconut rhinoceros beetle (CRB) on Guam is damaging and killing coconut palms and other palms.
- Island-wide, roadside damage surveys indicate that about 20% of coconut palms show visible CRB damage.
- Pheromone trap data and damage surveys have shown no significant upward or downward trend in the past 2 years and trees continue to be killed.

## Priority Issue 3: Coconut rhinoceros beetle - Current status

- First detected on Guam in 2007; also established in American Samoa, Palau, Guam, Hawaii (Oahu), and the CNMI (Rota)
- Palau, Guam, Hawaii, and CNMI have a virus-resistant strain, CRB-G, which does not respond to *Oryctes rhinoceros* nudivirus which was previously a highly effective self-sustaining biological control agent
- Much of the current effort on Guam is directed at reducing risk of accidental exporting CRB by attempts to reduce populations in proximity of ports and to increase outgoing biosecurity
- CRB-G is killing coconut palms throughout Guam. In some areas coconut palm mortality is almost 100%

## Priority Issue 4: Little fire ant



## Priority Issue 4: Little fire ant - Impacts

- **Human health.** LFA stings cause painful welts and produce varying allergic reactions.
- **Animal health.** stings to animal eyes cause a clouding or keratopathy leading to blindness
- **Ecological impacts.** LFA is highly competitive and displaces other invertebrates and vertebrates in infested areas. Mutualisms between LFA and Hemiptera causes explosions of plant pests, dramatically decreasing plant health and productivity.
- **Economic impacts.** Heavily infested structures and properties become uninhabitable without treatment. Guam's tourist industry is expected to be impacted.

## Priority Issue 4: Little fire ant - Current status

- First detected on Guam in 2011. Also in Hawaii and Yap (FSM)
- LFA has been documented to be in every village on Guam
- LFA identified at Guam ports, some in critical loading areas with direct transport to neighboring islands

# Challenges

## Human Resources

- Professional scientific/technical capacity is low
- Guam suffers from the *taxonomic impediment*
- Guam does not have a terrestrial biodiversity inventory

## Funding

- Invasive species projects on Guam are funded by many relatively small short-term competitive grants. Project management overhead (proposal writing and report writing) is very high, leaving little time to actually do the work.

# Funding sources

- Department of Interior - Office of Insular Affairs
- USDA - Forest Service
- USDA - APHIS
- DOD
- Government of Guam - Invasive Species Tarrif

# National/Territorial Invasive Species Plans

- Guam Invasive Species Management Plan <https://www.sprep.org/attachments/VirLib/Guam/nissap-2017-2019.pdf>
- Regional Biosecurity Plan for Micronesia and Hawaii  
<https://pacific.navfac.navy.mil/About-Us/Regional-Biosecurity-Plan-for-Micronesia-and-Hawaii/>

## Next steps

### Find and implement solutions for priority issues

- **Brown treesnake.** Eradicate BTS from Cocos Island
- **Cycad aulacaspis scale.** Implement an effective, island-wide, self-sustaining biocontrol program which will allow natural reproduction of surviving cycads (as per recommendations by Dr. Ronald Cave)  
<https://github.com/aubreymoore/CAS-biocontrol-seminar/raw/main/Cave-CAS-report-2022.pdf>)
- **Coconut rhinoceros beetle.** Implement an effective, island-wide, self-sustaining biological control program for CRB-G which will suppress populations, reduce damage and halt palm mortality.
- **Little fire ant.** Continue local outreach to slow spread; population control around ports, conservation areas, and beach parks; evaluation of biocontrol agents

The End - Thanks for listening.

**Invasive species aren't all bad.  
They provide job security for biologists.**

