

Improved traps for  
the coconut  
rhinoceros beetle

Moore and  
Quitugua

# Improved traps for the coconut rhinoceros beetle, *Oryctes rhinoceros*

**Aubrey Moore**

Western Pacific Tropical Research Center, University of Guam

**Roland Quitugua**

Cooperative Extension Service, University of Guam

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Pheromone Traps

Vaned bucket traps  
Ultraviolet light  
emitting diodes  
(UVLEDs)  
Pan traps

Tekken Fish Net  
Traps

Green-waste /  
Compost Piles  
DeFence Traps  
Bow Ties

Mark-Release-  
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Rotary Club, Guam, April 2015

# Overview

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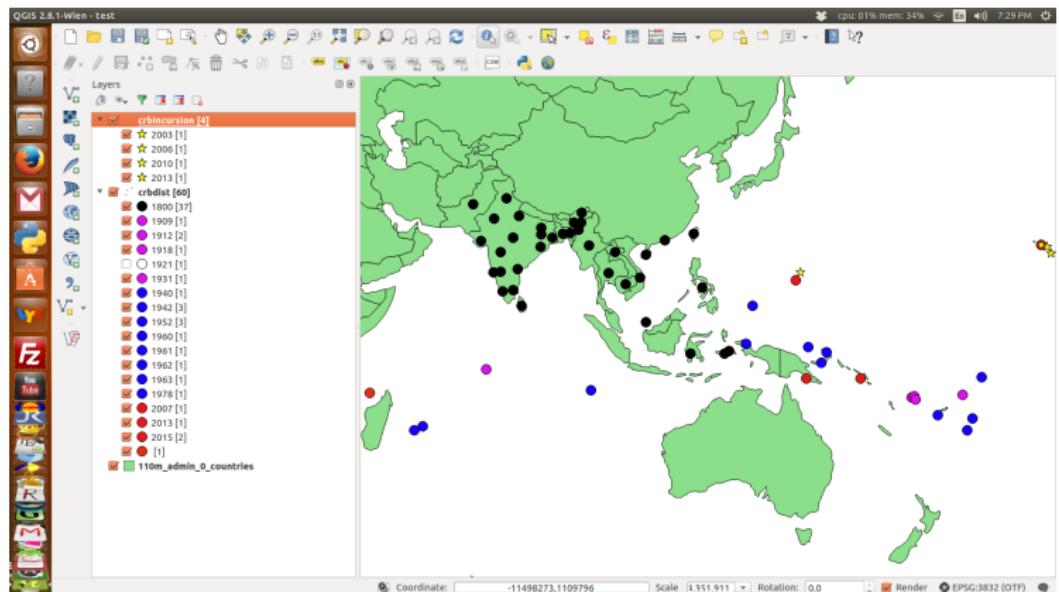
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# Geographic Distribution

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# Coconut rhinoceros beetle damage



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# Coconut rhinoceros beetle grubs



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# Feedback loop



**Figure:** Coconut palms killed by *Oryctes rhinoceros* in Fiji (photo by Bedford)

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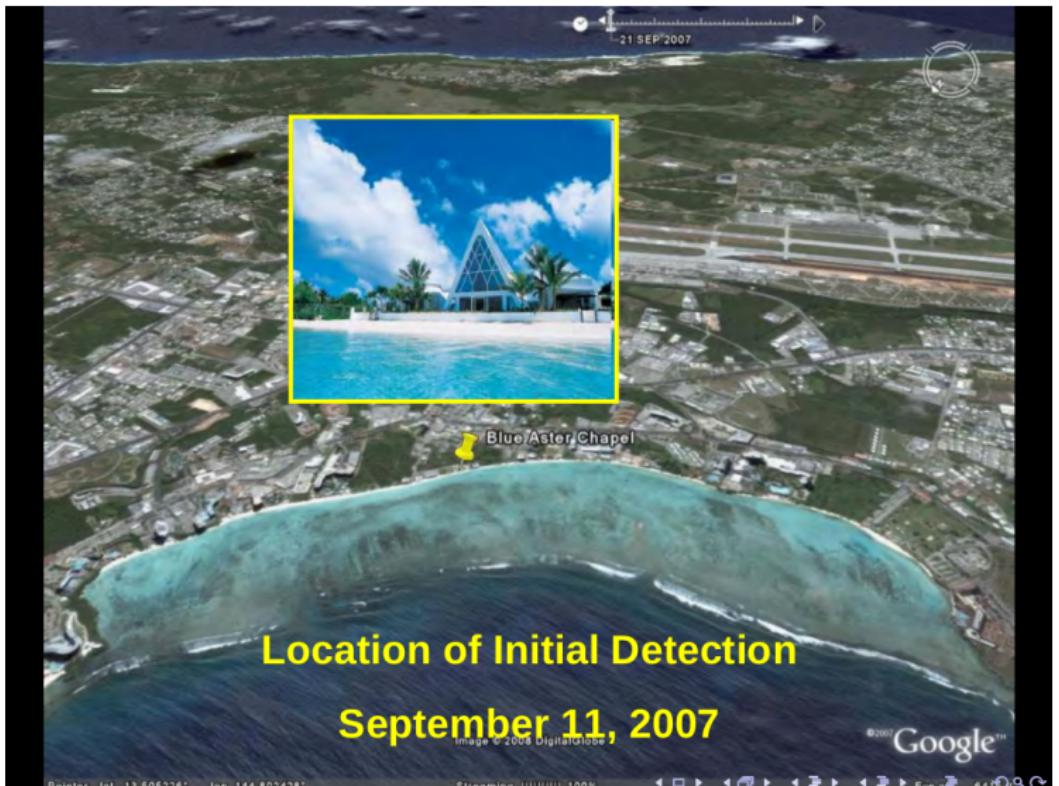
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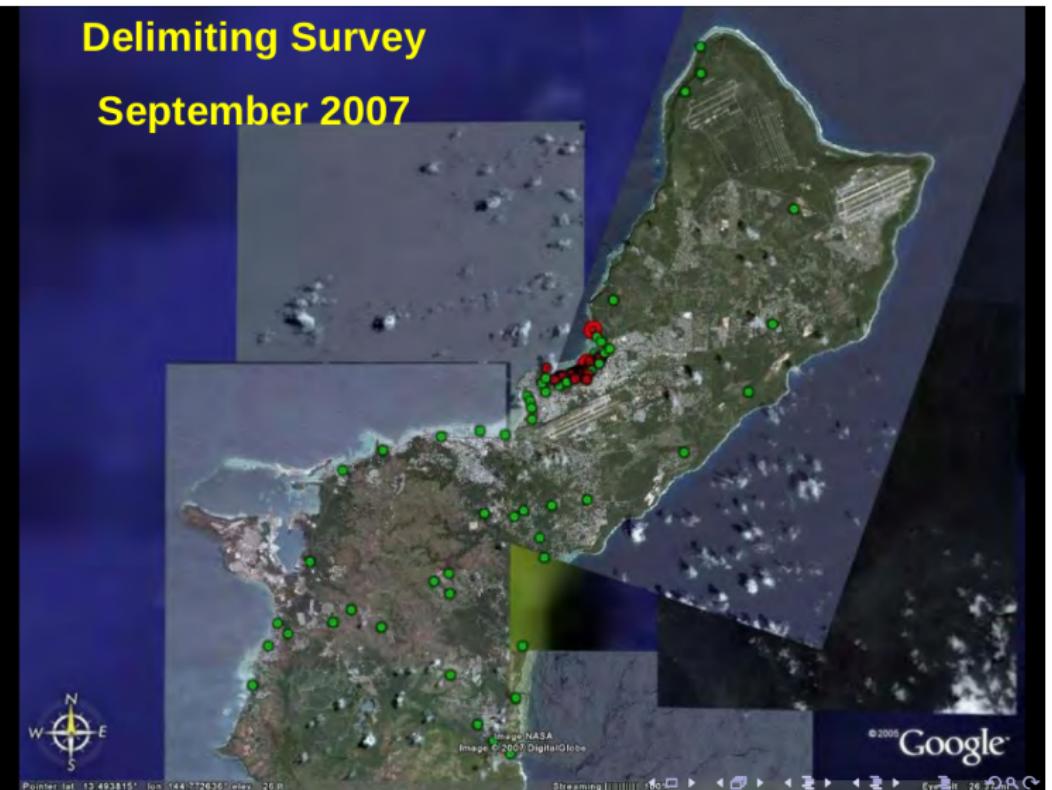
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## Delimiting Survey

September 2007



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# Guam Coconut Rhinoceros Eradication Project

## ORGANIZATION

### Partners:

USDA-APHIS

Guam Dept. of Agriculture

University of Guam

### Funding:

USDA-APHIS

US Forest Service

GovGuam

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# Guam Coconut Rhinoceros Eradication Project

## TACTICS

### Quarantine

Limit accidental transportation to uninfested parts of Guam.

### Pheromone Traps

Capture adults and detect spread of the beetle population

### Sanitation

Kill immatures and remove breeding sites

### Detector Dogs

Efficient discovery of breeding sites.

### Chemical Control

Injectable systemics for adults; spot treatments for breeding sites.

### Biocontrol

Autodissemination of *Oryctes* virus



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# Vaned bucket trap



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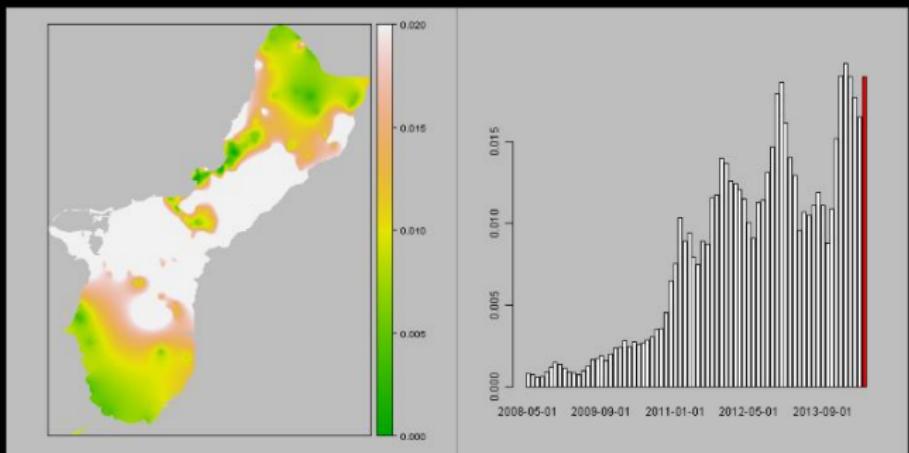
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# Vaned bucket trap

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90 day trapping period ending on 01 Jun 2014



Mean number of beetles caught per trap-day

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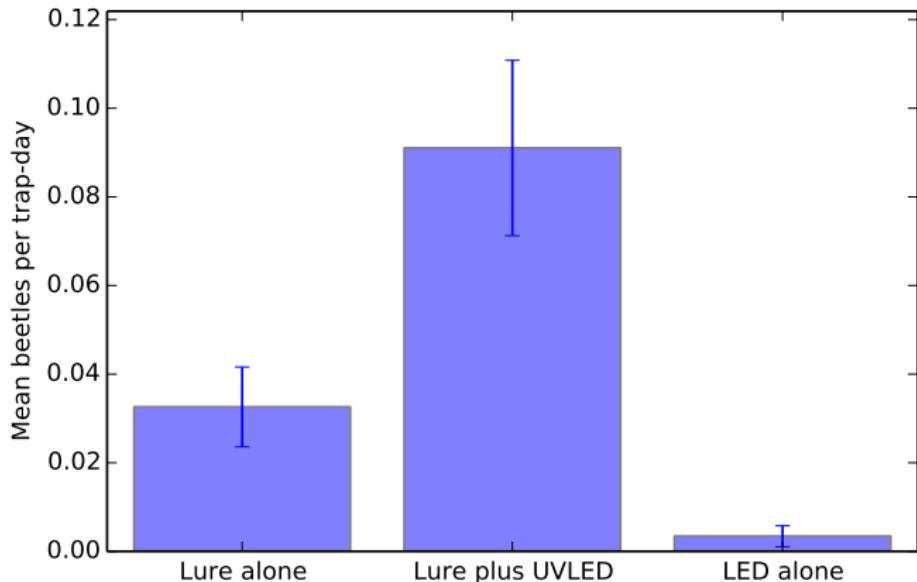
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Pan traps catch 16X as many rhino beetles as surrounding vaned bucket pheromone traps

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# Pan traps - with/without substrate in barrel

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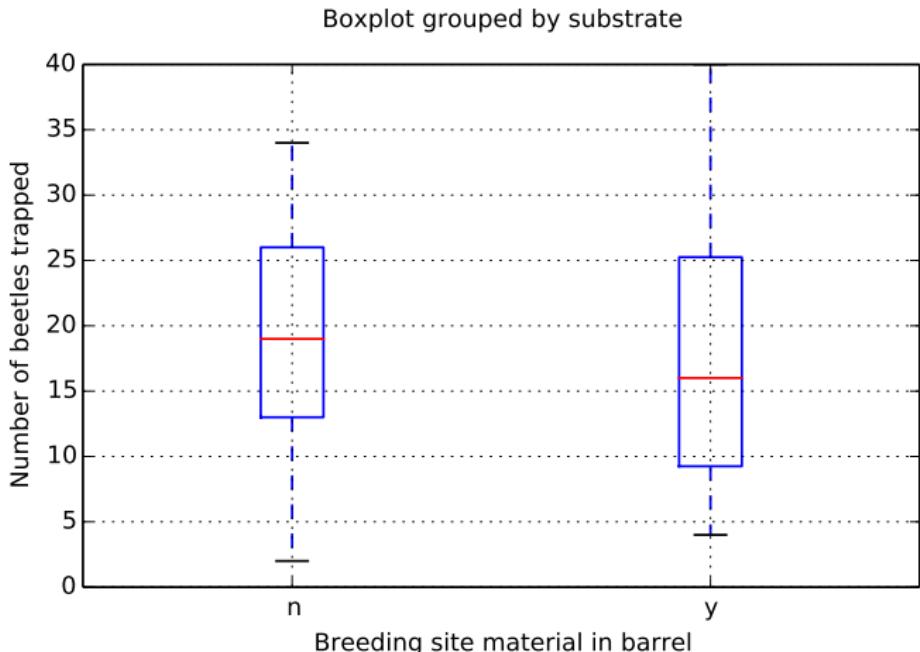
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# Evolution of CRB Pheromone Traps

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# Tekken Fish Net Traps

No lure required



Chipped breeding site material: 0.52 CRB trapped per day  
26X more attractive than standard pheromone traps



Fresh, unchipped green waste (pandanus, bamboo, breadfruit): 0.57 CRB trapped per day  
29X more attractive than standard pheromone traps

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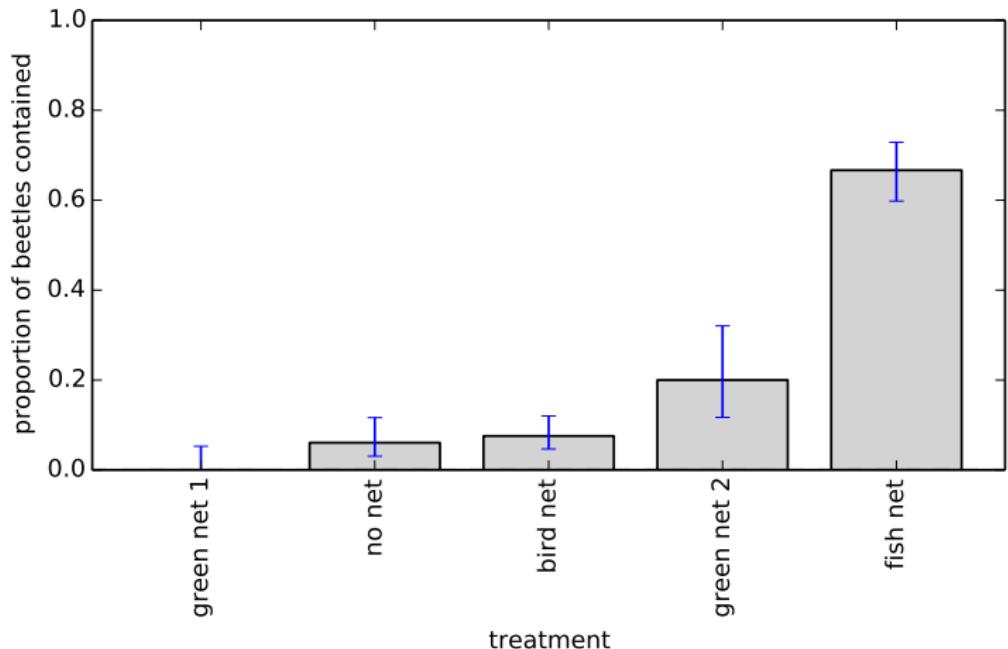
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# DeFence Trap



0.47 CRB per trap day; range = 0.22 to 0.85; n = 4 traps  
Captures 24X more CRB than standard pheromone traps

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# Bow Ties

No lure required



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- ▶ We tied pieces of netting around bases of petioles on 22 coconut palms
- ▶ Number of CRB trapped between Jan 28 and Mar 12, 2015: 3.2 (0 to 19)
- ▶ CRB trapped per day: 0.07 (0 to 0.44)

# Mark-Release-Recapture



1. Trapped beetles are fed and allowed to rest for one week
2. Beetles which pass a laboratory flight test are marked with a number
3. Marked beetles are released at the center of 31 pan traps spaced 100m apart
4. About 20% of beetles have been recaptured
5. If wild beetles behave the same as marked beetles, we can infer that pan traps catch about 20% of the wild population

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# Mark-Release-Recapture

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| Trap                            | Relative attractiveness | Proportion of population trapped |
|---------------------------------|-------------------------|----------------------------------|
| Standard pheromone trap         | 1X                      | 1%                               |
| Standard pheromone trap + UVLED | 3X                      | 4%                               |
| Pan trap                        | 16X                     | 20%                              |
| DeFence trap                    | 26X                     | 30%                              |

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1. Mass trapping using standard vaned-bucket pheromone traps did not result in population suppression. These traps catch only about 1% of the adult population.
2. Addition of breeding site material to the barrels under pan did not increase trap catch.
3. Our best pheromone trap is the a pan trap equipped with cone and UVLED. It catches about 16X more rhino beetles per day than our standard vaned bucket traps.
4. Covering breeding sites with fish netting may be effective for population suppression: traps adults attracted to the pile and prevents emergence of adults from within the pile. Netted piles catch about 25X more rhino beetles per day than standard pheromone traps.

# Mahalo and Si Yu'us Ma'ase

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- ▶ Sheri Smith, US Forest Service
- ▶ Lisa Ishibashi, USDA-APHIS
- ▶ Eric Jang and Matt Siderhurst, USDA-ARS-PBARC
- ▶ Hawaii CRB Eradication Project
- ▶ Johny Atuli and Frank Cushing