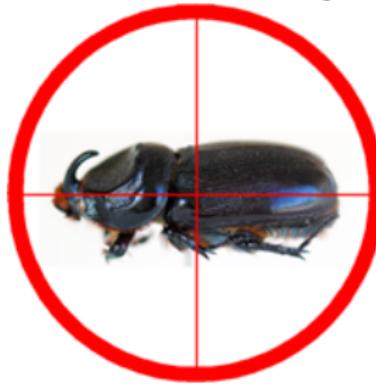


Update on the Guam Coconut Rhinoceros Beetle Eradication Project



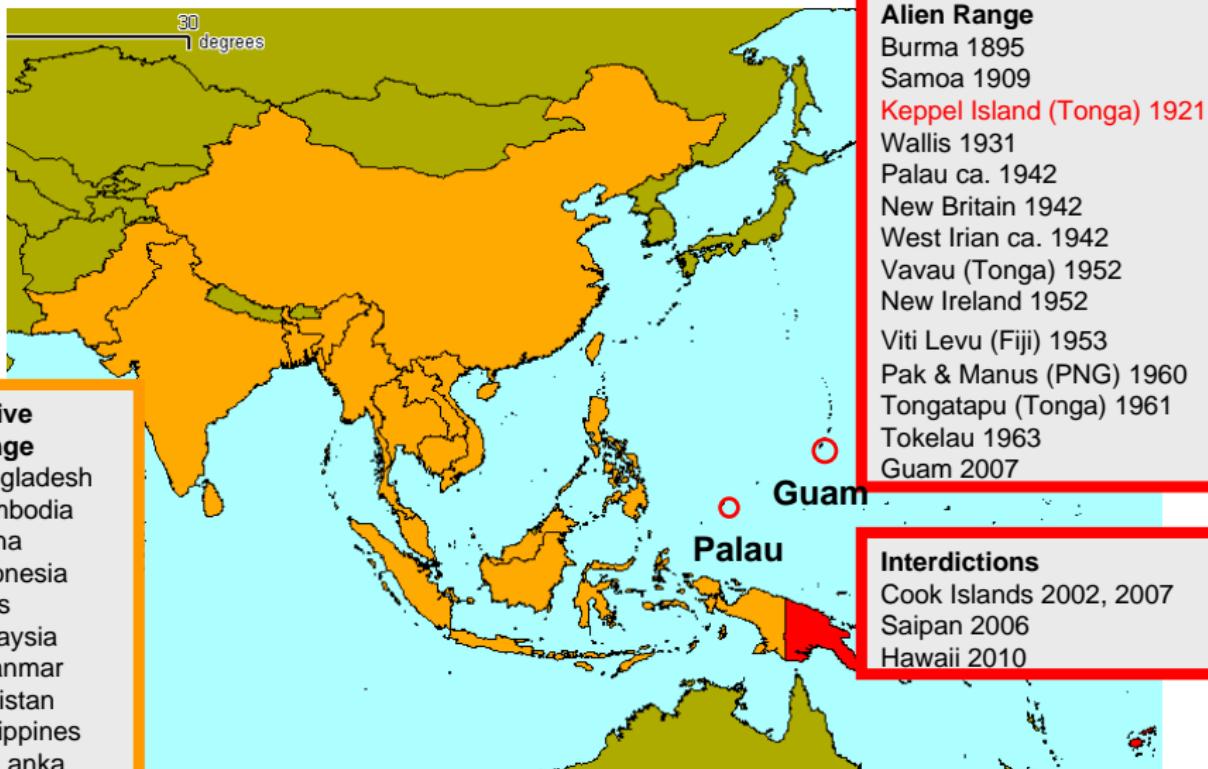
Regional Invasive Species Meeting, Guam, March 2013

Prepared by Aubrey Moore
University of Guam

First Coconut Rhinoceros Beetle
Collected on Guam
11-Sep-2007, Tumon Bay



Oryctes rhinoceros Distribution









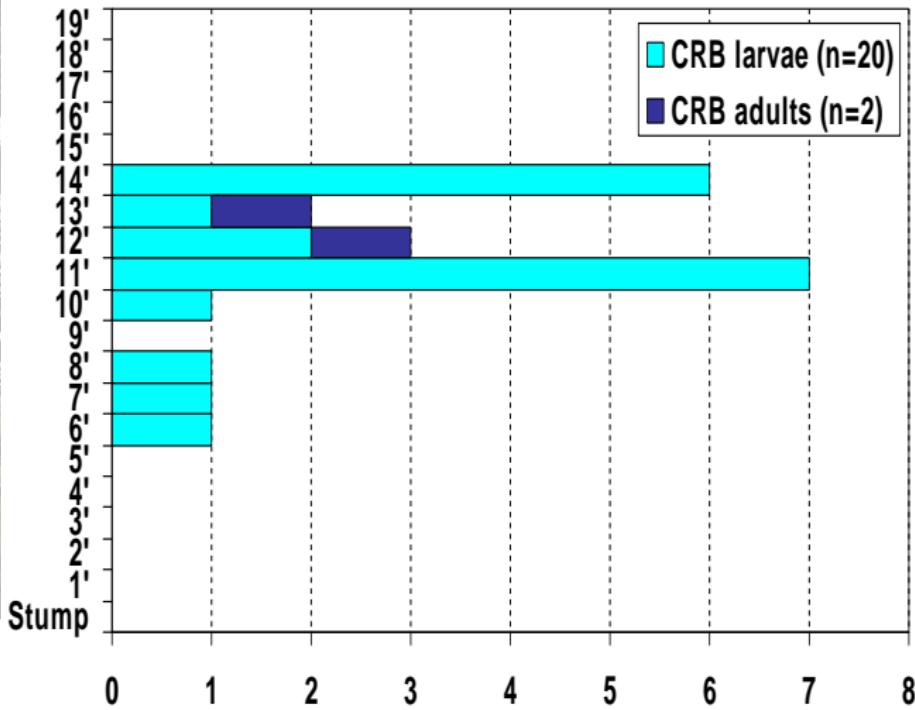








Vertical Distribution of CRB Larvae & Adults in Standing Dead Coconut Trankilidat, Guam; 25 Oct 2007



Novel CRB Behavior on Guam: Arboreal Development

CRB extracted from the crowns
of 121 felled coconut palms



Eggs	99
L1	40
L2	72
L3	210
Pupae	25
Adult males	34
Adult females	30
Total	510
Mean per tree	4.21

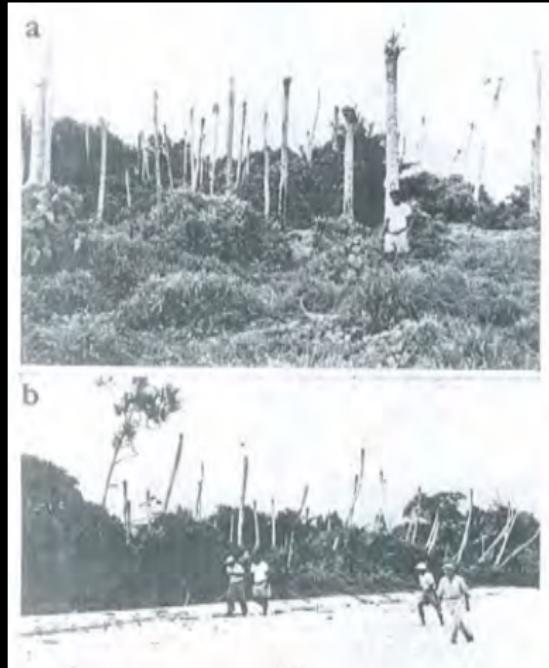


ADULTS KILL TREES

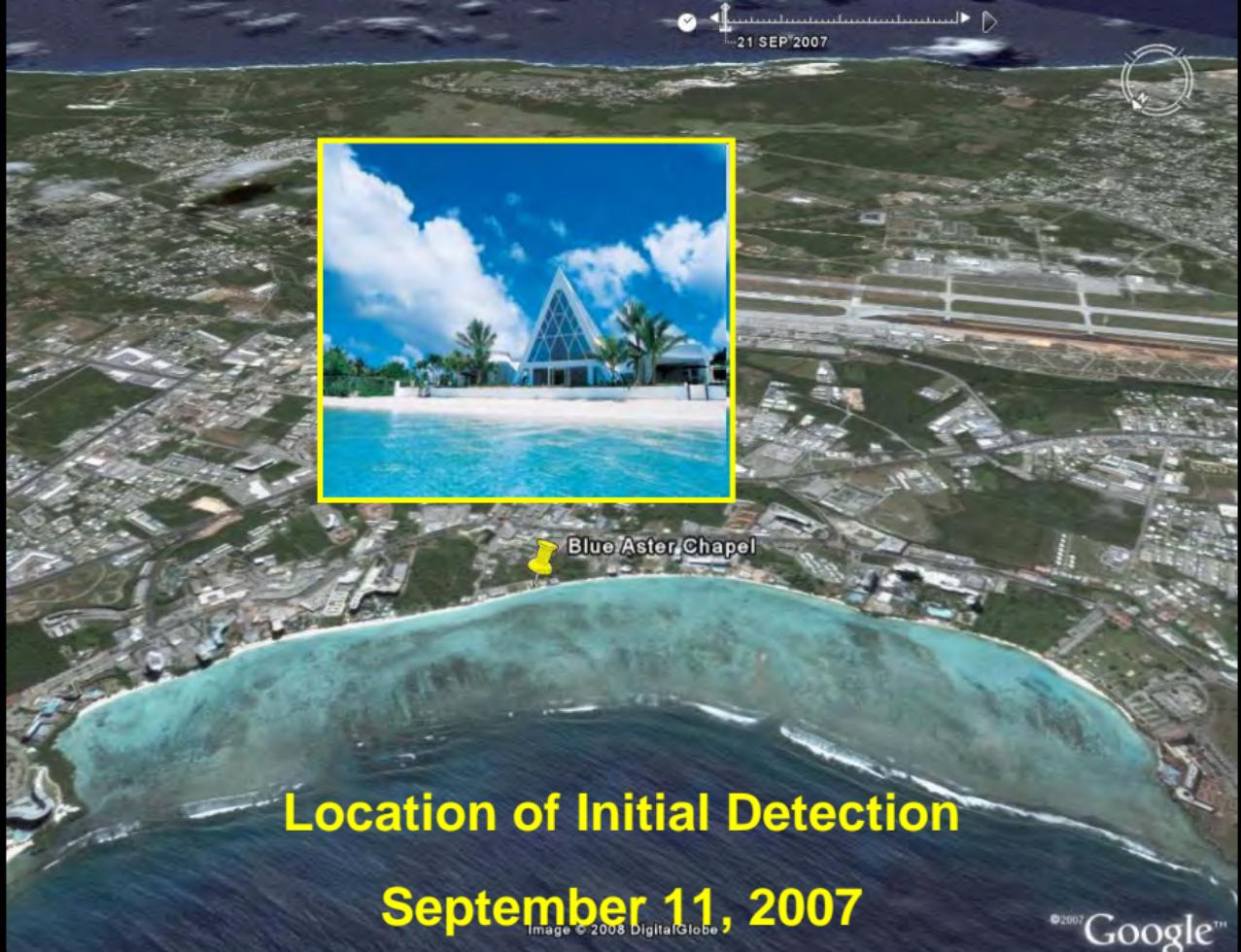
LARVAE FEED ON
DEAD TREES



Coconut palms killed by *Oryctes rhinoceros*; Viti Levu Island, Fiji; 1973
Source: ?



Coconut palms killed by *Oryctes rhinoceros*; Peleliu Island, Palau 1951
Source: Gressitt 1953



Location of Initial Detection

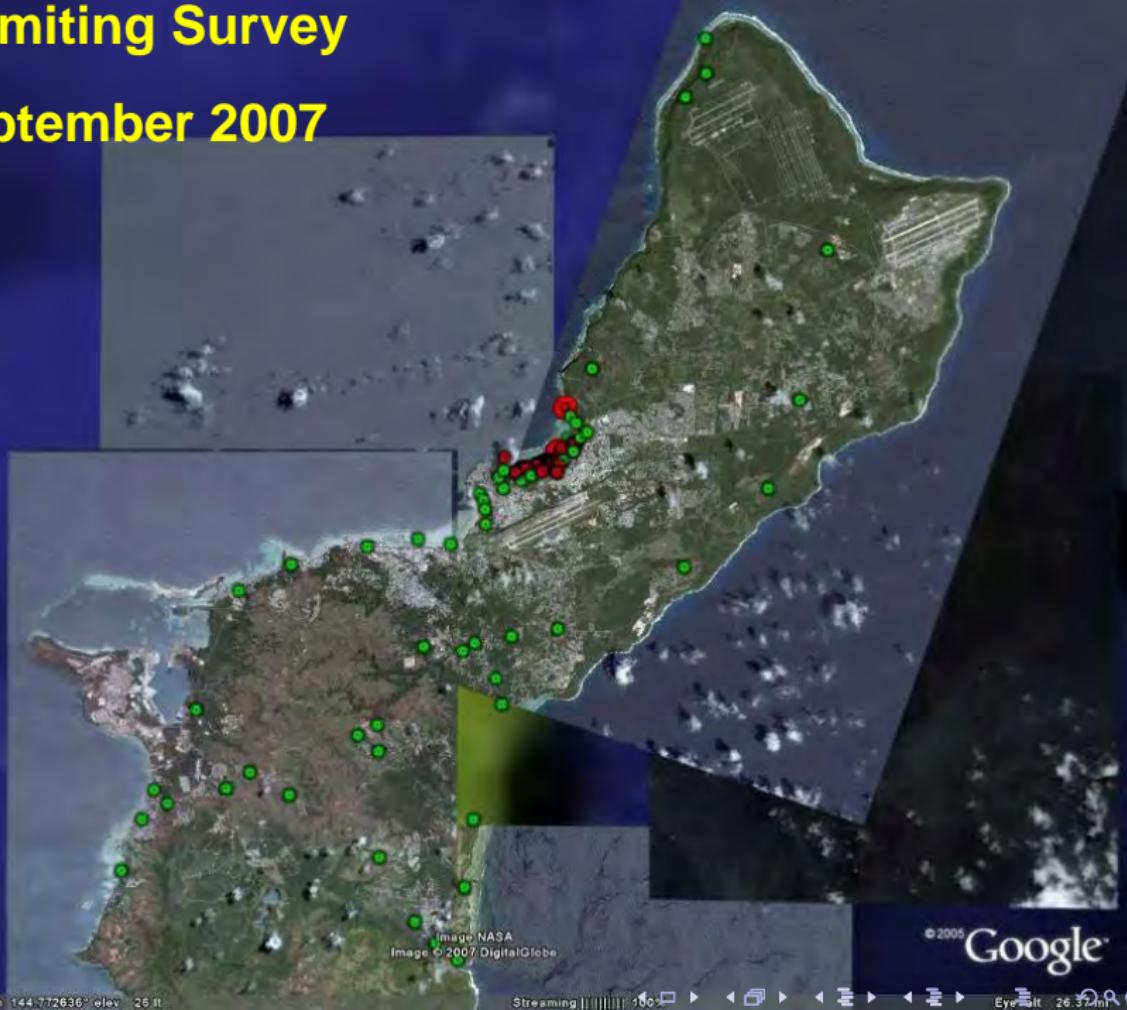
September 11, 2007

Image © 2008 DigitalGlobe

Digitized by Google

Delimiting Survey

September 2007



Guam Coconut Rhinoceros Eradication Project

ORGANIZATION

Partners:

USDA-APHIS

Guam Dept. of Agriculture

University of Guam

Funding:

USDA-APHIS

US Forest Service

GovGuam



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



Initial Quarantine Area

September 2007



Image © 2007 DigitalGlobe

Digitized by Google

PHEROMONE TRAPS

- Mass trapping unsuccessful
- Traps useful for monitoring



Trap Data Entry Form

Mozilla Firefox

File Edit View History Delicious Bookmarks Tools Help

http://guaminsects.net/orycles/upload_site_visit_gpx_3.php

New guinea sugarcan... Encyclopedia of Life F... webtip UOG mail Guam mail label printer weather Insect World Agriculture and Natural.. We Are Guahan

http://guaminsects.e_visit_gpx_3.php

Upload Trap Visit GPX file to Database

Trapper(s):

Trap Visit Date:

Choose a GPX file to upload:

Online Trap Data Report



Visualization of Trap Catch Data

Aubrey Moore

Guam Coconut Rhinoceros Beetle Eradication Project



Generated 2013-02-03 16:29:09

Path: C:/Documents and Settings/Administrator/My Documents/CRB monthly surveillance reports/map dev

R script: makeMaps.R

Brew file: makeBeamer.txt

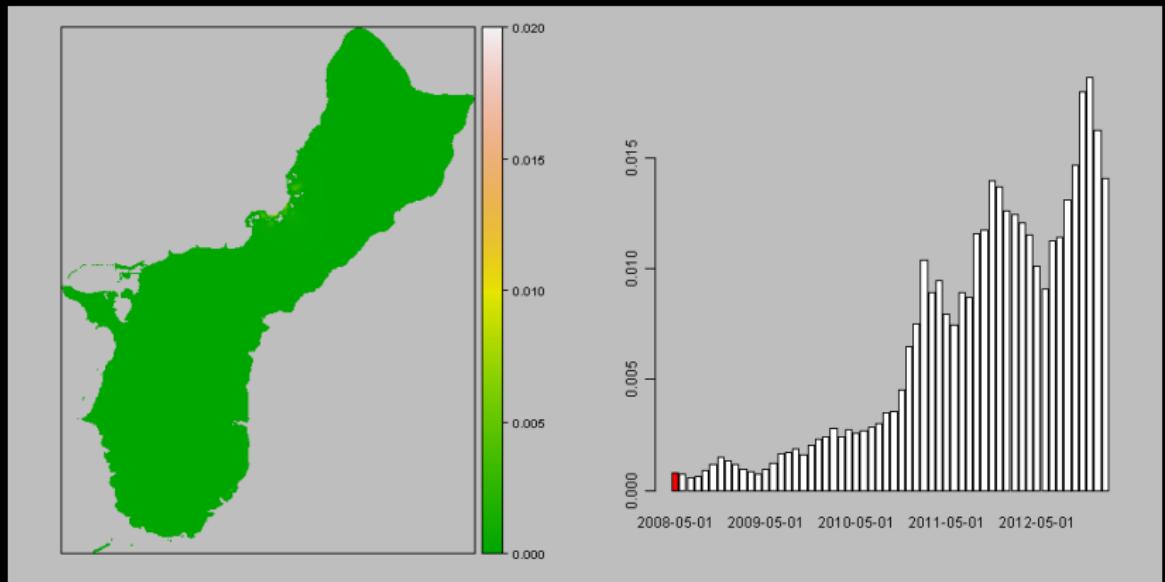
Introduction

- ▶ The following frames show spatial-temporal changes in numbers of CRB adults caught in pheromone traps.
- ▶ Note that trap catches on Guam are very low: the scale runs from 0 to only 0.02 beetles per trap day, a trap rate of only one beetle every 50 days.

Methods

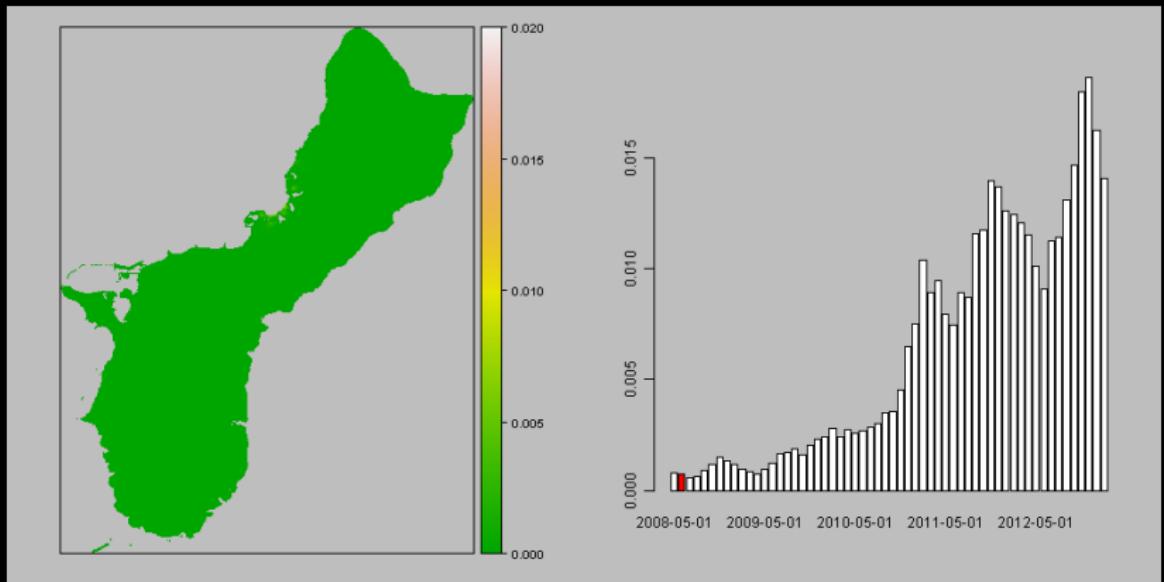
- ▶ Interpolated raster maps were made using an R script which:
 1. Accesses georeferenced data stored in the CRB project's online MySQL database.
 2. Processes the data using the GRASS6 GIS
 3. Writes the \LaTeX code which generated this PDF document.

90 day trapping period ending on 01 May 2008



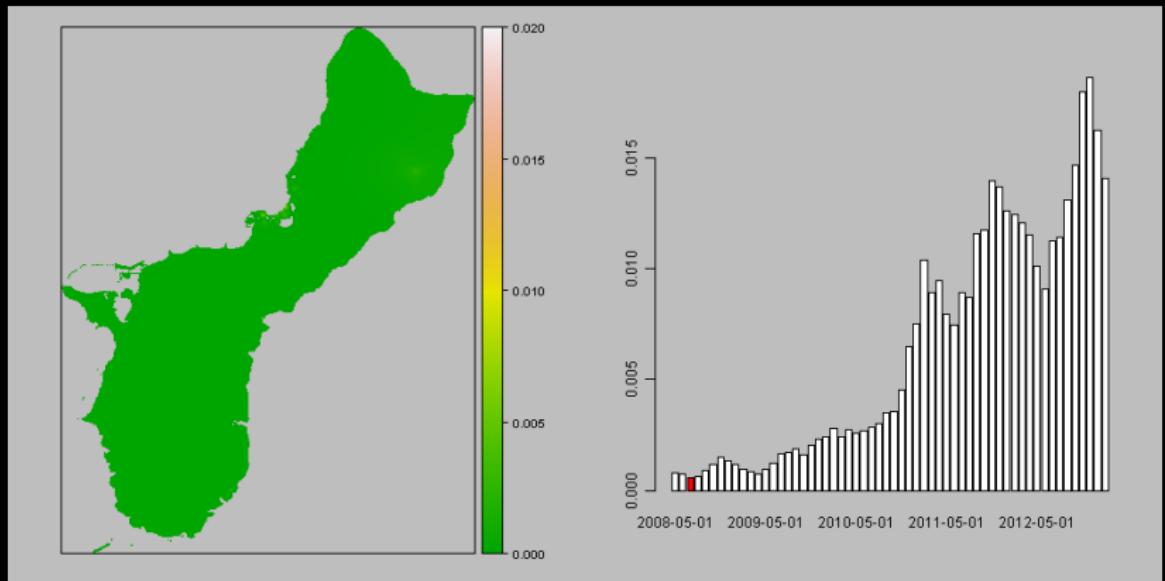
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jun 2008



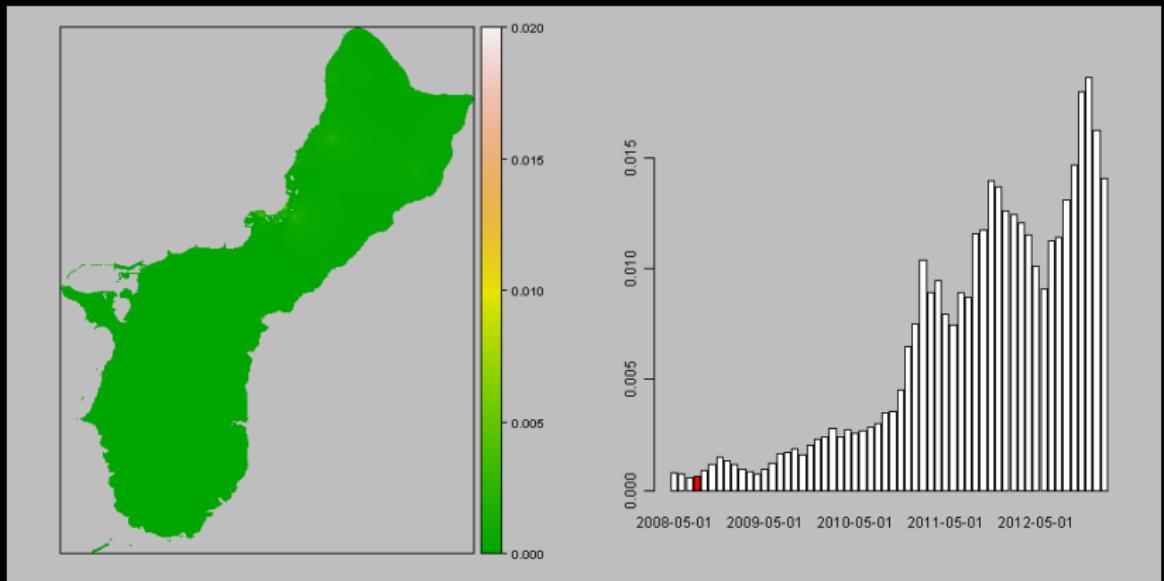
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jul 2008



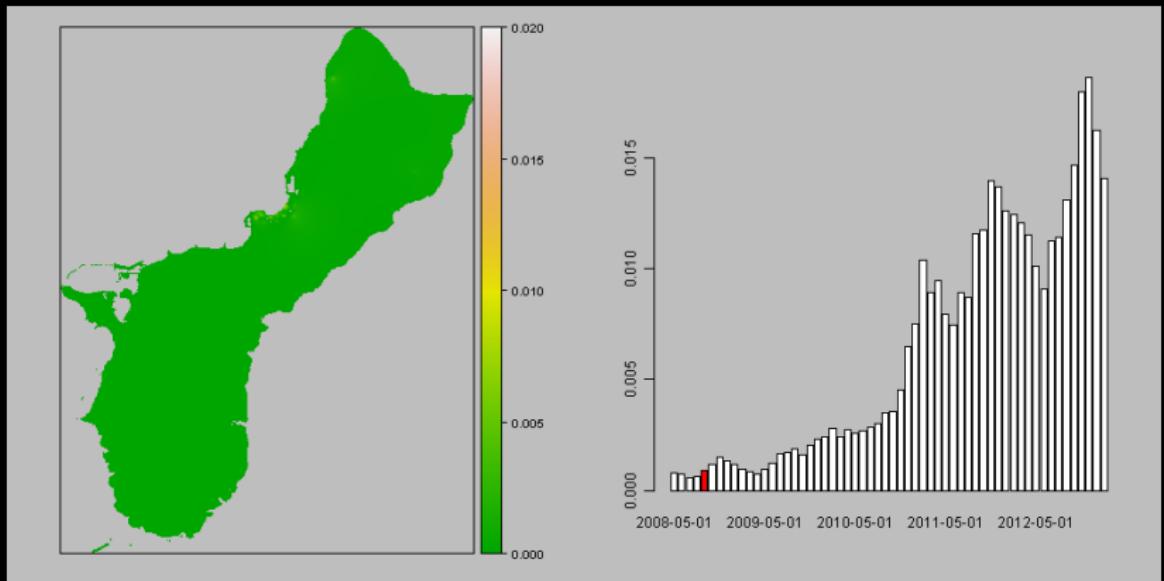
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Aug 2008



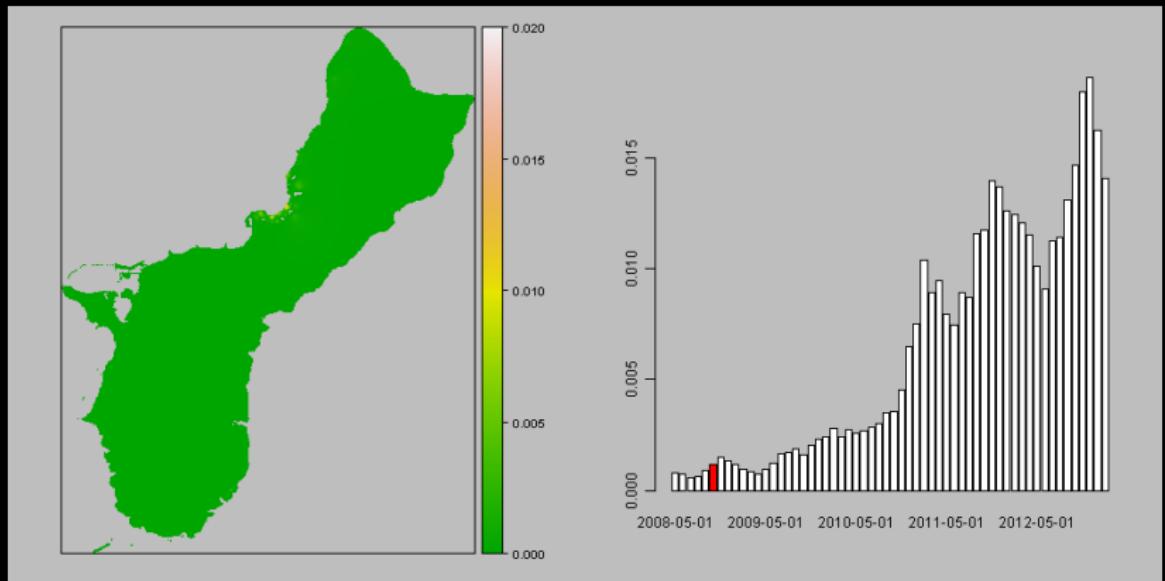
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Sep 2008



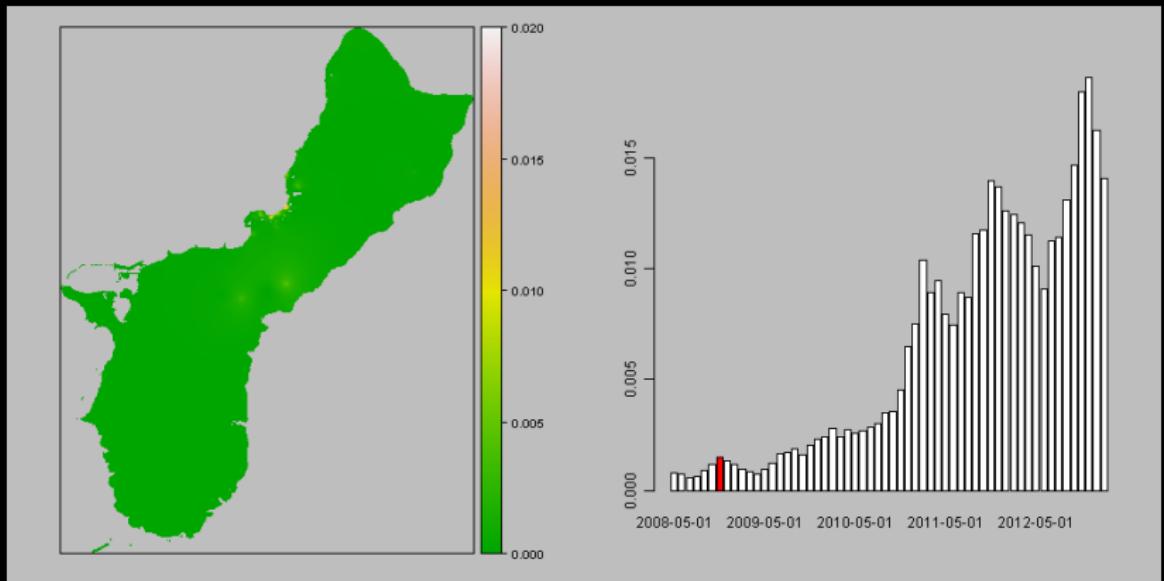
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Oct 2008



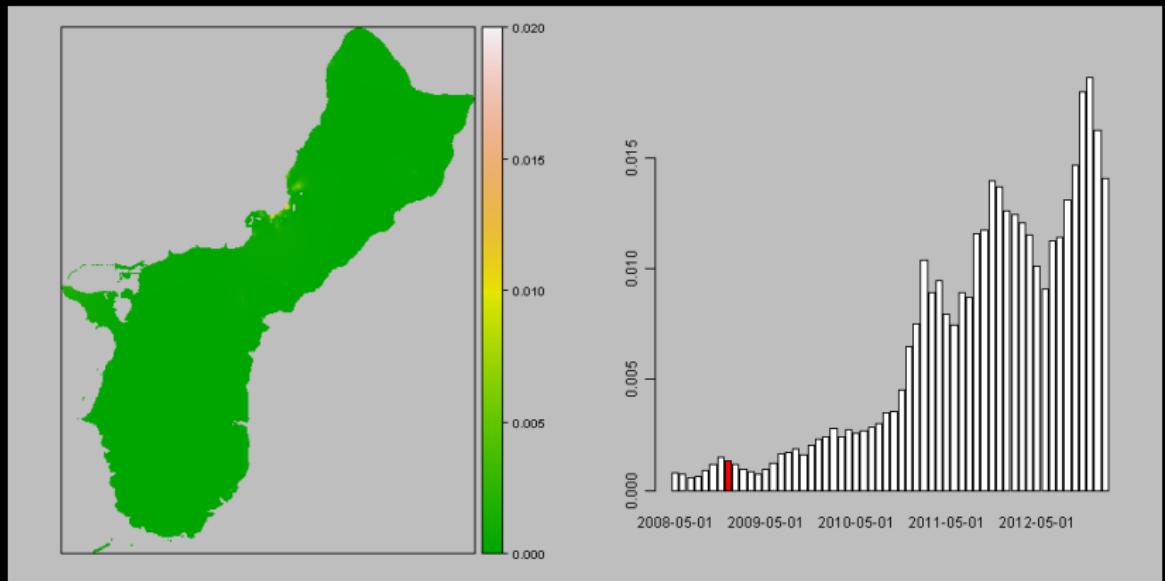
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Nov 2008



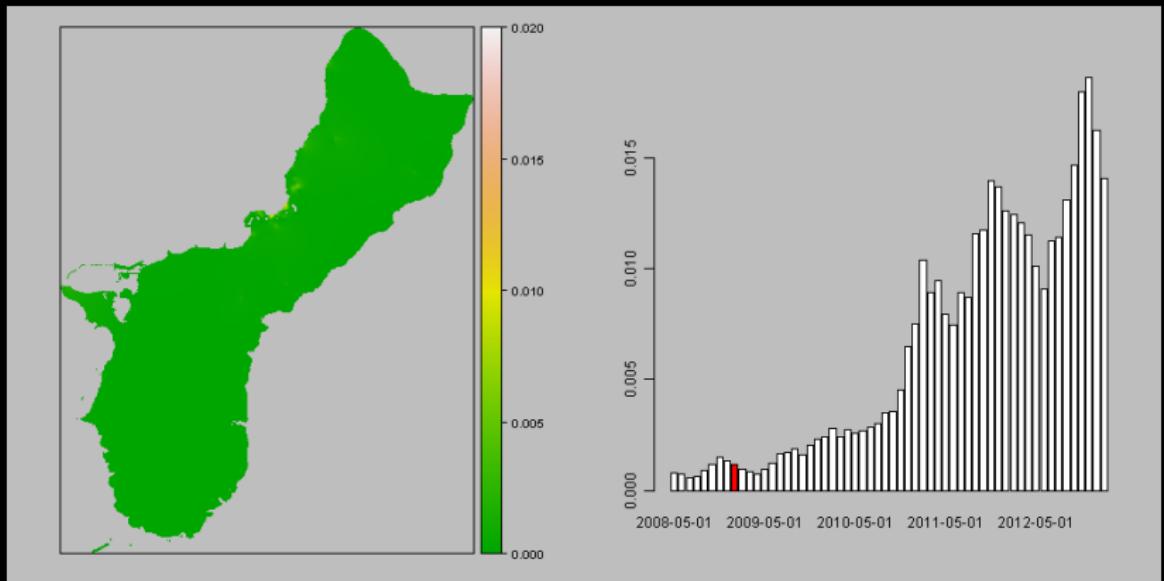
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Dec 2008



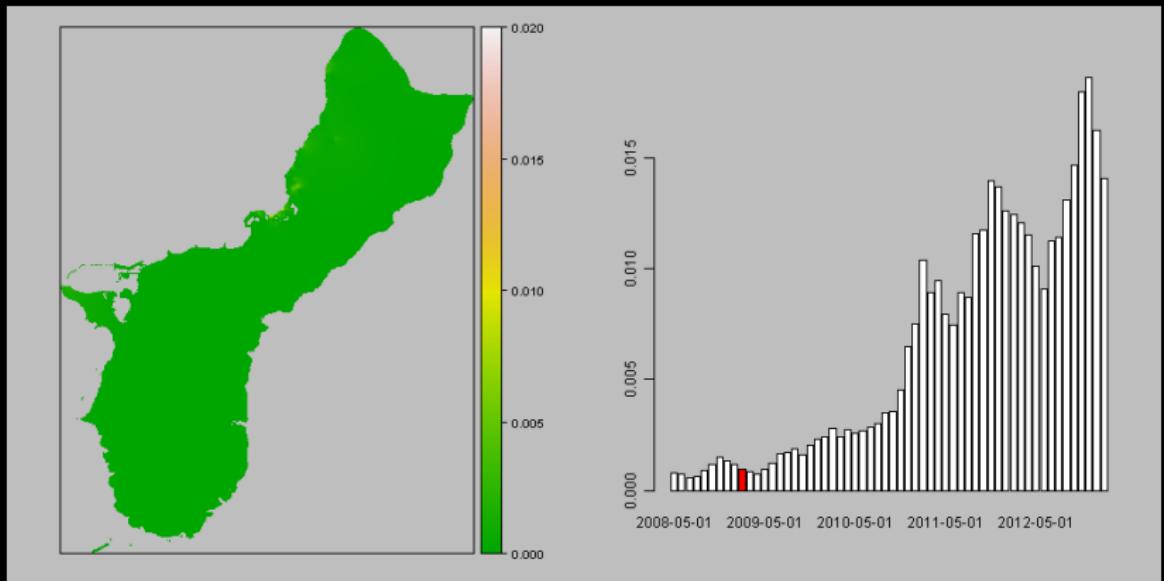
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jan 2009



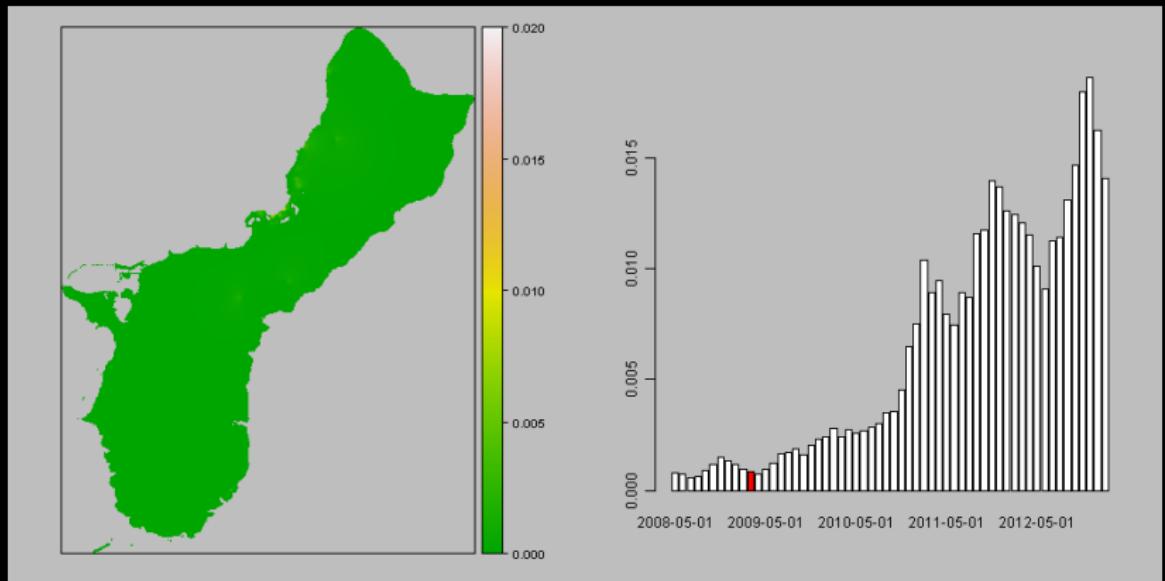
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Feb 2009



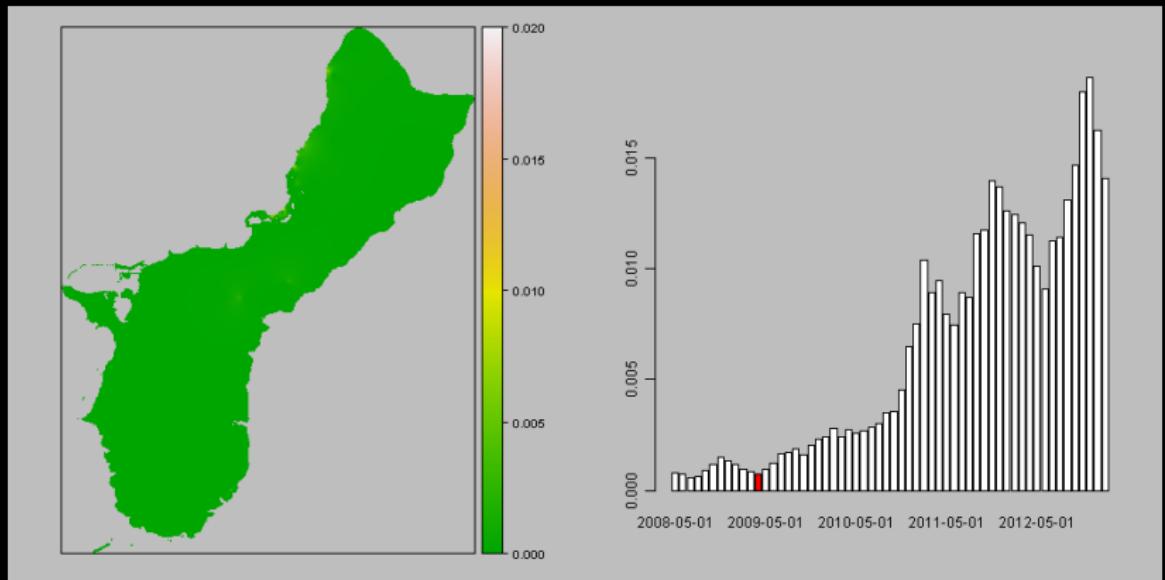
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Mar 2009



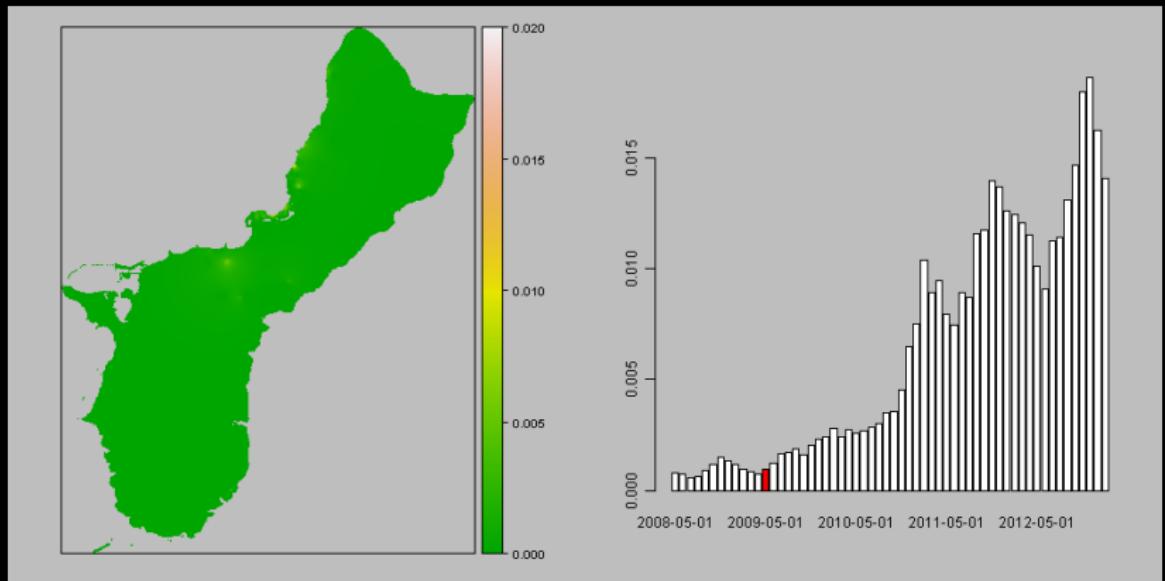
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Apr 2009



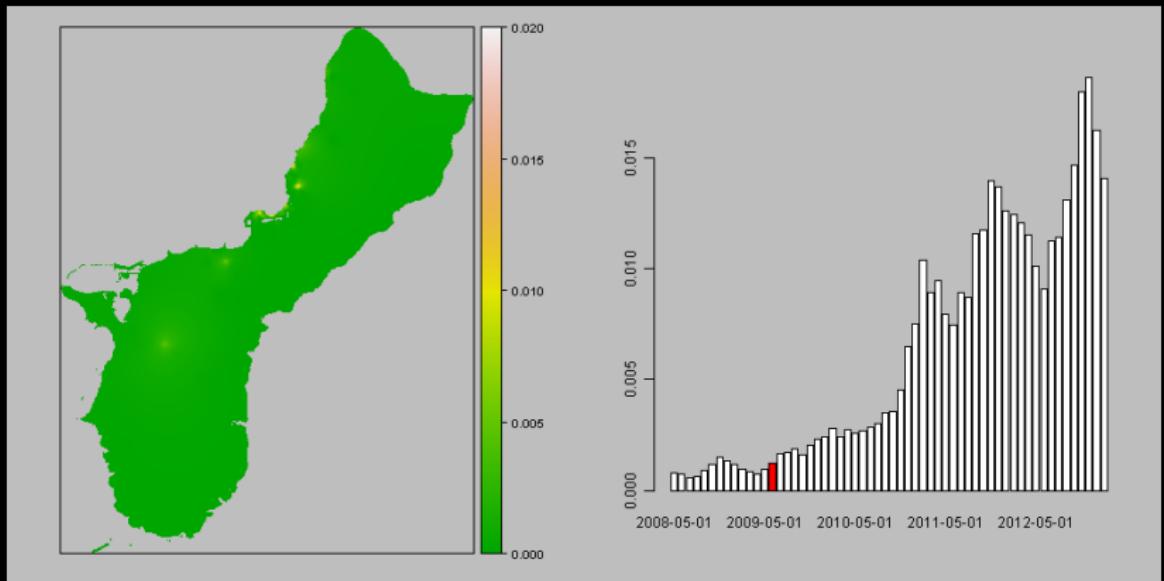
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 May 2009



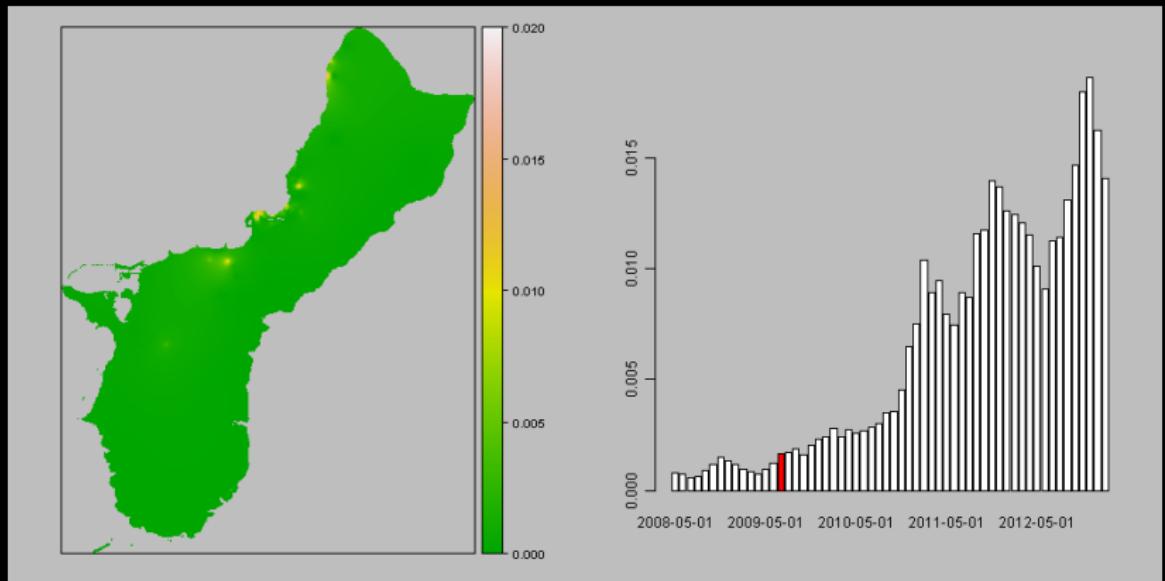
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jun 2009



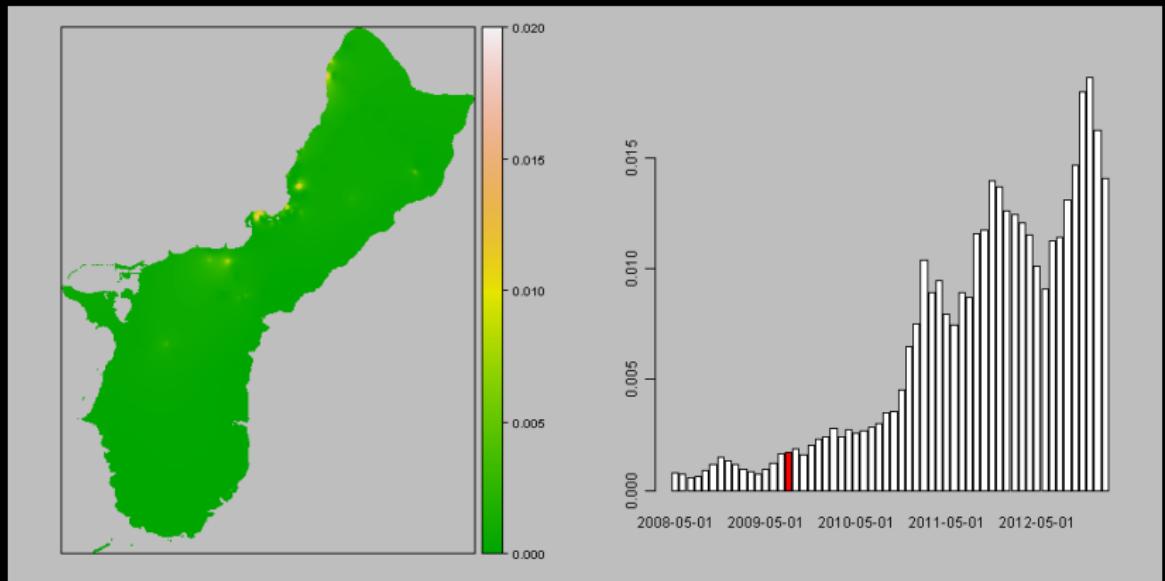
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jul 2009



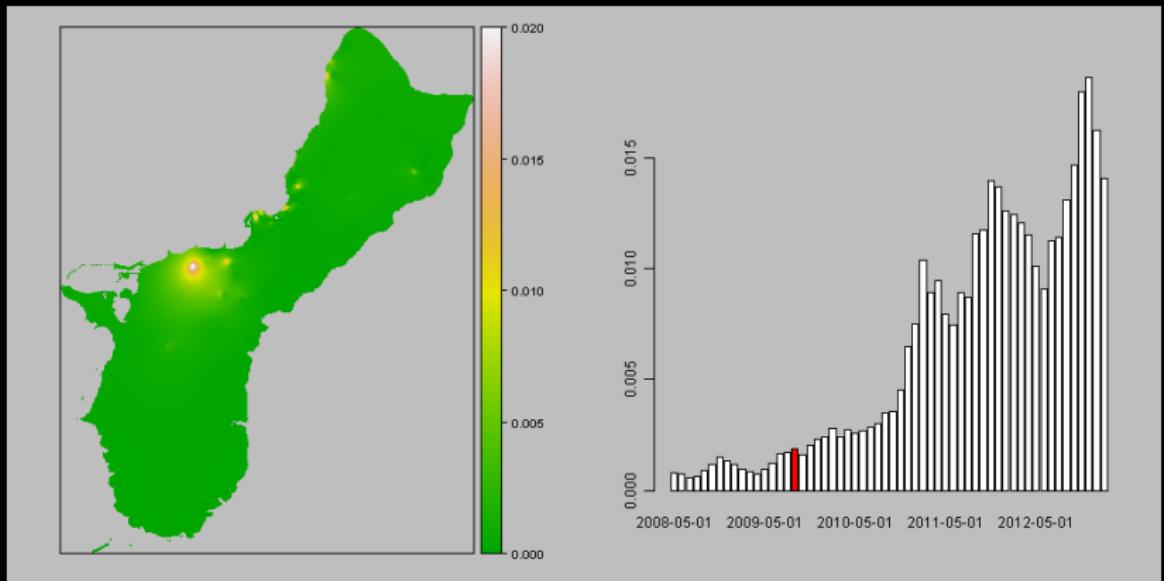
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Aug 2009



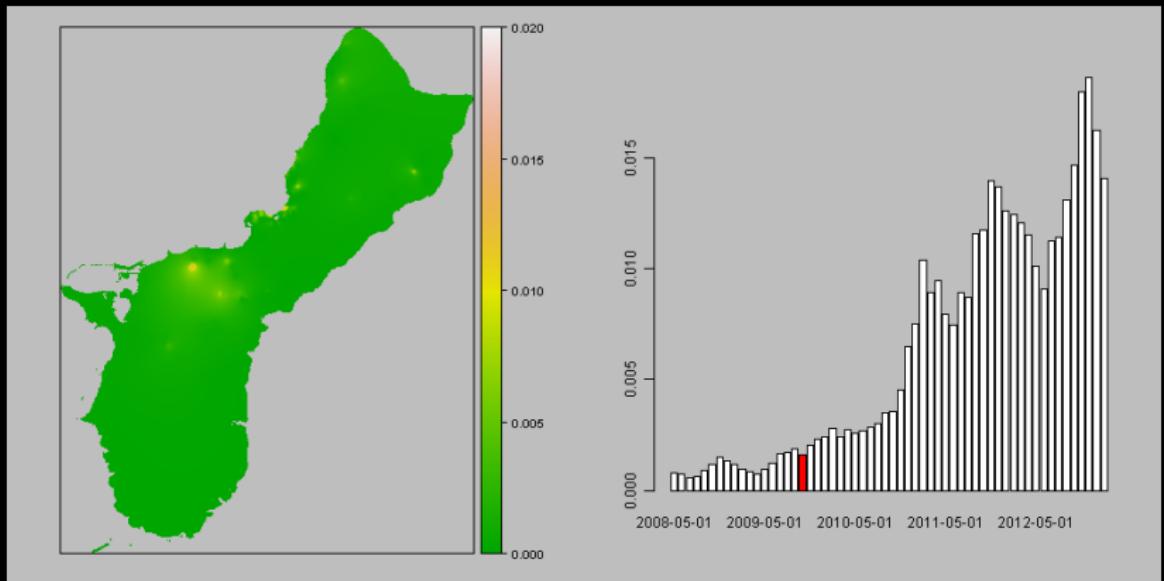
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Sep 2009



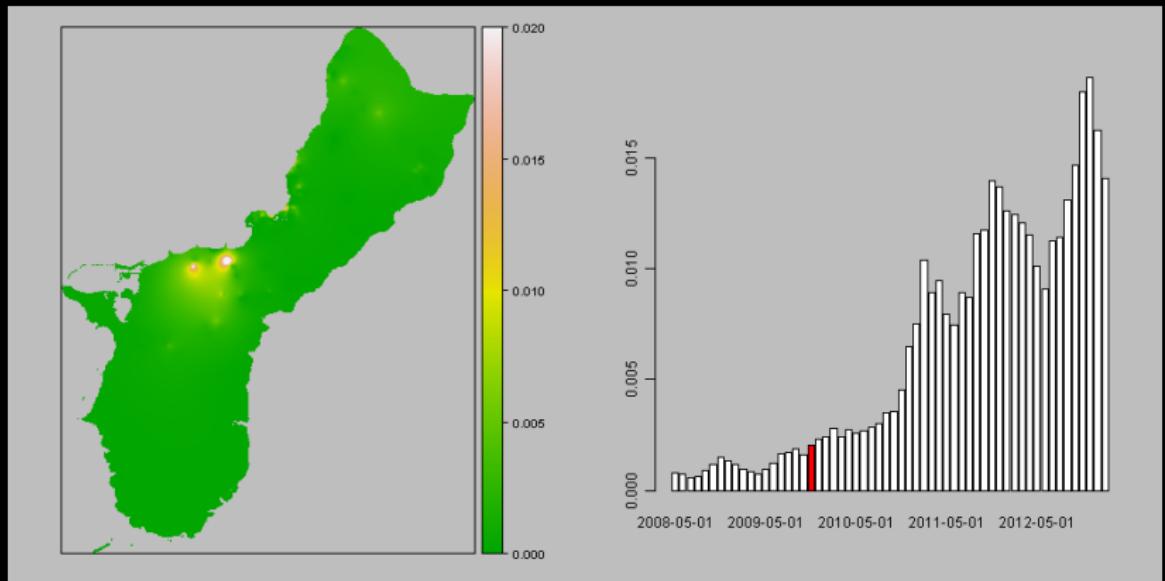
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Oct 2009



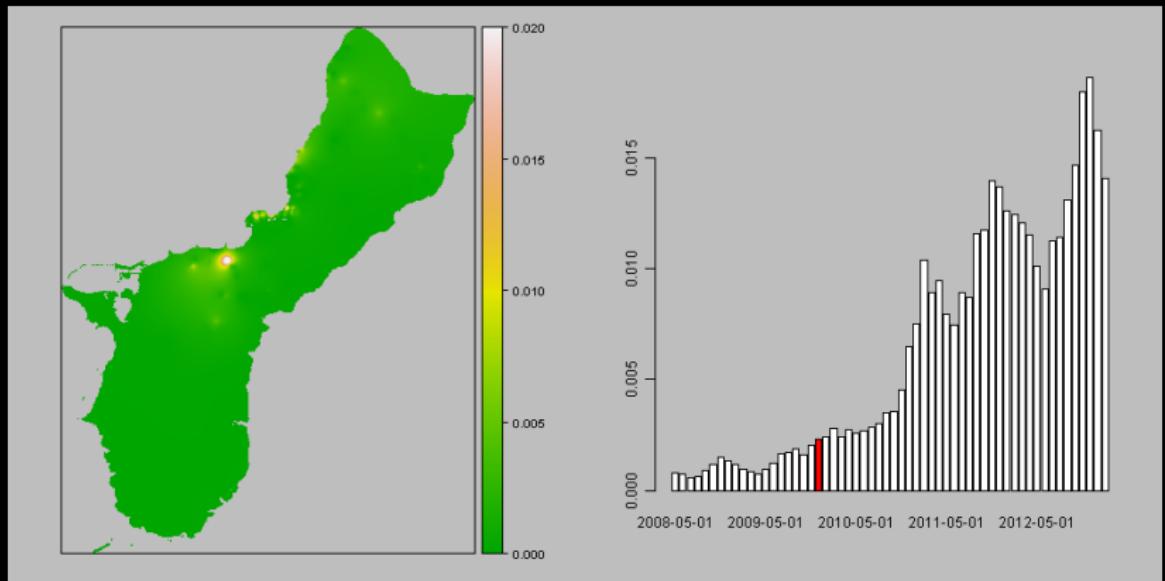
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Nov 2009



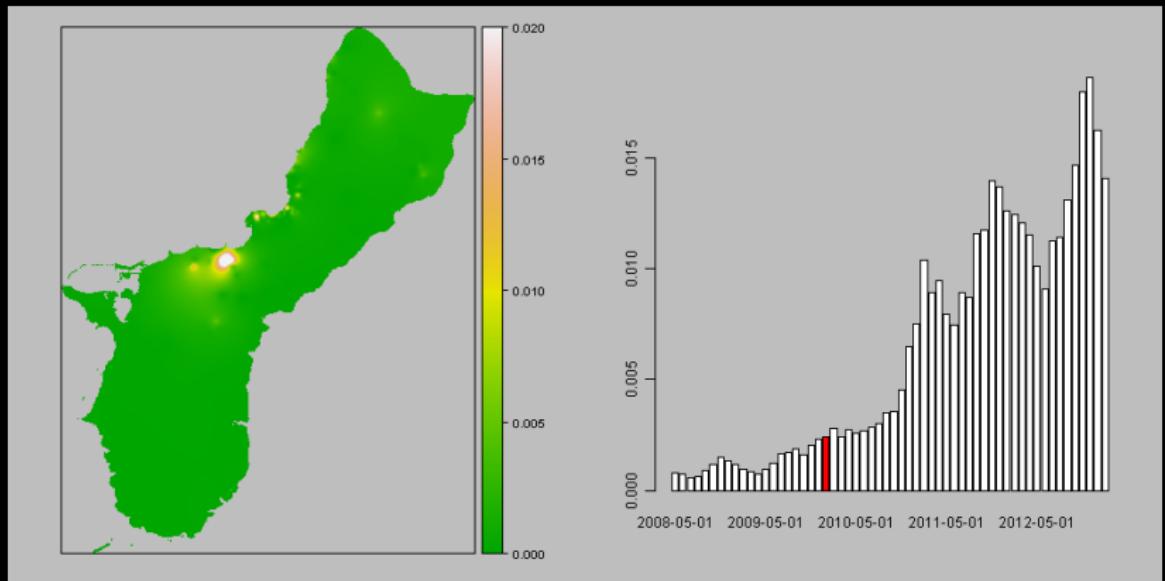
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Dec 2009



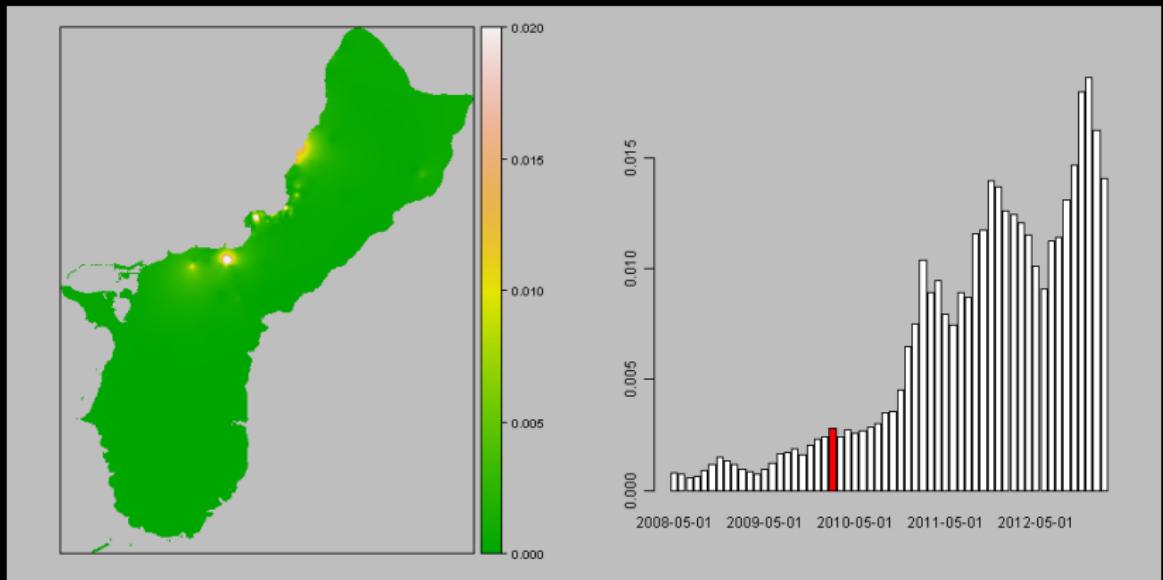
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jan 2010



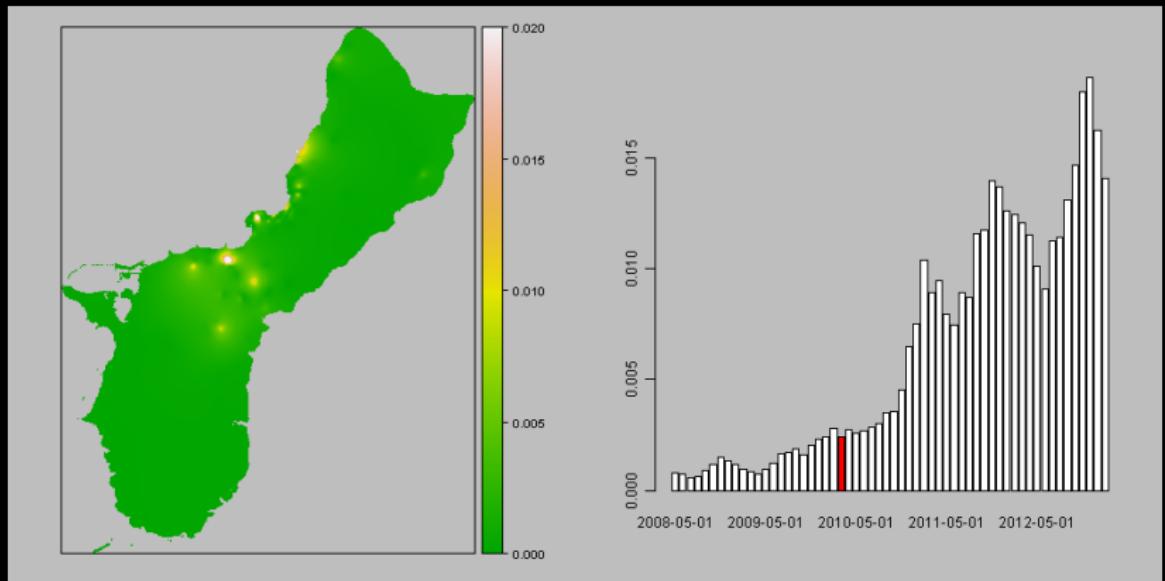
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Feb 2010



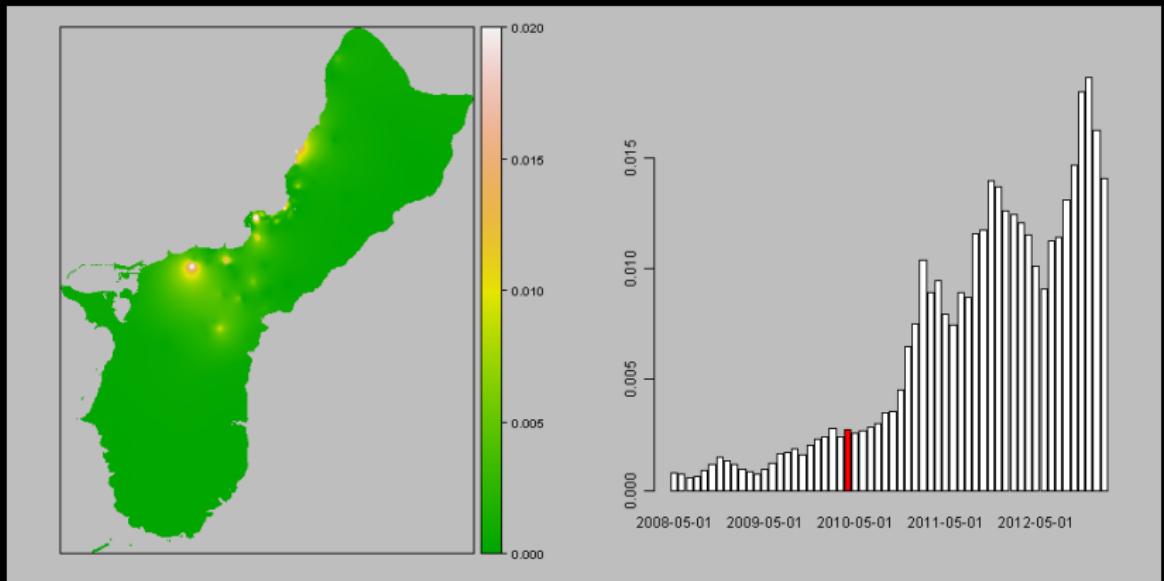
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Mar 2010



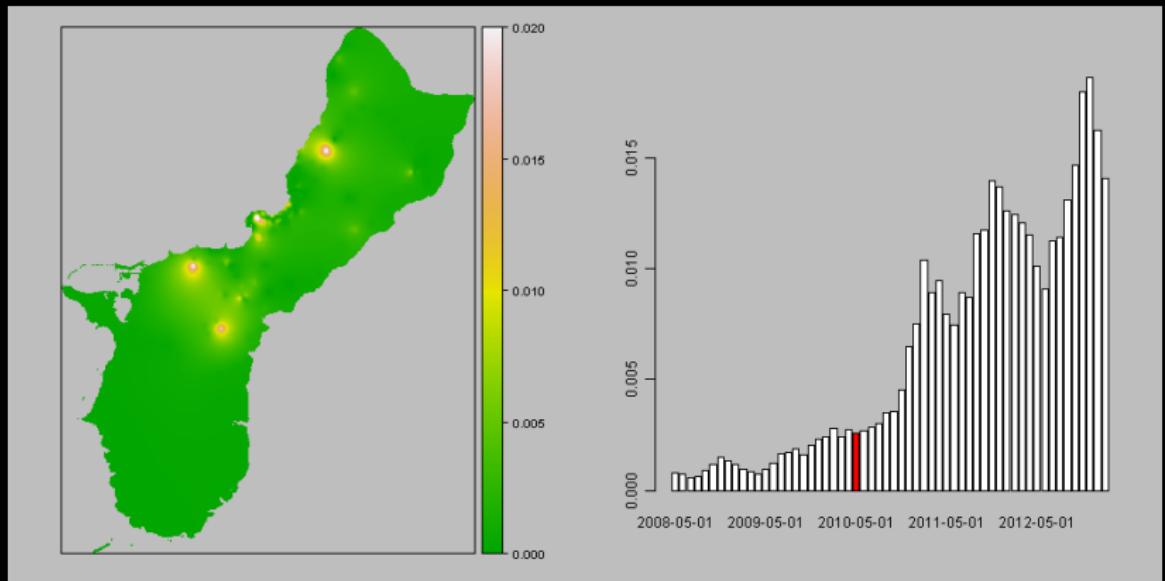
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Apr 2010



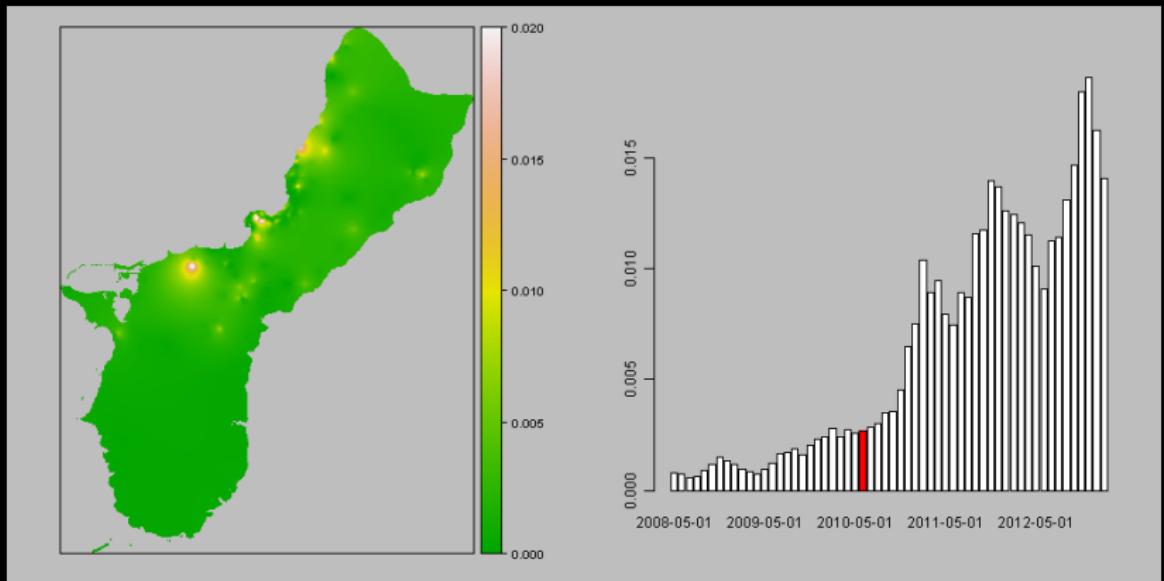
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 May 2010



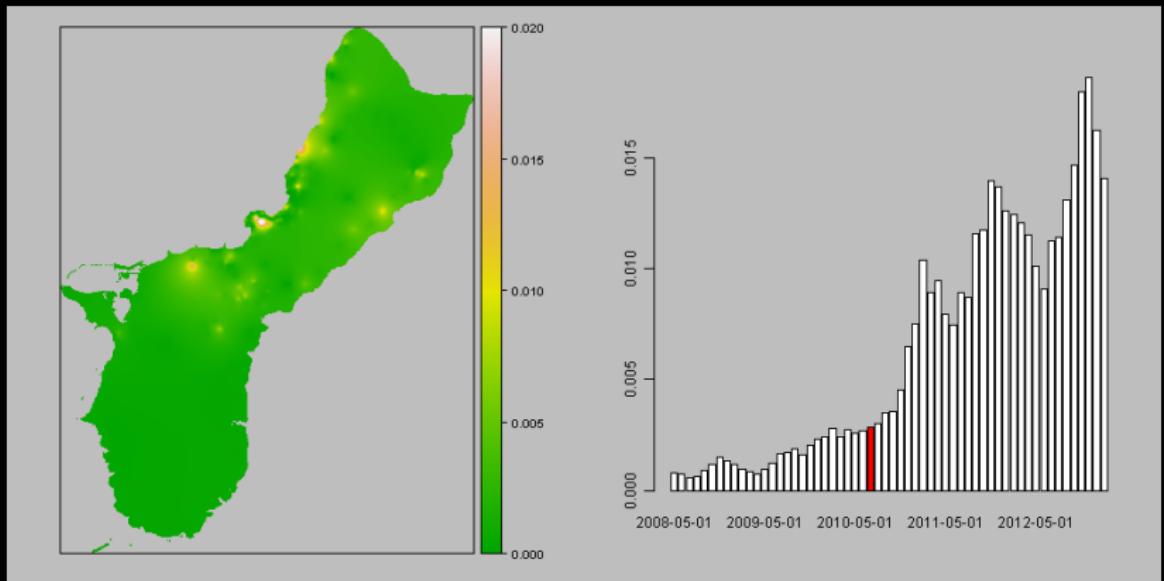
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jun 2010



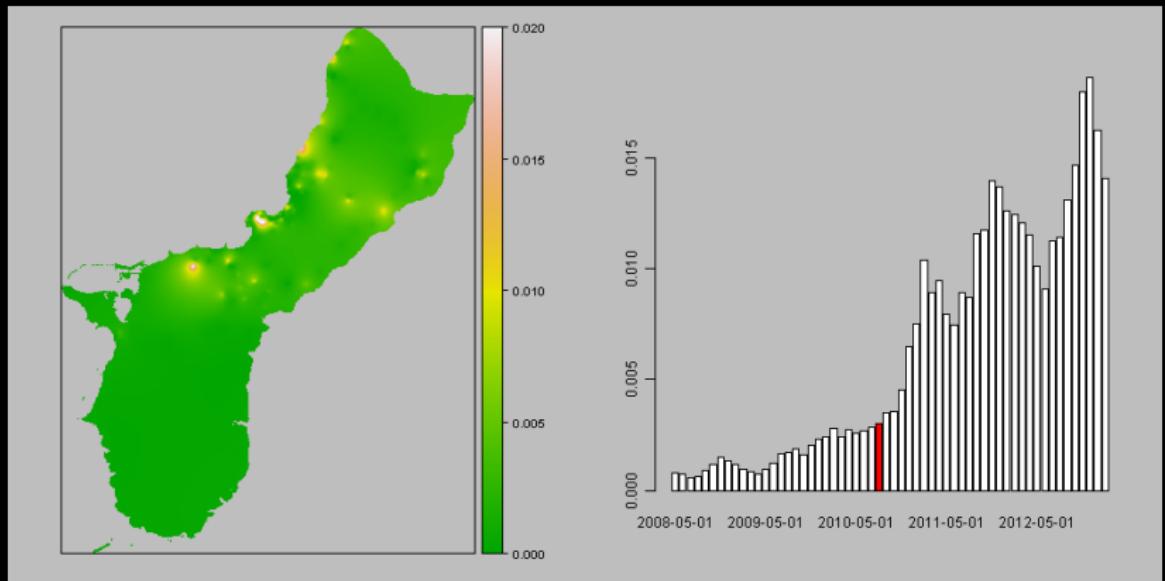
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jul 2010



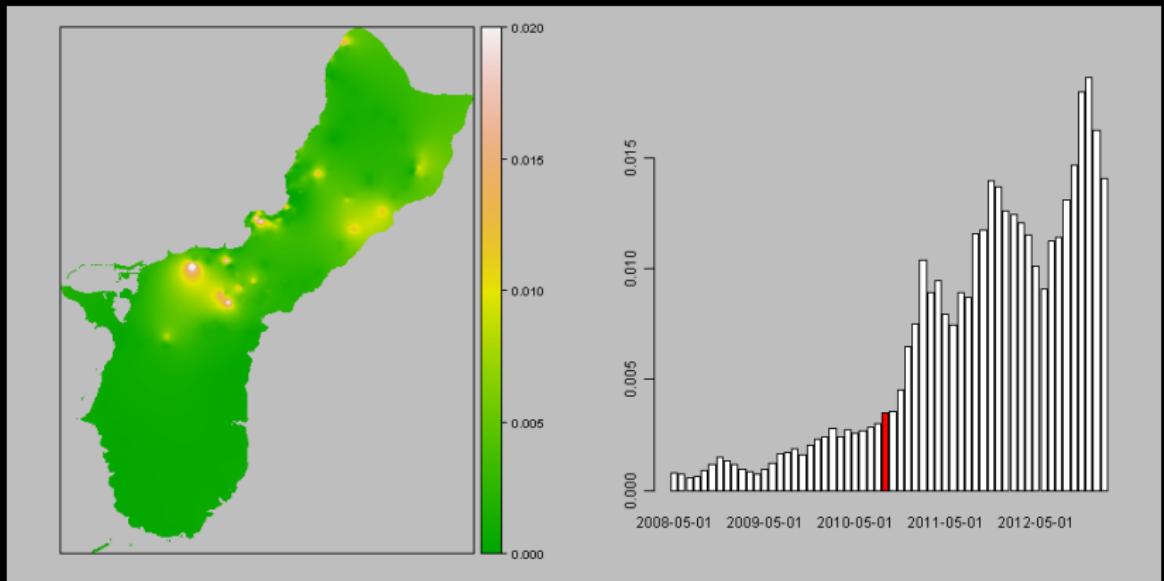
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Aug 2010



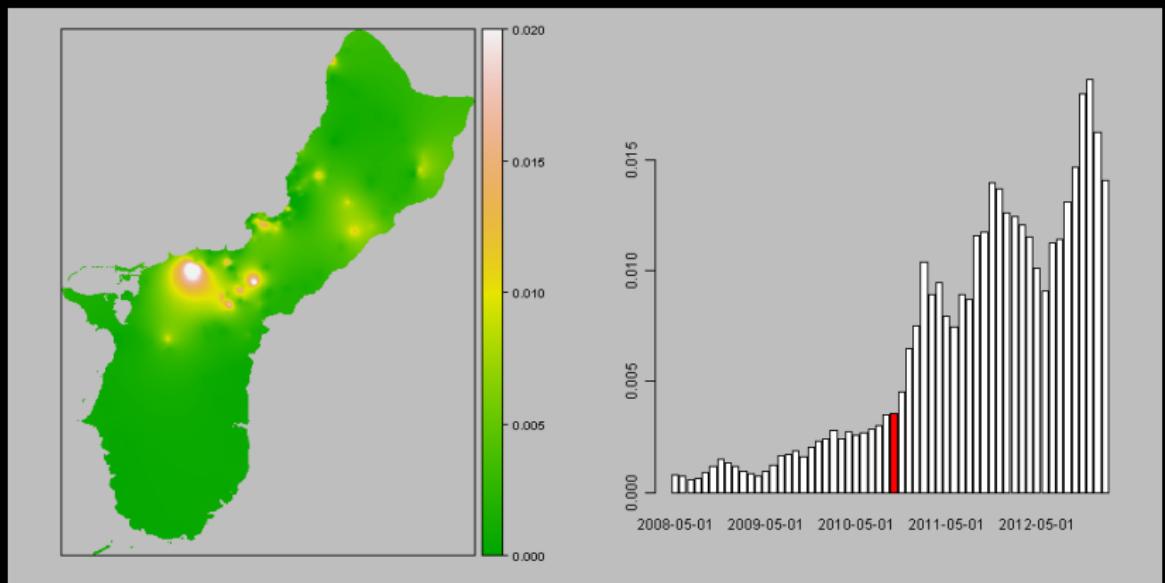
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90 day trapping period ending on 01 Sep 2010



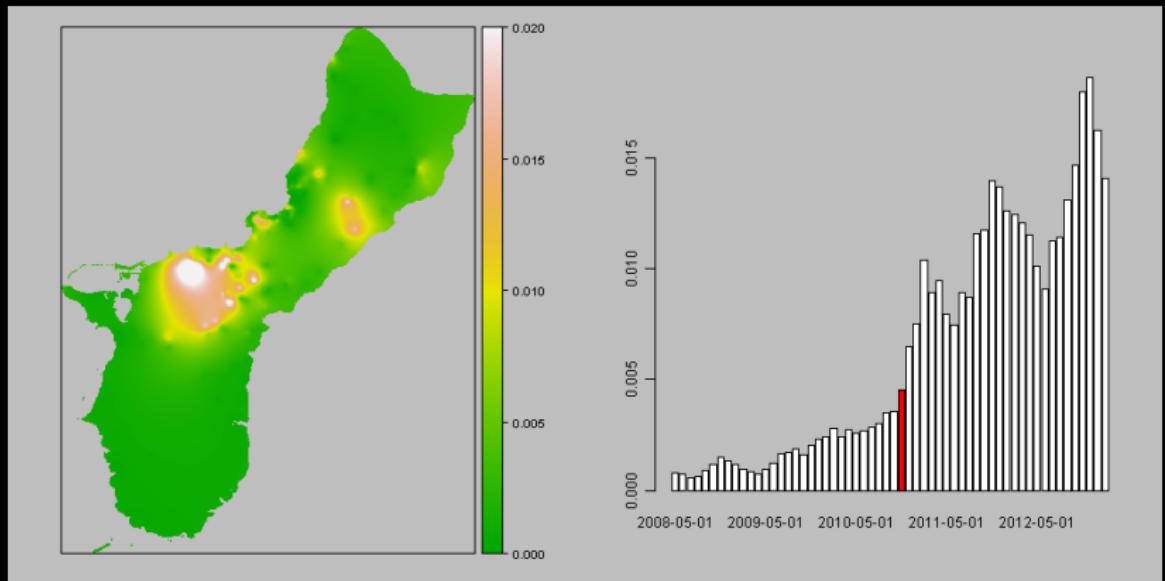
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Oct 2010



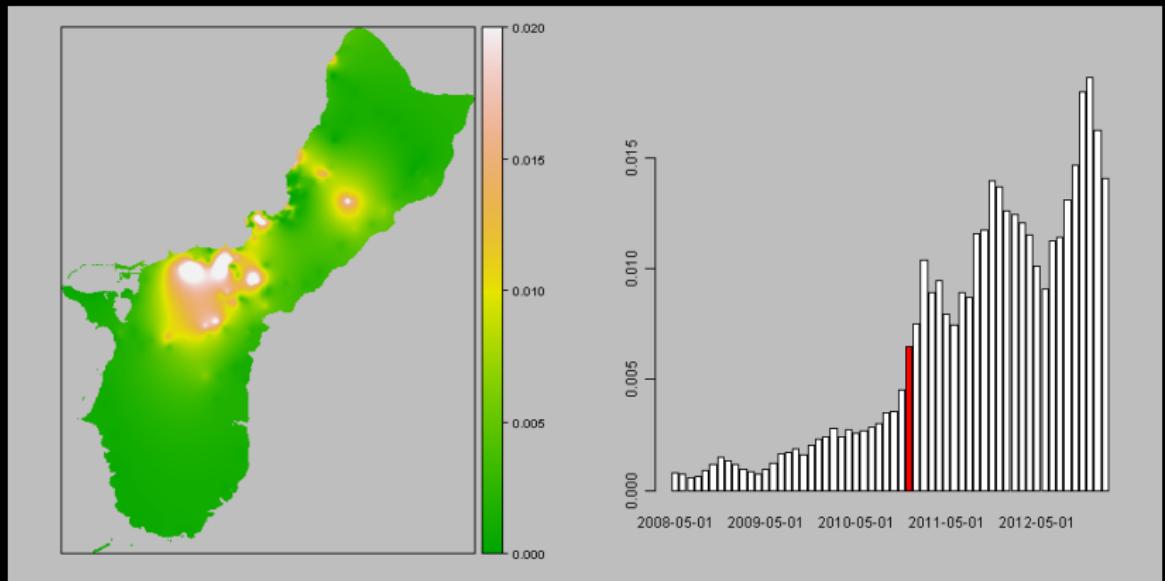
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Nov 2010



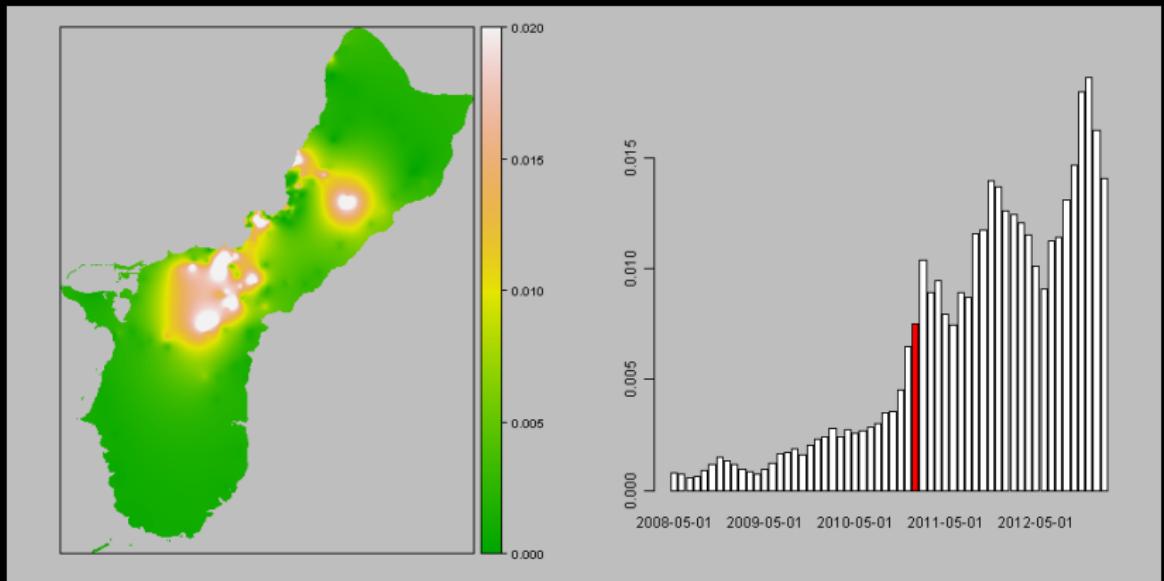
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Dec 2010



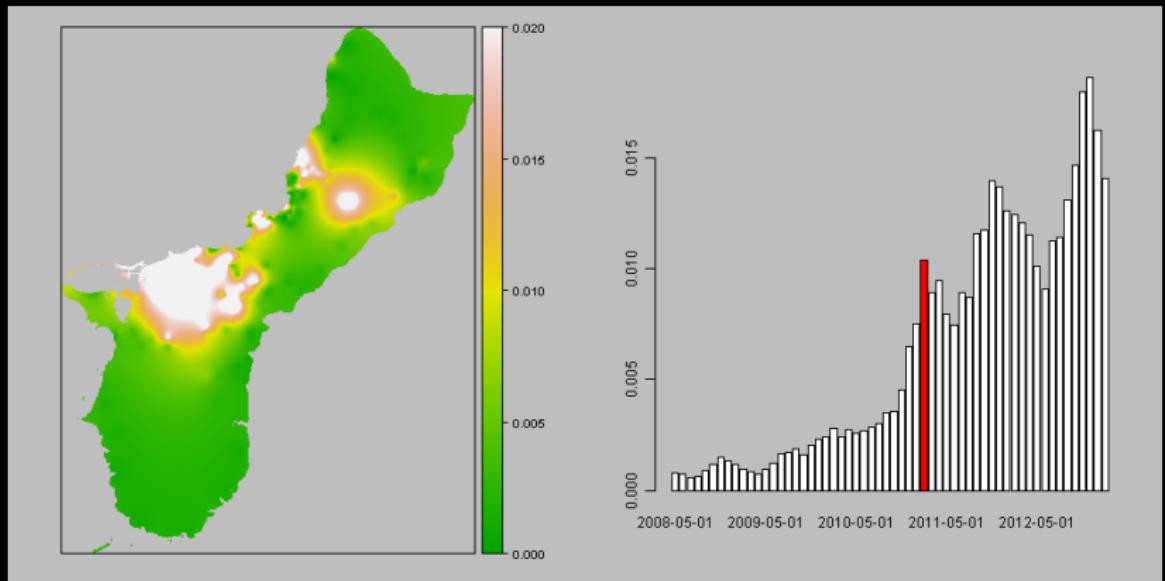
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jan 2011



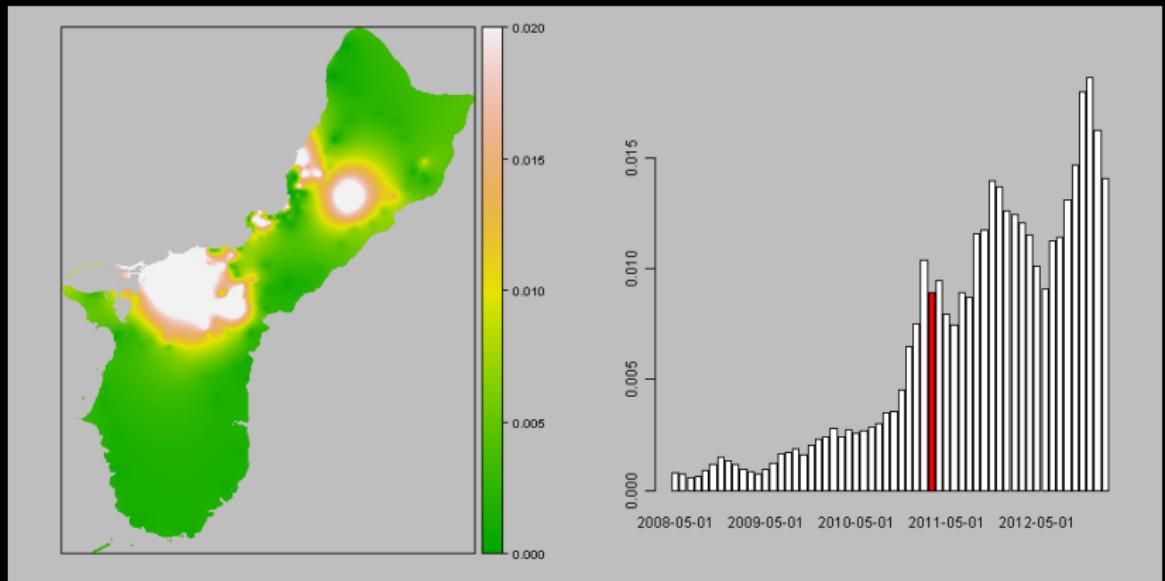
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Feb 2011



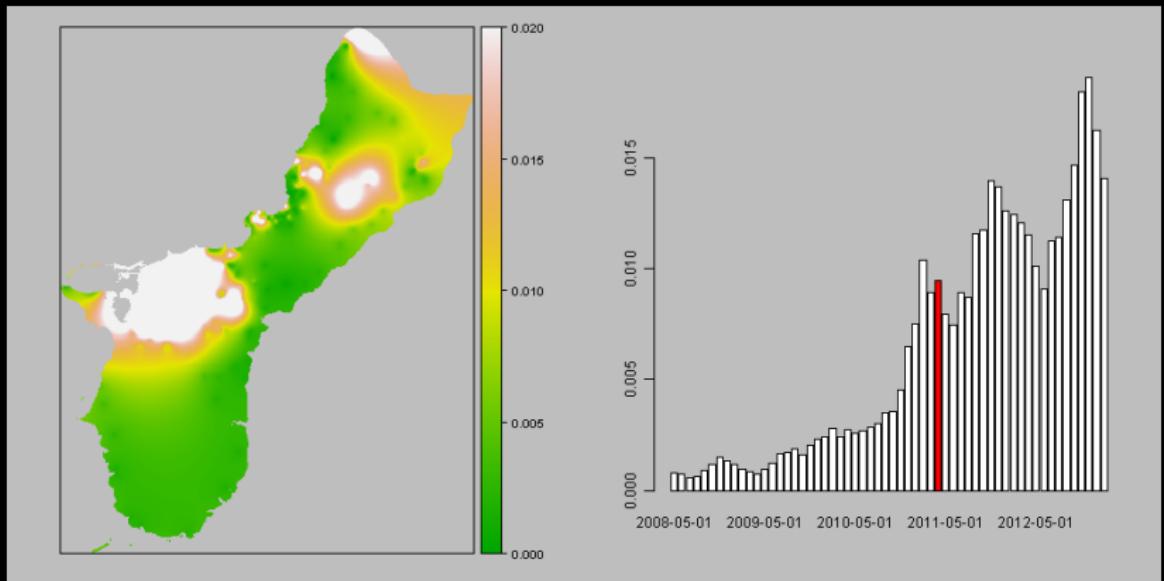
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Mar 2011



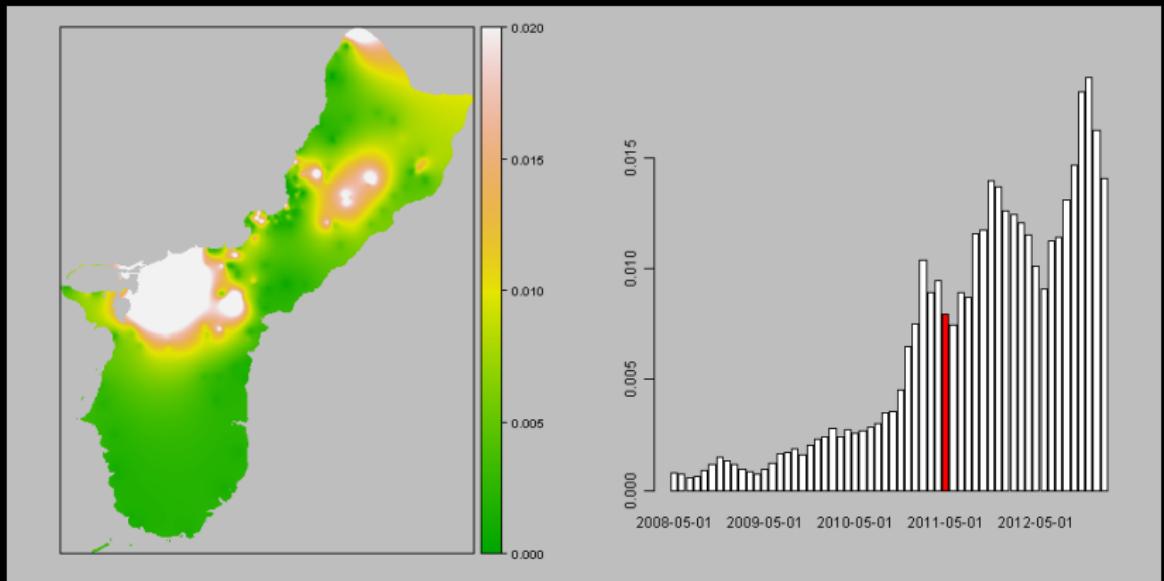
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Apr 2011



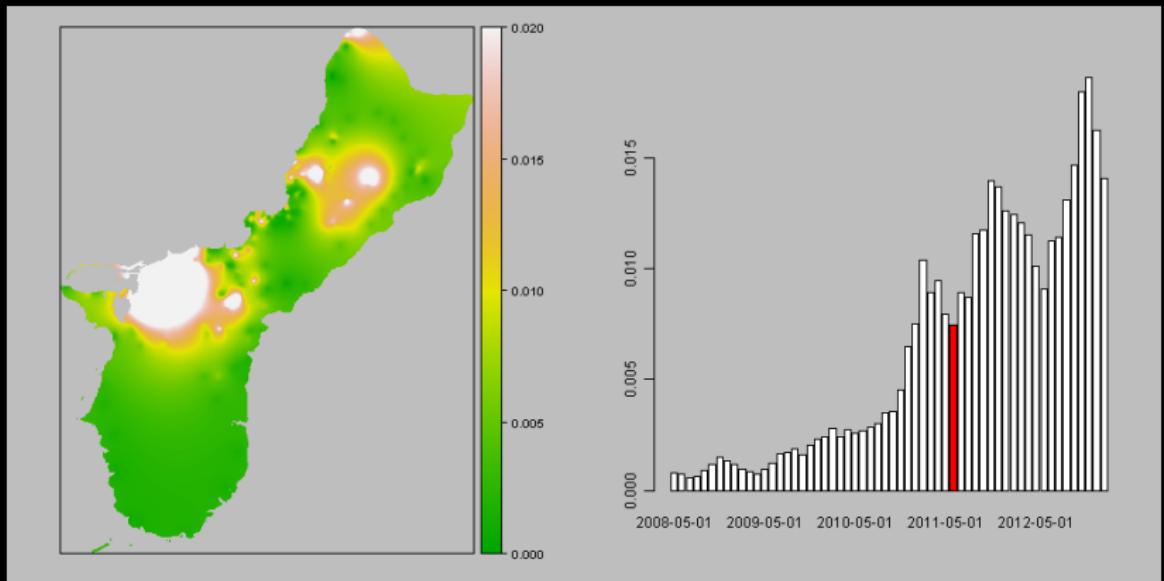
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 May 2011



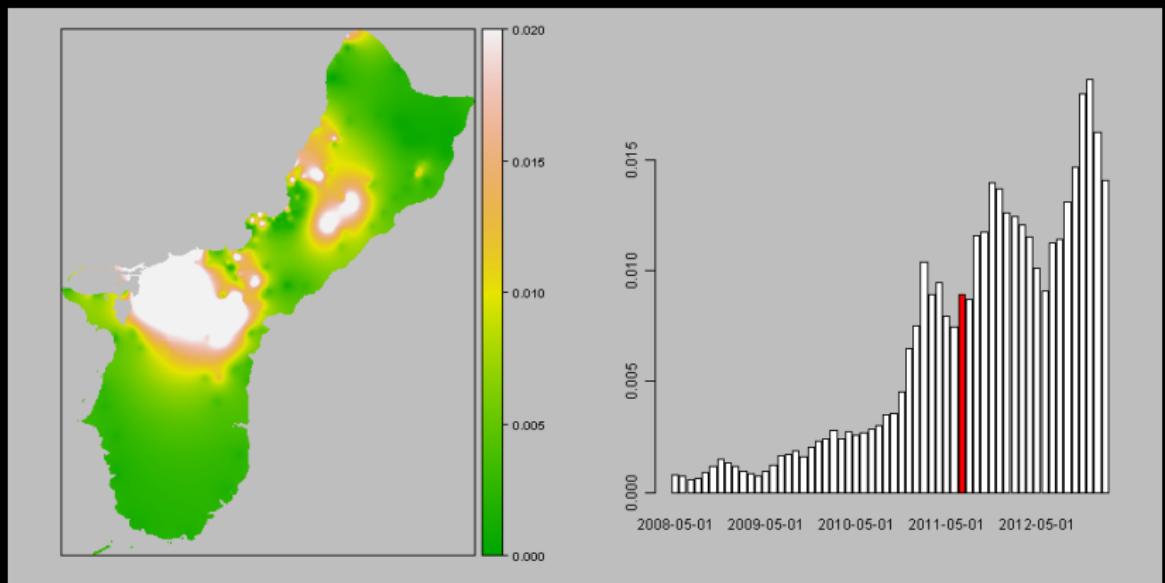
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jun 2011



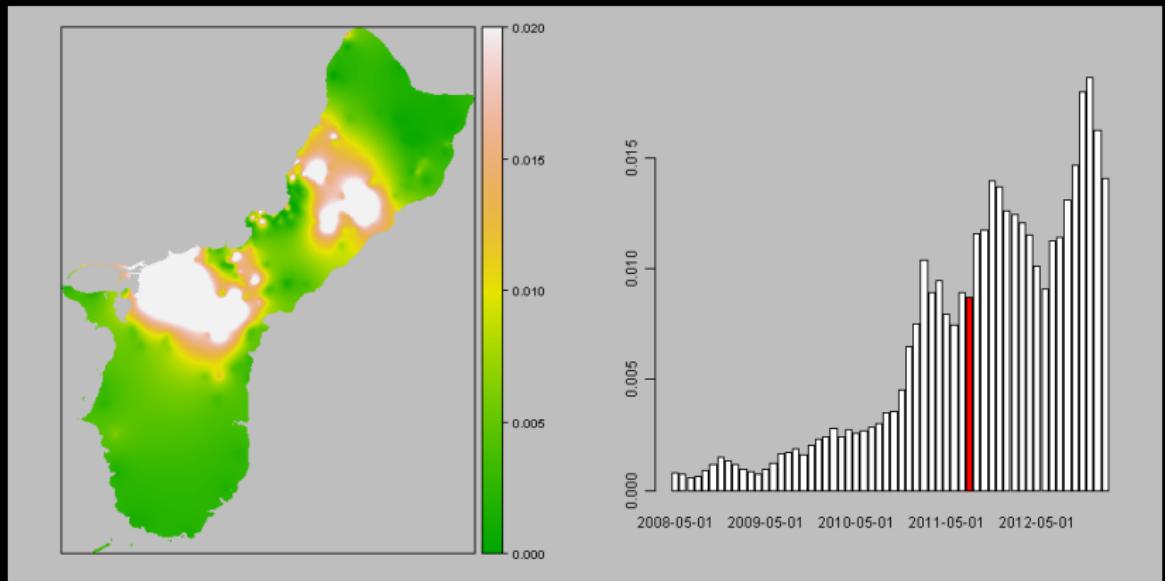
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jul 2011



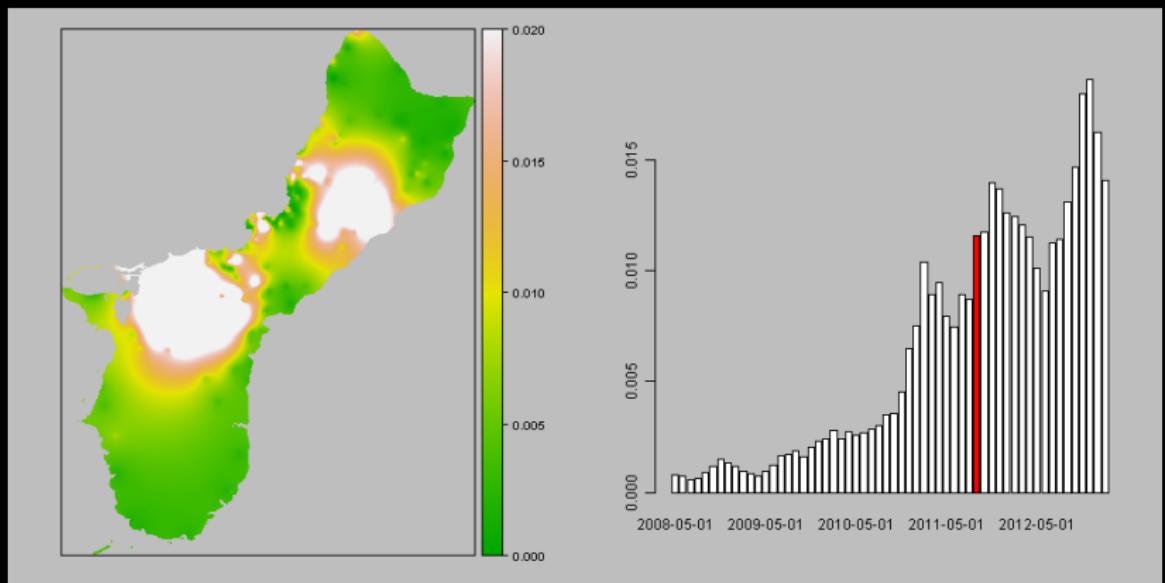
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Aug 2011



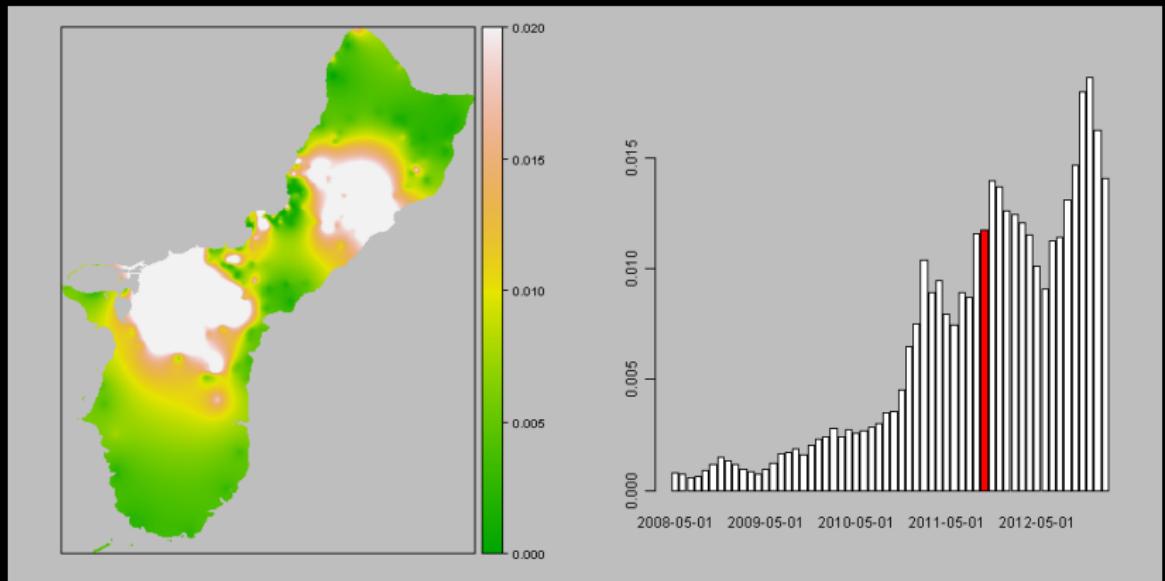
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90 day trapping period ending on 01 Sep 2011



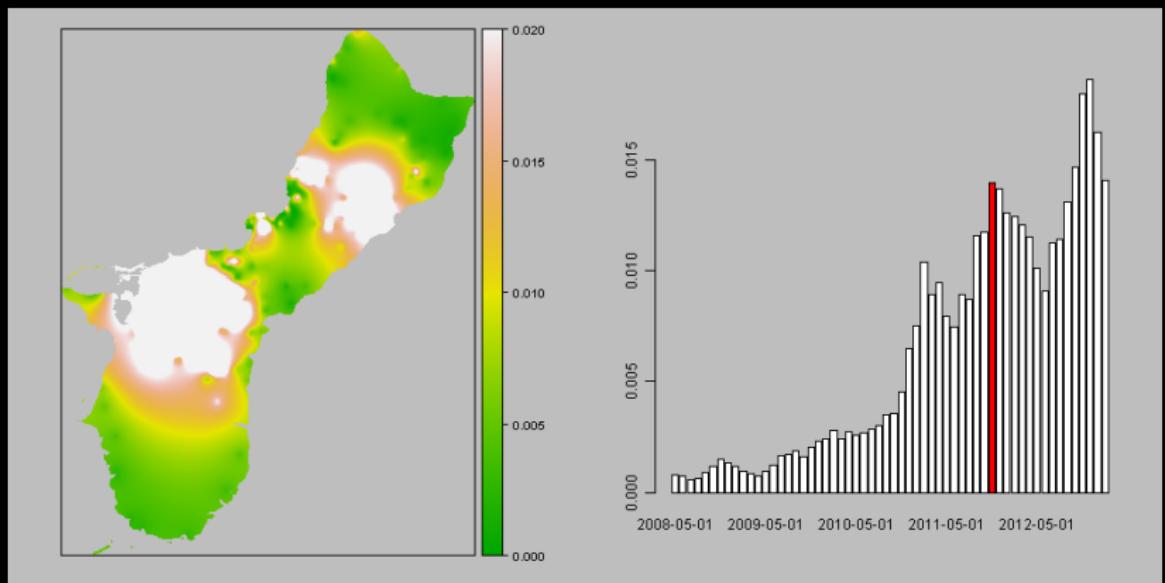
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90 day trapping period ending on 01 Oct 2011



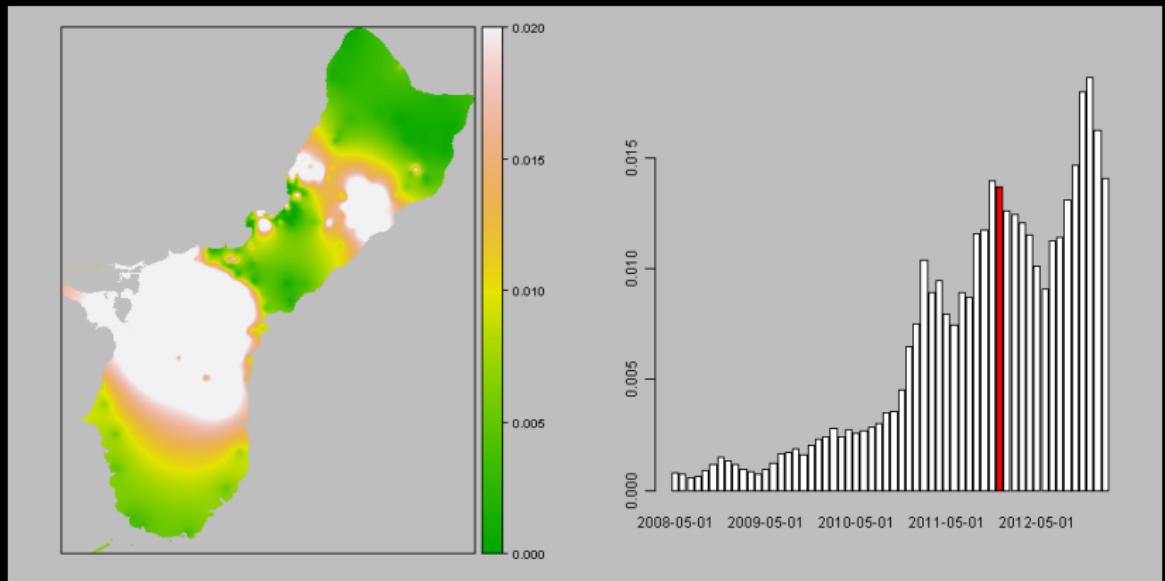
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Nov 2011



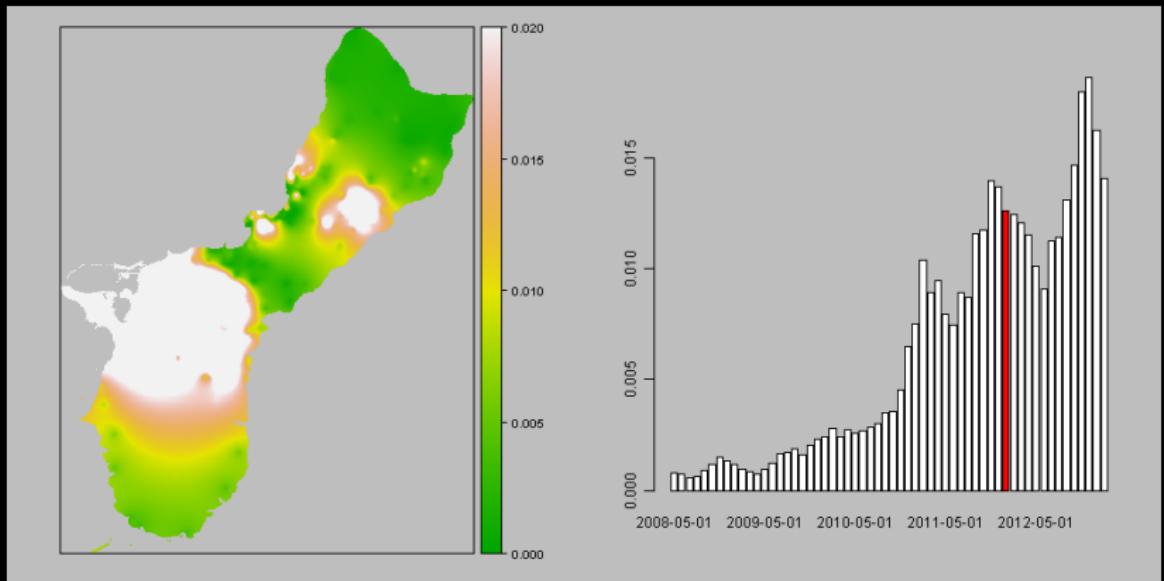
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Dec 2011



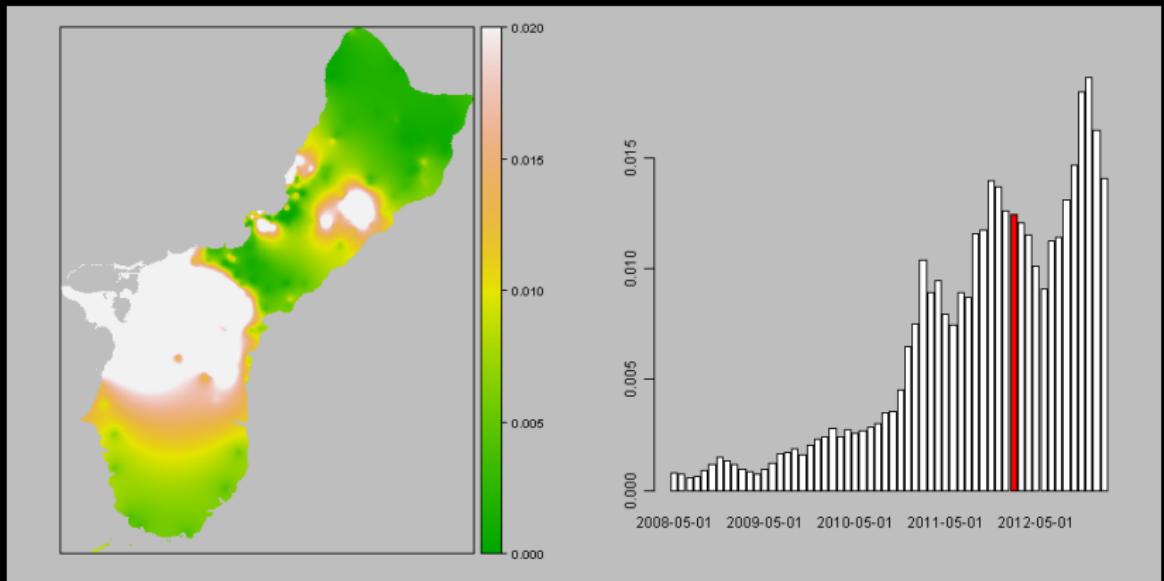
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jan 2012



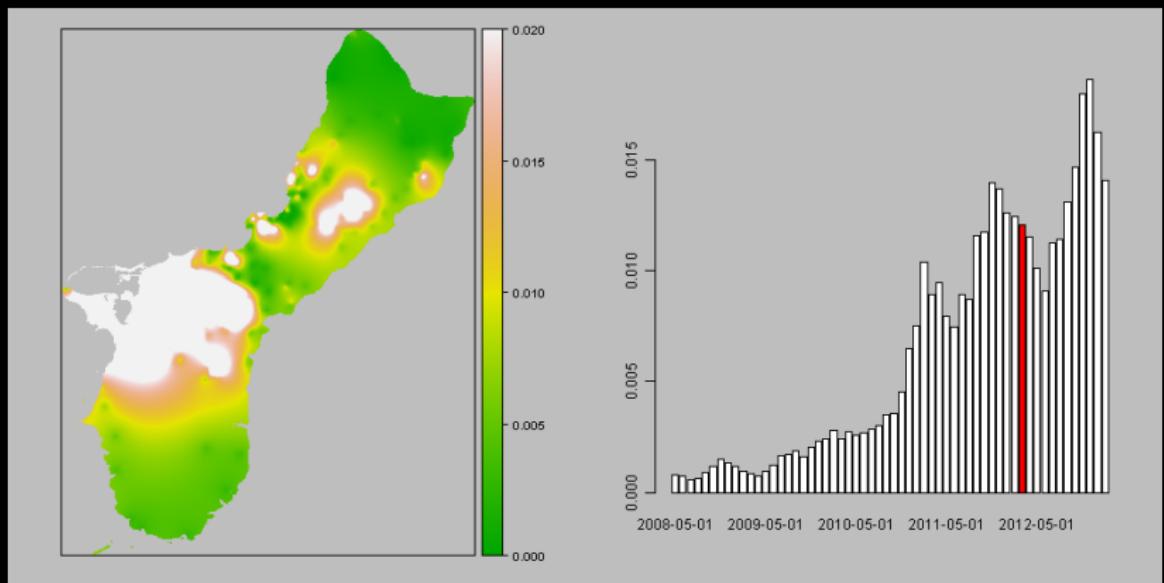
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Feb 2012



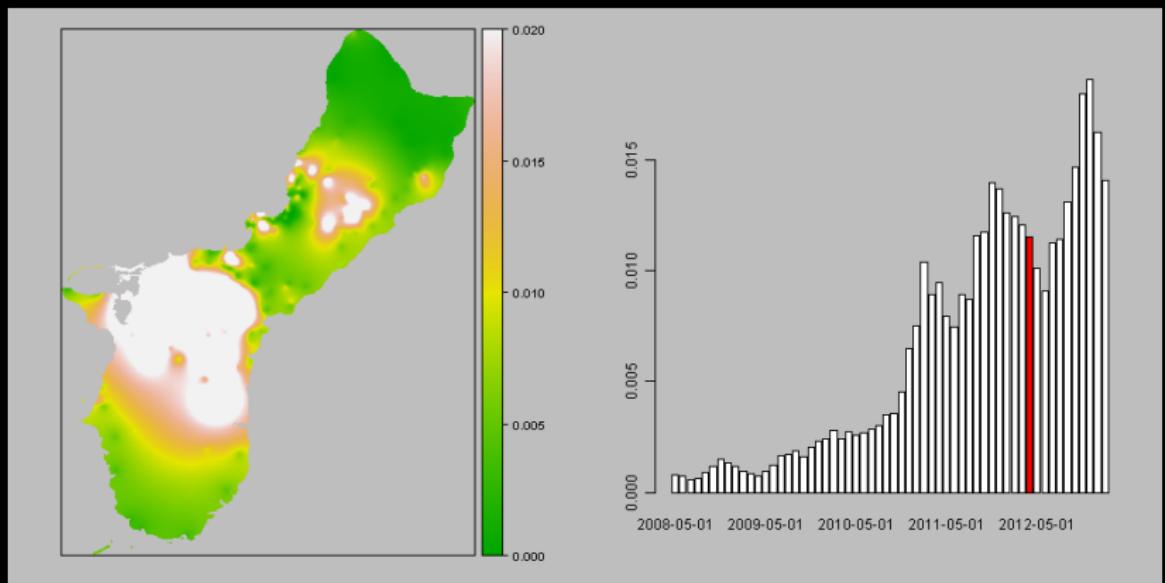
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Mar 2012



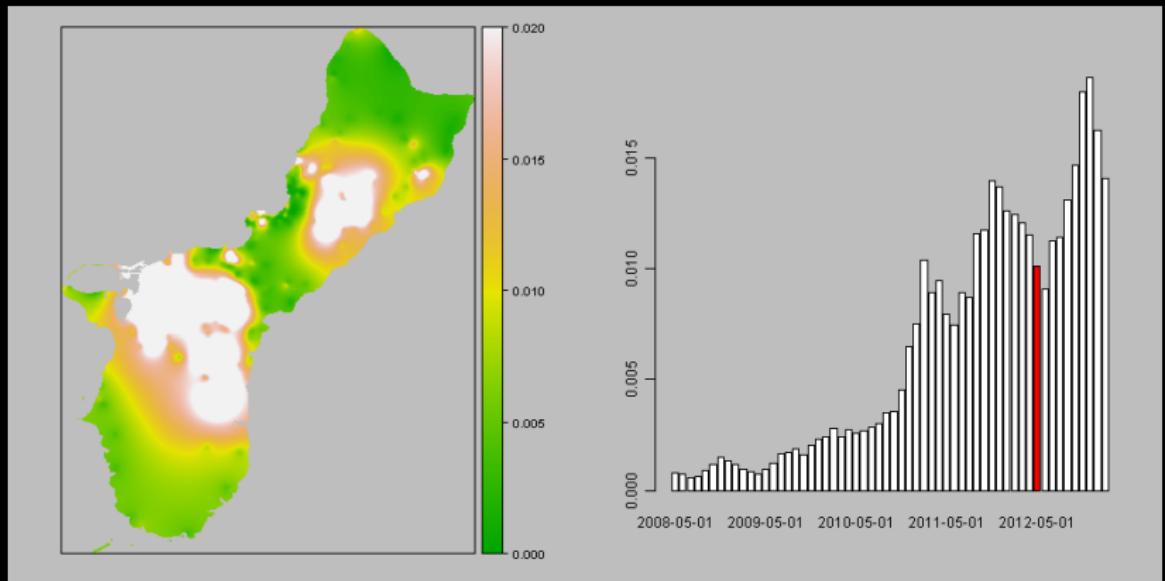
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Apr 2012



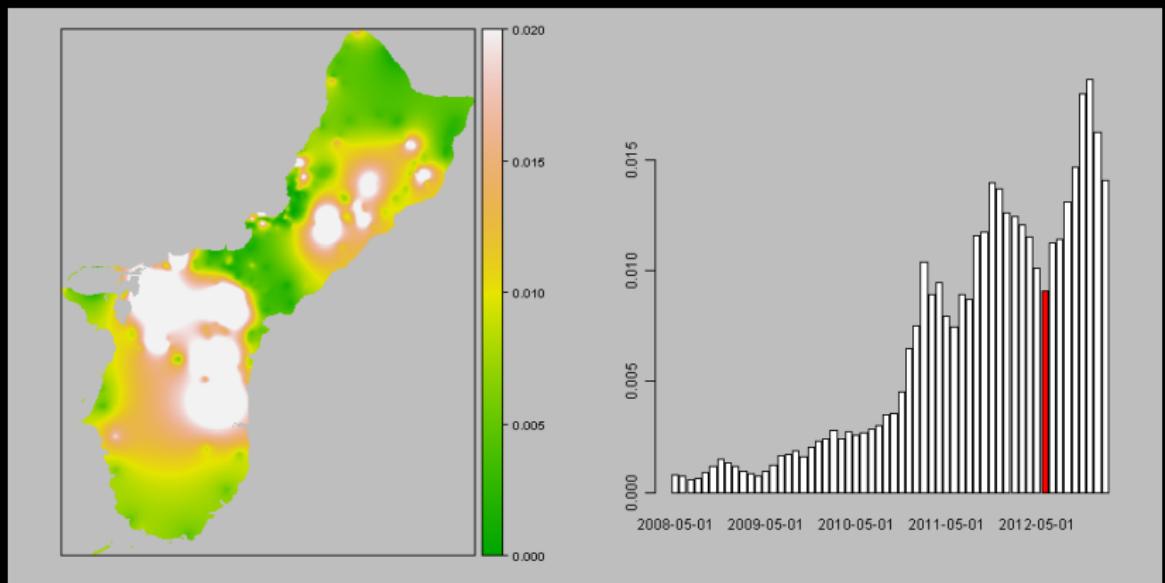
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 May 2012



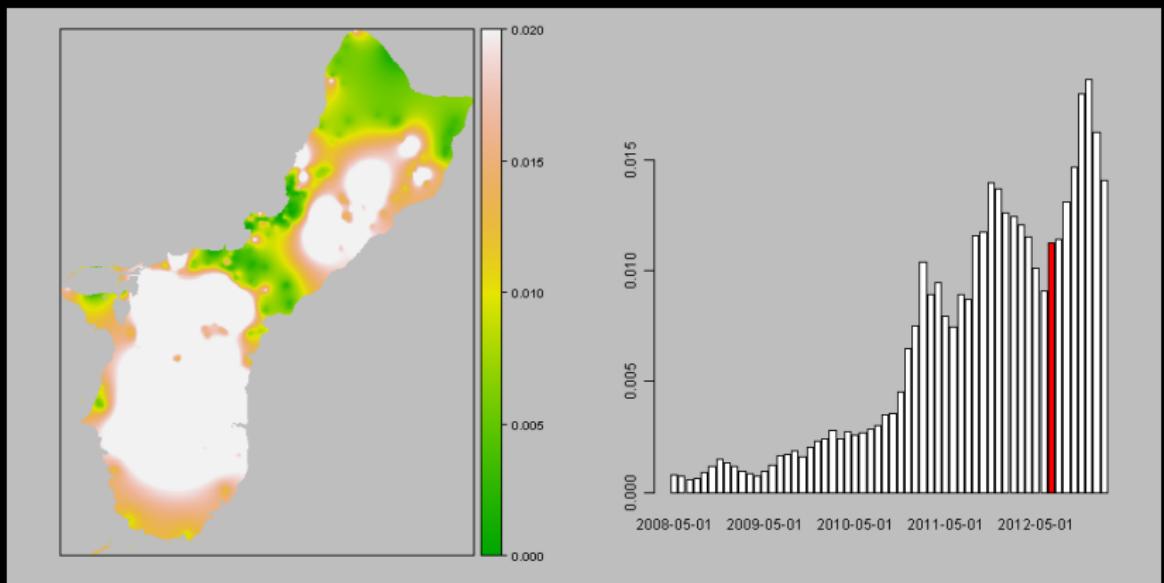
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jun 2012



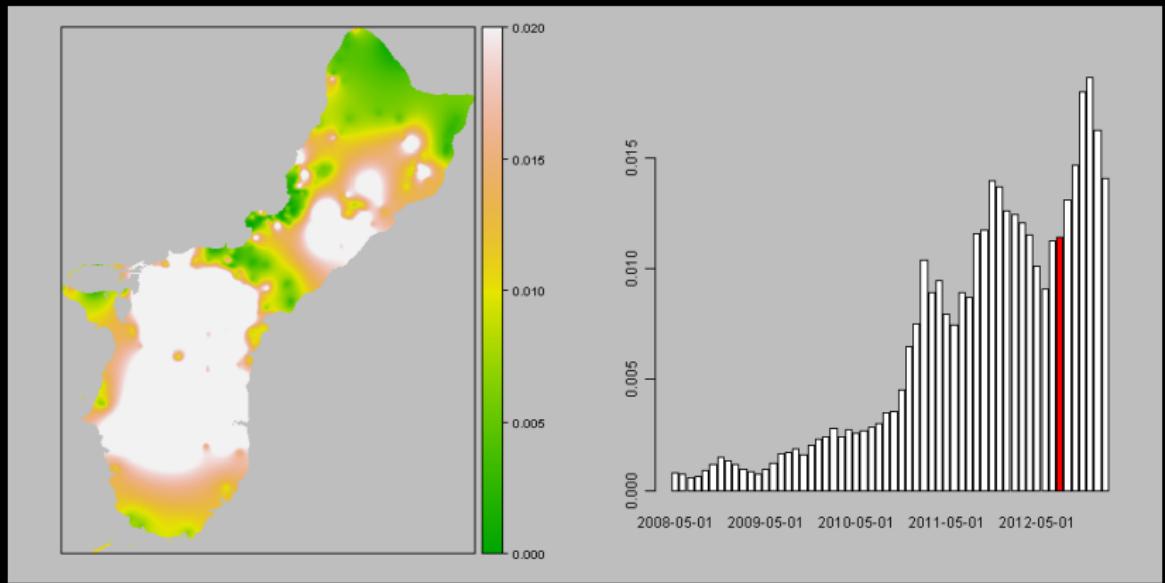
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jul 2012



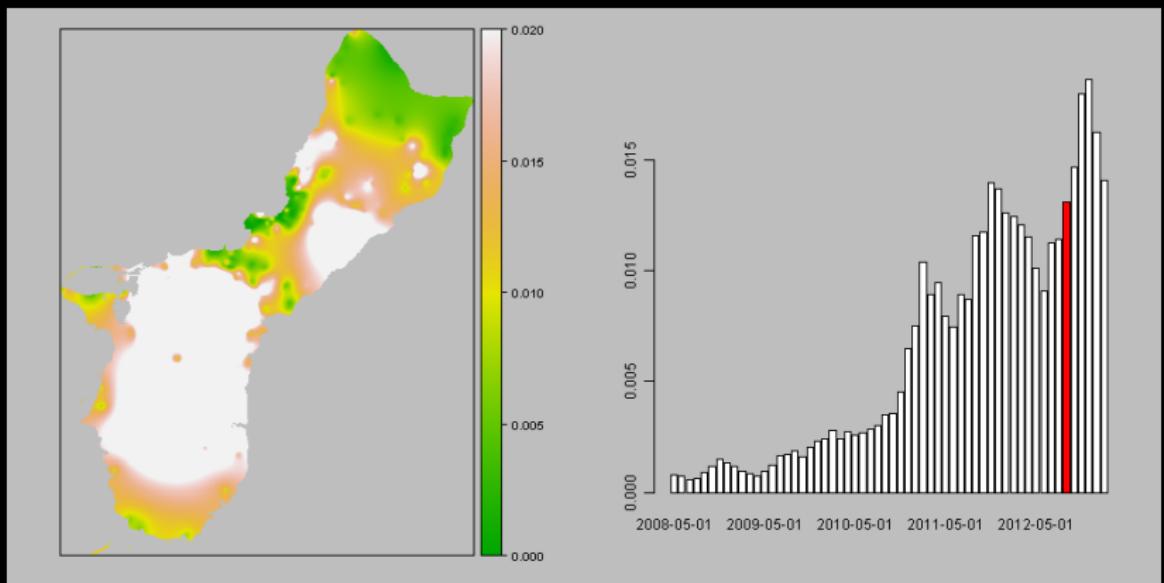
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Aug 2012



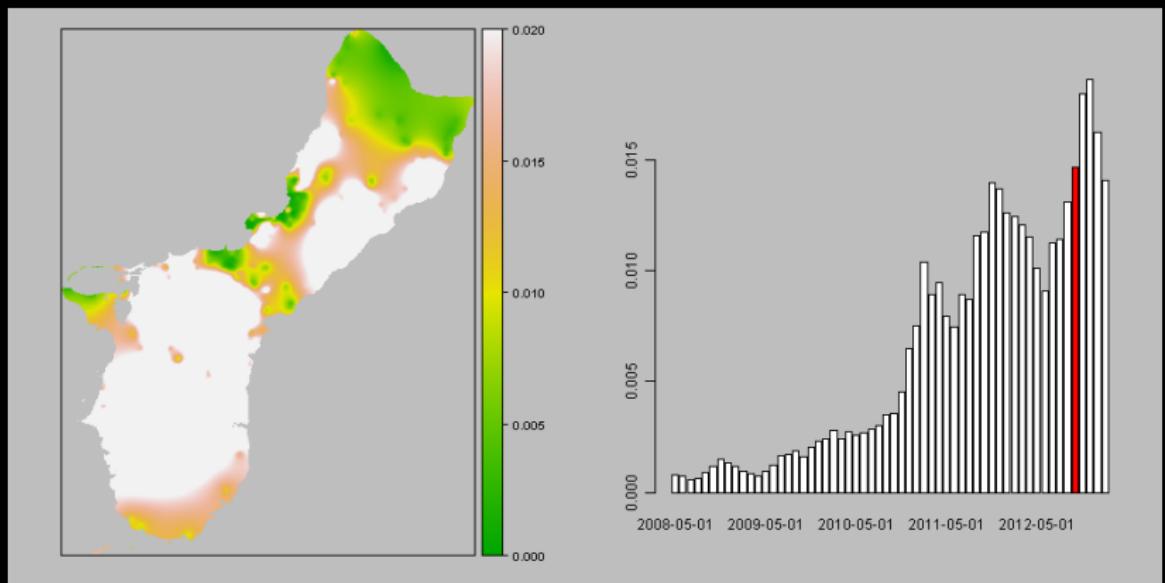
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Sep 2012



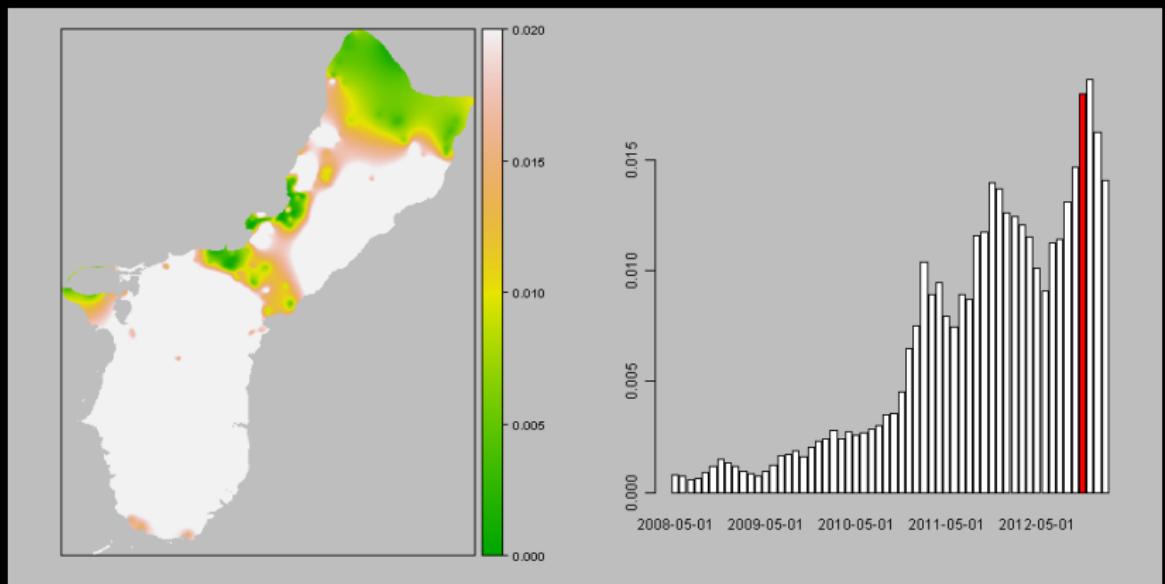
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Oct 2012



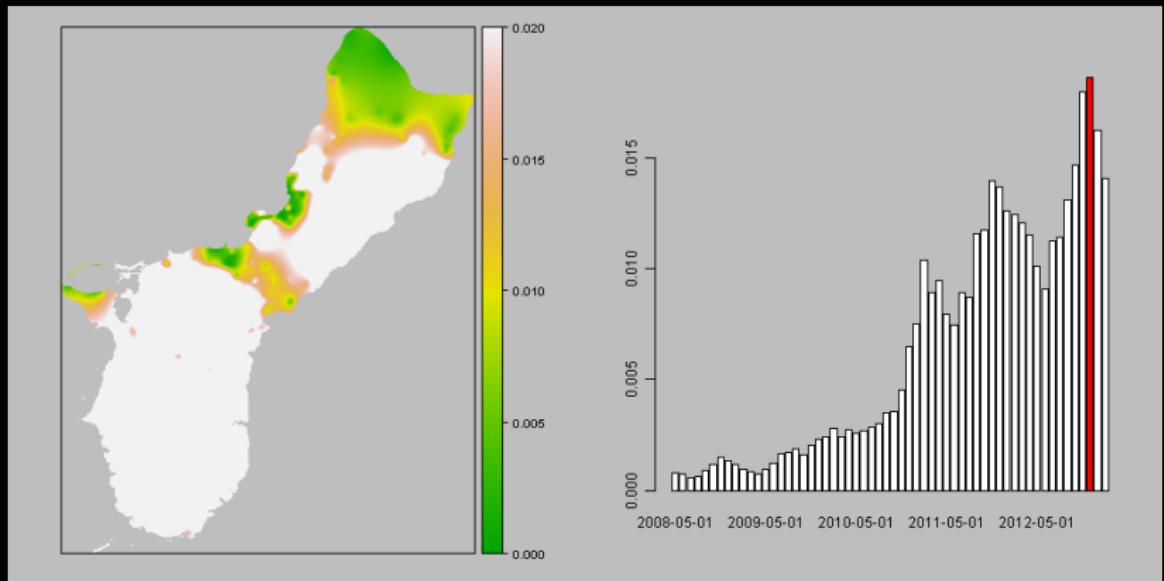
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Nov 2012



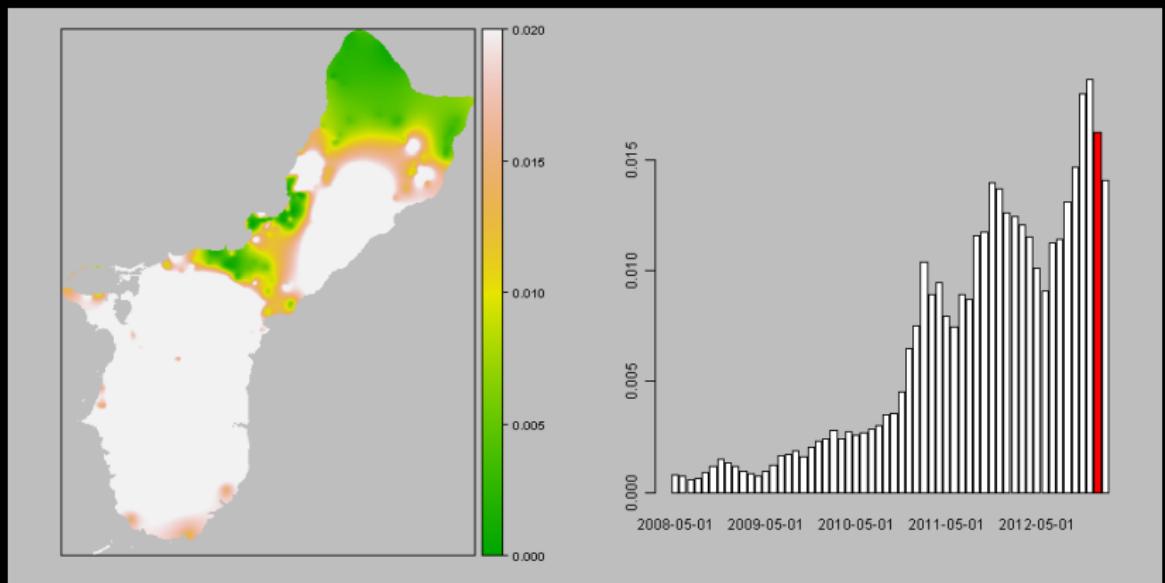
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Dec 2012



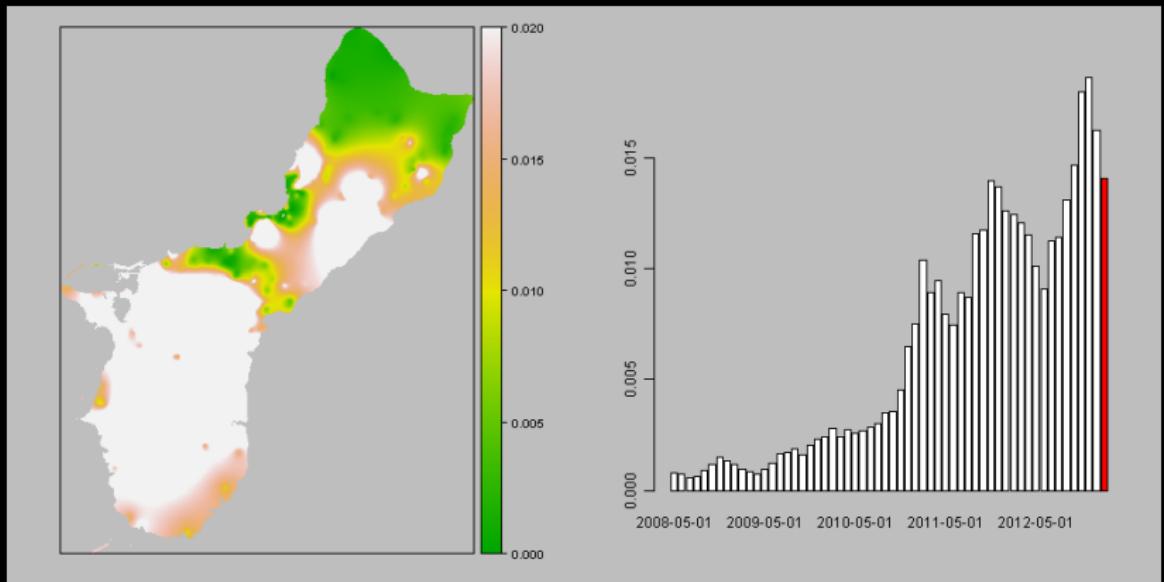
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jan 2013



Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Feb 2013



Mean number of beetles caught per trap-day

Sanitation









GRUBS – 296
PUPAE – 41
ADULTS - 15

DANGER
**RESTRICTED
AREA**

2007/12/09



2007/12/11

DETECTOR DOGS



CHEMICAL CONTROL



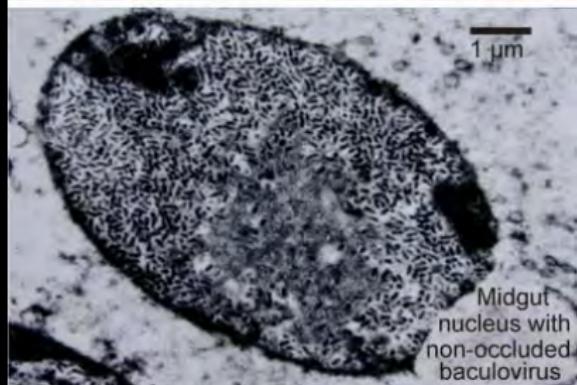
Insecticides Being Evaluated

- ▶ CYPERMETHRIN: quick knockdown of all stages; not persistent
- ▶ PYRIPROXIFEN (NYGARD®): insect growth regulator; prevents production of adults
- ▶ SPLAT RB® + CYPERMETHRIN: experimental attracticide; adults only

BIOCONTROL



Palm rhinoceros beetle



Midgut
nucleus with
non-occluded
baculovirus







Metarhizium for Biological Control

- ▶ a USDA import and release permit was obtained for *Metarhizium* which is being produced for biocontrol of CRB by the Philippines Coconut Authority
- ▶ 15 kg of spores were imported on September 10, 2011 and December 10, 2011
- ▶ following lab bioassays, field releases were started by incorporation into breeding sites and autodissemination by adult males
- ▶ *Metarhizium* appears to be working well: we are finding dead grubs with fungus even in areas where we did not apply spores

Biological Control of the Coconut Rhinoceros Beetle







