Update on the Guam Coconut Rhinoceros Beetle Eradication Project

For the Guam Invasive Species Council

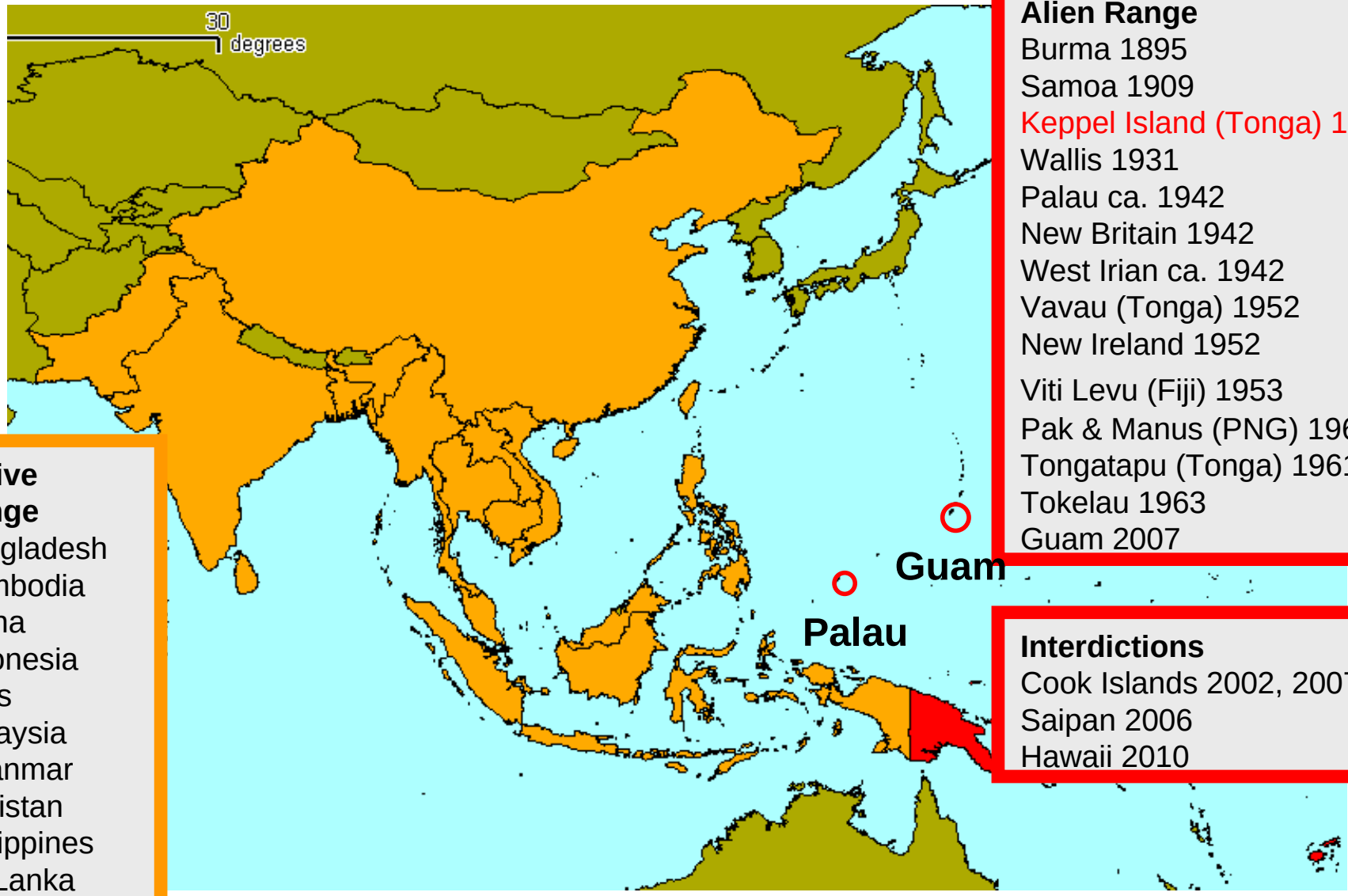
Aubrey Moore

University of Guam

February 15, 2012

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

Oryctes rhinoceros Distribution



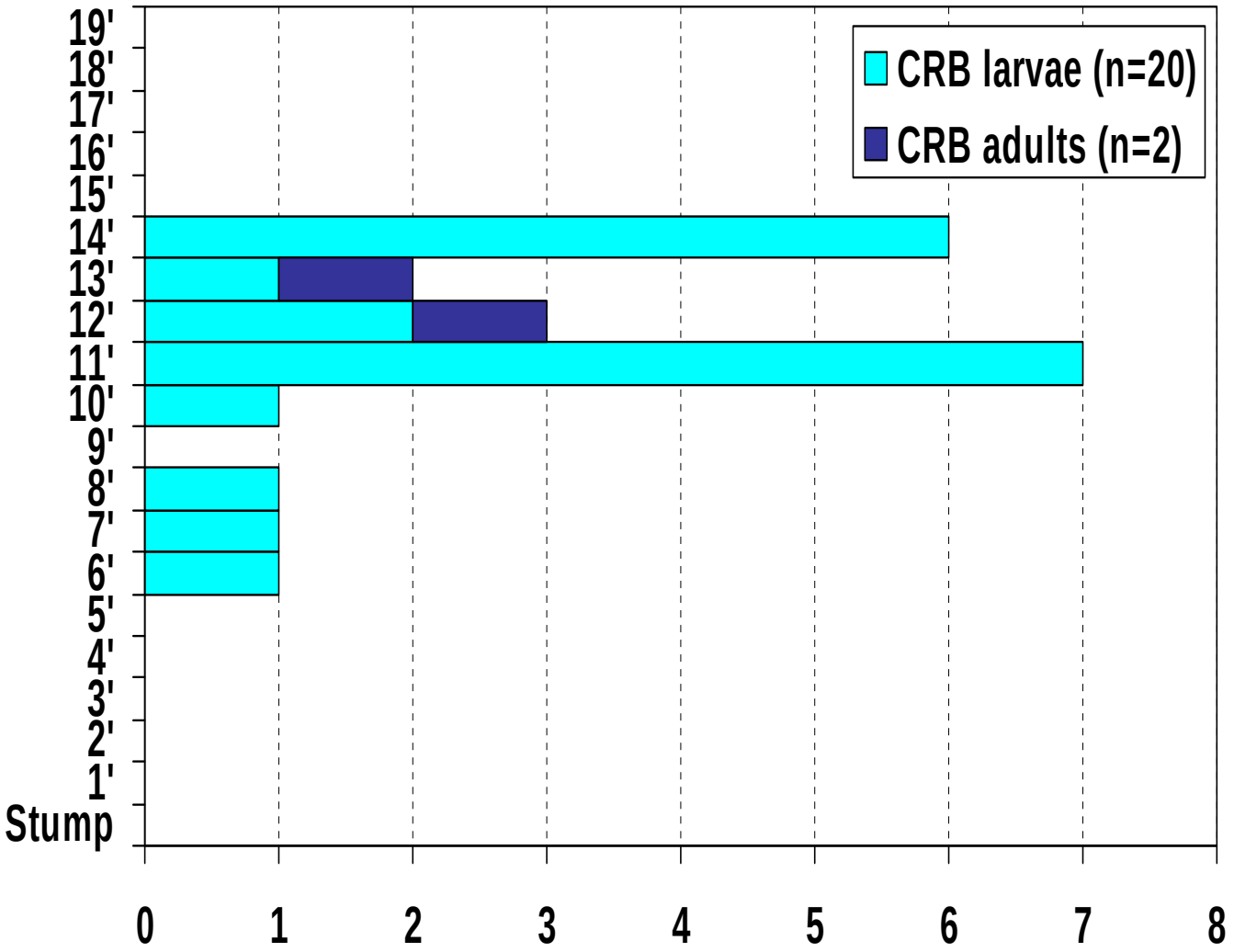
Native Range
Bangladesh
Cambodia
China
Indonesia
Laos
Malaysia
Myanmar
Pakistan
Philippines
Sri Lanka
Taiwan
Thailand
Vietnam

Alien Range
Burma 1895
Samoa 1909
Keppel Island (Tonga) 1921
Wallis 1931
Palau ca. 1942
New Britain 1942
West Irian ca. 1942
Vavau (Tonga) 1952
New Ireland 1952
Viti Levu (Fiji) 1953
Pak & Manus (PNG) 1960
Tongatapu (Tonga) 1961
Tokelau 1963
Guam 2007

Interdictions
Cook Islands 2002, 2007
Saipan 2006
Hawaii 2010


FELCO 2
SWISS MADE

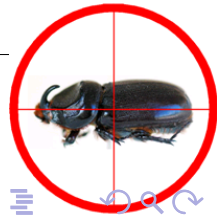
Vertical Distribution of CRB Larvae & Adults in Standing Dead Coconut Trankilidat, Guam; 25 Oct 2007



Novel CRB Behavior on Guam: Arboreal Development

CRB extracted from the crowns of 121 felled coconut palms

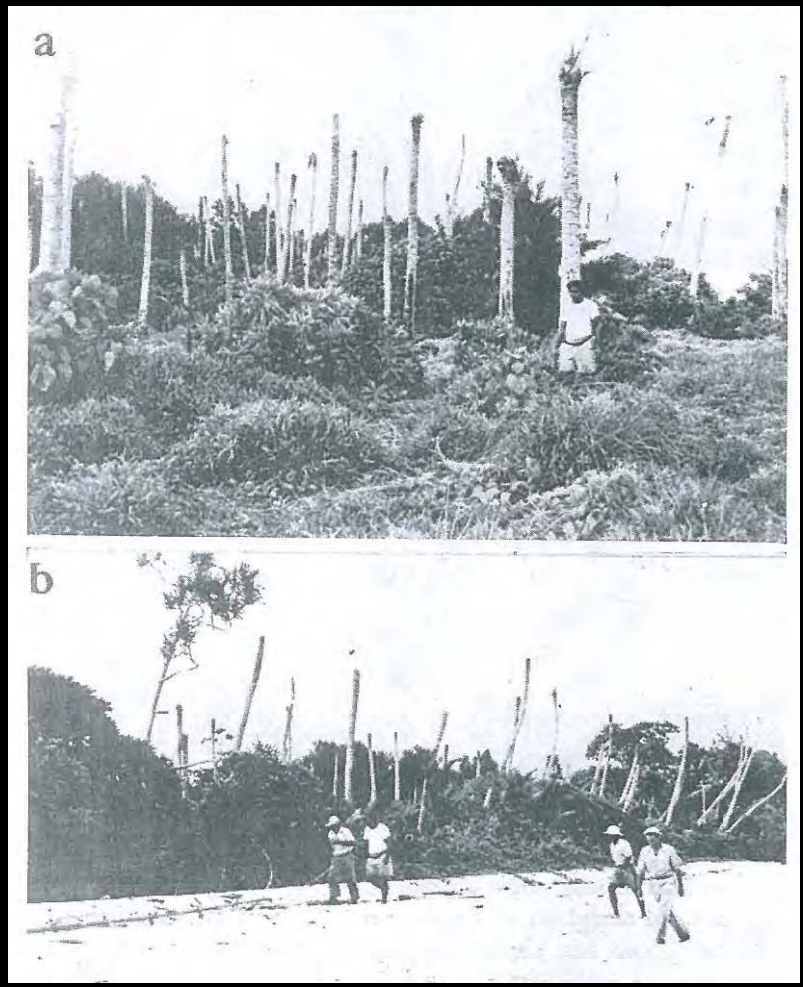
Eggs	99
L1	40
L2	72
L3	210
Pupae	25
Adult males	34
Adult females	30
Total	**510**
Mean per tree	**4.21**



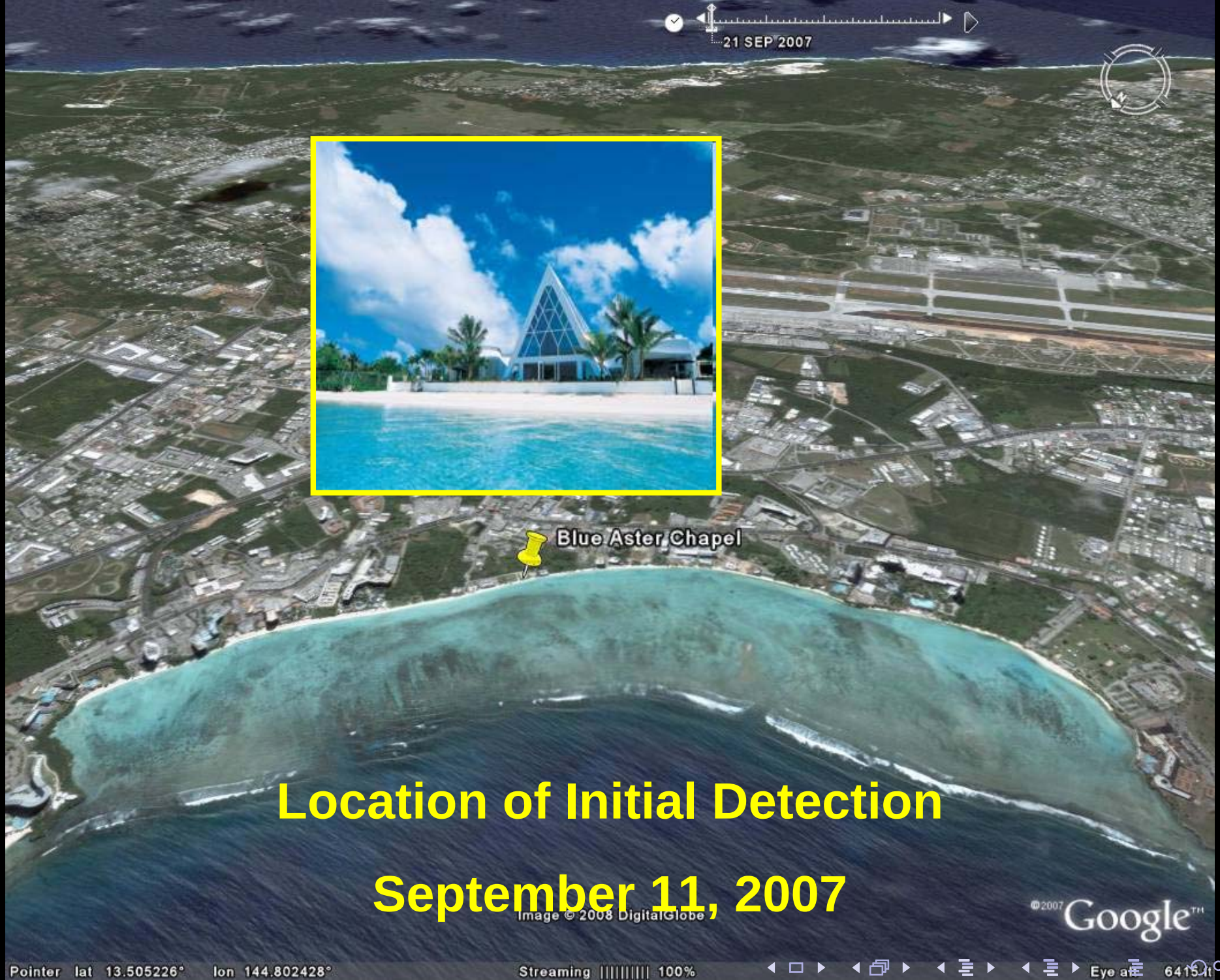
ADULTS KILL TREES

LARVAE FEED ON DEAD TREES

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

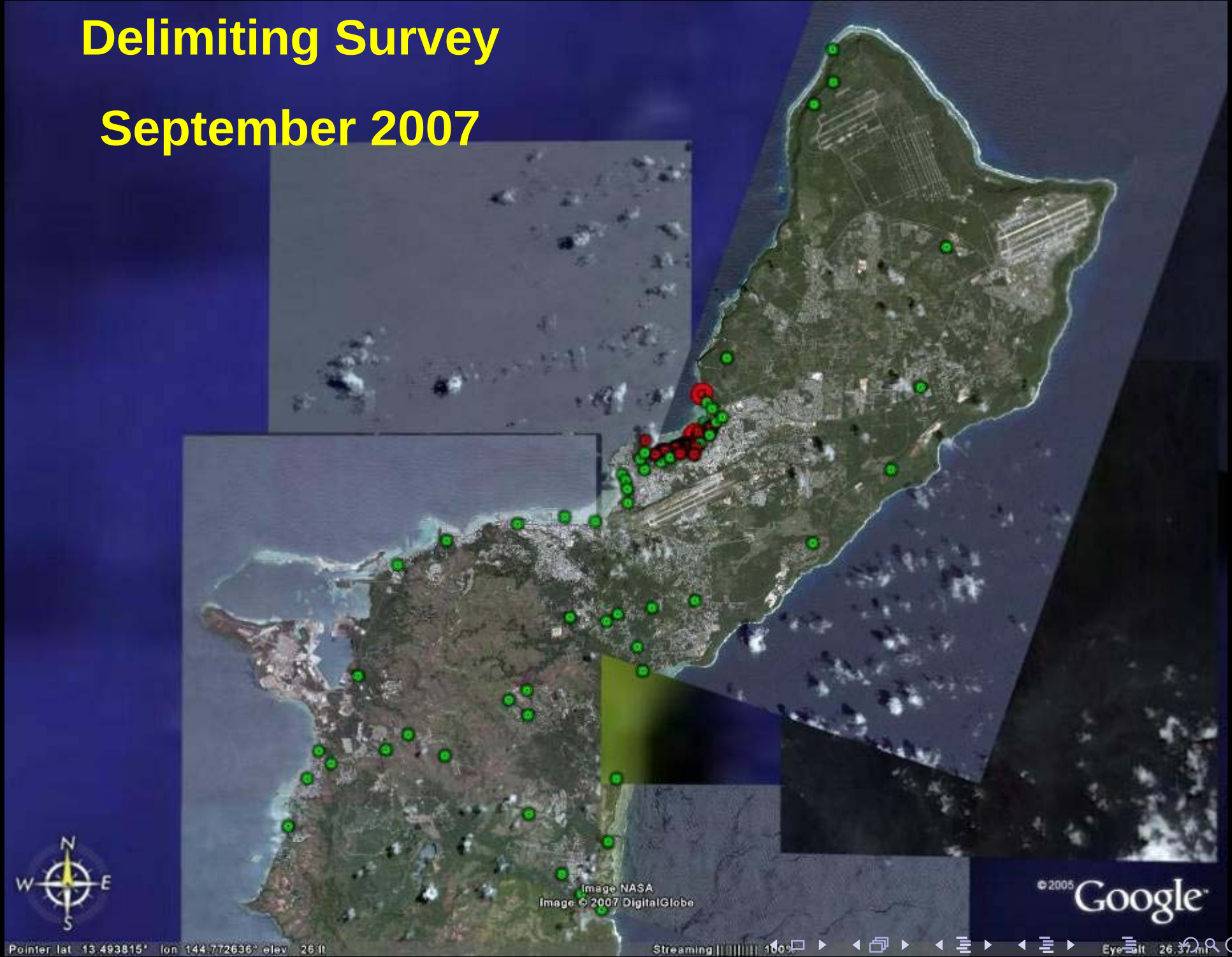


Coconut palms killed by *Oryctes rhinoceros;* Peleliu Island, Palau 1951
Source: Gressitt 1953


21 SEP 2007
Blue Aster Chapel
Location of Initial Detection
September 11, 2007
Image © 2008 DigitalGlobe
©2007 Google™
Pointer lat 13.505226° lon 144.802428°
Streaming 100%
Eye alt 6415 ft

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

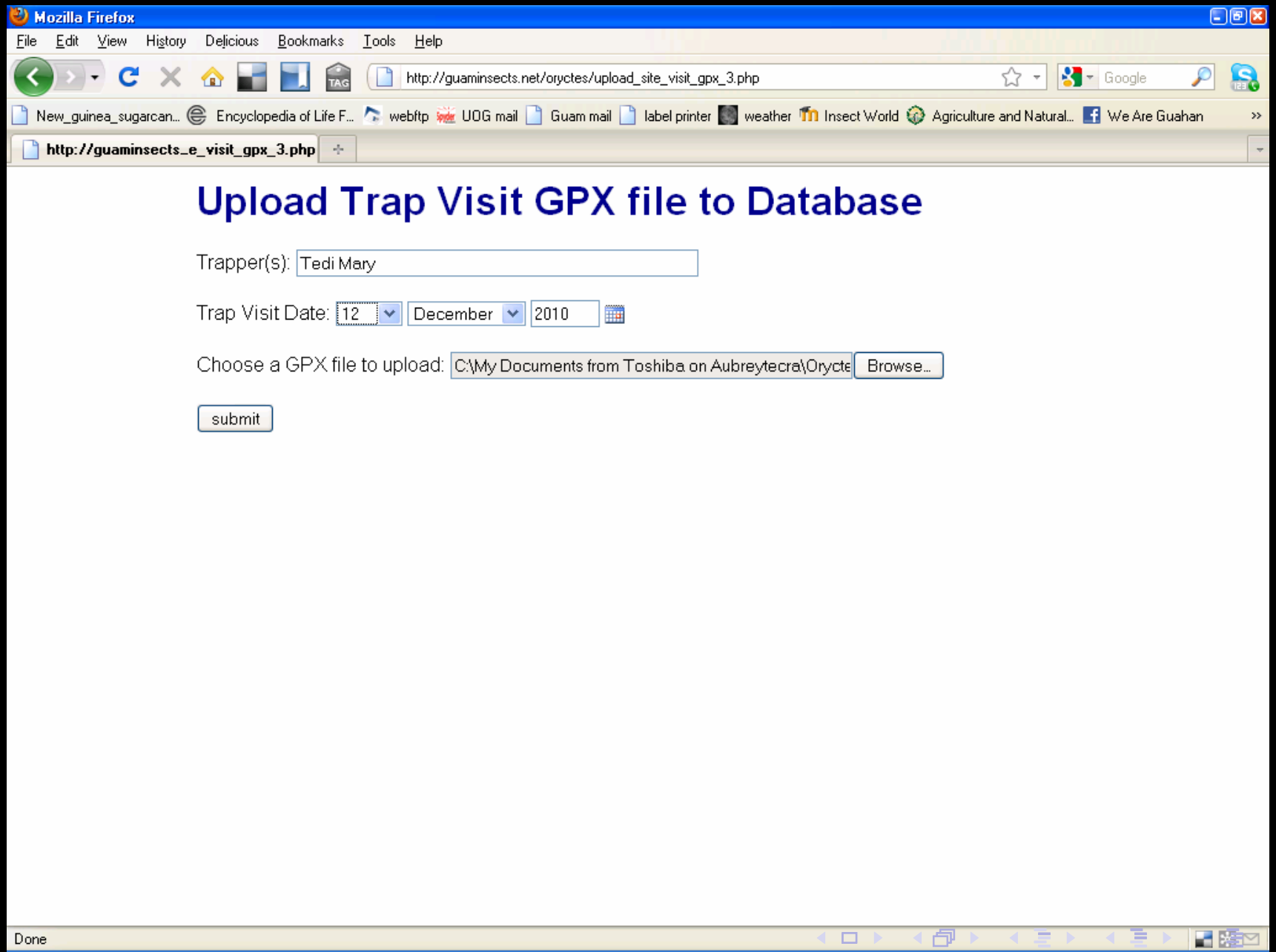
Initial Quarantine Area

September 2007

PHEROMONE TRAPS

- Mass trapping unsuccessful
- Traps useful for monitoring

Trap Data Entry Form



Online Trap Data Report

Mozilla Firefox

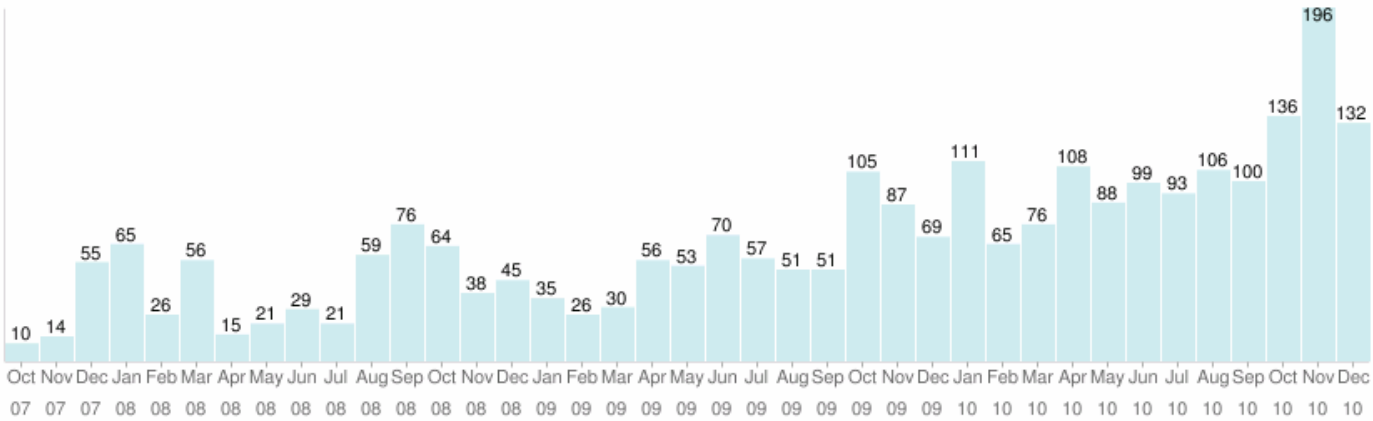
File Edit View History Delicious Bookmarks Tools Help

http://guaminsects.net/oryctes/trap_catch_all.php

New_guinea_sugarcan... Encyclopedia of Life F... webftp UOG mail Guam mail label printer weather Insect World Agriculture and Natural... We Are Guahan

http://guaminsects_rap_catch_all.php

Monthly Trap Catch - All Traps



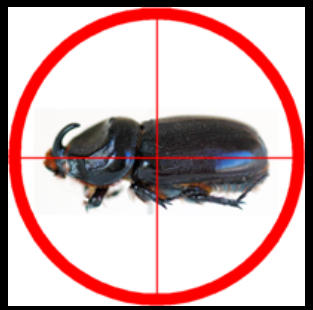
year	month	beetles_trapped	trap_visits
2007	10	10	402
2007	11	14	259
2007	12	55	238
2008	1	65	655
2008	2	26	909
2008	3	56	1990
2008	4	15	1100
2008	5	21	1134

Done

Visualization of Trap Catch Data

Aubrey Moore

Guam Coconut Rhinoceros Beetle Eradication Project



Generated 2012-02-01 19:28:20
Path: C:/Documents and Settings/Administrator/My Documents/CRB monthly surveillance reports/map dev
R script: makeMaps.R
Brew file: makeBeamer.txt

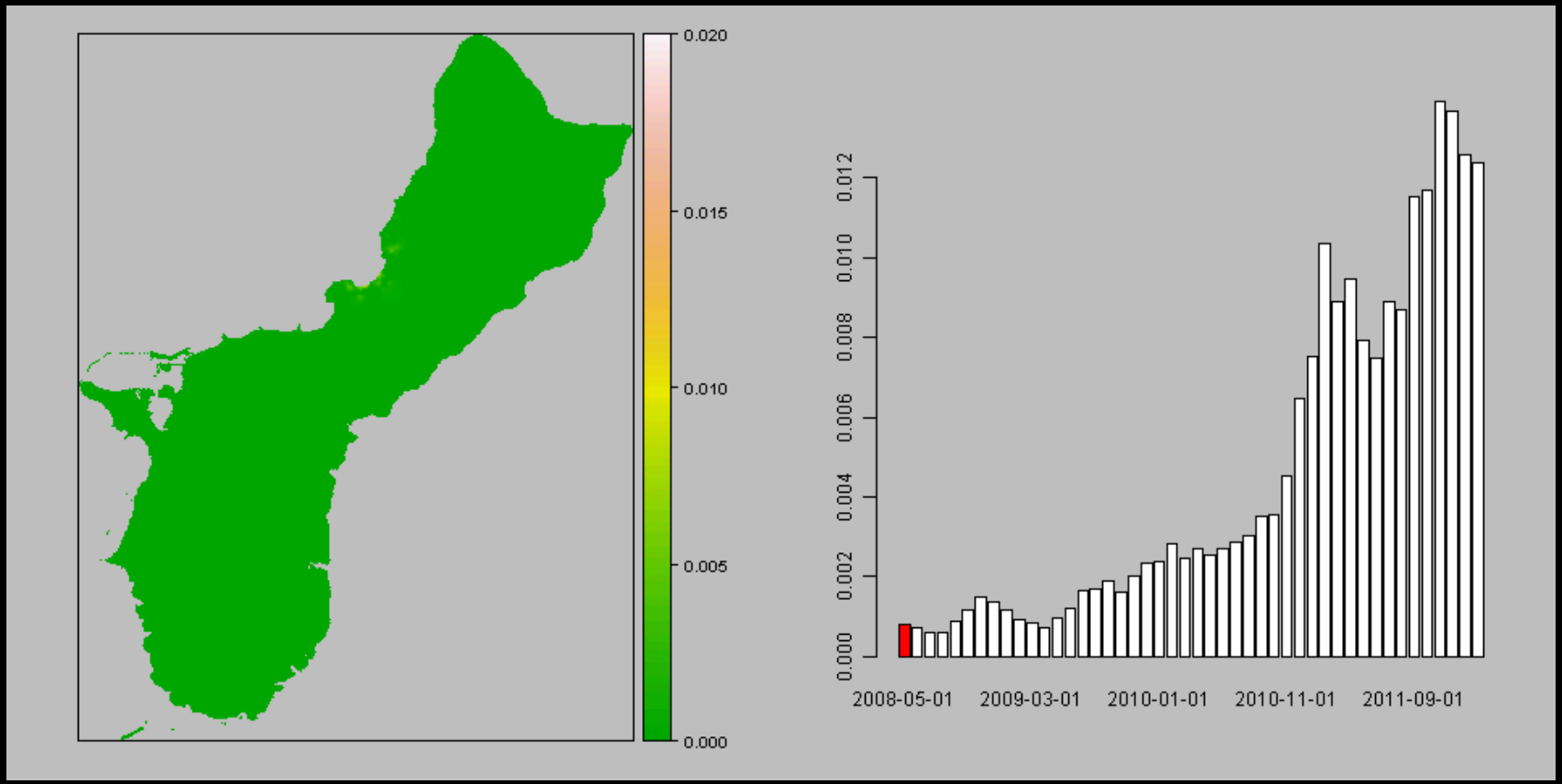
Introduction

- 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

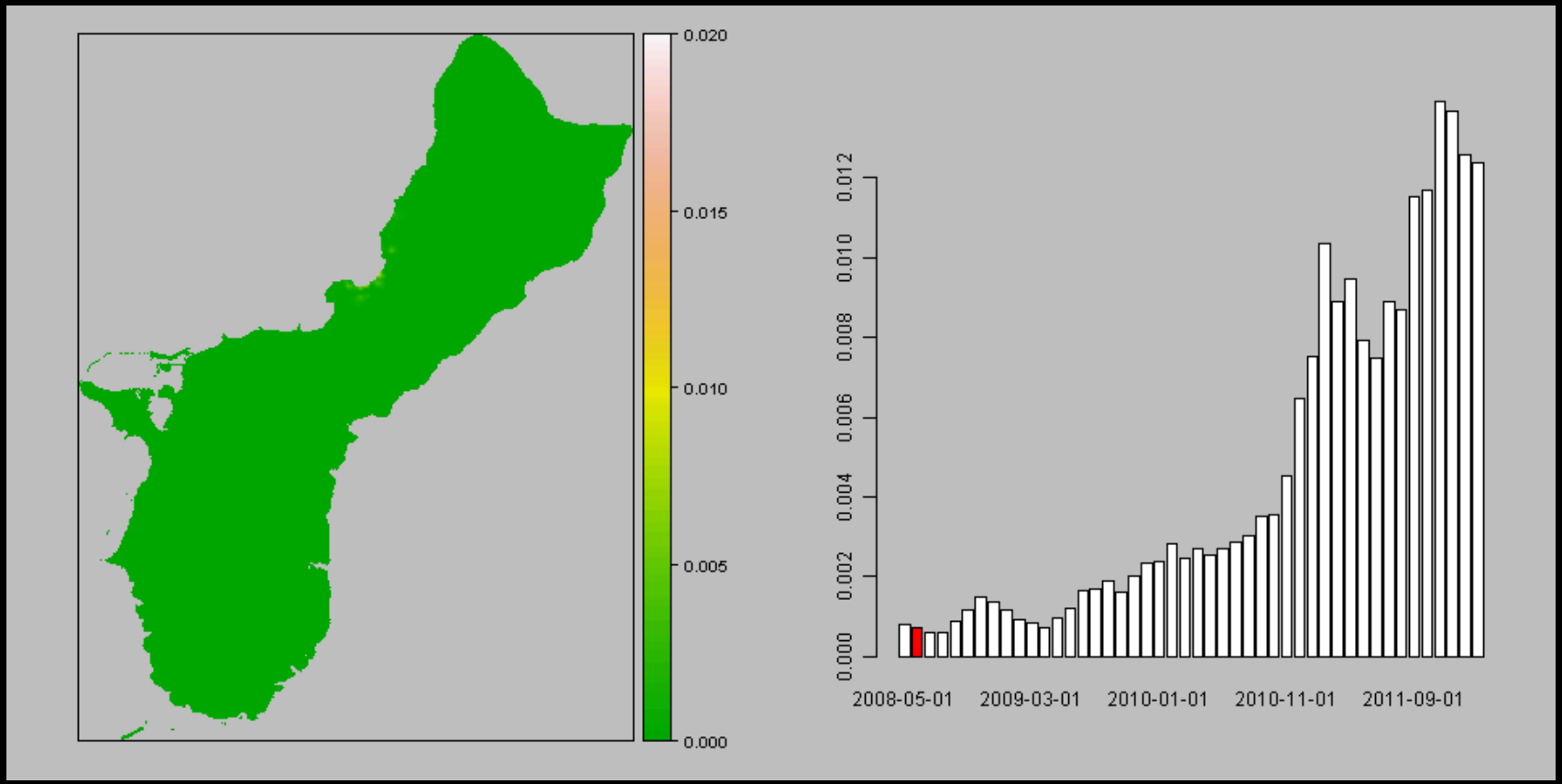
- Interpolated raster maps were made using an R script which:
  1. Accesses georeferenced data stored in the CRB project's online MySQL database.
  2. Processes the data using the GRASS6 GIS
  3. Writes the LaTeX code which generated this PDF document.

90 day trapping period ending on 01 May 2008



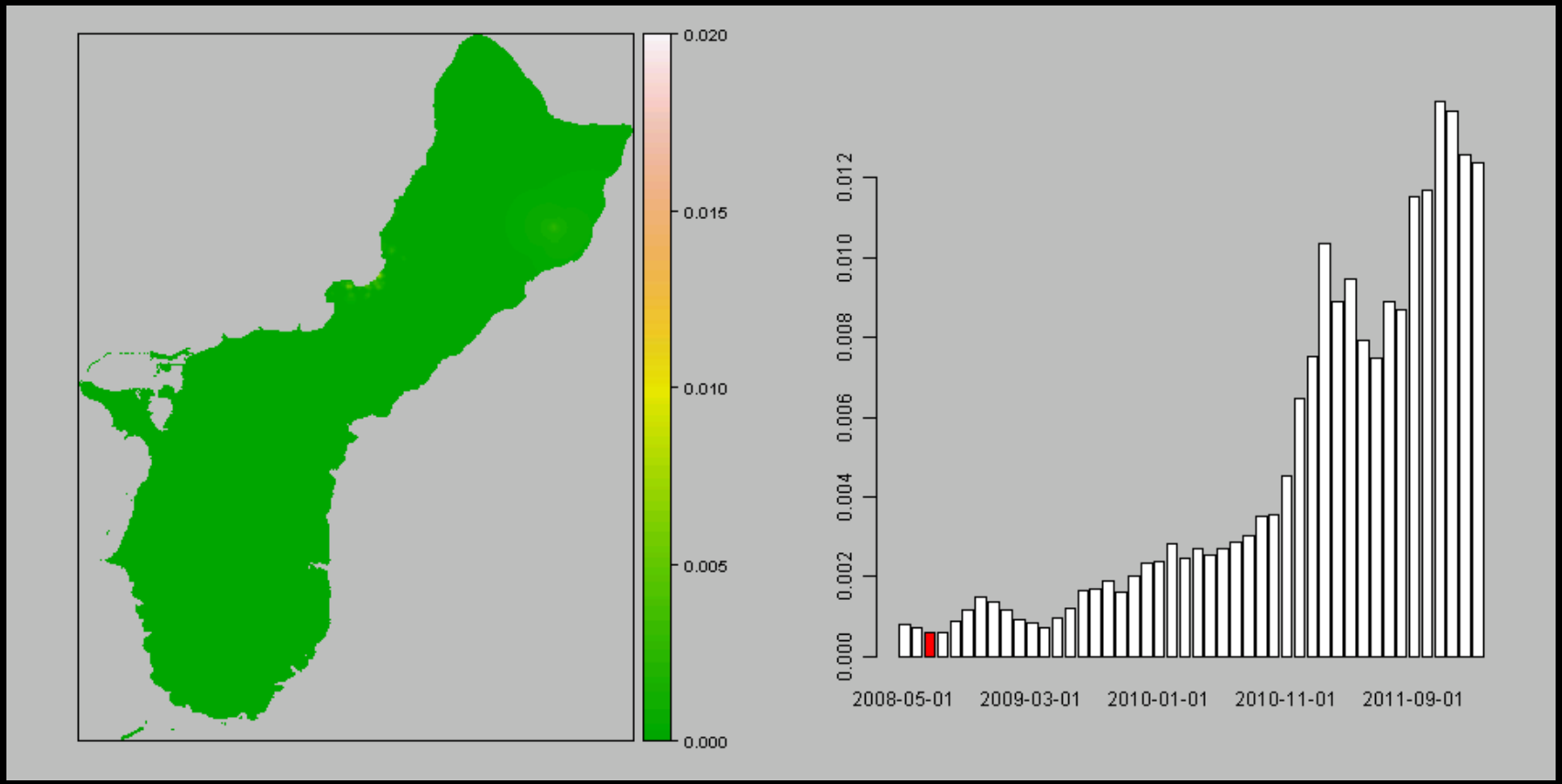
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jun 2008



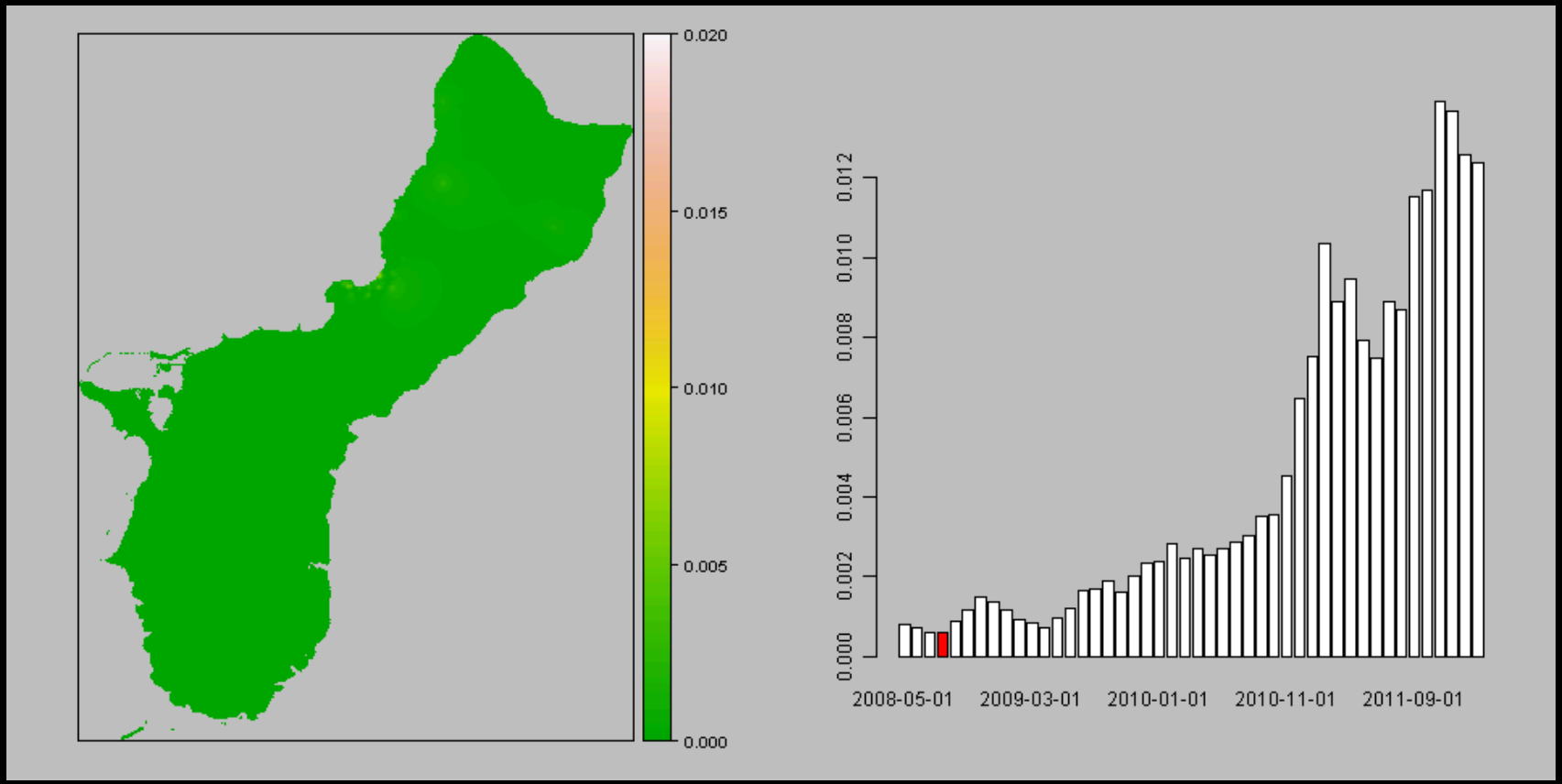
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jul 2008



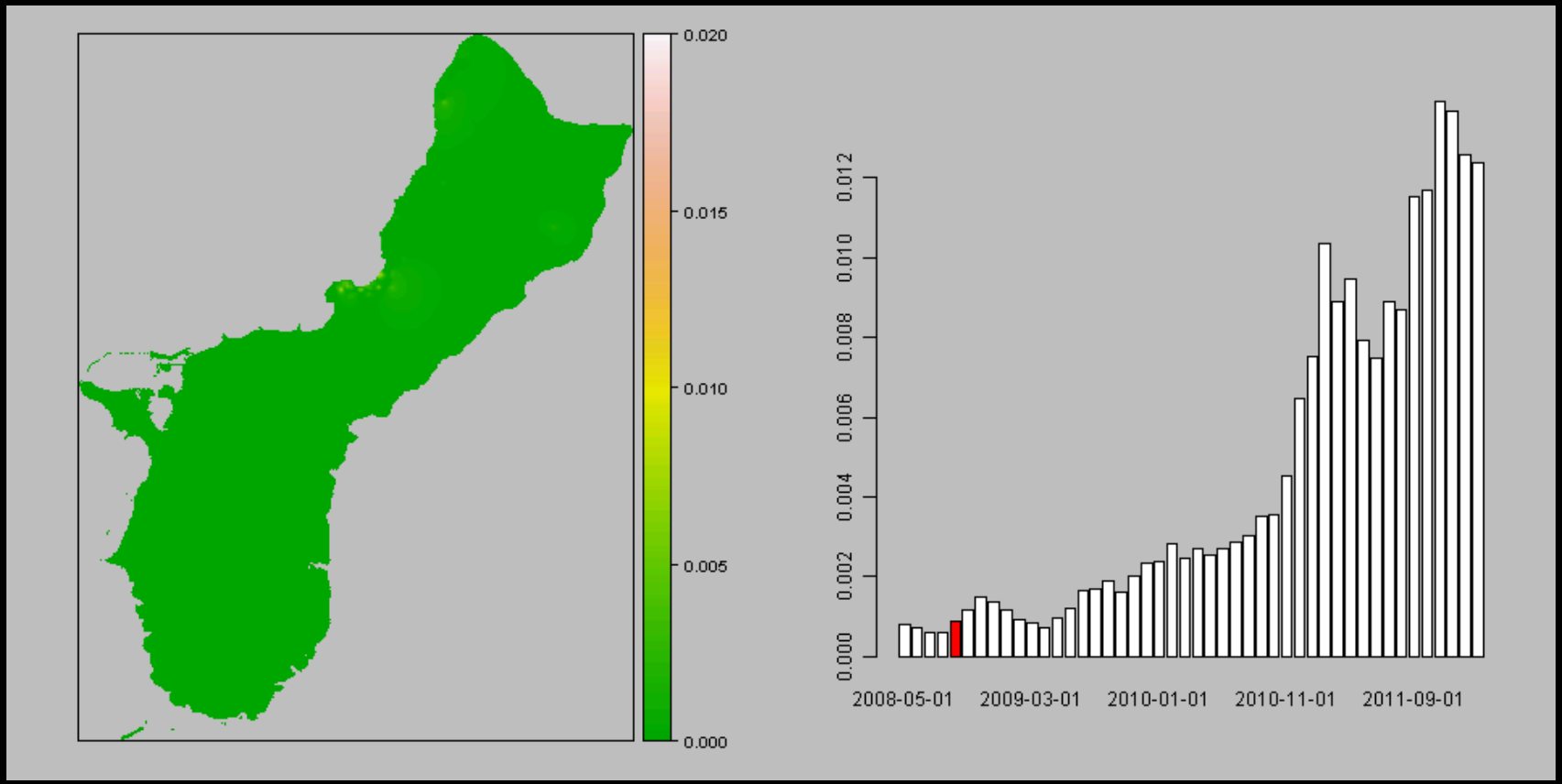
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Aug 2008



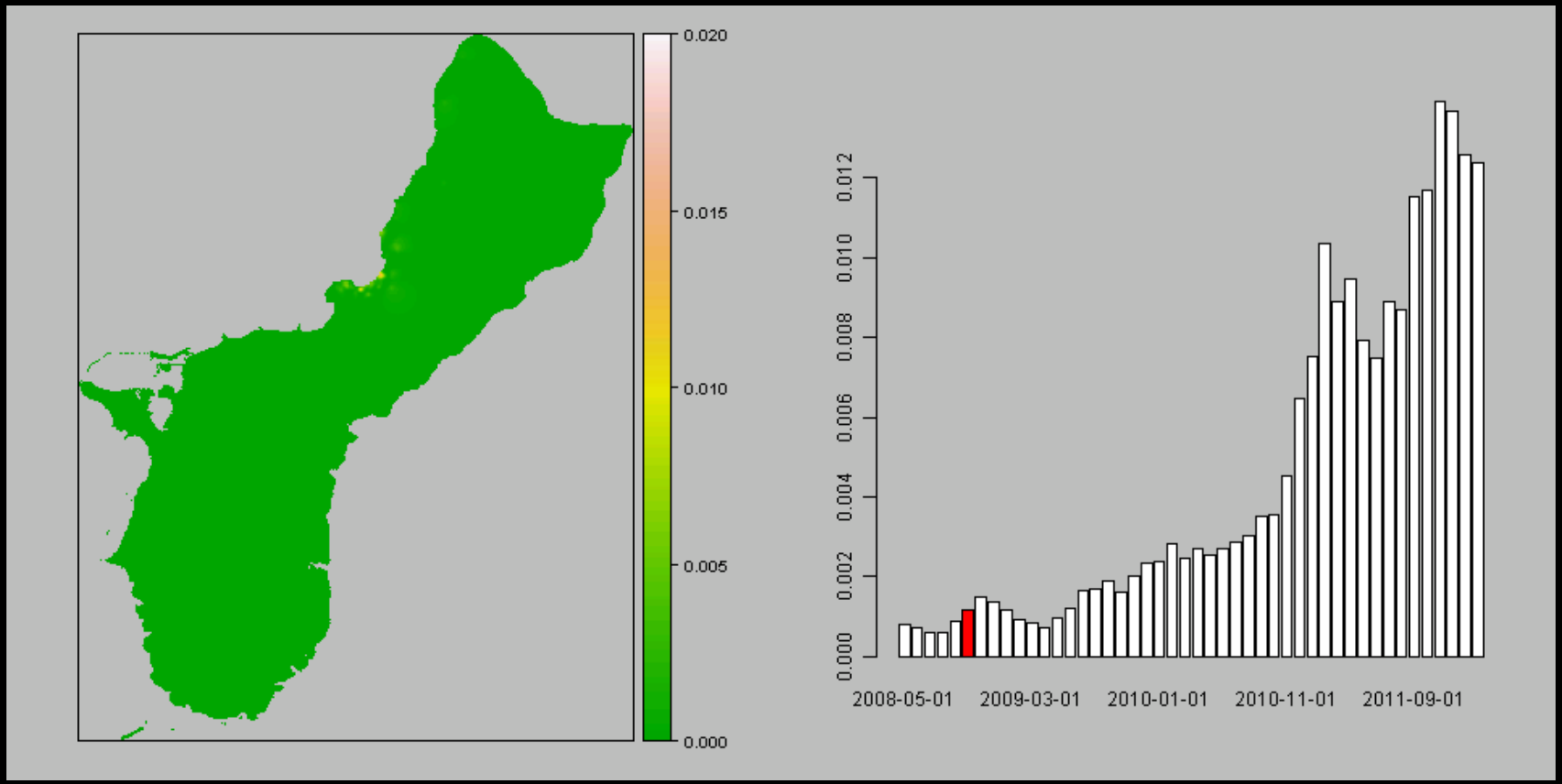
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Sep 2008



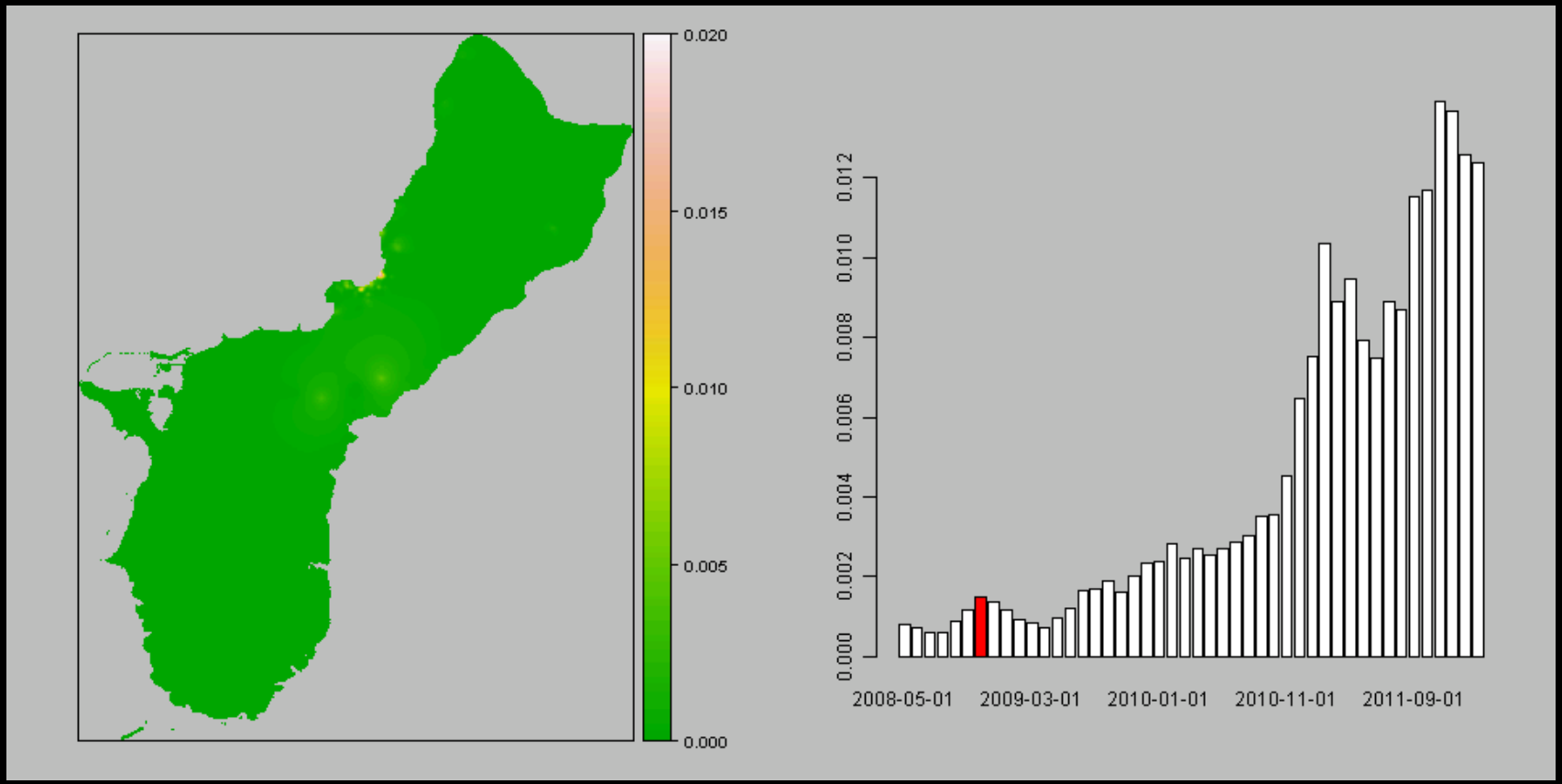
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Oct 2008



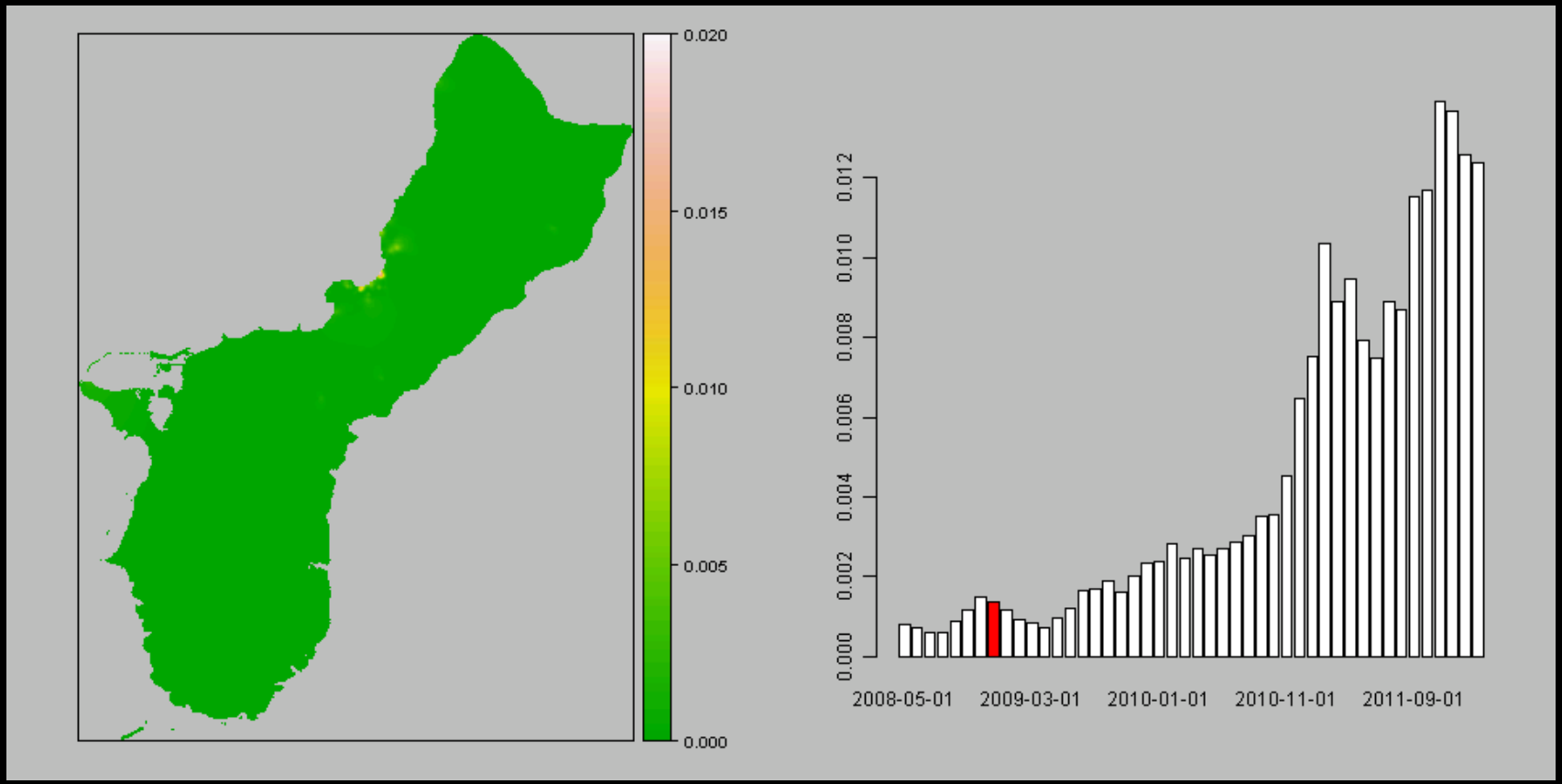
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Nov 2008



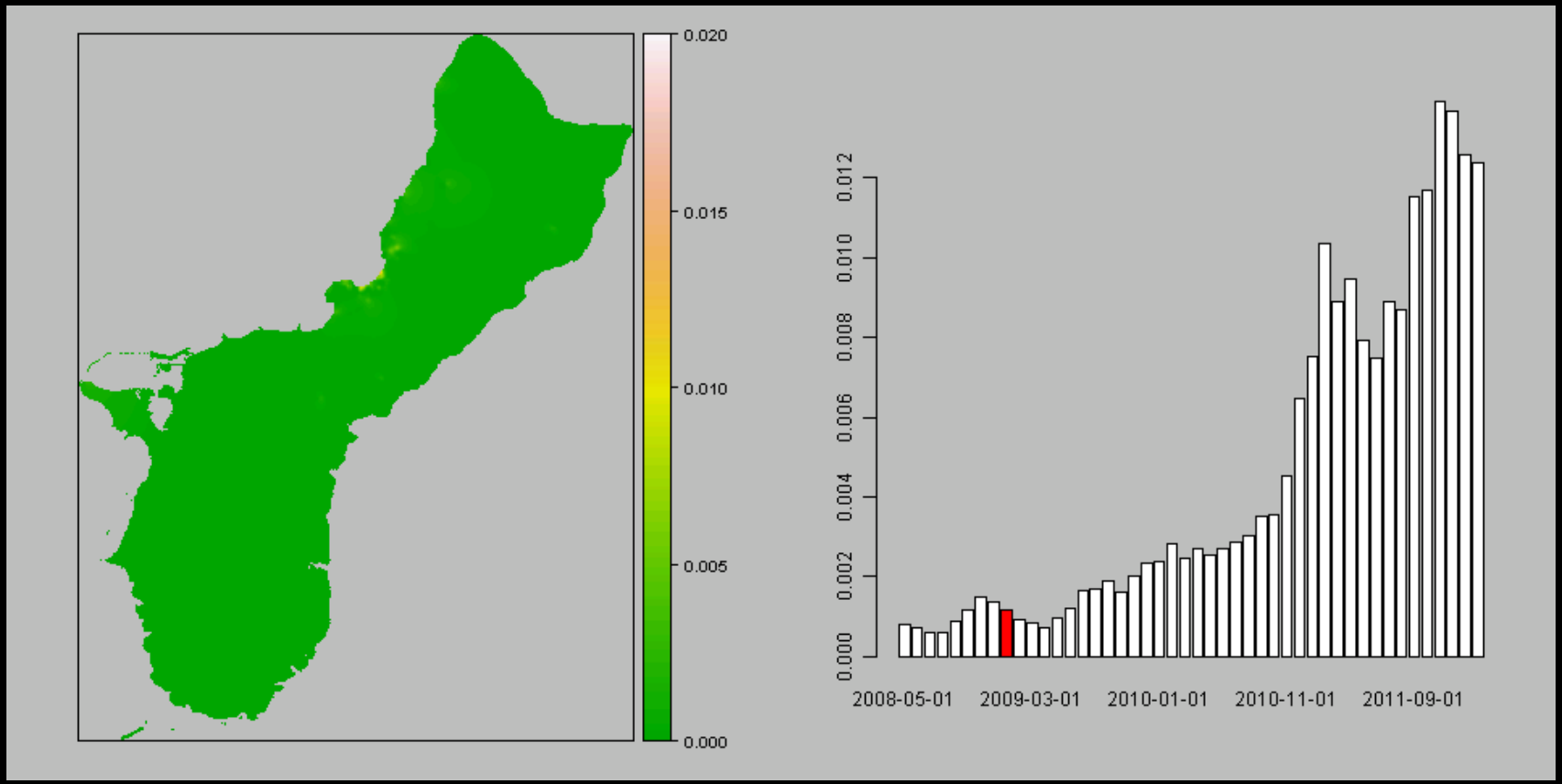
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Dec 2008



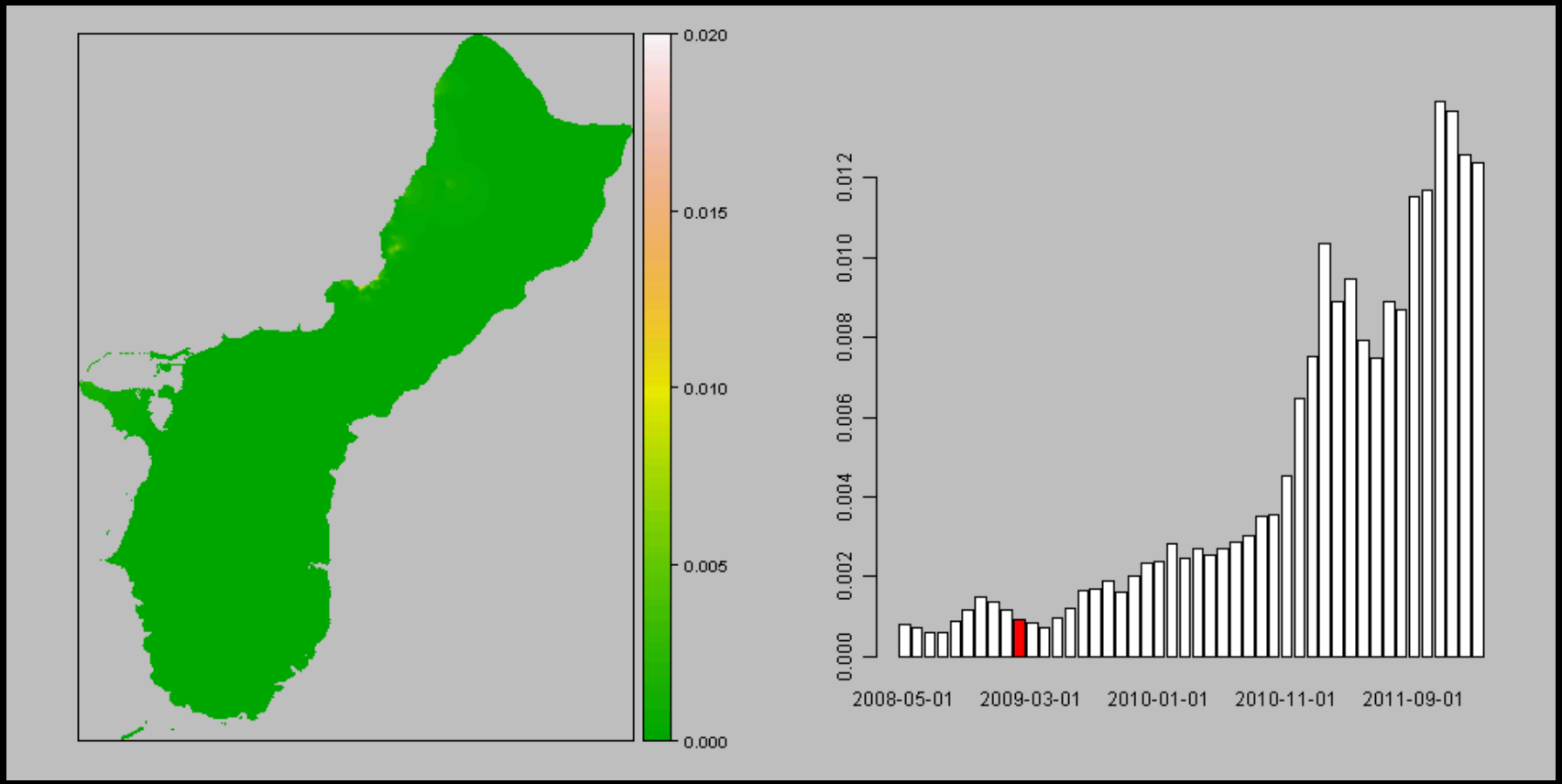
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jan 2009



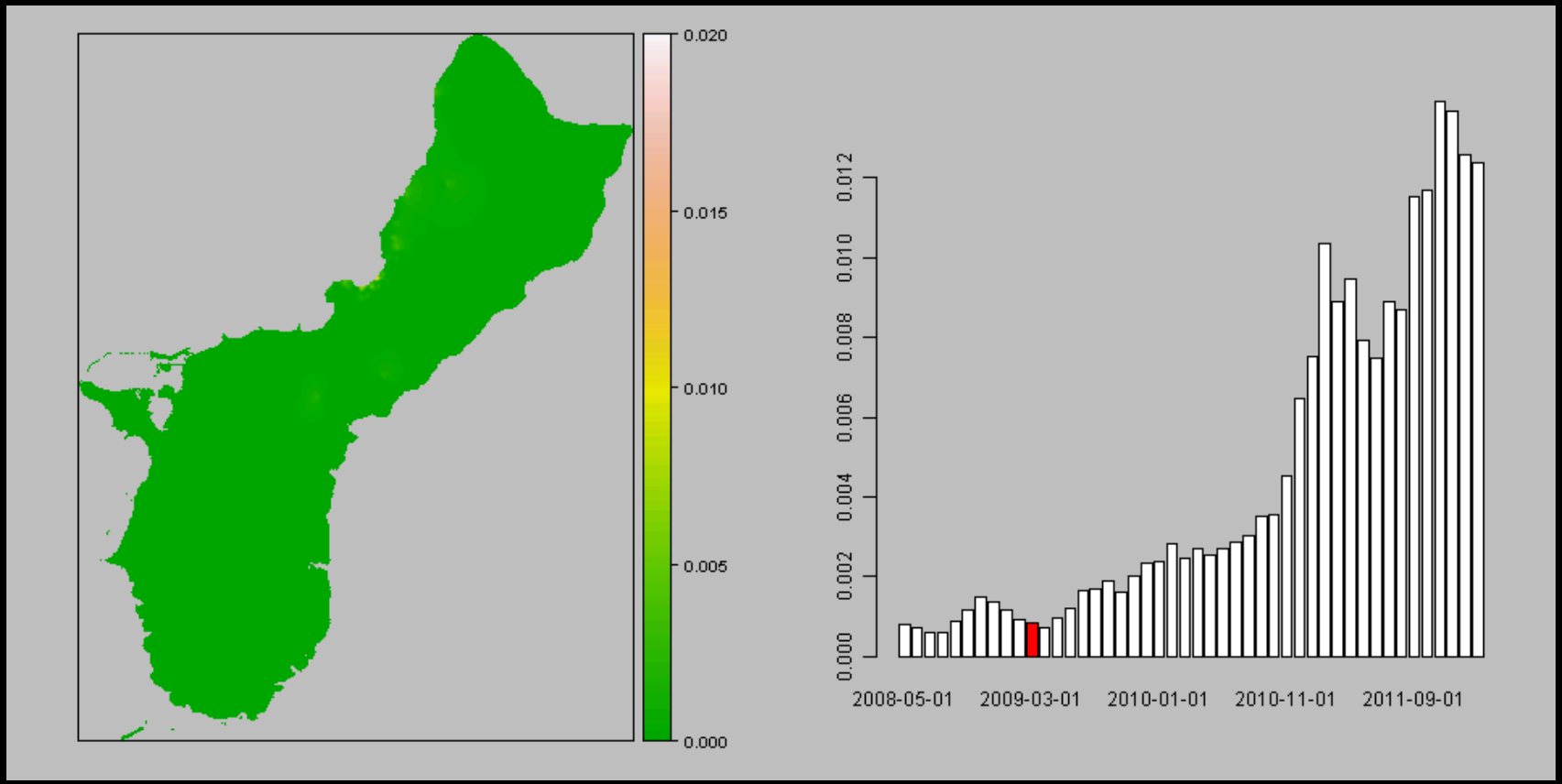
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Feb 2009



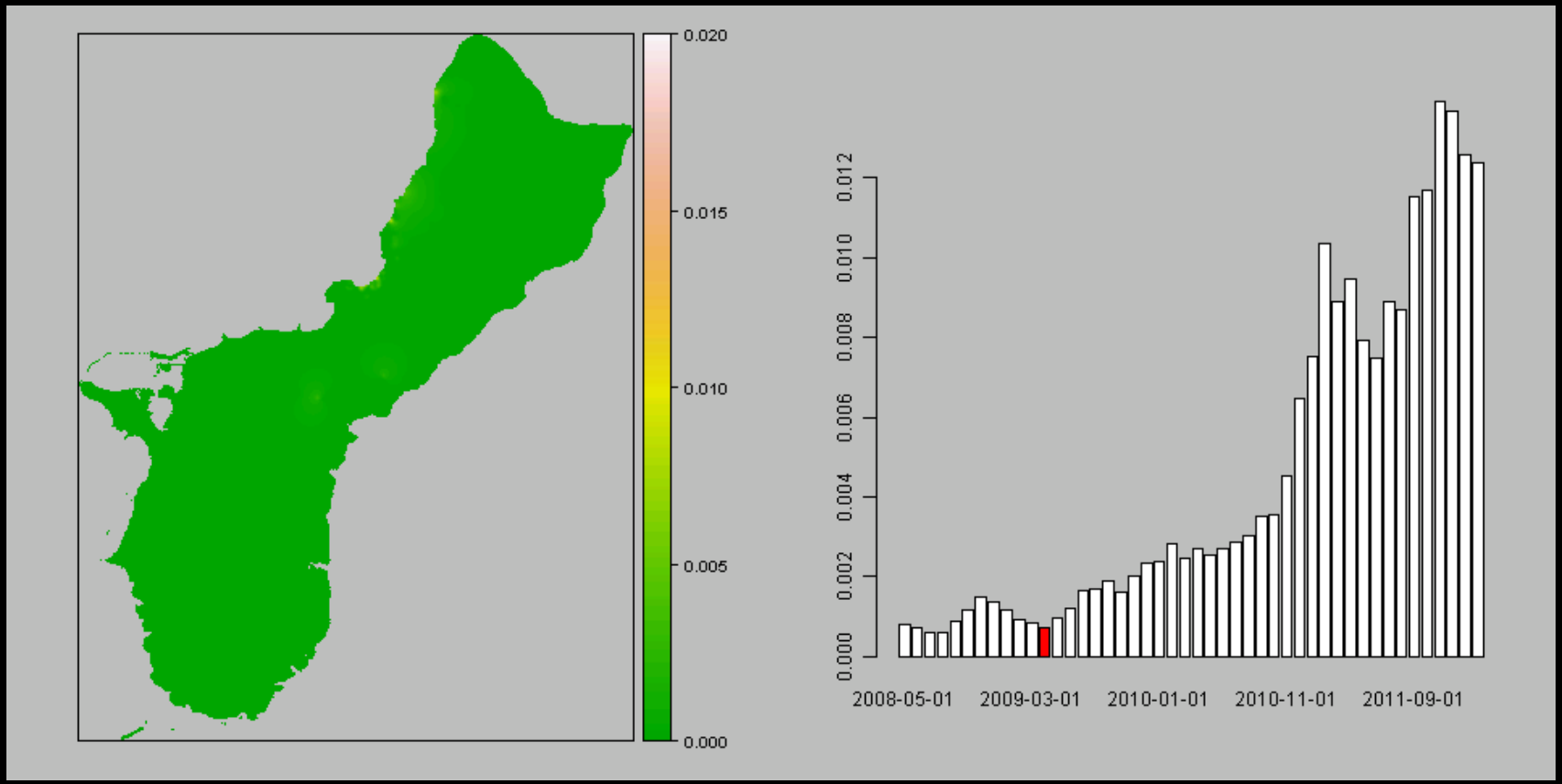
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Mar 2009



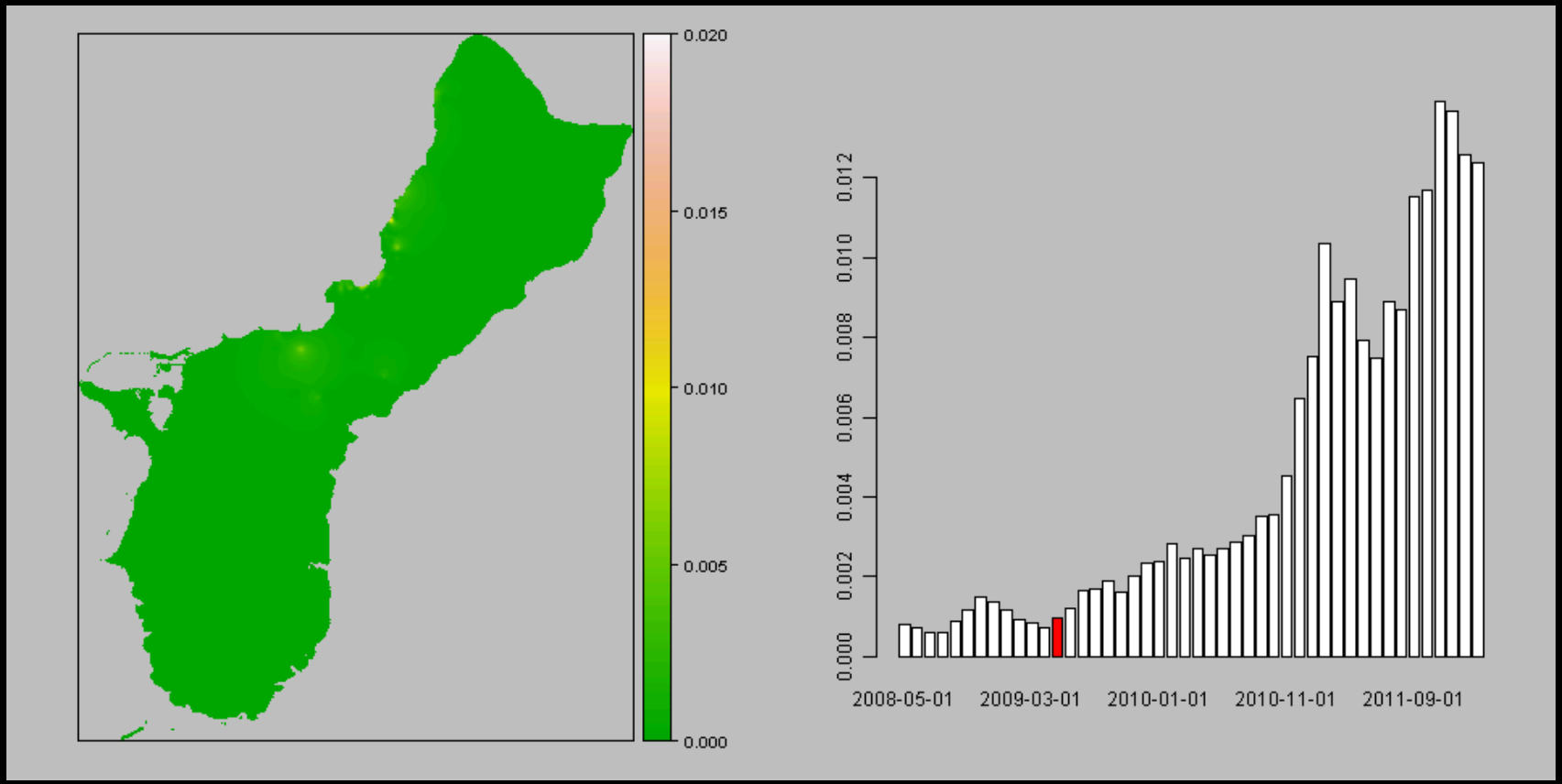
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Apr 2009



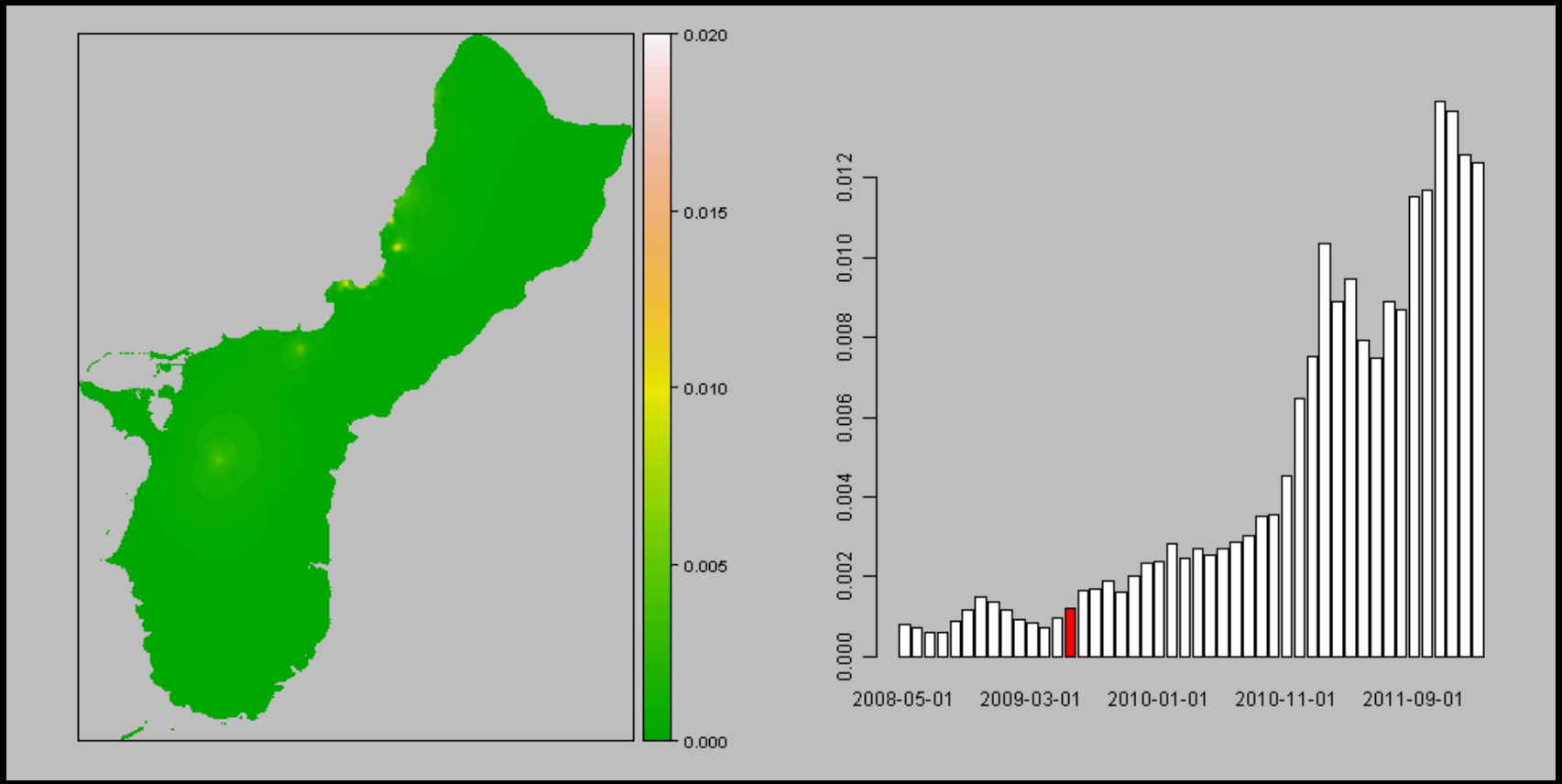
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 May 2009



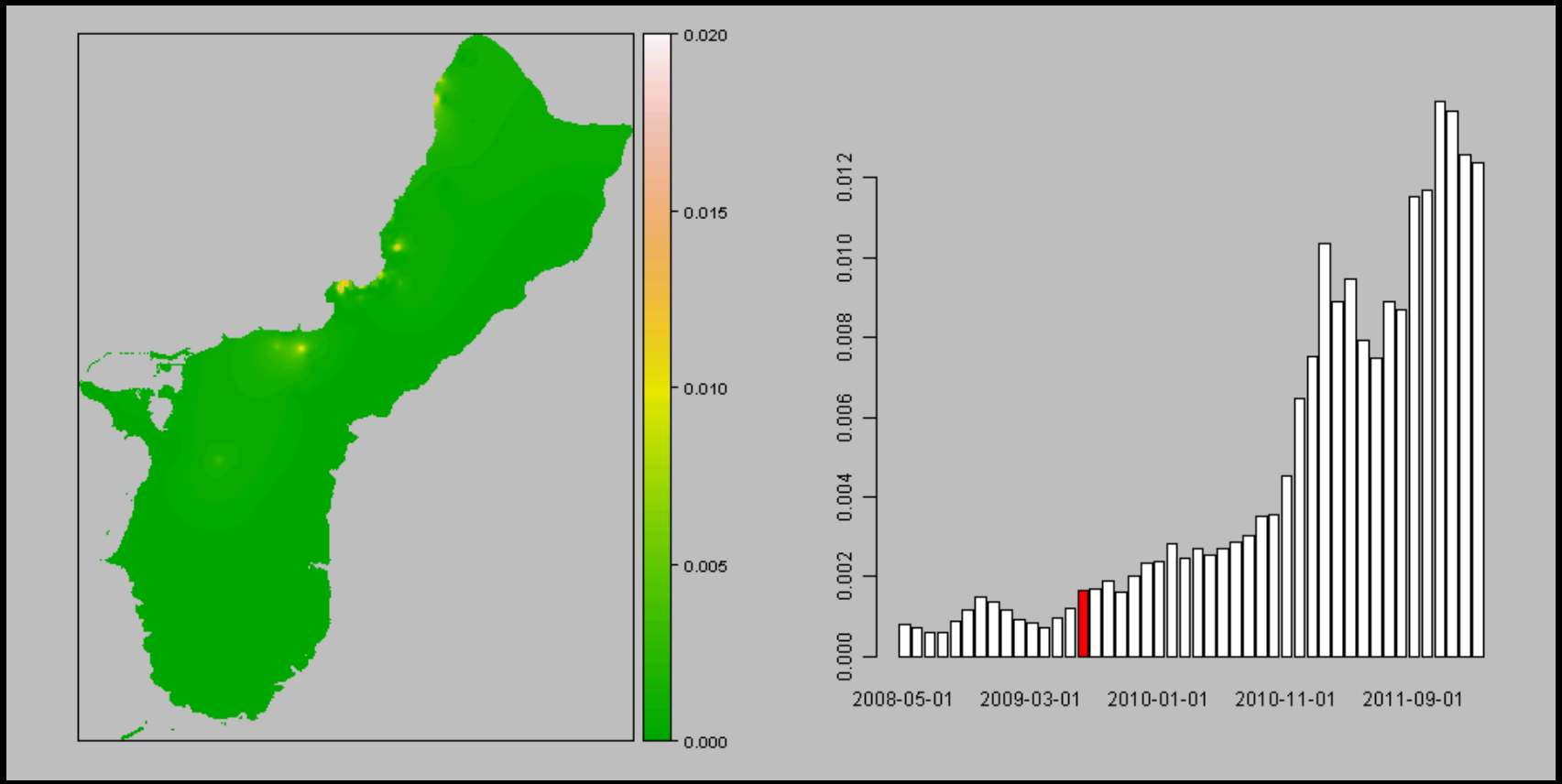
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jun 2009



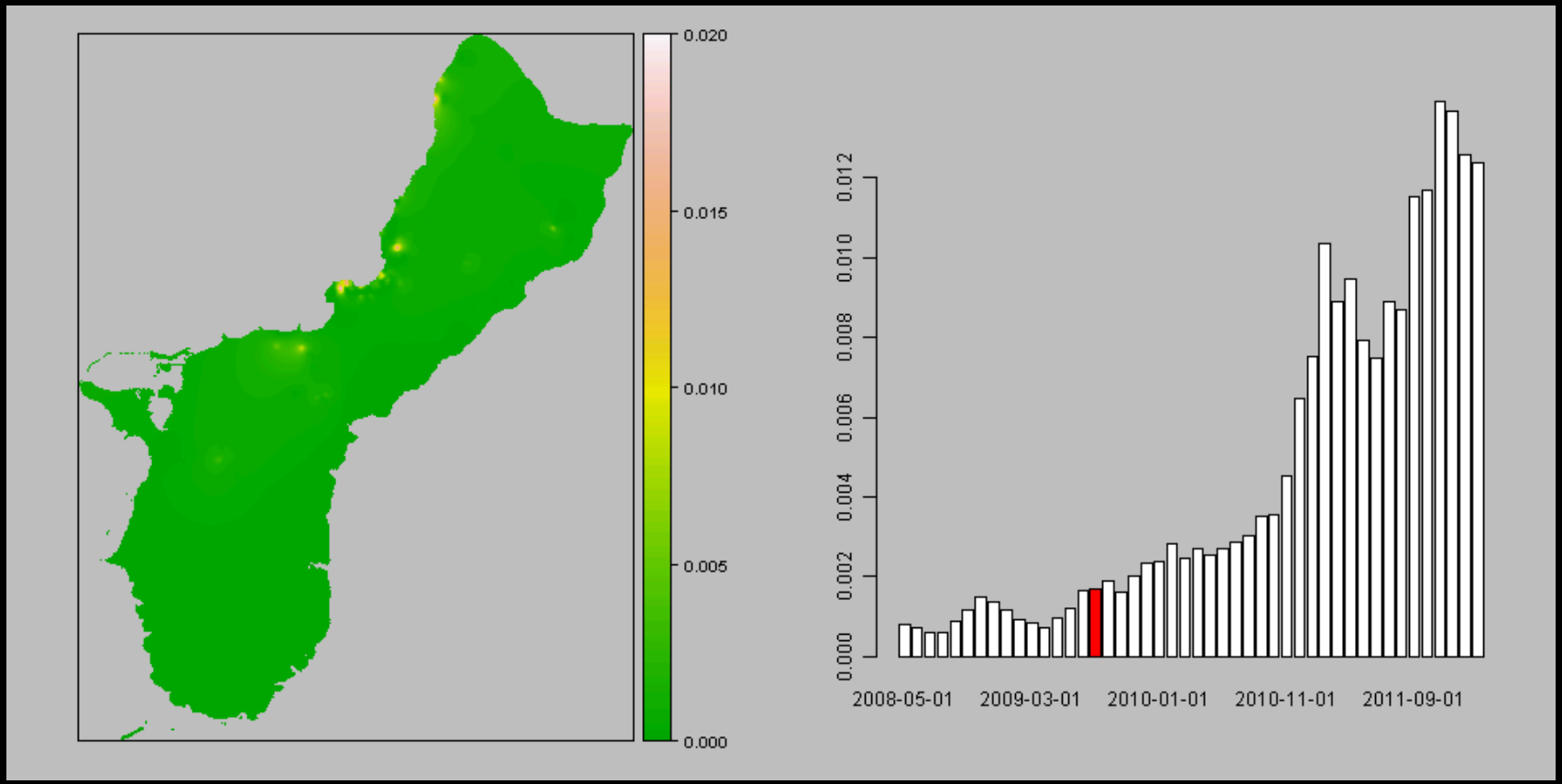
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jul 2009



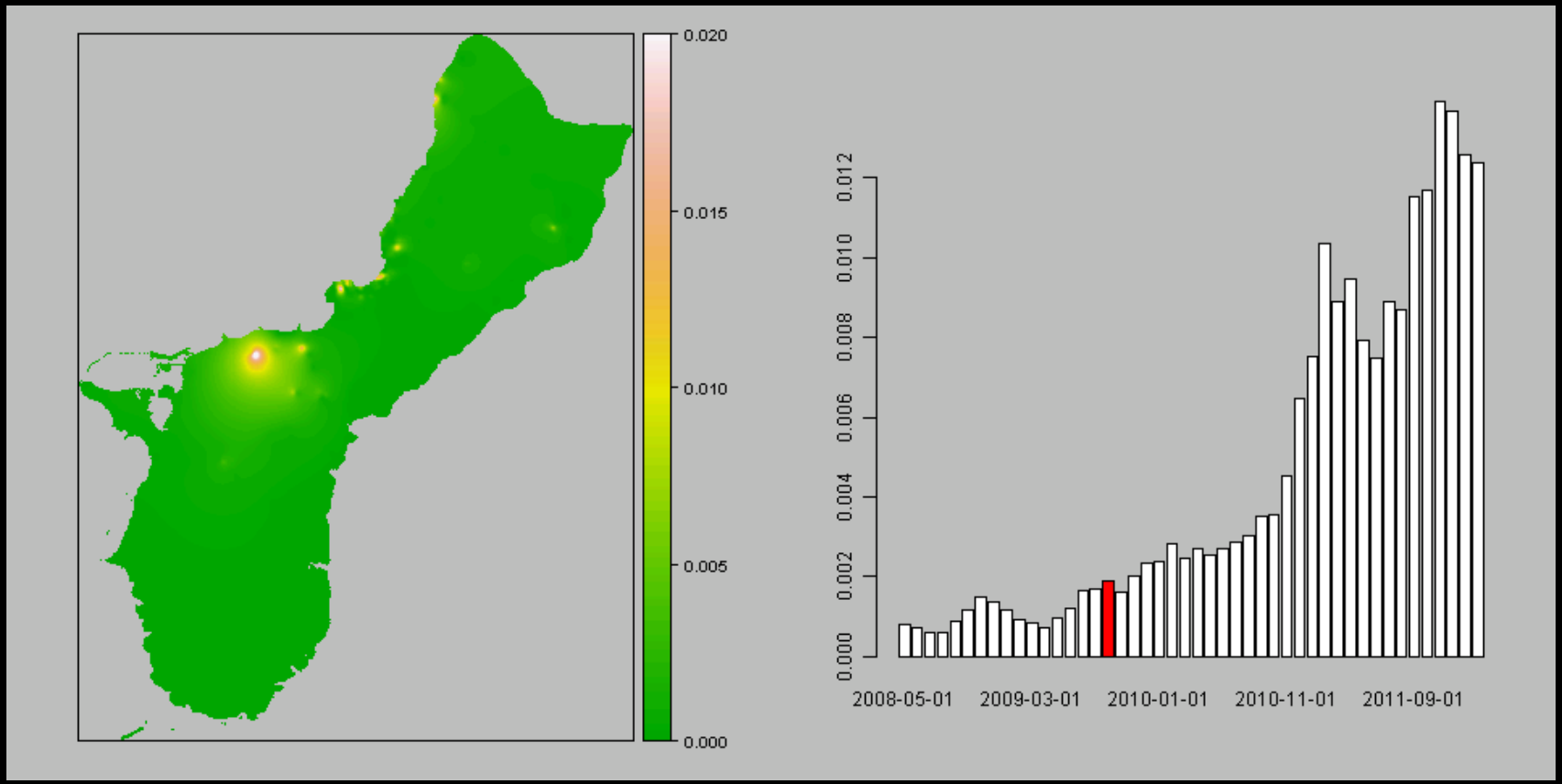
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Aug 2009



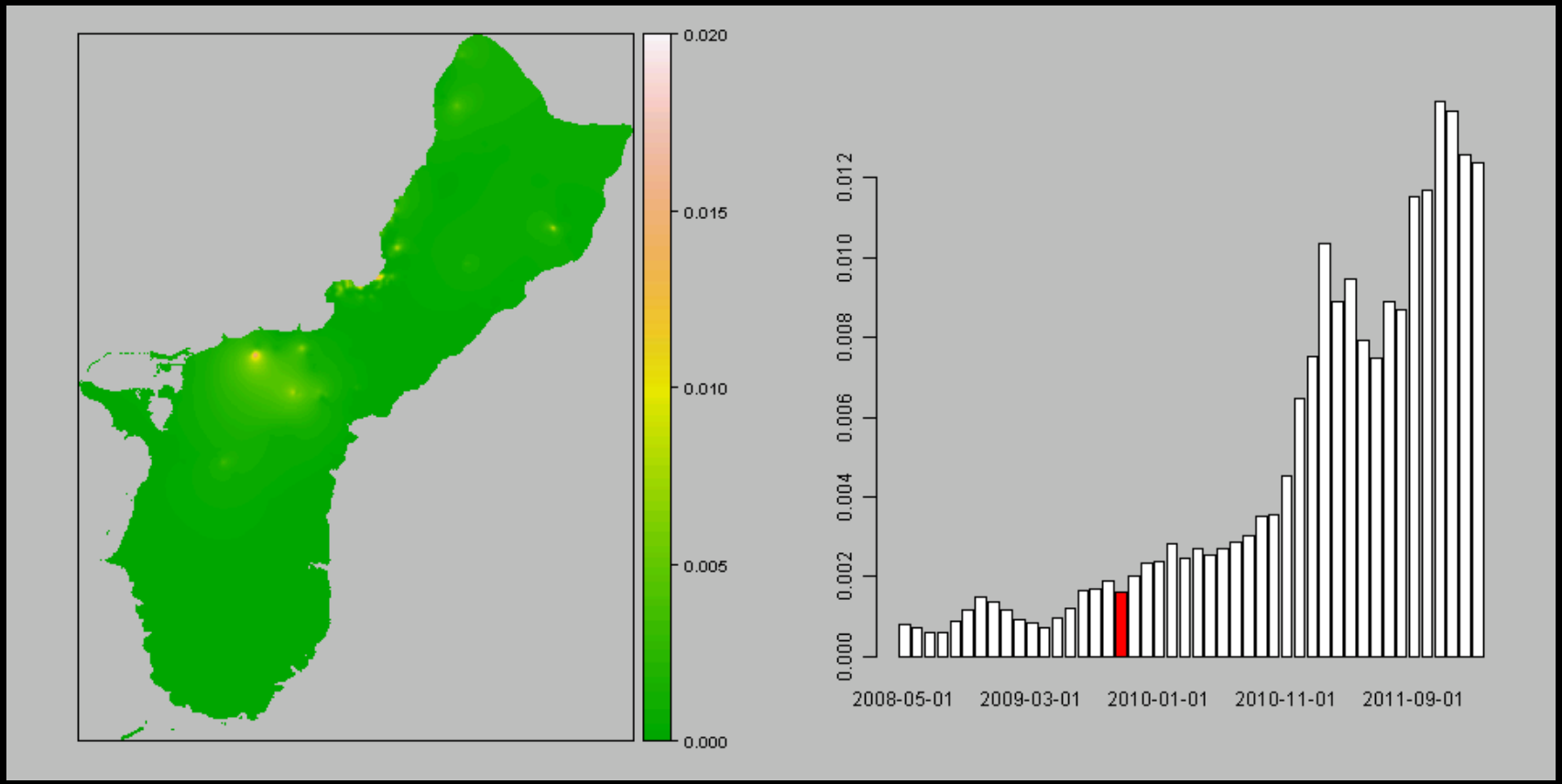
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Sep 2009



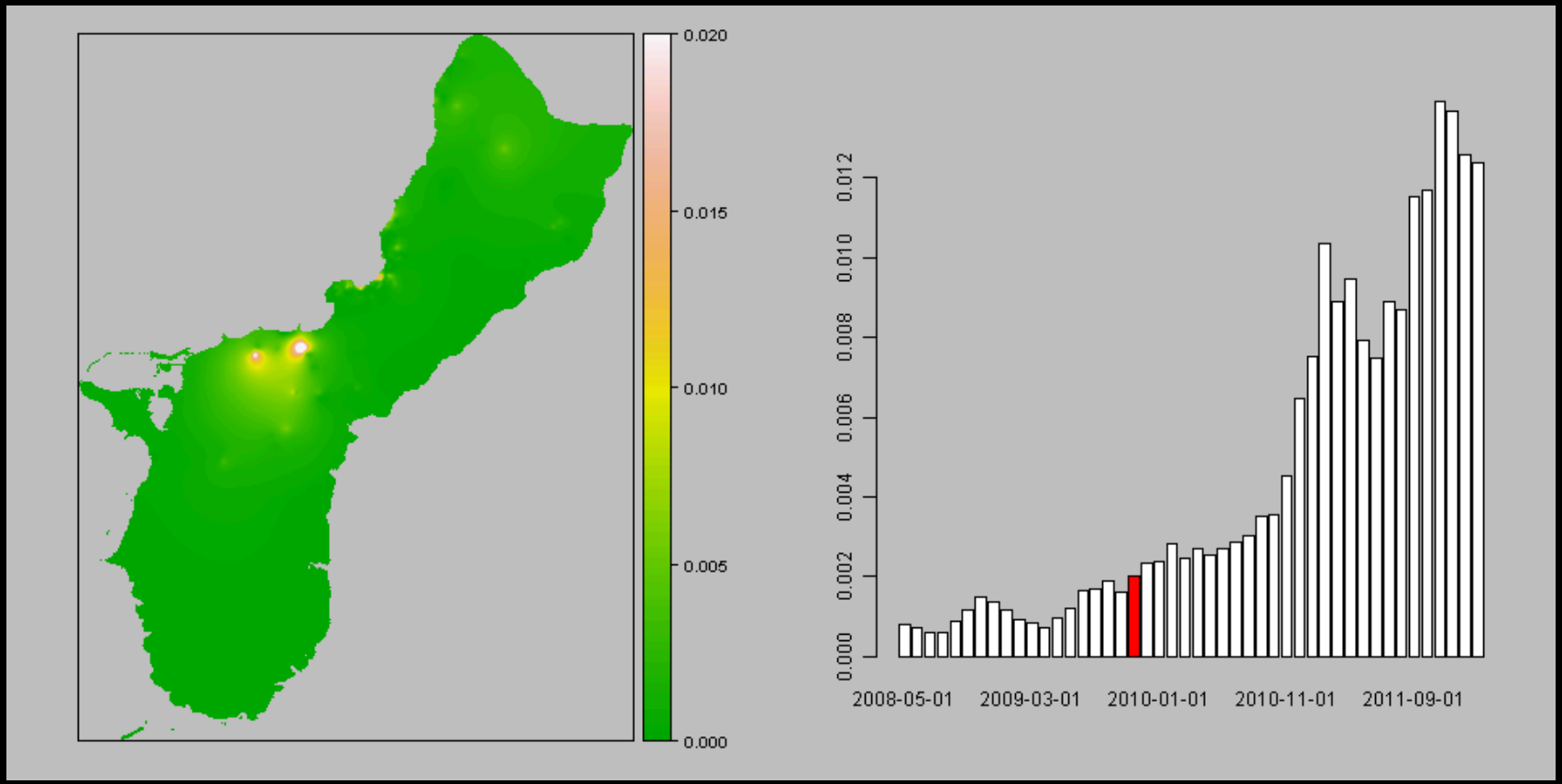
Mean number of beetles caught per trap-day

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



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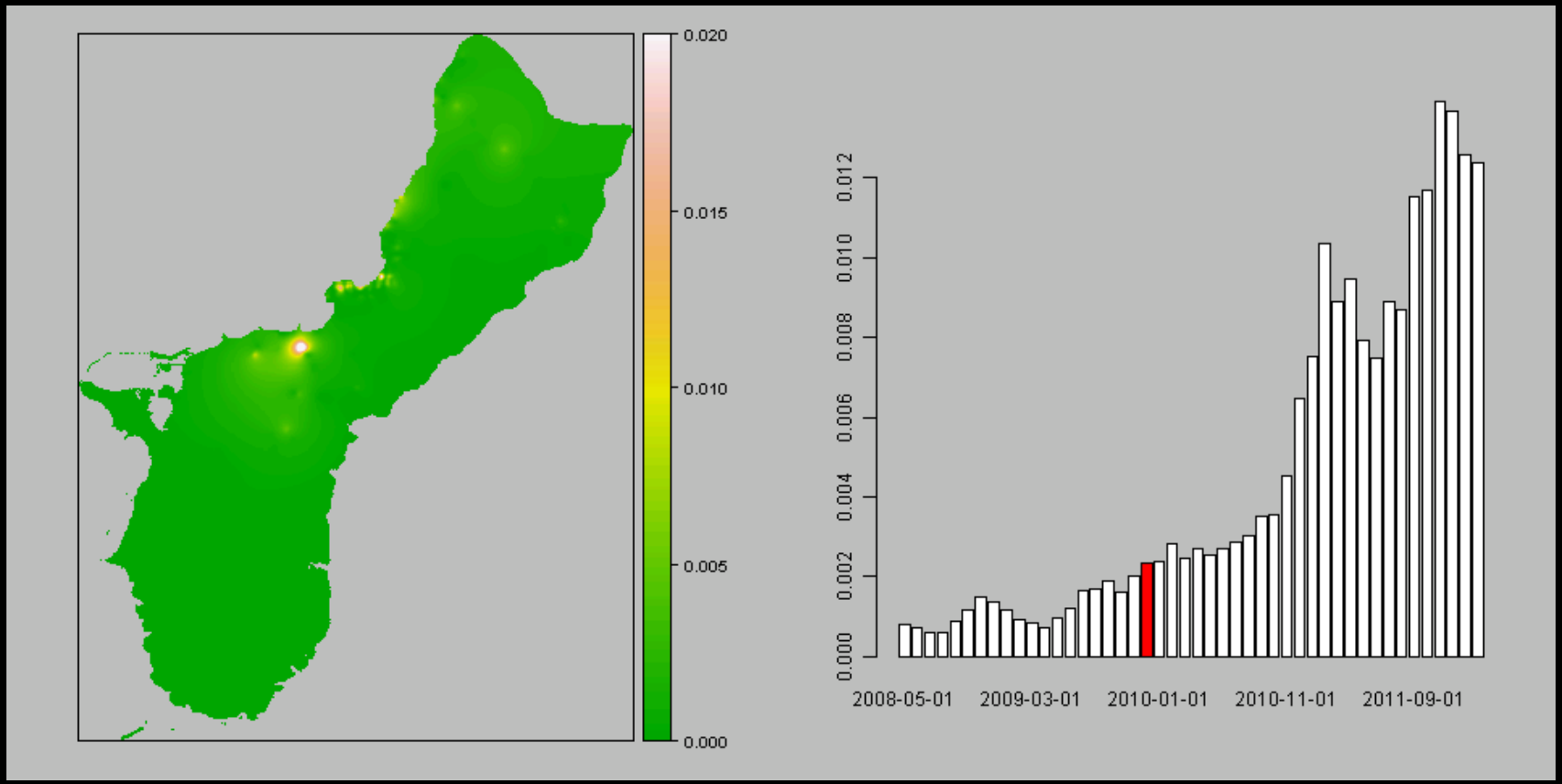

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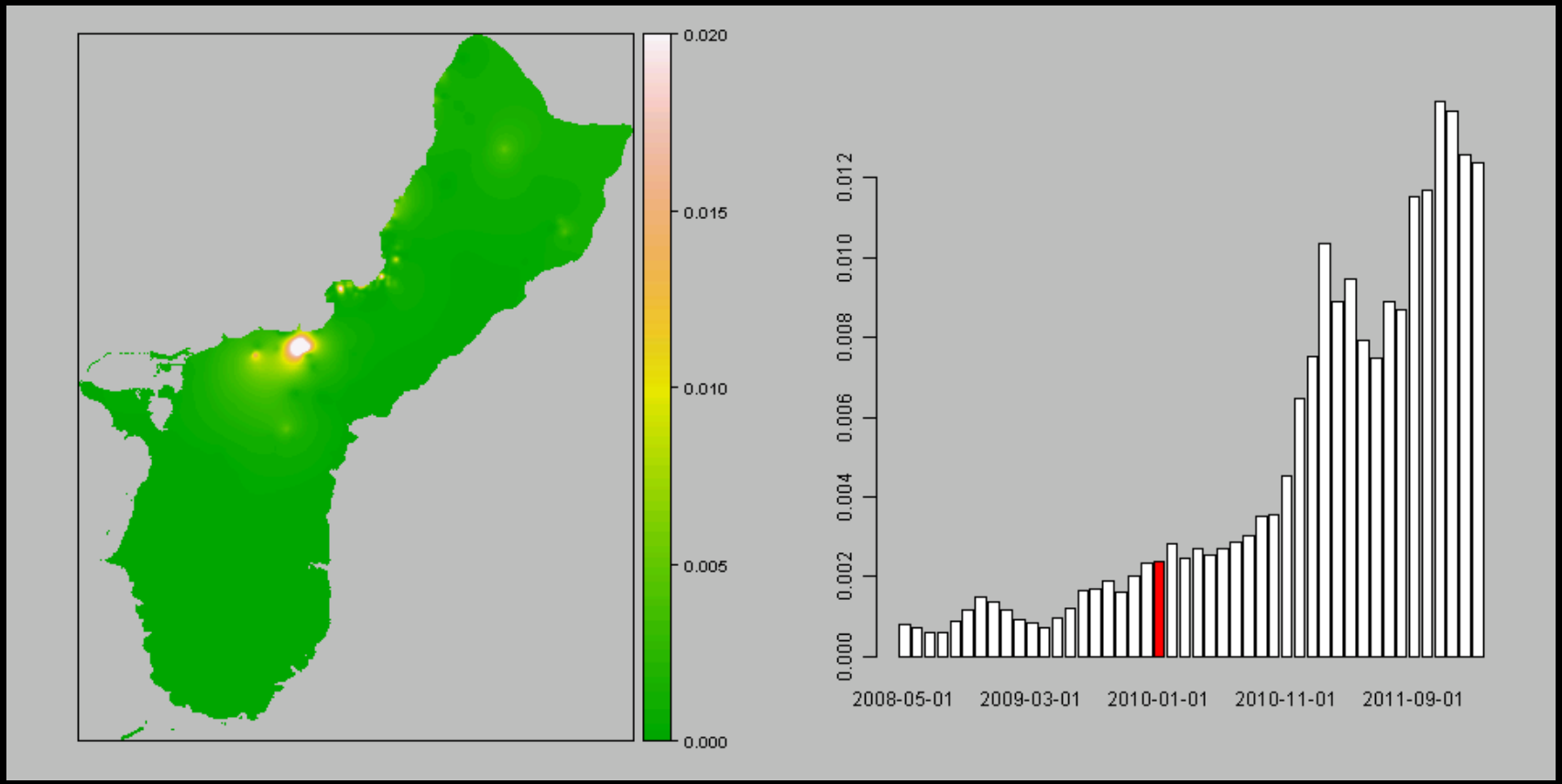

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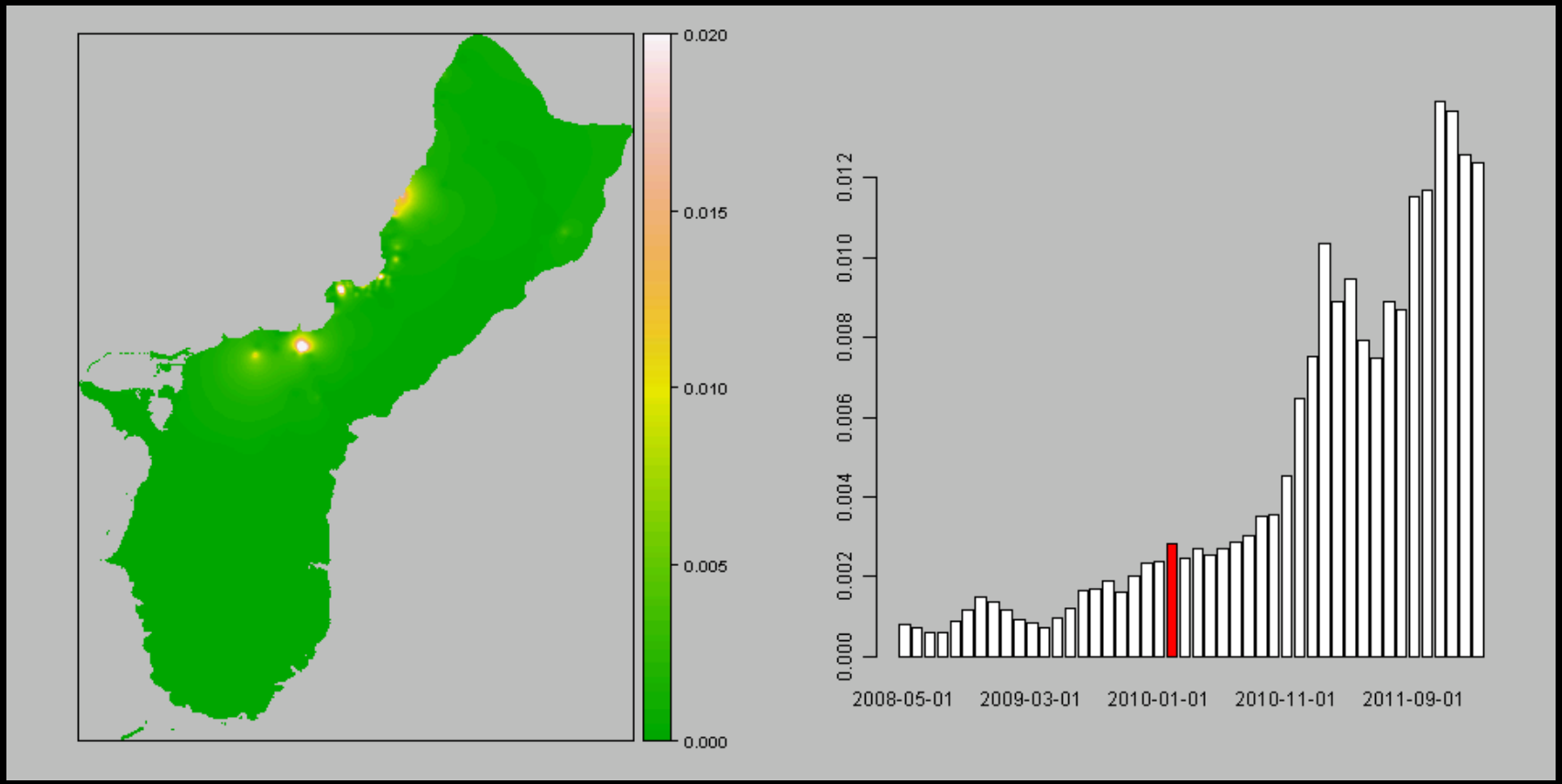
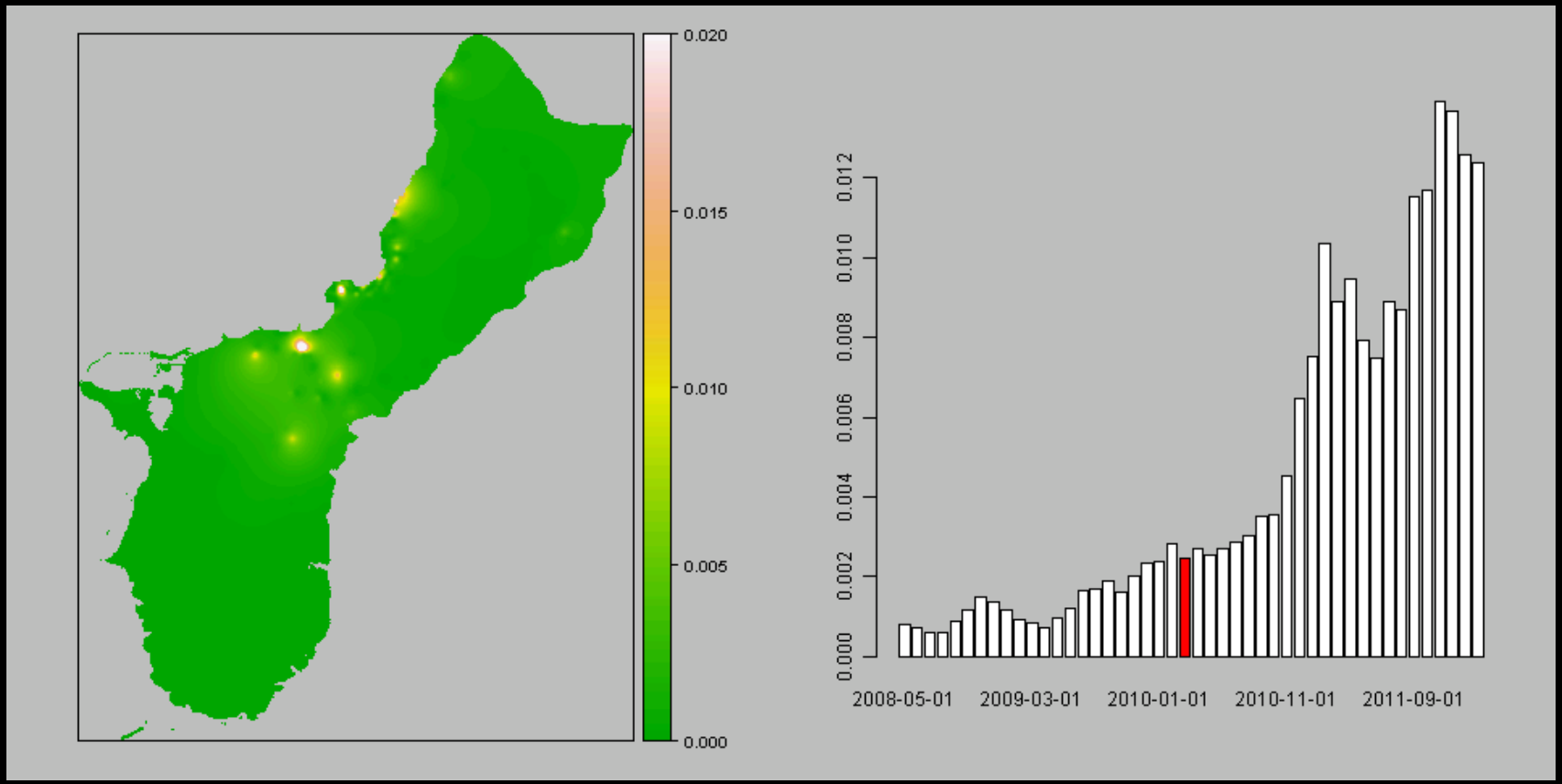


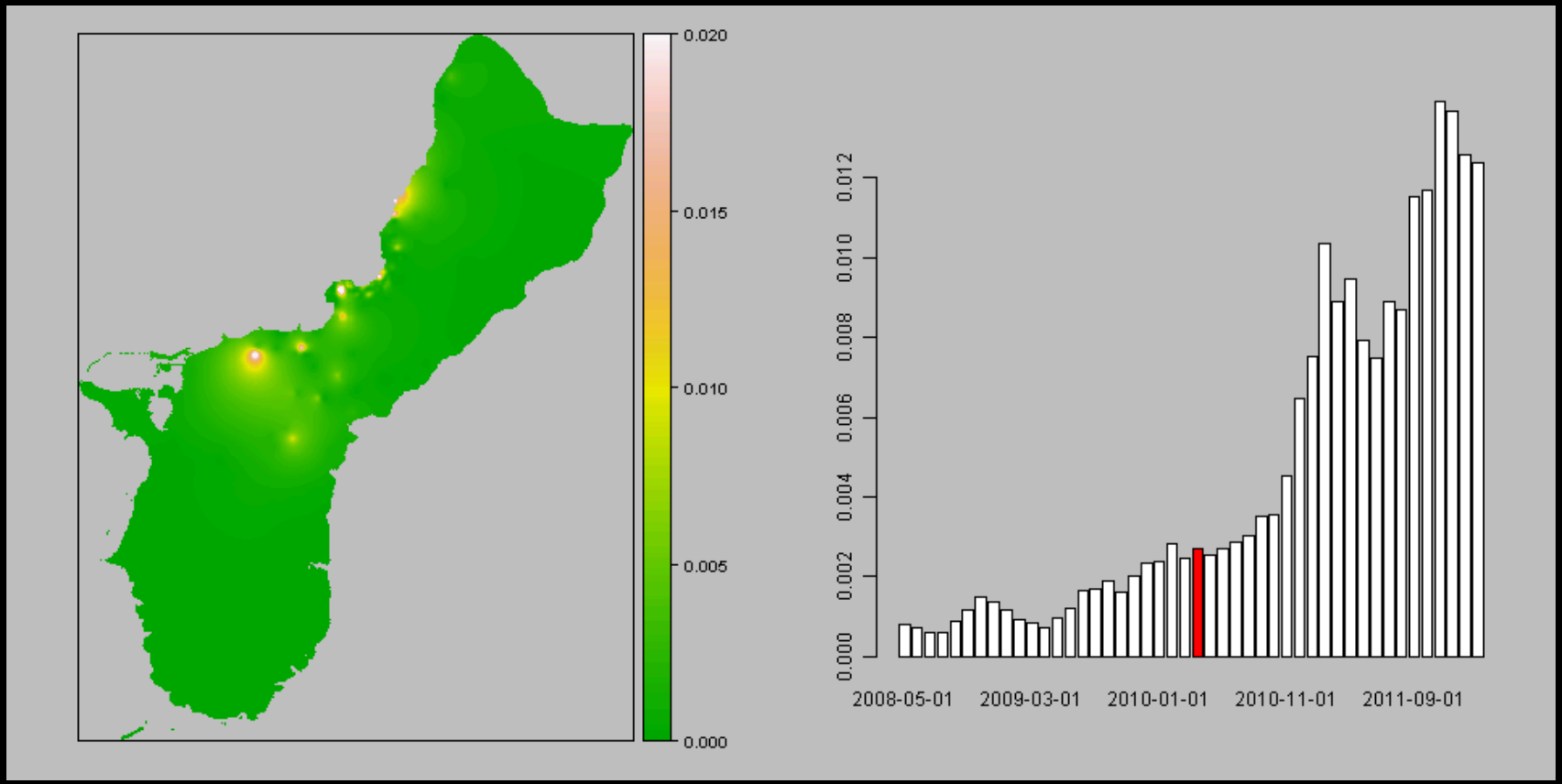
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Mar 2010



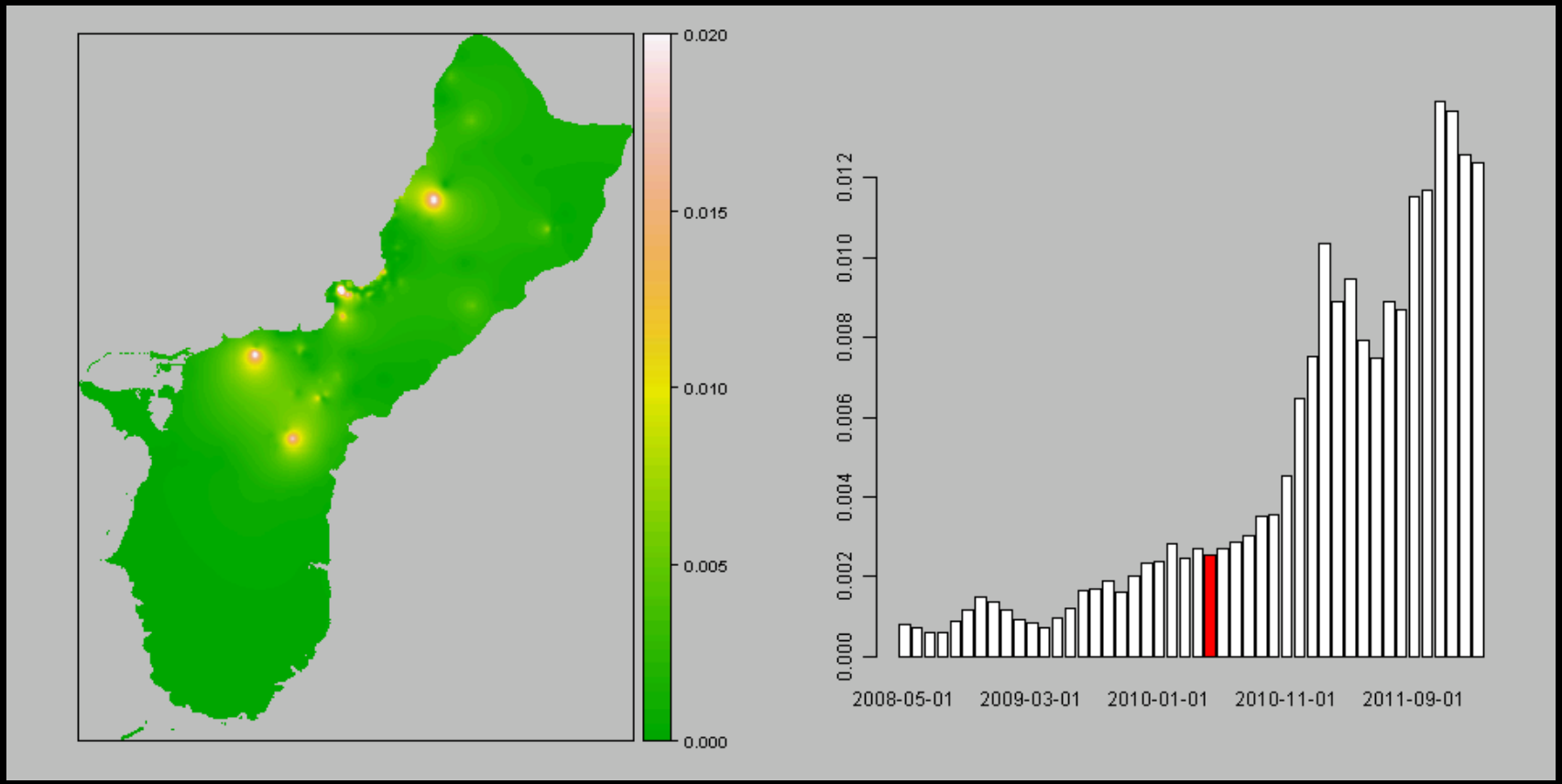
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Apr 2010



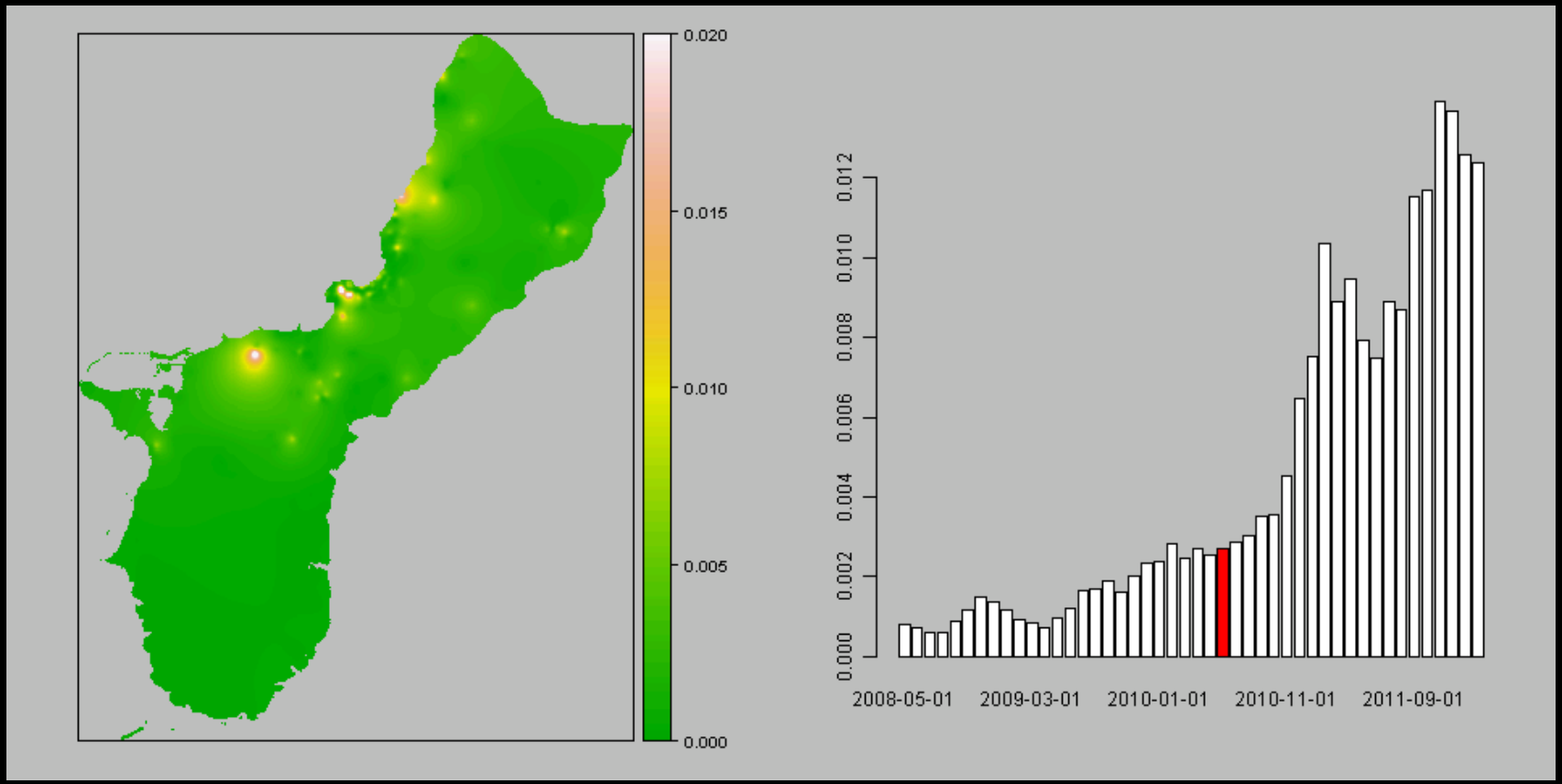
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 May 2010



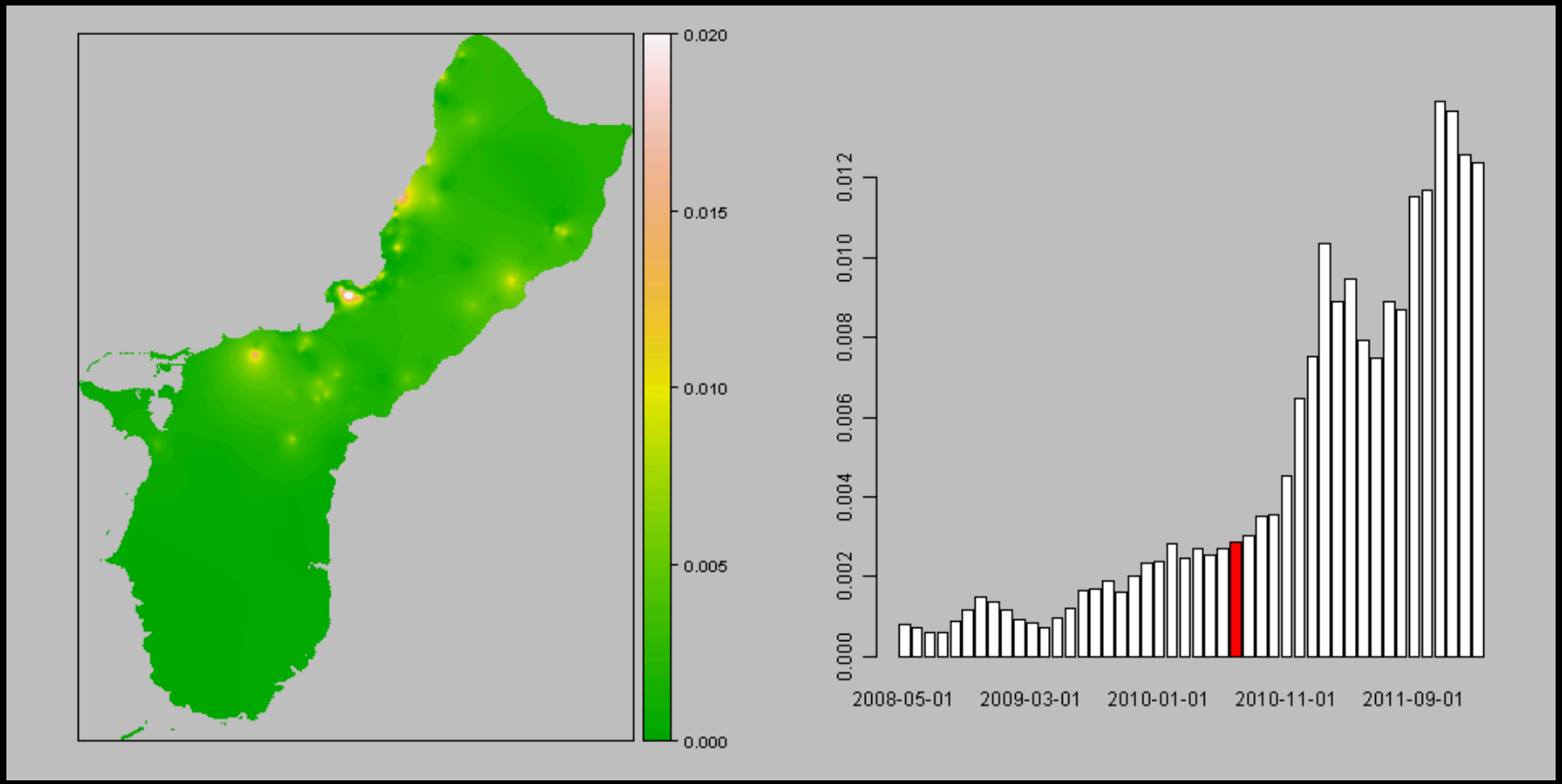
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Jun 2010



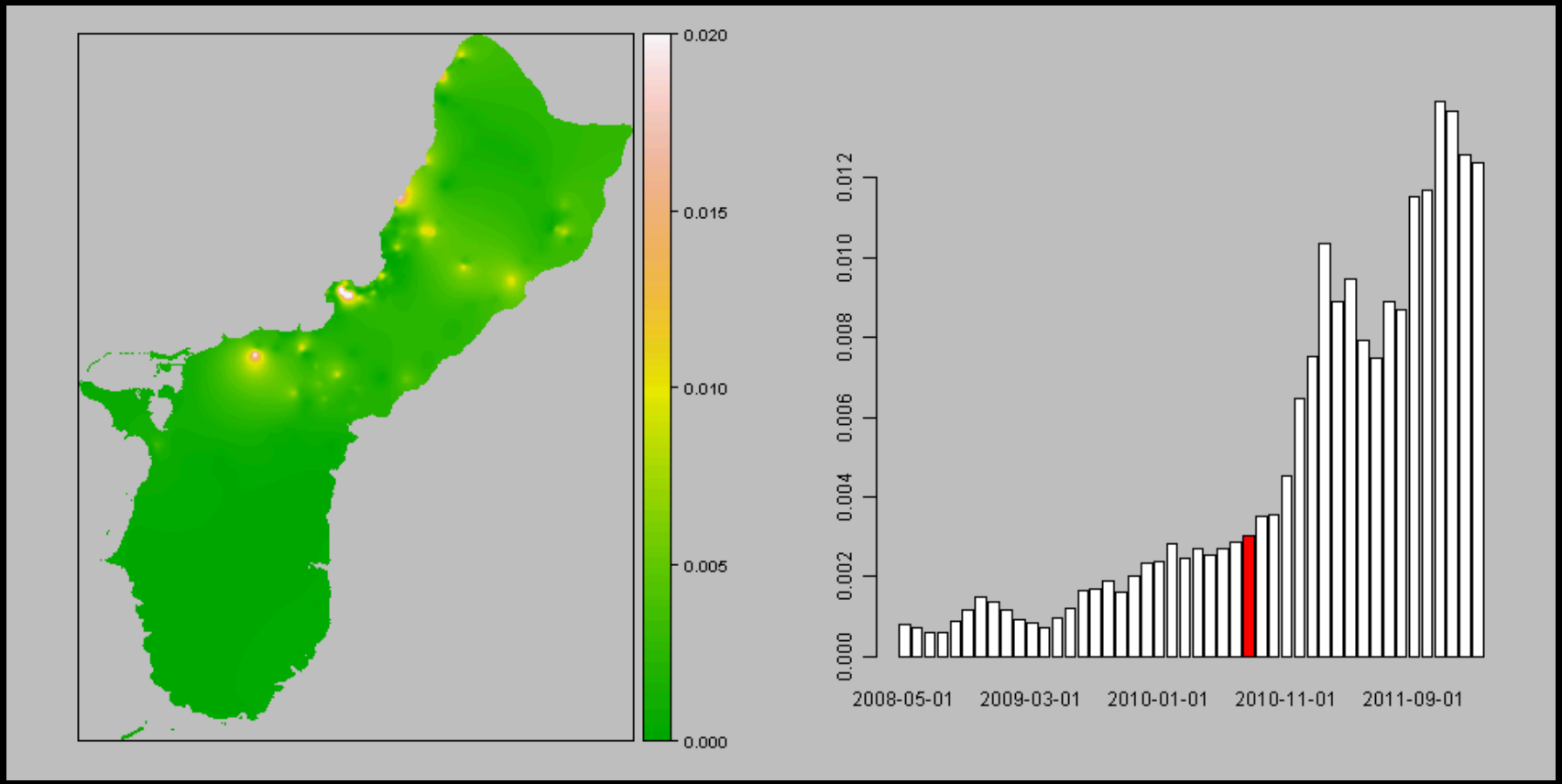
Mean number of beetles caught per trap-day

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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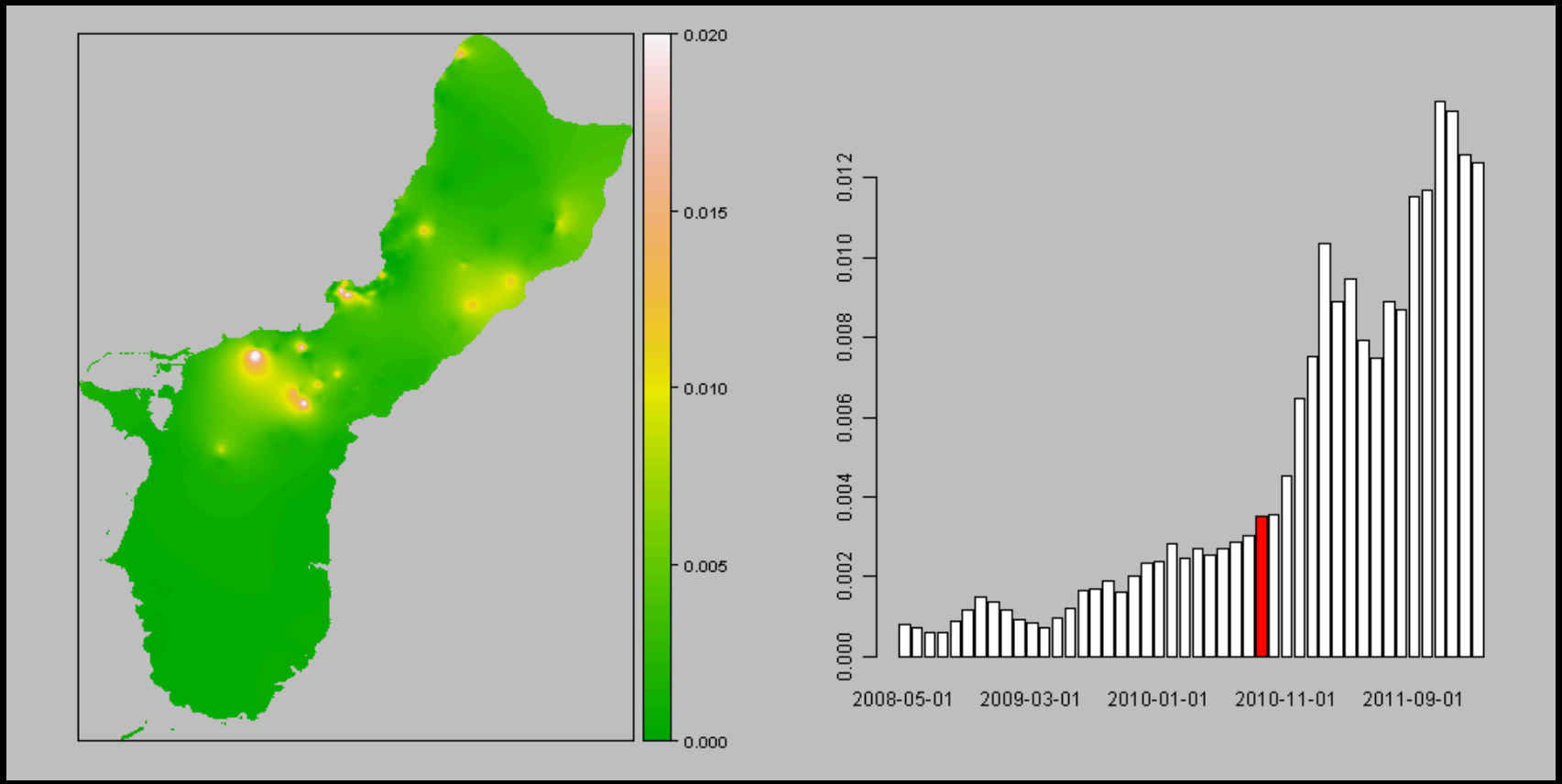
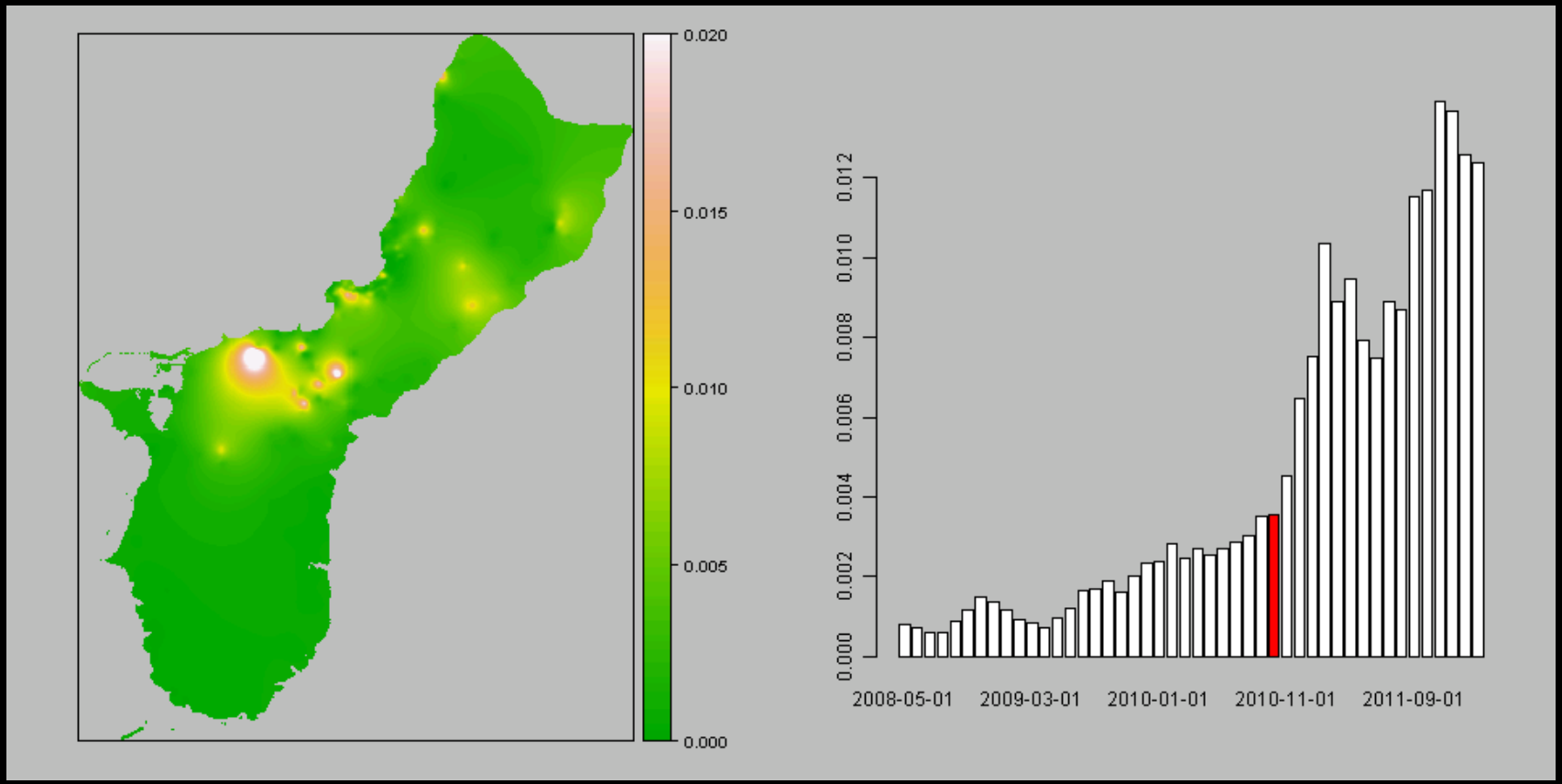


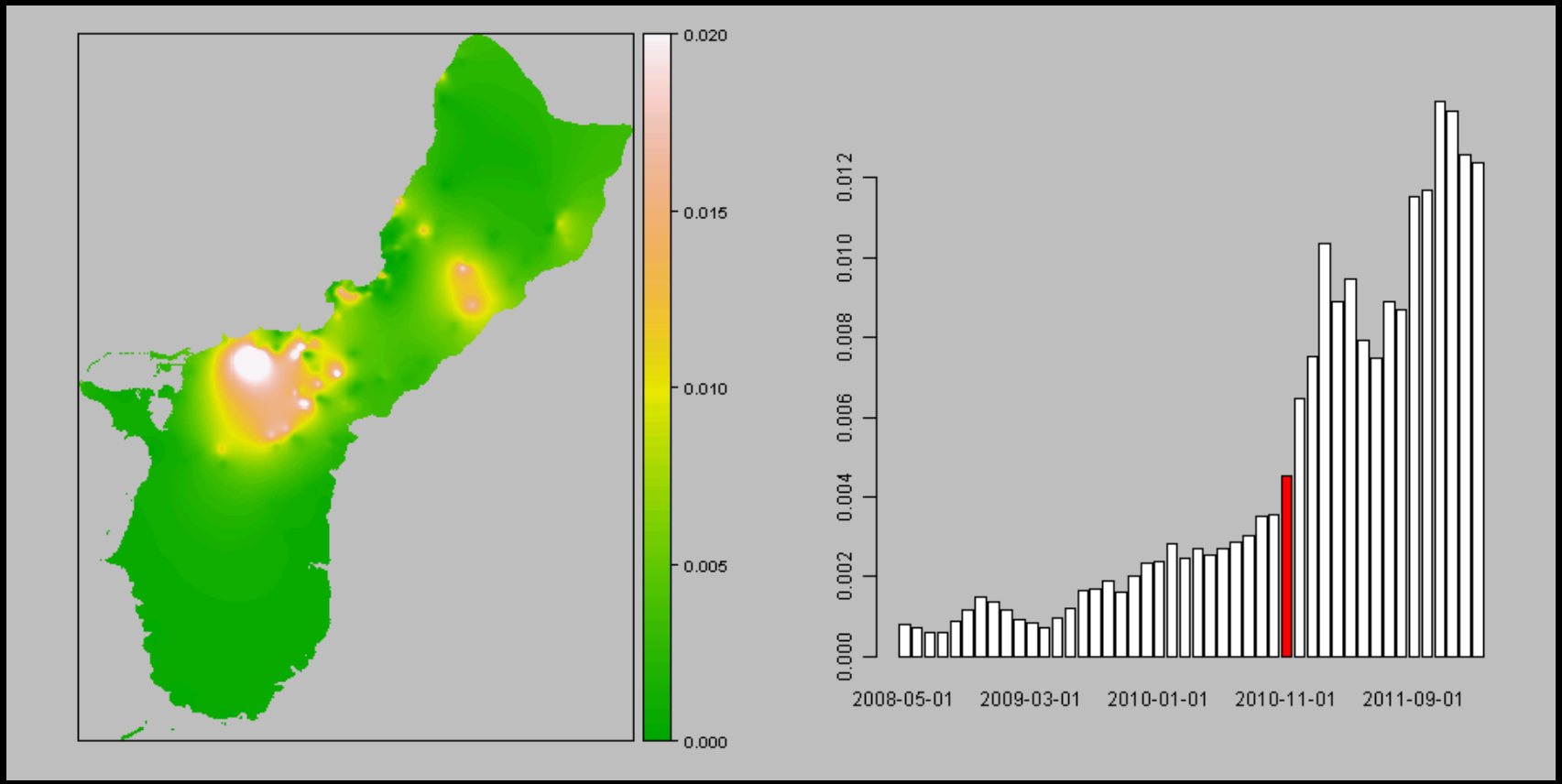
Mean number of beetles caught per trap-day

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



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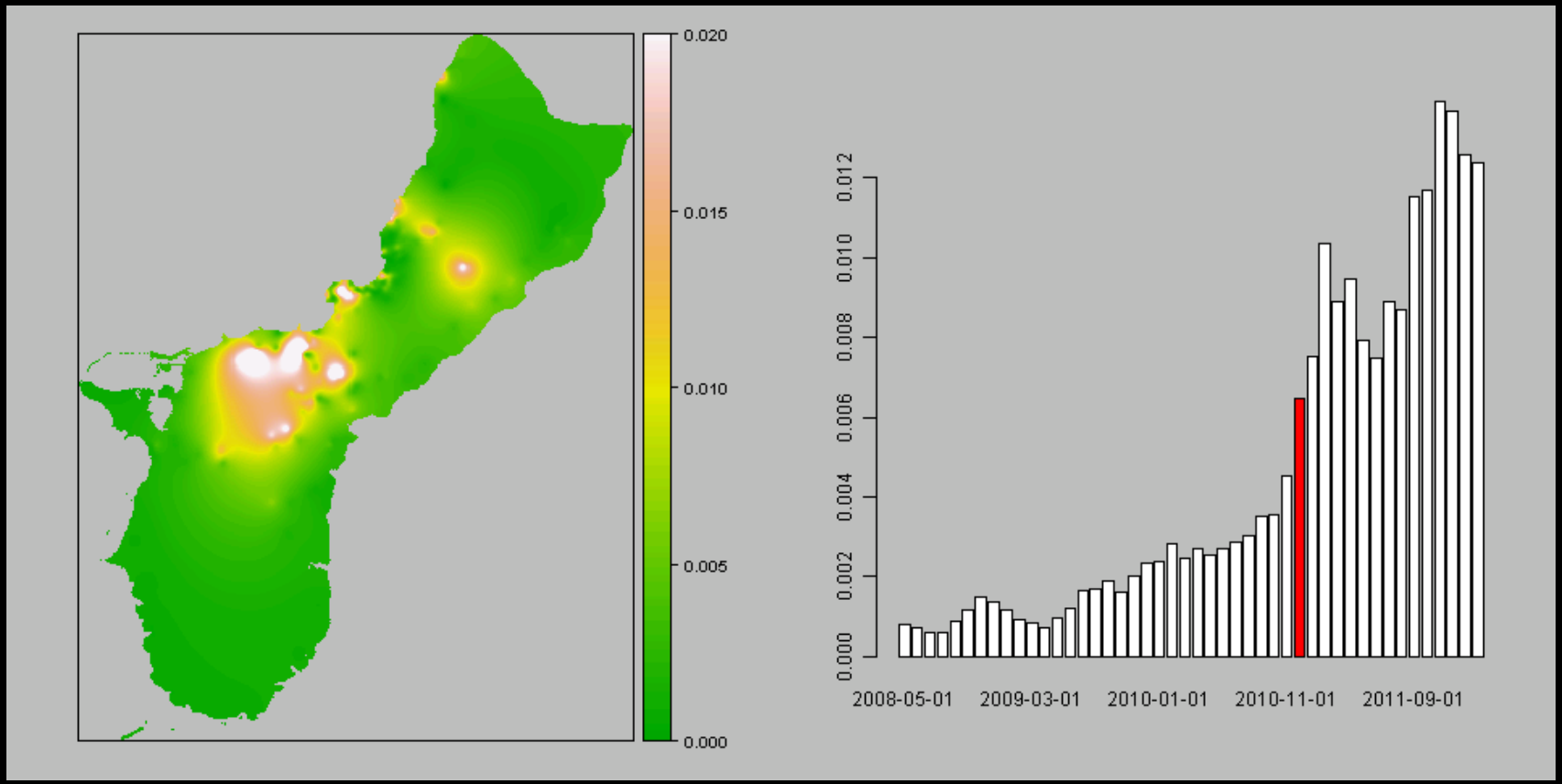

Mean number of beetles caught per trap-day

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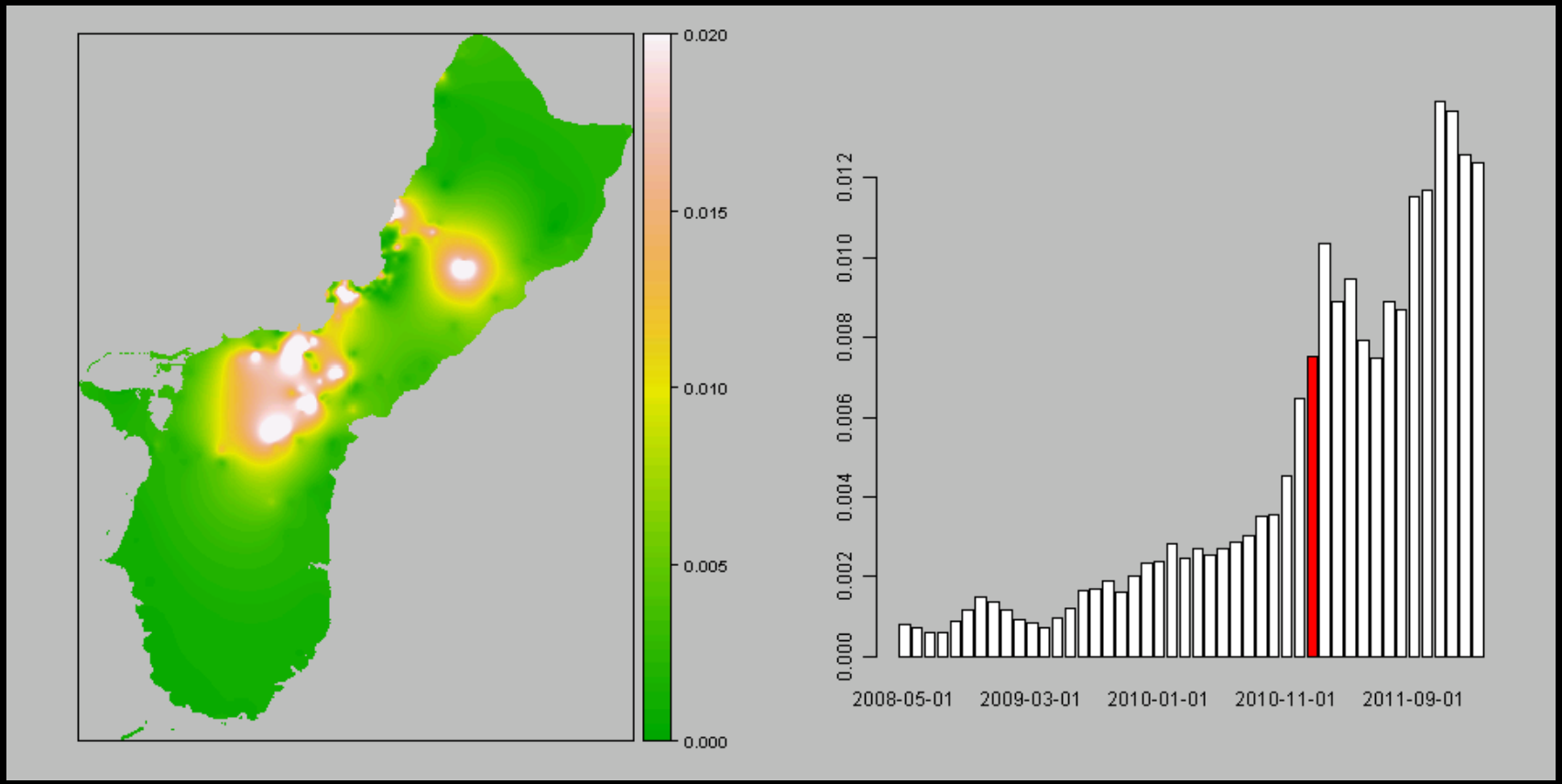

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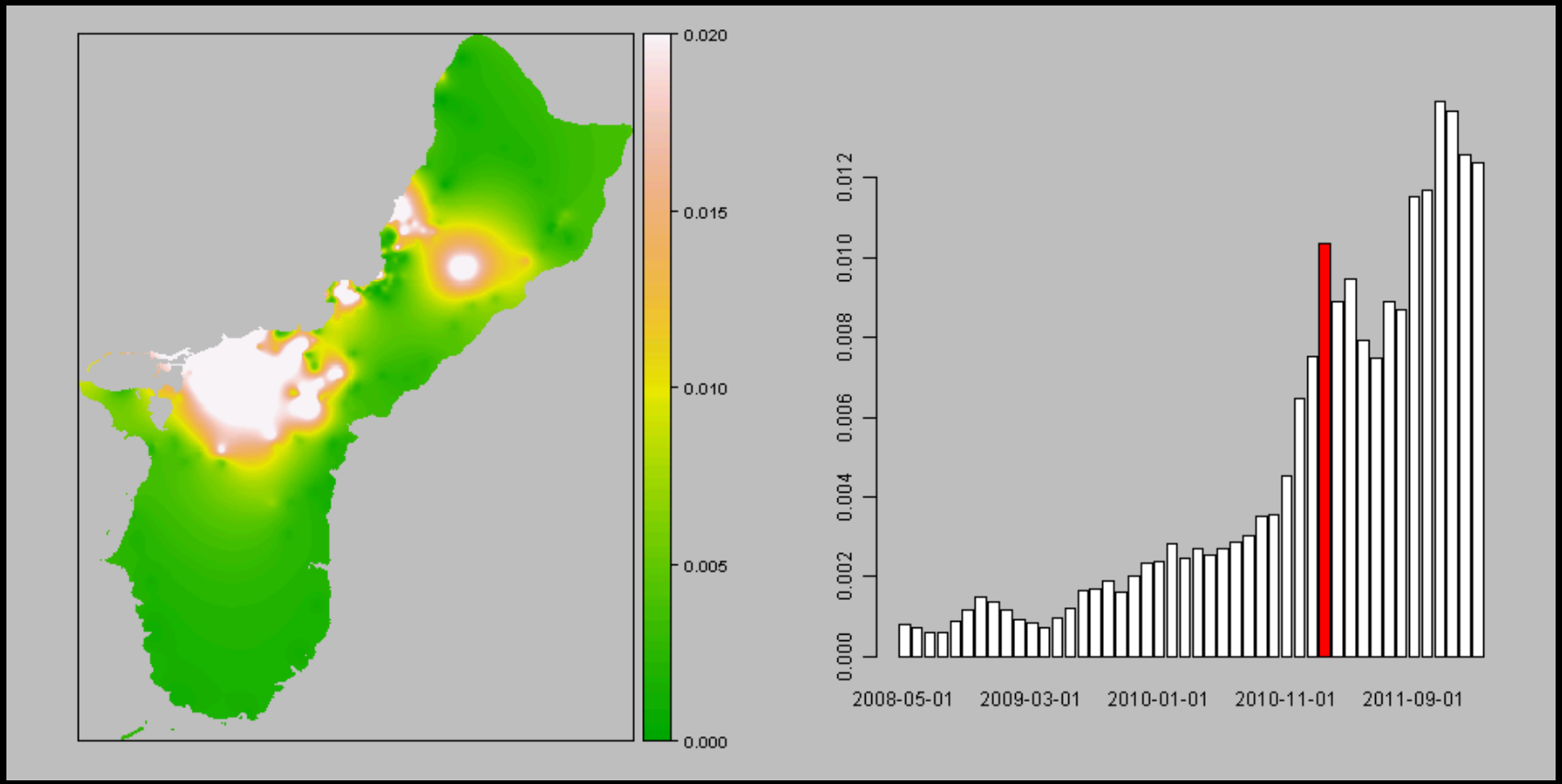
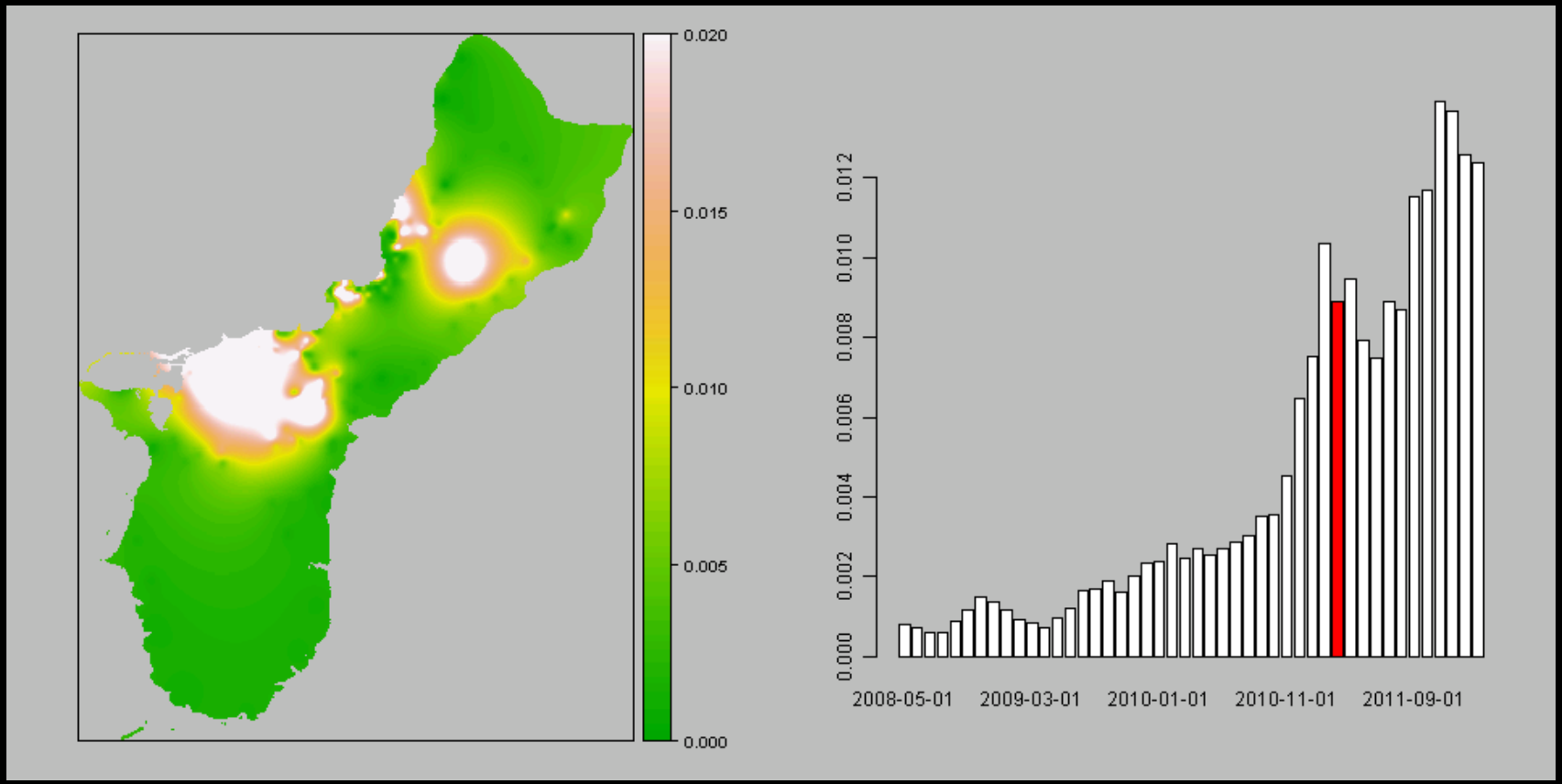


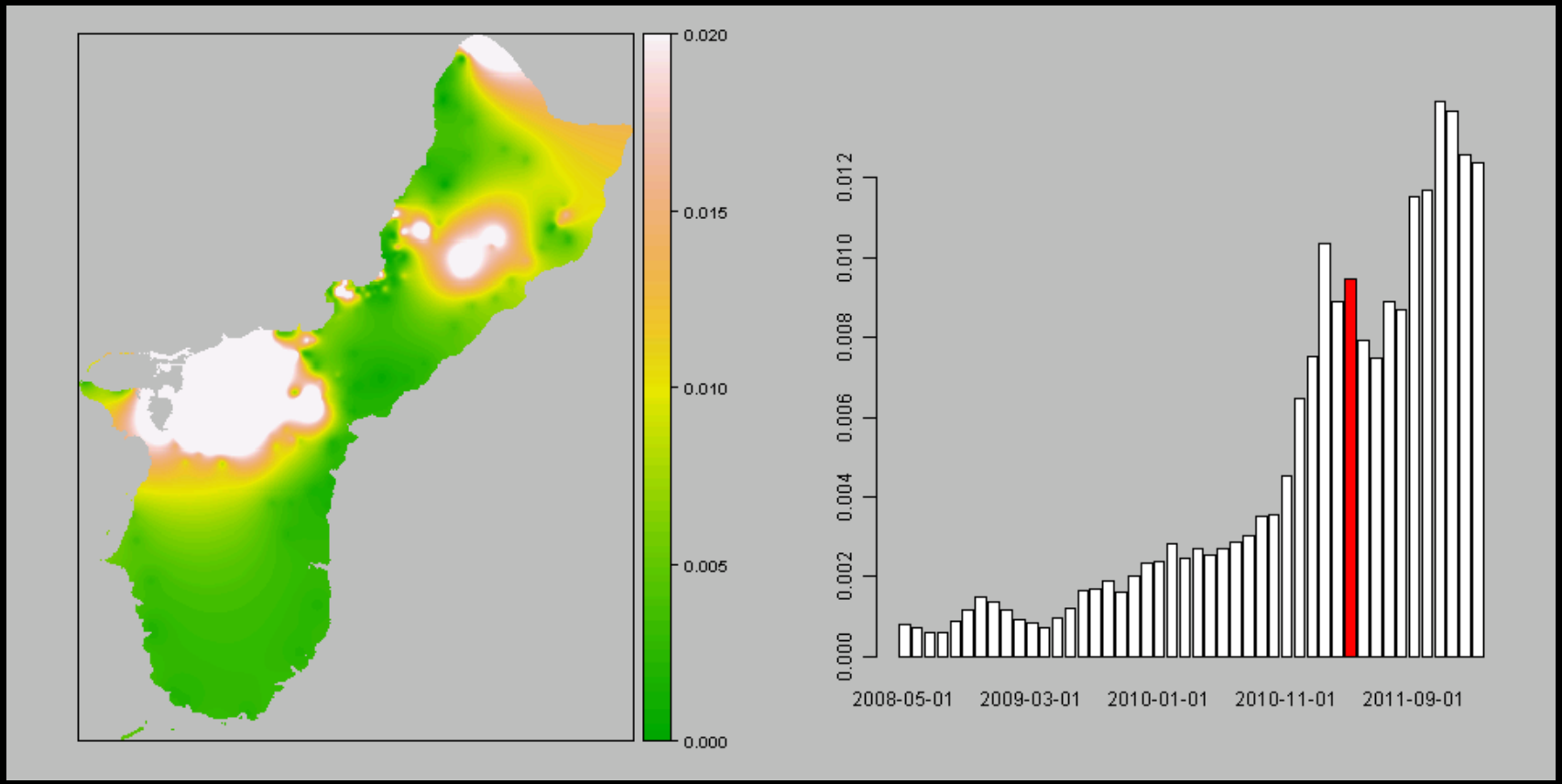
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Mar 2011



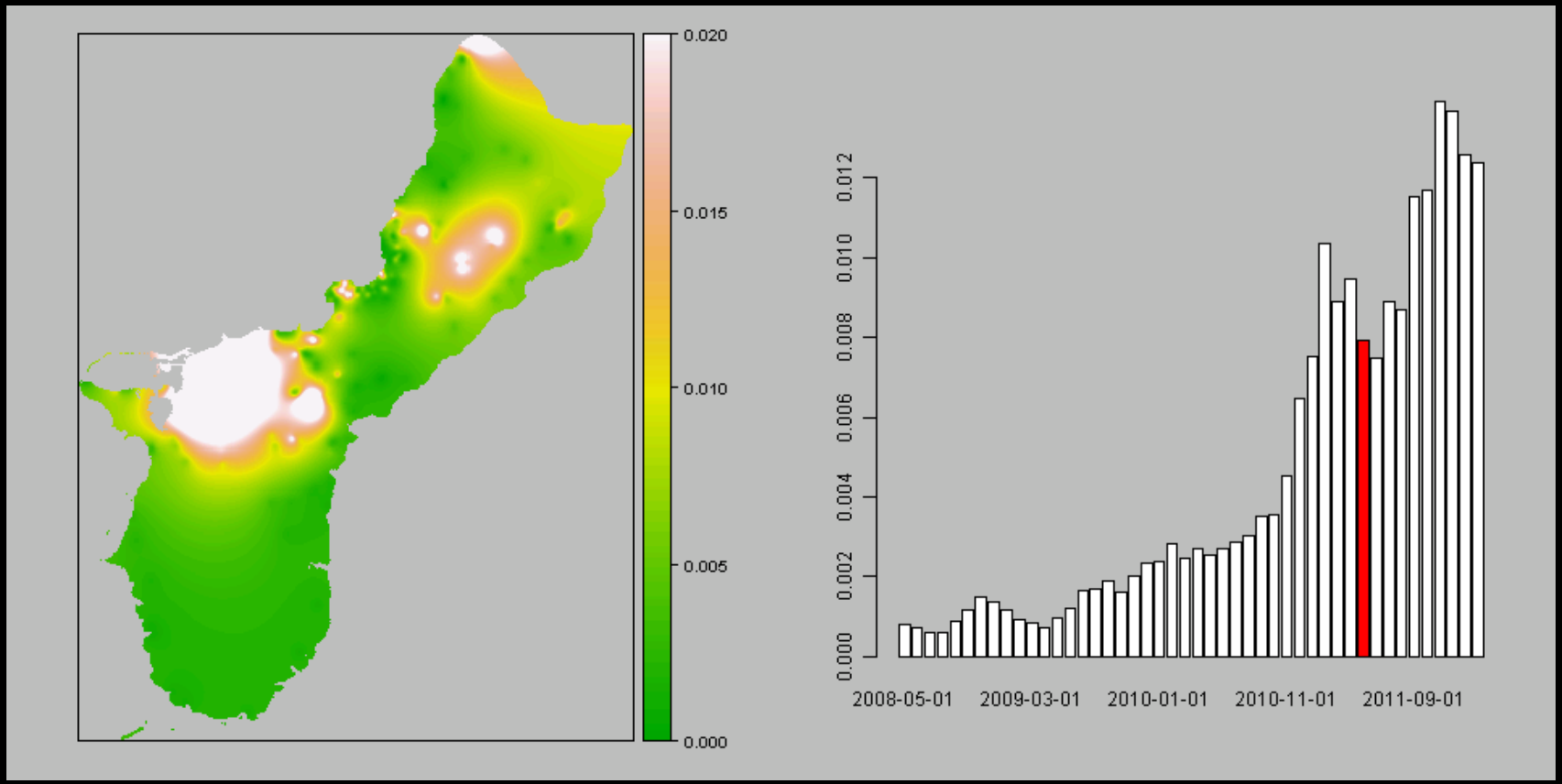
Mean number of beetles caught per trap-day

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



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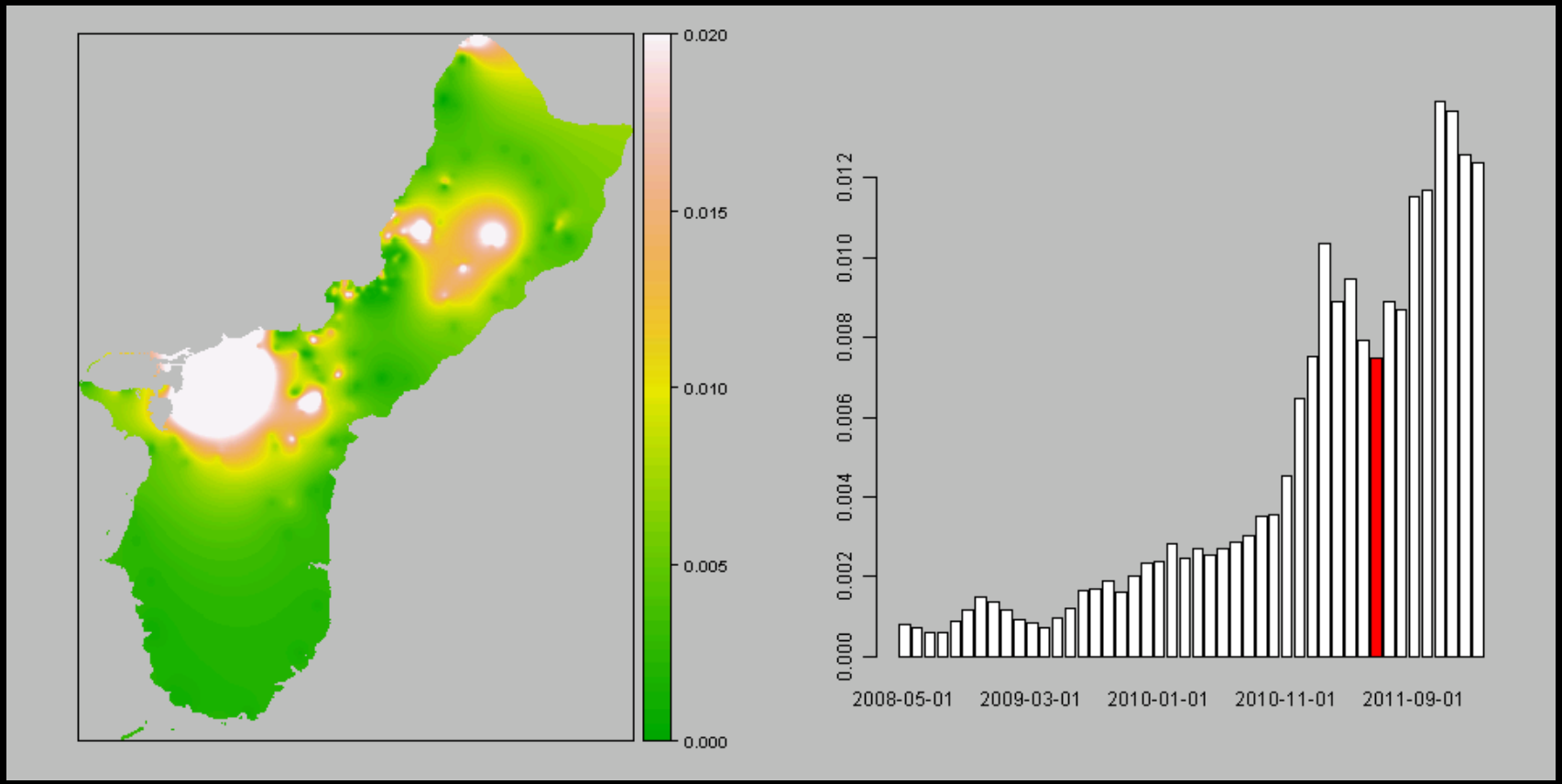

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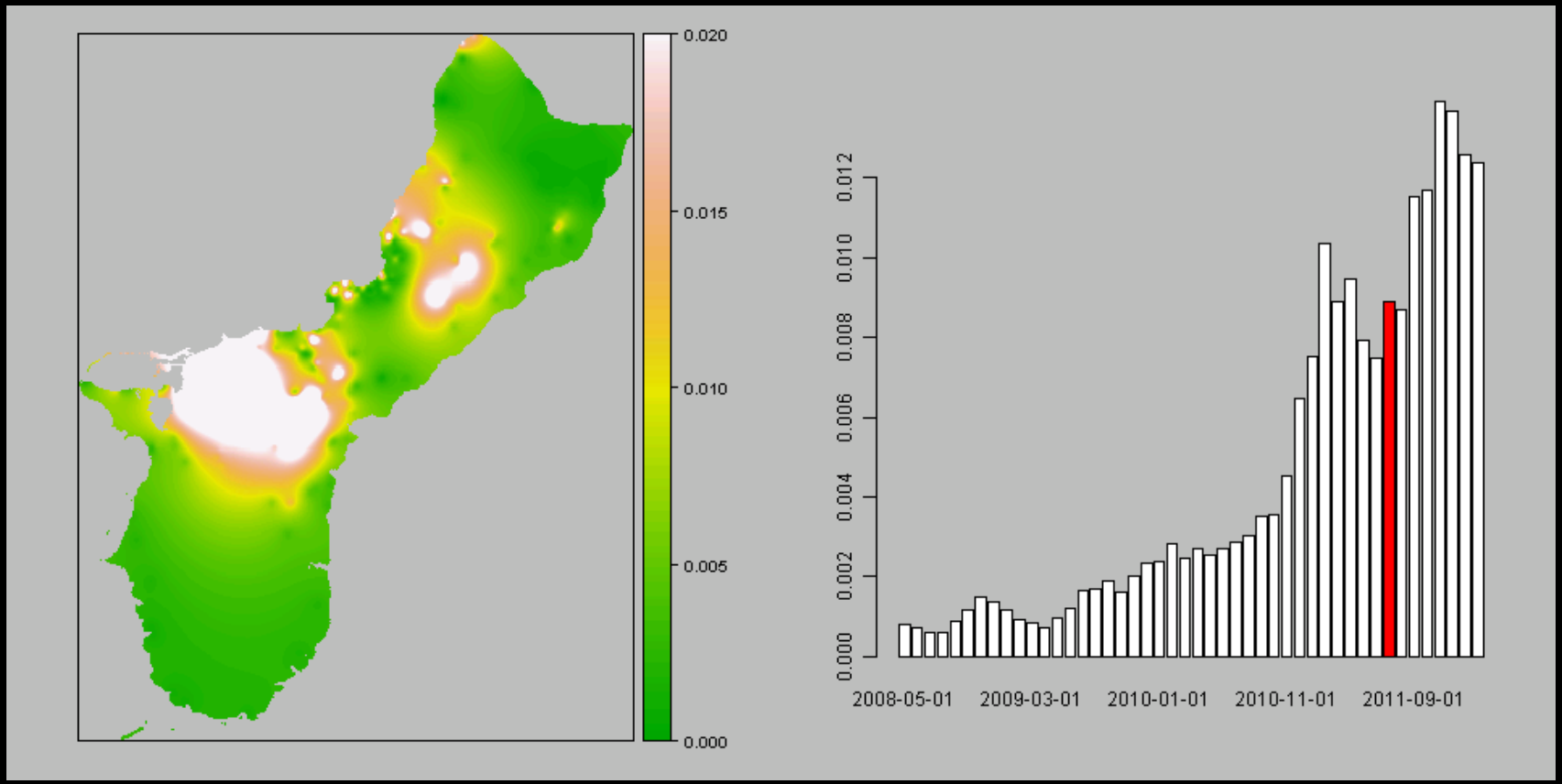
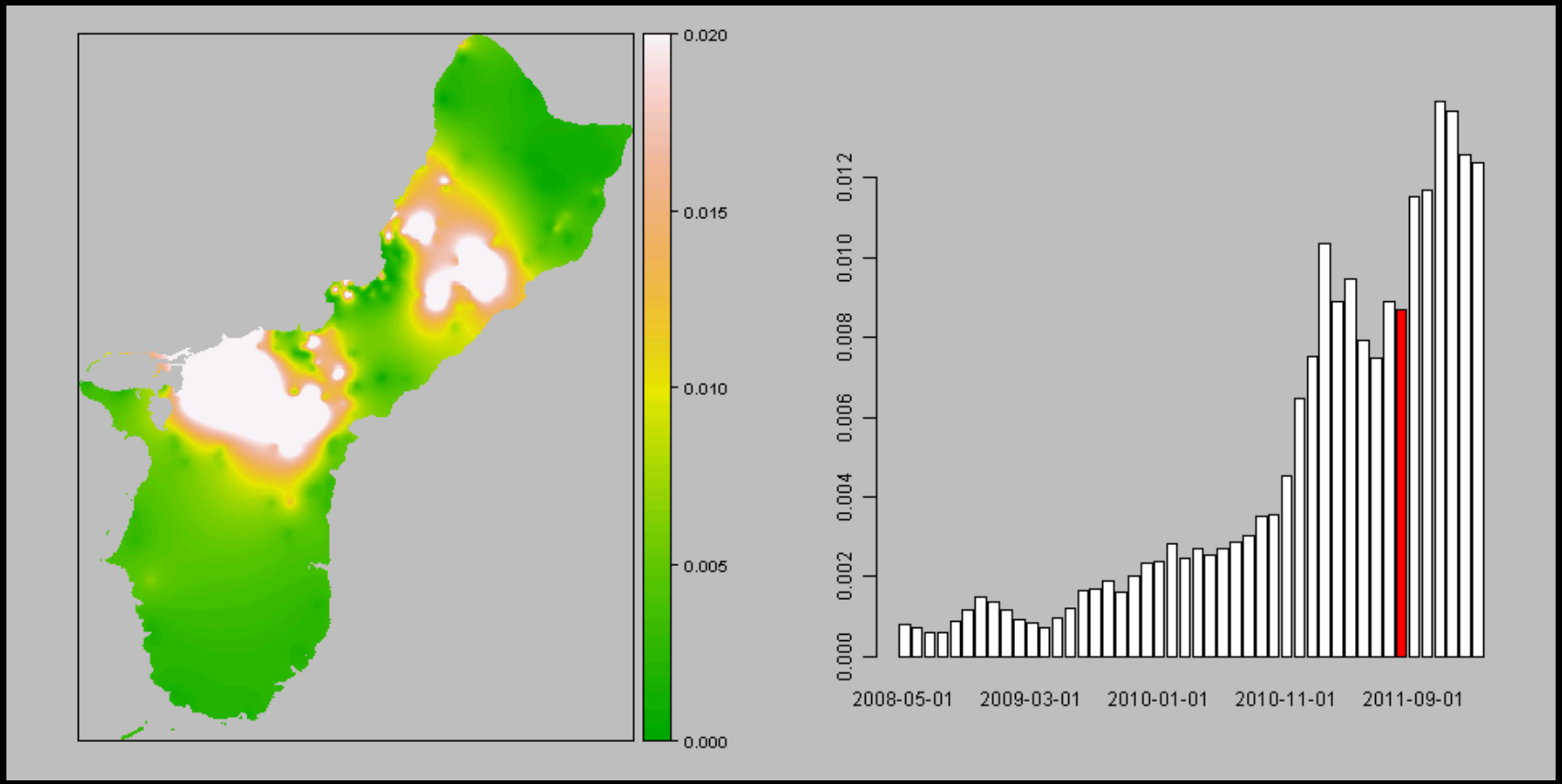


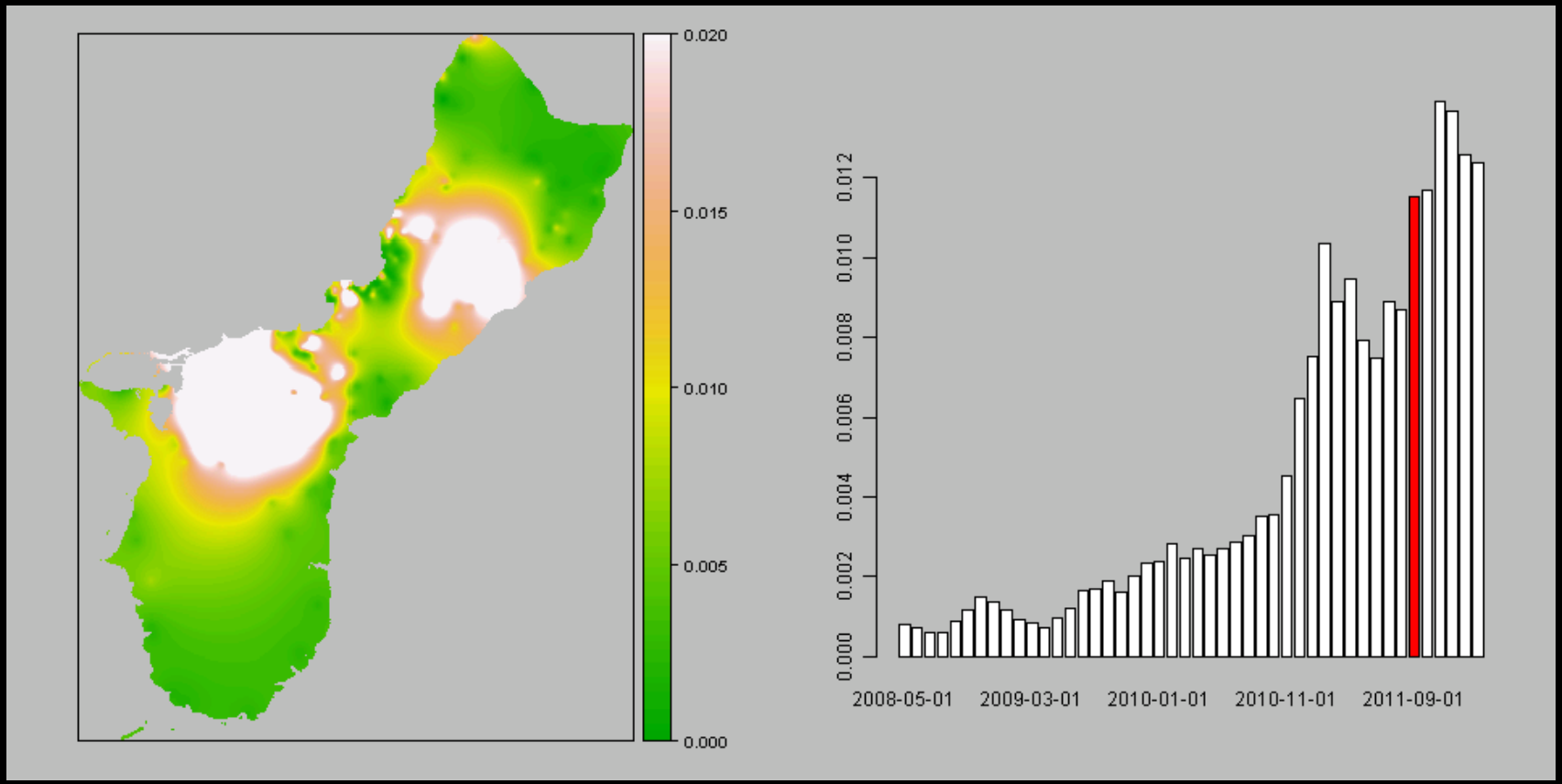
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Aug 2011



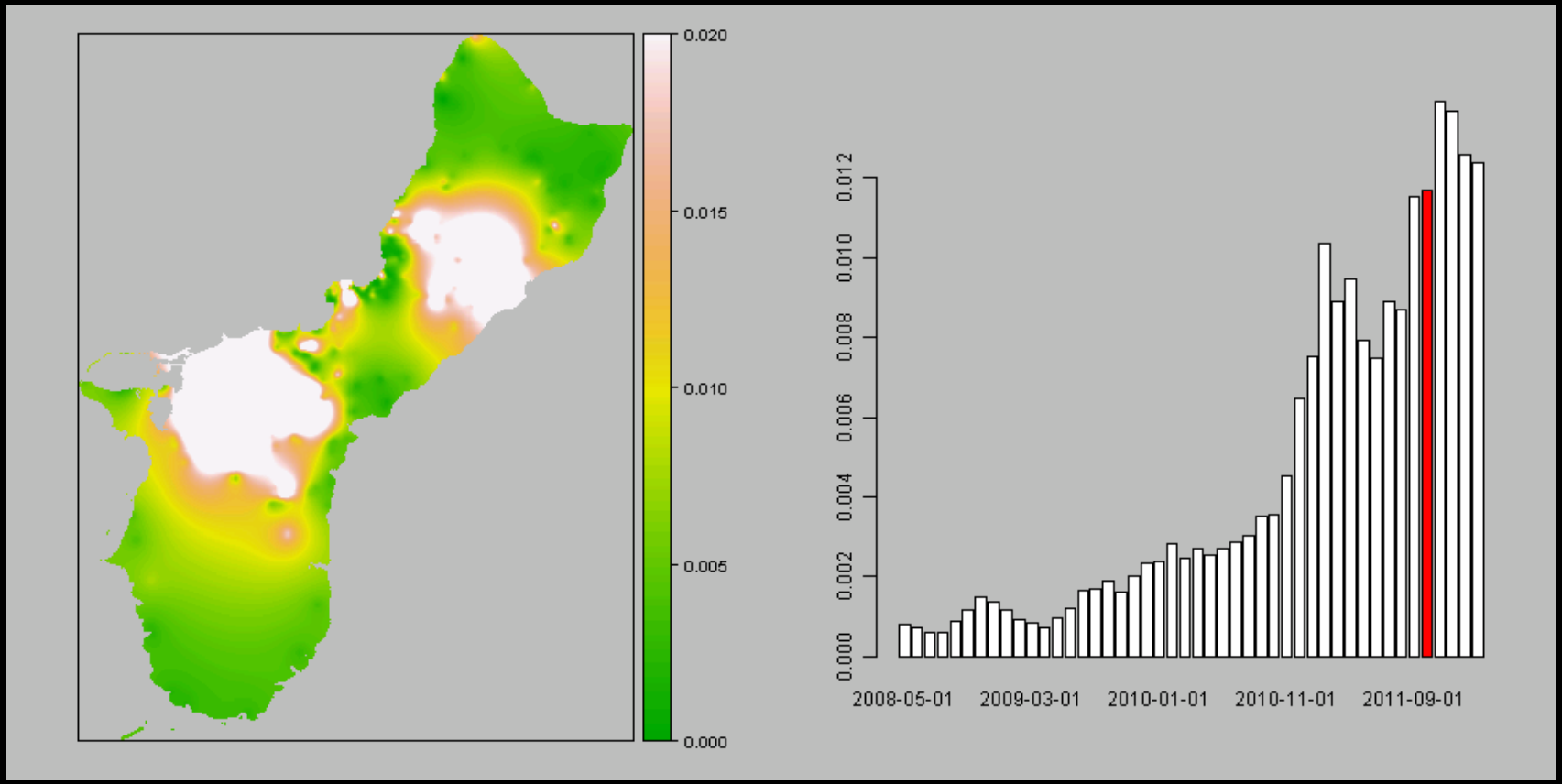
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Sep 2011



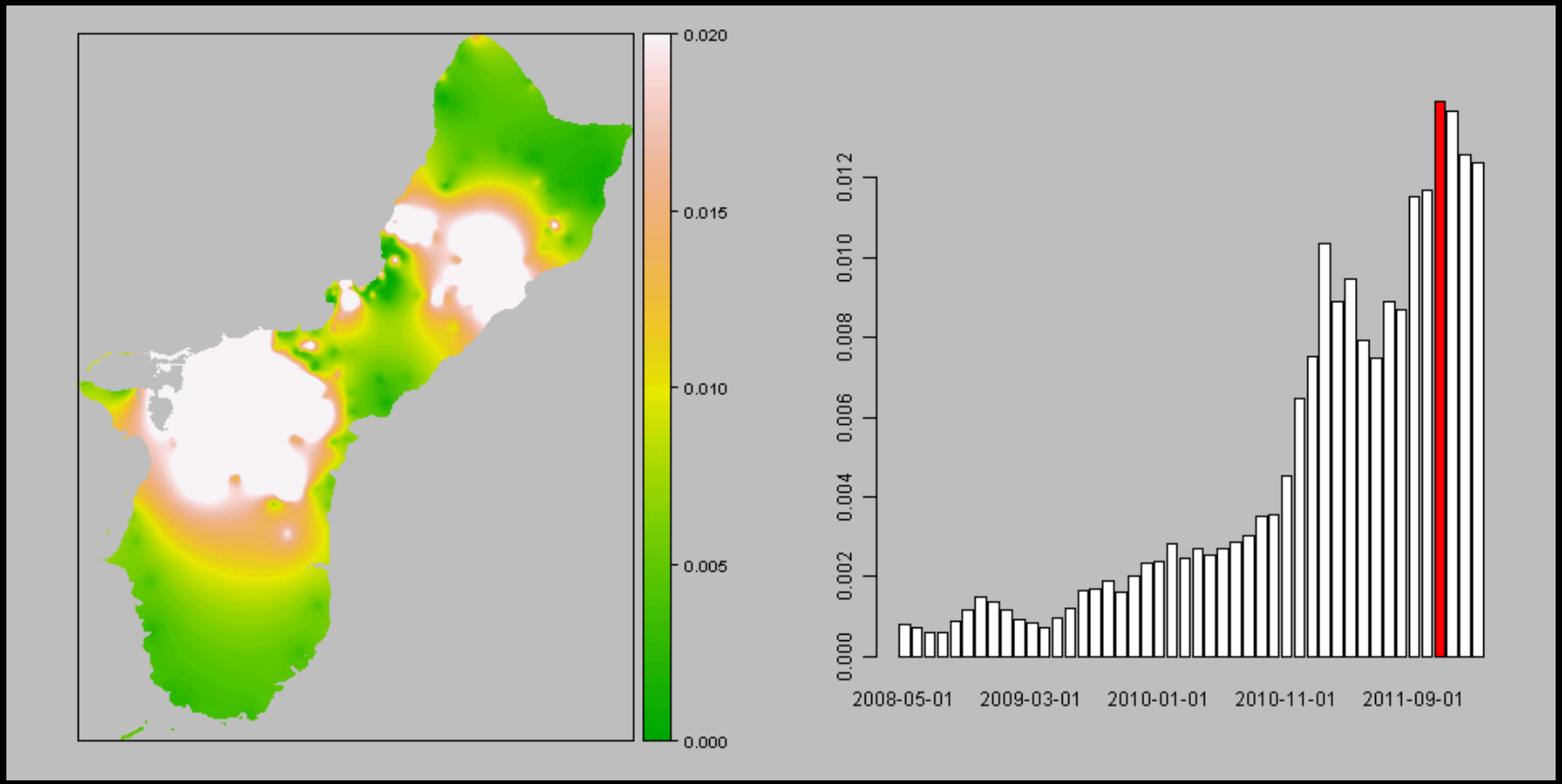
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Oct 2011



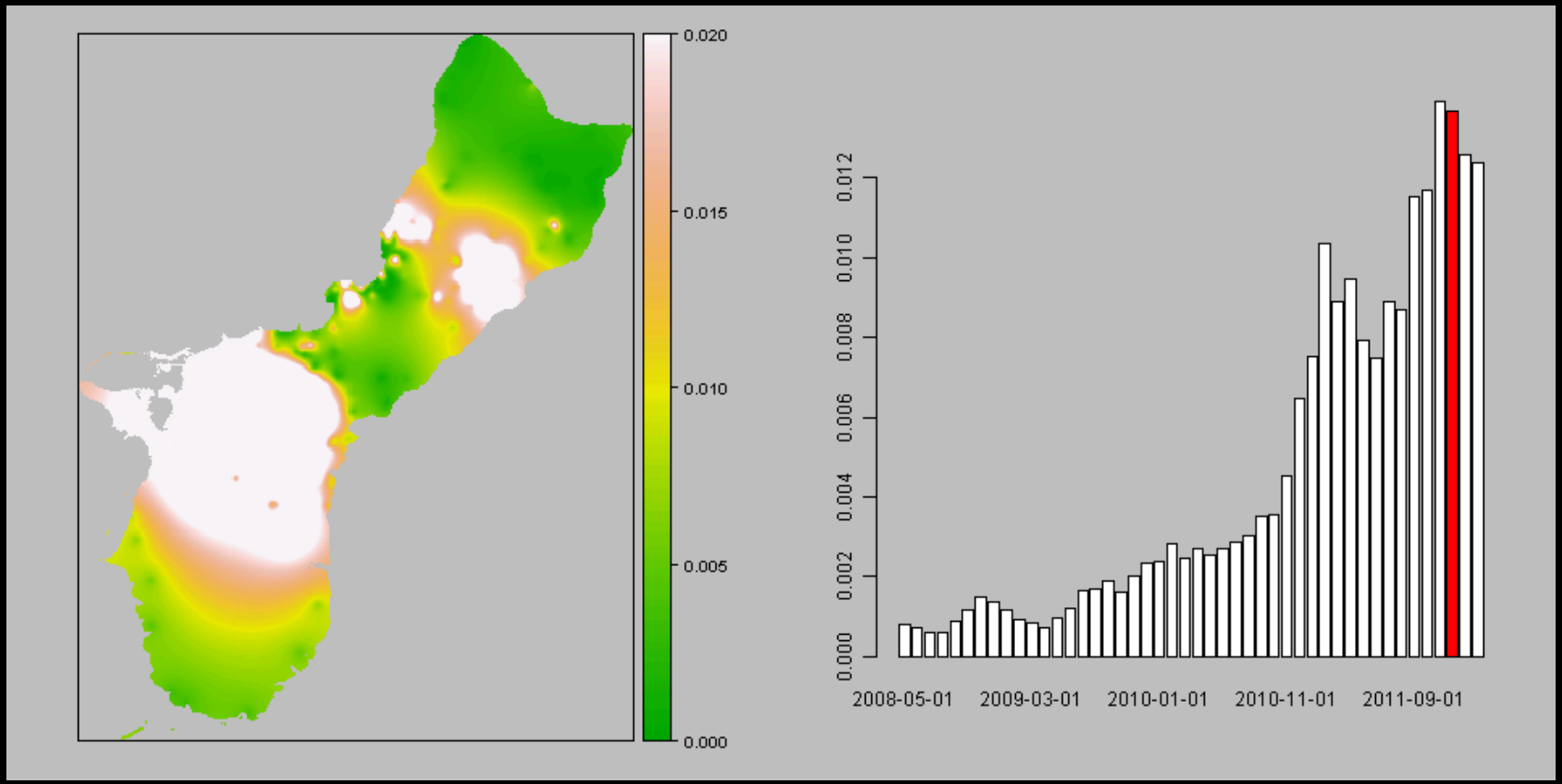
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Nov 2011



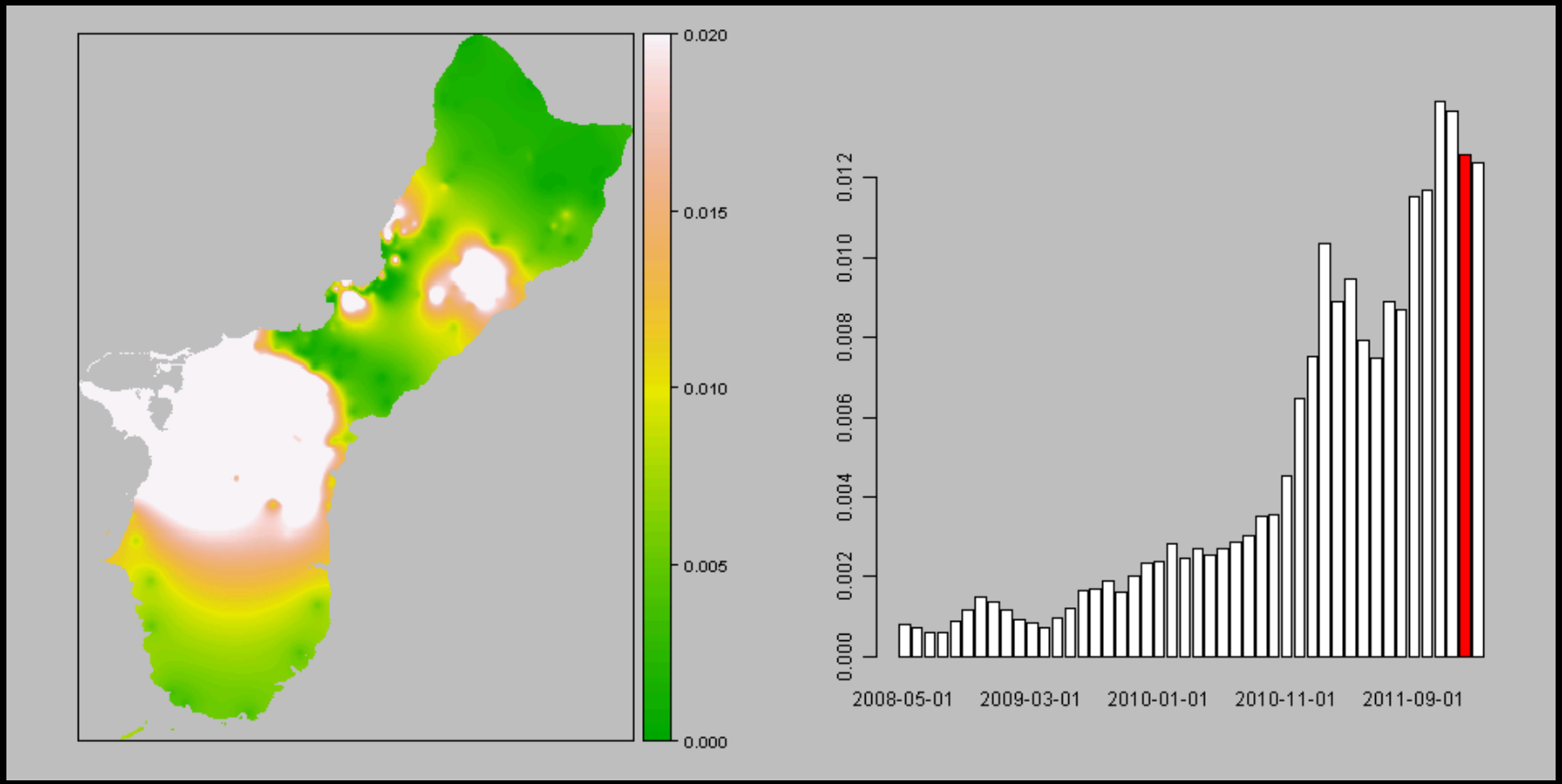
Mean number of beetles caught per trap-day

90 day trapping period ending on 01 Dec 2011



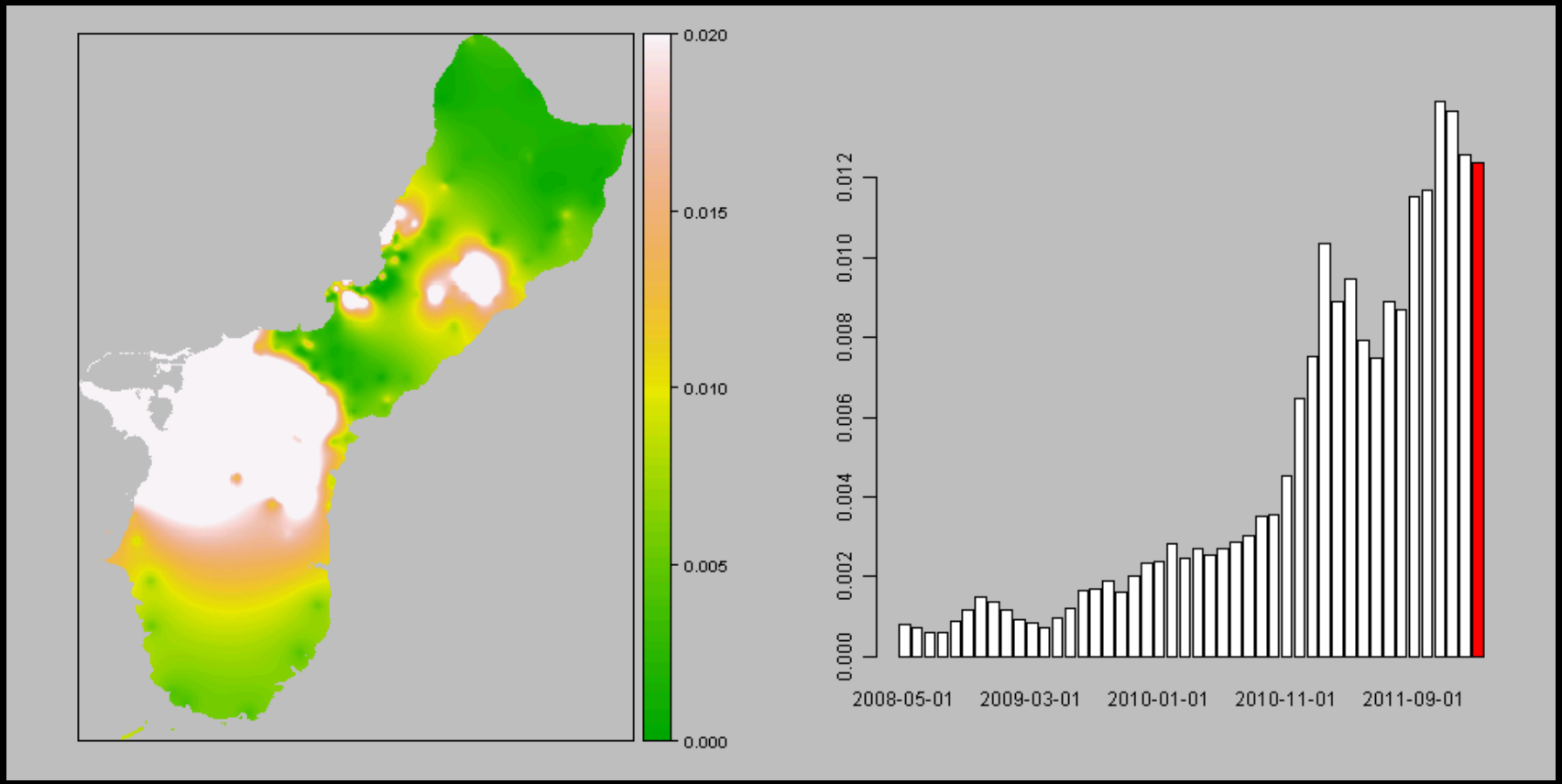
Mean number of beetles caught per trap-day

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


Sanitation


GRUBS – 296
PUPAE – 41
ADULTS - 15


DANGER
RESTRICTED
AREA
2007/12/09


2007/12/11

DETECTOR DOGS

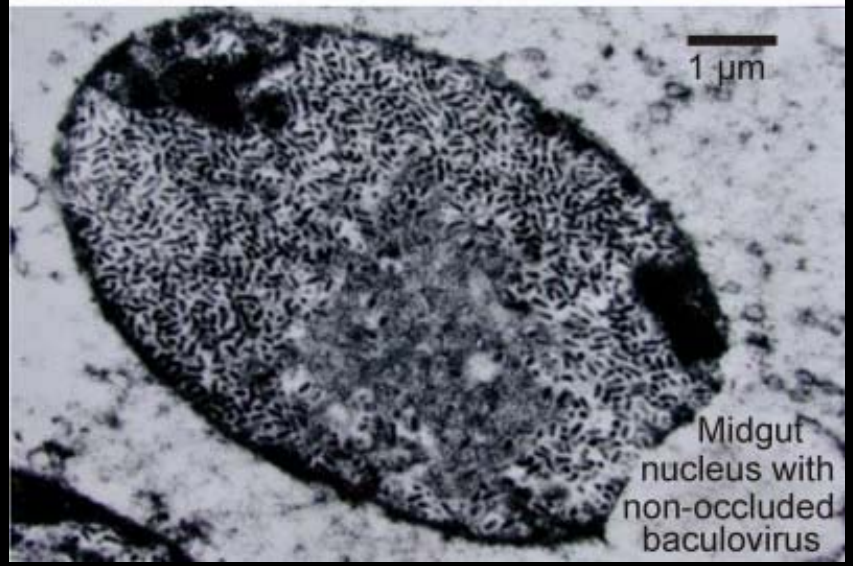
CHEMICAL CONTROL

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


2 cm
Palm rhinoceros beetle


1 µm
Midgut nucleus with non-occluded baculovirus

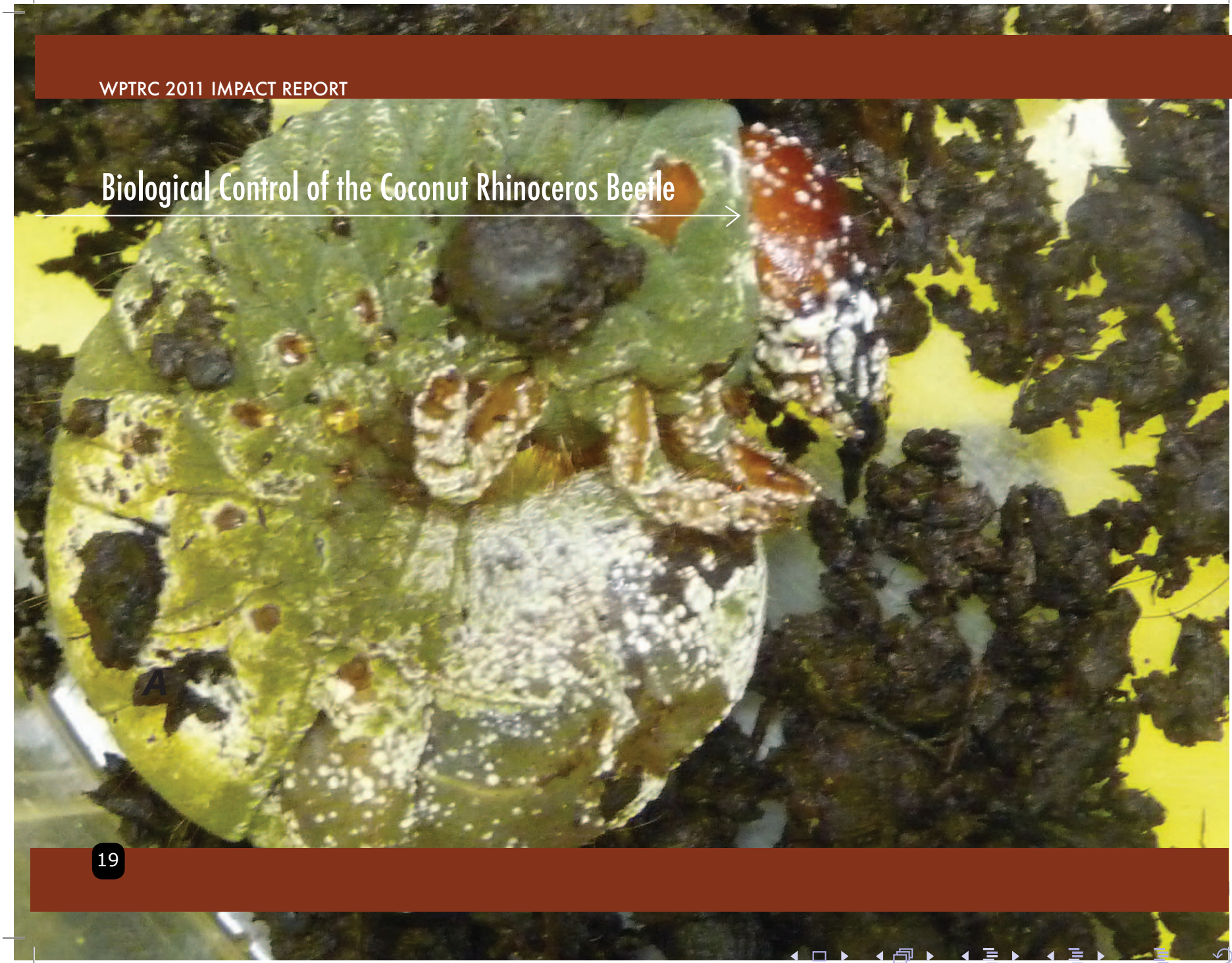

KwikSPACE
KwikSPACE


Ball
0099
MASON

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

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