

IMPACT OF CLIMATE CHANGE ON COCONUT RHINOCEROS BEETLE OUTBREAKS IN THE PACIFIC

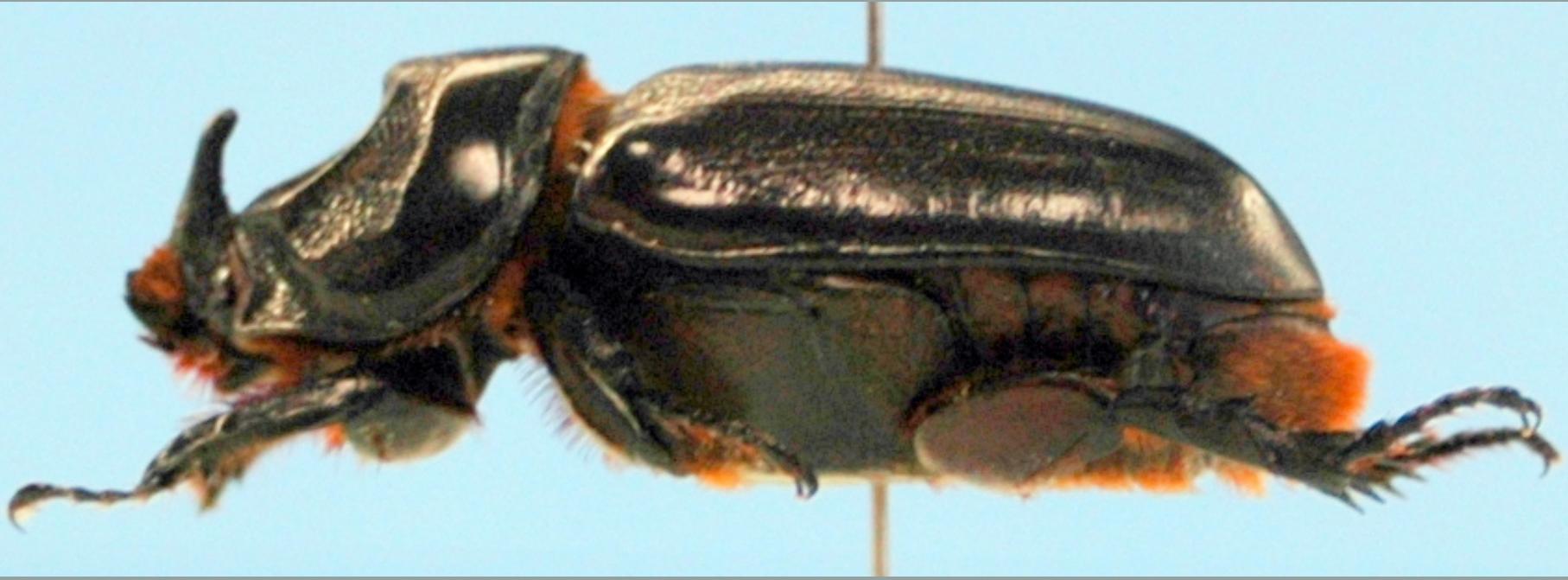
Aubrey Moore



College of Natural and Applied Sciences
University of Guam

Guam Extension & Outreach Climate Forum, Tumon, Guam - October 26, 2017

Available online at <https://aubreymoore.github.io/crb-climate-connection/>



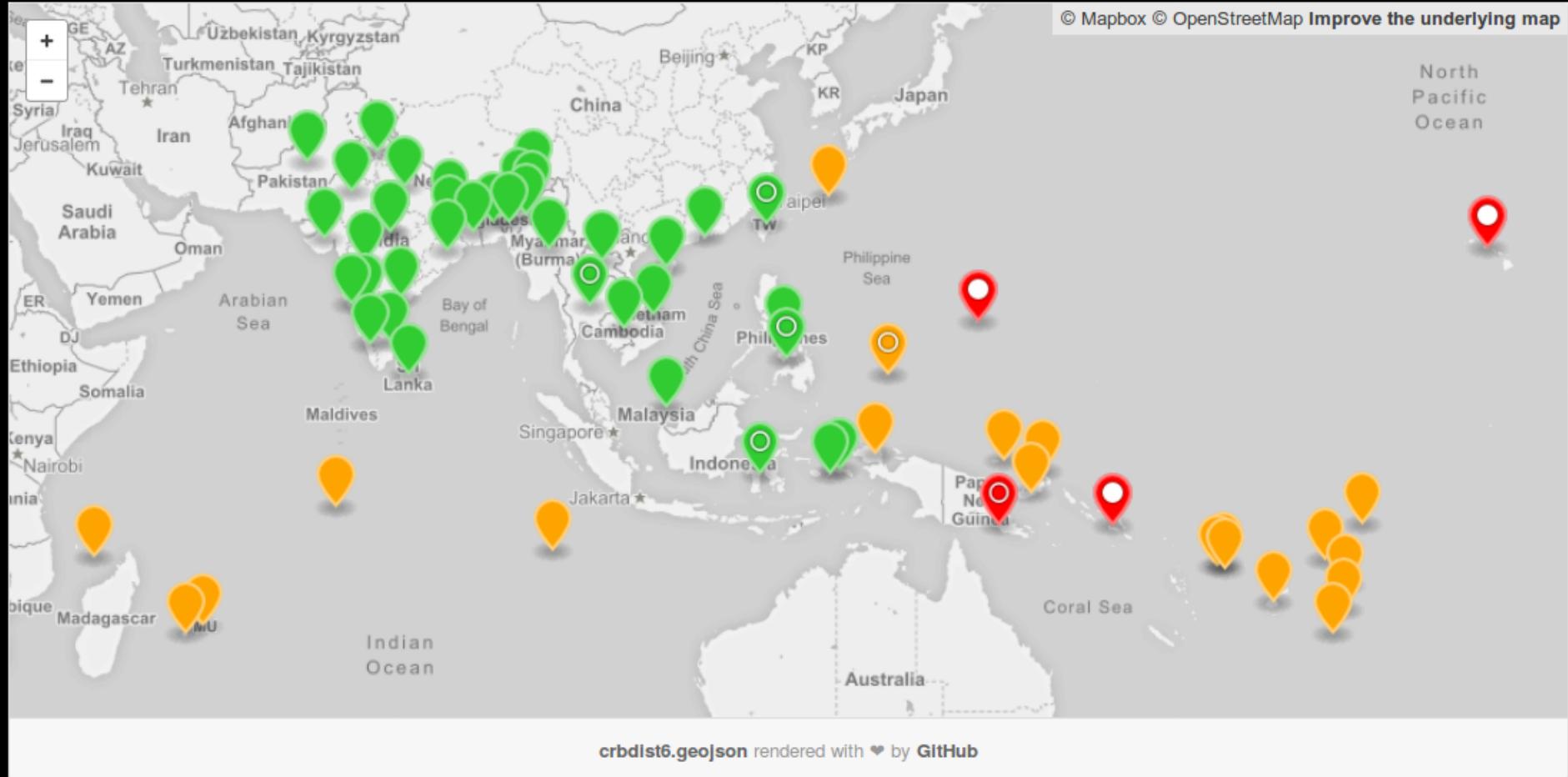
Orycte rhinoceros Biotype G

Coconut rhinoceros beetle invasion history

native range first detected in the 20th century first detected in the 21st century

open circle: population includes CRB-G biotype

filled circle: population is exclusively CRB-G biotype



Data available at <https://github.com/aubreymoore/crbdist>

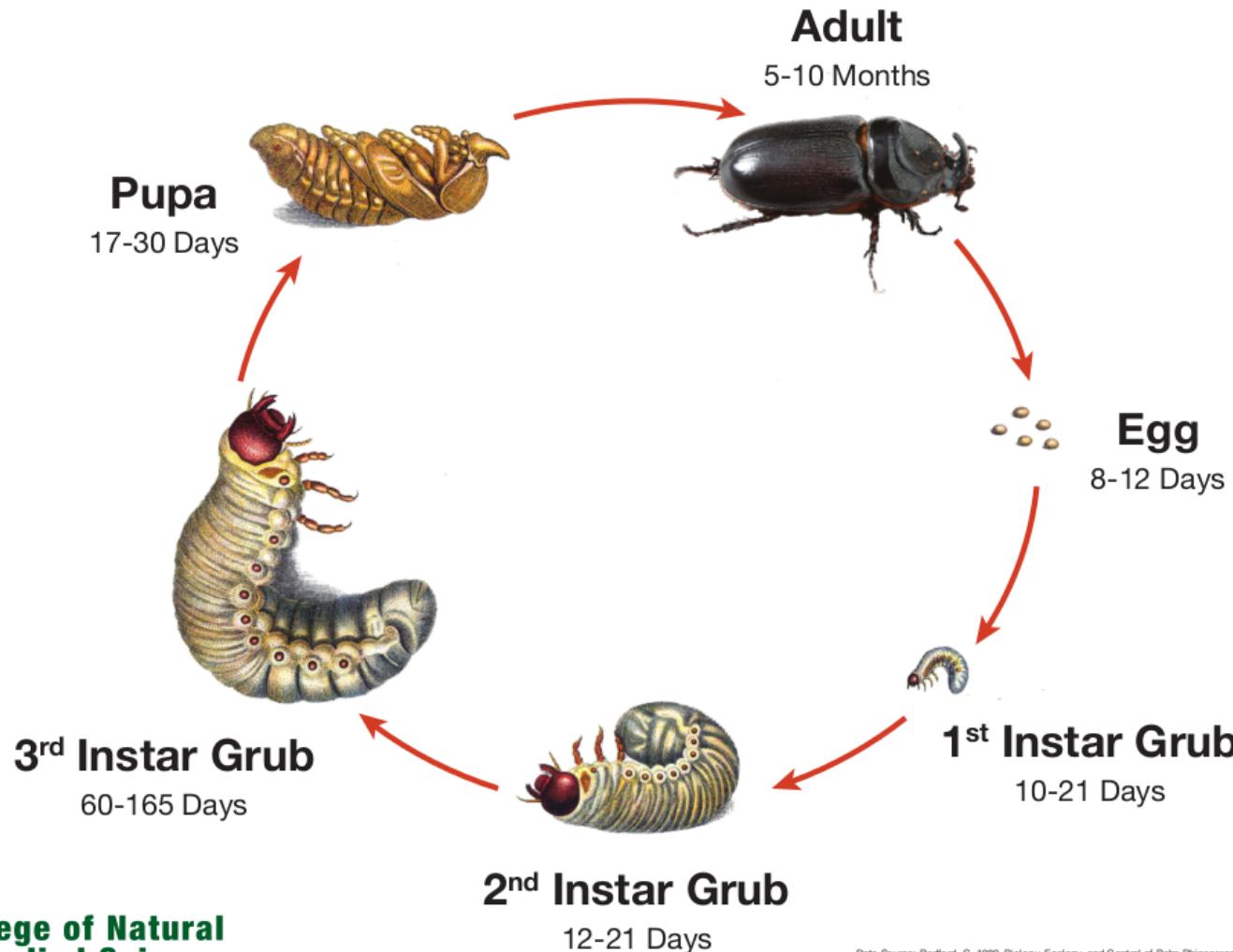






LIFE CYCLE OF THE COCONUT RHINOCEROS BEETLE

Oryctes rhinoceros



**College of Natural
& Applied Sciences**

University of Guam | Unibetsedåt Guåhan

Data Source: Bedford, G. 1980. Biology, Ecology, and Control of Palm Rhinoceros Beetles. *Annual Review of Entomology* 25: 309-339.
Published by The College of Natural & Applied Sciences (CNAS), University of Guam, in cooperation with the U.S. Department of Agriculture, under Dr. Lee S. Yudin, Director/Dean, University of Guam - Office of Research, Measurement, and Evaluation Division. For reprint requests, contact CNAS, University of Guam, Mihingo Hall, Box 1062, Mangilao, GU 96923-1062, USA. © 2000. The University of Guam is an equal opportunity/affirmative action institution providing programs and services to all people without regard to race, color, national origin, ancestry, disability, marital status, gender or orientation, or status as a covered veteran. Find CNAS publications at [CNAS.cgu.edu](http://cnas.cgu.edu).

CRB POPULATION GROWTH

ASSUMING UNLIMITED RESOURCES

- generation 0: 2
- generation 1: 100
- generation 2: 5,000
- generation 3: 250,000
- generation 4: 12,500,000
- generation 5: 625,000,000
- generation 6: 31,250,000,000

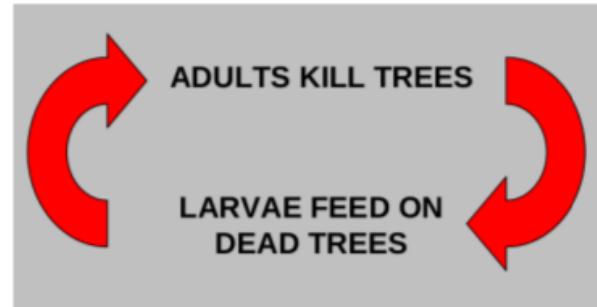


Figure : Coconut palms killed by *Oryctes rhinoceros* in Fiji (photo by Bedford)



- A typhoon leaves large numbers of potential CRB breeding sites
- Large numbers of CRB adults emerge from these sites and kill many coconut palms
- Dead standing coconut palms generate even more CRB adults which kill even more palms.

Climate Change Prediction

Impact on CRB Outbreaks

Global warming

?

More frequent
and more
intense tropical
cyclones

Will trigger island-wide self-sustaining outbreaks which will kill most remaining coconut palms

Sea level rise

Will trigger coastal outbreaks leading to increased erosion

COCONUT PALM MORTALITY VS. WIND SPEED

Event	Wind speed (mph)	Mortality
Hurricane Charlie (C4)	145	23%
Hurricane Andrew (C5)	165	59%

Source:

<http://lee.ifas.ufl.edu/Hort/GardenPubsAZ/RoyalsHurri>



Sea level in the Solomons has risen 8 mm per year since 1993.

Source: <https://www.sprep.org/climate-change/sea-level-in-solomon-islands-predicted-to-rise-over-8mm-in-the-coming-century>

