

CFES 2015

Aubrey Moore, Ph.D.
Associate Professor / Extension Entomologist

June 13, 2015

I was hired by the University of Guam on October 1, 2003 under a limited-term, split appointment (50% extension and 50% research). On June 26, 2008, I started a tenure-track appointment as extension entomologist with the academic rank of Assistant Professor. I am a faculty member of the Environmental Science Graduate Program and a member of the Western Pacific Tropical Research Center. At the end of the 2012 fall term I applied for tenure and promotion and received both.

This report documents my activities from June 2014 through the present. My current faculty role allocation is as follows:

- 51% Extension and Community Activities
- 34% Creative/Scholarly Activity or Research
- 15% University and Community Service

Note to Reader:

This report is available as an electronic document in PDF format on my website at <http://guaminsects.net/anr/content/cfes-2015-report-aubrey-moore>. Because this is not a public document, you will need to identify yourself to gain access by entering user name: **UogAdministrator** and password: **let_me_in**.

If you are reading the PDF version of the report, you will be able to follow hypertext links to documents I have referenced.

Contents

1	Extension and Community Activities	6
1.1	Diagnostic Services	6
1.1.1	Detection and Documentation of Invasive Species	6
1.1.2	Insect Identification Service for USDA-APHIS / Guam Customs and Quarantine Agency	6
1.1.3	Impediments	6
1.2	University of Guam Insect Collection	6
1.3	Guam Coconut Rhinoceros Beetle Eradication Project	7
1.3.1	Activities:	8
1.3.2	Impediments	9
1.4	Western Plant Diagnostics Network	9
1.5	Guam Invasive Species Advisory Committee (GISAC)	9
1.6	Public Outreach (Guest lectures, presentations, interviews)	10
1.7	Public Outreach (Internet)	10
1.8	Regional Collaboration	10
1.8.1	Regional Invasive Species Council Website	10
1.8.2	Insect Diagnostics for Micronesia	10
1.8.3	Support for the Hawaii Coconut Rhinoceros Beetle Eradication Project	11
2	Creative/Scholarly Activities or Research	12
2.1	Refereed Scientific Journal Articles	12
2.2	Presentations at Professional Meetings	12
2.3	Technical Reports Documenting Applied Research in Support of the Guam Coconut Rhinoceros Beetle Project	13
2.4	Guam New Invasive Species Alerts	17
2.5	Web Sites Designed and Maintained by Me	18
2.5.1	ANR Web Site.	19
2.5.2	Insects of Guam Web Site	19
2.5.3	Micronesia Biosecurity Plan Review Web Site	19
2.5.4	Moodle Site for my AG 109 Insect World Course	19
2.5.5	Knowledgebase Wiki for the UOG Cooperative Extension	20
2.5.6	Western Micronesia Regional Invasive Species Council Wiki	20
2.5.7	Guam Insects Blog Site	20
2.5.8	Life Desk Site for Micronesian Insects	20

Contents

2.6	Grants	20
2.6.1	US Forest Survey Program Review	21
3	University and Community Service	26
3.1	Participation in the Good to Great Initiative	26
3.2	Teaching	26
3.2.1	AG109 Insect World	26
3.2.2	AG/BIO 345 General Entomology	26
3.3	Music	26
3.4	Conference on Island Sustainability	26
3.5	Micronesia Biosecurity Plan	27
3.6	Collaboration on CESU Rare Butterfly and Snails Survey Grant	27
3.7	Collaboration on Biocontrol of Cycad Aulacaspis Scale	27
3.8	Collaboration on EPSCOR Proposal	27
3.9	University Technical Advisory Committee	27
3.10	Undergraduate Curriculum Review Committee (UCRC)	28

List of Tables

2.2	Active and pending grants other than those supporting the Guam Coconut Rhinoceros Beetle Eradication Project.	22
2.3	Recent unfunded grant proposals.	23
2.4	Staff support by my grants.	24
2.1	Active and pending grants in support of the Guam Coconut Rhinoceros Beetle Eradication Project.	25
3.1	Student evaluation for AG109, <i>Insect World</i>	26

1 Extension and Community Activities

1.1 Diagnostic Services

As an extension entomologist, a major part of my job is providing insect identification and pest control recommendations to a diverse clientele including commercial growers, gardeners, householders, GovGuam and federal agency personnel, and University of Guam colleagues. Most client contacts are initiated by a phone call or a visit by the client to the ANR office. In many cases identification and pest control recommendations require a site visit by me and/or extension associates to collect samples and define the problem. The number of extension calls requiring my assistance averages approximately three per day.

1.1.1 Detection and Documentation of Invasive Species

1.1.2 Insect Identification Service for USDA-APHIS / Guam Customs and Quarantine Agency

I am often called upon to identify insect specimens intercepted the Guam Customs and Quarantine Agency. USDA-APHIS has certified me for this service and has provided a very official looking badge to impress people with. (However, it is not quite as impressive as Dr. Millers bright red badge for getting onto the airport runways.)

1.1.3 Impediments

- Taxonomic skills.
- Lab facilities.
- Microscope.

1.2 University of Guam Insect Collection

The UOG insect collection is a valuable reference collection for extension entomology, teaching and research. I am a member of the board of directors for the collection and I work with Dr. Ross Miller to curate and catalog this collection.

To increase my knowledge of collection management, I attend the annual meetings of the Entomological Collections Network, which are typically held in conjunction with annual meetings for the Entomological Society of America.

I have a professional goal of building an online website to share all available information on Micronesian insects. This will include specimen level information for the collection complete with digital images and literature references. I built a digital catalog for the collection is using the BioLink Biodiversity Information Management System from CSIRO, Australia. The catalog currently contains 29,200 specimen records. BioLink is currently being redeveloped as an open source project (<http://code.google.com/p/biolink/>). I am an active collaborator in this project. In July 2012 I published an article entitled *Hosting a Biolink Database in the Amazon Web Services Cloud (EC2)* on the project's wiki (<http://code.google.com/p/biolink/wiki/BioLinkEC2>).

I have built and evaluated two websites for serving information on Micronesian insect biodiversity, including specimen level data from the collection. One is a Drupal content management system template called LifeDesk provided the Encyclopedia of Life Project and the other is a similar template called ScratchPads provided by the Museum of Natural History in London. I am honored to have been selected as an advocate for ScratchPads as part of the project's Ambassadors program (<http://scratchpads.eu/locate-scratchpad-ambassadors>). Further information on my websites is provided in the Creative/Scholarly Activities section (2.5).

In March 2014 I travelled to Honolulu to attend the Biodiversity Collections Digitization in the Pacific workshop sponsored by the Integrated Digitized Biocollections (IDigBio). I made an oral presentation entitled [Evaluation of a Scratchpad Template as an Online Database for the University of Guam Insect Collection](#) at this workshop.

In May 2014 I met with Dr. Bob Footitt at the Canadian National Insect Collection in Ottawa to discuss progress and future directions for the UOG collection. Dr. Footitt is a member of the board of directors for the UOG Insect collection.

1.3 Guam Coconut Rhinoceros Beetle Eradication Project

This is currently my largest and most time consuming project.

The coconut rhinoceros beetle (CRB) was first detected on Guam in the Tumon Beach hotel area on September 11, 2007. CRB is a very serious pest of coconut palms. Adult beetles may kill coconuts and other palms when they bore into the crowns to feed on sap. When CRB invaded Palau during the Second World War, it killed about half of all coconuts through the islands and totally exterminated the coconut palm from some of them. A delimitation survey indicated that the Guam infestation was limited to Tumon Bay and the adjacent Faifai Beach. In consultation with the Guam Department of Agriculture (GDOA), USDA-APHIS, and USDA-Forest Survey, it was decided to launch an eradication project.

I wrote the original eradication plan (available on-line at <http://guaminsects.net/>

uogces/kbwiki/index.php?title=Coconut_Rhinoceros_Beetle_Eradication_Plan) and this was funded by USDA and local funds. USDA provided funds under the condition that the project was to be run under an Incident Command System with the USDA-APHIS Guam Port Director as the federal commander, and the GDOA Director, or designee, as the local commander.

My original role was to provide scientific/technical support for the project, with the Guam Department of Agriculture (GDOA) providing project management with assistance from USDA-APHIS and USDA-Forest Service. However, it soon became apparent that GDOA had serious bureaucratic impediments which prevented hiring staff and procuring supplies and equipment within a reasonable time frame. The eradication project directors, with the consent of the Dean, agreed to run project staffing, procurement, and fiscal management through the University. As a result, my role was expanded to include much of the project management. I am currently managing two grants which fund the project and supervise about 15 temporary employees. Report writing on current grants and proposal writing to keep the project in business occupies much of my time.

In December 2013, an infestation of CRB was detected on Hickam Air Force Base on Oahu. Roland Quitugua and myself were recruited as subject matter experts and spent a week in Honolulu advising an incident command team set up by APHIS. Later, we were both added to a national technical working group for CRB. My activities in support of the Hawaii CRB Eradication project are detailed in the Regional Collaboration section [1.8.3](#).

1.3.1 Activities:

1. **Biweekly Planning Meetings.** This project is run as an incident command system. I attend biweekly planning meetings as a program manager.
2. **Conference Calls.** These teleconferences are with stakeholders and advisers in USDA APHIS and USDA Forest Service. These agencies are funding the project. Until recently calls were biweekly. They are now monthly.
3. **Grant Writing.** During the past 2 years, the Guam CRB Eradication Project has been almost entirely funded from 12 grants for which I wrote proposals and act as principal investigator. These grants are listed in the Creative / Scholarly Activity section.
4. **Report Writing.** All grants supporting the Guam CRB Eradication Project require regular reporting.
5. **Project Websites.** I have endeavored to share and archive data and information associated with the Guam CRB Eradication Project on-line. Prior to May 2009, I used a wiki site at http://www.guaminsects.net/uogces/kbwiki/index.php?title=Oryctes_rhinoceros. Afterwards, I used a Drupal site at <http://www.guaminsects.net/anr/category/miscellaneous/coconut-rhinoceros-beetle>.

6. **Project Database.** Trapping data from a network of about 1200 traps, detections of CRB grubs or adults, and observations of CRB defoliation and bore holes are entered daily into a web-based georeferenced MySQL database which I designed. Data from this database is publicly accessible from a web page at <http://www.guaminsects.net/anr/content/public-access-data-collected-guam-coconut-rhinoceros>. Links on this page enable the user to view trap catch data as a spatiotemporal display using a Google Earth animation or a chart of monthly totals. I use this system to produce monthly surveillance reports.
7. **Scientific/technical Support.** I do applied research in support of the Guam CRB Eradication Project. Results of this research is provided in a series of technical reports.
8. **Collaboration.** I have formed two collaborative research groups to do applied research aimed at controlling CRB damage. Dr. Sean Marshall and Dr. Trevor Jackson at AgResearch New Zealand collaborate with me on biological control using oryctes nudivirus (OrNV) and CRB population genetics. Dr. Matthew Siderhurst and Dr. Eric Jang of USDA-ARS-PBARC collaborate with me on CRB trap improvement.

1.3.2 Impediments

- My heavy workload does not permit enough time to prepare research results for publication in scientific journals.

1.4 Western Plant Diagnostics Network

I am the UOG coordinator for WPDN. This organization provides financial support for ANR's Plant Diagnostic Laboratory, offers First Detector Training workshops, and organizes identification workshops for important pest groups. As coordinator, I am required to organize First Detector Training workshops, attend monthly conference calls, attend annual meetings, and provide reports.

1.5 Guam Invasive Species Advisory Committee (GISAC)

I am an active, founding member of this informal group of Guam's biologists which meets irregularly about 6 times per year to discuss invasive species and what can be done to keep them out and mitigate the effects of those that do invade the island. I worked with Dr. Russell Campbell and Diane Vice to develop an emergency response plan for invasive species detected on Guam.

A wiki site which I built for GISAC was quickly adopted by the Western Micronesia Regional Invasive Species Council at http://guaminsects.net/gisac/index.php?title=Main_Page. (Evidence 1.6)

1.6 Public Outreach (Guest lectures, presentations, interviews)

During the reporting period I was interviewed numerous times by newspaper reporters, radio talk show hosts, and television news reporters (Table ??). Most, but not all involved questions about the Guam coconut rhinoceros beetle eradication project. I produced several fact sheets and articles for public print media during my two years as extension entomologist year and also published a lot of content on various websites. I have evaluated several current technologies for building a web presence for the Agriculture and Natural Resources Unit and the Drupal content management system seems to be a good fit. This allows us to publish information for public access while keeping some documents private for internal use only. My print and online output are discussed in more detail in the Creative/Scholarly Activity section.

1.7 Public Outreach (Internet)

I maintain a website for the the UOG Cooperative Extension Service's Agriculture and Natural Resources Program at <http://guaminsects.net/ANR>. I frequently post blog articles of public interest to this site (Table ??). I also maintain a website at <http://guaminsects.myspecies.info> which is intended to facilitate sharing information on insects in Micronesia. I frequently submit blog articles to this website which are of interest to entomologists (Table ??).

1.8 Regional Collaboration

1.8.1 Regional Invasive Species Council Website

I maintain a website for the Western Micronesia Regional Invasive Species Council (RISC) at <http://www.guaminsects.net/gisac/>. I attend RISC meetings whenever they are held on Guam and I make presentations at these meetings.

1.8.2 Insect Diagnostics for Micronesia

I am often contacted with requests for help with identifying pests from throughout Micronesia and suggesting solutions to the problems they cause. I expect this workload to increase because the number of practicing PhD level entomologists in Micronesia has dropped from 9 to 3 within the last decade.

1.8.3 Support for the Hawaii Coconut Rhinoceros Beetle Eradication Project

In December 2013, an infestation of CRB was detected on Hickam Air Force Base on Oahu. Roland Quitugua and myself were recruited as subject matter experts and spent a week in Honolulu advising an incident command system (ICS) team set up by APHIS. Later, we were both added to a national technical working group (TWG) for CRB. I built and maintain an online, full-text bibliographic for use by the TWG at http://guaminsects.myspecies.info/CRB_biblio.

Frequent requests for scientific/technical information from the ICS, TWG and Hawaii Department of Agriculture (several queries per week) has significantly increased my workload over the past several months.

2 Creative/Scholarly Activities or Research

2.1 Refereed Scientific Journal Articles

1. Fisher, Nicole, Aubrey Moore, Bradley Brown, Matthew Purcell, Gary Taylor, and John Salle (2014). “Two new species of Selitrichodes (Hymenoptera: Eulophidae: Tetrastichinae) inducing galls on Casuarina (Casuarinaceae)”. In: *Zootaxa* 3790.4, 534–542. ISSN: 1175-5334. URL: <http://biotaxa.org/Zootaxa/article/view/zootaxa.3790.4.2/7933>.
2. Moore, Aubrey, Chas Apperson, John McLaughlin, and Philipp Kirsch (In Preparation). “Automated classification of female *Culex pipiens* (Diptera: Culicidae) and *Cx. quinquefasciatus* from optically sensed wingbeat waveforms”. In: *Journal of Medical Entomology*. in preparation.
3. Moore, Aubrey and Donald Bright (In Preparation). “Three new island records for bark beetles (Curculionidae: Scolitinae) on Guam from a single coffee berry borer trap”. In: in preparation.
4. Moore, Aubrey, Trevor Jackson, Roland Quitugua, and Paul Bassler (In Press). “Coconut rhinoceros beetle, *Oryctes rhinoceros* (Coleoptera: Scarabaeidae), grubs develop in live coconut palms on Guam”. In: *Florida Entomologist*. in preparation.
5. Moore, Aubrey, N-Y Su, and Leonard Sigrah (In Preparation). “First record of the coconut termite, *Neotermes rainbowi* (Isoptera: Kaloterme) from Micronesia”. In: in preparation.
6. Moore, Aubrey, Gillian Watson, and Jesse Bamba (2014). “First record of eggplant mealybug, *Coccidohystrix insolita* (Hemiptera: Pseudococcidae), on Guam: Potentially a major pest”. In: *Biodiversity Data Journal* 2. DOI: [10.3897/BDJ.1.e1042](https://doi.org/10.3897/BDJ.1.e1042). URL: <http://biodiversitydatajournal.com/articles.php?id=1042>.

2.2 Presentations at Professional Meetings

1. Moore, Aubrey (2014b). “Biological invasion of forests on Guam and other islands of Micronesia”. In: *65th Western Forest Insect Work Conference*. oral presentation. Sacramento, California.

2. Moore, Aubrey (2014n). “Evaluation of a Scratchpad template as an online database for the University of Guam insect collection”. In: *iDigBio Biodiversity Collections Digitization in the Pacific Workshop*. oral presentation. Honolulu, Hawaii.
3. Moore, Aubrey (2014p). “Insects Attacking *Serianthes nelsonii*”. In: *2014 Island Sustainability Conference*. Guam.
4. Moore, Aubrey (2015d). “Pacific Entomology Conference 2015 Oral Presentation: Failure Analysis of the Guam Coconut Rhinoceros Beetle Eradication Project”. In: URL: [http://guaminsects.net/anr/sites/default/files/pec2015-crb-failure\(10\).pdf](http://guaminsects.net/anr/sites/default/files/pec2015-crb-failure(10).pdf).
5. Moore, Aubrey and Roland Quitugua (2014d). “Overview of the Guam coconut rhinoceros beetle eradication project”. In: *Hawaii CRB Incident Command Meeting*. Honolulu, Hawaii. URL: <http://guaminsects.net/presentations/CRB-Hawaii-ICS-Jan-2014.pdf>.
6. Moore, Aubrey and Roland Quitugua (2014e). *Rhino Beetle Presentation for Hawaii ICS - January, 2014*. CRB Technical Report. URL: <http://guaminsects.net/presentations/CRB-Hawaii-ICS-Jan-2014.pdf>.
7. Moore, Aubrey and Roland Quitugua (2015c). “Pacific Entomology Conference 2015 Oral Presentation: Coconut Rhinoceros Beetle Trap Improvements”. In: URL: <http://guaminsects.net/anr/sites/default/files/pec2015-improved-traps.pdf>.
8. Moore, Aubrey, Roland Quitugua, Matthew Siderhurst, and Eric Jang (2014). “Improved traps for the coconut rhinoceros beetle, *Oryctes rhinoceros*”. In: *Entomological Society of America*. Portland, OR. URL: http://guaminsects.net/anr/sites/default/files/Moore_1957_2.pdf.

2.3 Technical Reports Documenting Applied Research in Support of the Guam Coconut Rhinoceros Beetle Project

1. Iriarte, Ian, Roland Quitugua, Olympia Terral, Aubrey Moore, and Mariana Sanders (2015a). *Fact Sheet: Coconut Rhinoceros Beetle Behavior and Biology*. CRB Technical Report. URL: <http://guaminsects.net/anr/sites/default/files/Behavior%20and%20Biology%20Ian.pdf>.
2. Iriarte, Ian, Roland Quitugua, Olympia Terral, Aubrey Moore, and Mariana Sanders (2015b). *Fact Sheet: Coconut Rhinoceros Beetle trapping Methods*. CRB Technical Report. URL: <http://guaminsects.net/anr/sites/default/files/Trapping%20Final.pdf>.

3. Marshall, Sean and Aubrey Moore (2014a). “DNA analysis of Hawaii CRB”. In: URL: <http://guaminsects.net/anr/sites/default/files/CRB2014-02-12.pdf>.
4. Marshall, Sean and Aubrey Moore (2014b). “Hawaii beetle dissections”. In: URL: <http://guaminsects.net/anr/sites/default/files/CRB2014-01-17A.pdf>.
5. Moore, Aubrey (2014a). “APHIS biocontrol semiannual report”. In: URL: http://guaminsects.net/anr/sites/default/files/CRB2014-05-04_0.pdf.
6. Moore, Aubrey (2014f). “Chicken wire escape test”. In: URL: http://guaminsects.net/anr/sites/default/files/CRB2014-01-12A_0.pdf.
7. Moore, Aubrey (2014g). “Chicken wire vs plastic top”. In: URL: <http://guaminsects.net/anr/sites/default/files/CRB2014-01-15.pdf>.
8. Moore, Aubrey (2014h). “CRB dispersal by flight”. In: URL: <http://guaminsects.net/anr/content/2014-02-19a-crb-dispersal-flight>.
9. Moore, Aubrey (2014i). “CRB heat tolerance”. In: URL: <http://guaminsects.net/anr/content/2014-02-19-crb-heat-tolerance>.
10. Moore, Aubrey (2014j). “CRB mitigation for conservation of rear snails and butterflies at Haputo Beach”. In: URL: <http://guaminsects.net/anr/sites/default/files/2014-02-17%20Haputo.pdf>.
11. Moore, Aubrey (2014k). “CRB rearing”. In: URL: http://guaminsects.net/anr/sites/default/files/CRB%20Rearing_0.pdf.
12. Moore, Aubrey (2014l). “CRB Sanitation at the University of Guam Yigo Agricultural Experiment Station”. In: URL: <http://guaminsects.net/anr/sites/default/files/2014-06-26-YigoSanitation.pdf>.
13. Moore, Aubrey (2014m). “Cypermethrin applied to coconut palm crowns as a prophylactic treatment for prevention of CRB damage”. In: URL: <http://guaminsects.net/anr/sites/default/files/crownSpray.pdf>.
14. Moore, Aubrey (2014o). “Guam CRB project payroll simulation”. In: URL: <http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/CRB%20Payroll.ipynb>.
15. Moore, Aubrey (2014s). “Minibucket escape test”. In: URL: <http://guaminsects.net/anr/sites/default/files/CRB2014-01-17.pdf>.
16. Moore, Aubrey (2014t). “Minibucket test”. In: URL: <http://guaminsects.net/anr/sites/default/files/CRB2014-01-16.pdf>.
17. Moore, Aubrey (2014u). “Plastic top catch test”. In: URL: <http://guaminsects.net/anr/sites/default/files/CRB2014-01-12B.pdf>.

18. Moore, Aubrey (2014v). “Progress Report: Development of Integrated Pest Management for Coconut Rhinoceros Beetle on Guam”. In: URL: <http://guaminsects.net/anr/sites/default/files/FS-CRB-Report-Sep-2014.pdf>.
19. Moore, Aubrey (2014w). “Relative attractiveness of white and ultraviolet light emitting diodes plus oryctalure”. In: URL: http://guaminsects.net/anr/sites/default/files/LEDcolor_0.pdf.
20. Moore, Aubrey (2015a). “Best Way to Access Data in the Guam Coconut Rhinoceros Project Database”. In: URL: <http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/bestWaySQL.ipynb>.
21. Moore, Aubrey (2015b). “Generating a Trap Map Animation”. In: URL: <http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/trapMapViz.ipynb>.
22. Moore, Aubrey (2015c). “Harvesting data from the EpiCollect crb-yigo-barrel-epicollect Project”. URL: http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/crb_yigo_barrel_epicollect.ipynb.
23. Moore, Aubrey (2015d). “Pacific Entomology Conference 2015 Oral Presentation: Failure Analysis of the Guam Coconut Rhinoceros Beetle Eradication Project”. In: URL: [http://guaminsects.net/anr/sites/default/files/pec2015-crb-failure\(10\).pdf](http://guaminsects.net/anr/sites/default/files/pec2015-crb-failure(10).pdf).
24. Moore, Aubrey (2015e). “Standard CRB Pheromone Traps Catch More Females Than Males”. In: URL: <http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/CRB-sex-ratio.ipynb>.
25. Moore, Aubrey (2015f). “Trap Thinning”. URL: <http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/Trap%20Thining.ipynb>.
26. Moore, Aubrey (2015g). *Yigo Palm Image Album 2015-01-04*. CRB Technical Report. URL: <http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/Yigo%20Palm%20Image%20Album%202015-01-04.ipynb>.
27. Moore, Aubrey and Sean Marshall (2014). “Final Report for APHIS Biocontrol Grant: Entomopathogenic Virus for Biological Control of Coconut Rhinoceros Beetle on Guam”. In: 20140709. URL: http://guaminsects.net/anr/sites/default/files/final_July14-CRB%20APHIS%20Biocontrol.pdf.
28. Moore, Aubrey and Sean Marshall (2015). “Efficacy of Entomopathogenic Fungus for Biological Control of Coconut Rhinoceros Beetle (CRB) on Guam and DNA Profiling of Asia/Pacific CRB Populations with Respect to Virus Susceptibility”. URL: <http://guaminsects.net/anr/sites/default/files/semiannual-report-April2015.pdf>.

29. Moore, Aubrey and Roland Quitugua (2014a). “Adding CRB Breeding Site Material to Barrel Traps Does Not Increase Trap Catch”. In: URL: <http://guaminsects.net/anr/sites/default/files/barrelSubstrate.pdf>.
30. Moore, Aubrey and Roland Quitugua (2014b). “Bird net escape test”. In: ISSN: CRB-2014-02-23. URL: <http://guaminsects.net/anr/sites/default/files/BirdNet.pdf>.
31. Moore, Aubrey and Roland Quitugua (2014c). “Funnels Added to Pan Traps Increase Catch”. In: ISSN: CRB-2014-07-29. URL: <http://guaminsects.net/anr/sites/default/files/FunnelTest.pdf>.
32. Moore, Aubrey and Roland Quitugua (2014e). *Rhino Beetle Presentation for Hawaii ICS - January, 2014*. CRB Technical Report. URL: <http://guaminsects.net/presentations/CRB-Hawaii-ICS-Jan-2014.pdf>.
33. Moore, Aubrey and Roland Quitugua (2014f). “Test of Baffles to Prevent Escape from Pan Traps”. In: URL: <http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/Baffle%20Escape%20Test.ipynb>.
34. Moore, Aubrey and Roland Quitugua (2014g). “Test of Netting as a Physical Barrier for CRB Adults”. In: URL: <http://guaminsects.net/anr/sites/default/files/FishNetTest.pdf>.
35. Moore, Aubrey and Roland Quitugua (2014h). “Yigo barrel traps: trap catch comparison between pan and minibucket traps”. In: URL: <http://nbviewer.ipython.org/github/aubreymoore/YigoBarrels/blob/master/YigoBarrels.ipynb>.
36. Moore, Aubrey and Roland Quitugua (2015a). “DeFence Traps: Using Fish Netting as Novel CRB Pheromone Trap Deployed on Fence Lines”. URL: <http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/DeFence%20Traps.ipynb>.
37. Moore, Aubrey and Roland Quitugua (2015b). “Harvesting data from the Epi-Collect CRB-TALAYA Project”. URL: http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/crb_talaya.ipynb.
38. Moore, Aubrey and Roland Quitugua (2015c). “Pacific Entomology Conference 2015 Oral Presentation: Coconut Rhinoceros Beetle Trap Improvements”. In: URL: <http://guaminsects.net/anr/sites/default/files/pec2015-improved-traps.pdf>.
39. Moore, Aubrey and Roland Quitugua (2015d). “Protecting Coconut Palms from CRB Damage Using Fish Gill Netting”. URL: http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/Netted%20Coconut%20Palms_0.ipynb.

40. Moore, Aubrey and Roland Quitugua (2015e). “Taiwanese Gill Net Escape Test”. In: URL: <http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/Taiwanese%20Gill%20Net%20Escape%20Test.ipynb>.
41. Moore, Aubrey, Roland Quitugua, and Ian Iriarte (2015). “Netted Panel Traps to Test if CRB are Deflected”. URL: <http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/Netted%20Panel%20Traps%20Experiment%20to%20See%20if%20CRB%20are%20Deflected.ipynb>.
42. Moore, Aubrey, Roland Quitugua, Matthew Siderhurst, and Eric Jang (2014). “Improved traps for the coconut rhinoceros beetle, *Oryctes rhinoceros*”. In: *Entomological Society of America*. Portland, OR. URL: http://guaminsects.net/anr/sites/default/files/Moore_1957_2.pdf.
43. Moore, Aubrey and Matthew Siderhurst (2015). “Oryctalure synergist candidates field trial”. In: URL: <http://nbviewer.ipython.org/url/guaminsects.net/anr/sites/default/files/Oryctalure%20synergists%20field%20trial.ipynb>.
44. Quitugua, Roland, Mariana Sanders, Olympia Terral, and Aubrey Moore (2015). “Trifold Pamphlet: Coconut Rhinoceros Beetle Trapping”. URL: <http://guaminsects.net/anr/sites/default/files/crb-trapping-trifold.pdf>.
45. Sanders, Mariana, Roland Quitugua, Olympia Terral, and Aubrey Moore (2014). *Coconut Rhinoceros Beetle Behavior and Biology*. Extension Pamphlet. URL: <http://guaminsects.net/anr/sites/default/files/crb-behavior-biology.pdf>.
46. Sanders, Mariana, Roland Quitugua, Olympia Terral, and Aubrey Moore (2015). “Trifold Pamphlet: Coconut Rhinoceros Beetle Behavior and Biology”. URL: [http://guaminsects.net/anr/sites/default/files/crb-behavior-biology\(12\).pdf](http://guaminsects.net/anr/sites/default/files/crb-behavior-biology(12).pdf).

2.4 Guam New Invasive Species Alerts

1. McConnell, James and Aubrey Moore (2015). “Crambid moth, *Cydalima latricostalis*”. In: 2015-1. URL: [http://guaminsects.net/anr/sites/default/files/cydalima-laticostalis\(1\)_0.pdf](http://guaminsects.net/anr/sites/default/files/cydalima-laticostalis(1)_0.pdf).
2. Moore, Aubrey (2014c). “Brown marmorated stink bug, *Halymorpha halys*”. In: 2014-1. URL: <http://guaminsects.net/anr/sites/default/files/brownMarmoratedStinkBug.pdf>.
3. Moore, Aubrey (2014d). “Brown Marmorated Stink Bug *Halyomorpha halys* (Stal 1855) (Hemiptera: Pentatomidae)”. In: URL: <http://guaminsects.net/anr/sites/default/files/brownMarmoratedStinkBug.pdf>.

4. Moore, Aubrey (2014q). “Ixora leaf-mining weevil”. In: 2014-6. URL: <http://guaminsects.net/anr/sites/default/files/ixora-leafmining-weevil.pdf>.
5. Moore, Aubrey (2014r). “Leaf beetle, Calligrapha californica”. In: 2014-8. URL: [http://guaminsects.net/anr/sites/default/files/calligrapha-californica\(2\).pdf](http://guaminsects.net/anr/sites/default/files/calligrapha-californica(2).pdf).
6. Moore, Aubrey (2014x). “Spotted cucumber beetle (southern corn rootworm), Diabrotica undecimpunctata”. In: 2014-2. URL: <http://guaminsects.net/anr/sites/default/files/spotted%20cucumber%20beetle.pdf>.
7. Moore, Aubrey (2014z). “Unidentified roach”. In: 2014-07. URL: <http://guaminsects.net/anr/sites/default/files/newpestroach.pdf>.
8. Moore, Aubrey and Jesse Bamba (2014). “Spotted Cucumber Beetle (Southern Corn Rootworm) *Diabrotica undecimpunctata* (Coleoptera: Chrysomelidae)”. In: URL: <http://guaminsects.net/anr/sites/default/files/spotted%20cucumber%20beetle.pdf>.
9. Moore, Aubrey, James McConnell, and Gillian Watson (2014). “Camphor scale, Pseudonidia duplex”. In: 2014-5. URL: <http://guaminsects.net/anr/sites/default/files/camphorscale2.pdf>.
10. Rosario, Christopher A., Ross H. Miller, and Aubrey Moore (2014). “Varroa mite, Varroa destructor”. In: 2014-04. URL: <http://guaminsects.net/anr/sites/default/files/varroa%20mite.pdf>.
11. Route, Arnold and Aubrey Moore (2014a). “Castor hairy caterpillar, Olepa ricini”. In: 2014-3. URL: http://guaminsects.net/anr/sites/default/files/castor%20hairy%20caterpillar_0.pdf.
12. Route, Arnold and Aubrey Moore (2014b). “Castor Hairy Caterpillar *Olepa ricini* (Fabricius, 1775) (Lepidoptera: Arctiidae)”. In: URL: http://guaminsects.net/anr/sites/default/files/castor%20hairy%20caterpillar_0.pdf.

2.5 Web Sites Designed and Maintained by Me

For the past five years, I have been searching for the “right” technology for providing on-line extension information. The features I want include:

- Ease of use, including immediate, on-line editing, so that colleagues and collaborators can create content
- Ability to display digital images at several resolutions
- Full text search

- Methods for handling on-line and offline references
- Fine grained security which protects client confidentiality and allows for both protected, internal and public information sharing

My current technology of choice is Drupal, a free, open source contents management system.

2.5.1 ANR Web Site.

Home page: <http://guaminsects.net/anr>

This Drupal site is intended to facilitate sharing both internal and external information generated by the Agriculture and Natural Resources Unit of the University of Guam Cooperative Extension Service. This site is currently being used heavily by the Guam CRB Eradication Project. I also use this site for documenting my diagnostics work. I provide a recent example web page documenting discovery of thrips in anthurium flowers.

(Evidence 2.5.1; available on-line at <http://guaminsects.net/anr/content/thrips-damaging-anth>)

2.5.2 Insects of Guam Web Site

Home page: <http://guaminsects.myspecies.info>

This Drupal site is being evaluated for sharing information on Micronesian insects. Information will include specimen level information from the UOG insect collection complete with digital images and literature references. It was built using a template developed by the Scratchpad project <http://scratchpads.eu/> is sponsored by the European Institute of Distributed Taxonomy (EDIT) and the Natural History Museum in London. The ScratchPad project is celebrating the International Year of Biodiversity by highlighting a different Scratchpad taxon every week. I was honored to have one of my pages, describing the indigenous bug, *Leptocoris vicinus*, highlighted during the week of April 18 to 24, 2010.

(Evidence 2.5.2)

2.5.3 Micronesia Biosecurity Plan Review Web Site

Home page: MBP.GuamInsects.net

This is a secure, private Drupal site developed to facilitate sharing information among those reviewing the Micronesia Biosecurity Plan.

2.5.4 Moodle Site for my AG 109 Insect World Course

Home page: <http://campus.uogdistance.com/course/view.php?id=286>

This site was my first experience with Moodle, a content management system designed for teachers. I originally built it to provide on-line resources for my students, but later decided to open a few wikis to promote collaboration on laboratory exercises. I also

kept track of grades using Moodle. Examples from this site include the course resource page (Evidence 2.5.3a; available on-line at <http://campus.uogdistance.com/mod/resource/view.php?id=7349>) and a small PHP program I wrote to facilitate printing pinned insect specimen labels (Evidence 2.5.3b; available on-line at <http://tinyurl.com/insect-labels>).

2.5.5 Knowledgebase Wiki for the UOG Cooperative Extension

Home page: <http://www.guaminsects.net/uogces/kbwiki/index.php>

This was my first attempt at building an extension website to facilitate collaborative content creation. Digital copies of all of ANR's pest fact sheets can be found on this site. There is also a list of insect pests found on all major crops grown in Micronesia. I stopped maintaining this site in May, 2009 because the ANR site built with Drupal has more of the features I need.

(Evidence 2.5.4)

2.5.6 Western Micronesia Regional Invasive Species Council Wiki

Home page: <http://www.guaminsects.net/gisac/index.php>

Originally built for the Guam Invasive Species Advisory Council, this site was quickly adopted for sharing regional information on invasive species by the Western Micronesia Regional Invasive Species Council.

(Evidence 2.5.5)

2.5.7 Guam Insects Blog Site

Home page: <http://blog.guaminsects.net/>

I ran into recurring technical problems with this site which uses the WordPress content management system and have more or less abandoned development and maintenance.

2.5.8 Life Desk Site for Micronesian Insects

Home page: <http://micronesianinsects.lifedesks.org/>

This site uses a Drupal template being developed by the Encyclopedia of Life Project. I evaluate it for sharing information on Micronesian insects, but decided that the Scratchpad template (number 2, above) had a better feature set for what I wanted to do.

2.6 Grants

My active and pending grants are listed in table 2.1) and table 2.2. Fourteen support staff positions have been supported, partially or fully, from my grants during 2012 and 2013 (Table 2.4). Two of my recent grant proposals were not funded (Table 2.3).

2.6.1 US Forest Survey Program Review

During May 2014, officials from the US Forest Survey paid a visit to Guam to review performance on grants they have given to UoG over the past five years. A summary of my activities in support of these grants is available online at <http://guaminsects.net/anr/content/materials-forest-service-review-team>

Table 2.2: Active and pending grants other than those supporting the Guam Coconut Rhinoceros Beetle Eradication Project.

Title	Source	Grant No. or UOG Account	Amount
National Plant Diagnostic Network (NPDN)	via UC Davis	201223902-09	\$7,550
National Plant Diagnostic Network (NPDN) [PENDING]	via UC Davis		\$7,550
Octocula conservation [PENDING]	USFWS via DAWR		\$20,000

Table 2.3: Recent unfunded grant proposals.

Title	Source	Notes	Amount
Guam Insect Biodiversity	USFWS via DAWR		\$20,000
Octocula conservation	USFWS		\$18,000

Table 2.4: Staff support by my grants.

1	Bob Bourgeois
2	Roger Brown (partially)
3	Roland Quitugua (partially)
4	Ian Iriarte
5	Vincent Benavente
6	John Diego
7	Ken Leon Guerrero
8	Roland Cabrera
9	Derrick Diego
10	Marty Hara
11	Ken San Nicolas
12	Jessica Gross
13	Cris Crisostimo
14	Raymondo San Miquel

Table 2.1: Active and pending grants in support of the Guam Coconut Rhinoceros Beetle Eradication Project.

Title	Source	Grant No.or UOG Account	Amount
Support for the Guam Coconut Rhinoceros Project	USDA Forest Service	11-DG-11052012- 101	\$227,000
Biological Control of the Coconut Rhinoceros Beetle	USDA APHIS	12-8515-1555- CA	\$40,000
Support for the Guam Coconut Rhinoceros Project	USDA Forest Service	11-DG-11052012- 101	\$150,000
Biological Control of the Coconut Rhinoceros Beetle [PENDING]	USDA APHIS		\$40,000

3 University and Community Service

3.1 Participation in the Good to Great Initiative

3.2 Teaching

3.2.1 AG109 Insect World

I taught this course four times. My score on the student evaluations are consistently above average (Table 3.1).

Table 3.1: Student evaluation for AG109, *Insect World*.

Term	My Evaluation	College Average	University Average
Fall 2009	3.659	3.565	3.552
Spring 2011	3.986	3.519	3.617
Spring 2012	3.863	3.570	3.612
Spring 2013	na	na	na

3.2.2 AG/BIO 345 General Entomology

3.2.3

3.3 Music

As an amateur horn player I play regularly, and often very badly, with the Guam Symphony Orchestra and occasionally with the Guam Territorial Band. I have played for UOG graduations and for concerts arranged by the UOG music department. In spring 2013, I played in a horn quartet in a UOG Music Department recital.

3.4 Conference on Island Sustainability

I served on the planning committee for the Island Conference on Island Sustainability in 2010, 2011 and 2012.

3.5 Micronesia Biosecurity Plan

I have been involved with the Micronesia Biosecurity Plan (MBP) since its inception. The MBP is being developed to mitigate an expected increase in invasive species associated with the Guam military buildup. A first draft of the MBP was written by federal agencies supported by a \$2.7M grant from the Department of Defense (DoD). In January, 2010, I made 2 presentations at an MBP organizational meeting: *Biological Invasion of Guam* and *Invasive Insects on Guam*. In 2011, I assisted the UOG Center for Island Sustainability in securing a DoD cooperative agreement (CA) which provides \$1.1M to UOG to provide a peer review of the MBP and to develop an implementation plan. I was named as CoPI with Dr. Frank Camacho on the original CA, but I have resigned from this position to concentrate more on my entomological interests. However, I am still involved as a reviewer and I recently helped out by building a private, secure website to facilitate sharing information among those working on the MBP.

3.6 Collaboration on CESU Rare Butterfly and Snails Survey Grant

I am collaborating with Dan Lindstrom, John Benedict, Frank Camacho, and Curt Fiedler (UOG Biology), Alex Kerr (UOG Marine Lab), Brent Holland and Dan Rubinoff (UH Manoa) on a DOD funded survey of rare butterflies and snails. My contribution is a literature review of *Hypolimnas octocula marianensis* for publication in Micronesica, design and maintenance of project website and development of butterfly camera traps.

3.7 Collaboration on Biocontrol of Cycad Aulacaspis Scale

I am working with Tom Marler on introduction of parasitoids for biocontrol of the *Aulacaspis yasumatsui*.

3.8 Collaboration on EPSCOR Proposal

I have submitted many ideas to be incorporated into the EPSCOR proposal. I spent one and a half days at the PACSTEM meeting at the Hyatt discussing some of these ideas with colleagues.

3.9 University Technical Advisory Committee

I serve on UTAC as the representative for the College of Natural and Applied Sciences.

3.10 Undergraduate Curriculum Review Committee (UCRC)

In the April 2013 Faculty Elections, I was elected to serve on the UCRC.